Difäm Health Community (DHC)

Podcast: Immune system (Part 2-Cytokine storm)

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Ma name is Ute Papkalla, I am a member of the health team of the German Institut for Medical Mission, also called Difäm. With me is my colleague, Carina Dinkel. In the second part of our podcast on the immune system and the immune response to the coronavirus, we want to learn more about the cytokine storm. This is a special immune reaction of the body against the coronavirus, which can be very dangerous for people.

Carina, does the coronavirus affect every patient in the same way?

The reaction to an infection with the coronavirus is very diverse. Most patients infected with SARS-CoV-2 show mild or even no symptoms. However, 10 to 20 percent of patients develop stronger disease symptoms during the course of the COVID-19 disease. An even smaller percentage of patients develop the life threatening cytokine storm. The immune system of the patient is a decisive factor in how an infection with SARS-COV-2 develops.

Can you briefly summarize for us how the immune response works?

As we have learned in our last podcast, our immune system has two types of responses, the innate and the adaptive response. In the first days of an infection with a pathogen like the coronavirus, the innate immune system tries to kill all intruders. If it is overwhelmed, the adaptive immune system steps in. The reaction of T- and B-cells takes several days. However, once the adaptive immune system has fought the virus, it records its specifics in a database. When we get into contact with the same virus again, our antibodies are faster there to fight off an infection.

Why is the coronavirus such a problem for some people, especially for elderly people and those with other health problems?

It seems that children have a very strong innate response to an infection with the coronavirus. This means that they kill all intruding viruses in a very short time and have no or only weak symptoms. In contrast, many elderly people or those with underlying health problems show a ‘weaker’ innate response. This results in a delayed stimulation of the adaptive response, which in turn allows the virus to replicate more and consequently sends stronger alarm signs to the immune system. In few cases, often with fatal result, the immune system then turns crazy.

That does not sound good. What happens then?

Let us first talk about the mild and moderate cases. We currently divide Covid-19 in two disease phases: The first disease phase is caused by the virus and by its attempts to replicate in the body. This phase lasts about 10 to 14 days. This is the period of light to medium or

strong symptoms. For the great majority of people, the Covid infection is over at the end of this phase.

But not for all, I assume?

No, unfortunately not. Sometimes the body's response to infection can go into overdrive. This is the start of a second disease phase. It is caused by the immune system and an exaggerated attempt to fight the coronavirus. This is triggered by the over-production of cytokines, which are small proteins that signal between immune cells. They are the ones that control the production of T-cells, B-cells and antibodies. If they are produced in excess, a cytokine storm starts. This cytokine storm initiates a non-stop immune response that does not only kill the virus but also healthy body cells and organs.

Can you give me an example?

Sure. SARS -CoV-2 infects my old auntie who has a weaker immune system due to her age. The virus prefers the deep lung tissue for replication. There it triggers the innate immune response but this response is not strong. The virus can therefore infect more and more body cells and the immune system rings the alert bell. More and more cytokines are produced telling the T- and B-cells to become more active. The inflammation of my auntie's lungs becomes stronger and stronger until her lungs fail. She dies of acute respiratory distress syndrome.

Cytokine storms are a complication not only of Covid-19 but of other diseases as well. A cytokine storm in the context of Covid-19 often affects the lungs but also frequently leads to failure of the kidney function, the heart and even to an overall organ failure.

This is scary. Can anything be done against a cytokine storm?

An overreaction of the immune system is well known in medicine. All autoimmune diseases are based on immune cells that destroy a body's own cells and tissue. Therefore, there are medicines that help to reduce the activity of cytokines like the steroid Dexamethasone.

This is good news. Let me summarize in short:

The so-called cytokine storm syndrome is an exaggerated immune response through excessive or uncontrolled levels of circulating cytokines. This leads to systemic hyper-inflammation that can lead to multi-organ failure and death.

Even though we want the immune system to be strong and to destroy the coronavirus, it can happen that a patient has to be treated with a drug that reduces the activity of the immune system. Only in this way, the cytokine storm and the self-destruction of the body can be stopped.

Therefore, Covid-19 can become a very serious danger to health and life. Therefore, we had better prevent an infection.

I totally agree. So, wear masks in crowed places, keep your distance and wash your hands.

Be blessed and stay safe

Sources:

Immune system and Coronavirus

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