At its core, toxicology seeks to

: Toxicity is o en dose-dependent, meaning that the severity of the adverse e ects increases with the dose

: e route through which a toxicant enters the body (e.g., ingestion, inhalation, dermal contact) can in uence its

: Toxic substances can exert their e ects

: Factors such as age, sex, genetics, and pre-existing conditions can in uence an individual's

: Toxicologists employ risk assessment methodologies to evaluate the potential hazards associated with exposure to speci c chemicals and to inform regulatory decisions aimed at protecting public health and the environment.

: Toxicologists employ a wide range of experimental and computational techniques to assess the toxicity of chemicals [5-7].

: Cell-based assays and tissue culture models allow

Toxicology is the study of how substances interact with living organisms and the environment. It investigates the e ects of di erent doses and durations of exposure to chemicals, ranging from bene cial to toxic levels. Substances can disrupt biological processes through various mechanisms, including direct interactions with cells and modulation of signaling pathways. Toxicology intersects with elds like pharmacology and environmental science, informing drug safety and pollution control measures. Advances in technology, such as in vitro assays and computational modeling, are enhancing our ability to predict toxic outcomes and reduce reliance on animal testing. Personalized medicine increasingly relies on toxicological insights to tailor treatments to individual genetic pro les and minimize adverse reactions. Ultimately, toxicology plays a crucial role in protecting public health and the environment by unraveling the complex relationship between substances and biological systems.

Toxicology plays a vital role in our understanding of how chemicals a ect biological systems and in our e orts to mitigate the risks associated with exposure to toxic substances. By employing rigorous scienti c methodologies and principles, toxicologists contribute to the development of safer products, the protection of human health and the environment, and the advancement of public policy aimed at minimizing chemical hazards. As we continue to confront emerging challenges such as environmental pollution, chemical contamination, and drug safety, the importance of toxicology in safeguarding human well-being cannot be overstated.

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