MedicalXpress

Novel computational modeling, GI tract microorganisms

December 12 2014, by Kidron Vestal

Dr. Arul Jayaraman, professor of chemical engineering at Texas A&M University and holder of the Ray B. Nesbitt Professorship, has collaborated with researchers from Tufts University School of Engineering in the computational evaluation of gastrointestinal (GI) tract microorganism function. The journal *Nature Communications* published the findings in a November 20 edition.

The prediction and identification of metabolic properties found in the GI tract could offer new diagnosis and treatment opportunities for diseases and disorders in the GI tract as well as the understanding of other diseases related to metabolic and neurological functions.

Work previously published in the *Proceedings of the National Academy of Sciences* from Jayaraman's laboratory had already demonstrated that indole, a bacterial metabolite derived from the aromatic amino acid tryptophan, caused an anti-inflammatory response in the gut and increased resistance to pathogen colonization that could lead to infection.

Jayaraman said, "The previous work [essentially] focused on the biological effects of one molecule. However, since there can be several such bioactive molecules in the gut and it is not possible to test each one of them experimentally, we wanted to come up with a more rational way of identifying such molecules. We started working on this [research]… in Fall 2011. We are still far away from clinical implementation. I see this as a pipeline for generating potential candidates for testing in the lab and taking it forward to the clinic."

The research team focused on aromatic amino acids (AAAs) because their metabolites are involved in many of the more than 2,400 distinct reactions expressed in the microbiota as a whole.

Next steps for the team include identifying microbiota metabolites whose levels are either significantly elevated or depleted during diseases such as IBD or cancer, to find disease-specific markers and explore possible roles for these metabolites in disease progression.

More information: "Prediction and quantification of bioactive microbiota metabolites in the mouse gut." *Nature Communications* 5, Article number: 5492 DOI: 10.1038/ncomms6492

"The bacterial signal indole increases epithelial-cell tight-junction resistance and attenuates indicators of inflammation." *Proc Natl Acad Sci U S A.* 2010 Jan 5;107(1):228-33. DOI: 10.1073/pnas.0906112107. Epub 2009 Dec 4.

Provided by Texas A&M University