

Certified Reference Materials for Sports Testing

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The theme for World Metrology Day in 2008 provides a timely opportunity to review the importance of metrology in areas such as sports testing. It is crucial that results produced by testing laboratories around the world are accurate and comparable in order to ensure the effective monitoring of athletes.

The National Measurement Institute, Australia (NMIA), in conjunction with WADA, has been carrying out research programs to produce certified reference materials (CRMs) to underpin sports testing. These programs include the production of pure standards for a wide range of banned substances, their metabolites and their labelled analogues. Additionally, two matrix materials for banned substances in human urine have been prepared. The most commonly reported banned substances are anabolic steroids, specifically testosterone and nandrolone. CRMs have been developed for these two important steroids that contain the major metabolites of these compounds in freeze-dried human urine at their permitted cut-off levels. Concentrations of the steroid metabolites in these CRMs were determined using high-accuracy isotope dilution mass spectrometry (IDMS) reference methods.

These reference methods have been compared with those in place at other national metrology institutes in a CCQM intercomparison co-ordinated by NMIA. This study examined the measurement of 19-norandrosterone glucuronide (the major metabolite of nandrolone) in human urine and the results showed excellent international agreement.

Reference materials play an important role in the chemical measurement infrastructure. The pure substance CRMs produced by NMIA are designed to be used as calibrants or internal standards for IDMS, which is used routinely in sports testing. The matrix materials are designed to be used in the validation of routine test methods and as quality control materials. These CRMs provide a unique opportunity for WADA-accredited testing laboratories to benchmark their methods versus rigorously assigned reference values with well-defined uncertainties. The use of these reference materials should improve the fight against doping and ensure that high quality accurate measurements are produced which are comparable throughout the world.

References

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Production and certification of a reference material for the measurement of 19-norandrosterone in human urine