The functional role of cochlear synaptopathy for speech coding in the brain (CoSySpeech)

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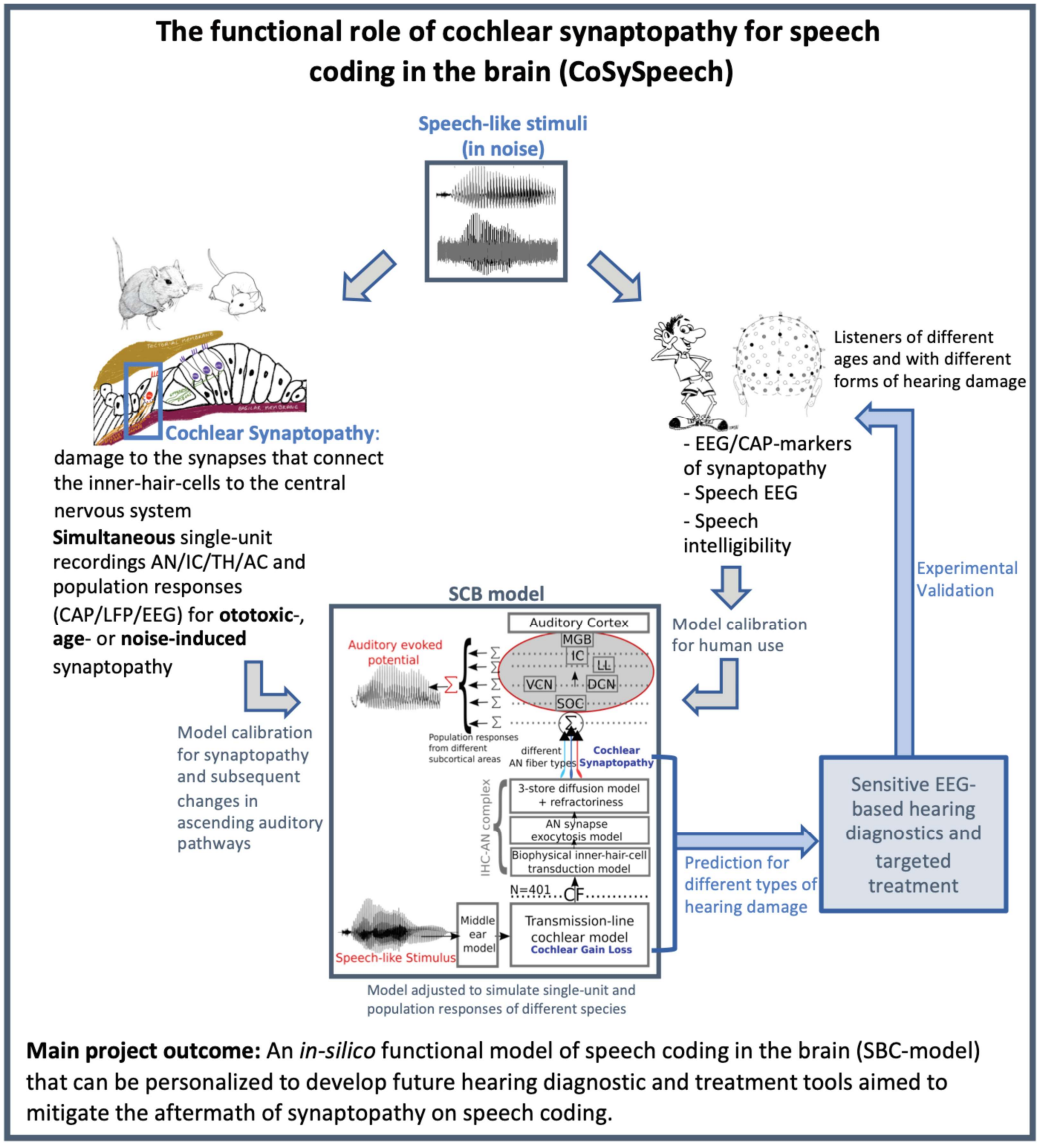
Inner ear (cochlear) synaptopathy is a form of primary neural degeneration, which damages synaptic connections between the auditory cells in the cochlea (sensory inner-hair-cells) and auditory-nerve fibers (neurons of the cochlear spiral ganglion). Our knowledge on synaptopathy is largely confined by animal histology studies which have shown that aging, ototoxic drugs and noise exposure can all cause synaptopathy without affecting hearing sensitivity. Consequently, cochlear synaptopathy is expected to affect more than 5% of the world population presently diagnosed with disabling hearing loss (WHO, 2011), urging the development of clinical screening protocols. At the same time, the functional consequences of synaptopathy for sound perception are poorly understood and therapeutic interventions largely non-existent. CoSySpeech aims to unravel, describe and manipulate the cascade of events occurring along the ascending auditory pathways after synaptopathy. This research will result in a unique, comprehensive framework for the functional aftermath of synaptopathy for speech coding in the brain (SCB-model), trendsetting the development of sensitive hearing screening methods and therapeutic interventions. Our consortium uniquely combines expert knowledge from different brain structures (periphery, brainstem, cortex) and spans various research modalities (histology, physiology, behavior, computational, behavior) to answer: "How does synaptopathy affect speech coding in the brain?"



Main project outcome: An *in-silico* functional model of speech coding in the brain (SBC-model) that can be personalized to develop future hearing diagnostic and treatment tools aimed to mitigate the aftermath of synaptopathy on speech coding.