## Table of Contents

PART I: BASIC PRINCIPLES

Cell Biology The Structure & Development of the Skeleton.

Biomechanics of Bone.

Embryonic Development of Bone and the Molecular Regulation of Intramembranou and Endochondral Bone Formation.

Mesenchymal <sup>+</sup>em Cells & Osteoblast Lineage.

Transcription and Function of Osteoblast Differentiation and Function. The Osteology te.

Cells of Bone: Osteoclast Generation.

Octeouast Function.

Integrin and Calcitonin Receptor Signaling in the Regulation of the Cytoskeleton and Function of Osteoclasts.

Apoptosis in Bone Cells.

Involvement of Nuclear Architecture in Regulating Gene Expression in Bone Cells.

## Biochemistry

Type I Collagen: Structure, Synthesis, and Regulation.

Collagen Crosslinking & Metabolism.

Bone Matrix Proteoglycans & Glycoproteins.

Osteopontin.

Bone Proteinases.

Cell Surface Attachment Molecules.

Intercellular Junctions and Cell-Cell Communication in Bone.

Bone Remodeling and Mineral Homeostasis

Histomorphometric Analysis of Bone Remodeling.

Phosphorus Homeostasis & Related Disorders.

Magnesium Homeostasis.

Metals in Bone: Aluminum, Boron, Cadmium, Chromium, Lead, Silicon, & Strontium.

The Biology of the Extracellular Ca2+-Sensing Receptor (CaR).

## The Hormones of Bone

Receptors for Parathyroid Hormone and Parathyroid Hormone-Related Peptide. Parathyroid Hormone - Molecular Biology.

Parathyroid Hormone-Receptor Interactions.

Actions of Parathyroid Hormone.

Renal and Skeletal Actions of PTH and PTHrP.

Physiological Actions of PTH and PTHRP: Epidermal, Mammary, Reproductive and Pancreatic Issues.

Vascular, Cardiovascular and Neurological Actions of PTHrP.

Nuclear Receptor Structure (VDR) and Ligand Specificities for Genomic and Rapid Biological Responses.

Vitamin D Gene Regulation.

Photobiology and Non-Calcemic Actions of Vitamin D. The Structure and Molecular Biology of the Calcitonin Receptor. Physiology & Pathophysiology of Calcitonin. Amylin & CGRP.

Other Systemic Hormones That Influence Bone Metabolism Estrogens & Progesting. Selective Estrogen Acceptor Modulators (SERMs). Mechanisms of Estiogen Action in Bone. Thyroid Hormone & Bone. Clinical and Basic Aspects of Glucocorticoid Action in Bone. Effects of Diabetes & Insulin on Bone Physiology. Ananogens: Receptor Expression and Steroid Action in Bone. Kirlins & Neuro-Osteogenic Factors.

Local Regulators

The Role of Insulin-like Growth Factors & Binding Proteins in Bone Cell Biology. Platelet-Derived Growth Factor & the Skeleton.

Fibroblast Growth Factor and Fibroblast Growth Factor Receptor Families in Bone.

Vascular Endothelial Growth Factors.

Transforming Growth Factor (beta).

Bone Morphogenetic Proteins.

Bone Morphogenetic Protein Receptors & Actions.

Colony-Stimulating Factors.

Local Regulators of Bone: IL-1, TNF, Lymphotoxin, Interferon-?, IL-8, IL-10, IL-4, the LIF/IL-6 Family, and Additional Cytokines.

Prostaglandins & Bone Metabolism.

Nitric Oxide and other Vasoactive Agents.

PART II: MOLECULAR MECHANISMS OF METABOLIC BONE DISEASES

Molecular Basis of PTH Overexpression.

Familial Benign Hypocalciuric Hypercalcemia and Neonatal Primary Hyperparathyroidism.

Multiple Endocrine Neoplasia Type I.

The Role of the RET Proto-oncogene in Multiple Endocrine Neoplasia Type 2. Systemic Factors in Skeletal Manifestations of Malignancy.

Local Factors in Skeletal Malignancy.

Molecular Basis of PTH Underexpression.

Jansen's Metaphyseal Chondrodysplasia & Blomstrand's Lethal

Chondrodysplasia: Two Genetic Disorders Caused by PTH/PTHrP Receptor Mutations.

Signal Transduction via G Proteins; Pseudohypoparathyroidism.

Other Skeletal Diseases Resulting from G Protein Defects - Fibrous Dysplasia & McCune-Albright Syndrome.

Osteogenesis Imperfecta.

Hereditary Deficiencies in Vitamin D Action.

Oncogenic Osteomalacia.

Osteopetrosis.

Hypophosphatasia: Nature's Window on Alkaline Phosphatase Function in Man. Paget's Disease of Bone.

Genetic Determinants of Bone Mass.

Pathophysiology of Ostec porosis.

Evaluation of Risk for Osteoporosis Fractures.

PART III: PHARMACOLOGIC MECHANISMS OF THERAPEUTICS

Pharmacclogic Mechanisms of Therapeutics: Parathyroid Hormone. Calcium

Calcium Receptors as Novel Drug Targets.

Bis, hosphonates: Mechanisms of Action.

Fluoride in Osteoporosis.

The Pharmacology of Estrogens in Osteoporosis.

Pharmacologic Mechanisms of Therapeutics: Vitamin D & Analogs.

Molecular and Clinical Pharmacology of Calcitonin.

Growth Hormone and Insulin-like Growth Factor-I Treatment for Metabolic Bone Diseases.

Anabolic Steroid Effects on Bone in Women.

Estrogen Effects on Bone in the Male Skeleton.

Mechanisms of Exercise Effects on Bone.

## PART IV: METHODS IN BONE RESEARCH

Application of Transgenic Mice to Problems of Skeletal Bone.

Use of Cultured Osteoblastic Cells to Identify and Characterize Transcriptional Regulatory Complexes.

Current Methodologic Issues in Cell & Tissue Culture.

Biochemical Markers of Bone Metabolism.

Methods and Clinical Issues in Bone Densitometry and Quantitative Ultrasonometry.

Controversies in Bone Mass Measurement.

Macro and Micro Imaging of Bone Architecture.

Transilial Bone Biopsy.

Animal Models in Osteoporosis Research.

Defining the Genetics of Osteoporosis - Using the Mouse to Understand Man.