Gastric bacterium Helicobacter pylori protects against asthma

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Infection with the gastric bacterium *Helicobacter pylori* provides reliable protection against allergy-induced asthma, immunologists from the University of Zurich have demonstrated in an animal model together with allergy specialists from the University Medical Center of the Johannes Gutenberg University Mainz. Their results published in the prestigious *Journal of Clinical Investigation* confirm the hypothesis recently put forward that the dramatic increase in allergic diseases in industrial societies is linked to the rapid disappearance of specific micro-organisms that populate the human body.

Allergy-induced asthma has been on the increase in the industrialized world for decades and has virtually taken on epidemic proportions. The rapid rise in allergic airway disease is attributed to air pollution, smoking, the hygiene hypothesis and the widespread use of antibiotics. The hygiene hypothesis states that modern hygiene measures have led to a lack of exposure to infectious agents, which is important for the normal maturation of the immune system. In an article published in the Journal of Clinical Investigation, scientists from the University of Zurich and the University Medical Center of the Johannes Gutenberg University Mainz now reveal that the increase in asthma could be put down to the specific disappearance of the gastric bacterium Helicobacter pylori (*H. pylori*) from Western societies.

H. pylori is resistant to gastric acid. According to estimates, around half of the world's population might be infected with the bacteria. The affliction often has no symptoms, but under certain conditions can cause

gastritis, gastric and duodenal ulcers, and stomach cancer. Consequently, *H. pylori* is often killed off with antibiotics as a precaution, even if the patient does not have any complaints.

Early infection with *H. pylori* protects against asthma

For their study, the researchers infected mice with *H. pylori* bacteria. If the mice were infected at the age of a few days old, they developed immunological tolerance to the bacterium and even reacted insignificantly – if at all – to strong, asthma-inducing allergens. Mice that were not infected with *H. pylori* until they had reached adulthood, however, had a much weaker defense. "Early infection impairs the maturation of the dendritic cells and triggers the accumulation of regulatory T-cells that are crucial for the suppression of asthma," says Anne Müller, a professor of molecular cancer research at the University of Zurich, explaining the protective mechanism.

If regulatory T-cells were transferred from infected to uninfected mice, they too enjoyed effective protection against allergy-induced asthma. However, mice that had been infected early also lost their resistance to asthma-inducing allergens if *H. pylori* was killed off in them with the aid of antibiotics after the sensitization phase. According to lung and allergy specialist Christian Taube, a senior physician at III. Medical Clinic of the Johannes Gutenberg University Mainz, the new results confirm the hypothesis that the increase in allergic asthma in industrial nations is linked to the widespread use of antibiotics and the subsequent disappearance of micro-organisms that permanently populate the human body: "The study of these fundamental mechanisms is extremely important for us to understand asthma and be able to develop preventative and therapeutic strategies later on."

Provided by University of Zurich