



Chest  
Heart &  
Stroke

# Our Research



**Are severe common cold infections in childhood linked to developing asthma?** Funded 2022-23. Dr Helen Groves, QUB.

**Are infants who get a serious common cold lung infection (CCLI) more likely to develop asthma? Or if they already have asthma, does that leave them more prone to infections? It's time to find out.**

Dr Helen Groves, from QUB, and her team think that infants who get a CCLI are more likely to develop asthma. They think that not being exposed to these infections decreases a child's chances of developing asthma. But how do you test this?

As most children born during the early part of the COVID-19 pandemic weren't exposed to CCLIs (because of lockdowns and restrictions), this gives the team an opportunity they wouldn't otherwise have to test the theory. The team want to find out if fewer of these children developed asthma, compared to infants who were exposed to common-cold viruses before lockdown.

**What difference will this research make?** The main aims of this study are to find out if childhood CCLIs cause asthma later, and see if preventing serious infections can play a role in preventing asthma.

New vaccinations and medicines to prevent CCLIs are being developed and should be available to give to patients within a few

years. It is important to find out whether using these new vaccines and medicines to stop CCLIs might help prevent them developing asthma. If we find that preventing children getting the common-cold virus when they are young is a bad thing, it may be best for young children not to receive new vaccines or medications. Therefore, this study could help doctors to decide which children should, or should not, get any new vaccine or medication in the future. In turn, it will hopefully reduce the numbers of infants developing asthma.

**Can an over the counter medication for cold sores help in the fight against COPD?** Funded 2022-23. Dr Dermot Linden, QUB.

**COPD is a major cause of illness and death in Northern Ireland. Almost 43,000 people are registered with their GP as having COPD - and there could be more. It killed 744 people in Northern Ireland in 2021-22, and nearly 9,000 people were hospitalized. Finding an effective treatment is an obvious priority.**

Dr Linden and his team want to test whether Valaciclovir (a type of cold sore medication) could be a potential new therapy for sufferers of COPD. They have used it to successfully treat Epstein-Barr Virus (EBV) - research we previously funded - which we have detected at high levels in the lungs of people with COPD. They hope to carry out a larger study in the future, testing the medication on larger numbers of people, and the study would help shape that study.

**What difference will this research make?** Doing this smaller scale lab study, will help the team understand how cells in the lungs respond to Valaciclovir, and whether this medication has the potential to be a future treatment for COPD. They can then use the results to plan a larger study. A larger study will allow to establish with more confidence that Valaciclovir is an effective treatment.

Finding an effective treatment is an obvious priority. Inhalers for COPD are also one of the costliest medications. If we can show that an over the counter medication is effective in treating COPD, not only be good for people living with the condition, but it will be good for the public purse.

### **Would interfering with interferons reduce or prevent COPD symptoms?** 2021-22. Dr Joe Kidney, Belfast Health Trust.

**Interferons are natural substances that helps the body's immune system fight infection and disease. What role do they play in COPD, and importantly, can we do something about it?**

Dr Kidney and his team have identified a pattern of inflammation (this is the body's natural defence against infection) in the lining of the airway in COPD that results in damaged cells. When the cells are damaged they can be irritable and worsen the inflammation, causing even more damage. When the cells are in this state, they react even more angrily to a simple infection like a cold (the cold is the main reason for people with COPD to be hospitalised). The team think interferons are key. Interferons usually increase in number after a viral infection, but they can occur in a loop, causing even more interferons to be produced. They think this is what causes the damage.

The researchers want to study whether this is the case. How much damage can interferons do when on a loop? How much do they cause normal lung cells to become like COPD cells? Can we block this reaction, and with what?

**What difference will this research make?** If the team can show that interferons (stuck on a loop) are the main culprits for causing COPD inflammation in cells, and they find a way of switching them off, then it opens up the opportunity for new treatments which are desperately needed for COPD.

### **How do dangerous biofilms develop in intensive care tubing, and can prevent VAP?** 2019-20. Dr Laura Jayne Sherrard, QUB.

**Interferons are natural substances that helps the body's immune system fight infection and disease. What role do they play in COPD, and importantly, can we do something about it?**

People who are critically ill and in intensive care often require equipment called endotracheal tubes to be placed in their airways to help them breathe. Microscopic organisms, especially bacteria can stick to the surface of these tubes and form thin layers called biofilms. These biofilms are very resilient to antibiotic treatment. This can lead to a type of chest infection developing, known as 'ventilator-associated pneumonia' (VAP).

Our knowledge of the microscopic organisms that form biofilms on these tubes, and how they respond to treatments, is limited. The best way to stop these microbes forming biofilms on the tubes is currently unknown.

So, we funded Dr Sherrard to find out more about what types of bacteria form these films, and how best to treat them.

**What difference will this research make?** Given that we know so little about how these biofilms form, we are no doubt missing out on new, effective ways to prevent them, and in turn preventing infection. VAP is a significant issue, with as many as 2 in 10 people on a ventilator will go on to develop it. Between 3,000 and 6,000

people die from this type of pneumonia every year in the UK, and prevention would save many lives. Improving what we know about the biofilms will speed up recovery time from VAP and hopefully even prevent it. This will be of benefit to patients in intensive care, their families, and it will reduce the financial burden on the NHS.

### **What role does histamine play in developing resistant asthma?** Funded 2019-20. Dr Karim Dib, QUB.

**Neutrophils are a type of white blood cell that help heal damaged tissues and fight infections. However, in people with severe asthma, the neutrophils attack the tissue in the airways. It is not known why this happens.**

Dr Karim Dib and Professor Liam Heaney think that it is due to histamine - usually released by cells during an allergic reaction - produced by bacteria in the airways. The researchers think that this histamine attaches to the neutrophils and prevents it from killing the bacteria, so the body releases more neutrophils to fight the bacteria. Flooding the body with neutrophils leaves the person prone to infections and inflammation, as the body struggles to deal with the bacteria. Over time, this reduces lung function. The study, the first to look at this, will test this theory, and whether blocking the histamine would be a useful treatment for patients with severe form of resistant asthma.

**What difference will this research make?** The ultimate aim would be to have medications available that help treat people with severe asthma. Severe asthma has a serious effect on the person's quality of life, but is also one of the most frequent causes of death in hospitalised patients. Showing the link between histamine and neutrophils, and then developing medications to treat this, would reduce deaths, improve people's quality of life, and help reduce the burden on carers and the healthcare services. Dr Dib told us "Our research has the promise to improve the medical condition of patients with severe forms of asthma. As a result, the daily life of these patients will be improved and less pressure will be put on carers".

### **What do we know about the harmful effects of oxygen treatment in clinical settings?** 2018-19. Dr Murali Shyamsundar, QUB.

**Oxygen treatment is important in intensive care and surgery, but in excessive amounts it can be harmful. Can we improve what we know and prevent injury?**

An excessive dose of oxygen (hyperoxia) can have serious negative effects for the patient. In critically ill patients, high levels of oxygen is associated with increased chances of dying, and may be linked to hospital-acquired pneumonia. How hyperoxia occurs and its effects are not completely understood. This study will try to add to what we currently know.

**What difference will this research make?** Dr Shyamsundar hopes that this project will have an impact on how oxygen is used with patients in critical care, people having surgery, and people being treated for heart attacks and after cardiac arrest. By better understanding how hyperoxia occurs and how it affects the body, we get a better handle on the proper amounts of oxygen that can be used with these different patient groups. The researchers also hope that Belfast will become a centre for researching hyperoxia and how injuries could be prevented and treated.