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Sommario/riassunto	The CA3 hippocampal region receives information from the entorhinal cortex either directly from the perforant path or indirectly from the dentate gyrus via the mossy fibers (MFs). According to their specific targets (principal/mossy cells or interneurons), MFs terminate with large boutons or small filopodial extensions, respectively. MF-CA3 synapses are characterized by a low probability of release and pronounced frequency-dependent facilitation. In addition MF terminals are endowed with mGluRs that regulate their own release. We will describe the intrinsic membrane properties of pyramidal cells, which can sometimes fire in bursts, together with the geometry of their dendritic arborization. The single layer of pyramidal cells is quite distinct from the six-layered neocortical arrangement. The resulting aligned dendrites provides the substrate for laminated excitatory inputs. They also underlie a precise, diversity of inhibitory control which we will also describe in detail. The CA3 region has an especially rich internal connectivity, with recurrent excitatory and inhibitory loops.

In recent years both in vivo and in vitro studies have allowed to better understand functional properties of the CA3 auto-associative network and its role in information processing. This circuit is implicated in encoding spatial representations and episodic memories. It generates physiological population synchronies, including gamma, theta and sharp-waves that are presumed to associate firing in selected assemblies of cells in different behavioral conditions. The CA3 region is susceptible to neurodegeneration during aging and after stresses such as infection or injury. Loss of some CA3 neurones has striking effects on mossy fiber inputs and can facilitate the generation of pathologic synchrony within the CA3 micro-circuit. The aim of this special topic is to bring together experts on the cellular and molecular mechanisms regulating the wiring properties of the CA3 hippocampal microcircuit in both physiological and pathological conditions, synaptic plasticity, behavior and cognition. We will particularly emphasize the dual glutamatergic and GABAergic phenotype of MF-CA3 synapses at early developmental stages and the steps that regulate the integration of newly generated neurons into the adult dentate gyrus-CA3 circuit.
