Sarah Gretzinger et al., Int J Adv Technol 2018, Volume 9
DOI: 10.4172/0976-4860-C1-002

Cell characterization methods for use in 3D bioprinting process development

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The development of biocompatible 3D printing methods has pushed the limits in tissue engineering and regenerative medicine in the past years and is considered to be a key technology in these application fields. Since the processing of living materials represents a major increase in process complexity, a directed and systematic process development approach is highly recommended for 3D bioprinting of cells. Such an approach is, however, profoundly dependent on the availability of suitable and accurate cell characterization methods. In this study, we evaluated different state-of-the-art cell characterization methods concerning applicability in 3D bioprinting process development. One metabolic assay, namely, PrestoBlue® and one flow cytometry approach. The theoretical evaluation was based on method versatility and high-throughput screening (HTS) compatibility, as well as method robustness. Further, we have evaluated the performance of two methods that differ in their corresponding mechanism. In this case study, INS-1E was used as model cell line. The evaluation was done with one non-invasive and one invasive cell characterisation method. As a non-invasive strategy, the metabolic assay PrestoBlue® was chosen, since the colometric assay can be performed by analysing the supernatant. A flow cytometry strategy was chosen as an invasive method. Here, a subsequent de-solubilization of the 3D printed object is necessary, in order to gain a single cell suspension. Our study demonstrates the importance of analytical method evaluation, for a specific application, and will facilitate a guidance for method selection.

Biography

Sarah Gretzinger is a PhD student at the Karlsruhe Institute of Technology, Karlsruhe, Germany. She has completed her Master's studies form the University of Ulm in cooperation with the Biberach University of Applied Science, Biberach an der Riss, Germany. Her research interest is: process development for cell-based products.

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