

Contents

1. Introduction to the Pathophysiology of Burns <i>R. Doleček</i>	1
2. Death Due to Thermal Trauma <i>W.R. Clark, Jr.</i>	6
Burn Mortality Rates	7
Mortality Models and Severity Indices	12
Statistical Assessment of Burn Mortality	13
Patterns and Causes of Death	14
Summary and Conclusions	19
3. The Endocrine and Metabolic Response to Burn Injuries: Mechanisms and Clinical Applications <i>R. Doleček</i>	28
Review of Endocrine Concepts	28
Postburn Immunosuppression	29
Effects of Postburn Endocrine and Metabolic Responses	33
Factors that Influence Postburn ATP Production and Utilization	38
The Acute-Phase Response	40
Clinical Applications	42
4. Hormones and Pain <i>R. Doleček</i>	46
Pathways of Pain Reception, Transmission, and Modulation	47
Presence of Hormones in Pain Pathways	50
Opioid Peptides and Pain	51
Nonopioid Pain-Modulating Substances	55
	xiii

5.	The Pituitary-Adrenal Axis	
	<i>R. Doleček, L. Brizio-Molteni, and A. Molteni</i>	62
	Proopiomelanocortin and its Derivatives	63
	Adrenocortical Hormones	67
	Response of the Pituitary-Adrenal Axis to Thermal Trauma	78
6.	The Pituitary-Gonadal Axis and Prolactin	
	<i>R. Doleček, L. Brizio-Molteni, and A. Molteni</i>	100
	Follicle-Stimulating Hormone and Luteinizing Hormone	100
	Prolactin	110
	Testosterone, 17- β -Estradiol, and Progesterone	117
	Summary and Conclusions	127
7.	The Pituitary-Thyroid Axis	
	<i>R. Doleček</i>	132
	Thyroid-Stimulating Hormone and Thyrotropin-Releasing Hormone	133
	Triiodothyronine (T ₃) and Thyroxine (T ₄)	134
	Response of the Pituitary-Thyroid Axis to Burn Injury	139
	Discussion	145
8.	The Renin-Angiotensin-Aldosterone System (RAA) in Thermal Trauma	
	<i>L. Brizio-Molteni, R.L. Warpeha, L.J. Cerullo, and M. Kotob</i>	148
	Incidence and Pathogenesis of Postburn Hypertension	148
	Components of the Renin-Angiotensin-Aldosterone System	150
	Mechanisms of Control and Action of RAA System	151
	Clinical Observations on Hypertension and RAA System Response in Burn Patients	154
	Response of the RAA System to Experimentally Induced Trauma	160
	Summary and Discussion	166
9.	The Endocrine Response of the Lung to Thermal Injury	
	<i>A. Molteni, W.R. Clark, Jr., D.L. Traber, D.N. Herndon, G. Piano, and L. Brizio-Molteni</i>	174
	Endocrine Function of the Lung: A Review	175
	Smoke Inhalation Injury: Incidence and Clinical Presentations	181

	Pulmonary Response to Thermal Injury (Cutaneous Burn)	182
	Pulmonary Response to Smoke Inhalation	190
	Summary and Discussion	201
10.	Calcium-Active Hormones and Postburn Low-Calcium Syndrome	
	<i>R. Doleček</i>	216
	Calcium and Inorganic Phosphate	216
	Effects and Regulation of Calcium-Active Hormones	221
	Response of Calcium, Phosphates, and Calcitropic Hormones to Burn Injury	224
	Possible Mechanisms of Increased cAMP and Decreased Serum Calcium	232
	Discussion	234
11.	Possible Involvement of Arachidonic Acid Metabolites in Thermal Trauma	
	<i>M. Gösta Arturson</i>	238
	The Arachidonic Acid Cascade: An Overview	238
	Inflammatory Response in Burn Wounds	240
	Mediators Responsible for Postburn Increase in Microvascular Permeability and Leukocyte Extravasation	242
	Agents That Suppress Postburn Increase in Microvascular Permeability	245
	Local Versus Systemic Effects of Prostaglandins After Thermal Injury	247
	Summary	248
12.	Tissue Hormones	
	<i>R.W. Yurt</i>	253
	Cellular Response to Tissue Injury	254
	Inflammatory Mediator Cascades	257
	Modulation of Cellular Response	258
	Modulation of Mediator Cascades	260
	Summary and Discussion	261
13.	Neuroendocrine and Sympathoadrenal Response to Thermal Trauma	
	<i>G.M. Vaughan</i>	267
	The Neuroendocrine Reflex Arc	267

	Multihormonal Influence on Postburn Hypertension	267
	Afferent and Efferent Signals Following Burn Injury	277
	Water and Electrolyte Metabolism	280
	Alteration of TSH Control and of Thyronine Interaction with the CNS	287
	Central Alteration of Leydig Cell Control	297
	Pineal Function	298
	Conclusion	300
14.	Burn Trauma as a Model of Severe Illness	
	<i>G.M. Vaughan, B.A. Pruitt, Jr., and A.D. Mason, Jr.</i>	307
	Thyroid Axis in Illness	307
	Altered Control of Metabolism in Illness	320
	Starvation	328
	Adrenocortical Considerations in Illness	331
	Gonadal Dysfunction	336
	Comparison of Starvation and Illness	338
15.	Thermal Trauma in Children	
	<i>H.H. Bode, D.N. Herndon, and D.L. Traber</i>	350
	Postburn Hypermetabolism	350
	Response of Thyroid Hormones, Catecholamines, and Prostaglandins	352
	Adrenocortical and Gonadotropin Response	354
	Postburn Hypertension, Electrolyte Balance, and Plasma Volume Status	357
	Alimentation and Other Therapeutic Considerations	359
16.	Aspects of Systemic Pathologic Changes after Thermal Trauma	
	<i>F.E. Cuppage, L. Brizio-Molteni, A. Molteni, and R. Doleček</i>	364
	Gross Pathologic Changes in the Endocrine Glands and Other Structures after Thermal Trauma	365
	Selected Histologic Specimens from Patients Who Died Within the First Week (2 to 5 Days) after Thermal Trauma	371
	Selected Histologic Specimens from Patients Who Died Within 2 Weeks (10 to 15 Days) after Thermal Trauma	379
	Selected Histologic Specimens from Patients Who Died About 3 Weeks (18 to 22 Days) after Thermal Trauma	391

Selected Histologic Specimens from Patients Who Died 4 to 5 Weeks (31 to 39 Days) after Thermal Trauma	400
Selected Histologic Specimens from a Patient Who Died 4 Months (121 Days) after Thermal Trauma	410
17. A Clinical Perspective on the Human Response to Thermal Trauma	
<i>M.M. Mani</i>	416
Endocrine System	416
Burn Shock	417
Postburn Hypermetabolism	417
Immune Competence and Anergy	417
Burn Wound	418
Summary	418
18. Therapeutic Implications	
<i>R. Doleček</i>	421
Blocking Mixtures in the Treatment of Burns	421
Treatment of Pain	431
Anabolic Hormone Therapy	433
Glucocorticoids	445
Index	453