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Cystic Fibrosis Research News

Title:

The Impact of Cystic Fibrosis Transmembrane Regulator Disruption on Cardiac Function and Stress Response

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What was your research question?

Cystic fibrosis primarily manifests as a lung disease. However, since the mutated protein (CFTR) that gives rise to cystic fibrosis is also expressed in the heart, we aimed to investigate the direct impact of CFTR disruption on the function of the heart and its response to stress.

Why is this important?

Our understanding of the role of CFTR in the heart is not complete. Although problems with heart function have been reported in people with cystic fibrosis, due to the coexistence of lung disease, it is not clear whether these changes are an adaptation response to lung disease. As such, the direct impact of CFTR disruption on the heart is unknown. Better understanding of this issue would lead to improved patient care.

What did you do?

We evaluated mice with dysfunctional CFTR either in the muscle alone or in all the cells of the body. These mice do not spontaneously develop lung diseases, and therefore, are ideal for us to

investigate the direct impact of CFTR on the heart. We measured the heart function using a magnetic resonance imaging (MRI) scan. In addition, we also studied myocyte to examine whether there were changes that occurred at the cellular level.

What did you find?

We found that mice with dysfunctional CFTR showed a slight increase in heart function at baseline. However, under stressed conditions when normal mice will show increased heart function, these mice showed a reduced response. In addition, aortic diameter was slightly decreased in mice with dysfunctional CFTR, suggesting that the heart of these mice might be beating against a higher pressure.

What does this mean and reasons for caution?

Heart symptoms have not been the focus of care for people with CF. However, our study suggests that hearts with dysfunctional CFTR showed increased function at baseline but attenuated stress response. This elevated baseline function may render the CF hearts under chronic low stress and hence are more likely to develop heart dysfunction. When coupled to severe lung diseases, this may accelerate the progression to heart failure in people with CF. With increased life expectancy for people with CF, early detection of abnormal cardiac function may further improve a CF patient's quality of life.

What's next?

Our current study was conducted in young CF mice. Further investigation with a longitudinal study will allow us to outline the long-term impact of CFTR disruption on the development of cardiac dysfunction. Meanwhile, studies over a long period of time on people with CF will also improve our understanding of the clinical effects of heart problems.

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