

Welcome to this lesson today on cell mediated response. Today we are going to talk about the cell mediated response and how it works as a part of adaptive immunity. So the cell mediated response, as I mentioned, is a type of adaptive immunity. So if you'll remember, we have two types of adaptive immunity, antibody mediated responses and cell mediated responses.

So the cell mediated response is a response taken against a threat that has entered the cell. So remember, antibody mediated immunity is a type of response that takes place before the threat has actually entered the cell. And it produces antibodies. But those antibodies are ineffective to pathogens once they've entered the cell. So we need to find another way to get rid of those pathogens once they've entered the cell. And that's where cell mediated responses come into play.

So as I mentioned, antibodies can't target a pathogen once it's inside the cell. So instead, we have our cell mediated response to help take care of this. So the cell mediated response involves T-cells and NK-cells. And NK stands for Natural Killer cells.

So T-cells, first of all, are a type of lymphocyte or a specific type of white blood cell. And these T-cells, there's two different kinds of T-cells we're going to be talking about today, helper T-cells and cytotoxic T-cells. So we have helper T-cells and cytotoxic.

So our helper T-cells, their main role-- they have a lot of different roles in the immune system. But one of their main roles is that they help to activate other cells that play roles in this immune response. And cytotoxic T-cells, their role is to attack abnormal cells in the body that have been compromised. So one of these types of abnormal cells could be a cell that's been infected with a virus or a cancerous cell, for example. So those are two types of T-cells that play a large role in cell mediated responses.

And then NK-cells, or natural killer cells, basically what they do is they're a type of lymphocyte. And they have more of a general response. So they'll kind of go around and kill any cell that's not considered one of your own natural body cells. So they're going to go around and they're going to find cells that don't belong. And then they'll just kill those. So it's more of a general response to these abnormal cells.

So what we're going to do now is draw out a diagram that's going to help you understand a little bit more about how this process of cell mediated response occurs. So let's say that this is one of our cells that's been infected by a virus. So the little star that we have in here is a virus.

So here's how it works. Basically, dendritic cells are cells within our body that are a type of phagocyte. So this cell

here is going to be the dendritic cell. So what they do is they will engulf foreign objects, such as this virus. So we'll have this dendritic cell that wanders around our body. It'll find this virus. And then it'll engulf it into the cell.

So that's the first thing that's happened. So this cell is called a dendritic cell. And again, it's a type of phagocyte.

So what's going to happen next is that that dendritic cell will start to process and digest that virus. And then what's going to happen is it's going to present that virus on its MHC complex. So this protein right here is the MHC complex.

So it's going to digest this virus. And then it's going to take a portion of that virus. And it's going to present it here, this little black ball right here. It's going to present it here on its MHC complex. And basically what this does is by presenting it in this manner, it alerts the immune system that the immune system needs to jump into control and try and target this virus.

So the next thing then that's going to happen is helper T-cells are going to come into play . So this is going to be one of our helper T-cells. So helper T-cells, different helper T-cells have different receptors. So helper T-cells are going to come up to this MHC complex, each one with a different receptor, and see if it has the receptor that fits.

If it doesn't, it's going to go away. And another one's going to come in and try. So it's kind of like fitting two pieces of a puzzle together. Only certain helper T-cells with certain receptors are going to be able to fit in this area here.

So the helper T-cell with the proper receptor will bind to that MHC complex containing that virus particle. And then that helper T-cell will become activated. So we found the correct helper T-cell with the correct receptor. It binds. And then it becomes activated.

And when it becomes activated, it makes copies of itself. So we have this helper T-cell becomes activated. And now it starts making copies of itself.

And then those copies will start to differentiate or start to specialize into different types of cells. So they can specialize into something called effector helper T-cell. And these effector helper T-cells, basically what they do is they release cytokines, which basically are these particles that get released. And they'll help to activate cytotoxic T cells.

So this effector cell will release these cytokines, which will help to activate then a cytotoxic T-cell. And then those cytotoxic T-cells can cause apoptosis, which is basically programmed cell death. So it causes the cells that have been compromised to basically die.

So it's good in the fact that it helps to kill the virus. It will have to kill the cell that's been infected. But it will also kill

the virus at the same time. So that's apoptosis. That's done by cytotoxic T-cells.

And then these cytotoxic T-cells can differentiate also into either memory cells or effector cells. So memory cells are a type of cell that basically if the body is exposed to this pathogen again in the future, it will know how to deal with that more quickly. It'll already have exposure to it once. It'll basically I guess you could say remember how to deal with that. And it'll be able to deal with it in a much more timely and efficient manner. So that's what memory cells are. They in a way produce immunity to certain types of pathogens you've already been exposed to in the past.

And then these helper T-cells, as I mentioned they can differentiate into these effector cells that produce cytokines that help to activate cytotoxic T-cells that help to get rid of that pathogen. And these helper T-cells can also differentiate into memory cells as well, which I just explained a moment ago. So this is kind of the process of how cell mediated responses work right here.

So this lesson has been an overview on the cell mediated response.