Behind the Pipeline: The Benefits of Matrix-M®

Video featuring Karin Lövgren Bengtsson, PhD, Chief Scientist, Adjuvant CMC, and Jenny Reimer, PhD, MBA, Senior Director CMC Strategy and PMO

A pillar of Novavax's technology platform is our Matrix-M® adjuvant. This cutting-edge technology fuels our pipeline, partnerships and our value creation efforts.

In this Behind the Pipeline episode, two of our scientists from Novavax Sweden – Karin Lövgren Bengtsson, PhD, scientific officer and inventor of Matrix-M, and Jenny Reimer, PhD, senior director CMC strategy and PMO – discuss Matrix-M and vaccine innovation. Karin and Jenny have spent their careers advancing adjuvant research.

Key Takeaways

- Matrix-M is saponin-based and first and foremost helps induce a broad, potent and long-lasting immune response.
- Matrix-M can improve tolerability while allowing development of vaccines containing less antigen. Less antigen offers a benefit in both tolerability for patients and in reduced cost of goods for drug developers.
- Preclinical and early clinical work suggests that Matrix can also be used across vaccine platforms not only in protein-based but also inactivated, toxoid, conjugate and virus-like particle for example.
- Novavax's proprietary technology platform includes Matrix-M and protein-based nanoparticles. When combined, our platform can produce strong, long-lasting and broad immune responses.

A key focus of our R&D work with our Matrix technology is to broaden the utility of Matrix, both inside and outside infectious diseases, while also evolving the lifecycle of this technology. This includes potential new versions of Matrix-M and new Matrix-based adjuvants, as we look to build a portfolio of new adjuvants.

Video Transcript

00:00:06:12 - 00:00:35:13
Karin: The Matrix-M® developments are based on discoveries on the immune-stimulating properties of Quillaja saponins. Quillaja saponins are molecules that are extracted from the bark of a tree that is native to the central of Chile. While we were exploring different formulations of these saponins, we found out that together with lipids, we could manufacture specific spherical cage-like structures.

00:00:35:16 - 00:00:48:11
Karin: We called these structures Matrix, and the Matrix formulation of saponins made a potent and stable adjuvant.

00:00:48:13 - 00:01:19:22
Jenny: I've been working on Matrix and adjuvants for nearly 20 years, and I remember back then as a newly baked immunologist, I was really fascinated by the impressive toolkit that our platform provides. Matrix-M® has effects on both the innate and adaptive immune system. The innate immune system provides a rapid response, and adaptive immunity is required for protection, and the long protection – the memory – you want when you vaccinate.

00:01:20:01 - 00:01:38:06
Jenny: We see that using Matrix-M®, we can lower the amount of antigen used in a vaccine, and this can have positive effects when you look at the cost of manufacturing vaccines. Moreover, we see that using Matrix-M®, we can overcome poor antigen immunogenicity.

00:01:38:08 - 00:02:06:15
Karin: You can keep it in a normal refrigerator. It even tolerates smaller exposures, shorter exposures to ambient temperatures. That's perfect for vaccine stockpiling, but it also increases vaccine accessibility to areas where a cold chain is

not readily available for storage, and more importantly, distribution of a vaccine.

00:02:06:17 - 00:02:31:00
Karin: There are some unique synergistic effects when we mix the Matrix-M adjuvant with our protein-based nanoparticles that makes the immune system produce a long-lasting and broad immune response. The Matrix-M® adjuvant activates relevant immune functions, and we used to say that Matrix-M is setting up the stage for the antigen in a vaccine.

00:02:31:01 - 00:03:03:00
Jenny: So, using Matrix-M® you help induce a strong immune response to the vaccine antigen of choice. We see that we get antibody responses, we get activation of T cells, and this is the foundation – the basis – to get a good immunological memory. Having the possibility to add Matrix-M® to a vaccine antigen provides us with possibilities to develop vaccines that are “difficult” in a way and that has been historically challenging to develop vaccines against.