

HANDBOOK OF PHYSIOLOGY

*A critical, comprehensive presentation
of physiological knowledge and concepts*

SECTION 9:

Reactions to Environmental Agents

Section Editor: DOUGLAS H. K. LEE

Associate Editors: HANS L. FALK
SHELDON D. MURPHY

Executive Editor: STEPHEN R. GEIGER

Contents

RESPONSE TO PHYSICAL AGENTS

Sound

1. Effects of noise exposure on auditory sensitivity
W. DIXON WARD 1
2. Pathophysiological responses of the auditory organ to excessive sound
STEPHEN A. FALK 17
3. Extraauditory effects of acoustic stimulation
ALEXANDER COHEN 31

Heat

4. Control of body temperature
JAN A. J. STOLWIJK
JAMES D. HARDY 45
5. Heat exchange between human skin surface and thermal environment
A. PHARO GAGGE
YASUNOBU NISHI 69
6. Human tolerance to hot climates
A. R. LIND 93

Microwaves

7. Microwave radiation
RUSSELL L. CARPENTER 111

Ionizing Radiation

8. Effects of ionizing radiation on mammalian cells
JOHN B. LITTLE
JERRY R. WILLIAMS 127

NATURE, ORIGIN, AND DISTRIBUTION OF CHEMICAL AGENTS

9. Chemical agents in air
D. S. BARTH
S. C. BLACK
J. R. HAMMERLE 157
10. Food additives and contaminants
A. D. CAMPBELL
W. HORWITZ
J. A. BURKE
C. F. JELINEK
J. V. RODRICKS
S. I. SHIBKO 167
11. Chemical agents from occupational sources
KINGSLEY KAY 181

12. Medicines and drugs as environmental agents
LEIGHTON E. CLUFF 193
13. Chemical agents in cigarette smoke
HANS L. FALK 199

REACTIONS AND DETERMINANTS AT PORTAL OF ENTRY

Respiratory System

14. Regional deposition of particles in the human respiratory tract
MORTON LIPPMANN 213
15. Radioactive materials—determinants of dose to the respiratory tract
P. J. WALSH
P. E. HAMRICK 233
16. Clearance mechanisms in the respiratory tract
KAYE H. KILBURN 243
17. Tissue and cellular reactions to particles, fibers, and aerosols retained after inhalation
J. S. HARINGTON
A. C. ALLISON 263
18. Immunological reactions to inhaled physical and chemical agents
ROBERT BURRELL 285

Skin

19. Permeability of the skin
ROBERT J. SCHEUPLEIN 299
20. Cutaneous allergic response
RUDOLF L. BAER
DAVID R. BICKERS 323
21. Cutaneous carcinogenesis: metabolic interaction of chemical carcinogens with skin
F. J. WIEBEL
H. V. GELBOIN 337

Alimentary System

22. Gastroenterologic response to environmental agents—absorption and interactions
CARL J. PFEIFFER 349
23. Metabolism of foreign substances in the gastrointestinal tract
KAARLO HARTIALA 375
24. Retention and excretion kinetics of chemical agents
JERZY K. PIOTROWSKI 389

TRANSPORTATION AND TRANSFORMATION
OF CHEMICAL AGENTS

25. Determinants of xenobiotic transport at biological barriers
MICHAEL J. JACKSON
VICTOR H. COHN 397
26. Hepatic and extrahepatic mixed-function oxidases
JOHN R. BEND
GARY E. R. HOOK 419
27. Hydrolytic transformation of environmental pollutants
D. J. ECOBICHON 441
28. Biochemistry and significance of transferase reactions in the metabolism of foreign chemicals
ROBERT M. HOLLINGWORTH 455

DISTRIBUTION AND EXCRETION OF CHEMICAL
AGENTS AND DERIVATIVES*Storage and Release*

29. Bone storage and release
FRANK A. SMITH
JOHN B. HURSH 469
30. Accumulation and release of chemicals by adipose tissue
J. C. STREET
R. P. SHARMA 483

Renal Excretion

31. Mechanisms of renal excretion of environmental agents
E. C. FOULKES 495
32. Renal injury and urinary excretion
L. MAGOS
T. W. CLARKSON 503

Alimentary Excretion

33. Alimentary excretion of environmental agents and unnatural compounds
CARL J. PFEIFFER
OSMO HÄNNINEN 513
34. Biliary excretion
CURTIS D. KLAASSEN 537

Pulmonary Excretion

35. Pulmonary excretion of absorbed gases
ROBERT A. KLOCKE 555

MECHANISM OF CELLULAR INJURY

36. Altered permeability of cell membranes
W. B. KINTER
J. B. PRITCHARD 563
37. Formation of reactive metabolites of foreign compounds and their covalent binding to cellular constituents
JAMES R. GILLETTE 577
38. Lipid peroxidation: a specific form of cellular injury
RICHARD O. RECKNAGEL
ERIC A. GLENDE, JR. 591
39. Intracellular digestion: lysosomes and cellular injury
IRA M. GOLDSTEIN
GERALD WEISSMANN 603
40. Action of environmental agents on nucleic acids and their metabolism
WALTER TROLL
ROBERT SHAPIRO 615
41. Altered protein synthesis
HERSCHEL SIDRANSKY 625
- Index 641