

How does stress effect the immune system?

Science Paper 1

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Johnston

Block 2

I have chosen to research stress and its effects on the immune system, regarding every day or long-term stressors, their effects on the body, and how it correlates with getting sick from a biological viewpoint. As a grade 12 student, stress is something that is faced frequently throughout the year. I also find I am constantly getting sick and wanted to investigate if there was a connection between the two. This paper will answer the research question: How does stress effect the immune system?

First, it is important to understand what stress is. Stress is the release of hormones such as cortisol, adrenaline, and norepinephrine into the body (“What is stress?” n.d.). Stress is a process allowing organisms to accommodate for the environmental demands (Aich & Priyadarshini, 2012), whilst also preparing to overcome any potential threats, switching into the commonly known phrase ‘fight or flight’ mode. Fight or flight mode is essentially that when placed in a situation where the brain feels under attack, the brain will send signals to the body either saying to fight and defend oneself, or to flee. When the body feels under attack, hormones are released to help to prepare the body for potential physical action, thus creating stress (What is stress?” n.d.).

Furthermore, stress has a negative impact on the immune system, as the body becomes less sensitive to cortisol, disabling the ability to regulate the inflammatory response (Kress, n.d.). When this happens, the tissue sensitivity to cortisol lessons and breaks down, and the ability to regulate immune responses weakens (Kress, n.d.). The inflammation system is necessary for short term response of eliminating pathogens and initiating healing, so when it is compromised

the body is less likely to be able to attack viruses effectively, and we become more likely to get sick. Our body is negatively affected because of these processes, making us sick.

Moreover, stress can have the worst effect on the immune systems of those that are of older age. As people age, they are less able to amount proper immune responses to stressors (Morey, Boggero, Scott, & Segerstrom, n.d.). This is because stress effects organisms similarly to the effects of chronological age, and these factors both affect and accelerate immunological aging – where your immune system becomes weaker (American Psychological Association, 2006). Another key factor to the weakening of the immune system over time, is the duration of time dealt with stress (American Psychological Association, 2006). Brief stressors, such as an exam, supress cellular immunity, however when the stressors are longer lasting the effects are more drastic (Segerstrom, S.C., & Miller, G.E, 2004). People who are older, and already stressed, are therefore more prone to stress-related immunity changes (American Psychological Association, 2006).

In short, stress has a negative impact on the immune system, as a person's immune cells become less sensitive to cortisol. The immune cells are then unable to properly regulate inflammatory responses, and because of it, when they are exposed to a virus, the body is more likely to develop a sickness. This effect takes a greater toll older people, as their immune systems weaken. Moving forward, it would be beneficial to do further research on not only *how* stress effects the immune system, but how we can prevent stress from effecting our immune system as drastically.

References

- Aich, P., & Priyadarshini, S. (2012). Effects of Psychological Stress on Innate Immunity and Metabolism in Humans: A Systematic Analysis. *PLOS One*.
<https://doi.org/10.1371/journal.pone.0043232>
- American Psychological Association (Ed.). (2006, February 23). Stress weakens the immune system. Retrieved October 22, 2018, from American Psychological Association website:
<https://www.apa.org/research/action/immune.aspx>
- Kress, R. (n.d.). Stress, Inflammation, Immunity. Retrieved October 30, 2018, from RN.com website: <https://www.rn.com/featured-stories/stress-inflammation-immunity/>
- Morey, J. N., Boggero, I. A., Scott, A. B., & Segerstrom, S. C. (n.d.). Current Directions in Stress and Human Immune Function. *PMC*.
<https://dx.doi.org/10.1016%2Fj.copsyc.2015.03.007>
- Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. *Psychological bulletin*, *130*(4), 601-30.
- What is stress? (n.d.). Retrieved November 7, 2018, from Stress Management society website:
<http://www.stress.org.uk/what-is-stress/>