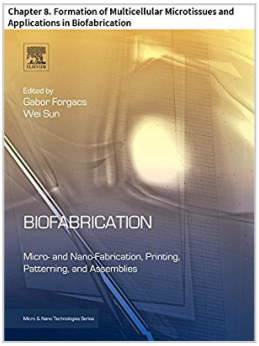

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By Andrew M. Blakely, Jacquelyn Y. Schell, Adam P. Rago, Peter R. Chai, Anthony P. Napolitano, Jeffrey R. Morgan

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Scaffold-free tissue engineering approaches take advantage of cell–cell interactions, specifically the phenomena of self-assembly and self-sorting. By using micro-molded nonadhesive hydrogels, mono-dispersed cells can be seeded and directed to form spheroids as well as more complex shapes. These complex structures, including toroids, honeycombs, and loop-ended dogbones, bypass the critical diffusion distance required to maintain cell viability in culture over time. In addition, the formed microtissues are amenable to assays that analyze the self-assembly dynamics, the sorting of two different cell types, the fusion of two individual tissues, and the power produced by cell aggregates as they contract around molded gel pegs. The biofabrication of multiple microtissues into a larger macrotissue with a patent network of lumens for perfusion is an active area of research for eventual translation of tissue engineering products to the operating room.

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