

Press Information, August 15, 2023

Illuminating the Causes of Depression

Na Cai receives the Friedmund Neumann Prize 2023

The Schering Stiftung awards the 10,000-euro Friedmund Neumann Prize 2023 to Na Cai for her outstanding work in psychiatric genetics and her contributions to our basic understanding of neuropsychiatric diseases, especially depression.

Depression is a major psychiatric disorder, afflicting around 8% of the population in Germany. It is commonly treated with antidepressants, often in combination with psychotherapy. These antidepressants are not always effective and can lead to myriad side effects. The reason we have not developed more effective antidepressants is that we do not yet know the biological basis behind the disorder.

Na Cai has achieved remarkable progress in researching the biological basis of depression, and her work has yielded three landmark findings: First, she identified genetic loci associated with an increased risk for developing depression, thus establishing genetics as a tool to investigate the biology of the disease. Second, she discovered a connection between the function of the mitochondria, the cell's powerhouse, and depression disorders. Third, she demonstrated that depression is highly heterogeneous and that it is possible to use genetic approaches to quantify and dissect this heterogeneity. Our understanding of depression today is similar to our understanding of cancer a century ago, when we did not know how many different forms there are. Na Cai's contribution to the field is likely to lead to better delineation between different forms of depression, thus enabling significant progress in the diagnosis and treatment of patients.

On September 5, the geneticist Dr. Na Cai will receive the Friedmund Neumann Prize 2023 for her outstanding work in psychiatric genetics and her contributions to our basic understanding of neuropsychiatric diseases, especially depression. "Through her work, Ms. Na Cai has laid the foundations to move from a mere phenomenological categorization of clinical depression to a molecular understanding of the causes of the disease. She thus makes an essential contribution to the further development of a field that is both urgent and necessary, as its importance grows daily," said Prof. Dr. Max Löhning, Chairman of the Foundation Council, to explain the jury's choice.

The Schering Stiftung has awarded the 10,000-euro prize since 2011 to young scientists for outstanding basic research in human biology, organic chemistry or human medicine. The prize aims to make visible excellent scientific achievement, honor scientists who have already developed a distinctive scientific profile, and help the prize winners establish themselves in their field of research.

Na Cai was nominated for the Friedmund Neumann Prize 2023 by Univ.-Prof. Dr. med. Dr. h.c. Matthias H. Tschöp, CEO and scientific director at Helmholtz Munich. Her dissertation advisor and yearslong mentor, Professor Jonathan Flint (Fellow of the Royal Society; Professor in Residence, Department of Psychiatry and Biobehavioral Sciences; Billy and Audrey Wilder Endowed Chair in Psychiatry and Neuroscience, UCLA Center for Neurobehavioral Genetics) will give the presentation speech as part of the award ceremony. He says about Na Cai: "She has been successful not just because she is a highly skilled and intelligent scientist – she has been successful because she is persistent. For as long as I have known her, she has devoted herself totally to her research. She is one of the most dedicated scientists I have known, and I am proud to have been able to help on her path to success."

Background

Na Cai uses genetics as a tool to investigate the nature of Major Depressive Disorder (MDD), one of the most common and debilitating diseases in the world. She started her career by being the lead analyst in a genome-wide association study (GWAS) on MDD that identified the first two significant and robust genetic associations to MDD. She also discovered a replicable increase in mitochondrial DNA (mtDNA) copy number and mutations in MDD patients as compared to controls and demonstrated that both are inducible by chronic stress in mouse models. Since then, her work has been two-pronged, one aiming to improve MDD diagnostics and resolve MDD heterogeneity, and the other focusing on molecular consequences of chronic stress. For the former, Na Cai investigated how disease definitions can impact genetic findings, and developed approaches to maximally utilize different definitions of MDD available in large datasets while preserving specificity of the findings to MDD. Her research group is currently investigating the relationship between the genetics of MDD and its symptoms, asking which symptoms are etiologically relevant to MDD, what biological pathways they capture, and how these pathways work together to cause MDD. Going forward, Na Cai is working on building and testing the genetic and biological validity of symptom-network models of MDD, and using that to inform and refine diagnostic criteria for MDD and its subtypes. For the latter, her research group is currently working on spatial-temporally resolving the molecular consequences of chronic stress in the brain using mouse models. Moving forward she will also focus on integrating their findings with brain imaging and multi-omics data from

post-mortem human subjects. She aims to develop a neurological understanding of what happens during chronic stress and why, biologically speaking, it is such a big risk factor for psychiatric disorders like MDD.

Na Cai studied biology with a focus on physiology and neurosciences at the University of Cambridge. In 2016, she earned her PhD in clinical medicine at the Nuffield Department of Clinical Medicine and the Wellcome Centre for Human Genetics at the University of Oxford, working in the lab of Professor Jonathan Flint. After postdocs at the Wellcome Sanger Institute and the European Bioinformatics Institute (EMBL-EBI) in the labs of Prof. Nicole Soranzo and Prof. Oliver Stegle, she became Principal Investigator at Helmholtz Pioneer Campus, Computational Health Center, Helmholtz Munich, in the fall of 2019. She is an active member of several international consortia, including the MDD and Cross Disorder working groups of the Psychiatric Genomics Consortium (PGC) and the newly founded ExDEP consortium, which uses data from electronic health records worldwide to study the genetics of MDD.

Ernst Schering Prize and Friedmund Neumann Prize Award Ceremony, Program:

Tuesday, September 5, 2023

5:00 p.m.: Ernst Schering Prize Lecture, Prof. Dr. Matthias Tschöp
Highly effective drugs against obesity: from discovery to approval (in German)

6:00 p.m.: Award Presentation
With a lecture by the laureate: *Genetics of Major Depressive Disorder – lessons and future challenges*

Venue:
Berlin-Brandenburgische Akademie der Wissenschaften
Leibniz-Saal
Markgrafenstr. 38, 10117 Berlin

Participation upon registration only. Please register until August 27, 2023, at www.scheringstiftung.de/Preisverleihung2023

Additional Lectures by Na Cai Wednesday, September 6, 2023:

10:00 a.m. (not open to the public): High-school lecture at Oberstufenzentrum Lise Meitner – School of Science
Lessons from studying the genetics of depression

3:00 p.m.: Public scientific lecture
Genetics of Major Depressive Disorder – epistemic iteration between genetic findings and phenotyping

Venue:
Charité – Universitätsmedizin Berlin
Charité Campus Mitte
Carl-Westphal-Hörsaal
Bonhoefferweg 3, 10117 Berlin

In English. No registration necessary.

More Information

Press information and images can be found at <https://scheringstiftung.de/presse/>.

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