Scientists study emerging strains of superbug Clostridium difficile

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(PhysOrg.com) -- New and emerging strains of the bacteria Clostridium difficile (C.diff) are being studied by scientists in Glasgow, London and Cambridge in an attempt to understand the rise in the reported incidence of this infection over the last decade.

The Glasgow Biomedical Research Centre at the University of Glasgow has received £502,142 from the Wellcome Trust to investigate new forms of C.diff, a relatively common infection usually acquired in hospitals which has caused a significant number of deaths throughout the UK and the world.

The study is being conducted in partnership with Prof Brendan Wren of the London School of Hygiene & Tropical Medicine and Prof Gordon Dougan at The Wellcome Trust Sanger Institute, Cambridge.

Dr Gillian Douce, senior lecturer in the Division of Infection & Immunity, University of Glasgow, said: “Patterns of infection of C.diff are changing. There are strains of this pathogen emerging that are more aggressive than others. The aim of the project is to understand how and why these strains have become more virulent.

“We hope that by gaining a much greater understanding of how the organism causes disease, we will be able to design more effective drugs and vaccines that can be used in the treatment and prevention of this horrible infection. Ultimately, we hope we can get a grip on C.diff and reduce its incidence.

C.diff is a bacteria which occurs naturally in the intestines of around three percent of the adult UK population and 66 percent of infants. It particularly affects the elderly and hospitalised patients, causing chronic and relapsing diarrhoea, which can kill. This infection is most dangerous to those patients whose immune systems are often already compromised. More than 80% of C.diff infections in the UK occur in people aged over 65.

Disease is most common following antibiotic treatment, when the ‘good and protective’ bacteria that normally live in the gut are killed, leaving the gut vulnerable to colonisation by C. diff. During its growth, the bacteria produce two types of toxin - A and B which damage the lining of the intestine and cause diarrhoea and other complications (such as toxic megacolon which can be fatal).

C. diff is easily spread within the hospital environment through contact with contaminated hands and surfaces with endospores of the organism. These robust seed-like reproductive structures are produced by the bacteria when outside the body and are resistant to many traditional cleaning agents.

The strains in which the team at Glasgow have most interest are the 027 and A-B+ strains which are apparently more aggressive and are associated with a much higher mortality rate. By studying their genetics we hope to develop to understand where these virulent strains have come from and whether they are still evolving to be even more dangerous. They will also look at the population as a whole to try to establish how many strains there are at present and how these are related.

As a consequence of this study, new methods to ‘fingerprint’ the bacteria will be designed that should enable doctors to quickly identify patients infected with particularly aggressive strains, allowing patients to be treated much more rigorously.

Dr Douce, who recently received a one-year fellowship from the Royal Society of Edinburgh, added: “The whole genome of historic and recent isolates of 027 are being sequenced and by comparing the genetic code of these bacteria we hope to see which bits of DNA in this strain are

different from older strains and which bits affect the virulence of the bug."

Provided by University of Glasgow

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