

Amino Acids & Nitrogen Metabolism

Stage	Enzyme	Nitrogen atoms		Oxidation-Reduction	Hi E bond	Comments
		Entering	Leaving			
Ammonia Uptake	(2) Glutamate dehydrogenase	NH ₄ ⁺		NADPH/H ⁺		Biosynthesis of glu from -ketoglutarate
	(6) Glutamine synthetase	NH ₄ ⁺			ATP	Biosynthesis of gln from glu, N for export
Ammonia Release	(1) Glutamate dehydrogenase		NH ₄ ⁺	NAD ⁺		Excess N for urea cycle
	(7) Glutaminase		NH ₄ ⁺			Incoming excess N (muscle) for urea cycle
Transaminations	(3) Alanine aminotransferase	alanine	aa derived from substrate - ketoacid			Coenzyme PLP; incoming alanine cycle N
	(4) Aspartate aminotransferase	aspartate	aa derived from substrate - ketoacid			Coenzyme PLP; biosynthesis
	(5) Glutamate aminotransferase	glutamate	aa derived from substrate - ketoacid			Coenzyme PLP; biosynthesis
Urea cycle		NH ₄ ⁺ , aspartate	urea		4	Liver cells, nontoxic urea synthesized for export