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Population neuroscience of the adolescent brain: observing to change

Tomas Paus^{1,2}

¹University of Toronto, Toronto, Canada

²Child Mind Institute, New York, USA

Population neuroscience endeavors to identify environmental and genetic factors that shape the function and structure of the human brain; it uses the tools and knowledge of genetics (and the “omics” sciences), epidemiology, and neuroscience. By understanding the processes driving variations in brain function and structure across individuals, we will also be able to predict an individual’s risk of (or resilience against) developing a brain disorder. In the long term, the hope is that population neuroscience will lay the foundation for personalized preventive medicine and, in turn, reduce the burden associated with complex, chronic disorders of brain and body.

In this talk, I will introduce the basic concepts of population neuroscience and illustrate this approach using data collected in the Saguenay Youth Study, the IMAGEN Study and ALSPAC. I will talk about our recent work on gene-expression profiles of sex and stress hormones, the relationship between income inequality and brain maturation, and polygenic risk score for schizophrenia, cannabis use and brain maturation. I will close by outlining possible strategies for translating knowledge obtained by such observational sciences into stratified preventive strategies aimed at changing health behaviors and, in turn, preventing common disorders of the brain and body.