How probiotics can prevent disease

April 2 2009

Using probiotics successfully against a number of animal diseases has helped scientists from University College Cork, Ireland to understand some of the ways in which they work, which could lead to them using probiotics to prevent and even to treat human diseases.

Presenting the work at the Society for General Microbiology meeting in Harrogate today (Thursday 2 April), Dr Colin Hill described how his team had used three animal models of disease that have human counterparts - bovine mastitis, porcine salmonellosis (a gastrointestinal disease) and listeriosis in mice (an often fatal form of food poisoning) - to demonstrate the protective effects of probiotics.

"Rather than use commercially available probiotics, we made our own probiotic preparations containing safe bacteria such as Lactobacillus species newly isolated from human volunteers" said Dr Hill, "In all three animal diseases we observed a positive effect in that the animals were significantly protected against infection".

The team also used probiotics to control disease in animals that were already infected. The results of these tests proved that administering these safe bacteria to an infected animal was as effective as the best available antibiotic therapies in eliminating the infectious agent and resolving the symptoms.

In each instance the protection was linked to a particular bacterial species, and the mechanism of action varied from direct antagonism (where the probiotic directly kills the pathogenic bacteria) to effects

mediated by the host immune system. For example *Lactobacillus salivarius* UCC118 protected mice against listeriosis (a disease which can affect pregnant women) by producing an antimicrobial peptide that eliminates *Listeria monocytogenes* in the gut of the animal. In another mechanism, *Lactococcus lactis* could be used to treat mastitis by eliciting an immune response that overwhelmed the infectious bacterium.

Dr Hill added, "It is likely that using probiotics rather than antibiotics will appeal to at-risk individuals since they are safe, non-invasive, do not create resistant bacteria and can even be administered in the form of tasty foods or beverages".

"We have shown that we can protect and even treat animals against pathogenic bacteria by introducing harmless bacteria at the site of the infection," said Dr Hill. "In order to use similar strategies in preventing or treating human disease we must understand the molecular basis of their efficacy. This understanding will provide the basis for intelligent screening and selection of the most appropriate protective bacterial cultures to go forward into human trials".

Source: Society for General Microbiology