

PROJECT REVIEW

“Long-Term changes in human skeletal muscles after anabolic steroid administration”

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The use of anabolic androgenic steroids (AAS) is widespread within both competitive and recreational sports in which large, strong muscles are an advantage or the primary goal (bodybuilding). To build more muscle mass and to enhance muscle force and power, AAS are particularly effective. Because the nucleus of a cell controls the different cellular-processes, including adaptations to training, long-term or irreversible changes in the number of nuclei in a muscle fiber will potentially give a person using AAS an advantage also after he/she stops using the drugs.

The maintenance ('homeostasis') of the myonuclei pool after muscular atrophy that recently has been observed in mice should ideally be confirmed in human experiments, along with an examination of the potential of epigenetic modifications - altogether comprising the concept of 'muscle memory'. However, implementing longitudinal studies with use of AAS supplementation in human subjects is not without ethical concerns, since the use of AAS is known to be associated with a number of negative side effects. Thus, a first-step approach would be to study whether former users of AAS show lasting myocellular modifications, i.e. elevated myonuclei density and signs of enhanced epigenetic memory compared to age- and exercise-matched controls. In relation to the potential for long-lasting myocellular modifications with AAS usage, i.e. maintained myonuclei density and epigenetic memory, the functional consequences of these potential changes subsequently could be investigated in a longitudinal design to address if previous AAS usage leads to amplified retraining capacity of human skeletal muscle.