New computational model reveals novel possibilities for H. pylori treatment

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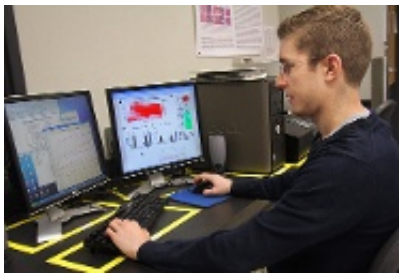

Adria Carbo reviews computer models for the H. pylori experiment

A new computational model developed by researchers at the Center for Modeling Immunity to Enteric Pathogens at Virginia Tech's Virginia Bioinformatics Institute offers new ways to study host immune responses to the gastric ulcer-causing bacterium Helicobacter pylori.

Using the model, researchers identified an abnormal immune response linked to development of lesions during H. pylori infection of the stomach. Their findings may help clinicians pinpoint how best to treat such infections.

"This large-scale computational model of host responses to H. pylori infection combines cutting-edge approaches in computational modeling and experimental research to help elucidate immune responses to H. pylori," said Raquel Hontecillas, co-director of the center, which is part of Virginia Tech's Nutritional Immunology and Molecular Medicine Laboratory.

H. pylori lives in the human gut and sometimes causes ulcers and cancers. Currently, doctors treat H. pylori infections with antibiotics that destroy the bacteria. However, H. pylori also can protect against diseases such as asthma, obesity and diabetes. Understanding how a harmless bacterial population becomes virulent and leads to disease has been difficult, but the computational model developed by the center researchers has led to new insights.

Based on results from experimental work with mouse models, the team of scientists built a computational simulation that can predict how and when infection begins and progresses. The model shows the position of cells during infection and accounts for the non-uniformity and randomness of immune responses.

Using the computational model, laboratory researchers found that, although H. pylori may be responsible for starting an infection, abnormal immune responses can contribute to chronic ulcers or cancers.

"The knowledge gained from such models will accelerate the development of novel drugs and vaccines for H. pylori-associated diseases," said Hontecillas. "The ultimate aim may not be to destroy H. pylori but to learn how to manipulate the interaction of the bacterium and host immune system to produce beneficial effects."

More information: Carbo A, Bassaganya-Riera J, Pedragosa M, Viladomiu M, Marathe M, et al. (2013) Predictive Computational Modeling of the Mucosal Immune Responses during Helicobacter pylori Infection. *PLoS ONE* 8(9): e73365. DOI: 10.1371/journal.pone.0073365

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