

New method to detect human growth hormone for anti-doping testing

September 4 2017



Credit: Macquarie University

A study led by researchers from Macquarie University has unveiled another way to detect whether a person has taken human growth hormone (GH), by tracking protein levels. Specifically, the researchers

used proteomics – the study of proteins and their interactions – to see which proteins had their levels altered when a person takes recombinant human growth hormone, the artificially developed version of the hormone that can be abused by athletes as a performance enhancer.

"We were able to detect changes in the levels of a group of eight proteins found in human blood plasma when a person has taken recombinant human growth [hormone](#). Six of these proteins have previously not been known to be affected by GH administration in human studies," said Dr Alamgir Khan from Macquarie University who oversaw the research.

"We found two proteins, ApoL1 and fetuin-A, that provide evidence of active hormone administration, while another protein called vitamin D-binding protein, could be particularly useful, due to the fact that its levels actually decreased as a result of administering the hormone and tended to stay at lower levels for a longer time. This means that anti-doping officials would have a longer period from when the athlete took the hormone to detect that something was amiss," he added.

The two current methods used by anti-doping organisations to detect the hormone performance enhancer include a [test](#) that identifies changes in the ratio of the artificially and naturally produced versions of the growth [protein](#), and another test that detects increased levels of two molecules after taking the hormone.

"The problem with these current tests is that they need to be done shortly after someone has taken the hormone, and there is variability in the test results among individuals. Our findings identify other blood markers which could potentially supplement existing biomarker tests providing more confidence to anti-doping authorities, athletes and the public for enjoying cleaner sports," explained Dr Khan.

Recombinant [human growth hormone](#), which works by stimulating cell

growth and production, is licenced for people who have a [growth](#) hormone deficiency, but is also one of the many performance enhancing substances abused by athletes. The researchers say that their results could also herald the development of even more robust and sensitive testing methods for the detection of an array of artificial enhancers.

"The proteomics approach used in this study could also be applied in developing more rigorous testing for other performance enhancers such as designer peptides", Dr Khan concluded.

Key to the study's findings was use of the gel technology and advanced mass spectrometry techniques available at the Australian Proteome Analysis Facility (APAF) located at the Macquarie University North Ryde campus in Sydney.

"Coupled with a well-designed clinical study, the research demonstrates the effectiveness of high quality proteomic analysis in contributing towards the fight for cleaner sports," concluded APAF Director, Associate Professor Mark Molloy.

More information: Plasma biomarker proteins for detection of human growth hormone administration in athletes, *Scientific Reports*, www.nature.com/articles/s41598-017-09968-7

Provided by Macquarie University

Citation: New method to detect human growth hormone for anti-doping testing (2017, September 4) retrieved 26 April 2024 from <https://medicalxpress.com/news/2017-09-method-human-growth-hormone-anti-doping.html>

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