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Team developing new drug against leading causes of death—sepsis and ARDS

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Scientists at Queen's University Belfast are developing a potential revolutionary new treatment for Sepsis and Acute Respiratory Distress Syndrome (ARDS), which are among the leading causes of death in hospitalised patients in the UK.

Currently, there are no effective treatments available for these life threatening syndromes.

The novel anti-inflammatory drug, SAN101, is being developed by a team of scientists and clinicians at the School of Pharmacy and the Centre for Infection and Immunity at Queen's, alongside colleagues at Trinity College Dublin (TCD). It is the result of an initial discovery made over 6 years ago at Queen's.

Pre-clinical results are published today (Wednesday 2 September) in *Science Translational Medicine* - one of the world's leading journals on experimental medicine. The research was funded by a major grant from the Medical Research Council awarded in 2012, following initial support from the Public Health Agency (PHA) HSC R&D Division.

Sepsis is one of the most frequent cause of death in hospitalised patients, with an estimated 19 million cases worldwide every year and around 8 million deaths. The condition claims 37,000 lives in the UK every year and costs the NHS around £2.5 billion annually. There may be up to 45,000 cases of ARDS each year in the UK and Ireland and up to 22,000 deaths.

The team at Queen's have developed a nanoparticle that binds to immune cells in the body and inhibits the excessive cycle of inflammation which drives the development of sepsis and ARDS. This new approach has the potential to reduce the impact of sepsis and ARDS in acutely ill patients.

Professor Chris Scott from Queen's School of Pharmacy said: "Through this research we are well on the road to developing a medical treatment for sepsis and ARDS."Sepsis arises when the body's immune system goes into overdrive, setting off a series of reactions including widespread inflammation. This inflammation can lead to a significant decrease in blood pressure, which inhibits blood supply to vital organs and can lead to multiple organ failure.

"A frequent complication of sepsis is ARDS - where the lungs can't provide enough oxygen for the rest of the body. Up to 25 per cent of patients with severe sepsis will develop ARDS and up to half of these patients will die.

"What we have developed is an anti-inflammatory nanoparticle - a microscopic particle that binds itself to cells called 'macrophages', which are often found at the site of an infection. We have found that this nanoparticle essentially blocks inflammation and interrupts the chain of reactions that lead to severe sepsis and ARDS."

Dr Adrien Kissenpfennig from the Centre for infection and Immunity said "This is an exciting study demonstrating the effectiveness of a novel nanoparticle formulation in mouse pre-clinical models of sepsis and a new ex-vivo human lung model of ARDS. This necessary research represents an essential milestone in the development of SAN101, paving the way for continued development towards eventual evaluation in patients."

Professor Danny McAuley from the Centre for Infection and Immunity

at Queen's is the lead clinician on the study. He said: "At present, there is no effective treatment for either sepsis or ARDS. There is a huge clinical need for a drug to fight the inflammation caused by sepsis and ARDS that causes so much damage to the body. Through this research, we are well on our way to developing that drug and, with the right funding and strategic partnerships, we could see it being trialled in patients in as little as two or three years. This is an exciting development and an excellent example of the potentially life-changing and life-saving impact of Queen's research."

Professor Scott will be presenting the development of SAN101 at the Applied Pharmaceutical Sciences of Great Britain Conference in Nottingham on the 9th September 2015.

Dr Janice Bailie, Assistant Director, HSC R&D Division, Public Health Agency said: "This exciting development in critical care research clearly demonstrates the value of investment in early stage translational research projects - such as those supported through the HSC R&D Division Translational Research Groups. I am delighted that the funding provided by HSC R&D Division has helped the team to achieve these promising results which have the potential to significantly improve the outcomes for patients with sepsis and ARDS."

More information: Targeting Siglecs with a sialic acid-decorated nanoparticle abrogates inflammation, stm.sciencemag.org/lookup/doi/ … scitranslmed.aab3459

Provided by Queen's University Belfast

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