

Choline transporters

Overview: The high-affinity, hemicholinium-3-sensitive, choline transporter (CHT, provisional nomenclature) is a member of the solute carrier family 5 (SLC5) of sodium-dependent transporters that, in mammals, includes the Na⁺/substrate co-transporters for glucose, *myo*-inositol and iodide (Ferguson and Blakely, 2004; Wright and Turk, 2004). CHT contains 13 putative TM domains with an extracellular N-terminus and cytoplasmic C-terminus (Apparsundaram *et al.*, 2000). CHT is expressed mainly in cholinergic neurones on nerve cell terminals and synaptic vesicles (keratinocytes being an additional location). In autonomic neurones, expression of CHT requires an activity-dependent retrograde signal from postsynaptic neurones (Krishnaswamy and Cooper, 2009). Through recapture of choline generated by the hydrolysis of ACh by acetylcholinesterase, CHT serves to maintain ACh synthesis within the presynaptic terminal (Ferguson and Blakely, 2004). Homozygous mice engineered to lack CHT die within one hour of birth as a result of hypoxia arising from failure of transmission at the neuromuscular junction of the skeletal muscles that support respiration (Ferguson *et al.*, 2004). A low-affinity choline uptake mechanism that remains to be identified at the molecular level may involve multiple transporters. In addition, a family of CHT-like proteins with weak Na⁺ dependence have been described (Traiffort *et al.*, 2005).

Nomenclature	CHT
Other names	CHT1, SLC5A7
Ensembl ID	ENSG00000115665
Endogenous substrates	Choline
Selective inhibitors (<i>K_i</i>)	HC-3 (1–5 nM)
Probes (<i>K_D</i>)	[³ H]-HC-3 (4–6 nM)
Stoichiometry	2–3 Na ⁺ : 2–3 Cl [−] : 1 choline

K_i and *K_D* values for hemicholinium-3 listed in the table are for human CHT expressed in *Xenopus laevis* oocytes (Okuda and Haga, 2000), or COS-7 cells (Apparsundaram *et al.*, 2000). Hemicholinium mustard is a substrate for CHT that causes covalent modification and irreversible inactivation of the transporter. Several exogenous substances (e.g. triethylcholine) that are substrates for CHT act as precursors to cholinergic false transmitters.

Abbreviations: HC-3, hemicholinium-3

Further Reading

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References

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