



香港城市大學
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Department of Biomedical Sciences

presents a seminar

“Plasticity of the auditory brainstem in the adult rat: molecular, cellular, functional”

Prof. Dr. rer. nat. Robert B. Illing
University of Freiburg

Date : 9 August 2017

Time: 11:00am – 12:30pm

Venue: Meeting Room 2-130, 1/F, Block 2, To Yuen Building

Abstract

Structural plasticity of the adult mammalian brain was not easily accepted among neuroscientists but has been proven on many levels since the 80s. To probe this plasticity, we modified state and activity of the rat central auditory system in different ways. There are obviously two major directions in which its functional state can be modified: increase or decrease of cochlea-derived activity. Lesioning the cochlea causes not only deafness of that ear and degeneration of its nerve including its presynaptic endings, but also entails constructive events in the auditory brainstem. The conjoined occurrence of these processes does not induce secondary cell death, but involves glial mitosis and the emergence of new presynaptic endings identified by their content of Gap43 originating from cholinergic cells in the superior olive. These synapses innervate various types of cochlear nuclear neurons, sparing GABAergic cells. This lesion-induced re-innervation involves the expression of MMP2 and PSA-NCAM by astrocytes, followed by loss of neurocan from the extracellular matrix, apparently easing Gap43-dependent synaptogenesis. It also has transsynaptic effect on extracellular matrix organization in the inferior colliculus. Conversely, stimulating the cochlear nerve with an electrode forced specific auditory brainstem neurons into a modified pattern of transcriptional activity. If this is done for one to several days in neonatally deafened adult rats, we observed a gradually increasing GABAergic input to collicular neurons of a tonotopically unorganized population, apparently mediated by a massive microglia and astrocyte activation. These results contribute to extend our understanding of adult brain plasticity in the central auditory system and beyond.

About the Speaker

After Prof. R. B. Illing graduated from University of Konstanz, he obtained a PhD in 1981 at the Max-Planck-Institute of Tübingen. In 1986, he was a research assistant at University of Freiburg. He has been the head of Neurobiological Research Laboratory at University of Freiburg since 1994.

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All are welcome !