Chronic muscle disuse occurs when skeletal muscles are not actively recruited to do work over an extended period of time. All forms of muscle inactivity are associated with muscle mass loss, weakness and a reduced endurance capacity. Several studies have shown lower ATP levels, along with parallel decreases in mitochondrial content and function within disused muscle. However, the mechanisms responsible for these decreases are not well understood. A likely explanation for this phenomenon is related to the principle pathway for mitochondrial biogenesis, which involves the import of newly synthesized preproteins from the cytosol into existing mitochondria.

We performed this study to determine whether muscle disuse affects protein import and whether changes in protein import are related to mitochondrial content and function. We hypothesized that steps involved during mitochondrial assembly would be impaired in disused muscle, and this would contribute towards compromising mitochondrial function and content.

Our results confirmed a reduction in mitochondrial import in disused muscle along with a lower abundance of proteins mediating this process in mitochondria. We also found a close relationship between mitochondrial assembly and its ability to generate ATP. Furthermore, the elevation in detrimental free radicals generated by dysfunctional mitochondria found in disused muscle appears to be involved in mediating the import pathway. Thus, this assembly process appears to be an important contributor to the reduced mitochondrial content and function observed in disused muscle, and targeting this pathway may be an effective strategy in preventing chronic-disuse induced muscle remodelling.

Reference: Singh K. and **D.A. Hood**. Effect of denervation-induced muscle disuse on mitochondrial protein import. . *Am J Physiol (Cell Physiol)* 300 (1), C138-45. 2011.

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