PROJECT REVIEW

"Detection of doping with Myostatin-Propeptide in human urine and blood"

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Class S4 of WADA's Prohibited List 2019 ("Hormone and metabolic modulators") lists myostatin inhibitors under sub-chapter 4 ("Agents preventing activin receptor IIB activation"). Like follistatin, myostatin-propeptide suppresses signaling of myostatin and subsequently leads to an increase in muscle mass and loss of body fat. In serum, >70% of myostatin is bound to myostatin-propeptide and thus myostatin-propeptide regulates skeletal muscle mass, i.e. if myostatin-propeptide is administered, more myostatin will be inhibited and then more muscle mass will be developed. Myostatin-propeptide is a glycoprotein containing one N-glycosylation site and 243 amino acids. Typical concentrations in serum and plasma are in the range of ng/mL.

So far, no approved myostatin-propeptide pharmaceuticals are available. Nevertheless, myostatin-propeptides can be bought on the black market for "research purposes". They are labelled either "MyoPro", "HMP", "Myostatin-Propeptide (HMP)", or erroneously "GDF-8" and "Myostatin". All of these proteins are expressed in E. coli and hence lack the characteristic glycosylation of human endogenous myostatin-propeptide. This fact will be exploited in order to detect doping with myostatin-propeptide. After immunoaffinity purification (serum, urine), myostatin-propeptide will be separated by electrophoresis (SDS- or IEF-PAGE) and detected by Western blotting. Due to the missing glycosylation, "black market" products will not only differ in molecular mass but also isoelectric point (pI) from endogenous myostatin-propeptide.