DCDG December 2022 Program - mRNA Vaccines: From Discovery to Platform
3:00 – 5:00 EST

Most people hadn't heard of mRNA before COVID. Since their introduction mRNA vaccines have been recognized as a technology which is readily adaptable to different diseases and infections, as well as to rapidly evolving viral variants. Their structure and manufacture resembles something closer to a synthetic small molecule than a biologically generated antigen while protection against historical and new pathogens is just an insertion change away from being a vaccine candidate. This DC Discussion Group session will be dedicated to the discovery and introduction of mRNA to the repertoire of live virus, protein based, polysaccharide, and other genetically based immunogens, and will highlight the opportunity to use platform thinking to facilitate the development and manufacture of vaccine of the future.

2:45 – 3:00	**Join Virtual Platform**
3:00 – 3:05	**CASSS Introduction** Trina Mouchahoir, *NIST* **Speaker Introductions** Meng Zhang, *GlaxoSmithKline*
3:05 – 3:35	**The Path to Success for mRNA Vaccines** Jeff Ulmer, *retired, formally GlaxoSmithKline*
3:35 – 4:05	**Ensuring Quality and Safety of mRNA Vaccines Today and Tomorrow** Sarita Acharya, *USP*
4:05 – 4:35	**Capping and Poly(A) Tail Analysis for mRNA Vaccine Product Development** Qi Zeng, *GlaxoSmithKline*
4:35 – 5:00	**Panel Discussion** Moderators: Timothy Schofield, *CMC Sciences, LLC* and Kristin Schultz-Kuszak, *AstraZeneca*

Speaker Abstracts:

The Path to Success for mRNA Vaccines

Jeff Ulmer, *retired, formally GlaxoSmithKline*

The rapid development of safe and effective mRNA vaccines for COVID-19 has been remarkable. The incredible speed with which a solution was identified and implemented was necessitated by the urgency of the situation and made possible by the large investments made at risk, which enabled much shorter timelines than traditionally would be required. However, this success can also be attributed to the solid foundational knowledge of nucleic acid vaccines, including both plasmid DNA and mRNA, and the supporting infrastructure created over the preceding three decades of research and development.

Ensuring Quality and Safety of mRNA Vaccines Today & Tomorrow

Sarita Acharya, *USP*

While the approval of an mRNA-based product is new, decades of research and scientific advances paved the way for developing mRNA vaccines against COVID-19. Galvanized by the success of these vaccines, mRNA technology is poised to have a broader impact on drug development and public health as a platform for future vaccines and treatments for other conditions, including infectious diseases and cancer.

The development and approval of mRNA-based vaccines for COVID-19 revealed the potential of this platform for both preventative and therapeutic purposes. With the advances in the technology, analytical approaches must also keep pace to ensure identity, safety, and efficacy of the evolving mRNA candidates. As regulatory guidelines and industry standards continue to evolve, a standard set of analytical methods to assess mRNA quality would support product developers, manufacturers, regulators, and control laboratories worldwide. Therefore, in collaboration with vaccine experts, USP has developed draft guidelines with analytical procedures for quality assessment of mRNA products to help accelerate the development of safe and effective mRNA-based products. Results of this work and stakeholder input will be shared.

Capping and Poly(A) Tail Analysis for mRNA Vaccine Product Development

Qi Zeng, *GlaxoSmithKline*

A functional mRNA molecule contains a N7-methylated guanosine triphosphate cap at the 5’ end, which plays an important role in mRNA translation, post transcriptional regulation and protecting mRNA molecules from 5’-3’ exonuclease mediated degradation. The 3’ terminal of mRNA is usually polyadenylated with 20-200 polyadenosine, in order to stabilize mRNA and increase translation efficiency. Therefore, characteristics of both 5’capping and 3’ polyA tail are Critical Quality Attributes (CQA) in analytical control strategy for closely monitoring product quality. This talk provides an overview of current technical development of analytical methods for 5’capping efficiency and 3’ polyA tail length distribution analysis.