Common virus linked to faster disease progression in cystic fibrosis

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A new study has found that cystic fibrosis patients who have a common virus may experience faster disease progression than patients who do not have the virus. Signs of faster cystic fibrosis disease progression included earlier times to lung transplant referral and reaching the final stages of the disease.

The study looked at the cytomegalovirus, a typically harmless type of herpes virus that is often contracted during late adolescence and early adulthood. It is estimated that over 90% of people aged 80 years have the virus, and it does not usually cause symptoms.

The researchers say their findings, which are published in the *European Respiratory Journal*, suggest the virus may be an unrecognised contributor to cystic fibrosis, but more research is needed to confirm whether the virus causes the disease to progress more quickly.

Cystic fibrosis is a genetic condition that affects the body's ability to control the movement of salt and water between cells. This can cause a build-up of thick mucus in the lungs, making it more difficult to breathe and causing patients to be more likely to develop lung infections. The average life span of cystic fibrosis patients is 37 years, and around 0.6% of patients have an organ transplant each year as it has the potential to extend their lives.

Michael Parkins is Associate Professor of Medicine, Microbiology and Infectious Diseases at the University of Calgary, Canada, and was one of

the lead researchers. He explained: "We already know that the cytomegalovirus can harm the health of cystic fibrosis patients who have had a lung transplant, as it can increase the risk of organ rejection, but we know very little about how this virus affects pre-transplant cystic fibrosis patients.

"An increasing body of evidence has demonstrated a link between cytomegalovirus and a number of chronic conditions such as Alzheimer's, heart disease and several cancers, but to date no studies have looked at the link between the virus and deterioration in chronic respiratory disease."

The study included 56 cystic fibrosis patients who were referred for lung transplant at the Calgary Adult Cystic Fibrosis Clinic. Of those patients, 30 (54.6%) tested positive for cytomegalovirus. Researchers also recorded patients' sex, BMI, education and presence of other infections and genetic traits, to assess if these factors affected when patients were referred for transplant or reached the final stages of cystic fibrosis disease.

The analyses showed that infection with the virus was the most important factor linked to disease progression. Patients with the virus were referred for lung transplants at a much younger age than patients who did not have cytomegalovirus, eight years earlier on average. Patients with the virus also died ten years earlier on average, compared to patients who did not have the virus.

Professor Parkins explained the findings: "Cytomegalovirus is normally dormant in people who have it, but it can become active again and spread more quickly after infection with other bacteria. We know that cystic fibrosis patients are more likely to develop lung infections, so it's possible that repeated cycles of activation of the virus exaggerates the damage to patients' lungs, contributing to faster disease progression.

"The association we found does not necessarily mean that cytomegalovirus directly causes more rapid disease progression—further studies are needed before such a bold statement could be made. However, our findings provide the first indication that this virus may have an impact on progression of cystic fibrosis, potentially leading to earlier transplant referral and even death."

The researchers say that a number of cytomegalovirus vaccines are currently being investigated in other areas of medicine, and that these could be trialled among cystic fibrosis patients to prevent possible infection.

The research team say there are also several interventions that could be trialled to manage cytomegalovirus among cystic fibrosis patients. Professor Parkins said: "Treatment might involve regular medication to slow the spread of the virus. Alternatively, treatment could be given only during times of reactivation, for example following infection or symptom flare-ups."

The researchers caution that the study is limited by the small number of patients included who all came from just one clinic, and by the lack of information about the direct cause of death or transplantation among patients.

Professor Tobias Welte, from Hannover University, Germany, is President of the European Respiratory Society and was not involved in the study. He said: "With improved diagnosis and medical treatment, cystic fibrosis is changing from a disease of childhood into a disease of adults, as patients are living for longer. The average life span for people with the disease is now around 37 years of age, but just 5% of cystic fibrosis patients across Europe are aged over 40 years.

"This is an exploratory study that raises an interesting hypothesis,

however, due to the limitations of the study, it does not confirm a role of the cytomegalovirus in cystic fibrosis. Further observational studies are necessary to be able to confirm the value of these findings."

The researchers say that they are now conducting further research in this area using larger international registries and multiple patient centres.

More information: Michael D. Parkins et al, Cytomegalovirus – an unrecognised potential contributor to cystic fibrosis disease progression?, *European Respiratory Journal* (2019). DOI: 10.1183/13993003.01727-2018

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