Provide a detoxification mechanism

Deamination is also an **oxidative reaction** that occurs under aerobic conditions in all tissues but especially the **liver and kidneys.** During oxidative deamination, an amino acid is converted into the corresponding keto acid *(for energy)* by the removal of the amine functional group as ammonia and the amine functional group is replaced by the ketone group. The ammonia eventually goes into the urea cycle.

Oxidative deamination occurs primarily on **glutamic acid** because glutamic acid was the end product of many transamination reactions.

Glutamate dehydrogenase is an enzyme of the **oxidoreductase class** that catalyzes the oxidative deamination of glutamate. Ammonia is released, and α-ketoglutarate is formed. Glutamate dehydrogenase is unusual in that it can use either **NAD** or **NADP as a coenzyme.** The reversible reaction has a major function in both the synthesis and degradation of glutamic acid and, via transaminases, other amino acids as well.

*** **Important:** Both **aspartate aminotransferase** *(AST)* and alanine aminotransferase *(ALT)* are **transaminases** *(aminotransferases)*. They **are not involved** in oxidative deamination reactions. In **contrast to transamination reactions** that transfer amino groups, **oxidative deamination** results in the liberation of the amino group as free ammonia.

Notes

1. Glutaminase deaminates **glutamine** to glutamate and ammonium ion; **asparaginase** deaminates **asparagine** to aspartate and ammonium ion.
2. Glutamate is unique in that it is the only amino acid that undergoes rapid oxidative deamination.
3. **Histidine** is deaminated by histidase to form ammonium ion *(NH^+_4)* and urocanate.
4. **Serine** and **threonine** are deaminated by serine dehydratase. Serine is converted to pyruvate, and threonine to α-ketobutyrate *(which is decarboxylated oxidatively to form propionyl CoA);* ammonium ion is released.