27O-ISMS30 Evaluation of Time Resolution in Mice Operant Learning System

○Mami OIKAWA[1,2], Yuichiro NOMURA[2,3], Syohei IKUTA[1,2], Daiki HORIE[2,4], Akira AMANO[4,5], Kazuhiro SHIMONOMURA[5,6], Yasuhiro SEYA[5,7], Chieko KOIKE[1,2,3,5]

[1]Grad. Sch. of Life Sciences, [2]Lab. for Systems Neurosciences and Developmental Biol., [3]Col. of Pharmaceut. Sci., [4]Col. of Life Sci., [5]Ctr. for Systems Vision Sci., [6]Col. of Sci. and Engin., Ritsumeikan Univ., [7]Fac. of Human Informatics, Aichi Shukutoku Univ.

A fundamental principle of vertebrate visual system relies on the functional separation of neuronal signaling into the ON and OFF pathways that generate visual contrast. These two pathways originate in depolarizing ON bipolar cells and hyperpolarizing OFF bipolar cells. Critical fusion frequency(CFF), defined as the frequency at which a flickering light is perceived as a continuous light, is useful for assessing the temporal characteristics of the visual system. Using electrophysiological analysis such as flicker electroretinogram (ERG) and visual evoked potential (VEP), CFF has been studied. It is important to analyze CFF in terms of behavioral performance to understand recognition of flicker frequency. We established a behavioral method for evaluating CFF of mice using the constant method that is one of the psychophysical techniques used for determining thresholds of various sensory functions. C57BL/6 mice were trained to perform a two-alternative forced choice task in which steady (250Hz) light and flickering (4-20Hz) light were presented on a green light emitting diode (green LED, 508nm) screen. The temporal frequency of flickering stimulus was randomly chosen on each trial. Mice responded to steady light by making nose-poke toward touchscreen. The proportions of correct responses (PCRs) were measured. Results showed that PCRs became lower with increasing temporal frequency of flickering stimulus. In the 20Hz condition, PCRs were close to chance level. From the data obtained, we calculated a threshold and the results suggest that CFF in behaving mice is approximately 14Hz that was lower than our previous methods using method of limits. Our behavioral assay of mouse model would contribute to development of diagnosis of human retinal disease by applying genetically manipulated mice.