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Cystic Fibrosis Research News

Title:

Resting energy expenditure in cystic fibrosis patients decreases after lung transplantation, which improves applicability of prediction equations for energy requirement

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What was your research question?

Resting energy expenditure (REE) represents the amount of calories or energy required for a 24-hour period by the body during a non-active period and is used to tailor dietary counselling in cystic fibrosis (CF) patients. Current nutrition guidelines in CF advise energy recommendations that are higher compared to those for healthy individuals with the same sex and age. REE can be measured with indirect calorimetry (IC)) with measurement of oxygen consumption and carbon dioxide production while breathing or predicted using equations. Is it possible to use prediction equations in clinical practice for assessing REE in CF patients before and after lung transplantation (LTx) and does REE change in CF patients before and after LTx?

Why is this important?

Energy needs before LTx are often estimated from REE, multiplied with disease factors such as inflammation, chronic infection, and increased work of breathing. Also, malabsorption of energy in the gut, which is common in people with CF, and physical activity, contribute to energy needs. It is important to provide adequate dietary advice to achieve and obtain a good nutritional status before and after LTx. After LTx, energy demands may be altered due to reduction of frequency of respiratory infections as a result of the removal of the infected lungs and should be taken into account to prevent increase in weight after LTx in CF patients.

What did you do?

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In clinically stable CF patients selected for LTx, REE was measured in fasted state (no tube feeding for a minimum of eight hours before measurement) by oxygen and carbon dioxide gas measurement of patient breathing using a ventilated hood system. This REE measurement was performed once before and four times after LTx, with a two-year follow-up. The predicted REE was calculated by four different prediction equations commonly used in clinical practice. We compared the results of the prediction equations with those of IC to determine the agreement between predicted and measured REE. A predicted REE between 90% and 110% of REE measured was considered as an acceptable prediction.

What did you find?

In our study, performed in fourteen CF patients, measured REE before LTx is about 20% higher on average compared to REE estimated by prediction equations. After LTx, the REE in CF patients decreases by almost 10%, meaning they require less energy to function when at rest. After adjusting REE for fat-free mass (FFM, Fat-free mass is body mass without fat mass and contents muscles, organs, bones and water. This is metabolic active body tissue and has impact on REE), a decrease was observed after LTx for all four time points (within a two-year follow-up) compared to before LTx. Body mass index (BMI), fat-free mass index (FFMI) and pulmonary function improved all after LTx, meaning patients were more like their healthy counterparts for weight, body fat and lung capacity.

What does this mean and reasons for caution?

This means that before LTx prediction equations underestimate REE in CF patients by about 20%. If measuring REE is no option, we recommend accounting for this additional 20% when calculating energy requirements and providing dietary advice to patients. This may be possible in patients with pneumothorax, claustrophobia, or clinically unstable conditions. Reasons for this increase in REE in CF patients before LTx could be related to bacterial *Pseudomonas aeruginosa* infection or CF-related diabetes but there is insufficient evidence yet to judge whether that is the case. Future studies are encouraged to validate our observations in a larger group of patients. In underweight CF patients, we stress the importance of measuring REE to optimize energy requirements to improve nutritional status if possible.

What's next?

We continue performing REE measurements with IC in CF patients before after LTx. After one year post lung transplantation, prediction equations as in healthy individuals can be used. If

unwanted and unexplained weight loss or weight gain occurs in patients, IC can be used to provide more clarity about energy needs.

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https://www.ncbi.nlm.nih.gov/pubmed/?term=Resting+energy+expenditure+in+cystic+fibrosis+patients+decreases+after+lung+transplantation%2C+which+improves+applicability+of+prediction+equations+for+energy+requirement