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BACKGROUND

Andreia Pimenta is a Researcher at Instituto de Tecnologia Química e Biológica António Xavier (ITQB-NOVA) of the NOVA University Lisbon. Completing her PhD in 2020, she has since been a junior researcher at the Bacterial Energy Metabolism group, focusing on studying sulfidogenic bacteria in disease. Her work is mainly focused on the study of the metabolism of anaerobic sulfidogenic bacteria, particularly *Bilophila wadsworthia*, and its interaction with the host in the context of the human gut microbiota. Currently her research is focused on unravelling host-gut microbiota interactions and exploring the role of *B. wadsworthia* in disease, using human colonic epithelial cells and *Galleria mellonella* larvae infection model to evaluate bacterial pathogenicity and virulence mechanisms. With proficiency in molecular biology, microbial physiology, and host-microbe interactions, Andreia has made significant contributions to the field, having published 18 articles (>320 cites, h-index 10) and presented her work at >20 scientific meetings worldwide. Her dedication to advancing science is accompanied by her commitment to contribute meaningfully to society.

SULFIDOGENIC BACTERIA AND THE HOST

from symbiosis to pathogenesis

Abstract

The human gut is a dynamic habitat where a variety of bacterial species coexists in a fine-tuned equilibrium. Dysbiosis, a disrupted gut microbiota, can be caused by changes in environmental conditions, such as diet, and can induce a variety of diseases. In particular, a Western diet characterized by low-fiber, high-fat, and high animal protein intake, significantly affects the stability and composition of the gut microbial community. This has been associated with an increase in sulfide-producing bacteria (known as sulfidogenic bacteria, SB), and the development of inflammatory bowel diseases (IBD) and colorectal cancer (CRC).

Gut SB metabolize both organic and inorganic sulfur compounds generating sulfide, which at high concentrations exerts toxic, and inhibitory effects. Notably, the gut microbiome is responsible for the majority of free circulating sulfide. Multiple studies established a connection between SB, high luminal sulfide concentrations and IBD, due to the toxic nature of sulfide, which in excess causes DNA damage, impairment of the epithelium barrier function, and chronic inflammation. Furthermore, there is compelling evidence linking a high consumption of red meat and fat to an increase of SB in the gut. This diet elevates gut taurine-conjugated bile acids, fostering the growth of taurine-metabolizing SB such as *Bilophila wadsworthia*.

Besides being sulfide producers, SB have also significant pathogenic potential. *B. wadsworthia* has been retrieved from biological specimens collected at various infection sites outside the GI tract. However, the mechanisms underlying its pathogenicity and virulence traits remain largely unknown. Previous reports underline the potential presence of hallmark virulence traits in *B. wadsworthia*, commonly associated with pathogens. It has been shown to adhere to host cells, extracellular matrix proteins, promote inflammation through the circulation of its lipopolysaccharide and damage the colonic mucus layer.

This research investigate the link between SB, gut inflammation, and disease by uncovering the molecular mechanisms underlying *B. wadsworthia* interactions with host cells.

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