The 2009 Narcolepsy-Swine Flu Mystery: How the Immune System Can Backfire

The year is 2009 and you've just tested positive for H1N1, also known as the swine flu. After a few weeks you have fully recovered and ready to go back to your normal routine. However, you notice that no matter how much sleep you get, you feel like you could fall asleep at any given moment. You return to the doctor and find out that you have developed narcolepsy.

Narcolepsy is a neurological sleep disorder characterized by rapid transitions from wakefulness to sleep. It is caused by the death of nerve cells producing hypocretin, a hormone important for wakefulness. Unfortunately, it is unknown how those specific nerve cells die, but it has been speculated to be linked to autoimmunity. Autoimmunity is like a supervillain origin story. The villain might have started out as the "good guy" and even helped ordinary people. Then something happens to completely change their worldview and they become evil, turning against society. The immune system is quite similar, it is the "good guy" and protects us from harm, but then something occurs to trick our immune system to turn against us. In the case of narcolepsy, if it is an autoimmune disorder, the immune system would attack the nerve cells that produce hypocretin.

Therefore, when narcolepsy cases increased during the 2009 swine flu pandemic, researchers did not think this was a coincidence. The phenomenon inspired the research of a 2013 study published in Science Translational Medicine. The study gave a potential explanation for how the swine flu could increase the chances of developing narcolepsy.

The researchers' evidence suggests that certain regions of hypocretin mimic a region of a swine flu protein. The swine flu protein acts like an alarm inside the body, signalling immune cells towards it. The immune system operates a lot like the hierarchy of a police force solving a crime. Initially, there are first responders who arrive at the scene to make sure regular civilians are safe and block off the area, then more police officers arrive to help first responders and collect evidence for the case. These police officers present evidence to detectives to help them solve the case. The detectives in this case are called helper T-cells. To solve the case, helper T-cells will create a memory of the swine flu protein and from then on, the helper T-cell will recognize the protein as an indication of infection. When they solve the case, they can inform another type of T-cell called a killer T-cell to arrest the criminal in question, in this case, the swine flu.

However, just like the police, sometimes the immune system might arrest an innocent civilian accidentally. Hence, due to the similarities between the hypocretin and swine flu protein, the helper T-cell may confuse hypocretin for the swine flu and may inform killer T-cells to arrest the wrong culprit.

Speaking of catching the wrong culprit, when the study initially came out, scientific media articles were quick to blame the Pandemrix vaccine rather than the swine flu itself. Although there is data showing that some people developed narcolepsy after being vaccinated with Pandemrix, the study could not find any conclusive evidence that anything in the vaccine could

cause this. Rather, they believe it is a stronger likelihood that the swine flu itself may have contributed to the development of narcolepsy and that the immune response produced by Pandemrix may have been too strong.

Overall, the study's rationale behind the narcolepsy-swine flu mystery may be the possible answer the public has been looking for.

By: Lene Wessel