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Commentary Article

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The Molecular and Functional Properties of Membrane Transporters in Drug Delivery

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DESCRIPTION

Over 400 membrane transporters in human cells have been found and characterised at the molecular and functional levels. There are two types of transporters: ATP-Binding Cassette (ABC) transporters and Solute Carrier (SLC) transporters. They are well-known determinants of drug distribution and metabolism, as well as in the development of certain disorders. Transporters, due to their biological function and tissue-specific expression, play an important role not only in drug disposition but also in drug-drug/drug-food interaction, and they have significant potential to be used as drug delivery targets. In 2019, they released a printed book in Chinese called Drug Transporters (PMPH 2019). The PMPH 2019 book covered the fundamentals of transporters and their roles in diseases, drug-drug interactions, and drug delivery. This field has grown rapidly that several new developing areas were discovered in the book, prompting them to propose a special issue focusing on the most recent achievements of drug transporters in drug interaction and delivery. The broad and overlapping substrate spectra of transporters are thought to be the fundamental explanation for transporter-based pharmacological interaction. All statins can be transported through Organic Anion Transporting Polypeptide ($OATP_1B_1$, $OATP_1B_3$, and $OATP_2B_1$). In terms of $OATP_1B_1$ and $OATP_1B_3$ are notably listed in Food and Drug Administration (FDA) and the European Medicines Agency (EMA) guidelines.

The acute enabling drug interaction through $OATP_2B_1$ was highlighted, as was the crucial function of $OATP_2B_1$ in adverse drug events. Furthermore, genetic variations in transporters influence stain *invivo* behaviour. The effect of genetic variation in drug metabolic enzymes and transporters on fluvastatin pharmacokinetics. Transporters have a lot of interest for drug delivery because of their key roles in drug disposal. The importance of blood-brain barrier, astrocytes, and neurons from physiological, pathological, and pharmacological views, and the possibility of these transporters as targets for better drug delivery to the brain. Transporter-targeted prodrugs have a history of success in industry pharmaceutics. The most notable examples are valacyclovir and valganciclovir, which are acyclovir and ganciclovir prodrugs, respectively. Both prodrugs may target enterocytes that express human peptide transporter and to improve oral absorption.

Recent advances in tumour-related amino acid transporters for medication delivery through prodrugs and nanoparticles. While ABC transporters expressed on biological barriers constantly limit therapeutic benefits, current advances in using novel micro/nano drug delivery technologies to bypass efflux transporter-mediated therapy failure are optimistic. Furthermore, significant pathogenic occurrences are associated with transporter biochemistry. One of the most significant resistance proteins was identified as the Breast Cancer Resistant Protein (BCRP). The ATP binding cassette subfamily G member 2 mutations might reduce uric acid excretion, resulting in hyperuricemia and a higher risk of gouty arthritis. Besides the Warburg effect, one of the distinctive metabolic pathways is