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Drug delivery is inherently a multidisciplinary field, a nexus of synthetic and physical chemistry, molecular biology, pharmacokinetics, engineering, *in silico* modelling, imaging, and disease pathology, with progress traditionally driven by researchers in both academia and industry. The interdisciplinary nature of our work is exemplified by the rapid collaborative response to development of mRNA vaccines for COVID-19, where epidemiology, immunology, drug delivery, and manufacturing technology became common terms in our daily news cycles. Ours is a field rapidly expanding, and with it, our researchers become increasingly interdisciplinary, navigating multifaceted projects and adapting to new developments. This special issue was designed to showcase what the future holds through the work of talented emerging leaders in drug delivery.

As a team of early career editors, we compiled this special issue taking care to ensure representation from colleagues around the world, in different fields of research and in research contexts within academia and industry. Our intent was to engage a broad audience, to highlight important research topics and to platform the researchers who lead this innovative work. Immediately, unifying themes and focus areas at the forefront of drug delivery emerged, from advanced delivery of nuclear medicine, to *in silico* and *in vitro* models of drug solubilization and release.

Oral drug delivery and the establishment of predictive *in vitro-in vivo* correlations (IVIVC) remains an important goal for drug delivery researchers. In this special issue, multiple groups have tackled this problem using advanced *in silico* and *in vitro* techniques to aid understanding of drug uptake from the gastrointestinal tract. Computational fluid dynamics informed the work of Salehi et al¹, and Li et al², providing insight into the impact of dissolution and diffusion on drug solubilization and luminal absorption respectively. Orsuzlak et al³, and Marks et al⁴, report on the use of polymers and impact of polymer topology in the generation of amorphous solid dispersions for oral delivery. Gleeson and colleagues at Merck⁵, demonstrate the utility of a gut-on-chip model of intestinal absorption in evaluating the impact of permeation enhancers on peptide uptake. This work on improving our understanding of oral IVIVC is complemented by a detailed and insightful report from Galetin et al⁶, who demonstrate the impact of free drug association with albumin on renal clearance. A study that will have a broad impact on many facets of drug delivery.

A second clear theme emerged from this special issue; understanding the impact of radionucleotide carrier design for the treatment of diseases. Larkina et al⁷, investigated linker site and chemistry for ^{99m}Tc labelled DARPIN-G3 radiotracers, showing that relocating a chelator for the radionucleotide from the N terminus to C-terminus improved reaction efficiency but did not confer an advantage in imaging contrast in mice bearing HER2 positive ovarian cancer xenografts. Kang et al⁸, demonstrated the diagnostic and therapeutic effect of radiolabelled VEGF-trap Aflibercept, in

the treatment of renal tumours in mice. This bifunctional fusion protein demonstrated utility in hypervascularised Renca tumours. In two complementary, but unrelated studies, Jiang and team⁹, and Chen et al¹⁰, investigated the use of the fibroblast activation protein inhibitor (FAPI-04) for targeting radiotracers to fibroblasts. The former developed a FAPI-maleimide which acted as an albumin 'hitchhiker' to enhance tissue distribution and tumour retention⁹. Chen et al, developed a heterobivalent probe using FAPI-04 and the somatostatin receptor-2 binding LM3 peptide to allow early detection of pulmonary fibrosis¹⁰. These radiotherapeutic approaches, from small molecule binders to VEGF fusion proteins, show the importance of chelator, carrier, protein position, bivalency and endogenous protein interactions on the success of radiotheranostic and therapeutic drug delivery design.

The third and final area of growing interest is highlighted by two articles. In the first, Agrawal and colleagues present a study on Hesperidin-loaded exosomes as a treatment for melanoma¹¹. The second, a perspective article by Chi-An Cheng¹², outlines the inherent challenges in developing robust methods to define and evaluate exosomes and extracellular vesicles (EVs) for drug delivery. This insightful article highlights the promise of EVs as personalised therapeutics and diagnostics, infinitely customisable trojan horses with huge potential, yet suffering from a lack of cohesive approaches to their generation, interrogation, and validation.

We hope you will agree that this virtual special Issue highlights a global network of emerging leaders in the pharmaceutical sciences, across both academia and industry. With insight into longstanding questions in drug delivery, such as predicting oral absorption from the gut, alongside new exciting ideas on the use of cell-derived drug carriers for treatment of diseases. The future of pharmaceutical sciences is bright, with emerging leaders ready to tackle pressing challenges and seize new opportunities. We look forward to witnessing their progress in the years to come.

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