

Efficient Lipid Peroxidation Catalyzed by Amyloid-Beta-Copper Complex: Observation of Chemical Oscillation and Chaos

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Biochemical oscillations are ubiquitous in living systems, occurring in many contexts such as circadian rhythms, DNA synthesis etc. In contrast, in vitro chemical oscillators are limited to only a few examples based largely on oxyhalogen chemistry, such as the well-known Belousov-Zhabotinsky reaction. Using a BODIPY lipid peroxidation probe, we have found that lipid membrane bound A β -Cu complexes function as peroxidases that catalyse the lipid peroxidation much more efficiently than free copper ions though the later generates more reaction oxygen species (ROS). Under low A β and probe concentrations (<1% total lipid), the reaction system starts to oscillate along with exponential decay kinetics. Our observations may have implications for the pathological roles of A β -Cu complexes in neuronal membrane damage.