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PROCEEDINGS

How to Design Engineered Organs to Enhance Physiological Function

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ABSTRACT

In the complex field of organ fabrication, which combines developmental biology, bioinspired engineering, and regenerative medicine, the main goal is to closely mimic the detailed structure and function of natural organs. While advanced techniques like 3D bioprinting have made significant strides but often fall short in accurately emulating the dynamic, self-organizing processes fundamental to organogenesis, particularly the nuanced patterns of cellular motility and spatial organization [1]. This issue highlights a big challenge in tissue engineering: making synthetic organs that truly match their natural models. Our work aims to bring together principles of developmental biology with the latest in organ making techniques. We focus on how cells move and come together to improve both the complexity and the realness of the tissues we engineer. This method moves us closer to making synthetic organs that could be used in medicine and helps us understand more about how tissues grow and repair themselves. Through the creation of the Manufacturing Multi-organs Database (MMDB) and the use of advanced predictive models, we analyze extensive biofabrication data to fine-tune the functional parameters of engineered organs. This thorough integration advances our understanding of organ functionality and development, leading us toward biomimetic precision in organ fabrication [2].

KEYWORDS

3D printing; organ fabrication; cellular motility; database and AI models

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