# 08 - 8. Glutamate

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•1. from 2-oxoglutarate and aspartate by aspartate aminotransferase, •2. from glutamine by glutaminase, or •3. from 2-oxoglutarate by ornithine aminotransferase Source Source •accumulation of precursors such as glutamine or by end-product inhibition Regulation Regulation •glutaminase Synthetic enzymes Synthetic enzymes •Glutamate dehydrogenase, glutamine synthetase Breakdown enzymes Breakdown enzymes •Broken down to glutamine or alpha-ketoglutarate Breakdown product Breakdown product •Largely glial uptake with conversion to glutamine Reuptake Reuptake •Important metabolic role – intermediary in oxidation pathway (malate shuttle), immediate precursor of all GABA in CNS, intermediary in ammonia cycle; NMDA - memory acquisition, developmental plasticity, epilepsy, and ischemic brain injury. NMDA receptor mediates long-term potentiation Function Function •metabotropic - 8 in total; 3 groups. Group I - mGluR1& mGluR5 – linked to phospholipase C •Ionotropic: NMDA and non-NMDA •NMDA - made up of subunits with distinct binding sites for glutamate, glycine, phencyclidine (PCP), magnesium, and zinc. •Non NMDA – kainate binding or AMPA type. Receptors Receptors •excitotoxic glutamate toxicity in stroke/schizophrenia/seizures suspected. NMDA antagonists can cause hallucinations – e.g. PCP, ketamine Disorders Disorders

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