Medical Xpress

# Therapeutic exercise lessens lung injury and muscle wasting in critically ill patients

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Moderate exercise can benefit patients with acute respiratory failure by reducing inflammation in the lungs. Credit: V. Altounian/Science Translational Medicine

Acute respiratory distress syndrome (ARDS) is a life-threatening lung condition that affects approximately 200,000 people a year in the United States and has a higher mortality rate than breast and prostate cancer combined. The condition most often occurs in people who are critically

ill or who have significant injuries; those who do survive it often experience profound skeletal muscle weakness.

Over the past 30 years, efforts to fight ARDS with various drug therapies aimed at the lungs have failed. However, doctors at Wake Forest Baptist Medical Center have tried a different approach - exercise.

"Based on some earlier work done here, we've known that getting critically ill patients up and moving around as soon as it's medically feasible helps them get off of ventilators sooner, increases their strength when they get out of intensive care and improves overall outcomes," said D. Clark Files, M.D., assistant professor of pulmonary, critical care, allergy and immunologic medicine at Wake Forest Baptist. "What we haven't understood is why it helps."

Using an animal model that mimics what happens in people with ARDS, Files and a team of researchers worked to understand how the mechanisms underlying early mobility therapy improve the outcomes of patients with this illness. The study is published in the March 11 edition of *Science Translational Medicine*.

In the study, mice with acute lung injury and the resulting muscle weakness were exercised for two days. The researchers found that a short duration of moderate- intensity exercise led to marked improvements in lung, limb and respiratory muscle function.

"We looked at specific pathways involved in muscle wasting and found that early exercise turns these pathways off," Files said. "There is a complex immune response to injury and it appears that exercise is acting on multiple different proteins that involve the innate immune system and dampen this over-exuberant immune response."

The researchers then confirmed their findings from the animal model by

comparing them to banked plasma from patients who were enrolled in an earlier clinical trial at Wake Forest Baptist in which patients were randomized to early mobility versus usual control. They confirmed that at least one of the markers most significantly changed in the regulation of the immune response in mice also occurs in humans.

"This study gives a lot of biological relevance to how and why early mobility tends to work," Files said. "We've identified some mechanisms that we think are very important."

Files said the next step will be to duplicate this study in older animals (instead of young mice used in the current study) because most people with ARDS are older with higher mortality.

"We want to know if therapies that work for younger ICU patients should be the same or different for older patients," he said.

**More information:** "Therapeutic exercise attenuates neutrophilic lung injury and skeletal muscle wasting," by D.C. Files et al. *Science Translational Medicine*, stm.sciencemag.org/lookup/doi/ … scitranslmed.3010283

Provided by Wake Forest University Baptist Medical Center

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