

# Annual Report 2018

LIFE COURSE EPIDEMIOLOGY OF CHRONIC COMMON DISEASES  
[WWW.EPIDEMIOLOGYGRONINGEN.NL](http://WWW.EPIDEMIOLOGYGRONINGEN.NL)



**umcg**

# Preface

Dear colleagues and research friends,

It is my pleasure to present the 2018 Annual Report of the Department of Epidemiology, University Medical Center Groningen. It gives an overview of our research output, teaching activities and research support activities last year.

In 2018, our enthusiastic and highly motivated staff, postdocs, PhD- and Master's students jointly worked on high quality research projects, teaching at BSc, MD, MSc and PhD levels, and on research support for other university and UMCG researchers.

A common theme, as always, was to contribute to building the future of healthy aging, by studying the patterns, causes and effects of people's health and common chronic disease conditions in the general populations as well as clinical populations.

You can read related and extra information by clicking on links in the report, thereby gaining an interactive experience as you scroll through it. I hope you will all enjoy reading our 2018 annual report and find connections between your own fields and our work.

Please feel free to contact us for further information or to discuss possible collaborations and/or new initiatives with our department in research and teaching.

Best wishes,

Prof. Marike Boezen  
Head of department

September 12, 2019

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# Summary and highlights of 2018

In 2018 our research led to 300 peer-reviewed publications, representing our high scientific and societal qualities. In addition, we had over 53 PhD students working in the Department of Epidemiology and saw 12 of them successfully defend their PhD thesis.

We were part of a pilot for the UMCG, in which departments were asked to write a strategic plan for their activities. We therefore spent the autumn retreat on evaluating our research strengths and discussing future developments in our research fields. This led to us formulating our goals for the coming five years.

One of these goals was to explicitly incorporate co-morbidity and multi-morbidities as research themes into our current and future projects. This goal fits perfectly into the UMCG's broader perspective on health aging (that is the absence of co-morbidity or multiple morbidities) and within the department we have wide-ranging epidemiological expertise on all the common chronic diseases and their risks factors.

We also conducted an employees' satisfaction survey, among the junior and senior staff members. Both groups were very positive about working in the department, the possibilities they have to improve and develop themselves, the broad support for these possibilities, and the open, collegial and friendly atmosphere. We will certainly strive to maintain these positive aspects in the future.

The Research Data Support (RDS) unit worked on more than 75 concurrent projects, in which the scope and content of the services they provided varied widely. However, during 2018, the UMCG started a reorganization so that all the research-related data support groups, including the RDS, could be concentrated under the central Information Management (IM) organization. RDS will keep its focus on the support of research, but now falls under the domain IM Research. This meant we officially had to

say goodbye to 17 department members on January 1, 2019. We wish them all the best in their new working environment in the UMCG.

The department's many teaching activities focus on scientific training in the methodology of medical research, including medical statistics. The department is involved in nearly all of the UMCG's teaching programs.

Please visit our website [www.epidemiology Groningen.nl](http://www.epidemiology Groningen.nl) for more information on our staff and their projects.

# Research focus

The Department of Epidemiology's mission is to build a future with Healthy Aging by conducting research, teaching and providing research support. Research is the department's leading activity. Our goal is to study the patterns, causes and effects of health and disease conditions in both the general population and in clinical populations. Consistently over the past ten years, the overall focus of the department has been on Life Course Epidemiology, which lies at the center of Healthy Aging, a main theme of both the UMCG and the University of Groningen.

Life Course Epidemiology can be defined as the study of the long-term effects of exposures during gestation, childhood, adolescence, young adulthood and later adult life on an individual's risk of chronic disease. In epidemiological practice, this means longitudinal research is required with follow-up over many years. The department has long experience with studies of both population-based cohorts and of various patient/clinical cohorts.

The department maintains a strong profile as a center of expertise on the methodology of cohort studies, including biobanking and Big Data studies. This is evident in the department's strong involvement in all the UMCG's major cohort studies. We have both the research expertise (methodological and disease-specific) and the research tools to facilitate and strengthen all the epidemiological, clinical and biobanking research performed in the UMCG. Moreover, we have the willingness and enthusiasm to use these skills and to teach them to others.

The Genetic epidemiology, Medical statistics & decision-making, and Patient-centered HTA units play a key role in conducting research studies and supporting researchers in the UMCG. The disease-oriented units for Chronic airway diseases, Lifestyle medicine in obesity & diabetes, and Cancer epidemiology play a key role in managing specific cohorts (e.g. Vlagtwedde-Vlaardingen, Gecko Drenthe, OncoLifeS; see the section on Cohorts, page 8).

All our staff members and members of the Research Data Support Unit have supportive roles in methodological advice and data support to nearly all the UMCG's clinical and pre-clinical departments.

We train future senior researchers by providing a large number of postgraduate medical training programs and PhD training programs. We also train future senior epidemiologists in our epidemiology specialist training program.

Overall, the Department of Epidemiology is a major driving force in initiating and conducting life course research, and is instrumental to the clinical research within the UMCG's main theme of Healthy Aging.

# Cohorts

The Department of Epidemiology provides data management and methodological support and is scientifically involved in all major cohort studies of the UMCG:

**Lifelines** investigates universal risk factors and their modifiers for multifactorial diseases. Lifelines is a prospective population-based study among more than 167,000 inhabitants from the northern provinces of the Netherlands, using a three-generation family design. [www.lifelines.nl](http://www.lifelines.nl)

**The Parelsnoer Institute (PSI)** is a collaborative study from the eight University Medical Centers. It comprises thirteen disease-based cohorts (including biobanks) of patients in the Netherlands. [www.parelsnoer.org](http://www.parelsnoer.org)

The **PREVEND** study observes the natural course of microalbuminuria and cardiovascular diseases in over 8,500 healthy adults. The goal is to monitor this cohort for the long-term development of cardiac-, renal- and peripheral vascular end-stage disease.

[https://www.umcg.nl/EN/Research/Researchers/  
Facilities/biobanks/biobanks/prevend/Paginas/default.aspx](https://www.umcg.nl/EN/Research/Researchers/Facilities/biobanks/biobanks/prevend/Paginas/default.aspx)

The follow-up of the PREVEND participants is organized by Lifelines.

The **Vlagtwedde-Vlaardingen cohort study** is an extensive longitudinal population based study, which started in 1965. It examines the course of chronic pulmonary diseases in almost 8,500 people.

<https://www.ncbi.nlm.nih.gov/pubmed/15879414>

<https://www.ncbi.nlm.nih.gov/pubmed/11073020>

The **GECKO** birth cohort study is following almost 3,000 Dutch children to study the development of body weight and fat distribution and the influence of mother and child factors. [www.geckodrenthe.umcg.nl](http://www.geckodrenthe.umcg.nl)

**OncoLifeS**. All patients with a newly diagnosed cancer are invited to participate in OncoLifeS. The main aim of this study is to evaluate the short and long term outcome of cancer and cancer treatment, with the perspective to improve the care for these patients and to increase the healthy ageing of a patient.

[www.umcg.nl/EN/Research/Researchers/Healthyageing/geras/Paginas/oncolifes.aspx](http://www.umcg.nl/EN/Research/Researchers/Healthyageing/geras/Paginas/oncolifes.aspx)

The expertise of the Department of Epidemiology has also been recognized outside the Netherlands. Epidemiologists from Groningen are participating in several European and world-wide initiatives on cohort studies and biobanking like **CHARGE**

[www.chargeconsortium.com](http://www.chargeconsortium.com)

# Research units of the Department of Epidemiology

Chronic airway diseases epidemiology  
Lifestyle medicine in obesity and diabetes  
Oncological epidemiology  
Medical statistics & decision making  
Digestive system diseases  
Genetic epidemiology  
Patient-centered HTA  
Health behavior epidemiology

# Unit leaders

The unit leaders of the department from left to right:

Nynke Smidt, associate professor of health behavior epidemiology

Paul Krabbe, associate professor health technology assessment

Marike Boezen, professor of pulmonary epidemiology, head of department

Harold Snieder, professor of genetic epidemiology

Eva Corpeleijn, associate professor of life style epidemiology

Behrooz Alizadeh, assistant professor digestive system diseases epidemiology

Marijke Hanania, business manager

Truuske de Bock, professor of cancer epidemiology



# Chronic airway diseases epidemiology

## PLANS

We will continue to maintain our focus on identifying factors associated with asthma remission. Our unique studies on genetics and epigenetics in non-smoking-related COPD in the general population will advance into functional studies. The current challenges are to develop and apply methods to identify rare genetic variants in COPD and to integrate genetic, epigenetic and environmental factors underlying asthma and COPD.

The unit has a longstanding and international track record in the epidemiology of chronic airway diseases (asthma and COPD). In our studies on large, population-based epidemiological cohorts, we have identified several important individual risk factors (e.g. genetic susceptibility) and environmental risk factors (e.g. [passive] smoking, air pollution, occupational exposures) for the onset and course of chronic airway diseases.

We play a leading role worldwide in the identification of common and rare genetic variants that underlie COPD and of their interaction with the environment. Uniquely, we link genetics with functionality and we also lead and/or participate in many international genetic and epigenetic studies on lung function and COPD. In our asthma research we focus on asthma remission, a rare phenomenon in which a patient spontaneously outgrows the disease. In addition, we are leading partners in several international genome-wide association studies on asthma.



MARIKE BOEZEN, HEAD OF THE UNIT

*To unravel the role of genetics, epigenetics and environments in the onset and course of asthma and COPD*

*Our research will ultimately help to unravel the etiology of chronic airway diseases and find ways to prevent, cure, or lower the burden of chronic airway diseases.*

## HIGHLIGHTS

We conducted the first genome-wide association study on the rare phenomenon of asthma remission. In which we identified three genetic polymorphisms associated with complete asthma remission. These polymorphisms were replicated in independent populations and associated with gene expression. This study provides leads toward identification of new asthma drug targets.

<https://www.ncbi.nlm.nih.gov/pubmed/29786918>

We discovered that occupational exposures to pesticides are associated with differences in DNA-methylation levels at 31 CpG-sites in 29 genes. Several of these genes have been previously linked to either pesticide exposure or lung-related diseases.

<https://www.ncbi.nlm.nih.gov/pubmed/29459480>

We further showed that DNA methylation measured in whole blood was associated with cigarette smoking and lung function. Interestingly, we were also able to validate this association in the tissue of interest for COPD, i.e. the lung.

<https://www.ncbi.nlm.nih.gov/pubmed/30390659>

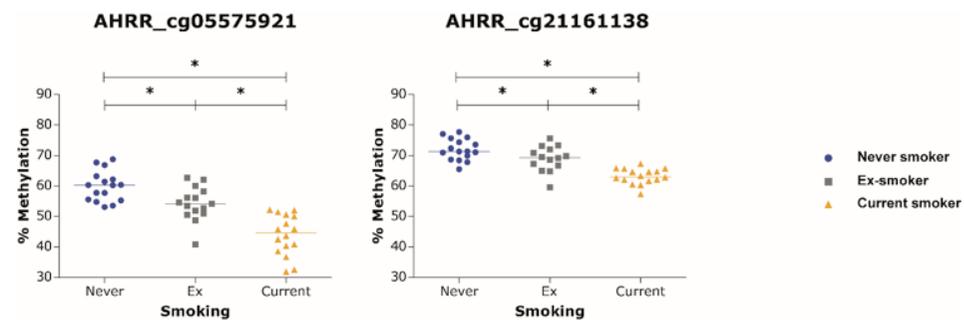


Figure. CpG-sites that show differences in DNA methylation levels between never smokers (blue circles), ex-smokers (gray squares) and current smokers (yellow triangles).

We showed that there were different associations between DNA methylation and COPD in subjects who had never smoked and those who were current smokers. Our results imply that factors other than smoking may affect DNA methylation (see figure below).

<https://www.ncbi.nlm.nih.gov/pubmed/30018765>

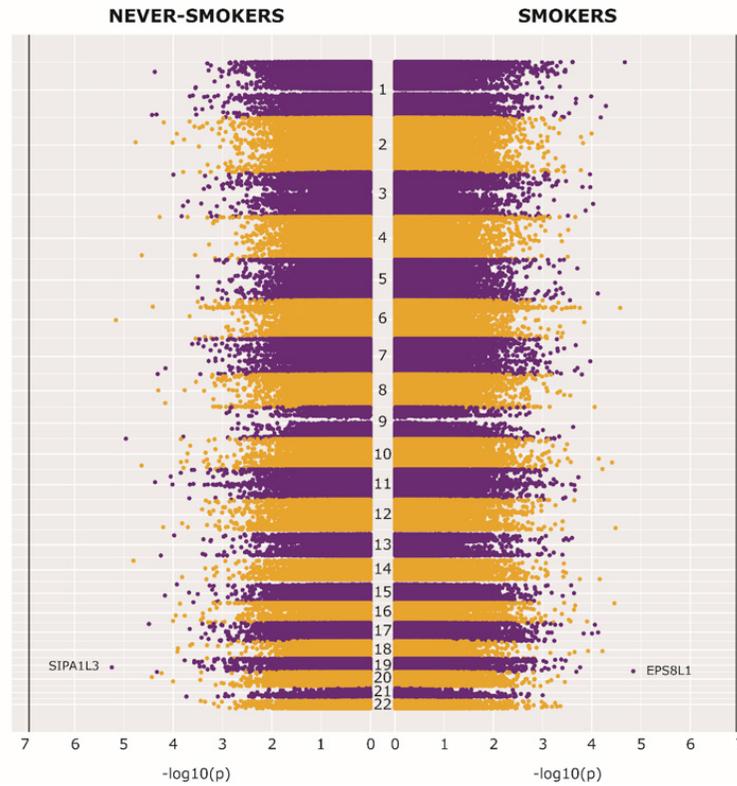


Figure. Associations between DNA methylation and COPD in subjects who had never smoked and those who were current smokers

As part of our Lung Foundation Netherlands consortium and the collaboration with Erasmus Medical Center (Rotterdam), we studied rare genetic variants underlying COPD through a genome-wide linkage scan. We identified significant evidence for linkage of COPD to chromosomes 5, 11 and 15 in a genetically isolated population, the Erasmus Rucphen Family (ERF) study.

<https://www.ncbi.nlm.nih.gov/pubmed/29725345>

## SENIOR STAFF

NAME	FUNCTION	TOPIC
H.M. Boezen (Marike)	Full Professor, unit chair	Chronic airway diseases; genetic epidemiology, epigenetics, exposures
J.M. Vonk (Judith)	Assistant professor	Longitudinal data analysis; Etiology and course of asthma and COPD; Lifelines
J.P. Schouten (Jan)	Assistant professor, honorary appointment	Medical ethical committee UMCG
N. ElBaz (Noha)	Lecturer	Coordinator education
D.A. van der Plaat (Diana)	Postdoc	Genetics and epigenetics of COPD
M. de Vries (Maaïke)	Postdoc	Genetics and epigenetics of COPD and ageing
R.P. Stolk (Ronald)	Professor, honorary appointment	Center for Information Technology, University Groningen
N. Veeger (Nic)	Senior researcher	Research coordinator Medical Center Leeuwarden

## PHD STUDENTS

NAME	TOPIC	COLLABORATION
N. Spinder (Nynke)	Occupational exposures and congenital anomalies in the offspring	EUROCAT, Genetics, UMCG
M.O. Faruque (Omar)	Occupational exposures and general health outcomes	Health Sciences, UMCG
M.R. Abdollahi (Reza)	The disease course in autoimmune hepatitis	Digestive system diseases unit
E. Naderi (Elnaz)	Genome and genomics of radio-sensitivity in individualized prediction of radiotoxicity	Digestive system diseases unit; Radio-oncology, UMCG
T. Habtewold (Tesfa)	Latent class analyses to distinguish subgroups in heterogeneous outcomes	Digestive system diseases unit; Psychiatry, UMCG
M.P. Roffel (Mirjam)	MicroRNAs in obstructive airway diseases	Pathology, UMCG
R.K. Wiersma (Rikstje)	Physical activity in childhood overweight across cultures	Life style medicine unit; Human Movement Sciences, UMCG
K.H. Misgina (Kebede)	Transgenerational malnutrition in early life in Northern Ethiopia	Patient-centered HTA unit: Pediatrics UMCG, Danone

T.P.C.H. Pereira Bernardes (Thomas)	Risk of hypertensive pregnancy complications	Patient-centered HTA unit; Obstetrics UMCG, AMC
Q. Chen (Qing)	Functional studies on novel COPD susceptibility genes for environmental exposures	Pathology, UMCG
B. Kirenga (Bruce)	Asthma in Uganda	General Practice and Elderly Care Medicine, UMCG

# Lifestyle medicine in obesity and diabetes

## PLANS

We will continue to combat obesity and type 2 diabetes by offering evidence that lifestyle care is a critical factor in healthy aging. Our focus will be on the development of dietary patterns and in-depth analysis of daily patterns of physical activity. We will contribute to shaping lifestyle education to medical students and to supporting the development of training programs for healthcare professionals like physiotherapists.

We focus on diet and physical activity as the major lifestyle factors of interest, primarily through observational studies and lifestyle interventions. Research themes are typically centered around two main issues: (1) How far are lifestyle factors related to obesity, cardio-metabolic risk and type 2 diabetes? And in what ways? (2) How far can lifestyle programs reverse overweight and reduce cardiometabolic risk? And how do these programs work? We focus our research on these issues in high-risk groups, such as young children, adolescents, the severely mentally ill, and renal transplant recipients. We also study the roles of both the individual and the obesogenic environment. For example, we have performed randomized controlled trials looking at how to improve lifestyle in renal transplant recipients and in psychiatric patients.



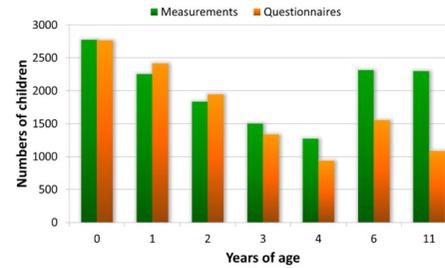
EVA CORPELEIJN, HEAD OF THE UNIT

*To make 'lifestyle medicine' a mainstream specialism in healthcare and to provide scientific evidence for the benefits of lifestyle care.*

*A healthy lifestyle as medicine: an effective approach to tackling multimorbidity and promoting healthy aging”.*

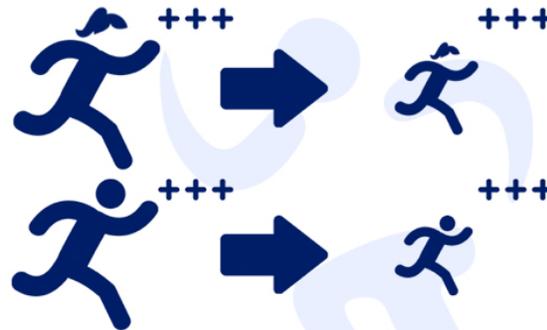
## HIGHLIGHTS

The 11-year follow-up of the GECKO Drenthe birth cohort has been completed successfully. This a large population-based cohort set up to look at the development of obesity in childhood.



We have published reports on the association between the physical activity of parents and their children in the GECKO Drenthe cohort [www.geckodrenthe.umcg.nl](http://www.geckodrenthe.umcg.nl)

Does physical activity of parents influence the activity of their children?



Higher physical activity in mothers is related to higher physical activity in daughters (4-7 years) and more active fathers are related to more active sons (4-7 years).

Brouwer et al. (2018)

Brouwer, S. I., Küpers, L. K., Kors, L., Sijtsma, A., Sauer, P. J. J., Renders, C. M. & Corpeleijn, E., 20-Aug-2018, In: BMC Public Health. 18, 1, 10 p., 1033.



For Lifelines <https://www.lifelines.nl/researcher/cohort-and-biobank> we developed two comprehensive and evidence-based lifestyle scores: The Lifelines Diet Score and the Lifelines Physical Activity Score. The first score indicates the quality of a person's dietary pattern in relation to chronic disease, while the second indicates their involvement in physical activity during leisure time and at work.

<https://www.lifelines.nl/researcher/publications/development-of-the-food-based-lifelines-diet-score-lds-and-its-application-in-129369-lifelines-participants>

## SENIOR STAFF

NAME	FUNCTION	TOPIC
E. Corpeleijn (Eva)	Associate professor, unit chair	Lifestyle and metabolism
D. Kromhout (Daan)	Professor	Nutrition
M. Cardol (Marloes)	Data manager	Gecko Drenthe cohorts

## PHD STUDENTS

NAME	TOPIC	COLLABORATION
S.I. Brouwer (Silvia)	Lifestyle and cardio-metabolic health in children	Institute for Sports Studies, Hanze Hogeschool, Groningen
O. Byambasukh (Oyuntugs)	Body composition and health over the life course	University of Mongolia
G. Klaassen (Gerald)	Lifestyle in renal patients	Nephrology, UMCG
A. Looijmans (Anne)	Lifestyle in psychiatry	Rob Giel Research Center (RGOC), GGZ Friesland
C. Lu (Congchao)	Physical activity and health in Chinese and Dutch children	Tianjin University
M. Osté (Maryse)	Diet and health in kidney patients	Nephrology, UMCG
P.C. Vinke (Petra)	Dietary patterns and health	Nephrology, UMCG
R. Wiersma (Rikstje)	Physical activity and obesity in young children	Movement Sciences

# Oncological epidemiology

## PLANS

We aim to refine our screening models further. One specific goal is to expand the UMCG's oncology data biobank OncoLifeS. After informed consent has been obtained from a patient with a new diagnosis of cancer, we can include their clinical data and biomaterials in this database.

The research of our unit is about the balance between short- and long-term outcomes of screening in patients and high risk populations and care for patients with cancer. Sustainable cancer screening and care should help increase the chances of a longer life and improve the quality of that life at an acceptable price for society. Therefore, most of our research focuses on identifying patients at increased risk of developing cancer. To assess and optimize screening strategies, we not only consider the short- and long-term treatment outcomes, but also the negative effects of over-diagnosis, tumor induction, and false-positive results. Systematic literature reviews, cohort analyses, computer simulations, and decision models are the most important methods we use in this work.



TRUUSKE DE BOCK, HEAD OF THE UNIT

*To contribute to the improvement of clinical and sustainable screening and care for patients with cancer, as reflected in developing guidelines.*

*Early detection to improve breast cancer outcomes and survival rates remain the cornerstone of breast cancer control.*

*(Anderson et al., 2008)*

## HIGHLIGHTS

### **Late-Breaking Abstract during the European Breast Cancer Conference (EBCC-11) in Barcelona.**

Up to ten years after a diagnosis of breast cancer, some women have more frequent symptoms of (severe) depression and symptoms of severe anxiety than women of the same age but without a history of cancer. They were all cared for by the same general practitioners. This finding remained significant after adjusting for a history of previous depression and the time since diagnosis. Submitted for publication.

### **Age should not be a limiting factor in cancer treatment**

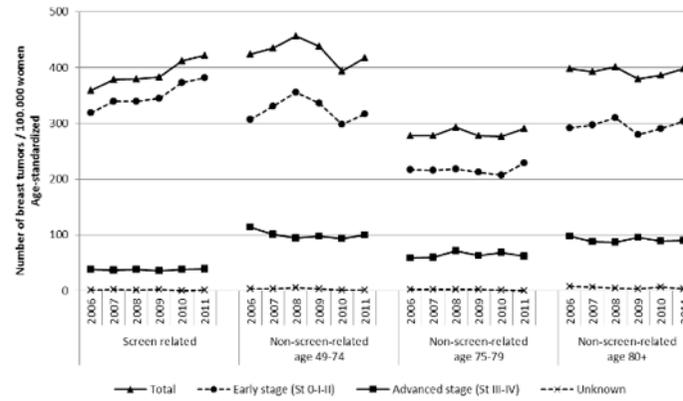
In a prospective multi-center cohort study of 116 women, we found evidence that age does not confer a negative impact on the quality of life following laparoscopic hysterectomy. Therefore, age should not be the reason to refrain from performing laparoscopic surgery.

<https://www.ncbi.nlm.nih.gov/pubmed/30587944>

### **Effects of breast cancer screening**

Data on actual screening attendance showed that the incidence of advanced breast cancer was significantly higher in non-screened women than in women who had undergone screening, supporting the expectation that screening will cause a stage shift to early detection.

<https://www.ncbi.nlm.nih.gov/pubmed/29574967>



Age-adjusted incidence rates (ESR) of early and advanced TNM-stages per year of breast cancer diagnosis, in relation to screening history and age. Calculated for the total female population 49 years and older of the Netherlands. Advanced TNM-stage was defined as Stage III-IV tumors.

<https://www.ncbi.nlm.nih.gov/pubmed/29574967>

## SENIOR STAFF

NAME	FUNCTION	TOPIC
G.H. de Bock (Truuske)	Full Professor, unit chair	Screening and follow-up
B. van Dijk (Boukje)	Senior researcher	Head and Neck Oncology
J. Nagel (Janny)	Project coordinator	OncoLifeS data biobank
G.W.D. Landman (Gijs)	Senior researcher	Cancer in diabetes patients
G. Sidorenkov (Grigory)	Senior researcher	Screening in lung cancer

## PHD STUDENTS

NAME	TOPIC	COLLABORATION
M.G. Huisman (Monique)	Outcomes after treatment for cancer in elderly	Oncological Surgery, UMCG
A. Phi (Anh)	Screening in BRCA1 and BRCA2	Radiology, University of Sydney, Australia
D. Brandenburg (Daan)	Follow-up after colorectal cancer: role GP	General practice, UMCG
C.M.G. van Driel (Catheleine)	Psychosocial effects of risk reducing salpingo- oophorectomy	Oncological Gynaecology; Clinical Genetics, UMCG
Z. Zhan (Zhuozhao)	Stepped Wedge Design	Technical University Eindhoven
M. Plas (Matthijs)	Inflammation after treatment for cancer in elderly	Oncological Surgery, UMCG
T. Koopman (Timco)	HER2 and Ki67 in solid tumors	Pathology, UMCG
M.A.C. Versluis (Marco)	Pathological and immunological parameters in endometrial cancer	Gynaecology and Pathology, UMCG
D. Schrijnders (Dennis)	Cancer in diabetes patients	Langerhans Medical Research Group, Zwolle
N.C. te Grootenhuis (Nienke)	Predictors for local recurrent disease in patients with vulvar cancer	Oncological Gynaecology, Pathology, UMCG
J.M. Woolderink (Jorien)	Screening in women with Lynch	Oncological Gynaecology, UMCG
J.M. Briët (Justine)	Laparoscopy in endometrial cancer	Oncological Gynaecology, UMCG

L.M. Boerman (Liselotte)	Long term cardiac outcome in breast cancer	General Practice, UMCG
E.A.G. Lammerink (Ellen)	Sexual outcomes after gynecological cancers	Oncological Gynaecology, UMCG
L. de Munck (Linda)	Population screening in breast cancer	Netherlands Cancer Registry; University of Twente
Y. Eltahir (Yassir)	Quality of life after breast reconstruction in women with breast cancer	Plastic Surgery, UMCG
E.A. Kop (Emiel)	Predictive markers for local control in early stage laryngeal cancer	Otorhinolaryngology; Pathology, UMCG
S.W. Maass (Saskia)	Long term depression and anxiety in breast cancer	General Practice, UMCG
F.J. van der Sluis (Fabian)	Predictors of outcome in surgical oncology	Oncological Surgery, UMCG
M. Leimkühler (Maleen)	Predictors for peritoneal carcinomatosis in colorectal cancer	Oncological Surgery, UMCG
L.B.M. Weerink (Linda)	Sarcopenia as predictor for outcome after surgical oncology	Oncological Surgery, UMCG
S. Moazzen (Sara)	Determinants for the development of gastric cancer	Tabriz Medical University, Iran
Y. Du (Yihui)	Screening for lung cancer	Radiology, UMCG
J. Wang (Jing)	The optimal screening for breast cancer in China	Radiology, UMCG; Epidemiology, Tianjin, China
F.O. Cortes Ibañez (Francisco)	Preventable factors in cancer	
L. Ding (Lilu)	Breast cancer screening	Radiology, UMCG; Epidemiology, Antwerp, Belgium
A. Stuursma (Anniek)	Preventive oophorectomy	Gynaecology, UMCG
L.T. Jonker (Leonie)	Home monitoring after surgery	Oncological Surgery, UMCG
N. Sadok (Nadia)	Breast reconstructions	Plastic Surgery, Oncological Surgery, UMCG

# Medical statistics & decision making

HEAD OF THE UNIT: CHRISTINE ZU EULENBURG

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## PLANS

The unit will continue to work on improving methodological approaches within defined research interests.

The unit's research activities focus on methods for statistical modeling and support for medical decision-making. Emphasis is placed on longitudinal and time-to-event analyses, as well as on causal inference techniques, which are core topics in the Life Course Epidemiology research program. Other focal points are techniques for decision analysis that are designed to support benefit-risk assessments of medications. We are also responsible for statistical education courses in the UMCG. In basic and advanced courses, we teach statistical methods to students at bachelor, master, and postgraduate levels. In addition to research and teaching in methodology, the unit collaborates with other units in the Department of Epidemiology, and with various clinical departments in the UMCG. In joint research projects, we offer tailored statistics for epidemiological and medical research and provide statistical support in the design and analysis of clinical studies.

*To develop, improve and disseminate advanced statistical methodology, and its applications, in clinical and epidemiological research.*

*Developing, improving  
and disseminating  
statistical methodology  
to foster excellence in  
medical research.*

## HIGHLIGHTS

The GetReal Initiative was launched in June 2018. This is a two-year project of the Innovative Medicines Initiative (IMI); it brings together partners from the original IMI Real-Life Data in Drug Development (GetReal) project to drive the adoption of tools, methodologies and best practices from IMI GetReal. The Aggregate Data Drug Information System (ADDIS) for the comparative effectiveness and benefit-risk analysis of medicines, which we developed in this unit, plays a key role in this project.

[www.drugis.org](http://www.drugis.org)

We have started making statistical theory available in Versatest, an online program for self-study for Bachelor students.

In 2018, our unit organized five PhD training courses on advanced statistics and nine lunchtime lectures for general UMCG staff on 'Help! Statistics!', which proved popular.

## SENIOR STAFF

NAME	FUNCTION	TOPIC
C.H. zu Eulenburg (Christine)	Full professor, unit chair	Statistical modeling
J.L. Hillege (Hans)	Full professor	Clinical epidemiology
S. la Bastide (Sacha)	Assistant professor	Causal inference
J.G.M. Burgerhof (Hans)	Lecturer	Teaching, study design
D. Postmus (Douwe)	Senior researcher	Medical decision making
J. de Keijser (Joris)	Software engineer	
D. Reid (Daan)	Software engineer	

## PHD STUDENTS

NAME	TOPIC	COLLABORATION
C. Pang (Chao)	Biobank data integration	Bioshare database; Genetics UMCG
J.H.A. van Miert (Jasper)	Optimal anticoagulation therapy	Hematology, UMCG
T. Brouwer (Tammo)	Anesthesia	Medical Center Leeuwarden
M. van den Broek (Merel)	Outcomes after bariatric surgery	Medical Center Leeuwarden
Y. Chen (Yuntao)	Advanced survival analysis techniques	
M. Angsupaisal (May)	Developmental neurology	Developmental Neurology, Pediatrics, UMCG
A. van Ojik (Annette)	In-hospital anticoagulation	Medical Center Leeuwarden
K. Donkelaar (Karljin)	Subarachnoid hemorrhage	Neurosurgery, UMCG
S. Roldan Munoz (Sonia)	Preference heterogeneity in regulatory benefit-risk assessment	Clinical pharmacy & pharmacology, UMCG
S. Ioannou (Solomon)	Machine learning techniques for predictive analytics	General Practice and Elderly Care Medicine, UMCG

# Digestive system diseases

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## PLANS

The unit plans to expand its collaborative research projects to identify the role of the exposome, diet, genetics and other clinical factors (see Figure) involved in diseases of the digestive system, including liver, cancer radiogenomics, and psychosis. The main challenges are to: (1) implement proper methodology to obtain e-care data; and (2) to integrate and analyze the heterogeneous data emerging from genetic and genomics analyses, longitudinal cohorts, standard clinical practices, and patient-reported outcomes.

This unit conducts large, international clinical- and population-based cohort studies as well as intervention studies. We aim to understand the causal and other factors associated with complex diseases of the digestive system and several other disorders (e.g. psychosis, cancer) and we aim to improve prediction of the clinical course. We implement both advanced genetic and epidemiological methods, applying multivariate data reduction techniques and trajectory modeling to multi-dimensional, longitudinal complex data. We are involved in several cohorts such as Lifelines, GROUP, ARAS and AZAR. The unit leads or co-leads several international genetic consortia on various topics, such as inflammatory bowel disease, the genomics of inflammatory factors, autoimmune hepatitis, and radiogenomics. Furthermore, we contribute to teaching various master and PhD courses, e.g. on clinical and genetic epidemiology, statistics, scientific integrity, and to the co-supervision of epidemiological MSc and PhD training trajectories.



BEHROOZ ALIZADEH, HEAD OF THE UNIT

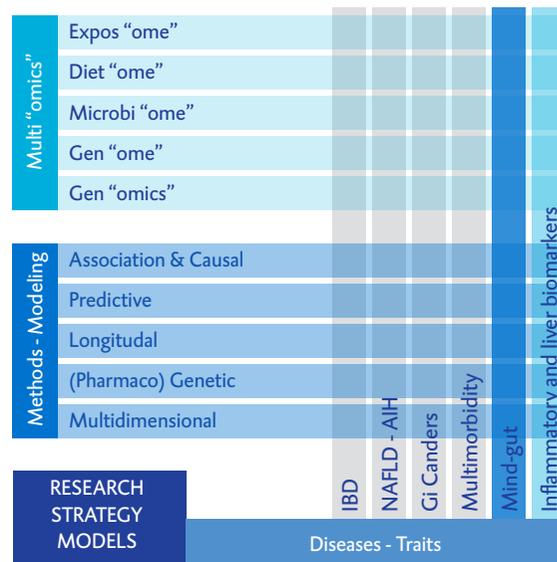
*To contribute to unraveling the causes and underlying mechanisms of complex diseases of the digestive system, and to contribute to implementation of personalized prediction, prevention, and cure.*

## HIGHLIGHTS

We developed the Groningen IBD Environmental Questionnaire (GIEQ), which is proving a reliable tool to study the exposome in IBD. It enables consistent measurements of a wide range of environmental factors. The GIEQ can be used to calculate an exposome risk score, which can be used for secondary prevention by identifying high-risk patients.

We initiated and collaborated on an international meta-genome-wide association study with over 200,000 subjects based on 78 cohorts. We identified 58 genetic locations for C-reactive protein (CRP), highlighting the main mechanism underlying chronic low-grade inflammation. This also showed a causal effect from CRP in both schizophrenia and bipolar disorder.

We further applied clustered trajectory modeling on long-term longitudinal data and identified five stable cognitive subtypes in patients with schizophrenia (impaired to high performance) and four stable subtypes in their siblings (severely impaired to high performance). Interestingly, the familial correlation coefficient was higher than 30%.



## SENIOR STAFF

NAME	FUNCTION	TOPIC
B.Z. Alizadeh (Behrooz)	Assistant professor, unit chair	Factors and course of disease of digestive system and inflammation
A. Islam (Atique)	Associate professor, honorary appointment	Statistics, analysis of complex data
A. Abbasi (Ali)	Senior researcher	Causal inference and prognostic modeling

## PHD FELLOWS

NAME	TOPIC	COLLABORATION
K. van der Sloot (Kim)	Exposome-genome interaction in the development and course of inflammatory bowel disease	Gastroenterology, UMCG, Mass. Gen. Hosp. Harvard, USA
S. Abedian (Shifteh)	Pharmacogenetics factors in the course of diabetes and inflammatory bowel diseases	Genetic epidemiology unit, UMCU, Utrecht
V. Peters (Vera)	The (non)sense of dietary measures for a healthy and diseased gut	Gastroenterology, UMCG MUMS, Maastricht WUR, Wageningen
N. Khalilian (Neda)	Comorbidity of skin diseases in IBD	Dermatology, UMCG
M.R. Abdollahi (Reza)	The disease course in autoimmune hepatitis	Chronic airway diseases unit, TUMS, Tabriz, Iran
S. Moazzen (Sara)	Diet in gastro-intestinal cancer	Oncological epidemiology unit, TUMS, Tabriz Iran
E. Naderi (Elnaz)	Genome and genomics of radio-sensitivity in individualized prediction of radiotoxicity	Chronic airway diseases unit, Radio-oncology UMCG, Man. Uni. Manchester UK; Aarhus University, Aarhus DK.
L.H. Rodijk (Lyan)	The trajectory and outcome of psycho-motor development in biliary atresia	Liver transplantation, UMCG
S. Farhang (Sara)	Predictors of the outcome of first episode psychosis in the Iranian ARAS-cohort	Psychiatry, UMCG TUMS, Tabriz, Iran

T. Habtewold (Tesfa)	Latent class analyses to distinguish subgroups in heterogeneous outcomes	Chronic airway diseases unit, Psychiatry, UMCG
N. Tiles-Sar (Natalia)	Causes and courses of social recovery in psychosis	Psychiatry, UMCG
M. Huq (Mahmudul)	Neural network analysis to dissect underlying genetic link between IBD and schizophrenia	
S. Ioannou (Solomon)	Unsupervised statistical modeling of multi-dimensional data	Medical statistics unit
M. Amini (Marzyeh)	To dissect endo-phenotype effect in association of genotype to phenotype in complex diseases	Genetic epidemiology unit, TUMS, Tehran, Iran

# Genetic epidemiology

## PLANS

The unit will focus on building prediction models, including genetic risk scores and gene-environment interaction models for common chronic diseases of aging. Examples include applying models to the (early) development of type 2 diabetes, chronic kidney disease, glaucoma, obesity and hypertension. These studies increasingly involve epigenetics as a molecular interface between genes and the environment. Furthermore, we are exploring the role of genetic and epigenetic markers and the application of machine-learning algorithms to facilitate precision medicine in intensive care. Together with the Department of Genetics, we lead the UMCG Genetics Lifelines Initiative (UGLI), which aims to perform genome-wide genotyping for the entire Lifelines cohort in the future.

The Genetic epidemiology unit plays a key role in teaching and the genetic data analysis for all the major cohort studies. Teaching activities include being involved in Epidemiology B registration, introductory and advanced courses in genetic epidemiology, and an introductory course in R. We also coordinate genetic studies in the Lifelines, TRAILS and GECKO cohorts and have been an active member, lead or co-lead of consortia studying genome-/epigenome-wide associations in blood pressure, kidney function, inflammatory factors, heart rate variability, fertility and birthweight.



HAROLD SNIEDER, HEAD OF THE UNIT

*Identifying genes, environmental exposures, and their interactions on cardiometabolic, renal and other common complex diseases of aging, and developing innovative analytical methods and software tools.*

*To investigate the genetic and environmental influences on the etiology, prediction and prognosis of cardiometabolic, renal and other common, chronic complex diseases.*

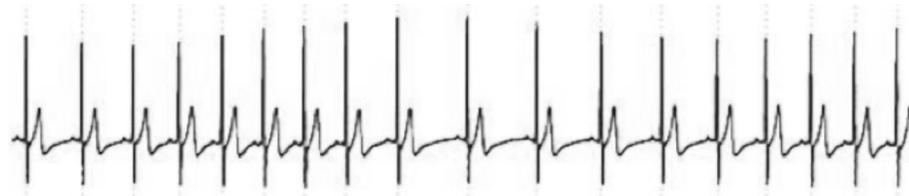
## HIGHLIGHTS

In 6,000 participants of the PREVEND study, we found that those with a low education have a 25% higher risk of developing chronic kidney disease compared to those with a higher education. Much of this increased risk can be explained by largely preventable risk factors.

<https://www.ncbi.nlm.nih.gov/pubmed/30541108>

A genetic risk score, comprising 53 genetic variants associated with creatinine-estimated glomerular filtration rate, was found to be a good genetic proxy for kidney function. However, it remains uncertain how useful this will be as an indicator of chronic kidney disease susceptibility.

<https://www.ncbi.nlm.nih.gov/pubmed/29294079>



In about 150,000 participants of the Lifelines population cohort, we found that age and sex were the most important determinants of cardiac autonomic function, explaining almost one-fifth of the individual differences in heart rate variability. The additional contribution from lifestyle and psychosocial factors was surprisingly small.

<https://www.ncbi.nlm.nih.gov/pubmed/29753022>

Based on a systematic review of epigenome-wide association studies, we selected 52 DNA methylation markers (so-called CpGs) associated with type 2 diabetes; 15 of these could be replicated in a Lifelines case-control sample.

<https://link.springer.com/article/10.1007%2Fso0125-017-4497-7>

Using cross-sectional and 5-year follow-up data from Lifelines, we showed that a high genetic risk score for type 2 diabetes and a low socio-economic position exacerbate each other's effect for the disease's prevalence, but not its actual incidence. Behavioral and clinical risk factors explained this interaction effect and should be given attention in prevention and community care programs in genetically predisposed people with a low socio-economic position.

<https://www.ncbi.nlm.nih.gov/pubmed/29381659>

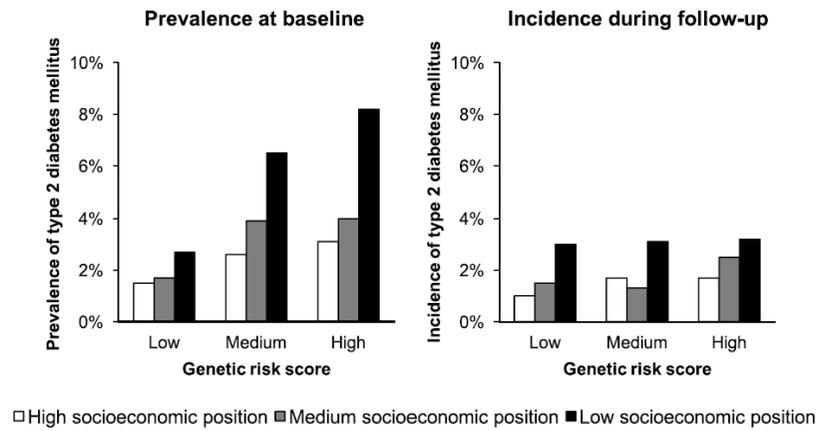


Figure. Prevalence and 5-year incidence of type 2 diabetes in 13,027 Lifelines' participants across socioeconomic groups and categories of the genetic risk score

## SENIOR STAFF

NAME	FUNCTION	TOPIC
H. Snieder (Harold)	Full professor, unit chair	Genetic epidemiology of cardiometabolic disease
I.M. Nolte (Ilja)	Senior researcher	Statistical genetics
P. van der Most (Peter)	Postdoc	Genetic and bioinformatic analyses
J. van Vliet-Ostaptchouk (Jana)	Postdoc	Genetic epidemiology of obesity and type 2 diabetes
A. Vaez (Ahmad)	Postdoc	Bioinformatics and post-GWAS analyses
J. Vehof (Jelle)	Research fellow	Genetic epidemiology of eye diseases

## PHD FELLOWS

NAME	TOPIC	COLLABORATION
S. Abedian (Shifteh)	Methods in pharmacogenetics	Digestive diseases unit
A. Amare (Azmeraw)	From genome-wide pleiotropy to prediction modeling of depression	Psychiatry, UMCG
M. Amini (Marzyeh)	Mendelian randomization and inflammation	Digestive diseases unit
N. Asefa (Nigus)	Heritability of eye diseases	Ophthalmology, UMCG
Y. van der Ende (Yldau)	New insights in (unrecognized) myocardial infarction	Cardiology, UMCG
X. Lu (Xueling)	Association between (epi)genetic determinants of type 2 diabetes and body burden of endocrine disrupting chemicals	Endocrinology, UMCG
T. Man (Tengfei)	Heart rate variability and blood pressure regulation	Merck, Beijing, China
A. Neustaeter (Anna)	Glaucoma screening driven by genetic and other risk factors	Ophthalmology, UMCG
K. Pärna (Katri)	Prediction models for type 2 diabetes	University of Tartu, Estonia
P. Poursafa (Parinaz)	Metabolic syndrome: the neglected role of air pollution	University of Isfahan, Iran
A. Sas (Arthur)	The epidemiology of aging and age-related pathology; biology and genetics unraveled	Psychiatry, UMCG
B. Tegegne (Balewgezizie)	Genetic and environmental influences on heart rate variability and its association with hypertension	Psychiatry, Vascular Medicine, UMCG
C. Thio (Chris)	Socio-economic status, genetic predisposition and the risk of chronic kidney disease	Nephrology, Health Sciences, UMCG
R. Verweij (Renske)	Understanding childlessness using genes and socio-environment	Sociology
E. Walaszczyk (Eliza)	Epigenetics and the development of type 2 diabetes	Endocrinology, UMCG; RIVM

B. Wang (Bin)	Estimating genetic and environmental contributions to complex traits and diseases. Use of migration, twin, candidate gene and genome-wide association designs	Beijing University, China
R. Wang (Rujia)	Shared genetic and environmental influences on major depressive disorder, anxiety disorder, obesity and substance use disorder	Psychiatry, UMCG
T. Xie (Tian)	Early (epi)genetic and environmental origins of obesity and hypertension	Lifestyle Medicine unit

# Patient-centered Health Technology Assessment (HTA)

## PLANS

We are interested in outcome instruments that cover health concepts across the spectrum of care and cure, and we are completing work on a novel generic health-outcome instrument –the CS-Base – that will be ready for use in 2019. We have joined forces with colleagues from Radboud UMC, UMC Utrecht and Maastricht UMC to kick-start Hii-Holland, which will serve as a platform for consulting medical practitioners and for assessing novel medical technology. To support the personalized choice of treatment strategies, we will combine insights from prediction modeling with analysis of routine data.

In our multidisciplinary team, we apply statistical, epidemiological, economic, psychometric and other key methods to evaluate the benefits of healthcare interventions and medical treatments. Our studies often focus on cost–effectiveness analyses and we use computer simulations to combine evidence and to extrapolate observed short-term disease effects to meaningful long-term outcome measures, including ‘quality-adjusted life years’ and ‘life years gained’. Models created at the patient level also help us support the evaluation of personalized treatment strategies. We also have special expertise in the development of ‘smart’ patient-reported health outcome measures.



PAUL KRABBE, HEAD OF THE UNIT

*To bridge the gap between scientific evidence and stakeholders based on the judgment of healthcare professionals, the views of patients and the public, and the needs of policymakers.*

## Showing the added value of health interventions.

### HIGHLIGHTS

#### Infant outcome instrument

The Infant Quality of Life Instrument (IQI) is an app developed together with Nestlé, Switzerland, to assess babies aged 0-12 months. A Dutch version of the IQI is being used in a study at the UMCG's Neonatal ICU.

<https://www.rug.nl/news/2018/12/are-babies-happy?>



#### Research study in Ethiopia

For a study on the nutritional and socio-economic factors related to maternal and child health in Northern Ethiopia, Kebede Haile Misgina, a PhD student, completed the collection of data on almost 1,000 women and their children in 2018.



#### Relevant outcomes in mental health

Qualitative research has shed light on the outcomes of depression treatment that are relevant to patients and clinicians. These will be used in our support tool for choosing the type of treatment for depression. The tool's development is supported by grants from Stichting De Friesland and Zorginstituut Nederland.

<https://www.improve-nl.nl>



### Medication data can support better estimates of prevalence

As medication use is often available in more detail than disease diagnoses, these data were used to indicate the prevalence of various diseases. Using prediction modeling and Random Forest models, we were able to predict the prevalence of 29 different diseases.

<https://academic.oup.com/eurpub/advance-article/doi/10.1093/eurpub/cky270/5272699>

### Implementation and scaling up of e-Health programs

To support implementation of e-Health initiatives in the Netherlands, the national Citrien fund's Health program 2.0 has been started. Action-based research will be combined with implementation studies that focus on scaling-up local initiatives in the Northern Netherlands and other regions.



## SENIOR STAFF

NAME	FUNCTION	TOPIC
P.F.M. Krabbe (Paul)	Associate professor, unit chair	Health outcome measurement
E. Buskens (Erik)	Full professor	Simulation modeling, population health, organization of care
T.L. Feenstra (Talitha)	Assistant professor	Simulation models, HTA of precision medicine
H. Groen (Henk)	Assistant professor	Fertility medicine and obstetrics
A.T. Lettinga (Ant)	Senior researcher	Process-oriented action research
A.D.I. van Asselt (Thea)	Senior researcher	Economic evaluation
K.M. Vermeulen (Karin)	Senior researcher	Economic evaluation and quality-of-life
M.M.H. Lahr (Maarten)	Postdoc	E-health and stroke
R. Jabrayilov (Ruslan)	Postdoc	Psychometrics
L. Sierkstra (Linda)	Researcher	Reintegration and rehabilitation after acquired brain damage

## PHD FELLOWS

NAME	TOPIC	COLLABORATION
B. Arifin (Ury)	Distress and health-related quality of life in Indonesian type 2 diabetes mellitus outpatients	PTEE
T.P.C.H. Pereira Bernardes (Thomas)	Risk of hypertensive pregnancy complications	Chronic airway diseases unit; Obstetrics UMCG, AMC
R. Botes (Riaan)	Functioning and quality-of-life at old age: expectation and appreciation	
S. Emamipour (Sajad)	Economic evaluation of personalized treatment in diabetes	PTEE, Global Health
L. van Dammen (Lotte)	Follow up of women and children after preconception lifestyle intervention	Reproductive Medicine UMCG, AMC
H. Dijk (Hermien)	Economic evaluation of child psychiatry	Economics & Business
N. Fitria (Tia)	Economic studies into hyperglycemia in pregnancy, gestational diabetes	PTEE, DIKTI, Indonesia
R. Freriks (Roel)	HTA child tool for mental health	Economics & Business
K. Füssenich (Koen)	Regional public health modeling	RIVM
G. de Graaf (Gimon)	Cost effectiveness of biomarkers in diabetes mellitus	

S. Holterman (Sander)	Business models e-health	Hogeschool Windesheim
L.T. Jonker (Leonie)	Measuring physical activity in oncological patients (MANHATTAN)	Surgery, General Practice
K. Kan (Kaying)	IMPROVE: Tailored treatment in depression	Psychiatry
M. Karsten (Matty)	Follow-up of women and children after preconception lifestyle intervention	Reproductive Medicine, AMC
R. Koleva-Kolarova (Rositsa)	Personalized medicine in oncology	Oncology
S. Konings (Steeff)	IMPROVE: Understanding heterogeneity in Schizophrenia Spectrum Disorders	RGOC, Economics & Business
W.J. Maas (Willemijn)	Collaborations for new treatments in acute stroke (CONTRAST)	Economics & Business, Neurology
M.J. Meijboom (Marjan)	Cost effectiveness of influenza vaccination	Faculty of Science and Engineering
Haile Misgina (Kebede)	Transgenerational malnutrition in early life in Northern Ethiopia	Chronic airway diseases unit; Pediatrics UMCG, Danone
E. Nijkamp (Ellen)	Fetal death and cost-effectiveness of the diagnostic/ obstetrics work-up	Obstetrics, UMCG
A. van Oers (Anne)	Effects of a structured lifestyle program in infertility	Reproductive Medicine
I. van Oostrum (Ilse)	Disease modeling, survival modeling	PTEE
A. Shahabeddin Parizi (Ahmad)	Patient-centered solid-organ transplant instrument	Internal Medicine, UMCG
B. Rodriguez Sanchez (Beatriz)	The economic approach to diabetes in old adults across Europe	Economics & Business
C. Schey (Carina)	MCDA for informing resource allocation decisions	Global Market Access Solutions
A. Selivanova (Anna)	Health-state valuation using discrete choice models	EuroQol Research Foundation
E.D. Tutuhaturunewa (Eric)	Evaluation midshaft clavicle fractures	Orthopedics, Sport Medicine
A. Tuvdendorj (Ariuntuya)	Economic studies into the burden of non-communicable diseases in Mongolia	Ministry of Health, Mongolia
R. Wasir (Riswandi)	HTA and cardiovascular drug reimbursement policy in Indonesia	PTEE, Utrecht University
J. Yauw (Josan)	DIAMANT: dynamic prediction in type 2 diabetes	UMCU, VUMC, RIVM

E. Veldhuijsen (Edith) Equity and ethics of expensive medicines in rheumatology Medical Ethics, PTEE  
E. Zwertbroek (Eva) Prediction in hypertensive disease in pregnancy Obstetrics

# Health behavior epidemiology

## PLANS

In the TRANSESSES project, we are investigating the relationship between socio-economic status (education, income, and occupation) and metabolic syndrome, and how development of this syndrome is mediated by health behaviors and family- and work-related life-events. In addition, we will investigate the association between exposure to neighborhood fast-food outlets and overweight in 137,361 adult Lifelines participants.

Health behavior has a major impact on our health and life expectancy, but its determinants are complex and multifaceted, including individual, social, and environmental factors. This makes it difficult to change health behaviors. It is therefore important to prevent unhealthy behavior and to maintaining healthy behavior. We analyze the data of large, population-based cohorts, such as TRAILS [www.trails.nl/en/hoofdmenu/over-trails](http://www.trails.nl/en/hoofdmenu/over-trails) and Lifelines [www.lifelines.nl](http://www.lifelines.nl), to investigate the development of health behavior over the life course and to identify periods of increased susceptibility for behavior change (i.e. major life events, including marriage, parenthood, retirement, or hospital admission). To identify gaps in the literature, we conduct systematic reviews and meta-analysis. In addition to using existing data sources, we collect relevant data through observational cohort studies and randomized controlled trials.



NYNKE SMIDT, HEAD OF THE UNIT

*Understanding changes in health behavior is a challenge due to the complex interplay between individual, social and environmental factors.*

*To investigate the determinants that shape our health behavior over the life course.*

## HIGHLIGHTS

### KNAW grant

In 2018 Prof. A. (Aart) Liefbroer was awarded a Royal Netherlands Academy of Arts and Sciences (KNAW) grant for the project 'Life-course transitions, socio-economic status and health behaviors: A collaborative NIDI-NIAS-UMCG project' (€ 500.000)

### Cross-cultural validation of the MCLHB-DRR scale

The Dutch version of the questionnaire 'Motivation to Change Lifestyle and Health Behaviors for Dementia Risk Reduction' (MCLHB-DDR) was validated in the general Dutch population aged between 30 and 80 years old.

### Survey on Lifestyle & Dementia

The results of this survey – on reducing dementia risk – showed that the attitudes and health beliefs held by residents of the municipality of Groningen (n=655) are poor. The general population needs to be given more information to improve their knowledge of dementia and its risk factors, and of the normal standards for healthy behavior.

### Demin study: protect your brain

We received permission from the Dutch Ministry of Health, Welfare and Sport to start recruiting participants for the Demin study, which aims to reduce dementia risk among adults (aged 40-60 years) who have a family history of dementia. [www.demin.nl](http://www.demin.nl)

Local newspapers (Dagblad van het Noorden, Leeuwarder Courant) and local radio stations (RTV Noord, Radio Westerwolde, Radio Glasnost) paid attention to the launch of this project in December 2018.



Figure. Protect your brain (DEMIN flyer)

### **Determinants of participation in voluntary work**

Socio-economic status, being married, social network size, church attendance and previous volunteer experiences are positively associated with volunteering. Higher age, functional limitations and transitions into parenthood are found to be inversely related to volunteering.

<https://www.ncbi.nlm.nih.gov/pubmed/30384837>

<https://www.dailymail.co.uk/news/article-6344503/Married-couples-church-goers-graduates-likely-volunteer-depressed.html>

## SENIOR STAFF

NAME	FUNCTION	TOPIC
N. Smidt (Nynke)	Associate professor, unit chair	Health behavior epidemiology
A.C. Liefbroer (Aart)	Full professor	Life course demography
J. Aris (Judith)	Postdoctoral fellow	Reproductive and children's health

## PHD STUDENTS

NAME	TOPIC	COLLABORATION
J. Niebuur (Jacobien)	Determinants and health consequences of participation in voluntary work	Sociology Netherlands, Interdisciplinary Demographic Institute (NIDI)
R. Broekstra (Reinder)	Big data and the dilemma of innovative knowledge versus threats to personal integrity	Social Psychology, UMCG, Institute for Medical Education, IBM
J. Vrijzen (Joyce)	Uptake and effectiveness of tailor-made lifestyle advice to reduce dementia risk in middle-aged people with a family history of dementia (Demin study)	Internal Medicine/ Geriatrics, UMCG
M.A. Pouw (Maaïke)	'Hospital at Home' care for elderly patients with cognitive impairment: a randomized feasibility trial	Internal Medicine/ Geriatrics, UMCG
M. Feenstra (Marlies)	Functional recovery trajectories in hospitalized older adults: towards problem definition, actors, and measurements	Internal Medicine/ Geriatrics, UMCG
F. Stenveld (Fiona)	Effectiveness of Melatonin, Temazepam and placebo on sleep quality in older hospitalized patients with sleeping problems	Internal Medicine/ Geriatrics, UMCG
L. Hoveling (Liza)	Unraveling the mediating pathways between socio-economic status and health: a transgenerational and life-course perspective (TRANSSES)	Health Sciences, UMCG/Netherlands Interdisciplinary Demographic Institute (NIDI)

J.E. Mooyaarts (Jarl)	Socio-economic background and the transition to adulthood	Netherlands Interdisciplinary Demographic Institute (NIDI)
J.C. Koops (Judith)	Socio-economic background and fertility decisions: a cross-national comparison	Netherlands Interdisciplinary Demographic Institute (NIDI)
J.S. Muller (Joanne)	Socio-economic background, family life course and later-life economic outcomes: a cross-national comparison	Netherlands Interdisciplinary Demographic Institute (NIDI)

# Teaching activities

The Department of Epidemiology organizes and performs a wide range of teaching activities. These include courses for the regular curriculum of the medical school, the research masters' program for epidemiology, postdoctoral training, and courses for UMCG staff and interns. At the heart of the department's activities are the training courses in scientific methodology and statistics for medical research. Staff also share their own specific disease- and methodological expertise with medical students (in bachelor and master's courses), students (masters and PhD level), and with other staff and interns in the UMCG. In total, departmental staff undertook 6,000 hours of teaching in the academic year 2017-2018. Teaching therefore constitutes an important and crucial activity for the department, and this emphasis is illustrated by the fact that all our staff are required to have gained a basic university teaching certificate (BKO) to improve the quality of education provided.

Beyond meeting the needs of future doctors in general, we also recognize the need to train the epidemiologists of the future. To this end, the department has established a specific training trajectory, called Epidemiologist B (PhD level). This training trajectory is suitable for those aiming at formal registration as an epidemiologist with the Netherlands Epidemiological Society and SMBWO (Stichting voor Opleiding tot Medisch-Biologisch Wetenschappelijk Onderzoeker/Foundation for the training of medical- and biological science researcher). The trajectory for Epidemiologist B, was recognized in 2014 by the Netherlands Epidemiological Society as valid certification.

Different staff also organize a range of established and well-attended, general postdoctoral courses on epidemiology, medical statistics, mixed models, methodology for phase II/III clinical trials, and genetic epidemiology. However, courses are also given on more specific themes related to epidemiology, such as our useful course on 'Introduction to R and bioinformatics.' In 2017-2018, we implemented new postdoctoral

courses on 'Advanced Clinical Epidemiology', 'Applied Longitudinal Data Analysis', and 'Advances in Genetic Epidemiological Research and Data Analysis.' The department also started the monthly lecture series on 'Help Statistics', which covers common statistical methods and questions. All these activities contribute to the training of PhD students, UMCG staff, and interns, so that they can conduct medical research to the highest standards. In addition, our staff collaborate on and coordinate courses in other faculties, for example, for the Faculty of Economics and Business we offer a course on 'Economic Evaluation in Healthcare', and for the Faculty of Science and Engineering we give a course on 'Nutrition in Medicine.'

Overall, staff from the Department of Epidemiology are involved in a range of teaching activities at all levels – bachelor, master, and postdoctoral – contributing a breadth and depth of knowledge and expertise, as well as a large dose of enthusiasm.



Teaching activities hours and BKO held by staff

BKO Basic university teaching diploma; GSMS Graduate School for Medical Sciences; CPE Clinical and Psychosocial Epidemiology; FSE Faculty of Science and Engineering, GNK Geneeskunde (Medical School).

# Business management

*To support staff and make an efficient contribution to the primary processes of our department.*

### Personnel management

The Department of Epidemiology welcomed 10 new employees in 2018, of which eight were PhD students. Due to an internal reorganization, 18 employees from the Research Data Support unit will be embedded in the UMCG's central IT department from January 2019. The secretariat is responsible for planning and monitoring staff evaluations, including the evaluation of PhD students after their first six months and one year (95% response rate). The budget for education and training was fully spent during the 2018 financial year, and the training plan for 2019 has been started.

### Financial management

An overview of the department's expenses for 2018 are presented below.

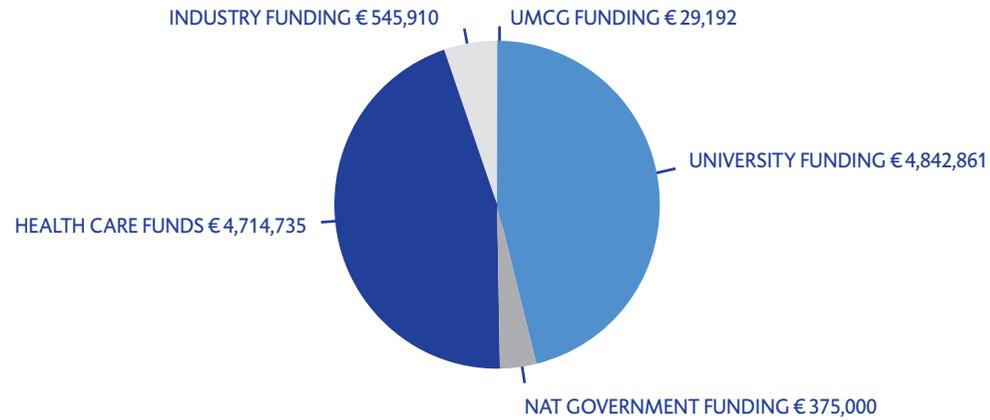
EXPENSES IN 2018 (X € 1.000):

	RESEARCH & TEACHING	RESEARCH DATA SUPPORT	TOTAL
PERSONNEL	3,296	1,172	4,468
PROJECT RELATED AND MATERIAL COSTS	746	156	902
TOTAL	4,042	1,328	5,370

The department's project portfolio was expanded for University-funded PhD projects (University funding), while several externally funded projects (Health care funds, Industry funding and UMCG funding) were completed.



MARIJKE HANANIA, BUSINESS MANAGER



The department also received four grants for new research projects (see table).

TABLE. RESEARCH GRANTS AWARDED TO DEPARTMENT OF EPIDEMIOLOGY STAFF IN 2018

PRINCIPAL INVESTIGATOR	FUNDING BODY	TITLE	BUDGET (€)
Hans Hillege	IMI	Get Real Initiative	352,568
Erik Buskens	ZonMw	Actieonderzoek	234,350
Truuske de Bock	ZonMw	Increased cancer incidence	60,000
Maaïke de Vries	Stichting Astma Bestrijding	DNA methylation: a potential therapeutic target for the treatment of COPD	25,000
<b>TOTAL</b>			<b>671,918</b>

## Facts & Figures



### SENIOR STAFF

NAME	FUNCTION
M. Hanania (Marijke)	Business manager
R. Geuze (Roelian)	Staff assistant, Finance and Quality Assurance
A. Vermue-Gels (Anita)	Secretary
A. van der Zee (Aukje)	Secretary
L. Kuil (Lisette)	Secretary

# Appendix

## Completed

### PhD projects

PROF. G.H. DE BOCK

X.A. Phi

Breast cancer screening in women at elevated risk. Comparative evaluation of screening modalities.

Groningen; UMCG

November 12, 2018, University of Groningen

M.G. Huisman

Preoperative risk assessment of adverse outcomes in onco-geriatric surgical patients.

Groningen; UMCG

July 4, 2018, University of Groningen

D. Brandenburg

The role of the general practitioner in the care for patients with colorectal cancer.

Groningen; UMCG

March 21, 2018, University of Groningen

Z.Z. Zhan

Evaluation and analysis of stepped wedge designs: application to colorectal cancer follow-up.

Groningen; UMCG

February 2, 2018, University of Groningen

PROF. R.P. STOLK, DR. N. SMIDT

M. Oldenkamp Breast cancer screening in women at elevated risk.  
Comparative evaluation of screening modalities.  
Groningen; UMCG  
March 14, 2018, University of Groningen

PROF. A.C. LIEFBROER, DR. N. SMIDT

L. K. Elsenburg Adverse life events and overweight in childhood, adolescence and  
young adulthood.  
Groningen; UMCG  
April 16, 2018, University of Groningen

PROF. C. ZU EULENBURG

A.G. Boxum Postural control and reaching throughout infancy: in cerebral palsy and  
in typical development.  
Groningen; UMCG  
September 19, 2018, University of Groningen

DR. P.F.M. KRABBE

B. Arifin Distress and health-related quality of life in Indonesian type 2 diabetes  
mellitus outpatients.  
Groningen; UMCG  
June 29, 2018, University of Groningen

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