

Lecture no. 11

EICOSANOIDS

1. *Eicosanoids* are a large group of molecules derived from **20 carbon polyunsaturated fatty acids**.
2. The principal groups of hormones of this class are **prostaglandins (PG), prostacyclins, leukotrienes (LT), thromboxanes (TX) and lipoxins (LX)**.
3. Arachidonic acid is the most abundant precursor for these hormones.
4. Stores of arachidonic acid are present in membrane lipids and released through the action of various lipases.
5. The specific eicosanoids synthesized by a particular cell are dictated by the group of processing enzymes expressed in that cell.
6. Phospholipase A₂ releases arachidonic acid from membrane phospholipids.
7. The released arachidonic acid is converted to prostaglandin H₂ (PGH₂) by *cyclic oxygenase 1* (Cox 1) and *cyclic oxygenase 2* (Cox 2) enzymes.
8. PGH₂ is converted to prostacyclins, thromboxanes and prostaglandins by isomerase enzymes present in tissues.
9. Thromboxane A₂ is synthesized by platelets and promotes vasoconstriction and platelet aggregation.
10. Prostacyclin is produced in the lungs and vascular endothelium, inhibits platelet aggregation and produces vasodilatation.
11. Leukotrienes mediate allergic response and inflammation.

Prostaglandins(PG)

1. Von Euler in 1934 isolated and named a substance isolated from seminal fluid as prostaglandins.

2. Unlike the other hormones, prostaglandins are not localized in any particular tissue.
3. Most prostaglandins act locally at the site of their production on a cell interaction–paracrine effect and also act by autocrine mechanism.
4. Prostaglandins have varied functions particularly important in female reproduction, parturition, cardiovascular system.
5. They play a prominent role in causing pain, inflammation and fever.
6. PGs may be considered to regulate several physiological functions such as contraction of smooth muscles in reproductive organs, and functions in erection, ejaculation, sperm transport, ovulation and also luteolysis.
7. They also regulate blood pressure, lipolysis, gastric secretion and blood clotting.
8. High levels of estrogen promote oxytocin receptors in the endometrium stimulatePGF₂ alpha synthesis and its secretion from the endometrium.
9. PGF₂ alpha potentiates the contractions of the uterus by estrogen during parturition.
10. In females PGF₂ α is involved in the follicular rupture and ovulation, also aids sperm transport in males. From endometrium PGF passes directly through the walls of utero-ovarian vein into artery by counter current mechanism and causes vasoconstriction of the blood vessels supplying the CL, the hypoxia in CL leading to *luteolysis*.