

Scientists closing in on an new type of vaccine

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When we acquire diarrhea on a vacation, it is often caused by a bacterial infection. Now a Danish research team is working on a new type of vaccine design targeting the disease causing bacterium - if it works it may very well revolutionize not only the prevention of this disease, but also offer protection against other pathogens with a heavy disease burden such as *Mycobacterium tuberculosis* and antibiotic-resistant *Staphylococcus aureus* (MRSA).

Bacterially induced diarrhea is a global problem. The consequences of this type of infection ranges from a ruined vacation, over lost man hours in the military, to malnutrition as well as serious and life-threatening dehydration in third world countries.

Unfortunately there is currently no vaccine providing long-term protection against the bacterium. However, this might change soon. A Danish research team from University of Southern Denmark has gained a new understanding of the diarrhea-causing bacteria. This new knowledge will be explored in order to develop more effective vaccines against it as well as other bacterial pathogens.

Bacteria far more complex

"We can show that bacteria are far more complex than previously thought. Seen in this light, we believe that vaccines so far have been developed based on a too simplistic idea of what bacteria can do and what the human immune response reacts towards. We think that this is the reason why otherwise promising vaccine candidates have shown little

or no protection when tested in late clinical trial phases. Based on our research, we can now appreciate bacterial proteins in a whole new way - and if our hypothesis is correct - develop an entirely new class of vaccines", says Anders Boysen, postdoc, Department of Biochemistry and Molecular Biology, University of Southern Denmark (SDU). Anders Boysen is head of the [research project](#).

The research group also involves Professor Martin Røssel Larsen, Associate Professor Jacob Møller-Jensen and Associate Professor Giuseppe Palmisano. The project is supported with a 2.93 million DKK Novo Pre-Seed grant (393.677 €) from Novo Seeds, which is part of the Novo Nordisk Foundation and Novo A/S as well as the University of Southern Denmark's internal Proof of Concept Board. And quite unusual for an SDU-based research project, a significant sum of the obtained funding is dedicated to business development.

The commercial aspect

"This research project is special because we have focused on the business idea and creating a spin out from our university from day one. Therefore, we at SDU Business have worked closely with the inventors in order to mature the commercial aspects of the project and raise funds to develop the technical aspects. The support from Novo is thus not funneled into a new research project, but is laying the foundation for a spin out, led by Anders Boysen", says Ann Zahle Andersen, Ph.D. and Business Scout at SDU Business.

The researchers are working on the ETEC bacterium, which belong the E. coli family. The Danish research team believes that a special and so far very rarely identified protein modification is particularly efficient in activating the immune system because it is foreign to the human body. If this holds true, it should be possible to develop a vaccine containing this modification, and use it like any other prophylactic vaccine: A person is

immunized with a small and harmless dose of the modified bacterial protein. The protein in turn stimulates the body's immune system to recognize the agent as foreign, destroy it, and "remember" it. Thus, the body learns to recognize the bacteria through the modified protein and can attack the pathogen with full force if encountered.

Provided by University of Southern Denmark

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