

MULTIFUNCTIONAL CHEMICAL AGENTS FOR METAL CHELATION, POSITRON EMISSION TOMOGRAPHY (PET) IMAGING, FLUORESCENCE IMAGING, AND AMYLOID PLAQUE CLEARANCE IN ALZHEIMER'S DISEASE

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Alzheimer's disease (AD) is characterized by the deposition of amyloid plaques containing the amyloid beta (A β) peptide. Currently, no treatment is available for AD. Metal ion interactions of the A β peptide are believed to help formation of toxic aggregates. Developing chemical compounds that will take care of A β aggregation and control abnormal metal interaction are therefore highly demanded. To this end, several multi-functional compounds have been developed in our laboratory and tested for the following major applications:

A β plaques and metal binding: Our compounds have strong affinities for A β peptides aggregates and metal ions, as demonstrated in our laboratory. To the best of our knowledge, there is no other report for such a high affinity ligand for both the plaques and metal ions. Compounds reduce the amyloid plaque formation and can be used as therapeutic agents for AD. Fluorescence imaging of A β plaques: The compounds are highly fluorescent and can be used in imaging applications in vitro. We have used these compounds to image synthetic A β plaques and also in the brain slices of Tg2576 APP transgenic mice. Positron emission tomography (PET) imaging: Some of the developed compounds bind very strongly copper ions and can thus be used in the synthesis of ⁶⁴Cu PET imaging agents for the detection of A β plaques in humans. Overall, these compounds have various potential applications as therapeutic or diagnostic agents for Alzheimer's disease.