Streptococcus pyogenes infects the lung-to-liver route of transmission

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When Streptococcus pyogenes is infected, human Rhinovirus is released into the oral cavity, causing strep throat. Health practitioners recommend decongestants and preventative measures for people who are known to be infected. However, Streptococcus pyogenes frequently re-infects if it persists in the oral cavity for more than five days and sets up a systemic infection, leading to sepsis and paralysis in patients. This is probably the main reason why hygienic measures (i.e., antibiotic therapy) are ineffective.

To understand the molecular mechanism of this re-infection, the investigators first looked at how Streptococcus pyogenes replicates in the bloodstream. They studied gene expression in mouse cells using the next generation of RNA sequencing technology. This turned out to be rather difficult. Streptococcus pyogenes is not so transcriptionally active in the bloodstream, and its expression levels are low when exposed to liver enzymes. In contrast, this bacterium shows activity in the gastrointestinal tract, where immune cells such as platelets and macrophages are located.

The investigators then used next generation DNA sequencing technology in non-human primates to find which genes were expressed at high levels in blood cells and intestinal tract cells. The scientists discovered that 18% of Streptococcus pyogenes express a particular receptor on their surface, TRIP50, which is also expressed in the GI tract. The investigators showed that enzyme TRIP50, which is involved in the immune response, is inhibited in the gills but not in the livers, a sign that the infection is being transmitted through the lung-to-liver route. In addition, they found that differences in expression of the receptor between the livers and gut cells led to differential infection: T helper 11 genes are expressed in a big way in the GI tract, but markedly decrease in the lungs.

This research has important implications. What would be more effective in preventing infection? Combination of traditional antifungal drugs such as clindamycin and anthracycline with endotoxin therapy can be very effective. However, this strategy has several drawbacks. First, clindamycin suppresses the immune system. Second, it might cause local injury in the rectum and common stools and lead to Crohnâ€™s disease, the most common form of dysentery. This does not mean that one should avoid using anthracycline therapy, as chronic diseases such as chronic obstructive pulmonary disease and asthma are among the important dangers, since these conditions also increase the risk of bacterial infections.

Thus, the researchers concluded that next generation RNA sequencing techniques might be effective in identifying the molecule involved in infection and the viral element that causes it. In addition, this technique could help researchers understand better the chain of events involved in the re-infection process.

In summary, the study is very interesting. It was conducted in an animal model which deals with different organisms such as bacteria, viruses, and fungi. Moreover, it was conducted by researchers who are medical doctors, namely Paul Radwell and Shinichiro Nomura. This study shows that RALP could be the key to infection by one of the most dangerous bacterial organisms in the world. All these implications add to the strong sense of urgency of creating better products for use in public health.

For more details on the work, please refer to the article entitled Streptococcus pyogenes alters cell-generated receptor-ligand expression. PLoS ONE, 10.1371/journal.pone.0091405.

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A Small Brown Bear Standing Next To A Tree