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DESIGN AND DELIVERY OF MESSENGER RNA BASED-THERAPEUTICS

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In these last years, we are witnessing the emergence of new class of biopharmaceuticals based on messenger RNA (mRNA). One of the most promising applications of mRNA is their use as vaccines. Any antigenic protein can be encoded by mRNA allowing the development of preventive and therapeutic vaccines to fight against infections, cancer and allergies. Messenger RNA offers a strong safety compared to DNA because it cannot be integrated in host genome. The translation machinery being in the cytosol, mRNA expression does not require nuclear import which is of benefit for hard to transfect cells as dendritic cells. By contrast to peptides, they lack major histocompatibility haplotype restriction. Moreover, mRNA can be recognized by pattern recognition receptors conferring them immunostimulatory properties. But, their recognition by RNA sensors has a negative impact on their translation. The high sensitivity of mRNA for degradation slowed down its in-situ applications in their early use. Therefore, different strategies have been proposed to produce mRNA tailored to be self adjuvanting, to improve the stability and translation and to enhance the immune response. Many reports including ours have demonstrated that mRNA vaccines have proved preclinical efficacy. I will review the current knowledge regarding crucial aspects that should be considered when developing mRNA-based vaccines. Promises and challenges for clinical trials will be also discussed.



Biography

Chantal Pichon is Full Professor at the University of Orleans (France). She has completed PhD in Cellular Biology and Microbiology (1991) at the University of Aix-Marseille before spending 2 years at the AFRC, Cambridge-UK as Post-doc fellow. She is performing her research activities at the Center for Molecular Biophysics of CNRS where she is coordinating the department of Cell Biology and Innovative therapies. Her lab is the pioneer of histidine-based nanoparticles and has developed novel strategies to improve uptake by chemical targeting and/or ultrasound trigger of nucleic acids. These last years, they are focusing their research on RNA as therapeutics. Chantal Pichon has a track-record of 108 publications and has obtained 20 grants (European, national, industrial and charities grants).

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