

Newly discovered immune cells contribute to toxic shock

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Recently discovered immune cells called MAIT cells play a key role in group A streptococcal toxic shock, researchers at Karolinska Institutet in Sweden report. The results, which are published in the journal *PNAS*,



have potential implications for the diagnosis and treatment of this lifethreatening condition.

Group A streptococcus is a bacterium commonly found in the population and is the most common bacterial cause of mild throat infection (tonsillitis). However, the bacterium can also cause life-threatening conditions if it enters the blood or other tissue, where it can give rise to sepsis or <u>toxic shock</u>, conditions that develop rapidly, and are associated with a <u>high mortality rate</u>, and often, extensive tissue damage—hence the popular media epithet "killer bacteria."

Toxic shock occurs when the bacteria produce toxins called superantigens that cause the <u>immune cells</u> to overreact and produce large amounts of cytokines—proteins/peptides whose normal function is to regulate the body's immunological and inflammatory response. Researchers at Karolinska Institutet now show that MAIT cells, a relatively recently discovered immune cell type, play a fundamental role in the <u>cytokine</u> response to superantigens and group A streptococcus.

"MAIT cells are few in number, but respond rapidly to group A streptococci to produce large amounts of cytokines," says lead author Johanna Emgård, doctoral student at the Department of Medicine, Karolinska Institutet (Huddinge). "This overproduction of cytokines is called a cytokine storm, and results in leaking blood vessels, hypotension and organ failure."

The researchers also show that MAIT <u>cells</u> are activated in patients during the acute phase of the infection. "This discovery is important, as it means that we've found a new potential target for diagnosis and treatment," says Anna Norrby-Teglund, professor at the same department and the study's last author. "This is particularly important given the characteristically rapid development of group A streptococcal toxic shock, for which early diagnosis and treatment is critical for the



outcome of the infection."

The study is a collaboration between Anna Norrby-Teglund's research group and Johan Sandberg's research group at the Department of Medicine, Karolinska Institutet (Huddinge). The research was financed by the EU's seventh framework program, Karolinska Institutet, the Swedish Research Council, the Swedish Cancer Society and the Canadian Institute of Health Research.

More information: Johanna Emgård el al., "MAIT Cells Are Major Contributors to the Cytokine Response in Group A Streptococcal Toxic Shock Syndrome," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1910883116

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