

Heme and Copper bound Amyloid β Peptides: Reactive Intermediates relevant to oxidative degradation of neurotransmitters

Somdatta Ghosh Dey*

School of Chemical Sciences, IACS, Kolkata, India

somdattaghoshdey@gmail.com; icsgd@iacs.res.in

Alzheimer's disease (AD) is a neurodegenerative disorder that has generally been associated with the accumulation of amyloid beta ($A\beta$) peptides and formation of partially reduced oxygen species (PROS) catalyzed by heme and Cu bound $A\beta$ active sites in the brain. Degradation of neurotransmitters is another hallmark feature of AD. The heme bound $A\beta$ peptides can act as peroxidases and degrade neurotransmitters like serotonin through reactive intermediates like compound 0 and compound I, which have been trapped and characterized. Cu bound $A\beta$ peptides are also found to catalyze the oxidation of serotonin in the presence of H_2O_2 . While both, a Cu(II)-OOH species and a dimeric, EPR silent, Cu_2O_2 bis- μ -oxo species are formed under the reaction conditions, the Cu(II)-OOH species is the reactive intermediate responsible for serotonin oxidation. Second sphere amino acid residues play significant roles in the reactivities exhibited by these metal- $A\beta$ complexes.

1. A. K. Nath, A. Ghatak, A. Dey,* S. G. Dey* *Chem. Sci.* **2021**, *12*, 1924.
2. M. Roy, A. K. Nath, I. Pal, S. G. Dey* *Chem. Comm.* **2020**, *56*, 4505.
3. I. Pal, A. K. Nath, M. Roy, M. Seal, C. Ghosh, A. Dey,* S. G. Dey* *Chem. Sci.* **2019**, *10*, 8405.