EXOSOME REGULATES OLIGEMRIZATION OF Aβ AND ATTENUATES Aβ-INDUCED LTP IMPAIRMENT EFFECT IN VIVO AND TG2576 MICE

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Introduction: A number of studies indicate that oligomeric forms of amyloid beta (Aβ) interfere with long-term potentiation (LTP), a cellular correlate of learning and memory, when they are administrated to cultured neurons, acute brain slices or hippocampus regions of live animal. However, the levels of LTP inhibition markedly vary depending upon the concentration of Aβ used. It was previously suggested that there are several factors that can regulate the contents of Aβ in the interstitial fluid (ISF), for example, transporting proteins through blood-brain barrier, Aβ-degrading enzymes, etc.

Aims: Because of these reasons, we wondered the physiological function of exosome in acute brain, whether they could regulate the LTP or Aβ-induced LTP impairments.

Methods:

In vivo LTP in intact hippocampus SC-pathway

Osmotic pump injection of purified exosome

Slice field recording of hippocampal SC-pathway

Results: In this research, we found that the exosome, a small secreted lipid vesicles that contain lots of membrane proteins including insulin-degrading enzyme (IDE) can decrease the quantity of Aβ as well as the oligomeric Aβs in vitro, through WB, ThT assay and CD Spectroscopy. Furthermore, the preincubation of Aβ with exosome prevents Aβ from blocking late phase of LTP which was normally inhibited by injecting Aβ alone to rat hippocampus in vivo, and the same with the sequential injection of exosomes followed by Aβ.

Conclusions: From this research, we can conclude that exosome regulates oligemrization of Aβ and attenuates Aβ-induced LTP impairment effect in vivo and Tg2576 mice.