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The UCSF-FDA TransPortal: A Public Drug Transporter Database

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Abstract

Drug transporters play a key role in the absorption, distribution, and elimination of many drugs, and they appear to be important determinants of therapeutic and adverse drug activities. although a large body of data pertaining to drug transporters is available, there are few databases that inform drug developers, regulatory agencies, and academic scientists about transporters that are important in drug action and disposition. in this article, we inform the scientific community about the uCsF-FDa Transportal, a new and valuable online resource for research and drug development.

To provide a central resource for information about important drug transporters, we have developed a free-of-charge online drug transporter database, University of California, San Francisco–Food and Drug Administration (UCSF-FDA) TransPortal (http://bts.ucsf.edu/fdatransportal). We have highlighted 31 drug transporters from the ATP-binding cassette (ABC) and solute carrier (SLC) transporter superfamilies that play a critical role in drug disposition, toxicity, and efficacy—including transporters listed in the 2012 US FDA draft drug interaction guidance[1] and the International Transporter Consortium white paper.[2] For each transporter, we have compiled primary literature on its expression levels, subcellular localization, and direction of transport in the kidney, liver, small intestine, placenta, and blood–brain barrier (Figure 1). In addition, we have listed known inhibitors and substrates of each transporter and summarized transport kinetic data (K_m, K_i, IC_{50}) from *in vitro* studies. Finally, clinical drug–drug interactions attributed to drug transporters are listed, along with a description of the impact on the affected drug's pharmacokinetics and pharmacodynamics.

Other drug transporter databases include the University of Tokyo's TP-search (http://125.206.112.67/tp-search/login.php), Q. Yan's Human Membrane Transporter Database (http://lab.digibench.net/transporter), M. Müller's ABC-Transporter Database (http://nutrigene.4t.com/translink.htm), C. Yuzong's Drug ADME Associated Protein Database (http://xin.cz3.nus.edu.sg/group/admeap/admeap.asp), UCSF's Pharmacogenomics of Membrane Transporters (http://pharmacogenetics.ucsf.edu), and the University of Washington's Metabolism and Transport Drug Interaction Database (http://www.druginteractioninfo.org). However, several of the databases have not been updated in recent years, and none includes data on expression levels of drug transporters across human tissues.

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CONFLICT OF INTEREST

The authors declared no conflict of interest.

Furthermore, in general, the databases provide limited information on the substrates and inhibitors of the 31 transporters that are included in TransPortal.

TransPortal currently contains information from more than 297 primary literature sources and drug labels. From these sources, TransPortal provides messenger RNA expression levels for 31 transporters in five human tissues that play a role in drug–drug interactions. In addition, the database provides information on 482 substrates, 866 inhibitors, and 48 clinical drug–drug interactions. The database is also text-searchable, user-friendly, and in compliance with Section 508 of the Rehabilitation Act, with many links to PubMed, drug labels, and websites within the database. The UCSF-FDA TransPortal, supported by the FDA Critical Path Initiative (http://www.fda.gov/ScienceResearch/SpecialTopics/CriticalPathInitiative/default.htm), is thus an important tool for research and for enhancing the development of safer medications.

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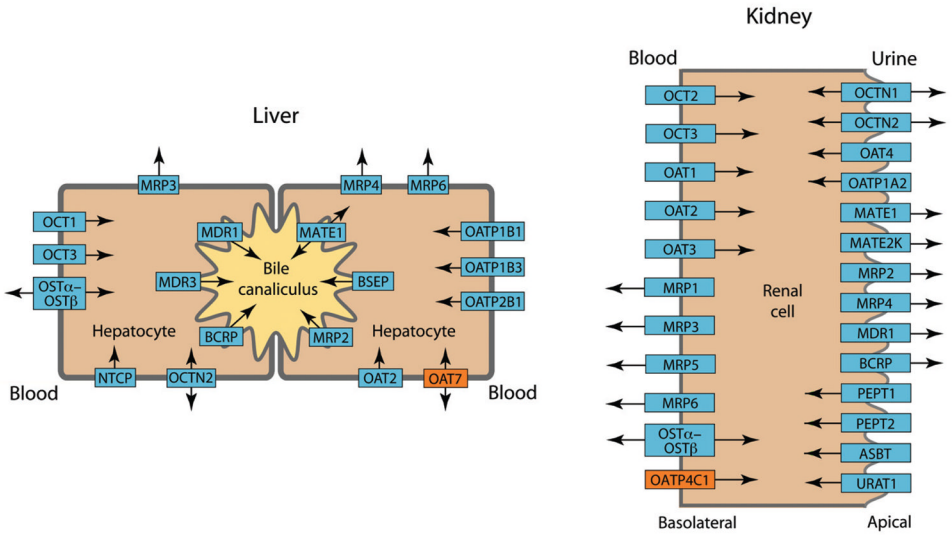

Figure 1.

Representative TransPortal screenshot of drug transporters in human liver and kidney. (For definitions of the abbreviations, please see the glossary at http://bts.ucsf.edu/fdatransportal.)