

Anal Bioanal Chem. 2011 Aug;401(2):449-62. Epub 2011 May 18.

Detecting growth hormone abuse in athletes.

Holt RI.

Developmental Origins of Health and Disease Division, University of Southampton School of Medicine, Southampton, UK. R.I.G.Holt@southampton.ac.uk

It is believed that athletes have been abusing growth hormone (GH) for its anabolic and lipolytic effects since the early 1980s, at least a decade before endocrinologists began to treat adults with GH deficiency. There is an on-going debate about whether GH is performance enhancing. Although many of the early studies were negative, more recent studies suggest that GH improves strength and sprint capacity, particularly when it is combined with anabolic steroids. Although use of GH is banned by the World Anti-Doping Agency (WADA), its detection remains challenging. Two approaches have been developed to detect GH abuse. The first is based on measurement of pituitary GH isoforms; after injection of recombinant human GH, which comprises solely the 22-kDa isoform, endogenous production is down-regulated leading to an increase in the 22-kDa isoform relative to other isoforms. The second is based on measurement of markers of GH action. Insulin-like growth factor-I (IGF-I) and N-terminal pro-peptide of type III collagen (P-III-NP) increase in response to GH administration in a dose-dependent manner. When combined with discriminant function analysis, use of these markers differentiates between individuals taking GH and placebo. Subsequent studies have shown that the test is applicable across different ethnicities and is unaffected by injury. WADA regulations state that when analytes are measured by immunoassay, two assays are needed. Final validation of the marker test is currently being undertaken with modern commercially available immunoassays to finalise the threshold values to be used to determine whether a doping offence has been committed.

PMID: 21590497 [PubMed - indexed for MEDLINE]