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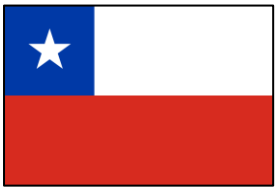


This vacancy booklet is meant for Chilean students intending to enrol in a PhD program abroad, using an ANID or other PhD scholarship. This booklet gives an overview of PhD vacancies available at Erasmus MC for (candidate) PhD scholarship holders.

For students in biomedical sciences, biomedical engineering, computer sciences, medicine, vet medicine, pharmacy, health sciences and related studies
(for students interested in MSc programs, please visit https://www.eur.nl/node/53106)

Introducción Erasmus MC

Publications in preclinical, clinical & health sciences 2016-2020. Source: InCites 21 June 2021

Foreign institute with Chile	co-publ	Citation impact
Harvard University	579	11.25
Johns Hopkins University	381	14.86
Harvard Med School	318	9.78
UC San Francisco	228	15.17
Erasmus MC	214	17.85
University of Michigan	172	9.30
University of Pennsylvania	162	13.10
UC Los Angeles	156	17.31
Johns Hopkins Medicine	109	5.14
Cornell University	88	9.94

El Centro Médico Universitario de Erasmus, conocido como Erasmus MC, es el resultado de la unión entre la Facultad de Medicina de Erasmus Universidad Rotterdam y tres hospitales universitarios (general, pediátrico y oncológico). La facultad y los hospitales se encuentran integrados en un campus y dirigidos por una mesa ejecutiva. El compromiso de Erasmus MC es una población saludable y la excelencia en el cuidado de la salud a través de investigación y educación de calidad (www.erasmusmc.nl; https://www.eur.nl/en/erasmusmc/graduate-school) .

Investigación e innovación: Año a año, Erasmus MC ha sido clasificado dentro del top 30 a nivel mundial en medicina (US News Clinical Medicine 2022: no 8-42) y ciencias biomédicas (Nature Index for Biomedical Sciences 2019). Nuestro objetivo principal es trasladar los descubrimientos hechos en laboratorio a la práctica clínica, cubriendo desde investigación preclínica, a clínica y ciencias de la salud.

Educación y capacitación: Erasmus MC es la escuela de medicina más grande de los Países Bajos, con ~2,500 estudiantes de medicina y ~250 graduaciones de doctorado cada año. Erasmus MC se destaca por ser la universidad con la educación médica más enfocada a la investigación en los Países Bajos, con 20% de los estudiantes de medicina terminando con el grado de MD-PhD, siendo de esta manera médicos clínicos e investigadores.

Erasmus MC ofrece programas de licenciatura, maestría, doctorado y residencias médicas, con el propósito de entrenar a la siguiente generación de médicos practicantes e investigadores. Un ejemplo de nuestro compromiso con el avance de la investigación es nuestra colaboración con la Universidad Tecnológica de Delft, con la cual ofrecemos el programa de licenciatura y maestría en nanobiología, siendo así las primeras universidades *en el mundo* en ofrecer este programa con la finalidad de cerrar la brecha entre ciencias de la salud y tecnología. Adicionalmente, Erasmus MC está orgulloso de sus tasas de supervisión, con aproximadamente 1,000 residentes médicos y 1,250 estudiantes de doctorado siendo supervisados por alrededor de 750 médicos especialistas y 1,500 investigadores.

Nuestros programas de doctorado están adaptados a las necesidades individuales de cada estudiante. En el caso particular de los estudiantes de doctorado provenientes de Chile, pueden optar por un proyecto en colaboración con un (co)supervisor Chileno, resultando en un título de doctorado de los Países Bajos, un título conjunto o un doctorado doble.

Atención médica: Erasmus MC fue remodelado recientemente, contando ahora con alrededor de 1,000 habitaciones individuales, para acelerar la innovación médica y la capacidad de tratar pacientes con los más novedosos materiales y procedimientos https://www.youtube.com/watch?v=agYQOLrhmrQ.

Erasmus MC & Europa*:* Erasmus MC forma parte de las 10 escuelas de medicina más grandes de la Unión Europea, debido al número de publicaciones totales y el número de publicaciones procedentes de investigaciones financiadas por la Comunidad Europea (p.e. FP7 y Horizon programs). Así mismo, es la escuela de medicina europea más exitosa dentro de Horizon2020 (tema Salud, cambio demográfico y bienestar), coordinando el 36% de los proyectos otorgados (a partir de septiembre de 2019). Como tal, es una puerta de entrada atractiva a las redes de investigación europeas, lo cual es un beneficio cuando regresas después de tu graduación a Chile.

Erasmus MC & Chile: A pesar de la experiencia limitada con estudiantes de doctorado provenientes de Chile, hemos tenido estudiantes Chilenos de alta calidad, razón por la cual buscamos más talento Chileno destinado a convertirse en nuestro nuevo vínculo a su regreso a Chile.

Programa de doctorado en Erasmus MC - Información general

Elegir una universidad para inscribirse en un programa de doctorado es el paso más importante en una carrera orientada a la investigación. Este el es máximo nivel de educación que ofrecen las universidades y el resultado de tus estudios de doctorado determinará los próximos pasos en tu carrera. Un doctorado es, en esencia, un programa de capacitación y educación en investigación y por ello, la calidad de las publicaciones de investigación del instituto donde deseas inscribirte es muy importante. Asimismo, observamos que las delegaciones de universidades, tanto europeas como no europeas, siempre dan importancia al acceso a becas de investigación europeas. Entonces, si tu idea es desarrollar tu carrera profesional en un contexto internacional, debes saber que Erasmus MC tiene una excelente trayectoria en la calidad de sus trabajos de investigación y en la obtención de becas de investigación europeas (becas del programa Horizonte 2020, en materia de salud, cambio demográfico y bienestar).

Preclinical, clinical & Health Sciences 2016-2020 *InCites Clarivate dbase as of Oct, 5th, 2021*

University or Med School only*	publ	world impact
Erasmus MC*	24,271	2.55
UCLA DG Med School*	15,863	2.47
Harvard University	139,589	2.37
Stanford University	40,396	2.32
Johns Hopkins University	63,010	2.27
Johns Hopkins Medicine*	22,879	2.27
Harvard Univ Med School*	70,795	2.27
UC San Francisco	47,712	2.22
Yale University	34,241	2.21
UC Los Angeles (UCLA)	37,742	2.21
University of Chicago	16,265	2.13

Horizon2020 Health, Demographic Change & Wellbeing
data from ec.europa.eu/dashboard 23 SEP 2020

Organization, country (*med school only)	Net contribution (in €)	project participations
INSERM, FR	115.160.351	122
Univ of Oxford, UK	76.643.642	74
LSHTM, UK	74.201.528	26
Erasmus MC*, NL	61.255.042	72
Karolinska Inst*., SE	61.171.462	89
Radboud Univ, NL	57.262.658	52
UCL, UK	55.748.799	63
UMC Utrecht*, NL	53.889.035	50
ICL, UK	50.417.535	43
KCL, UK	49.689.847	49
KU Leuven, BE	45.388.558	68
LUMC*, NL	43.742.800	56
CoEPI, NO	36.000.000	2
Univ of Cambridge, UK	32.761.296	47
Charite Univ*, DE	32.291.420	46
Univ of Newcastle, UK	31.686.153	39

Tabla de la izquierda: *Impacto internacional: el impacto citado de este grupo de publicaciones comparado con el impacto internacional (el promedio mundial es 1,00). Publicaciones en la WoS: publicaciones de investigación en los dominios combinados de ciencias preclínicas, clínicas y de la salud entre 2016 y 2020, que figuraban en la base de datos Web of Science al 5 de octubre de 2020.*
Tabla de la derecha: *organizaciones con mayor éxito en el programa europeo de financiación de la investigación, Horizonte 2020, en materia de salud, cambio demográfico y bienestar, clasificadas según la cantidad de euros obtenidos, en función de los datos del panel de la UE al 23 de septiembre de 2020. Erasmus MC es la primera escuela de medicina continental, ya que el instituto INSERM, de Francia, es una organización nacional y las otras dos organizaciones más exitosas son británicas.*

El objetivo de los programas de doctorado en Erasmus MC es brindarte las herramientas para que seas un investigador independiente capaz de resolver cuestiones complejas, con base en evidencia científica. Los graduados habrán desarrollado las competencias necesarias para valorar la investigación científica y habrán dado importantes pasos en su formación académica en ciencias biomédicas. Los estudiantes del doctorado cuentan con una preparación óptima para desempeñarse como futuros miembros del personal de investigación (clínica) en centros médicos universitarios, universidades de investigación, institutos de investigación y/u ocupar cargos de dirección y definición de políticas, como en la administración de universidades biomédicas, hospitales y otras organizaciones de atención médica, compañías biomédicas y farmacéuticas y ministerios, entre otros.
La premisa central de nuestra **filosofía educativa** es que una buena formación científica requiere el aprendizaje activo. Esto significa que capacitamos a los estudiantes de los programas de doctorado y maestría en investigación en pequeños grupos y en ocasiones de forma individual, e integramos la enseñanza de contenidos teóricos y habilidades prácticas. Por ello, se alienta a los estudiantes a que utilicen de forma activa el aprendizaje recién adquirido, lo que permite integrar sus conocimientos y mejorar la calidad de su investigación. La convergencia es un impulsor importante para mejorar la multi y transdisciplinariedad en la educación que impartimos en todos los niveles. Los alumnos aprenden de sus profesores, quienes son los mejores en su campo, tienen experiencia internacional y cuentan con grupos de investigación que colaboran con otros grupos de investigación a nivel nacional e internacional.

Un programa de doctorado típico suele durar cuatro años y es necesario contar con un título previo de Máster en Ciencias (MSc), Medicina (MD) o Veterinaria (DVM) para poder cursarlo. En el área de Ciencias Médicas, los postulantes combinarán sus estudios de doctorado con una maestría de especialización en Ciencias de la Salud. Los postulantes deben obtener un puntaje de 7.0 en el examen IELTS o de 100 en el examen TOEFL. Sin embargo, durante el doctorado, se perfeccionarán sus habilidades de escritura y presentación en inglés.

Formación y supervisión: como estudiante de doctorado, te inscribirás en la Escuela de Posgrado Erasmus MC, que ofrece cursos genéricos y altamente especializados. Sin embargo, el programa de doctorado se adapta en gran medida a las necesidades individuales del estudiante y en los primeros meses desarrollarás, junto con tu supervisor, tu propio programa que mejor se ajuste a tus necesidades científicas y al rumbo que quieras dar a tu carrera profesional. Cabe destacar que también esperamos que puedas trabajar con independencia (te brindaremos capacitación para lograrlo) y que te atrevas a tomar la iniciativa. Además, te alentaremos a competir por viajes de estudio, a participar en concursos de diseño de pósteres o en otras actividades extracurriculares relacionadas.

- *Deberás realizar* un trabajo de investigación científica independiente y presentar los resultados en una tesis.
- *Contarás con la supervisión* de un profesor titular (promotor) y el respaldo de uno o dos cosupervisores.
- *Tomarás* cursos, seminarios y conferencias equivalentes a un mínimo de 30 puntos de crédito EC (puedes elegir entre 150 cursos de la escuela de posgrado y también puedes tomar cursos fuera de Erasmus MC).
- *Serás parte* de un entorno de investigación de vanguardia multidisciplinario, multinacional, con importantes subvenciones.
- *Es posible*, dependiendo de tu proyecto, *que viajes al exterior* (visita de investigación) para aprender en otro entorno.

Tu tesis doctoral: cada proyecto de investigación es diferente, cada estudiante de doctorado es diferente y el aprendizaje y la experiencia de laboratorio pueden diferir también porque los estudiantes de doctorado provienen de diferentes universidades. Sin embargo, nos enorgullece contar con algunos de los requisitos de examen doctoral más exigentes del mundo. Esto te dará una importante ventaja a la hora de dar el próximo paso en tu carrera profesional. Para tener una idea de cómo serán tus resultados luego de obtener tu título de Doctorado, consulta la tabla que figura a continuación:

country	publications	conferences abroad	honors & awards	teaching
Brazil	5 publications in top 3 journals, 1x top 25%, 1x other	6 conference visits + 1 conference organization	1 grant, editorial board, 4x coordinator research projects	lecturer, 4 MSc interns,
Poland	2x top 10, 2x top 25%, 1x other	3 conference visits	1 scholarship, 2 travel grants	3 BSc + 4 MSc interns
Romania	1x top 10, 3x top 25%, 2x other, 2 book chapters	1 conference + 2x course organizer, 1x course co-chairman	1 grant, editorial board	1 MSc intern
U.K.	4x top 25%, 6x other	1 course, 4 conferences	4 awards, board AAV	teaching assistant, 1 MSc intern
P.R. China	2x top 3, 1x top 5, 1x top 25%, 1 other	3 conference visits, 1 research visit	1 scholarship + 5 awards	1 MSc intern
Sudan	1x top 3, 4x top 5, 1x top 10, 2x top 25%, 12x other	6 courses/workshops, 23 conferences	2 grants	not reported
Italy	2x top 3, 1x top 5, 4x top 25%, 2x other, 2 in preparation	1 research visit,2 workshops, 7 conference presentations	1 scholarship + 3 awards	1 MSc intern
India	3x top 25%, 8x other	8 conferences	2 awards	teaching assistant, 2 MSc interns
Mexico	1x top 10, 11x top 25%, 1x top 50% journal	4 courses, 6 conferences	1 scholarship + 5 awards, JHP Editorial Board EHF	teaching assistant, 1x intern JMS
Syria	1x top 1, 9x top 25%, 3x other	8 conferences	1 award	2x teaching assistant med school, 1x teaching nurse school
U.S.A.	2x top 3, 1x top 10, 14x other	12 conferences & workshops	not reported	5x teaching at courses, 2x advisor, 1x MSc intern
Germany	4x top 3, 1x top 10, 3x top 25%,	5 conferences, 3 courses	not reported	lecturer at med and at nursing school, residents, 2x med and 1x MSc intern
Morocco	1x top 5, 2x top 25%, 5x other	10 conferences, 6 courses	1 grant	not reported
Indonesia	1x top 3, 4x top 5, 3x top 10 , 4x top 25%, 3x Top 50% journals	1 course, 4 conferences	1 grant + 4 awards	teaching at Med School and MSc Program, 1 intern BSc student
Thailand	3x top 25%, 1x submitted, 2x in preparation	13 conferences	5 travel grants, co-chair, committee member at national science days	teaching endocrinology course

Leyenda: *país: país de origen del graduado del doctorado; publicaciones: número de publicaciones que el graduado haya realizado al momento de la defensa de la tesis doctoral, la calidad se indica por la clasificación de la revista en el campo de investigación del estudiante graduado; conferencias en el exterior: número de conferencias, cursos y visitas de investigación en el exterior; honores y premios: cantidad de subvenciones y premios, becas o viajes de estudio, membresías en comités o juntas obtenidas por el graduado; enseñanza: cursos y supervisión de alumnos impartidos por el graduado del doctorado.*

Después de tu tesis, no se interrumpirá tu contacto con nosotros una vez que obtengas tu título de doctor: dado tu conocimiento de nuestro personal y nuestras actividades de investigación, además de tu comprensión de la dinámica de las becas de investigación occidentales, pasarás de ser un estudiante graduado a un valioso colega y socio de investigación en el extranjero. La tabla que figura en la página 2 muestra que nuestras publicaciones en colaboración con científicos en países extranjeros ostentan, en promedio, más citas que las de países extranjeros con varias universidades en todo el mundo. Esto solo es posible gracias a ti, ya que muchas de nuestras colaboraciones exitosas son con exalumnos.

Cómo postularse para cubrir una vacante de doctorado

Cómo usar este folleto de postulación: Este cuadernillo presenta información general sobre las vacantes para alumnos de doctorado en diversos laboratorios de distintos departamentos de Erasmus MC. Sin embargo, si te gusta el campo de investigación de un profesor determinado, pero no su vacante para doctorado, puedes escribirle directamente ya que las direcciones de correo electrónico de los profesores figuran en la vacante. La mayoría de las vacantes se describen de forma genérica, para darte una idea del tema que se estudia, pero esto también se te brinda cierta flexibilidad para proponer algunas variaciones. Además, es posible que no encuentres el tipo de investigación que te interesa: este cuadernillo te muestra alrededor de 50 vacantes para alumnos de doctorado, pero contamos con más de 200 profesores titulares y 1500 miembros de personal científico. Por ello, siempre puedes acceder a www.erasmusmc.nl o a las páginas de vacantes y comunicarte con el personal de Erasmus MC en función de la información que figura en la página web en lugar de la incluida en este cuadernillo.

Escribir una carta de motivación o de presentación: las solicitudes de vacantes tienen poco espacio para describir las tareas de investigación y solo se pueden mostrar algunas publicaciones. Esta carta brinda una fuente de lectura adicional. Los supervisores esperan que los postulantes al doctorado escriban una buena carta de motivación, donde se describa su interés por el área de investigación del profesor y el aporte que puede realizar el postulante al proyecto de doctorado gracias a su experiencia previa.

Debido a que casi todos los estudiantes de doctorado en Erasmus MC dependen de una beca de investigación o una beca doctoral propia, se recomienda mencionar que, una vez aceptado por el profesor, te postularás para una beca doctoral. Esta puede ser una beca de ANID (Agencia Nacional de Investigación y Desarrollo) como lo es el programa beca de doctorado en el extranjero, o una beca para estudios de doctorado en una universidad o en un hospital universitario. Obtener una beca puede parecer un requisito, pero nosotros lo consideramos un paso adicional que servirá como prueba de calidad más adelante en tu carrera. Este también es el motivo por el cual tu supervisor futuro te ayudará con la sección de investigación de tu solicitud de beca.

Te ha aceptado un profesor, ¿qué sigue? Una vez que hayas tenido la entrevista (o varias entrevistas) y te hayan aceptado, en la mayoría de los casos procederás a solicitar una beca. Tus supervisores te ofrecerán ayuda con la descripción científica de la solicitud de la beca doctoral y en general deberás presentar una Carta de aceptación con tu solicitud. Tu supervisor puede obtenerla a través de RDO Dr Raoul Tan. Al solicitar una beca diferente en tu propia universidad o en un hospital afiliado a una universidad, siempre puedes pedir ayuda a tu supervisor futuro o comunicarte con RDO.

Una vez presentada tu solicitud y que, poco después, hayas conseguido la beca, deberás informar a tus futuros supervisores. Ellos a su vez informarán a los departamentos de Personal y Recursos Humanos (RR. HH.) sobre tu incorporación como nuevo estudiante de doctorado y es posible que también te contacten otros miembros del personal de Erasmus MC. En general, RR. HH. se comunicará contigo con solo dos meses de antelación a tu fecha de llegada prevista.

Documentos que necesitas para que RR. HH. prepare tu solicitud e inscripción

- Una copia color de tu pasaporte (todas las páginas escritas y con sellos).
- Comprobante de seguro médico con cobertura en los Países Bajos. Si no tienes uno, puedes contratar el seguro médico una vez que hayas llegado a los Países Bajos.
- **Prueba de que cuentas con medios de subsistencia independientes**: por ejemplo, estipendios, subvenciones, patrocinios, pagos periódicos, una carta de nombramiento o un contrato de empleo.
- Una copia de un certificado que pruebe que tienes las calificaciones adecuadas para realizar la investigación; tu diploma o certificado de estudios universitarios. El diploma o el certificado de estudios universitarios debe estar aprobado por un escribano o por la municipalidad.
- Una copia de la propuesta de investigación; firmada por tu supervisor.

PD: Todos estos documentos deben estar traducidos al **inglés, holandés o francés** por un traductor oficial.

Además de los documentos obligatorios mencionados con anterioridad, se recomienda presentar:

- una copia de un certificado de nacimiento, legalizada o apostillada, para verificar los datos personales para la Base de datos municipal de registros personales (GBA).

PD: Todos estos documentos deben estar traducidos al **inglés o holandés** por un traductor oficial.

Department of Biochemistry

Work environment:
Erasmus MC is an internationally recognized centre for highly rated transfer of knowledge and high-quality knowledge development in the fields of illness and health. The research groups at the department of Biochemistry are interested in the understanding of the mechanisms of gene expression control during development and disease.

Peter Verrijzer's lab aims to understand the mechanisms of gene regulation that underpin development and disease. We are particularly interested in the role of chromatin remodelers in human disease and the coupling between cellular metabolism and epigenetics. We use an integrated approach, combining biochemistry, proteomics, developmental genetics and cell biology. Taking advantage of evolutionary conservation, key regulators are studied both in human cells and in the genetically tractable fruit fly.
Tokameh Mahmoudi's lab aims to translate basic molecular advances in the HIV and HBV field into development and testing of novel therapeutics in the clinic. We delineate the molecular events that lead to HIV latency and HBV–mediated liver tumorigenesis. Parallel projects use unbiased and candidate approaches to identify molecular targets or therapeutic molecules in HIV latency reversal, which we characterize in in vitro latency models and T cells obtained from HIV infected patient volunteers. We also use the human liver organoid technology to model HBV infection and study mechanisms of HBV-induced liver tumorigenesis.
Jeroen Demmers's lab develops mass spectrometry-based methodologies for qualitative and quantitative proteomics analysis. Our research focuses on the analysis of protein post-translational modifications, protein-protein interactions, protein complex composition and analysis of proteome dynamics. The ultimate goal is to develop analytical tools to better understand how cellular processes are controlled at the molecular level in health and disease.
Selected publications:

Verrijzer	Mahmoudi	Demmers:
2017 Mohd-Sarip A et al **Cell Reports**	2018 Marian C et al **Cell Chem Biol**	2017 Sap KA et al **J Proteome Res**
2014 Reddy BA et al **Molecular Cell**	2018 Palstra R-J et al **Science Advances**	2016 Urbán N et al **Science**
2013 Moshkin YM et al **PLoS Genet**	2016 Stoszko M et al **EBioMedicine**	2016 Yu N et al **Curr Biol**
2012 Mohd-Sarip A et al **Science**	2012 Li V et al **Cell**	2012 Schwertman et al.**Nat. Genet**

Qualifications and skills:
We are looking for highly motivated PhD students that have received excellent scientific and practical training in the areas of Molecular Virology, Molecular Biology, Proteomics, or Bioinformatics to join our research teams. The Biochemistry department has a modern infrastructure and facilities. We have in house access to the very efficient and up-to-date core proteomics, genomics, and bioinformatics and in house high through put DNA and RNA sequencing facilities. We have an MLII facility for HBV work and have access to and use the MLIII and MLII (biosafety level 2 and 3) and MLI cell culture facilities.

We offer: High quality state-of-the-art project, supervision, lab facilities and infrastructure, and training. We will cover Laboratory costs. Your salary and living expenses will be covered by your University or Scholarship Council.

Department of Biochemistry

School/Department:	***Department of Biochemistry and Department of Pathology, Erasmus MC***
Supervisor information:	Prof. dr. Tokameh Mahmoudi, PhD, t.mahmoudi@erasmusmc.nl Lab webpage:Mahmoudilab.com Selected grants: ERC StG, Health Holland, ZonMW 2019 Selected publications: 2021 Nature Communications 12(1):2475 2020 Journal of Virological Methods. 2019 Current Opinion in Virology. 2020 bioRxiv 2018 Science Advances 4(2):e1701729. 2020 Science Advances 6(32):6617-6629 2020 Viruses. 12(9):E973. 2019 Pharmacol Res. 2019 Jan;139:524-534. 2018 Cell Chemical Biology 25(12):1443-1455.e14. 2016 EBioMedicine. 3:108-121.
Project Title:	**HIV Cure: mechanisms, drug discovery, clinical study and valorization**
Abstract: Combination antiretroviral therapy effectively halts HIV replication and has significantly reduced AIDS-associated mortality. However, cART is not curative, it has side-effects, and apart from the costs of lifelong therapy, the global roll-out of cART, particularly in resource-limited countries, remains an ongoing challenge. HIV persists because the integrated provirus can remain in a nonproductive latent state, defined by the absence of HIV-1 gene expression. Because of this reservoir of latently HIV-1 infected cells, interruption of cART leads to a rapid rebound of unrestricted viral replication, necessitating life-long treatment. Ongoing progress in understanding the molecular mechanisms that control HIV transcription and latency has led to the development of strategies to target the reservoir, to stimulate the virus to emerge out of latency, coupled to either induction of death in the infected reactivated cell or its immune clearance. World no 20 in Infectious Diseases World no 30 Biomedical Sciences	We use various cell based and patient-derived models of HIV latency to screen for, identify, characterize, and clinically translate potential novel therapeutics toward HIV cure: [1] An innovative approach to eliminate HIV-1-infected cells emerging out of latency is to pharmacologically reactivate viral expression and concomitantly trigger intracellular pro-apoptotic pathways in order to selectively induce cell death (ICD) of infected cells. [2] Using a medium through-put screen of fungal metabolites combined with HIV latency reversal bioassays and state of the art fractionation coupled to MS and NMR bioassays, we identify molecules capable of activating latent HIV, characterize their mechanisms of action. [3] The unbiased identification of factors physically associated with the latent HIV-1 provirus would be highly valuable to unravel the molecular correlates of latency and develop new latency reversal agents. But, due to technical limitations, this has not been possible. We developed dCas9 targeted chromatin and histone enrichment strategy coupled to mass spectrometry (Catchet-MS) to isolate the latent HIV-1 promoter and identified novel and previously known factors physically associated with potentially repressing the latent LTR, and will investigate the molecular mechanisms by which they function. For one of the candidates bound, we found the FDA approved IKZF1 targeting thalidomide analogues reversed latency in CD4+T-cells isolated from virally suppressed HIV-1 infected participants. [4] We identified the BAF complex as a central player in repressing HIV transcription, highlighting it as a potential target to reverse HIV latency. In collaboration we found that small-molecule inhibition of BAF re-activates latent HIV in a spectrum of primary models as well as in cells obtained from HIV-infected patients using drug screens. We also found macrolactam scaffold BAF inhibitors to be potentially potent latency reversal agents.
Requirements of candidate:	•We are looking for a highly motivated PhD student who has received excellent scientific and practical training in the areas of Molecular Virology or Molecular Biology who also has some basic training or interest in bioinformatics to join our research team. •The student should be fluent in English (*English speaking countries & Netherlands:* no requirement; *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs).* •We offer: Supervision, lab facilities and infrastructure, and training. We will cover Laboratory costs. •As a candidate PhD student at Erasmus MC, your salary and living expenses will be covered by your University or Scholarship Council.

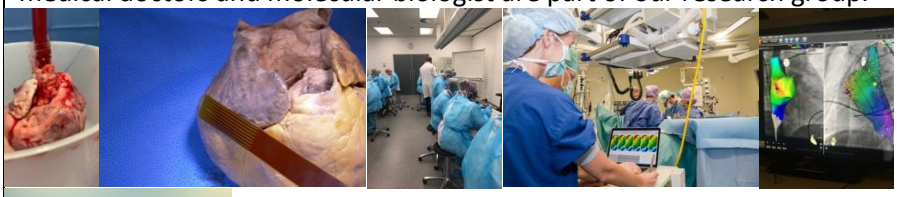
Department of Biochemistry

School/Department:	***Department of Pathology and Department of Biochemistry, Erasmus MC***
Supervisor information:	Prof. dr. Tokameh Mahmoudi, PhD, t.mahmoudi@erasmusmc.nl Selected grants: ERC StG, Health Holland, ZonMW 2019 Selected publications (* as last author): 2021 Elife 10:e60747. Application of human liver organoids as a patient-derived primary model for HBV infection and related hepatocellular carcinoma* 2021 Nature Communications. doi: 10.1038/s41467-021-22608-z. Selective cell death in HIV-1-infected cells by DDX3 inhibitors leads to depletion of the inducible reservoir* 2021 Cell Death Dis. 12(7):641. Clinical stage drugs targeting inhibitor of apoptosis proteins purge episomal Hepatitis B viral genome in preclinical models. 2021 Cancer Lett. 506:35-44. 3D human liver organoids: An in vitro platform to investigate HBV infection, replication and liver tumorigenesis* 2012 Cell 149(6):1245-56. Wnt pathway activation through inhibition of proteosomal bcatenin degradation within the intact endogenous Axin1 complex*
Project Title:	**Human liver organoid-tumoroid platform in study of HBV infection and tumorigenesis**
Main methodology and techniques 3D liver organoid cultures from healthy donor, HBV infected and hepatocellular carcinoma patients, Next generation sequencing analysis of chromatin and gene expression (ChIP-seq and RNA-seq) , High resolution imaging (confocal, fluorescence microscopy), Flow Cytometry Activated Cell Sorting, Lentiviral transduction and gene editing, molecular biology and molecular virology techniques. Lab webpage: Mahmoudilab.com world no 14 Gastroenterology & Hepatology World no 30 Biomedical Sciences	***Abstract:*** Persistent Hepatitis B virus (HBV) infection remains the leading cause of liver cirrhosis and hepatocellular carcinoma world-wide. However, the molecular events that occur as consequence of HBV infection and which mediate onset of hepatocellular carcinoma have remained elusive because of lack of a relevant primary untransformed model system. My group, in collaboration with the HUB has recently developed a patient-derived HBV infected human liver organoid model system (de Crignis 2021), using the adult stem cell human liver organoid/tumoroid technology (Huch 2015), which allows long term culturing and analysis of HBV infected patient or healthy donor livers providing a platform suitable for antiviral drug screening and examination of HBV-induced mechanisms of liver pathogenesis and HCC. Human liver organoids are infected with both recombinant virus as well as HBV infected patient serum and determinants of infection and viral replication are examined. We generate transgenic organoids to study the function of viral and host factors and perform drug and toxicity screens using the HBV liver organoid platform and examine the role of various pathways implicated in liver cancer such as Wnt-bcatenin (Li VS 2012), and epigenetic regulators.
Requirements of candidate:	• We are looking for a highly motivated PhD student who has received excellent scientific and practical training in the areas of Molecular Virology or Molecular Biology who also has some basic training or interest in Bioinformatics to join our research team. • The student should be fluent in English (*English speaking countries & Netherlands:* no requirement; *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*. • We offer: Supervision, lab facilities and infrastructure, and training. We will cover Laboratory costs. • As a candidate PhD student at Erasmus MC, your salary and living expenses will be covered by your University or Scholarship Council.

Department of Biostatistics

School/Department:	**Department of Biostatistics, Erasmus MC**
Supervisor information: World no 21 Public, Environmental & Occupational Health 2021	Prof. dr. Dimitris Rizopoulos, (promotor, d.rizopoulos@erasmusmc.nl) Dr. Joost van Rosmalen (co-promotor, j.vanrosmalen@erasmusmc.nl) See www.drizopoulos.com and https://www.scopus.com/authid/detail.uri?authorId=26041070200 for a personal website and an overview of publications. The most relevant publications on this topic are: -J. van Rosmalen, D. Dejardin, Y. van Norden, B. Löwenberg, E. Lesaffre (2017). *Including historical data in the analysis of clinical trials: Is it worth the effort?* Statistical Methods in Medical Research. -Hatswell A, Freemantle N, Baio G, Lesaffre E, van Rosmalen J (2020). *Summarising salient information on historical controls: A structured assessment of validity and comparability across studies*. Clin Trials. -Banbeta A, van Rosmalen J, Dejardin D, Lesaffre E (2018). *Modified power prior with multiple historical trials for binary endpoints*. Stat Med
Project Title:	**How to assess the value of historical controls in Bayesian dynamic borrowing methods**
Abstract:	Consider the common situation where a clinical trial is planned, say on a new treatment for Alzheimer's disease, and data from previous trials are available. The intervention treatment tends to differ across trials, but the control treatment often remains the same. We might then add the controls of the previous trials to the analysis of the current (newly planned) trial, to increase the statistical power and reduce the sample size. However, care must be taken to ensure that these historical data are sufficiently comparable to the current study, to avoid a bias in the estimates. Several Bayesian statistical methods have been developed that include the historical data when it is sufficiently similar to the current data, but downweight or even discard the historical data in case of substantial differences. The main methods are the power prior (Ibrahim & Chen, Statistical Science 2000), the meta-analytic predictive prior (Neuenschwander et al., Clin Trials 2010) and the commensurate prior (Hobbs et al., Bayesian Anal 2012). Despite the wide range of available methods, it's not clear which method performs best. In this project we will focus on determining which of the available methods is best suited for practical use, what settings should be used for that method and on developing a framework with appropriate metrics (e.g. power and type I error rate) to compare different methods. The meta-analytic predictive prior will be the starting point. Research questions include: - How should frequentist characteristics of borrowing methods be assessed? - What is the best way to make borrowing methods robust against prior-data conflict? - How should we choose the settings (e.g. the prior) of these dynamic borrowing methods to optimize the tradeoff between power and type I error rate? - How can we justify the choice for a borrowing method based on what we know about the similarity of the historical and the current data? These borrowing methods will be applied to real-life case studies (e.g. we have a case study on a series of trials for Alzheimer's disease) and simulated data. Keywords: Bayesian statistics, biostatistics, historical data, power prior, meta-analytic predictive prior
Requirements of candidate:	We're looking for an enthusiastic student with a background (master's degree) in biostatistics or statistics who is interested in developing and applying new biostatistical methodology. Knowledge of Bayesian statistics is a prerequisite. A good command of the English language (especially writing) is also necessary. We offer a good working environment with a friendly atmosphere and constructive scientific supervision in the Department of Biostatistics of Erasmus MC, Rotterdam, the Netherlands. The department is well known for its expertise on methods for analyzing longitudinal data (joint modeling and other methods), Bayesian statistics and the analysis of historical data. In addition to the project outlined above, we can also facilitate PhD projects on other topics. The scholarship will, at least, cover subsistence allowance and an international airplane ticket. We're able to provide help with the scientific part of your scholarship proposal. English language requirement: IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Cardiology

School/Department:	***Department of Cardiology, section electrophysiology, Erasmus MC***
Supervisor information: World no 28 in Cardiac & Cardiovascular Systems	•*Prof dr. Natasja MS de Groot* •***Email:*** *n.m.s.degroot@erasmusmc.nl* •***Website:*** https://www.erasmusmc.nl/en/research/researchers/groot-natasja-de , https://www.medicaldelta.nl/onderzoek/medical-delta-cardiac-arrhythmia-lab •***Grants:*** *EU-LSH, Dutch-German Heart Foundation grant, Cardiovascular research Netherlands, personal grants: Dutch Heart Foundation Junior Staffmember, VIDI; multiple companies (e.g. Johnson&Johnson, Bayer)* ***Most important publications:*** Zhang, D., et al. (2019) ***Nature Communications,*** Calkins, H., **Heart Rhythm,** de Groot, N., (2016) **Circulation-Arrhythmia and Electrophysiology;** Knol, W. G., et al. (2019). **Heart Rhythm,** Starreveld, R., (2019) **Europace,** Kharbanda R. (2020) **JACC EP.**
Project Title:	**Innovation in Diagnosis and Therapy of Cardiac Arrhythmias**
Abstract:	Our projects are aimed at unravelling the pathophysiology of complex cardiac tachyarrhythmias, developing and testing developing novel diagnostic tools (in close collaboration with Technical university Delft) and therapies for cardiac arrhythmias. Main topics are high resolution mapping studies of cardiac arrhythmias in particular atrial fibrillation, unravelling bio-electrical mechanisms of (post-operative) cardiac arrhythmias, dysrhythmias in patients with congenital heart disease and neuromodulation of atrial fibrillation. For this purpose, we have developed a unique way of recording and processing cardiac signals to perform mapping procedures in the surgical rooms and catheterization laboratory. In addition, we have access to biomimetic set ups for tissue slices and an ex-vivo-heart perfusion model. Our innovative scientific contributions include: discovery of novel mechanisms underlying persistence of atrial fibrillation, introduction endovascular mapping approach guiding ablative therapy of atrial tachyarrhythmias in patients with congenital heart disease, development of a novel, intra- operative epicardial mapping approach, discovery of the role of Bachmann's bundle in development of atrial tachyarrhythmias, performed worldwide the first high resolution mapping studies in pediatric patients, discovery conduction properties in pediatric patients with congenital heart disease. In our cardiac bio-electricity lab, we combine expertise of developmental biology, cardiac electrophysiology with macro- and microscopic cardiac morphology. We perform clinical and experimental studies in surgical rooms, EP labs, outpatient clinic and animal lab. We have several multi-disciplinary collaborations and electrical-, biomechanical engineers, a variety of medical doctors and molecular biologist are part of our research group.  **Keywords:** cardiac surgery, electrophysiology laboratory, biomarkers, human-, animal-, clinical-, experimental mapping studies, electrical activity, ECG analysis, electrograms, biomarkers and medical technology.

Requirements of candidate:	• We are looking for highly motivated, hardworking students to join our very international team. Our strength is in using team work to tackle large scientific questions.
	• Master degree or MD
	• Scholarship that will, at least, cover subsistence allowance and international airplane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Cardiology

School/Department:	***Department of Cardiology, Erasmus MC***
Supervisor information: World no 28 in Cardiac & Cardiovascular Systems	• Dr. HMM van Beusekom, Dr. Majoor-Krakauer, Dr. IJpma, Dr. Vreeken • ***Email:*** h.vanbeusekom@erasmusmc.nl • ***Website:*** Department - Cardiology (erasmusmc.nl) • ***Grants:*** • 2020-2024 Private Foundation: Aortic Aneurysm disease • 2018-2022 ZonMW Coronary stent in a box and on a chip • 2016-2023 CVON CONTRAST Development of gyrencephalic stroke models, thrombus biobank analyses • 2014-2018 ZonMW Imaging drug and scaffold metabolomics in coronary artery disease • 2013 Thrombosis foundation Functional three-dimensional architecture of the coronary thrombus … • ***Most important publications:*** - Consensus standards for acquisition, measurement, and reporting of intravascular OCT … GJ Tearney, E Regar, T Akasaka, et al, Journal of the American College of Cardiology 59 (12), 1058-1072; 2012 - Marked inflammatory sequelae to implantation of biodegradable and nonbiodegradable polymers in porcine coronary arteries WJ Van der Giessen, AM Lincoff, RS Schwartz, HMM Van Beusekom, et al, Circulation 94 (7), 1690-1697; 1996 - Endothelial progenitor cell capture by stents coated with antibody against CD34…First In Man … J Aoki, PW Serruys, H van Beusekom, et al, Journal of the American College of Cardiology 45 (10), 1574-1579; 2005 - Intracoronary optical coherence tomography and histology at 1 month and 2, 3, and 4 years after implantation of everolimus-eluting bioresorbable vascular scaffolds in a porcine … Y Onuma, PW Serruys, LEL Perkins, et al, Circulation 122 (22), 2288-2300; 2010 - Reduction in thrombotic events with heparin-coated Palmaz-Schatz stents in normal porcine coronary arteries. PA Hårdhammar, HMM van Beusekom, HU Emanuelsson, et al, Circulation 93 (3), 423-430; 1996 - Mutations in SMAD3 cause a syndromic form of aortic aneurysms and dissections with early-onset osteoarthritis. van de Laar IM, Oldenburg RA, Pals G. et al. Nat Genet. 2011;43(2):121-6 - Cardiac Phenotypes, Genetics, and Risks in Familial Noncompaction Cardiomyopathy. J.I. van Waning, K. Caliskan, M. Michels et al. J Am Coll Cardiol 2019;73 (13);1601-11
Project Title:	***Human disease model technology and mathematical modelling for arterial interventions in coronary arteries and aortic aneurysms***
Abstract:	This line of investigation is a collaboration between several Erasmus MC departments (Clinical genetics (Majoor-Krakauer), Pathology (IJpma), Cardiology (van Beusekom, Vreeken) and Delft University of Technology (van Steijn). Our group aims to develop animal free models to study vascular disease and improve treatment strategies. In particular, we focus on coronary interventions and aortic aneurysms. **Coronary interventions.** In this project we culture coronary arteries in a bioreactor (VABIO), which allows real-time ultrasound and OCT imaging to study coronary atherosclerosis and vascular responses to percutaneous coronary interventions (PCI) especially drug eluting stents. We specifically study drug distribution in the arterial wall and how this relates to vascular disease. To that end we also develop organ-on-a-chip (OOC) approaches in collaboration with the Delft University of Technology (TUD). **Aortic aneurysms.** This project aims to develop human disease models to mimic and predict aortic aneurysm formation. This will help to reveal potential risks for AA disease development as well as predicting outcome after treatment using endovascular repair strategies (EVAR) on the aortic wall. **PhD positions** would be possible in the 1. Bioreactor culture arena for coronary arteries and aortae, and the development of OOC approaches for PCI and EVAR. 2. A technology-oriented PhD position that deals with modelling of cellular and chemical processes in the arterial wall in collaboration with TUD.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using teamwork to tackle large scientific questions and thus require a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: - English speaking countries & Netherlands: no requirement - Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Department of Cardiology

School/Department:	***Department of Cardiology Erasmus MC***
Supervisor information: World no 28 in Cardiac & Cardiovascular Systems	• *Dr. HMM van Beusekom and Dr. J Bobii Gibert* • ***Email:*** *h.vanbeusekom@erasmusmc.nl or j.bobiigibert@erasmusmc.nl* • ***Website:*** Department - Cardiology (erasmusmc.nl) • ***Grants:*** • *2020-2024 Private Foundation: Aortic Aneurysm disease* • *2020-2022 Erasmus MC grant: Human disease model technology* • *2018-2022 ZonMW Coronary stent in a box and on a chip* • *2016-2023 CVON CONTRAST Development of gyrencephalic stroke models, thrombus biobank analyses* • *2014-2018 ZonMW Imaging drug and scaffold metabolomics in coronary artery disease* • *2013 Thrombosis foundation Functional three-dimensional architecture of the coronary thrombus …* • ***Most important publications:*** • Mechanical Characterization of Thrombi Retrieved With Endovascular Thrombectomy in Patients With Acute Ischemic Stroke. Boodt N, Snouckaert van Schauburg PRW, Hund HM et al Stroke. 2021 Aug;52(8):2510-2517. doi: 10.1161/STROKEAHA.120.033527. PMID: 34078112 • Endovascular treatment for calcified cerebral emboli in patients with acute ischemic stroke. Bruggeman AAE, Kappelhof M, Arrarte Terreros N, et al; MR CLEAN Registry Investigators. J Neurosurg. 2021 Apr 2:1-11. doi: 10.3171/2020.9.JNS201798. • Consensus standards for acquisition, measurement, and reporting of intravascular optical coherence tomography studies: a report from the International Working Group for … GJ Tearney, E Regar, T Akasaka, et al, Journal of the American College of Cardiology 59 (12), 1058-1072; 2012 • Marked inflammatory sequelae to implantation of biodegradable and nonbiodegradable polymers in porcine coronary arteries WJ Van der Giessen, AM Lincoff, RS Schwartz, HMM Van Beusekom, et al, Circulation 94 (7), 1690-1697; 1996 • Endothelial progenitor cell capture by stents coated with antibody against CD34: the HEALING-FIM (Healthy Endothelial Accelerated Lining Inhibits Neointimal Growth-First In Man … J Aoki, PW Serruys, H van Beusekom, et al, Journal of the American College of Cardiology 45 (10), 1574-1579; 2005 • Intracoronary optical coherence tomography and histology at 1 month and 2, 3, and 4 years after implantation of everolimus-eluting bioresorbable vascular scaffolds in a porcine … Y Onuma, PW Serruys, LEL Perkins, T Okamura, N Gonzalo, et al, Circulation 122 (22), 2288-2300; 2010 • Reduction in thrombotic events with heparin-coated Palmaz-Schatz stents in normal porcine coronary arteries. PA Hårdhammar, HMM van Beusekom, HU Emanuelsson, et al, Circulation 93 (3), 423-430; 1996 • Long-term endothelial dysfunction is more pronounced after stenting than after balloon angioplasty in porcine coronary arteries. HMM van Beusekom, DM Whelan, SH Hofma, et al, Journal of the American College of Cardiology 32 (4), 1109-1117; 1998
Project Title:	***Acute ischemic stroke in a large gyrencephalic animal model***
Abstract:	In a collaborative project with Erasmus MC departments of Neurology, Radiology and Neurosurgery we developed a swine model of temporary MCA occlusion (clips) to induce focal ischemia-reperfusion and study incomplete microvascular reperfusion and cerebral vasomotor tone. We use imaging techniques *to asses reperfusion, cerebral blood flow and infarct size.* Histology and (immuno)histochemistry are used to further characterize infarct size and composition. We are looking for a PhD student to further develop the stroke model using vasomotor tone studies *in-vivo,* using high resolution imaging techniques, and *ex-vivo,* using organ bath studies or thin brain slice vasoreactivity assays. We would also welcome a PhD student to further develop cognitive assays for long-term follow-up after acute ischemic stroke.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Cardiology

School/Department:	***Department of Cardiology Erasmus MC***
Supervisor information: World no 28 in Cardiac & Cardiovascular Systems	• *Dr. HMM van Beusekom, Dr. J. BobiiGibert* • ***Email:*** *h.vanbeusekom@erasmusmc.nl or j.bobiigibert@erasmusmc.nl* • ***Website:*** Department - Cardiology (erasmusmc.nl) • ***Grants:*** • *2020-2024 Private Foundation: Aortic Aneurysm disease* • *2020-2022 Erasmus MC grant: Human disease model technology* • *2018-2022 ZonMW Coronary stent in a box and on a chip* • *2016-2023 CVON CONTRAST Development of gyrencephalic stroke models, thrombus biobank analyses* • *2014-2018 ZonMW Imaging drug and scaffold metabolomics in coronary artery disease* • *2013 Thrombosis foundation Functional three-dimensional architecture of the coronary thrombus …* • ***Most important publications:*** • Mechanical Characterization of Thrombi Retrieved With Endovascular Thrombectomy in Patients With Acute Ischemic Stroke. Boodt N, Snouckaert van Schauburg PRW, Hund HM et al Stroke. 2021 Aug;52(8):2510-2517. doi: 10.1161/STROKEAHA.120.033527. PMID: 34078112 • Endovascular treatment for calcified cerebral emboli in patients with acute ischemic stroke. Bruggeman AAE, Kappelhof M, Arrarte Terreros N, et al; MR CLEAN Registry Investigators. J Neurosurg. 2021 Apr 2:1-11. doi: 10.3171/2020.9.JNS201798. • Consensus standards for acquisition, measurement, and reporting of intravascular optical coherence tomography studies: a report from the International Working Group for … GJ Tearney, E Regar, T Akasaka, et al, Journal of the American College of Cardiology 59 (12), 1058-1072; 2012 • Marked inflammatory sequelae to implantation of biodegradable and nonbiodegradable polymers in porcine coronary arteries WJ Van der Giessen, AM Lincoff, RS Schwartz, HMM Van Beusekom, et al, Circulation 94 (7), 1690-1697; 1996 • Endothelial progenitor cell capture by stents coated with antibody against CD34: the HEALING-FIM (Healthy Endothelial Accelerated Lining Inhibits Neointimal Growth-First In Man … J Aoki, PW Serruys, H van Beusekom, et al, Journal of the American College of Cardiology 45 (10), 1574-1579; 2005 • Intracoronary optical coherence tomography and histology at 1 month and 2, 3, and 4 years after implantation of everolimus-eluting bioresorbable vascular scaffolds in a porcine … Y Onuma, PW Serruys, LEL Perkins, T Okamura, N Gonzalo, et al, Circulation 122 (22), 2288-2300; 2010 • Reduction in thrombotic events with heparin-coated Palmaz-Schatz stents in normal porcine coronary arteries. PA Hårdhammar, HMM van Beusekom, HU Emanuelsson, et al, Circulation 93 (3), 423-430; 1996 • Long-term endothelial dysfunction is more pronounced after stenting than after balloon angioplasty in porcine coronary arteries. HMM van Beusekom, DM Whelan, SH Hofma, et al, Journal of the American College of Cardiology 32 (4), 1109-1117; 1998
Project Title:	***Arterial thrombosis in acute myocardial infarction and acute ischemic stroke***
Abstract:	We have a biobank of coronary thrombi aspirated from patients suffering an acute coronary syndrome containing thrombi and periprocedural plasma and contains thrombus and plasma samples of more than 900 patients. We want to investigate the relation between thrombus composition, plasma biomarkers and patient outcome. We aim to do the same as host of the Dutch biobank and core lab for thrombi collected during stroke treatment in the MRCLEAN studies. This growing biobank now contains over 2000 sample and is connected to clinical databanks (radiology and neurology). This line of investigation is a collaboration between the departments of Cardiology, Neurology, Radiology and Pulmonary Disease at Erasmus MC. We study the relation between thrombus composition and clinical data such as etiology of thrombosis, patient outcome and imaging data.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Cardiology and Department of Epidemiology

School/Department:	***Department of Epidemiology***	***Department of Cardiology, Erasmus MC***
Supervisors information: World no 21 Public, Environmental & Occupational Health 2020 World no 28 in Cardiac & Cardiovascular Systems	• *Dr.* ***Maryam Kavousi****, MD, PhD* • ***Email:*** *m.kavousi@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/groups/cardiometabolic-epidemiology* • ***Grants and Awards:*** • *AXA Research Fund* (2012) • *IDF* (2014) • *Prestigious UNESCO-Loreal Fellowship 'For Women in Science'* (2014) • *Prestigious ZonMw VENI Grant* (2015) • *COLCIENCIAS* (2016) • *Erasmus MC Mrace Grant* (2016, 2019) • *Netherlands Organisation for Scientific Research* (2017, 2017, 2019, 2020, 2020) • *Dutch Heart Foundation* (2017, 2019, 2020) • *NIH* (2019, 2020) • *European Commission Horizon 2020* (2020) • *European Commission Horizon 2020 – Innovative Medicines Initiative (IMI)* (2020) • *European Society of Cardiology Viviane Conraads Outstanding Achievement Award* (2020) • *Young Academy of The Royal Netherlands Academy of Arts and Sciences* (2020) • *Dutch Cardiovascular Alliance* (2020) • ***Most important publications:*** • **BMC Medicine** 2020; 18:263. • **Heart** 2020; 1062:133-9. / 2019;105:1414-22. • **Lancet** 2019;394:2173-83. • **Circulation** 2019;139:e1019-20. • **JACC** 2019;74:1420-21. • **Diabetologia** 2019;62:1581-90. • **Circulation Research** 2017 121:1392-400 • **JAMA Cardiology** 2017 2:986-94. • **JAMA 2016** 316:2126-34. / 2014 311:1416-23. • **JAMA Cardiology** 2016 1:767-76.	• *Professor* ***Dirk J.G.M Duncker,*** *MD, PhD* • ***Email:*** *d.duncker@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/departments/cardiology* • ***Grants and Awards:*** • *NATO Science Fellowship (1991)* • *American Heart Association (1992, 1994)* • *Royal Dutch Academy of Sci. Fellowship (1995)* • *Dutch Heart Foundation (1999, 2007)* • *Prestigious Dutch Heart Foundation Established Investigator Fellowship (2000)* • *Erasmus MC Grant (2008)* • *European Space Agency Grant (2004)* • *US Navy Grant (2007)* • *Center for Translational Mol. Med. Grant (2008)* • *EU-FP7-Health-2010 Grant (2010)* • *Dutch CV Research Grants (2012, 2014, 2017)* • *Wellcome Trust Grant (2017)* • *Prestigious Gabor Kaley Award from the American Physiological Society and the Microcirculatory Society (2020)* • ***Most important publications:*** • **Circ Res** 2007;100:1079-88 / 2008;102:795-803 • **Physiol Rev** 2008;88:1009-86 • **Circ Heart Fail** 2009;2:233-42 / 2016;18:588-98 • **Circulation** 2012;126:468-78 • **Comprehensive Physioly** 2012;2:321-447 • **JACC Cardiovasc Interv** 2015;8:1990-99 • **Basic Res Cardiol** 2016;111:61 / 2020:115:21 • **Cardiovasc Res** 2018;114:954-64. • **Cardiovasc Res** 2020;116:741-755 / 756-770 • **Eur Heart J** 2015;36:3134-46 / 2017;38:1951-58 • **Eur Heart J** 2020;41:1687-96 / 2020 (PMID32626906) • **Eur J Heart Fail** 2018;20:89-96 • **Braunwald's Heart Disease** 11th Ed, 2018, Ch 57 • **ESC Textbook of Sports Cardiol** 2019 Ch 1.2.4
Project Title:	***The failing heart: ageing-associated cardiovascular changes in women and men***	
Abstract:	Heart failure is largely known as a disease of the elderly. It has turned out as a global pandemic affecting at least 26 million people worldwide and is increasing in prevalence. Heart failure is associated with substantial morbidity and mortality, despite advances in medical therapy. Aging denotes a convergence of diminishing cardio-protective mechanisms and growing disease processes that contributed to development of heart failure. This project outlines the link between (normal) aging and the increased risk for deterioration of cardiovascular function and development of heart failure. We will focus on microscopic and macroscopic changes in cardiovascular structure and function, cardio-protective mechanisms, and diseases associated with aging. The project will be conducted at the intersection of the two departments of Experimental Cardiology (Professor Dirk Duncker) and Epidemiology (Dr. Maryam Kavousi) and will cover the epidemiology, pathophysiology, and prognosis of heart failure from basic laboratory studies (Experimental Cardiology) to population-based studies (Department of Epidemiology). Due to differences in cardiovascular structure and function between women and men, we will take a sex-specific approach throughout the project. This project aims to increase our understanding of ageing process and transition from a healthy heart to the development of heart failure and would aid in appropriate and effective primary prevention strategies for both women and men.	
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD – preferably with basic skills in laboratory molecular techniques and epidemiology • Scholarship that will, at least, cover subsistence allowance and international airplane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*	

Department of Cell Biology

The Department of Cell Biology performs top level research at the cutting edge of life and biomedical sciences. The department is truly multi-disciplinary, with expertise in -omics and single-cell technologies, perturbation approaches, and advanced imaging. Research is supported by a team of mathematical biologists. While research is mostly of a fundamental nature, the department strives to apply basic knowledge to health care, for example by improving diagnostics and therapies.

The Department of Cell Biology focusses on:

Line 1. The regulation of gene expression as a means to establish cell type and fate;
Line 2. The organization of the cell nucleus, with a focus on chromatin folding and remodeling;
Line 3. Molecular and cell biological studies of the microtubule cytoskeleton.

Realizing that cells are contiguous entities, connecting the research lines is an important departmental effort. For example, nuclear processes can be viewed both as an endpoint of signal transduction cascades emanating from cell fate-determining factors, but also as a starting point of cellular identity; communication between these processes is mandatory and is regulated a.o. by the cytoskeleton. The department focusses on the functions of molecule(s) and molecular networks in hematopoietic and neural stem/progenitor cells, and, more recently, on cardiomyocytes. It studies individual cells, populations, tissues and organs, and animal models and humans.

The Department of Cell Biology has a strong tradition of intra-departmental interactions, and has (international) collaborations with teams from other top institutes and consortia. The department has an excellent reputation in training top quality PhD students; it currently has about 30 PhD students. The senior PIs are Danny Huylebroeck (head of department), Maarten Fornerod, Niels Galjart, Frank Grosveld, Gert Jansen, Sjaak Philipsen, Raymond Poot, Wilfred van IJcken (also associated with the genomics core facility), Derk ten Berge. Junior PIs are Eskeatnaff Mulugeta, Ana Ruiz-Saenz, Ralph Stadhouders (also with Pulmonology), Debbie van den Berg, Tamar van Dijk, and Jeffrey van Haren. Please, see www6.erasmusmc.nl/cellbiology/research/research-groups for a more extensive description of the various research projects and groups in the department.

Five example publications illustrating the research carried out at the department:

Borg J et al. (2010). Haploinsufficiency for the erythroid transcription factor KLF1 causes hereditary persistence of fetal hemoglobin. **Nature Genetics** 42, 801-805.

Quevedo M et al. (2019). Mediator complex interaction partners organize the transcriptional network that defines neural stem cells. **Nat Commun** *10*, 2669.

ten Berge D et al. (2011). Embryonic stem cells require Wnt proteins to prevent differentiation to epiblast stem cells. **Nature Cell Biology** 13, 1070-1075.

Yu N et al. (2016). Isolation of Functional Tubulin Dimers and of Tubulin-Associated Proteins from Mammalian Cells. **Curr Biol** *26*, 1728-1736.

van den Berghe V et al. (2013). Directed migration of cortical interneurons depends on the cell-autonomous action of Sip1. **Neuron** 77, 70-82.

Department of Cell Biology

School/Department:	***Department of Cell biology, Erasmus MC***

Supervisor information:
 	
World no 30 Biomedical Sciences
	• ***Eskeatnaf Mulugeta, Ph.D., MSc., MBT.,MBF.,*** *principal investigator,* e.mulugeta@erasmusmc.nl
	• **ORCiD**: *0000-0003-4045-4835*
	• ***Website:*** *https://www.erasmusmc.nl/en/research/researchers/mulugeta-eskeatnaf*
	
	• ***Selected publication***
	  • ***Blood****, 2020 DOI: https://doi.org/10.1182/blood.2020004826*
	  • ***Cell Reports****, 2020: DOI: https://doi.org/10.1016/j.celrep.2020.107647*
	  • ***Stem Cells****, 2019: DOI: https://doi.org/10.1002/stem.3111*
	  • ***eLife****, 2019 DOI: 10.7554/eLife.48561*
	  • ***Nature structural & molecular biology****, 2019: DOI: https://doi.org/10.1038/s41594-019-0231-0*
	  • ***BioRxiv****, 2017 DOI: https://doi.org/10.1101/209932*
	  • ***Genome research****, 2016 DOI: http://www.genome.org/cgi/doi/10.1101/gr.201665.115.*
	  • ***Nature medicine****, 2016 DOI: https://doi.org/10.1038/nm.4098*
	  • ***Nature communications****, 2016 DOI: https://doi.org/10.1038/ncomms12222*
	  • ***Nature****, 2012: DOI: https://doi.org/10.1038/nature11070*
	  • ***Cell****, 2009: DOI: https://doi.org/10.1016/j.cell.2009.10.034*
	
	  • ***Full list of publication:*** *https://scholar.google.com/citations?hl=en&user=o5XA41sAAAAJ*

Project Title:	***Systems Biology of Signaling and Transcription Factors***
Abstract:	Cellular development and differentiation is a tightly controlled process that is orchestrated by the transcriptional regulation of genes. The control of gene transcription entails several layers of regulatory modules. Signaling pathways and their downstream TFs are important components of this gene transcription regulatory module and allow cells to properly respond to environmental cues. This interpretation within the cell's nucleus involves several genes that are organized in gene regulatory networks (GRNs), driving epigenomic and transcriptional changes and thereby cell fate, differentiation and maturation. We are interested in understanding the dynamics of such biochemical cascades and connected GRNs using in embryonic stem cells as a model. The aim of this PhD project is to understand the crosstalk and dynamics of signaling and TFs and their impact on the epigenome. To achieve this, we are using a holistic approach based on perturbation approaches and apply existing/emerging state-of-the-art computational and molecular biology techniques, including the development of novel single cell-omics techniques. Your responsibilities will include co-designing and performing such experiments, analyzing data, and documenting and reporting results in lab- and departmental meetings and at (inter-)national conferences
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*.

Department of Cell Biology

School/Department:	***Department of Cell Biology Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences	• ***Ana Ruiz-Saenz, Ph.D.****, principal investigator,* • ***Email:*** *a.ruizsaenz@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/researchers/ruiz-saenz* • ***Grants:*** • *H2020 Marie Skłodowska-Curie Individual Fellowship. (2020-2022)* • *AACR Scholar in Training Award (2017)* • *Post-doctoral Ramón Areces Foundation Grant (2013-2015)* • *EMBO Short-Term Fellowship (2009)* • ***Most important publications:*** - ***Biochem Pharmacol****. (2021) doi: 10.1016/j.bcp.2020.114317.* - ***Mol Cancer Res*** *(2021) doi: 10.1158/1541-7786.MCR-20-0825.* - ***Nature Cell Biology****. (2019) doi: 10.1038/s41556-019-0328-z.* - ***Cell Reports*** *(2018) doi: 10.1016/j.celrep.2018.09.035.* - ***Cancer Research*** *(2018) doi: 10.1158/0008-5472.CAN-18-0430.* - ***Journal of Clinical Oncology*** (2018) doi: 10.1200/JCO.2017.77.1899. - ***Breast Cancer Res Treat****.* (2016) doi: 10.1007/s10549-016-3698-y. - ***Oncogene*** (2015) doi: 10.1038/onc.2014.455. - ***Journal of Cell Science*** (2013) doi: 10.1242/jcs.120840. Epub 2013 Aug 13. - ***Journal of Cell Biology****.* (2012) doi: 10.1083/jcb.201202137.
Project Title:	***Exploring novel mechanisms of cancer progression in breast cancer***
Abstract:	Breast cancer has the highest mortality of any cancer in women worldwide. Over the last few years, increased understanding of tumor biology has led to the development of targeted molecular therapies, increasing survival and improving the quality of life. However, despite these advances, resistance to therapies and cancer progression remain a burden in the successful treatment of cancer. The molecular mechanisms driving resistance and cancer progression are complex and encompass not only the cancer cell but its interaction with the surrounding microenvironment. Our previous studies concentrated on the oncogenic function of HER2 in HER2-amplified breast cancers (*Cancer Research* 2018) and a new strategy to target the undruggable HER3 (*Oncogene* 2015). Recent studies of tumor genomes have identified mutations in novel genes without clear links to cancer. We are particularly interested in deciphering the impact that those mutations have in cancer progression and response to treatment. In this context, your work will focus on unraveling novel mechanisms of genetic deregulation in cancer progression in collaboration with other groups at the Medical Oncology and Cell Biology Departments. The work encompasses a wide range of experimental techniques including protein biochemistry and cell signaling, gene expression regulation, CRISPR technology, and interrogation of clinical samples. Your responsibilities will include co-designing and carrying out experiments, analyzing data, and documenting and reporting results in lab and departmental meetings. We aim to create and foster a professional, creative, inclusive and productive environment, where all lab members are empowered with the skills, knowledge and resources required for their projects and future careers. To do so, team members are expected to be ambitious, critical and take full responsibility for their projects in a supportive, collaborative and open culture.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: o *English speaking countries & Netherlands:* no requirement o *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Cell Biology

School/Department:	***Department of Cell Biology Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences	• ***Jeffrey van Haren, Ph.D.****, principal investigator,* • ***Email:*** *a.vanharen@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/researchers/haren-jeffrey-van* • ***Grants/ awards:*** - ***H2020 Marie Skłodowska-Curie IF****(2020-2022)* - ***ASCB/EMBO Travel Award*** *Postdoctoral Fellows (2017)* • ***Selected publications:*** - ***Nature Cell Biology*** *(2018)* doi: 10.1038/s41556-017-0028-5 - ***Current Opinion in Cell Biology*** *(2020)* doi: 10.1016/j.ceb.2020.03.003 - ***Journal of Cell Biology*** (2021) doi: 10.1083/jcb.201905199 - ***Current Biology*** (2016) doi: 10.1016/j.cub.2016.04.020 - ***Current Biology*** (2014) doi: 10.1016/j.cub.2014.06.037 - ***Genes and Development*** (2013) doi: 10.1101/gad.216200.113 - ***Cell Reports*** (2012) doi: 10.1016/j.celrep.2012.08.040 - ***Molecular Biology of the Cell*** (2010) doi: 10.1091/mbc.E09-12-1036 - ***Current Biology*** (2010) doi: 10.1016/j.cub.2010.04.024 - ***Journal of Cell Biology*** (2008) doi.org/10.1083/jcb.200707203
Project Title:	***Understanding directional neuronal migration in the developing nervous system***
Abstract:	**This project aims at improving our understanding of the cellular machinery that controls neuronal migration and guidance**. Defective guidance of neurons during embryonic development leads to various neuro-developmental disorders such as lissencephaly, Joubert syndrome, Hirschsprung's disease, and dysgenesis of the corpus callosum, and is linked to autism and epilepsy. Long range guidance of neurons involves the detection of guidance molecules, secreted by cells at a distance. Concentration gradients of such molecules can either attract or repel neurons (a process termed chemotaxis). While many guidance signals and their receptors have been identified, it is still largely unclear how guidance signals are processed in space and time within the neuron, and how such signals direct localized assembly/disassembly of the actin cytoskeleton, which is the main driver of cell movement. To improve our understanding of this process, we will construct a parts list of the neuronal guidance machinery, and observe/quantify the dynamics of these components using advanced microscopy approaches. Furthermore, we will utilize novel approaches to control cell guidance, and aim to develop a highly standardized *in vitro* neuronal guidance assay that will allows us to perform quantitative analysis of cytoskeletal assembly in navigating cells. This project involves a wide range of experimental techniques including novel **optogenetic perturbation techniques** (see ***NCB 2018****,* doi:10.1038/s41556-017-0028-5), **live cell microscopy** (including spinning disk confocal microscopy, TIRFM and LLSM), **CRISPR, micropatterning and protein engineering**. Knowledge gained from these studies will improve our understanding of human neuronal migration / guidance disorders, and might in the future help in regenerative medicine, or the development of advanced organ-on-chip technology. Your responsibilities will include co-designing and performing experiments, analyzing data, reporting/presenting results (e.g. in lab meetings, graduate school events, and at (inter-)national conferences), and in collaboration with Dr. van Haren write research manuscripts.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student with a background in molecular cell biology, nanobiology or related fields to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Successful applicants are expected to be ambitious, critical thinkers who take responsibility for their projects in a supportive, collaborative and open culture. • Master degree or MD, preferably with experience in basic molecular biology techniques. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Child & Adolescent Psychiatry

School/Department:	***Department of Child and Adolescent Psychiatry,*** *collaborating Department: Department of Epidemiology,* ***Erasmus MC***
Supervisor information: World no 27 Social Sciences & Public Health World no 33 Radiology, Nucl Med, Med Imaging World no 42 Neurosciences & Behavior	**Prof. dr. Henning Tiemeier** Email: ***h.tiemeier@erasmusmc.nl*** Website: ***https://www.hsph.harvard.edu/henning-tiemeier/*** **Grants:** multiple EU-Horizon2020 grants, NIH-NICHD grant, both VIDI and VICI, (see *https://www.nwo.nl/en/researchprogrammes/nwo-talent-programme*), EU Norface grant **one of the world's 165 most highly cited scientists in the field of Social Science, general** (Clarivate/Thompson Reuters 2017, 2018 and again in 2019) H-index: 92 (Web of Science), 127 (Google Scholar) **Most important publications:** • KW Jansen TA, Korevaar TIM, Mulder TA, White T, Muetzel RL, Peeters RP, Tiemeier H. The Association of Maternal Thyroid Function during Pregnancy with Child Brain Morphology: A Time Window-Specific Analysis in a Prospective Cohort Study. Lancet E&D 2019; 7:629-637. • Xerxa Y, Delaney SW, Rescorla LA, Hillegers MHJ, White T, Verhulst FC, Muetzel RL, Tiemeier H. Association of Poor Family Functioning From Pregnancy Onward With Preadolescent Behavior and Subcortical Brain Development. JAMA Psychiatry. 2021;78(1):29-37. • Zou R, Tiemeier H, van der Ende J, Verhulst FC, Muetzel RL, White T, Hillegers M, El Marroun H. Exposure to Maternal Depressive Symptoms in Fetal Life or Childhood and Offspring Brain Development: A Population-Based Imaging Study. Am J Psychiatry. 2019; 176:702-710. • Rietveld CA, Medland SE, Derringer J, Yang J, Esko T, Martin NW, Westra HJ, Shakhbazov K, Abdellaoui A, (…) Teumer A; LifeLines Cohort Study, Tiemeier H, van Rooij FJ, Van Wagoner DR, Vartiainen E, Viikari J, Vollenweider P, Vonk JM, Waeber G, Weir DR, Wichmann HE, Widen E, Posthuma D, van Duijn CM, Visscher PM, Benjamin DJ, Cesarini D, Koellinger PD. GWAS of 126,559 individuals identifies genetic variants associated with educational attainment. Science. 2013;340:1467-71.
Project Title:	Early life adversity, maternal psychopathology, parenting and offspring neurodevelopment
Abstract:	**Project Background:** Many children experience early life adversities such as poverty, inadequate housing, poor neighbourhood, or parental psychopathology. These adversities have been repeatedly related to less optimal child development. What is less know are the protective factors that provide resilience against adversity, in particular whether supportive parenting, good family functioning or peer friendships provide buffering against the impact of adversity on behaviour and cognition. Also, in this project repeated brain imaging measures in adolescence will enable us to identify whether the interplay of childhood adversity and buffering factors impacts brain development in adolescence. **Aim:** The student will investigate how potential resilience or buffering factors, i.e. supportive parenting, neighborhood safety and peer friendship protect against poor behavioral and cognitive outcomes in children with and without experience of adversity. **Study Design and Methods:** The Generation R Study is a population-based cohort. Behavioral and brain imaging assessment at 10 and 13 years has been completed. Adversities such as parenting have been observed and assessed by questionnaire, father and mother mental health has been studied from pregnancy onwards. Importantly, this project will utilize observations in the home setting conducted in about 4000 children in the first few months of life, peer ratings and community data on neighborhood health. Child behavioral problems were repeatedly measured by parent, teacher and self-report. Brain function and morphology assessments are available in *N* ~ 5500 children and adolescents. **Training** in neuroscience and epidemiology leading to a MSc Epidemiology from Netherlands Institute of Health Sciences (**https://www.nihes.com/**) is part of the PhD program.
Requirements of candidate:	• We are looking for a highly motivated student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD, background medicine, psychology, public health, epidemiology or neuroscience • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Clinical Genetics

The department Clinical Genetics performs innovative and high quality scientific research with a focus on three cornerstones: neurogenetics; genetics of congenital anomalies and genetics of cardiovascular disorders. The research focusses on both fundamental research to understand the mechanisms which cause hereditary diseases, as well as translational research for a quick translation of knowledge and renewing technology to improve diagnoses and treatments in favor of patients.
Some examples of diseases that are studied within our research section are: Fragile X syndrome, Parkinson disease, FXTAS, white matter disorders, malformations of cortical brain development, Hirschsprung disease and Pompe disease. Recently, three new research lines have been started focused on 1) aneurysms 2) the role of microglial cells in neurological diseases and 3) the role of the non-coding genome in gene regulation and genetic disorders. Additional research lines include: research om human cancers (uveal melanoma, Lynch Syndrome, breast cancer), psychological aspects of prenatal genetic testing and Non Invasive Prenatal Testing (NIPT).
We use state of the art methods to studying hereditary monogenic and polygenic disorders. Next Generation Sequencing and functional studies play an important role in unraveling disease mechanisms. For functional genetics and genomics, *in vitro* as well as *in vivo* models are used. We apply state-of-the-art methodologies, such as the use of induced pluripotent stem cells (so-called iPS-cells) generated from patients, disease modelling of brain development using cerebral organoids and epigenome characterization using massively-parallel-reporter assays. Widely applied animal models for the functional research are genetically modified mice and zebrafish. The functional work is performed in close cooperation with the Functional Unit of the Diagnostic section and the counseling section through which patients can be recruited.
Currently, approximately 70 people are working in the research section, among which 30 PhD students. Most of these people are paid by external funding from many different funding bodies such as the EU, NIH, NWO, ZonMW, KWF, Heart foundation, Parkinson Foundation META kids and the Brain and Behaviour Research foundation.
On our website the different research lines are described in more detail
https://www.erasmusmc.nl/klinische_genetica/research/lijnen/
Our Principal Investigators (PIs) can be found on:
https://www.erasmusmc.nl/klinische_genetica/research/introduction/
A film presenting several of the research line can be found on:
https://www.youtube.com/watch?v=7iYn9DaCmbA&feature=youtu.be

Selection of recent publications

- Qaudri M et al. LRP10 genetic variants in familial Parkinson's disease and dementia with Lewy bodies: a genome-wide linkage and sequencing study. **Lancet Neurol. 2018** 17(7):597-608
- Tedja MS, et al. Genome-wide association meta-analysis highlights light-induced signaling as a driver for refractive error.. **NatureGenetics 2018** ;50(6): 834-848.
- Barakat TS, et al., Functional Dissection of the Enhancer Repertoire in Human Embryonic Stem Cells. **Cell Stem Cell. 2018;** Aug 2;23(2):276-288.e8.
- Oosterhof N, et al. Colony-Stimulating Factor 1 Receptor (CSF1R) Regulates Microglia Density and Distribution, but Not Microglia Differentiation In Vivo. **Cell Rep 2018** 24(5):1203-1217
- Bergsma AJ, et al., Alternative Splicing in Genetic Diseases: Improved Diagnosis and Novel Treatment Options. **Int Rev Cell Mol Biol. 2018**;335:85-141.
- van Poppelen NM, et al., Genetic Background of Iris Melanomas and Iris Melanocytic Tumors of Uncertain Malignant Potential. **Ophthalmology. 2018**, pii: S0161-6420(17)32844-0.
- van der Steen SL, et al., Choosing between Higher and Lower Resolution Microarrays: do Pregnant Women Have Sufficient Knowledge to Make Informed Choices Consistent with their Attitude? **J Genet Couns. 2018**;27(1):85-94.
- van Waning JI, et al. Genetics, Clinical Features, and Long-Term Outcome of Noncompaction Cardiomyopathy. **J Am Coll Cardiol. 2018**, 71(7):711-722
- Halim D, et al. Loss of LMOD1 impairs smooth muscle cytocontractility and causes megacystis microcolon intestinal hypoperistalsis syndrome in humans and mice. **Proc Natl Acad Sci U S A**. **2017**, 114(13):E273.
- Olgiati S, et al., DNAJC6 Mutations Associated With Early-Onset Parkinson's Disease. Ann Neurol. 2016; 79(2):244-56.
- Zeidler S, et al., Combination Therapy in Fragile X Syndrome; Possibilities and Pitfalls Illustrated by Targeting the mGluR5 and GABA Pathway Simultaneously. **Front Mol Neurosci. 201**7;10:368.
- Goverde A et al., Small-bowel Surveillance in Patients With Peutz-Jeghers Syndrome: Comparing Magnetic Resonance Enteroclysis and Double Balloon Enteroscopy. **J Clin Gastroenterol. 2017** ;51(4):e27-e33.

Department of Clinical Genetics

School/Department:	***Department of Clinical Genetics Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 30 Biomedical Sciences	• ***Stefan Barakat, M.D., Ph.D., MSc.****, principal investigator* • ***Email:*** *t.barakat@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/groups/barakat-lab-non-coding-genome-in-clinical-genetics* • ***Personal Grants:*** • *Niels Stensen Fellowship (2014); EMBO Long-Term Fellowship (2014); Marie Skłodowska-Curie Individual Fellowships (IF-EF) (2015); Human Frontiers Science Project Long-Term Fellowship (2015); Wellcome Trust ISSF2 award (2015); NARSAD Young Investigator Award (2016); ZonMW VENI award (2016); Erasmus MC fellowship (2017); EMC Human Disease Model Award (2018)* • ***Awards:*** *American Society of Human Genetics (ASHG) Charles J. Epstein Award for Excellence in Human Genetics Research (2015); International Society for Differentiation Beverly Kerr McKinnel Award, for outstanding research as a PhD student (2012)* • ***Most important publications: (H-index:14; total citations:>1320)*** *(sep 2020)* ***Nature Reviews Neurology*** *doi: 10.1038/s41582-020-0395-6 (**IF: 27.0**)* *(apr 2020)* ***Acta Neuropathologica*** *doi: 10.1007/s00401-020-02128-8 (**IF18.2**)* *(dec 2019)* ***Acta Neuropathologica*** *doi: 10.1007/s00401-019-02109-6 (**IF:18.2**)* *(aug 2018)* ***Cell Stem Cell*** *doi: 10.1016/j.stem.2018.06.014 (**IF:23.3**)* *(aug 2015)* ***Genome Biology*** *doi: 10.1186/s13059-015-0698-x (**IF:11.9**)* *(mar 2014)* ***Molecular Cell*** *doi: 10.1016/j.molcel.2014.02.006 (**IF:14.7**)* *(mar 2013)* ***Cell Reports*** *doi: 10.1016/j.celrep.2013.02.018 (**IF:8.3**)* *(apr 2012)* ***Nature*** *doi: 10.1038/nature11070 (**IF:40.1**)* *(jun 2012)* ***Molecular Cell*** *doi: 10.1016/j.molcel.2012.04.003 (**IF:14.7**)* *(oct 2011)* ***Nucleic Acid Research*** *doi: 10.1093/nar/gkr550 (**IF:9.2**)* *(jun 2010)* ***Cell Stem Cell*** *doi: 10.1016/j.stem.2010.05.003 (**IF:23.3**)* *(nov 2009)* ***Cell*** *doi: 10.1016/j.cell.2009.10.034 (**IF:30.4**)* *For full list see: https://www.ncbi.nlm.nih.gov/pubmed/?term=tahsin+stefan+barakat*
Project Title:	***Deciphering the role of Non-Coding DNA sequences in the genetics of neurodevelopmental disorders***
Abstract:	Despite the fact that we know that the majority of DNA sequences (~98%) in the human genome do not encode protein-coding genes, our understanding of those sequences and why they are important is still far from complete. An important group of non-coding genome elements are enhancers that are crucial for the proper regulation of spatiotemporal gene expression. The clinical genetic work-up of patients suffering from neurodevelopmental disorders currently focusses almost completely on exons. An attractive hypothesis is that currently genetically unexplained patients might have mutations in regulatory elements such as enhancers that might cause their phenotype, but before this hypothesis can be tested on a large scale it is crucial to identify regulatory elements involved in brain development. In my lab, we are trying to understand the role of regulatory elements in brain development using several approaches. We are using state-of-the-art techniques to profile the epigenome of cerebral organoids using ChIP-seq, ATAC-seq, and single cell RNA-seq to identify putative regulatory elements. Using ChIP-STARR-seq, a novel type of massively parallel reporter assay system that we have developed, we are generating genome-wide enhancer activity maps of various brain related cell types. Using functional genomics and CRISPR-Cas9 mediated screens, we validate putative enhancers. Integrative computational analysis and data mining further helps us to identify crucial regulatory elements, that we sequence in a large cohort of genetically unexplained patients. Using iPSC technology combined with genome-engineering, we validate our findings. In addition, we perform disease modeling for novel genetic neurodevelopmental disorder. Ultimately, our efforts will lead to an enhanced understanding of the brain regulome and will lead to novel diagnostic approaches for patients suffering from neurodevelopmental disorders.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department Clinical Genetics

School/Department:	***Department of Clinical Genetics, Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 30 Biomedical Sciences	• **Prof. dr. Ype Elgersma,** *y.elgersma@erasmusmc.nl* • ***Websites:*** ○ *www.neuro.nl/research/elgersma* ○ *www.encore-expertisecentrum.nl* ○ *www.functionalgenomics.nl* • ***Personal Grants:*** *VIDI, VICI* • ***Most important publications:*** - **Mol Psych 2015** 20:1311-21 - **Nature 2015** 526:50-1 - **Am J Hum Genet 2017** 5:768-788 - **Nature Neuroscience 2019** 22:1235-1247 **JAMA Neurology 2015**: 72:1052–1060. **J Clin Invest 2015** 125:2069-2076 **Mol Psych 2019** 24: 757-771 **Neuron 2021** 109(15):2374-2379
Project Title:	***Gaining insight in the molecular mechanisms underlying neurodevelopmental disorders.***
Abstract:	- Neurodevelopmental disorders (i.e. intellectual disability, autism) affect >1% of the population, and often have a genetic basis. Our lab seeks to get insight in the molecular and cellular mechanisms underlying these disorders, with the ultimate goal to develop treatments. Our research into these disorders is divided into three research lines: (1) Improving genetic diagnosis, (2) Understanding the mechanisms underlying neurodevelopmental disorders, and identifying treatments (3) Translational studies (i.e. clinical trials) to improve the quality of life of the affected individuals. For the candidate student we have possibilities to join the following projects: - Improving diagnosis: To improve genetic diagnosis, we have developed a functional genomics screen (PRiSM) (see functionalgenomics.nl) to rapidly determine if a genetic variant is pathogenic. This screen is not only important for providing a diagnosis, but also allows us to get more insight in the genes underlying neurodevelopment. New assays will be developed and validated for this screen. - Understanding the mechanisms and identify treatments: - To get more insight in the pathophysiology of neurodevelopmental disorders, we typically make use of genetically engineered mouse models as a tool to dissect the underlying mechanisms. Mouse models are analyzed at the biochemical, cellular (electrophysiological) and behavioral level. By analyzing the mice at all these levels we hope to understand the specific function of these genes and proteins in brain development and learning and memory. Besides mouse models, we are also using iPS cells to study these disorders. The genes and proteins that we in particular focus on are proteins associated with the RAS-ERK-MTOR signaling pathway and the proteasome. Treatments that we are in particular interested in are antisense oligonucleotide (ASO) treatments, that target directly the mutated RNA.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Epidemiology

School/Department:	***Department of Epidemiology Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	• *Dr.* ***Maryam Kavousi****, Associate Professor* • ***Email:*** *m.kavousi@erasmusmc.nl* • ***Website:*** *http://www.erasmus-epidemiology.nl/* • ***Personal Grants:*** • *AXA Research Grant, 2012* • *IDF, 2014* • *Prestigious UNESCO-Loreal Fellowship 'For Women in Science', 2014* • *Prestigious ZonMw VENI Grant, 2015* • *Erasmus MC Mrace Grant, 2016* • *ZonMw Grant, 2017* • *Hartstichting (Dutch Heart Foundation) Grant, 2017* • ***Most important publications:*** • **Nature Genetics 2011** 43(10):940-947 • **Circulation 2011** 124(25):2855-2864 • **Circulation 2012** 126(4):468-478 • **Annals of Internal Medicine 2012** 156(6):438-444 • **JAMA 2014** 311(14):1416-1423 • **BMJ 2014** 349:g5992 • **JAMA 2016** 315(23):2554-2563 • **JAMA Cardiology 2016** 1(6):708-713 • **JAMA Cardiology 2016** 1(7):767-776 • **JAMA 2016** 316(20):2126-2134 • **JAMA Cardiology 2017** 2(9):986-994 • **Circulation Research 2017** 121(12):1392-1400 • **Nature Genetics 2018** 50(9):1225-1233
Project Title:	***Global Cardiomtabolic Risk Profile***
Abstract:	*Population aging is magnifying the global burden of cardiometabolic disorders and their consequences. Global cardiometabolic risk represents the overall risk of developing cardiovascular diseases and/or type 2 diabetes due to a cluster of risk factors. Development of clinically useful primary and secondary prevention strategies will require a more comprehensive understanding of these complex conditions. We study the association of traditional and novel risk factors, representing of different pathophysiologic pathways, with cardiometabolic risk across its spectrum. The risk factors comprise biomarkers, including the novel omics markers, as well as the new cardiovascular imaging markers.* *Besides contribution of various pathways, as well as their interactions, to form the natural course of cardiometabolic disorders, differences between women and men in these processes are highly of interest.* *The studies are performed within the Cardiometabolic research line of the Department of Epidemiology using the large population-based Rotterdam Study. We closely collaborate with other renowned population-based studies across Europe and United States including the cohorts involved in the international CHARGE Consortium (The Cohorts for Heart and Aging Research in Genomic Epidemiology).*
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Epidemiology

School/Department:	***Department of Epidemiology, Erasmus MC***	
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	• ***Dr. Daniel Bos, MD, PhD*** • ***Email:*** *d.bos@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/groups/imaging-of-arteriosclerosis* • ***Grants and Awards:*** • *Royal Academy of Arts and Sciences Grant (2016)* • *Lourens Penning Prize for best publication in the field of Neuroradiology(2016)* • *Harvard HSPH Grant (2016)* • *Erasmus MC Mrace Grant (2017)* • *BrightFocus Foundation Grant (2017)* • *Erasmus MC Mrace Grant (2019)* • *European Commission Horizon 2020 - Research and Innovation Framework Programme (2019)* • *Netherlands Organisation for Scientific Research (2019)* • ***Most important publications:*** • **JACC** 2020; 19;75:2387-2399. • **BMC Medicine** 2020; 18:263. • **Heart** 2020; 106(2):133-139. • **Plos Med** 2020; 17(5):e1003115. • **Eur Heart J** 2018; 39:3369-3376. • **JACC** 2018; 72: 582-584. • **Alzheimers Dement** 2018; pii: S1552-5260(18)30129-8. • **Eur Radiol** 2018; 2018: 28:3082-3087. • **Circulation** 2017; 135:2207-09. • **Circ Cardiovasc Genet** 2013; 2013; 6:47-53.	• ***Dr. Maryam Kavousi, MD, PhD*** • ***Email:*** *m.kavousi@erasmusmc.nl* • ***Website:*** *https://www.ergo-onderzoek.nl/managementteam/15* • ***Grants and Awards:*** • *AXA Research Fund* (2012) • *IDF* (2014) • *Prestigious UNESCO-Loreal Fellowship 'For Women in Science'* (2014) • *Prestigious ZonMw VENI Grant* (2015) • *COLCIENCIAS* (2016) • *Erasmus MC Mrace Grant* (2016, 2019) • *Netherlands Organisation for Scientific Research* (2017, 2017, 2019, 2020, 2020) • *Dutch Heart Foundation* (2017, 2019, 2020) • *NIH* (2019, 2020) • *European Commission Horizon 2020* (2020) • *European Commission Horizon 2020 – Innovative Medicines Initiative (IMI)* (2020) • *European Society of Cardiology Viviane Conraads Outstanding Achievement Award* (2020) • *Young Academy of The Royal Netherlands Academy of Arts and Sciences* (2020) • *Dutch Cardiovascular Alliance* (2020) • ***Most important publications:*** • **BMC Medicine** 2020; 18:263. • **Heart** 2020; 1062:133-9. / 2019;105:1414-22. • **Lancet** 2019;394:2173-83. • **Circulation** 2019;139:e1019-20. • **JACC** 2019;74:1420-21. • **Diabetologia** 2019;62:1581-90. • **Circulation Research** 2017 121:1392-400 • **JAMA Cardiology** 2017 2:986-94. • **JAMA 2016** 316:2126-34. / 2014 311:1416-23. • **JAMA Cardiology** 2016 1:767-76.
Project Title:	***Imaging the progression of arteriosclerosis; sex-specific causes and clinical consequences***	
Abstract:	Cardiovascular diseases (CVD), including ischemic heart disease and stroke, remain leading causes of mortality and permanent disability worldwide. Arteriosclerosis (i.e. hardening of the arteries) is the condition underlying the majority of CVD cases. Importantly, the burden of arteriosclerosis varies considerably across the circulatory system and often occurs at multiple locations simultaneously. Many important knowledge gaps pertaining to the etiology, progression, and prognosis of arteriosclerosis remain. The current project is aimed at comprehensively investigating the sex-specific incidence, progression, and risk factors of arteriosclerosis in the heart-brain axis within the large population-based Rotterdam Study. Using state-of-the-art medical imaging techniques, including CT and MRI, changes in arteriosclerosis have been visualized. We aim to study longitudinal changes in arteriosclerosis throughout the arterial system and the factors influencing these changes. In particular, we study whether there are sex-specific patterns in the changes in arteriosclerosis and its contributing risk factors. The studies will be performed within the Cardiometabolic research group Department of Epidemiology and the Imaging of Arteriosclerosis research group of the Departments of Epidemiology and Radiology.	
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*	

Department of Epidemiology

School/Department:	***Department of Epidemiology, Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	• **Dr. Mohsen Ghanbari** Assistant professor, Principal investigator of the Molecular & Systems Epidemiology group • **Email:** m.ghanbari@erasmusmc.nl • **Website:** http://www.erasmus-epidemiology.nl https://www.erasmusmc.nl/en/research/researchers/ghanbari-mohsen • **Grants:** • Early Career Award, The Cohorts for Heart and Aging Research in Genomic Epidemiology, 2018 • European Foundation for the Study of Diabetes Fellowship, 2018 • Alzheimer Netherland Fellowship, 2018 • **Most important publications:** Dr. Ghanbari has so far published over 80 international peer-reviewed publications. • **Nature Communications**. 2021 May 14;12(1):2830. Epigenome-wide association meta-analysis of … • **Stroke**. 2021 Mar;52(3):945-953. Circulatory MicroRNAs as Potential Biomarkers for Stroke Risk … • **Brain.** 2020 Apr 1;143(4):1220-1232. Plasma tau, neurofilament light chain and amyloid-β levels … . • **Cell.** 2020 Sep 3;182(5):1214-1231. The Polygenic and Monogenic Basis of Blood Traits and Diseases. • **Diabetes Care.** 2020 Apr;43(4):875-884. Epigenetic Link Between Statin Therapy and Type 2 Diabetes. • **Nature Communications.** 2019 Aug 20;10(1):3346. A metabolic profile of all-cause mortality risk … . • **Human Mutation.** 2019 Nov;40(11):2131-2145. A functional variant in the miR-142 promoter … . • **Nature Genetics.** 2019 Apr;51(4):636-648. Multi-ancestry genome-wide gene-smoking interaction … . • **Nature Communications.** 2019 Jan 22;10(1):376. Multi-ancestry study of blood lipid levels identifies … . • **Gastroenterology.** 2017 Oct;153(4):1096-1106. Epigenome-Wide Association Study Identifies … .
Project Title:	***Integration of population-based omics data to explore molecular mechanisms underlying age-related diseases***
Abstract:	Genetic and molecular epidemiology are emerging innovative fields of research in which molecular and biological concepts are incorporated into computational models and epidemiologic studies to identify genetic predispositions of complex diseases. This is made possible by recent rapid technological advances in high-throughput laboratory assays that measure various biomarkers from biological samples. Although traditional epidemiology has been proven valuable to identify associations between exposure and disease in populations; yet, it does so without obtaining information of the biological processes that underlie the associations. Molecular epidemiology could enhance the measurement of exposure, effect, and susceptibility, and give insight into biological mechanisms. This knowledge will ultimately lead to the identification of early etiologic, diagnostic, and prognostic markers of diseases, allow us to better target preventive strategies and yield new therapeutics for complex diseases. Within the Molecular & Systems epidemiology research line of the department of Epidemiology, we conduct cutting-edge research on the genetic determinants and novel biomarkers of age-related diseases (e.g., Cardiovascular disease, type 2 diabetes, Alzheimer's disease, fatty liver disease) using omics data (incl. genomics, epi-genomics, transcriptomics, proteomics, and metabolomics) from the Rotterdam Study, a large population-based cohort of 15,000 participants followed since 1990. Moreover, we closely collaborate with several renowned international population-based cohort studies across Europe and United States on large-scale international projects.
Requirements of candidate:	• We are looking for a highly motivated, bright student to join our international and multidisciplinary team. For this projects, using big data and often collaborating in consortia, we require strong statistical skills and good communication skills. • The student should have an MD or Master degree in Biology, Epidemiology, Biostatistics or a related field, and should be fluent in English (IELTS≥7.0 (≥6.0 for all subs), TOEFL ≥100 (≥20 for all subs). • We offer: Supervision, data access, advanced courses in genetic epidemiology and biostatistics, research infrastructure, and other training. Your salary and living expenses should be covered by the scholarship. We could help with the scientific part of the proposal. For more information related to this proposal, please contact dr. Mohsen Ghanbari (m.ghanbari@erasmusmc.nl).

Department of Epidemiology

School/Department:	***Department of Epidemiology, Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	• ***Prof dr M. Kamran IKRAM*** • ***Email:*** *m.ikram@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/departments/epidemiology* • ***Grants:*** • *Lee Kuan Yew Fellowship, Singapore (2011)* • *VENI, Netherlands Organisation for Scientific Research, the Netherlands (2012)* • *National University Health System, National University of Singapore, Clinician Scientist Program Grant, Singapore (2012)* • *National Medical Research Council, Clinician Scientist Award, Investigator Category, Singapore (2013)* • *European Institute of Innovation and Technology (2016)* • *ParkinsonFonds, the Netherlands (2018)* • *Netherlands Organization for Scientific Research – Covid 19 Program, the Netherlands (2020)* • ***Most important publications:*** **Mov Disord** *2020; Sept 23 Epub* **J Am Coll Cardiol** *2020;75:2387-2399* **PLoS Med** *2019;16:e1002933* **Nature Medicine** *2019;25:1364-1369* **Int J Epidemiol** *2019;48:1286-1293* **Lancet Neurol** *2018;17:434-444* **Nat Neurosci** *2016;19:1569-1582* **Am J Epidemiol** *2020; Sept 5 Epub* **Brain** *2020;143:1220-1232* **Nat Genet** *2019;51:1624-1636* **Circulation** *2019;139:1698-1709* **JAMA Neurol** *2018;75:1256-1263* **Circulation** *2017;135:2207-2209* **Nature** *2016;536:41-47*
Project Title:	***Vascular disease and autonomous dysregulation in Parkinson's Disease***
Abstract:	Parkinson's disease (PD), which is the most common subtype of parkinsonism, is a chronic neurodegenerative condition in the elderly. Although several environmental and genetic factors have been implicated in the development of parkinsonism, there is still uncertainty about the exact mechanisms underlying neuronal cell loss in these conditions. Among others, a potential role of vascular disease has been hypothesized based on the observation that that markers of vascular pathology are strongly related to two other common neurological syndromes, namely stroke and dementia. Furthermore, a high prevalence of lacunar infarcts in the basal ganglia of patients with parkinsonism have been reported. During the course of dementia 25% of patients develop parkinsonism, whereas approximately a third of patients with PD are eventually diagnosed with dementia. However, in spite of an overlap in clinical and pathological features between these neurological syndromes, the role of vascular pathology in the etiology of parkinsonism syndromes remains unclear. Besides vascular disease, cardiovascular dysregulation, as a manifestation of autonomous dysfunction, has also been implicated in PD. However, these observations have mainly come from clinical studies, in which the exact order of events is difficult to disentangle (reverse causality). Thus far, observations from population-based studies are largely lacking. In view of these gaps in the literature, our overall aim of this project is to determine the role of vascular disease and autonomous dysfunction in the development of Parkinson's disease and non-PD parkinsonism. To accomplish this data from the large population-based Rotterdam Study (N=14,926), which has been running for more than 30 years, will be used. Within this cohort, extensive cardiovascular risk factors assessment, including imaging of the major arteries in the heart-brain axis, has been performed. All persons are also evaluated for parkinsonism, using questionnaires, extensive examinations at our research center and follow-up of medical records.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our international and multidisciplinary team. Due to the nature of the project and data, strong statistical skills and good communication skills are required. • The student should have completed an MD or MSc in Neurosciences, Psychology, Health Sciences, Epidemiology, or a related field. A good command of English is required (level of IELTS 7.0 (min 6.0 for all subs) or TOEFL 100 (min 20 for all subs). • Within the project the student will have access to the Rotterdam Study data, training in epidemiology and statistics, and the broader Erasmus MC research infrastructure. The scholarship will, at least, have to cover subsistence allowance and international air plane ticket. We are happy to help with the scientific part of your scholarship proposal, please contact prof.dr. M.K. Ikram (m.ikram@erasmusmc.nl)

Department of Epidemiology

School/Department:	***Department of Epidemiology Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	***Prof.dr. M. Arfan Ikram and dr Gennady Roshchupkin*** *Secondary affiliation MA Ikram: Adj. professor at Harvard Chan School of Public Health, Boston* ***Email:*** *m.a.ikram@erasmusmc.nl and g.roshchupkin@erasmusmc.nl* ***Websites:*** *https://www.erasmusmc.nl/en/research/researchers/ikram-arfan-m and www.roshchupkin.com* ***Personal Grants MA Ikram:*** *Total research funding over last 10 years is more than 15 MEuro, including ERC Starting Grant, European JPND grant, multiple Horizon 2020 consortium collaborations, multiple NIH R01-subcontract PI.* *MA Ikram has supervised 28 PhD students.* ***Most important publications:*** • *Satizabal CL. Nat Genetics 2019* • *Hibar DP. Nat Commun 2017* • *Roshchupkin GV. Nat Commun 2016* • *Ikram MA. NEJM 2009* *Wang J. PNAS 2019* *Adams HH. Nat Neurosc 2016* *Ikram MA. Nat Genetics 2012*
Project Title:	***Deep Learning in Omics Data Analysis and Precision Medicine***
Abstract	A central goal of human genetics is to understand the relationship between genetic variation and diseases or traits. There are many different technologies, study designs and analytical tools for identifying such relations. Recent technological advances and biobank initiatives have allowed studies involving hundreds of thousands, and even millions, of individuals. Moreover, many studies have started collected other omics data beyond genetic data, including **gene expression, methylation, proteins, metabolites, and microbiome**. This allows getting closer to the trait's etiology. However, by nature most of the analytical tools and methods are either univariate or cannot handle multi-omics data. Therefore, cross-omics methods are missing. Human genetics needs new types of approaches to solve such problems for improving the diagnosis, treatment, and classification of complex diseases. **Deep learning (DL)** is a rapidly growing field. The application of the neural networks has become a golden standard in many research areas. DL algorithms have shown successful ability to detect a complex pattern in high-dimensional data, and also are able to integrate data from various resources by having many input channels into neural network **The main goal of this project is to develop new DL methods for multi-omics analysis, which will be able to integrate prior biological knowledge and improve our understanding of the etiology of complex traits, such as dementia and cognition**. An additional dimension in this project will be to combine the various omics data to brain MRI-imaging. We aim to apply these methods on large datasets from population-based **Rotterdam study, UK Biobank** as well as within **international CHARGE consortium**.
Requirements of candidate:	**We are looking for** a highly motivated, hardworking student to join our very international team. Successful candidates are expected to have a strong quantitative or computer science background, excel at critical thinking, with a strong motivation to engage in the development and application of advanced analytical methods. The following are strongly preferred requirements for interest candidates: • Master degree in mathematics, computer science, statistics, bioinformatics, physics, electrical engineering, or in an equivalent discipline. •Strong knowledge of Python and R. •Experience with machine learning and deep learning methods. •Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) •English language requirement: - English speaking countries & Netherlands: no requirement - Other countries: IELTS 6. **We offer you:** - Access to the research infrastructure at Erasmus MC (including Rotterdam Study and related datasets) as well as access to our network of international collaborations (>25 countries) - A dedicated team of supervisors (prof. Ikram | dr. Roshchupkin) with longstanding expertise in epidemiology, -omics, imaging, and deep learning - A supportive working environment within a team of dedicated, open and transparent colleagues - Overhead and material costs - Fees for relevant coursework and conferences

Department of Epidemiology

School/Department:	***Department of Epidemiology, Erasmus MC***	
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	• ***Dr. Annemarie I. Luik, PhD*** • ***Email:*** a.luik@erasmusmc.nl • ***Website:*** https://www.erasmusmc.nl/en/research/groups/psychiatric-epidemiology • ***Grants and Awards:*** • *European Sleep Research Society Top Young Researcher Abstract (2018)* • *Sleep Research Society Foundation Career Development Award (2019)* • *Netherlands Organization for Scientific Research (2020)* • ***Most important publications:*** • **Nature Hum Behav** 2020; in press. • **Mov Disord.** 2020; published online Sep 15. • **Alzheimers Dement** 2020; 16: 1259-1267. • **JAMA Psychiatry** 2019; 76: 21-30. • **JAMA Pediatrics** 2019; 173: 883-885. • **Nature Genet** 2019; 51: 387-393. • **Nature Comm** 2019; 15: 1521. • **Brain** 2019; 142; 2013-2022. • **NPJ Digital Med** 2018; 1:3 • **Lancet Psychiatry** 2017; 4: 749-758. • **Nature Genet** 2017;49: 274-281. • **Psychol Med** 2016; 46: 1951-1960. • **Mol Psychiatry** 2015; 20: 1232-1239.	• ***Dr. Daniel Bos, MD, PhD*** • ***Email:*** d.bos@erasmusmc.nl • ***Website:*** https://www.erasmusmc.nl/en/research/groups/imaging-of-arteriosclerosis • ***Grants and Awards:*** • *Royal Academy of Arts and Sciences Grant (2016)* • *Lourens Penning Prize for best publication in the field of Neuroradiology(2016)* • *BrightFocus Foundation Grant (2017)* • *Erasmus MC Mrace Grant (2019)* • *European Commission Horizon 2020 - Research and Innovation Framework Programme (2019)* • *Netherlands Organisation for Scientific Research (2019)* • ***Most important publications:*** • **JACC** 2020; 19;75:2387-2399. • **BMC Medicine** 2020; 18:263. • **Heart** 2020; 106(2):133-139. • **Plos Med** 2020; 17(5):e1003115. • **Eur Heart J** 2018; 39:3369-3376. • **JACC** 2018; 72: 582-584. • **Alzheimers Dement** 2018; pii: S1552-5260(18)30129-8. • **Eur Radiol** 2018; 2018: 28:3082-3087. • **Circulation** 2017; 135:2207-09. • **Circ Cardiovasc Genet** 2013; 2013; 6:47-53.
Project Title:	***Unravelling the role of vascular disease in depression***	
Abstract:	Depression remains one of the top causes of disability worldwide according to the World Health Organization. Interestingly, an increasing body of evidence shows a role for vascular disease in the development of depression at older ages. The current increase in the occurrence of depression around the age of 60 may even be largely attributed to vascular disease. However, important aspects of the relationship between vascular disease and depression remain poorly understood and require further investigation. An important topic within the field of research on vascular disease pertains to its location in the blood vessel system. Although vascular disease may occur anywhere in the body, the presence and amount of vascular disease may differ considerably across different blood vessels within the same person. As such, vascular disease located in the main blood vessels that provide the brain with blood may thus play a more important role in the development of depression and depressive symptoms than vascular disease in more distant arteries. The overall aim of this project is to comprehensively investigate the role of vascular disease in the development of depression and to better understand the potential causal link between vascular disease and depression. To accomplish this data from the large population-based Rotterdam Study (N=14,926), which has been running for more than 30 years, will be used. Within this cohort, medical imaging of the major arteries in the heart-brain axis has been performed. All persons are also extensively evaluated for depression, using questionnaires, clinical interviews and follow-up of medical records. Henceforth, the link between vascular disease and the development of depression can be established. The studies will be performed within the Psychiatric research group of the Department of Epidemiology and the Imaging of Arteriosclerosis research group of the Department of Epidemiology and Radiology. Moreover, we participate in different large consortia, including CHARGE and ENIGMA.	
Requirements of	• We are looking for a highly motivated, hardworking student to join our international and multidisciplinary team. Due to the nature of the project and data, strong statistical skills, good communication skills, and an interest in medical imaging and mental health are required. • The student should have completed an MD or MSc in Neurosciences, Psychology, Health Sciences, Epidemiology, or a related field. A good command of English is required (level of IELTS 7.0 (min 6.0 for all subs) or TOEFL 100 (min 20 for all subs). • Within the project the student will have access to the Rotterdam Study data, training in epidemiology and statistics, and the broader Erasmus MC research infrastructure. The scholarship will, at least, have to cover subsistence allowance and international air plane ticket. We are happy to help with the scientific part of your scholarship proposal, please contact dr. Annemarie Luik at a.luik@erasmusmc.nl or dr. Daniel Bos at d.bos@erasmusmc.nl.	

Department of Epidemiology

School/Department:	***Department of Epidemiology, Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics World no 21 Public, Environmental & Occupational Health	• **Dr.ir. Trudy Voortman** *Principal investigator Nutrition & Lifestyle Epidemiology, Life-course epidemiology* • **Email:** trudy.voortman@erasmusmc.nl • **Website:** www.erasmusmc.nl/en/research/groups/nutrition-and-lifestyle-epidemiology ; www.trudyvoortman.com • **Personal honors and grants:** • European Society for Clinical Nutrition and Metabolism (ESPEN) Fellowship 2020 • American Society for Nutrition – Peter Reed Award for outstanding research in macronutrient metabolism, 2018 • Thrasher Pediatric Medical Research Career Award, USA, 2016 • European Foundation for the Study of Diabetes Fellowship, 2015 • Selected member of the European Nutrition Leadership Platform (ENLP), 2015-present • **Most important publications:** Dr. Voortman has published over 100 international publications, of which more than 60 publications as direct supervisor of the researchers in her team. Most PhD students in our team write 5 to 8 publications as first author within their PhD project and contribute to additional papers as coauthor. All publications in our team have been published in journals in the top quartile of their field and more than half have been published in top-10% journals. Recent publications: - **BMJ**-British Medical Journal 2017;356:j1000. Dairy consumption and risk of hypertension. - **Lancet** 2018;391(10129):1513-23. Risk thresholds for alcohol consumption. - **The Lancet Diabetes & Endocrinology** 2017;5(5):367-76. Vitamin D in pregnancy and child bone health - **Gastroenterology** 2018; doi:10.1053/j.gastro.2018.02.024. Diet in early life and celiac disease - **Nature Medicine** 2019; doi: 10.1038/s41591-019-0547-7. Lifestyle and dementia risk. - **BMJ,** 2019. doi: 10.1136/bmj.l4292. Dietary fat and genetic risk of type 2 diabetes. - **Nature,** 2020 doi: 10.1038/s41586-020-2338-1. Global repositioning of non-optimal cholesterol. - **Clinical Nutrition,** 2020 doi: 10.1016/j.clnu.2019.01.021. Protein intake and diabetes risk (CSC project) - **Circulation Genom Precis Med.** 2020 doi:10.1161/CIRCGEN.119.002766. Diet and DNA methylation
Project Title:	**Nutrition and Lifestyle and cardiometabolic health across the life course: a focus on underlying pathways and mechanisms**
Abstract:	Nutrition and lifestyle affect health throughout the life course: from pregnancy and infancy to old age. In our research group, we study nutrition and other lifestyle factors in pregnant women, children, adults and elderly; and how diet and lifestyle impact health in these groups. In these projects, we also focus on underlying mechanisms of how nutrition affects disease risk, including e.g. inflammation, metabolomics, DNA methylation, and gut microbiome composition. The studies are performed within the Nutrition & Lifestyle research group at the Department of Epidemiology, one of the world leading academic centers in epidemiology. The candidate can use data from large cohort studies available at the department and through collaborations in consortia. Studies at the department for example include the Rotterdam Study, a population based study among 15,000 people followed since 1990 and the Generation R Study, a birth cohort study in 10,000 mothers and their children. Our Nutrition & Lifestyle team closely collaborates with other research lines at Erasmus MC and other institutes across Europe and the United States, including the departments of Nutrition at Harvard School of Public Health, Wageningen University, Cambridge University, Tufts University. For more information about our team and department, please check our webpages: www.erasmusmc.nl/en/research/groups/nutrition-and-lifestyle-epidemiology and https://www.erasmusmc.nl/en/research/departments/epidemiology
Requirements of candidate:	• We are looking for a highly motivated student to join our very international and multidisciplinary team. For these projects, using large datasets and in collaborations with various other research groups, strong statistical and good communication skills are required. • The candidate should have an MD or MSc degree in Health Sciences, Epidemiology, Biostatistics,. Nutrition Science, or a related field, and should be fluent in English (IELTS≥7.0 (≥ 6.0 for all subs), TOEFL ≥100 (≥ 20 for all subs). • We offer: Supervision by at least two supervisors, data access to cohort studies, advanced courses in epidemiology at our postgraduate research school NIHES, and other training. Your salary and living expenses should be covered by the scholarship. We are happy to discuss the details further with you directly and help with the scientific part of your proposal. Please contact dr. Trudy Voortman at trudy.voortman@erasmusc.nl

Department of Gastroenterology & Hepatology

In a nutshell:

- Head: Prof. dr Marco Bruno
- Staff: 6 hepatologists, 10 gastroenterologists
- Trainees/fellows: 19 trainees, 2 foreign fellows for advanced training (6 months)
- GI translational lab: head Prof. dr Maikel Peppelenbosch
- 55 PhD students on liver, GI, clinical and/or translational projects
- GI clinical research unit: datamanagers, research nurses, statistician
- Current world ranking: no 14 (US News subject ranking 2021)

Well established interdisciplinary working relationships with department of surgery, oncology and radiology with both clinical and research activities being initiated and steered by multidisciplinary interest groups (liver centre, pancreas centre, esophageal cancer center

Clinical and translational research is centered around the following main topics:

Gastroenterology:

Oncology

o Pancreatic cancer (early diagnosis in high risk individuals, pancreatic cyst differentiation and follow-up, optimal palliative treatment strategies, neoadjuvant treatment in stage II/borderline disease, folfirinox followed by radiotherapy in locally advanced disease, pancreatic biopsies and personalized medicine)

o Esophagal cancer (neoadjuvant treatment strategies, Barrett's esophagus identification biomarkers for better risk profiling, drug prevention of Barrett's)

o Colonic cancer (colonic cancer in high risk populations, general population screening for colonic cancer)

Advanced endoscopy

o Resection techniques (EMR/ESD)

o EUS (follow-up studies high risk pancreatic cancer, pancreatic cyst follow-up study, improving the yield of EUS-guided tissue sampling)

o ERCP (stenting of benign biliary strictures with metal stents, biodegradable stenting of pancreatic strictures, advanced endoscopic imaging of biliary tree and pancreas, tissue sampling)

o Esophagal stenting (optimal stent design and protocol in both malignant and benign strictures)

Inflammatory bowel disease

o Optimal en cost effective treatment with biologicals

o IDB and pregnancy

Hepatology:

o Viral hepatitis (novel treatment therapies, advanced imaging of the liver)

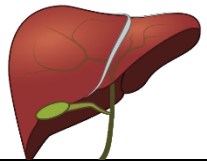
o Cirrhosis (early detection of HCC, treatment of complications of portal hypertension)

o Hepatocellular carcinoma (novel treatment strategies)risk profiling, prediction of response etc.

Publications, Grants:

See vacancy from the relevant PI

Department of Gastroenterology & Hepatology

School/Department:	***Department of Gastroenterology and Hepatology, Erasmus MC***
Supervisor information: world no 14 Gastroenterology & Hepatology 	**Andre Boonstra**, PhD, Associate Professor - Immunology of Viral Hepatitis and Liver Cancer ***Email:*** p.a.boonstra@erasmusmc.nl For information about our research and laboratory: www.viralhepatitis.nl and https://www.erasmusmc.nl/en/research/groups/chronic-viral-hepatitis-liver-cancer For information on our EU funded ESCALON project: www.escalon.eu ***Most relevant recent publications:*** *Hepatitis B core-specific memory B cell responses associate with clinical parameters in patients with chronic HBV. J Hepatol. 2020 Jul;73(1):52-61.* *Serum immune signatures associated with HCC development in DAA-treated HCV patients. Gastroenterology. 2018. Feb; 154(3):515-517.* *Serum Biomarkers for the Prediction of Hepatocellular Carcinoma. Cancers. 2021; 13(7):1681..* *Hepatitis B core-related antigen levels predict recurrence-free survival in patients with HBV-associated early-stage hepatocellular carcinoma: results from a Dutch long-term follow-up study. J Viral Hepat. 2021 Jan;28(1):205-208.*
Project Title:	***Immunology of persistent viral infections and biomarker studies to predict development of liver cancer.***
Abstract:	**The innate and adaptive immune response to HBV, HCV, HEV and HIV/HCV co-infections: NK and virus-specific T cells** Our previous studies have shown that NK cells from chronic HBV patients are functionally impaired. Moreover, we and others demonstrated that the virus-specific T cell compartment in chronic HBV/HCV patients is altered and not potent enough to eradicate the virus. The project is aimed at characterizing the functional defect of NK cell and T cell responses in patients in more detail, with special focus on the mechanisms that regulate and suppress these responses. During the project peripheral blood lymphocytes and also responses in the liver compartment will be assessed using flow cytometry with HBV/HCV/HIV tetramer-specific multimers and functional markers. Furthermore, highly sensitive assays to determine the function of NK cells and HBV/HCV-specific $CD4^+$ and $CD8^+$ T cells will be conducted in order to identify specific markers and mechanisms that initiate and maintain the chronicity of viral hepatitis infections. Besides characterization of the chronic phase of infection also changes in the immune response during standard-of-care and novel therapy and after stopping therapy will be assessed. The studies combine classical immunological studies with transcriptomics/proteomics to identify biomarkers that predict the response to therapy. For more information see: www.viralhepatitis.nl **Biomarker studies in viral hepatitis and HCC** Hepatobiliary malignancies represent a major cause of mortality globally. The most common tumors are hepatocellular carcinoma (HCC). Key factors related to the excessive mortality of these tumors are the lack of reliable screening methods and the complexity of diagnosis, which requires advanced imaging technology and difficult-to-access tissue. These barriers are amplified by poor accessibility present in resource-limited regions, all of which leads to tumors being diagnosed at advanced stages in which curative therapy is not an option. To overcome these barriers, we will validate immune-related markers in serum to predict HCC in South America and evaluate factors associated to early HCC development. This project advances the field by focusing on a unique approach to screen and diagnose tumors based on serum detection of biomarkers before a tumor is visible on imaging, allowing for early tumor detection in a cost-effective manner that will lead to implementation of curative therapies. In addition, this project addresses modifiable risk factors for hepatobiliary tumors that could be targeted for prevention.
Requirements of candidate:	• We are looking for highly motivated, talented students with a Master degree or MD, to join our research team. The scholarship will, at least, cover subsistence allowance and an international airplane ticket. • Working in the lab requires that the student has good communication skills. Therefore we have English language requirements: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs), for English speaking countries & the Netherlands: no language requirements applicable.

Department of Gastroenterology & Hepatology

School/Department:	***Department of Gastroenterology & Hepatology Erasmus MC***
Supervisor information: World no 14 Gastroenterology & Hepatology	• ***Sonja I. Buschow, PhD*** • ***Email:*** *S.Buschow@erasmusmc.nl* • ***Websites:*** Researcher - S.I. Buschow, PhD; Research group/lab - Antigen-based Immunotherapy group; (Sonja Buschow | LinkedIn) • ***Most important Grants:***. Health Holland/ TKI (Dutch government) grants for the development of **a peptide-based therapeutic vaccine** (400k€; 2017) against **chronic HBV infection** and its subsequent testing in **a Phase I study** (800k€; 2021) all in collaboration with Company ISA pharmaceuticals b.v. KWF (Dutch cancer association) grants for the development of **T cell therapy** for **liver cancer** (150k€; 2020) and the development of an **Mass Spectrometry-based Immunopeptidomics** approach to identify T cell targets (150k€; 2016). • ***Most important publications:*** Jansen et al., Clin Transl Immunology. 2021 Bouzid et al., Cancers. 2021 Dou et al., J Infect Dis. 2018 Buschow et al., J Hepatol. 2015 Buschow et al., Traffic 2009 Li et al., Hepatology. 2021 De Beijer et al., J Virol. 2020 Worah et al., Cell Rep. 2016 Tel et al. Blood. 2013 Van Niel et al., Immunity 2006
Project Title:	***Antigen-based Immunotherapy development for gastrointestinal & Hepatic disease***
Abstract:	**Our translational research projects are aimed at finding T cell targets for antigen specific immunotherapy development for different gastrointestinal and hepatic diseases, including viral hepatitis and cancers**. For this purpose we elucidate which antigens are presented as peptides in HLA both on professional antigen presenting dendritic cells (DCs) to initiate T cell responses, as well as on infected or malignant cells to be targeted by effector T cells. We **analyze HLA-eluates by Mass spectrometry** to get insight into (the regulation of) antigen processing, presentation and recognition in DCs and target cells and to **derive effective HLA-epitopes for immunotherapy**. In the lab we use various immunological assays to further investigate the significance of identified epitopes, to **test prototype vaccines** and to **study regulatory mechanisms** for disease specific immune responses. We have already developed a therapeutic peptide based vaccine for chronic hepatitis B infection that now awaits clinical testing and now aim to develop vaccines also for liver cancer and other gastrointestinal malignancies. In addition **we** intent to improve immunotherapy design and treatment regimens by researching which adjuvants or immune modulatory treatments (e.g. checkpoint inhibitors) can most effectively support antigen-based immunotherapy specific diseases or even patients.

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.
	• Master degree or MD with demonstrated experience in basic immunological and/or biochemical research techniques
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Gastroenterology & Hepatology

School/Department:	***Department of Gastroenterology & Hepatology Erasmus MC***

Supervisor information:
 	
World no 14 Gastroenterology & Hepatology
	• ***dr Qiuwei Abdullah Pan***, g.pan@erasmusmc.nl
	• ***Website:*** https://www.erasmusmc.nl/en/research/researchers/pan-q
	• ***Personal Grants (ongoing):***
	  • *Netherlands Organisation for Scientific Research, Vidi grant: € 800,000*
	  • *Dutch Cancer society young investigator grant, € 549.000…*
	• ***Most relevant recent publications as corresponding author:***
	1. LGR5 marks targetable tumor-initiating cells in mouse liver cancer. ***Nature Communications****. 2020 Apr 23;11(1):1961. doi: 10.1038/s41467-020-15846-0. (IF:* ***15****)*
	2. Cancer-Associated Fibroblasts Provide a Stromal Niche for Liver Cancer Organoids That Confers Trophic Effects and Therapy Resistance. ***Cell Mol Gastroenterol Hepatol****. 2021;11(2):407-431. (IF:* ***9.2****)*
	3. Estimating Global Prevalence of Metabolic Dysfunction-Associated Fatty Liver Disease in Overweight or Obese Adults. ***Clinical Gastroenterology and Hepatology****. 2021 Feb 20:S1542-3565(21)00208-1. (IF:* ***11.4****)*
	4. The biological process of lysine-tRNA charging is therapeutically targetable in liver cancer. ***Liver International****. 2021 Jan;41(1):206-219. (IF:* ***5.8****)*
	5. Dynamics of Proliferative and Quiescent Stem Cells in Liver Homeostasis and Injury. ***Gastroenterology.*** *2017 Oct;153(4):1133-1147. (IF:* ***22.7****)*
	6. Unphosphorylated ISGF3 drives constitutive expression of interferon-stimulated genes to protect against viral infections. ***Science Signaling****. 2017 Apr 25;10(476). pii: eaah4248. (IF:* ***8.2****)*
	7. SMAD4 exerts a tumor-promoting role in hepatocellular carcinoma. ***Oncogene****. 2015 Sep 24;34(39):5055-68. (IF:* ***9.9****)*
	
	Publication link (about 200 in total; >20 first authorship; >100 last/corresponding authorship publications)
	https://pubmed.ncbi.nlm.nih.gov/?term=Pan+Q%5BAU%5D+AND+%28Erasmus%29+OR+Pan%2C+Qiuwei&sort=date&size=100

Project Title:	***Understanding the biological and therapeutic implications of stem cells in liver cancer***
Abstract:	The key concept underlying the cancer stem cell (CSC) or tumor-initiating cell (TIC) theory is that tumors are maintained through a hierarchical structure, in which different cell populations have different functionalities in pathophysiology. The bulk of a tumor is thought to consist of CSCs/TICs as well as rapidly proliferating cells. CSCs/TICs are responsible for tumor initiation, resistance to conventional treatment, and distant metastasis. In the liver, we previously have characterized two populations of stem cells in responding to tissue injury, including the proliferative LGR5 stem cells and label-retaining quiescent stem cells. We further defined that the LGR5 compartment as an important CSC population, representing a viable therapeutic target for combating liver cancer. Hepatitis virus infection and fatty liver disease are the main causes of liver cancer. In this project, we aim to in depth understand the role of different stem cell populations in liver carcinogenesis and develop potential therapeutic targeting in the context of viral hepatitis and fatty liver disease-caused liver cancer.

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.
	• Master degree or MD with demonstrated experience in basic immunological and/or biochemical research techniques
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Gastroenterology & Hepatology

School/Department:	***Department of Gastroenterology & Hepatology Erasmus MC***

Supervisor information:
 	
World no 14 Gastroenterology & Hepatology
	• *dr Qiuwei Abdullah Pan, g.pan@erasmusmc.nl*
	• ***Website:*** *https://www.erasmusmc.nl/en/research/researchers/pan-q*
	• ***Personal Grants (ongoing):***
	  • *Netherlands Organisation for Scientific Research, Vidi grant: € 800,000*
	  • *Dutch Cancer society young investigator grant, € 549,000*
	• ***Most relevant recent publications as corresponding author:***
	1. *Potential association between COVID-19 mortality and health-care resource availability.* ***Lancet Global Health****. 2020 Apr;8(4):e480. (IF:* ***26.8****; Cited* ***530****)*
	2. *Estimating Global Epidemiology of Low-Pathogenic Human Coronaviruses in Relation to the COVID-19 Context.* ***Journal of Infectious Diseases****. 2020 Jul 23;222(4):695-696. (IF:* ***5.2****)*
	3. *Systematically mapping clinical features of infections with classical endemic human coronaviruses.* ***Clinical Infectious Diseases****. 2021 Aug 2;73(3):554-555. (IF:* ***9.1****)*
	4. *Hepatitis E virus infection activates NLRP3 inflammasome antagonizing interferon response but therapeutically targetable.* ***Hepatology****. 2021 Aug 15. doi: 10.1002/hep.32114. (IF: 17.4)*
	5. *Cross-reactivity towards SARS-CoV-2: the potential role of low-pathogenic human coronaviruses.* ***Lancet Microbe*** *2020 Aug;1(4), e151.*
	
	Publication link (about 200 in total; >20 first authorship; >100 last/corresponding authorship publications)
	https://pubmed.ncbi.nlm.nih.gov/?term=Pan+Q%5BAU%5D+AND+%28Erasmus%29+OR+Pan%2C+Qiuwei&sort=date&size=100

Project Title:	***Antiviral therapy development against human coronavirus infections***
Abstract:	Coronaviruses are a large family of RNA viruses circulating among a wide range of animal species. Seven types of coronaviruses naturally infect humans, although all of them are thought to originate from animals. The three highly pathogenic coronaviruses, including MERS-CoV, SARS-CoV, and SARS-CoV-2, can cause severe acute respiratory diseases in humans. By contrast, the four genotypes of low pathogenic human coronaviruses (LPH-CoV), including OC43, HKU1, 229E and NL63, usually only cause mild and self-limiting respiratory tract infections. Genetically, SARS-CoV-2, SARS-CoV, MERS-CoV, OC43 and HKU1 are betacoronaviruses, whereas 229E and NL63 are alphacoronaviruses. SARS-CoV-2 is most closely related to SARS-CoV, moderately to MERS-CoV and is slightly distal to LPH-CoV. LPH-CoV, including OC43, HKU1, 229E and NL63 are endemic and have been widely circulating among the global population for decades. We recently have comprehensively characterized the clinical features of LPH-CoV and they actually can cause severe outcomes in special patient populations. However, there is no approved medication for treating these infections. The unprecedented escalation of COVID-19 pandemic has called urgency for antiviral drug development. In this project, we aim to understand the antiviral mechanisms and develop antiviral therapies against both high and low pathogenic coronaviruses as well as possible new coronaviruses that may emerge in the future.

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.
	• Master degree or MD with demonstrated experience in basic immunological and/or biochemical research techniques
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of General Practice - Musculoskeletal disorders

The Department of General Practice is internationally renowned for its high-quality, innovative and multidisciplinary research on the diagnosis, prognosis and treatment of musculoskeletal disorders in primary care.

Main areas of research:
Early diagnosis, prognosis and (subgroup specific) treatment of musculoskeletal disorders, specifically:
(1) Osteoarthritis and related disorders
(2) Low back pain and neck/shoulder pain
(3) Musculoskeletal disorders in the young and active individual

Why choosing for this department?
The research is led by prof.dr. BW Koes (World #4 expert on back pain) and prof.dr. SMA Bierma-Zeinstra (World #5 expert on osteoarthritis). Together with a team of assistant/associate professors (2), post-doctoral researchers (4) and over 30 PhD-students, this vibrant research group delivers high-quality research, publishes is the top international journals in the field, is well acknowledged in multiple international guideline and guideline committees, and is an active player in multiple global and multi-disciplinary research projects. Within Erasmus MC, the research group works together with departments of Orthopedics, Radiology, Medical Imaging Processing, Internal Medicine, Genetics, Sports Medicine, Epidemiology, Biomechanics, and Rheumatology to address all aspects of musculoskeletal disorders. The department works with large data sets (Rotterdam Study; CHECK, BACE, OA Trial Bank) as well as with newly collected data for diagnostic/prognostic and interventional studies.

Honors & Awards (selection)
- Editorial Board Memberships of prestigious magazines: Osteoarthritis & Cartilage (Bierma-Zeinstra; associate editor), British Journal of Sports Medicine (Middelkoop, Macri)
- Personal Awards: Clinical Research Award by the Osteoarthritis Research Society International (2015)
- Personal Grants (NWO, ERC, other)
- NWO Vidi – €900K
- Collaborative Grants (NWO, Horizon2020, MSCA, other):
- NWO/ZonMw – 3 mil€
- Other (inter)national funds (incl. charity) – 20 mil€

Key publications of the department

Prof. BW Koes

Cochrane Database Sys Rev, 2020; 4(4):CD013581
BMJ, 2019; 367:l6273
The Lancet, 2018;391,10137
N Engl J Med, 2017;376(12):1111-1120
BMJ, 2012;344:e497
N Engl J Med, 2007;356(22):2245-56
Ann Intern Med, 2007;147(10):685-92

Prof. SMA Bierma-Zeinstra

Br J Sports Med, 2020; 54(14):822-824
Lancet, 2019; 393:1745-59
Nat Rev Rheum, 2019;15:438-448
Nat Rev Rheum, 2017;13(12):705-706
JAMA, 2017;318(12):1184
BMJ, 2017; 356:j1131
N Engl J Med, 2014;370(26):2546-7

Department of General Practice

School/Department:	***'Musculoskeletal disorders' at the Department of General Practice and Department of Orthopedic Surgery***
Supervisor information: world no 8 Surgery world no 21 Public, Environmental & Occupational Health world no 32 Clinical Medicine	• *Prof dr SMA Bierma-Zeinstra* • ***Email:*** *s.bierma-zeinstra@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/groups/general-practice* • ***Personal Grants:*** - *Early identification and prevention of knee osteoarthritis (NWO VIDI)* - *"Anna Prijs" (National award for excellent biomedical musculoskeletal research)* - *Clinical Research Award of the Osteoarthritis Research Society International (OARSI)* • ***Most important publications:*** - *Br J Sports Med 2020; 54(14):822-824* - *Lancet 2019; 393:1745-59* - *Nat Rev Rheumatol 2019;15:438-448* - *Ann Rheum Dis 2018;77:875-882* - *Nat Rev Rheum, 2017;13(12):705-706* - *JAMA, 2017;318(12):1184* - *BMJ, 2017; 356:j1131* - *N Engl J Med, 2014;370(26):2546-7* - *Nat Genetics, 2014;46(5):498-502* - *JAMA, 2013;310(8):837-847* - *Nature Rev Rheum, 2013;9(10):630-4* - *Nat Genetics, 2011;43(2):121-6* - *BMJ, 2010;341:c5688* - *JAMA, 2010;303(2):144-9* - *BMJ, 2009;339:b4074*
Project Title:	***The early diagnosis, prognosis and (subgroup specific) treatment of osteoarthritis***
Abstract:	Osteoarthritis is the most common form of rheumatic diseases. Due to the aging population and the high prevalence of overweight and obesity, the prevalence of osteoarthritis is rising. In the Netherlands, osteoarthritis is expected to be the most prevalent disease by 2040. The majority of patients with osteoarthritis are treated in primary care and orthopedic practice. Early diagnosis, identification of high-risk groups, and surrogate outcomes in early OA can help optimizing treatment for patients with osteoarthritis, or even prevention. As there is no cure for osteoarthritis, current treatment focusses on symptomatic relief. On average, treatment effects of guideline recommended treatments for osteoarthritis provide small to moderate improvements in pain and function. Nevertheless, subgroups of patient with osteoarthritis do respond strongly to certain types of interventions and should hence be identified for optimal treatments effect. Within this internationally renowned research group, multiple research projects on the epidemiology and (subgroup specific) treatment of osteoarthritis in primary care are available for highly motivated junior researchers.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using teamwork to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of General Practice

School/Department:	***'Musculoskeletal disorders' at the Department of General Practice***
Supervisor information: world no 21 Public, Environmental & Occupational Health world no 32 Clinical Medicine	• *Prof dr BW Koes* • ***Email:*** *b.koes@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/groups/general-practice* • ***Personal Grants:*** - *Advise and medical treatment of acute low back pain in primary care (NWO)* - *Medical treatment of sciatica in primary care (NWO)* • ***Most important publications:*** - *Cochrane Database Sys Rev, 2020; 4(4):CD013581* - *BMJ, 2019; 367:l6273* - *The Lancet, 2018;391,10137* - *New Engl J Med, 2017;376(12):1111-1120* - *BMJ, 2012;344:e497* - *New Engl J Med, 2007;356(22):2245-56* - *Ann Intern Med, 2007;147(10):685-92*
Project Title:	***Diagnosis and prognosis of musculoskeletal disorders***
Abstract:	Musculoskeletal disorders occur very frequently in primary care. The etiology, diagnosis and prognosis are often unknown, which hampers adequate management of patients presenting with these disorders in primary care. Our department is one of the international key-players in the field of musculoskeletal disorders in primary care. We are involved in a large number of cohort studies and clinical trials evaluating risk factors, the value of diagnostic- and therapeutic interventions, as well as studying the prognosis (and its determinants) of the most common musculoskeletal disorders presenting in primary care. This includes studies on low back pain, sciatica, neck and shoulder pain, knee pain (patellofemoral pain syndrome), ankle distortions, and osteoarthritis. We also study musculoskeletal disorders and sport injuries among the young and active individuals. Next to original research, the department is also active in writing systematic reviews and meta-analysis on these topics. The PhD-candidate will be active with (secondary) data-analysis, writing original research papers and systematic reviews within the field of musculoskeletal disorders in primary care.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Hospital Pharmacy

Department:	***Department of Hospital Pharmacy, Erasmus MC***
Supervisor information: World no 36 Pharmacology & Toxicology	Prof. dr.P.H.M. (Hugo) van der Kuy, Prof. dr. K.M. (Karel) Allegaert, Prof. dr. B.C.P. (Birgit) Koch, Associate prof. dr. L.E. (Loes) Visser **Email research coordinator:** *e.e.m.vankampen@erasmusmc.nl* **Website:** *https://www.erasmusmc.nl/en/research/departments/pharmacy* **Grants: Several national grants, IMI and the Combacte grant from European Union.** **Most important publications:** Abdulla, Alan et al. "Failure of Target Attainment of Beta-Lactam Antibiotics in Critically Ill Patients and Associated Risk Factors: A Two-Center Prospective Study (Expat)." Critical Care 24, no. 1 (2020/09/15 2020): 558. https://doi.org/10.1186/s13054-020-03272-z. Atrafi, Florence et al. "Intratumoral Comparison of Nanoparticle Entrapped Docetaxel (Cpc634) with Conventional Docetaxel in Patients with Solid Tumors." Clinical Cancer Research 26, no. 14 (2020): 3537. https://doi.org/10.1158/1078-0432.Ccr-20-0008. Francke, M. I. et al. "Monitoring the Tacrolimus Concentration in Peripheral Blood Mononuclear Cells of Kidney Transplant Recipients." Br J Clin Pharmacol (Oct 6 2020). Kloosterboer, S. M. et al. "Risperidone Plasma Concentrations Are Associated with Side Effects and Effectiveness in Children and Adolescents with Autism Spectrum Disorder." Br J Clin Pharmacol (Jul 9 2020). Sablerolles, R. S. G., et al. "Covid Medication (Comet) Study: Protocol for a Cohort Study." Eur J Hosp Pharm 27, no. 4 (Jul 2020): 191-93. Van den Anker, J. N., et al. "Approaches to Dose Finding in Neonates, Illustrating the Variability between Neonatal Drug Development Programs." Pharmaceutics 12, no. 7 (Jul 20 2020).
Project Title:	**PhD-projects in the hospital pharmacy, Erasmus MC**
Abstract:	Within our pharmacy, the goal is to individualize and optimize patient drug therapy. To achieve this our research is built on three research lines: *1. Medication optimization and safety* Research focused on the optimization of pharmacotherapy in primary care and in secondary or tertiary care settings. This domain also works on prevention of (re-)hospitalizations by optimizing pharmacotherapy. Within this research line, there is an epidemiological track. Head of department, prof. dr. P.H.M. (Hugo) van der Kuy, associate prof. dr. J. (Jorie) Vermissen, associate prof. dr. L.E. (Loes) Visser *2. Model-based dosing* No two patients are identical, so individual drug dosing can lead to better treatment. The focus is on pharmacokinetics (PK) and pharmacodynamics (PD), therapeutic drug monitoring (TDM), and their implementation in clinical practice. By the use of PK/PD models we establish the relation between drug dosage, drug concentration and drug effect and we implement the outcomes of our research in clinical practice. Principal investigator, associate professor, dr. B.C.P. (Birgit) Koch. *3. Pediatric and perinatal pharmacology* This research line includes different topics; prescribing to children, advanced therapy medicinal product (ATMP), oncology and radio-pharmacy. For children PK/PD modeling is a good way to achieve safe prescriptions of (off-label) drugs in neonatal intensive care. With the opening of our ATMP facility we are combining fundamental research and clinical practice. Furthermore we are innovative in the field of radio-pharmacy by labeling specific tracers. Upon that we are planning trials with 3D-printed tablets to optimize individual dosing. Team, prof. dr. K.M. (Karel) Allegaert, dr. R.B. (Robert) Flint , dr. E.J. Ruijgrok and dr. S.L.W. (Stijn) Koolen. Within these research lines, we also investigate education; for example the most effective teaching tools for medical students. Principal investigator, assistant professor, dr. F. (Floor) van Rosse. Further information: https://www.erasmusmc.nl/en/research/departments/pharmacy

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. The candidate should have great interest in the field of pharmacy, medication optimization, pharmacometrics, modelling and/or pediatric pharmacology.
	• Master degree or MD, in pharmacy, medicine, biomedical or biopharmaceutical sciences.
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we will help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Immunology

The mission of the Department of Immunology at Erasmus University Medical Center is to perform cutting edge and outstanding fundamental, translational and clinical research, provide excellent teaching in Immunology and support patient care with high quality immunological diagnostic services. Research in the department of Immunology spans molecular to clinical immunology and includes the development and function of innate and adaptive immunity, autoimmunity and inflammation, immune deficiencies, immunity to pathogens and tumors, neuroimmunology, computational biology in immunology and lymphoid malignancies.

The department of Immunology and its faculty have a long history of excellent training of PhD students in an intellectually stimulating and culturally diverse environment. The department of Immunology has state-of-the-art research facility, including bioinformatics, and provides an outstanding environment for PhD student training. Faculty of the department have extensive national and international collaborations, and a seminar series that provide excellent opportunities for students to network. Further information on the department, individual faculty and programs can be found at: https://www.erasmusmc.nl/immunologie/?lang=en .

Key publications 2020-21 by PI's of the Dept. of Immunology

Assmann, Jorn L.J.C. et al. 2021. "TRB Sequences Targeting ORF1a/b Are Associated with Disease Severity in Hospitalized COVID-19 Patients." *Journal of Leukocyte Biology*. (September 15, 2021).

Erkeland, Stefan J et al. 2021. "The MiR-200c/141-ZEB2-TGFβ Axis Is Aberrant in Human T-Cell Prolymphocytic Leukemia." *Heamatologica*.

Meijers, Ruud W.J. et al. 2020. "Responsiveness of Chronic Lymphocytic Leukemia Cells to B-Cell Receptor Stimulation Is Associated with Low Expression of Regulatory Molecules of the Nuclear Factor-KB Pathway." *Haematologica* 105(1): 182. (September 15, 2021).

Mueller, Yvonne M et al. 2021. "Immunophenotyping and Machine Learning Identify Distinct Immunotypes That Predict COVID-19 Clinical Severity." *medRxiv*: 2021.05.07.21256531. (May 18, 2021).

Orme, Michelle E. et al. 2021. "Systematic Review of Anti-DsDNA Testing for Systemic Lupus Erythematosus: A Meta-Analysis of the Diagnostic Test Specificity of an Anti-DsDNA Fluorescence Enzyme Immunoassay." *Autoimmunity Reviews*: 102943. (September 15, 2021).

van Riet, Job et al. 2021. "The Genomic Landscape of 85 Advanced Neuroendocrine Neoplasms Reveals Subtype-Heterogeneity and Potential Therapeutic Targets." *Nature Communications* 12(1): 1–14. (July 29, 2021).

Schrijver, Benjamin et al. 2020. "Inverse Correlation between Serum Complement Component C1q Levels and Whole Blood Type-1 Interferon Signature in Active Tuberculosis and QuantiFERON-Positive Uveitis: Implications for Diagnosis." *Clinical & Translational Immunology* 9(10): e1196. (September 15, 2021).

van der Velden, Vincent H. J. et al. 2021. "Potential and Pitfalls of Whole Transcriptome-Based Immunogenetic Marker Identification in Acute Lymphoblastic Leukemia; a EuroMRD and EuroClonality-NGS Working Group Study." *Leukemia 2021 35:3* 35(3): 924–28. (September 15, 2021).

Talarico, Rosaria et al. 2021 "The impact of COVID-19 on rare and complex connective tissue diseases: the experience of ERN ReCONNET". *Nature Reviews Rheumatology* 2021 17(3):177-84

Tyler, Paul M. et al. 2021. "Human autoinflammatory disease reveals ELF4 as a transcriptional regulator of inflammation". *Nature Immunology* 2021 22(9): 1118-26

Zhao, Manzhi et al. 2020. "Rapid in Vitro Generation of Bona Fide Exhausted CD8+ T Cells Is Accompanied by Tcf7 Promotor Methylation" ed. Annette Oxenius. *PLOS Pathogens* 16(6): e1008555. (November 24, 2020).

Editorial Board Memberships:

Associate Editor, Frontiers in Immunology (Katsikis); Review Editor, Frontiers in Genetics (Katsikis); Editorial Board Member in Cells and in BioMedInformatics (van de Werken), Section Editor, Journal of Immunology (Katsikis till 2014)

The department has a track record of external funding via grant support. Selected grants mentioned:

Horizon2020 (Drexhage), NWO Vidi (van Luijn; van der Burg) and Aspasia (van der Burg), NWO-VENI award, KWF-fellowship and cancer research grants (Erkeland), Worldwide Cancer Research Grant and NIH (Katsikis), DDHF (van de Werken), ReumaFonds (Versnel), Prinses Beatrix Spierfonds and Horizon2020 (Jacobs) and pharma industry (Langerak, van der Velden, van Hagen).

Department of Immunology

School/Department:	***Department of Immunology, Erasmus MC***
Supervisor information: World no 34 Immunology	•***Prof dr. P. Martin van Hagen;*** ***p.m.vanhagen@erasmusmc.nl*** •***Grants:*** - *IPAD trial: Influencing Progression of Airway Disease in patients with Primary Antibody Deficiency Genetics first in Primary Immune Deficiency, Netherlands Organisation for Health Research and Development, 2019* - *PIPGEN Project 7 : The role of PI3K neurodevelopmental disorders: Marie Sklodowska-Curie Grant , EU Horizon 2020, 2020* - *Moodstratification: EU Horizon 2020, 2018* •***Co-supervisor: Dr. Virgil A.S.H. Dalm*** •***Co-supervisor: Dr. Layal Chaker*** •***Secondary affiliation dr. Chaker:*** *Harvard T.H. Chan School of Public Health* •***Most important publications of supervisors:*** J Allergy Clin Immunol. 2016, PMID: 31268374 Blood, 2017, PMID: 28972011 Lancet, 2017, PMID: 28336049 Nature Communications, 2018, PMID: 30367059 Nature Communications., 2020, PMID: 32769997 Nature Immunology , 2021 PMID: 34326534 J Clin Immunol., 2021, PMID: 34505230 Nat Rev Rheumatoly, 2021, PMID: 33408338
Project Title:	***Deciphering the genomic and epi-genomic landscape of immunoglobulins***
Abstract:	Immunoglobulins (Igs) have a central role in the immune response by specifically recognizing and binding to particular antigens, such as bacteria or viruses, and aiding in their abolishment. The antibody immune response is highly complex and has recently gained general interest during the COVID-19 pandemic. Also, Igs, as well as the immune system in general, have been attributed a critical role in inflammation and inflammaging, potentially providing a viable target for age-related diseases such as cardiovascular disease (CVD). While certain environmental aspects influencing fluctuations and differences in serum levels of Igs have been uncovered, there is still little to no information on the genomic landscape involved in this process. Furthermore, differences in methylation, a process that can change DNA activity without changing its sequence, that may lead to differences between Igs and Ig response in the population, has never been study, but may be crucial. Unravelling essential genetic variations is pivotal for several outstanding issues including antibody responses to infections or vaccinations as well as clinically relevant diseases (e.g. immunodeficiency disorders). With this project we aim to decipher the genomic and epigenomic (methylation) landscape of immunoglobulins. • We will use genome-wide (GWAS) approaches to identify novel genetic variations responsible for immunoglobulin levels and responses with in the general population. • Investigating whether methylation pattern differences in the general population are associated with differences for immunoglobulin levels and response through a so-called Epigenome-wide association study (EWAS) • Construct polygenic risk scores to investigate potential causal association with inflammaging and inflammation-associated diseases, such as CVD and cancer. • Utilize Mendelian Randomization approaches for studying causality between immunoglobulins and age-related diseases.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD with a background in statistical programming, preferably R • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)* *We offer you:* • Overhead and material costs • Fees for relevant coursework and conferences

Department of Immunology

School/Department:	***Department of Immunology Erasmus MC***
Supervisor information: World no 34 Immunology	• *Prof dr. Anton W Langerak (supervisor)* • *Dr. Harmen JG van de Werken & Dr. Marco WJ Schreurs (co-supervisors)* • ***Email:*** *a.langerak@erasmusmc.nl and/or h.vandewerken@erasmusmc.nl and/or m.schreurs@erasmusmc.nl* • ***Website:*** Anton Langerak *and Harmen van de Werken& II and Marco Schreurs* ***Personal Grants:*** 1. *DDHF CCBC (2018)* 2. EU-TRANSCAN NOVEL (2019) • ***Most important recent relevant publications:|*** - **van de Werken, H. J. G.***, van Riet, J.*, …, Mostert, B. The genomic landscape of 85 advanced neuroendocrine neoplasms reveals subtype-heterogeneity and potential therapeutic targets. ***Nat. Commun.* 12,** 1–14 (2021). - **Assmann JLJC*, Kolijn PM*, Schrijver B*, … Langerak AW.** TRB sequences targeting ORF1a/b are associated with disease severity in hospitalized COVID-19 patients. J Leukoc Biol. 2021. Epub ahead of print. - van Riet, J., …, **van de Werken, H. J. G.** SNPitty: An Intuitive Web Application for Interactive B-Allele Frequency and Copy Number Visualization of Next-Generation Sequencing Data. ***J. Mol. Diagnostics* 20,** 166–176 (2018). - **van de Werken, H. J. G.**, …, Joffe, B. Small chromosomal regions position themselves autonomously according to their chromatin class. ***Genome Res.* 27,** 922–933 (2017). - **van de Werken, H. J. G**.*, Landan, G*., …, de Laat, W. Robust 4C-seq data analysis to screen for regulatory DNA interactions. **Nat. Methods** 9, 969–972 (2012)
Project Title:	***Precision medicine in an immune disease and cancer context using Machine learning and Artificial intelligence***
Abstract:	Machine Learning (ML) and Artificial Intelligence (AI) are key to better predict clinical outcome with highly complex clinical and molecular data sets. Moreover, these sophisticated methods can be applied to develop new algorithms and visualization tools to better understand basic cellular and molecular principles. In this project we aim to improve our biological understanding, diagnostic tools and response to therapy through ML and AI using different context-dependent -omics data sets in three subprojects: **1.** We will deeply interrogate whole transcriptome data to understand transcription and aberrant splicing in cancer. We will develop new algorithms[5] and visualization tools[3] and integrate whole genome data and chromosome conformation data when necessary [1,4].This can lead to many novel insights in cancer development and potential new therapies in this devastating disease. **2.** We will use immune receptor repertoire ("immunome") data from lymphoproliferative disease to identify context-dependent profiles of immune cells[2]. These profiles can support precision medicine through 1) definition of benign and malignant immune cell clones (diagnostics/prognostics) 2) traceability of clones upon therapy (monitoring), and 3) identification of disease-specific patterns to guide therapeutic decision making (theranostics). Examples of the impact of immunome analysis in a broader context include: Stereotyped BCR subsets in chronic leukemia with different prognostics, minimal disease monitoring, eligibility for immune therapy, TCR profiles with disease impact in cancer but also infectious disease, e.g. COVID-19. **3**. We aim to improve allergy diagnostics based on the IgE profile of allergic individuals. The newly developed Allergy Explorer (ALEX) allows the acquisition of an IgE profile comprising 282 allergen extracts and components. The major challenge is the correct and clinically useful interpretation of such extensive IgE profiles, including reactivity of variable clinical implication. AI may support the clinician in the interpretation of the IgE profiles in combination with clinical signs and symptoms, and other clinical and demographic patient characteristics. Based on these projects we hope to show that ML and AI supported clinical decision making as such may significantly benefit future treatment of cancer and immunological disease at a personal level (Precision Medicine).
Requirements of candidate:	○ We are looking for a candidate with strong analytical and problem-solving skills, being highly motivated and having excellent communication and writing skills and being able to work independently. A background in immunology and/or cancer biology is of significant added value. • Master's degree in bioinformatics, computational biology, statistics, or a related field. • The candidate should have demonstrated excellent scientific writing and software engineering skills in R and Python or Perl. • Scholarship that will, at least, cover subsistence allowance and international airplane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Internal Medicine – Calcium & Bone Metabolism

Why would you do scientific research on bone?

Contrary to general belief, the skeleton is a highly dynamic organ where many energy demanding processes take place, such as life-long bone remodeling, stem cell renewal, hematopoiesis and mineral homeostasis. Therefore, bone plays a central role in a wide variety of diseases affecting millions of people world-wide. Our international team is working on 3 main research lines: 1) Bone regeneration: We aim to characterize the mechanisms behind bone cell differentiation and underlying bone formation and degradation to gain insight into diseases where bone formation is not well controlled (osteoporosis, craniosynostosis) or during fracture healing. 2) Bone metastases: We study the complex interactions between bone metastatic cancer cells and osteoblasts to identify new therapeutic approaches in bone metastases and potentially diagnostic profiles. 3) Rare bone diseases: We investigate the molecular mechanisms of rare, monogenic human diseases of disturbed bone and mineral metabolism as well as candidate bone anabolic genes derived from large population-based genetic studies.

Group of Calcium & Bone metabolism: we have trained over 25 PhD students and have published around 250 papers. Our team has been involved in numerous (inter)national collaborations/grants, and we list a few European grants to give you an impression:

- FP6: GEFOS, NucSys (Marie Curie RTN)
- FP7: GENOMOS, PEOPLE IRSES network INTERBONE, BioInspire
- Horizon2020: MCSA-RISE

Publications:

- Lodberg A et al. A follistatin-based molecule increases muscle and bone mass without affecting the red blood cell count in mice. FASEB J. 2019;33(5):6001-6010
- Mumtaz N et al. Zika virus infection perturbs osteoblast function. Sci Rep. 2018;8(1):16975
- Brum A et al. Mucin 1 (Muc1) deficiency in female mice leads to temporal skeletal changes during aging. JBMR Plus. 2018;2(6):341-350
- Baroncelli M et al. Human osteoblast-derived extracellular matrix with high homology to bone proteome is osteopromotive. Tissue Eng Part A. 2018;24(17-18):1377-1389
- Koek N et al. Osteoclastogenic capacity of peripheral blood mononuclear cells is not different between women with and without osteoporosis. Bone. 2017;95:108-114
- Morhayim J et al. Osteoblasts secrete miRNA-containing extracellular vesicles that enhance expansion of human umbilical cord blood cells. Sci Rep. 2016;6:32034
- Brum A et al. Connectivity Map-based discovery of parbendazole reveals targetable human osteogenic pathway. Proc Natl Acad Sci U S A. 2015;112(41):12711-6

Contact information: Dr. Bram CJ van der Eerden, b.vandereerden@erasmusmc.nl , +31(10)7032841, @eerden1970, Skype: bramvandereerden; website: https://publons.com/researcher/2698444/bram-cj-van-der-eerden/

Dept of Internal Medicine – Calcium & Bone Metabolism

School/Department:	***Department of Internal Medicine-Calcium and bone metabolism, Erasmus MC***
Supervisor information: world no 27 Endocrinology & Metabolism	• **Bram C.J. van der Eerden, PhD;** b.vandereerden@erasmusmc.nl • **Website:** - https://www.erasmusmc.nl/en/research/researchers/eerden-bram-van-der - https://publons.com/researcher/2698444/bram-cj-van-der-eerden/ • **Personal grants:** - 2018-2022: Health~Holland, TKI, - 2016-2020: Horizon2020-MCSA-RISE-2015 - 2012-2016: FP7-PEOPLE-2011-IRSES • **Most important publications (Total publications, 96; H-index, 26)** - Brent et al., **Bone**. 2021; 142: 115692 - Van Hengel et al., **Mater Today Bio**. 2020; 7: 100060 - Fecher-Trost et al. **J Bone Miner Res**. 2019;34(4):699-710 - Lodberg et al. **FASEB J**. 2019;33(5):6001-6010 - Brum et al. **JBMR Plus**. 2018;2(6):341-350 - Mumtaz et al. **Sci Rep**. 2018;8(1):16975 - Vermeij et al. **Nature**. 2016;537(7620):427-431 - Zambetti et al., **Cell Stem Cell**, 2016; 19(5): 613-627 - Brum et al. **Proc Natl Acad Sci** U S A. 2015;112(41):12711-6
Project Title:	**Integrative approach to study bone regeneration**
Abstract:	Contrary to common belief, bone is a highly dynamic and vital organ with a multitude of events taking place, such as continuous bone remodeling, stem cell renewal, hematopoiesis, mineral homeostasis, etc. Osteoporosis, in which often several of these processes are affected, is the most common skeletal disorder, affecting many millions of patients globally. As a consequence, every 3 seconds an individual suffers from a fracture worldwide, of which 10% does not heal well (non-union fractures). Given its complexity and multitude of cell types involved, it is difficult to study specific processes taking place in the regenerating skeleton *in vivo*. Within the laboratory of Calcium and bone metabolism, we therefore use a multidisciplinary approach to identify new factors and mechanisms involved in bone formation and bone regeneration. We study bone formation and healing in human bone cell models by manipulating genes of interest and the consequences for mesenchymal stromal cell-derived osteogenesis and adipogenesis and the effects on other cell types in the bone marrow niche including endothelial cells. Promising new candidates are also being scrutinized in *in vivo* osteoporosis and bone fracture/regeneration models. Among the currently employed state-of-the-art methodologies, we use organ-on-chip (OoC) microfluidics to study cell-cell interaction under physiological cues, CrispR-Cas9-mediated gene editing but also biomaterial sciences and 3D (bio)printing. By studying a combination of bone formation, angiogenesis, 3D-printed scaffolds and newly discovered genes/compounds, we obtain insights into novel physiologically relevant and targetable processes in bone metabolism and provide a better understanding towards therapeutic approaches to improve bone regeneration and shorten the societal and financial burden associated with fractures. The qualified candidate will work within international teams of scientists in an interdisciplinary setting, and will receive both theoretical training and hands-on training in a large range of cutting-edge techniques. PhD students are supported by a supervision committee, participate in scientific and professional skills courses, attend international conferences and receive career development support.
Requirements of candidate:	• Background: Cell biology, molecular biology, biomedical, creative, punctual, enthusiastic, communicative • Master degree or MD, animal experimentation permit is preferred. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ English speaking countries & Netherlands: no requirement ○ Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept of Internal Medicine – Calcium & Bone Metabolism

School/Department:	***Department of Internal Medicine-Calcium and bone metabolism, Erasmus MC***
Supervisor information: world no 27 Endocrinology & Metabolism	*Dr. Marjolein van Driel, Prof. Dr. Hans van Leeuwen* *m.vandriel@erasmusmc.nl, j.vanleeuwen@erasmusmc.nl* *https://www.erasmusmc.nl/en/research/groups/laboratory-for-calcium-and-bone-metabolism* ***Recent publications:*** *J Cell Physiol. 2020 May;235(5):4865-4877. doi: 10.1002/jcp.29365* *FASEB J. 2020 Apr;34(4):5435-5452. doi: 10.1096/fj.201902610R* *Front Bioeng Biotechnol. 2019 Mar 1;7:38. doi: 10.3389/fbioe.2019.00038.* *FASEB J. 2019 May;33(5):6001-6010* *J Cell Physiol. 2019 Mar;234(3):2984-2996* *Eur J Immunol. 2018 Feb;48(2):220-229* *Tissue Eng Part A. 2018 24(3-4):207-218* *Adv Healthc Mater. 2018 e1800507. 2018 doi: 10.1002/adhm.201800507* *Bone 2018 117:70-8* *J Bone Miner Res. 2018 33(4):606-620* *J Cell Physiol. 2018 doi: 10.1002/jcp.27116* *Tissue Eng Part A. 2018 24(17-18):1377-1389* *J Cell Physiol. 2018 233(1):387-395* *J Cell Physiol. 2018 233(6):4895-4906* *J Cell Physiol. 2018 233(2):1424-1433* *Mol Cell Endocrinol. 2017 453:46-51* *Biochim Biophys Acta. 2017 1864(7):1133-1141* *Stem Cell Reports. 2017 Apr 11;8(4):947-960*
Project Title:	**Dormant cells (cancer stem cells) in bone metastases**
Abstract:	The special milieu of the bone environment provides a fertile soil for many cancers to metastasize to. But especially for patients with breast or prostate tumors, metastatic cells preferentially go to the bone. The consequences of bone metastases are devastating and patients die because of complications to the bone. Despite the discovery of many factors involved, no cure has yet been found for bone metastases. The metastatic process is determined by highly specific interactions between disseminating cancer cells and the bone microenvironment. Recent research in our lab focuses on the role of the osteoblasts (bone forming cells) in metastatic growth. We developed co-culture models of osteoblasts and different types of metastatic prostate cancer cells (bone or non-bone derived). Only bone derived metastatic cancer cells can survive and grow in bone by impairing osteoblast differentiation and so keep osteoblasts in a tumor cell growth stimulatory stage: a vicious circle. When cancer cells metastasize to the bone, they can stay dormant for years in the bone before colonization and expansion takes place. These dormant cells are thought to be the cancer stem cells. **Finding markers to trace these dormant cells and exploring the mechanisms that trigger these dormant cells to start proliferating in the bone environment are the main goals of the current PhD project.** By performing co-culture models of differentiating osteoblasts and surviving (dormant) metastatic prostate cancer cells, we obtained gene profiles (micro-array) that specifically characterize these dormant cancer cells. These will be the basis to further discover new (protein) markers. Functional studies will focus on re-activation of dormant cells and studies to unravel the factors in the bone that trigger re-activation of dormant cancer cells. We will make use of GFP transduced human metastatic prostate cancer cells to be able to distinguish them from human osteoblasts. ***The obtained knowledge will be used to develop new therapies for bone metastases***

Requirements of candidate:	• Background: Cell biology, molecular biology, interest in cancer research, creative, punctual, enthusiastic, communicative
	• Master degree or MD
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  • English speaking countries & Netherlands: no requirement
	  • Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept of Internal Medicine – Cardiovascular Pharmacology

School/Department:	***Department of Internal Medicine-Cardiovascular Pharmacology, Erasmus MC***
Supervisor information: world no 36 Pharmacology & Toxicology	• ***Prof. Dr. Antoinette Maassen van den Brink*** • ***Email: a.vanharen-maassenvandenbrink@erasmusmc.nl*** • ***Website: https://pharma.erasmusmc.nl/migraine.html*** • ***Grants:*** *- Dutch Research Council: Veni (2004), Vidi (2011), Vici (2020)* *- Conacyt: several grants (3x postdoc, 2x PhD student)* *- Secretaría de Eduacación, Ciencia, Tecnología e Innovación. Mexico City (1x postdoc)* *- Dutch Heart Foundation* *- Dutch Brain Foundation* *- Berlin Institute of Health* • ***Most important publications:*** 1. *Van Casteren, D.S., Kurth, T., Danser, A.H.J., Terwindt, G.M., MaassenVanDenBrink, A. (2021). Sex differences in response to triptans: A systematic review and meta-analysis. Neurology, 96:162-170.* 2. *MaassenVanDenBrink, A., Reekers, M., Bax, W.A., Ferrari, M.D., Saxena, P.R. (1998). Coronary side effect potential of current and prospective antimigraine drugs. Circulation, 98:25 30.* 3. *MaassenVanDenBrink, A., Meijer, J., Villalón, C.M., Ferrari, M.D. (2016). Wiping out CGRP - potential cardiovascular risks. Trends in Pharmacological Sciences, 37:779-88.* 4. *De Vries, T., MaassenVanDenBrink, A. (2019). Monoclonal antibody targeting CGRP in difficult-to-treat migraine. Nature Reviews Neurology, 15:688-689.* 5. *Al-Hassany, L., MaassenVanDenBrink, A. (2020). Targeting CGRP in migraine: a matter of choice and dose. Lancet Neurol, 19:712-713.* 6. *Mulder, I.A., Li, M., de Vries, T., Qin, T., Yanagisawa, T., Sugimoto, K., van den Bogaerdt, A., Danser, A.H.J., Wermer, M.J.H., van den Maagdenberg, A.M.J.M., MaassenVanDenBrink, A., Ferrari, M.D., Ayata, C. (2020). Anti-migraine CGRP receptor antagonists worsen cerebral ischemic outcome in mice, Ann Neurol, 88:771-784.* 7. *MaassenVanDenBrink, A., Meijer, J., Villalón, C.M., Ferrari, M.D. (2016). Wiping out CGRP - potential cardiovascular risks. Trends in Pharmacological Sciences, 37:779-88.*
Project Title:	***Migraine: the role of CGRP and cardiovascular safety of CGRP (receptor) blockade***
Abstract:	**Background:** Migraine is a highly disabling and prevalent disorder, occurring 2-3 times more often in females than in males. A novel class of antimigraine drugs consists of antibodies against Calcitonin Gene-Related Peptide (CGRP) or its receptor. While blocking CGRP may be a big advantage for migraine patients without a good response to current therapies, the potential risks of 'wiping out' the vasodilator CGRP, which is thought to have a rescue function in case of threat of ischemia, should be well studied. Further, the role of CGRP may be different in male and female migraine patients, which is relevant in view of the predominance of migraine in females. **Project description:** The current PhD project will focus on the (neuro)vascular role of CGRP, with a special emphasis on the role of sex hormones on the CGRP-ergic system. We will use animal in vivo models as well as human blood vessels in vitro. Depending on the interest of the PhD student, also human in vivo and/or epidemiological studies could be part of this project. **Expected result:** A typical Dutch PhD thesis, containing multiple published papers in top pharmacological or neurological journals. The PhD student will work with an extensive team of basic scientists, clinicians, and technicians, allowing him/her to cover both preclinical and clinical research. **PhD student profile:** Ideally, the student has a solid background in physiology and pharmacology, and some experience with animal research, biochemistry and molecular biology. He/she does not need to be a clinician.

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.
	• Master degree or MD
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept of Internal Medicine – Genetics Lab & Population Genomics

School/Department:	**Department of Internal Medicine-Genetics Lab & Population Genomics, Erasmus MC**
Supervisor information: World no 13 Collaboration Big Science - Genetics world no 27 Endocrinology & Metabolism	• *Prof dr. M.C. (Carola) Zillikens;* ***Email:*** *m.c.zillikens@erasmusmc.nl* ***Websites:*** *http://glimdna.org/ ; https://www.erasmusmc.nl/en/research/groups/genetic-laboratory-of-internal-medicine ; https://www.erasmusmc.nl/en/research/researchers/zillikens-carola ; https://www.erasmusmc.nl/en/research/groups/laboratory-for-calcium-and-bone-metabolism* • ***Grants:*** *Several grants from Dutch and Australian Government and private foundations* • ***Most important publications:*** 1. *Waqas K, Chen J, et al. J Bone Miner Res. 2020 May 28. doi: 10.1002/jbmr.4096.* 2. *van den Beld AW,. Lancet Diabetes Endocrinol. 2018 Aug;6(8):647-658* 3. *Jiang X, et al. Nat Commun. 2018 Jan 17;9(1):260.* 4. *Zillikens MC* , et al Nature Commun 2017 Jul 19;8(1):80.* Erratum in: *Nat Commun. 2017 Nov 7;8(1):1414.* 5. *Zheng HF, et al. Nature. 2015 Oct 1;526(7571):112-7* 6. *Locke AE, et al. Nature. 2015 Feb 12;518(7538):197-206.* 7. *Shungin D, et al. Nature. 2015 Feb 12;518(7538):187-96.* 8. *van Dijk FS*, Zillikens MC*, et al. N Engl J Med. 2013 Oct 17;369(16):1529-36.* 9. *Zhu H, et al. Cell. 2011 Sep 30;147(1):81-94* 10. *Kilpelainen TO, et al. Nat Genet. 2011 Aug;43(8):753-60*
Project Title:	***Advanced glycation end products in relation to ageing & age-related diseases***
Abstract:	Advanced glycation end products (AGEs) are heterogeneous glycated products that accumulate in the body over lifetime as part of normal ageing but increased under certain conditions. It is becoming more and more clear that they are involved in age-related related diseases as evidence from population studies and wet-lab studies accumulates (Singh et al. 2001). AGEs (e.g. glucospane, pentosidine and carboxymethyllysine) are produced after glycation of protein amino acid residues, lipids or nucleic acids and sometimes through oxidation without enzymatic catalysis (Vistoli et al. 2013). They tend to accumulate in long-lived tissues because of irreversible formation and limited clearance. In diseases such as diabetes and renal failure, the accumulation of AGEs is accelerated and lifestyle factors such as smoking and diet also contribute to the accumulation (van Waateringe et al. 2016). AGEs can exert influence through several mechanisms, e.g., through formation of cross-links in extracellular matrix or binding to its transmembrane receptor RAGE. Several studies have found some evidence of an association between AGEs and type 2 diabetes and complications, cardiovascular diseases, and neurodegenerative diseases (Chaudhuri et al. 2018). However, large-scale population based studies are scarce. Within the Rotterdam Study - a large population-based prospective cohort study in the Netherlands - we have assessed AGEs accumulation level in the skin as a reflection of AGEs accumulation in long-lived tissues using a device called the AGE ReaderTM. It measures the skin fluorescence based on the fluorescent property of several AGEs and so far 3009 participants had the measurement from 2013-2016. WE have shown cross-sectional associations between skin AGEs and several traits including vitamin D levels (Chen J et al. 2018), bone fractures (Waqas K 2020), cognition (Chen J et al unpublished, Mooldijk et al 2020) and cardiovascular diseases (Chen J. et al unpublished). We also have estimated dietary AGEs intake from previous visits and have shown a weak relation with skin AGEs (Chen J et a.l 2020) and with stool microbiome (Chen J et al. unpublished) and fractures (Waqas K et al. 2020). Follow-up data on incident diseases are being collected every 3-5 years. Repeated measurements of skin AGEs are planned for 2021. We plan to also measure levels of AGEs in serum. In the current project, we aim to study the association between skin AGEs and serum and dietary AGEs using prospective data on incident disease events and perform repeated measurements of skin AGEs. We also plan genetic studies performing GWAS on skin AGEs and through Mendelian Randomisation (MR) techniques we want to study whether the observed associations are causal. We plan to do this in international consortia, where the Rotterdam Study group has leading roles. The Rotterdam Study has been designed by the Department of Epidemiology of Erasmus MC, featured with densely and deeply phenotyped baseline and follow-up information on incident diseases, multi-layer omics data including genome-wide association studies, whole exome sequencing, transcriptomics, methylation and microbiome data as well as detailed life style information including dietary information, medical history and medication use.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: *English speaking countries & Netherlands:* no requirement *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept of Internal Medicine – Genetics Lab & Population Genomics

School/Department:	***Department of Internal Medicine-Genetics Lab & Population Genomics, Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics world no 27 Endocrinology & Metabolism	•Prof. Dr. Joyce B.J. van Meurs (j.vanmeurs@erasmusmc.nl) •Dr. Cindy Boer (c.boer@erasmusmc.nl) Postdoctoral researcher •**Website:** http://www.glimdna.org ; https://www.linkedin.com/in/joyce-van-meurs-78171313/; https://www.erasmusmc.nl/en/research/researchers/meurs-joyce-van •**Key words: Population genomics, novel analytic techniques, international and multidisciplinary collaboration, learning environment** •**Grants:** - NWO-VIDI (prestigious Dutch personal grant): *€900K*) - H2020 EU: €1500K of in total €12000K - National Heart, Lung and blood institute (NIH, USA):$350K of in total $5000K - BBMRI-NL roadmap: *€2500K* - Multiple ZONMW-grants (Dutch Government funding scheme) In total >€1000K - Erasmus strategic grant: €500K •***Most important publications:*** **Cell** 2021 184:4784-4818 (2021) **IF: 38.6]** **Ann Rheum Dis** 2020 80:598-604) (2021) **[IF:12.4]** **Genome Biol.** 2019 Nov 14;20:235 **[IF:13.2]** **Nat Genet**. 2017 Jan;49(1):131-138. **[IF:27.1]** **Nat Commun**. 2015;6 **[IF14:11.3]** **Lancet.** 2010 Jul 17;376(9736):180-8 **[IF: 33.6]** **Ann Rheum Dis** 2020 80:367-375) **[IF:12.4]** **Nat Commun.** 2019 Oct 25;10(1):4881. **[IF:11.9]** **Nature.** 2017 Jan 5;541(7635):81-86. **[IF:41.6]** **Nat Genet.** 2017 Jan;49(1):139-145 . **[IF:27.1]** **Proc Natl Acad Sci,** 2012 22;109(21):8218-23 **[IF:9.9]**
Project Title:	***Large scale population genomics to unravel mechanisms of locomotor diseases***
Abstract:	The Genetic Laboratory of the Department of Internal Medicine has a longstanding tradition and reputation in genomics research, positioned as one of the leading centers in the field of genomics of complex diseases worldwide, with particular focus on locomotor diseases. Prof. Joyce van Meurs has excellent track record in population genetics and genomics studies in osteoarthritis, chronic pain and biological aging. We offer an interesting and challenging position in a multidisciplinary research environment. The project focusses on combining and examining multiple molecular level data ((epi)genetics, transcriptomics, proteomics, metabolomics, microbiome) to understand mechanisms of diseases of the locomotor system, such as chronic pain and osteoarthritis. The hallmark of population genomics research is the agnostic, large-scale nature of the data, which allows for novel biological pathways to be discovered. The project is embedded within well-known large scale population studies (Rotterdam Study and Generation R), which have comprehensive phenotyping (including detailed imaging data) as well as a wealth of molecular data available. We also have full access to the UK-biobank data a frequently utilized database for genomics studies. Research will take place in multidisciplinary international consortia, in which the group is well-known and has a leading role. You will explore the available molecular and detailed phenotype data using state-of-the-art analysis techniques (including machine-learning/AI/MR). The aim is to translate the findings of our population genomics studies into two directions: 1. Mechanic studies where cell models are used to further study the identified mechanisms; this includes using IPS-cells as a personalized model for disease (done in collaboration with cell biology lab) 2. Application of novel findings into clinic in collaboration with clinical departments.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept of Internal Medicine – Genetics Lab & Population Genomics

School/Department:	***Department of Internal Medicine-Genetics Lab & Population Genomics, Erasmus MC***
Supervisor information: World no 13 Collaboration Big Science - Genetics world no 27 Endocrinology & Metabolism	• *Prof. Fernando Rivadeneira (f.rivadeneira@erasmusmc.nl), Full Professor* • *Dr. Ling Oei (h.l.d.w.oei@erasmusmc.nl), Assistant Professor* • *Dr. M. Carolina Medina Gomez (m.medinagomez@erasmusmc.nl), Post-doctoral Scholar* • ***Website:*** *http://glimdna.org* • ***Grants:*** - *ERC Advanced Grant 2021: €2,500K* - *Coordinating center European Commission-FP7: HEALTH-2007: €3,000K* - *Co-Principal investigator/subcontractor US Government-NIH/R01 2010: $150K of $2,500K* - *Netherlands Consortium of Healthy Aging (NCHA): 2009-2012: €200K* - *Project manager NWO GROOT Investeringen 2006: €6,000K* - *NWO VIDI €800K* - *EU European cooperation in science and technology €150K* - *Marie Skłodowska-Curie Innovative Training Network €520K of €3,800K* - *Erasmus MC fellowship €400K* • ***Most important publications:*** 2008: Lancet, 371(9623): p. 1505-12. IF:38.3 — 2009: Nat Genet 41, 1199-206. IF:36.4 2010: Nature 467, 832-8 IF:36.3 — 2012: PLoS Genet, Jul;8(7):e1002718. Epub 2012 Jul 5 IF:9.5 2012: Nature Genetics;44(5):491-501. IF:35.2 — 2012: Diabetes Care;36(6):1619-28. IF:8.57 2016: J Bone Miner Res;31(5):1099-106. IF:6.3 — 2017: Nat Commun;8(1):121. IF: 12.4 2018: Am J Hum Genet;102(1):88-102. IF: 9.9 — 2018: BMJ;362:k3225. IF:27.6 2019: Diabetes Care; 43(1):137-144. IF: 13.4
Project Title:	***Osteoporosis and Environmental Pollution assessed by a Multi-system Approach***
Abstract:	The Genetic Laboratory of the Department of Internal Medicine has a longstanding tradition and reputation in genomics research and epidemiology, positioned as one of the leading centers in the field of genomics of complex diseases worldwide, with particular focus on musculoskeletal diseases. Our approach is multidisciplinary, combining epidemiology with large-scale genomic and (more recently) microbiome research. The lab is also home to the Generation R and Rotterdam Study cohorts and coordinates the EU-Funded Genetic Factors for Osteoporosis Consortium (GEFOS) consortium and the GEnomics of MusculoSkeletal traits TranslatiOnal expertise Network (GEMSTONE). Prof. Fernando Rivadeneira has excellent track record in genome-wide association studies (GWAS), the epidemiology of diabetic bone disease and Mendelian Randomization (MR) studies. We offer an interesting and challenging position in an ambitious yet friendly scientific and clinical research environment (http://glimdna.org). PhD project: You will investigate the influence of environmental pollutants in bone health, through the assessment of endocrine-disrupting chemicals in clinically recruited osteoporosis patients. These individuals will also receive extensive radiological scans and hormone tests in a multi-omic approach, to study the potential underlying pathophysiological mechanisms in different organ systems. Also, questionnaires are collected to potentially advise on healthy lifestyle. Data will be analyzed with both conventional statistics and explorative advanced techniques. Further, collaborative side-projects are possible, including: genetics of diabetic bone disease in type 2 diabetes mellitus in big datasets from population-based studies and clinical cohorts, the potential role of the gut microbiome in the relation of type 2 diabetes and bone disease, clinical risk prediction from polygenic risk scores for various diseases.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept of Internal Medicine –Metabolism & Reproduction

School/Department:	***Department of Internal Medicine-Metabolism & Reproduction, Erasmus MC***
Supervisor information: world no 27 Endocrinology & Metabolism	• ***Dr. Ir. Jenny A. Visser*** • ***Email:*** *j.visser@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/groups/metabolism-and-reproduction* *https://www.linkedin.com/in/jenny-visser-1375357/* • ***Grants:*** - *2019 - 2022 Health Holland TKI grant* - *Royalties* • ***Most important publications:*** - Hoyos LR et al. Loss of anti-Müllerian hormone (AMH) immunoactivity due to a homozygous AMH gene variant rs10417628 in a woman with classical polycystic ovary syndrome (PCOS). Hum Reprod. 2020, 35(10):2294-2302. - Moolhuijsen LME, Visser JA. Anti-Müllerian Hormone and Ovarian Reserve: Update on Assessing Ovarian Function. J Clin Endocrinol Metab. 2020, 105(11):dgaa513. - Kaikaew K et al. Sex Difference in Corticosterone-Induced Insulin Resistance in Mice. Endocrinology. 2019, 160(10):2367-2387. - Day F et al. Large-scale genome-wide meta-analysis of polycystic ovary syndrome suggests shared genetic architecture for different diagnosis criteria. PLoS Genet. 2018, 14(12):e1007813. - Day FR et al. Genomic analyses identify hundreds of variants associated with age at menarche and support a role for puberty timing in cancer risk. Nat Genet. 2017, 49(6):834-841. - Mahfouz A et al. Genome-wide coexpression of steroid receptors in the mouse brain: Identifying signaling pathways and functionally coordinated regions. Proc Natl Acad Sci U S A. 2016, 113(10):2738-43. - Day FR et al. Large-scale genomic analyses link reproductive aging to hypothalamic signaling, breast cancer susceptibility and BRCA1-mediated DNA repair. Nat Genet. 2015, 47(11):1294-1303. - Grefhorst A et al. Estrogens increase expression of bone morphogenetic protein 8b in brown adipose tissue of mice. Biol Sex Differ. 2015,6:7. - van Houten E et al.Reproductive and metabolic phenotype of a mouse model of PCOS. Endocrinology. 2012, 153(6):2861-9.
Project Title:	***Understanding sex differences in metabolism***
Abstract:	Obesity remains a prevalent global public health issue as it is a major risk factor for type 2 diabetes, cardiovascular diseases and cancer. Although the global prevalence of obesity is higher in women than in men, obese men are more prone to develop obesity-related conditions than obese women. This sex difference diminishes when women enter menopause, suggesting a prominent role for sex steroids in controlling metabolism. Indeed, disturbances in gonadal function are associated with metabolic problems. For instance, obesity and insulin resistance is frequently present in women with polycystic ovary syndrome (PCOS), a disease characterized by hyperandrogenism. Our studies are aimed at understanding the mechanisms that contribute of the sexual dimorphism in metabolic diseases. We have several research projects in which we delineate the effects of altered sex steroids and gonadal growth factors (such as AMH) on metabolism. In particular, we aim to understand why the effects of sex steroid hormones differ in male vs female white and brown adipose tissues. We also study how gut hormones contribute to sex differences in metabolism. Studies are performed at physiological (mouse models), cellular (iPS cells), and molecular level. In addition, studies will be performed at a genetic level in collaboration with (inter)national consortia.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD *(with experience in molecular biology techniques)* • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: o *English speaking countries & Netherlands:* no requirement o *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept of Internal Medicine – Neuroendocrine Tumors

School/Department	***Dept Internal Medicine - Neuroendocrine Tumors, Erasmus MC***
Supervisor information: world no 27 Endocrinology & Metabolism	• **Prof. Dr. W.W. de Herder & Dr. J. Hofland** • ***Email:*** *w.w.deherder@erasmusmc.nl & j.hofland@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/departments/internal-medicine-laboratories* • ***Personal Grants:*** • *ERC H2020 Marie-Curie Intra-European Fellowship (2013), Royal College of Physicians UK (2013), Daniel den Hoed Foundation (2015), Erasmus MC MRACE-Grant (2017), Swiss National Science Foundation (2018), co-investigator Dutch Cancer Fund (2019), NET Research Foundation (2020)* • ***Most important publications:*** • Additional holmium-166 radioembolisation after lutetium-177-dotatate in patients with neuroendocrine tumour liver metastases (HEPAR PLuS): a single-centre, single-arm, open-label, phase 2 study. **Lancet Oncol** 2020; 21: 561-570 • Advances in the diagnosis and management of well-differentiated neuroendocrine neoplasms. **Endocr Rev** 2020; 41: 371-403 • Management of carcinoid syndrome: a systematic review and meta-analysis. **Endocr Relat Cancer**. 2019; 26: R145-156 • Symptomatic and radiological response to 177Lu-DOTATATE for the treatment of functioning pancreatic neuroendocrine tumors. **J Clin Endocrinol Metab** 2019, 104(4): 1336-1344 • Salvage peptide receptor radionuclide therapy with [177Lu-DOTA,Tyr3]octreotate in patients with bronchial and gastroenteropancreatic neuroendocrine tumours. **Eur J Nucl Med Mol Imaging** 2019, 46(3):704-717. • Role of biomarker tests for diagnosis of neuroendocrine tumours. **Nature Rev Endo** 2018, 14(11):656-669 • MAFA missense mutation causes familial insulinomatosis and diabetes mellitus. **PNAS** 2018 Jan 30;115(5):1027-1032 • Persistent Hematologic Dysfunction after Peptide Receptor Radionuclide Therapy with 177Lu-DOTATATE: Incidence, Course, and Predicting Factors in Patients with Gastroenteropancreatic Neuroendocrine Tumors. **J Nucl Med.** 2018 Mar;59(3):452-458 • Consensus on biomarkers for neuroendocrine tumour disease. **Lancet Oncol.** 2015 Sep;16(9):e435-e446.
Project Title:	***Discovery of novel biomarkers for gastroenteropancreatic neuroendocrine tumors***
Abstract:	Neuroendocrine neoplasms of the pulmonary and gastrointestinal systems are heterogeneous tumors. Although rare, their incidence has risen 6-fold over the last 3 decades. Well-differentiated neuroendocrine tumors (NETs) have limited treatment options and are often accompanied by severe hormonal syndromes. Our NET Center of Excellence has been world-leading in this field with translational biomarker research(Nature Rev Endo 2018), participation in international guidelines(Neuroendocrinology 2016) and the development of radionuclide imaging(Lancet 1989) and therapy(NEJM 2017). Our research lines in endocrine oncology have a strong translational aspect with close interaction between clinical and basic scientists. We participate in international clinical trials, have created clinical databases with >2000 NET patients and have a dedicated Neuroendocrine Laboratory with decades of experience in in vitro and ex vivo characterization of NET cells. Current projects focus on the discovery of novel biomarkers for gastroenteropancreatic NETs through epigenomics, proteomics and microbiomics. This includes regulatory control of somatostatin receptor expression as well as the search for biomarkers for carcinoid syndrome-related complications and for the efficacy of peptide receptor radionuclide therapy (PRRT). This project will integrate into our long-standing translational biomarkers studies to improve diagnostics, prognostication and prediction of therapeutic outcome in patients with bronchial and gastroenteropancreatic NETs.
Requirements of candidate:	• We are looking for a highly motivated and enthusiastic student to join our international team. The candidate should be a team player with good communication and writing skills and interested in translational cancer science • Master degree or Medical Degree. Prior experience in molecular biology, bioinformatics and statistics is of significant added value. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: fluently speaking and writing. • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept of Internal Medicine – Thyroid Function in Health & Disease

School/Department:	***Department of Internal Medicine-Thyroid Function in Health & Disease, Erasmus MC***
Supervisor information: world no 27 Endocrinology & Metabolism	Prof dr R.P. Peeters & Dr. W.E. Visser **Email:** *r.peeters@erasmusmc.nl* & *w.e.visser@erasmusmc.nl* **Website:** *https://www6.erasmusmc.nl/inwendige_geneeskunde/endocrinologie/research* **Personal Grants:** - ZonMW VENI grant and VIDI grant (Dutch equivalents of ERC Starting and Advanced Grant), - ZonMW Clinical Fellowship, - ZonMW TOP Grant, - and several EU-Horizon2020 Grants **Most important publications:** - Peeters RP. Subclinical Hypothyroidism. **N Engl J Med**. 2017 376(26):2556-2565 & **N Engl J Med**. 2017 377(14):1404. - Korevaar TIM, Medici M, Visser TJ, Peeters RP. Thyroid disease in pregnancy: new insights in diagnosis and clinical management. **Nature Rev Endocrinol.** 2017 13(10):610-622. - Chaker L, Bianco AC, Jonklaas J, Peeters RP. Hypothyroidism. **Lancet.** 2017 - Teumer A, Chaker L, Groeneweg S, …., Peeters RP, Naitza S, Völzke H, Sanna S, Köttgen A, Visser TJ, Medici M. Genome-wide analyses identify a role for SLC17A4 and AADAT in thyroid hormone regulation. **Nature Commun.** 2018 Oct 26;9(1):4455. - Maternal thyroid function during pregnancy and child brain morphology: a time window-specific analysis of a prospective cohort. Jansen TA, Korevaar TIM, Mulder TA, White T, Muetzel RL, Peeters RP, Tiemeier H. **Lancet Diabetes Endocrinol.** 2019 Aug;7(8):629-637.390(10101):1550-1562. - Effectiveness and safety of the tri-iodothyronine analogue Triac in children and adults with MCT8 deficiency: an international, single-arm, open-label, phase 2 trial. Groeneweg S, Peeters RP, Moran C, ….., Polak M, Chatterjee K, Visser TJ, Visser WE. **Lancet Diabetes Endocrinol.** 2019 Sep;7(9):695-706.58 - Association of Thyroid Function Test Abnormalities and Thyroid Autoimmunity With Preterm Birth: A Systematic Review and Meta-analysis. Consortium on Thyroid and Pregnancy—Study Group on Preterm Birth, Korevaar TIM, Derakhshan A, Taylor PN, Meima M, …, Steegers EAP, Peeters RP. **JAMA.** 2019 Aug 20;322(7):632-641
Project Title:	***Consequences of thyroid dysfunction for development, metabolism and aging***
Abstract:	Thyroid hormone is essential for normal growth, metabolism and adequate functioning of almost all tissue. Thyroid dysfunction is a very prevalent disorder, with hypothyroidism affecting circa 5% of the population. It is more prevalent in women and in elderly. We study the consequences of disturbances of thyroid hormone action at multiple levels. In close collaboration with the department of epidemiology, we study the consequences of mild alterations in thyroid function on child development (Lancet Diab and Endo 2019) and pregnancy outcome (JAMA 2019) in the large population-based birth cohort Generation R, whereas we study the consequences of thyroid dysfunction on the aging process (JAMA Intern Med 2017 & Circ Res 2017) in the population-based Rotterdam Study. We closely collaborate with other renowned population-based studies across Europe and United States and initiated two consortia (JAMA 2019 & Nature Communications 2018). In addition, we have several research projects in which we delineate the consequences of genetic defects in thyroid hormone pathways genes at the molecular level. This led to the identification of different types of thyroid hormone insensitivity due to defects at the level of uptake into the cell (MCT8 deficiency, Lancet 2004) or at the receptor level (NEJM 2012). The studies performed in this area focus on understanding the molecular mechanisms leading to these diseases, as well as developing treatments. This has led to the first international clinical trial for MCT8 deficiency (Lancet Diab & Endo), which was coordinated by our group.

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.
	• Master degree or MD *(with experience in molecular biology techniques)*
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Medical Oncology

The treatment of an individual with cancer is determined by specific characteristics of that individual patient, the cancer cells, and their environment, and needs to be constantly adjusted according to the changes observed in these characteristics. To improve treatment, we need to improve our understanding of the many characteristics determining the outcome of patients after treatment. Three of our key research areas are:

Translational Cancer Genomics and Proteomics (PI Prof. Dr. John Martens)

We aim to discover clinically relevant breast, colorectal and prostate cancer biomarkers of disease progression using genomics techniques.

- We use various genomics tools (RNA sequencing; next generation sequencing) to discover and validate new prognostic and predictive markers providing insight into molecular mechanisms of disease progression and therapy failure. It is our ambition to offer patients the best possible choice of treatment.
- To understand the evolution of metastatic cancer towards therapy resistance we study the temporal variation in various types of circulating biomarkers (circulating tumor cells (CTCs) and circulating endothelial cells (CECs); circulating nucleic acids (ctDNA/ctRNA) and exosomes) during therapy.

Key publications

1. Smid M et al. Breast cancer genome and transcriptome integration implicates specific mutational signatures with immune cell infiltration. Nat Commun. 2016; 7:12910.
2. Sieuwerts AM, et al. mRNA and microRNA expression profiles in circulating tumor cells and primary tumors of metastatic breast cancer patients. Clin Cancer Res. 2011 17:3600-3618.
3. Angus L, et al. Genomic landscape of a large cohort of metastatic breast cancer patients. Nat. Genetics. 2019.

Translational Immuno-Oncology (PI Assoc Prof Dr. Reno Debets)

We aim to understand T cell immunity in common tumor types and enable treatment of patients with customized combination adoptive T cell therapy. To this end, we follow 3 research lines:

- Develop and test adoptive T cell therapy: selection and validation of targets and receptors, gene-engineering of T cells, and implementation of clinical T cell treatments (>15-year track record). Our laboratory has tested gene-engineered T cells in advanced renal cell cancer, the 1st clinical study of its nature in Europe (completed). We are currently selecting safe and effective targets and obtaining corresponding TCRs according to a stepwise approach using the latest in silico and laboratory tools: a first product (a TCR against MAGE-C2) is scheduled for clinical testing in Q4 2019.
- Understand and intervene with T cell immunity: discovery and functional assessment of determinants of anti-tumor T cell immunity using techniques that address frequencies, functions and spatio-organization of T cells as well as intervention studies with (immune) modulators using 3D cultures and syngeneic and immune deficient mouse models.
- Monitor patient T cell immunity: we phenotypically assess changes of T cell (subsets) in blood and tissue of patients with various tumor types in relation to resistance to (immune)therapies, to stratify patients and guide selections of drugs that make tumors better amenable to T cell treatments.

Key publications

1. Straetemans T et al. Recurrence of melanoma following T cell treatment: continued antigen expression in a tumor that evades T cell recruitment. Mol Ther. 2015 23:396.
2. Hammerl D et al. Adoptive T Cell Therapy: New Avenues Leading to Safe Targets and Powerful Allies. Trends Immunol, 2018 18:30169.
3. Kunert A et al. CD45RA+CCR7- CD8 T cells lacking co-stimulatory receptors demonstrate enhanced frequency in NSCLC patients responding to nivolumab. J Immunotherapy Cancer, 2019 7:149.

Prostate Cancer Clinical Trials (PI Dr. Martijn Lolkema)

- Genomic classification of prostate cancer patients to predict outcome to anti-cancer treatment. In collaboration with the Hartwig Medical Foundation and the Center for Personalized Cancer Treatment we obtained Whole Genome Sequencing data from > 400 prostate cancer patients and we are analyzing the data in order to understand the inter-patient heterogeneity. Moreover, we are building a biobank of clinically annotated samples (circulating markers and tissue biopsies) from patients with metastatic prostate cancer who are actively undergoing treatment.
- Prospective Clinical Trials. We perform prospective clinical trials in prostate cancer patients mainly based on biomarker stratification such as a trial in which we use patient selection using AR-V7 expression in CTCs to allocate patients for cabazitaxel treatment.

Key publications

1. Van Dessel et al. The genomic landscape of metastatic castration-resistant prostate cancers using whole genome sequencing reveals multiple distinct genotypes with potential clinical impact https://www.biorxiv.org/content/10.1101/546051v1
2. Belderbos et al. Associations between AR-V7 status in circulating tumour cells, circulating tumour cell count and survival in men with metastatic castration-resistant prostate cancer. Eur J Cancer. 2019 121:48-54.
3. Priestley et al. Pan-cancer whole genome analyses of metastatic solid tumors. https://www.biorxiv.org/content/10.1101/415133v4

Department of Medical Oncology

School/Department:	***Department of Medical Oncology Erasmus MC***
Supervisor information: world no 42 Oncology	• *Prof dr. John Martens (supervisor)* • *Dr. Harmen van de Werken (co-supervisor)* • ***Email:*** *j.martens@erasmusmc.nl and/or h.vandewerken@erasmusmc.nl* • ***Website:*** *John Martens and Harmen van de Werken & II* • ***Personal Grants:*** *DDHF CCBC (2014 & 2018)* *Astellas (ML; 2014)* *NKB EMCR (2014)* • ***Most important recent publications:*** **1.** Lindsay Angus, …, **Harmen J.G. van de Werken** , …, **John W.M. Martens** 2019. "Genomic landscape of metastatic breast cancer and its clinical implications". ***Nature Genetics*** 51(10):1450-1458.. **2. Harmen J.G. van de Werken*, van Riet, J.*,** … and Mostert, B. 2021 The genomic landscape of 85 advanced neuroendocrine neoplasms reveals subtype-heterogeneity and potential therapeutic targets. **Nature Communications**. 12, 1–14. **3.** Nik-Zainal, Serena, … **John W. M. Martens**, …, and Michael R. Stratton. 2016. "Landscape of Somatic Mutations in 560 Breast Cancer Whole-Genome Sequences." ***Nature*** 534(7605):47–54. **4.** Smid, Marcel, .., **John W. M. Martens**. 2016. "Breast Cancer Genome and Transcriptome Integration Implicates Specific Mutational Signatures with Immune Cell Infiltration." **Nature Communications** 7:12910. **5. Harmen J.G. van de Werken** et al.. 2017 Small chromosomal regions position themselves autonomously according to their chromatin class. Genome Res. 27, 922–933 **6. van de Werken, Harmen J. G.**, 2012 et al. "Robust 4C-Seq Data Analysis to Screen for Regulatory DNA Interactions." ***Nature Methods*** 9(10):969–72.
Project Title:	***Cancer Computational Biology to Gain Insights in Biology and Create Clinical Value Using Multi-Omics Data Sets of Advanced and Metastatic Patients***
Abstract:	A Dutch initiative involved the biobanking of tumor biopsies and matched blood samples from cancer patients with locally advanced and metastatic diseases and subjecting them to Whole Genome Sequencing (WGS). The heroic effort generated a database of currently more than 4000 WGS datasets revealing pan-cancer and subtype specific driver events and mutational programs relevant for disease progression and therapy failure. In these first studies matched transcriptomics, in addition to WGS data, were not included as these data were generated at a later time point. Therefore, the next intruding step is to interrogate available transcriptome data and integrate them with matched WGS data. This provides us with the opportunity, in metastatic cancer, 1) to identify the phenotypic heterogeneity, 2) the clinical significance of RNA-seq beyond WGS data 3) and identify novel disease progression and cancer drug-resistances modules. Currently, we have access to 2072 matched RNA-seq datasets from 36 cancer types and eight different treatment categories, including chemotherapy and immunotherapy. We will interrogate this very comprehensive data set by applying state-of-the art- bioinformatic and computational biology methods including regularized multivariate analyses and machine learning methods, such as Random Forest and Neural Networks. The insights we will gain from this interrogation will be incorporated in patient stratification statistical models to ultimately support physicians in their clinical decision making, which may improve the health of cancer patients in the future.
Requirements of candidate:	○ We are looking for a candidate with strong analytical and problem-solving skills, being highly motivated and having excellent communication and writing skills and able to work independently. A background in cancer biology is of significant added value. • Master's degree in bioinformatics, computational biology, statistics, or a related field. • The candidate should have demonstrated excellent scientific writing and software engineering skills in R and Python or Perl. • Scholarship that will, at least, cover subsistence allowance and international airplane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Medical Oncology

School/Department:	***Laboratory of Tumor Immunology, Department of Medical Oncology, Erasmus MC***
Supervisor information: world no 42 Oncology	**Supervisors:** Dr. Hayri Emrah Balcioglu (h.balcioglu@erasmusmc.nl) Prof. Dr. Reno Debets (j.debets@erasmusmc.nl) **Website:** https://www.erasmusmc.nl/en/cancer-institute/research/groups/medical-oncology-tumor-immunology ; https://www.tme-facility.com **5 grants (out of 15 running grants):** - Dutch Cancer Society; Adoptive therapy with T cells gene-engineered with a co-stimulatory TCR to treat patients with MAGE-C2-positive melanoma and head and neck cancer. **570 k€**. - Merck; Genomic and immune profiling of metastasized urothelial cancers.**735 k€**. - Dutch Cancer Society; Co-stimulatory TCRs to advance treatment efficacy of adoptively transferred T cells. **457 k€**. - Erasmus MC Daniel den Hoed Foundation; Adoptive T cell therapy to treat common cancers: new roads to unique targets and pre-treatments. **500 k€**. - Top consortia for knowledge and innovation (Dutch government); T-cells act against hard-to-treat cancers (T-ACT): unique targets and new technological platform to develop safe and effective adoptive cellular therapeutics (T-ACT). **900 k€**. **5 publications (out of 150):** - Lamers C et al. Treatment of metastatic renal cell carcinoma with autologous T-lymphocytes genetically retargeted against carbonic anhydrase IX: first clinical experience. **J Clin Oncol**, 2006 24:e20. - Straetemans T et al. Recurrence of melanoma following T cell treatment: continued antigen expression in a tumor that evades T cell recruitment. **Mol Ther**, 2015 23:396. - Kunert A et al. T cell receptors for clinical therapy: *in vitro* assessment of toxicity risk. **Clin Cancer Res**, 2017 23:6012. - Kortleve D et al. News and views: Orthoptopic editing of T-cell receptors. **Nature Biomedical Engineering**, 2019, 3:949. - Hammerl D et al. Spatial immunophenotypes predict resistance to anti-PD1 treatment and capture distinct paths of T-cell evasion in triple negative breast cancer. **Nature Comm**, in press.
Project Title:	**CD8 T-cell trafficking and activity captured in patient 3D spheroid model**
Abstract:	Emergence of immunotherapy has changed the treatment and patient outcome for various tumor types. Unfortunately, patient response and reasons behind failure of response is currently hard to assess. In the laboratory of tumor immunology, we aim to define and understand shortcomings of T cell immunity in cancers, and translate our findings into the development of anti-cancer T cell treatments. The T cell migration towards tumors, and accumulation and activation in the tumor is crucial for the success of immunotherapy. Along this line, it is imperative to capture the real dynamics of patient T cell activity, particularly the interactions between T cells and tumor cells, or lack there-of. Recently, we have set up a 3-D tumoroid model to monitor movement and anti-tumor activity of patient T cells in real-time. This technique enables quantification of patient T cell migration, infiltration, activation and tumor clearance in 3D. With this project, the PhD candidate will determine differences in such dynamics between T cells derived from patient tumors that are responsive versus those that are not responsive to immune therapies. In more detail, the candidate will study tumor cell-directed mechanisms of T cell suppression, and will correct such T cell suppression via genetic and pharmacological means, ultimately, identifying determinants of response to therapy, and targets for sensitization of non-responsive tumors to immunotherapy.

Requirements of candidate:	- highly motivated, hardworking
	- background in cancer biology, mechanobiology and/or tumor immunology is a preferred value
	- master degree or MD.
	- scholarship that will cover subsistence allowance and international air plane ticket
	- english language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Molecular Genetics

School/Department:	***Department of Molecular Genetics, Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences **Miao-Ping Chien** received her PhD in chemistry and biochemistry from the University of California, San Diego in 2013, and went on to do a postdoc at Harvard University, working on technology development for biology (combining biophysics, computation and optical instrumentation). She joined Erasmus MC as a group leader in June 2017 and became a principal investigator at Oncode Institute in 2019. Her current research focuses on developing and applying multidisciplinary technologies (advanced microscopy and imaging, computation, single cell technology, bioinformatics, (photo)chemistry) to investigate the underlying mechanisms of tumorigenesis, particularly of rare cancer-driving cells. She is also a founder of UFO Biosciences, which aims to enable better cancer care by creating treatment options for rare, cancer-driving cell populations that escape traditional treatment.	***Dr. Miao-Ping Chien,*** m.p.chien@erasmusmc.nl, http://www.mpchienlab.org/ ***Selected Grants:*** *2021 Oncode Technology Development Grant* *2020 Ammodo Science Award* *2020 Erasmus-TU Delft Convergence Grant* *2019 Oncode Institute Junior Fellow* *2018 Erasmus MC Fellowship* *2018 CancerGenomiCs.nl Junior PI's Grant* *2018 Dragon Gate Grant (Taiwan MoST)* *2017 NWO Veni award (NWO Talent Scheme)* *2017 CancerGenomiCs.nl Junior Fellow* ***Selected publications:*** 1. *You, Li*, Su, P.R.*, Betjes, M.*, Ghadiri Rad, R., Chou, T.C., Beerens, C., van Oosten, E., Leufkens, F., Gasecka, P., Muraro M., van Tol R., van Steenderen, D., Farooq, S., Hardillo, J.A.O., Baatenburg de Jong, R., Brinks, D.A,* ***Chien, M.P****. "Functionally annotated transcriptomic profiling of single cells from heterogeneous populations based on dynamic phenotypes",* ***Nature Biomedical Engineering****, In press (2021)* 2. *Su, P.R., You, L., Beerens, C., Bezstarosti, K., Demmers, J., Pabst, M., Kanaar, R., Hsu, C.C.,* ***Chien, M.P.****, "Functional single cell proteomic profiling of cells with abnormal DNA damage response dynamics". Under review* 3. *Li L et al. "A Comprehensive enhancer screen identifies TRAM2 as a key and novel mediator of YAP oncogenesis."* ***Genome Biology****, 2021, 22, 54,* 4. ***Chien M.P*** *et al. "Photoactivated voltage imaging in tissue with an archaerhodopsin-derived reporter",* ***Science Advances****, 2021: Vol. 7, no. 19, eabe3216* 5. *Werley C.A., et al "An ultrawidefield microscope for high-speed fluorescence imaging and targeted optogenetic stimulation."* ***Biomedical Optics Express****. 2017, 8(12), 5794-5813.* 6. ***Chien M.P.****, et al. "Enzyme-Directed Assembly of Nanoparticles in Tumors Monitored by In Vivo Whole Animal and Ex Vivo Super Resolution Fluorescence Imaging."* ***J Am Chem Soc****. 2013 Dec 18;135(50):18710-3.* 7. ***Chien M.P.****, et al. "Enzyme-Directed Assembly of a Nanoparticle Probe in Tumor Tissue."* ***Advanced Materials****. 2013, July 12 (25): 3599-3604.*
	Investigation of tumorigenesis via advanced imaging and single cell -omics analysis The Chien Lab is looking for self-motivated PhD students with a strong interest in working in a multidisciplinary lab. In our lab, we develop single cell technologies combining optical, biomedical and bioinformatics methods to address biological questions, particularly in cancer biology and immuno-oncology. The candidate will have a chance to work on wet-lab projects, dry-lab projects or a combination of these two. For the wet-lab projects, the candidate can apply the technologies developed in Dr. Chien's group, including advanced imaging and single cell sequencing (analysis), to cancer cell lines or patient-derived primary cultures to investigate molecular mechanisms of tumorigenesis and therapy resistance. For the dry-lab projects, the candidate can work on advanced imaging analysis including machine learning-based approaches or bioinformatics analysis (-omics data analysis).

Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.
	• Master degree or MD
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

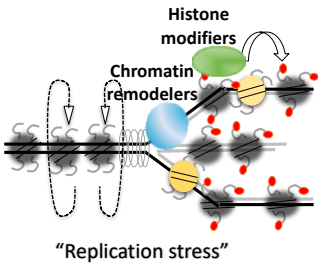
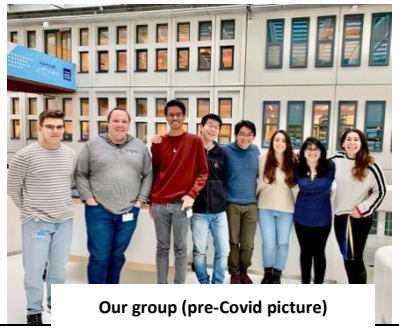
Department of Molecular Genetics

School/Department:	***Department of Molecular Genetics, Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences	• **Dr. Hannes Lans, Associate professor DNA repair mechanisms and disease** • w.lans@erasmusmc.nl www.lanslab.eu • **Grants:** - **2018** 2x Dutch Research Council (€ 568000) - **2017** Dutch Cancer Society (€ 534000) - **2014** WorldWide Cancer Research (€ 218000) - **2012** MSCA FP7-PEOPLE-ITN (€ 689000) - **2008** Veni grant Dutch Research Council (€ 208000). • ***Most important publications:*** Ribeiro-Silva C et al (2020) Ubiquitin and TFIIH-stimulated DDB2 dissociation drives DNA damage handover in nucleotide excision repair. ***Nature Communications*** 11:4868 Lans H et al (2019) The DNA damage response to transcription stress. ***Nature Reviews Mol Cell Biol* 20:766-784** Borgermann N et al (2019) SUMOylation promotes protective responses to DNA-protein crosslinks. ***EMBO Journal*** 38:e101496 Ribeiro-Silva C et al (2018) DNA damage sensitivity of SWI/SNF-deficient cells depends on TFIIH subunit p62/GTF2H1. ***Nature Communications*** 9:4067 Slyskova J et al (2018) Base and nucleotide excision repair facilitate resolution of platinum drugs-induced transcription blockage. ***Nucleic Acids Research*** 46:9537-9549 Marteijn JA et al (2014) Understanding nucleotide excision repair and its roles in cancer and ageing ***Nature Reviews Mol Cell Biol*** 15:465-81
Project Title:	**Cell-type specific functional analysis of DNA repair**
Abstract:	Accumulation of DNA damage is an important underlying cause of major health issues like cancer and aging. Nucleotide excision repair (NER) is a major cellular defense mechanism that repairs a large variety of helix-distorting DNA damage, including that induced by solar UV irradiation and platinum-based anticancer drugs. Hereditary defects in NER cause multiple different cancer-prone and degenerative diseases in which tissues are differently affected, but of which the exact pathogenesis is not understood. We have found that NER activity changes depending on development and cell type, but how this is regulated is not known. We investigate the tissue-specific activity of NER through the identification and functional characterization of novel regulatory proteins and mechanisms within this important DNA repair pathway. To this end, we use different model systems, including *C. elegans,* mammalian cell culture and *in vitro* differentiated cells (based on induced pluripotent stem cells). We pursue a multi-disciplinary approach, using cell biology, CRISPR- and RNAi-mediated screening combined with live cell confocal microscopy and quantitative proteomics, to study NER mechanisms in different cell types. We are looking for a highly motivated PhD student who wants to work on this frontline ambitious project aimed at understanding how NER protects different cell types against DNA damage. The results of this project will help to better understand the molecular pathogenesis associated with inherited NER deficiency and to develop therapies aimed at alleviating discomfort associated with cancer and aging.
Requirements of candidate:	• The candidate should have a MSc and experience with molecular and cellular biology. • Our lab offers the PhD candidate state-of-the-art equipment and expertise to address the scientific questions stated above. Our lab consists of a mix of national and international PhD students and Postdocs and has an infrastructure that ensures intensive supervision and training during the PhD program. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: IELTS 7.0*(min 6.0 for all subs)*, TOEFL 100*(min 20 for all subs)*

Department of Molecular Genetics

School/Department:	**Molecular Genetics Department, Erasmus MC**
Supervisor information: World no 30 Biomedical Sciences	• Prof. Dr. Jurgen Marteijn (Full Professor on Transcription Stress and DNA damage response) • J.Marteijn@erasmusmc.nl www.genomestability.nl **Grants and Prizes:** **2019:** AMMODO Science award for groundbreaking research (€1.200.000) **2019:** VICI Grant of Netherlands Organization for Scientific Research (€1.500.000). **2014:** VIDI Grant of Netherlands Organization for Scientific Research (€800.000). **2011:** Erasmus MC Fellowship (€ 400.000). **5 Selected papers:** **1:** Elongation factor ELOF1 drives transcription-coupled repair and prevents genome instability. Geijer M, …, Marteijn JA. **Nature Cell Biology** (Accepted 2021) **2:** The DNA damage response to transcription stress Lans H, …, Marteijn JA.. **Nature Reviews Molecular Cell Biology** (2019) **3:** The core spliceosome as target and effector of non-canonical ATM signalling. Tresini M, …, Marteijn JA. **Nature** (2015) **4:** Enhanced chromatin dynamics by FACT promotes transcriptional restart after UV-damage. Dinant C, …, Marteijn JA **Molecular Cell**, (2013). **5:** UV-sensitive syndrome protein UVSSA recruits USP7 to regulate TCR. Schwertman P, …, Marteijn JA. **Nature Genetics** (2012).
Project Title:	**The molecular mechanism of DNA damage-induced aging**
Abstract:	Due to the improved life span, age related diseases and discomfort have become a major social and medical issue. It is thus highly relevant to understand the biological processes that could counteract this phenomenon. Accumulation of DNA damage is a major contributor of age-related diseases. DNA damage blocks the transcription process, which is a crucial process for proper cell function. If the DNA damage that blocks transcription is not properly repaired it will result in cellular dysfunction, apoptosis and senescence, finally resulting in DNA damage induced aging. Cells counteract these deleterious effects by transcription-coupled repair (TCR), which removes the DNA damage thereby resolving the transcriptional block. The severe developmental problems and premature aging features of Cockayne syndrome patients - characterized by a hereditary TCR defect - underscore the importance of this process. Our lab is one of the world leading labs in the TCR field, and has recently identified several new repair factors in this pathway including UVSSA and ELOF1. Despite detailed knowledge on the TCR mechanism itself, surprisingly little is known about the last crucial step of TCR; how transcription restarts if the DNA damage is repaired. Using a multi-disciplinary approach of state-of-the-art live cell imaging and proteomic tools, the PhD student will study the molecular mechanism of transcription recovery after DNA repair. In addition, using unbiased CRISP/CAS9 based whole genome screens and advanced quantitative interaction proteomics studies we will identify novel proteins involved in this process. Together this will result in crucial new insights in TCR and will help to counteract the aging process.
Requirements of candidate:	• The candidate should have a Master and experience with molecular/cellular biology. • Our lab offers the PhD candidate state-of-the-art equipment and expertise to address the scientific questions stated above. Our lab consists of a mix of both national and international PhD students and Post-docs and has an infrastructure that ensures intensive supervision during the PhD program. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: IELTS 7.0*(min 6.0 for all subs)*, TOEFL 100*(min 20 for all subs)*

Department of Molecular Genetics

School/Department:	***Department of Molecular Genetics, Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences	• *Dr. Nitika Taneja, Ph.D., Principal Investigator and Group Leader* • ***Email:*** *n.taneja@erasmusmc.nl* • ***Website:*** *https://www.erasmusmc.nl/en/research/researchers/taneja-nitika* • ***Grants:*** • *Women in STEM Incentive grant by NWO, 2021* • *Erasmus+, 2020* • *Young investigator award by Daniel den Hoed Stichting Fonds, 2018* • ***Most important publications:*** • Lo et al. (2021) ***Science Advances*** *PMID: 33952518* • DiPiazza et al. (2021) ***PNAS*** *PMID: 34035174* • Taneja et al. (2017) ***Molecular Cell*** *PMID:28318821* • Taneja and Grewal (2017) ***Cell Cycle*** *PMID: 28805495* • Mizuguchi et al. (2017) ***PNAS*** *PMID: 28490498* • Mizuguchi et al. (2014) ***Nature*** *PMID: 25307058* • Lee et al. (2013) ***Cell*** *PMID: 24210919* • Raychaudhuri et al. (2013) ***Plos Biology*** *PMID: 23300376*
Project Title:	**Targeting chromatin modifiers for novel chemotherapeutic regimens**
Abstract:	DNA replication is an essential but a precarious cellular process of central importance both to the development of cancer and its treatment. Indeed, failures in the replication process, for instance mutations in critical elements of the chromatin remodeling pathways, contribute to genome instability, an early event in tumorigenesis. The primary research goal of my lab is to obtain mechanistic understanding of pathways mediated by chromatin remodeling which allow stabilization of DNA replication machinery in normal as well as cancer cells. Such pathways play important role in in the hyper-proliferation of cancer cells and could also drive resistance towards chemotherapy. Therefore, chromatin modifying factors could become the potential candidates to be targeted for better therapies for the treatment of cancer as they are frequently mutated in cancerous cells but not in normal cells. We have recently identified a novel pathway and proteins involved in this pathway, which if targeted, can be exploited in the development of novel cancer therapeutic regimens. The focus of this project is to further understand the mechanistic link between chromatin remodeling pathways and the stability of DNA replication machinery to proper chromatin organization and concomitant genome stability. Through our research, we are trying to obtain a mechanistic understanding of the chromatin modifying (post-translational histone modifying) processes that render cells sensitive or resistant to commonly used chemotherapeutic treatments. **Main methodology and techniques**: The candidate will be part of a research team, including a senior postdoc as a daily supervisor, a PhD student working on a parallel project and a technician expert in sevaral techniques used in our lab. Our lab uses multidisciplinary approach combining high-thoughput genomics, quantitative imaging and high-thoughput proteomics. We use 2-D normal as well as human cancer cell lines and mouse 3-D tumor organoids for our studies. We frequently use CRISPR/Cas9 genome editing, Next generation sequencing analysis of chromatin via ChIP-Seq, 3-D chromatin organization via Hi-C, super-resolution imaging using SIM/STORM microscopes, single cell-based quantitative (QIBC) imaging and quantitative proteomics.  "Replication stress"  Our group (pre-Covid picture) PI:Nitika Taneja at ErasmusMC Board of examiners, B.Sc/M.Sc Nanobiology program Teacher at Erasmus MC & TU-Delft
Requirements of candidate:	We are looking for a highly motivated, hardworking student with master's degree to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. English requirements: *English speaking countries & Netherlands:* no requirement *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)* We offer: Supervision, lab facilities and infrastructure, and training. We will cover Laboratory costs. As a candidate PhD student at Erasmus MC, your salary and living expenses will be covered by your university or Scholarship Council. For more information regarding this vacancy, please contact n.taneja@erasmusmc.nl.

Department of Molecular Genetics

School/Department:	**Molecular Genetics Department, Erasmus MC**
Supervisor information: World no 30 Biomedical Sciences	• Prof.Dr. W. Vermeulen and Dr. A. Pines • w.vermeulen@erasmusmc.nl and a.pines@erasmusmc.nl • www.vermeulenlab.com • **Grants and Prizes (selected):** - Oncode Institute, Principle Investigator (2017); - Worldwide Cancer Research Project Grants (2015, & 2017); - Dutch Cancer Society (KWF), Research Grants (2016, & 2017); - European Research Council, ERC Advanced Grant (2013); - Dutch Scientific Organization, NWO-ENW-TOP grant (2018) • **5 Selected papers:** 1. Ubiquitin and TFIIH-stimulated DDB2 dissociation drives DNA damage handover in nucleotide excision repair. Ribeiro-Silva C, …. Vermeulen W (corr. Auth.), and Lans H. **Nature Commun..(**2020). 2. The DNA damage response to transcription stress. Lans, H., Hoeijmakers, J., Vermeulen, W*. and Marteijn, J.A*. (*corr. Auth.).. **Nature Rev.Mol.Cell.Biol.** (2019) 3. DNA damage sensitivity of SWI/SNF-deficient cells depends on TFIIH subunit p62/GTF2H1. Ribeiro-Silva, C., …., Vermeulen, W. **Nature Commun.** (2018). 4. TRiC controls transcription resumption after UV damage by regulating Cockayne Syndrome protein A. Pines, A.,…… Vermeulen, W.*, Pannu, N.S.* and Attikum, H.* (*corr. Auth.) **Nature Commun.** (2018). 5. The core spliceosome as target and effector of non-canonical ATM signalling. Tresini M, …, Vermeulen W.(corr.Auth.) Marteijn JA. **Nature** (2015).
Project Title:	**Transcription stress: a link between DNA damage and aging**
Abstract:	DNA is continuously damaged by environmental pollutants, radiation, and common cellular metabolites. DNA lesions interfere with genomic function, including transcription. Transcription-blocking lesions are removed by Transcription-Coupled Nucleotide Excision Repair (TC-NER), initiated by lesion-stalled RNApolymerase and subsequent binding of the Cockayne Syndrome (CS) A and B proteins. Inherited *CSA* and *CSB* mutations are associated with serious health threats; including accelerated aging, developmental arrest and progressive neurodegeneration. Our research is aimed to provide mechanistic insight into the functional crosstalk between TC-NER-deficiency, DNA damage signaling, gene expression, and protein homeostasis by applying a multi-disciplinary approach combining innovative state-of-the-art technologies. To investigate the cell-specific consequences of *CSA* and *CSB* mutations, we will use CRISPR/CAS9-mediated gene editing combined with induced pluripotent stem cells (iPSC) reprogramming and cell-specific differentiation. The different cells will be used for quantitative mass-spectrometry to reveal the dynamic TC-NER interactome; RNA-sequencing to monitor transcription stress; live cell imaging to follow protein dynamics; super-resolution microscopy and biochemical 'protein aggregation' assays to study the protein homeostasis. The PhD student will participate in this frontline ambitious project aimed to obtain important mechanistic insight into the functional significance of TC-NER to counteract general DNA damage-induced diseases, including the molecular basis of neurodegeneration. • Our lab offers: - state-of-the-art equipment and expertise to address the scientific questions stated above. - an internationally oriented work environment. - excellent PhD-training and coaching ensured through established Institutional and Departmental training and supervision programs.
Requirements of candidate:	• We are looking for highly motivated students that have a Master and thorough knowledge of molecular and cellular biology. • English language requirement: ✓ *English speaking countries & Netherlands:* no requirement ✓ *Other countries:* IELTS 7.0*(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Neuroscience

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	• *Dr. Aleksandra Badura (Associate Professor)* • ***Email:*** *a.badura@erasmusmc.nl* ***Website:*** *https://neuro.nl/research/badura* • ***Grants:*** - *Horizon 2020, Marie Sklodowska Curie Actions Innovative Training Network (PIPgen https://pipgen.eu/)* - *Dutch Research Council (NWO) Starting Grant Vidi* - *Dutch Research Council (NWO) Postdoctoral Fellowship Veni* - *Erasmus MC Pilot grant* • ***Most important publications:*** 1. **Badura A.,** Verpeut J.L., Metzger J.W, Pereira T.D, Pisano T.J., Deverett B., Bakshinskaya D.E., Wang S.S.-H. Normal cognitive and social development require posterior cerebellar activity**. eLife** 2018; 7, e36401. 2. Giovannucci A.*, **Badura A.*,** Deverett B., Najafi F., Pereira T.D., Gao Z., Ozden I., Kloth A.D., Pnevmatikakis E., Paninski L., De Zeeuw C.I., Medina J.F., Wang S.S.-H. Cerebellar granule cells acquire a widespread predictive feedback signal during motor learning **Nature Neurosci**. 2017; 20, 727–734. 3. Wang S.S.-H, Kloth A.D., **Badura A.** The Cerebellum, Sensitive Periods, and Autism. **Neuron** 2014; 83 (3), 518-532. 4. **Badura A.** *, Schonewille M. *, Voges K., Galliano E., Renier N., Gao Z., Witter L., Hoebeek F.E., Chédotal and De Zeeuw C.I. Climbing fiber input shapes reciprocity of Purkinje cell firing. **Neuron** 2013; 78, 700-13. 5. Wulff P., Schonewille M., Renzi M., Viltono L., Sassoè-Pognetto M., **Badura A.**, Gao Z., Hoebeek F.E., van Dorp S., Wisden W., Farrant M., De Zeeuw C.I. Synaptic inhibition of Purkinje cells mediates consolidation of vestibulo-cerebellar motor learning. ***Nature Neurosci.*** 12, 2009 1042-9.
Project Title:	**Functional role of a novel ASD risk gene in the developing and adult brain**
Abstract:	Genetic studies have implicated our gene of interest as a candidate gene for autism-spectrum disorder (ASD); however, a causal relationship between this gene and ASD does not exist. Recently, we identified a patient with biallelic mutations in this gene that presented with ASD, poor motor skills, intellectual disability, and hyperactivity. To fully understand the underlying pathology, we generated a mouse model with the patient-specific mutations. The mutant mice displayed gross impairments in motor coordination and sensorimotor learning as well as ASD-related behavioral abnormalities, hyperactivity, and cognitive deficits. We found that the patient and the mouse model show cerebellar anatomy and hypoplasia of several midbrain regions. We established that this gene is expressed in GABAergic neurons within the substantia nigra (SN) and ventral tegmental area (VTA) where mutant mice show a dramatic loss of GABAergic cells. The aim of this project is to answer the following questions: (1) How does the novel ASD risk gene regulate cerebellar development and how does its deficiency affect cerebellar functioning? (2) Which behavioral phenotypes are affected by the loss of GABAergic cells in the SN and VTA?
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using teamwork to tackle important scientific questions and thus requires a student with good communication skills. • Master degree in biochemistry, biophysics, neuroscience, or life sciences. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • Proficiency in at least one of the coding languages: MATLAB, Python, C, Java, C++ • Biomedical skills: Experience with Western blot, qPCR, PCR is required. Previous experience with mouse experiments is not a prerequisite but is welcomed. • Neuroscience skills: General histology and immunocytochemistry. Candidates with experience in optogenetics or electrophysiology will be given a preference. • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Neurosciences

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	• ***Prof. Dr. J. Gerard G. Borst****, Professor of Neurophysiology (promotor)* • ***Email:*** *g.borst@erasmusmc.nl* • ***Website:*** *www.neuro.nl* • ***Personal Grants:*** - *ZONMW-TOP 2018 (665 k€)* - *EU-MSCA-ITN-2016 (total 2.5 M€)* - *Dutch Scientific Organization (ALW-Open) Grant, 2013, 2015 (300 k€ each)* - *Neuro-Basic Pharma Phenomics (FES0908) (2010; total 13 M€)* • ***Most important publications:*** - *Nature 383, 431-434 (1996)* - *Neuron 23, 821-832 (1999);* - *Science 289, 953-7 (2000);* - *Science 327: 1614-1618 (2010);* - *Nature Neurosci. 13: 1050-1052 (2010);* - *Ann Rev Physiol. 74:199-224 (2012);* - *Neuron 78: 936-948 (2013);* - *PNAS 114: 4249-4254 (2017);* - *J. Neurosci. 38: 2057-2068 (2018).* - *eLife 8, doi: 10.7554/eLife.49091 (2019).*
Project Title:	**Neuronal mechanisms underlying tinnitus**
Abstract:	Tinnitus is a very common disorder in which a patient hears sound in the absence of an external source. Severe tinnitus can have a devastating impact on the quality of life, but despite the large burden of disease there is currently no curative treatment, and the mainstay of therapy currently focusses on helping patients cope with their tinnitus. A substantial roadblock in developing an effective treatment for tinnitus is the lack of understanding of the neuropathological mechanisms underlying it. In this project you will investigate the cellular mechanisms underlying tinnitus. To test this, you will investigate in mice whether cortical feedback inhibition is altered in the inferior colliculus of animals with tinnitus. The presence of tinnitus will be assessed by a novel operant conditioning task, while neuronal IC activity and cortical feedback will be measured and manipulated using in vivo optical (two-photon imaging, optogenetics) and electrophysiological (multi-electrode; patch clamp) techniques. These experiments will provide novel insight into tinnitus mechanisms at both a cellular level and at the level of individual auditory regions, which will constitute an important synergistic step towards the development of a curative treatment.

Requirements of candidate:	• We are looking for a highly motivated student with interests in hearing research and preferentially experience with in vivo recordings to join our international team.
	• Master degree or MD with research experience.
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal).
	• English language requirement:
	  • *English speaking countries & Netherlands:* no requirement
	  • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Neurosciences

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	***Dr. P.A. Forbes, PhD and Prof. M.A. Frens*** • ***Email:*** *p.forbes@erasmusmc.nl ; m.frens@erasmusmc.nl ; http://www.neuro.nl* • ***Personal Grants:*** - *Dutch Scientific Organization Grant (VIDI, Top Talent, VENI), 2017, 2019, 2021* - *ESA Parabolic Flight Campaigns, 2016, 2017, 2018* - *European Research Commission (Marie Sklodowska-Curie Action), 2014* - *National Science and Engineering Research Council (Canada), 2013* - *Nissan Motors, 2013* • ***Most important publications:*** - eLife, 2021, doi: 10.7554/eLife.65085 - Scientific Reports, 2021, doi: 10.1038/s41598-021-93037-7 - Journal of Neuroscience, 2020, doi: 10.1523/JNEUROSCI.1463-19.2020 - Annals of Neurology, 2020, doi: 10.1002/ana.25679 - Nature Communications 2019, doi: 10.1038/s41467-019-09738-1 - Journal of Physiology, 2019, doi: 10.1113/JP278642 - Frontiers in Physiology, 2019, doi: 10.3389/fphys.2019.00476 - eNeuro, 2018, doi: 10.1523/ENEURO.0170-18.2018 - Handbook of Clinical Neurology, 2018, doi: 10.1016/B978-0-444-63916-5.00004-5 - Journal of Physiology, 2017, doi: 10.1113/JP272614 - Journal of Neuroscience, 2016, doi: 0.1523/JNEUROSCI.1902-16.2016
Project Title:	**Neuromechanical principles underlying the multiaxial control of human balance**
Abstract:	Upright balance is a continuous struggle against Earth's gravitational pull. Our vertical posture is inherently unstable and must be balanced within a small base of support. Any difficulties in maintaining upright balance puts us at risk of serious injuries due to falls, bringing personal, societal and economic burdens that will continue to increase without a comprehensive understanding of the mechanisms underpinning standing balance. Ongoing balance control relies on complex interactions between our body's biomechanics and the neural (sensory, motor and cognition) systems contributing to standing. For example, the brain must account for the fact the muscles generating torque around our joints often cross axes, meaning that any passive/active muscle tension influences joint torques in multiple directions (i.e. cross-talk). While these biomechanical and neural factors of balance have intrigued researchers for decades, methodological difficulties in unraveling their interactions provides an incomplete picture of how the brain controls standing. The long-term aim of our research is to disentangle these biomechanical and neural contributions to standing balance by combining robotic simulation, human neurophysiology (EEG/EMG), computational modeling and sensory stimulation to push the field passed these obstacles. This project will determine how biomechanical and neural factors along our two primary axes of balance are coordinated to maintain balance, establishing whether cross-talk between their control impedes or enhances our adaptation to the daily challenges of balance. In addition, this project will reveal how sensory and motor cues of balancing self-motion govern the conscious perception and control during imposed sensorimotor errors. Finally, by performing experiments in healthy participants and patients (i.e. vestibular loss and cerebellar ataxia), we will directly test how disruption at different levels of balance influence the brain's ability to adapt and learn. Overall, this innovative research will reveal causal relationships between the neural computations and compensatory responses required for balance and locomotion.

Requirements of candidate:	• We are looking for a highly motivated student with interests in hearing research and preferentially experience with in vivo recordings to join our international team.
	• Master degree or MD with research experience.
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal).
	• English language requirement:
	  • *English speaking countries & Netherlands:* no requirement
	  • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Neurosciences

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	• *dr Johan JM Pel, associate professor* • ***Email:*** *j.pel@erasmusmc.nl* • ***Website:*** *http://www.neuro.nl/research.php* • ***Personal Grants:*** - ZonMW grant 2009, 2012, 2018 - Zon MW – DST India grant 2012 • ***Most important publications:*** - Transl Vis Sci Technol. 2019 Jul 30;8(4):13. - Graefes Arch Clin Exp Ophthalmol. 2019 Apr 3 - Brain Dev. 2018 Oct 6. pii: S0387-7604(18)30469-8. - Cerebellum. 2018 Sep 14. doi: 10.1007/s12311-018-0975-9 - Graefes Arch Clin Exp Ophthalmol. 2018 Feb;256(2):371-379 - J Vis. 2016;16(5):18 - Dev Med Child Neurol. 2016 Oct;58(10):1030-5 - Motor Control. 2016 Jan;20(1):1-20 - J Vis Exp. 2016 Jul 9;(113) - J Ophthalmol. 2015;2015:425067 - J Parkinsons Dis. 2014 4:599–608 - Invest Ophthalmol Vis Sci. 2013 Mar 5;54(3):1656-64 - J Alzheimers Dis. 2012 Jan 1;30(1):131-43
Project Title:	***Visual-motor and visual vestibular interactions***
Abstract:	The reflex movements that we display as a baby gradually develop into complex goal-directed behavior, which is essential for development and learning. The underlying sensorimotor integration translates visual, vestibular and somatosensory information into (in)voluntary motor output during complex behaviors such as standing balance or goal-directed arm movements. In children, abnormal performance scores of neuropsychological and motor tests signal integration problems. They fail, however, in revealing which underlying functions, e.g. visual, motor or visuomotor integration, are impaired. In elderly, neurodegeneration may result in deficits in the sensorimotor integration network leading to behavioral problems. In our group, we are interested in the fundamental and clinical relevance of quantitatively assessed (altered) eye, hand and body movements during sensorimotor integration tests. To achieve this goal, we develop new techniques, including advanced eye movement recordings (imprinted lenses) and combine them with quantitative assessment of visuomotor integration performances and interactions. Ultimately, our approaches allow us to determine how different sensory modalities interact and how they contribute to the development and control of motor and non-motor functions.
Requirements of candidate:	• *We are looking for a highly motivated, hardworking student to join our international team. Our strength is to tackle large scientific questions and thus requires a student with good communication skills.* • *Master degree or MD* • *Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)* • *English language requirement:* ○ *English speaking countries & Netherlands: no requirement* ○ *Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)*

Department of Neurosciences

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	• **Dr. Martijn Schonewille,** m.schonewille@erasmusmc.nl https://neuro.nl/research/schonewille • **Personal Grants:** - ERC Starting Grant (ERC-Stg), 2015 - Dutch Scientific Organization (ALW-Open) Grant, 2014 (co-appl.) - Dutch Scientific Organization (ALW-Veni) Grant, 2011 - Erasmus University Fellowship, EUR, 2010 - Grants for group members: - Dutch Scientific Organization (ALW-Veni) Grant, 2018 - German Research Organization (DFG) Grant, 2019 - Dutch Scientific Organization (Offroad), 2020 - South African Research Organization (NRF-Nuffic), 2020 - Erasmus MC Fellowship 2021 - Dutch Scientific Organization, NWO-XS, 2021 (2x) • **Most important publications:** Nat Neurosci. 9(4):459-61; Neuron. 12;58(5):655-8; Nat Neurosci. 12(8):1042-9; Neuron. 26;67(4):618-28; Neuron. 14;70(1):43-50.; Nat Rev Neurosci. 12(6):327-44. Review; EMBO J. 7;31(5):1217-30; Neuron 22;78(4):700-13; eLife; 10.7554/eLife.02536; Nat Commun. 2016 Sep 1;7:12627; PNAS 2021 September 7, 2021 118 (36) e2016969118; eLife; 10.7554/eLife.45590.001; PNAS 2021 September 14, 118 (37) e2102635118; Nat Comm. 2021 12, Art#: 4129 (2021); eLife 2021;10:e63668;
Project Title:	**Cerebellar differentiation in development of motor functions and neurodevelopmental disorders**
Abstract:	The perfect execution of a voluntary movement requires the appropriate integration of current bodily state, sensory input and desired outcome. To assure that this motor output becomes and remains appropriate, the brain needs to learn from the result of previous outputs. The cerebellum plays a central role in sensorimotor integration, yet - despite decades of studies- there is no generally excepted theory for cerebellar functioning. We recently demonstrated that cerebellar modules, identified based on anatomical connectivity and gene expression, differ distinctly in spike activity properties. It is the lab's long-term goal to identify the ontogeny of anatomical and physiological differences between modules, and their functional consequences. To achieve this goal, we make use a variety of techniques including molecular approaches, in vitro and in vivo electrophysiology, 1p and 2p imaging techniques, optogenetic stimulation and behavioral evaluations. We aim to determine how differential gene expression patterns control the development of distinct physiological properties and anatomical connection patterns of the types of neurons in different cerebellar modules. We will determine the impact of the genetic differentiation in cerebellar input, processing and output. Ultimately, the combined results of these studies will reveal how distinct differences between cerebellar modules develop, and how the modular ensemble ensures proper cerebellar information processing for optimal coordination of timing and force of movements. Combined with the growing body of evidence for a cerebellar role in higher order brain functions and neurodevelopmental disorders, this knowledge will be fundamental for understanding how the juvenile brain develops.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our international team. Since we are tackling complex scientific questions regarding decision making, procedural learning, as well as memory disorders, we hope to find a student is willing to learn new techniques, has affinity with quantitative data analysis, and can communicate well. • Master degree in (bio)physics or neuroscience, an engineering degree, or an MD. • Scholarship that will cover subsistence allowance and international air plane ticket. • English language requirement: IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs).* When writing the CSC proposal we will help with the scientific part of your scholarship proposal.

Department of Neurosciences

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	• **Dr. Zhenyu Gao,** z.gao@erasmusmc.nl ; https://neuro.nl/research/gao • **Personal Grants:** - ERC Starting Grant (ERC-Stg), 2019 - Dutch Scientific Organization (NWO-VIDI) Grant, 2019 - Dutch Scientific Organization (NWO-Klein) Grant, 2019 - Dutch Scientific Organization (NWO-CAS) Grant, 2017 - Erasmus MC Fellowship, 2016 - Dutch Scientific Organization (NWO-VENI) Grant, 2014 • **Most important publications:** - Nature 2018 563(7729):113-116 - Elife 2017 15;6 pii:e28132 - Neuron 2016 89(3):645-57 - Cell Reports 2013 253(4):1239-51 - Nature Reviews Neuroscience 2012 13: 619–635 - Journal of Neuroscience 2012 31;32(44):15533-46 - Neuron 2011 14;70(1):43-50
Project Title:	**Dissecting the brain-wide connectome for motor planning**
Abstract:	All voluntary movements are directed by proper motor plans in the brain. How does the brain effectively generate these motor plans and use them to direct future movements? Previous studies suggested that the motor cortex play a key role in motor planning. Motor cortical neurons maintain their activity for seconds before the movement's onset, which allows the brain to temporarily retain valuable information to secure accurate execution of the motor plans. Our recent research provided evidence for the functional involvement of the cerebellum in motor planning (Gao *et al*, Nature 2018). For this PhD project we will focus on further dissecting the brain-wide circuits that are relevant for motor planning. We will examine whether the sensorimotor representation from the cerebral cortex is integrated in cerebellum during motor planning and that the computation in cerebro-cerebellar circuits is instrumental for supporting the preparatory activity. We will use an integrative approach to 1). identify the cerebrum-to-cerebellum inputs that are relevant for motor planning; 2). determine how cerebellar circuits integrate cerebral inputs and generate corresponding outputs during motor planning; 3). Identify the role of cerebellar outputs in motor planning and explore their computational mechanisms. This project will greatly advance our knowledge on the general computational principles underlying motor planning. In the future it will pave the way to a mechanistic understanding of brain-wide communication in cognitive tasks with its influence extended to future computer science, humanized prosthetics, and medicine.
Requirements of candidate:	• We look for highly motivated students to join our multi-disciplinary team. We welcome students with Msc in biotechnology, neuroscience, bio-engineering, and other life sciences majors. Prior experience in molecular biology, imaging, electrophysiology and computational modelling is preferred, but not essential. • Master degree in (bio)physics or neuroscience, an engineering degree, or an MD. • Scholarship that will cover subsistence allowance and international air plane ticket. • English language requirement: IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs).* When writing the CSC proposal we will help with the scientific part of your scholarship proposal.

Department of Neurosciences

School/Department:	***Department of Neuroscience Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences World no 42 Neuroscience & Behavior	• **Prof. Dr. Chris I. De Zeeuw**, *c.dezeeuw@erasmusmc.nl* • *https://neuro.nl/research/de-zeeuw* • ***Personal Grants:*** - ERC Advanced Grant (ERC-Adv), 2014 - ERC PoC grants (ERC-PoC), 2015, 2016, 2017 - Dutch Scientific Organization (ALW-Open) Grants, 2016, 2017 - ZonMw Grant, 2016 - KNAW Grants, 2017, 2018 • ***Most important publications:*** - Nature Neuroscience 2021 24: 160 - Nature Communications 2020 11 - Nature 2018 563:113 - Science Adv 2018 4 - Nature Neuroscience 2017 20:727 - Nature Reviews Neuroscience 2021 22:92 - Nature Communications 2019 10 - Nature Communications 2018 9 - Science 2017 356:1084 - Neuron 2017 93:409
Project Title:	**Cerebro-cerebellar Interactions during Cognitive Processing**
Abstract:	Coordinating cognitive processes forms the most important and complex task of the brain. Not surprisingly, coordinated control of these functions requires intensive communication within and between many brain regions. Of crucial importance is the mutual communication between cerebellum and cerebral cortex (De Zeeuw, 2021, *Nature Reviews Neuroscience*; Gao et al., 2018, *Nature*). This becomes apparent, for instance, in patients suffering from autism (Peter et al., 2016, *Nature Commun*), spino-cerebellar ataxia (Hoogland et al., 2015, *Current Biol*), or Alzheimer's (Sepulveda-Falla et al., 2014, *J. Clin. Invest.*), in which the output neurons of cerebellum and cerebral cortex become dysfunctional. Before we can start to understand such pathology, we need to comprehend cerebello-cerebral communication under the normal conditions, like decision making and motor planning. For this reason we have developed a behavioral paradigm in which mice are being trained to use their whiskers to discriminate the location or properties of an object, to make a decision based on their sensory input during a delay period, and to report their decision as licking into a trained direction (Gao et al., 2018, *Nature*). This task has been shown to require proper functioning of the cerebellum and cerebral cortex, but it is unclear how subcortical structures ultimately determine direction encoding in this process (Boele et al., 2018, *Science Adv*). For this CSC project we will 1) record neuronal activity in the cerebellum, cerebral cortex and subcortical structures simultaneously in normal mice during and after training; 2) selectively modulate neuronal activity during and after training using optogenetics; and 3) rescue phenotypes in mouse models of autism, ataxia and Alzheimer's. Together, these specific aims should allow us to elucidate how interactions between cerebellum and cerebral cortex drive complex cognitive and motor tasks, and compensate for dysfunctions thereof in wide-spread brain diseases.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our international team. Since we are tackling complex scientific questions regarding decision making, procedural learning, as well as memory disorders, we hope to find a student is willing to learn new techniques, has affinity with quantitative data analysis, and can communicate well. • Master degree in (bio)physics or neuroscience, an engineering degree, or an MD. • Scholarship that will cover subsistence allowance and international air plane ticket. • English language requirement: IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs).* When writing the CSC proposal we will help with the scientific part of your scholarship proposal.

Dept. of Oral & Maxillofacial Surgery, Special Dental Care & Orthodontics

School/Department:	***Department of Oral & Maxillofacial Surgery, Special Dental Care & Orthodontics Erasmus MC***
Supervisor information: world no 8 Surgery World no 13 Collaboration Big Science - Genetics world no 33 in Radiology, Nuclear Medicine and Imaging	• *Prof dr Eppo Wolvius – Head of Department Prof dr. Fernando Rivadeneira Dr Gennady Roshchupkin* • ***Email:*** *e.wolvius@erasmusmc.nl f.rivadeneira@erasmusmc.nl g.roshchupkin@erasmusmc.nl* • ***Website:*** *https://www.oral-health.nl/* • ***Grants:*** - *European Reference Network on Cranial diseases https://ern-cranio.eu…* - *European Commission Cost Action: GEnomics of MusculoSkeletal traits TranslatiOnal Network (CA86139) https://www.cost.eu/actions/CA18139/* - *European Commission MSC-ITN Tissue engineering in osteoarthritis and bone disease https://www.carbonresearch.eu.* - *ERC Advanced grant 2021* • ***Most important publications:*** *1. Vucic, S., R. W. Drost, A. J. van Wijk, P. R. Wesselink and E. B. Wolvius (2016). "Patterns of orodental injury and mouthguard use in Dutch field hockey." Br J Sports Med 50(11): 661-668.* *2. Vucic, S., R. W. Drost, E. M. Ongkosuwito and E. B. Wolvius (2016). "Dentofacial trauma and players' attitude towards mouthguard use in field hockey: a systematic review and meta-analysis." Br J Sports Med 50(5): 298-304.* *3. Jonsson, L., T. E. Magnusson, A. Thordarson, T. Jonsson, F. Geller, B. Feenstra, M. Melbye, E. A. Nohr, S. Vucic, B. Dhamo, F. Rivadeneira, E. M. Ongkosuwito, E. B. Wolvius, E. J. Leslie, M. L. Marazita, B. J. Howe, L. M. Moreno Uribe, I. Alonso, M. Santos, T. Pinho, R. Jonsson, G. Audolfsson, L. Gudmundsson, M. S. Nawaz, S. Olafsson, O. Gustafsson, A. Ingason, U. Unnsteinsdottir, G. Bjornsdottir, G. B. Walters, M. Zervas, A. Oddsson, D. F. Gudbjartsson, S. Steinberg, H. Stefansson and K. Stefansson (2018). "Rare and Common Variants Conferring Risk of Tooth Agenesis." J Dent Res 97(5): 515-522.* *4. Vucic, S., T. I. M. Korevaar, B. Dhamo, V. W. V. Jaddoe, R. P. Peeters, E. B. Wolvius and E. M. Ongkosuwito (2017). "Thyroid Function during Early Life and Dental Development." J Dent Res 96(9): 1020-1026.* *5. Asllanaj, B., L. Kragt, I. Voshol, M. Koudstaal, M. A. Kuijpers, T. Xi, S. J. Berge, C. Vermeij-Keers and E. M. Ongkosuwito (2017). "Dentition Patterns in Different Unilateral Cleft Lip Subphenotypes." J Dent Res 96(13): 1482-1489* *6. Liu, X., Kayser, M., Kushner, S.A., Tiemeier, H., Rivadeneira, F., Jaddoe, V.W.V., Niessen, W., Wolvius, E.B. and Roshchupkin, G.V., 2021. Association between prenatal alcohol exposure and children's facial shape. A prospective population-based cohort study. medRxiv.*
Project Title:	***Three-dimensional (3D) Facial Shape Analysis using Artificial Intelligence***
Abstract:	The human face is complex three-dimensional structure that makes each of us uniquely distinguishable, but strongly determined by genetic factors. Consequently, many developmental, psychiatric and genetic abnormalities have defined facial morphological features. However, the underlying complexity of facial morphology cannot be fully captured by simple geometric measures. Rather, it is now increasingly clear that the genetic determination of facial morphology and its relation with health outcomes requires more sophisticated quantitative approaches for capturing facial morphology. Recent advances in computational and methodological approaches have made possible accurate and precise derivation of facial traits. This project will focus on developing methods (based on **machine learning** and **deep learning technologies**) to derive complex facial measurements. the ultimate aim of this project is to leverage the large-scale 3D facial imaging, which provides extensive genetic and epidemiological measures, to unravel the complexity between genetics, facial morphology and health outcomes.
Requirements of candidate:	We are looking for a highly motivated, hardworking student to join our very international team. Successful candidates are expected to have a strong quantitative or computer science background, excel at critical thinking, with strong motivation to engage in development and application of advanced analytical methods. • Master degree in mathematics, computer science, statistics, bioinformatics, physics, electrical engineering, or in an equivalent discipline. • Experience with: Python, linux, shell. • Experience with machine learning methods. deep learning methods is advantage • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we can help with the scientific part of your scholarship proposal) • English language requirement: English speaking countries & Netherlands: no requirement; Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept. of Oral & Maxillofacial Surgery, Special Dental Care & Orthodontics

School/Department:	***Department of Oral & Maxillofacial Surgery, Special Dental Care & Orthodontics Erasmus MC***
Supervisor information: erc world no 8 Surgery World no 13 Collaboration Big Science - Genetics	*Prof. Eppo Wolvius (e.wolvius@erasmusmc.nl), Head of the Department* *Prof. Fernando Rivadeneira (f.rivadeneira@erasmusmc.nl), Full Professor* *Dr. Lea Kragt (l.kragt@erasmusmc.nl), Post-doctoral Scholar* ***Website:*** *www.oral-health.nl* ***Most important publications:*** 2016: J Dent Res 95(4):395-401. 2016: Caries Res 50(5):471-479 & 489-497 2017: J Dent Res 96(13): 1482-1489. 2017: J Dent 62:18-24. 2018: Hum Mol Genet 27(17):3113-3127. 2019: Qual Life Res 28(7):1783-1791. 2020: Bone 132:115-180. 2021: J Nutr. 151(7):1993-2000
Project Title:	***The oral microbiome in adolescents - individual, environmental and genetic determinants***
Abstract:	The department of oral and maxillofacial surgery, special dental care and orthodontics conducts oral health research in big datasets from population-based cohorts and clinical cohorts. Oral health research in this setting is worldwide nearly unique. Dr Lea Kragt has worked within this research line for 8 years, is coordinating the collection of dental data and has initiated and conducted research on different aspects within the research group, from quality of life factors to endocrine disrupters. We offer an interesting and challenging position in an ambitious yet friendly scientific and clinical research environment. PhD project: The oral microbiome offers an innovative approach to develop new preventive strategies for dental diseases. Dental caries for example is a major public health problem with a prevalence around 30% in Dutch children and up to 90% among children worldwide, typically affecting in larger proportions socially disadvantaged and marginalized populations. Though caries is a preventable disease, due to its multifactorial nature, the condition is difficult to tackle. Therefore the aim of this project is to provide a basis for the use of the oral microbiome in both risk-identification and progression-control of dental caries by understanding its composition and modifiability. Dental biofilm samples have been collected (n=4800) and are processed using 16S rRNA sequencing to obtain oral microbiome profiles. Logistic regression (alpha diversity) and permutation analysis (beta diversity) will be used to identify associations between general as well as oral health factors and oral microbiome profiles. The candidate for this project is free to develop additional research objectives related to the oral microbiome during the project.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Research Master degree (epidemiology, biomedical, (micro)biology or equivalent) or doctor of medicine (MD) or doctor of dentistry (DD) required • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: *English speaking countries & Netherlands:* no requirement *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Dept. of Oral & Maxillofacial Surgery, Special Dental Care & Orthodontics

School/Department:	***Department of oral and maxillofacial surgery, special dental care and orthodontics, Erasmus MC***
Supervisor information: erc world no 8 Surgery World no 13 Collaboration Big Science - Genetics	*Prof. Eppo Wolvius (e.wolvius@erasmusmc.nl), Head of the Department* *Prof. Fernando Rivadeneira (f.rivadeneira@erasmusmc.nl), Full Professor* *Dr. Lea Kragt (l.kragt@erasmusmc.nl), Post-doctoral Scholar* ***Website:*** *www.oral-health.nl* ***Most important publications:*** 2016: J Dent Res 95(4):395-401. 2016: Caries Res 50(5):471-479 & 489-497 2017: J Dent Res 96(13): 1482-1489. 2017: J Dent 62:18-24. 2018: Hum Mol Genet 27(17):3113-3127. 2019: Qual Life Res 28(7):1783-1791. 2020: Bone 132:115-180.
Project Title:	***Oral health trajectories - individual, environmental and genetic determinants***
Abstract:	The department of oral and maxillofacial surgery, special dental care and orthodontics conducts oral health research in big datasets from population-based cohorts and clinical cohorts. Oral health research in this setting is worldwide nearly unique. Dr Lea Kragt has worked within this research line for 8 years, is coordinating the collection of dental data and has initiated and conducted research on different aspects within the research group, from quality of life factors to endocrine disrupters. We offer an interesting and challenging position in an ambitious yet friendly scientific and clinical research environment. PhD project: Dental caries is a major public health problem with a prevalence around 30% in Dutch children and up to 90% among children worldwide. Next to this, dental caries is socially patterned, typically affecting in larger proportions socially disadvantaged and marginalized populations. The disparities already exist early in childhood, but increase throughout the lifetime. Carious lesions are very common in children, but the transition from childhood to adulthood is an even more sensitive period for the development of oral health and disease. The underlying mechanisms in the association of disadvantaged populations with oral diseases are not clear. The candidate will identify and investigate distinct trajectories of oral health and disease in growing children/young adults using latent class models. Multinomial multilevel regression analysis will be performed to study the behavioral, environmental and genetic predictors of oral health trajectories. In addition, he/she will employ state of the art biomarkers (including genomic) assessments that provide additional insight to assess causal relationships between potentially confounded risk factors for oral diseases. For example, the potential role of the oral microbiome in the relation of individual and environmental factors and oral diseases might be explored considering a plausible mediation by these factors.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Research Master degree (public health, epidemiology or equivalent) or doctor of medicine (MD) or doctor of dentistry (DD) • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: *English speaking countries & Netherlands:* no requirement *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Pathology

The Department of Pathology of the Erasmus Medical Center in Rotterdam, The Netherlands.
https://www.erasmusmc.nl/pathologie/research/?lang=en
Head of the Dept: Prof. Dr. F. van Kemenade.

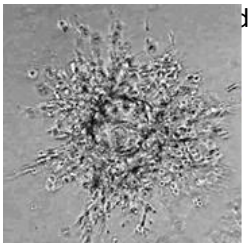
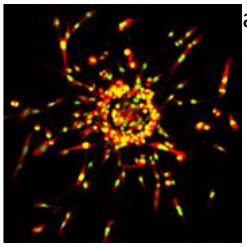
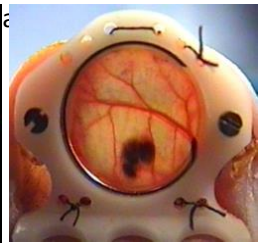
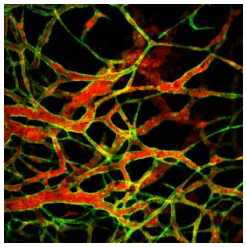
In the Department of Pathology of the Erasmus MC the research topics can be grouped into two major themes: 1. Oncology and 2. Cardiovascular / transplantation-immunology. The cancer research is both translational and basal, and encompasses topics in cancers of the brain, urogenital and GI tract. In addition there are basic research topics in stem cell research and there is a Center for Optical Imaging in which various projects are being carried out.

Why choosing for this department?
The department of Pathology is well equipped with virtual all molecular techniques and a laboratory for molecular diagnostics is incorporated. The department harbors a accredited tissue bank of over 40,000 frozen specimens. In addition, being the largest department of pathology in the country there is a large FFPE archive, and a large archive of autopsy-related specimens. The department belongs to a cluster of service laboratories (Lab Medicine, Immunology, Microbiology, Radiology), but research collaborations are extending well beyond to departments of (clinical) genetics, experimental cardiology, nephrology / transplantation and more.

Key publications (2016- 2017 of the senior PIs:)
Prof. Fodde (GI, stem cell biology): Schewe M et al., Cell Stem Cell. 2016.; Rodriguez-Colman MJ et al., Nature. 2017.
Prof. Houtsmuller (Center for Optical Imaging): Sanchez H. Nucleic Acids Res. 2017; Meddens MB et al. Nat Commun. 2016.
Prof. Kros (Neuro-Onc) van den Bent MJ. et al. Lancet 2017; Zheng PP et al. Med Res Rev; 2017; Zhu C. et al. Neuro Oncol. 2017; Thompson EM et al. Lancet Oncol. 2016.
Dr. van Leenders (Urogenital) Roobol MJ et al. Eur Urol. 2017; Ruela-de-Sousa RR. et al. Eur Urol. 2016.; Alberts AR et al. Eur Urol. 2016.

Selected recent Honors & Awards:
Collaborative Grants (NWO, Horizon2020, MSCA, other):
NWO – Building blocks € 150K; KWF- Ovarian Cancer € 570K; KWF – Raman spectroscopy €635K; MLDS – Colon cancer € 240K; Horizon 2020 – SPIDIA4P € 119K; Industry – Roche €131K; Industry – Astrazenica €269K; Industry – MDX Health €578K.

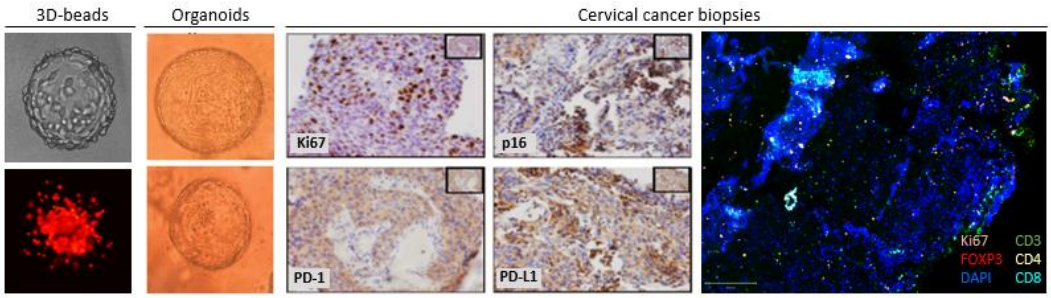
Department of Pathology

School/Department:	***Department of Pathology Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences world no 42 Oncology	• *Prof dr Adriaan B. Houtsmuller* *Assoc. Prof dr Timo L.M. ten Hagen* • ***Email:*** *a.houtsmuller@erasmusmc.nl* *t.l.m.tenhagen@erasmusmc.nl* • ***Website:*** *www.erasmusmc.nl , www.molmed.nl* • ***Grants:*** *NIH, EU FP6, EU FP7, CSC, Mrace, NWO, BBOL, DdHSt* • ***Most important publications:*** 1) …ten Hagen TLM, Smits R, Bruno MJ, Fuhler GM, Peppelenbosch MP. Carcinogenesis. 2019 Feb 20 2) …ten Hagen TLM. Sci Rep. 2018 Jun 25;8(1):9596. 3) …ten Hagen TLM, …, Peppelenbosch MP, Fuhler GM. Oncotarget. 2016 8;7(45):73525-40. 4) …ten Hagen TLM, Fuhler GM. Oncotarget. 2016 Apr 19;7(16):21922-38. 5) …ten Hagen TLM Nat Protoc. 2015 Jun;10(6):904-15. 6) …ten Hagen TL. Eur J Cancer. 2016 Jan;53:135-43. 7) …Houtsmuller AB. Sci Rep. 2019 Jul 18;9(1):10460. 8) …Houtsmuller AB, van den Dries K, Wiseman PW, Cambi A. Nat Commun. 2016 7:13127. 9) …Houtsmuller A, Huveneers S, de Rooij J. Sci Rep. 2015 5:17225. 10) …Houtsmuller AB, van de Water B. J Cell Sci. 2012 125(Pt 19):4498-506.
Project Title:	**Understanding local and systemic progression of cancer with respect to tumor – stroma interaction and metastasis development.**
Abstract:	Local development of cancer is not only interesting for development of therapeutics or understand what drives tumor progression. Importantly, aspects of local development connect with the occurrence of metastasis, progression of the disease and eventually mortality. For instance, while tumor cell proliferate and a larger mass is formed the surrounding tissue, tumor stroma, needs to be recruited. The environment (may) provide stimulatory signals, inflammatory cells promote growth, specific immune cells inhibit antitumor responses, nutrients and oxygen are delivered through a (newly) developed vascular bed. These all will help the tumor to progress locally. However, these factors as well affect progression beyond the primary tumor. Vasculature and lymphatics help metastasis by providing the logistics for spreading cells, inflammation may help cells to escape through opening tissues and endothelial lining, and locally produced factors may have an effect at distance, either by inhibiting or promoting growth of new tumors, or by creating a favorable niche at distance for circulating tumor cells to locate. It is clear that expansion of a tumor is not just a stochastic effect but that certain tumor cells are responsible for the onset of growth, which some would call tumor stem cells, and that expansion may involve a different set of tumor cells resulting from the stem cells. More so, when tumors evolve locally clonal growth may occur, but clearly differentiation of tumor cells takes place. For instance, it is proposed that cells go through transitions such as the EMT (epithelial-to-mesenchymal transition), where proliferation is tuned down and migratory capacity goes up when a cell is destined to metastasis. When at location this process is reversed; the tumor cells loses the migratory capacity while gaining again in proliferative capacity. However, we have examples where this is not a given; tumor cells exhibit high proliferation as well as migration capacities at the same time. Here we study the aspects of tumor progression as disease in a number of in vitro and in vivo models including, but not limited to, intravital microscopy, advanced 3D live cell imaging, spehriod cultures, clonal expansion, and vascular formation. Below 3D growth and dispersion in vitro (left two images) and intravital window with image of green    
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: *English speaking countries & Netherlands:* no requirement *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

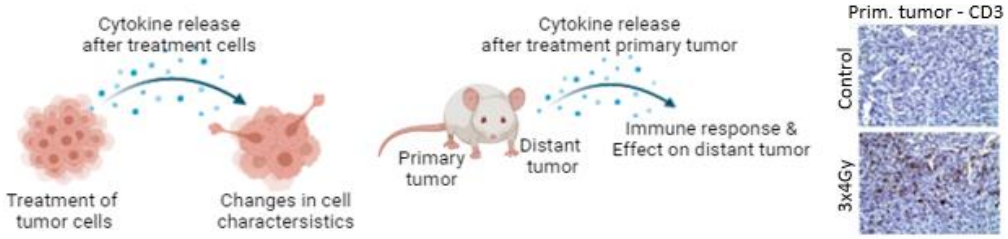
Department of Pathology

School/Department:	Department of Pathology Erasmus MC
Supervisor information: World no 30 Biomedical Sciences world no 42 Oncology	• Prof dr Adriaan B. Houtsmuller Assoc. Prof dr Timo L.M. ten Hagen • Dr. Mohamadreza Amin • **Email:** a.houtsmuller@erasmusmc.nl t.l.m.tenhagen@erasmusmc.nl M.amin@erasmusmc.nl • **Website:** www.erasmusmc.nl , www.molmed.nl • **Grants:** NIH, EU FP6, EU FP7, CSC, Mrace, NWO, BBOL, DdHSt • **Most important publications:** 1-Seynhaeve, A.L.B et al. Hyperthermia and smart drug delivery systems for solid tumor therapy. Adv Drug Deliv Rev 2020. 2-Amin, M.; et al. Regulation of in vivo behavior of tat-modified liposome by associated protein corona and avidity to tumor cells. Int J Nanomedicine 2018, 13, 7441-7455. 3-Seynhaeve, A.L. et al Intact doxil is taken up intracellularly and released doxorubicin sequesters in the lysosome: Evaluated by in vitro/in vivo live cell imaging. J Control Release 2013, 172, 330-340. 4-Li, L. et al. Improved intratumoral nanoparticle extravasation and penetration by mild hyperthermia. J Control Release 2013, 167, 130-137. 5-Lu, T et al. Formulation and optimization of idarubicin thermosensitive liposomes provides ultrafast triggered release at mild hyperthermia and improves tumor response. J Control Release 2015, 220, 425-437 6-Lokerse, W.J et al. In depth study on thermosensitive liposomes: Optimizing formulations for tumor specific therapy and in vitro to in vivo relations. Biomaterials 2016, 82, 138-150. 7-Li, L et al. Mild hyperthermia triggered doxorubicin release from optimized stealth thermosensitive liposomes improves intratumoral drug delivery and efficacy. J Control Release 2013, 168, 142-150. 8-Li, L et al Triggered content release from optimized stealth thermosensitive liposomes using mild hyperthermia. J Control Release 2010, 143, 274-279.
Project Title:	**Evaluation of immune stimulatory effect of heat and chemotherapy in hyperthermia triggered drug delivery**
Abstract:	Liposomes have shown great capability in formulation, reduction of side effects and enhancing pharmacokinetics of chemotherapeutics by stable encapsulation of chemotherapeutics and long circulating properties. However, effective drug delivery at the cellular level by means of such preparations is still unsatisfactory (1-3). One promising approach is using spatiotemporal drug release by means of liposomes with the capacity for content release triggered by internal or external stimuli (1). Among different stimuli, interests to application of external heat, hyperthermia, is getting more attention and by means of advanced liposomal preparations and heating technologies high level of control over application of heat and drug release could be achieved. Mild hyperthermia (41-43 oC) not only can enhance drug delivery by triggering the release or increasing permeation and distribution of drugs into tumor interstitium (4) but also sensitizes tumor cells to the therapy. In addition to these local mild hyperthermia can also induce immune responses that could be used against tumor. On the other hand most of the commonly used cytotoxic chemotherapeutics also invade tumors by inducing immunologic cell death. In fact, this is under argue whether the direct toxic effect of chemotherapeutics is responsible for the antitumor effect or it is the induced immune response that eliminate cancer cells. Therefore, in treatment of tumor by temperature sensitive liposomes (TSL), there are two different stimuli that stimulate immune response by different pathways and importantly different timings. While in our previous studies we enhanced the antitumor activity of TSL+ hyperthermia by optimizing liposomal preparations or heat application (5-8) in this project we want to evaluate how immune system could be harnessed in favor of tumor regression and not tumor growth and progression. We argue that immune responses induces by each arm may interfere with each other and therefore, their combination may not necessarily be synergistic or even additive. For example while immunogenic cell death mediated by therapeutic agents is in favor of anti-tumor immune response, suppression of immune system followed by administration of high dose of chemotherapeutics may results in opposite responses favoring tumor growth. Therefore, knowing the pathways, mediators and timing of immune responses provoked by these stimuli and when combined with each other enable proper control over treatments of tumor. Additionally, knowing these pathways suggests what kind of immunomodulatory agents can boost the overall therapeutic effect and to achieve such impact when is best to prescribe. In this project we want to evaluate the local and systemic immune reactions followed by treating mouse model of melanoma tumor by either local mild hyperthermia alone or TSL containing doxorubicin or idarubicin plus local application of heat. And later improve the therapeutic activity by adjusting drug dose, dose schedule, duration of hyperthermia and finally using immune modulators. This could be done in two in vitro and in vivo settings using protein analysis techniques such as SDS-PAGE, western blotting and proteomic analysis. immunohistochemistry analysis of treated tumors, confocal microscopy and intravital imaging.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

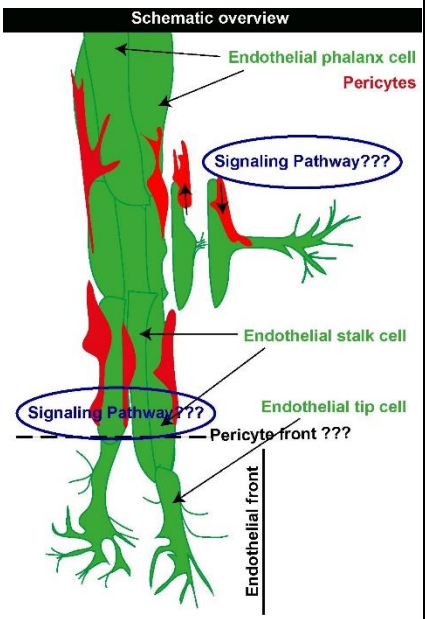
Department of Pathology

School/Department:	***Department of Pathology Erasmus MC, and Radiotherapy, Amsterdam UMC***
Supervisor information: World no 30 Biomedical Sciences world no 42 Oncology	Associate Professor, head LEO, head NICE, Timo L.M. ten Hagen Email: t.l.m.tenhagen@erasmusmc.nl Assistant professor dr. Arlene L. Oei Email: a.l.oei@amsterdamumc.nl Selected publications: - J Nanobiotechnology, Doi: 10.1186/s12951-021-00846-z - Cancers, 2020. Doi: 10.3390/cancers12030582. - Biol Proced Online, Doi: 10.1186/s12575-019-0114-0 - Advanced drug delivery reviews, 2019. Doi: 10.1016/j.addr.2020.01.003 - Int J Nanomedicine, Doi: 10.2147/IJN.S190736 - Int J Mol Scie, 2018. Doi: 10.3390/ijms19082420 - Radiation Oncology, 2017. Doi: 10.1186/s13014-017-0813-0 - Cancer Research, 2015. Doi: 10.1158/0008-5472.CAN-15-0816
Project Title:	**Exploring the role of HPV in treatment response for cervical cancer**
Abstract:	HPV is a common sexually transmitted virus that can lead to different types of cancer, including cervical cancer. In fact, more than 95% of cervical cancers are HPV-positive. To reduce cervical cancer incidence, HPV vaccines have been developed which are estimated to prevent 70-85% of cervical cancer. However, according to the World Health Organization, vaccination will only deliver a 0.1% reduction in cervical cancer mortality up to 2030 (WHO, 2021). At present, the 5-year overall survival of patients with localized cervical cancer is approximately 92%. Unfortunately, this percentage rapidly drops to 56% for patients with regional disease and to only 17% for patients with distant (metastasized). Thus, we are not yet close to eliminating the burden that cervical cancer imposes on women worldwide. In fact, there is clear need to develop novel treatment strategies for patients, particularly those with non-localized cervical cancer. The development of novel therapies depends on a better understanding of the disease. We hypothesize that the HPV viral load in cervical cancer determines immune responsiveness to anti-cancer treatments. More insights on the meaning of HPV viral load can be decisive for choice of treatment. To that end tumor (immuno)biology to radiotherapy, chemotherapy, hyperthermia and immune modulators needs to be thoroughly investigated in both in vitro an in vivo models in response to improve treatment strategies.  *Figure: Cervical cancer cell lines will be used in 3D-cultures; patient derived organoids are made for cervical tumor biopsies to study treatment responses in vitro; patient material is also used for quantification of immune cells to be correlated to treatment outcome.*
Requirements of candidate:	• We are looking for a highly motivated, hardworking student, who has completed a BSc and MSc in biomedical sciences or a related studies, to join our team. In vitro and in vivo experiences are a pre. • A good command of English is required. English speaking countries & Netherlands: no requirement; other countries: IELTS 7.0 (min. 60.0 for all subs) or TOEFL 100 (min. 20 for all subs). • We offer: supervision, lab facilities and cover laboratory costs. • The scholarship will have to cover: your salary and living expenses.

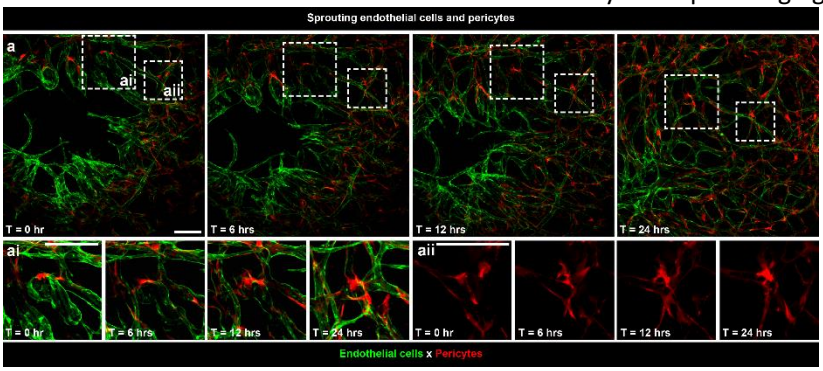
Department of Pathology

School/Department:	***Department of Pathology Erasmus MC, and Radiotherapy, Amsterdam UMC***
Supervisor information: World no 30 Biomedical Sciences world no 42 Oncology	Associate Professor, head LEO, head NICE, Timo L.M. ten Hagen Email: t.l.m.tenhagen@erasmusmc.nl Assistant professor dr. Arlene L. Oei Email: a.l.oei@amsterdamumc.nl Selected publications: - Cancers, 2020. Doi: 10.3390/cancers12030582. - Adv Drug Deliv Rev. Doi: 10.1016/j.addr.2020.03.006 - Advanced drug delivery reviews, 2019. Doi: 10.1016/j.addr.2020.01.003 - Int J Nanomedicine. Doi: 10.2147/IJN.S96123 - Int. J. of Hyperthermia, 2019. Doi: 10.1080/02656736.2019.1685686
Project Title:	**Studying the abscopal effect of thermoradiation in a triple negative breast cancer mouse model**
Abstract:	Surgery, radiotherapy, and chemotherapy can successfully achieve control of primary breast tumours. However, many patients progress with disease recurrence and metastasis, which are refractory to treatment and correlated with (very) poor prognosis. Triple negative breast cancers, representing about 15-20% of all breast cancers, recur more rapidly (2.6 vs. 5.0 years) and are associated with lower overall survival than other breast cancers (4.2 vs. 6 years). About 10-15% of all breast cancer patients suffer from an aggressive form and will develop metastases within 3 years after diagnosis of the primary tumour. While radiotherapy and hyperthermia have been successful to treat breast cancer recurrence, a new strategy to target metastases is needed. The role of the immune system in tumor progression and response to therapy has received considerable attention. Recruitment of sufficient T-cells remains a challenge in immunologically cold tumours, such as in most triple negative breast cancers. Evidence suggests focal radiotherapy and hyperthermia can induce an abscopal effect. We aim to better understand the abscopal effect to determine e.g. the cytokine release that triggers the immune response after different radiation schedules and hyperthermia doses; and subsequently effects on cell migration, colony formation and viability.  *Figure: In vitro experiments will be used to study changes in cell characteristics after various treatment combinations and treatment schedules, in particular cytokine release and immune related cell surface receptors. In animal models the abscopal effect will be studied by treatment of the primary tumor and measuring tumor growth of the distant tumor. Subsequently mechanisms of action will be elucidated to explain treatment responses.*
Requirements of candidate:	• We are looking for a highly motivated, hardworking student, who has completed a BSc and MSc in biomedical sciences or a related studies, to join our team. In vitro and in vivo experiences are a pre. • A good command of English is required. English speaking countries & Netherlands: no requirement; other countries: IELTS 7.0 (min. 60.0 for all subs) or TOEFL 100 (min. 20 for all subs). • We offer: supervision, lab facilities and cover laboratory costs. • The scholarship will have to cover: your salary and living expenses.

Department of Pathology

School/Department:	Department of Pathology Erasmus MC
Supervisor information: World no 30 Biomedical Sciences world no 42 Oncology	• *Prof dr Adriaan B. Houtsmuller, a.houtsmuller@erasmusmc.nl* • *Assoc. Prof dr Timo L.M. ten Hagen , t.l.m.tenhagen@erasmusmc.nl* • *Dr. Ann L.B. Seynhaeve, a.seynhaeve@erasmusmc.nl* • ***Website:*** *www.erasmusmc.nl , www.molmed.nl* • ***Grants:*** *Mrace* • ***Most important publications regarding this program:*** 1)Biol Proced Online. 2020 Feb 1;22:3. doi: 10.1186/s12575-019-0114-0 2)Sci Rep. 2018 Jun 25;8(1):9596. doi: 10.1038/s41598-018-27943-8. 3)J Vis Exp. 2018 Jan 19;(131):55115. doi: 10.3791/55115. 4)Cancer Res. 2007 Oct 1;67(19):9455-62. doi: 10.1158/0008-5472.CAN-07-1599.
Project Title:	**Investigating synchronization and impact of pericyte interacting with endothelial cells during angiogenesis.**
Abstract:	Pericytes have long been neglected in research and were even believed to be absent in the tumor-associated vasculature. These cells are closely associated with endothelial cells and are important to form a functional blood conducting network in normal as well as in tumor development. While presence of pericytes has been documented in the past, and is reviewed by Simms in 1986, focused investigation into these cells is more recent as well as therapeutic recognition. Tumors need vessels to grow and, as we observed that tumor-associated pericytes are differently expressed in various tumor types, the presence or absences of pericytes can have implications for tumor development and therapy. We recently observed that pericyte motion, along different vascular tubes (i.e. growing, newly formed and established), proceeds via a clear synchronized pattern. At the position of an emerging endothelial sprout, the nearby pericytes are moving away along the existing tube to later re-emerge when the endothelial sprout moves further into the tissue. Also, pericytes form a front at a specified distance from the migrating endothelial tip cell implying a strong forward-driving synchronized communication between pericytes and adjacent endothelial stalk cells. Next to that, velocity seemed to be determined by a pericyte – endothelial cell synchronized interacting signal. Many questions are still not completely answered and proven. Where do angiogenic pericytes originate from? What determines interaction of pericytes with endothelial cells and what molecular and/or biological pathways drives these cells? How important is this interaction in the establishment of a functional vasculature and in successful anti-cancer therapy. What are the consequences when this interaction is lost? We want to explore the biological implications of pericyte - endothelial cell interaction in more detail and investigate the consequences when communication between pericytes and endothelial cells is lost. As pro- as well as anti-vascular processes are important in cancer treatment a better understanding of the close relationship between pericytes and endothelial cells is of critical value.  *Schematic overview of the research direction. We want to investigate the biological behavior and genetic signaling of pericytes interacting with endothelial cells in angiogenesis and tumor therapy.*
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. As mice models are a major part of the experimental set-up affinity to work with animals is required. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: *English speaking countries & Netherlands:* no requirement *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Pathology

School/Department:	***Department of Pathology Erasmus MC***
Supervisor information: World no 30 Biomedical Sciences world no 42 Oncology	• *Prof dr Adriaan B. Houtsmuller, a.houtsmuller@erasmusmc.nl* • *Assoc. Prof dr Timo L.M. ten Hagen , t.l.m.tenhagen@erasmusmc.nl* • *Dr. Ann L.B. Seynhaeve, a.seynhaeve@erasmusmc.nl* • ***Website:*** *www.erasmusmc.nl , www.molmed.nl* • ***Grants:*** *Mrace* • ***Most important publications regarding this program:*** 1)Seynhaeve ALB, ten Hagen TL, Theranostics. 2020 2)Seynhaeve ALB, ten Hagen TL. Sci Rep. 2018 3)ten Hagen TL, Oncotarget. 2016 4)ten Hagen TL, Nat. Protoc. 2015 5)Seynhaeve AL, ten Hagen TL, J. Controlled Release. 2013 6)Seynhaeve AL, ten Hagen TL, Cancer res. 2008 7)Houtsmuller AB. Sci Rep. 2019 8)Houtsmuller AB, Nat Commun. 2016 9)Houtsmuller AB, Sci Rep. 2015
Project Title:	***Investigation the association between endothelial cells and mural cells in angiogenesis***
Abstract:	Angiogenesis, the formation of new blood vessels, is essential for the proper development of tissues. Endothelial cells form the inner lining providing a dynamic barrier between underlying tissue and blood. Vascular mural cells are wrapped around the endothelial tube and are considered as stabilizing cells: control contractility and regulate endothelial proliferation. Vascular mural cells can be subdivided in vascular smooth muscle cells (vSMC), surrounding the larger vessels, and pericytes in smaller capillaries although some vessels have mural cells with properties between vSMC and pericytes. This distinction is more difficult in the tumor as typical properties separating arteries and veins are lost due to the more rapid and chaotic vessel growth. The study of angiogenesis is predominantly focused on endothelial cells and much less is known of mural cells. However, mural cells play a fundamental role in normal as well as pathological angiogenesis and are crucial for endothelial survival. The complex molecular association between both cells suggests that pericytes are more than just supporting cells. Functionality, ontogeny and identity are not fully understood and as there is no single common marker available to define vSMC and pericytes this makes it a more challenging cell type to investigate. We argue that mural cells are equally important to establish a functional vascular network and the cellular and molecular interaction between these cells will be studied. To do this we developed intravital microscopy using transgenic mice in which we can follow the dynamic nature of these cells in a 4D (XYZ+T, time dimension) manner. Also 2D and 3D in vitro cell cultures and ex vivo material will be used to study all steps in angiogenesis.  *Figure: High resolution 4D intravital imaging of sprouting endothelial cells and pericytes. (a) Shown are 70 µm subsequential maximal projections of endothelial cells (eNOStagGFP in green) and pericytes (Cspg4-DsRed in red) in a B16BL6 melanoma tumor. (ai, aii) Zoom-in showing endothelial cell and pericyte spatial and temporal dynamics. x represent reference points in the vasculature. Scale bar represent 100 µm.*
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. As mice models are a major part of the experimental set-up affinity to work with animals is required. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Psychiatry

Brain disorders should be considered one of the 21st century's top global health challenges as they constitute the largest burden of disease, both within Europe and worldwide.
Our understanding of the underlying etiology and pathophysiology of mental illness is necessary to create healthy changes for future generations. Yet, the study of the human brain is often challenging and difficult due to high complexity of this organ and the multifactorial nature of emotions and cognition.
Furthermore, the stigma of mental illness remains a profoundly significant barrier to early-intervention and treatment continuity, thereby perpetuating the consequences of psychiatric illness for patients, families, healthcare providers, and society.
Therefore, to address these complementary and interconnected aspects of mental illness, our department has undertaken specific areas of intense research focus within our research program from 'bench to bedside to society'.

Mission statement
Our mission is to innovate and optimise the diagnosis, treatment and prevention of severe mental health disorders in a medical context. The research conducted herein comprises applied, clinical and translational studies.
The research of the Department of Psychiatry focusses on:
- Neurobiology of Mood & Psychotic Disorders;
- Applied social and forensic psychiatry;
- Medical psychology.

Our scientific research is organized into three main research lines that, each with their specific area/ focus of interest, are distinguished by their complementary methodological approaches. The three research lines cooperate naturally.

Six examples illustrating the research carried out at the department:

1. Bouwkamp CG, Kievit AJA, Markx S, Friedman JI, Zutven L van, Minkelen R van, Vrijenhoek T, Xu B, Sterrenburg-van de Nieuwegiessen I, Veltman JA, Bonifati V, Kushner SA. Copy number variation in syndromic forms of psychiatric illness: the emerging value of clinical genetic testing in psychiatry. ***Am J Psychiatry 2017; 174: 1036-1050.***
2. Grootendorst-van Mil, N. H., Bouter, D. C., Hoogendijk, W. J. G., van Jaarsveld, S. F. L. M., Tiemeier, H., Mulder, C. L., & Roza, S. J. The iBerry study: a longitudinal cohort study of adolescents at high risk of psychopathology. ***European Journal of Epidemiology, 2021; 36(4), 453–464.***
3. Influence of age on ECT efficacy in depression and the mediating role of psychomotor retardation and psychotic features. Heijnen WTCJ, Kamperman AM, Tjokrodipo LD, Hoogendijk WJG, van den Broek WW, Birkenhager TK. ***J Psychiatr Res. 2019 Feb;109:41-47. doi: 10.1016/j.jpsychires.2018.11.014. Epub 2018 Nov 15.***
4. Sharma V, Bergink V, Berk M, Chandra PS, Munk-Olsen T, Viguera AC, Yatham LN. Childbirth and prevention of bipolar disorder: an opportunity for change. ***Lancet Psychiatry 2019; 6(9): 786-792.***
5. Vrij FM de, Bouwkamp CG, Gunhanlar N, Shpak G, Lendemeijer B, Baghdadi M, Gopalakrishna S, Ghazvini M, Li TM, Quadri M, Olgiati S, Breedveld GJ, Coesmans M, Mientjes E, Wit T de, Verheijen FW, Beverloo HB, Cohen D, Kok RM, Bakker PR, Nijburg A, Spijker AT, Hassmans PMJ, Hoencamp E, Bergink V, GROUP Study Consortium, Vorstman JA, Wu T, Olde Loohuis LM, Amin N, Langen CD, Hofman A, Hoogendijk WJ, Duijn CM van, Ikram MA, Vernooij MW, Tiemeier H, Uitterlinden AG, Elgersma Y, Distel B, Gribnau J, White T, Bonifati V, Kushner SA. Candidate GSPG4 mutations and induced pluripotent stem cell modeling implicate oligodendrocyte progenitor cell dysfunction in familial schizophrenia. ***Mol Psychiatry 2019; 24(5): 757-771.***
6. Wierdsma AI, Mulder CL. Cost sharing does not lead to an overall increase of involuntary commitments in the Netherlands. ***JAMA Psychiatry 2018; 75(2): 213.***

Department of Psychiatry

School/Department:	***Department of Psychiatry Erasmus MC***
Supervisor information: world no 27 in Social Sciences & Public Health world no 61 in Psychiatry/Psychology	• *Nina Grootendorst, MD PhD, psychiatrist* • ***Email:*** *n.grootendorst@erasmusmc.nl* • ***Website:*** *psych.nl; iberrystudy.nl* • ***Grants:*** - *>1M euro of national funding for the cohort infrastructure and PhD projects* • ***Most important publications:*** - Eur J Epidemiol. 2021 - Psychiatry Res. 2018 - BMJ Open. 2017 - Front Psychiatry. 2018 - J Pediatr. 2015 - J Psychiatr Res. 2014
Project Title:	**The Z factor: Adolescent Mental Health in Contemporary Society**
Abstract:	Over the last decades there has been a modest but marked increase of especially common mental health problems of depression and anxiety (Mojtabai et al 2016). In particular adolescents are vulnerable for mental health problems as three-quarters of common mental health problems emerge before the age of 25 years old. At this moment, Generation Z, those born within the past 20 years, is about to enter adulthood. My research group studies the influence of common societal factors on the development of this generation. Although mental health is often considered a personal matter, mental health is affected by a combination of biological, psychological, and societal factors. The heavy influence of society in this intersectionality is often underexposed. Specific topics taken along include the influence of urbanicity on development of psychotic symptoms and drug use, the effects use of social media on sleep, the potential bidirectional relationship of financial debts and psychopathology and climate anxiety. Also, given the cross-diagnostic design, we are interested to study the phenomenology of suicidal behavior, the development of personality disorders and the prodromal phase of psychotic disorders. This project is imbedded in the iBerry cohort, a cohort of 1,022 adolescents at high risk for psychopathology in the greater Rotterdam area, the Netherlands (Grootendorst et al 2021 Eur J Epid). This cohort started in 2015 in the Erasmus MC, when participants where 15 years old and will run for 10 years. Giving the complexity, explanations would require a broad biopsychosocial approach (Bolton & Gillett, 2019). To shed light on the often complex underlying mechanisms our research integrates social and epidemiological psychiatry with biological and technical techniques, for example psychomotor tasks, examination of steroid profiles in hair samples and measures of the peripheral nervous system in relation to psychopathology. In sum, the project the Z factor will likely generate targets to improve mental health of future generations. **Keywords:** adolescents, population-based, psychiatry, mental health
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our international team. Due to the nature of the project and data, strong statistical and methodological skills, good communication skills, and an interest in mental health are required. • The student should have completed an MD or MSc in Neurosciences, Psychology, Health Sciences, Epidemiology, or a related field. • Within the project the student will have access to the iBerry Study data, training in epidemiology and statistics, and the broader Erasmus MC research infrastructure. The scholarship will, at least, have to cover subsistence allowance and international air plane ticket. We are happy to help with the scientific part of your scholarship proposal, please contact dr. Grootendorst at n.grootendorst@erasmusmc.nl

Department of Public Health

School/Department:	*Department of Public Health Erasmus MC*
Supervisor information: world no 21 Public, Environmental & Occupational Health	**Prof. dr. HJ de Koning,** *h.dekoning@erasmusmc.nl* ; www.erasmusmc.nl www.erasmusmc.nl/MAGE/ **Selected Grants:** ERC Advanced Grant: ROBINSCA Trial ; EU H2020 grant: EU-TOPIA **10 publications that show some of the variety in our research:** 1. Reduced Lung-Cancer Mortality with Volume Ct Screening in a Randomized Trial. New England Journal of Medicine 2020; 382 (6): 503-13. 2. Supplemental MRI Screening for Women with Extremely Dense Breast Tissue. N Engl J Med. 2019 Nov 28;381(22):2091-2102. 3. Impact of a cardiovascular disease risk screening result on preventive behaviour in asymptomatic participants of the ROBINSCA trial. Eur J Prev Cardiol. 2019 Aug;26(12):1313-1322. 4. Quality-of-Life Effects of Prostate-Specific Antigen Screening. N Engl J Med 2012;367(7):595-605. 5. Benefits and Harms of Computed Tomography Lung Cancer Screening Strategies: A Comparative Modeling Study for the U.S. Preventive Services Task Force. Annals of Internal Medicine 2014;160 (5):311-20. 6. Effects of Systematic Screening and Detection of Child Abuse in Emergency Departments. Pediatrics 2012;130(3):457-64. 7. Cost-Effectiveness of Screening Women with Familial Risk for Breast Cancer with Magnetic Resonance Imaging. Journal of the National Cancer Institute 2013;105(17):1314-21. 8. Prostate-cancer mortality at 11 years of follow-up. N Engl J Med. 2012 Mar 15;366(11):981-90. 9. Risk prediction models for selection of lung cancer screening candidates: A retrospective validation study. PLoS Med. 2017 Apr 4;14(4):e1002277. 10. A comparative modeling analysis of risk-based lung cancer screening strategies. J Natl Cancer Inst. 2019: 112(5)466-79)
Project Title:	**4-IN-THE-LUNG-RUN (TOWARDS INDIVIDUALLY TAILORED INVITATIONS, SCREENING INTERVALS, AND INTEGRATED CO-MORBIDITY REDUCING STRATEGIES IN LUNG CANCER SCREENING)**
Abstract, project and research group description:	Lung cancer is the leading cause of cancer-related mortality worldwide. Two large-scale randomized-controlled studies have shown that Low-Dose Computed Tomography (LDCT) lung cancer screening is effective in reducing lung cancer mortality. However, implementation of lung cancer screening is still limited in most countries because many key questions about large-scale introduction of risk-based lung and thoracic CT scanning remain open. 4-IN-THE-LUNG-RUN (TOWARDS INDIVIDUALLY TAILORED INVITATIONS, SCREENING INTERVALS, AND INTEGRATED CO-MORBIDITY REDUCING STRATEGIES IN LUNG CANCER SCREENING) is an European lung cancer screening implementation study with the aim of recruiting 26,000 participants across at least 5 different European countries. The objectives of the trial are as follows: 1. The study's primary aim is to investigate whether screening for lung cancer is possible in a high-risk population, whether personalized less intensive screening is safe enough to maintain previously demonstrated benefits, while at the same time reducing disadvantages and costs for the individual and society. 2. Examining how lung cancer screening can be made more acceptable for the hard-to-reach high-risk population. We want to investigate how they can best be approached and invited, for example by tailoring the recruitment and education materials to socioeconomic status, health literacy levels, gender as well as psychological needs and perceived barriers of eligible individuals. 3. Investigating how engagement in health-promoting behavior, with a special emphasis on smoking cessation, can be promoted within a lung cancer screening study, by integrating information from the CT scan on lung cancer and other tobacco-related conditions (such as cardiovascular disease and COPD). 4. Using natural history models to estimate the long-term health effects, as well as the cost-effectiveness of the personalized approach to recruitment, screening interval and integrated smoking cessation interventions in lung cancer screening. We also want to test the external validity of several lung cancer prediction models with the 4-IN-THE-LUNG-RUN sample and update or extend prediction models. 5. Evaluating the added value of biomarkers in the blood for lung cancer risk assessments and personalized intervals for CT screening and determining if biomarkers can help in the clinical evaluation of suspected lung nodules/can be used to develop active surveillance strategies. 6. Investigating the role and possibilities of AI-oriented deep-learning systems in supporting identification of lung cancer nodules and other comorbidities. Within Erasmus MC, the early detection of disease evaluation section has extensive expertise in the field of early detection evaluation, Health Technology Assessment and modelling the natural course of diseases (particularly cancer). The research group also evaluates the national cancer screening programs and is partner in the American Cancer Intervention and Surveillance Modeling Network (CISNET). Within this group, the advantages and disadvantages of screening scenarios are estimated by means of microsimulation models, and different risk prediction models are compared. There is a lot of expertise in conducting large-scale screening trials within the Erasmus team, such as the NELSON trial (Dutch-Belgian lung cancer screening trial, N=15.792) or ROBINSCA (Dutch cardiovascular screening trial, N=43.447).
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. The candidate should have experience with setting up and conducting scientific research, scientific writing, working in an interdisciplinary team, and should have an affinity with quantitative research. • Master degree or MD in: Medicine, Health Sciences, Epidemiology, Psychology or Econometrics/Data Science. • We offer candidates the opportunity to gain more experience with working on a large-scale international project, advanced data analysis and writing scientific publications. We support candidates who want to further develop their skills in the field of leadership, goal-oriented work, creativity, initiative, involvement, and visibility within the scientific community. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement (excl. English speaking countries, NL): IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Public Health

School/Department:	Department of Public Health, Erasmus MC
Supervisor information: world no 20 Infectious Diseases world no 21 Public, Environmental & Occupational Health	*Main supervisor:* ***Prof. dr. Sake J. de Vlas,*** *s.devlas@erasmusmc.nl* *Co-supervisor:* ***Dr. Luc E. Coffeng,*** *l.coffeng@erasmusmc.nl* ***Website****: https://activitiesreport2020.publichealthrotterdam.com/infectious-disease-control/ and https://scholar.google.com/**citations**?hl=nl&user=MeqoQ4QAAAAJ and https://nias.knaw.nl/news/luc-coffeng-selected-as-**distinguished-lorentz-fellow**-for-research-on-infectious-disease-control/* Dr. Sake de Vlas is a mathematical biologist by training and Professor of Infectious Disease Modelling. Throughout his scientific career, spanning over 30 years, his main research activity has been to develop and apply mathematical models for the transmission and control of infectious diseases, varying from parasitic worm infections to micro-parasites (e.g. HIV, HPV and leprosy). Recent work includes modelling of tuberculosis (TB) control in EU countries, as well as strategies against Covid-19 in the Netherlands. He is a member of different research networks, including the Neglected Tropical Diseases Modelling Consortium. He has been primary advisor 25 PhD-students, of which 10 from low and middle-income countries. He has published 260 peer-reviewed articles (h-index: 44 Web-of-Science, 57 Google Scholar). ***Selected recent publications:*** de Vlas SJ, Coffeng LE. Achieving herd immunity against COVID-19 at the country level by the exit strategy of a phased lift of control. Sci Rep. 2021;11:4445. Gugole F, et al. Uncertainty quantification and sensitivity analysis of COVID-19 exit strategies in an individual-based transmission model. PLoS Comput Biol. 2021;17:e1009355. Hollingsworth TD, et al. Evaluating the potential impact of interruptions to neglected tropical disease programmes due to COVID-19. Trans R Soc Trop Med Hyg. 2021;115:201-4. Behrend MR, et al. Modelling for policy: The five principles of the Neglected Tropical Diseases Modelling Consortium. PLoS Negl Trop Dis. 2020;14:e0008033. Bulstra CA, et al. Mapping and characterising areas with high levels of HIV transmission in sub-Saharan Africa: A geospatial analysis of national survey data. PLoS Med. 2020;17:e1003042. Van der Werf MJ, et al. Screening for latent tuberculosis (TB) infection in low TB incidence countries. Clin Infect Dis. 2020;70:716-7. Blok DJ, de Vlas SJ, Richardus JH. Finding undiagnosed leprosy cases. Lancet Infect Dis. 2016;16:1113. Matthijsse SM, et al. Public health benefits of routine human papillomavirus vaccination for adults in the Netherlands: a mathematical modeling study. J Infect Dis. 2016;214:854-61.
Project Title:	***Model-based evaluation of national COVID-19 policies***
Abstract:	Mathematical models have proven to be very useful in the evaluation of health programs. Also in the ongoing COVID-19 pandemic, many (national) control policies have been "prospectively evaluated" by comparing model predictions of the impact of considered interventions. With the progressing pandemic, we now see more and more studies to "retrospectively evaluate" the timing and degree of implemented lockdowns, school closures, curfews and other drastic measures. Accurate modelling of specific situations is challenging though, due to often poorly understood geographic patterns and individual heterogeneities (e.g. exposure, mobility, participation in vaccination programs) that largely determine the course of the transmission. Also, these aspects are difficult to capture in standard deterministic models. De Vlas his research group pioneered in using individual-based modelling for infectious diseases. This technique (also called agent-based modelling) allows for incorporating the many relevant, interrelated, aspects of infectious disease transmission and control in real-world situations. We have developed an (open access) COVID-19 individual-based model for the Netherlands situation, allowing for individual heterogeneity and geographic spread between (clusters of) towns/villages, and municipalities/provinces. With proper data this model can be adapted to any national or regional situation to prospectively and/or retrospectively evaluate COVID-19 interventions in that particular situation. We search for mathematically skilled PhD students who will adapt and apply this model to the setting in their country, informed by local data. The candidate should actively pursue the collection of existing databases to quantify the model, e.g. through Ministries of Health or Centers for Disease Control.
Requirements of candidate:	• Any background with a strong mathematical component, such as epidemiology, biomedical sciences, biostatistics, mathematical biology or econometrics. Experience with advanced data analysis is essential; experience with deterministic modeling and programming skills in R language is recommended. • We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ● *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Radiology & Nuclear Medicine

The Department of Radiology & Nuclear Medicine has an extensive research network spanning the range from the development, improvement, validation, application and assessment of imaging techniques in health and various disease systems. We use state-of-the-art radiological equipment in conjunction with advanced image analysis methods that include artificial intelligence and deep learning. The department collaborates with several clinical, fundamental and epidemiological partners within Erasmus MC.

The Department of Radiology & Nuclear Medicine has the following main areas of research:

(1) ***Clinical Research***: Musculoskeletal Research Group (ADMIRE*), Neuro-, Cardiac-, Abdominal- and Lung Imaging, Nuclear Diagnosis and Therapy, Image-Guided Diagnosis and Therapy

(2) ***Fundamental and Translation Research***: Biomedical Imaging Group Rotterdam (BIGR**), Physics in CT and MR technology, Optical Molecular Imaging, Molecular Imaging and Therapy (SPECTRIM)

(3) ***Health Sciences***: Population Imaging, Pediatric Population Neuro Imaging, Assessment of Radiological Technology (ART)

* http://www.erasmusmc.nl/admire , ** http://bigr.nl

Why choose Radiology & Nuclear Medicine?

We offer various PhD projects on advanced image technologies and/or innovative image analysis using artificial intelligence and deep learning, working with the experts in the field. Researchers of the department publish more than 300 articles in peer-reviewed journals each year, ranked with a MNCS of 2.03 (ie quality is 2x world average). Fourteen PhD students defended their thesis in 2017.

Key publications (until Oct 2018) of the department:

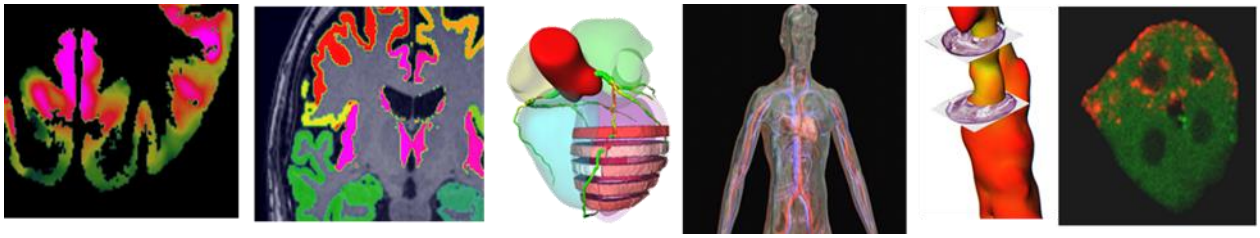
- A spatio-temporal reference model of the aging brain. ***Neuroimage 2018:169;11-22.*** See on-line demo: http://agingbrain.nl
- Osteoporotic Vertebral Fracture Prevalence Varies Widely Between Qualitative and Quantitative Radiological Assessment Methods: The Rotterdam Study. ***J Bone Miner Res 2018:33;560-568.***
- Two-Year Outcome after Endovascular Treatment for Acute Ischemic Stroke. ***NEJM 2017:376;1341-1349.***
- Change in Carotid Intraplaque Hemorrhage in Community-dwelling Subjects: A Follow-up Study Using Serial MR Imaging. ***Radiology 2017:282;526-533.***
- Semiautomated registration of pre- and intraoperative CT for image-guided percutaneous liver tumor ablation interventions***. Medical Physics 2017:44;3718-3725.***

Honors & Awards (numbers from 2017):

Personal Grants/Fellowships: 12
Funded International Consortia: 11
Government Grants: 13
Grants from Charitable Organizations: 32
PPP & (Semi-)Industrial Funding: 31
Institutional Grants: 9
Travel Grants: 4

Valorization:

- Patents: https://patents.google.com/patent/WO2017010864A1/ko
- Spin-offs: Quantib BV (www.quantib.com)



Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology & Nuclear Medicine-ADMIRE, Erasmus MC*** ***ADMIRE-Advanced Musculoskeletal Magnetic Resonance Imaging Research Erasmus MC***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Associate Professor Edwin H.G. Oei, MD, PhD:* e.oei@erasmusmc.nl , www.admire-group.com • ***Personal Grants:*** - ***Dutch*** Research Council (***NWO***) - *GE Healthcare / National Basketball Association (NBA) Patellar Tendinopathy CFP 2016* - *Radiological Society of North America (RSNA) 2014* • ***Most important publications:*** - Breda et al. J Magn Reson Imaging. 2020 Aug;52(2):420-430 - De Vries et al. Semin Arthritis Rheum. 2020 Apr;50(2):177-182 - Eijgenraam et al. Eur Radiol. 2019 Oct;29(10):5664-5672Verschueren et al. Osteoarthritis Cartilage. 2017 Sep;25(9):1484-1487 Van Tiel et al., Radiology. 2016 May;279(2):523-31. - Van der Heijden et al. Am J Sports Med. 2016 May;44(5):1172-8
Project Title:	**Analysis of advanced musculoskeletal magnetic resonance imaging (MRI) data from clinical and population-based studies.**
Abstract:	The ADMIRE group's research focuses on imaging of common musculoskeletal diseases such as osteoarthritis, osteoporosis, and sports injuries, with advanced imaging techniques. We develop, improve, and validate innovative MRI, CT, ultrasound methods with the aim to identify new sensitive imaging biomarkers for pathological tissue processes and structural and compositional changes in tissues such as cartilage, bone, meniscus and tendon. We apply our novel imaging techniques in various clinical studies in collaboration with clinical departments. Another important research focus is on musculoskeletal population imaging, in which we apply MRI in the large-scale population based Rotterdam Study among elderly and the Generation R cohort among children and adolescents to study and epidemiology, genetics, and development of musculoskeletal diseases and body composition. The aim of this project will be to analyze existing, readily available, but unexplored quantitative MRI datasets acquired in clinical and population cohorts. The exact focus of the project and datasets to be utilized, will be defined at a later stage depending on the candidate's expertise and preference, but may as an example the assessment of bone, cartilage and meniscus quality on MRI from clinical osteoporosis and osteoarthritis studies, and correlation with symptoms or clinical outcomes. In the population imaging studies, an example would be the analysis of knee or hip MRI scans in the Generation R study, and correlation with risk factors and genetics. The project would typically entail the reading, annotation and quantitative biomarker extraction from acquired MRI datasets and correlating these with clinical and/or epidemiological data. According to the PhD student's profile and preference, the level of technical or analytical (MR physics, MRI analysis, deep learning) versus clinical focus will be defined.
Requirements of candidate:	• This project requires a highly motivated, hardworking candidate with good communication skills and an affinity with medical imaging and musculoskeletal disease. Given the flexibility in topic and clinical versus technical focus, we encourage candidates with various backgrounds including medical and technical (e.g. biomedical engineering, physics or bioinformatics) to apply. • Master degree or MD • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology & Nuclear Medicine, Erasmus MC*** ***BIGR-Biomedical Imaging Group Rotterdam***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Assistant Professor Dr. Esther Bron; e.bron@erasmusmc.nl* • ***Website:*** *www.bigr.nl,https://estherbron.com/, https://scholar.google.nl/citations?user=Mg7Q67sAAAAJ&hl=nl* • ***Selected publications:*** - Bron et al. Cross-Cohort Generalizability of Deep and Conventional Machine Learning for MRI-based Diagnosis and Prediction of Alzheimer's Disease, NeuroImage: Clinical, 2021 https://doi.org/10.1016/j.nicl.2021.102712 - Li et al. Longitudinal diffusion MRI analysis using Segis-Net: a single-step deep-learning framework for simultaneous segmentation and registration, *NeuroImage*, 2021 https://doi.org/10.1016/j.neuroimage.2021.118004 - Venkatraghavan et al. Disease Progression Timeline Estimation for Alzheimer's Disease using Discriminative Event Based Modeling, *NeuroImage*, 2019. https://arxiv.org/abs/1808.03604 - Bron et al. Standardized evaluation of algorithms for computer-aided diagnosis of dementia based on structural MRI: the CADDementia challenge. *NeuroImage*, 2015. https://caddementia.grand-challenge.org/
Project Title:	**Neuroimage Analysis and Machine Learning**
Abstract:	Brain diseases – including dementia and stroke – impose an enormous burden to the individual and to society. As a consequence, there is an urgent need to develop effective preventive and therapeutic strategies. It is therefore essential to improve the understanding of the progression of diseases, patient selection in clinical trials, and patient monitoring in clinical practice and clinical trials. Neuroimage analysis and machine learning play a herein a crucial role, i.e. for developing robust quantitative brain imaging biomarkers and for developing data-driven models for diagnosis and prediction. PhD projects on the following topics are offered: *Predictive modeling of Alzheimer's disease* – In our research, we develop innovate diagnostic and prediction models using spatiotemporal modeling and state-of-the-art machine learning and deep learning approaches. For this we analyze of thousands of brain MRI scans and clinical data from several large clinical, population and multi-center studies. Such method are however not yet used in clinical practice as this is hampered by the integration of multimodal biomarkers, heterogeneity of the disease and differences between datasets. In this project, we aim develop methods that can be translated towards clinical practice focusing on novel technology, multidisciplinary collaboration, objective performance evaluation beyond accuracy. *The baby brain pipeline: MRI analysis in craniosynostosis* – Syndromic craniosynostosis is a congenital disorder in which several skull sutures close prematurely, causing skull and facial anomalies. The Dutch Craniofacial Center at the Erasmus MC aims to get a better understanding of the disease process and its consequences, particularly relating to visual, behavioral and neurocognitive functioning. It is yet unclear whether surgery of these children is beneficial. We hypothesize that in some patients refraining from surgery might result in similar outcome, but this cannot yet be proven. We aim to use advanced MRI techniques to study the impact of craniosynostosis on the structure and function of the brain. For the analysis of these brain scans, in small children with brain deformations, no automated approaches exist. The proposed project aims at development of dedicated image analysis tools for children with craniosynostosis.

Requirements of candidate:	• This project requires a highly motivated, hardworking candidate with good communication skills, who likes to become part of our international team.
	• Master degree in a technical discipline preferably with an affinity for medical applications (medical physics, biomedical engineering, physics, computer science, engineering, …)
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  • *English speaking countries & Netherlands:* no requirement
	  • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology & Nuclear Medicine, Erasmus MC*** ***BIGR-Biomedical Imaging Group Rotterdam***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Prof dr Wiro Niessen,: w.niessen@erasmusmc.nl www.bigr.nl* • *Dr Gennady Roshchupkin; g.roshchupkin@erasmusmc.nl www.roshchupkin.com* • ***Personal Grants:*** *Wiro Niessen is (co-PI) of numerous Dutch and European research grants, including on Imaging Genetics (1 MEuro), Radiomics (600 kEuro). He received personal VICI grants (1.25 MEuro) and Simon Stevin award (500 kEuro). Total research funding over last 10 years is more than 15 MEuro. He has supervised 42 PhD students.* • ***Most important publications:*** - Hofer, E.et al 2020. Genetic correlations and genome-wide associations of cortical structure in general population samples of 22,824 adults. Nature Communications, 11(1), pp.1-16.. - Van der Lee SJ et al. Gray matter heritability in family-based and population-based studies using voxel-based morphometry. Human Brain Mapping. 2017;38(5):2408-23. - Wang, J. et al2019. Gray matter age prediction as a biomarker for risk of dementia. Proceedings of the National Academy of Sciences, 116(42), pp.21213-21218.. - Hibar DP et al. Novel genetic loci associated with hippocampal volume. Nature Communications. 2017;8. - Roshchupkin GV et al. Heritability of the shape of subcortical brain structures in the general population. Nature Communications. 2016;7. - Santos EMM et al. Observer variability of absolute and relative thrombus density measurements in patients with acute ischemic stroke. Neuroradiology. 2016;58(2):133-9. - Roshchupkin GV et al. HASE: Framework for efficient high-dimensional association analyses. Scientific Reports. 2016;6. - Roshchupkin GV et al. Fine-mapping the effects of Alzheimer's disease risk loci on brain morphology. Neurobiology of Aging. 2016;48:204-11. - Niessen WJ. MR brain image analysis in dementia: From quantitative imaging biomarkers to ageing brain models and imaging genetics. Medical Image Analysis. 2016;33:107-13. - Huizinga W et al. PCA-based groupwise image registration for quantitative MRI. Medical Image Analysis. 2016;29:65-78.
Project Title:	**Distributed Machine Learning in application for large-scale omics studies**
Abstract	**Artificial Intelligence** field has seen dramatic advances in the past few years with much excitement around the use of deep learning (DL), many-layered convolutional neural networks (CNN). The world has witnessed striking advances in the ability of machines to understand and manipulate data, including images, language, and speech. CNN showed ability to detect a complex pattern in high-dimensional data, but also are able to integrate data from various resources by having many input channels into neural network. Human genetics can benefit immensely from DL. However, the application of AI in genetics analysis is still quite limited. The main issue is the restriction for data sharing between cohorts and loss of power, compare to the pooled analysis. Distributed Learning is a distributed machine learning approach which enables model training on a large corpus of decentralized data. **The main goal of this project** is to develop new distributed learning framework for multi-center genetics analysis in collaboration with **NVIDIA company**, which will be able to utilize machine learning approaches and increase power of gene discovery. We aim to apply these methods on large datasets from population-based Rotterdam study, UK Biobank as well as within **world-wide genetics consortiums**.
Requirements of candidate:	We are looking for a highly motivated, hardworking student to join our very international team. Successful candidates are expected to have a strong quantitative or computer science background, excel at critical thinking, with a strong motivation to engage in the development and application of advanced analytical methods. • Master degree in mathematics, computer science, statistics, bioinformatics, physics, electrical engineering, or in an equivalent discipline. •Strong knowledge of: Python. •Experience with machine learning and deep learning methods. •Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology & Nuclear Medicine, Erasmus MC*** ***BIGR-Biomedical Imaging Group Rotterdam***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Associate Professor Dr. ir. Stefan Klein; s.klein@erasmusmc.nl* • ***Website:*** *https://scholar.google.nl/citations?user=iaAFK0MAAAAJ* • ***Selected publications:*** - Venkatraghavan et al. Disease Progression Timeline Estimation for Alzheimer's Disease using Discriminative Event Based Modeling, *NeuroImage*, 2019. https://arxiv.org/abs/1808.03604 - Sun, Niessen, Klein. Randomly perturbed B-splines for nonrigid image registration. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2017. *CSC funded* - Huizinga et al. PCA-based groupwise image registration for quantitative MRI. *Medical Image Analysis*, 2016. - Bron et al. Standardized evaluation of algorithms for computer-aided diagnosis of dementia based on structural MRI: the CADDementia challenge. *NeuroImage*, 2015. https://caddementia.grand-challenge.org/ - Klein, Staring et al. Elastix: a toolbox for intensity-based medical image registration. *IEEE Transactions on Medical Imaging*, 2010. (>2500x cited, software used by researchers and companies worldwide, www.elastix.isi.uu.nl)
Project Title:	**Image Analysis and Machine Learning**
Abstract:	We develop advanced image analysis methods and machine learning approaches to extract more information from medical images than can be seen by the naked eye. PhD projects on the following topics are offered: *Radiomics for precision cancer medicine* - Radiomics is a big-data analytics technique, in which hundreds of candidate features are calculated from imaging data and annotated tumour contours, quantifying location, shape and appearance of the tumour. Using machine-learning algorithms, such as SVMs or deep neural networks, these computational features are combined into predictive models, also called 'radiomics signatures'. At Erasmus MC, we have access to unique datasets that allow development of novel radiomics signatures that could aid the diagnosis and treatment of cancer. *Disease progression modelling of neurodegenerative diseases* – Alzheimer's Disease and related disorders of the brain are a major challenge in the ageing population worldwide. Development of novel curative treatments is hampered by the heterogeneity of the disease, lack of reliable tools for early and differential diagnosis, and limited insight in the various disease progression patterns. In our research, we develop innovate computer-aided diagnosis methods and data-driven disease progression models, using spatiotemporal analysis of thousands of brain MRI scans. *Image analysis and machine learning for osteoarthritis* – Osteoarthritis is the most common degenerative disorder of the knee joint. Reliable methods for early diagnosis, fine-grained disease staging, and accurate patient stratification are urgently needed to improve patient care. MRI provides 3D visualization of multiple tissues in and around the knee joint, and holds great promise as a basis for detailed phenotyping and spatial mapping of pathology. In collaboration with the ADMIRE group (headed by Dr. Oei), we develop methods for quantitative MRI analysis, and study the relation of MRI markers with clinical, biochemical, and genetic markers.

Requirements of candidate:	• This project requires a highly motivated, hardworking candidate with good communication skills, who likes to become part of our international team.
	• Master degree in a technical discipline (physics, mathematics, computer science, engineering, etc.)
	• Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)
	• English language requirement:
	  ○ *English speaking countries & Netherlands:* no requirement
	  ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

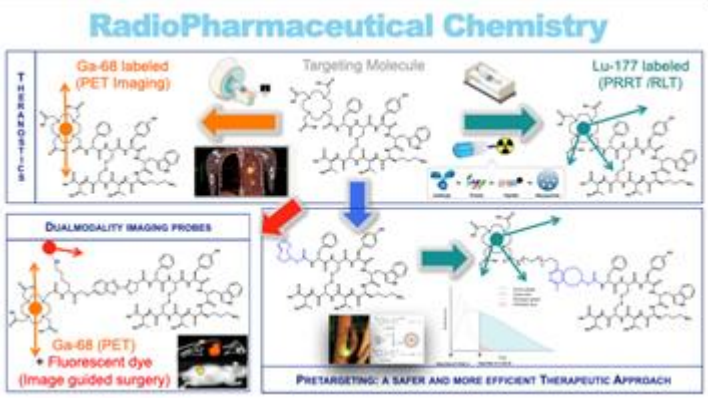
Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology & Nuclear Medicine, Erasmus MC*** ***BIGR-Biomedical Imaging Group Rotterdam***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Dr. Theo van Walsum* • ***Email:*** *t.vanwalsum@erasmusmc.nl* • ***Website:*** *www.bigr.nl , www.bigr.nl/people/TheovanWalsum* • ***Most important publications:*** - *autoTICI: Automatic Brain Tissue Reperfusion Scoring on 2D DSA Images of Acute Ischemic Stroke Patients, IEEE TMI 2021* - *Automatic collateral scoring from 3D CTA images, IEEE TMI 2020* - *Automated quantification of bileaflet mechanical heart valve leaflet angles in CT images, IEEE TMI 2018* - *Quantitative analysis of geometry and lateral symmetry of proximal middle cerebral arteryJSCD 26(10), 2017* - *Automatic segmentation and quantification of the cardiac structures from non-contrast-enhanced cardiac CT scans, PMB 62(9), 2017* - *Classification of hemodynamically significant stenoses from dynamic CT perfusion and CTA myocardial territories MP 44(4), 2017* - *Epicardial fat volume and the risk of atrial fibrillation in the general population free of cardiovascular disease, JACC: Cardiovascular imaging, 2017*
Project Title:	**Quantitative Imaging Biomarkers for Cardiovascular Diseases**
Abstract:	Cardiovascular disease is one of the major health problems in the western world. Whereas treatment options are growing, there is still much unknown on diseases and optimal treatment strategies. Quantitative imaging biomarkers may play an import role in this field. Using quantitative information from images can learn more on diseases and disease development, and may, based on this knowledge, also provide information for clinical decision making. Additionally, the large amounts of imaging data and clinical data may also be used to directly learn decision models from existing databases. In this research line, we are developing quantitative imaging biomarkers for cardiovascular diseases. We are focusing on CTA (cardiac, brain) as well as X-ray imaging modalities (the latter for interventional decision making), for heart disease and stroke. In this work, we are also more and more exploiting the power of deep learning approaches. Examples of recent studies from our group in this field are listed above.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree in an engineering discipline • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology & Nuclear Medicine, Erasmus MC*** ***BIGR-Biomedical Imaging Group Rotterdam***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Dr. Theo van Walsum* • ***Email:*** *t.vanwalsum@erasmusmc.nl* • ***Website:*** *www.bigr.nl , www.bigr.nl/people/TheovanWalsum* • ***Most important publications:*** - *Virtual extensions improve perception-based instrument alignment using optical see-through devices. IEEE TVCG, 2021* - *Dynamic coronary roadmapping via catheter tip tracking in X-ray fluoroscopy with deep learning based Bayesian filtering, MedIA 61, 2020* - *Ultrasound aided vertebral level localization for lumbar surgery, IEEE TMI 36(10)* - *A Hidden Markov Model for 3D Catheter Tip Tracking With 2D X-ray Catheterization Sequence and 3D Rotational Angiography, IEEE TMI 36(3)* - *Non-rigid registration of liver CT images for CT-guided ablation of liver tumors, Plos One 11(9)* - *4D Ultrasound tracking of liver and its verification for tips guidance, IEEE TMI 35(1)* - *Automatic online layer separation for vessel enhancement in X-ray angiograms for percutaneous coronary interventions, MedIA 39*
Project Title:	**Trackerless navigation approaches for interventional radiology and cardiology**
Abstract:	Minimally invasive interventions are good for patient and society. Compared to conventional surgery, minimally invasive interventions give reduced trauma, leading to benefits for patient and society. These advantages come at the expense of the physician, who often lacks direct eyesight and tactile feedback during the interventions. Surgical navigation systems, which link the patient to pre-operative imaging information, and which are equipped with systems to track instrument and patient motion, have been utilized in e.g. neuro, spine and orthopedics surgery to support the physician in minimally invasive interventions. Purpose of the research in this project is to develop technology that permits navigation approaches in soft tissue interventions, such as percutaneous coronary interventions and liver interventions (tumor ablations). To this end, we are utilizing imaging information (ultrasound / X-ray) acquired during the procedures, and integrate pre-operative information in these images. For this, advanced segmentation, registration and tracking methods have been developed, and more recently we are also exploiting deep learning methods for these purposes. The publications listed above show some of the recent approaches in this line. Additionally, we are investigating augmented reality approaches for navigation.
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree in an engineering discipline • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: • *English speaking countries & Netherlands:* no requirement • *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Radiology & Nuclear Medicine

School/Department:	***Department of Radiology and Nuclear Medicine, Erasmus MC*** ***Molecular Medicine***
Supervisor information: world no 33 Radiology, Nuclear Medicine & Medical Imaging	• *Associate Professor Dr. Yann Seimbille, y.seimbille@erasmusmc.nl* • ***Website:*** *1) https://www.erasmusmc.nl/en/research/departments/radiology-and-nuclear-medicine; 2) https://www.erasmusmc.nl/en/research/groups/radiopharmaceutical-chemistry; 3) https://www.erasmusmc.nl/en/research/researchers/seimbille-yann* • ***Grants:*** - *Long-acting sstr2 antagonists and pretargeted alpha therapy,* ***Dutch Cancer Foundation****, 2019-2023* - *Broad spectrum, high precision theranostic cancer therapy, Convergence kick-off grant, 2020-2022* - *Theranostics hitting breast cancer: pointing the arrows at HER2 and GRPR,* ***Erasmus MC Grant****, 2021-2025* • ***Most important publications:*** - Koustoulidou S, Hoorens M, Dalm S, Debets R, Mahajan S, **Seimbille Y**, de Jong M. *Cancers*, 2021, 13(5), 1100 (https://doi.org/10.3390/cancers13051100). - Chen KT, Nieuwenhuizen J, Handula M, **Seimbille Y**. *Organic and Biomolecular Chemistry*. 2020, 18(31), 6134-6139 (https://doi.org/10.1039/D0OB01222J). - Qiu L, Wang W, Li K, Peng Y, Lv G, Liu Q, Gao F, **Seimbille Y**, Xie M, Lin J. *Theranostics*. 2019, 9(23), 6962-6975 (https://doi.org/10.7150/thno.35084). - Chevalier C, Stojanović O, Colin DJ, Suarez-Zamorano N, Tarallo V, Veyrat-Durebex C, Rigo D, Fabbiano S, Stevanović A, Hagemann S, Montet X, **Seimbille Y**, Zamboni N, Hapfelmeier S, Trajkovski M. *Cell*. 2015, 163, 1360-1374 (https://doi.org/10.1016/j.cell.2015.11.004). - Suarez-Zamorano N, Fabbiano S, Chevalier C, Stojanovic O, Colin DJ, Stevanovic A, Veyrat-Durebex C, Tarallo V, Rigo D, Germain S, Ilievska M, Montet X, **Seimbille Y**, Hapfelmeier S, Trajkovski M. *Nature Medicine*. 2015, 21, 1497-1501 (https://doi.org/10.1038/nm.3994). - Su H, Bodenstein C, Dumont RA, **Seimbille Y**, Dubinett S, Phelps ME, Herschman H, Czernin J, Weber W. *Clinical Cancer Research*. 2006, 12, 5659-5667 (https://doi.org/10.1158/1078-0432.CCR-06-0368).
Project Title:	**Theranostic agents for cancer imaging and therapy**
Abstract:	The RadioPharmaceutical Chemistry (RPC) group's research program is a molecular imaging-based program focused on **theranostics** and **multimodality imaging probes**, with an emphasis on developing these novel radiopharmaceuticals for clinical translation. We are offering to work on a project aiming at the development of a new generation of theranostics pointing at the major Achilles' heels of tumors, such as the fibroblast activation protein alpha (FAPa) or the chemokine receptor type 4 (CXCR4). The new radioactive drugs will be capable of providing adequate diagnostic information and subsequently kill the tumor cells when targeted radionuclide therapy is found appropriate. Addition of a fluorescent dye will provide dual-modality imaging probes for pre-operative surgical planning and intraoperative surgical guidance, whereas conjugation of a potent antineoplastic drugs will yield small-molecule drug conjugates (SMDC) for targeted chemotherapy. Preclinical evaluations of our theranostics will allow to identify which lead candidate could potentially be translated to the clinic. 
Requirements of candidate:	• We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. • Master degree in the field of Chemistry, Biochemistry or Pharmaceutical Sciences. Strong expertise in organic chemistry and analytical techniques (NMR, HPLC, MS) required. Experience with radiolabeling techniques and biological assays is an asset. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: ○ *English speaking countries & Netherlands:* no requirement ○ *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)*

Department of Surgery

School/Department:	***Department of Surgery, Erasmus MC***
Supervisor information: world no 8 Surgery world no 14 Gastroenterology & Hepatology	**Prof. dr. Luc van der Laan & dr. Monique Verstegen** *l.vanderlaan@erasmusmc.nl / m.verstegen@erasmusmc.nl* ***Selected publications:*** - *Materials Science & Engineering, 2020, Willemse, van der Laan & Verstegen, et al* - *Transplantation, 2020,Verstegen & van der Laan, et al* - *Cancers, 2019, van Tienderen, van der Laan & Verstegen, et al.* - *Nature Medicine, 2017, Broutier ,Verstegen, van der Laan & Huch, et al.* - *Nature, 2016, Blokzijl, Verstegen, van der Laan & van Boxtel et al.*
Project Title:	**Exploring the regenerative potential of liver organoids in liver transplantation**
Abstract:	Although the adult liver is well-known for its regenerative capacity, the cellular events that drive this repair are pleiotropic and not fully elucidated. The two liver epithelial cell types, hepatocytes and cholangiocytes, have self-renewal capacity to maintain homeostasis and in response to liver injury. Moreover to the plasticity of epithelial cells, bipotent progenitor cells are found within the canals of Hering, the smallest branches of the biliary tree in the liver. These bipotent progenitor cells can differentiate into both mature hepatocytes and cholangiocytes. In larger bile ducts, including in the extrahepatic bile ducts, typical peribiliary glands harbor biliary progenitor cells which provide a proliferative response upon damage of the bile duct providing new cholangiocytes to restore the biliary lining. With the development of the 3D organoid culture technique, epithelial cells, including those found in the liver can be expanded *in vitro* (Huch et al, Cell, 2015) and used as model for stem cell biology and liver diseases such as Metabolic Associated Fatty Liver Disease (MAFDL) or primary liver cancer. The projects in our lab involve the use of biliary organoids to model liver-related disease (MAFLD, Allagile Syndrome, Cystic Fibrosis), study liver and bile duct regeneration (by developing liver-on-a-chip technology), and liver and bile duct tissue engineering (decellulairsation techniques and extracellular matrix analysis). During liver transplantation performed in Erasmus MC, biopsies are collected from liver and extrahepatic bile duct from donor and recipient (explanted liver) to be used in research projects. These biopsies are analyzed using histological techniques (immunohistochemistry, immunofluorescence, conventional, confocal and light-sheet microscopy) and molecular biological techniques (qPCR, RNA-expression arrays and whole genome sequencing). In addition, the LGR5-positive, Wnt-responsive adult stem cells from liver and the extrahepatic bile duct, will be cultured and expanded as organoids to be used as (patient-specific) models for liver regeneration and/or disease, including primary liver cancer. **Main methodology and techniques**: 3D biliary organoid cultures from healthy donor and patient biopsies (NASH, primary liver cancer). Gene expression analysis (single cell RNA sequencing, RT-qPCR), high resolution imaging (OIC-confocal, fluorescence microscopy), protein expression analysis (FACS, Immunohistochemistry, Western blotting).
Requirements of candidate:	• We are looking for a highly motivated PhD student who has received excellent scientific and practical training in the areas of stem cell biology, transplantation medicine and/or regenerative medicine to join our research team. • The student should be fluent in English (IELTS *min 6.0)*, TOEFL 100 *(min 20 for all subs).* • We offer: Supervision, lab facilities and infrastructure, and training. • We will cover Laboratory costs. • As a candidate PhD student at Erasmus MC, your salary and living expenses will be covered by your University or Scholarship Council.

RAZONES PARA ELEGIR ERASMUS MC

Eres bien recibido: esperamos saludarlo como nuestro estudiante de doctorado y como nuestro futuro colega. Esperamos que se sienta como en casa y colabore con nosotros en cualquier paso posterior de su carrera. Es importante destacar que no necesita preocuparse por el idioma holandés: los Países Bajos ocupan el primer lugar como el mejor país de habla inglesa (donde el inglés no es un idioma nacional) y Rotterdam es la ciudad con mayor dominio del inglés en los Países Bajos según el EF-EPI 2020 ranking.

El siguiente paso en tu carrera: un doctorado (PhD) en Erasmus MC resulta en 4 publicaciones internacionales revisadas por pares, y tener publicaciones es fundamental para el siguiente paso de tu carrera. En la mayoría de universidades se requiere una o menos publicaciones, así que el titularse de Erasmus MC representa una ventaja significativa.

Tu educación & entrenamiento: con un personal científico de ~1,500 personas para menos de ~1,250 estudiantes de doctorado y ~750 especialistas médicos para ~1,000 residentes, tenemos una excelente relación de supervisión.

Tu vida social: más del 30% de nuestros estudiantes de doctorado son extranjeros, además tenemos una organización activa de estudiantes de doctorado tanto en Erasmus MC como en Erasmus University Rotterdam, así como en oficinas internacionales. Vivir en la ciudad portuaria más grande de Europa, significa que estás a una hora de Ámsterdam (en automóvil), Amberes (en automóvil), Bruselas (en tren) o Londres (en avión), a 1,5 horas de Berlín (en avión) o a 2 horas de París (en tren). Adicionalmente Rotterdam figuró como #5 en el ranking de mejores ciudades para viajar de Lonely Planet de 2016.

Nuestra organización: Erasmus MC es una de las diez escuelas de medicina más grandes de Europa y la escuela de medicina continental europea más exitosa en obtener subvenciones de la Comisión Europea (Horizon 2020-Health, Demographic Changes & Wellbeing Nuestras colaboraciones científicas con contrapartes Chilenas son muy buenas y la calidad de nuestras colaboraciones (como se expresa en la cita / publicación promedio, ver la tabla a continuación) es muy alta en comparación con otras universidades extranjeras, lo cual es una ventaja al regresar a Chile. Además, estamos en el puesto número 30 del mundo en el **Nature Index for Biomedical Sciences 2019**.

Capacitamos a jóvenes científicos Chilenos con la esperanza de que se conviertan en nuestra próxima generación de colaboradores. Esperamos se una a Erasmus MC y se convierta en nuestro futuro colega tanto en los Países Bajos como después de su regreso a Chile, porque nuestra colaboración no se detiene después del título.

US News Ranking 2022	World Rank
Surgery	8
Gastroenterology & Hepatology	14
Public, Env & Occup Health	21
Endocrinology	27
Infectious Diseases	27
Social Sciences & Public Health	27
Cardiac & Cardiovasc Systems	28
Clinical Medicine	32
Radiology, Nucl Med, Med Imaging	33
Immunology	34
Pharmacology & Toxicology	36
Microbiology	42
Neuroscience & Behavior	42
Oncology	42

Nature Index Ranking	World Rank
2019 Collaboration Big Science - Genetics	13
Institutional Outputs - Life Sciences	19
2021 Infectious Diseases	20
2019 Biomedical Sciences	30
2020 Cancer	48

Publications in preclinical, clinical & health sciences 2016-2020. Source: InCites 21 June 2021

Foreign institute with Chile	co-publ	Citation impact
Harvard University	579	11.25
Johns Hopkins University	381	14.86
Harvard Med School	318	9.78
UC San Francisco	228	15.17
Erasmus MC	214	17.85
University of Michigan	172	9.30
University of Pennsylvania	162	13.10
UC Los Angeles	156	17.31
Johns Hopkins Medicine	109	5.14
Cornell University	88	9.94

On the US News website, Erasmus MC is ranked as Erasmus University Rotterdam for the given subject rankings.

**) Citation Impact = Category Normalized Citation Impact, CNCI*