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New study reveals body's mechanism to prevent useful bacteria from causing disease

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The study, led by NYU School of Medicine researchers and published in Nature, relates to the theory that our bodies co-evolved with bacteria over millions of years.



Singapore – A new study reveals a mechanism by which the immune system may decide whether a bacterial species is a partner in bodily processes or an invader worthy of attack.

The study, led by NYU School of Medicine researchers and published in *Nature*, relates to the theory that our bodies co-evolved with bacteria over millions of years. Over that time, microbes gradually came to help regulate bodily processes from digestion to energy processing to immune defences.

To make this possible, the body had to develop mechanisms by which it "tolerates" the presence of potentially helpful bacteria, not attacking them as foreign invaders. Complicating matters, many species – including those in the *Helicobacter* family – are helpful, or at least harmless, normally, but cause disease when genetic or environmental factors alter the normal balance.

Called *pathobionts*, such bacteria can shift in the eyes of immune cells from friendly (commensal) to dangerous, triggering inflammation – a rush of cells and proteins meant to destroy bacteria, but that damage the body's cells in the wrong context.

The degree to which the immune system tolerates a given bacterium depends on this friend/foe decision, and the current study reveals a related mechanism in mice exposed to *Helicobacter hepaticus*. While it is still unknown whether this species is helpful to gut function in mice, it can be dangerous in some instances, much as the helpful species *Helicopbacter pylori* can cause ulcers and stomach cancer in humans.

"Our findings represent a significant step toward clarifying the mechanisms that help the body manage the risk of keeping potentially dangerous, but often useful, bacteria around," says lead study author Dan Littman, MD, PhD, the Helen L. and Martin S. Kimmel Professor of Molecular Immunology in the Department of Pathology at NYU Langone Health.