

Introduction to the Special Issue on Cortical Interneurons*

Local circuit GABAergic inhibitory interneurons comprise a highly heterogeneous cell population with distinct molecular, morphological, and electrophysiological properties. Despite representing only 15–20% of the total cortical neuron population, their remarkable diversity endows them with the ability to provide exquisite spatiotemporal control over principal cell activity to regulate information flow within and between established cortical circuits. Moreover, each cortical interneuron subtype is unique in its proliferative history, migration during corticogenesis as well as postnatal integration into cortical circuitry. Indeed several developmentally regulated neurological disorders such as epilepsy, schizophrenia and autism are associated with deficits in the numbers and function of distinct interneuron cohorts. For all of these reasons inhibitory interneurons have recently become the intense focus of investigators drawn from a wide variety of backgrounds.

In the summer of 2009 a number of these investigators assembled in Mallorca, Spain to participate in an EMBO Workshop entitled *Cortical Interneurons in Health and Disease*. Drawn from a broad range of interests, speakers presented data on the developmental origins of inhibitory interneurons, cellular and functional diversity, and the roles played by inhibitory interneurons in defined cortical assemblies. This Workshop also included an extended round table discussion tackling the almost philosophical question of “What is an Interneuron?”. The resounding success of this Workshop was in part a reflection that this field, which not long ago was solely the domain of anatomists and physiologists, has now attracted cell and developmental biologists, geneticists and clinicians all receptive to new ideas about the roles of this undoubtedly important cell population. The cross fer-

tilization of ideas and lively interaction between participants ensures that the near and distant future for this field is bright.

In this issue we bring together reviews from several of the Workshop participants in the hope that we can represent the diversity of research currently undertaken and bring into focus the most pressing issues emerging from this burgeoning field. Reviews by Anderson, Zecevic, and Ross tackle the nature of interneuron development and diversity. Nelson, Soltesz, Rudy, Rossier, Yuste and Whittington address issues related to cell classification, plasticity of cell identity and the role(s) played by these cells in particular well defined networks. Finally reviews by both Baraban and Lewis highlight the potential roles played by specific inhibitory interneuron cohorts in the etiology and pathology of cortical malfunction. Together these articles project a sense of the breadth to which this field has grown and thus go some way towards living up to the meeting’s ambitious title. Of course, much of the excitement in this field reflects the amount there is still to be learned. Full elucidation of the roles played by inhibitory interneurons in cortical network development, function, and disease will ultimately require a deeper and more nuanced appreciation of each cell type. Nonetheless, the interest in these cells has resulted in a burgeoning in the multidimensional approaches used to study them. Interneurons have long languished in the backwater of cortical research. We are ecstatic that these cells, relatively small in number but rich in diversity, are attracting talented researchers from numerous and distinct fields of the neurosciences and beyond.

Chris J. McBain
Gord Fishell