

Cambridge University Press

978-0-521-41426-5 - Temperature Regulation in Laboratory Rodents

Christopher J. Gordon

Table of Contents

[More information](#)

Contents

<i>Preface</i>	<i>page</i> ix
<i>Acknowledgments</i>	xi
<i>List of abbreviations</i>	xiii
1 Introduction to temperature regulation	1
1.1 A brief historical perspective	1
1.2 Current research status of thermoregulation	3
1.3 Why study laboratory rodents?	5
1.4 Overview of temperature regulation in rodents	6
1.5 Do rodents provide a suitable model for human thermoregulation?	16
2 Neurology of temperature regulation	19
2.1 Temperature sensitivity of the CNS	19
2.2 Neurophysiological studies	25
2.3 Neuropharmacological agents	34
2.4 CNS lesions and temperature regulation	37
2.5 Fever	41
3 Metabolism	47
3.1 Partitioning of metabolism	47
3.2 Methods for measuring metabolism	48
3.3 Basal metabolism	52
3.4 Metabolism during hibernation	60
3.5 Maximum (peak) metabolic rate	61
3.6 Metabolic thermoneutral zone	62
3.7 Physical factors affecting metabolism	66

viii *Contents*

4 Thermoregulatory effector responses	73
4.1 Peripheral vasomotor tone	73
4.2 Metabolic (facultative) thermogenesis	81
4.3 Evaporative heat loss	91
4.4 Behavioral thermoregulatory effectors	99
4.5 Motor activity as a thermoregulatory effector?	107
5 Body temperature	109
5.1 Partitioning of body temperature	109
5.2 Core temperature	111
5.3 Brain thermal homeostasis	115
5.4 Thermal tolerance	119
5.5 Circadian temperature rhythm	127
5.6 Effects of psychological stress on body temperature	134
6 Growth, reproduction, development, and aging	137
6.1 Optimal thermal conditions for growth	137
6.2 Effects of thermal stress on reproductive function	140
6.3 Development of thermoregulation from birth to weaning	148
6.4 Aging and thermoregulation	157
7 Temperature acclimation	163
7.1 Terminology	163
7.2 Acclimation to cold	164
7.3 Acclimation to heat	180
8 Gender and intraspecies differences	191
8.1 Gender differences	191
8.2 Intraspecies differences	196
9 Thermoregulation during chemical toxicity, physical trauma, and other adverse environmental conditions	205
9.1 Chemical toxicity	205
9.2 Hypoxia and ischemia	214
9.3 Trauma and shock	217
9.4 Hypergravity	219
9.5 Regulated hypothermia: a generalized protective mechanism?	222
<i>References</i>	225
<i>Index</i>	269