

STATISTICAL DISCRIMINATION OF STEROID PROFILES WITH SUPPORT VECTOR MACHINES IN DOPING CONTROL

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Due to their performance enhancing properties, the World Anti-Doping Agency (WADA) has put a ban upon the use of anabolic steroids (e.g. testosterone, nandrolone). Therefore, accredited doping control laboratories screen, among others, for these prohibited substances in urine. It is particularly challenging to detect the misuse with naturally occurring anabolic steroids such as testosterone (T), which is a very popular ergogenic agent in sports and society.

To screen for misuse with these compounds, drug testing laboratories monitor the urinary concentrations and their ratios, which consist the steroid profile, of steroid metabolites and compare them with reference ranges to detect unnaturally high values. However, the interpretation of the steroid profile is difficult due to large inter-individual variances, various confounding factors and different endogenous steroids marketed.

A support vector machine (SVM) algorithm was developed to statistically evaluate urinary steroid profiles containing an extended range of steroid profile parameters. This model makes it feasible interpret the analytical data in the quest for deviating steroid profiles and showed its versatility towards different kinds of misused endogenous steroids. The SVM model outperformed the current biomarkers with respect to detection sensitivity and accuracy, particularly when it is coupled to individual data as stored in the Biological Passport.

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