Author Spotlight – Dr. Janine Knauer-Arloth

Here we had the chance to learn from Dr. Janine Knauer-Arloth about her work recently published in Biological Psychiatry. Dr. Knauer-Arloth is a Group Leader at the Max Planck Institute of Psychiatry, within the Medical Genomics Lab. Her laboratory recently identified genomic changes that occur with glucocorticoid stimulation, providing new insight into the effects of stress systems on the brain and periphery.

How did you first start thinking about this research question? What was the spark?

My research journey has been focused on understanding the impact of stress on health. During my PhD, I explored how genetic variations influence immediate gene expression changes in response to stress. My postdoctoral research delved deeper into the role of epigenetic mechanisms, particularly DNA methylation, in shaping long-term stress responses. I developed AI tools to analyze large-scale omics data and integrate information from multiple sources. This led to the current study, which investigates the complex interplay between genetic, epigenetic, and transcriptional factors in determining individual responses to stress.

Tell us about your work in this paper - what was your study design?

We conducted a multi-omics study in whole blood to investigate the impact of genetic factors on the molecular response to glucocorticoid receptor activation. We measured DNA methylation and gene expression in blood samples from 199-297 individuals before and after dexamethasone treatment. Using a network-based approach, we identified SNPs that influence both DNA methylation and gene expression in response to glucocorticoid stimulation. These variants were associated with increased risk for various diseases, suggesting their potential role in disease susceptibility.

What was the central finding? Why was this important?

The identified set of genetic variations can impact both DNA methylation and gene expression, ultimately leading to increased risk for various diseases, including psychiatric, respiratory, autoimmune, and cardiovascular disorders. By understanding how these genetic factors interact with stress responses, we can gain valuable insights into the underlying mechanisms of stress-related diseases and potentially develop new prevention and treatment strategies.

Is there a little nugget buried in the results section that most readers might not notice?
One of the most exciting findings from our study is the identification of a subset of genetic variations that influence both DNA methylation and gene expression specifically in response to stress. These effects are not apparent under baseline conditions and can only be detected by studying the response to a specific stimulus, such as dexamethasone treatment. This highlights the importance of investigating stimulus-specific molecular mechanisms to uncover novel disease targets.

What's next for your research?
I am excited to continue exploring the intersection of bioinformatics, AI, and psychiatric genomics. My future research will delve into single-cell analysis of brain and peripheral tissues, focusing on neuroinflammation and stress responses. By unraveling intricate gene networks, we aim to identify novel targets for the prevention and treatment of mental health disorders.

I am passionate about using cutting-edge AI approaches to unravel the complexities of human disease. I am excited to continue pushing the boundaries of scientific discovery and contribute to the development of innovative treatments for mental health conditions.

What do you most enjoy about the SOBP meeting?
I'm most looking forward to sharing our latest findings on isoform-specific networks in psychiatric disorders. This work represents a significant step forward in understanding the complexity of genetic regulation and its implications for mental health.

Read the full details of her work here:
Knauer-Arloth, J., Hryhorzhevska, A., & Binder, E. B. (2024). Multi-omics analysis of the molecular response to glucocorticoids-insights into shared genetic risk from psychiatric to medical disorders. *Biological Psychiatry*. https://doi.org/10.1016/j.biopsych.2024.10.004