Biology Video 3 - Comparing Cells and Viruses

(4)(C) compare structures of viruses to cells, describe viral reproduction and describe role of viruses in causing diseases such as HIV and influenza: (4)(A) compare prokaryotic and eukaryotic cells

‘Sup y’all? It’s Lisa D again, and I just got a text from my buddy Desiree in Dallas. She wanted to know why her brother got antibiotics from the doctor when he had an ear infection, but Desiree didn’t get anything from the doctor when she had the flu.

Well, to explain, I just drew her a sweet Venn diagram. And not just any old Venn Diagram, oh, no sir! This is a sweet three-skie Venn Diagram! Do y’all wanna see what I drew? Yeah, ya do!

Alright. We’ve got two big circles at the bottom and a big one at the top, all over-lapping and awesome. Where 2 circles overlap, that’s what those 2 circles have in common, and this triangle here in the middle, that’s what all three circles have in common.

Before we get into it, let’s remember what we’re talking about here – viruses verses cells. That’s it. We’re gonna start speaking Greek and Latin here in a second, but don’t lose sight of the big picture y’all – viruses versus cells.

Uh oh, it is already Greek speak time, y’all. Alright, our planet has two types of cells – eukaryotic cells and prokaryotic cells, big fancy Greek words for cell type A and cell type B. We’ll talk about those in a bit. Let’s put virus particles here at the top. Now remember, viruses aren’t cells. Don’t forget that. In fact, from now on, let’s just call them “virus particles,” and we’ll put prokes on the left and eukes on the right.

Well, there’s already one thing we can already put for virus particles that’s different from prokes and eukes – viruses aren’t alive. Let’s put that, “not living.” And we can go ahead and put “living” for prokes and eukes. Man, let’s put a big ol’ star on that one!

Alright, and while we’re at it, let’s go ahead and translate these fancy Greek words. “Prokes” means bacteria. That’s it. Eukes are every other type of cell – plant cells, animal cells, fungus cells, blood cells, algae cells, any type of cell that isn’t a germ. Let’s write that.
Well, something in common between all three of these things, both cells and virus particles, is that they all have genetic material. They all need genes to reproduce. Let’s write that in the middle.

So let’s look at these things. Here’s an HIV virus that causes AIDS. You’ve got some nucleic acids here in the middle. It’s got some spikes around it and a capsid. Now, this is pretty complex virus, but I told Big-D Desiree that this is still simpler than even the simplest cell!

Here’s a prokaryotic cell. This bacterium is *E. coli*. *E. coli* live in our guts and help us break down food. Thanks, buddy. But, we also know that bacteria can also cause infections and make us sick. Now, this is biology, so we have to speak Latin. Germs that make us sick are called “pathogens.” I made sure that Desiree noticed that there isn’t a nucleus. Spoiler alert! They also have some cool flagella floppin’ out there, too. Ooooh... did you notice the ribosomes?

Finally, here’s a eukaryotic cell. We’ve seen these a thousand times before. Big ol’ nucleus in the middle, lots of cell parts wrapped up in their own membranes. Got some ribosomes, too. Here’s a plant cell, still a eukaryote. Just has some extra organelles – a cell wall out there, got some chloroplast rockin’ out some photosynthesis. Alright, y’all, let’s keep on with this Venn!

We can talk about a nucleus. Eukes have nukes, but bacteria don’t. Remember that – eukes have nukes. And we can go ahead and say that neither virus particles nor prokaryotic cells have a nucleus. We can also say that virus particles and bacteria are pathogens because prokes are sometimes germs. We can also say that prokes and eukes both have ribosomes, but only eukaryotic cells have “membrane-bound organelles.” You know, cell parts with their own membranes.

Okay, one last thing – how these guys multiply. Plant and animal cells do cell division. You remember the word mitosis, right? When bacteria divide, it’s called “binary fission.” It just means they divide in half and double. Now, viruses are special. They don’t actually reproduce, they infect a host cell, and the host cell makes more viruses. We’ll talk about that more in a bit. For now, let’s keep adding to the world’s awesomest Venn diagram!

Oh yeah, there is one more thing! Antibiotics! Antibiotics kill living bacteria cells. Since viruses aren’t alive, you can’t kill them. Right? I mean, you can’t kill a chair or pencil. So antibiotics only work against
prokaryotic infections, not viral infections. There we go. That’s why Desiree’s doctor didn’t give her antibiotics. It wouldn’t have worked. Antibiotics don’t work against viruses.

Wow! That Venn is a beast! I told Big-D Desiree that if she could remember all of that, she could remember everything she needs to know. I can’t think of any similarities between our cells and virus particles. Maybe y’all can?

Alright, one last thing. Let’s take a look at how viruses multiply, and I’ll let you go. Take a look at this picture. It’s like a thousand words.

First thing, the virus attaches itself to the cell. We call it a host cell. Then, it injects its genes into the host cell. See? Like this. The flu virus has DNA, but HIV has RNA. What evs. Sometimes the whole virus injects itself into the cell. Next, the virus genes take over, and they start to multiply. Eventually so many viruses are created that the cell explodes, and the entire process starts over again. Eventually, thankfully, our immune system takes over, and it stops the viruses before they can multiply more. That’s why Big-D Desiree was sick for a while, but then she got better all on her own. Antibiotics wouldn’t have worked against the flu.

Well, I hope that clears things up for y’all. Until next time, this is Lisa D saying, “Wash your hands.”