1. Record Nr. UNINA9911011649903321

Autore	Ghorbani Farnaz
Titolo	Principles of Bioinspired and Biomimetic Regenerative Medicine / / edited by Farnaz Ghorbani, Behafarid Ghalandari, Chaozong Liu
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2025
ISBN	3-031-87744-6
Edizione	[1st ed. 2025.]
Descrizione fisica	1 online resource (1213 pages)
Collana	Biomaterials, Bioengineering and Sustainability, , 2731-7528 ; ; 3
Altri autori (Persone)	GhalandariBehafarid LiuChaozong
Disciplina	612.028 571.538
Soggetti	Regenerative medicine Proteins Biomaterials Biomedical engineering Biochemistry Biology - Technique Biophysics Regenerative Medicine and Tissue Engineering Biomaterials-Proteins Biomedical Engineering and Bioengineering Biophysical Methods
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Part 1: Introduction -- CH1. The concept and history of bioinspired and biomimetic regenerative medicine -- Part 2. Bioinspired and biomimetic materials for regenerative medicine -- CH2. Bioinspired polymers for regenerative medicine -- CH3. Bioinspired and biomimetic hydrogels for regenerative medicine -- CH4. Biomimetic ceramics for regenerative medicine -- CH5. Lipid-based systems for regenerative medicine -- CH6. Glycan-based systems for regenerative medicine -- CH7. Peptide-based systems for regenerative medicine -- CH8. Nucleic acid-based systems for regenerative medicine -- Part 3: Bioinspired design for regenerative medicine -- CH9. Nature-inspired architecture for

regenerative medicine -- CH10. Smart bio-inspired structures: Organ-on-chip -- CH11. Bioinspired self-assembled nanotechnology for regenerative medicine -- CH12. Bioinspired surface technology for regenerative medicine -- CH13. Biochemical and biophysical design of materials for regenerative medicine -- Part 4: Application of bioinspired and biomimetic materials/architecture -- CH14. Bioinspired and biomimetic materials/architecture in bone regeneration -- CH15. Bioinspired and biomimetic materials/architecture in cartilage regeneration -- CH16. Bioinspired and biomimetic materials/architecture in tendon and ligament regeneration -- CH17. Intervertebral disc regeneration using biomimetic materials and bio-inspired architecture -- CH18. Bioinspired and biomimetic materials/architecture in muscle regeneration -- CH19. Bioinspired and biomimetic materials/architecture in cardiovascular regeneration -- CH20. Bioinspired and biomimetic materials/architecture in skin regeneration -- Part 5: Method of characterization of bioinspired and biomimetic materials/ architecture -- CH21. Wet-lab techniques for characterizing bioinspired materials and structures for regenerative medicine -- CH22. Dry-lab computational approaches for simulating bioinspired materials/structures for regenerative medicine -- CH23. Advancement of synthetic biology strategies for bioinspired regenerative medicine.

Sommario/riassunto

Nature has developed a diverse of materials, structures, and processes that are highly optimized for various functions. Through the field of biomimicry and bioinspiration, engineers are enhancing their understanding of natural design principles and applying these insights to create complex engineering models across different scales. These innovative approaches are particularly appropriate to address challenges in tissue engineering and regenerative medicine. Natural materials and systems exhibit a diverse array of functions, including but not limited to structural support, signal transduction, charge transfer, self-assembly, self-organization, and self-replication. Consequently, nature’s "solution manual" is remarkably comprehensive. Despite significant advancements, the reconstruction of nature-inspired designs using synthetic materials presents ongoing challenges. As a result, nature and bioinspired materials and architectures have emerged as a paradigm shift within the realm of tissue engineering and regenerative medicine. This comprehensive guide aims to provide scientists with inspiration to address a variety of critical challenges in tissue regeneration by directly applying established design principles. A key focus of this volume is the utilization of bioinspired architectures in tissue engineering. It also emphasizes the development of nature-inspired structures through the integration of novel biological macromolecules, bioinspired polymers and hydrogels, as well as biomimetic ceramics. Furthermore, the text concentrates on the biochemical and biophysical dimensions of bioinspired surface engineering. Both dry-lab and wet-lab methodologies for characterizing nature and bio-inspired materials and structures are also addressed. The publication seeks to promote the development of high-level translational knowledge among both established and emerging scientists.