Department für Neurowissenschaften

INSTITUT FÜR BIOLOGIE
UND UMWELTWISSENSCHAFTEN

Invitation to a guest lecture
at the joint colloquium of the Institute of Biology and Environmental Sciences and the Department of Neuroscience

Module bio890: Current topics in biology

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Adaptive and dynamic brain mechanisms for encoding a complex auditory world

All animals use auditory sensory information to navigate and communicate. To generate an auditory perception, the acoustic signal must first be parsed by the ear and brain into different components of frequency, timing, and intensity. The extraction of different kinds of information from a common sensory stimulus by the brain relies on the specialization of synaptic mechanisms and intrinsic neuronal firing characteristics. We investigate this process by studying the cellular and synaptic properties of the first central nervous system auditory structure, the cochlear nucleus, in an avian model system. In addition to a well-established 'timing' pathway for sound localization, we provide evidence for parallel processing of temporal envelope information in the so-called 'intensity' pathway for sound localization. A diversity of cell types in this pathway support improved and highly reliable coding of a complex sound stimulus across the population, and supports a continuum of amplitude modulation coding properties. We explored the ionic channel mechanisms underlying the temporal coding based on a model of spike threshold adaptation and show that a feature associated with the timing pathway, the low-threshold potassium conductance, is required for temporal sensitivity in these neurons as well. Together, these results suggest the importance of intrinsic biophysical properties in the avian cochlear nucleus to the parallel processing of simple intensity and spectrotemporal or envelope cues.

24.05.2022, 4:15 pm, W04 1-162

Host: Prof. Dr. Christine Köppl (Cochlea und auditorische Hirnstammphysiologie), DfN

Members of all institutes are cordially invited to join the lecture.