

25 January 2023

SCIENTIFIC DEVELOPMENTS IN mRNA CANCER VACCINATIONS



Dear Member

What are mRNA vaccines?



Messenger ribonucleic acid (mRNA) vaccines are biological substances that are usually administered in a series of injections to provide protection against the development of certain diseases. The mechanism by which these vaccines work is to trigger an immune response and create antibodies against the specific disease ⁽¹⁾.

While traditional vaccines exert their effect by inserting the actual virus or pathogen to initiate the immune response, mRNA vaccines insert genetic instructions; whereby the body then responds by creating a part of the virus or pathogen ^{(2) (3)}.

Recent advances in mRNA vaccines



Over the years, there have been various advances in the research and development of RNA-containing products, particularly mRNA vaccines. The most recent and relevant achievements in mRNA vaccines was during the COVID-19 pandemic. This saw the first FDA-approved mRNA vaccine. The favourable results observed in terms of feasibility to produce, efficacy and safety profiles sparked enthusiasm for mRNA vaccine research in other disease states; one of which being cancer prevention and treatment ^{(2) (3)}.

Cancer and mRNA vaccines



mRNA cancer vaccines are a relatively new concept but are already topical with advances in research at clinical trial stages in the United Kingdom. This offers an alternative to chemotherapy, which is a less selective approach to therapy (attacks cancer and non-cancerous cells). The unique encoding ability of mRNA vaccines will allow for pieces of the genetic code specific to the cancer to be presented to the immune system; allowing for direct and selective targeting of cancer cells only ^{(4) (5)}.

The clinical trials will focus on two groups, patients in remission and those who have active cancer. The first group will test the ability of mRNA to prevent cancer reoccurrence, that is immunisation. The second will aim to determine efficacy in terms of controlling and shrinking tumours, that is mRNA as treatment ⁽⁴⁾.

Advantages of mRNA vaccines in the oncology setting ⁽⁶⁾

- mRNA vaccines are for the most part well-tolerated, with adverse effects being transient and easy to manage
- No risk of DNA mutation
- They are considered to be non-infectious



- Reduced toxicity
- Immunity which is responsible for anti-tumour responses
- Ease of large-scale, rapid production

Challenges of mRNA vaccines in the oncology setting ⁽⁸⁾



mRNA vaccines in the oncology setting are promising therapeutic options, and although there have been numerous advances, there is still a way to go in terms of clinical outcomes being relatively modest at present and requiring extensive studies.

Over the years, efforts have been made to improve stability of these vaccines. Although great improvements are noted, this still requires attention. The cost of production is unknown at this point and will be a huge deciding factor when it comes to access and affordability.

In summary, mRNA vaccines are biological substances with diverse abilities. The success of mRNA vaccines used against the COVID-19 infection sparked a new enthusiasm for the benefits in other conditions, such as cancer. Clinical trials for their use in the oncology setting are underway. mRNA vaccines offer advantages in terms of being more selective to cancer cells, well-tolerated and their ease of large-scale production. Challenges include the need for further studies, the risk of immune escape, concerns around stability and cost.

POLMED will be keeping a close eye on the development of this technology and perform the necessary health technology assessments as products become available in the South African market.

Regards,
POLMED

References:

1. Cleveland Clinic: Health Treatments - 800.223.2273. mRNA vaccines. 2023. Accessed on 11/01/2022. <https://my.clevelandclinic.org/health/treatments/21898-mrna-vaccines>.
2. National Library of Medicine: He Q, et al. mRNA cancer vaccines: Advances, trends and challenges. 23/03/2022. Accessed on 11/01/2023. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8942458/>.
3. Forbes: Cancer Vaccine Trials—Using Same mRNA Tech Behind Covid Shots—Could Launch In U.K. This September. Accessed 13/01/2023.
4. WHO: Health Product Policy and Standards. Messenger RNA Vaccines. Accessed on 11/01/2022. <https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/vaccine-standardization/mrna-vaccines>.
5. Kiedler k, et al. mRNA Cancer Vaccines. 2016. Accessed on 12/01/2023. <https://pubmed.ncbi.nlm.nih.gov/28101688/>.
6. BBC News: UK plan for national mRNA cancer vaccine advance. 06/01/2023. Accessed on 12/01/2023. <https://www.bbc.com/news/health-64176038>.
7. The Lancet - Oncology. Lorentzen CL, et al. Clinical advances and ongoing trials of mRNA vaccines for cancer treatment. 01/10/2021. Accessed on 12/01/2022.
8. Chen J, et al. Current Developments and Challenges of mRNA Vaccines. 2022. Accessed on 13/01/2022. <https://www.annualreviews.org/doi/full/10.1146/annurev-bioeng-110220-031722>.

CONFIDENTIALITY: This email contains confidential information. The information on this email and attachments thereto (if any) is only for the use of the intended recipient. If you are not the intended recipient, any disclosure, copying and/or distribution of the content of this email to any person other than the sender (as specified in the email), or the taking of any action thereon, is strictly prohibited. Interception of this email is also prohibited. If you have received this email in error please notify the sender (as specified in the email) using the contact details contained in such e-mail and delete this email and any attachments thereto, once you have notified the sender.

*Please use the latest browser to view the Electronic Vaccination Data System (EVDS).



**IF YOU ARE OVER 12+ YEARS OLD,
REGISTER AND GET VACCINATED NOW!**

<https://vaccine.enroll.health.gov.za/#/>

COVID-19 Public Hotline: 0800 029 999
WhatsApp Support Line: 0600-123456

**STAY
SAFE**

PROTECT SOUTH AFRICA

COVID-19
Online Resource & News Portal
SACoronavirus.co.za

health
Department of Health
REPUBLIC OF SOUTH AFRICA

