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Quantum and statistical mechanical and bioinformatics studies in Alzheimer's and Parkinson's diseases

Orkid Coskuner Weber
Turkish-German University, Turkey

Alzheimer's and Parkinson's diseases affect 45 million and 10 million people worldwide. The mechanisms of these severe diseases are currently poorly understood at the atomıic and molecular levels. Intrinsically disordered proteins are at the centers of Alzheimer's and Parkinson's diseases. These proteins do not adopt stable structures but possess rapid conformational changes and fast aggregation processes. Thus, measurements of their chemical, physical and biological properties at the monomeric and oligomeric levels face challenges. Furthermore, oxidative stress, mitochondrial dysfunction, and genetics, as well as glucose interactions, affect the mechanism of these two neurodegenerative diseases. We study the molecular mechanisms of Alzheimer's and Parkinson's diseases at the atomic and molecular levels. For these purposes, we develop and apply novel quantum and statistical mechanical and bioinformatics tools. We published 30 peer-reviewed research papers and a book chapter about these topics. Here, we will discuss the usefulness of quantum and statistical mechanics and bioinformatics in the studies of complex diseases, such as Alzheimer's and Parkinson's diseases.

Biography

Orkid Coskuner Weber completed her PhD studies in biophysics and physical chemistry at the University of Cologne in Germany. She worked as a postdoctoral scientist at the Johns Hopkins University and then at Stanford University. She was a research assistant professor at George Mason University and an assistant professor at the University of Texas at San Antonio. Currently, she is an assistant professor at the Turkish-German University and took a position in Istanbul for opening the Alzheimer's and Parkinson's disease research center. She has been working as a scientist at the National Institute of Standards and Technology, USA, since 2005.

weber@tau.edu.tr

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