



CAPSULE 2

HOW DOES CORONAVIRUS GET INTO A CELL ?

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As we have seen, viruses are very small compared to our cells. We also surely know, from the TV etc., that the virus can be sneezed-out by someone ill and end up being transmitted from one person to another. The virus arrives on tiny floating water droplets into the lungs. There, a virus will be in contact with a cell of the lung, but how does it get into our cells? We saw in the first capsule that our cells are discrete, kind of self-sufficient, entities with a fairly impermeable membrane, so how does the virus go about getting in?

To understand this we have to consider what viruses and cells are made of. When we fry an egg, we use two kinds of matter. First we melt the butter in the pan; then we break in the egg. While cooking, the white and then the yolk harden, yum! So we can make an interesting observation; heating melted the butter but solidified the egg. Why? The reason is that the butter and the egg are essentially made of two different materials, the butter is 'lipid' (or fat) and the egg is made of 'protein'.

Why I am telling you this? Because: despite their difference in size, our cells and viruses are both covered in an impermeable layer of lipid. Watch out though; things don't work the same at the microscopic level as at the everyday level! A microscopic drop of water is water-tight even though its 'skin' is only made of water! So even if on a large scale butter is not good for making tight skins, on a microscopic scale it is. Around the cell, the lipid skin is colonized by islands of molecules called proteins that form the gateways that allow the exchange of materials between cells. Despite being much smaller than the cell the virus is organized somewhat similarly. Like our cells, the virus is surrounded by a lipid membrane, but the clumps in its membrane contain just one kind of protein, known as the Spike protein because of its shape. However the spikes are a bit more ornate in shape and are more like the spikes of the Queen's crown. Indeed the name 'Corona' means crown in Latin, and it is these spike proteins that make the 'crown' around the coronavirus that is visible under the electron microscope, which sees images at the scale of a nanometer (billionths of a meter).

So let's go back to the main question 'how does the virus get into the cell'? It is useful to imagine the spikes not as the points of a crown, but rather as being similar to your house key. The Spike protein of the virus recognizes a special lock in the membrane of the cell (this lock is known as ACE2) and can open the 'front door' of the cell to let the virus in.

Do you understand? Would you like to draw a small virus opening the door of a huge cell?