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The birth and death of proteins in human brain---and their involvement in neurodegeneration

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Abstract

Protein aggregation is a common feature in aging and neurodegenerative disorders. For example, the senile plaques and tangles are widely spread in affected brain regions of Alzheimer's disease(AD), and the Lewy bodies and Lewy threads are pathological indicators in Parkinson's disease, Dementia with Lewy bodies and AD. Major components in these protein aggregations are beta amyloid, tau, and alpha synuclein respectively. Numerous reports indicated that the aggregation formation of these proteins and many other proteins is associated with the dysfunction of protein degradation. Indeed, as the one of the major machinery of protein degradation, the proteasome had decreased enzymatic activity in neurodegenerative conditions such as AD. For example the chymotrypsin-like proteasome activity was observed impaired in AD subjects and the aggregated proteins could impair the capability of proteasome response to stress conditions. *In vitro* study revealed that inhibition of proteasome could induce vast alteration of gene expression related with protein metabolism, lipid metabolism and signal transduction pathways. On another hand the lysosomal function was also impaired in aging and neurodegenerative conditions. More interestingly, inhibition of proteasome could impair protein synthesis in cultured neuronal cells. The rate and capacity of protein synthesis in aging and pathological brains were also declined significantly. Further investigation revealed that the oxidation level of rRNA molecules especially free 5S rRNA has elevated significantly. Such tight association and cross-talk between protein synthesis and degradation pave a new way for therapeutic development for aging and neurodegeneration.

Biography

Dr. Qunxing Ding has completed his Ph.D at the age of 28 years from Chinese Agricultural University (Beijing, China) and postdoctoral studies from University of Kentucky (Lexington, KY, USA). He is currently an associate professor in Kent State University and has published more than 40 papers in reputed journals and serving as an Associate Editor of repute journals such as Journal of Alzheimer's Disease and American Journal of Neurodegenerative Disorders.