

Daniela Puzzo, M.D., Ph.D.

University of Catania

Catania, Italy

Amyloid-beta is Necessary for Hippocampal Synaptic Plasticity and Memory

2009 Investigator-Initiated Research Grant

Beta-amyloid (also known as amyloid-beta) is a protein fragment that is a focal point of research into the causes of Alzheimer's disease. Excessive beta-amyloid aggregates into amyloid plaques, a characteristic feature of the disease. However, low levels of beta-amyloid are present in the normal brain, and the protein fragment is released from nerve cells during brain activity. It is not known whether beta-amyloid is merely a waste product or whether it plays an important role in brain function.

Daniela Puzzo, M.D., Ph.D. and colleagues are studying the role of low levels of beta-amyloid in the brain. For these studies, the researchers utilize a mouse model of learning and memory known as long-term potentiation (LTP). LTP is a long-lasting increase in the strength of connections between nerve cells in the brain, believed to represent a cellular mechanism of memory. In previous work, the researchers have shown that very low levels of beta-amyloid, or small clusters of beta-amyloid known as oligomers, can increase LTP in the mouse brain. In contrast, higher levels of beta-amyloid inhibit LTP.

Dr. Puzzo and colleagues now plan to test whether LTP observed in normal situations requires low levels of beta-amyloid. They will use antibodies against beta-amyloid to remove any natural amounts of the protein fragment from their experimental preparation, and test whether such antibodies prevent LTP. They will also attempt to block the production of beta-amyloid as another approach to examining its role in LTP. The researchers hope that these experiments will advance our understanding of the role of beta-amyloid in the healthy brain.