



Erasmus MC

PhD vacancies for Chinese PhD scholarship candidates 2020-2021

Version 1, October 2020

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This vacancy booklet is meant for Chinese students intending to enrol in a PhD program abroad, using a CSC (Chinese Scholarship Council), a university, a university hospital 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, medicine, vet medicine and health sciences

Introduction Erasmus MC



PR Chinese co-publications: domains of preclinical, clinical & Health Sciences 2015-2019
Source: InCites 28 SEP 2020

Foreign institute w PR China	co-publ	cit/publ
Harvard University	5,072	23.75
Johns Hopkins University	2,408	29.57
UC Los Angeles	1,594	21.98
Yale University	1,587	30.10
Stanford University	1,393	35.07
Duke University	1,384	22.80
University of Pennsylvania	1,381	28.48
Columbia University	981	45.44
University of Oxford	944	61.34
Cornell University	826	24.28
Erasmus MC	719	64.07
University of Chicago	632	15.33



Erasmus University Medical Center, known as Erasmus MC, Erasmus University's Med School and its university hospitals are all integrated into one campus and led by one executive board. The education centre with 400 study places and 40 teaching & lecture rooms for up to 6,000 students was opened in 2012 and was awarded for its architecture in 2013. In 2018 the old hospitals were replaced with [a state of the art single-patient bedroom hospital](#). Erasmus MC is committed to a healthy population and excellence in healthcare through research and education.

Patient care: Erasmus MC, only satisfied with the best possible care has only single patient rooms ("VIP" hospital) to accelerate its medical innovation and ability to treat patients with the newest and most innovative materials and procedures.

Research & Innovation: Erasmus MC has consistently been ranked in the world's top 30 for both clinical medicine and biomedical sciences ([US News Clinical Medicine 2019](#), [Nature Index Biomedical Sciences 2019](#)). Importantly, the world impact of its research papers in preclinical, clinical & health sciences is 2,35 which is on the top of the world wide ranking list, just below Harvard (2,37). The overall research aim of Erasmus MC is to translate bench discoveries to bedside applications and covers all fields from preclinical via clinical to health sciences research.

Education & Training: Erasmus MC offers BSc, MSc, PhD and Residency programs to train the next generation of medical practitioners and researchers. It is one of the largest European medical schools, with ~2,500 medical students and between 220-250 PhD graduations/year. Its **medical education** is, with 33% of its med students having published a paper, 70% having been abroad and 20% choosing for a MD-PhD, (to become both clinical doctor and scientist), quite exceptional. Equally, it expects its **PhD students** to have 4 or more research publications (within the top 25% journals of their field of research) before admission to the graduation exam. All PhD students have a MSc, MD or DVM upon enrolment and most have an individual scholarship or are paid by a research grant.

Innovative education programs: [Erasmus MC and Delft University of Technology](#) were the first in the world to offer a BSc-MSc program in nanobiology, bridging the gap between life sciences & technology. This intensive collaboration with a university of technology generates a broader range of research collaborations and more focus on direct application in society.

Supervision rates: with ~750 registered medical specialists vs ~1,000 residents and ~1,500 scientific staff (plus 600 postdocs) vs ~1,250 PhD students we have one of the best supervisor ratio's in the world (PhD students have at least two supervisors).

Erasmus MC & Europe: Erasmus MC belongs to the 10 biggest medical schools in the European Union as measured by both number of publications and number of publications originating from EC-funded research (i.e. FP7 and Horizon programs) and it is the most successful continental European med school within the Horizon2020 theme Health, Demographic Change & Wellbeing (see right table page 3). Also, it is one of the core partners within [EIT health](#). As such it is an attractive gateway to the European research networks, which is a benefit when you return after your graduation to China.

Collaboration with PR China

Erasmus MC is known for its long-term collaborations and partner loyalty. This philosophy is translated in high quality research collaborations, as indicated by the average number of citations shared with Chinese partners. This is often of much better research quality than what Chinese universities enjoy with more famous partners (see table, top of the page).

Erasmus MC 的博士项目-概述

本手册适用于能够获得 CSC 或其他博士学位奖学金（例如，大学或大学医院奖学金）的学生（以及正在考虑获得博士学位的学生），因为 Erasmus MC 的大多数博士生都有自己的奖学金或被授予研究补助金。该手册概述了各部门，其研究范围和当前职位空缺。

选择一个学校进行博士学位进修是研究型职业中最重要的一步。这是大学提供的最高的教育项目，博士培养的结果决定了职业发展的下一步。由于博士学位本质上是一项研究培训与教育计划，因此您想报名参加的研究所的研究出版物的质量非常重要。我们还注意到，来访的中国大学代表团始终非常重视获得欧洲研究资助的机会。因此，如果您有计划返回中国，请知道 Erasmus MC 在其研究论文的质量以及获得欧洲研究资助（所谓的 Horizon2020 资助，主题健康，人口变化与健康）方面都有良好的佳绩。

ORGANIZATION, (preclinical, clinical & health sciences 2010-2019)	world impact	WoS publ
Harvard University	2,37	226.898
Erasmus MC/ Erasmus Univ Rdam	2,35	45.080
Johns Hopkins University	2,28	102.309
Duke University	2,28	59.164
Columbia University	2,26	59.979
University of Chicago	2,18	29.245
University of California Los Angeles	2,17	65.232
University of Pennsylvania	2,16	80.071
Stanford University	2,16	60.382
Yale University	2,11	52.131
University of Michigan	2,10	68.062
University of Pittsburgh	2,09	66.955
Cornell University	2,08	40.329
Univ Texax SW Med Center, Dallas	2,06	31.508
New York University	1,91	39.698
Shanghai Jiao Tong University	1,53	35.753
Fudan University	1,44	30.587
Sun Yat Sen University	1,40	30.291

Organization, country	H2020 Net EU Contribution	H2020 Participations
INSERM, FR	€ 115.160.351	122
Univ of Oxford, UK	€ 75.643.642	74
LSHTM, UK	€ 74.201.528	26
Erasmus MC, NL	€ 61.255.042	72
Karolinska Inst, SE	€ 61.172.462	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
Fraunhofer G, DE	€ 28.591.569	39
SERMAS, Es	€ 27.907.655	29

左表：世界影响：与世界影响相比，这组出版物的被引影响（世界平均水平为 1,00）WoS 出版物：2020 年 8 月 31 日在 Web of Science 中发现的 2010-2019 年临床前，临床和健康科学组合领域的研究出版物

右表：欧洲研究资助计划 Horizon2020 中最成功的组织-主题为健康，人口变化与福利，以获得的欧元数量排名（按 2020 年 9 月 23 日在欧盟信息中心上的发现）。Erasmus MC 是自法国的 INSERM 是一个全国性组织，另外两个成功的组织是英国

Erasmus MC 博士项目的目标是使您成为一名独立的研究人员，能够根据科学证据解决复杂的问题。毕业生将具有评估科学研究的能力，并朝着成为生物医学学者的方向迈出了重要一步。博士生已经做好充分的准备，可以成为大学医学中心，研究型大学，研究机构的未来（临床）研究人员，和/或填补人员和政策职位，例如在生物医学大学，医疗机构，生物医学和制药公司的管理人员，政府部门等等。

我们**教育理念**的核心是，良好的科学训练需要积极学习。这意味着我们以小组甚至有时单独授课的方式来培养博士和研究型硕士生，并且以综合方式教授理论知识和实践技能。因此，激发学生积极地使用他们新获得的知识，这既巩固他们的知识，又提高了他们的研究质量。知识融汇是提高我们各级教育的多学科性和跨学科性的重要驱动力。学生向具有国际经验的领域内顶尖的教员学习，这些教员有国际合作经验并与其他（国际）研究小组合作。

一个典型的博士学位课程将花费 4 年，并且候选人必须拥有其理学硕士，医学或 DVM 学位。在健康科学领域，候选人将把他们的博士学位研究与健康科学专业硕士相结合。候选人必须具有 7.0 的托福或 100 的雅思，但是在博士期间，他们的英语写作和表达能力将得到进一步提高。

培训和指导：作为博士研究生，您将注册 Erasmus MC 研究生院，该研究生院提供通用和高度专业化的课程。但是，博士学位课程是高度个性化的，在最初的几个月内，您将与您的导师一起开发最适合您的科学需求以及您理想的研究道路。重要的是，我们还希望您能够独立工作（我们会训练您的工作方式）以及敢于主动，并且我们会激发您竞争会议旅游奖，海报奖或开展其他相关的课外活动。

- 您将进行一项独立的科学研究并将结果呈现在论文中。
- 您将由一名正教授（发起人）监督，并由一或两名副教授指导
- 您将研修 30 个 EC 学分，包括惨叫课程，研讨会和会议（您可以从 Grad School 的 150 门课程中选择，并且可以参加 Erasmus MC 以外的课程）
- 您将在一个多学科，跨国和资助驱动的最新研究环境中展开研究
- 根据您的项目，可以出国（研究访问）在其他环境中学习

您的博士学位论文：每个研究项目都不同，每个博士生都不同，知识和实验室经验也可能不同。但是，我们为拥有世界上最高的博士学位考试要求之一而感到自豪。当您迈向职业生涯的下一步时，这将为您带来巨大的优势。为了给您留下深刻印象，下面表格中是 CSC 中国博士获得学位后的产出。

示例：2019 年 EMC 最后十名中国博士发表学位论文及获得荣誉

No of Publications + field specific ranking of the journal of publication	Courses & conferences followed abroad	Honors & Awards obtained during PhD
2x Top 3, 1x top 10, 1x top 25%	not reported	PhD scholarship
1x Top 5, 3x Top 25%, 3x top 50%, 2x in preparation	1 conference	PhD scholarship + 2 travel awards
2x Top 10, 3x in preparation	3 conferences	PhD scholarship + 2 conference awards
2x Top 3, 1x top 10 , 3x Top 25%, 1x Top 50%, 1x Top 75%	4 courses, 3 conferences	PhD scholarship
1x top 3, 1x top5, 1x top 10, 3x top 25%, 2x Top 50%, 2x top 75%, 2x in preparation	1 international conference	PhD scholarship
2x top 5, 2x top 10	not reported	PhD scholarship
2x Top 3, 1x Top 10, 1x top 50%, 1x Top 75%	9 courses, 6 conferences	PhD scholarship
1x Top 5, 1x top 10, 1x Top 25%, 3x top 50%, 1x top 75%, 3x in preparation	2 conferences	PhD scholarship + 1 travel award
2x top 3, 1x top 5, 1x top 25%, 1 other	1 conference	PhD scholarship + 1 award
5x top 10, 1x other	3 conferences, 1 research visit	PhD scholarship, 3 travel grants, 1 fellowship, 1 paper award

在您完成毕业论文获得博士学位后，您还将会与我们保持一定的联系：由于您对我们的员工和研究方向及动态有一定的了解，回国后您将成为为我们的重要的海外合作者。从第 2 页的表格可以看出，我们的研究人员和中国学者共同发表的论文的平均被引用次数要远高于其他大学与中国学者共同发表的论文。取得这些成果的原因是因为您的参与，因为我们许多成功的合作都是与我们以前的校友合作获得的。

如何申请博士

关于这本博士职位空缺手册的使用？ 该手册对伊拉斯姆斯大学医学院不同院系及各个实验室的博士生职位进行了简短描述。如果您对某位教授的研究领域感兴趣，但他/她没有空缺的博士职位，你仍然可以在空缺职位中注明他/她的电子邮件地址。大多数职位空缺都是以通用的方式描述的，目的是让您对他们所研究的课题有所了解，也可以让您灵活地提出一些与主题相关的建议。另外，您有可能找不到您感兴趣的研究方向：这本职位空缺手册只显示了大约 50 个博士生的空缺职位，但是我们有 200 多名正式教授和大约 1,500 名科研人员。此外，您也可以随时访问学校官网（www.erasmusmc.nl），根据网站发布的信息与伊拉斯姆斯大学医学院员工联系交流，而不仅仅是本手册中提供的信息。

首先准备一封动机信： 博士职位空缺中简短描述了研究课题的内容和一些发表的论文。这些论文是您进一步获取研究课题信息的来源。导师希望博士候选人申请者写一封好的动机信，阐述您对教授所做研究课题的兴趣，以及您在硕士期间获得的经验及技能与博士项目相匹配的程度或者能给博士项目研究带来哪些帮助。

由于伊拉斯姆斯大学医学院几乎所有的博士生都是基于研究基金或自己的博士奖学金来获得他们的博士职位。因此，我们建议你在拿到教授的邀请信后去申请博士奖学金。奖学金可以是 CSC 奖学金，也可以是基于大学或大学医院的博士奖学金。获得奖学金可能是一种要求，但我们认为它是一个额外的入学考试，这将作为你以后职业生涯质量的证明。

当您被教授录取后，接下来怎么办？在大多数情况下，在你参加了面试(或多次面试)并被录取后，你将会申请奖学金。您的导师将为您博士奖学金的申请提供科学的描述，同时会给您一封申请奖学金所需要的录取通知书。由于我们有一半的中国博士学者获得了 CSC 的资助，因此[伊拉斯姆斯大学中国中心](#)将为您申请 CSC 奖学金提供程序性的帮助。当您在申请自己的大学或大学附属医院的奖学金时，您可以随时询问您未来的导师或联系 [RDO](#)。

您的奖学金申请一旦被提交后，经过一段时间的审核，获得授予您奖学金的消息后，您需要告诉您未来的导师。他们会把您的情况告知人事部门及人力资源部，这时将会有伊拉斯姆斯大学医学院的工作人员和您取得联系。通常，在你预计到达日期的前两个月，人力资源部门会和您取得联系。

为准备申请和注册所需的人力资源文件

- 护照的扫描件（所有的手写页和盖章页）；
- 在荷兰投保的医疗保险证明；如果你目前没有医疗保险，你可以到达荷兰后再安排医疗保险；
- 经济独立能力证明：例如津贴、助学金、资助证明、定期薪水、任命书或雇佣合同。
- 证明你具备进行研究所需的适当资格的证书副本；你的毕业证书或大学证书。毕业证书或大学证书须经公证处或市政府批准。
- 一份由你的导师签名的研究计划书。

除上述强制性文件外，建议提交

- 出生证明的副本，该副本已被双认证或加盖公章，用于确定市政个人档案数据库（GBA）的个人详细信息。

注： 这些文件必须由官方翻译人员翻译成英语、荷兰语或法语。

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

2017 Mohd-Sarip A et al **Cell Reports**
2014 Reddy BA et al **Molecular Cell**
2013 Moshkin YM et al **PLoS Genet**
2012 Mohd-Sarip A et al **Science**

Mahmoudi

2018 Marian C et al **Cell Chem Biol**
2018 Palstra R-J et al **Science Advances**
2016 Stoszko M et al **EBioMedicine**
2012 Li V et al **Cell**


Demmers:


2017 Sap KA et al **J Proteome Res**
2016 Urbán N et al **Science**
2016 Yu N et al **Curr Biol**
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.



School/Department:	Department of Biochemistry, Erasmus MC
Supervisor information:  World no 50 Molecular Biology & Genetics World no 67 Cell Biology	Prof. dr. Tokameh Mahmoudi, PhD, t.mahmoudi@erasmusmc.nl <u>Selected personal grants:</u> ERC StG laureate (2014) <u>Selected publications:</u> <ol style="list-style-type: none"> 1. Stoszko, M et al., 2020. Science Advances 6(32):6617-6629 2. Ne, E et al., 2020 Cell Host Microbe (revision 'Sneak Peak') 3. Marian, C et al., 2018. Cell Chemical Biology 25(12):1443-1455.e14. 4. Palstra, RJ et al., 2018. Science Advances 4(2):e1701729. 5. Zhao, M et al., 2019. Pharmacol Res. 2019 Jan;139:524-534. 6. Bertoldi, A. et al., 2020 Journal of Virological Methods. 7. Lungu, C et al., 2020 Viruses. 12(9):E973. 8. Stoszko M et al., 2016. EBioMedicine. 3:108-121.
Project Title:	HIV Cure: mechanisms, drug discovery, clinical study and valorization
Abstract:	<p>Combination antiretroviral therapy (cART) 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 (UNAIDS fact sheet 2019). HIV persists because subsequent to stable integration into the CD4+ T cell host genome, the 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 (Siliciano and Siliciano, 2015). 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 clearance by the immune system.</p> <p>Below five ongoing focus areas of our research into HIV-1 cure:</p> <p>[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. We showed that a new class of compounds, DDX3 inhibitors, induce selective cell death in HIV infected patient cells and lead to depletion of the inducible latent reservoir in these patients.</p> <p>[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 identified GTX, a molecule capable of activating latent HIV, and unravelled its mechanism of action at the molecular level in targeting the elongation phase of HIV transcription.</p> <p>[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 a novel transcriptional repressor, IKZF1. We also found the clinically advanced IKZF1 targeting drug iberdomide, to reverse latency in CD4+T-cells isolated from virally suppressed HIV-1 infected participants.</p> <p>[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 with the Purdue University and the Broad Institute, 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. To develop next-generation BAF inhibitors, we performed a screen of more than 350,000 compounds, uncovering a novel class of molecules that displays potent latency reversal with significantly less associated cytotoxicity (patent filed 2018).</p> <p>[5] Combining genome-wide association, functional genomics data and mechanistic interrogation, we unraveled the underlying biological basis of HIV non-coding disease associated genomic variants near the IL-32 gene in determining susceptibility to HIV-1 infection.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • 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 (<i>English speaking countries & Netherlands</i>: no requirement; <i>Other countries</i>: IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>). • 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.

School/Department:	Department of Biochemistry, Erasmus MC
Supervisor information:  World no 50 Molecular Biology & Genetics World no 67 Cell Biology	Prof. dr. Tokameh Mahmoudi, PhD, t.mahmoudi@erasmusmc.nl <u>Selected personal grants:</u> ERC StG laureate (2014) <u>Selected publications:</u> 2019 BioArxiv (and under review eLife) de Crignis E et al. Human liver organoids; Modelling HBV Infection, Replication and Related Tumorigenesis. doi: https://doi.org/10.1101/568147 2012 <i>Cell</i> Li VS, Ng SS, Boursma P, Karthaus RW, Gerlach JP, Mohammed S, Heck AJ, Maurice MM, Mahmoudi T*, and Clevers H*. Wnt pathway activation through inhibition of proteosomal b-catenin degradation within the intact endogenous Axin1 complex. 149(6):1245-56.
Project Title:	Liver organoid-tumoroid platform in study of HBV infection and tumorigenesis
Abstract:	<p>Project Summary Persistent Hepatitis B virus (HBV) infection remains the leading cause of liver cirrhosis and hepatocellular carcinoma world-wide. However, identification and study of the molecular events that occur as consequence of HBV infection and which mediate onset of hepatocellular carcinoma have been greatly hindered because of the lack of a relevant primary untransformed model system. The stem cell based liver organoid / tumoroid technology for the first time allows the culturing, expansion, banking, differentiation of hepatocytes from healthy donors or infected patients at various stages of disease (Huch M et al., 2015). My group has also recently developed a primary HBV infected and patient-derived human liver organoid model system (de Crignis et al, 2019) which for the first time allows long term culturing and analysis of HBV infected patient livers providing a platform suitable for antiviral drug screening and examination of HBV-induced mechanisms of liver pathogenesis and HCC. We have generated HBV infected patient and healthy liver organoid culture lines seeded from surgically explanted tissue. 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 will perform drug and toxicity screens using the HBV infected liver organoid platform and also examine the role of various pathways implicated in liver cancer such as Wnt-beta-catenin (Li VS et al <i>Cell</i> 2012), p53 and Ras in the organoid model. Transgenic liver organoid lines including those that exogenously express the HBV receptor NTCP or the viral gene HBX, E and core Antigens are also generated and molecular determinants of infection and oncogenesis are investigated using these tools.</p> <p>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 (OIC-confocal, fluorescence microscopy), Flow Cytometry Activated Cell Sorting, Lentiviral transduction and gene editing</p>
Requirements of candidate:	<ul style="list-style-type: none"> 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 (<i>English speaking countries & Netherlands</i>: no requirement; <i>Other countries</i>: IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>). 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 t.mahmoudi@erasmusmc.nl.

Department of Biostatistics

School/Department:	Department of Biostatistics, Erasmus MC
Supervisor information: World no 21 Public, Environmental & Occupational Health 2020	<p>Prof. dr. Dimitris Rizopoulos, d.rizopoulos@erasmusmc.nl Dr. Joost van Rosmalen, j.vanrosmalen@erasmusmc.nl</p> <p>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:</p> <ul style="list-style-type: none"> - Nasserinejad K, van Rosmalen J, de Kort W, Rizopoulos D, Lesaffre E. Prediction of hemoglobin in blood donors using a latent class mixed-effects transition model. <i>Stat Med</i>. 2016 Feb 20;35(4):581–94. - Nasserinejad K, van Rosmalen J, van den Hurk K, Baart M, Hoekstra T, Rizopoulos D, et al. Prevalence and determinants of declining versus stable hemoglobin levels in whole blood donors. <i>Transfusion</i>. 2015 Aug;55(8):1955–63. - Nasserinejad K, de Kort W, Baart M, Komárek A, van Rosmalen J, Lesaffre E. Predicting hemoglobin levels in whole blood donors using transition models and mixed effects models. <i>BMC Med Res Methodol</i>. 2013 May 2;13:62.
Project Title:	Longitudinal modeling of blood donation data
Abstract:	<p>Blood donors experience a temporary decline in their hemoglobin values after each donation due to the loss of iron. Frequent blood donation may put donors at risk of developing iron deficiency. Therefore blood banks monitor donors' iron status by measuring the hemoglobin value before each donation. Donors whose hemoglobin value is too low are temporarily deferred from donation. The longitudinal data collected by blood banks is a valuable data source to help understand the hemoglobin recovery process after donation and to better tailor donation policies and thereby reduce the number of deferrals.</p> <p>Our research group has previously developed longitudinal models for hemoglobin based on data from Dutch donors, in collaboration with researchers from the Dutch blood bank Sanquin. These models are based on mixed models, transition models and growth mixture models to account for specific features of the data, such as within-donor correlations, state dependence and donor heterogeneity. A Bayesian statistical approach is used to incorporate relevant prior knowledge on the recovery process.</p> <p>In this new project we will further develop these statistical models and apply them to large international data sets. We will also assess the value of biomarkers for better predicting future hemoglobin value and deferral, and develop models to estimate the relationship between blood donation and long-term health outcomes. The Dutch blood bank (Sanquin) will be a main partner and source of data for this project. In addition, we're collaborating with researchers from other countries (Australia, Belgium, Denmark, South Africa, UK) in an international modeling network.</p> <p>Keywords: blood donation, mixed models, longitudinal data, Bayesian statistics, biostatistics</p>
Requirements of candidate:	<ul style="list-style-type: none"> • 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 methods for repeated measurements/longitudinal data and 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. • 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 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>)

Department of Cardiology

School/Department:	Department of Cardiology, section electrophysiology, Erasmus MC
Supervisor information: World no 23 in Cardiac & Cardiovascular Systems	<ol style="list-style-type: none"> 1. Prof dr. Natasja MS de Groot 2. Email: n.m.s.degroot@erasmusmc.nl <p>Website: https://www.linkedin.com/in/prof-dr-natasja-de-groot-md-phd-emc-65760662/ https://www.erasmusmc.nl/en/research/researchers/groot-natasja-de https://www.medicaldelta.nl/onderzoek/medical-delta-cardiac-arrhythmia-lab</p> <p>Grants: EU-LSH, Dutch-German Heart Foundation grant, Cardiovascular research Netherlands, personal grants: Dutch Heart Foundation Junior Staff member, VIDI; multiple companies (e.g. Johnson&Johnson, Bayer) Most important publications: Zhang, D., et al. (2019) <i>Nature Communications</i>, Calkins, H., Heart Rhythm, de Groot, N., (2016) <i>Circulation-Arrhythmia and Electrophysiology</i>; Knol, W. G., et al. (2019). <i>Heart Rhythm</i>, Starreveld, R., (2019) <i>Europace</i>, Kharbanda R. (2020) <i>JACC EP</i>.</p>
Project Title:	Innovation in Diagnosis and Therapy of Cardiac Arrhythmias
Abstract:	<p>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 mechanisms of (post-operative) atrial fibrillation, 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.</p> <p>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.</p> <p>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, including langendorfer set ups. We have several multi-disciplinary collaborations (e.g. electrical, biomechanical engineering and molecular biology).</p>   <p>Keywords: cardiac surgery, electrophysiology laboratory, biomarkers, human-, animal-, clinical-, experimental mapping studies, electrical activity, ECG analysis, electrograms, biomarkers and medical technology.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Department of Cardiology and Dept of Epidemiology

School/Department:	Dept of Epidemiology and Dept Cardiology, Erasmus MC	
Supervisors information: World no 21 Public, Environmental & Occupational Health 2020 World no 23 in Cardiac & Cardiovascular Systems	<ul style="list-style-type: none"> • Dr. Maryam Kavousi, MD, PhD • Email: m.kavousi@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/cardiometabolic-epidemiology • Grants and Awards: <ul style="list-style-type: none"> - AXA Research Fund (2012) - IDF (2014) - Prestigious UNESCO-Loreal Fellowship 'For Women in Science' (2014) - Prestigious ZonMw VENI Grant (2015) - COLCIENCIAS (2016) - Erasmus MC Mrcase 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: <ul style="list-style-type: none"> - 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. 	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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 Physiology 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:	<i>The failing heart: ageing-associated cardiovascular changes in women and men</i>	
Abstract:	<p>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.</p>	
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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 50 Molecular Biology & Genetics World no 67 Cell Biology	<ul style="list-style-type: none"> • Prof dr D. Huylebroeck, d.huylebroeck@erasmusmc.nl • Selected publications: Birkhoff et al. (2020) <i>Hum Mol Genet.</i> 29, 2535-2550. Vandamme et al. (2020) <i>Cancer Res.</i> 80, 2983-2995. Deryckere et al. (2020) <i>Development</i> 147, dev.184861. Dries R et al. (2020) <i>Stem Cells</i> 38:202-217. Dobrev MP*et al. (2018) <i>Development</i> 145, dev157222. Stryjewska A et al. (2017) <i>Stem Cells</i> 35:611-625. Wu LM et al (2016) <i>Nat Neurosci.</i> 19:1060-1072. Scott CL et al. (2016) <i>J Exp Med.</i> 213:897-911. Gomes Fernandes M et al. (2016) <i>J Exp Med.</i> 212, 2015-2025. Omlusik KD et al (2015) <i>J Exp Med.</i> 212, 2027-2039. van den Berghe V et al (2013) <i>Neuron</i> 77, 70-82.
Project Title:	Systems/Omics approaches to study nuclear interpretation of BMP signaling in stem/progenitor cells: ZEB2
Abstract:	<p>BMP signaling controls multiple cellular processes during embryogenesis and its developmental actions are recapitulated during tissue/organ repair. We address the the multi-functional and multi-modal actions of the Mowat-Wilson Syndrome transcription factor ZEB2. Phenotypic analysis of conditional <i>Zeb2</i> KO mice, combined with biochemistry/omics has revealed multiple functions and mechanisms of action of the Smad-interacting protein Zeb2. Altogether, these models explain major aspects of Mowat-Wilson Syndrome (MOWS, OMIM#235730), including intellectual disability (brain cortex development), epilepsy (GABAergic interneurons in the ventral forebrain), Hirschsprung disease (neural crest, enteric nervous system) and other defects, including in neural crest derived craniofacial development. Additional mouse models reveal hitherto unknown and sometimes unexpected functions in e.g. myelinogenesis and (re)myelination, maturation of subtypes of immune cell, and Zeb2-mediated cardiac repair attempts in the infarcted heart. Our present work continues to study Zeb2 in neural differentiation of human and mouse ESCs, and human iPSCs from MOWS patients with new types of <i>ZEB2</i> mutation (including in the super enhancer gene desert of 3.3-3.7 Mb in length) and comparing the transcriptomes of the iPSCs under various differentiation protocols, also using cerebral organoids. We have identified Zeb2-dependent genes (RNA-Seq in <i>Zeb2</i>-KO cells) and novel protein partners (tag-Zeb2 proteomics), and are mapping Zeb2 genome-wide binding sites (ChIP-Seq) in neural as well as mesendodermal differentiation, and post-translational modifications affecting its stability. Importantly, novel insights in Zeb2 locus regulation itself by distant regulatory elements, which are likely relevant to MOWS as well, were obtained by using targeted chromatin conformation capture (T2C method). In addition to these studies, we would like to produce our own sets of genome-wide binding sites data for phospho-Smad1/5/9 binding in unstimulated and BMP/Nodal-stimulated ESCs, and compare these to Zeb2 binding sites, which will involve taking the cells into BMP/Nodal co-stimulated mesendodermal differentiation. Subsequent skeletal muscle differentiation is an option as well. Last, but not least, new projects are envisaged to study Zeb2 in various cancers, where together with its locus encoded lncRNA and its regulatory miRNAs it is studied intensively, by virtue of setting up tumor-immune cell (and other cell types) spheroids.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ We are looking for highly motivated, talented students to join our international team. ○ Master degree or MD. ○ A fair scholarship that covers subsistence allowance and international air plane ticket. ○ Working in the lab requires that the student has good communication skills. ○ English language requirement: <i>English speaking countries & Netherlands:</i> no requirement <i>Other countries:</i> 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 50 Molecular Biology & Genetics World no 67 Cell Biology	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • <i>Blood</i>, 2020 DOI: https://doi.org/10.1182/blood.2020004826 • <i>Cell Reports</i>, 2020: DOI: https://doi.org/10.1016/j.celrep.2020.107647 • <i>Stem Cells</i>, 2019: DOI: https://doi.org/10.1002/stem.3111 • <i>eLife</i>, 2019 DOI: 10.7554/eLife.48561 • <i>Nature structural & molecular biology</i>, 2019: DOI: https://doi.org/10.1038/s41594-019-0231-0 • <i>BioRxiv</i>, 2017 DOI: https://doi.org/10.1101/209932 • <i>Genome research</i>, 2016 DOI: http://www.genome.org/cgi/doi/10.1101/gr.201665.115. • <i>Nature medicine</i>, 2016 DOI: https://doi.org/10.1038/nm.4098 • <i>Nature communications</i>, 2016 DOI: https://doi.org/10.1038/ncomms12222 • <i>Nature</i>, 2012: DOI: https://doi.org/10.1038/nature11070 • <i>Cell</i>, 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:	<p>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.</p> <p>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</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands</i>: no requirement ○ <i>Other countries</i>: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs).

Department 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 on 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. **Nature Genetics** **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 JJ, 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.** **2017**;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 Clinical Genetics

School/Department:	Department of Clinical Genetics Erasmus MC
Supervisor information: world no 50 Molecular Biology & Genetics	<ul style="list-style-type: none"> • Stefan Barakat, M.D., Ph.D., MSc., principal investigator • Email: t.barakat@erasmusmc.nl <ul style="list-style-type: none"> • 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) <i>Nature Reviews Neurology</i> doi: 10.1038/s41582-020-0395-6 (IF: 27.0) (apr 2020) <i>Acta Neuropathologica</i> doi: 10.1007/s00401-020-02128-8 (IF:18.2) (dec 2019) <i>Acta Neuropathologica</i> doi: 10.1007/s00401-019-02109-6 (IF:18.2) (aug 2018) <i>Cell Stem Cell</i> doi: 10.1016/j.stem.2018.06.014 (IF:23.3) (aug 2015) <i>Genome Biology</i> doi: 10.1186/s13059-015-0698-x (IF:11.9) (mar 2014) <i>Molecular Cell</i> doi: 10.1016/j.molcel.2014.02.006 (IF:14.7) (mar 2013) <i>Cell Reports</i> doi: 10.1016/j.celrep.2013.02.018 (IF:8.3) (apr 2012) <i>Nature</i> doi: 10.1038/nature11070 (IF:40.1) (jun 2012) <i>Molecular Cell</i> doi: 10.1016/j.molcel.2012.04.003 (IF:14.7) (oct 2011) <i>Nucleic Acid Research</i> doi: 10.1093/nar/gkr550 (IF:9.2) (jun 2010) <i>Cell Stem Cell</i> doi: 10.1016/j.stem.2010.05.003 (IF:23.3) (nov 2009) <i>Cell</i> 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:	<i>Deciphering the role of Non-Coding DNA sequences in the genetics of neurodevelopmental disorders</i>
Abstract:	<p>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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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 21 Public, Environmental & Occupational Health	<ul style="list-style-type: none"> • Dr. Daniel Bos, MD, PhD • Email: d.bos@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/imaging-of-arteriosclerosis • Grants and Awards: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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. 	<ul style="list-style-type: none"> • Dr. Maryam Kavousi, MD, PhD • Email: m.kavousi@erasmusmc.nl • Website: https://www.ergo-onderzoek.nl/managementteam/15 • Grants and Awards: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - BMC Medicine 2020; 18:263. - Heart 2020; 106(2):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:	<p>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.</p>	
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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 21 Public, Environmental & Occupational Health	<ul style="list-style-type: none"> • Dr. Mohsen Ghanbari Assistant professor, Principal investigator of 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: <ul style="list-style-type: none"> - Early Career Award, The Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) consortium, 2018 - European Foundation for the Study of Diabetes Fellowship, 2018 - Alzheimer Netherland Fellowship, 2018 • Most important publications: Dr. Ghanbari has so far published 60 international peer-reviewed publications. <ul style="list-style-type: none"> - 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 ... - Blood. 2018 Oct 25;132(17):1842-1850. DNA methylation age is associated with an altered hemostatic ... - 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:	<p>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; however, 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.</p> <p>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, Alzheimer's disease, fatty liver disease) using multi-omics data (genomics, epigenomics, 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • 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\geq7.0 (\geq6.0 for all subs), TOEFL \geq100 (\geq20 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 21 Public, Environmental & Occupational Health	<ul style="list-style-type: none"> • Prof dr M. Kamran IKRAM • Email: m.ikram@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/departments/epidemiology • Grants: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - <i>Mov Disord</i> 2020; Sept 23 Epub - <i>Am J Epidemiol</i> 2020; Sept 5 Epub - <i>J Am Coll Cardiol</i> 2020;75:2387-2399 - <i>Brain</i> 2020;143:1220-1232 - <i>PLoS Med</i> 2019;16:e1002933 - <i>Nat Genet</i> 2019;51:1624-1636 - <i>Nature Medicine</i> 2019;25:1364-1369 - <i>Circulation</i> 2019;139:1698-1709 - <i>Int J Epidemiol</i> 2019;48:1286-1293 - <i>JAMA Neurol</i> 2018;75:1256-1263 - <i>Lancet Neurol</i> 2018;17:434-444 - <i>Circulation</i> 2017;135:2207-2209 - <i>Nat Neurosci</i> 2016;19:1569-1582 - <i>Nature</i> 2016;536:41-47
Project Title:	<i>Vascular disease and autonomous dysregulation in Parkinson's Disease</i>
Abstract:	<p>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 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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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
<p>Supervisor information:</p>  <p>World no 21 Public, Environmental & Occupational Health</p>	<ul style="list-style-type: none"> • Prof.dr. M. Arfan Ikram • Secondary affiliation: Adj. professor at Harvard Chan School of Public Health, Boston • Email: m.a.ikram@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/researchers/ikram-arfan-m • Personal Grants: 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. He has supervised 28 PhD students. • Most important publications: Satizabal CL. Nat Genetics 2019 Wang J. PNAS 2019 Hibar DP. Nat Commun 2017 Adams HH. Nat Neurosc 2016 Roshchupkin GV. Nat Commun 2016 Ikram MA. Nat Genetics 2012 Ikram MA. NEJM 2009
Project Title:	Deep Learning in Omics Data Analysis and Precision Medicine
<p>Abstract</p>	<p>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.</p> <p>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</p> <p>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.</p> <p>Co-supervision in this project will be done by dr. Gennady Roshchupkin.</p>
<p>Requirements of candidate:</p>	<p>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:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - English speaking countries & Netherlands: no requirement - Other countries: IELTS 6. <p>We offer you:</p> <ul style="list-style-type: none"> - 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 21 Public, Environmental & Occupational Health	<ul style="list-style-type: none"> • Dr. Annemarie I. Luik, PhD • Email: a.luik@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/psychiatric-epidemiology • Grants and Awards: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - <i>Nature Hum Behav</i> 2020; in press. - <i>Mov Disord.</i> 2020; published online Sep 15. - <i>Alzheimers Dement</i> 2020; 16: 1259-1267. - <i>JAMA Psychiatry</i> 2019; 76: 21-30. - <i>JAMA Pediatrics</i> 2019; 173: 883-885. - <i>Nature Genet</i> 2019; 51: 387-393. - <i>Nature Comm</i> 2019; 15: 1521. - <i>Brain</i> 2019; 142: 2013-2022. - <i>NPJ Digital Med</i> 2018; 1:3 - <i>Lancet Psychiatry</i> 2017; 4: 749-758. - <i>Nature Genet</i> 2017;49: 274-281. - <i>Psychol Med</i> 2016; 46: 1951-1960. - <i>Mol Psychiatry</i> 2015; 20: 1232-1239.
	<ul style="list-style-type: none"> • Dr. Daniel Bos, MD, PhD • Email: d.bos@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/imaging-of-arteriosclerosis • Grants and Awards: <ul style="list-style-type: none"> - 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 Mrcce Grant (2019) - European Commission Horizon 2020 - Research and Innovation Framework Programme (2019) - Netherlands Organisation for Scientific Research (2019) • Most important publications: <ul style="list-style-type: none"> - <i>JACC</i> 2020; 19;75:2387-2399. - <i>BMC Medicine</i> 2020; 18:263. - <i>Heart</i> 2020; 106(2):133-139. - <i>Plos Med</i> 2020; 17(5):e1003115. - <i>Eur Heart J</i> 2018; 39:3369-3376. - <i>JACC</i> 2018; 72: 582-584. - <i>Alzheimers Dement</i> 2018; pii: S1552-5260(18)30129-8. - <i>Eur Radiol</i> 2018; 2018: 28:3082-3087. - <i>Circulation</i> 2017; 135:2207-09. - <i>Circ Cardiovasc Genet</i> 2013; 2013; 6:47-53.
Project Title:	<i>Unravelling the role of vascular disease in depression</i>
Abstract:	<p>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.</p> <p>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.</p> <p>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.</p>
Requirements of	<ul style="list-style-type: none"> ○ 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
<p>Supervisor information:</p> <p>World no 21 Public, Environmental & Occupational Health</p>	<ul style="list-style-type: none"> • Dr.ir. Trudy Voortman <i>Principal investigator Nutrition & Lifestyle Epidemiology, Life-course epidemiology</i> • Email: trudy.voortman@erasmusmc.nl • Website: www.erasmusmc.nl/en/research/groups/nutrition-and-lifestyle-epidemiology ; www.trudyvoortman.com • Personal honors and grants: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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:	<p>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.</p> <p>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.</p> <p>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</p>
Requirements of candidate:	<ul style="list-style-type: none"> • 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@erasmusmc.nl

Department of Gastroenterology & Hepatology

School/Department:	Department of Gastroenterology and Hepatology, Erasmus MC
Supervisor information: world no 14 Gastroenterology & Hepatology	<ul style="list-style-type: none"> • Associate Professor dr Jaap Kwekkeboom • Email: j.kwekkeboom@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/researchers/kwekkeboom-j • Recent personal Grants: <ul style="list-style-type: none"> - Merus NV research grant 2020: € 192,000 - Pfizer research grant 2018: € 85,000 - Health Holland Life Sciences & Health grant 2017: € 689,257 - Erasmus MC PhD-grant 2016: € 150,000 - Pfizer research grant 2015: € 499,591 • Most important recent publications: <ol style="list-style-type: none"> 1. Campos Carrascosa L, van Beek AA, de Ruiter V, Doukas M, Wei J, Fisher TS, Ching K, Yang W, van Loon K, Boor PPC, Rakké YS, Noordam L, Doornebosch P, Grünhagen D, Verhoef K, Polak WG, IJzermans JNM, Ni I, Yeung YA, Salek-Ardakani S, Sprengers D, Kwekkeboom J. FcγRIIB engagement drives agonistic activity of Fc-engineered αOX40 antibody to stimulate human tumor-infiltrating T cells. <i>J. Immunother Cancer</i> 2020; 8(2): e000816. 2. Zhou G, Sprengers D, Mancham S, Erkens R, Boor PPC, van Beek AA, Doukas M, Noordam L, Campos Carrascosa L, de Ruiter V, van Leeuwen RWF, Polak WG, de Jonge J, Groot Koerkamp B, van Rosmalen B, van Gulik TM, Verheij J, IJzermans JNM, Bruno MJ, Kwekkeboom J. <i>J Hepatol</i>. 2019;71(4):753-762 3. Zhou G, Sprengers D, Boor PPC, Doukas M, Schutz H, Mancham S, Pedroza-Gonzalez A, Polak WG, de Jonge J, Gaspersz M, Dong H, Thielemans K, Pan Q, JNM IJ, Bruno MJ, Kwekkeboom J. Antibodies Against Immune Checkpoint Molecules Restore Functions of Tumor-Infiltrating T Cells in Hepatocellular Carcinomas. <i>Gastroenterology</i> 2017;153(4): 1107-1119 e1110. 4. Sideras K, Biermann K, Verheij J, Takkenberg BR, Mancham S, Hansen BE, Schutz HM, de Man RA, Sprengers D, Buschow SI, Verseput MC, Boor PP, Pan Q, van Gulik TM, Terkivatan T, IJzermans JN, Beuers UH, Sleijfer S, Bruno MJ, Kwekkeboom J. PD-L1, Galectin-9 and CD8(+) tumor-infiltrating lymphocytes are associated with survival in hepatocellular carcinoma. <i>Oncoimmunology</i> 2017;6(2): e1273309.
Project Title:	Co-targeting of tumor-infiltrating T cells and NK cells to treat liver cancer and colorectal cancer
Abstract:	<p>The focus of our research group is to identify novel immunotherapeutic targets for hepatocellular carcinoma and mismatch-repair-deficient colorectal cancer. Current immune checkpoint inhibitors (anti-PD1, anti-PD-L1 and anti-CTLA-4 antibodies) have limited clinical efficacy in these cancer types. These antibodies target immune checkpoint molecules expressed on T cells only. We hypothesize that co-targeting of immune checkpoint expressed on both T cells and NK cells may show higher clinical efficacy. The aim of this PhD-project is to determine which inhibitory and/or stimulatory immune checkpoint molecules should be targeted to simultaneously enhance anti-tumor responses of T-cells and NK-cells in these types of cancer.</p> <p>You will isolate tumor-infiltrating lymphocytes from surgically resected human cancer tissues and, using flow cytometry, establish which inhibitory and stimulatory immune checkpoint molecules are over-expressed on both T cells and NK cells in these tumors. Subsequently, using different types of T-cell and NK-cell culture assays, you will determine whether antibodies against these over-expressed molecules, and combinations of these antibodies, can simultaneously enhance the functionality of tumor-derived T cells and NK cells. Human cancer cell lines and tumor-derived organoids will be used to study cytotoxicity of T cells and NK cells against cancer cells. The mechanisms-of-action by which antibodies targeting these immune checkpoints enhance functionality of tumor-infiltrating NK cells and T cells will be studied using RNA-sequencing. Together, this project will reveal potentially interesting molecular targets for immunotherapy in hepatocellular carcinoma and MMR-proficient colorectal cancer.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ We are looking for a highly motivated student to join our international team. ○ Master degree or MD with at least basic expertise in cell culture and flow cytometry. ○ Scholarship that will cover subsistence allowance and international air plane ticket (we will help in writing the scientific part of your scholarship proposal). ○ English language requirement: <i>English speaking countries & Netherlands</i>: no requirement. <i>Other countries</i>: 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 and Hepatology, Erasmus MC
<p>Supervisor information:</p> <p>world no 14 Gastroenterology & Hepatology</p>	<ul style="list-style-type: none"> • dr Qiuwei Abdullah Pan • Email: q.pan@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/researchers/pan-q • Personal Grants (ongoing): <ul style="list-style-type: none"> - Netherlands Organisation for Scientific Research, Vidi grant 2019: € 800,000 - Dutch Cancer society young investigator grant, 2017, € 549.000... • Most relevant recent publications (*corresponding author): <ol style="list-style-type: none"> 1. Cao W, Li M, Liu J, Zhang S, Noordam L, Verstegen MMA, Wang L, Ma B, Li S, Wang W, Bolkestein M, Doukas M, Chen K, Ma Z, Bruno M, Sprengers D, Kwekkeboom J, J W van der Laan L, Smits R, Peppelenbosch MP, Pan Q*. LGR5 marks targetable tumor-initiating cells in mouse liver cancer. <i>Nature Communications</i>. 2020 Apr 23;11(1):1961. doi: 10.1038/s41467-020-15846-0. (IF: 12) 2. Liu J, Li P, Wang L, Li M, Ge Z, Noordam L, Lieshout R, Verstegen MMA, Ma B, Su J, Yang Q, Zhang R, Zhou G, Carrascosa LC, Sprengers D, Ilzermans JNM, Smits R, Kwekkeboom J, van der Laan LJW, Peppelenbosch MP, Pan Q*, Cao W*. Cancer-Associated Fibroblasts Provide a Stromal Niche for Liver Cancer Organoids That Confers Trophic Effects and Therapy Resistance. <i>Cell Mol Gastroenterol Hepatol</i>. 2020 Sep 12;S2352-345X(20)30140-5. (IF: 7) 3. Chen K, Ma J, Jia X, Ai W, Ma Z, Pan Q*. Advancing the understanding of NAFLD to hepatocellular carcinoma development: From experimental models to humans. <i>Biochim Biophys Acta Rev Cancer</i>. 2019 Jan;1871(1):117-125. (IF: 7.4) 4. Cao W, Chen K, Bolkestein M, Yin Y, Verstegen MMA, Bijvelds MJC, Wang W, Tuysuz N, Ten Berge D, Sprengers D, Metselaar HJ, van der Laan LJW, Kwekkeboom J, Smits R, Peppelenbosch MP, Pan Q*. Dynamics of Proliferative and Quiescent Stem Cells in Liver Homeostasis and Injury. <i>Gastroenterology</i>. 2017 Oct;153(4):1133-1147. (IF: 17) 5. Wang W, Yin Y, Xu L, Su J, Huang F, Wang Y, Boor PPC, Chen K, Wang W, Cao W, Zhou X, Liu P, van der Laan LJW, Kwekkeboom J, Peppelenbosch MP, Pan Q*. Unphosphorylated ISGF3 drives constitutive expression of interferon-stimulated genes to protect against viral infections. <i>Science Signaling</i>. 2017 Apr 25;10(476). pii: eaah4248. (IF: 6.5) <p>Publication link (>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</p>
Project Title:	<i>Understanding the biological and therapeutic implications of stem cells liver cancer</i>
Abstract:	<p>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.</p> <p>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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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 MSc/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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs), or discuss for specific cases.

Department of Gastroenterology & Hepatology

School/Department:	Department of Gastroenterology and Hepatology, Erasmus MC
Supervisor information: world no 14 Gastroenterology & Hepatology world no 24 Infectious Diseases	<ul style="list-style-type: none"> • dr Qiuwei Abdullah Pan • Email: q.pan@erasmusmc.nl <ul style="list-style-type: none"> • Website: https://www.erasmusmc.nl/en/research/researchers/pan-q • Publication link: • Personal Grants (ongoing): <ul style="list-style-type: none"> - Netherlands Organisation for Scientific Research, Vidi grant 2019: € 800,000 - Dutch Cancer society young investigator grant, 2017, € 549.000... • Most relevant recent publications (*corresponding author): <ol style="list-style-type: none"> 1. Ji Y, Ma Z, Peppelenbosch MP, Pan Q*. Potential association between COVID-19 mortality and health-care resource availability. <i>Lancet Glob Health</i>. 2020 Apr;8(4):e480. doi: 10.1016/S2214-109X(20)30068-1. (IF: 21.6) 2. Cao W, Li M, Liu J, Zhang S, Noordam L, Verstegen MMA, Wang L, Ma B, Li S, Wang W, Bolkestein M, Doukas M, Chen K, Ma Z, Bruno M, Sprengers D, Kwekkeboom J, J W van der Laan L, Smits R, Peppelenbosch MP, Pan Q*. LGR5 marks targetable tumor-initiating cells in mouse liver cancer. <i>Nature Communications</i>. 2020 Apr 23;11(1):1961. doi: 10.1038/s41467-020-15846-0. (IF: 12) 3. Ma Z, Li P, Ikram A, Pan Q*. Does Cross-neutralization of SARS-CoV-2 Only Relate to High Pathogenic Coronaviruses? <i>Trends Immunol</i>. 2020 Oct;41(10):851-853. (IF: 13.4) 4. Li P, Ikram A, Peppelenbosch MP, Ma Z, Pan Q*. Systematically mapping clinical features of infections with classical endemic human coronaviruses. <i>Clin Infect Dis</i>. 2020 Sep 14;ciaa1386. (IF: 8.3) 5. Li P, Liu J, Ma Z, Bramer WM, Peppelenbosch MP, Pan Q*. Estimating Global Epidemiology of Low-Pathogenic Human Coronaviruses in Relation to the COVID-19 Context. <i>J Infect Dis</i>. 2020 Jul 23;222(4):695-696. (IF: 5) <p>Publication link (>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 </p>
Project Title:	Antiviral therapy development against human coronavirus infections
Abstract:	<p>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 population. 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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 MSc/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), or discuss for specific cases.

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 in 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.

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
- *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

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€

Department of General Practice

School/Department:	'Musculoskeletal disorders' at the Department of General Practice, and Orthopedic Surgery																
Supervisor information: world no 21 Public, Environmental & Occupational Health world no 32 Clinical Medicine	<ul style="list-style-type: none"> • Prof dr SMA Bierma-Zeinstra • Email: s.bierma-zeinstra@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/general-practice • Personal Grants: <ul style="list-style-type: none"> - 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: <table border="0"> <tr> <td>Br J Sports Med 2020; 54(14):822-824</td><td>Nat Genetics, 2014;46(5):498-502</td></tr> <tr> <td>Lancet 2019; 393:1745-59</td><td>JAMA, 2013;310(8):837-847</td></tr> <tr> <td>Nat Rev Rheumatol 2019;15:438-448</td><td>Nature Rev Rheum, 2013;9(10):630-4</td></tr> <tr> <td>Ann Rheum Dis 2018;77:875-882</td><td>Nat Genetics, 2011;43(2):121-6</td></tr> <tr> <td>Nat Rev Rheum, 2017;13(12):705-706</td><td>BMJ, 2010;341:c5688</td></tr> <tr> <td>JAMA, 2017;318(12):1184</td><td>JAMA, 2010;303(2):144-9</td></tr> <tr> <td>BMJ, 2017; 356:j1131</td><td>BMJ, 2009;339:b4074</td></tr> <tr> <td>N Engl J Med, 2014;370(26):2546-7</td><td></td></tr> </table> 	Br J Sports Med 2020; 54(14):822-824	Nat Genetics, 2014;46(5):498-502	Lancet 2019; 393:1745-59	JAMA, 2013;310(8):837-847	Nat Rev Rheumatol 2019;15:438-448	Nature Rev Rheum, 2013;9(10):630-4	Ann Rheum Dis 2018;77:875-882	Nat Genetics, 2011;43(2):121-6	Nat Rev Rheum, 2017;13(12):705-706	BMJ, 2010;341:c5688	JAMA, 2017;318(12):1184	JAMA, 2010;303(2):144-9	BMJ, 2017; 356:j1131	BMJ, 2009;339:b4074	N Engl J Med, 2014;370(26):2546-7	
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BMJ, 2017; 356:j1131	BMJ, 2009;339:b4074																
N Engl J Med, 2014;370(26):2546-7																	
Project Title:	The early diagnosis, prognosis and (subgroup specific) treatment of osteoarthritis																
Abstract:	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>																
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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
<p>Supervisor information:</p> <p>world no 21 Public, Environmental & Occupational Health world no 32 Clinical Medicine</p>	<ul style="list-style-type: none"> • Prof dr BW Koes • Email: b.koes@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/general-practice • Personal Grants: <ul style="list-style-type: none"> - Advise and medical treatment of acute low back pain in primary care (NWO) - Medical treatment of sciatica in primary care (NWO) <p>Most important publications: 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</p>
Project Title:	Diagnosis and prognosis of musculoskeletal disorders
Abstract:	<p>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.</p> <p>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.</p> <p>Next to original research, the department is also active in writing systematic reviews and meta-analysis on these topics.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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 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. *JBM R 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 parabendazole 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, @eerd1970, 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, laboratory for calcium and bone metabolism
<p>Supervisor information:</p> <p>world no 29 Endocrinology & Metabolism</p>	<ul style="list-style-type: none"> • Bram C.J. van der Eerden, PhD • Email: b.vandereerden@erasmusmc.nl • Website: <ul style="list-style-type: none"> - https://www.erasmusmc.nl/en/research/researchers/eerden-bram-van-der - https://publons.com/researcher/2698444/bram-cj-van-der-eerden/ • Personal grants: <ul style="list-style-type: none"> - 2018-2022: Health~Holland, TKI, - 2016-2020: Horizon2020-MCSA-RISE-2015 - 2012-2016: FP7-PEOPLE-2011-IRSES • Most important publications (Total publications, 86; H-index, 25) <ul style="list-style-type: none"> - 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 - Brum et al. Proc Natl Acad Sci U S A. 2015;112(41):12711-6
Project Title:	Integrative approach to study fracture healing
Abstract:	<p>Contrary to common belief, bone is a highly dynamic organ with many 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 <i>ex vivo</i>.</p> <p>Organ-on-chip (OoC) microfluidics has become a novel state-of-the art technology to study cell-cell communication in a physiologically relevant manner. To better understand angiogenesis during bone fracture healing, we have successfully established OoC devices to study the crosstalk of mesenchymal stromal cells and endothelial cells known to crucially interact <i>in vivo</i>. Using this model, we will delineate novel factors involved in angiogenesis of bone and study these <i>in vivo</i>, using murine fracture healing and bone regeneration models. We will combine bone formation, angiogenesis, 3D-printed scaffolds and newly discovered genes/compounds to obtain insights into novel physiologically relevant processes in bone metabolism and provide a better understanding towards the approaches to improve bone regeneration and shorten the burden associated with fractures.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • English speaking countries & Netherlands: no requirement • Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

School/Department:	Dept Internal Medicine-Endocrinology, Erasmus MC
<p>Supervisor information:</p> <p>world no 29 Endocrinology & Metabolism</p>	<ul style="list-style-type: none"> • Prof dr. M.C. (Carola) Zillikens; Email: m.c.zillikens@erasmusmc.nl Website: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - Several grants from Dutch and Australian Government and private foundations • Most important publications: <ol style="list-style-type: none"> 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:	<p>Advanced glycation end products (AGEs) are heterogeneous glycosylated 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 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 al. 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept of Internal Medicine – Endocrinology, metabolism & reproduction

School/Department:	Dept Internal Medicine-Metabolism & Reproduction, Erasmus MC
<p>Supervisor information:</p> <p>world no 29 Endocrinology & Metabolism</p>	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - 2019 - 2022 Health Holland TKI grant - Royalties • Most important publications: <ul style="list-style-type: none"> - 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 EL 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:	<p>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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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 (<i>with experience in molecular biology techniques</i>) ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>)

Dept of Internal Medicine – Endocrinology, neuroendocrine tumors

School/Department	Dept Internal Medicine, Endocrinology, Erasmus MC
<p>Supervisor information:</p> <p>world no 29 Endocrinology & Metabolism</p>	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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.
<p>Project Title:</p>	<p>Discovery of novel biomarkers for gastroenteropancreatic neuroendocrine tumors</p>
<p>Abstract:</p>	<p>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).</p> <p>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.</p> <p>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.</p>
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> ○ 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 – Endocrinology, thyroid lab

School/Department	Dept Internal Medicine, Endocrinology, Erasmus MC
<p>Supervisor information:</p> <p>world no 29 Endocrinology & Metabolism</p>	<ul style="list-style-type: none"> • Prof dr R.P. Peeters & Dr. W.E. Visser • Email: r.peeters@erasmusmc.nl & w.e.visser@erasmusmc.nl • Website: https://www.erasmusmc.nl/en/research/groups/thyroid-laboratory • Personal Grants: <ul style="list-style-type: none"> - 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 - Erasmus MC fellowship • Most important publications: <ul style="list-style-type: none"> - 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 - Groeneweg S, Van Geest FS, Visser WE. Disease characteristics of MCT8 deficiency: an international, retrospective, multicentre cohort study. Lancet Diabetes Endocrinol 2020 July 8(7):594-605
<p>Project Title:</p>	<p>Consequences of thyroid dysfunction for development, metabolism and aging</p>
<p>Abstract:</p>	<p>Thyroid hormone is essential for normal development, metabolism and adequate function of all cells and tissues. Thyroid dysfunction is a very prevalent disorder, with hypothyroidism affecting circa 5% of the population.</p> <p>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 (<i>Lancet Diab & Endo 2019</i>) and pregnancy outcome (<i>JAMA 2019</i>) in the large population-based birth cohort Generation R, whereas we study the consequences of thyroid dysfunction on the aging process (<i>JAMA Intern Med 2017 & Circ Res 2017</i>) in the population-based Rotterdam Study. We closely collaborate with other renowned population-based studies across Europe and United States and initiated two consortia (<i>JAMA 2019 & Nat Comm 2018</i>).</p> <p>We have several research projects in which we investigate normal and defective thyroid hormone signaling at the molecular level. We discovered different thyroid hormone signaling disorders, e.g due to defective cellular transport (MCT8 deficiency, <i>Lancet 2004; Lancet Diab&Endo 2020</i>) or defective receptor signaling (<i>NEJM 2012</i>). We investigate mechanisms of disease through utilizing patient-derived induced pluripotent stem cells. We pursue therapy development programs and are in the lead of several international clinical trials (<i>Lancet Diab & Endo 2019</i>).</p>
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> ○ We are looking for a highly motivated, hardworking student to join our very international team. Our strength is to use team work to tackle large scientific questions, thus requiring good communication skills. Projects are available focusing on epidemiology or molecular biology. ○ Master degree or MD ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept of Internal Medicine – Endocrinology & Genetics Lab

School/Department:	Department of Internal Medicine, Erasmus MC
<p>Supervisor information:</p> <p>world no 29 Endocrinology & Metabolism</p>	<ul style="list-style-type: none"> • Prof. Fernando Rivadeneira (f.rivadeneira@erasmusmc.nl), 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: <ul style="list-style-type: none"> - 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 Investeren 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: <ul style="list-style-type: none"> - 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:	<p>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).</p> <p>PhD project:</p> <p>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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept of Internal Medicine – Genetics Lab

School/Department:	Department of Internal Medicine, Erasmus MC, The Netherlands
Supervisor information:	<ul style="list-style-type: none"> • Prof. Dr. Joyce B.J. van Meurs (j.vanmeurs@erasmusmc.nl) associate professor • Dr. Cindy Boer (c.boer@erasmusmc.nl) Postdoctoral researcher • Website: http://www.glimdna.org ; https://www.linkedin.com/in/joyce-van-meurs-78171313/; • Key words: Large scale population genomics, novel analytic techniques, international and multidisciplinary collaboration, learning environment • Grants: <ul style="list-style-type: none"> - NWO-VIDI (prestigious Dutch personal grant): €900K - H2020 EU: €1500K of in total €1200K - 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: <ol style="list-style-type: none"> 1. New Engl J Med 350(20):2033-41 (2004) [IF07 : 52.6] 2. Nat Genet. 2013;45(10):1238-43. [IF14:31.6] 3. Proc Natl Acad Sci, 2012 22;109(21):8218-23 [IF10:9.9] 4. Nature. 2017 Jan 5;541(7635):81-86. [IF17:41.6] 5. Nat Commun. 2015;6 [IF14:11.3] 6. Nat Commun. 2019 Oct 25;10(1):4881. [IF17:11.9] 7. Genome Biol. 2019 Nov 14;20(1) [IF17:13.2] 8. Nat Genet. 2017 Jan;49(1):131-138. [IF17:27.1] 9. Nat Genet. 2017 Jan;49(1):139-145 . [IF17:27.1] 10. Lancet. 2010 Jul 17;376(9736):180-8 [IF10: 33.6] 11. Link
Project Title:	Large scale functional population genomics to unravel mechanisms of locomotor diseases
Abstract:	<p>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.</p> <p>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.</p> <p>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).</p> <p>The aim is to translate the findings of our population genomics studies into two directions:</p> <ol style="list-style-type: none"> 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:	<ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Dept. of Internal Medicine – Laboratory of Nephrology & Transplantation

The research performed at The Rotterdam Transplantation Laboratory is translational of nature and can be dissected into three research lines being Transplantation Immunology, Molecular Markers and Tissue Repair & Cell Therapy. Examples of our equipment and operational techniques are: multi-parameter flow cytometry/flow cytometry based cell sorting, imaging flow cytometry, diverse cell culture assays i.e., kidney organoids, Elispot, cytotoxicity assays, GWAS, extracellular vesicles, RT-qPCR, epigenetics, histology and immunohistochemistry.



Transplantation Immunology: The wide range of assays to monitor pathways of donor directed reactivity is used to unravel the T and B cell mediated immune responses in patients. In addition, we study the mode of action of (novel) immunosuppressive drugs with the aim to titrate the immunosuppressive burden on our patients in such a way that side-effects (infections, malignancies, cardiovascular events) are kept at a minimum while at the same time rejection processes are prevented.

Molecular Markers: Within this research line we focus on the discovery of molecular markers for either diagnostic or prognostic purposes. We aim to identify patients with complications after kidney transplantation (graft rejection or development of malignancies) in a minimally invasive way via molecular markers in blood or urine. Cell damage due to allograft rejection is accompanied by the release of donor-derived cell-free DNA, extracellular vesicles, and endothelial cells in blood.

Tissue repair & Cell Therapy: We study repair of diseased (transplant) organs by use of cellular therapies such as mesenchymal stem cells. These cells can suppress devastating immune responses against injured organs and stimulate cells within the organs to proliferate and differentiate. Furthermore, we are working on the generation of miniature kidney tissue, so called organoids, from primitive stem cells, which may one day be implanted in the diseased kidney. The aim of these studies is to improve the quality of transplant organs and to repair diseased organs to delay the need for transplantation.

Publications by the Rotterdam Transplant Laboratory

- Shankar AS, et al. Human kidney organoids produce functional renin. *Kidney Int* 2020 Sep 9:S0085-2538
- Niu Q, et al. Immunosuppression Has Long-Lasting Effects on Circulating Follicular Regulatory T Cells in Kidney Transplant Recipients. *Front Immunol.* 2020 Aug 28;11:1972.
- Shankar AS, Hoorn EJ, Gribnau J, Baan CC, Hoogduijn MJ. Current State of Renal Regenerative Therapies. *Transplantation*. 2019;103(2):250.
- Yan L, et al. T Follicular Helper Cells As a New Target for Immunosuppressive Therapies. *Front Immunol.* 2017;8:1510.
- Verhoeven JGHP, et al. Liquid Biopsies to Monitor Solid Organ Transplant Function: A Review of New Biomarkers. *Ther Drug Monit.* 2018;40(5):515.
- Gonçalves FDC, et al. Membrane particles generated from mesenchymal stromal cells modulate immune responses by selective targeting of pro-inflammatory monocytes. *Sci Rep.* 2017;7(1):12100

Contact information:

Prof Carla Baan, c.c.baan@erasmusmc.nl, WeChat: carla baan
Dr Martin Hoogduijn, m.hoogduijn@erasmusmc.nl,
www.RotterdamTransplantationLab.nl



School/Department:	Department of Internal Medicine, Erasmus MC
Project Title:	Exploiting the message from the kidney: the value of extracellular vesicles in transplant rejection
<p>Supervisor information:</p> 	<p>Prof dr Carla C. Baan (female) Email: c.c.baan@erasmusmc.nl, WeChat: carla baan Website: www.rotterdamtransplantationlab.nl http://nl.linkedin.com/pub/carla-baan/8/a19/960 www.erasmusmc.nl Personal Grants: 2019, Dutch Kidney Foundation 2018, Astallas Pharma 2017, Dutch Kidney Foundation 2016, Lundbeck Foundation Denmark</p> <p>Most important publications: van der Zwan M, et al. Front Immunol. 2020 Jul 3;11:1332. Niu Q, et al. Front Immunol. 2020 Aug 28;11:1972. van der Zwan M, et al. Drugs. 2020 Jan;80(1):33-46. Shankar AS, et al. Kidney Int 2020Sep 9:S0085-2538(20)30968-6 Snijders MLH, et al. Transplantation. 2020 Mar 6. Woud WW, et al. Transplantation 2019 May;103(5):e110-e111. Verhoeven JGHP et al. Ther Drug Monit. 2018;40(5):515-525. de Leur K, et al. Front Immunol. 2017;8:306. Gonçalves FDC, et al. Sci Rep. 2017;7:12100.</p>
<p>Abstract:</p> <p>world no 31 Immunology. world no 32 Clinical Medicine</p>	<p>Worldwide, approximately 80.000 kidney transplantations are performed annually. Without a close match, organ transplants will be rejected, and immune competent cells like T cells will attack the new organ. Rejection occurs in up to 25% of cases, but the reasons for rejection are still largely unknown. The discovery that extracellular vesicles participate in the transfer of signaling information between eukaryotic cells and that they readily cross cell walls is a boon to hopes in gaining insight into the molecular and cellular mechanisms driving this response. We propose the novel concept that donor organ released extracellular vesicles present a way for recipient immune cells to initiate the transplant rejection process. To test this, a novel ex vivo platform will be developed to decipher the mechanisms that govern targeted delivery of extracellular vesicle cargo to immune cells. Extracellular vesicles are submicron membrane vesicles that are released by all human cells and transport cell-derived molecules to other cells, changing their phenotype and function. In organ transplantation, donor extracellular vesicles carry and present foreign antigens including the immune activating proteins that interact with recipient antigen presenting cells and sets off the T cell dominated immune response. Technological advances in ex vivo tissue engineering systems, imaging technologies and omics now facilitate the study of i. how donor kidney-extracellular vesicles interact with recipient antigen presenting cells, ii. which molecules are involved and iii. by what means we can interfere in this reaction. This study delivers new knowledge about immune activating mechanisms that are also of importance in auto-immunity, cancer and infectious disease.</p> 
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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. **Nature Comm.** 2019 Nov; 20:10(1):5251
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. **Nature.** 2019 Nov;575(7781):210-216.

Department of Medical Oncology

Department:	Department of Medical Oncology. Erasmus MC
Supervisor information: world no 32 Oncology	Supervisors: Dr. Antoinette Hollestelle (a.hollestelle@erasmusmc.nl) Prof dr. John Martens (j.martens@erasmusmc.nl) Website: https://www.erasmusmc.nl/en/cancer-institute/research/departments/medical-oncology Grants: Over 45 grants from national, European and international research funders, including 7 industry grants. Most important recent publications: <ol style="list-style-type: none"> 1. Lindsay Angus, ..., John W.M. Martens. 2019. Genomic landscape of metastatic breast cancer and its clinical implications. Nature Genetics 51(10):1450-8. 2. Kyriaki Michailidou, ..., Antoinette Hollestelle, ..., Douglas F. Easton. 2017. Association analysis identifies 65 new breast cancer risk loci. Nature 551(7678):92-4. 3. Serena Nik-Zainal, ..., John W. M. Martens, ..., Michael R. Stratton. 2016. Landscape of somatic mutations in 560 breast cancer whole-genome sequences. Nature 534(7605):47-54. 4. Marcel Smid, ..., John W. M. Martens. 2016. Breast cancer genome and transcriptome integration implicates specific mutational signatures with immune cell infiltration. Nature Communications 7:12910. 5. Alison M. Dunning, ..., Antoinette Hollestelle, ..., Stacey L. Edwards. 2016. Breast cancer risk variants at 6q25 display different phenotype associations and regulate ESR1, RMND1 and CCDC170. Nature Genetics 48(4):374-86. 6. Marjanka K. Schmidt, ..., Antoinette Hollestelle, ..., Douglas F. Easton. 2016. Age- and tumor subtype-specific breast cancer risk estimates for CHEK2*1100delC carriers. J Clin Oncol 34(23):2750-60 7. Hanne Meijers-Heijboer, ..., Antoinette Hollestelle, ..., Mieke Schutte. 2003. The CHEK2*1100delC mutation identifies families with a hereditary breast and colorectal cancer phenotype. Am J Human Genet 72(5):1308-14. 8. Hanne Meijers-Heijboer, ..., Antoinette Hollestelle, ..., Michael R. Stratton. 2002. Low-penetrance susceptibility to breast cancer due to CHEK2*1100delC in noncarriers of BRCA1 or BRCA2 mutations. Nature Genetics 31(1):55-9.
Project Title:	<i>Unraveling the mechanisms underlying CHEK2 c.1100delC-driven breast tumorigenesis</i>
Abstract:	<p>In 2002, we discovered the <i>CHEK2</i> c.1100delC mutation as the first moderate-risk breast cancer (BC) susceptibility allele, conferring a 2.3-fold increased BC risk⁸. Although we gained much knowledge since then regarding the clinical features of women and BC patients carrying this allele, we still do not know how <i>CHEK2</i> c.1100delC drives the development of BC biologically.</p> <p>Therefore, we recently sequenced the BC genomes of patients carrying this particular <i>CHEK2</i> mutation and identified a structural variant signature specific to <i>CHEK2</i> mutation carriers. This signature provides clues to unraveling the biological mechanism of CHEK2-driven tumorigenesis. Furthermore, although CHEK2 is a key player in homologous recombination repair, like BRCA1 and BRCA2, the biological mechanism by which it promotes BC seems quite different.</p> <p>In this project the PhD student will develop a normal human ER-positive breast model system to study CHEK2-driven tumorigenesis by generation of induced pluripotent stem cells and gene editing techniques such as CRISPR/Cas9 or prime editing and stem cell differentiation protocols. Once this model system is developed the mechanism will be further studied using techniques such as whole genome and transcriptome sequencing as well as functional and DNA repair assays.</p> <p>Ultimately, we will apply this gained knowledge to improve treatment for breast cancer patients carrying the <i>CHEK2</i> c.1100delC mutation.</p> <p>The PhD student will be working in a project team with molecular biologists, clinicians/epidemiologists and computational biologists supervised by Dr. Hollestelle and prof. Martens. The student will take part in the excellent educational PhD and career guidance program of the Molecular Medicine postgraduate school at Erasmus MC.</p>
Requirements of candidate:	<p>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.</p> <p>A background in cancer biology is of significant added value.</p> <p>Master degree in molecular/cellular biology or a related field.</p> <p>The candidate should have demonstrated excellent scientific writing and experimental laboratory skills.</p> <p>A scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)</p> <p>The student should be fluent in English (English speaking countries & Netherlands): no</p> <p>Requirement: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs).</p>

Department of Medical Oncology

Department:	Department of Medical Oncology. Erasmus MC
<p>Supervisor information:</p> <p>world no 32 Oncology</p>	<ul style="list-style-type: none"> • Prof dr. John Martens (supervisor) • Dr. Harmen van de Werken & Dr. Martijn Lolkema (co-supervisors) • Email: j.martens@erasmusmc.nl and/or ccbc@erasmusmc.nl • Website: ccbc.erasmusmc.nl • Personal Grants: <ul style="list-style-type: none"> DDHF CCBC (2014 & 2018) Astellas (ML; 2014) NKB EMCR (2014) • Most important recent publications: <ol style="list-style-type: none"> 1. Priestley, Peter, Jonathan Baber, Martijn P. Lolkema, ..., Edwin Cuppen. 2019. "Pan-Cancer Whole Genome Analyses of Metastatic Solid Tumors." <i>Nature</i> 575(7781):210-216 2. Lindsay Angus, ..., Martijn P. Lolkema, ..., Harmen J.G. van de Werken, ..., John W.M. Martens 2019. "Genomic landscape of metastatic breast cancer and its clinical implications". <i>Nature Genetics</i> 51(10):1450-1458.. 3. Dessel, Lisanne F. van, ..., Harmen J. G. van de Werken, ..., John W.M. Martens, ... and Martijn P. Lolkema. 2019. "The Genomic Landscape of Metastatic Castration-Resistant Prostate Cancers Using Whole Genome Sequencing Reveals Multiple Distinct Genotypes with Potential Clinical Impact." <i>Nature Communication</i> 10(1):5251 4. Nik-Zainal, Serena, ... John W. M. Martens, ..., and Michael R. Stratton. 2016. "Landscape of Somatic Mutations in 560 Breast Cancer Whole-Genome Sequences." <i>Nature</i> 534(7605):47-54. 5. Smid, Marcel, ..., John W. M. Martens. 2016. "Breast Cancer Genome and Transcriptome Integration Implicates Specific Mutational Signatures with Immune Cell Infiltration." <i>Nature Communications</i> 7:12910. 6. Queirós, Ana C., ..., Harmen J. G. van de Werken, ... and José I. Martín-Subero. 2016. "Decoding the DNA Methylome of Mantle Cell Lymphoma in the Light of the Entire B Cell Lineage." <i>Cancer Cell</i> 30(5):806-21. 7. van de Werken, Harmen J. G., 2012 et al. "Robust 4C-Seq Data Analysis to Screen for Regulatory DNA Interactions." <i>Nature Methods</i> 9(10):969-72. 
<p>Project Title:</p>	<p>Cancer Computational Biology and its Clinical Value using Multiple State-of-the-art Omics Data of Prostate and Breast Cancer Patients.</p>
<p>Abstract:</p>	<p>Cancer onset, progression and drug resistance mechanisms are driven by hereditary and somatically acquired genomic aberrations. Many cancer driver genes and their coding changes are currently known. However more than 98% of the somatic DNA mutations in cancer occur in non-coding areas of the human genome and their contribution towards cancer cell behavior is still enigmatic. In this project we will interrogate the entire cancer genome with a focus on its regulatory part including promoters, enhancers, silencers and regions generating non-coding RNAs to gain insight in their contribution to cancer progression and mechanisms of drug-resistance. Moreover, we aim to develop novel tools that may improve patient stratification.</p> <p>Currently, we possess world-wide the largest metastatic Whole Genome Sequencing data sets from breast (Currently, n > 600) and prostate cancer patients (n > 400)^{1,2,3} and matched RNA-seq data. These comprehensive data sets will give us the opportunity to unravel novel biology including interaction of DNA elements and regulatory mechanisms. We will apply next to state-of-the-art bioinformatics and statistical analyses, Machine Learning methods to interrogate this rich data source. We will compare the results to primary cancer^{4,5} and integrate our data with publicly available data sources from ChIP-seq and 3D chromosome conformation capture assays⁷ to reveal non-coding drivers of cancer initiation and progression and importantly drug-resistance^{3,6}. Ultimately, we will apply this gained knowledge to improve patient stratification.</p> <p>The PhD student will be supervised by a team of molecular biologists, clinicians and computational biologists headed by respectively prof. J. Martens, dr. M. Lolkema and dr. H. van de Werken. The student will be housed in the Erasmus MC CCBC (https://ccbc.erasmusmc.nl/). The PhD-student will be engaged in the excellent educational PhD and career guidance program at Erasmus MC.</p>
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> • 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 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 Perl or Python and preferably in Java. • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • 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).

Department of Neurosciences

The Department of Neuroscience focusses on cerebro-cerebellar connections, plasticity and circuit dynamics underlying sensorimotor integration, information processing and synaptic properties in sensory systems and neurodevelopmental disorders, such as Angelman Syndrome. The department was founded in 2001 by a merger of the Physiology and Anatomy departments, bringing together experts in both fields to tackle today's questions in Neuroscience.

The Department of Neuroscience focusses on:

- (1) **Motor Pillar: Cerebro-cerebellar connectivity, plasticity and development**
- (2) **Sensory Pillar: Vestibular and auditory processing**
- (3) **Cognition: Neurodevelopmental disorders**

Key publications of 4 of the senior professors at Dept of Neuroscience

Prof Chris I De Zeeuw (Motor Pillar)

- Nature Neuroscience 2009 12:1042-9
- Science 2012 337:749-53
- Neuron 2013 78:700-13
- Neuron 2014 81:1215-17
- Neuron 2016 89:645-57
- Neuron 2017 93:409-424
- Science 2017 356:1084-7
- Nature 2018 563:113-116

Prof Ype Elgersma (Cognition Pillar)

- Nature Neuroscience 2007 10:1125-7
- Nature Neuroscience 2007 10:280-2
- JAMA 2008 300:287-94
- Nature Neuroscience 2009 12:1042-9
- Lancet Neurology 2013 12:1076-83
- JAMA Neurology 72:1052-60
- Mol Psych 201520:1311-21
- Nature 2015 526:50-1
- Nature Neuroscience 2019 22:1235-1247

Prof Gerard J Borst (Sensory Pillar)

- Science 2010 327:1614-8
- Nature Neuroscience 2010 13:1050-2
- Neuron 2013 78:936-48
- Proc Natl Acad Sci 2017 114:4249-4254
- J Neurosci 2017 37:7278-7289
- J Neurosci 2018 38:2057-2068

Prof Steven A Kushner (Cognition Pillar)

- Science 2007 316:457-60
- JAMA 2008 300:287-94
- Nature Neuroscience 2009 12:1042-9
- Science 2009 323:1492-6
- Neuron 2014 83:722-35
- Mol Psych 201520:1311-21
- Mol Psych 2016 21:364-75
- Mol Psych 2016 21:1153
- Mol Psych 2019 24: 757-771

Honors & Awards (selection)

Elected Memberships:

Royal Netherlands Academy of Arts & Sciences (KNAW) – CI De Zeeuw.

Personal Grants (NWO, ERC, other)

NWO PIONIER – CI De Zeeuw, GJ Borst

NWO Vici – Y Elgersma

NWO Vidi – CH Hansel, MA Frens, M De Jeu, A Houweling, FE Hoebeek, SA Kushner, G van Woerden, Z Gao

NWO Veni – A Belmeguenai, FE Hoebeek, M

Collaborative Grants (NWO, Horizon2020, MSCA, other):

NWO- 15 mil€

Horizon 2020 – 10 mil€

Schonewille, K Boekhoorn, G van Woerden, Z Gao, A Badura, HJ Boele

ERC Starter – M Schonewille, Z Gao

ERC Advanced – CI De Zeeuw

ERC Proof of Concept – CI De Zeeuw (3x)

MSCA – 1.0 mil€

Industry – 3 mil€

Valorization

Department company: Neurasmus BV/RT

Department of Neuroscience

School/Department:	Department of Neuroscience Erasmus MC
Supervisor information: world no 48 Neurosciences & Behavior	<ul style="list-style-type: none"> • Prof. Dr. J. Gerard G. Borst, Professor of Neurophysiology (promotor) • Email: g.borst@erasmusmc.nl • Website: www.neuro.nl • Personal Grants: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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:	<p><i>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.</i></p> <p><i>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.</i></p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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
<p>Supervisor information:</p> <p>world no 48 Neurosciences & Behavior</p>	<ul style="list-style-type: none"> • Prof dr MA Frens, full professor in Neuroscience • Email: m.frens@erasmusmc.nl • Website: www.neuro.nl • Personal Grants, (examples): <ul style="list-style-type: none"> ➤ NWO-SGW research talent (2018; PhD student) ➤ 3 ESA grants (2017/2018) ➤ NWO IMDI Grant (2012; 3 yr postdoc) ➤ European FP7 ITN grant (2009; 2 AIO's) ➤ Human Frontier grant (2008; 750 k\$) ➤ NWO-VIDI grant (2003; 600 k€) • Most important publications: <ul style="list-style-type: none"> ➤ Nature Neurosci, PMID: 16568098 ➤ Neuron, PMID: 11430812. ➤ Ann Neurol. PMID 31925838 ➤ PLoS One, PMID: 25894396 ➤ eNeuro, PMID: 30073197 ➤ Front Neurosci, PMID: 28824366 ➤ J Physiol, PMID: 12949226 ➤ IOVS, PMID: 27379580. ➤ Spine, PMID: 26418634
<p>Project Title:</p>	<p>Liquid biopsy in neurological disorders</p>
<p>Abstract:</p>	<p>Many neurological disorders are difficult to diagnose and monitor because no blood or imaging biomarker exists to prove disease presence or quantify its severity. Instead, the neurologist relies much more on clinical history and neurological examination. Even though this clinical evaluation often leads to a reliable diagnosis as time progresses and symptoms become more clear, an accurate biomarker could decrease initial diagnostic uncertainty and help monitor the clinical effect of new or existing drugs. For neurological disorders characterized by specific brain damage (for example: the temporal lobe in Alzheimer's, the substantia nigra in Parkinson's, and white matter in multiple sclerosis), such a biomarker would need to sensitively measure specific neuronal cell death, preferably in an easily accessible place such as the blood stream. But does such a biomarker exist? What makes a neuron different from others is its methylation pattern: the epigenetic control mechanism for transcription. Given that genetic fragments are released into the blood stream following neuronal death, it should be possible to quantify brain damage from a serum sample using next-generation sequencing: a liquid biopsy. In this project, you will determine the neural correlates of circulating cell-free DNA and have the opportunity to work towards clinical implementation of cell-free DNA in a multidisciplinary team of geneticists, neurologists and radiologists.</p> <p>Research questions</p> <ul style="list-style-type: none"> • Can we diagnose and monitor neurological disorders with circulating cell-free DNA? • Is circulating cell-free DNA related to brain atrophy determined from MRI scans? • How do other intrinsic or extrinsic factors influence levels of neuronal cell-free DNA?
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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
<p>Supervisor information:</p> <p>world no 48 Neurosciences & Behavior</p>	<ul style="list-style-type: none"> • Prof dr MA Frens, full professor in Neuroscience • Email: m.frens@erasmusmc.nl • Website: www.neuro.nl • Personal Grants, (examples): <ul style="list-style-type: none"> ➤ NWO-SGW research talent (2018; PhD student) ➤ 3 ESA grants (2017/2018) ➤ NWO IMDI Grant (2012; 3 yr postdoc) ➤ European FP7 ITN grant (2009; 2 AIO's) ➤ Human Frontier grant (2008; 750 k\$) ➤ NWO-VIDI grant (2003; 600 k€) • Most important publications: <ul style="list-style-type: none"> ➤ Nature Neurosci, PMID: 16568098 ➤ Neuron, PMID: 11430812. ➤ Ann Neurol. PMID 31925838 ➤ PLoS One, PMID: 25894396 ➤ eNeuro, PMID: 30073197 ➤ Front Neurosci, PMID: 28824366 ➤ J Physiol, PMID: 12949226 ➤ IOVS, PMID: 27379580. ➤ Spine, PMID: 26418634
<p>Project Title:</p>	<p><i>Predicting cortical maturation and autism spectrum disorder from cerebellar and brain-wide structural imaging data</i></p>
<p>Abstract:</p>	<p>In the past, the cerebellum has mainly been implicated in motor control. However, recent studies have highlighted the considerable role of the cerebellum in non-motor domains, such as executive functions, language skills and emotional processing. This is further signified by evidence indicating cerebellar development might play a crucial role in cortical maturation and by the presence of cerebellar dysfunction in neurodevelopmental disorders like Autism Spectrum Disorder (ASD).</p> <p>The cerebellum is strongly interconnected with the cerebral cortex, with its functional subunits being involved in a wide array of motor and cognitive tasks. Given that the cerebellum is among the first brain structures that differentiates but one of the last to mature, it is especially vulnerable to genetic and environmental stressors disrupting development. Yet, large population-based studies in the past have failed to investigate the cerebellum in much detail and have focused predominantly on neocortical development as the best predictor of future behavior. However, mounting evidence of the importance of the cerebellum for normal motor and cognitive behaviors stresses the urgency to move towards brain-wide association studies in large, longitudinal population cohorts, which are rapidly becoming the golden standard. The development of cerebello-neocortical networks can be particularly valuable for the prediction of adult behavior. Early-in-life disruption of cerebellar development has been shown to increase the risk for several developmental disorders such as ASD but also Attention Deficit/Hyperactivity Disorder (ADHD) and Developmental Dyslexia.</p> <p>We therefore hypothesize that cerebellar development (1) is essential for cortical maturation, (2) predicts autistic traits later in life, and (3) is distinctively affected with or without co-occurring attention deficits. Here, we aim to address these hypotheses using the uniquely large and well-studied cohort. We will analyze longitudinal structural MRI data from thousands of scans using state-of-the-art algorithms and correlate them to social responsiveness, a continuous outcome for autistic traits. In addition, we will identify the structural patterns of groups clusters for autistic traits and attention deficits, a common comorbidity of autism.</p> <p>The analytical framework developed in this project will describe normal developmental growth curves of the cerebellum in detail, a structure often ignored in large population-wide studies. Next, this project will substantially advance insights into the role of the cerebellum and its vast connections to other regions of the brain in ASD. Furthermore, the detailed developmental growth curves of the cerebellum can be used as a reference to study neurodevelopmental diseases suspected to have cerebellar involvement and will thereby prove useful for new innovative approaches in the newly founded Erasmus MC Child Brain Center.</p>
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement <ul style="list-style-type: none"> ○ <i>Other countries:</i> 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 48 Neurosciences & Behavior	<ul style="list-style-type: none"> • dr Johan JM Pel, associate professor • Email: j.pel@erasmusmc.nl • Website: http://www.neuro.nl/research.php • Personal Grants: <ul style="list-style-type: none"> - ZonMW grant 2009, 2012, 2018 - Zon MW – DST India grant 2012 • Most important publications: <p><i>Transl Vis Sci Technol.</i> 2019 Jul 30;8(4):13.</p> <p><i>Graefes Arch Clin Exp Ophthalmol.</i> 2019 Apr 3</p> <p><i>Brain Dev.</i> 2018 Oct 6. pii: S0387-7604(18)30469-8.</p> <p><i>Cerebellum.</i> 2018 Sep 14. doi: 10.1007/s12311-018-0975-9</p> <p><i>Graefes Arch Clin Exp Ophthalmol.</i> 2018 Feb;256(2):371-379</p> <p><i>J Vis.</i> 2016;16(5):18</p> <p><i>Dev Med Child Neurol.</i> 2016 Oct;58(10):1030-5</p> <p><i>Motor Control.</i> 2016 Jan;20(1):1-20</p> <p><i>J Vis Exp.</i> 2016 Jul 9;(113)</p> <p><i>J Ophthalmol.</i> 2015;2015:425067</p> <p><i>J Parkinsons Dis.</i> 2014 4:599–608</p> <p><i>Invest Ophthalmol Vis Sci.</i> 2013 Mar 5;54(3):1656-64</p> <p><i>J Alzheimers Dis.</i> 2012 Jan 1;30(1):131-43</p>
Project Title:	Visual-motor and visual vestibular interactions
Abstract:	<p><i>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.</i></p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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 Neuroscience

School/Department:	Department of Neuroscience Erasmus MC
<p>Supervisor information:</p>  <p>world no 48 Neurosciences & Behavior</p>	<ul style="list-style-type: none"> • Dr. Zhenyu Gao, z.gao@erasmusmc.nl <ul style="list-style-type: none"> • https://neuro.nl/research/gao • Personal Grants: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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:	<p>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 <i>et al</i>, 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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. ○ Scholarship that will cover subsistence allowance and international air plane ticket. ○ English language requirement: IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>).

Department of Neuroscience

School/Department:	Department of Neuroscience Erasmus MC
<p>Supervisor information:</p>  <p>world no 48 Neurosciences & Behavior</p>	<ul style="list-style-type: none"> • Dr. Martijn Schonewille, m.schonewille@erasmusmc.nl <ul style="list-style-type: none"> • https://neuro.nl/research/schonewille • Personal Grants: <ul style="list-style-type: none"> - 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 • Most important publications: <ul style="list-style-type: none"> 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 eNeuro 2018 Feb 12 ; 5(1) eLife; 10.7554/eLife.45590.001
Project Title:	<i>Cerebellar differentiation in development of motor functions and neurodevelopmental disorders</i>
Abstract:	<p><i>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 accepted 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.</i></p> <p><i>To achieve this goal, we make use a variety of techniques including molecular biological approaches, anatomical reconstruction, in vitro and in vivo electrophysiology 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.</i></p> <p><i>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.</i></p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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
<p>Supervisor information:</p>  <p>world no 48 Neurosciences & Behavior</p>	<ul style="list-style-type: none"> • Prof. Dr. Chris I. De Zeeuw, c.dezeeuw@erasmusmc.nl <ul style="list-style-type: none"> • https://neuro.nl/research/de-zeeuw • Personal Grants: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - <i>Nature Reviews</i> 2012 13: 619–635 - <i>Neuron</i> 2013 22;78(4):700–13 - <i>CSHP</i> 2015 7(9):a021683 - <i>Neuron</i> 2016 89(3):645–57 - <i>Neuron</i> 2017 93(2):409–424 - <i>Nature</i> 2018 563(7729):113–116 - <i>Science</i> 2012 337(6095):749–53 - <i>eLife</i> 2014 10.7554/eLife.02536 - <i>Cell Reports</i> 2015 13(9):1977–88 - <i>Nature Commun.</i> 2016 1;7:12627 - <i>Science</i> 2017 356:1084–7 - <i>Science Adv.</i> 2018 4: eaas9426
Project Title:	Cerebro-cerebellar Interactions during Cognitive Processing
Abstract:	<p>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, 2020, <i>Nature Reviews</i>; Gao et al., 2018, <i>Nature</i>). This becomes apparent, for instance, in patients suffering from autism (Peter et al., 2016, <i>Nature Commun</i>), spino-cerebellar ataxia (Hoogland et al., 2015, <i>Current Biol</i>), or Alzheimer's (Sepulveda-Falla et al., 2014, <i>J. Clin. Invest.</i>), 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, <i>Nature</i>). 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, <i>Science Adv</i>). 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>). When writing the CSC proposal we will help with the scientific part of your scholarship proposal.

Department of Obstetrics & Gynecology

The ambition of the Erasmus MC department of Obstetrics and Gynecology is to improve health care and health from the earliest moment of the life course. The department is divided into the subdivision of Reproductive Medicine and Obstetrics and Fetal Medicine. The clinic of Obstetrics is located in the Erasmus MC-Sophia and the outpatient clinics in the Erasmus MC. Our department consists of an enthusiastic group of gynaecologists, perinatologists, assistant physicians, medical ultrasound operators, and scientific staff. The focus of the department's research is Embryonic Health & Fetal and Neonatal Care in which we closely collaborate with the Departments of Radiology, Internal Medicine, Pediatrics/Neonatology, Epidemiology, Biostatistics and Clinical Genetics.

Periconception Epidemiology is a new research field linking research of the subdivisions of Reproductive Medicine and of Obstetrics and Fetal Medicine. In 2009 the Rotterdam Periconception Cohort has been set up as a prospective study to elucidate the impact of periconception conditions of expectant parents, exposures and (epi)genetic mechanisms underlying disorders in fertility, embryonic and fetal health, and the consequences for health of parents and children. This cohort is embedded in patient care of the department and collaborations exist with other departments, including the Mother and Child Center (Neonatology, Paediatrics). The department is a forerunner in the valorization of knowledge to reduce perinatal morbidity and mortality (Social Obstetrics). Moreover, it also plays a pioneering role in the digital development of screening, (tele)monitoring and lifestyle (coaching) programs and a life course platform to support health care and to enable Big data collection and advanced analysis to generate new knowledge for further improvement of health from the early life course onwards.

Department of Obstetrics & Gynecology

School/Department:	Department of Obstetrics and Gynaecology, Erasmus MC
Supervisor information: world no 32 Clinical Medicine	Names: Prof. dr. Régine P.M. Steegers-Theunissen / dr. Babette Bais E-mail: r.steegers@erasmusmc.nl / b.bais@erasmusmc.nl Website: https://www.erasmusmc.nl/nl-nl/sophia/patientenzorg/zorgverleners/steegers-theunissen-regine Selected publications: <ul style="list-style-type: none"> • Steegers-Theunissen RP, Verheijden-Paulissen JJ, van Uitert EM, et al. Cohort profile: the Rotterdam periconceptional cohort (Predict Study). <i>Int J Epidemiol</i> 2016;45:374-381. • Van Dijk MR, Koster MPH, Oostingh EC, et al. A Mobile App Lifestyle Intervention to Improve Healthy Nutrition in Women Before and During Early Pregnancy: Single-Center Randomized Controlled Trial. <i>J Med Internet Res</i> 2020; 22 (5): e15773, doi: 10.2196/15773 https://www.jmir.org/2020/5/e15773 • Oostingh EC, Ophuis RH, Koster MPH, et al. Mobile health coaching on nutrition and lifestyle behaviors for subfertile couples using the Smarter Pregnancy Program: model-based cost-effectiveness analysis. <i>JMIR Mhealth Uhealth</i> 2019 vol. 7 iss.10 e13935 1-9 http://mhealth.jmir.org/2019/10/e13935/ • Barker M, Dombrowski SU, Colbourn T, et al. Intervention strategies to improve nutrition and health behaviours before conception. <i>The Lancet</i> 2018, April 16, http://dx.doi.org/10.1016/S0140-6736(18)30313-1
Project Title:	<i>Periconception mental health: development of monitoring and interventions.</i>
Abstract:	<p>In our research group Periconception Epidemiology)we investigate the effects of various maternal and paternal lifestyle factors on embryonic and fetal development and growth, such as nutrition, smoking, alcohol, and folic acid, in the unique periconceptional period, defined as the time window from 14 weeks preceding to 10 weeks after conception. Based on these findings, we aim to develop eHealth interventions, such as www.smarterpregnancy.co.uk (www.slimmerzwanger.nl), targeted at improving lifestyle behaviors. A major part of our research is embedded in the Rotterdam periconception cohort (Predict study), a large ongoing prospective cohort study embedded in patient care with recruitment of women and partner in the periconception period. This study started in 2010 and consist of > 3000 women and pregnancies. Here, <i>we focus on</i>:</p> <ul style="list-style-type: none"> • the determinants of periconceptional health of the couple; • the reproductive performance and pregnancy course and outcome; • the underlying epigenetic profiles to explain associations between periconceptional parental health, reproductive performance and pregnancy course and outcome. <p>Thus far, we have focused on healthy lifestyle behaviors, such as an adequate fruit and vegetable intake. As mental health is an important modifier of lifestyle behavior as well as pregnancy course and outcome, it is our aim to extend our research with this topic and focus in particular on sleep as one of the mental health determinants. The objectives of our project are: 1) to develop tools for improvement of diagnosing, monitoring and treatment of sleep problems before and during pregnancy, and 2) to investigate the impact of periconception maternal sleep problems on (preimplantation)embryonic development and prenatal outcome. For this project we are searching for an ambitious PhD candidate with an interest in the topics: sleep, mental health and pregnancy.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • We are looking for a highly motivated, hardworking student to join our international team. • MD or MSc degree in Epidemiology, Health Sciences, Biostatistics or a related field. • You have good communication skills and are a team player, but can also work independently. • Experience in scientific research is a plus. • Scholarship that will, at least, cover subsistence allowance and an international air plane ticket. • English language requirement: <ul style="list-style-type: none"> ○ <i>English speaking countries & Netherlands</i>: no requirement. • <i>Other countries</i>: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs).

Department of Obstetrics & Gynecology

School/Department:	Department of Obstetrics and Gynaecology, Erasmus MC
Supervisor information: world no 32 Clinical Medicine	Dr. Ir. Lenie van Rossem, PhD, l.vanrossem@erasmusmc.nl , Prof. Dr. R.P.M. Steegers-Theunissen r.steegers@erasmusmc.nl Selected publications: <ul style="list-style-type: none"> • Steegers-Theunissen et al, 2016: Int J Epidemiol 2016 DOI: 10.1093/ije/dyv147 ; • Parisi et al, 2018 Eur J Clin Nutr 2018 Dec;72(12):1655-1662 DOI: 10.1038/s41430-018-0161-Z; • van Rossem et al, Pediatrics November 2015, 136 (5) e1294-e1301 DOI: 10.1542/peds.2015-0874
Project Title:	<i>Periconceptional parental food intake: Intake of processed food and placenta-related outcome in mother, embryo and fetus</i>
Abstract:	Periconceptional parental health is a determinant of fertility and pregnancy course and outcome of mother and child. Moreover, in the first trimester of pregnancy organogenesis of the embryo takes place as well as the development of the placenta, which are essential for fetal development in the second and third trimester of pregnancy. Several modifiable factors are involved in embryonic growth. Low fruit and vegetable intake, and a western diet are associated with a smaller embryo, whereas a fish and olive rich diet, and an energy-rich diet are associated with a larger embryo. The current project is focused on the elucidation of the impact of the periconceptional intake of processed foods on embryonic and fetal development. This project will be embedded in the Rotterdam Periconceptional Cohort (Predict) study, which is an ongoing cohort of tertiary care patients who are followed from the periconception period up until one year after birth. In this cohort, we will use the data of a food frequency questionnaire (FFQ) filled out by patients and repeated measurements of first trimester embryonic growth and morphology, and second and third trimester fetal growth parameters.
Requirements of candidate:	<ul style="list-style-type: none"> • We are looking for a highly motivated PhD student who has received excellent scientific training in the areas of nutrition or epidemiology or medicine, who also has basic training or interest in the early life course / obstetrics 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, facilities, and infrastructure. 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 l.vanrossem@erasmusmc.nl.

Department of Obstetrics & Gynecology

School/Department:	Department of Obstetrics and Gynaecology, Erasmus MC
Supervisor information: world no 32 Clinical Medicine	Dr. M. Rousian (m.rousian@erasmusmc.nl), Prof. Dr. R.P.M. Steegers-Theunissen (r.steegers@erasmusmc.nl), Selected publications: <ol style="list-style-type: none"> 1. Steegers-Theunissen RP, Verheijden-Paulissen JJ, van Uitert EM, et al. Cohort profile: the Rotterdam periconceptional cohort (Predict Study). <i>Int J Epidemiol</i> 2016;45:374-381. 2. Rousian M, Koster MPH, Mulders AGMGJ, Koning AHJ, Steegers-Theunissen RPM, Steegers EAP. Virtual reality imaging techniques in the study of embryonic and early placental health. <i>Placenta</i> 2018;64:Suppl 1:S29-S35. 3. Steegers-Theunissen RPM, Twigt J, Pestinger V, Sinclair KD. The periconceptional period, reproduction and long-term health of offspring: the importance of one-carbon metabolism. <i>Hum Reprod Update</i> 2013;19:640-655. 4. Rousian M, Koning AHJ, Van der Spek PJ, Steegers EAP, Exalto N. Virtual reality for embryonic measurements requiring depth perception. <i>Fertil Steril</i> 2011;95:773-774.
Project Title:	<i>Preimplantation embryo quality: Periconception conditions and the development of the inner and outer cell mass of the preimplantation embryo.</i>
Abstract:	<p>Over more than three decades, extensive translational research identified strong associations between fetal growth and development and fetal programming of health and diseases in later life (Developmental Origins of Health and Disease). More recently, the focus of this research shifted to the periconception period, defined as the time window of 14 weeks before up to 10 weeks after conception, thereby covering the vulnerable processes of gametogenesis, embryogenesis and initiation of placentation. During this period, numerous molecular and biological processes are involved, such as epigenetic modification (e.g. genome wide methylation), but also unique transcriptional and translational activities. Therefore, the periconceptional period is a critical time window for exposures potentially resulting in large health effects on the lifelong postnatal phenotype. The fact that most birth cohorts start enrolment and data collection in the second half of pregnancy or at birth, thereby ignoring the periconceptional window, has also resulted in the initiation of our unique Rotterdam Periconceptional Cohort (Predict study). In this cohort we have available unique, serial ultrasound measurements from the early first trimester onwards. Morphologic parameters as well as early placentation is being studied using innovative virtual reality imaging techniques. The Predict study is designed as a tertiary hospital-based, prospective open birth cohort study, with a focus on three research areas: i. Determinants of maternal and paternal periconceptional health; ii. Reproductive performance, pregnancy course and outcome iii. Underlying molecular biological mechanisms, such as 1C-metabolism and epigenetics, but also cardiovascular and inflammatory mechanisms. The <u>aim</u> of the current project is to investigate the development of the pre-implantation embryo and the associations with markers of prenatal fetal growth and development. We will use the Embryoscope and virtual reality techniques as state-of-the-art imaging modalities to assess the development of the inner en outer cell mass of day 5 pre-implantation embryos. These measurements will be used in advanced analysis (deep learning and machine learning) to study associations with pregnancy chance and outcome.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • We are looking for a highly motivated and talented student to join and enrich our international team. • Furthermore: a master degree or MD, a fair scholarship that covers subsistence allowance and international air plane ticket, good communication skills • 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).

Department of Obstetrics & Gynecology

School/Department:	Department of Obstetrics and Gynaecology, Erasmus MC
Supervisor information: world no 32 Clinical Medicine	<p>Dr. S. Schoenmakers (s.schoenmakers@erasmusmc.nl) Prof. Dr. R. P.M. Steegers-Theunissen (r.steegers@erasmusmc.nl)</p> <p>Selected Publications:</p> <ol style="list-style-type: none"> 5. Faas M. Liu Y et al. Microbiota induced changes in the immune response in the pregnant mice. Front Immunol. 2020 Jan 9;10:2976. doi: 10.3389/fimmu.2019.02976 . eCollection 2019 . 6. Schoenmakers S. Steegers-Theunissen, R.P.M., Faas MM. The matter of reproductive microbiome. Obstetric Medicine. 2018. https://doi.org/10.1177/1753495X18775899 . 7. Steegers-Theunissen RP, Verheijden-Paulissen JJ, van Uitert EM, et al. Cohort profile: the Rotterdam periconceptional cohort (Predict Study). Int J Epidemiol 2016;45:374-381. 8. Steegers-Theunissen RPM, Twigt J, Pestinger V, Sinclair KD. The periconceptional period, reproduction and long-term health of offspring: the importance of one-carbon metabolism. Hum Reprod Update 2013;19:640-655.
Project Title:	<i>Obesity during pregnancy: the mechanistic role of the gut microbiome in maternal pregnancy course and fetal outcome</i>
Abstract:	<p>In the Netherlands, obesity affects more than 30% of women in reproductive age. In 30-50% of their pregnancies, complications occur with subsequent long-term health consequences for mothers and children. Therefore, better patient care of maternal obesity (MOB) before and during pregnancy will improve health and reduce the burden of related health care and societal costs.</p> <p>The microbiome, including the virome, is an important environmental factor and modifier in health and disease. A healthy microbial profile (symbiosis) plays a significant role in maintaining immune responses and a balanced nutrient dependent one-carbon metabolism. As obesity, independent of pregnancy, is associated with a deranged microbial profile, it is our <u>aim</u> to get more insight into the role of the microbiome before and during pregnancy in obese women on immune responses and one-carbon metabolism. The objectives of the current project are to investigate in experimental obese mice and obese women the effects of pre- and probiotic treatment on the gut microbiome profile, and maternal, fetal and placental immune responses in relation to the one-carbon metabolism. The project is a close collaboration between the Erasmus MC and UMC Groningen, The Netherlands and will exploit new understandings to promote efficient disease prevention and potential personalized therapeutic interventions to overcome adverse disease pathways, before, during and after pregnancy.</p> <p>The applicant will work in our multidisciplinary project on the investigation of obese women and the impact of the microbiome in the preconceptional period, during pregnancy and at birth on underlying pathways of embryonic, fetal and newborn health. This study will be embedded in our ongoing Rotterdam Periconceptional Cohort (Predict study). Features of embryonic, fetal and newborn health will be investigated longitudinally using state-of-the-art imaging techniques like three-dimensional ultrasound and virtual reality techniques, and microbiome dynamics.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • We are looking for a highly motivated and talented student to join and enrich our international team. • The candidate preferably has a Master in molecular biology, microbiology or MD, a fair scholarship that covers subsistence allowance and international air plane ticket, good communication skills • 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)).

Department of Oral and Maxillofacial Surgery

School/Department:	Department of oral and maxillofacial surgery, special dental care and orthodontics, Erasmus MC
Supervisor information: world no 13 Surgery	<p>Prof. Eppo Wolvius (e.wolvius@erasmusmc.nl), Head of the Department Prof. Fernando Rivadeneira (f.rivadeneira@erasmusmc.nl), Associate Professor Dr. Lea Kragt (l.kragt@erasmusmc.nl), Post-doctoral Scholar</p> <ul style="list-style-type: none"> • Website: www.erasmusmc.nl/en/sophia/research/departments-and-centers/oral-and-maxillofacial-surgery • 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:	<p>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 disruptors. We offer an interesting and challenging position in an ambitious yet friendly scientific and clinical research environment.</p> <p>PhD project:</p> <p>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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: <i>English speaking countries & Netherlands:</i> no requirement <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Department of Oral and Maxillofacial Surgery

School/Department:	Department of Maxillofacial Surgery, Special Dental Care & Orthodontics Erasmus MC
<p>Supervisor information:</p> <p>world no 13 Surgery</p>	<ul style="list-style-type: none"> • Prof dr Eppo Wolvius – Head of Department Prof dr. Fernando Rivadeneira • Email: e.wolvius@erasmusmc.nl f.rivadeneira@erasmusmc.nl • Website: https://www.ipc.nl/specialties/oral-maxillofacial-surgery-special-dental-care/ • Grants: <ul style="list-style-type: none"> - 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. • Most important publications: <ol style="list-style-type: none"> 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." <i>Br J Sports Med</i> 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." <i>Br J Sports Med</i> 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. Dharmo, 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." <i>J Dent Res</i> 97(5): 515-522. 4. Vucic, S., T. I. M. Korevaar, B. Dharmo, V. W. V. Jaddoe, R. P. Peeters, E. B. Wolvius and E. M. Ongkosuwito (2017). "Thyroid Function during Early Life and Dental Development." <i>J Dent Res</i> 96(9): 1020-1026. 5. Aslanaj, 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." <i>J Dent Res</i> 96(13): 1482-1489.
<p>Project Title:</p>	<p>Three-dimensional (3D) Facial Shape Analysis</p>
<p>Abstract:</p>	<p>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.</p> <p>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.</p>
<p>Requirements of candidate:</p>	<p>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.</p> <ul style="list-style-type: none"> • 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)

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:

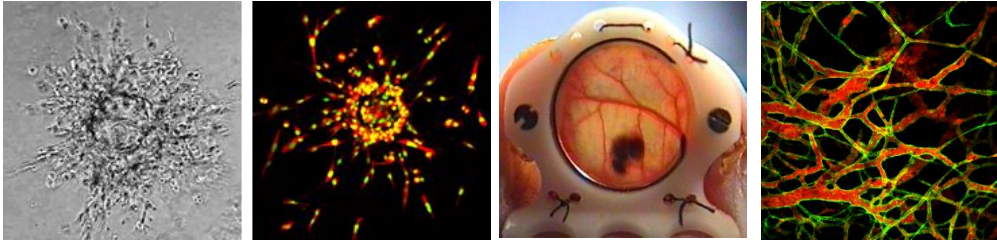
Collaborative Grants (NWO, Horizon2020, MSCA, other):

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.

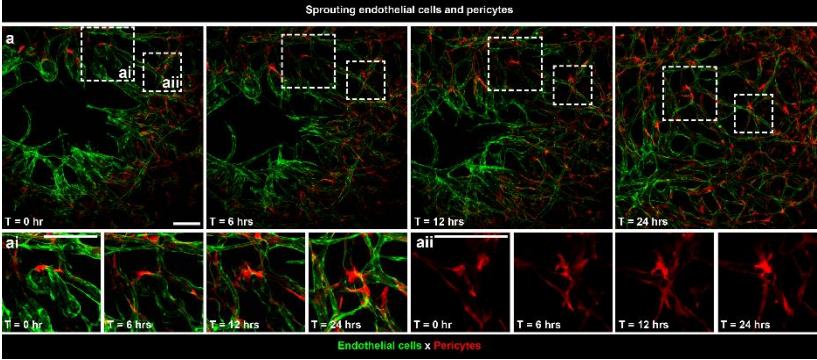
Department of Pathology

School/Department:	Department of Pathology Erasmus MC
Supervisor information: world no 32 Oncology	<ul style="list-style-type: none"> • <i>Prof dr Adriaan B. Houtsmuller</i> <i>Assoc. Prof dr Timo L.M. ten Hagen</i> • <i>Dr. Mohamadreza Amin</i> • 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: <ol style="list-style-type: none"> 1-Seynhaeve, A.L.B.; Amin, M.; Haemmerich, D.; van Rhoon, G.C.; Ten Hagen, T.L.M. Hyperthermia and smart drug delivery systems for solid tumor therapy. <i>Adv Drug Deliv Rev</i> 2020. 2-Amin, M.; Bagheri, M.; Mansourian, M.; Jaafari, M.R.; Ten Hagen, T.L. Regulation of in vivo behavior of tat-modified liposome by associated protein corona and avidity to tumor cells. <i>Int J Nanomedicine</i> 2018, 13, 7441-7455. 3-Seynhaeve, A.L.; Dicheva, B.M.; Hoving, S.; Koning, G.A.; Ten Hagen, T.L. Intact doxil is taken up intracellularly and released doxorubicin sequesters in the lysosome: Evaluated by in vitro/in vivo live cell imaging. <i>J Control Release</i> 2013, 172, 330-340. 4-Li, L.; Ten Hagen, T.L.; Bolkestein, M.; Gasselhuber, A.; Yatvin, J.; van Rhoon, G.C.; Eggermont, A.M.; Haemmerich, D.; Koning, G.A. Improved intratumoral nanoparticle extravasation and penetration by mild hyperthermia. <i>J Control Release</i> 2013, 167, 130-137. 5-Lu, T.; Lokerse, W.J.M.; Seynhaeve, A.L.B.; Koning, G.A.; Ten Hagen, T.L.M. Formulation and optimization of idarubicin thermosensitive liposomes provides ultrafast triggered release at mild hyperthermia and improves tumor response. <i>J Control Release</i> 2015, 220, 425-437 6-Lokerse, W.J.; Kneepkens, E.C.; ten Hagen, T.L.; Eggermont, A.M.; Grull, H.; Koning, G.A. In depth study on thermosensitive liposomes: Optimizing formulations for tumor specific therapy and in vitro to in vivo relations. <i>Biomaterials</i> 2016, 82, 138-150. 7-Li, L.; ten Hagen, T.L.; Hossann, M.; Suss, R.; van Rhoon, G.C.; Eggermont, A.M.; Haemmerich, D.; Koning, G.A. Mild hyperthermia triggered doxorubicin release from optimized stealth thermosensitive liposomes improves intratumoral drug delivery and efficacy. <i>J Control Release</i> 2013, 168, 142-150. 8-Li, L.; ten Hagen, T.L.; Schipper, D.; Wijnberg, T.M.; van Rhoon, G.C.; Eggermont, A.M.; Lindner, L.H.; Koning, G.A. Triggered content release from optimized stealth thermosensitive liposomes using mild hyperthermia. <i>J Control Release</i> 2010, 143, 274-279.
Project Title:	Evaluation of immune stimulatory effect of heat and chemotherapy in hyperthermia triggered drug delivery
Abstract:	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> 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 32 Oncology	<ul style="list-style-type: none"> 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: <ol style="list-style-type: none"> ...ten Hagen TLM, Smits R, Bruno MJ, Fuhler GM, Peppelenbosch MP. Carcinogenesis. 2019 Feb 20 ...ten Hagen TLM. Sci Rep. 2018 Jun 25;8(1):9596. ...ten Hagen TLM, ..., Peppelenbosch MP, Fuhler GM. Oncotarget. 2016 8;7(45):73525-40. ...ten Hagen TLM, Fuhler GM. Oncotarget. 2016 Apr 19;7(16):21922-38. ...ten Hagen TLM Nat Protoc. 2015 Jun;10(6):904-15. ...ten Hagen TL. Eur J Cancer. 2016 Jan;53:135-43. ...Houtsmuller AB. Sci Rep. 2019 Jul 18;9(1):10460. ...Houtsmuller AB, van den Dries K, Wiseman PW, Cambi A. Nat Commun. 2016 7:13127. ...Houtsmuller A, Huveneers S, de Rooij J. Sci Rep. 2015 5:17225. ...Houtsmuller AB, van de Water B. J Cell Sci. 2012 125(Pt 19):4498-506.
Project Title:	<i>Understanding local and systemic progression of cancer with respect to tumor – stroma interaction and metastasis development.</i>
Abstract:	<p>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, spheroid cultures, clonal expansion, and vascular formation. Below 3D growth and dispersion in vitro (left two images) and intravital window with image of green vessels and red blood marker (right two images)</p> <div data-bbox="496 1402 1487 1640">  </div>
Requirements of candidate:	<ul style="list-style-type: none"> 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: <i>English speaking countries & Netherlands: no requirement</i> <i>Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)</i>

Department of Pathology and Department of Medical Oncology

School/Department:	Department of Pathology Erasmus MC
<p>Supervisor information:</p> <p>world no 32 Oncology</p>	<p>• Prof dr Adriaan B. Houtsmuller Assoc. Prof dr Timo L.M. ten Hagen Dr. Ann L.B. Seynhaeve</p> <p>• Email: a.houtsmuller@erasmusmc.nl t.l.m.tenhagen@erasmusmc.nl a.seynhaeve@erasmusmc.nl</p> <p>• Website: www.erasmusmc.nl , www.molmed.nl</p> <p>• Grants: Mrace</p> <p>• Most important publications: 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</p>
<p>Project Title:</p>	<p><i>Investigation the association between endothelial cells and mural cells in angiogenesis</i></p>
<p>Abstract:</p>	<p>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.</p>  <p>Figure: High resolution 4D intravital imaging of sprouting endothelial cells and pericytes. (a) Shown are 70 μm subsequential maximal projections of endothelial cells (eNOS tagGFP 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.</p>
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Department of Pathology and Department of Medical Oncology

School/Department:	Department of Pathology Erasmus MC
<p>Supervisor information:</p> <p>world no 32 Oncology</p>	<ul style="list-style-type: none"> Prof dr Adriaan B. Houtsmuller Assoc. Prof dr Timo L.M. ten Hagen Dr. Ann L.B. Seynhaeve <ul style="list-style-type: none"> Email: a.houtsmuller@erasmusmc.nl t.l.m.tenhagen@erasmusmc.nl a.seynhaeve@erasmusmc.nl Website: www.erasmusmc.nl, www.molmed.nl Grants: Mrace Most important publications regarding this program: <ol style="list-style-type: none"> 1) Biol Proce 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.
<p>Project Title:</p>	<p>Investigating synchronization and impact of pericyte interacting with endothelial cells during angiogenesis.</p>
<p>Abstract:</p>	<p>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.</p> <div data-bbox="1127 856 1544 1457"> <p>Schematic overview</p> <p>The diagram illustrates the process of angiogenesis. It shows a central green structure representing the endothelial tube, with red structures representing pericytes. The tube has a 'tip cell' at the leading edge and 'stalk cells' behind it. Pericytes are shown moving along the tube. Labels indicate 'Endothelial phalanx cell', 'Pericytes', 'Signaling Pathway???' (in two locations), 'Endothelial stalk cell', 'Endothelial tip cell', 'Pericyte front???' (indicated by a dashed line), and 'Endothelial front' (indicated by a solid line).</p> </div> <p><i>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.</i></p>
<p>Requirements of candidate:</p>	<ul style="list-style-type: none"> 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: <i>English speaking countries & Netherlands:</i> no requirement <i>Other countries:</i> 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. 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

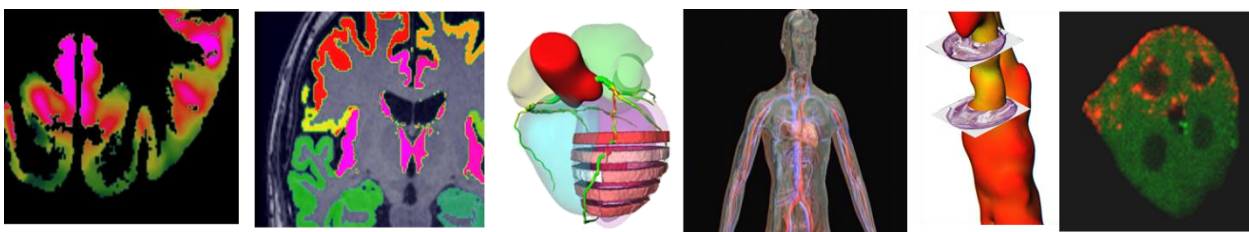
PPP & (Semi-)Industrial Funding: 31

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, Erasmus MC ADvanced Musculoskeletal Imaging Research Erasmus MC (ADMIRE)
Supervisor information: world no 32 Clinical Medicine, world no 36 Radiology, Nuclear Medicine, Medical Imaging	<ul style="list-style-type: none"> • Associate Professor Edwin H.G. Oei, MD, PhD • Email: e.oei@erasmusmc.nl • Website: www.admire-group.com • Personal Grants: <ul style="list-style-type: none"> - Dutch Research Council (NWO) - GE Healthcare / National Basketball Association (NBA) Patellar Tendinopathy CFP 2016 - Radiological Society of North America (RSNA) 2014 • Most important publications: <ul style="list-style-type: none"> 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):5664-5672 Verschuuren 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:	<p>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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands:</i> no requirement ○ <i>Other countries:</i> IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs)

Department of Radiology & Nuclear Medicine

School/Department:	Biomedical Imaging Group Rotterdam, Erasmus MC
Supervisor information: world no 36 Radiology, Nuclear Medicine, Medical Imaging	<ul style="list-style-type: none"> • Assistant Professor Dr. Esther Bron • Email: e.bron@erasmusmc.nl • Website: www.bigr.nl, https://estherbron.com/, https://scholar.google.nl/citations?user=Mq7Q67sAAAAJ&hl=nl • Selected publications: <ul style="list-style-type: none"> - Venkatraghavan et al. Disease Progression Timeline Estimation for Alzheimer's Disease using Discriminative Event Based Modeling, <i>NeuroImage</i>, 2019. https://arxiv.org/abs/1808.03604 - Li et al. A hybrid deep learning framework for integrated segmentation and registration: evaluation on longitudinal white matter tract changes, <i>International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)</i>, 2019. https://arxiv.org/abs/1908.10221 - Bron et al., Multiparametric computer-aided differential diagnosis of Alzheimer's disease and frontotemporal dementia using structural and advanced MRI, <i>European Radiology</i>, 2017 - Bron et al. Standardized evaluation of algorithms for computer-aided diagnosis of dementia based on structural MRI: the CADDementia challenge. <i>NeuroImage</i>, 2015. https://caddementia.grand-challenge.org/
Project Title:	Neuroimage Analysis and Machine Learning
Abstract:	<p>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:</p> <p><u>Predictive modeling of Alzheimer's disease</u> – In our research, we develop innovative diagnostic and prediction models using spatiotemporal modeling, 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 practices 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 making use of novel machine learning strategies.</p> <p><u>The baby brain pipeline: MRI analysis in craniosynostosis</u> – 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, behavioural 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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:	Biomedical Imaging Group Rotterdam, Erasmus MC
Supervisor information: world no 36 Radiology, Nuclear Medicine, Medical Imaging	<ul style="list-style-type: none"> • Associate Professor Dr. ir. Stefan Klein • Email: s.klein@erasmusmc.nl • Website: www.bigr.nl, www.bigr.nl/people/StefanKlein, https://scholar.google.nl/citations?user=iaAFKOMAAAAJ • Selected publications: <ul style="list-style-type: none"> - Venkatraghavan et al. Disease Progression Timeline Estimation for Alzheimer's Disease using Discriminative Event Based Modeling, <i>NeuroImage</i>, 2019. https://arxiv.org/abs/1808.03604 - Sun, Niessen, Klein. Randomly perturbed B-splines for nonrigid image registration. <i>IEEE Transactions on Pattern Analysis and Machine Intelligence</i>, 2017. <i>CSC funded</i> - Huizinga et al. PCA-based groupwise image registration for quantitative MRI. <i>Medical Image Analysis</i>, 2016. - Bron et al. Standardized evaluation of algorithms for computer-aided diagnosis of dementia based on structural MRI: the CADDementia challenge. <i>NeuroImage</i>, 2015. https://caddementia.grand-challenge.org/ - Klein, Staring et al. Elastix: a toolbox for intensity-based medical image registration. <i>IEEE Transactions on Medical Imaging</i>, 2010. (>2000x cited, software used by researchers and companies worldwide, www.elastix.isi.uu.nl)
Project Title:	Image Analysis and Machine Learning
Abstract:	<p>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:</p> <p><u>Radiomics for precision cancer medicine</u> - 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.</p> <p><u>Disease progression modelling of neurodegenerative diseases</u> – 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 innovative computer-aided diagnosis methods and data-driven disease progression models, using spatiotemporal analysis of thousands of brain MRI scans.</p> <p><u>Image analysis and machine learning for osteoarthritis</u> – 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.</p>
Requirements of candidate:	<ul style="list-style-type: none"> ○ 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: ○ <i>English speaking countries & Netherlands</i>: no requirement ○ <i>Other countries</i>: 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
<p>Supervisor information:</p> <p>world no 36 Radiology, Nuclear Medicine, Medical Imaging</p>	<ul style="list-style-type: none"> • <i>Prof dr Wiro Niessen</i> • Email: w.niessen@erasmusmc.nl • Website: www.bigr.nl • 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., Roshchupkin, G.V., Adams, H.H., Niessen WJ., Sudha Seshadri ., 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, Roshchupkin GV, Adams HHH, Schmidt H, Hofer E, Saba Y, Schmidt R, Hofman A, Amin N, van Duijn CM, Vernooij MW, Ikram MA, Niessen WJ. Gray matter heritability in family-based and population-based studies using voxel-based morphometry. Human Brain Mapping. 2017;38(5):2408-23. • Wang, J., Knol, M.J., Tiulpin, A., Dubost, F., de Bruijne, M., Vernooij, M.W., Adams, H.H., Ikram, M.A., Niessen, W.J. and Roshchupkin, G.V., 2019. 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, Adams HHH, Jahanshad N, ... , Niessen WJ, ... , Thompson PM, Ikram MA. Novel genetic loci associated with hippocampal volume. Nature Communications. 2017;8. • Roshchupkin GV, Gutman BA, Vernooij MW, Jahanshad N, Martin NG, Hofman A, McMahon KL, Van Der Lee SJ, Van Duijn CM, De Zubicaray GI, Uitterlinden AG, Wright MJ, Niessen WJ, Thompson PM, Ikram MA, Adams HHH. Heritability of the shape of subcortical brain structures in the general population. Nature Communications. 2016;7. • Santos EMM, Yoo AJ, Beenen LF, Berkhemer OA, den Blanken MD, Wismans C, Niessen WJ, Majoie CB, Marquering HA. Observer variability of absolute and relative thrombus density measurements in patients with acute ischemic stroke. Neuroradiology. 2016;58(2):133-9. • Roshchupkin GV, Adams HHH, Vernooij MW, Hofman A, Van Duijn CM, Ikram MA, Niessen WJ. HASE: Framework for efficient high-dimensional association analyses. Scientific Reports. 2016;6. • Roshchupkin GV, Adams HH, van der Lee SJ, Vernooij MW, van Duijn CM, Uitterlinden AG, van der Lugt A, Hofman A, Niessen WJ, Ikram MA. 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, Poot DHJ, Guyader JM, Klaassen R, Coolen BF, Van Kranenburg M, Van Geuns RJM, Uitterdijk A, Polfliet M, Vandemeulebroucke J, Leemans A, Niessen WJ, Klein S. PCA-based groupwise image registration for quantitative MRI. Medical Image Analysis. 2016;29:65-78.
Project Title:	Federated Machine Learning in application for large-scale omics studies
Abstract	<p>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.</p> <p>Federated Learning (FD) is a distributed machine learning approach which enables model training on a large corpus of decentralized data.</p> <p>The main goal of this project is to develop new FD methods for multi-center genetics analysis, 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.</p>
Requirements of candidate:	<p>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.</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - English speaking countries & Netherlands: no requirement - Other countries: IELTS 6.0

Department of Surgery

School/Department:	Erasmus MC, Department of Surgery
Supervisor information: world no 13 Surgery	<p>Prof. dr. Luc van der Laan & dr. Monique Verstegen l.vanderlaan@erasmusmc.nl / m.verstegen@erasmusmc.nl</p> <p>Selected publications:</p> <ul style="list-style-type: none"> - <i>Materials Science & Engineering</i>, 2020, Willemse, van der Laan & Verstegen, et al - <i>Transplantation</i>, 2020, Verstegen & van der Laan, et al - <i>Cancers</i>, 2019, van Tienderen, van der Laan & Verstegen, et al. - <i>Nature Medicine</i>, 2017, Broutier, Verstegen, van der Laan & Huch, et al. - <i>Nature</i>, 2016, Blokzijl, Verstegen, van der Laan & van Boxtel et al.
Project Title:	Exploring the regenerative potential of liver organoids in liver transplantation
Abstract:	<p>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 <i>in vitro</i> (Huch et al, Cell, 2015) and used as model for stem cell biology and liver diseases such as Metabolic Associated Fatty Liver Disease (MAFLD) or primary liver cancer.</p> <p>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 (decellularisation techniques and extracellular matrix analysis).</p> <p>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.</p> <p>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).</p>
Requirements of candidate:	<ul style="list-style-type: none"> • 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 <i>min 6.0</i>), TOEFL 100 (<i>min 20 for all subs</i>). • 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.

REASONS TO CHOOSE FOR ERASMUS MC

You are most welcome 非常欢迎大家踊跃申请伊拉斯姆斯大学医学中心的博士职位，一旦申请成功，大家并不需要担心申请签证的问题。希望在未来的职业生涯中能与我們合作，快来到我们这个大家庭吧。当然，根据“英孚英语水平指数”显示，[荷兰是全世界 100 多个母语非英语国家中](#)，英语水平最高的国家，然而在荷兰各大城市排名中，鹿特丹以 71.68 分位居第一。所以在荷兰的国际留学生完全不需要担心必须学习荷兰语的问题。

Your next step in your career: 完美的职业生涯：完成伊拉斯姆斯大学医学中心的博士学位意味着你需要发表 4 篇经同行评审的国际性文章（SCI）。文章对于大多数生物医学工作者的职业生涯来说都是至关重要的，然而在大多数高校对于博士毕业的要求是发表 1 篇左右的 SCI 即可，所以在伊拉斯姆斯大学医学院顺利拿到博士学位将会使你在未来的道路上更具有优势。

Your training & education: 师资配备：我们具有非常棒的师资配比。为约 1250 名博士学生配备了大约 1500 位科研工作者，为约 1000 位住院医师配备了约 750 位医学专家。

Your social life: 便利的生活：在我们医学中心拥有超过 30% 的国际博士学生，并在伊拉斯姆斯大学医学中心，伊拉斯姆斯大学及国际办公室都有设有博士生组织部。在 2016 年《孤独星球》中城市排名第 5 的鹿特丹，是欧洲最大的海港城，这意味着不管是驱车前往阿姆斯特丹或安特卫普，乘火车到布鲁塞尔或巴黎（2 小时），坐飞机到伦敦或者柏林（1.5 小时）都非常的便捷。

Our organization 我们的机构：伊拉斯姆斯大学医学中心是欧洲 10 个最大的医学中心之一，并且是欧盟委员会资助的临床前，临床和健康科学十大出版物机构之一。相比其他高校而言，我们与中国同行的科研合作非常好且质量高（通过下方表格中对于文章的引用量及发表量可以看出）。并且，我们在 [Nature Index for Biomedical Sciences 2019](#) 的世界排名中第 30 名（healthcare institutions）。

年轻的中国科学家们：希望你们能成为我们与中国合作的下一代。希望与你同行。

US News Ranking 2020	World rank
Surgery	13
Gastroenterology & Hepatology	14
Public, Environmental & Occup Health	21
Cardiac & Cardiovascular Systems	23
Infectious Diseases	24
Endocrinology & Metabolism	29
Immunology	31
Clinical Medicine	32
Oncology	32
Radiology, Nuclear Med & Med Imaging	36
Pharmacology & Toxicology	39
Neuroscience & Behavior	48
Cell Biology	67

PR Chinese co-publications: domains of preclinical, clinical & Health Sciences 2015-2019		
Source: InCites 28 SEP 2020		
Foreign institute w PR China	co-publ	cit/publ
Harvard University	5,072	23.75
Johns Hopkins University	2,408	29.57
UC Los Angeles	1,594	21.98
Yale University	1,587	30.10
Stanford University	1,393	35.07
Duke University	1,384	22.80
University of Pennsylvania	1,381	28.48
Columbia University	981	45.44
University of Oxford	944	61.34
Cornell University	826	24.28
Erasmus MC	719	64.07
University of Chicago	632	15.33

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