A Simple Breakdown of the Ingredients in the COVID Vaccine

[1] Three COVID-19 vaccines have been granted Emergency Use Authorization (EUA) from the U.S. Food and Drug Administration (FDA) since mid-December 2020. Prior to authorization by the FDA, these vaccines underwent the same rigorous safety and effectiveness standards as all other vaccines. Quickly, vaccine distribution began, starting with health care professionals on the frontlines of patient care.

[2] There have been many rumors flying around on the internet about what's in the vaccine. Some rumors even suggested that the vaccines contain gluten, wheat, eggs and even bee venom! All of that is simply untrue.

[3] If you're among the many wondering "what's actually in it?" and, "is it safe to receive the injection?", keep reading.

COVID Vaccine Ingredients

[4] There are two COVID-19 messenger-ribonucleic acid (mRNA) vaccines currently authorized for emergent use in the United States: the Pfizer-BioNTech and the Moderna vaccines. A third vaccine developed by Johnson &Johnson (J&J) Janssen uses a viral vector platform. Conventional vaccines rely on weakened and inactivated pathogens or a fragment of the pathogen to trigger an immune response. In contrast, the COVID-19 mRNA vaccines use a new approach by which mRNA is delivered into our cells to provide the genetic instructions for our own cells to "temporarily" make a "specific" viral protein (the coronavirus spike protein) that triggers an immune response. The J&J COVID-19 vaccine is a type of "replication-incompetent vector vaccine." This vaccine also contains the genetic instructions to express a stabilized coronavirus spike protein, but instead of mRNA, these instructions are delivered via DNA stored inside a modified vector virus (Adenovirus 26). This adenovirus has been engineered to enter the human cells and deliver the desired genetic information without replicating itself or causing illness. Once inside the cells, the DNA encoding for the coronavirus spike protein can be read by the cell and transcribed into mRNA. At this point, the J&J vaccine acts similarly to the mRNA vaccines.

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[5] 1. The Pfizer-BioNTech COVID-19 vaccine is made of the following ingredients:

- **mRNA** – Also known as messenger ribonucleic acid, mRNA is the only active ingredient in the vaccine. The mRNA molecules contain the genetic material that provide instructions for our body on how to make a viral protein that triggers an immune response within our bodies. The immune response is what causes our bodies to make the antibodies needed to protect us from getting infected if exposed to the coronavirus.
- **Lipids** – Their main role is to protect the mRNA and provide somewhat of a "greasy" exterior that helps the mRNA slide inside the cells.
    - 1,2-Distearoyl-snglycero-3-phosphocholine
    - cholesterol
- **Salts** – The following salts are included in the Pfizer vaccine and help balance the acidity in your body.
    - potassium chloride
    - monobasic potassium phosphate
    - sodium chloride
    - dibasic sodium phosphate dihydrate
- **Sucrose** This ingredient helps the molecules maintain their shape during freezing.

[6] 2. The Moderna COVID-19 Vaccine is made of the following ingredients:

- **mRNA**
- **Lipids:**
    - SM-102
    - cholesterol
    - 1,2-distearoyl-sn glycero-3-phosphocholine [DSPC]

The remaining ingredients (below), including acids, acid stabilizers, salt and sugar all work together to maintain the stability of the vaccine after it's produced.

- **Acetic acid**
- **Tromethamine & Tromethamine hydrochloride**
- **Salts:** Sodium acetate
- **Sugar:** Sucrose

[7] 3. The J&J COVID-19 Vaccine is made of the following ingredients:

- Recombinant, replication-incompetent ***adenovirus type 26*** expressing the SARS-CoV-2 spike protein: a modified and harmless version of a different virus (Adenovirus 26) is used as a "vector" to deliver the DNA gene sequence to produce the coronavirus spike protein. Once the modified adenovirus vaccine enters into the cells, the body of the virus essentially disintegrates and the DNA material within it travels into the nucleus of the human cell where it is transcribed into mRNA. The coronavirus spike protein is then produced and displayed on the cell's surface, prompting the immune system to begin producing antibodies and activating T-cells to fight off what it thinks is an infection.

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The Adenovirus 26 in the J&J vaccine does not replicate, and like the mRNA vaccines, does not change our genetic code.

- **Citric acid monohydrate**
- **Trisodium citrate dihydrate**
- **Sugars**
    - 2-hydroxypropyl-β-cyclodextrin (HBCD)
    - polysorbate-80, sodium chloride
- **Ethanol**

[8] "Overall, the main ingredients in the Pfizer-BioNTech and Moderna vaccines are very similar, and all three vaccines were found to be safe and efficacious in preventing symptomatic COVID-19 disease in ***rigorously*** conducted clinical trials.[1] These COVID-19 vaccines are safe and went through the same rigorous testing process as other vaccines before being approved for emergent use in the United States.[2] Although local and systemic side effects have been reported, as is the case for many other medical interventions, the risk of lacking protection against COVID-19 and developing severe disease far exceeds those posed by the vaccine itself.[3] " says Juan Ravell, M.D., division chief of allergy and immunology at Hackensack University Medical Center.[4] "These ingredients are safe and the development of these COVID-19 vaccines marks a huge step towards acquiring herd immunity and the end of this pandemic.[5]"

Questions

Question 1. What is the author's main pattern when he/ she describes the ingredients of the vaccines?

A. list pattern

B. sequence pattern

C. cause- effect pattern

Question 2. What is the main idea sentence of paragraph [4]?

Question 3. What does the J&J stand for?

Question 4. Why are there acids, acid stabilizers, salt and sugar in the Moderna COVID-19 Vaccine?

A. to maintain the stability of the vaccine

B. there is nothing to do with these ingredients.

C. to encode the virus

Question 5. According to the mechanism of action of the J&J COVID-19 vaccine, what is the nature of the mRNA?

A. T-cells
B. Adenovirus 26
C. The DNA

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Question 6. What is not true about **adenovirus type 26** ?

A. It changes the body's genetic code
B. It is used as an intermediate host
C. It delivers the desired genetic information

Question 7. "Rigorously" has the closet meaning to

A. Attentively
B. Austerely
C. Unlawfully

Question 8. Read the paragraph [8] then match

Main idea sentence

Major detail(s)

Minor detail(s)

Sentence 5

Sentence 3

Sentence 2

Sentence 1

Question 9. Drag and drop

_____ COVID-19 messenger-ribonucleic acid (mRNA) vaccine(s) currently authorized for emergent use.

_____ COVID-19 vaccine(s) have been granted Emergency Use Authorization.

_____ COVID-19 vaccine(s) uses a viral vector platform

1 | 2 | 3

Question 10. Fill in the gap

- ➔ **Lipids'** main role is to protect the _____ and provide somewhat of a "greasy" exterior.
- ➔ _____ help balance the acidity in your body.
- ➔ _____ does not change our genetic code.

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