
ENVIRONMENTAL TOXICOLOGY AND RISK ASSESSMENT

*Standardization of Biomarkers
for Endocrine Disruption and
Environmental Assessment*

8th Volume

DIANE S. HENSHEL
MARSHA C. BLACK
MICHAEL C. HARRASS

Editors



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***Environmental Toxicology and
Risk Assessment:
Standardization of Biomarkers
for Endocrine Disruption and
Environmental Assessment:
Eighth Volume***

D. S. Henshel, M. C. Black, and M. C. Harrass, Editors

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To make technical information available as quickly as possible, the peer-reviewed papers in this publication were prepared "camera-ready" as submitted by the authors.

The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of the peer reviewers. In keeping with long-standing publication practices, ASTM maintains the anonymity of the peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM.

Foreword

This publication, *Environmental Toxicology and Risk Assessment: Standardization of Biomarkers for Endocrine Disruption and Environmental Assessment: Eighth Volume*, contains papers presented at the Eighth Symposium on Environmental Toxicology and Risk Assessment: Standardization of Biomarkers for Endocrine Disruption and Environmental Assessment, held 20–22 April 1998 in Atlanta, GA. The symposium was sponsored by Committee E-47 on Biological Effects and Environmental Fate, and was held in conjunction with the standards development meetings of E-47. The symposium chair was Diane S. Henshel, Indiana University. Cochairs were Marsha C. Black, Environmental Health Science Program, University of Georgia, and Michael E. Harrass, Amoco Corporation, Chicago, IL. Each of these individuals served as editor for this resulting publication.

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Overview

The Eighth Symposium on Environmental Toxicology and Risk Assessment was held on April 20–22, 1998 in Atlanta, GA. The theme of the symposium was Standardization of Biomarkers for Endocrine Disruption and Environmental Assessment. This theme was introduced in the plenary session, which examined the current status of invertebrate (Gerald LeBlanc) and vertebrate (Nancy Denslow) endocrine disrupter screening assays and tests, and *in vitro* endocrine disrupter testing (Ana Soto). A fourth speaker, George Daston, presented an industrial perspective on endocrine screening tests.

A theme running through the symposium was the use of biomarker endpoints in toxicology and risk assessment, including biochemical, developmental, behavioral, and endocrine indicators. Sessions focused on aquatic toxicology, behavioral toxicology, biochemical indicators, developmental indicators, endocrine indicators, biodegradation and fate of chemicals, quality assurance and quality control within laboratory and field studies, risk assessment and communication, and harmonization of standards development.

This volume presents 29 vigorously peer-reviewed papers, a subset of the 87 presentations at the Atlanta meeting. Fourteen of the papers in this Special Technical Publication (STP) are focused on biomarkers and tests for endocrine disruption. The STP is organized in three main sections. The first three papers in this volume are the plenary overview papers by LeBlanc, Denslow and Soto. The second section (“Endocrine Disruption”) includes additional endocrine-related papers, including an overview of the status of biomarker screening and testing for endocrine disruption and current approaches for evaluating endocrine disruption in various vertebrate and invertebrate systems. The final section (“Developing Methods for Effects and Exposure Assessment”) presents a variety of developing techniques for evaluating environmental exposure and related effects covering a number of species and endpoints.

We thank the session chairs for their efforts to recruit speakers and peer reviewers: Leroy Folmar (USEPA, Gulf Breeze, FL); Jack Bantle (Oklahoma State University, Stillwater, OK); Tim Canfield (USEPA, Ada, OK); Doug Fort (The Stover Group, Stillwater, OK); Bruce Greenberg (University of Waterloo, ONT, Canada); Mark Hinman (Exxon Biomedical Sciences, Inc, East Millstone, NJ); Chris Ingersoll (USGS Midwest Science Center, Columbia, MO); Mike Kangas (MJ Kangas and Associates, University Heights, OH); Anne Keller (USEPA, Athens, GA); Nancy Lane (Lane Environmental Inc, Richland, WA); Edward Little (USGS Midwest Science Center, Columbia, MO); Eugene Mones (Jim Thorpe, PA); and Fred Price (Booz-Allen and Hamilton Inc., McLean, VA).

This volume and the symposium would not have been possible without the generous help of many people. We greatly appreciate the organizational skills and patience of Kim Shipley as well as the contributions of Angela Sturdevant (Indiana University). We would also like to thank the ASTM staff who helped us plan and run the symposium and produce this STP. We also thank the surprisingly patient Wayne Landis, our very helpful and wise COP (Committee on Publications) representative.

A special thanks is due to the reviewers of these articles. It appears to be a well-kept secret that every contribution to the STP from an ASTM E47 symposium undergoes peer review. At least two reviewers determine acceptability and propose changes to improve the manuscript's clarity and accuracy. It is obvious to us, the editors, that reviewers spend much time in this process and we want to acknowledge their invaluable contributions.

ASTM Committee E47 on Biological Effects and Environmental Fate has sponsored over 20 symposia over the last two decades. Many standard methods now in use began as papers in the STPs resulting from these symposia. We anticipate that many of the ideas and methods represented in the present volume may lead to fully developed guides and practices. We encourage our readers to consider these papers as “standards in the making” and welcome their participation in the development of consensus standards.

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