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Toxicogenomics - Applications and Future Perspectives

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ABSTRACT As one reflects back through the past 50 years of scientific research, a significant accomplishment was the advance into the genomic era. Basic research scientists have uncovered the genetic code and the foundation of the most fundamental building blocks for the molecular activity that supports biological structure and function. Accompanying these structural and functional discoveries is the advance of techniques and technologies to probe molecular events, in time, across environmental and chemical exposures, within individuals, and across species. The field of toxicology has kept pace with advances in molecular study, and the past 50 years recognizes significant growth and explosive understanding of the impact of the compounds and environment to basic cellular and molecular machinery. The advancement of molecular techniques applied in a whole-genomic capacity to the study of toxicant effects, toxicogenomics, is no doubt a significant milestone for toxicological research. Toxicogenomics has also provided an avenue for advancing a joining of multidisciplinary sciences including engineering and informatics in traditional toxicological research. This review is aimed at discussing the potential applications and future challenges of toxicogenomics in drug discovery and drug development.