

IUIS Webinar: Stress dampens anti-viral immunity

Stress modulates viral-associated immune responses

is associated with dysregulated immune responses, leading to increased severity of viral infection.

antiviral cytotoxicity, virus-specific T cell response, interferon production
stress modulating context, associated with a rapid reduction of CD4+ T cells

stress shapes the long-term antibody response and viral reactivation

J Biol Chem 2005; 280: 19491-19498

CD4+ T cell-associated immunosuppression

presses Th1 cells, but enhances Treg and Th2 cells

antigen processing and presentation in DC, reduce anti-viral cellular and humoral responses

CD4+ T cell-associated immunosuppression in DC, reduce anti-viral cellular and humoral responses

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In this IUIS Webinar “Yuting Ma discusses the impacts of psychological stress on virus-associated immune responses”

Yuting began her webinar describing the 3 stages of COVID-19: asymptomatic, mild-moderate and severe COVID-19. She further highlighted the absence of a gold standard for treating COVID-19. As a result, the most effective countermeasures include preventing transmission, stimulating anti-viral immunity and/or dampening inflammatory immunity depending on the stage of infection. She further highlighted that in addition to pathology caused by the COVID-19, the pandemic also induces psychology stress particularly in medical professionals and COVID-19 patients. Additionally, healthy individuals also experience pandemic-induced psychological stress due to social, economic and financial challenges. It is well recognised that stress levels can also affect bodily functions including metabolic and immunity pathways (see below). She presented data from a murine stress model, that demonstrated that stressed mice have a lower capacity to induce viral-specific T cell immunity and lower B cell activation than non-stressed mice. She further demonstrated a stress-induced effect of stress on the gut bacteriome and virome, as well as metabolic dysfunction. Factors that can all contribute to dampened immunity.

Stress modulates viral-associated immune responses

Stress is associated with dysregulated immune responses, leading to increased susceptibility to and severity of viral infection.

- Reduced NK cytotoxicity, virus-specific T cell response, and antibody production
- Elevated circulating cortisol, associated with a rapid reduction of CD4⁺ T cells
- Negatively shape the long-term antibody response to influenza vaccinations

(*Int J Behav Med* 2005; *Health Psychol* 2008; *Psychosom Med* 2004)

Glucocorticoid (GC)-associated immunosuppression

- Suppress Th1 cells, but enhance Treg and Th2 cells
- Disrupt antigen processing and presentation in DC, reduce anti-viral cellular and humoral immunity
- Induce selective and tissue-specific PD-1 expression on NK cells to prevent immunopathology

(*Am N Y Acad Sci* 2004; *Eur J Immunol* 2006; *J Immunol* 2010; *Brain Behav Immun* 2006; *Nat Immunol* 2018)

Catecholamines (CA)- and 5-HT-associated immune regulation

- CA inhibits CD8⁺ T cell activation against viral challenges
- CA disrupts intestinal barrier, promote the colonization of pathogenic bacteria
- CA liberates ferric iron from transferrin and lactoferrin, to support the growth of harmful bacteria
- Platelet-derived 5-HT delayed virus elimination and increased immunopathological liver damage

(*J Neuroimmunol* 1994; *Neurogastroenterol Motil* 2010; *J Bacteriol* 2010; *Nat Med* 2008)



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Source: Yuting Ma IUIS
Webinar