



VIRTUAL ENVIRONMENTAL ERGONOMICS

REGULATION OF MUSCLE MASS BY HYPOXIA: OPPOSITE EFFECT OF ACUTE AND CHRONIC EXPOSURE

Accompanying video: <https://youtu.be/-aLUnCLkuYU?t=480>

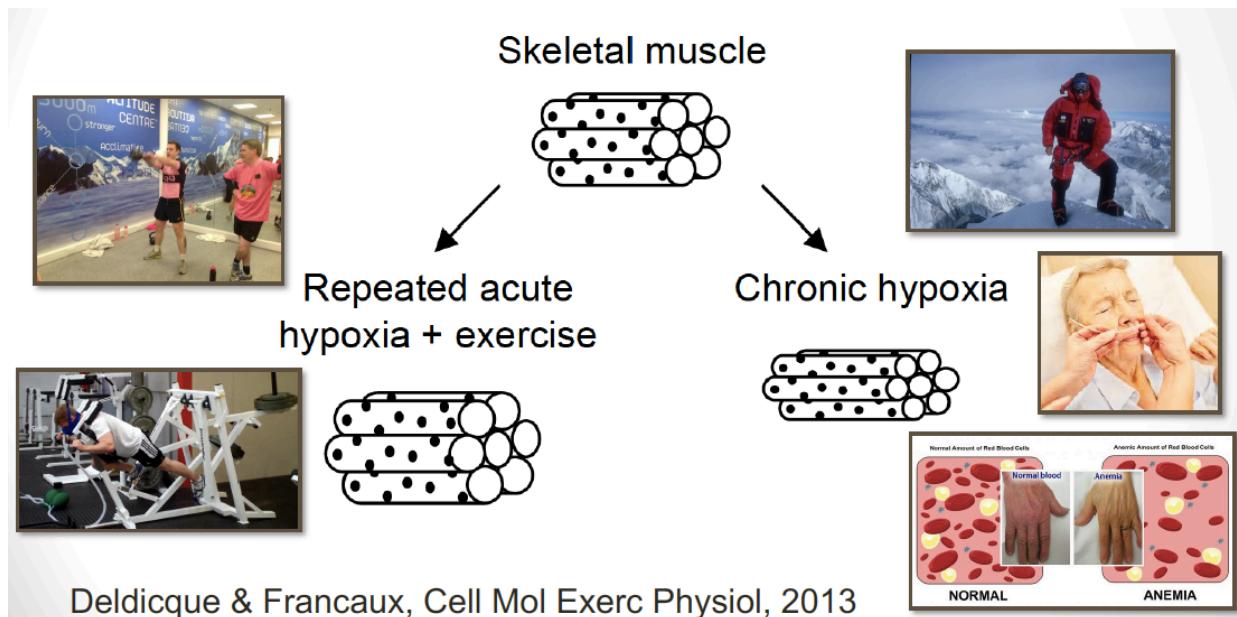
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CONTENT

Hypoxia is a state of lowered oxygen tension that can be created by environmental or pathological conditions. Regardless the origin of hypoxia, skeletal muscle cells adapt to deal with the acute or chronic reduction in oxygen availability. Although contrasting results have been reported as well, long lasting hypoxia generally leads to a negative regulation of protein balance and a loss of muscle mass, whereas intermittent hypoxia seems rather to exert a positive effect on muscle growth in the context of resistance exercise training.

The purpose of the present presentation is to present the idea that chronic and acute hypoxia regulate skeletal muscle mass in two opposite ways. Chronic hypoxia-induced muscle atrophy in native highlanders, climbers or patients suffering from chronic obstructive pulmonary disease was previously thought to be caused by less calories ingested and reduced physical activity. More and more evidence is accumulating showing that hypoxia itself contributes to the loss of muscle mass during chronic exposure. In contrast repeated acute hypoxic sessions have the potential to slow down muscle atrophy and even to stimulate muscle mass accretion when coupled to resistance exercise as is the case with occlusion training.

Further investigation should now focus on the molecular mechanisms by which acute and chronic hypoxia regulate skeletal muscle mass. Particular attention should be paid to satellite cells, which can be activated by hypoxia in-vitro.





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Questions

What is the difference between normobaric and hypobaric hypoxia? Give one example for each.

Can we consider blood flow restriction (BFR) as a full hypoxic strategy?

Have all patients suffering from chronic obstructive pulmonary disease (COPD) a low muscle mass?

What are satellite cells? How could they participate to hypoxia-induced muscle adaptation?