

CHEMICAL TOOLS AND TACTICS TO STUDY MULTIPLE FACETS IN ALZHEIMER'S DISEASE

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Alzheimer's disease (AD), associated with degeneration of neurons and synapses in the brain, leads to motor impairment and eventual fatality. Neurodegeneration could be related to various interconnected features, including (i) plaque formation from amyloid- β ($A\beta$) peptide fragments, (ii) metal ion dyshomeostasis and miscompartmentalization, as well as (iii) inflammation and increased oxidative stress due to overproduction of reactive oxygen species (ROS). The inter-relations between some of these pathological factors have been investigated. Metals are found entangled in the $A\beta$ plaque and likely contribute to $A\beta$ neurotoxicity and oxidative stress. ROS have been shown to increase the rate of $A\beta$ plaque formation. Our understanding of the correlation between these elements and AD neuropathogenesis has been very limited, however. There is currently no cure for AD; therapies are focused on symptomatic relief targeting the decrease in the levels of acetylcholine, only one of the multiple factors causing the disease.^[1-5] To find a cure for AD, we require a better understanding of the relationship between the various causative factors of this devastating disease. Towards this goal, we need suitable chemical tools and tactics capable of targeting and regulating its multiple underlying factors simultaneously.^[2-4] Herein, our rational design and preparation of our chemical tools will be discussed with our investigations of their interactions and reactivities with targets *in vitro* as well as their efficacy *in vivo*.^[6-11]

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