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HYBRID

Bioproduction of messenger RNA: key benefits and challenges

Chantal Pichon

Inserm; University of Orléans, Orléans, France

Messenger RNA (mRNA) has emerged as a promising biopharmaceutical for a vast array of therapeutic applications. In vitro transcription (IVT) is currently the available technology for mRNA production. mRNA has a vast array of therapeutics applications, including immunotherapies, replacement of defective proteins in genetic and chronic diseases, gene editing, regenerative medicine and cell reprogramming. However, it requires a complex supply chain and costly purification process. Despite the advantage of being cell free, finding an alternative way for a cost-effective production is of interest when multiple dosing is required. There are different strategies that have been proposed to investigate whether mRNA biomanufacturing is achievable and could be a more profitable alternative. In this lecture, I will outline the different options that could be proposed for that. For each strategy, there are clear assets but also major challenges to tackle. As a showcase, I will present our Yscript project consisting in the generation of a specific mRNA bioproduction process in yeasts integrating innovative extraction and purification processes, a complete shift of paradigm compared to IVT production. The long-term vision is to significantly advance the current state of knowledge in mRNA manufacturing in order to promote the well-being and health of citizens, while reducing the economic burdens and social disparities associated with biopharmaceutical therapies.

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