

PROJECT REVIEW

“Detection of Follistatin-doping in urine and blood”

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Chapter S4 of WADA's Prohibited List 2018 (“Hormone and metabolic modulators”) lists myostatin inhibitors under sub-chapter 4 (“Agents modifying myostatin function(s)”). Follistatin (FST) suppresses signaling of myostatin and subsequently leads to an increase in muscle mass and loss of body fat. FST is a secreted glycoprotein, which can be found in many tissues and organs (e.g. pituitary, bone marrow, ovary, kidney, liver, blood vessels). Due to alternative splicing, three FST-isoforms exist (FS-288, FS-300, and FS-315). The isoform with 315 amino acids (FS-315) is the dominant one. FS-315 can also be detected in blood. Typical concentrations in serum and plasma are in the range of 2-3 ng/mL.

So far, no approved follistatin pharmaceuticals are available. Nevertheless, follistatins can be bought from many internet providers for “research purposes”. Their products are labelled either “Follistatin”, “Follistatin 344”, or “Follistatin 315”. Most of these proteins are expressed in *E. coli* and hence lack the characteristic glycosylation of human endogenous follistatins. This fact will be exploited in order to detect doping with follistatins. After immunoaffinity purification (serum/plasma, urine), FST will be separated by electrophoresis (SDS-, SAR-, or IEF-PAGE) and detected by Western blotting. Due to the missing glycosylation, “black market” FSTs will not only differ in molecular mass but also isoelectric point (pI) from the endogenous FSTs.