

Incorporating 'Omics in the Study of Reproduction and Development

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Sponsor: Reproductive and Developmental Toxicology Specialty Section

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In recent years, ground breaking research in genomic applications in the area of reproductive and developmental toxicology have been successful in linking changes in the expression of specific genes and their higher-level biological processes to effects induced by drugs or chemicals in developing tissues. While gene expression profiling has demonstrated the ability to provide mechanistic insight into the cellular mechanisms of drug and chemical-induced effects, proteomics provides advantages in areas beyond the genome. For example, post-translation modifications of proteins that are known to be involved in cell-cell signaling cascades for developmental pathways, the flux-balance in signaling molecules themselves, or the metabolic intermediates connecting to these pathways are important parts of our ability to understand the pathogenesis of fetal malformations. These higher-level operations can be inferred, but not directly evaluated through measurement of mRNA or DNA sequencing. In recent years, the application of proteomics in the study of reproduction and development has rapidly increased, while such studies that incorporate metabolomics approaches are at their infancy. A summary of the recent advances in genomic, proteomic, and metabolomic methodologies that demonstrate the successful use of these technologies in the study of reproduction and development will be provided. Finally, an illustration of how these data may be integrated by multi-scale models of dynamical systems will be highlighted that can serve to improve our understanding of reproductive and developmental toxicities. [This abstract has been reviewed by EPA and approved for publication but does not necessarily reflect Agency views.](#)

Metabolomics in the Study of Reproduction and Development, Susan Sumner, RTI International, Research Triangle Park, NC

Application of Transcriptomics to Assess Chemicals with Estrogenic Activity, Jorge Naciff, The Procter and Gamble Company, Cincinnati, OH

Identifying Molecular Mechanisms of Gene Expression in Mammalian Gametes and Embryos Using Functional Genomics Approaches, Erdogan Memili, Mississippi State University, Starkville, MS

Virtual Tissue Models in Developmental Toxicity Research, Thomas Knudsen, U.S. EPA, Research Triangle Park, NC