Article: 0591
Topic: EPW17 - e-Poster Walk Session 17: Cognitive Neuroscience

Differential Effects of Cell-derived Amyloid-beta Monomers and Dimers on Spontaneous Neuronal Network Activity

C. Lange-Asschenfeldt[1], U. Henning[1], A. Müller-Schiffmann[2], C. Korth[2], P. Görtz[1]

[1]Psychiatry and Psychotherapy, Heinrich-Heine-University Duesseldorf, Duesseldorf, Germany ;

[2]Neuropathology, Heinrich-Heine-University Duesseldorf, Duesseldorf, Germany

Introduction: Growing evidence suggests that soluble amyloid-beta (Abeta) peptides play a pivotal role in Alzheimer's disease(AD) pathogenesis by mediating synaptotoxic effects particularly at early disease stages.

Objectives/ Aims: We quantified the effects of different order Abeta assemblies on spontaneous firing dynamics ofneuronal networks cultured on multielectrode arrays ('neurochips") as a read-out. We used naturally secreted, stable and conformationally highly homogenous Abeta monomers, dimers, and a mixture of different low-noligomers, derived from permanently transfected cell lines.

Results: Abeta dimers promoted a dose-dependent suppression of overall activity and network synchrony and altered the burst structure already in the low picomolar dose range. By contrast, Abeta monomers exhibited no effect on overall activity, but only a slight effect on burst structure and a moderate effect on network synchrony. A yet different response pattern was seen for a mixture of various low-n Abeta oligomers. Thus, multiparametric assessment of electrical activity changes on neurochips revealed characteristic signatures of the network response for the different Abeta assemblies. Since alterations of Network function likely occur in initial disease stages, these results confirm the pivotal role of Abeta dimers in early AD pathogenesis.

Conclusions: Neurochip recordings of toxic dimeric Abeta species may serve as a valuable diagnostic read-out in early AD and may also be applicable for future testing of drugs, antibodies, or small molecules aiming at Abeta dimers.

https://doi.org/10.1016/S0924-9338(15)30470-3 Published online by Cambridge University Press