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From population- to subject-based limits of T/E ratio to detect testosterone abuse in elite sports.

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In elite sports, indirect testing of testosterone abuse is mainly based on the testosterone over epitestosterone (T/E) ratio. Since this marker is characterized by a small ratio of intra- to inter-individual variation, it is surprising that current anti-doping strategy uses a screening test based on a population-based limit. From a database of more than 15,000 steroid profiles obtained from routine controls, the collection of steroids profiles of 11 elite athletes followed during 2 years, and a longitudinal study involving 17 amateur athletes, 8 of which were orally administrated testosterone undecanoate pills, we selected 12 case studies to represent the possible scenarios to which the anti-doping laboratories are confronted. Various detection strategies at the disposal of the laboratories are employed and discussed, including isotope ratio mass spectrometry (IRMS) analysis and a Bayesian interpretation of the T/E-time profile. The weak sensitivity versus specificity relation of a population-based limit for the T/E ratio is outlined. As a result, we propose a Bayesian screening test whose T/E threshold progressively evolves from a population basis to a subject basis as the number of individual test results increases. We found that this screening test heightens drastically the capacity to detect testosterone abuse, at no additional financial and administrative expenses for anti-doping authorities.

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