

Combining materials, cells and methods in 3D bioprinting

Abstract:

Human tissues are complex objects, consisting of highly organised extracellular matrix components and in most cases several cell types, arranged in a spatially strictly controlled manner. With bioprinting we are able to deposit living cells in combination with biomaterials, creating three-dimensional, tissue-like constructs. However, we are not yet able to realise the necessary complexity and simultaneously resolution when we want to print volumetric constructs, as they would be needed for medical applications.

More complexity could be achieved when different materials and cell types are combined during the bioprinting process; in addition, the combination of different additive manufacturing technologies within one print might help to mimic the real tissues better. Our lab is interested in such combinations, e.g. of bioinks with calcium phosphate bone cements, of melt electrowriting and extrusion printing or bringing together two or more cell types in a core/shell fashion. This will be demonstrated using a few examples from our current work.