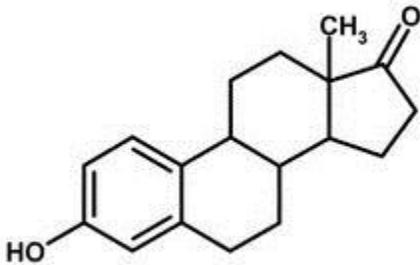


Glutathione & the Ecosystem

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The health of an ecosystem affects the metabolism of animals.

Glutathione is a molecule produced in the liver that is essential in the metabolism within any organism--including humans and animals. Although the chemical process that glutathione undergoes is on a molecular level, it is tied to various factors within the earth's ecosystem, or physical and biological components of an environment. One example of the interaction between the ecosystem and glutathione is when there is environmental pollution, it can negatively impact the metabolic process in animals, thus impacting entire populations.

1. Significance of Glutathione

- Glutathione is a molecule that is comprised of of three amino acids or proteins, and is produced in the liver. Its enzymes facilitate a nucleophilic (or nucleus seekers) attack on electrophilic (or electron-centric) molecules, which makes up the initial step of elimination of foreign compounds in the body. Not only is it essential in process of metabolic functioning, but it serves as a way to protect cells in humans as well as most animals and plants.

Glutathione Function in Animals

- Animals utilize glutathione in very important ways. As a multigene family of enzymes, glutathione can bind to toxic substances and cause them as well as products of oxidative stress to be excreted from the body through urine or bile. This process is known as glutathione S-transferase (GST) detoxification. Without

glutathione, organisms would not be able to survive since expelling toxicants from the body is a key part of the metabolic process.

Pollution of Ecosystems

- Through environmental pollution from industry, energy production, vehicle emissions, agricultural as well as livestock practices, the ecosystem is contaminated and its members--countless organisms--are affected in a variety of ways. Examples of harmful pollutants found in ecosystems are dibutyl phthalate (DBP), commonly used in plasticizers, adhesives or printing inks; Ethacrynic acid (ECA), a potential drug for various human health disorders; and n-butyl chloride, used as a solvent and as a medicine to control worms within veterinary medicine.

Effects of Pollution on Glutathione Levels

- Scientists have growing concern over the emerging relationship between environmental pollution and the decreasing ability of animals to detoxify contaminants. In one study conducted by the University of Florida, pollution of a regional lake ecosystem showed effects in brown bullheads, a species of catfish. It was determined that female bullheads displayed that detoxification from industrial pollutants through glutathione-induced processes were compromised. In another study by Nanjing University in China, it was found that phthalate pollution altered glutathione levels in certain aquatic plants.

Expert Insight

- Agricultural chemicals, such as organochlorine pesticides used to prevent or destroy crop pests, have adverse effects on humans, organisms and on the overall ecosystem within the natural environment. In particular, such chemicals affect the reproduction levels as well as the effectiveness of glutathione-based reactions that allow animals such as fish to expel these pollutants from their bodies. It is important that such consequences be further monitored and that control measures be developed to decrease the related environmental degradation.

References

- [Green Facts: Glutathione](#)
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- [Informa World: Physiological Responses of Submerged Macrophytes to Dibutyl Phthalate Exposure](#)
- [Science Direct: Hepatic Glutathione](#)

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