MICROWELL ELISA
HUMAN GROWTH HORMONE (HGH)

ENZYME IMMUNOASSAY TEST KIT
Catalog Number. 10003

Enzyme Immunoassay for the Quantitative Determination of Human Growth Hormone (HGH) Concentration in Human Serum

Introduction

Human growth hormone (HGH, somatotropin) is a polypeptide secreted by the anterior pituitary. It is 191 amino acids in length and has a molecular mass of approximately 22,000 daltons. Its metabolic effects are primarity anabolic. HGH promotes protein conservation and is engaged in a wide range of mechanisms for protein synthesis. It also enhances glucose transport and facilitates glycogen storage. Its cascade of growth-promoting action is mediated by another family of peptide hormones, the somatomedins. HGH measurement is primarily of interest in the diagnosis and treatment of various forms of abnormal growth hormone secretion. Disorders caused by hyposecretion include dwarfism and unattained growth potential, and hypersecretion is associated with gigantism and acromegaly.
Caution must be exercised in the clinical interpretation of growth hormone levels. These vary throughout the day, making it difficult to define a normal range or to judge an individual's status based on a single determination. Many factors are known to influencec the rate of growth hormone secretion, including periods of sleep and wakefulness, exercise, stress, hypoglycemia, estrogens, corticosteroids and L-dopa. Because of its similarity to prolactin and placental lactogen, earlier growth hormone immunoassays were often plagued with falsely high values in pregnant and lactating women.

Because not all acromegalic individuals have elevated baseline levels of growth hormone, suppression tests based on glucose loading are of value in this context. In spite of the induced hyperglycemia, there is rarely a decrease from baseline levels in acromegaly.
Growth hormone-deficient individuals have fasting and resting levels similar to those found in normal individuals. Various challenge tests have therefore been devised to differentiate them. For example, with the onset of deep sleep or after 15 to 20 minutes of vigorous exercise, growth hormone levels normally rise. Other tests of growth hormone responsiveness are based on the administration of L-dopa, arginine and insulin. Propanolol or estrogen are sometimes given in conjunction with the primary stimulus to accentuate the response.

A small number of dwartism cases have been documented in which both the basal level of HGH and the response to challenge testing were normal. Such cases may involve tissue insensitivity to either growth hormone or the somatomedins, or immunoreactive but biologically inactive growth hormone.

The Human Growth Hormone Enzyme Immunoassay provides a rapid, sensitive and reliable test. There is no cross-reactivity with HCG, TSH, LH, FSH and prolactin.

Principle of the test

The HGH Quantitative Test Kit is based on the principle of a solid phase enzyme-linked immunosorbent assay. The assay system utilizes a polyclonal anti-HGH antibody for solid phase (microtiter wells) immobilization and a mouse monoclonal anti-HGH antibody in the antibody-enzyme (horseradish peroxidase) conjugate solution. The test sample is allowed to react simultaneously with the antibodies, resulting in HGH molecules being sandwiched between the solid phase and enzyme-linked antibodies. After a 60–minute incubation at room temperature, the wells are washed to remove unbound labeled antibodies. A solution of TMB is added and incubated for 20 minutes, resulting in the development of a blue color. The color development is stopped with the addition of 2N HCl, and the color is changed to yellow and measured spectrophotometrically at 450 nm. The concentration of HGH is directly proportional to the color intensity of the test sample.

Intended use

For the quantitative determination of human growth hormone (HGH) concentration in human serum.

Materials and components

Materials provided with the test kits:
- Antibody-coated microtiter wells.
  Reference standard set, contains 0, 1.0, 2.5, 7.5, 15 and 30ng/mL (WHO, 1st IRP, 66/217) HGH, in liquid form (ready to use) or lyophilized form.
- Enzyme conjugate reagent, 12 mL.
- TMB Substrate, 12 mL.
- Stop Solution, 12 mL.
- Wash Buffer Concentrate (50X),15mL

Materials required but not provided:
- Precision pipettes: 0.05, 0.1, 0.2, and 1.0 mL.
- Disposable pipette tips.
- Distilled water.
- Vortex mixer or equivalent.
- Absorbent paper or paper towel.
- Graph paper.
- Microtiter well reader.

Specimen collection and preparation

Serum should be prepared from a whole blood specimen obtained by acceptable medical techniques. This kit is for use with serum samples without additives only.

Storage of test kits and instrumentation

Unopened test kits should be stored at 2-8°C upon receipt and the microtiter plate should be kept in a sealed bag with desiccants to minimize exposure to damp air. Opened test kits will remain stable until the expiring date shown, provided it is stored as prescribed above. A microtiter plate reader with a bandwidth of 10nm or less and an optical density range of 0-2 OD or greater at 450nm wavelength is acceptable for use in absorbance measurement.

Reagent preparation

1. All reagent should be brought to room temperature (18- 22°C) before use.
2. Dilute 1 volume of Wash Buffer (50x) with 49 volumes of distilled water. For example, Dilute 15mL of Wash Buffer Concentrate (50x) into distilled water to prepare 750 mL of washing buffer (1x). Mix well before use.
3. If reference standards are lyophilized,reconstitute each Standard with 0.5mL distilled water. Allow the reconstituted material to stand for at least 20 minutes. Reconstituted Standards Should be sealed and stored at 2-8°C.

Assay procedures

1. Secure the desired number of coated wells in the holder.
2. Dispense 50µL of standard, specimens, and controls into appropriate wells.
3. Dispense 100µL of Enzyme Conjugate Reagent into each well.
4. Thoroughly mix for 30 seconds. It is very important to have complete mixing in this step.
5. Incubate at room temperature (18-22°C) for 60 minutes.
6. Remove the incubation mixture by flicking plate content into a waste container.
7. Rinse and flick the microtiter wells 5 times with washing buffer(1X).
8. Strike the wells sharply onto absorbent paper or paper towels to remove all residual water droplets.
9. Dispense 100µL of TMB substrate into each well. Gently mix for 5 seconds.
10. Incubate at room temperature in the dark for 20 minutes.
11. Stop the reaction by adding 100µL of Stop Solution to each well.
12. Gently mix for 30 seconds. It is important to make sure that all the blue color changes to yellow color Completely.
13. Read optical density at 450nm with a microtiter reader within 30 minutes.

Important Note

The wash procedure is critical. Insufficient washing will result in poor precision and falsely elevated absorbances readings.

Calculation of results

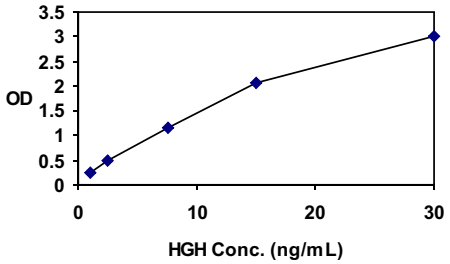
Calculate the mean absorbance value (A_{450}) for each set of reference standards, specimens, controls and patient samples.

Constructed a standard curve by plotting the mean absorbance obtained from each reference standard against its concentration in ng/mL on graph paper, with absorbance values on the vertical or Y axis and concentrations on the horizontal or X axis. Use the mean absorbance values for each specimen to determine the corresponding concentration of HGH in ng/mL from the standard curve.

Example of standard curve

Results of typical standard run with optical density reading at 450nm shown in the Y- axis against HGH concentrations shown in the X-axis.

HGH (ng/mL)	Absorbance (450nm)
0.0	0.052
1.0	0.253
2.5	0.501
7.5	1.158
15.0	2.075
30.0	3.025



This standard curve is for the purpose of illustration only, and should not be used to calculate unknowns. Each user should obtain his or her own data and standard curve.

Expected values and sensitivity

Each laboratory must establish its own normal ranges based on patient population. A normal range for human growth hormone levels is difficult to define because of the normal physiological fluctuations in HGH concentration. In most adult subjects at rest, after an overnight fast, the HGH level in serum is 7 ng/mL or less. Changes in HGH levels in response to various stimuli gives a more accurate assessment of pituitary dysfunction requires provocative tests, either stimulation or suppression.
The minimal sensitivity of the test is 0.5 ng/mL.

Performance characteristics

1.Accuracy: Comparison between Our Kits and commercial available Kits provide the following data
N = 134
Correlation Coefficient = 0.92
Slope = 1.065
Intercept = -0.129
Mean (Our) = 2.22
Mean (DPC) = 1.96
2. Precision
1] Intra-Assay:

Concentrations	Replicates	Mean	S.D.	% CV
Level	20	4.61	0.26	5.74
Level I	20	9.81	0.74	7.58
LevelIII	20	26.07	2.44	9.35

2]. Inter-Assay:

Concentrations	Replicates	Mean	S.D.	% CV
Level	20	4.75	0.56	11.86
Level I	20	9.86	1.25	12.67
LevelIII	20	25.84	2.93	11.35

3. Linearity
Two patient sera were serially diluted with 0 ng/mL standard In a linearity study. The average recovery was 101.9 %.

Sample A			
Dilution	Expected	Observed	% Recov.
Undiluted	25.26	25.26	
2x	12.63	11.67	92.4
4x	6.30	6.18	98.1
8x	3.16	3.24	102.5
16x	1.58	1.67	105.7
Average Recovery: 99.7 %			

Sample B			
Dilution	Expected	Observed	% Recov.
Undiluted	19.97	19.97	
2x	9.98	9.65	98.6
4x	4.99	5.01	99.6
8x	2.49	2.70	108.2
16x	1.25	1.37	109.6
Average Recovery: 104.0 %			

4.Recovery
Various patient serum samples of known prolactin levels were mixed and assayed in duplicate. The average recovery was 101.8 %.

Expected Concentration	Observed Concentration	% Recovery
1.32	1.24	94.3
1.89	1.88	99.5
2.75	2.80	101.8
5.47	5.19	94.9
9.62	10.81	112.4
18.73	20.23	108.0
Average Recovery: 101.8 %		

5.Sensitivity:
The minimum detectable concentration of this assay is estimated to be 0.5 ng/mL.
6.Cross-reactivity
The following human materials were tested for crossreactivity of the assay:

Antigens	Concentration	Equivalent HGH	%Cross-Reactivity
HCG	500,000 mIU/mL	0.0 mIU/mL	0.0
LH	500 mIU/mL	0.0 mIU/mL	0.0
TSH	500 µIU/mL	0.0 mIU/mL	0.0
FSH	500 mIU/mL	0.0 mIU/mL	0.0
Prolactin	500 ng/mL	0.5 mIU/mL	0.1

7.Hook Effect
No hook effect was observed up to 500.0 ng/mL of HGH in This assay.

Limitations of the Procedure

There are some limitation of the assay. We should let our customers know about that.
1)As with all diagnostic tests, a definite clinical diagnosis should not be based on the results of a single test, but should only be made by the physician after all clinical and laboratory findings have been evaluated.
2)Studies have implicated possible interference in immunoassay results in some patients with known rheumatoid factor and antinuclear antibodies. Serum samples from patients who have received infusions containing mouse monoclonal antibodies for diagnostic or therapeutic purposes, may contain antibody to mouse protein (HAMA). Although we have added some agents to avoid the interferences, we cannot guarantee to eliminate all the effects of that.
3)The wash procedure (steps 6-8) is critical. Insufficient washing will result in poor precision and falsely elevated absorbance. The use of tap water for washing could result in a higher background absorbance.

References.

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