

Engineering of human 3D vascularized tissues including disease models

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To ensure consumer safety, products must be tested for their safety, and efficacy. Although animal models and two dimensional in vitro models have been widely used, the relevance of these models is limited due to species specific differences and the lack of cell matrix interactions. As an ethical alternative three dimensional models mimic the complex in-vivo microenvironment of human tissues and are thus more predictive for the human situation. However, the applicability of current models is restricted by the lack of the complex vascular system. Therefore, a biological vascularized scaffold (BioVaSc) based on a decellularized porcine jejunum was developed that allows the reseeding of the vascular structures, embedded in the scaffold, with human endothelial cells and the connection of the vascular network with an outer bloodstream. The BioVaSc can be used as a platform to generate vascularized tissue equivalents e.g. skin, trachea and intestine models. In addition to the healthy condition of the tissues different diseased models can be generated using this technology by the addition of tumor cells, pathogens or stimulated immune cells, which is vital for the development of new effective pharmaceutical products.