

SLC4 – Bicarbonate cotransporter family

Human gene name	Protein name	Aliases	Predominant substrates	Transport type ¹⁾	Tissue distribution and cellular / subcellular expression	Link to disease	Human gene locus	Sequence accession ID	Splice variants and their features
SLC4A1	AE1	Band 3	Cl ⁻ / HCO ₃ ⁻	E	erythrocytes, intercalated cells of renal collecting duct, heart and colon	hemolytic anemia, distal renal tubular acidosis	17q21–q22	NM_000342	
SLC4A2	AE2		Cl ⁻ / HCO ₃ ⁻	E	widely distributed; basolateral in most epithelial cells	achlorhydria, osteopetrosis	7q35–36	NM_003040	
SLC4A3	AE3		Cl ⁻ / HCO ₃ ⁻	E	brain, retina, heart and smooth muscle, epithelial cells of kidney and GI tract	seizure, blindness	2q36	NM_005070 NM_201574	2 splice variants
SLC4A4	NBCe1	NBC, NBC1	HCO ₃ ⁻ (and/or CO ₃ ²⁻)	C / Na ⁺	NBCe1-A: renal proximal tubule, eye NBCe1-B: widely distributed, pancreas, heart, eye NBCe1-C: brain	proximal renal tubular acidosis with ocular abnormalities	4q21	NM_001098484 NM_003759	3 splice variants
SLC4A5	NBCe2	NBC4	HCO ₃ ⁻ (and/or CO ₃ ²⁻)	C / Na ⁺	liver, testes, spleen	(hypertension)	2p13	NM_133478 NM_021196	2 splice variants
SLC4A7	NBCn1	NBC2, NBC3	HCO ₃ ⁻	C / Na ⁺	widely distributed: spleen, testes, brain, heart, lung, liver	blindness, auditory impairment, (breast cancer)	3p22	NM_003615	
SLC4A8	NBCBE	NBC3	Cl ⁻ / HCO ₃ ⁻	E	brain, testes, and ovary		12q13.13	NM_004858 NM_001039960	2 splice variants
SLC4A9	AE4		Cl ⁻ / HCO ₃ ⁻	E	kidney (alpha-intercalated cells, basolateral), stomach and duodenum (apical)		5q31	NM_031467	
SLC4A10	NBCn2	NCBE	HCO ₃ ⁻	C / Na ⁺	brain	partial frontal lobe epilepsy	2q23-q24	NM_022058	2 splice variants
SLC4A11	NaBC1	BTR1	borate (B(OH) ₄ ⁻), Na ⁺ , OH ⁻	C / Na ⁺	kidney, salivary gland, testis, thyroid, trachea	corneal endothelial dystrophy	20p12	NM_032034	

*) C: Cotransporter; E: Exchanger; F: Facilitated transporter; O: Orphan transporter

References:

Original version of the SLC table:

[Romero MF, Fulton CM, Boron WF.](#) The SLC4 family of HCO₃⁻ transporters. Pflugers Arch. 2004 Feb;447(5):495-509. Epub 2004 Jan 14.

Questions & Comments