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Sommario/riassunto

Construction of comprehensive and detailed brain regions neuroanatomical connections matrices (macro-connectomes) is necessary to understand how the nervous system is organized and to elucidate how its different parts interact. Macro-connectomes also are the structural foundation of any finer granularity approaches at the neuron classes and types (meso-connectomes) or individual neuron (micro-connectomes) levels. The advent of novel neuroanatomical methods, as well as combinations of classic techniques, form the basis of several large scale projects with the ultimate goal of producing publicly available connectomes at different levels. A parallel approach, that of systematic and comprehensive collation of connectivity data from the published literature and from publicly accessible neuroinformatics platforms, has produced macro-connectomes of different parts of the central nervous system (CNS) in several mammalian species. The emergence of these public platforms that allow for the manipulation of rich connectivity data sets and enable the construction of CNS macro-connectomes in different species may have significant and long lasting implications. Moreover, when these efforts are leveraged by novel statistical methods, they may influence our way of thinking about the brain. Hence, the present brain region-centric paradigm may be challenged by a network-centric one. Ultimately, these projects will provide the information and knowledge for understanding how different neuronal parts communicate and function,

developing novel approaches to diseases and disorders, and facilitating translational efforts in neurosciences. With this Research Topic we bring together the current state of macro-connectome related projects including the large scale production of thousands of publicly available neuronatomical experiments, databases with tens of thousands of connectivity records collated from the published literature, and the newest methods for displaying and analyzing this information. This topic also includes a wide range of challenges and how they are addressed - from platforms designed to integrate connectivity data across different sources, species and CNS levels of organization, to languages specifically designed to use these data in models at different scales of resolution, to efforts of 3D reconstruction and data integration, and to approaches for extraction and representation of this knowledge. Finally, we address the present state of different efforts of meso-connectomes construction, and of computational modeling in the context of the