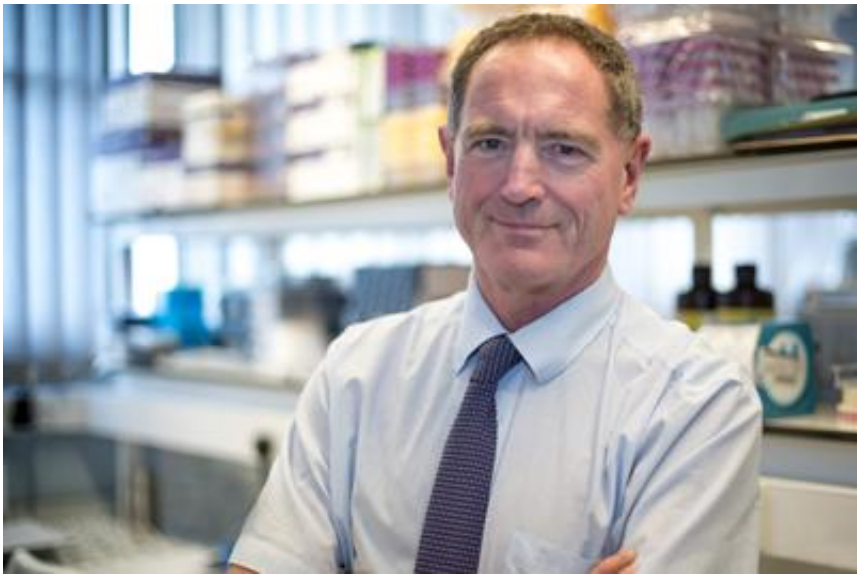
Doctors develop pioneering nose drop to help fight meningitis

August 2 2017



Professor Rob Read. Credit: University of Southampton

Doctors in Southampton have pioneered the development of a nose drop containing a type of 'friendly' bacteria that could help prevent meningitis and other infections.

Professor Robert Read, director of the NIHR Southampton Biomedical Research Centre, and his team have inserted a gene into a harmless bacterium that will be able to live inside the nose.

It is hoped that the modified bacteria will protect against the bacterial

species responsible for causing a severe type of meningitis.

Around 10 per cent of adults carry Neisseria meningitidis – the cause of meningococcal meningitis – in the back of their nose and throat with no signs or symptoms.

However, in some people, this bacterium can invade the bloodstream and cause life-threatening infections including meningitis and blood poisoning, which is known as septicaemia.

Meningitis occurs in people of all age groups but infants, young children and the elderly are more predisposed. Meningococcal meningitis, which is a bacterial form of the disease and is responsible for 1,500 cases a year in the UK, can cause death in as little as four hours from the onset of symptoms.

In a previous study, the research team found inoculating adults with a 'friendly' bacterial strain, known as Neisseria lactamica (Nlac), which is a close cousin of N. meningitidis, resulted in Nlac settling harmlessly in the nose for months and prevented them carrying N. meningitidis at the same time.

They now hope genetically enhancing the bacteria with a 'sticky' surface protein from N.meningitidis will increase the ability of Nlac to reside in the nose and generate a strong immune response that protects against the meningitis-causing bacteria.

If successful, this would offer the potential to prevent the spread of infection or the ability to rapidly control an outbreak as meningococcal meningitis cannot develop in the absence of N. meningitides.

The concept of using friendly bacteria to tackle infections, known as 'bacteriotherapy', is already used to treat inflammatory bowel disease

and Clostridium difficile infections.

When clinical trials of the nose drop begin at the NIHR Southampton Clinical Research Facility, it will be the first time a genetically modified bacteria has been used in this way to try to prevent infections that develop in the nose and throat.

"We have already shown that placing Nlac in the nose of healthy adults caused no harm to the volunteers, the bacteria settled and it caused an immune response which we believe could prevent the acquisition of harmful bacteria," said Professor Read, who is a professor of infectious diseases at the University of Southampton.

"Now, following extensive work in the laboratory, we have developed a nose drop which includes Nlac that has been enhanced with a gene to help broaden its effect to, we hope, exclude N. meningitidis."

Professor Read, who is also an honorary consultant at University Hospital Southampton NHS Foundation Trust, added: "The next stage of this process is to test the drops on healthy volunteers in a clinical trial to ensure the strain of bacteria we have created is going to stay and grow in the nose.

"If successful then we will have a future therapy that we can adapt to combat other diseases caused by bacteria that breed in the nasal pathway such as pneumonia and ear disease."

Provided by University of Southampton