

# Endocrinology

## Anterior pituitary hormone

GH, Adrenocorticotropic hormone (ACTH) from adrenal cortex, Thyroid stimulating hormone (TSH), Luteinizing hormone (LH), prolactin.

## posterior pituitary hormone

Antidiuretic hormone (ADH) or vasopressin, oxytocin.

## Adrenal cortex

cortisol, corticosterone, aldosterone.

## Thyroid gland

T<sub>4</sub> (Thyroxine), T<sub>3</sub> or Triiodothyronine, calcitonin

## pancreas

Islets of Langerhans →

- i) Insulin
- ii) Glucagon

## ovaries

Estrogen (E), progesterone (P)

## Testes

Testosterone

## parathyroid gland

parathormone

## placenta

Human chorionic gonadotropin (HCG), which indicates for pregnancy, Estrogen (E), progesterone (P), Human Somatomammotropin.

## • chemistry of Hormone

### ① Steroid Hormone

The chemical structure based on the steroid nucleus similar to that of cholesterol.

#### Example

Cortisol, aldosterone, Estrogen, progesterone, Testosterone.

### ② peptides Hormone

Anterior pituitary hormones are either proteins or derivatives of them.

#### Example

GH, Insulin, Glucagon, parathormone, oxytocin and vasopressin

① Define the source and chemistry of GH.  
Describe the functions of GH.

GH or somatotropin, is a small protein molecule that contains 191 amino acids in a single chain. The molecular weight of GH is 22 kDa. Human GH is produced from hGH-N-chromosome. The structure of GH varies from species to species. GH is ~~large~~ bound to a protein in plasma that is a large fragment of extracellular domain of GH-receptor. GH is metabolized very rapidly with a half life of 6-20 min. About 0.2-1 mg of GH is secreted per day in an adult person.

GH is secreted from the acidophilic cells of anterior pituitary. For these reason anterior pituitary is also called adionohypophysis. Anterior pituitary contains about 5 mg of GH and from which average 0.5 mg is secreted daily. GH receptor is 620 amino acid receptor protein and the hormone act through JAK-STAT pathway.

### Functions of GH

From different experimental and clinical evidences the functions of GH has been identified and experimental evidences is given below —

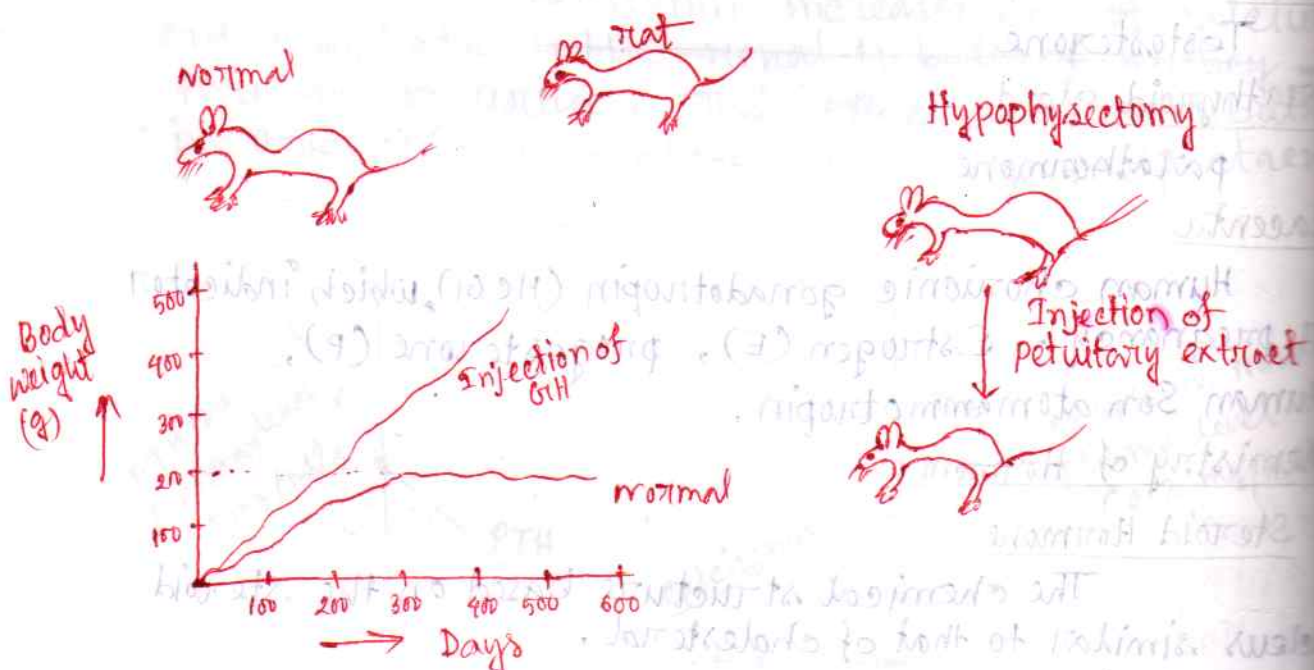


Fig:- Effect of GH on body weight; experimental evidences.

### General functions of GH

① GH has significant role on general body growth and skeletal growth.

② It can increase the rate of protein synthesis in most cells of the body.

④ GH decreases the rate of glucose utilization throughout the body.

### General body growth and skeletal growth

Growth is a complex phenomenon involved in the synthesis of protein. Due to growth the length and size of the body increases with weight. It occurs in an orderly sequence of nutritional changes. In molecular basis, the growth includes cell division, increasing cell size, cell number and weight. Different organs have different rates of growth. Therefore, growth is an organized process including skeletal growth.

GH stimulates the multiplication of epiphysis. This can increase the length of cartilage bones. In hypophysectomized animal a membrane is appeared at the epiphyseal line by which growth is inhibited.

In human the multiplication of epiphyseal cartilage continues up to 20-25 years up to that age bone can grow in length. GH influences the growth of bones in several ways —

- ① By increasing the intestinal absorption of  $Ca^{2+}$ .
- ② By increasing the calcium absorption on the matrix of the bone.
- ③ By increasing the length of the epiphyseal cartilage.

### Effect on protein metabolism

The important mechanism by which the growth hormone increases protein deposition is not well known. GH can effect on protein metabolism by different ways —

#### ① Increase of amino acid transport through the cell membrane

GH directly increases the transport of amino acid into the cell by which the amino acid concentration is increased in the cell. As a result the protein synthesis is increased in the cell.

#### ② Enhancement of RNA translation

When the amino acid concentration is increased, GH increases the RNA translation to cause protein synthesis by the ribosome. Therefore the protein is synthesized in the cell.

#### ③ Increase of transcription of DNA to form RNA

GH can increase the protein synthesis by increasing the rate of transcription. By this process other factors like energy, vitamins and amino acids are also available for growth.