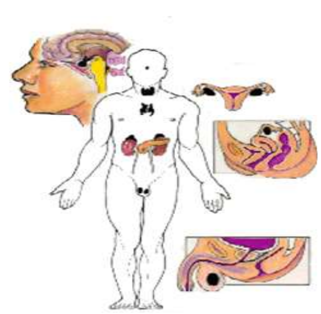
# UNIT-I

# The Endocrine System

## How the endocrine system controls everything

- General Overview
- Basic Anatomy
- Control of the endocrine system
- Specific endocrine events



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# CORTICOSTEROIDS

## INTRODUCTION

**Corticosteroids** are a class of chemicals that includes the steroid hormones that are produced in the adrenal cortex of vertebrates.

Corticosteroids are involved in a wide range of physiological processes, including stress response, immune response, and regulation of inflammation, carbohydrate, metabolism, protein catabolism, blood electrolyte levels, and behavior.

**Glucocorticoids** such as cortisol control carbohydrate, fat and protein metabolism, and are anti-inflammatory by preventing phospholipid release.

**Mineralocorticoids** such as aldosterone control electrolyte and water levels, mainly by promoting sodium retention in the kidney.

Some common natural hormones are corticosterone ,cortisone and aldosterone.

# METABOLISM OF CALCIUM

## CALCIUM:-

After C, 0, H and N, **calcium** is the most abundant body constituent, making up about 2% of, body weight: 1-1.5 kg in an adult. Over 99% of this is stored in bones, the rest being distributed in plasma and all tissues and cells.

Calcium serves important physiological roles.

Calcium is a mineral that is an essential part of bones and teeth. The heart, nerves, and blood-clotting systems also need calcium to work.

Calcium is essential to all living things, and calcium phosphate is the main component of bone. Children and pregnant women are encouraged to eat foods rich in calcium, such as milk and milk products, leafy green vegetables, fish and nuts and seeds, to promote the growth of healthy teeth and bones.

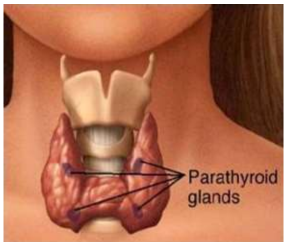
**macrolide,** class of antibiotics characterized by their large lactone ring structures and by their growth-inhibiting (bacteriostatic) effects on bacteria. The macrolides were first discovered in the 1950s, when scientists isolated erythromycin from the soil bacterium *Streptomyces erythraeus*. In the 1970s and 1980s synthetic derivatives of erythromycin, including clarithromycin and azithromycin, were developed.

Macrolides are usually administered orally, but they can be given parenterally. These drugs are valuable in treating pharyngitis and pneumonia caused by *Streptococcus* in persons sensitive topenicillin. They are used in treating pneumonias caused either by *Mycoplasma* species or by *Legionella pneumophila* (the organism that causes Legionnaire disease); they are also used in treating pharyngeal carriers of *Corynebacterium diphtheriae*, the bacillus responsible for diphtheria.

Macrolides work by binding to a specific subunit of ribosomes (sites of protein synthesis) in susceptible bacteria, thereby inhibiting the formation of bacterial proteins. In most organisms this action inhibits cell growth; however, in high concentrations it can cause cell death. Some species of bacteria, including*Streptococcus pneumoniae* and *Staphylococcus aureus*, have been found to carry mutations that alter the macrolide binding site on the ribosomal subunit, which renders the bacteria resistant to the agents. Other mechanisms of resistance to macrolides, including the activation of drug efflux proteins and the production of drug-inactivating enzymes, also have emerged in some strains of bacteria.

Minor side effects of macrolides include nausea, vomiting, diarrhea, and ringing or buzzing in the ears (tinnitus). Serious side effects, including allergic reaction and cholestatic hepatitis (inflammation and congestion of bile ducts in the liver), are generally associated only with the use of erythromycin. Macrolides also have important drug interactions that can lead to adverse affects on the heart.

# PARATHYROID HORMONE




**Parathyroid hormone** (**PTH**), **parathormone** or **parathyrin**, is secreted by the chief cells of the parathyroid glands as a polypeptide containing 84 amino acids.

It acts to increase the concentration of calcium ($Ca^{2+}$) in the blood, whereas calcitonin (a hormone produced by the parafollicular cells (C cells) of the thyroid gland) acts to decrease calcium concentration.

PTH secretion is mainly controlled by the concentration of free calcium in the plasma---low plasma ca ion stimulates secretion and vice-versa by acting upon the parathyroid hormone 1 receptor (high levels in **bone** and **kidney**) and the parathyroid hormone 2 receptor (high levels in the **central nervous system, pancreas, testis**, and **placenta**).

PTH half-life is approximately 4 minutes.

# Glucagon:-

is a peptide hormone, produced by alpha cells of the pancreas. It works to raise the concentration of glucose in the bloodstream. Its effect is opposite that of insulin, which lowers the glucose.

The pancreas releases glucagon when the concentration of glucose in the bloodstream falls too low. Glucagon causes the liver to convert stored glycogen into glucose, which is released into the bloodstream.

High blood-glucose levels stimulate the release of insulin. Insulin allows glucose to be taken up and used by insulin-dependent tissues.

Thus, glucagon and insulin are part of a feedback system that keeps blood glucose levels at a stable level. It increases energy expenditure and is elevated under conditions of stress.

Glucagon belongs to a family of several other related hormones.

# The role of glucagon in the body:-

Glucagon plays an active role in allowing the body to regulate the utilisation of glucose and fats.

Glucagon is released in response to low blood glucose levels and to events whereby the body needs additional glucose, such as in response to vigorous exercise.

When glucagon is released it can perform the following tasks:

- Stimulating the liver to break down glycogen to be released into the blood as glucose
- Activating gluconeogenesis, the conversion of amino acids into glucose
- Breaking down stored fat (triglycerides) into fatty acids for use as fuel by cells