

Samen verleggen we grenzen voor een duurzame toekomst van gezondheid

ANNUAL REPORT

20
21

**Department of Biomedical Sciences
of Cells and Systems (BSCS)**

UMCG



university of
groningen



umcg

ANNUAL REPORT

20
21

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Department of Biomedical Sciences of Cells and Systems (BSCS)

UMCG

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— — — 1. Foreword

2021 in review

Hereby we present to you our second Annual Report of the Department of Biomedical Sciences of Cells and Systems (BSCS). The 2021 report will again provide you with a quantitative overview of all our activities and achievements, in science, education, business development and outreach.

The risks of such overviews is that they may be (mis)used as numerical indicators to score quality and progress or (even worse) as failures, especially when evaluating individual contributions. So, whereas we do consider and value the quantitative data in this report as our "medals", we also like to emphasize that they are the result of collaborative efforts of many (not always mentioned by name) and that many other non-quantitative events have enlightened 2021. The latter, despite the remaining, often frustrating restrictions related to the Covid-19 pandemic, forcing people to work in (unpleasant) shifts or to work at home and execute their work behind square screens. Our deep respect goes to all the young people, especially those from abroad, who were so often deprived of social contacts and yet, mostly managed to still do their work with dedication and the highest quality possible, given the circumstances.

Even in 2022, we are still fighting the pandemic; but, maybe there is some light at the end of that tunnel now, such that we may go back to our normal lives soon and share exciting research discoveries in-person and inspire and mentor students face-to-face.

This annual report of course will also give you an overview of the focus of our research and education. It is not only the quantitative part, the numbers that count. I am proud that we have a department where curiosity and creativity brings us to achievements that are seen by a wide audience. I am proud of a team that cooperates under difficult circumstances and we can present these nice 2021 outcomes.

Harrie Kampinga
Head of the department, BSCS
February 2022



2. Research at BSCS

Our mission is to contribute significant advancements to the understanding of the fundamentals of functional and dysfunctional human biology at the molecular, cellular and systems level that ultimately will be applicable to combat diseases and increase human health span.

In BSCS, research and education are intertwined.

- With our research, we aim to discover and transfer knowledge to medical applications
- With our education, we teach cutting-edge biology to the doctors and scientist of the future

This way, we strive to advance the cycle of bench-to-bed-to-bench for human well-being.



The societal relevance of this mission is considered to be comprised of the following 3 main items:

1. Understanding basic mechanism of the function of cells & systems drive advances in Medicare

Nearly all current medical treatments are based on discoveries, often done long before the related application, on detailed insights in how molecules, cells and systems function and how they are derailed in disease.

- * Our early analysis on how precision radiotherapy can be targeted to avoid radiation side effects has been the basis for proton therapy.
- * Our screens in *Drosophila melanogaster* have led to the discovery of therapeutic compounds now explored for the treatment of PKAN.

2. We connect state-of-the-art Research with Innovative Education

Academic education requires role models and modern teaching.

- * BSCS takes pride in intense training and careful supervision of its PhD students.
- * We support problem-based, curiosity-driven learning programs (such as in flipped classrooms), provide basic and advanced courses in science technologies and strategies, and practical courses.
- * We develop novel digital education tools (e-learning).

3. Collaborations drive discoveries

The progress of science is based on specialized expertise for discoveries, but requires intense collaborations amongst experts for driving such discoveries all the way to utilization.

BSCS strives for a great team spirit not only to nurture internal collaboration but also strongly supports collaborations with external partners in and outside the UMCG.

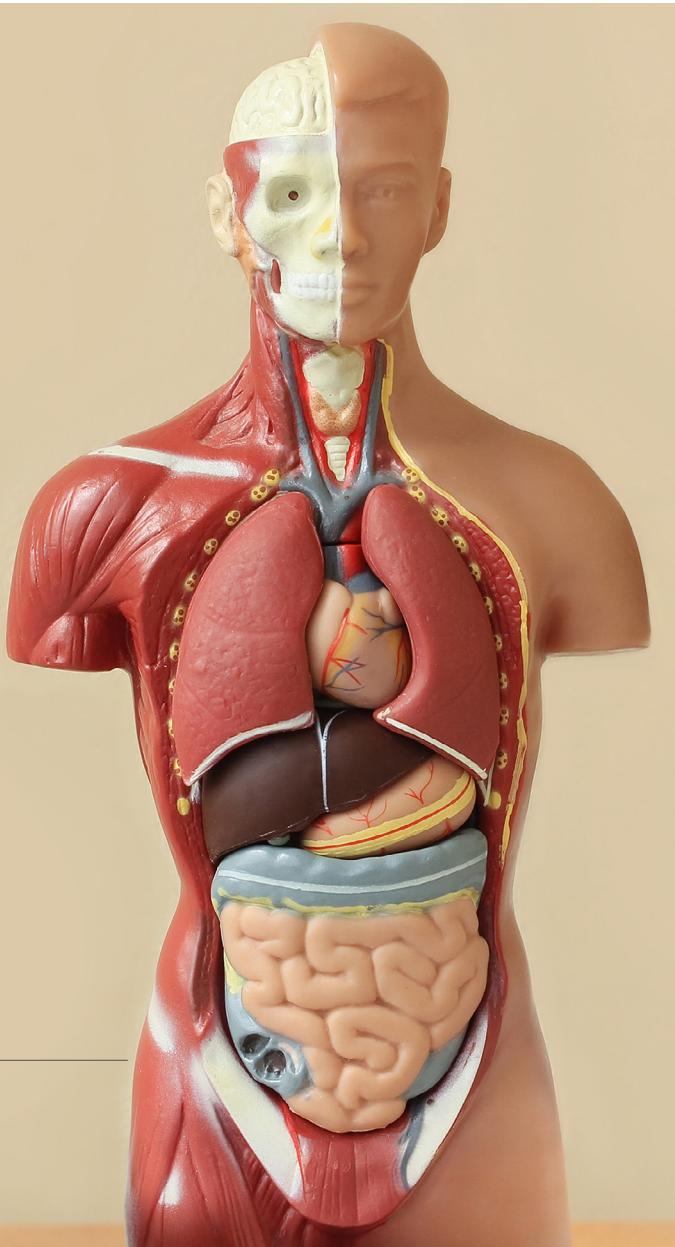
3. Research groups at BSCS

Research in the Department of Biomedical Sciences of Cells and Systems is divided into the following four sections:

3.1 Section Anatomy and Medical Physiology

The section Anatomy and Medical Physiology perform basic research on human motivational processes using different motivational contexts and research techniques. Human motivational process in biomedical education and training also underly the development of several digital applications by our group that support under-

graduate and postgraduate anatomy and physiology teaching. These applications can also be implemented in applied research on teaching efficacy. The two facilities of the Section – Dissection Room and Medical Physiology Lab –offer possibilities to collaborate in external research programs.



Groups:

- The research group of **Janniko Georgiadis** mainly focuses on human motivational processes in i) biomedical education and training, integrating educational science with gaming-psychology, and ii) sexual behavior, focusing on predictive coding theory.



3.2 Section Cognitive Neuroscience

The section Cognitive Neuroscience does research into symptoms and treatment of different psychiatric disorders and of age-related cognitive impairment.

Groups:

- **André Aleman** focuses on three lines of investigation: i) Psychiatric symptoms and vulnerability, with a focus on cognitive-emotional interactions, ii) Cognitive aging, with a focus on mild cognitive impairment and iii) Treatment and prevention, with a focus on non-invasive neuro-stimulation.



- **Sander Martens** focuses on individual differences in temporal attention within and across sensory modalities.



- **Marie-José van Tol** focuses on the interaction between mood and cognition in major depressive disorders, and especially factors that promote a prolonged course of these disorders and prevent relapse.



- **Branislava Ćurčić-Blake** focuses on brain connectivity analysis and improving cognitive functioning in patients with multiple sclerosis and elderly people with mild cognitive impairment (MCI), as well as auditory verbal hallucinations.



- **Iris Sommer** aims to improve future perspectives for patients with schizophrenia and other complex brain disorders. Special emphasis is put on biomarkers and personalized medicine. Her group has a broad interest in methods such as imaging, post-mortem analysis, epidemiology and treatment studies.



3.3 Section Molecular Cell Biology

The research mission of this section is to study basic processes in molecular cell biology to generate novel, fundamental insights related to cellular and organismal fitness. Through high-quality research, we aim at identifying and, where possible, at exploiting cellular targets to promote healthy aging and/or treat human disease.

- **Steven Bergink** aims to understand how DNA damage is linked to disturbances of protein homeostasis. (Steven resigned from our Department on 01-08-2021).



resigned from our
Department on
01-08-2021).

Groups:

- **Lara Barazzuol** (Seconded from the department of Radiation Oncology) focuses on assessing the effect of DNA damage (as caused by radiation and chemotherapy) on the brain and aims to achieve an improved biological and molecular understanding of cancer treatment-induced neurocognitive dysfunction.

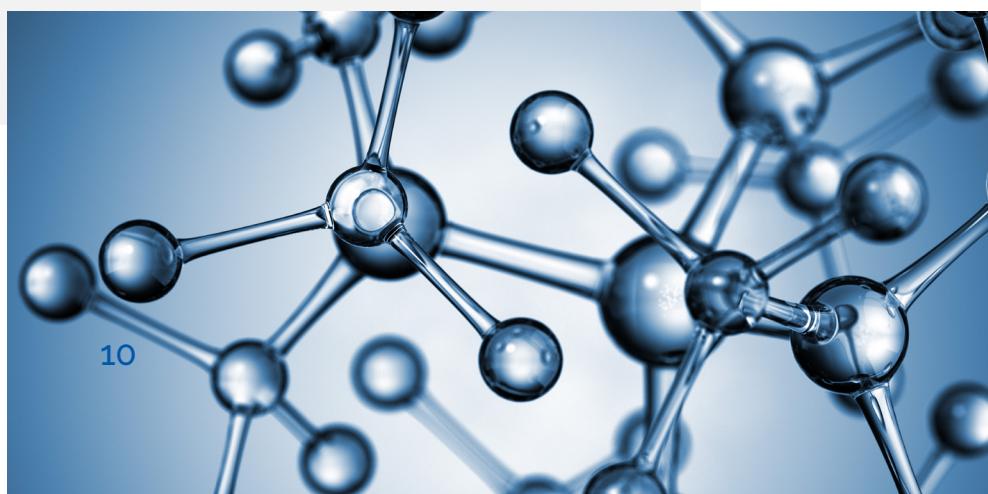


- **Ben Giepmans** aims to better visualize how molecules, organelles and cells act in concert to organize life, and how this may be affected in diseases. Focus is on developing and improving large-scale multimodal microscopy approaches that allow better identification of targets with new probes.



Special interest is in uncovering the trigger that leads to Type 1 diabetes.

- **Rob Copes** (Seconded from the department of Radiation Oncology) focuses on the role, mechanism and regenerative potential of normal tissue stem cells in the response of tissues to different radiation qualities, such as photons and protons.



- **Mark Hipp** studies the cellular quality control machinery to identify the mechanisms that healthy cells use to prevent toxic protein aggregation, and to help cells to use these mechanisms to prevent diseases associated with protein aggregation.



- **Muriel Mari** focuses on
 - i) Investigation of the membrane rearrangements underlying the biogenesis of the autophagosomes, the vesicular carriers that are the hallmark of autophagy, and
 - ii) Improvement and development of new electron microscopy approaches to increase the number of biological questions that can be addressed with these techniques.



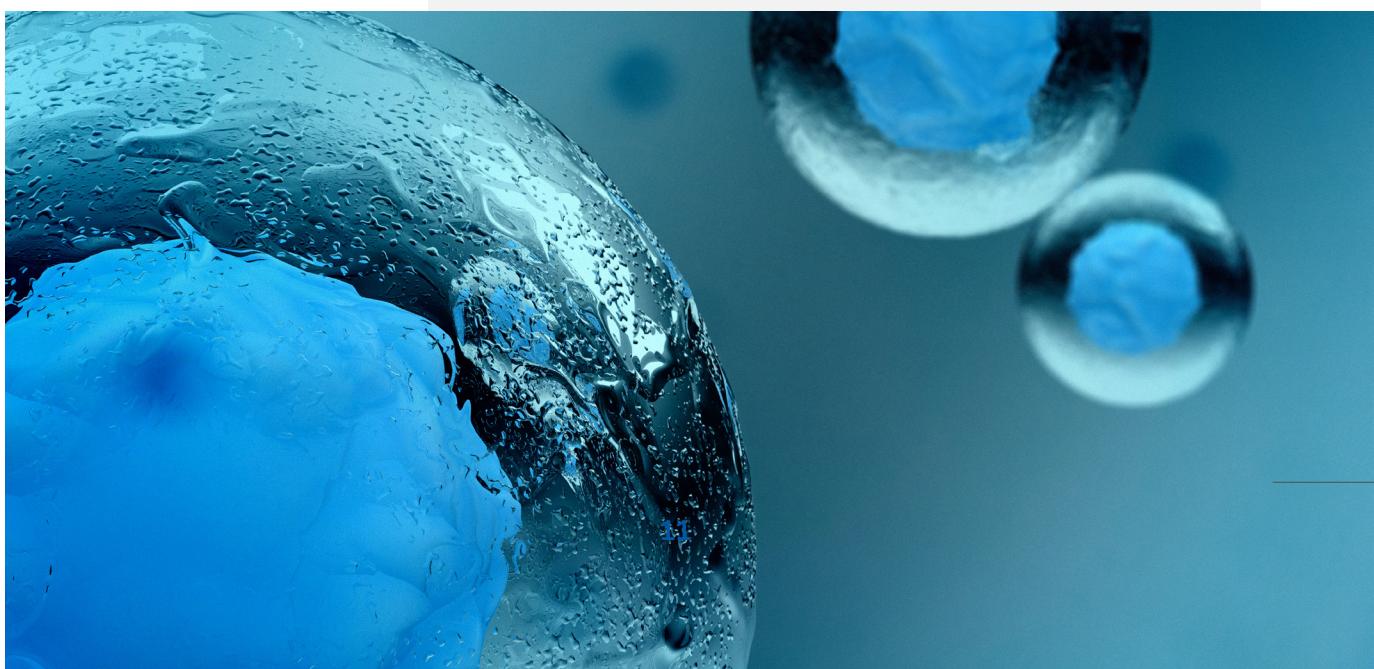
- **Harrie Kampinga** studies how cells maintain a healthy proteome, which is not only crucial for protein function and hence functionality of cells, but also essential to prevent accumulation of protein damage (protein aggregates)

that can lead to a cascade of toxic events that threaten cellular health span. To ensure a proper protein homeostasis, an intricate protein quality control (PQC) network exists in cells in which Heat Shock Proteins (HSP), the central research topic in his group, play a central role.



Rabouille group

- **Catherine Rabouille** focuses on
 - i) how cellular stress remodels the secretory pathway into a phase separated stress assembly in cell culture and
 - ii) how cells initiate unconventional secretion through the Golgi protein GRASP in organoids.



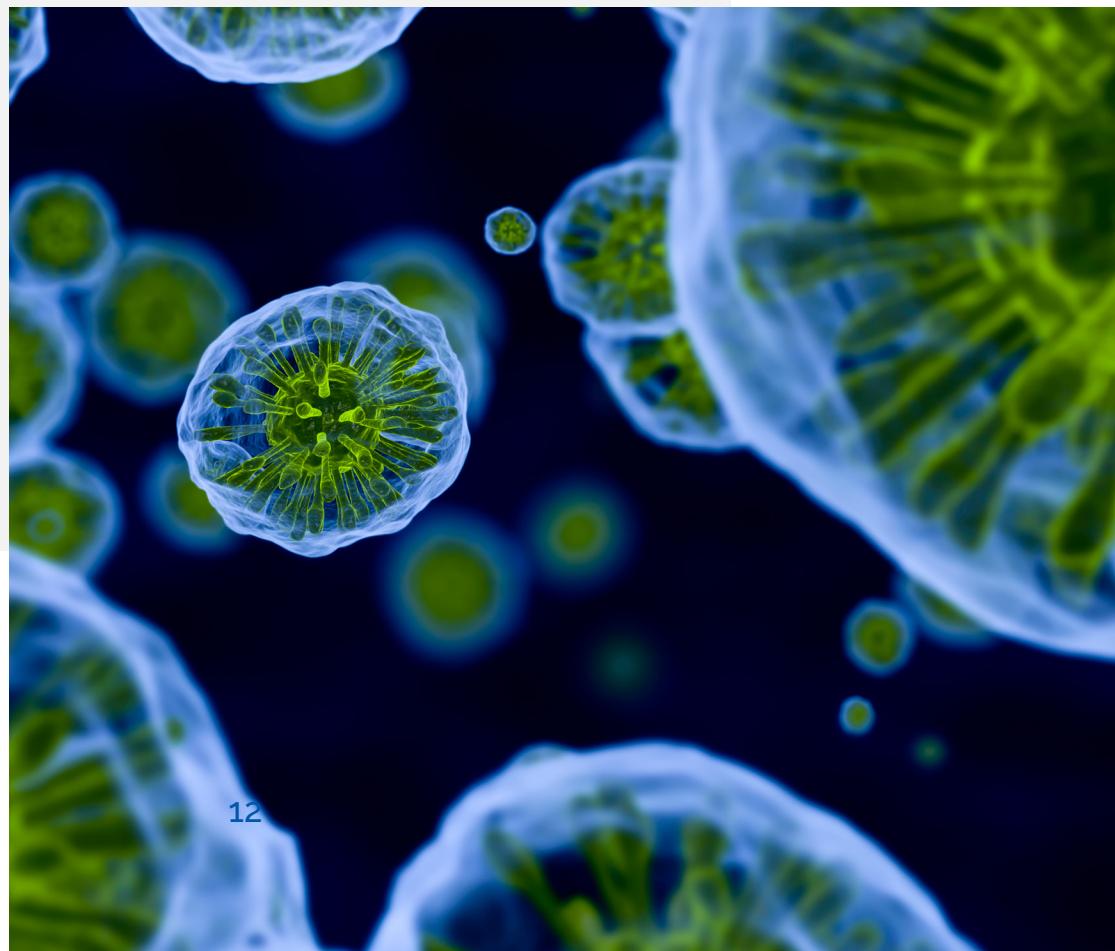
- **Fulvio Reggiori** aims at unveiling the regulation and molecular mechanism of autophagy using yeast as the model system. As the long-term objective is to understand the exact contribution of autophagy in specific physiological and pathological contexts, the group is also investigating the interaction between autophagy-related proteins and pathogens, in particular viruses, and the role of autophagy in preventing neurodegeneration.



- **Ody Sibon** aims to understand molecular mechanisms behind neurodegenerative diseases presenting with movement disorders. Obtained fundamental insights are used to design treatment strategies which are currently tested in clinical settings.



- **Sven van IJzendoorn** aims to understand the molecular mechanisms that control the intracellular dynamics of proteins, lipids and membranes in the context of the functional organization of cells, and to understand how these mechanisms contribute to health or, when disrupted, to human disease. In this context our focus is also on rare congenital disorders caused by disrupted intracellular protein dynamics and cellular organization, which includes elucidating their pathogenesis, development of patient-specific iPSC-based cell models and lead identification for novel therapeutic strategies.



3.4 Section Molecular Neurobiology

The mission of the Section Molecular Neurobiology is to study the central nervous system (CNS) during healthy ageing and neurodegenerative diseases using state of the art techniques.

Groups:

- **Wia Baron's** research interests lie in the area of myelin biogenesis and myelin repair with emphasis on the disease multiple sclerosis (MS). Currently, her research aims at revealing and overcoming environmental restrictions in MS lesions that underlie remyelination failure.



- **Bart Eggen** focuses on neuron-glia signaling and on the epigenetic regulation of different glial cell phenotypes and associated functionalities. This research is focused on brain development, ageing and perturbed functions of cells of the central nervous system in neurodegenerative conditions.



- **Inge Holtman** focuses on the effect of natural genetic variation on susceptibility to brain diseases using state-of-the-art computational and machine learning approaches.



- **Susanne Kooistra** focuses on how the epigenome regulates glial cell identity and function under neuroinflammatory conditions like multiple sclerosis, using single cell-omics approaches.

- **Inge Zijdewind** investigates mechanisms – at the level of muscles, spinal cord, and cortex – responsible for increased levels of fatigue and fatigability in different groups of subjects (including multiple sclerosis). Additionally, associated effects of fatigue and fatigability on physical and cognitive performance, and quality of life are studied.



4. Awarded Research Proposals

Projects awarded to the PIs:

#	Research Group	Funding body	Project Title	Budget
1	H.Kampinga	Huntington DNJB6	Inhibition of the aggregation of mutant huntingtin by activating DNAJB6 – fase 2	€ 264.000
2	F.Reggiori/M.Mari/L.Barazzuol/M. Mauthe	Million Dollar Bike Ride	Deciphering the causes of mitochondrial network disruption in WDR45-defective cells and their contribution to the BPAN pathology	€ 58.000
4	B.N.G.Giepmans	NWO	NL-BioImaging Advanced Microscopy bridging grant	€ 71.475
5	B.N.G.Giepmans	ZonMw	Pancreatic exocrine malfunction may trigger beta cell stress	€ 749.990
6	B.N.G.Giepmans	EU EFRO IMDAP	Imaging Data Platform (IMDAP)	€ 224.778
7	Svan IJzendoorn	ZonMW ARMED	Antioxidant treatment as a novel therapeutic option for microvillus inclusion disease - ARMED	€ 246.227
8	B.J.L.Eggen/ S Kooistra/ I.R. Holtman	Alzheimer NL	Understanding the role of microglia subpopulations in AD	€ 300.000
9	B.J.L.Eggen/ S. Kooistra	MS Research	Delineating altered cell-cell interactions in MS lesion development and progression: an integrative single-cell and spatial transcriptomics approach	€ 290.000
10	B.J.L.Eggen/ N.Brouwer	MS Research	Coordinator MS-Center North	€ 12.500
11	B.J.L.Eggen	MS Research	spatial gene expression analysis of de- and remyelinating/remyelinated lesions in a cuprizone mouse model, niet te homerenen	€ 20.000
12	W.Baron	MS Research	Targeting extracellular HSP90b as a novel therapeutic intervention to overcome remyelination failure in multiple sclerosis	€ 287.482
13	A.Aleman	QPS Chugai	MR scans for pharmaceutical development	€ 143.200
14	A.Aleman	QPS GH Res	Cognitive performance changes due to a psilocybin-like compound	€ 12.000
15	I.E.C.Sommer	ZonMw	Fewer cognitive sideeffects of electroconvulsive therapy with rivastigmine patches	€ 589.300
16	I.E.C.Sommer	Hersenstichting	No Guts No Glory	€ 999.956
17	I.E.C.Sommer	HAMAD Qatar Nat.Res.Fund	Early detection of psychotic disorders	€ 10.632
18	I.E.C.Sommer	Boehringer	A phase III randomized, double-blind, placebo-controlled, parallel group trial to examine the efficacy and safety of BI 425809 once daily over 26 week treatment period in patients with schizophrenia (CONNEX-2)	€ 211.560
19	I.E.C.Sommer	SUFFUGIUM	Elke stem telt	€ 24.953
20	M.J.van Tol	Pilotfonds KNAW	Marvelous Mind	€ 10.000
21	M.S.Hipp	Alzheimer Nederland	Modulating Intracellular Quality Control to Prevent Spreading of Aggregated Tau	€ 50.000

Projects awarded to the PhDs/ Postdocs:

#	PhD/ Postdoc	Research Group	Funding body	Project Title	Budget
Grants					
1	Jouke Jan Wedman	Ody Sibon/Hein Schepers	De Cock-Hadders	Elucidating the remarkable property of vitamin derivatives to enter the brain and rescue neurodegeneration	€ 5.500
2	Yingying Cong	F. Reggiori	Swiss IBSA Foundation	Killing coronaviruses by striking at their heart	€ 30.000
3	Noura Faraj	B.N.G.Giepmans	De Cock-Hadders	An in vivo model to define the effect of exocrine ablation on pancreatic β-cell stress	€ 4.000
4	Qinghong Li	S.van IJzendoorn	De Cock-Hadders	Identifying repurposable drugs that stimulate intestinal absorption in microvillus inclusion disease	€ 4.000
5	Alejandro Marmolejo	Erik Boddeke/ Amalia Dolga	De Cock-Hadders	Studying microglia in Alzheimer's Disease: an organoid system.	€ 4.000
6	Jody de Jong	W.Baron	De Cock-Hadders	Remyelination failure in multiple sclerosis: exploring the net effect of the extracellular matrix of distinct MS lesions on glial cell behavior	€ 4.000
7	Jody de Jong	W.Baron	MS Research	Consequences of the extracellular matrix architecture in white matter multiple sclerosis lesions to glial cell behaviour relevant for remyelination	€ 7.684
8	Jody de Jong	Wia Baron / Bart Eggen	Monique-Blom de Wagt grant	Overcoming remyelination failure in MS: the effect of the extracellular matrix on remyelination-relevant behaviour of glia cells in white matter MS lesions	€ 7.684
9	Wendy Oost	W.Baron	De Cock-Hadders	Large-scale electron microscopy for multiple sclerosis	€ 4.000
10	Janna de Boer, Dr.	I.E.C.Sommer	CLARIAH Say No More!	Say no more! Natural Language Processing for diagnosis and screening in psychiatry	€ 9.500
11	B.Brand	I.E.C.Sommer	De Cock-Hadders	Predicting treatment response to raloxifene augmentation in patients with a schizophrenia spectrum disorder	€ 4.000
12	Shiral Gangadin	I.E.C.Sommer	De Cock-Hadders	Identification and treatment of immune dysregulation in schizophrenia spectrum disorders	€ 4.000
13	Sofia Puvogel	I.E.C.Sommer/ Bart Eggen	De Cock-Hadders	Alterations within vascular and neuronal cross-talk in Schizophrenia	€ 4.000
14	Mirjam Koster	Bart Eggen/ Wia Baron	De Cock-Hadders	A pilot study to identify distinct cell populations in multiple sclerosis lesions using single-nucleus RNA-seqencing	€ 5.500
15	Marion Wijering	Bart Eggen / Wia Baron	Monique-Blom de Wagt grant	Spatial gene expression analysis of de- and remyelinated lesions in the cuprizone mouse model	€ 20.000
16	Marion Wijering	Bart Eggen/ Wia Baron	De Cock-Hadders	Functional analysis of MS-associated astrocyte genes in iPSC-derived astrocytes from relapsing-remitting multiple sclerosis patients	€ 5.148
17	Tiago Medeiros Furquim	Bart Eggen/ Erik Boddeke	De Cock-Hadders	Single-cell epigenomics of microglia from multiple sclerosis brain	€ 5.500
18	Rianne Gorter	Wia Baron	De Cock-Hadders	Unraveling an unexpected role for MMP7 in remyelination	€ 5.500
Fellowships					
19	Tiago Furquim, Alejandro Garza and Prajit Dhar (Faculty of Arts)	Bart Eggen/ Erik Boddeke	BCN Seed Grant 2021	Deciphering the grammar and morphology of the protein language in Alzheimer's Disease	€ 10.000
20	Rianne Gorter	Wia Baron	Network Glia	'young investigator' stipend for the virtual Euroglia Meeting 2021	€ 250



“Our department has achieved a balanced gender ratio and welcomed a number of new PhD students.”

5. Facts and Figures

5.1 Funding received/ Projects awarded

Projects and Funding	2020	2021
Budget awarded projects	€ 4.068.420	€ 4.710.069
Number of projects awarded	23	39*

*See the previous section for a list of awarded projects.

5.2 PhD Graduations

Number of PhDs Graduated per section	2020	2021
Section Cognitive Neuroscience	3	4
Section Molecular Cellbiology	6	4
Section Molecular Neurobiology	3	5
Total	12	13*

*See the Appendix-1 for a list of all PhD theses defended per section at the end of the report.

5.3 Scientific Publications

Number of publications per section	2020	2021
Section Anatomy and Medical Physiology	3	00
Section Cognitive Neuroscience	63	97
Section Molecular Cellbiology	43	52
Section Molecular Neurobiology	25	25
Total	134	174*

*See the Appendix-2 for a list of all publications published per section at the end of the report.

5.4 People

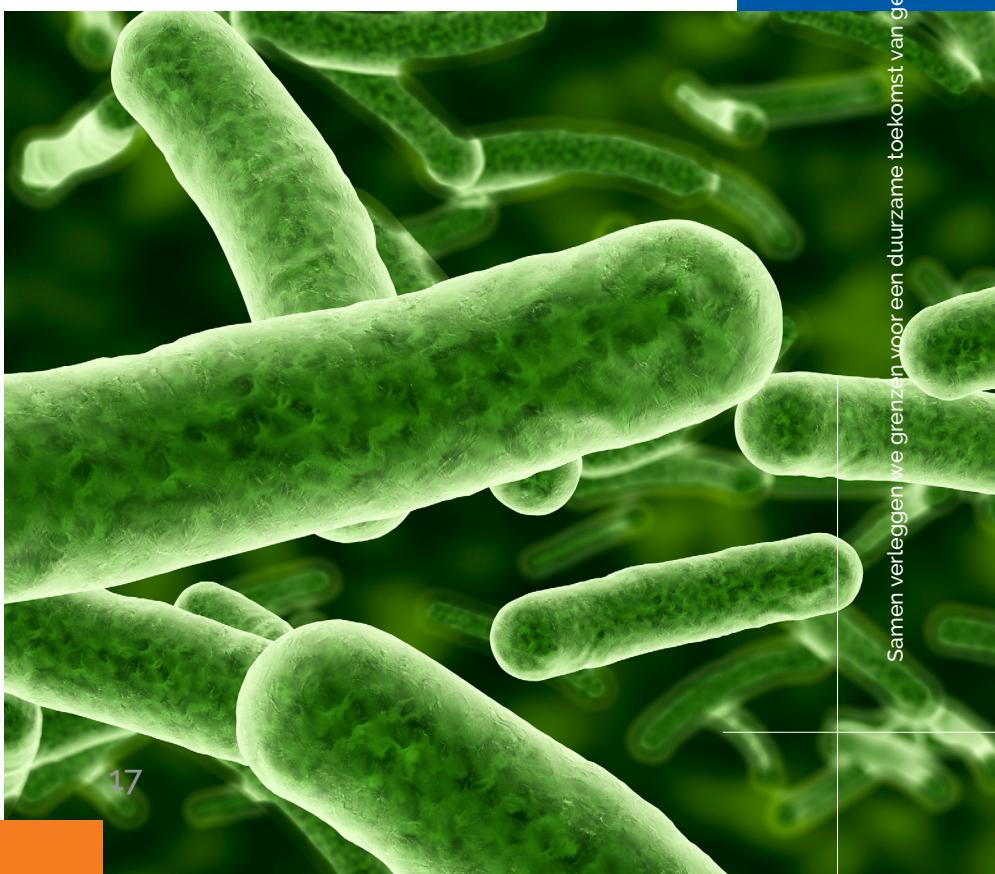
Gender	2020	2021
Men	62 (41%)	83 (50%)
Women	91 (59%)	84 (50%)
Total	153	167

PhDs students	2020	2021
PhD regular	38	48
PhD bursaries	4	12
Total	42	60

Employees	2020	2021
Total FTE	113.15	122.85
Total number of employees	153	167
No. of employees moved out	7	6
No. of employees joined	23	13
Transferred employees	-	11

Internationals	2020	2021	
No. of Dutch employees	89 (58%)	135 (81%)	
No. of International employees	64 (42%)	32 (19%)	
No. of nationalities	22	16	
USA	1	Italy	3
Brazil	2	Japan	1
Canada	1	Mexico	1
China	2	Netherlands	135
Germany	11	Slovenia	1
France	2	Spain	2
India	2	Syria	1
Iraq	1	Switzerland	1

Management team BSCS	
Harrie Kampinga	Head of the Department
Janniko Georgiadis	Head of the Section Anatomy and Medical Physiology
André Aleman	Head of the Section Cognitive Neuroscience
Fulvio Reggiori	Head of the Section Molecular Cellbiology
Bart Eggen	Head of the Section Molecular Neurobiology
Henk Heidekamp	Managing Director
Arnoud Rozema	Financial Controller and Staff Advisor
Mallikarjuna Gurram	Research Coordinator
Wytse Hogewerf	Staff Assistant
Harry Moes	Housing, HRM, Finance and Quality Assurance
Greetje Hollander	Secretary Anatomy & Medical Physiology
Hedwig van Oosten	Secretary Cognitive Neuroscience Center
Greetje Noppert	Secretary Molecular Cellbiology
Trix van der Sluis-Rozema	Secretary Molecular Neurobiology



6. Facilities

6.1 Dissection Room facility

The Dissection Room facility is a modern facility where real human anatomy can be studied extensively and in considerable detail. The facility strongly supports life-long learning, offering both basic undergraduate courses and specialist post-graduate trainings across a great variety of teaching and training programs, locally, regionally, nationally and internationally. This irreplaceable form of learning is afforded by human body donors, who generously give their body to the University of Groningen to stimulate, support and improve biomedical education and research. The facility has a close collaboration with the Wenckebach Skills Center for the optimization of resident training and surgical approaches, for simulating skills needed in the operation room, and for research on clinically relevant anatomy.

Specific services:

- 3 different embalming methods to optimally cater to a range of education or research requests.
- partnership with Wenckebach Skills Center enables very wide range of education, training, and research activities with donated bodiesgreat expertise in organizing international specialist surgical courses.



People involved in the facility and their roles:

Janniko R. Georgiadis – Head of the facility

Steve Oosterhoff – Manager of the facility

Peter Veldman – Prosector

Ronald Meijer - Prosector

Contact:

Department of Biomedical Sciences of Cells and Systems

University Medical Center Groningen

Antonius Deusinglaan, 1

Section Anatomy and Medical Physiology

Internal Zipcode FB42

9700 AD Groningen

The Netherlands

<https://bscs.umcg.nl/en/facilities/dissection-room>

“

Our high quality facilities and laboratories provide excellent opportunities for education, research and development to our collaborators and partners.

”

6.2 Medical Physiology Lab facility

The Medical Physiology Lab is used to teach the basic concepts of physiology to 700-1000 students per year of medicine, human movement sciences, dentistry, pharmacy, biomedical sciences and the University College Groningen. Via experiential learning, these students master the concepts in respiratory physiology, cardiovascular physiology, exercise physiology and neurophysiology: the students experience the tests themselves and they perform those tests on fellow students, and learn to interpret the results. For medical students, this is also their first experience in physical examination and additional measurements, such as electrocardiography, blood pressure measurements, and lung function tests.

In 2020, we received a financial investment from the UMCG to update, upgrade, and increase the numbers of our equipment, to be able to match the practice in the clinic, to deal with larger numbers of students per practical, and to be able to offer high-end courses in physiology for medical residents and specialists. The first investments were used to update (and upgrade) one of the set-ups of exercise physiology, to renew the set-up for continuous blood pressure measurements, and to replace the stethoscopes for the cardiovascular function tests.



People involved in the facility and their roles.

Janniko R. Georgiadis – Head of the facility

Ruby Otter-Drost – Manager of the facility

Annelies van der Molen – Coordinator of the facility

Contact:

Department of Biomedical Sciences of Cells and Systems

University Medical Center Groningen

Antonius Deusinglaan, 1

Section Anatomy and Medical Physiology

Internal Zipcode FB42

9700 AD Groningen

The Netherlands

<https://bscs.umcg.nl/en/facilities/medphyslab>

6.3 Cognitive Neuroscience Center (CNC) facility

We provide high-quality measurements and analyses of brain structure and activity using a diversity of cutting-edge technologies. Founded in 2002, the CNC is a research facility where people from the UMCG, the RUG, and external users collaborate, combining a variety of disciplines including medicine, psychology, linguistics, biology, and artificial intelligence.

The main aim of our center is to understand the neural basis of cognitive and emotional functioning during development and ageing using different modalities including fMRI, EEG, NIRS, and neurostimulation.

We focus on different research topics:

- Diverse psychiatric disorders including depression and schizophrenia
- Cognitive Aging
- Attentional and emotional control
- Visual perception
- Food perception
- Language acquisition
- Neurofeedback
- Motor control
- Drug development

We are uniquely placed for a wide variety of (brain) studies. We collaborate with the Department of Nuclear Medicine and Radiology to support integration of PET and MR studies. Besides data acquisition, the CNC supports researchers with analyses and statistics and can provide a workplace environment with its own servers for (guest) researchers. Furthermore, the CNC offers commercial partners a complete brain research 'package' encompassing acquisition, analysis and reporting.



People involved in the facility and their roles:

Prof. André Aleman – Head of the facility

Contact:

Cognitive Neuroscience Center
Internal Zipcode FA32,
Antonius Deusinglaan 2,
9713 AW Groningen

For information, you can contact
Hedwig van Oosten at h.w.p.m.van.oosten@umcg.nl,
Telephone +31 50 361 64 44.
<https://bscs.umcg.nl/en/facilities/cognitive-neuroscience-center/>
<https://umcgresearch.org/w/cognitive-neuroscience-center>

6.4 Drosophila melanogaster facility

Drosophila melanogaster (fruit fly) is one of the most well studied animals to answer biological research questions in various fields, including ecology, evolution, behaviour, genetics, biomedical research, development and more.

The Drosophila facility at the UMCG is using a wealth of advanced genetic tools to design fly models to understand biological processes underlying age-related diseases. These models are used to investigate novel treatments for human diseases.

In collaboration with interested parties (researchers, educational organisations) we can design, and assist in generating and providing the requested Drosophila models.

We provide the following services:

1. Assist in the design of a suitable Drosophila model for research questions
2. Infrastructure for interested parties to generate the Drosophila model
3. Deliver fruit flies for small scale (genetic) teaching courses



People involved in the facility and their roles:

Prof. Ody Sibon -- Head of the facility

Ellie Eggens-Meijer --Technician: logistics Drosophila service unit

Bart Kanon -- Technician: Drosophila handling

Erika Geubel -- Technician: Drosophila handling

Contact:

Drosophila melanogaster – facility

Department of Biomedical Sciences of Cells and Systems

University Medical Center Groningen

Antonius Deusinglaan, 1

Section Molecular Cellbiology Internal Zipcode FB32

9700 AD Groningen

The Netherlands

<https://umcgresearch.org/w/drosophila-melanogaster>

6.5 UMCG Microscopy & Imaging Center (UMIC) facility

Microscopy is a longstanding great enabling technology to help to understand how molecules regulate, or affect, life. UMIC offers training and access to advanced microscopes and image processing aimed at cellular imaging.

UMIC staff is highly enthusiastic because it is again a fantastic time to be a microscopist! Recent developments that already routinely can be used at UMIC include:

- I. intravital microscopy to study molecules and cells in living organism using
 - a. single-photon confocal laser scanning microscopy (CLSM)
 - b. two-photon CLSM
 - c. light sheet microscopy
- II. Robotics allow live-cell imaging plates at high throughput

Special niches at UMIC, including custom-built microscopes and expert assistance that attract international researchers include

- III. correlated light and electron microscopy (CLEM);
- IV. 'nanotomy' to analyze molecules and organelles in tissues in a Google earth-like manner with nanometer range resolution
- V. Identification using 'Color' electron microscopy

In 2021 several new techniques are available by a major upgrade of the instruments. UMIC is very dynamic and has many more approaches for cellular imaging, with several new investments planned. Do you want to apply seemingly impossible microscopic approaches in your research, feel free to contact us (www.umic.info).

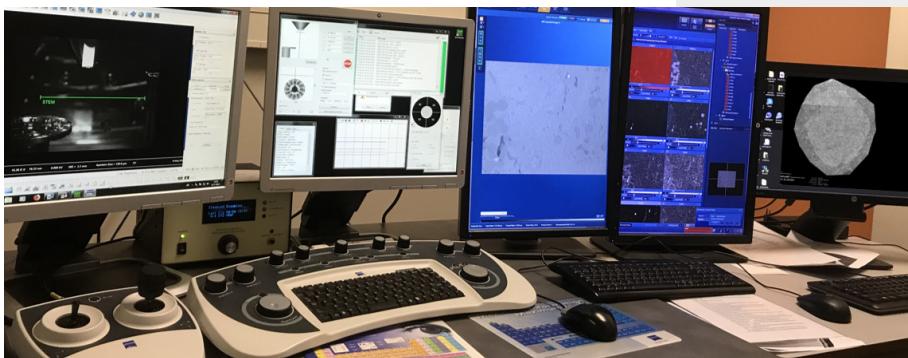
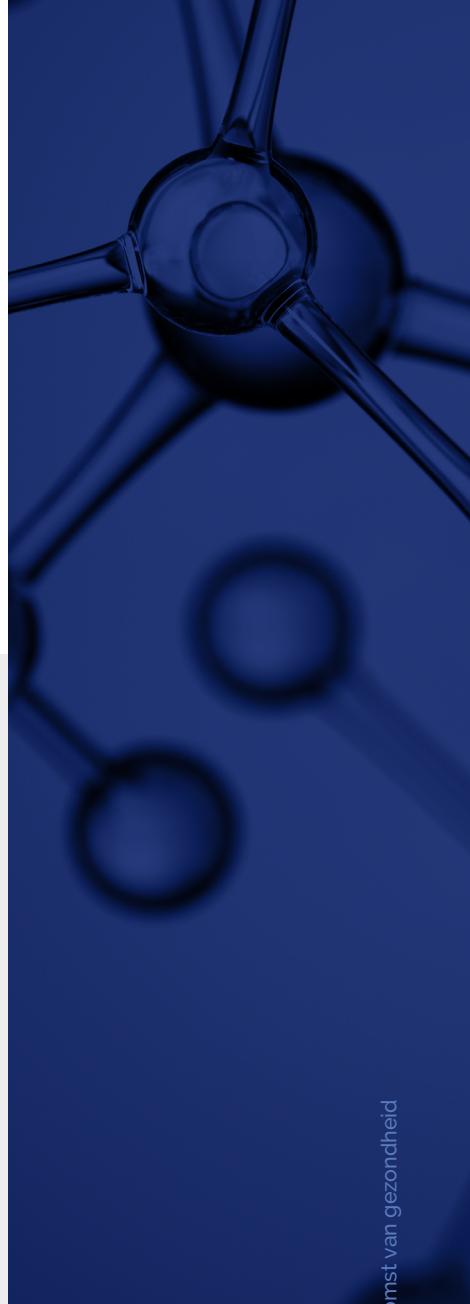


Fig. 6.5a: Multimodal microscopy: Different signals are obtained from the electron microscope that allows 'nanotomy' and 'ColorEM'. Samples are sent from other regions in the Netherlands/ world to use these niche techniques in biomedical research.



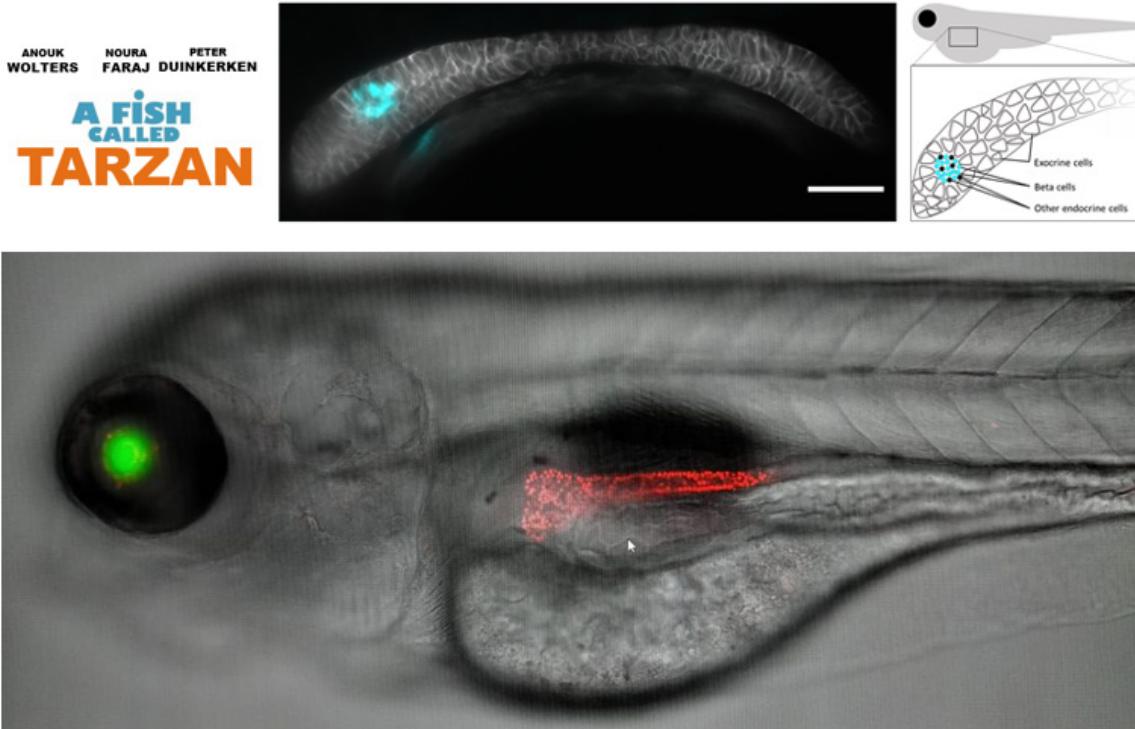


Fig 6.5b: Tarzan (top) and Jane (bottom), zebrafish larvae to study the pancreas in context of Type 1 diabetes. UMIC optogenetics and imaging of living larvae, including using multi-photon , single plane illumination microscopy and FAST-EM.

People involved in the facility and their roles:

Ben Giepmans – Director

Klaas Sjollema – Managing Director Light Microscopy

Jeroen Kuipers – Managing Director Electron Microscopy

UMIC participates in the NVvM, NL-Biolimaging, NEMI, is a DTL-hotel and nPOD core facility

Contact:

UMCG Microscopy & Imaging Center (UMIC)

Antonius Deusinglaan 1 (FB32)

9700 AD Groningen

The Netherlands

EM-dbase: nanotomy.org

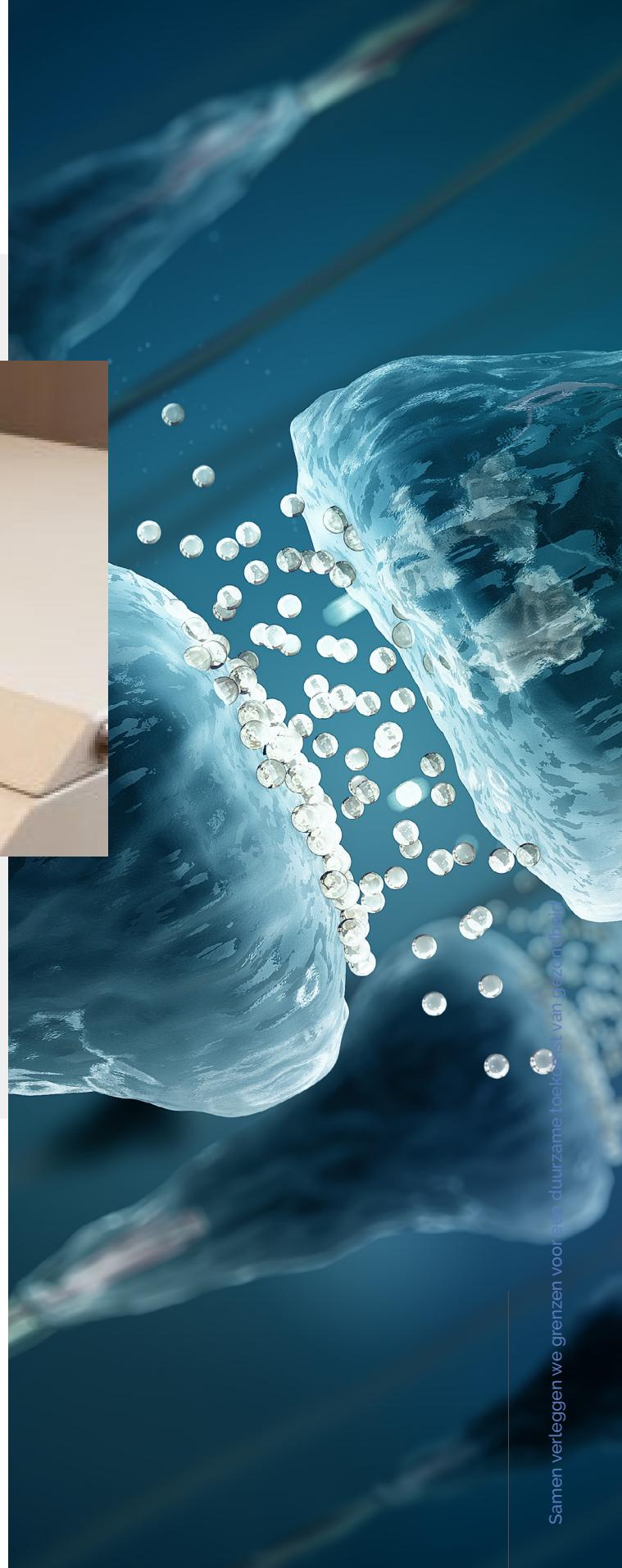
UMIC core: umic.info

<https://umcgresearch.org/w/umic>



6.6 Cesium-137 γ -ray facility

The Cesium-137 γ -ray machine is to be used by authorized researchers to irradiate cells, Drosophila larvae, mice and rats and other samples.



People involved in the facility and their roles:

RPO (Radiation Protection Officer): Rob Coppes

RPE (Radiation Protection Expert): Rick Havinga

Contact person radiation worker (level 5): Uilke Brouwer

Contact:

<https://bscs.umcg.nl/en/facilities/cesium-137%CE%B3-ray-facility/>

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Department of Biomedical Sciences of Cells and Systems

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7. Education

Teaching and training is also a core activity within the BSCS department. The research staff from BSCS is involved in a wide range of educational activities spanning across multiple faculties and institutions. Below we provide a list

of courses that are being coordinated by the research staff from the BSCS. This list does not include the activities where the BSCS members were not the coordinators.

Faculty/ Institute	Course	Coordinator
Medicine	G2020 Course Semester 1.2	Hiske van Duinen
	G2020 Course Semester 2.1	Hiske van Duinen
	G2020 Course Semester 2.2	Janniko Georgiadis
	G2020 Premaster	Rob Bakels
	G2020 chair TBP (toetsbeoordelingspanel)	Rob Bakels
	European Medical School Oldenburg-Groningen	Janniko Georgiadis
	Psychiatry and Neuroscience (2nd year)	Branislava Ćurčić-Blake
Dentistry	Bachelor, year 1	Anne-Marijke Kosta
	Coordinator Medische lijn	Inge Zijdewind
Science and Engineering (FSE)	Master BCN: Human neuroanatomy	Janniko Georgiadis
	Bachelor Life Sciences & Technology / Biology: Medical Physiology	Hiske van Duinen
	Master BCN: Membrane Biology and Disease	Wia Baron
	Medical Cell Biology	Muriel Mari
	Functional Neuroscience	Susanne Kooistra
	Glia and Stem Cell Biology	Bart Eggen
Human Movement Science	Bachelor BW: Neuroanatomie 1	Janniko Georgiadis
	Bachelor BW: Algemene fysiologie	Ruby Otter-Drost
	Bachelor BW: Neurofysiologie	Rob Bakels
	Bachelor BW: Inspanningsfysiologie	Hiske van Duinen
University College Groningen	Anatomy & Histology	Cyril Luman
	Human Physiology	Pepijn Schoonen
	Clinical Psychology: mental health and illness	André Aleman
Hanze	Anatomie van de mens(Master Physician Assistant)	Carola Haven
Post-graduate teaching and training	Common Trunk surgery residency training program	Janniko Georgiadis
BSCS/UMIC, UMCG	Cellular Imaging Light	Ben Giepmans
BCN, UMCG	Cognitive Neuro-psychiatry, Research Masters	Marie-José van Tol
BCN	Functional Neuroscience (N-track, BCN Master)	Susanne Kooistra
BCN,UMCG	BCN Mathematics for neuroscientists	Branislava Ćurčić-Blake

8. Scientific dissemination & Business development

At BSCS, we encourage and support researchers to share our know-how, drive discoveries towards applications and (in doing so) collaborate with industries. We welcome collaborations to generate access to our scientific ideas and state-of-the-art facilities. Below we list out results from our recent efforts to connect science with business.

8.1 PKAN

The Sibon group discovered and developed a potential treatment for the neurodegenerative disease Pantothenate Kinase-Associated Neurodegeneration (PKAN) (Srinivasan et al., Nat. Chem Biol 2015; Jeong et al., EMBO MOL. MED 2019). Currently, financed by the Stichting Zeldzame Ziekte Fonds, Stichting Kans voor PKAN kinderen, de Stichting Lepelaar, ZonMW and the Hersenstichting, an investigator driven clinical trial started (September 2021) for PKAN patients in close collaboration with the Expertise Centre for Movement Disorders, at the UMCG. The product under investigation was designed, developed and produced (clinical usage grade) by prof. Sibon and her collaborators. The product is proven to be effective in Drosophila and mouse models for PKAN and the aim of the clinical study is to test our developed product in the clinic.

8.2 Enatom

Enatom is a joint initiative by the Section Anatomy & Medical Physiology and the 360 degree visualization company VIEMR to visualize in exquisite detail human anatomical specimens for use in distance learning applications and solutions. Thanks to considerable investments over the past few years, Enatom has made substantial progress in anatomic content and image quality.



8.3 Anatomy Gym

Anatomy Gym is a game-like App for smartphone and tablet to learn anatomical facts. It was launched in 2020. Anatomy Gym has seen considerable interest from users as well as from teaching parties that want to include specific modules. Anatomy Gym is scalable to a very large and diverse audience, and progress has been made to stimulate its further development and sustainability.

8.4 Stem cell therapy

Radiotherapy of head and neck cancer is often accompanied with dysfunction of the salivary glands leading to xerostomia (dry mouth syndrome). Basic science by the Coppes' lab linked this to identification of a salivary gland cell stem compartment that is depleted by radiation. This has now developed into a stem cell therapy in which stem cells from the patient are collected before and give back after radiation for the treatment of this side effect. After pre-clinical testing and development of a protocol for safe clinical use, a first in man Phase I/II trial will start this summer at the UMCG.

9. Outreach & Dissemination

Besides research and education, all scientific staff members from BSCS, including PhD students, postdocs, and group leaders, have been actively involved in the scientific outreach and dissemination activities. Below we list out the notable activities by BSCS during the year 2021.

Outreach by the PIs:

1. Mario Mauthe, Fulvio Reggiori, Muriel Mari and Lara Barazzuol received a grant from the 2020 Million Dollar Bike Ride Grant Program.
2. Rob Coppes in an article on [UMCGresearch.org](https://umcgresearch.org): For the very first time, the UMCG starts offering tissue-specific stem cell transplants to cancer patients who are at risk of a dry mouth after radiotherapy. umcgresearch.org/stemcellpodcast.com, longfonds.nl, umcgkankerresearchfonds.nl, omroephethogeland.nl, longevity.technology, academictimes.com, reuma-arnhem.nl, svt.se, dvhn.nl, rd.nl, [rtvnoord.nl-1](https://rtvnoord.nl) and [rtvnoord.nl-2](https://rtvnoord.nl).
3. Branislava Ćurčić-Blake, Sander Martens and several in house neuroscientists contributed with movies for Brain Awareness week 2021 <https://neurofederatie.nl/BAW21>.
4. Iris Sommer on Brainwash talks (NPO2) gives a glimpse into the woman's brain. <https://www.tvgids.nl/tv/brainwash-talks>
5. Marvelous Mind receives € 10,000 from KNAW science communication fund <https://www.rug.nl/research/bcn-brain/marvelousmind/>
6. Muriel Mari and Mario Mauthe on "Teaching from Bench to Bedside - A bachelor course at the crossroads of research, care and patient involvement" <https://umcgresearch.org/w/teaching-from-bench-to-bedside>
7. André Aleman and Branislava Ćurčić-Blake appeared in an article in Dagblad van het Noorden and RTV Noord titled, Elderly people with forgetfulness: possibly a harbinger of Alzheimer's <https://dvhn.nl/groningen/stad/Meer-aan-de-hand-bij-ouderen-met-vergeetachtigheid-mogelijk-een-voorbode-van-Alzheimer-26835401.html>
8. André Aleman and Branislava Ćurčić-Blake appeared in an article on RTV Noord titled, Can electrical stimulation of the brain prevent dementia? <https://www.rtvoord.nl/nieuws/818795/kan-elektrisch-stimuleren-van-de-hersen-en-dementie-tegengaan>
9. Rob Coppes in an article on UMCG KennisZicht - Growing a working mini-organ with thyroid tissue <https://kennisinzicht.umcg.nl/Paginas/schildklier-kweken.aspx>
10. After 123 issues (4 per year), the BCN Newsletter changed its name to BCN magazine. Its editor-in-chief is Sander Martens. <https://www.rug.nl/research/behavioural-cognitive-neurosciences/news/magazine?lang=en>
11. MS researcher Susanne Kooistra has been appointed as Assistant Professor <https://bscs.umcg.nl/en/2021/08/23/appointment-susanne-kooistra-as-assistant-professor/>
12. Susanne Kooistra received Rogier Hintzen Award <https://bscs.umcg.nl/en/2021/10/04/susanne-kooistra-received-rogier-hintzen-award/>
13. Marie-José van Tol is the new chair of De Jonge Akademie <https://www.dejongeakademie.nl/nieuws/2106122.aspx>
14. Iris Sommer has been awarded the Distinguished Lorentz Fellowship <https://bscs.umcg.nl/en/2021/12/16/6006/>
15. Iris Sommer was one of the speakers at 2021 Gala of Science <https://ita.nl/nl/voorstellingen/gala-van-de-wetenschap-2021/1655706/>
16. Iris Sommer gave a TED talk about the female brain <https://www.tedhaarlem.com/article/alles-tedhaarlem-2021/>
17. BSCS researchers Bart Eggen, Inge Zijdewind and Wia Baron are MT members of the MS Center Noord Nederland (MSCNN, www.msCNN.nl). As MSCNN coordinator Nieske Brouwer distributes a monthly electronic newsletter to inform subscribers (130) on timely topics (e.g., COVID-19 and MS), and MSCNN activities (e.g., MS seminars, PhD defenses) and MSCNN news (e.g., new employees, publications, grants), among others, via interviews.
18. Inge Zijdewind and Liesbeth Simmelink presented a research proposal during patient group meeting for the MS-vereniging regio Groningen/Noord Drenthe.



Outreach by the PhDs/Postdocs:

1. Dr. Yingying Cong from the group of Prof. Fulvio Reggiori received a 30,000 euros fellowship from Swiss IBSA Foundation to work on a research project entitled "Killing coronaviruses by striking at their heart" for 1 year. <https://www.ibsafoundation.org/en/activities/fellowships/ibsa-foundation-fellowships-2020>.
2. Mario Mauthe, from the group of Fulvio Reggiori, was elected as a new board member of the Nordic Autophagy Society (NAS). <https://nordicautophagy.org/board-members/>
3. Abel Soto Gamez, from the group of Prof. Rob Coppes, received the "Tekke Huizinga Funds" Scholarship for a study visit to two labs in Tokyo for improving skills in stem cell technologies."
4. Shiral Gangadin, from the group of Iris Sommer, is one of the 12 new faces of science (KNAW) (Info)
5. Shiral Gangadin as Blogger Faces of Science 2021 <https://www.nemokennislink.nl/facesofscience/wetenschappers/shiral-gangadin/>
6. Janna de Boer and Alban Voppel, from the group of Iris Sommer, received the NWO Open Mind Award <https://www.nwo.nl/nieuws/vijf-out-box-ideeen-krijgen-open-mind-beurs>
7. Three BSCS PhD students from the Section Molecular Neurobiology write an alternating blog (<https://www.grunnmoves.nl/blog-mscnn>) on their MS research and their experience as PhD students for the website of Grunn MoveS.
8. Tiago Medeiros Furquim and Alejandro Marmolejo Garza from BSCS, together with Prajit Dhar (Faculty of Arts) received a BCN Seed Grant 2021 for their project titled "Deciphering the grammar and morphology of the protein language in Alzheimer's Disease". <https://www.rug.nl/research/behavioural-cognitive-neurosciences/information/bcn-seed-grants-2021.pdf>
9. Rianne Gorter received a Network Glia 'Young Investigator' Stipend for the virtual Euroglia Meeting 2021.



10. Appendix 1: PhD graduations

More details about the PhD graduations can be found on the university research portal.

Section Cognitive Neuroscience

- 1 Jasper Nuninga,
Supervisor(s): Iris Sommer,
Thesis title: Electrically induced neuroplasticity: Exploring the effects of electroconvulsive therapy for depression using high field MRI
<https://doi.org/10.33612/diss.149053115>
- 2 Mascha Linsen.
Supervisor(s): Iris Sommer,
Thesis title: Understanding hallucinations outside the context of psychotic disorders
<https://doi.org/10.33612/diss.182727500>
- 3 Maya Schutte,
Supervisor(s): Iris Sommer,
Thesis title: A Transdiagnostic Comparison of Hallucinations
<https://doi.org/10.33612/diss.193691966>
- 4 Shereif A.M.M. Haykal ,
Co-Supervisor: Branislava Ćurčić-Blake,
Thesis Title: Visual pathway white matter alterations in glaucoma
<https://doi.org/10.33612/diss.183967255>

Section Molecular Cellbiology

- 5 Cecilia Rocchi,
Supervisor(s): Coppes, R.P; Barazzuol, L.
Thesis title: Exploring the Regeneration Potential of Salivary Glands using Organoids as a Model.
<https://doi.org/10.33612/diss.168896082>
- 6 Wouter Huiting.
Supervisor(s): Kampinga, H.H., Bergink, S.
Thesis title: The impact of genotoxic stress on protein homeostasis.
<https://doi.org/10.33612/diss.168249330>
- 7 Yi Yu.
Supervisor(s): Sibon, O.C.M., Schepers, H..
Thesis title: Exploring novel strategies to rescue Coenzyme A deficiency-related diseases in Drosophila melanogaster models.
<https://doi.org/10.33612/diss.177562111>
- 8 Marit de Beer,
Supervisor(s): Giepmans, B.N.G., Sven Ijzendoorn
Thesis title: Development and application of protein-based probes for correlated microscopy.
<https://doi.org/10.33612/diss.147586577>

Section Molecular Neurobiology

- 9 Yang Heng,
Supervisor(s): Bart Eggen, Jon Laman, Susanne Kooistra,
Thesis title: Innate Immune memory and Transcriptional profiling of Microglia
<https://doi.org/10.33612/diss.151944032>
- 10 Malte Borggrewe,
Supervisor(s): Jon Laman, Bart Eggen, Susanne Kooistra,
Thesis title: Exploring the VISTA of glial cells
<https://doi.org/10.33612/diss.168886037>
- 11 Clarissa Branco Haas,
Supervisor(s): Bart Eggen, Jon Laman
Thesis title: Insulin signaling and microglia in the young and aged brain
<https://doi.org/10.33612/diss.183132348>
- 12 Dennis Lentferink,
Supervisor(s): Wia Baron, Bart Eggen,
Thesis title: Regional diversity in oligodendrocyte progenitor cells: implications for remyelination in grey and white matter
<https://doi.org/10.33612/diss.165785295>
- 13 Charlotte de Jong,
Supervisor(s): Wia Baron, Dick Hoekstra,
Thesis title: On the role of galectin-4 in (re)myelination and multiple sclerosis
<https://doi.org/10.33612/diss.183761740>

11. Appendix 2: Publications

More details about these publications can be found on the university research portal.

Section Cognitive Neuroscience:

1. Writing Committee for the Attention-Deficit/Hyperactivity Disorder; Autism Spectrum Disorder; Bipolar Disorder; Major Depressive Disorder; Obsessive-Compulsive Disorder; and Schizophrenia ENIGMA Working Groups, Patel Y, Parker N, Shin J, Howard D, French L, Thomopoulos SI, Pozzi E, Abe Y, Abé C, Anticevic A, Alda M, Aleman A, et al., Virtual Histology of Cortical Thickness and Shared Neurobiology in 6 Psychiatric Disorders. 2021 Jan 1;78(1):47-63. doi: 10.1001/jamapsychiatry.2020.2694.
2. Wang Z, Goerlich KS, Ai H, Aleman A, Luo YJ, Xu P. Connectome-Based Predictive Modeling of Individual Anxiety. *Cereb Cortex*. 2021 May 10;31(6):3006-3020. DOI: 10.1093/cercor/bhaa407
3. Tahmasian M, Aleman A, et al., ENIGMA-Sleep: Challenges, opportunities, and the road map. *J Sleep Res.* 2021 Apr 28:e13347. doi: 10.1111/jsr.13347.
4. van der Stouwe ECD, Pijnenborg GHM, Opmeer EM, de Vries B, Marsman JC, Aleman A, van Busschbach JT. Neural changes following a body-oriented resilience therapy with elements of kickboxing for individuals with a psychotic disorder: a randomized controlled trial. *Eur Arch Psychiatry Clin Neurosci.* 2021 Mar;271(2):355-366. DOI: 10.1007/s00406-020-01097-z
5. Han LKM, Dinga R, Hahn T, Ching CRK, Eyler LT, Aftanas L, Aghajani M, Aleman A, et al., Brain aging in major depressive disorder: results from the ENIGMA major depressive disorder working group. *Mol Psychiatry.* 2021 Sep;26(9):5124-5139. doi: 10.1038/s41380-020-0754-0.
6. Wang Z, S Goerlich K, Luo Y, Xu P, Aleman A. Social-Specific Impairment of Negative Emotion Perception in Alexithymia. *Soc Cogn Affect Neurosci.* 2021 Aug 18;nsab099. PMID: 34406408. doi: 10.1093/scan/nsab099.
7. Opel N, Thalamuthu A, et al., among other: Aleman A. Brain structural abnormalities in obesity: relation to age, genetic risk, and common psychiatric disorders : Evidence through univariate and multivariate mega-analysis including 6420 participants from the ENIGMA MDD working group. *Mol Psychiatry*. 2021 Sep;26(9):4839-4852. doi: 10.1038/s41380-020-0774-9.
8. Faramarzi M, Kasten FH, Altaş G, Aleman A, Ćurčić-Blake B, Herrmann CS. Similar EEG Activity Patterns During Experimentally-Induced Auditory Illusions and Veridical Perceptions. *Front Neurosci.* 2021 Apr 1:15:602437. DOI: 10.3389/fnins.2021.602437
9. Wang Z, Chen M, Goerlich KS, Aleman A, Xu P, Luo Y, Wang Z, Chen M, Goerlich KS, Aleman A, Xu P, Luo Y, Wang Z, Chen M, Goerlich KS, Aleman A, Xu P, Luo Y. Deficient auditory emotion processing but intact emotional multisensory integration in alexithymia. *Psychophysiology.* 2021 Jun;58(6):e13806. PMID: 33742708. doi: 10.1111/psyp.13806.
10. von Conta J, Kasten FH, Ćurčić-Blake B, Aleman A, Thielscher A, Herrmann CS. Interindividual variability of electric fields during transcranial temporal interference stimulation (tTIS). *Sci Rep.* 2021 Oct 13;11(1):20357. doi: 10.1038/s41598-021-99749-0.
11. Moseley P, Aleman A, et al., Correlates of Hallucinatory Experiences in the General Population: An International Multisite Replication Study. *Psychol Sci.* 2021 Jul;32(7):1024-1037. doi: 10.1177/0956797620985832.
12. van Belkum SM, de Boer MK, Opmeer EM, Kortekaas R, Mulder T, Woonings F, Hoenders HJR, Kamphuis H, Aleman A, Schoevers RA. No antidepressant effects of low intensity transcranial pulsed electromagnetic fields for treatment resistant depression *J Affect Disord.* 2021 Nov 1;294:679-685. doi: 10.1016/j.jad.2021.07.087.
13. de Haan T, van den Berg B, Woldorff MG, Aleman A, Lorist MM. Diminished Feedback Evaluation and Knowledge Updating Underlying Age-Related Differences in Choice Behavior During Feedback Learning. *Front Hum Neurosci.* 2021 Mar 5;15:635996. doi: 10.3389/fnhum.2021.635996.
14. Opel N, et al., among others: Aleman A., Correction: Brain structural abnormalities in obesity: relation to age, genetic risk, and common psychiatric disorders. *Mol Psychiatry.* 2021 Jun 22. doi: 10.1038/s41380-021-01191-1.
15. Merritt K, McGuire PK, Egerton A; 1H-MRS in Schizophrenia Investigators, Aleman A, et al., Association of Age, Antipsychotic Medication, and Symptom Severity in Schizophrenia With Proton Magnetic Resonance Spectroscopy Brain Glutamate Level: A Meganalysis of Individual Participant-Level Data. *JAMA Psychiatry.* 2021 Jun 1;78(6):667-681. doi: 10.1001/jamapsychiatry.2021.0380.
16. Flores-Vazquez, J. F., Ramirez-Garcia, G., Marrufo-Melendez, O. R., Alcalal-Lozano, R., Lietz, M., Rodriguez-Agudelo, Y., Acosta-Castillo, G. I., Renken, R., Aleman, A., Enriquez Geppert, S. & Luisa Sosa-Ortiz, A., Anosognosia in Amnestic Mild Cognitive Impairment is Related to Diminished Hippocampal Volume Comparable to Alzheimer's Disease Dementia: Preliminary MRI Findings. *Frontiers in Aging Neuroscience*, 5-Sep-2021, (Accepted/In press)
17. Dauwan M, Begemann MJH, Slot MIE, Lee EHM, Scheltens P, Sommer IEC. Physical exercise improves quality of life, depressive symptoms, and cognition across chronic brain disorders: a transdiagnostic systematic review and meta-analysis of randomized controlled trials. *J Neurol.* 2021 Apr;268(4):1222-1246. doi: 10.1007/s00415-019-09493-9.
18. Nuninga JO, Sommer IEC. The Dentate Gyrus: Its Value for Depression. *Biol Psychiatry Cogn Neurosci Neuroimaging.* 2021 Jan;6(1):6-7. doi: 10.1016/j.bpsc.2020.10.016.
19. Nuninga JO, Mandl RCW, Sommer IEC. The dentate gyrus in depression: directions for future research. *Mol Psychiatry.* 2021 Jun;26(6):1720-1722. doi: 10.1038/s41380-020-0678-8.
20. Faay MDM, Sommer IE. Risk and Prevention of Aggression in Patients With Psychotic Disorders. *Am J Psychiatry.* 2021 Mar 1;178(3):218-220. doi: 10.1176/appi.ajp.2020.21010035.



21. Marschall TM, Ćurčić-Blake B, Brederoo SG, Renken RJ, Linszen MMJ, Koops S, Sommer IEC. Spontaneous brain activity underlying auditory hallucinations in the hearing-impaired. *Cortex*. 2021 Mar;136:1-13. doi: 10.1016/j.cortex.2020.12.005.
22. Horowitz MA, Moncrieff J, de Haan L, Bogers JPAM, Gangadin SS, Kikkert M, Veling W, Sommer IEC. Tapering antipsychotic medication: practical considerations. *Psychol Med*. 2021 Sep 20:1-4. doi: 10.1017/S0033291721003299.
23. Kusztrits I, Larøi F, Laloyaux J, Marquardt L, Sinkeviciute I, Kjelby E, Johnsen E, Sommer IE, Hugdahl K, Hirnstein M. Mapping psychotic-like experiences: Results from an online survey. *Scand J Psychol*. 2021 Apr;62(2):237-248. doi: 10.1111/sjop.12683.
24. Nuninga JO, Mandl RCW, Sommer IEC. Clinical Relevance of Brain Changes After Electroconvulsive Therapy: Is There Really No Link at All? *Biol Psychiatry*. 2021 Feb 15;89(4):e13-e14. doi: 10.1016/j.biopsych.2020.04.030.
25. Schutte MJL, Bohlken MM, Collin G, Abramovic L, Boks MPM, Cahn W, Dauwan M, van Dellen E, van Haren NEM, Hugdahl K, Koops S, Mandl RCW, Sommer IEC. Functional connectome differences in individuals with hallucinations across the psychosis continuum. *Sci Rep*. 2021 Jan 13;11(1):1108. doi: 10.1038/s41598-020-80657-8. Erratum in: *Sci Rep*. 2021 Apr 14;11(1):8540.
26. Voppel AE, de Boer JN, Brederoo SG, Schnack HG, Sommer I. Quantified language connectedness in schizophrenia-spectrum disorders. *Psychiatry Res*. 2021 Oct;304:114130. doi: 10.1016/j.psychres.2021.114130.
27. DeLisi LE, Sommer IEC. Editorial: Racial and ethnic disparities in research and treatment of people with schizophrenia. *Curr Opin Psychiatry*. 2021 May 1;34(3):199-202. doi: 10.1097/YCO.0000000000000691.
28. Brand BA, de Boer JN, Sommer IEC. Estrogens in schizophrenia: progress, current challenges and opportunities. *Curr Opin Psychiatry*. 2021 May 1;34(3):228-237. doi: 10.1097/YCO.0000000000000699.
29. Ioannou M, Foiselle M, Mallet J, Stam EL, Godin O, Dubertret C, Terro E, Sommer IEC, Haarman BCM, Leboyer M, Schoevers RA. Towards precision medicine: What are the stratification hypotheses to identify homogeneous inflammatory subgroups. *Eur Neuropsychopharmacol*. 2021 Apr;45:108-121. doi: 10.1016/j.euroneuro.2020.11.001.
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31. Nuninga JO, Mandl RCW, Sommer IEC. Correction: The dentate gyrus in depression: directions for future research. *Mol Psychiatry*. 2021 Jun;26(6):2677. doi: 10.1038/s41380-020-0712-x. Erratum for: *Mol Psychiatry*. 2021 Jun;26(6):1720-1722.
32. van der Zalm Y, Foldager L, Termorshuizen F, Sommer IE, Nielsen J, Selten JP. Clozapine and mortality: A comparison with other antipsychotics in a nationwide Danish cohort study. *Acta Psychiatr Scand*. 2021 Mar;143(3):216-226. doi: 10.1111/acps.13267.
33. Germann M, Brederoo SG, Sommer IEC. Abnormal synaptic pruning during adolescence underlying the development of psychotic disorders. *Curr Opin Psychiatry*. 2021 May 1;34(3):222-227. doi: 10.1097/YCO.0000000000000696.
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35. So SH, Chung LK, Tse CY, Chan SS, Chong GH, Hung KS, Sommer IEC. Moment-to-moment dynamics between auditory verbal hallucinations and negative affect and the role of beliefs about voices. *Psychol Med*. 2021 Mar;51(4):661-667. doi: 10.1017/S0033291719003611.
36. Jagesar RR, Roozen MC, van der Heijden I, Ikani N, Tyborowska A, Penninx BWJH, Ruhe HG, Sommer IEC, Kas MJ, Vorstman JAS. Digital phenotyping and the COVID-19 pandemic: Capturing behavioral change in patients with psychiatric disorders. *Eur Neuropsychopharmacol*. 2021 Jan;42:115-120. doi: 10.1016/j.euroneuro.2020.11.012.
37. Dazzan P, et al., amont others: Sommer IEC; OPTiMiSE study group. Symptom Remission and Brain Cortical Networks at First Clinical Presentation of Psychosis: The OPTiMiSE Study. *Schizophr Bull*. 2021 Mar 16;47(2):444-455. doi: 10.1093/schbul/sbaa115.
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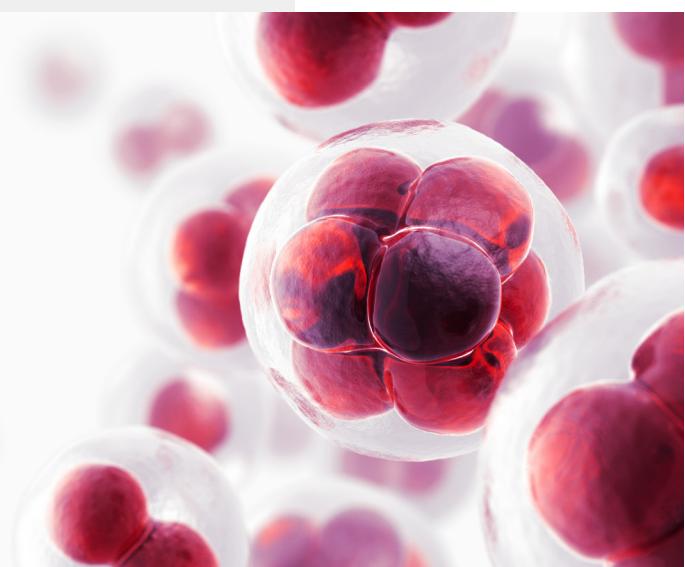
“ ... whereas we do consider and value the quantitative data in this report as our “medals”, we also like to emphasize that they are the result of collaborative efforts of many (not always mentioned by name) and that many other non-quantitative events have enlightened 2021”

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