

# Contents

---

<b>Acknowledgements</b>	<b>xi</b>
<b>Introduction</b>	<b>xiii</b>
<b>Chapter 1 Diabetes Mellitus</b>	<b>1</b>
Introduction	1
Blood Glucose Values in Birds	2
Do Birds Suffer Adverse Consequences from a High Blood Glucose Concentration	5
Anatomic and Physiologic Design Features	6
Concluding Remarks and Future Research	26
References	31
<b>Chapter 2 Chronic Renal Failure</b>	<b>40</b>
Introduction	40
Metabolic Rate and Renal Function	42
Nitrogen and Urea Metabolism and Protein Turnover	44
Additional Aspects of Renal Failure	56
Natural Animal Model	57
Bear and Small Mammal Hibernators	64
Concluding Remarks and Future Directions	66
References	70

<b>Chapter 3</b>	<b>Atherosclerotic Vascular Disease</b>	<b>78</b>
	Introduction	78
	Atherosclerosis in Mammals	79
	Biology of the Arterial System: Implications for the Genesis of Atherosclerosis in Mammals	83
	Genesis of Atherosclerotic Lesions	88
	Natural Animal Model: The Fish	89
	Fish Coronary Circulation	90
	Fish Coronary Artery Thickenings	91
	Genesis of Fish Lesions	94
	Biomechanical Factors in Fish	94
	Dietary Influences and Role of Cholesterol in Fish	96
	Biology of the Vascular Smooth Muscle in Fish	99
	Concluding Remarks: What Can We Learn From the Fish as a Natural Model?	99
	References	102
<b>Chapter 4</b>	<b>Disuse Osteoporosis and Disuse Muscle Atrophy</b>	<b>107</b>
	Disuse Osteoporosis	108
	Disuse Muscle Atrophy	126
	References	143
<b>Chapter 5</b>	<b>Ammonia Toxicity</b>	<b>149</b>
	Ammonia Tolerance and Metabolism	149
	Brain Ammonia Metabolism	157
	Glutamatergic Neurons	159
	Glutamate, a Neurotransmitter and the “Glutamate-Glutamine” Cycle	160
	Mechanism of Ammonia Neurotoxicity	164
	Effects on Brain Energy Metabolism	169
	Effects on Glutamatergic Synapses	171
	Ammonia and the Fish Central Nervous System	175
	Summary	181
	References	183
<b>Chapter 6</b>	<b>Hypoxia/Ischemia</b>	<b>190</b>
	Cerebral Blood Flow: Its Regulation	191
	Brain Energy Metabolism	195

Oxygen and Oxygen/Glucose Deprivation and the Brain	199
Natural Animal Models	230
Concluding Remarks and Future Directions	245
References	254
<b>Epilogue</b>	<b>261</b>
References	266
<b>Index</b>	<b>267</b>