Editorial
Volume 12:3, 2021

Chemical Sciences Journal

ISSN: 2150-3494 Open Access

Editorial on Xenobiotics

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Editorial

A xenobiotic is a chemical compound contained within an organism that was not created naturally or that was not supposed to be present. It may also include substances found in far higher concentrations than normal. Natural compounds may also become xenobiotics if they are absorbed by another organism, as in the uptake of natural human hormones by fish found downstream of sewage treatment plant outfalls or the chemical defences generated by certain species to defend themselves from predators.

Xenobiotic metabolism extracts xenobiotics from the body. This involves the deactivation and excretion of xenobiotics, which takes place primarily in theliver. Excretion routes are urine, faeces, breath, and sweat. Hepatic enzymes are responsible for the metabolism of xenobiotics by first activating them (oxidation, reduction, hydrolysis and/or hydration of the xenobiotic), and then conjugating the active secondary metabolite with glucuronic acid, sulfuric acid, or glutathione, followed by excretion in bile or urine. While the body can eliminate xenobiotics by reducing them to a less toxic form and then excreting them, it is also possible in some cases for them to be transformed into a more toxic form. Bioactivation is the term for this process, which can cause structuraland functional changes in the microbiota.

Xenobiotics in the environment

Xenobiotic compounds are a concern for sewage treatment systems because they are multiple and each can face its own set of challenges in terms of elimination. Some xenobiotics have a high resistance to decomposition. Owing to their recalcitrant properties, xenobiotics such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and trichloroethylene (TCE) accumulate in the atmosphere and have become a public health issue due to their toxicity and accumulation.

Microorganisms may be a potential solution to the problem of xenobiotic waste In the ecosystem, a method known as bioremediation. Microorganisms can adapt to xenobiotics introduced into the environment through horizontal gene transfer, allowing them to use them as energy sources. This mechanism can be modified further to manipulate microorganism metabolic pathways in order to make them degrade harmful xenobiotics at a faster pace under unique environmental conditions. The genes responsible for microorganisms' ability to metabolize some xenobiotics have been identified, and it has been proposed that this research may be used to engineer microorganisms specifically for thisreason. Not only can existing pathways be engineered to be expressed in other species, but new pathways can also be formed.

How to cite this article: Raajitha Bellamkonda. "Editorial on Xenobiotics." Chem Sci J 12 (2021). 234

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Received 16 March 2021; **Accepted** 24 March 2021; **Published** 30 March 2021