

CONTENTS

<i>Preface</i>	<i>xv</i>
<i>Acknowledgments</i>	<i>xvii</i>
Chapter 1 INTRODUCTION	1
Basic Physiological Concepts	4
Types of Stress	4
Chapter 2 HUMAN NERVOUS SYSTEM	7
Cellular Physiology	7
Central Nervous System	13
Emotional Brain	15
Reticular Formation	16
Hypothalamus	16
Limbic Cortical Region	17
Peripheral Nervous System	17
Autonomic Nervous System	17
Autonomic Nervous System Activation	22
Physiological Effects of Sympathetic and Parasympathetic Activation	22
Cardiovascular System	22
Heart	22
Arterial Pressure	23
Systemic Vasculature	24
Gastrointestinal System	24
Respiratory System	24
Various Glands of the Body	25
Sweat glands	25

	Apocrine glands	25
	Eye	25
	Brain	26
	Muscle	26
	Other Structures of the Body.....	26
	Metabolism	26
	Parasympathetic Effects of the Stress Response ..26	
	Neurotransmitters of the Autonomic Nervous System	29
	Effector Organ Receptors	31
	Summary	33
Chapter 3	THE STRESS RESPONSE	35
	Pathways Activated by the Stress Response	36
	Autonomic Nervous System Activation	36
	Sympathetic Activation	37
	Parasympathetic Activation	38
	Fight or Flight Response	40
	Endocrine Activation	42
	General Adaptation Syndrome	42
	Summary	44
Chapter 4	ENDOCRINOLOGY	46
	General Discussion	46
	Hormones and their Actions	47
	Chemistry, Measurement, and Concentrations of Hormones	47
	Secretion of Hormones	49
	Other Factors that Influence Hormonal Secretions	49
	Mechanism of Hormonal Feedback Control ..	50
	Mechanism of Action of Hormones	50
Chapter 5	PITUITARY GLAND	55
	Pituitary Gland and Its Relationship to the Hypothalamus	56
	Anterior Pituitary	56

Hypothalamic Releasing Hormones	57
Posterior Pituitary	58
Pars Intermedia	60
Implication for the Stress Response	60
Anterior Pituitary Hormones	60
Growth Hormone	61
Growth Hormone and Stress	62
Summary	64
Pars Intermedia Hormones	65
Melanocyte Stimulating Hormone	65
Melanocyte Stimulating Hormone and Stress	66
Summary	67
Posterior Pituitary Hormones	67
Oxytocin	67
Antidiuretic Hormone	68
Antidiuretic Hormone and Stress	69
Summary	73
Chapter 6 ADRENAL GLAND	74
Adrenal Medulla	74
Physiological Effects of Epinephrine and Norepinephrine	77
Central Nervous System	77
Respiratory System	77
Gastrointestinal System	77
Circulatory System	77
Additional Effects of the Catecholamines	79
Adrenal Cortex	80
Mineralocorticoids	81
Aldosterone and Stress	82
Glucocorticoids (Cortisol)	84
Carbohydrate Metabolism	84
Protein Metabolism	85
Fat Metabolism	85
Other Effects of Cortisol	86
Muscular System	86
Anti-inflammatory Effects	86

	Autoimmune System	86
	Other Tissues of the Body	87
	Summary of Metabolic Effects	87
	Control of Cortisol Secretion	88
	Adrenal Cortisol Secretion and Circadian Rhythm	90
	The Adrenal Gland and Stress	90
	Adrenal Medulla	91
	Adrenal Cortex	92
Chapter 7	THYROID GLAND	94
	Physiological Effects of Thyroid Hormones ..	95
	Factors that Influence Thyroid Activity	96
	Effects of Stress on Thyroid Function	96
	Summary	100
Chapter 8	PARATHYROID GLAND	102
	Parathyroid Hormone	102
	Calcitonin	103
	Calcium and Stress	103
	Summary	105
Chapter 9	REPRODUCTIVE GLANDS	107
	Male Hormones	108
	Effects of Stress on Male Sex Hormones	108
	Summary	113
	Female Hormones	113
	Effects of Stress on Female Sex Hormones ..	115
	Prolactin	117
	Effects of Stress on Prolactin Secretion	118
	Summary	120
Chapter 10	PANCREAS	122
	Glucagon	122
	Glucagon and Stress	123
	Insulin	123
	Insulin and Stress	124
	Summary	128

Chapter 11	THE PINEAL GLAND	130
	Effects of Stress on the Pineal Gland	131
	Circadian Rhythm	133
	Effects of Stress on Circadian Rhythm	133
	Summary	134
Chapter 12	THE IMMUNE SYSTEM	136
	White Blood Cells	137
	Lymphatic System	138
	Spleen	139
	Thymus Gland	139
	The Immune System and Stress	141
	Summary	144
Chapter 13	OTHER HORMONAL SYSTEMS	
	Renin-Angiotensin System	147
	Renin-Angiotensin System and Stress	148
	Effect of Stress on Kidney Function	151
	Summary	151
	Prostaglandins	151
	Prostaglandins and Stress	153
	Summary	155
	Endogenous Opiates	155
	Endogenous Opiates and Stress	156
	Summary	158
Chapter 14	MEASUREMENT OF THE STRESS	
	RESPONSE	160
	Chemical Measurements	161
	Catecholamines	161
	The 17-hydroxycorticosteroids	163
	Other Physiological Measurements of the	
	Stress Response	164
	Electromyography	164
	Temperature Measurements and	
	Plethysmography	165
	Cardiovascular Activity	165
	Electrodermal Measurement	165

	Electroencephalography	166
	Summary	166
Chapter 15	STRESS AND DISEASE	168
	The Link Between Stress and Disease	168
	Neurophysiological Pathways of Stress Related Disorders	169
	Interneuronal Stress Response	169
	Neurovascular Stress Response	170
	Neuromuscular Stress Response	171
	Neurohumoral Stress Response	173
	Stress Management Strategies	174
	Interneuronal Stress Response	175
	Neurovascular Stress Response	175
	Neuromuscular Stress Response	175
	Neurohumoral Stress Response	176
	Stress-Related Disorders	176
	Skeletal Muscle System	177
	Gastrointestinal System	177
	Other Digestive Disorders	179
	Respiratory System	179
	Skin Disorders	180
	Immune System	180
	Cardiovascular System	181
	Urino-Genital System	182
	Summary	183
Chapter 16	CONCLUSION	185
	Physiology of the Stress Response	186
	Neural Axis	186
	Peripheral and Central Nervous Systems	186
	Autonomic Nervous System	187
	Neuroendocrine Axis	187
	Sympathetic-Adrenal-Medullary Axis	187
	Hypothalamic Posterior Pituitary Axis	188
	Renin-Angiotensin-Aldosterone System	188
	Glucagon and Insulin	189
	Anterior Pituitary-Adrenal-Cortical Axis	190

Somatotropin Axis	190
Other Components of the Neuroendocrine Axis	191
Gonadotropin Axis	191
Thyroid Axis	191
Summary	192
<i>Afterword</i>	196
<i>References</i>	198
<i>Glossary</i>	230
<i>Index</i>	257