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## Addressing challenges in mRNA drug development and manufacturing

The rapid development and approval of COVID-19 vaccines has spurred a renewed interest in mRNA as a therapeutic strategy. An ideal platform due to the simplicity of manufacturing and robust immune response, mRNA-based drug products are being explored for use in infectious disease, protein replacement, and immuno-oncology applications, among others. Despite the advantages, challenges still exist around designing the template mRNA to properly balance the innate immune response with making a robust amount of protein, and ensuring the route of administration and vaccine form not only enable the desired therapeutic response, but also address storage and other logistical issues. This article details common challenges in the mRNA industry and explores avenues developers are researching to overcome them.

Click on each challenge above to learn more.

<u>Learn more</u> about our flexible mRNA development and manufacturing service offering and collaborative approach to addressing industry challenges.

## References:

- 1. Rohner, E. et al. (2022). Unlocking the promise of mRNA therapeutics. *Nature Biotechnology*, 40, 1586-1600. https://doi.org/10.1038/s41587-022-01491-z
- Minnaert, A. et al. (2021). Strategies for controlling the innate immune activity of conventional and self-amplifying mRNA therapeutics: Getting the message across. Advanced Drug Delivery Reviews, 176:113900. <a href="https://doi.org/10.1016/j.addr.2021.113900">https://doi.org/10.1016/j.addr.2021.113900</a>
- 3. Kwon, S. et al. (2022). mRNA vaccines: the most recent applications of synthetic mRNA. *Archives of Pharmacal Research*, 45:245-262. <a href="https://doi.org/10.1007/s12272-022-01381-7">https://doi.org/10.1007/s12272-022-01381-7</a>
- 4. Ramachandran, S. et al. (2022). Delivery strategies for mRNA vaccines. Pharmaceutical Medicine, 36:11-20. https://doi.org/10.1007/s40290-021-00417-5
- 5. Tenchov, R. et al. (2021). Lipid nanoparticles From liposomes to mRNA vaccine delivery, a landscape of research diversity and advancement. ACS Nano, 15:16982-17015. https://doi.org/10.1021/acsnano.1c04996

