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Mitochondrial dysfunction, oxidative stress and genetic factors in Alzheimer´s disease

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Alzheimer`s disease affects 10 million Americans and 44 million people worldwide. There are various biochemical mechanisms and processes that play a role in Alzheimer´s disease. These mechanisms are debated in the literature and there is currently no efficient drug that halts the progress of the disease. Efficient and effective drug design studies require detailed understanding of associated biochemical and biophysical mechanisms at the atomic level with dynamics. We investigate all biochemical processes and mechanisms associated with Alzheimer´s disease using quantum chemistry, statistical mechanics, bioinformatics, artificial intelligence and experiments. Using the information that we gain from biochemical investigations, we design monoclonal antibodies in collaboration with pharmaceutical companies. In this talk, we will present some of our studies about the roles of genetics, mitochondrial dysfunction and oxidative stress mechanisms in Alzheimer´s disease. Our theoretical and experimental results show that ATP reduces the fibrillization of disordered amyloid-β, transition metal ion coordination with amyloid-β increases the fibrillization progress and genetic factors significantly impact the fibrillization and aggregation properties of amyloid-β alloforms. Furthermore, we will provide insights into monoclonal antibody design for the treatment of Alzheimer´s disease.

Biography

Orkid Coskuner Weber is an expert in Alzheimer´s and Parkinson´s disease mechanism studies and monoclonal antibody design. She recived her Ph.D. degree from the Universitaet zu Koeln in Germany. She was a postdoc at Johns Hopkins and Stanford Universities. She was an assistant professor at George Mason University and at the University of Texas at San Antonio. She recently took a position in Istanbul for opening the Alzheimer´s and Parkinson´s disease research center. She has been associated with the National Institute of Standards and Technology since 2005. She develops and uses quantum chemical, statistical mechanical, bioinformatics, artificial intelligence and experimental tools in her research activities.

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