Among critically ill patients, muscle wasting occurs rapidly

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Zudin A. Puthucheary, M.R.C.P., of University College London, England, and colleagues conducted a study to characterize and evaluate the time course and pathophysiology of acute muscle loss in critical illness.

"Survivors of critical illness experience significant skeletal muscle weakness and physical disability, which can persist for at least 5 years. Muscle wasting contributes substantially to weakness acquired in the intensive care unit, but its time course and underlying pathophysiological mechanisms remain poorly characterized and not well understood," according to background information in the article.

The study included 63 critically ill patients who were prospectively recruited within 24 hours of intensive care unit (ICU) admission from

August 2009 to April 2011 at a university teaching and a community hospital in England. Muscle loss was determined through serial ultrasound measurement of the rectus femoris (a muscle in the quadriceps) cross-sectional area (CSA) on days 1,3,7, and 10.

The researchers found reductions in the rectus femoris CSA observed at day 10 (-17.7 percent). Decrease in the rectus femoris CSA was greater in patients who experienced multiorgan failure compared with single organ failure: -15.7 vs. -3.0 percent by day 7; -8.7 percent vs. -1.8 percent by day 3.

In addition, muscle protein synthesis was depressed to levels equivalent to the healthy fasted state on day 1. It increased to rates similar to the healthy fed state by day 7; but the net balance remained negative (i.e., destructive metabolism). "Importantly, these overall effects occurred despite the administration of enteral nutrition. Unexpectedly, higher protein delivery in the first week was associated with greater muscle wasting," the authors write.

"Early interventions to enhance anabolism [a constructive phase of muscle building metabolism] may be required in addition to those aimed at reducing catabolism if muscle wasting is to be limited or prevented."

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