Lecture No.11

Prostaglandins are a group of hormone-like lipid compounds that are derived enzymatically from fatty acids and have important functions in the animal body. Every prostaglandin contains 20 carbon atoms,including a 5-carbon ring.

Thena me *prostaglandin* derives from the prostate gland, when prostaglandin was first isolated from seminal fluid. It was later shown that many other tissues secrete prostaglandins for various functions Prostaglandins are potent but have a short half-life before being inactivated and excreted. Therefore, they send only paracrine (locally active) or autocrine (acting on the same cell from which it is synthesized) signals

Function

There are currently ten known prostaglandin receptors on various cell types.

Type	function
prostacyclin I_2 (PGI_2)	Vasodilatation inhibit platelet aggregation bronchodilation
prostaglandin E_2 (PGE_2)	smooth muscle contractionGI tract bronchodilation GI tract smooth muscle relaxation vasodilation ↓ gastric acid secretion ↑ gastric mucus secretion uterus contraction (when pregnant) lipolysis inhibition ↑ autonomic neurotransmitters [7]
($PGF_{2\alpha}$)prostaglandin $F_{2\alpha}$	uterus contraction bronchoconstriction

Clinical uses

Synthetic prostaglandins are used:

- To induce childbirth (parturition) or abortion (PGE_2 or PGF_2, with or without mifepristone, a progesterone antagonist);
- To prevent and treat peptic ulcers (PGE)
- As a vasodilator in severe Raynaud's phenomenon or ischemia of a limb
- In treatment of glaucoma (as in bimatoprost ophthalmic solution, a synthetic prostamide analog with ocular hypotensive activity) (PGF2α)
- As an ingredient in eyelash and eyebrow growth beauty products due to side effects associated with increased hair growth

Gastrointestinal Hormones

1. **Gastrin is produced by G cells of the antral glands** Of the duodenum and small intestine. It affects the Motility and trophics of the gastric and intestinal mucosa.
2. **Cholecystokinin (CCK) is produced by I cells of** the duodenum and upper jejunum. As most important function is considered to be the stimulation of the secretion of pancreatic juice, induction of the contractions of the gallbladder and relaxation of Oddi's sphincter, as well as the lower esophageal sphincter.
3. **3. Gastrin-releasing peptide (GRP) occurs** in nerves, stomach and intestines. It is a strong stimulator of gastrointestinal peptides i.e. of gastrin, PP, CCK, motilin, neurotensin, enteroglucagon, glucagon, insulin and somatostatin.
4. **Somatostatin (SMS) – is produced by endocrine** and paracrine D cells in the entire intestine. It inhibits the motility in GIT and exocrine and endocrine secretions.
5. **Secretin is produced by S cells of the duodenum** and jejunum. It stimulates the secretion of fluid and bicarbonates in pancreas, large intestine, and secretion of pepsin in the stomach. It inhibits the secretion of HCl, motility of the stomach and the tonus of the lower oesophageal sphincter.

6. **Motilin is produced in M cells of the duodenum.** It induces the contractile activity of the stomach and intestines.
7. **Neurotensin is produced by N cells and nerves in** the ileum and large intestine. It decreases the gastric, intestinal and pancreatic secretions and blood perfusion. It stimulates the smooth muscles of the large intestine. By its means, the so-called ileal brake takes place, which is a delayed peristalsis in the small intestine in the instance when the chyme enters the duodenum.

The pineal gland or *epiphysis* synthesizes and secretes melatonin

The pineal gland is a small organ shaped like a pine cone (hence its name). It is located on the midline. It produces melatonin, a serotonin derived hormone, which affects the modulation of sleep patterns.

The precursor to melatonin is serotonin, a neurotransmitter that itself is derived from the amino acid tryptophan. Within the pineal gland, serotonin is acetylated and then methylated to yield melatonin.

Melatonin is a hormone that is produced by the pineal gland in the brain. Melatonin levels vary in 24 hour cycles and are controlled by our body clock. Normally its production is reduced by being in bright light. Levels increase at night. This is why it is often called 'the hormone of darkness'. But in fact the word melatonin itself means 'skin whitening'. This is due to how it affects skin in some animals. But it does not change the skin color of humans. Some plants have small amounts of melatonin as well. These include plants we use as food.

Serotonin is a monoamine neurotransmitter. Biochemically derived from tryptophan serotonin is primarily found in the gastrointestinal tract (GI tract), platelets, and the central nervous system (CNS) of animals, including humans.

- Most serotonin is found in the gut cells and used to control intestinal movement. Serotonin has various other functions such as the regulation of: Appetite, Cognitive functions such as learning and memory, Mood, Sleep, Mental health, Depression, Aggression.

- Serotonin is seen more in men than women because women don't make as much serotonin as men. This is why reason women tend to suffer from depression more often than men.