

Abstract

Online Monitoring of T-Cell Growth: Assessment of the Concentration and Quality, and Real-Time Detection of Contamination [†]

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Abstract: Based on the modification of biological substances, either directly from the patient to be treated or from healthy donors, Advanced Therapy Medicinal Products (ATMPs) are promising therapeutic solutions (among others, CAR T-cells represent the current and best-known ATMPs). However, at a few hundred thousand USD per dose, these products suffer from their prohibitive price, limiting the number of treated patients. The reasons for this can be summarized as follows. The whole process takes place in sterile facilities and requires trained staff (as well as onerous equipment) who perform sampling for the numerous rounds of quality control performed throughout production. Production can last more than one week, and each round of sampling further increases the risk of contamination and the need to fight against them. Therefore, there exists a need for online control of the content of the bioreactor during production, especially focused on concentration measurements and quality assessments. Meanwhile, the real-time detection of possible contamination would allow production to be stopped as soon as a problem arises, hence saving days of useless cultures and reducing the cost of global production. In this conference, we present simple and real-time white-light spectroscopy to simultaneously monitor T-cell growth, estimate the production quality and detect contamination. The mathematical description of the absorption spectra shape allows us to achieve these goals. The contactless nature of white-light spectroscopy prevents sampling of the bioreactor's content, and consequently, reduces the risk of concomitant contamination. The possible integration of such online methods in bioreactors is also proposed with the ulterior motive of democratizing the use of ATMPs for as many people as possible.

Keywords: white-light spectroscopy; cell-growth monitoring; quality control; quality assessment



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