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Biophysical Analysis of Nanoparticles Used in the Treatment of Neurodegenerative Diseases JUYOUN PARK, RICHARD KYUNG, CRG-NJ — The build up of active and abnormal oxygens within cells causes damage to DNA and proteins, and finally causes neuronal cells. Elevated levels of redox-active metals have proven themselves to be the catalyst for the cascading process that leads to common neurodegenerative diseases such as Alzheimers Disease, Parkinsons Disease, and macular degeneration. In this research, in Alzheimers specifically, we have studied about the redox-active metals that have caused production of reactive oxygen species (ROS) from the aggregation, oligomerization, and amyloidosis of amyloid beta peptides(A) and the formation of harmful neurofibrillary tangles (NFTs) causing cell death and wreaking havoc in the brain. Also, a chelation treatment method to eliminate the toxic levels of these metals are investigated from multiple dimensions, including optimization energy, electrostatic potential map, and dipole moment. Since chelation therapy is a potentially highly effective form of treatment for neurodegenerative diseases, various relevant molecules are computationally tested to perform this task of reducing metal ion levels. Through the analysis of various confirmed metal ion chelators, it can be determined which are the most efficient chelators to be used in therapy.

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