

Uso não ético e ilegal de
medicamentos no Esporte

Detecção e uso do hGH
no esporte

ABCD

Autoridade Brasileira
Controle de Dopagem

**Secretaria Nacional de
Esporte,
Educação, Lazer e
Inclusão Social**

ABCD

**Autoridade Brasileira
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Wada
O Código

IOC, IPC, IFs

Governos

NOCs, NPCs,
NFs

NADOs,
RADOs



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Atletas & Comitativa

WADA Technical Document for Sport Specific Analysis

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**Minimum Levels of Analysis for Sports and Disciplines of
Olympic, IOC Recognized and Non IOC Recognized
International Federations**

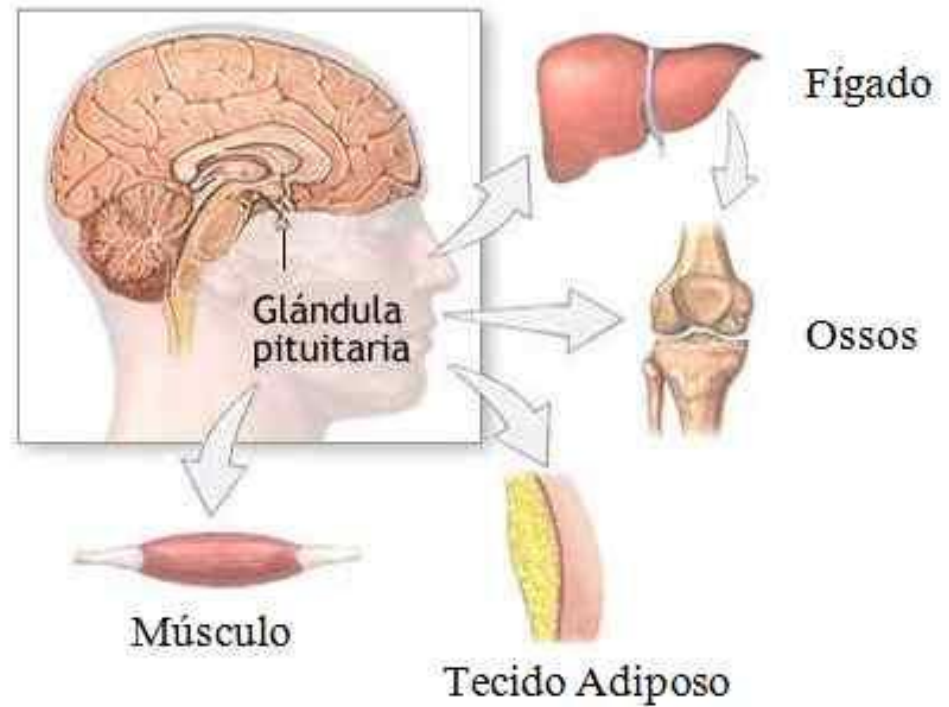
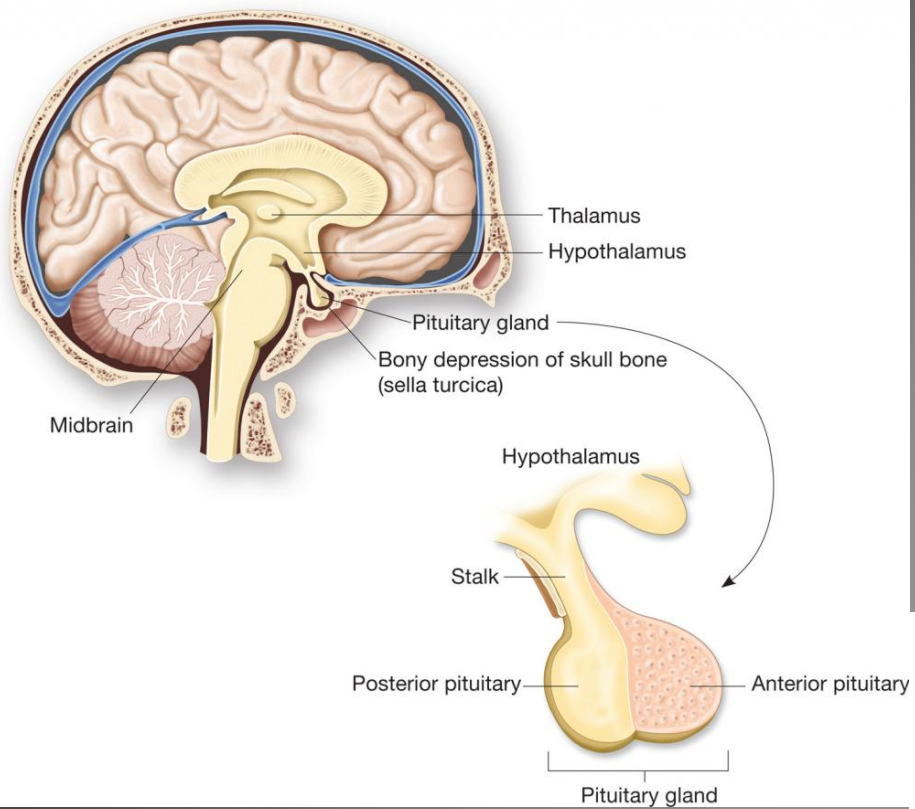
SPORT	DISCIPLINE	ESAs %	GH% 5	GHRF s %
Aquatics	Diving	0	5	5
Aquatics	Swimming Sprint 100m or less	10	10	10
Aquatics	Swimming Long Distance 800m or greater	30	5	5
Aquatics	Swimming Middle Distance 200-400m	15	5	5
Aquatics	Open Water	30	5	5
Aquatics	Synchronized Swimming	10	5	5
Aquatics	Water Polo	10	10	10
Football	Beach Football	5	5	5
Football	Football	10	10	10

What is hGH?

Human growth hormone (hGH) is a hormone that is naturally produced by the body. It's synthesized by cells in the anterior pituitary gland located at the base of the brain.

In serum, hGH exists as a complex combination of different molecular forms (isoforms= 22-kDa and 20-kDa).

It has a short half-life of 10-20 min.



Why Athletes Misuse GH?

GH has a number of **effects on protein anabolism** and intermediate metabolism that may improve exercise performance through **increased fuel and oxygen delivery** to exercising muscle, **increased muscle strength** or any combination of these factors. It may improve cardiovascular function and thermo regulation.

Aspects of GH that are attractive to athletes

- Reduction of body fat
- Increase the muscle mass
- Ergogenic activit (purported)
- Aid in recovery from injury
- Undetectability

Side effects of hGH abuse

- Diabetes
- Worsening cardiovascular diseases
- Muscle, bone and joint pain,
- Hypertension
- Cardiac deficiency,
- Abnormal growth of organs,
- Accelerated osteoarthritis.

Challenges in the Detection of GH Misuse

- rhGH has an identical amino acid sequence to the native 22-kDa isoform of the hormone,
- It has a short half-life (<20 min) ,
- Exercise and stress are potent stimulators of GH secretion .

HGH testing procedure

- The hGH production differs in different people. For adult males, it ranges between 0-5 nanogram per milliliter (ng/ml), while in women in ranges from 0-10 ng/ml.
- Doping with recombinant hGH (recGH) alters the naturally constant proportions between the different isoforms of hGH present in blood. (ISOFORM APPROACH)

The measurements of IGF-1 and P-III-NP to hGH markers in serum uncover the manipulation of the hGH/IGF-1 (MARKERS APPROACH)

Development of A Test to Detect GH Misuse

- Two different yet complementary approaches
- 1- The pioneered by Christian Strasburger, Martin Bidlingmaier and Zida Wu in Germany, is based on the detection of different pituitary GH isoforms,
- 2- The second, which was developed by the GH-2000 and GH-2004 teams, utilizes the measurement of GH-sensitive (bio)markers.

Serum - Soro

Coleta de sangue para análise **no soro** detecção de **GH, HBOC y ESA**):

Número de amostras: **2** (uma A e uma B).

- Volumen requerido: 2 x 5mL .
- Tubos BD Vacutainer® **SSTTM-II, EU ref. 367955 o BD Vacutainer® SSTTM-II PlusAdvance, ref. UE 367954**).
- Se extrai o sangue dentro de un tubo que tem un gel polimérico inerte separador de soro e um fator de activação da coagulação.
- O conteúdo deve ser homogeneizado logo que seja possível após a coleta (por exemplo, os tubos devem ser suavemente rodados pelo menos três vezes). O conteúdo será então enviado ao Laboratório sem nenhuma outra ação.



Serum - Soro



- Coleta de sangue para análise de Substâncias e Métodos Proibidos **no soro** (por exemplo, detecção de **GH, HBOC y ESA**):
 - Número de amostras: 2 (uma amostra A e uma amostra B).
 - Volumen requerido: 2 x 5mL (ou volume especificado pelo Laboratório pertinente).
 - Tubos BD Vacutainer® SSTTM-II, EU ref. 367955 o BD Vacutainer® SSTTM-II PlusAdvance, ref. UE 367954).
- Se extrai o sangue dentro de um tubo que tem un gel polimérico inerte separador de soro e um fator de activação da coagulação.
- O conteúdo deve ser homogeneizado logo que seja possível após a coleta (por exemplo, os tubos devem ser suavemente rodados pelo menos três vezes). O conteúdo será então enviado ao Laboratório sem nenhuma outra ação.



The Isoform Method

This method was introduced prior to the 2004 Athens Olympic Games and subsequently improved when the assays used for the method were commercialized. Later applied at the 2006 Torino Winter Games.

The currently applied tests kits were firstly used during 2008 European Football Championship and 2008 Olympic Games Beijing.

The GH-2000 Marker Method

The GH-2000 marker method measures two serum proteins, insulin-like growth factor-I (IGF-I) and N-terminal propeptide of type III procollagen (P-III-NP),

This method was first conceived by Peter Sönksen. Both IGF-I and P-III-NP have little diurnal or day-to-day variation, low intraindividual variation and only change minimally in response to exercise.

The GH-2000 Marker Method

The hGH Biomarkers test was introduced for testing in **2012 London Olympic Games**.

The markers decline with age as endogenous GH secretion declines and a factor relating to the inverse of age is also included in the formulae.

The Isoform and biomarkers Approach are reliable?

There have been approximately 15 AAF of the hGH Isoform test and only 2 AAF with the application of the hGH Biomarkers.

During the 2015 Report only 5 AAF were reported.

When do you should use Isoform and biomarkers Approach are ?

hGH Isoform test has a short window of detection – **24-48 hours** from the use.

Biomarkers test – window of detection from **48 hours to 2 weeks** from the use.

During the 2015 Report only 5 AAF were reported.



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OBRIGADO!

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