EDU 360 News

30/7/64

ประชาสัมพันธ์จากฝ่ายวิจัย

เรื่อง ขอเรียนเชิญเข้าร่วมเสวนา

ฝ่ายวิจัยขอเรียนเชิญอาจารย์ผู้สนใจทุกท่านเข้าร่วมเสวนา “เสฟ (สื่อ) ข่าวอย่างไร? ให้เท่าทันท่ามกลางสถานการณ์โควิด-19” **ในวันศุกร์ที่ 30 กรกฎาคม 2564 เวลา 18.00-20.00 น. ทางห้อง MORAL CLUB** ทั้งนี้ ท่านสามารถติดต่อสอบถามรายละเอียด ได้ที่ โทร. 087 – 489-2292 หรือ Line: @flatfive รายละเอียดดังเอกสารแนบ

จึงเรียนมาเพื่อโปรดทราบ

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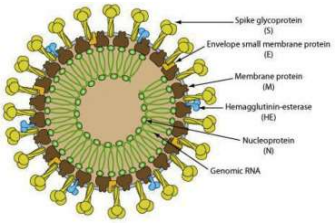
เจ้าหน้าที่บริหารงานทั่วไป

28 July 2021

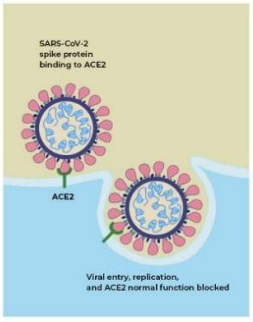
Facts about virus

1. A virus is an infectious agent that can infect all life forms. It is a **non-living entity**, meaning it cannot divide itself when it is outside the living cells (host cells). It can be induced to replicate only when it gains entry inside a host cell, forcing each host cell to rapidly replicate many copies of the original virus (parent virus).
2. When outside the living cells, a virus is merely a chemical structure, consisting mainly, for example, of
   (a) the genetic material of molecules of DNA or RNA that encode the structure of proteins needed for replicating itself to produce daughter viruses.
   (b) a protein coat which covers and protects the viral DNA or RNA, and
   (c) an envelope of **lipids**.
3. After gaining its entry to a host cell, the virus hijacks host cell's resources for replication process.

COVID-19 virus

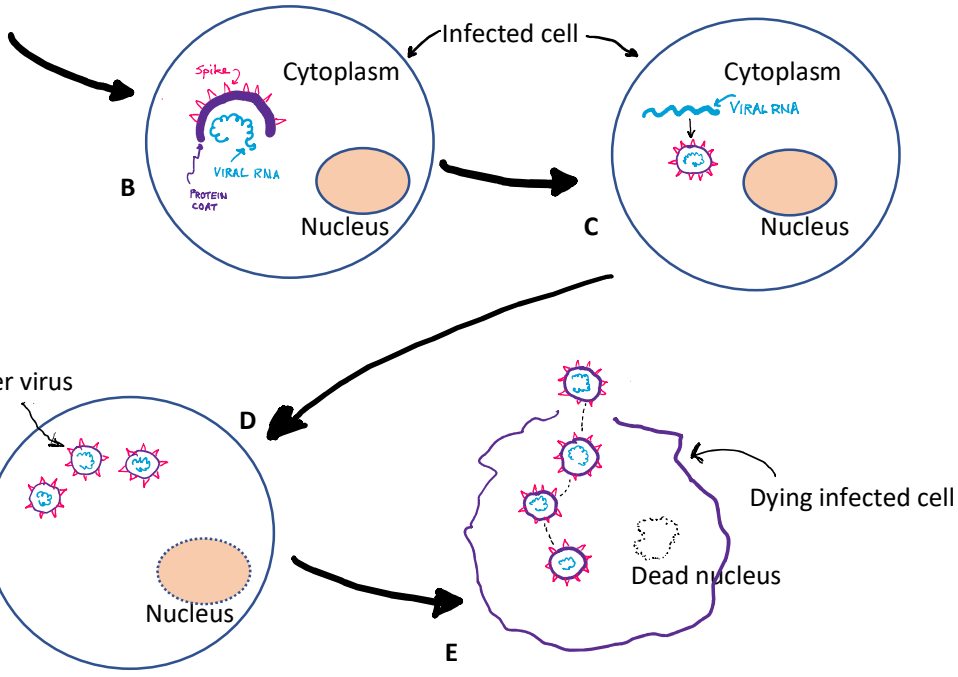


A simple illustration of COVID-19 virus is shown in the diagram on the right. The spike protein (S) plays an important role in invading a host cell by binding to the ACE-2 (Angiotensin Converting Enzyme-2) receptors expressed on the host cell membrane (see Diagram below). *Note that the invasion takes place specifically at the living cells that have ACE-2 receptors only*. The ACE-2 expressing cells are located in the kidneys, testis, gallbladder and heart.



A

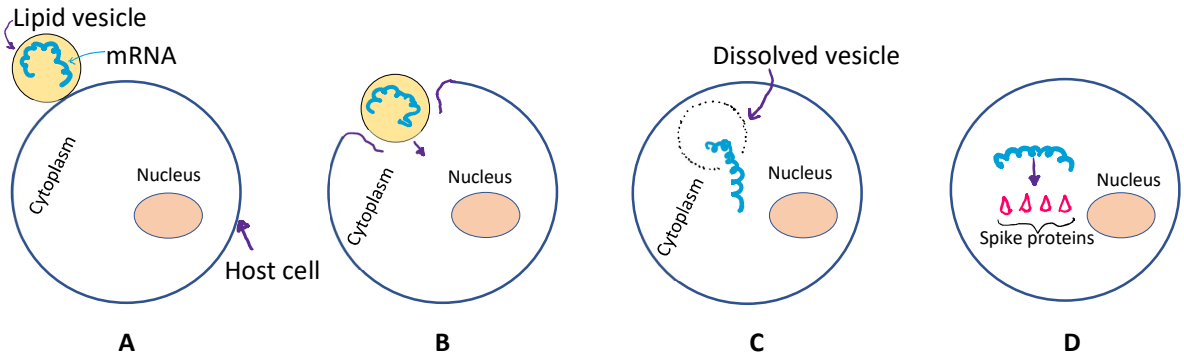
Diagram A depicts a viral spike protein, S (highlighted in pink), binds to an ACE-2 receptor of a host cell (highlighted in green). The binding of S to ACE-2 triggers an event that allows the virus to get inside the host cell. Once inside the cell (now called "infected cell"), a viral replication process begins as shown in Diagrams B, C, D and E below sequentially:



COVID-19 mRNA Vaccines

One way to stop COVID-19 virus from infecting host cells is to prevent the viral spike proteins from binding to the ACE-2 receptors of host cells using antibodies produced in the body against the spike proteins of COVId-19 virus specifically.

Each type of mRNA vaccines contains special mRNAs that encode for the production of the spike proteins of COVID-19 virus. Each piece of mRNA is encased in a small lipid droplet or vesicle (Diagram A). When injecting an mRNA vaccine into the body, the mRNA-encased vesicles are easily taken up or engulfed naturally by any cells (Diagram B) *regardless whether they have ACE-2 receptors on their cell surfaces or membranes or not.* Once inside the cell, each vesicle is stripped away and, consequently, the piece of mRNA is circulating in the cell cytoplasm (Diagram C). These naked pieces of mRNAs then instruct the cells to make viral spike proteins (Diagram D). After making the viral spike proteins in the cell cytoplasm, the proteins are finally presented on the cell surface (not shown). This allows the immune cells in the body to detect and recognise the viral spike proteins as foreign proteins. As a result, the body's immune cells begin to produce antibodies against COVID-19 spike protein.



Can viral-spike mRNAs of mRNA-based vaccine incorporate or integrate in a person's DNAs

In order for the viral-spike mRNAs to

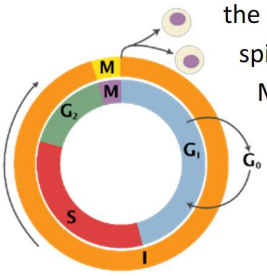
(i) be transcribed to complementary viral-spike DNA (cDNA), and

(ii) to incorporate or integrate into chromosomal DNA,

the following events must take place:

1. The viral-spike mRNAs, which are localised in the **cytoplasm** soon after the injection of an mRNA-based vaccine into the body, *must enter in the nuclear space of the nucleus*. This can possibly happen in the following ways:
   a. By chance:
      That is, these mRNAs could be forced to migrate from the cytoplasm to the nucleus via nuclear pores by unexpected or catastrophic events. *Although the chance is quite small, it is possible!*

b. By temporary breakdown of the nuclear membrane during mitosis phase (M phase): In the body, every healthy living cell containing nucleus (called eukaryotic cell) revolves cyclically through the series of events that cause it to divide into two daughter cells (cell division). The cyclical events are collectively called "cell cycle", which consists of four phases, namely, G1 phase (check-point #1), S (synthesis), G2 (check-point #2), and M phase (mitosis). In M phase (particularly prophase stage), the cell is preparing for mitotic activity, in which the chromosomes start to duplicate. The window of M phase (highlighted in pink in the diagram below) is approximately 30 min (depending upon the doubling time of each cell type). At this stage *the nuclear membrane is induced to break down or dissolved temporarily*, allowing the chromosomes to be exposed to other cytoplasmic organelles including the viral-spike mRNA. The nuclear space, where nuclear membrane temporarily disappears in M phase, is considered here as "virtual nuclear space". *That is, there is no boundary between the cytoplasm and the nucleus in M phase of the cell cycle*. *Therefore, there is a chance that viral-spike mRNAs can freely move into the virtual nuclear space*.



c.

2. Once having gained access to the nuclear space (via either process 1a or 1b above), the viral-spike mRNAs must be transcribed to viral-spike cDNAs. This can take place via an enzyme called *reverse transcriptase (RTase)*. It has been evident from literature that:
   a. *many viruses, for example, HIV, Hepatitis B, etc., use RTases to replicate their DNAs so as to integrate their DNAs into the host (human) DNAs*, and
   b. *in eukaryotic cells (such as human cells), RTases are used to extend the telomeres of their linear chromosomes.*

   This may imply that RTases can exist in the cell and be ready to be used to transcribe viral-spike mRNAs to viral-spike cDNAs at the right moment for the reverse transcription process to take place. As a result, there is a possibility that viral-spike cDNA can be formed and found in the vicinity of chromosomal DNAs in the virtual nuclear space.
3. Incorporation or integration of the viral-spike cDNAs into chromosomal DNAs: This requires an integrate enzyme such as integrase. It has been documented in literature that integrase produced by some viruses can integrate its viral DNAs into the host cells' DNAs.

One concern that should not be ignored: what would happen if people, who have recently received an mRNA vaccine, are accidentally infected with a virus (for example a common flu) at the period the cells in our body are still loaded with viral-spike mRNAs from the mRNA vaccine and concurrently when some host cells are in the prophase stage (in M phase of its cell cycle)?

Conclusions: It is worth pointing out the following:

1. **COVID-19 virus targets specifically on a subset of cells in the body**

   The virus infects or targets only a subset of cells that express ACE-2 molecules on their cell membranes.
2. **Insertion of mRNA vesicles into host cells is non-specific**

   Each mRNA (encoding the genes for making a COVID-19 spike protein) from an mRNA-based vaccine is wrapped up with a lipid droplet or vesicle. The lipid vesicles can easily be taken up naturally by **any cells (non-specific)** in the body soon after they make contact with the host

cells' membranes and can be stripped away when they are inside the cell. Once a person is vaccinated with this kind of vaccine, the mRNAs can be found in any type of cells (for example, ovary cells), causing them to make viral spike proteins in the cell.

3. There is a possibility that these viral-spike mRNAs can be transcribed to viral-spike cDNAs encoding for the production of viral-spike proteins. Also there is a possibility that the viral-spike cDNAs can integrate in each vaccinated person's DNAs.
4. These viral-spike mRNAs used in mRNA-based vaccines are foreign, encode the genes for making COVID-19 spike proteins, and are likely unstable inside host cells. Mutations of these mRNAs can possibly happen which can result in making other foreign proteins (other than the viral spike protein) which are unlikely favourable or do more harm to the body. These foreign proteins can possibly trigger unexpected problems such as cancers to the vaccinated persons in the future.