How does microglia examine damaged synapses?

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Microglia, immune cells in the brain, is suggested to be involved in the repair of damaged brain, like a medical doctor. However, it is completely unknown how microglia diagnoses damaged circuits in an in vivo brain. Japanese group led by Professor Junichi Nabekura and Dr Hiroaki Wake of National Institute for Physiological Sciences, NIPS, Japan, successfully took a live image how microglia surveys the synapses in the intact and ischemic brains of mice by using two-photon microscopic technology. They report their finding in *Journal of Neuroscience* on April 1, 2009.

They took an intense tune-up of their two-photon microscopy and achieved to visualize the fine structures of neurons and glias of mice in the range of 0 to 1 mm from the brain surface (world-leading deep imaging technology).

Surprisingly even in the normal (intact brain), microglias actively reached out their processes selectively for neuronal synapses at an interval of one hour with a contact duration of 5 minutes. More frequently microglias contacted on more active synapses. Once the brain received the damage such as ischemic infarction, microglial surveillance of synapses was much prolonged in duration, up to 2 hours. Frequently after the prolonged survey by microglia, damaged synapses were eliminated. This is the first report to show how microglia actively surveys the synapses in vivo and determines the fate of synapses, remained or eliminated

"Dynamic change of microglial surveillance of neuronal circuits in damaged brain, observed here, could contribute to establish the therapeutic approach targeted to damaged circuits", said Professor Nabekura.

Source: National Institute for Physiological Sciences

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