Fighting microbes with microbes

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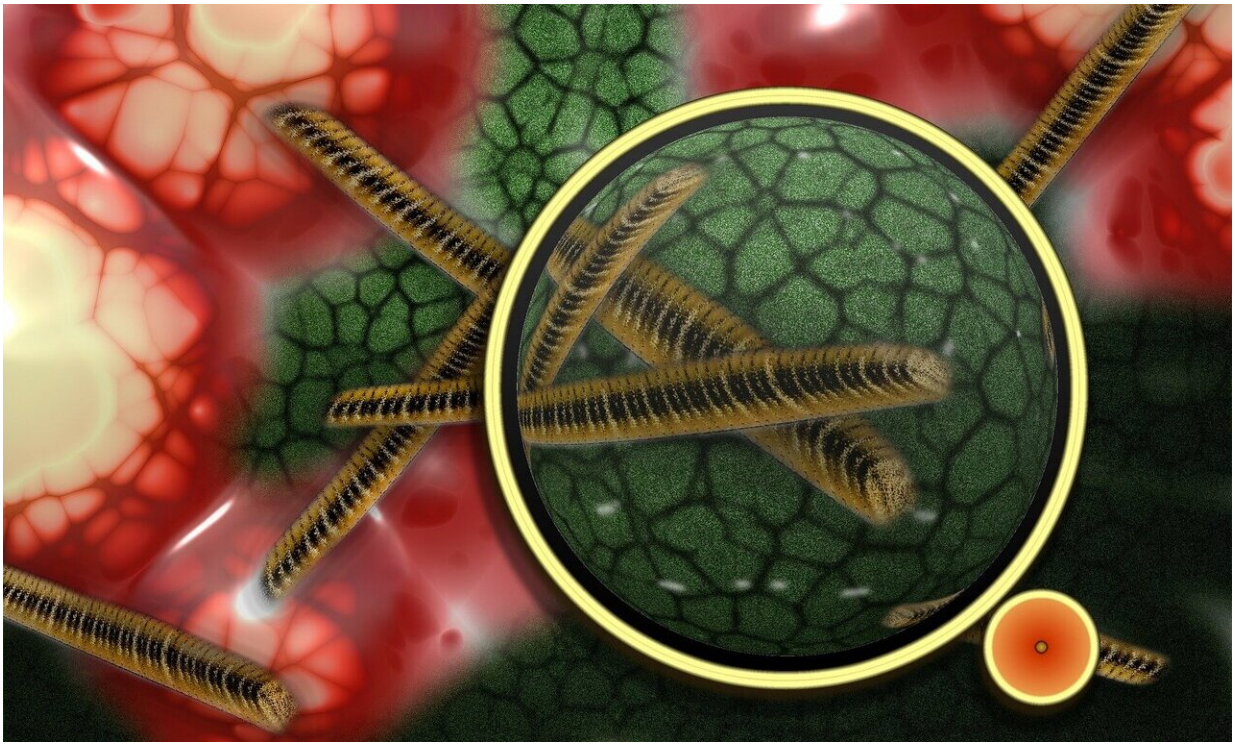

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The intestinal commensal microbial community (or microbiota) is composed of several microorganisms that, among other functions, are beneficial for the protection against infectious agents. When the microbiota is altered many bacteria are lost, compromising the protective ability and enabling invasion by harmful bacteria. Antibiotics, despite being the best way to treat infections, can lead to changes in the

microbiota and to the loss of some of these protective bacteria.

As recently published in *Nature Microbiology*, researchers from Instituto Gulbenkian de Ciência (IGC), in collaboration with Stanford University (USA), studied the effect of antibiotics on the microbiota composition, using mice as a model organism. In this study, researchers observed that some individuals, when treated with antibiotics, lost the protective abilities and were very susceptible to infections, while others, despite receiving the same treatment, were resistant.

Rita Oliveira, researcher and main author of the study, states that "mice did not all show the same response post-antibiotic treatment" and explains: "we observed that the exchange of microorganisms among cohoused individuals was determinant for reacquisition of members of the microbiota post-antibiotic treatment, and consequently in the reduction of the risk of developing new infections." The presence of the low abundant bacterium, member of the microbiota, Klebsiella michiganensis was shown to be sufficient to explain the resistance to invasion by other bacteria like *E. coli* or Salmonella, "because it can metabolize the nutrients available in the intestine more efficiently," competing against potential invaders and preventing the entry of other bacteria that can harm the host.

The increasing consumption of antibiotics is a public health problem that can compromise the effectiveness of future treatments, highlighting the importance of the identification of bacteria and mechanisms that can minimize the negative effects associated with their consumption. "This study opens doors to the hope that for each human pathogen there is one or more bacteria of the microbiota that can be administered as a direct competitor of that pathogen," concluded Rita Oliveira.

Karina Xavier, leader of the IGC research group responsible for the study, reinforces that "in the future, what is desirable is that anytime we

use antibiotics we also take complements that can restore the microbiota and potentiate the beneficial effects it entails. For that, the identification of super competitive bacteria like this one is essential." The research group aims now at expanding the study to different antibiotics and continues to explore the protective effect of Klebsiella michiganensis against other pathogens.

More information: Rita A. Oliveira et al, Klebsiella michiganensis transmission enhances resistance to Enterobacteriaceae gut invasion by nutrition competition, *Nature Microbiology* (2020). DOI: 10.1038/s41564-019-0658-4

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