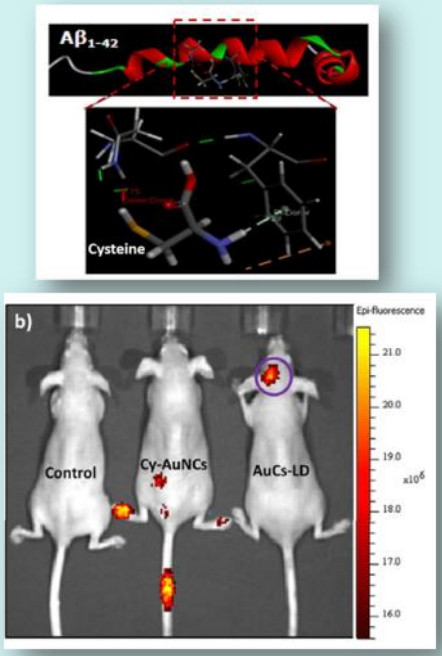
Modified Abstracts: Work done in SCTIMST

Gold nanoclusters & Fluorescence imaging: a distinctive approach for Alzheimer's disease

In an article entitled "**Bifunctional cysteine gold nanoclusters for b-amyloid fibril inhibition and fluorescence imaging: a distinctive approach to manage Alzheimer's disease**" published in Journal of material chemistry B by Royal Society of Chemistry, the authors Resmi *et al* tried to inhibit the formation of amyloid fibril through the thiophilic interaction between the side chain of an aromatic residue in a polypeptide and a sulfur atom of a compound, using a cysteine-capped gold nanoclusters (Cy-AuNCs).

Authors utilized molecular docking to examine the thiophilic interactions between the sulfur atom of Cy -AuNCs and the aromatic rings of the protein. After enhancing brain targeting and passage through the blood-brain barrier (BBB), the material was proven to have favourable biocompatibility, along with the capability for real-time imaging facilitated by the intrinsic fluorescence.

The efficacy of these nanoclusters in disintegrating amyloid fibrils and their ability to traverse the BBB were demonstrated in both *in vitro* and *in vivo* settings using the BBB model and the AD animal model, respectively. The findings of the study suggest that nanoparticle-based artificial molecular chaperones may present a promising therapeutic approach for AD.

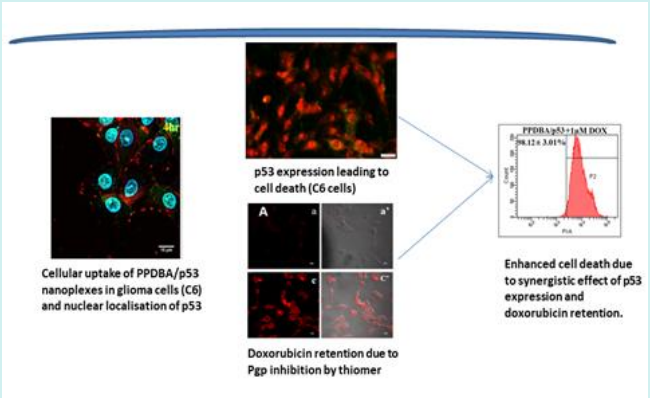


Molecular interaction of Cy-AuNCs with Ab1–42 (top) and brain imaging of live animals after the injection of Cy-AuNCs and AuCs-LD at 4 h (bottom).

(Bifunctional cysteine gold nanoclusters for b-amyloid fibril inhibition and fluorescence imaging: a distinctive approach to manage Alzheimer's disease. AN Resmi, CR Rekha, ME Dhushyandhun, Sarathkumar E, Sachin JS, Gulia KK, RS Jayasree, J Mater Chem B, 2023, 11, 4715)

Cationic thiomers for intracellular delivery of p53 & doxorubicin for anticancer applications

Cancer is uncontrolled growth of mutated cells and is a serious health concern even with all the advances achieved in this area. Multiple treatment strategies are found to be more effective and combination therapy for treating cancer has gained lot of attention and is in practice. Recently nanomedicines are gaining attention in the treatment of cancer and multifunctional nanoparticles which can deliver therapeutic molecules targeting multiple pathways is widely investigated. Chemotherapy is one of the most important treatment option along with surgery to treat cancers. But the side effects associated with it, the low bioavailability as well as the multidrug resistance reduces the effectiveness of this treatment mode. Apart from toxicity, one of the major problem associated with chemotherapy is multidrug resistance. Most of the cancer types are reported to have mutant p53 and this can lead to overexpression of P-gp leading to poor chemo sensitivity. The research team lead by Dr Rekha in Biosurface Technology, **developed cationic thiomers which can deliver therapeutic gene p53 and also the chemotherapeutic drug doxorubicin simultaneously**. The cationic thiomer and p53 forms a nanoplex and doxorubicin along with nanoplex is delivered to C glioma cells. The cationic thiomer was found to have good P-gp inhibition properties and high drug retention for longer period of time in both C6 and A549 cells. The IC50 of doxorubicin alone was found to be 3 µM, but when administered with PPDBA/p53 (4:1) and 1µM DOX the cell death was as high as 98%. *In vivo* evaluation in mice tumor model showed a reduction of almost 20% from the initial tumor size when treated with PPDBA II/p53/DOX. This study proves that presence of p53 and efflux pump inhibitor can reduce the chemotherapeutic doses which will be beneficial for treating chemo unresponsive cancers.



(Priya SS and Rekha MR. Synergistic effect of p53 gene/ DOX intracellular delivery and P-gp inhibition by pullulan thiomers on cancer cells: in vitro and in vivo evaluations. J Mater Chem B, 2023,11, 1365-1377)