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## Micro RNA-mediated Neurotrophic and Synaptic Networks in Alzheimer's Disease

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Messenger RNA (mRNA) molecules comprise a copy of a particular gene, which is used by the cell to create a protein. In recent years, scientists have discovered and characterized another type of RNA known as microRNA. MicroRNAs are shorter segments of RNA that bind to mRNAs and control whether a protein is made.

Walter J. Lukiw, Ph.D. and colleagues are studying the role of microRNA in Alzheimer's disease. They have observed that a specific microRNA, known as 125b, is found at unusually high levels in the brains of persons with Alzheimer's disease. They have also found that microRNA-125b levels are increased in older nerve cells grown in culture when those cells are exposed to certain signals. One of those signals is beta-amyloid, a protein fragment implicated as a possible cause of Alzheimer pathology.

Dr. Lukiw and colleagues plan to study the role of microRNA-125b in nerve cells and other brain cells growing in culture. They will examine how microRNA-125b affects the expression of proteins and alters cellular signaling systems in those cells. Many of the proteins of interest are involved in the formation of synapses, key regions that allow nerve cells to send rapid signals through the nervous system. Because synapses are damaged in the early stages of Alzheimer's disease, the proteins involved in their function are a key focus of Alzheimer research.

Dr. Lukiw's team will examine the possibility that microRNA-125b is a key signal leading to dysfunction of synapses in Alzheimer's disease. These studies will help to define the key pathways in the brain leading to neurodegeneration in persons with Alzheimer's disease.