# Regulation of organic cation transporters

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Organic cation transporters (OCTs) are membrane proteins that translocate organic cations across the cellular plasma membrane. Organic cations are positively charged molecules of endogenous (important neurotransmitters such as serotonin and histamine) or exogenous (drugs such as doxorubicin and metformin) origin. OCTs are highly expressed in excretory organs such as the liver and kidneys, where they play an important role in drug excretion, and in the brain, where they are thought to be involved in the cellular reuptake of neurotransmitters. Regulation of OCT activity may therefore have important physiological, pharmacological, and toxicological consequences. OCT activity can be rapidly regulated by several different protein kinases by altering their affinity for substrates or by influencing their trafficking to/from the plasma membrane. The trafficking of OCTs may also be determined by interaction with specific partners, such as the tetraspanin CD63, which appears to contribute to the specific basolateral expression of OCTs in the cells of the renal proximal tubules. Post-translational modifications resulting from a direct interaction of OCTs with kinases such as dual-specificity tyrosine (Y)-phosphorylation-regulated kinase 1A (DYRK1A) can alter the cellular distribution of transporters, thereby modifying their activity. As DYRK1A is druggable kinase, which is highly expressed in some neurodegenerative diseases, this protein-protein interaction may alter the cerebral neurotransmitter balance in these conditions. Therefore, regulation of OCT activity may be an important tool to restore OCT function under pathological conditions. The studies of the author on this topic are supported by the DFG (CI 107/14-1).