

Signal transducer and activator of transcription 3 signaling as a potential target to treat muscle wasting diseases.

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Public Summary:

This review article discusses the role of STAT3 signaling in skeletal muscle regeneration and maintenance of muscle mass. STAT3 signaling plays a pivotal role in regulating the function of multiple cell types within the muscle tissue microenvironment. This includes muscle stem cells (MuSC), myofibers and macrophages. Indeed, we and others have recently shown that transient pharmacological inhibition of STAT3 promotes MuSC expansion and enhances tissue repair in vivo. STAT3 activation has also been directly linked to the loss of muscle mass in several chronic muscle wasting conditions. Muscle wasting is associated with several human diseases, thus there is a critical need to identify new potential targets for the development of efficient therapeutic approaches. STAT3 signaling is emerging as a critical regulator of skeletal muscle maintenance and regeneration, and as a nodal point of integration of extracellular cues emanating from the microenvironment. Overall, this could potentially lead to the development of more targeted and efficient therapeutic approaches.

Scientific Abstract:

PURPOSE OF REVIEW: The review summarizes our current knowledge of the role of signal transducer and activator of transcription 3 (STAT3) signaling in skeletal muscle regeneration and the maintenance of muscle mass. **RECENT FINDINGS:** STAT3 signaling plays a pivotal role in regulating the function of multiple cell types in skeletal muscle. This includes muscle stem cells, myofibers, and macrophages. It regulates muscle stem cell function by antagonizing self-renewal. STAT3 also functions in myofibers to regulate skeletal muscle mass. This is highly relevant under pathological conditions where STAT3 activation promotes protein degradation and muscle atrophy. Transient pharmacological inhibition of STAT3 partially prevents muscle wasting. However, the mechanisms responsible for the improvement of muscle condition are not currently well understood. This is because of the complexity of the system, as STAT3 has a critical role in regulating the function of several cell types residing in skeletal muscle. **SUMMARY:** Muscle wasting is associated with several human diseases such as muscle dystrophies or cancer cachexia. However, currently there are no effective treatments for this condition, and there is a critical need to identify new potential targets for the development of efficient therapeutic approaches.

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