Poster | Neural Excitability, Synapse and Glia

[3P]Glial Mechanisms

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*Videos are available throughout the meeting period.

[3P-048]BUbbly Dense Organization (BUDO): A novel structure of microglia in early postnatal mouse brain

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Microglia, the tissue-resident immune cells in the central nervous system, are key players in development, homeostasis and disease of the brain. Microglia have been shown to phagocytose viruses, cell debris and excess synapses in their lysosome for digestion. Microglial lysosome are immunopositive for Cluster of Differentiation 68 (CD68), a transmembrane glycoprotein, which are typically distributed as small clusters throughout microglial body. However, we sometimes observed novel organization immunopositive for CD68 in the mouse brain in the limited time windows during early postnatal days. The novel organization consisted of accumulated spherical CD68-positive structures, resembling bunches of grapes. We named the structure BUbbly Dense Organization (BUDO) and investigated the cell type, spatiotemporal distribution and function of BUDO. First, we immunohistochemically assessed BUDO at postnatal 0 day (P0) in the brain of C57BL/6J mice, finding that BUDO was immunopositive for a microglia/macrophage marker Iba1. BUDO also expressed microglia-specific markers in CNS such as P2Y12R and Siglec-H, but not the macrophage-specific marker CCR2. These results suggested that BUDO is derived from microglia. Second, the temporal and spatial distribution of BUDO was investigated. BUDO was found in the various brain regions at P0 with the regional preference near the lateral ventricle. Immunohistochemial analysis revealed that BUDO mainly exists until P14 and gradually disappeared after that with no evidence for existence in the adult brain. Next, we examined the function of BUDO. We found BUDO always contains red autofluorescent signals in their CD68-positive spheres. To examine whether BUDO phagocytoses the autofluorescent signals, we deleted fetal microglia using a CSF1R inhibitor PLX3397, finding that number of BUDO was significantly decreased at P0 and that autofuluorescent signals spread without shaping spheres. Because the distribution of the autofluorescent signals resembles that of red blood cells, we hypothesized that microglia form BUDO in response to the blood leakages. Indeed, immunohistochemial analysis showed that BUDO always exists in the vicinity of blood vessels, suggesting that BUDO is related to the blood leakage. Our findings suggest that there are blood leakages in mice brain during development and microglia respond to it for clear up harmful debris released from the leakage.