

1. Record Nr.	UNINA9910502652803321
Titolo	Extracellular matrix biomineralization of dental tissue structures // Michel Goldberg, Pamela Den Besten, editors
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2021] ©2021
ISBN	3-030-76283-1
Descrizione fisica	1 online resource (305 pages)
Collana	Biology of extracellular matrix ; ; 10
Disciplina	611.314
Soggetti	Teeth Matriu extracel-lular Dentina Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Intro -- Preface -- Contents -- Part I: Extracellular Matrix Molecules of Mineralized Structures -- Chapter 1: Structure of Collagen-Derived Mineralized Tissues (Dentin, Cementum, and Bone) and Non-collagenous Extra Cellular M... -- 1.1 Mineralization in Collagen-Derived Tissues -- 1.1.1 Matrix Vesicle (MV) Initiated Mineralization -- 1.1.2 Collagen and Extracellular Matrix (ECM) Proteins-Derived Mineralization -- 1.1.2.1 Dentin -- Anatomy of Dentin -- Matrix Vesicles Initiated Mineralization in Mantle Dentin -- Collagen and ECM Proteins-Derived Mineralization in Circumpulpal Dentin -- Dentin Formation -- Cells, Structure and Extracellular Matrix Components of Dentin -- Circumpulpal (and Secondary) Dentin Formation -- 1.2 Cementum -- 1.2.1 Cementum Anatomy -- 1.2.2 Cementum Formation (Cementogenesis) -- 1.3 Bone -- 1.3.1 Bone Anatomy -- 1.3.2 Bone Cells -- 1.3.3 Types of Bone Formation -- 1.3.3.1 Primary Bone -- 1.3.4 Bone Structural Systems -- 1.3.4.1 Osteon -- 1.3.4.2 Secondary Bone -- 1.3.4.3 Craniofacial Bones -- 1.3.5 Bone Composition (Also See Chap. 2) -- 1.3.5.1 ECM Structure -- 1.3.5.2 Bone Mineral Composition -- 1.4 Mineralization in Non-collagen-Derived Tissues -- 1.4.1 Enamel -- 1.4.1.1 Anatomic Organization --

The Formation of Enamel from Secretion to Maturation -- 1.4.1.2
Mature Enamel -- 1.4.1.3 Enamel Mineralization -- References --
Chapter 2: Extracellular Matrix Proteins: Nomenclature and Functions in
Biomineralization -- 2.1 ECM Proteins in Collagen-Derived Mineralized
Tissues -- 2.1.1 Collagens -- 2.1.2 Non-collagenous Proteins (NCPs)
-- 2.1.2.1 The Small Integrin-Binding Ligand N-Linked Glycoproteins
(SIBLINGs) -- 2.1.2.2 Proteoglycans -- 2.1.2.3 Other Proteins Present in
the ECM Implicated in Mineralization -- 2.1.2.4 Lipids -- 2.2 ECM
Proteins in Non-collagen-Derived Mineralized Tissue/Enamel -- 2.2.1
Composition.
2.3 Conclusion -- References -- Part II: Collagen-Derived Extracellular
Matrix Components: Dentin, Bone and Cementum -- Chapter 3:
Collagenous Mineralized Tissues: Composition, Structure, and
Biomineralization -- 3.1 Composition of CMTs -- 3.1.1 Mineral Phases
in CMTs -- 3.1.1.1 Nano-crystalline Nonstoichiometric Apatite: The
Major Mineral Phase of CMTs -- 3.1.1.2 Minor Mineral Phases in CMTs
-- 3.1.2 Organic Components of CMTs -- 3.1.2.1 Collagen Type I: The
Major Component of CMTs -- 3.1.2.2 Noncollagenous Macromolecules
-- 3.1.2.3 Small Molecules -- 3.2 Structural Organization of CMTs --
3.3 Biomineralization of CMTs -- 3.4 Conclusion -- References --
Chapter 4: Non-collagenous ECM Matrix Components Growth Factors
and Cytokines Involved in Matrix Mineralization -- 4.1 Introduction --
4.2 Extracellular Matrix Components -- 4.2.1 Collagen -- 4.2.2 Non-
collagenous Proteins (NCPs) -- 4.3 Noncollagenous Proteins in the
Dentin Matrix That Regulate Mineralization -- 4.3.1 Introduction --
4.3.2 Dentin Sialoprotein (DSP) and Dentin Phosphoprotein (DPP) --
4.3.3 Dentin Matrix Protein 1 (DMP1, AG1) -- 4.3.4 Matrix Extracellular
Phosphoglycoprotein (MEPE) (Osteocyte/Osteoblast Factor 45 (OF45),
Osteoregulin) -- 4.3.5 Osteopontin (OPN) (Bone Sialoprotein 1 (BSP1)
/Secreted Phosphoprotein 1 (SPP1)) -- 4.3.6 Bone Sialoprotein (BSP2) --
4.3.7 Type II TGF- Receptor Interacting Protein-1 (TRIP1) -- 4.4
Glucose Regulatory Protein-78 (GRP78) -- 4.5 Growth Factors and
Cytokines -- 4.6 Transforming Growth Factor Beta (TGF-) -- 4.6.1
Extracellular Matrix Regulation of BMPs and TGF Signaling -- 4.7
Conclusions -- References -- Chapter 5: Odontoblast Processes: New
Insights into Its Role in Dentin Mineralization -- 5.1 Introduction -- 5.2
The Entire Dentinal Tubule Is Full of Numerous Mini-branches with
Significantly Higher Dentinal Tubules in the Edge of the.
5.3 Mineralization Is Not Limited to the Mineralization Front but Occurs
Throughout Dentin Matrices Surrounding Odontoblast Pr... -- 5.4 Cell
Lineage Tracing Combined with Mineral Dye Injections Demonstrate
that Mineralization Occurs Along with the Entire Den... -- 5.5 Vital
Roles of Molecules in Odontoblast Differentiation and Dentin
Mineralization -- 5.5.1 Dentin Sialophosphoprotein (DSPP) Is Critical for
Proper Dentin Mineralization -- 5.5.2 Dentin Matrix Protein 1 Is Critical
for Postnatal Dentin Formation -- 5.5.3 BMP1/TLL1 Plays Crucial Roles
in Maintaining Extracellular Matrix Homeostasis Essential to Root
Formation and Dentin Min... -- 5.6 Conclusion -- References --
Chapter 6: Small Leucine-Rich Proteoglycans (SLRPs) and
Biomineralization -- 6.1 Introduction -- 6.2 SLRP Family -- 6.2.1
Protein Structures/Domains -- 6.3 SLRPs in Mineralized Tissues and
Their Potential Functions -- 6.3.1 Identification and Localization of
SLRPs in Pre- and Mineralizing-Fractions and Available Imaging
Techniques -- 6.3.2 Collagen-Based Mineralization and SLRPs -- 6.3.3
GAGs in Mineralization -- 6.3.4 SLRP Functions in Biomineralization --
6.3.5 Effect of SLRPs on Biomineralization Through Gain- and Loss-of-
Function Approaches In Vitro -- 6.3.6 Gene KO Models: SLRPs Affect
Bone/Tooth Structures/Mineralization -- 6.4 SLRPs as Therapeutics and

Tissue Engineering -- References -- Chapter 7: Cementum Proteins Beyond Cementum -- 7.1 Introduction -- 7.2 The Origins of Cementum -- 7.3 Cementum Structure -- 7.4 Cementum Function -- 7.5 Cementum Composition -- 7.5.1 Inorganic Components -- 7.5.2 Organic Components -- 7.5.3 Collagens -- 7.5.4 Proteoglycans/Glycosaminoglycans -- 7.5.5 Tissue Nonspecific Alkaline Phosphatase (TNALP) -- 7.6 Phosphoproteins -- 7.7 Vitamin K-Dependent Proteins -- 7.8 Enamel-Related Proteins -- 7.9 Amelogenin (AMEL) -- 7.10 Ameloblastin (AMBN). 7.11 Cementum-Specific Proteins -- 7.11.1 Cementum-Derived Growth Factor (CGF) -- 7.11.2 Cementum Attachment Protein (CAP) -- 7.11.3 Cementum Protein 1 (CEMP1) -- 7.12 Cementum Therapeutics -- 7.13 Novel Prospects -- 7.13.1 Stem Cells -- 7.13.2 Cementum Proteins -- 7.14 Conclusion -- References -- Chapter 8: Biochemistry of Non-collagenous Proteins of Bone -- 8.1 Introduction -- 8.2 Function of Non-collagenous Proteins in Bone -- 8.2.1 Non-collagenous Proteins with Catalytic Functions -- 8.2.2 Non-catalytic Non-collagenous Proteins of Bone -- 8.2.3 Other Binding Sites Through Which Non-collagenous Proteins Mediate Their Functions -- 8.2.4 Methodology Affects the Way We Think About Bone Formation -- 8.2.5 How does age affect the composition of bone matrix (or woven bone versus lamellar bone)? -- 8.2.6 Replacement of Non-collagenous Proteins to Treat Human Disease -- 8.3 Conclusions -- References -- Part III: Enamel -- Chapter 9: Human Tooth Enamel, a Sophisticated Material -- 9.1 Introduction -- 9.2 The Hierarchical Structure of Teeth -- 9.2.1 Construction of Human Tooth Enamel -- 9.2.1.1 Microscale -- 9.2.1.2 Nanoscale -- Crystals Morphology -- Crystals Chemical Composition -- Crystals Atomic Structure -- Crystals Surface Structure -- 9.3 Mechanical Properties -- 9.3.1 Mechanical Properties of the Jaw -- 9.3.1.1 Macroscale Properties -- The Jaw Bones -- Relationship of Bone Piezoelectric Properties and Activity of Bone Cells -- 9.4 Nanoscale Properties -- 9.4.1 The Teeth -- 9.4.1.1 Human Tooth Dentine and Enamel -- 9.4.2 Piezoelectric Properties of Enamel and Dentine -- 9.4.3 Mechanisms of the Carious Dissolution Process -- 9.4.4 The Carious Process at the Macroscale Level -- 9.4.5 The Dental Caries at the Nanoscale Level -- 9.5 Defect Analysis -- 9.5.1 Defects in Ionic Crystals -- 9.5.1.1 Relationship to Crystal Growth -- 9.5.1.2 Surface Charge. 9.5.2 Etch Pit Dislocation Analysis -- 9.5.3 Etch Pit Dislocations in Apatite -- 9.5.3.1 Surface Energy Calculations -- 9.5.3.2 Crystal Defects in Enamel Crystals Analysis Using TEM -- 9.5.4 Central Dark Line -- 9.6 Conclusion -- References -- Chapter 10: Proteinases in Enamel Development -- 10.1 Enamel Formation Overview -- 10.2 Matrix Metalloproteinase-20 -- 10.3 Kallikrein-Related Peptidase-4 -- 10.4 A Disintegrin and Metallopeptidase Domain-10 -- References -- Chapter 11: Enamel Matrix Biomineralization: The Role of pH Cycling -- 11.1 Part 1: Secretion of Matrix Proteins, Enamel Mineralization, and pH Regulation -- 11.1.1 Introduction -- 11.1.2 Secretory Stage Enamel -- 11.1.3 Maturation Stage Enamel -- 11.1.4 Discovery of pH Cycling -- 11.1.5 Amelogenin-Mediated Enamel Matrix Mineralization -- 11.1.5.1 Disassembly of Amelogenin Bound on HAP Crystals -- 11.1.6 Enamel Matrix Proteinases, MMP-20, and KLK4 -- 11.1.6.1 Optimal Conditions for Proteinase Activity in the Enamel Matrix -- 11.1.7 A Model for pH Cycling and KLK4-Regulated Enamel Maturation -- 11.2 Part 2: Regulations of Ion-Pumps, Transporters and Carbonic Anhydrases (CAs) Involved in Enamel Mineralization and pH Mod... -- 11.2.1 Regulation of Matrix pH -- 11.2.1.1 Matrix Acidification -- 11.2.1.2 Buffering to Neutralize Matrix pH -- 11.2.2 Conclusions -- References

-- Chapter 12: Environmental Factors and Enamel/Dentin Defects --
12.1 Fluoride and Fluorosis -- 12.2 Endocrine Disruptors and Enamel
Hypomineralization -- 12.3 Combinations of Environmental Factors --
12.4 Conclusions -- References.
