

Decarboxylases (E.C. 4.1.1.-)

Overview: The decarboxylases generate CO₂ and the indicated products from acidic substrates, requiring pyridoxal phosphate (ADC, AADC, GAD, HDC, ODC and PSDC) or pyruvate (SAMDC and PSDC) as a co-factor.

Nomenclature	S-Adenosylmethionine decarboxylase	L-Arginine decarboxylase	L-Aromatic amino-acid decarboxylase	Glutamic acid decarboxylase
E.C.	4.1.1.50	4.1.1.19	4.1.1.28	4.1.1.15
Preferred abbreviation	SAMDC	ADC	AADC	GAD
Other names	–	Ornithine decarboxylase-like protein (Zhu <i>et al.</i> , 2004)	DOPA decarboxylase (DDC), 5-hydroxytryptophan decarboxylase	GAD1 (GAD65), GAD2 (GAD67)
Ensembl ID	ENSG00000123505	ENSG00000142920	ENSG00000132437	ENSG00000128683, ENSG00000136750
Substrate(s)	S-Adenosylmethionine	L-Arginine	DOPA, L-tryptophan, 5-hydroxy-L-tryptophan	L-Glutamate, L-aspartate
Product(s)	5'-Deoxyadenosyl-(3-aminopropyl)methylsulfonium	Agmatine	5-Hydroxytryptophan, dopamine	GABA
Selective inhibitors	SAM486A (8.0; Stanek <i>et al.</i> , 1993), AMA	–	Benserazide, carbidopa, 3-hydroxybenzylhydrazine, L- α -methyldopa	S-Allylglycine

The presence of a functional ADC activity in human tissues has been questioned (Coleman *et al.*, 2004). *s*-Allylglycine is also an inhibitor of SAMDC (Pajunen *et al.*, 1979).

Nomenclature	Histidine decarboxylase	Malonyl-CoA decarboxylase	Ornithine decarboxylase	Phosphatidylserine decarboxylase
E.C.	4.1.1.22	4.1.1.9	4.1.1.17	4.1.1.65
Preferred abbreviation	HDC	MLYCD	ODC	PSDC
Ensembl ID	ENSG00000140287	ENSG00000103150	ENSG00000115758	ENSG00000100141
Substrate(s)	L-Histidine	Malonyl-CoA	L-Ornithine	Phosphatidylserine
Product	Histamine	Acetyl-CoA	Putrescine	Phosphatidylethanolamine
Endogenous regulation	–	AMP-activated protein kinase-evoked phosphorylation (Saha <i>et al.</i> , 2000)	Antizymes (ENSG00000104904, ENSG00000180304, ENSG00000143450), which tonically inhibit IDC activity Antizyme inhibitor (ENSG00000155096)	–
Selective inhibitors	α -Fluoromethylhistidine (Garbarg <i>et al.</i> , 1980)		Eflornithine, 1-aminooxy-3-aminopropane	–

Abbreviations: AMA, S-(5'-deoxy-5'-adenosyl)-methylthioethyl-hydroxylamine; SAM, S-adenosylmethionine; SAM486A, 1-guanidinoimino-2,3-dihydroindene-4-carboximidamide, also known as CGP48664

Further Reading

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