First, I will recapitulate recently published findings regarding high-frequency signaling in the cerebellar cortex. Then, I will focus on the question how cerebellar granule cells (GCs) process the incoming signals: According to classical theories about cerebellar computation, each GC detects a specific pattern of active mossy fibers. Yet, mossy fibers convey broad-bandwidth neuronal signals ranging from several hertz up to kilohertz frequencies. How GCs detect this great diversity in the temporal patterns of the mossy fiber inputs remains unclear. We found that GCs closer to the white matter are gradually tuned to detect signals with higher frequency, and are less excitable than granule cells close to the Purkinje cell layer. The inner-zone GCs have parallel fibers that are tuned for high-speed signal propagation, project preferentially to the base of the Purkinje cell dendritic tree, and elicit faster postsynaptic potentials in the Purkinje cells. Implication for theories of cerebellar computation will be discussed.

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