# Researchers reveal that immune system like a turbo-charged hybrid car

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(Medical Xpress)—Trinity College Dublin scientists have made a significant breakthrough in understanding the immune system that could lead to new treatments for diseases such as sepsis and Type 2 diabetes. A team led by Professor of Biochemistry, Luke O'Neill of the School of Biochemistry and Immunology in the Trinity Biomedical Sciences Institute has revealed that during an infection, immune cells switch their "engine" from the more sedate "battery" power, to using the equivalent of petrol to supercharge the engine needed to fight the infection. The work has just been published in the international leading science journal *Nature*.

In the process of metabolism, the immune system burns food for energy and uses the products to make molecules to energise and keep the body healthy, as well as defending it at a time of infection. Much research has been done in this area, but according to Professor O'Neill, this new research defines the process of metabolism in great detail.

"Importantly we have found that a product of this metabolic change called 'succinate', feeds back to the system and leads to further stimulation, in a manner akin to turbo-charging from an engine's exhaust. This is the part of the process that could lead to new therapies for diseases where the immune system is out of control. Such loss of control happens in overwhelming infection as occurs in sepsis, or in diseases such as Type 2 diabetes or rheumatoid arthritis. We think this system is in overdrive in these diseases," says O'Neill. The observation was made because of work into Type 2 diabetes, where glucose levels

rise and stimulate macrophages to become inflamed, promoting resistance to insulin, the hallmark of this disease.

"We have managed to demonstrate protection from death in sepsis by interfering with this process with a drug, giving us hope that our work might have potential for the prevention of death during bacterial infections," says Dr Gillian Tannahill, first author of the study. The findings may also have relevance for the treatment of Type 2 diabetes.

**More information:** Article: Succinate is an inflammatory signal that induces IL-1b through HIF-1a, DOI: 10.1038/nature11986

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