

3D Bioprinting Strategies for Building Human Body Parts: Biomaterials, Tissue Engineering, & Regenerative Medicine

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Abstract: Tissue engineering and regenerative medicine hold promise for individuals affected by severe tissue injuries or end-stage organ failure. The integration of 3D bioprinting technologies with these strategies has opened up a compelling avenue for bioengineering biological tissue constructs that closely resemble native tissues or organs in terms of their biological, structural, anatomical, and functional characteristics. An essential aspect of these cutting-edge technologies lies in the precise deposition of multiple tissue-specific cell types and biomaterials within a single 3D tissue architecture. Consequently, ongoing efforts within the sphere of 3D bioprinting are focused on developing tissue-specific bioink systems. These bioinks go beyond their role as mere mechanical support structures; they also encompass the crucial responsibility of mimicking tissue-specific microenvironmental cues necessary for the successful maturation of bioengineered tissues. The presentation will offer a detailed exploration of recent progress in bioprinting technologies, specifically focusing on their applications in various aspects of tissue engineering and regenerative medicine. Additionally, it will underscore the significance of bioprinting in creating advanced *in vitro* tissue models tailored to meet the specific requirements of precision medicine.