An interdisciplinary quest for better oral drug delivery yields new therapies

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Abstract

This presentation details our progression of drug delivery strategies designed to address clinically challenging problems, specifically focusing on the oral delivery of poorly soluble and permeable compounds. Our approach involves customizing solutions for both the drug and its target disease, with a strong emphasis on nano-scale systems. We highlight the development of next-generation non-competitive active delivery systems that circumvent competition with natural ligands. To achieve this, we utilize gambogic acid (GA), a small molecule pigment, as a novel targeting ligand for the transferrin receptor (TfR), which is highly expressed on small intestine barriers. Our recent work includes the synthesis of precision-polyesters (P2s) via controlled polymerization, allowing for the crucial optimization of ligand-receptor stoichiometry and providing a robust toolbox for accessing desired nanostructures. The significant body of data presented establishes a new paradigm in nanomedicine research and promises to open novel, broadly applicable, and clinically relevant regimens for various diseases. The success of these ongoing projects will further open new avenues in receptor-mediated oral delivery for difficult-to-deliver compounds, which currently constitute about 40% of new chemical entities requiring specialized systems.