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Sommario/riassunto

This research topic was suggested by Robert Sachdev to bring together a series of articles dealing with the laminar organization of the neocortex. By convention, there are six cortical layers but this number may vary throughout the cerebral cortex of a given species or between species: many regions lack one or more layers, whereas in other regions there are more than six layers. The laminar location of cortical neurons —their cell bodies— is determined during development. However, neurons are more than their cell bodies; they also have dendrites that may span within a given layer (intralaminar neurons) or across a variety of layers (translaminar neurons). For example, layer V pyramidal neurons have dendrites that span the entire cortical depth, whereas layer III pyramidal neurons have dendrites that span across layers I to IV. Some GABAergic interneurons have dendrites located within a cortical layer (e.g., neurogliaform cells), whereas the dendrites of other interneurons span several layers (e.g., bitufted cells). For neurons having dendrites that cross laminar boundaries, one might ask, why segregate their cell bodies so carefully into lamina? Among many other obvious questions: What is the evidence for or against integration of information across laminae for neurons whose dendrites span several layers? A traditional view is that activity flows through cortical layers in a feed-forward manner, going from layer IV, to layers II and III and onwards. Another view is that cortical layers can have distinct inputs that activate them, triggering spikes. Can processing

sequences be state dependent? Furthermore, different cortical layers have distinct transcriptomic profiles, neurochemical attributes, connectivity patterns, number and types of synapses and many other structural attributes. Thus, based on anatomy, or physiology or imaging: What is the function of each cortical layer? What do the different layers do?