

# SUSCEPTIBILITY TO INHALED POLLUTANTS

UTELL/FRANK,  
EDITORS



STP 1024

**STP 1024**

# ***Susceptibility to Inhaled Pollutants***

*Mark J. Utell and Robert Frank, editors*



ASTM  
1916 Race Street  
Philadelphia, PA 19103

## Library of Congress Cataloging-in-Publication Data

Susceptibility to inhaled pollutants / Mark J. Utell and Robert Frank, editors.

-- (Special technical publication ; STP 1024)

"ASTM publication code number (PCN) 04010240-17."

Papers presented at the Conference on the Susceptibility to Inhaled Pollutants.

Includes bibliographies and index.

ISBN 0-8031-1262-9

1. Air--Pollution--Toxicology--Congresses. 2. Air--Pollution--Health aspects--Congresses. I. Utell, Mark J. II. Frank, Robert, 1921-. III. Conference on the Susceptibility to Inhaled Pollutants (1987 : Williamsburg, Va.) IV. Series: ASTM special technical publication ; 1024.

RA576.A2S87 1989

363.73'92--dc20

89-32217

CIP

Copyright © by AMERICAN SOCIETY FOR TESTING AND MATERIALS 1989

### NOTE

The Society is not responsible, as a body,  
for the statements and opinions  
advanced in this publication.

### Peer Review Policy

Each paper published in this volume was evaluated by three peer reviewers. The authors addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and the ASTM Committee on Publications.

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 these peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM.

## Foreword

The Conference on the Susceptibility to Inhaled Pollutants was presented 29 Sept. through 1 Oct. 1987 at Williamsburg, VA. The Conference was sponsored by The American Lung Association, The American Petroleum Institute, The Electric Power Research Institute, The Health Effects Institute, The Natural Resources Defense Council, and the U.S. Environmental Protection Agency. Mark J. Utell, The University of Rochester School of Medicine, and Robert Frank, Johns Hopkins University, served as chairmen of the conference and are editors of the resulting publication.

# Contents

<b>Preface</b>	1
<b>The Susceptible Individual: An Overview</b> —JOSEPH D. BRAIN	3
<b>The Influence of Responses in Susceptible Populations in Establishing Standards for Ambient Air Pollutants</b> —MORTON LIPPMANN	6
 MARKERS AND MECHANISMS OF SUSCEPTIBILITY	
<b>Species and Individual Variations in Sensitivity to Lung Injury</b> —JAMES D. CRAPO	23
<b>The Potential Use of Immunological Markers in Determining Individuals Susceptible to Inhaled Pollutants</b> —HILLEL S. KOREN	32
<b>Mechanisms of Airway Hyperresponsiveness</b> —DEAN SHEPPARD	47
 CHARACTERIZING THE STUDY GROUPS AND THEIR RESPONSES	
<b>Overview on Characterizing Study Groups and Their Responses</b> —DAVID V. BATES	55
<b>Issues in the Selection of Subjects for Clinical and Epidemiological Studies of Asthma</b> —JONATHAN M. SAMET	57
<b>The Distribution of Airways Responsiveness in Populations</b> —SCOTT T. WEISS	68
<b>Individual Variability in the Magnitude of Acute Respiratory Responses to Ozone Exposure</b> —WILLIAM F. MCDONNELL	75
 EXERCISE AND REGIONAL DOSIMETRY	
<b>Exercise and Regional Dosimetry: An Overview</b> —FREDERICK J. MILLER, WILLIAM F. MCDONNELL, AND TIMOTHY R. GERRITY	91
<b>Upper Airway Scrubbing at Rest and Exercise</b> —MICHAEL T. KLEINMAN AND WILLIAM J. MAUTZ	100

<b>Exercise and Regional Dosimetry: Factors Governing Gas Transport in the Lower Airways</b> —JAMES S. ULTMAN	111
---	-----

<b>Aerosol Boluses</b> —WILLI STAHLHOFEN, JOSEF GEBHART, AND GERHARD SCHEUCH	127
--	-----

#### SUSCEPTIBLE POPULATION MODELS

<b>Childhood Factors Related Potentially to Respiratory Health in Adulthood</b> — FREDERICK W. HENDERSON AND ALBERT M. COLLIER	141
---	-----

<b>Susceptibility of Young and Aging Lungs to Inhaled Pollutants</b> —JOE L. MAUDERLY	148
---	-----

<b>Nutritional Status and Oxidants</b> —JEROLD A. LAST	162
--	-----

<b>Evaluating Relationships Among Personal Risk Factors, Ambient Oxidant Exposure, and Chronic Respiratory Illness</b> —JACK D. HACKNEY AND WILLIAM S. LINN	174
--	-----

<b>Respiratory Infection and Oxidants</b> —MARK W. FRAMPTON AND NORBERT J. ROBERTS, JR.	182
--	-----

#### ASTHMA: CLINICAL MODEL OF SUSCEPTIBILITY

<b>Sulfur Dioxide-Induced Bronchoconstriction in Asthmatics Exposed for Short Durations Under Controlled Conditions: A Selected Review</b> —DONALD H. HORSTMAN AND LAWRENCE J. FOLINSBEE	195
---	-----

<b>Acid Aerosols and Asthma: A Review</b> —JANE Q. KOENIG, DAVID S. COVERT, AND WILLIAM E. PIERSON	207
---	-----

<b>Ozone and Asthma</b> —HOMER A. BOUSHEY	214
---	-----

<b>Asthma and Nitrogen Dioxide: A Review of the Evidence</b> —MARK J. UTELL	218
---	-----

#### CONFERENCE SUMMATION

<b>Reflections on the Symposium: Susceptibility to Inhaled Pollutants</b> — ROGER O. MCCLELLAN	224
---	-----

<b>Index</b>	233
--------------	-----





ISBN 0-8031-1262-9