New steroid test uses oil exploration technique

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It's a technique that has previously been used for oil exploration — now researchers at The University of Nottingham have developed a new, highly sensitive, anti-doping steroid test using hydropyrolysis.

The process — which uses high pressure environments to investigate the chemical structure and make-up of a sample — has been refined and developed at the University to develop highly accurate tests for detecting levels of illicit steroids in urine. The test procedure is already in the process of being commercialised and is expected to be ready for use in the 2012 Olympics.

Funding from the Natural Environment Research Council's Ocean Margins LINK programme saw researchers take the hydropyrolysis technique and apply it to geochemical studies. This allowed the team to reconstruct the history of ocean basins to help assess whether it was worth drilling for oil. By taking core samples over geological time, the technique can detect the first 'charge', or presence, of oil.

But the same process can be used to detect the presence of illicit steroids in the urine of athletes — and racehorses. High pressure hydrogen is used to bombard the sample at pressures of 150 atmospheres and temperatures of up to 500 degrees Celsius. This leaves sample molecules in a cleaner, less degraded state than other extraction techniques, allowing more accurate readings to be taken. Carbon isotopes are then measured, with the results showing the ratios of carbon 12 and carbon 13 in the sample — whether geochemical or biological.

Colin Snape, Professor of Chemical Technology and Chemical Engineering at the University, said: “Steroids are produced naturally in the body, but they have a different carbon 13/carbon 12 ratios to those that have been introduced illicitly. By refining the measurements of these two isotopes we can produce a very accurate test for the presence of illegal steroids in athletes.

“We are currently working with the World Anti-Doping Agency (WADA) to develop the technique for trial and have entered into partnership with Strata Technology, a London-based company with expertise in high pressure equipment, to commercialise the technique.”

The technique is also being used to refine current radio carbon dating processes, which use the carbon 14 isotope to measure the age of an archaeological sample.

“Most of these samples use charcoal,” Professor Snape added. “But the stuff you are trying to accurately date is often mixed in with much later debris from the same site. Hydropyrolysis can remove this very rapidly and efficiently. We are hoping that this will become the accepted model for cleaning up radio carbon dating samples in the future — the fundamental research for this is taking place at the moment.”

Professor Snape is an expert on hydropyrolysis — he’s been working on the technique, both in industry and academia, for the past 25 years. Over the coming year he hopes to refine the testing process, exploring optimum sample sizes and checking the sensitivity of the technique, working with WADA and experts in steroid testing from Imperial College London.

Source: University of Nottingham