The role of *H. pylori* HP1021 orphan response regulator and its homologues in physiology and virulence of selected pathogenic Epsilonproteobacterial species.

Epsilonproteobacteria are microorganisms that grow under conditions of low oxygen levels or almost without oxygen. Some species of Epsilonproteobacteria are pathogenic to humans. For example, *Helicobacter pylori* is an important factor increasing the risk of developing a peptic ulcer and stomach cancer. *Campylobacter jejuni* is the leading bacterial cause of diarrhoea. *Arcobacter butzleri* is the cause of gastrointestinal infections, blood infections, but also abortions in animals. Therefore, they pose a serious threat to health and even to people's lives. Therefore, these bacteria are intensively studied to explain the mechanisms of their pathogenicity, but also to characterize their life processes to understand how they are able to survive effectively in the external environment and in the host organism. Oxygen is one of the major threats to these bacteria. Interestingly, the mechanisms of their response to oxygen are not fully understood. Our research aims to characterize one of the regulatory proteins present in all Epsilonproteobacterial species – HP1021-like regulators. These proteins activate or inhibit the synthesis of other cellular proteins that help fight stress. But until now it was not known which stress factor changes HP1021 activity. We noticed that these proteins are modified by oxygen. In response to atmospheric oxygen stress, the structure of the protein undergoes modification. This entails changes in its interaction with DNA and the activation or inhibition of protein synthesis that helps the cell defend itself from the negative aerobic stress. We aim to characterise the mechanism of these changes and describe the role of HP1021-like regulators in the response of bacterial cells to stress. What's more, we would like to find out if and how these regulators help bacteria to infect people. Understanding the mechanisms conditioning the response to oxygen stress can help in the future to develop new effective therapies directed against *H. pylori*, *C. jejuni*, *A butzleri* or other pathogenic Epsilonproteobacteria.