44th RAP Seminar

The 44th Seminar on RIKEN Center for Advanced Photonics

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Location: **1F Seminar Room, BSI Central Bldg., Wako, RIKEN**

(理研 和光キャンパス 脳科学総合研究センター中央研究棟 1階セミナー室)

Title: **Grand design of the neocortex**

大脳新皮質のグランドデザイン解読を目指して

Speaker: **Dr. Hiroyuki HIOKI**

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To unlock the mechanisms of high-order bran functions, it is absolutely essential to understand the neural network, which forms the structural cornerstone of the brain. This is because “without structure there is no function”.

We have analyzed the neuronal network composed of GABAergic neurons in the rodent neocortex. Neocortical GABAergic neurons have attracted particular attention, since it has been reported that GABAergic neurons play a key role in higher-order brain functions including memory, and psychiatric disorders such as schizophrenia. I will introduce that the synaptic connections between GABAergic neurons are not random but specific in terms of cell types and connections sites. For instance, parvalbumin (PV)-positive fast-spiking neurons, a major type of GABAergic neurons, displayed a compartmental organization of inhibitory inputs across cortical layers, with somatic and dendritic compartments of PV neurons receiving inhibitory inputs from different types of GABAergic neurons.

In addition, we have engaged in the tool development to prompt the analysis of the neural network. Since the discovery of Golgi’s method in the latter half of the 19th century, neural circuit analysis has always carved out its place in history at the cutting edge of development. Now, the transparency technology, which enables rapid and large-scale 3-dimensional structural analysis, is being continuously developed both in Japan and overseas. It is expected to bring about new breakthroughs in neural circuit analysis. In particular, the tissue-clearing method ScaleS has superior retention of ultrastructure, and it can be applied to electron microscopy. I will discuss new emerging trends in the field of neuroanatomy.

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