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Cell Types of Adult Mouse Brain: Definition and Experimental Access

Bosiljka Tasic joined the Allen Institute for Brain Science in Seattle in late 2011, where she is currently the Director of Molecular Genetics. There, she leads an effort toward comprehensive molecular analysis of cellular identity in the mouse brain. She is also interested in integrative cellular phenotyping, where different cellular properties (e.g., molecular, physiological, and morphological) are obtained for single cells and used to derive multimodal cell-type taxonomies. She has a long-standing interest in the development of novel genetic tools to enable access to specific cell populations for their functional characterization. Before joining the Allen Institute, Bosiljka completed her postdoctoral training with Liqun Luo at Stanford University, obtained her Ph.D. with Tom Maniatis at Harvard University, and received a Bachelor's degree from the University of Belgrade, Serbia.

Abstract: Single-cell genomics has fundamentally changed the way we define and experimentally access cell types and assess changes in their states or identity. One of the major team efforts at the Allen Institute for Brain Science is to define all cell types in the mouse brain by single-cell/single-nucleus transcriptomics (RNA-sequencing and spatial transcriptomics). I will present our current definition of cell types in mouse brain based on single cell transcriptomics as well as its correlation with other cellular properties which suggest specific cell type functions. Establishing causality relationships between specific properties and cell type function requires highly specific and temporally regulated perturbations combined with integrative phenotyping. I will present the development of new viral genetic tools that can be delivered systemically to the whole mouse brain to specifically label, monitor, perturb, or treat a cell class or type. The new viral genetic tools perform well across rodents and primates and have the potential to enable systematic analysis of brain cell type function and become precursors for highly specific neural circuit therapeutics.