Effects of the Structure of 3D Printed Structures for Cell Growth

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Burn injuries, trauma, and organ transplants are often time-consuming, costly, and complex to treat. Tissue engineering offers a promising alternative, allowing tissue to be grown using a patient's own cells. One innovative approach involves 3D printing, where scaffolds are printed to support cell growth. This project aimed to determine the optimal architecture for 3D-printed scaffolds based on pore density and structure type. Two scaffold designs—gyroid and grid structures—were printed with varying infill densities and seeded with yeast cells. The cells were cultured for 24 hours, after which microscopic imaging was used to observe cell distribution on the scaffolding. Additionally, turbidity tests were conducted by washing the cells off the scaffolds with 1 mL of water and measuring the optical density (OD600) using a spectrometer. Results indicated that gyroid structures exhibited higher OD600 values at higher infill densities compared to grid structures, suggesting superior facilitation of cell growth. These findings have significant implications for tissue engineering, demonstrating that gyroid structures offer better tissue growth properties at higher densities. Future scaffold designs can build upon these results to optimize tissue regeneration.

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