Magnetite Nanoparticles a Key player in Alzheimer's Disease

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Abstract

The accumulation of iron in form of magnetite nanoparticles with amyloid peptide is a key process in the development of Alzheimer's disease (AD) [1]. However, the origin and role of magnetite inside the AD brain is still unclear [2].

We have investigated the interaction between these important players in AD with superconducting quantum interference, scanning electron microscope, surface plasmon resonance, and magnetic force microscopy [3]. The results support the notion that the magnetite-Amyloid β complex is created before the synthesis of the magnetic nanoparticles, bringing a highly stable interaction of this couple. The capacity of amyloid peptide to bind and concentrate iron hydroxides, the bases for the formation of magnetite, benefits the spontaneous synthesis of these nanoparticles thanks to the catalysis of amyloid peptide [4]. This symbiotic interaction between amyloid and magnetite helps in the Fe^{2+} stabilization as well contributes to the aggregation of amyloid monomers to fibrils. A neuronal culture model was used to monitor the changes in spontaneous activity and effective connectivity in amyloid-magnetite affected cultures. The activity of controls was compared in parallel with magnetite, amyloid and magnetite-amyloid complex. A clear spontaneous degradation of neuronal activity is only observed with the amyloid-magnetite dose, disrupting neuron network communities [5].

Our results demonstrate that magnetite nanoparticles have a more prominent role in this disease, than the previously assigned in the literature, which could help in a better understanding of this neurodegenerative disease and in the development of new AD treatments.
Single-spaced and a single paragraph

References

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Figures

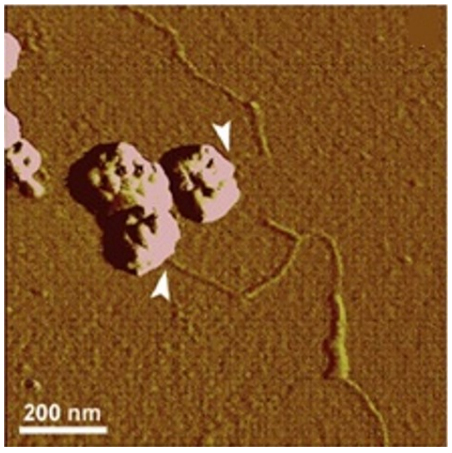

Figure 1. Image from Magnetic Atomic Force Microscope of Amyloid fibril grown up with the generated magnetite nanoparticles [3]