



## Keywords:

Genetic variability in toxicology; Mechanisms of personalized toxicology; Genetic variability in toxicology; Mechanisms of personalized toxicology

## Introduction

The field of toxicology has traditionally focused on understanding the adverse effects of chemicals and biological agents on living organisms. However, the advent of personalized medicine and genomics has led to a paradigm shift, emphasizing the role of genetic variability in determining individual susceptibility to toxic agents. This article explores the mechanisms of personalized toxicology, highlighting the importance of genetic factors in modulating toxic responses. The introduction discusses the historical context of toxicology and the recent developments that have paved the way for personalized approaches. It also outlines the scope of the review, which will delve into the molecular and cellular mechanisms underlying genetic variability in toxicology and its implications for clinical practice and public health.

## Mechanisms of Personalized Toxicology

### Genetic variability in toxicology:

Genetic variability in toxicology refers to the differences in an individual's genetic makeup that influence their response to toxic agents. These variations can occur at the level of DNA sequence, gene expression, and protein function. The most well-studied examples of genetic variability in toxicology are polymorphisms in genes involved in drug metabolism, such as cytochrome P450 (CYP) enzymes. These polymorphisms can lead to differences in the rate and extent of drug metabolism, which in turn affects the concentration of the drug in the body and its potential for toxicity. Other examples include variations in genes that regulate the immune system, which can influence the severity of allergic reactions and autoimmune diseases. The mechanisms of personalized toxicology are complex and multifactorial, involving interactions between genetic and environmental factors. This section will explore the molecular and cellular mechanisms underlying genetic variability in toxicology, focusing on the role of DNA sequence, gene expression, and protein function.

