JUNE 2021

NEUROSCIENCE
NEWSLETTER

Georg-August-Universität Göttingen · International Max Planck Research School

The Neuroscience Program...

in COVID-19 Mode

Welcome to the 8th Neuro-Newsletter of the Göttingen International MSc/PhD/MD-PhD Program and the International Max Planck Research School (IMPRS) Neurosciences!

Over the past year, many of our planned activities had to be abandoned due to the ongoing COVID-19 pandemic. And nonetheless, we managed to continue running our Neuroscience program, thanks to the major efforts, substantial flexibility, and improvisation skills of program students, faculty, and management. Starting with the first lockdown in spring 2020, we had to switch to online formats for lectures, lab courses, and communication. Social life had to be put on hold, eliminating all the lively interactions that normally characterize our study program. The key ingredients of our program are scientific and cultural exchange, which are difficult to maintain when personal meetings with fellow students, colleagues, family, and friends are impossible and self-isolation is imposed by a worldwide pandemic crisis. We needed to develop new mechanisms to connect with each other, to run the program, and to help new students to settle and integrate - and many program routines needed to be adjusted, often at very short notice. Our well-proven selection process, for example, had to be turned inside out. Instead of the usual entry tests, conducted at various places all over the world, we had to run over 100 short online interviews involving 10 of our PhD students and 10 faculty members. Interview questions had to be composed, interview teams had to be as-

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sembled and briefed, and multiple-time-zone interview logistics had to be put in place - all at breakneck speed. Somewhat to our surprise, it worked well. So very well, in fact, that we decided to stick to the new online interview format ... as an unexpected benefit of the COVID-19 crisis.

As the pandemic hit Germany, we also switched thesis committee meetings and thesis defences to online formats. While not many would have imagined that a thesis can actually be defended online, our students managed the new circumstances with substantial flexibility and audacity, supported by GAUSS and GGNB, where examination procedures were quickly adapted and made legally waterproof. However, despite this success in the face of major challenges, we will switch back to defences in presence as soon as possible, and if only to reinstate the greatly missed après-defence gatherings.

Reduced infection rates in summer and late autumn 2020 and the possibility to perform systematic COVID-19 tests brought back some degree of normality. We could start the winter semester with lectures in presence, and lab courses could be resumed, strictly observing the many COVID-19 rules that have almost become second nature to us. And even when the situation worsened again later in 2020, we managed to navigate our program through the pandemic by the combined effort of our coordination office, our fantastic students, and our faculty members. GGNB and GAUSS provided invaluable guidance, and our special thanks go to Göttingen International, whose up-to-date information for incoming students has been particularly important in times of constantly changing travel and visa regulations. Another true game changer that has to be mentioned here has been the COVID-19 testing program at the Göttingen Campus, spearheaded by the local Max Planck Institutes of Experimental Medicine and Biophysical Chemistry, the University, the University Medical Center, and the GWDG (https://ccs.uni-goettingen.de/index.xhtml).

The pandemic has left its marks in many ways on all of us, even when oneself, family, or friends have so far remained spared from an infection. In this issue of the NeuroNewsletter, students and alumni of our program share with us personal experiences with the pandemic – some sad, some challenging, and some encouraging. The newsletter also introduces our new cohort of students from 2020, the PhD graduates, and our faculty, and it includes articles on the 'path of life' of some of our alumni.

From the challenging and often troubling experiences of the past, we look into the future expectantly and quite optimistically. We are confident that, together, we will continue to have lively lectures, courses, and, eventually again, real student retreats – after all, the past year has demonstrated again and in a dramatic fashion how important science and scientific thinking are.

Nils Brose
Martin Göpfert
Jonas Barth
Sandra Drube

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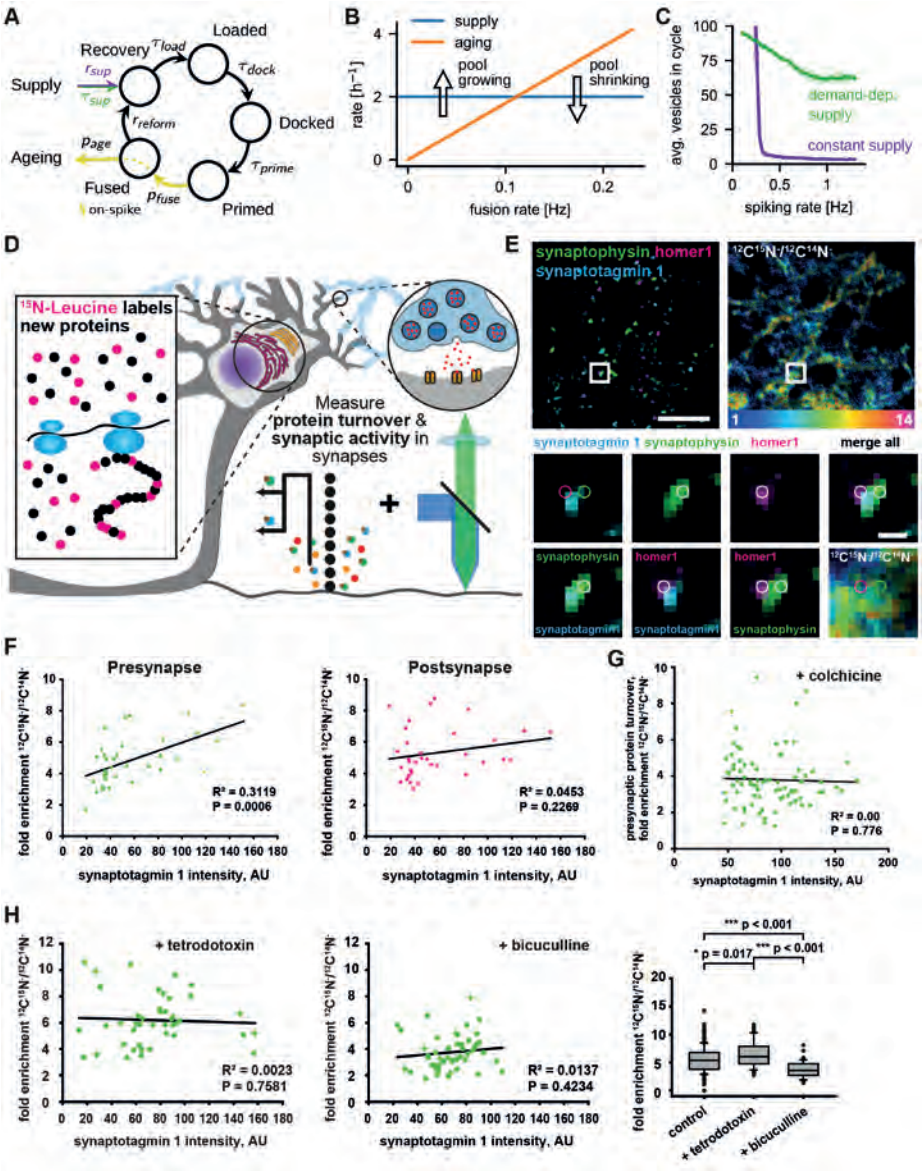
Presynaptic protein turnover

is linked to neuronal activity *by Sebastian Jähne*

We cannot escape time and its effect on us. If we want it or not, we will age and face a variety of (probably unpleasant) changes. Similarly, all of our building blocks are subject to ageing, including proteins, which tend to become dysfunctional when they age and have to be removed/degraded in order to prevent damage to the cells. Logically, they need to be replaced by newly synthesized ones. The process of production and degradation can be termed turnover. Neurons, being non-dividing cells and having to survive for many years, face special challenges and are strongly affected by defects in turnover[1]. Furthermore, turnover is also having an important role in processes of plasticity, such as long-term potentiation[2] and was linked to neuronal activity[3–5]. Even synaptic vesicles (SVs) ageing is activity dependent.



SVs can be found in two main clusters: a recycling one, which participates in release and a reserve one, which under physiological conditions is rarely released[6,7]. We previously found that the recycling pool actually consists of younger SVs and that on average a vesicle can only participate in 200 rounds of release[8]. The higher the activity of a synapse, the more SVs will be released, which consequently age faster and become inactive. This implies that more new SVs need to be supplied in a more active synapse to compensate for the age-related loss.

To test this hypothesis, we modeled the SV cycle using existing experimental data (Figure 1A)[9]. In our model

Fig. 1: *Protein turnover in presynapses correlates with synaptic activity. A-C The SV cycle was mathematically modeled. B At a constant SV supply, the SV pool is unstable, either increasing or decreasing. C Conversely, demand-dependent SV supply compensates for SV ageing and allows stable neurotransmission. D-H This prediction was tested combining imaging mass spectrometry and fluorescence microscopy of neurons. E Exemplary images (scale = 5µm) with close-up of a synapse (scale = 500nm). 12C15N-/12C14N- depicts the amount of new proteins, synaptotagmin1 the synaptic activity. F Presynaptic, but not postsynaptic protein turnover correlates to synaptic activity, confirming the prediction. G Blocking microtubule polymerization with colchicine abolished the correlation. H Similarly, chronically increasing (bicuculline) or decreasing (tetrodotoxin) neuronal activity removed the correlation, but had effects on the overall turnover of proteins in synapses.*

Figure panels are taken from Jähne et al. 2021, Cell Reports. (https://doi.org/10.1016/j.celrep.2020.107588)

synapse, at a fixed SV supply rate the number of SVs in the vesicle cycle either increases (at low neuronal activity) or decreases (at high neuronal activity) at all but one synaptic activity rate (Figure 1B). This would make synapses very unstable. As expected, an activity-dependent supply of SVs stabilized the synapses (Figure 1C). We confirmed our theoretical observations by correlating protein turnover and neuronal activity in individual synapses of primary hippocampal neurons employing a combination of fluorescence microscopy and imaging mass spectrometry (Figure 1D,E). Presynaptic, but not postsynaptic, protein turnover correlated with synaptic activity, i.e. if a synapse was more active, it also contained more newly-made presynaptic proteins (Figure 1F). This demand-dependent supply was vulnerable to disruptions of microtubule polymerization, suggesting that new vesicle proteins are transported to synapses rather than being locally synthesized (Figure 1G). Chronically modulating neuronal activity also abolished the relationship between activity and turnover, leading to overall homeostatic scaling effects (Figure 1H).

In summary, we showed that synaptic boutons theoretically require a demand-dependent SV supply to compensate losses of activity-based ageing. We also confirmed the existence of this supply by looking at the turnover and activity in single synapses. The machinery involved in this mechanism is still unknown and should be the focus of further studies. Especially, since a defect of it may cause severe problems.

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Sebastian JÄHNE joined the IMPRS Neurosciences in 2013 after finishing an undergraduate degree in Biochemistry and Molecular Biology at the University College Dublin. In his doctoral thesis at the Institute for Neuro- and Sensory Physiology, supervised by Silvio Rizzoli, he used superresolution microscopy and imaging mass spectrometry to study the molecular architecture of neurons and the turnover in synapses. After defending his thesis in 2019, he stayed on as a postdoc.

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Risk factors for multiple drug use

On the effects of exposure to environmental risk in early-life and common genetic variation
by Agnes Steixner-Kumar

Substance use and abuse is fairly common in the general population and is particularly frequent in patients with certain psychiatric disorders. A very severe pattern of drug consumption is called multiple drug use or polytoxicomania. Everybody walking through big cities knows this phenomenon in its extreme form: "junkies". Affected individuals use a range of different drugs consecutively or in parallel and often without clear preferences. Besides the obvious dangers to physical health, e.g. higher risk of overdosing, accidents and infections, this behavior also markedly impacts on the social life of individuals and aggravates underlying psychiatric conditions.

While it is known that certain environmental risk factors can increase the risk for polytoxicomania, systematic in-depth investigations in large samples are rare. In particular, the question whether an accumulation of several risk factors in early-life leads to a higher risk for polytoxicomania in later life has not been addressed previously. Therefore, we investigated the impact of environmental and genetic risk factors on the development of polytoxicomania in our GRAS (Göttingen Research Association for Schizo-

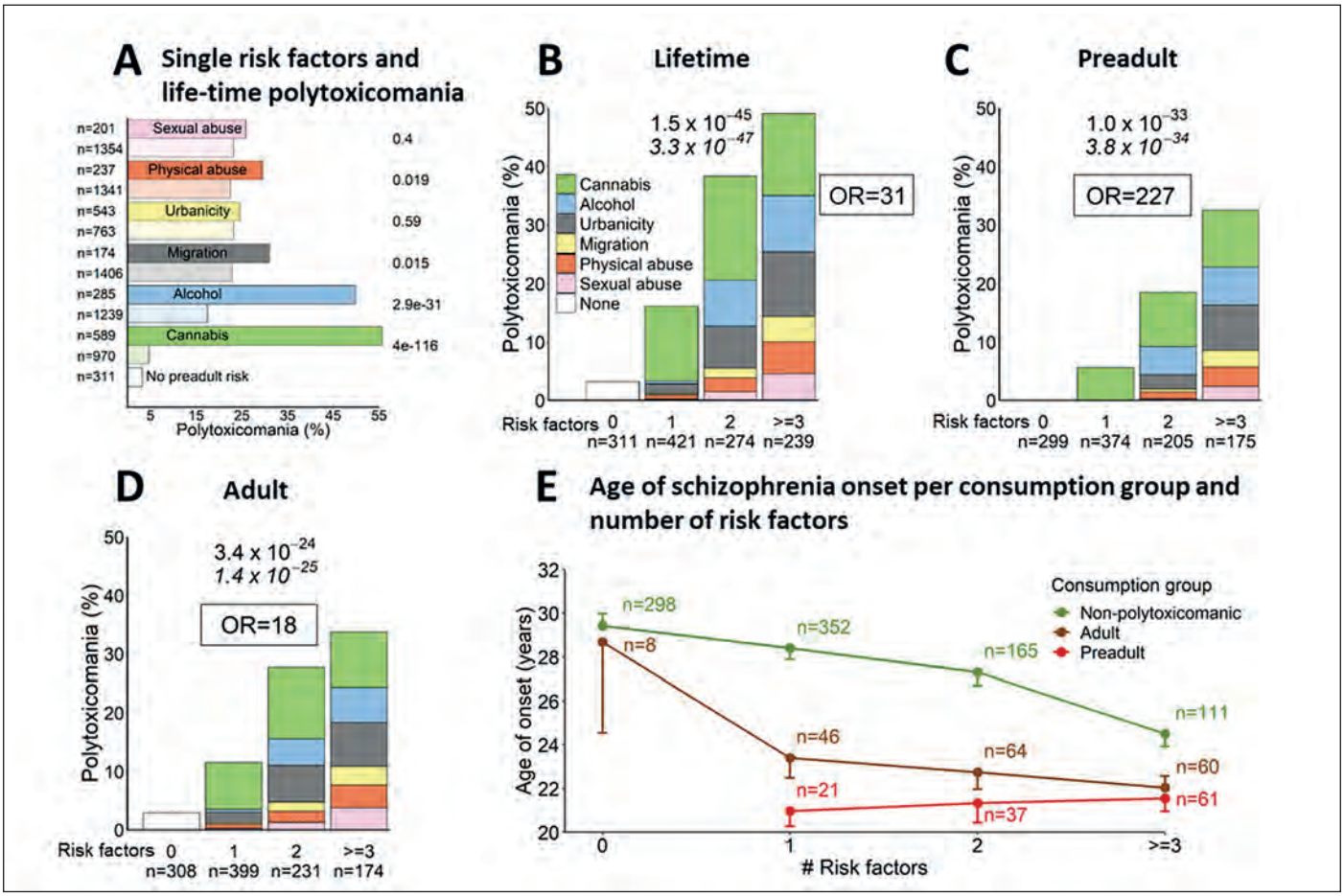

Fig 1: ***(A)*** *Associations of single preadult environmental risk factors and lifetime polytoxicomania. Columns in dark colors: individuals exposed to respective risk factor; light colors: individuals not exposed to this specific risk (not necessarily devoid of any risk at all). Accumulation of preadult environmental risk factors leads to stepwise increase in* ***(B)*** *lifetime polytoxicomania,* ***(C)*** *preadult polytoxicomania and* ***(D)*** *exclusively adult polytoxicomania.* ***(E)*** *Preadult environmental risk factors, drug consumption behavior and age at schizophrenia onset: Note that the extremely early age of onset in preadult polytoxicomanics is not further influenced by additional risk accumulation. Mean±SEM. (A-D) Chi²-test (normal font) and Cochran-Armitage test (italics) p-values. OR: Odds Ratio.*

phrenia) sample of deeply phenotyped and genotyped schizophrenia patients.

On the individual level, risk factor exposure in early life was associated with polytoxicomania to varying degrees (Figure 1A). For example, cannabis consumption showed a strong association, exerting its well-known function as gateway drug, whereas physical abuse and urbanicity showed weak to no association when considered alone. However, upon accumulation of these risk factors, each additional risk factor led to a clear step-wise increase in the proportion of polytoxicomanic individuals, rendering the number of risk factors more informative than the type of risk exposure (Figure 1 B-D). Furthermore, the accumulation of these risk factors led to a higher risk for aggressive and suicidal behavior. Another alarming finding was that the age at schizophrenia onset was considerably lower in individuals that had developed polytoxicomania before reaching adulthood (=age of 18) than in individuals without polytoxicomania (Figure 1E). This finding is particularly disconcerting as a lower age of disease onset often goes along with worse disease outcomes and quality of life.

In addition to environmental risk factors, we analyzed single nucleotide variants (SNPs) as possible risk factors for early onset polytoxicomania by developing a novel genetic approach that employs multiple genome-wide association studies. The aim of this novel analysis strategy was to extract reliable genetic signals from relatively small, but phenotypically well characterized samples. Using this approach, we identified 41 SNPs potentially associated with preadult polytoxicomania. Unfortunately, suitable replication samples were not available anywhere world-wide. Thus - although interesting - genetic results should be interpreted with some caution.

In summary, the accumulation of environmental risk in early-life shows remarkable association with polytoxicomanic behavior. Whereas genetic risk factors presumably contribute to the underlying susceptibility to develop this condition, the environmental effects appear by magnitudes larger. These findings emphasize the importance of social and political prevention strategies that might help to alleviate the “risk load” of vulnerable individuals, thereby preventing polytoxicomania and leading to improved quality of life.

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Agnes STEIXNER-KUMAR conducted her doctoral studies under the supervision of Prof. Dr. Dr. Hannelore Ehrenreich at the Clinical Neuroscience Department, Max Planck Institute of Experimental Medicine in Göttingen, and will defend her thesis in June 2021. Afterwards she will continue as a post-doctoral researcher in the Ehrenreich lab to further study the genetics of psychiatric disease and genomic effects of EPO/hypoxia in the brain.

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Digging for synaptic miniature events

Improved quantal size estimation reveals the limits of synaptic homeostasis *by Sebastian Sydlik*

Synaptic transmission via chemical synapses is essential for inter-neuronal communication of higher life forms. Two fundamental modes of chemical synaptic transmission can be distinguished: 1) Evoked synaptic transmission in response to action potential stimulation, and 2) spontaneous miniature synaptic transmission in the absence of stimulation. While both modes of synaptic transmission are defined by the fusion of synaptic vesicles, the exact relationship between evoked and spontaneous miniature synaptic transmission is still debated. Most studies focus on evoked release and assume that spontaneous miniature synaptic transmission represents the fusion of single synaptic vesicles from a pool of vesicles that also gives rise to evoked transmission. The exact biological relevance of spontaneous miniature synaptic transmission is however still debated.

According to the binomial model, the evoked postsynaptic current (EPSC) amplitude is the product of three param-

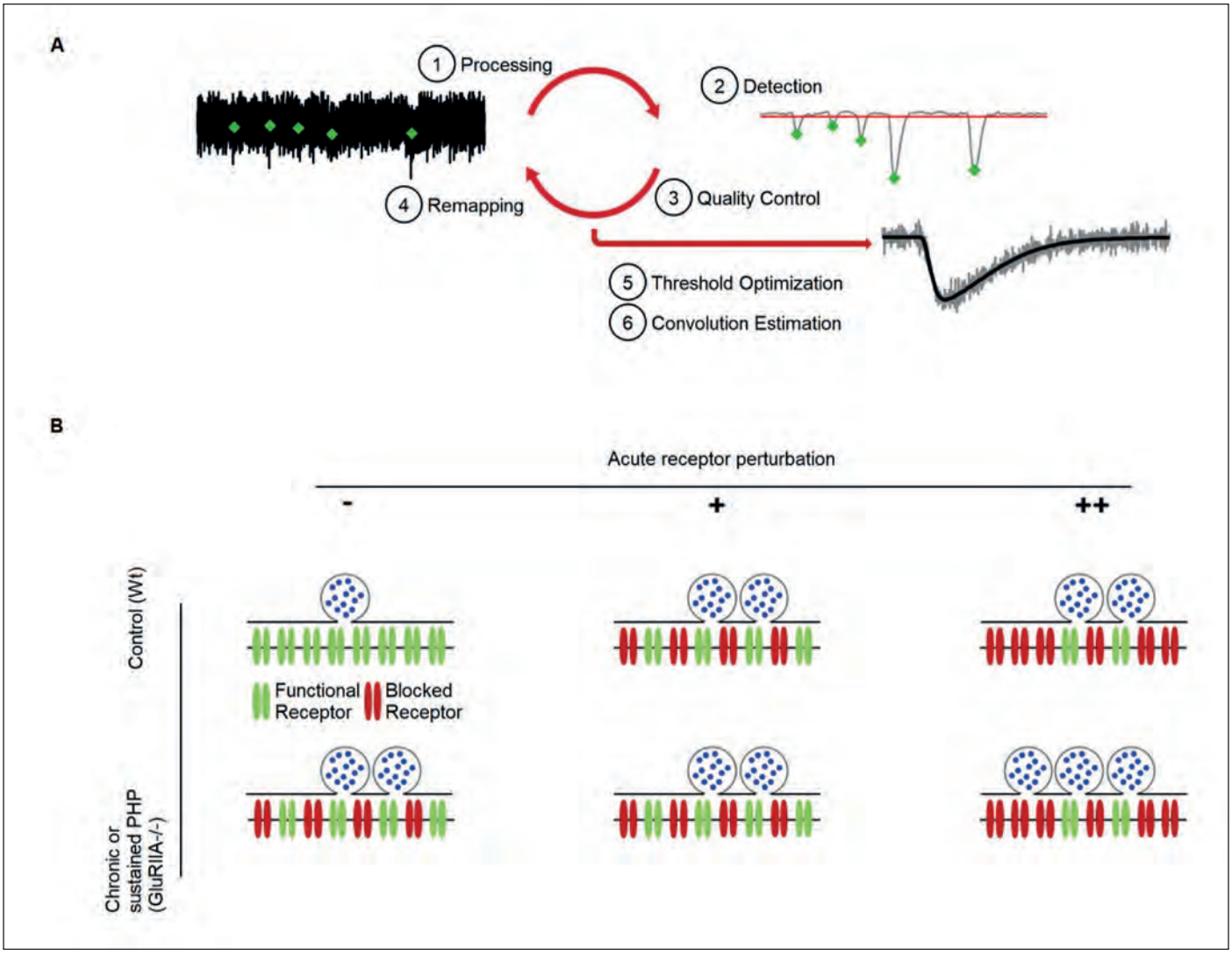

Fig. 1: ***A.*** *reMini workflow for optimized mEPSC readout from high noise traces.* ***B.*** *Synaptic Homeostasis maintains synaptic strength. The number of released vesicles is upregulated upon acute receptor perturbation with an antagonist or chronic receptor perturbation by removing the glutamate receptor subunit GluRIIA. reMini allows detection and quantification of mEPSCs at poor SNR conditions and reveals that PHP saturates at high antagonist concentrations, while there is increased homeostatic capacity at high antagonist concentrations in the chronic homeostasis background.*

eters: 1) The number of available release sites (*N*), 2) the release probability (*p*), and 3) the postsynaptic response to the fusion of a single synaptic vesicle, also referred to as quantal size (q). The binomial model facilitates interpreting changes in synaptic function and locating these changes to the pre- or postsynaptic site. One process involving balanced changes in these binomial parameters is Synaptic Homeostasis. Synaptic Homeostasis refers to the tight regulation of synaptic strength, i.e. the postsynaptic response to presynaptic firing. It precisely maintains a steady state of synaptic transmission, protecting the synapse against perturbations. Perturbing q using the *Drosophila* neuromuscular junction (NMJ) as a model system reveals that changes in *N* and *p* drive the maintenance of synaptic strength. In these studies, q is mostly estimated from miniature EPSCs (mEPSCs).

A major problem in estimating q from mEPSCs is the low signal to noise ratio (SNR), especially at the *Drosophila* NMJ. Hence, we here developed an algorithm for refined analysis of miniature events at this synapse that we call *reMini*. It detects and analyzes mEPSCs through an iterative process involving automated threshold optimization of filtered data, followed by a quality control step, event extraction and analysis of the raw data. It significantly improves mEPSC detection and quantification of mEPSC amplitude and kinetics of simulated two-electrode voltage clamp data. Thereby it uncovers two-fold smaller mean amplitudes (thus also a two-fold larger estimate of the number of released vesicles), as well as faster kinetics and increased frequency of mEPSCs recorded from wild-type NMJs. Furthermore, it allows quantifying small mEPSCs after strong receptor perturbation, conditions that previously could not be studied as no, or only few, mEPSCs were detected.

q can be perturbed in two different ways, pharmacologically or genetically. Pharmacological perturbations via receptor antagonists thereby lead to a rapid or acute induction of homeostasis, while genetic removal of receptor subtypes allows studying chronically induced homeostasis that exists through development.

reMini reveals a saturation of acute presynaptic homeostatic plasticity (PHP) at high concentrations of the glutamate receptor antagonist Philanthotoxin-433 (PhTx). If high concentrations of PhTx are applied in a mutant of the glutamate receptor subunit GluRIIA that expresses chronic homeostasis, *reMini* exposes increased homeostatic capacity beyond that of the wt condition. This highlights the different limits of presynaptic homeostatic plasticity during acute and sustained receptor impairment.

Sebastian SYDLIK joined the IMPRS Neurosciences in 2013 and moved on to Zürich after completing his Master's Thesis in the lab of André Fiala. He recently completed his Doctoral Studies on synaptic transmission in the lab of Martin Müller.

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Ali Ghadami, Iran, BSc from Islamic Azad University, Tehran Medical Sciences, Iran

Sophie Gobeil, Canada, BSc from University of Calgary, Canada

Vladyslav Ivanov, Ukraine, BSc from Georg-August-Universität Göttingen, Germany

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Mahalakshmi Ramadas, India, BTech from SASTRA Deemed University, Tamil Nadu, India

Anna Siegert, Germany, BSc from Georg-August-Universität Göttingen, Germany

Dawn J Tan, Singapore, BSc from National University of Singapore, Singapore

Ilona Vieten, Germany, BSc from Universität zu Köln, Germany

Margaret Young, USA, BA from Northwestern University, USA

Applications 2020 and 2021

In the year 2020, the Neuroscience program received 420 applications from 62 countries.

Germany 20
other Western Europe 19
Eastern Europe 32
North America 18
Central/South America 24
North Africa 25
Central/South Africa 55
Asia / Near East 48
Central Asia / Far East 176
Australia 3

In the year 2021, the Neuroscience program received 451 applications from 66 countries.

Germany 25
other Western Europe 31
Eastern Europe 17
North America 30
Central/South America 22
North Africa 19
Central/South Africa 39
Asia / Near East 50
Central Asia / Far East 215
Australia 3

New Students

PhD projects started in 2020/21

Hebatallah Abdelrasol
Deciphering the effects of alpha-synuclein aggregation in the physiology of excitable cells
Tiago Outeiro,
Mathias Bähr,
Wolfram-Hubertus Zimmermann

Lukas Amann
Multisensory integration of somatosensory and visual feedback during motor adaptation
Alexander Gail,
Hansjörg Scherberger,
Christian Tetzlaff

Avika Chopra
The role of RNA in synapse physiology and neurodegeneration in synucleinopathies
Tiago Outeiro,
André Fischer,
Silvio Rizzoli

Max Crayen
Neural Mechanisms of visual feature conjunction in macaque cortex
Stefan Treue,
Hansjörg Scherberger,
Michael Wibral

Paloma Huguet Rodriguez
Molecular mechanisms underlying generation of silent synapses,
Oliver Schlüter
Nils Brose,
Silvio Rizzoli

Nare Karagulyan
Mechanisms of sound encoding in the cochlea
Tobias Moser,
Erwin Neher,
Oliver Schlüter

Tor Memhave
The development of *in vivo* X-nuclei magnetic resonance imaging and its application in the characterization and monitoring of neuropsychiatric diseases
Susann Boretius,
Hannelore Ehrenreich,
Silvio Rizzoli

Aditi Methi
An integrative analysis of gene expression networks in neurodegenerative diseases
André Fischer,
Tiago Outeiro,
Johannes Soeding

Adrián Palacios Muñoz
Dissection of social interactions during male-male courtship behavior in *D. melanogaster*
Jan Clemens,
Tim Gollisch,
Viola Priesemann

Ranjit Pradhan
The role of microglia ncRNA in neurodenegerative diseases
André Fischer,
Tiago Outeiro,
Alexander Flügel

Lucía Rojas Meza
Molecular mechanism of synaptic release machinery in DRG neuron
Jeongseop Rhee,
Swen Hülsmann,
Thomas Dresbach

Andrew Sasmita
Investigating the Effects of Dysfunctional Myelin on Tau Pathology in Mouse Models of Alzheimer's Disease
Klaus-Armin Nave,
Thomas Bayer,
Nils Brose

Asude Tura
Longitudinal changes in structural and functional connectivity in depression associated with clinical improvement
Roberto Goya-Maldonado,
Susann Boretius,
Arezoo Pooresmaeili

The Doctors of 2020/21

Reham Abdelaziz
Structural determinants of voltage dependent gating of K^+ channels
Luis Pardo,
Martin Göpfert,
Andreas Neef

Burak Bali
Optogenetic Manipulation of the Auditory System
Tobias Moser,
Manuela Schmidt,
Jens Gruber

Robert Epple
The Synaptic RNAome - identification, interactions and intercellular transfer
André Fischer,
Camin Dean,
Tiago Outeiro

Albert Lehr
Modulation of neuronal excitability in the cognitive control network by electrical stimulation
Andrea Antal,
Susann Boretius,
Arezoo Pooresmaeili

Myrto Panopoulou
Cocaine-induced synaptic changes in the nucleus accumbens: role in drug-motivated behaviour and relapse risk
Oliver Schlüter,
André Fischer,
Siegrid Löwel

M. Sadman Sakib
Epigenomic and transcriptomic analysis of developing, adult and aging brain: mechanisms of brain folding, neuronal function and finding novel therapy for dementia
André Fischer,
Tiago Outeiro,
Camin Dean

Sinem Meleknur Sertel
Time- and gender-dependent differences in neuronal behaviors in culture
Silvio Rizzoli,
Hannelore Ehrenreich,
Henrik Bringmann

Aditya Singh
Investigation of brain networks for personalized rTMS in healthy subjects and patients with major depressive disorder: A translational study
Roberto Goya-Maldonado,
André Fischer,
Peter Dechent

Lukas Weiss
Information processing in the olfactory system of different amphibian species
Ivan Manzini,
Martin Göpfert,
Camin Dean

Rashad Yusifov
Molecular and structural correlates of ocular dominance plasticity in mice
Siegrid Löwel,
Oliver Schlüter,
Marion Silies

Reuptake Alumni Mentoring Program

After a first very successful round in 2019/2020, the next mentoring cycle had to be postponed because the COVID-19-related challenges kept us running. With this one-to-one Alumni Mentoring Program, we want to facilitate meaningful connections between experienced alumni from both the Molecular Biology and the Neuroscience program and current PhD students as well as junior postdocs across a wide variety of academic and non-academic careers and research fields. Focusing on career advancement, professional development and networking, this program aims to be a rewarding and inspiring experience for all participants. The next mentoring cycle started with the application phase for mentees and mentors on 01 May 2021.

SD/JB

Quitting science to stay in academia

A tale of Greek gods, politics and basic research *by Georg Hafner*

Do you know who Atlas is? Atlas is a Titan from Greek mythology, whose task it is to hold the sky on his shoulders. It is no easy task because the sky is heavy and although he prevents the earth from being crushed by the celestial sphere, he does not receive much appreciation for this "titanic" duty. Sometimes I feel like Atlas in my new job as a science coordinator at the Tübingen AI Center. I have to work hard to maintain and grow the scientific ecosystem, but I operate from the second row - no mentioning on papers or presentations. But in this article, I want to tell you why being a science coordinator can be really exciting and rewarding.

Let's start at the beginning. Already during my PhD in Göttingen at the Institute for Neuroanatomy, I made the decision not to continue in academia. I enjoyed working at the university, I enjoyed working in science, but I just did not see myself enjoy the lifestyle of a PI. I wanted to stay connected to science but more on a conceptual, big-picture level. There are jobs for people like me and one of them is science coordinator. It is an interesting profession because there is no specific education you could obtain to become qualified for it. Most positions require a PhD because knowing the university system is a must. I applied to several different institutions and finally started working at the Tübingen AI Center (AI Artificial Intelligence).

Tübingen has slowly built an international reputation not only for world-class Swabian ravioli but also as a top university. The Tübingen AI Center was founded in 2018 as one of six competence centers for research on artificial intelligence in Germany. I work for its director. He is a man with a vision not only for how Tübingen, not only for how Germany but how Europe should become a hotspot for AI, competing with North America and China on eye-level. He is a testimony for how individual people can transform the landscape of continents. Of course, this is no longer a purely scientific issue but also a political one. Thus, in December, there was a virtual meeting between several scientific directors in Tübingen and Stuttgart, multiple ministers of the German government, the EU vice president, the German chancellor and – most importantly – me! I was one of several coordinators who organized this meeting. At the moment I am helping to write a grant that states what the AI Center will do with the multi-million-euro budget it is promised annually as a gift from the government to transform Germany into a leading power in AI research. Of course, these are the highlights of my work. The daily work involves a lot of e-mail communication, online-meetings, employee administration or financial management. Most of the tasks I do, I was actually never trained for. Thus, starting in this job can be sometimes overwhelming. Good project management skills, a considerate style of communication and the willingness to learn new things are very advantageous. I was lucky to get this job in Tübingen at a time when a lot of new exciting things are happening here. I feel like the sun is just rising over Tübingen promising a time full of adventures and I am watching it from the first row, because I am the guy who helps hold up the morning sky!

Busy in the office. Source: private

Georg HAFNER joined the IMPRS Neurosciences in 2013. He completed his doctoral thesis at the Institute for Neuroanatomy under the supervision of Jochen Staiger. Using viral tools, he studied the connectivity of neuronal cell types. He briefly stayed on as a postdoc before starting his new position as a coordinator at the Tübingen AI Center in 2020.

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Life after kissing the Ganseliesel

… and life in the era of COVID-19/20 *by Sadim Jawhar*

The past year has been challenging for all of us. Nevertheless, it allowed us to sit back, remember, and reflect on our lives. It has been nine years now since I left Göttingen, and I still remember the details of the first day there. I arrived at the Geistrasse dorm tired and looking forward to what awaits me in the next five years. In the evening, I managed to find my way to the Gänseliesel, after being lost for half an hour, to meet my neuroscience and molecular biology batch, among them my future husband.

Sadim kissing the Gänseliesel. Source: private

The master's program was extremely helpful. Besides learning about different research topics and techniques, it helped me figure out my research interests and skills. My Ph.D. thesis was about studying therapeutic targets in Alzheimer's disease using mouse models at Professor Thomas Bayer's Lab-University Medicine Göttingen. After kissing the Gänseliesel, I returned to Qatar, where I had a Post-Doc at Qatar Biomedical Research Institute. I shortly realized that I was interested in research but from another perspective.

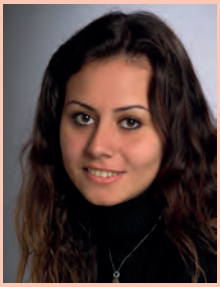
My interest is in planning and managing research and its outcomes to respond to regional and global challenges. I had the opportunity to join the Qatar National Research Fund (QNRF), Qatar's national funding agency and one of the spearheading funding agencies in the region. I am currently the Joint Funding Program Manager, working on developing and managing the joint research funding calls with other local or international partners to address specific research questions. The beauty of this job is that it gives you a broad understanding of different research fields. You work closely with experts from different backgrounds to develop calls in biomedicine, social sciences, energy, ICT...etc. Besides, it gives you an idea of the challenges and opportunities in different sectors and countries. Each call represents a separate project with exciting features, and each day brings you a new challenge and question. Having a research background allows me to understand the researchers' needs while developing the calls. Time and project management skills are critical, as you need to keep on top of a wide range of tasks and communications with internal and external stakeholders. While the work is sometimes demanding, I can't describe the feeling of accomplishment I have at the end of each cycle when I see promising research projects getting awarded and visualize their societal impacts in the future.

The past year of working remotely due to COVID-19 restrictions feels like a

Sadim with her family. Source: private

surreal journey. In the beginning, it took me some time to set up my office and split territories with my husband's office and my daughter's homeschooling desk and coordinate work, kids' schooling, and other home duties. However, I learned the importance of putting a particular routine while working from home to keep things on track, especially when you have many other responsibilities besides work. With some adjustments, I tend to find productivity and efficacy very high while working from home. On the other hand, it is essential to set boundaries between work and personal time to avoid burnout. Catching up with colleagues and friends using online meeting platforms is also very important to avoid being trapped in the narrow circle. Although I miss my previous unmasked outdoor life, I must admit that being locked at home got us closer to each other as a family (more than needed sometimes, such as having the kids invading the online meetings). It also amazingly makes the world feel smaller as we live in the same conditions, empathize with each other, and wait for the exact solutions.

A long time from now, we will be reminding our kids about these days. For the time being, we keep telling our little girls about Göttingen, sweet Göttingen; perhaps one day, they might be kissing the Gänseliesel themselves.



Sadim JAWHAR did her doctoral thesis under the supervision of Prof. Thomas Bayer at the University Medical Center Göttingen, Division of Molecular Psychiatry. She was awarded the GGNB Excellence Stipend and Otto Creutzfeldt PhD Award in 2013. She currently works at Qatar National Research Fund (QNRF) as a Joint Funding Program Manager.

Being a Journalist in a Pandemic

by Nehal Johri

The hardest part of being a journalist is getting the science out of your head. With little molecules of knowledge pecking at your brain and a tendency to strictly adhere to scientific guidelines, you freeze when your boss says, "Go to a pro-Trump rally. Thousands of people will be there. Oh, and they won't be wearing masks. But get me x, y, z." The task is great for your portfolio but it defies everything that experts have urged you to do. Stay at home, maintain a 1.5m distance, and avoid large gatherings. And you're about to break all of those rules.

I work as a News & Current Affairs reporter for Deutsche Welle, Germany's international broadcaster. My job is to go towards whatever is making the news. Be it protests. Be it street interviews where people's unintended spit flies all over my equipment. Be it US election 2020.

While vote counts were rolling in from different states, my team and I were parked outside Biden's headquarters in Wilmington, Delaware. There was an inner, restricted circle for top US media outlets, with amenities. The rest of us worked from an outer ring, Mowgli style: Peeing in the bushes, bearing 14 hours of work per day, staying vigilant to go live on TV any minute. It took almost a week to declare the new president.

In today's multimedia environment, a journalist is expected to fit into multiple roles that were earlier broken into specializations. For instance, I pitch stories, interview people, write articles, film events, edit videos, re-edit those videos for more casual-toned platforms such as Instagram and Twitter, write

scripts and voice my own TV pieces. Every once in a while, I adapt my stories for radio as well. Many journalists go through hours of voice training to hone the art.

If you are entering a conflict zone, you also need to learn some basic self-defense, get familiar with tear gas masks, and be quick to identify commonly used weapons. Unexpectedly, my first conflict zone was the US.

A glimpse of crowded pro-Trump rallies in Washington DC Source: private

Once news of Biden's win broke, protests began. Streets of Washington DC filled up with Trump supporters calling the election a "steal". And it became my job to squirm through these crowds (largely Covid-19 deniers), approach unmasked people, and ask them to explain what their anger was directed at. We double-masked, taped mics on to long poles and spoke as briefly with each person as possible. Yet, despite the precautions, we were exposing ourselves to a much higher risk of getting Covid-19.

High risk, high reward: that's journalism. It is a profession where you are respected for the bold, unique stories you deliver; not for being the safest reporter in the room.

Journalism is grounded in a moral tenet; it's the search for truth, not unlike scientific research. That truth requires different groups to have a voice, opposing opinions to be revealed, and for journalists to never twist what really happened. Essentially, it's a window into places where people cannot be. And so it requires reporters to put themselves in difficult situations.

Nehal with a fellow TV reporter outside Biden's headquarters during US election 2020 Source: private

I often understand how SARS-CoV-2 works and spreads better than my colleagues. That means I have to work against my instincts to get the job done. But at the end of the day, when your story airs on TV or social media and you've opened up a tiny pocket of the world for everyone else to see, it can be a thrill that makes up for the risk.

Nehal JOHRI is an alumna of the IMPRS for Neurosciences' program (2015-2017). During her Master's, she studied motor systems under the supervision of Prof. Dr. Hansjörg Scherberger at DPZ. For a year after that, she freelanced as a science writer and later joined a training program (Volontariat) at DW to become a multimedia journalist. She is presently a News & Current Affairs Reporter for them in Berlin.

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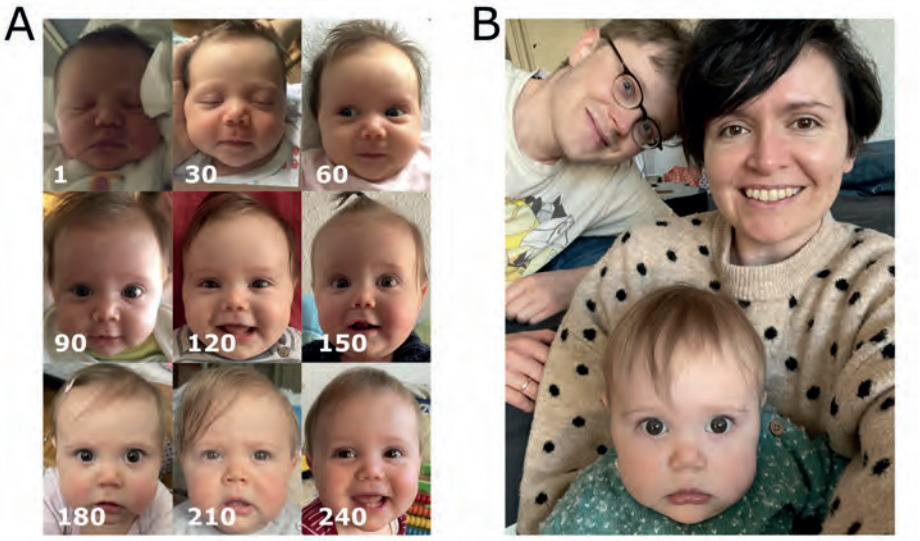
Having a "Corona-time" baby in Germany

by Oana Dormann

I never imagined I would have a baby under such unusual circumstances. I actually visited Göttingen in January 2020 and went to this salty lake 5 months pregnant. My friend Sona tells me: "You should come again later and see how fascinating it feels to float in salty water and suddenly feel weightless!" Little did I know, within the next 2 months every end-of-pregnancy plan I had would be cancelled: a trip to Italy, a trip to Copenhagen and lastly, our honeymoon in the Elbe Philharmonic... Not to mention all the courses for birth preparation, yoga for pregnant women, you name it... There is some silver lining to this. Since I have several friends who are teachers, they were not bound to a place anymore, so I had company in the last 2 months of pregnancy. My husband was working quite a lot so I was very happy to have friends cook for me and go for walks together. To make a long story short, we went to the hospital on a Sunday night, in the end I had a C-section 24h later and Maia Sophie was finally there: 3725 g, 52 cm, born at 10:17 on the 25th May! She was perfect and unexpectedly big! Oh, did I mention I had to keep a mask on all those hours I was trying to deliver? My husband was allowed to stay with us for a couple of hours after the surgery and was then kicked out. The baby stayed with me the whole time. Because of the virus they allowed only one person to come visit, usually the father, visiting hours were limited to 1 hour per day. Luckily no one checked, so he could stay for 3 hours. In the hospital everyone was wearing masks and in those first days of being a mom it was tough to not see a smile. After three days I felt strong enough to go home. The next weeks I recovered quite quickly and then I would go for long walks and stop to feed Maia when she was hungry. Summer is my favorite season!!! Since I didn't have any acquaintances with babies, I was walking alone and listening to podcasts or music. This way I upped my Spanish level and learned about finances.

In the meantime I did come in contact with some moms, but the time of face to face meetings was very short. So now we're back to mostly texting and sending pictures of each-other's babies. Fortunately I had decided to go back to work after 7.5 months. I only get to see my colleagues' faces via a computer screen, but this still adds diversity to my days. And being in home office (as long as no experiments are ongoing), I get to see my husband and daughter for breakfast and lunch and sometimes we even go for a walk together during the week. This way we enjoy more time together than if I worked on site, especially given the commute (I live in Ulm and I work in Biberach). Although we had to give up many things we were used to, I am grateful that we are all healthy and get to experience so much time with Maia while she is little, because time flies incredibly fast...



A. Development of Maia Sophie at regular intervals in days (numbers in white). B. Maia in her natural environment.
Source: private

Oana DORMANN (formerly Toader) did an external Master thesis at the Italian Institute of Technology in Genoa, Italy, followed by doctoral studies in Hannah Monyer's Lab at Uniklinikum Heidelberg. After graduation in 2016, she joined the CNS research department at Boehringer Ingelheim as a post-doc (as of 2021 scientist).

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And now to something completely different

From Neurosciences to IT Security *by Christian Henrich*

I joined the Neurosciences program in 2005 with the vague idea of using insights gained from studying biological brains to improve our secondary, silicon brains. I had just finished four years of studying Informatics and was only slightly disheartened by one professor claiming that neural networks were dead as a foundation for artificial intelligence. However, it was not to be.

After finishing my Master in Göttingen, I returned to Karlsruhe and wrote my thesis on the security properties of hash functions. Turning my back to Neurosciences was not an easy decision, but IT Security, to me, provides the perfect blend of theory (we have strict mathematical proofs), application (every time you use the Internet, IT Security happens), and people (people are, maybe unfortunately, an integral part of IT Security). It encompasses the creation of new primitives and protocols as well as proving their security, the implementation of existing concepts, the evaluation of established products and their interaction with end users. It is part mathematics, part logic, part engineering, and part social science, and I have yet to find a field of science where theory and application are this close together.

After my Diplom, I started working on cryptography voting schemes, predominantly Bingo Voting. Our goal was a voting scheme allowing the verification of election results without requiring trust in the voting machine. For this, the voter using Bingo Voting receives a receipt that allows them to check whether their vote was tallied correctly. This receipt is simultaneously unreadable for anyone else, and even with help from the voter it is impossible to discern which candidate received the vote (under certain assumptions). If you want to read more on Bingo Voting, I have written an article in the German Wikipedia, or you could have a look at my thesis ("Improving and Analysing Bingo Voting").

We implemented Bingo Voting and deployed it for the student parliament elections in Karlsruhe in 2007. Bingo Voting received the German IT Security Award for Bingo Voting in 2008. In 2009, this success story received a little dampener. The German Federal Constitutional Court ruled that elections must be verifiable without special knowledge. The ruling was against the use of commercial voting machines in German elections that do require trust in the voting machines, which at the same time are protected against scrutiny by the public. But unfortunately, the Zero-Knowledge-Proofs heavily used by Bingo Voting are not what you might call common knowledge. By the way, neither are the details of Sainte-Laguë/Schepers, the method of calculating the number of seats in parliament from the number of votes for each party, but I digress.

After finishing my thesis and until recently I have been working the Forschungszentrum Informatik Karlsruhe (FZI) and the Bundeskriminalamt (BKA). Details are not as interesting as they might seem, and also confidential, so please excuse my brevity.

This brings us to my current position. This March I started at the University Albstadt-Sigmaringen as professor for IT Security. I expect my first semester will be challenging, but I am looking forward to teaching as well as research. If you have any research regarding security, please feel free to contact me.

Christian HENRICH
graduated from the Neuroscience Program in Göttingen with an MSc degree in 2007. He finished an Informatics program with a Diplom in the same year and stayed in Karlsruhe for a PhD. He is alumnus of the KIT and KASTEL (Competence Center for Applied Security Technology), laureate of the German IT Security Award, and since 2021 Professor for IT Security at the Albstadt-Sigmaringen University.

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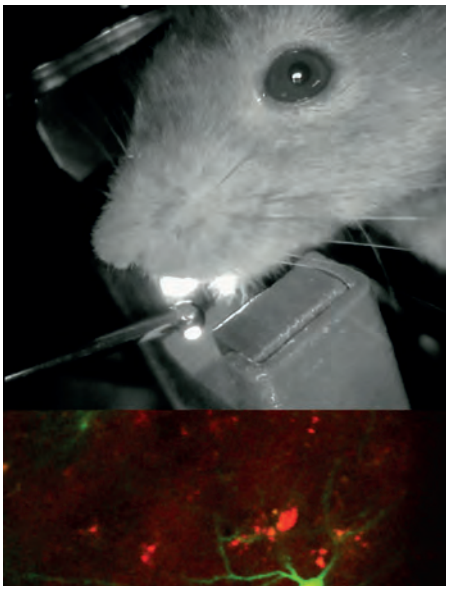
When life gives you lemons...

train mice! *by Sharlen Moore*

During my Ph.D. time in Göttingen, I studied the role of glial cells (specifically oligodendrocytes) in auditory processing and perception. My experience working in a multidisciplinary environment under the mentorship of both Prof. Klaus-Armin Nave and Dr. Livia de Hoz allowed me to develop different tools and approaches to relevant questions in neuroscience. Already before moving to Germany, I was interested in understanding the hidden roles that glial cells play in the brain. After my Ph.D., which was mainly sensory physiology oriented, I aimed to transition towards the study of higher-order processes, such as complex behaviors or learning. For that reason, as the next step in my career, I wanted to work in a lab where I could develop skills and apply state-of-the-art methods to study glial cells in behaving animals. I joined the lab of Dr. Kishore Kuchibhotla at Johns Hopkins University at the end of 2019. The Kuchibhotla Lab is a young and diverse lab that specializes in the study of context-dependent learning in mice and has unraveled behavioral manipulations that allow the study of knowledge expression and knowledge acquisition parallelly. Dr. Kuchibhotla recently showed that by removing access to reinforcement during training, we gain access to an animal's latent knowledge, proving that task contingencies are acquired much faster than what the animal can express in the presence of reinforcement1. In this case, 'expert' behavior is seen in the absence of reinforcement several hundred trials earlier than in the reinforced context. Why then if an animal knows a task, it does not entirely express that knowledge? One hypothesis is that neuromodulatory circuits play a role in promoting an 'over-motivated' state, in which the presence of reinforcement drives most of an animal's behavioral variability. As a first step to study this, we sought to reduce over-motivation in mice using a novel behavioral manipulation.



Top: Head-fixed mouse being trained in an auditory go/no-go task, receiving a water reward.

Bottom: Two photon imaging of astrocytes from the auditory cortex expressing a calcium indicator (green).

Most protocols to study learning involve a physiological restriction for animals to be motivated to perform a task in which they receive the restricted substance as a reward. Typically, animals are water or food restricted to ~85% of their baseline weight, which might influence their well-being, as this restriction can induce stress2, potentially impacting behavior3. Recently, an alternative to water restriction was described4, in which a non-palatable substance (citric acid, CA) is added to the animals' drinking water, which reduces their liquid consumption allowing them to maintain a weight of ~97%. This method proved effective for the wellbeing of rats and their mo-

The Homewood campus at Johns Hopkins University during a snowy day Source: private

tivation to learn a task. As a way to naturalistically manipulate and study neuromodulatory circuits involved in contextual learning, I am currently implementing these types of behavioral methods to train mice and aim to develop further ones. In the Kuchibhotla Lab, my general research interests are focused on understanding the role of neuromodulatory inputs to astrocytes in shaping cortical network activity during perception and cognition.

In addition to my research experience, I have found Baltimore to be an amazing and lively city. For instance, it has a great art scene, amazing museums, beautiful views around the harbor, and delicious dining spots. Although a big portion of my time here has been under COVID conditions, I have managed to get to know the city, form a running team with my friends, and engage in community outreach. And talking about training and behavioral variations, my new lab is currently training for the 2021 'Lab Olympics', the IMPRS tradition with a socially distanced twist.

The Kuchibhotla Lab during the 2020 socially distanced 'Lab Olympics'

Source: private

Sharlen MOORE completed her PhD work in the Neurogenetics Department at the Max Planck Institute of Experimental Medicine, mentored by Prof. Klaus-Armin Nave and Dr. Livia de Hoz. Since November 2019, she is a postdoctoral fellow in the Kuchibhotla Lab at Johns Hopkins University.

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IMPRS made it into YouTube!

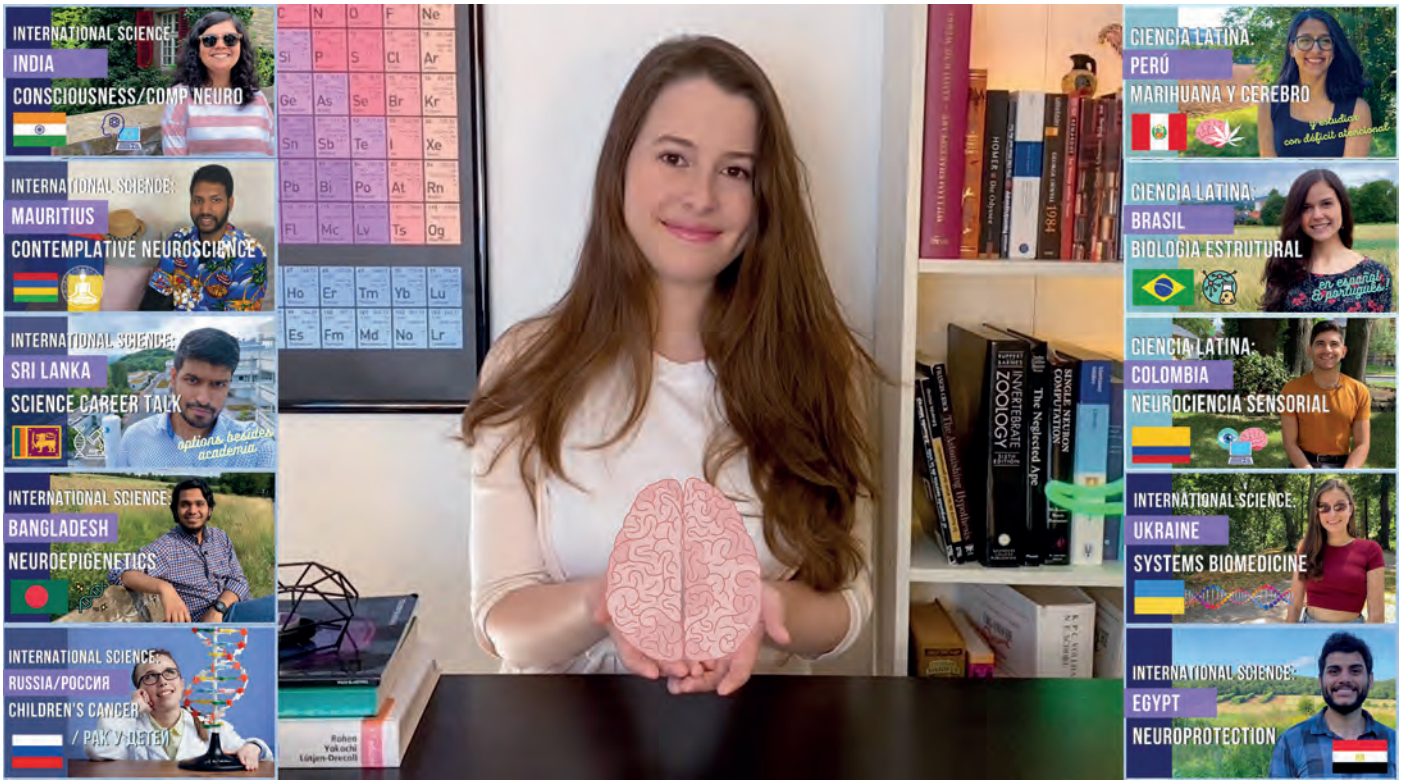
Visibility and representation in science *by Melanie Nuesch*

Amidst the COVID-19 pandemic, 2020 was a strange year which challenged the way we live. I have started a scientific YouTube channel in English and Spanish for many reasons: spark enthusiasm, broaden the availability of content in Spanish and give visibility and representation to scientists. Many are IMPRS colleagues.

For education, this year was particularly challenging, since many centers were not prepared for e-learning. In particular, I am from Uruguay, South America. Even though each country has its own complexity, Latin America has shared issues regarding education (for more, read this article I have coauthored: Moronta et al. 2021). The availability of educational and scientific content in Latin Spanish has been highly neglected. One reason is the human capital flight resulting from socio-economic problems. These matters also affect motivation and retention of students in academic programs. In 2020, lots of centers could not move their classes online fast enough and students had to find resources on their own and then take a test at the end of the semester. This caused instability, negative feelings and dropouts. I wanted to contribute to aid this.

My first idea was aiding e-learning by making neuroscience lectures, since I have teaching experience on the subject. Still, I wanted my content to help with the discomfort issue, plus entertain and inform lay people (who also deserve proper information and play a huge role in how the pandemic plays out). Graduates might be hesitant about what the next steps are and having extra difficulties because of the situation.

Therefore I started interviewing scientists from all over the world, from different stages of their careers to tell their stories, what kind of research they do and viewers can relate to them and visualize what kind of path they want, which helps them gain control over their future and making a plan. It also demystifies science, seen



YouTube Channel "Mel Nuesch". Playlists: International Science and Ciencia Latina. Source: private

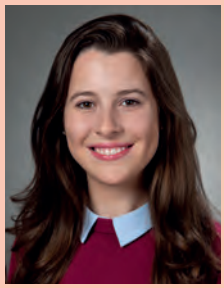
by many as that big, difficult thing that only geniuses or certain people can do. Seeing peers talking about struggles, how they overcame them and also the good things gives courage to those that think they are not enough – it empowers. I try that my guests comment on things such as women, POC and LGBTQ+ in STEM, FirstGen, environmental awareness and more. However, this transcends communities, for what I added interviews in English. Many IMPRS faces appear: Aishwarya Bhonsle, Juan Diego Prieto, Polina Derevyanko, Sakib Sadman, Abdelrahman AlOkda, Krishna Perianen Ramasawmy, Dilantha Perera, Ana Carolina Schwarzer, Nadia Paglilla, Mariia Metelova, Lucía Rojas and me, and more are coming soon.

"For me, it was the first time that I get to speak in front of a camera about myself or my work. I think it's important that young scientists get exposed to this often as it helps with reforming the ideas and improve the storyline of oneself." Abdelrahman AlOkda.

"The interview was an incredible opportunity to share with young scientists my experience and I am glad I could contribute to encouraging people to keep loving science!" Mariia Metelova.

I also made videos about scientific careers such as biology, math, physics, biochemistry, astronomy, and more are coming. I received many messages from students, some at remote areas, thanking me and the interviewees, saying how it helped them to keep focused on their dreams during these difficult time. Some scientists also benefited from the networking opportunities. All in all, it has brought nothing but positive results to everyone and invite you all to check it out and subscribe!

Melanie NUESCH is an IMPRS Master's alumna who worked in neuroepigenetics and genetics, combining bioinformatics and neuroscience. She is a molecular biomedicine PhD student at the University of Bonn, working at the Systems Medicine branch of DZNE Bonn (Joachim Schultze group), currently in functional immunogenomics and systems medicine in COVID-19 patients. She is part of the Latin American Network of Scientific Culture and Communication (RedLCC) and has a scientific YouTube channel, "Mel Nuesch".

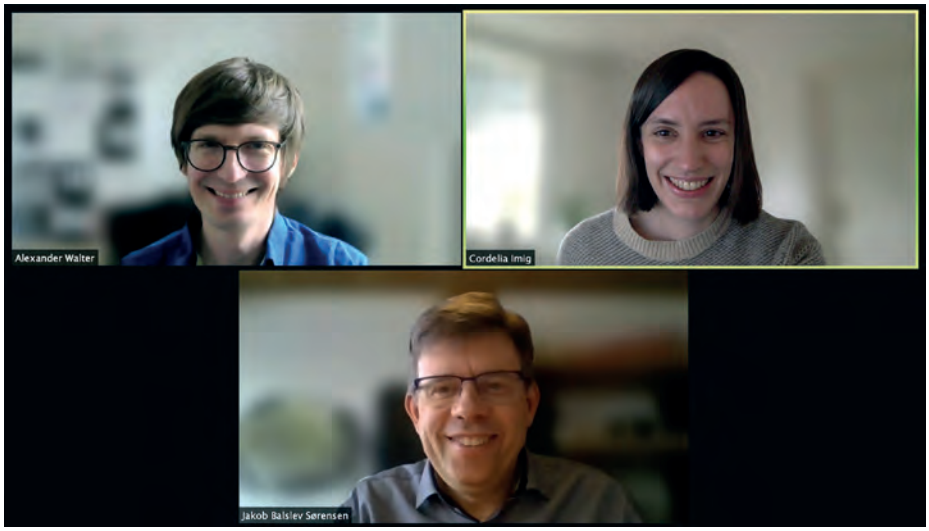


New "Little Göttingen" in Denmark

by Cordelia Imig

For many years, I was a member of the exclusive club of Neuroscience alumni that knew how to easily answer one of THE most common questions from colleagues or friends "Are you still in Göttingen?" with: "Yes, I am extremely happy here! We have fantastic Neuroscience research and the city is so international." Depending on the expression of my conversation partner, I sometimes also added how easy it is to get to Hamburg, Berlin, or Frankfurt by train. Despite of my love for Göttingen, I was aware that a certain degree of mobility may be necessary to facilitate the next career step. And so it happened that at the end of February 2020, after more than 10 years in Göttingen, I boarded a train to start my journey as a group leader at the University of Copenhagen in Denmark.

The decision to start applying for group leader positions was made in 2017, almost four years after 'kissing the girl'. For my future research, I wanted to dissect synapse-like signaling mechanisms along the gut-brain-axis. I became particularly interested



Cordelia with Alex and Jakob collaborating in Covid-times Source: private

in a group of secretory cells of the gut epithelium that sense force, nutrients, and microbial metabolites and pass this information on to sensory afferents that signal to the brain. I was very fortunate to have had the support of my postdoc mentor Nils Brose during this transition and to have received a small grant, which allowed me to visit labs in Australia and the UK to generate preliminary data. I also participated in several conferences that year and so it happened that I discussed my research plans with two fellow synapse biologists with ties to Göttingen on a walk through the 'Peak District' in England. Jakob B. Sørensen is a former member of the IMPRS Neuroscience faculty and his group in Copenhagen investigates the molecular control of synaptic transmission in health and disease. Alexander Walter is an alumnus of the MSc Neuroscience programme and an Emmy Noether group leader in Berlin, where he combines experimental and theoretical approaches to study the synapse. During the walk, Alex shared his experience as a junior group leader and Jakob became an official collaborator on my project.

A year later, I submitted two grant applications with Jakob as my formal mentor and I am now a MSCA and Lundbeck Foundation fellow in Denmark. Alex was also recently awarded a major grant and is in the process of moving to join the faculty in Copenhagen. Despite of a slightly 'uncomfortable' start caused by Covid-19-related lockdowns and restrictions that impacted both research and life (international long-distance relationships during a pandemic are not fun), I am happy to have embarked on this venture. In Denmark, private foundations such as Lundbeck, Novo Nordisk, and Carlsberg (yes, the beer for which Mads Mikkelsen cycles through Copenhagen) provide public research funding also at junior career stages. The Lundbeck Foundation, who awards the 'Brain Prize', is especially committed to help Denmark become "one of the world's leading nations within brain research"[1]. Moreover, the University of Copenhagen has started the first MSc Neuroscience programme in Denmark last year and it was a pleasure to contribute with a few lectures to the "Synapse" module.

I am now very much looking forward to future collaborations with Jakob and Alex in Copenhagen and we are also determined to continue some Göttingen traditions: In a few years from now, groups of tourists may stare in disbelieve at people with funny hats, who climb the famous statue of The Little Mermaid to 'kiss the girl' in a sea of flowers.

Cordelia IMIG did her PhD and postdoctoral work in the lab of Nils Brose at the Max Planck Institute of Experimental Medicine. She is now an Assistant Professor in the Dept. of Neuroscience at the University of Copenhagen, Denmark.

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[1]https://lundbeckfonden.com/en/news/denmark-gets-its-first-masters-degree-programme-in-neuroscience

Returning to work in a pandemic

How Covid-19 has shaped work after maternity leave *by Natalia Manrique Hoyos*

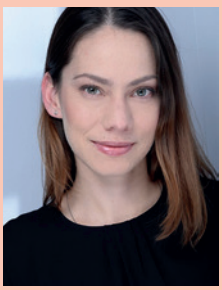
When Covid-19 hit in March 2020, the lockdown felt like a regression to the first weeks after my son Nico was born in September 2019. Back then I barely left home due to a mix of exhaustion, sleep deprivation, and anxiety around keeping him happy and safe. As Covid-19 cases went down and the lockdown was lifted, I enjoyed the warmer weather before returning to work as project manager in June, when Nico was 9 months old and his dad started his 5-month paternity leave. Due to Covid-19, my company allowed working from home, so I was lucky to avoid some of the challenges a "normal" return to a full-time office job would mean: daily 1.5h commute, not seeing my son for ca. 10 hours straight, late meetings, traveling, etc. With home office, I saw him right before starting work, during coffee or lunch break, and as soon as I was done for the day. With flexible hours, I could pause if my partner had an appointment and needed me to take over, and continue working afterwards or in the evening. With the new virtual-first mindset, I could attend meetings without spending countless hours traveling, and wasn't excluded from initiatives due to travel constraints. It was a smoother transition than I could have imagined.

Our little family enjoying a summer day in Spreewald. Source: private

After we both returned to work, we re-adjusted our schedules: I start work early while my partner takes the morning shift and brings Nico to daycare, and I finish work early to pick him up and spend time together before bedtime. With the second lockdown in November our daycare closed, so we had to adapt and split work and childcare times: My partner looked after Nico until noon, and I took over in the afternoon. I would try to schedule all meetings and important tasks needing uninterrupted concentration in the mornings, and juggled second-priority or small tasks while taking care of Nico in the afternoon. If either of us had meetings we couldn't fit into our "focused-work-time", we were usually able to exchange shifts that day. This was the best setup for us, as even if we had enough holidays to take while daycare closed, we felt it would cause more work and stress down the line. I absolutely recognize how lucky I am to have a supportive partner and a job that allowed flexibility throughout this situation, and am aware that not everyone is as fortunate. There are many reports on how Covid-19 has strongly hit mothers (example here). Especially single parents have been forced to sometimes make impossible choices with long-term consequences on their professional and financial situation.

In addition to the uncountable deaths and long-term health consequences for many, Covid-19 has disrupted our routines, kept us away from loved ones, and caused devastating financial distress on many families and businesses. A silver lining is that it has made us question how we work, how we vote, how we buy, how we learn, how we get access to healthcare (physical and mental), how we collaborate, how we access information, etc. This has created opportunities and willingness to make these processes better, more inclusive and accessible, and many of these changes might be here to stay. When the Covid-19 crisis is over, I will have to reevaluate what works for me/us and readapt to the new conditions. But for now, I am excited to see how the world applies lessons learned to shape a "new normal": hopefully one with more options to access quality services, and that embraces flexibility and capacity for change.

Natalia MANRIQUE HOYOS did her doctoral thesis in Mikael Simon's department at the Max Planck Institute for Experimental Medicine, Center for Biochemistry and Molecular Cell Biology. She defended her PhD thesis in October 2012. She joined Springer (now Springer Nature) in May 2013 and has held different roles around business strategy. Currently she is Sr. Project Manager, Corporate Strategy in Springer Nature.



Friedrich Hirzebruch Prize

Friedrich Hirzebruch Prize for Alexander Dieter

In January 2021, the jury of the Friedrich Hirzebruch Prize for Mathematics, Natural Sciences and Engineering honoured Alexander Dieter's research towards new neuroscientific methods that use optical stimulation of the auditory nerve to improve the quality of cochlear implants.

According to the general secretary of the "Studienstiftung", the award is given for exceptionally broadly based work that opens up fundamental insights in a field and perspectives for important areas of application. Alex' dissertation showed in an exemplary way how individual support for particularly talented and committed young people – together with the excellent research environment provided by the host laboratory – creates scope for innovative and highly relevant research.

The Studienstiftung has been awarding the doctoral prize since 2014. The award is intended to highlight exceptional academic achievements by scholarship holders and includes the prize money of 5,000 € donated by the „Freunde und Förderer der Studienstiftung des deutschen Volkes" and the „Theodor Pfizer Stiftung zur Unterstützung der Studienstiftung". An independent jury of well-known scientists decides on the awardee.

The jury was impressed by Alex' results, which demonstrate both behaviourally relevant perception, as well as near-physiological spectral resolution of optogenetic auditory nerve stimulation, and thereby open up new possibilities for hearing rehabilitation in the future. The jury also highlighted the broad spectrum of methods used in the work, ranging from viral transduction, over electrophysiological and behavioural methods, to the control and application of micro-LED-based cochlear implants.

Alex completed his doctoral studies in the lab of Prof. Tobias Moser at the Institute of Auditory neuroscience of the University Medical Center Göttingen in November 2019. Since 2020, he holds a postdoc position at the Center for Molecular Neurobiology at the University Medical Center Hamburg-Eppendorf. His dissertation with the title "Towards Optical Cochlear Implants: Behavioral and Physiological Responses to Optogenetic Activation of the Auditory Nerve" can be found on the following website: https://ediss.uni-goettingen.de/handle/21.11130/00-1735-0000-0005-12A6-B?locale-attribute=en

SD/AD

Dr. Alexander Dieter
Center for Molecular Neurobiology Hamburg

Anniversary celebration postponed

Much to our regret, we had to change our plans regarding the celebration of the Molecular Biology and Neuroscience programs' 20th anniversary. Last year we still had the hope that it would be enough to postpone the celebration by one year. Unfortunately, we had to realise that such a big celebration was unrealistic this year as well. Instead of burying our heads in the sand, we are now looking forward to our 25th anniversary and to the time when we can celebrate together on a grand scale with all current and former members of the Molecular Biology and Neuroscience programs, our colleagues and friends!

We will, of course, keep you informed about further plans.

SD/JB

Obituary Mohammed

It is with our deepest regret that we have to inform you that the former Neuroscience student Mohammed Abdelwahab Osman Mohammed (http://www.gpneuro.uni-goettingen.de/students/stud2018/stud_02.php) suddenly passed away in April this year.

Mohammed joined the IMPRS Neuroscience program as a NEURASMUS student in 2018 after earning an MBBS from the University of Khartoum in Sudan. He successfully completed his MSc in 2020 in the Synaptic Physiology and Plasticity Group under the supervision of Brett Carter at the European Neuroscience Institute Göttingen (ENI-G) before joining the lab of Prof. Pieter Roelfsema as a doctoral student at the Netherlands Institute for Neuroscience in Amsterdam.

We knew Mohammed as an extremely friendly and open-minded person, an inquisitive and science-loving student, who was very empathetic and collegial. He will be missed greatly.

Our thoughts go to his family and friends. We wish them much strength and express our heartfelt condolences.

The speakers of the Neuroscience Program Prof. Nils Brose and Prof. Martin Göpfert
The Neuroscience office team Jonas, Franziska, and Sandra

When I was in my early weeks in Göttingen I was stammering in English. Mohammed could see my struggles with public speaking. Yet he always understood what I meant and he would rephrase my points so that my questions would be answered. This gave me the confidence that I can be understood and that people were interested in what I had to say. Over time, my stammer improved in large part to his help in class. This is the care and respect he accorded all. He was just the kindest!

He was also a very generous soul outside of class. I always had a thing about cake being completely finished, and he quickly realized this somehow. So whenever I brought in cake, he would always take two big pieces even when full and compliment the cake. He took great interest in others and always tried to make their lives happier. And he was quick on his feet, especially on the dance floor where he had the best moves. He was the life and light of the party. It was always so cool to hang out with him!

His passing is an unspeakable loss to science and the lives Mohammed touched. I am unable to accept losing him and will always miss him.

Julia Dziubek

The loss of Mohammed comes with an immense amount of grief.

It is obvious that grief does not submit to mathematical measures. Sorry for that Mohammed, I know you love math.

Some months ago, Mohammed shared this text with me from the philosopher Judith Batler.

It is a beautiful text. Coming from Mohammed's personal voice, I hope we can find consolation, and relief from grief with Batler's words.

"Mourning has to do with yielding with an unwanted transformation, where neither the full shape nor the full impact of that alteration can be known in advance; this transformative effect of losing always risks becoming a deformative effect. Whatever it is, it cannot be wielded, it is a kind of undoing. […] It suddenly flashes up something about us, something that delineates the ties we have to others, that shows us that we are bound to one another. And that the bonds that compose us also do strand us, leave us uncomposed. Loss might seem utterly personal, private and isolating, but it also may furnish an unexpected concept of community. These social relationships that have the power to sustain and to break us, make us drive with great speed away from the unbearable grief, or drive precisely into its clutches, or do both at once. It is the condition for showing what we value, and even perhaps what steps to take to preserve what is left of what we love."

'Speaking of rage and grief' by Judith Batler. Sent by Mohammed, August 2020.

Inés Hojas García-Plaza

Mohammed -Wahba- as we called him; had a very short life, although he was destined to greatness, he already passed by great, as a gracious reminder of life rather than life itself.

He was a symbol of hope, laughter, and passion. An avid science lover and a kind human being. An aspiring scientist and a true artistic child in the face of life. He certainly imprinted his memory in each of us vividly. Maybe one day his questions and curiosities would be answered, while he rests in his eternal sleep.

Hazim Abdelrahman

Mohammed came to my lab in Göttingen as a rotation student in 2019 and again for his master thesis in 2020. We worked closely together throughout that time: overcoming technical hurdles in the lab, managing the uncertainty surrounding the pandemic response, all while trying to learn something new about synaptic function.

His scientific work in the lab was exceptional: his natural talent as an experimentalist, his sharp mind and tenacious drive promised a bright future in research science. However, it was Mohammed's kind nature and good humor that made him a pleasure to work with and to talk to.

Thinking about the time we were able to spend together as colleagues over the past two years leaves a sense of gratitude for having known Mohammed and an appreciation for the positive influence he has had on my life. But now, in the moment, there is a profound sadness at this loss.

Brett Carter

New Faculty

Joining the program since 2020

Rubén Fernández-Busnadiego started his career in Munich/Martinsried before he did a postdoc at Yale University. After being a group leader at the Max Planck Institute of Biochemistry in Martinsried for several years, he became full professor at the University Medical Center Göttingen in 2019. At the Institute for Neuropathology he now focusses on the study of membrane contact sites (MCS) and the molecular architecture of neurons using cutting-edge cryo electron microscopy. Already a GGNB member in the programs 'Biomolecules: Structure - Function - Dynamics' and 'Molecular Biology of Cells', we are happy to now also welcome Professor Fernández-Busnadiego as a faculty member of our Neuroscience Program

Further information: https://www.uni-goettingen.de/en/616529.html

Gregor Bucher became a Junior Professor of Developmental Genetics and group leader in Göttingen in 2006 and has headed the department of Evolutionary Developmental Genetics at the University of Göttingen since 2017. Using various genetic and transgenic tools, Professor Bucher studies the evolution of and development of insect brains and seeks to understand the formation of the insect head. In addition to the Neuroscience Program, Professor Bucher is a member of the GGNB programs 'Genes and Development', 'Cellular and Molecular Physiology of the Brain' and 'Genome Science'. We are happy that he is now going to introduce key aspects of neural development to our students.

Further information: https://www.uni-goettingen.de/en/57924.html

Viola Priesemann came to Göttingen as postdoc in 2013 already, and was a Bernstein Fellow/group leader in Göttingen from 2014 until 2016. Subsequently, she started a Max Planck Research Group at the MPI for Dynamics and Self-Organization. Her research interests range from neural networks and information processing to homeostatic plasticity and modelling of the pandemic progression. Dr. Priesemann studies spreading processes, self-organization and information processing in living and artificial networks. She is already a member of the GGNB program 'Theoretical and Computational Neuroscience' and we cordially welcome her in the Neuroscience faculty.

Further information: https://www.uni-goettingen.de/en/622913.html

Left the program since 2020

Ira Milosevic was a student in our program and obtained her doctoral degree in the departments of Membrane Biophysics and Biochemistry at the MPI for Biophysical Chemistry under the supervision of Erwin Neher and Reinhard Jahn in 2006. She spent several years at Yale University before she returned to Göttingen and became an independent group leader at the European Neuroscience Institute in December 2012. With the advantage of having been a student in our program herself, she led many students through lab rotation projects and MSc and PhD theses before she now moved on and opened the Neuronal Physiology and Pathology Group as an associate professor at the University of Oxford. In her lab, Ira is studying various aspects of processes that regulate synaptic vesicle formation using mouse and mammalian cells as model systems, along with cutting-edge imaging, electrophysiological and cell biological techniques. Moreover, she is exploring the signaling processes that arise from altered synaptic vesicle recycling and neurotransmission, and lead to neurodegeneration and corresponding diseases.

Further information: https://www.ndm.ox.ac.uk/team/ira-milosevic

Faculty Leaving

Walter Paulus
had been an active faculty member since the start of the program in 2000. As the head of the Department of Clinical Neurophysiology, he devoted his research to the understanding and modulation of cortical plasticity in humans with a focus on Parkinson's disease, epilepsy, migraine, stroke and dystonia. Other research areas were neuro-rehabilitation and hereditary neuropathies. With his retirement in 2021, Professor Paulus now left us as an active faculty member of the Göttingen Neuroscience Program.
Further information: https://www.uni-goettingen.de/en/58014.html

Manuela Schmidt
came to Göttingen as an Emmy Noether Group Leader at the Max Planck Institute for Experimental Medicine in 2012. Just like Ira Milosevic, she had been a student of the Göttingen Neuroscience Program before and had left Göttingen for a postdoc in the USA. Manuela did her Ph.D. in the "old ENI" under the supervision of Stephan Sigrist in 2006. After her time at the Scripps Research Institute in La Jolla, she returned as junior group leader to the Max Planck Institute of Experimental Medicine and became a faculty member of our program. In 2019, Manuela was appointed W2-Professor at the Faculty of Biology and Psychology at the University of Göttingen. Her Somatosensory Signaling and Systems Biology Group has focused on the comparative and quantitative analysis of somatosensory signaling networks in established mouse models of acute and chronic pain. In 2020, Manuela accepted a professorship offer from the University of Vienna, Austria, where she now heads the Division of Pharmacology and Toxicology.
Further information: https://pharmtox.univie.ac.at/people/professors/prof-schmidt/

Current Faculty Members

Andrea Antal
Matthias Bähr
Thomas Bayer
Susann Boretius
Nils Brose
Wolfgang Brück
Gregor Bucher
Brett Carter
Jan Clemens
Peter Dechent
Thomas Dresbach
Hannelore Ehrenreich
Gregor Eichele
Rubén Fernández-Busnadiego
André Fiala
André Fischer
Alexander Flügel
Tim Friede
Alexander Gail
Tim Gollisch
Martin Göpfert
Ralf Heinrich
Stefan Hell
Swen Hülsmann
Reinhard Jahn
Igor Kagan
Siegrid Löwel
Wiebke Möbius
Tobias Moser
Klaus-Armin Nave
Tiago Outeiro
Luis Pardo
Arezoo Pooresmaeili
Viola Priesemann
Jeong Seop Rhee
Silvio Rizzoli
Annekathrin Schacht
Hansjörg Scherberger
Oliver Schlüter
Caspar Schwiedrzik
Michael Sereda
Jochen Staiger
Stefan Treue
Melanie Wilke
Sonja Wojcik
Fred Wolf
Fred Wouters

For details regarding the research of all faculty members, please see www.gpneuro.uni-goettingen.de/content/c_faculty.php

TMS/tES Research...

... through the COVID-19 Pandemic *by Andrea Antal*

The COVID-19 pandemic has broadly disrupted research on human subjects, including the development and application of non-invasive brain stimulation (NIBS) methods. Moreover, the rapid onset of regulatory restrictions and related social isolation did not allow for systematic planning of how clinical research work may continue throughout the pandemic or how can be restarted. Considering that NIBS is a unique non-pharmacological research tool and a treatment option, of which have been successfully established for a wide range of neuropsychiatric disorders, the continuation and reestablishment of NIBS applications in the current situation as well as through future epidemics is of overriding importance. In some cases around the world studies on human subjects were able to modify their existing protocols to continue research efforts on a fully remote basis, using online video assessments or using at-home brain stimulation procedures. Unfortunately, only in one of our studies was able to proceed with minimal accommodations …Many studies were incompatible with these procedures, and were required to stop. Research activities in our labs were diverted to writing, reviewing and analyzing data remotely. Because the on-site research activities were disrupted, we had difficulties in meeting the required protocol-procedures, including the follow-up measurements.

After a few weeks we considered changes in interventions that do not impact the research trial integrity (e.g. number of visits) or even considered changes that strategically change research trial scope (e.g. changing to a pilot trial). Working with human subjects, for any applicable changes in the protocols, we had to apply for ethical approvals.

The most important point is that the missing laboratory testings resulted in a loss of data from ongoing trials. Of course, a delayed data acquisition was partly possible after the labs were re-open. Nevertheless, until today, it is almost impossible to maintain productivity, and keeping on the high level the well-being, education, and professional development of staff. For example, for early career scientists (ERC) and students concerned with their degree progress, additional support by adapting progress requirements (e.g. payed extensions) and providing them more opportunities for online networking, would be necessary and should be offered. In our lab, like in most places across the world, although neuromodulation studies have been suspended, yet the costs associated with those experiments (e.g. salaries) have continued. This placed a financial burden on these studies (besides the problem that the final results of the studies will be delayed or the aims cannot be reached at all). It is possible to get an approval for a No Cost Extension, by almost all of the third parties grant agencies. This offers significant relief to PIs but it is almost impossible to get a payed extension of a project (e.g. for PhD students), almost these might increase the likelihood that the dedicated resources already invested in these projects will be indeed fruitful.

I think it is very important to recognize and consider the amount of additional anxiety related to the current situation, placed on ECRs. Master and PhD students. For those students, with only months of funding left during they have to complete their degrees, this is a very stressful time. Nevertheless, it is also very difficult for senior researchers with grant deadlines and for PIs because of the above mentioned financial problems…We need new strategies to address these issues and to sup-

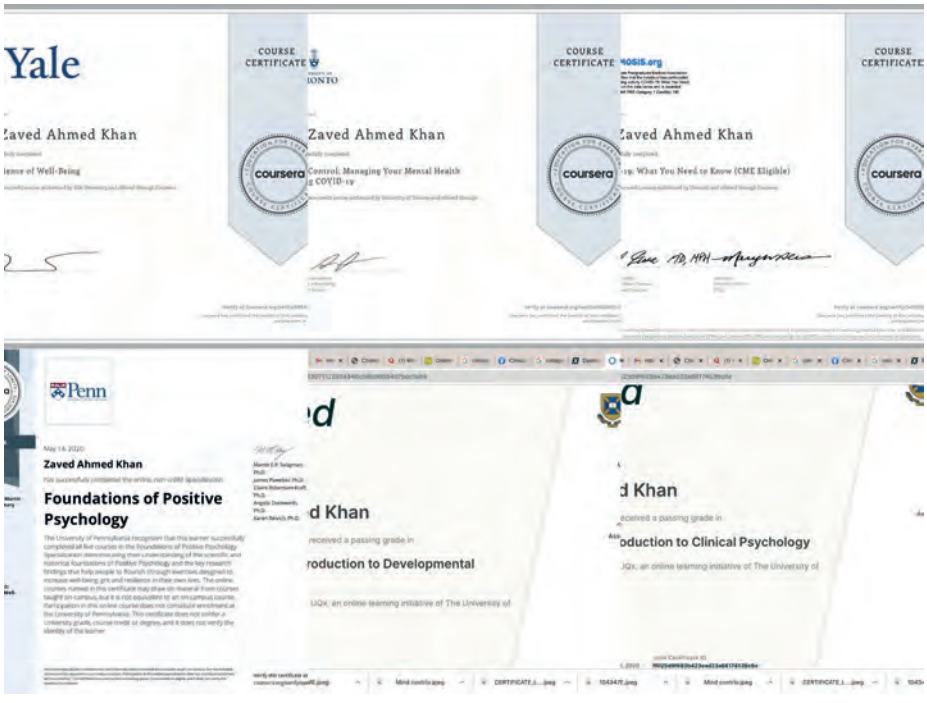
port our students through this difficult time, by maintaining group cohesion through implementing explicit support structures, particularly for those who are on their own, with families far away. The vast majority of labs, including our, have Zoom work meetings, but online tools cannot replace face-to-face interactions (although they are the best substitutes during the pandemic). The work in the labs is also a social experience and an essential source of support. What else can we do online? Scheduled coffee breaks, games and film nights, cocktail happy hours and many other events can be implemented successfully to replace at least some of the social interactions that are important to both our mental wellbeing and our lab unity.

Andrea ANTAL has been a faculty member of the Neuroscience Program since 2015: https://www.uni-goettingen.de/en/88816.html

My journey to self-awareness

and learning new skills during the COVID-19 lockdown *by Zaved Ahmed Khan*

I don't even know when exactly I had become completely invested in psychology. Lockdown initiated by the COVID-19 pandemic provided ample opportunities to devote some time to pursue my long-awaited dream of becoming a psychologist. I enrolled myself to MA (Psychology) at Indira Gandhi Open University, India. I completed my online classes, assignment, exams, and internship, which are part of this postgraduate programme's first year. I think I have always been an observing person; I observe people so much that it has become sort of like a habit that I engage in without even being aware of. I always notice people and all their quirks, the way they are standing, doing something, the tone of their voice, the vocabulary, their behaviour, how they dress, and all that.



Some certificate for skill to be used for Mental health issues in this pandemic Source: private

Initially after my senior secondary school. When I decided what subjects I should major in, I never really decided that I'd do psychology and pursue a career in it. I always thought I was good at Biology, and I loved medicine, but after studying psychology now, I think I would have done better career-wise in this field. Better late than never, psychology just opened up a new path for me and a whole lot of understanding about why people do what they do. By the time I was in my 2nd year, my course work wasn't enough for me, and I just got so involved in psychol-

ogy and that the need to know everything and the curiosity just keeps building up.

The main thing about psychology is that it's subjective as well as objective. Everyone experiences things differently as well as connect and have similar traits with people. I have also taken few courses through EDX and Coursera offered by the University of Toronto, Pennsylvania University, Penn State University and the University of Queensland.

What's more interesting to me is how our brain works and how everything in our body is related; hormonal imbalances mess with your emotions; if your feelings aren't controlled, it will lead to some physiological problems. With my solid neuroscience training at International Max Planck Research School, Göttingen, I can easily relate to psychology theories and understand their significance.

Our minds are profound, and it's always going to be a wonder how our minds work, how each of our senses works, and there might be some similarities in the way we think. Still, it can never be the same, and figuring out how one mind works will not explain how everyone's results, so we will never truly understand a human mind, and it is always going to be a mystery about how each of our minds works. COVID-19 lockdown has given me time to think about the new field of study and the motivation to keep building it. I planned to complete my training and degree in Clinical Psychology with a license in the coming months. With this second peak of COVID-19 and second lockdown, I will devote my time to the field of psychology whatever time left after work from home. With another pandemic in the building of mental health, we need many psychologists in India and around the globe for mental health issues. I hope at least I can help my students at Chandigarh University, India.

Skills to be learned during next lockdown

Source: private

Zaved Ahmed KHAN completed his Master's thesis in Ludger Hengst's lab at the Institute of Biochemistry in Martinsried. After graduation in 2004, he joined VIT University as a lecturer and completed his PhD in the field of neuropharmacology. He has worked on "Pre-clinical studies on the role of green tea polyphenols/EGCG nanoparticles for cancer therapy" and "Encapsulation of L-theanine to increase its bioefficacy as anxiolytics" with research grants from the National Tea Research Foundation, India. Presently, he is working as the Head of Department and Professor at the Department of Biotechnology Engineering and Food Technology, Chandigarh University, India. He is exploring the neuroscience extension to education, psychology, engineering and management.

The double life

by Carolina Quintanilla Sánchez

SARS-CoV-2 pandemic has been challenging our world for more than a year. As we learn, we get some progress, but then further obstacles reach us. The way it has affected us vary and so the way in which we face it; hence, sharing our experiences is an opportunity of learning and empathy. So, here is my little grain of salt.

I am a MSc Neuroscience student and have a double life: physically in Mexico and virtually in Göttingen. The embassy in my country was closed during April to mid-December 2020. This means a lot of things that could be wrapped up in three: the uncertainty of being capable to finish the program, having the lectures at night (time zone difference of 7 hours) and missing the overall experience of being in Göttingen with my colleagues.

All the way from October until now, it has been an oscillatory experience; from having great moments to the worst. There is a process in which I need to understand my body necessities over the things that I want to do. Waking up at midnight every day to virtually attend lectures is highly demanding, even if I have my 8 hours of straight sleep (which usually I don't achieve). I must say that it has been a tricky process, because just when I am feeling I am doing fine, everything goes down again and even the simplest cognitive task seems to be too hard to accomplish. Coffee doesn't help anymore.

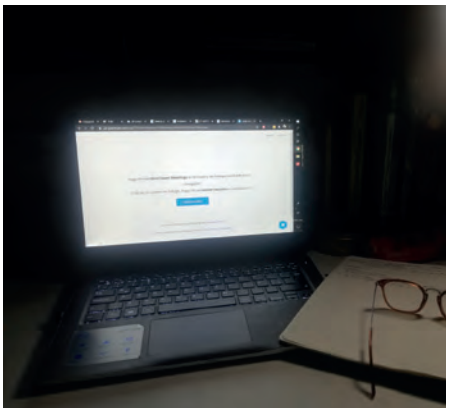
This situation has had a physical impact too, so I needed to re-arrange routine, change some habits and just be kinder with myself, in order to keep going and try to be as healthy as possible. As far as I know, I have not been infected with SARS-CoV-2, so it is all about an indirect struggle. A chronic alteration in my circadian clock has been impairing my mind and body, and only coming back to a normal vigilance/sleep cycle can fix this.

However, I must say that in middle of all the burden, there are also several sources of motivation, the main being my interest in Neuroscience. It has been an amazing adventure, with topics which I have never faced, great professors and many things that could be done and that I have never thought of. I am really grateful that I can experience the program even in the face of adversity. It is amazing how my own brain remains stubborn even in this stressful situation. Additionally, I have been embraced by the kindness of my coordinators, professors and colleagues and my relatives, which have made several efforts to support me.

This Monday I had finally my visa appointment with the hope of being in Germany soon. Honestly, I wish I could have it soon because otherwise, I predict an even harder situation with all this accumulative stress. I remain positive and will do my best to keep going.

Maybe it would have been easier just to postpone my studies. But I needed to give it a try because, when is the perfect situation anyway?

Editors' note: Carolina eventually arrived in Göttingen on the 14th of March.



Carolina QUINTANILLA SÁNCHEZ has been a Master's student in the Neuroscience Program since October 2020: http://www.gpneuro.uni-goettingen.de/students/stud2020/stud_14.php.

http://www.gpneuro.uni-goettingen.de/

Neurofaces 2000 - 2020