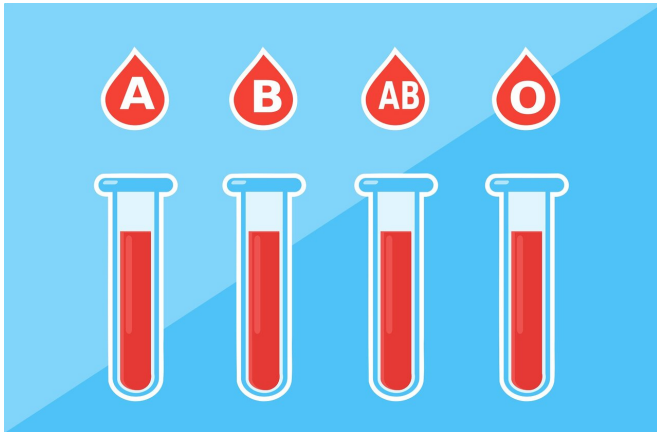


# Enzymes that can transform blood type A to O found in human gut biome

17 June 2019, by Bob Yirka



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A team of researchers at the University of British Columbia has found two types of enzymes that together, can transform type A blood to type O blood in the human gut biome. In their paper published in the journal *Nature Microbiology*, the group describes their metagenomic study of bacteria in human feces and what they found.

There are four [blood](#) types: A, B, AB and O. These types are not compatible for blood transfusions, except for type O, which can be transfused into recipient, making it highly valued. The difference between the blood types is due to sugar molecules known as blood antigens that reside on the surfaces of [red blood cells](#). Those with A-type antigens have A-type blood, those with B-type antigens have B-type blood and those with both antigens have AB-type blood. Type O is different because it does not have any antigens on its surface. An [immune response](#) is initiated if blood is found with the wrong type of antigen—since type O red blood [cells](#) have none, no immune response is initiated.

Prior research [by the team at UBC](#) showed that

certain enzymes could be used to convert A, B, or AB to O by removing the antigens. In this new effort, the researchers found that two enzymes working together convert type A blood to O, and that they exist in the human gut biome.

The work involved moving DNA from uncultured bacteria to *Escherichia coli*, then using them to screen for any microbes capable of removing the antigen from the surface of a red blood cell. The team reports that their initial findings were not very positive—they did not find any microbe that could do the job. But they did find two that could carry it out together. The first, a GalNAc deacetylase, converted the antigen to an amine. The second removed the amine, leaving a blood cell with no antigen—a type O.

The team plans to continue their study of the enzymes to determine if they would be safe to use for converting blood for transfusions into human test subjects.

**More information:** Peter Rahfeld et al. An enzymatic pathway in the human gut microbiome that converts A to universal O type blood, *Nature Microbiology* (2019). [DOI: 10.1038/s41564-019-0469-7](#)

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