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Commentary

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Mechanisms of drug toxicity in pharmaceutical development

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Description

Drug toxicology includes studies of the consequences of toxic exposure to drugs and medical institutions. The field of drug toxicology also includes the treatment and prevention of pharmaceutically induced side effects. Pharmacokinetics can be divided into two different categories pharmacodynamics (effects of drugs on organisms) and pharmacokinetics (effects of organisms on drugs). Targeted toxicity is also called mechanism-based toxicity. This type of adverse effect from exposure to a drug is often due to the interaction of the drug with its intended target. In this case, both the therapeutic and toxic targets are the same. Drugs often need to be modified to target different aspects of the disease or condition to avoid toxicity during treatment. Statins are an example of a class of drugs that can have toxic effects on the immune response that is the therapeutic target. As with penicillin, some medications can cause an allergic reaction. In some people, administration of penicillin induces the production of certain antibodies and can provoke an immune response. Unjust activation of this reaction raises serious health concerns and can prevent the immune system from functioning properly. Immune responses to drug exposure can be very common in accidental contamination events. Tamoxifen, a selective estrogen receptor modulator, has been shown to alter the humoral adaptive immune response of sea bream. In this case, the drug can have undesired effects not only on humans, but also on unintentionally exposed organisms.

Drug toxicology includes studies of the consequences of toxic exposure to drugs and medical institutions. The field of drug toxicology also includes treatment, and there are many mechanisms by which drugs can cause toxic effects. A very common mechanism is that either a drug or its metabolites covalently bind to a particular enzyme or receptor in a tissue-specific pathway, which results in a toxic reaction. Covalent bonds can occur in both on-target and off-target situations, and after *in vivo* changes. Toxicity refers to how toxic or potentially harmful a substance is. In the context of pharmacology, drug toxicity is when a person accumulates too much drug in the bloodstream and adversely affects the body. Drug toxicity can occur if the 1dose is too high, or if the liver or kidneys are affected. The drug cannot be removed from the bloodstream and may accumulate in the body

For certain drugs, drug toxicity can also occur as a side effect. In this case, the usual therapeutic doses of the drug can cause unintended, harmful and undesired side effects. In some cases, as with the drug lithium, the threshold between effective and toxic doses can be very narrow. The therapeutic dose for one person can be toxic to another. Drugs with a long half-life accumulate in the bloodstream of a person and can accumulate over time. In addition, factors such as age, kidney function, and fluid intake can affect the rate at which the body removes drugs from the system. For this reason, drugs like lithium require frequent blood tests to track the level of the drug in the bloodstream. Signs and symptoms of toxicity vary from drug to drug. In the case of lithium, various symptoms can occur depending on whether the toxicity is acute or chronic .Possible mild symptoms of acute lithium poisoning include diarrhea, dizziness, nausea, abdominal pain, vomiting, and weakness. More serious symptoms include hand tremor, ataxia, muscle cramps, slowed speech, nystagmus, seizures, coma, and rarely heart problems. Chronic lithium toxicity presents with a variety of symptoms such as slowed speech, tremors, and hyperreflexia.

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