

Crab and other crustacean shells may help prevent and treat inflammatory disease

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Crab shell (waste)



Chitin microparticles



Researchers at Florida Atlantic University and their colleagues have developed an oral form of microparticles in crab and other crustacean shells as a dietary supplement that may prevent and treat IBD and other inflammatory diseases. Credit: Florida Atlantic University

Microparticles in crab, shrimp and lobster shells have anti-inflammatory mechanisms that could lead to the development of novel preventive and

therapeutic strategies for those who suffer from IBD. Since these shells are abundant and a major waste in the seafood industry, they may provide an alternative to costly drugs that don't always work.

Yoshimi Shibata, Ph.D., professor of biomedical science in the Charles E. Schmidt College of Medicine at Florida Atlantic University, has received a \$380,552 grant from the National Institute of Complementary and Alternative Medicine of the National Institutes of Health (NIH) to further investigate how microparticles called "chitin" found in crab, shrimp and [lobster shells](#) have anti-inflammatory mechanisms that could lead to the development of novel preventive and therapeutic strategies for individuals who suffer from [inflammatory bowel disease](#) (IBD) and others diseases.

Current medications for IBD include antibiotics, corticosteroids and other biologic anti-inflammatory drugs that are costly and don't always work. Since lobster, crab and shrimp shells are a major waste in the [seafood industry](#), chitin is abundant and low-cost to prepare. Chitin microparticles are also non-toxic, biodegradable and non-allergenic, and therefore safe for oral ingestion as a dietary food supplement.

Shibata's collaborators are Zhongwei Li, Ph.D. in FAU's Charles E. Schmidt College of Medicine; C. Kathleen Dorey, Ph.D. at Virginia Tech Carilion School of Medicine; and Emiko Mizoguchi, M.D., Ph.D., with the Center for the Study of Inflammatory Bowel Disease, Massachusetts General Hospital, Harvard Medical School.

Shibata is an immunologist whose research focuses on macrophages, which are multifunctional cells that are essential for the host protective immune systems and inflammation.

Many scientists now believe that most—or perhaps all—chronic diseases stem from [chronic inflammation](#), which plays a direct role in diseases

such as IBD, diabetes, cardiovascular disease, cancer, asthma and many other diseases.

"Under normal conditions, inflammation is a process that actually protects health and promotes healing by mobilizing the immune system to attack invading bacteria and kill them through the immune system reaction," said Shibata. "Chronic inflammation on the other hand harms instead of heals because the [immune system](#) attack never stops."

Crab, shrimp and lobster shells contain carbohydrates, calcium and protein. Shibata and his colleagues designed the active carbohydrates in these crustaceans by removing the calcium and protein and making small particles with the carbohydrates that are similar to bacteria, called mimetic microbes. They have developed an oral form of this substance as a dietary supplement. The team has demonstrated that oral administration of chitin microparticles reduces disease conditions of allergic asthma, food allergies, colitis and food borne infections in animal models and seasonal allergies in humans. They have also conducted additional studies to advance their understanding of the mechanisms underlying the effects of chitin microparticles on macrophage activation.

"In this new study, we are going to focus on intestinal macrophages and how these mimetic microbes we have developed can produce anti-inflammatory activities, normalize the gut bacterial flora and ultimately improve the symptoms associated with inflammatory bowel disease," said Shibata.

According to the Crohn's & Colitis Foundation of America, more than 1.4 million Americans suffer from Crohn's disease and ulcerative colitis, and approximately 70,000 new cases of IBD are diagnosed each year. Children under the age of 18 are the fastest growing population of IBD patients.

"The causes of inflammatory bowel disease and the factors that influence its activity are not known," said David J. Bjorkman, M.D., M.S.P.H., a gastroenterologist and dean and executive director of medical affairs for FAU's Charles E. Schmidt College of Medicine. "The impact of this condition can range from mild to severe debilitation."

Provided by Florida Atlantic University

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