mRNA - a revolutionary vaccine

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INTRODUCTION

The goal of this presentation is to show the development of a new type of vaccine and to understand why it is so important. Also we want to show what kind of illnesses it could fight.

RELEVANCE OF THE STUDY

mRNA vaccines are innovative, effective and powerful. If the research of this vaccines is successful, they could make the SARS-COV-2 virus, allergies or even cancer harmless. This type of vaccine is faster and cheaper to produce and much safer than a conventional vaccine for the patient.

CONCLUSION

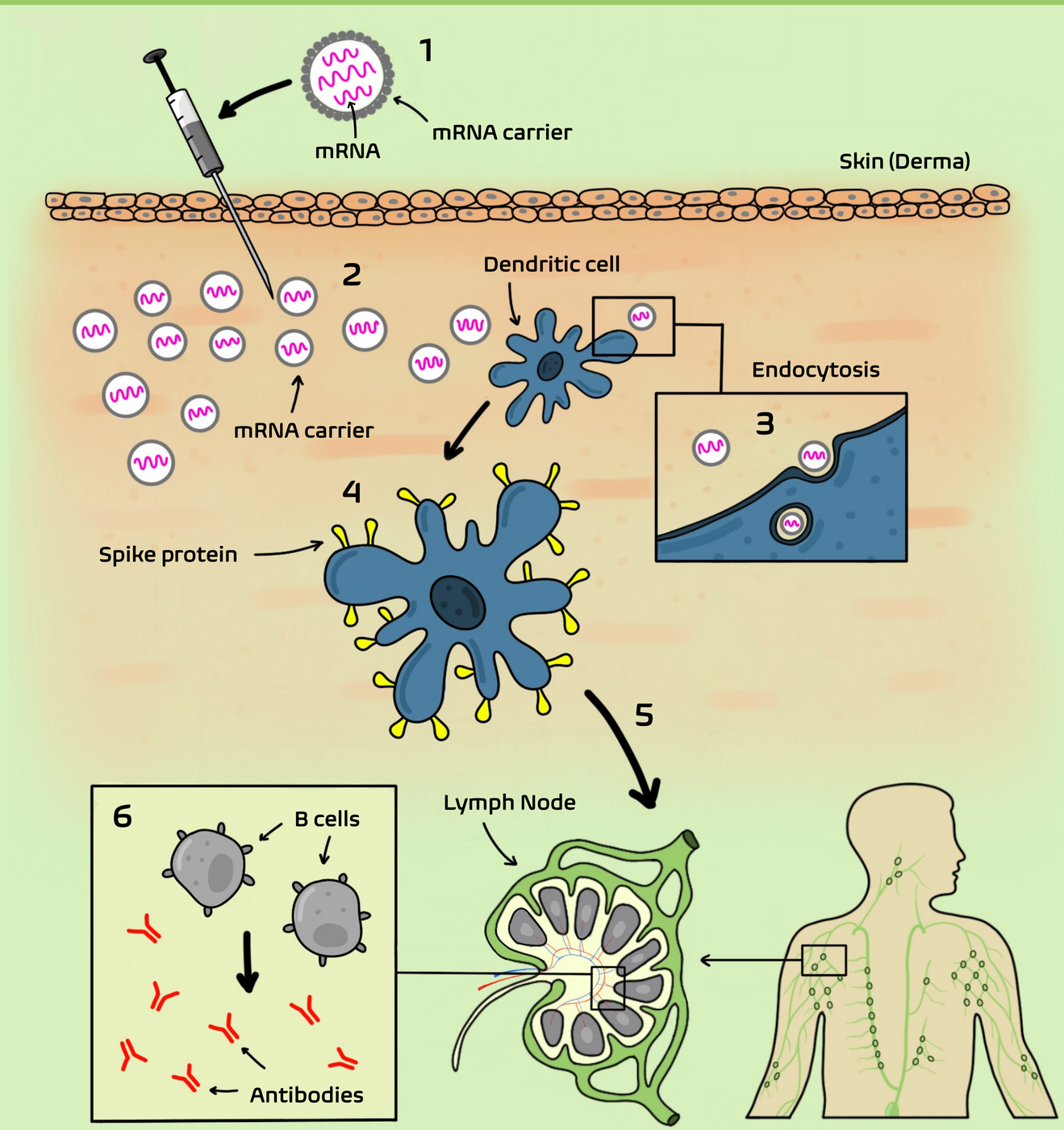
Currently, there are no mRNA vaccines approved for human use. To ensure these vaccines work appropriately, unintended effect have to be removed, the delivery of the vaccine to cells should be more effective and the storage has to be improved. However, this vaccine has a lot of benefits and hopefully we will soon be able to reach concrete answers and use it on people.

Blackburn, L. (2018), *RNA vaccines: an introduction*, https://www.phgfoundation.org/briefing/rna-vaccines;

Stevenson, V. (2020, may 29), *How mRNA Vaccines could beat COVID-19* (File Video), https://youtu.be/8Vra-Nmnaug;

Fast-and-fit vaccines, Nat Biomed Eng. 2020;4(8):757-758. doi:10.1038/s41551-020-00605-9.

RNA messenger (or mRNA), is a type of RNA (ribonucleic acid) that encodes and carries genetic informations from DNA to proteins.



1 The virus' mRNA sequence (the molecule that tells cells what to build), which is coded for a specific antigen (in this case the spike protein) is inserted into a carrier made of lipid nanoparticles.

2 The mRNA carriers are administrated by a subcutaneous injection in the patient.

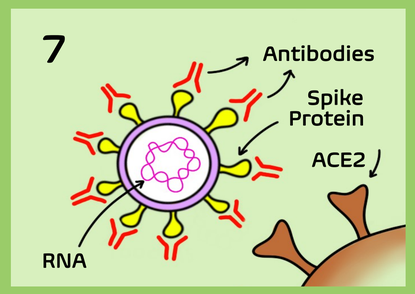
3 mRNA carriers enter the Dendritic cells (antigen-presenting cells, also known as accessory cells) through a process called endocytosis.

4 Inside the Dendritic cells the mRNA is translated into Spike proteins, which are then expressed on the surface by specific molecules (MHC I).

5 The Dendritic cells with the Spike proteins on the surface reach the Lymph Nodes in the lymphatic system.

6 The B cells (or B lymphocytes), a type of white blood cells located inside the Lymph Nodes, in reaction to the Spike proteins produce Antibodies (Ab).

7 The Antibodies bind to the virus' Spike Proteins preventing them from binding to the receptors (ACE2) and blocking the virus' transmission.



Without Antibodies the Spike proteins would bind to the receptors (ACE2) and the virus would infect the host cell.