SYSTEMATIC REVIEW OF THE ROLE OF PROSTAGLANDINS

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ABSTRACT

The prostanoids are part of a family of biologically active lipids derived from the action of cyclooxygenases or prostaglandin synthases upon the twenty"carbon essential fatty acids or eicosanoids. They can be further subdivided into the main groups, the prostaglandins, prostacyclins and thromboxanes, each of which is involved in some aspect of the inflammatory response. The prostaglandins were first isolated from semen and named from the prostate gland, thought to be their source, as long ago as the 1930s, but it was the 1960s before the biosynthetic relationship to specific essential fatty acids was described and intensive research into their biological properties began. The Nobel Prize for Medicine for 1982 was given to Professors Bengt Samuelsson, John Vane and Sune Bergstrom for their discoveries in this field (see the review by Samuelsson cited below). In general, prostaglandins occur at very low levels in tissues, of the order of nanomolar concentrations, but they have profound biological activities. Mostly used in drug in misoprostol, riprostrol, enprostil and arbaprostil prostacyclin all the prostaglandins analogous PGs present in human bronchi, cardiac muscles lungus, menstrual fluid, semen, stomach mucosa, vagus nerve, placenta blood vessels bronchi, cardiac muscles lungus, menstrual fluid, semen, stomach mucosa, vagus nerve, placenta blood vessels. They both sustain homeostatic functions and mediate pathogenic mechanisms, including the inflammatory response. They are generated from arachidonate by the action of cyclooxygenase (COX) isoenzymes and their biosynthesis is blocked by nonsteroidal anti-inflammatory drugs (NSAIDs), including those selective for inhibition of COX-2.

Keywords- PGE₂, PGF₂, PGD₂, PGI₂, eicosanoids, smooth muscles.
INTRODUCTION

The eicosanoids are used as signaling molecules. They generally act locally, either affecting cell that makes them or nearby cells; in most cases, eicosanoids are not systemic hormones, because of their short half-lives. A general structure of the prostaglandins is all naturally occur in 1933, Maurice goldblat and von Euler independently found that a humoral principal present in the human seminal fluid lead to both smooth muscles contraction and vaso-contriction. Euler(1935) 1962 Samuelsson, Bergstrom et al. elucidated structures of PGE1 & PG F2α, 1964 Bergstrom - Biosynthesis of PGE2 from A. identified the lipid soluble nature of that component Prostaglandins are unsaturated carboxylic acids, consisting of of a 20 carbon skeleton that also contains a five member ring and are based upon the fatty acid, arachidonic acid. There are a variety of structures one, two, or three double bonds. On the five member ring there may also be double bonds, a ketone, or alcohol groups. It convenient to name prostaglandins as derivatives of C-20 acid, the latter is 7-octylcycloprntantyl) heptanoic acid different prostaglandins are designated by letters. They differ from each other 1930 Kurzrok & Lieb with regard to function on the five membered ring.

In structure, they are best considered as derivatives of a C 20 saturated fatty acid, prostanoic acid, which does not itself occur in nature. A key feature is a five-membered ring encompassing carbons 8 to 12, as illustrated below. The thromboxanes are similar but have heterocyclic oxane structures. They are all synthesised by specific enzymes, which confer stereospecificity and chirality on every functional group, and are thus distinct from the isoprostanes, which are produced by non enzymic means. In the approved nomenclature, each prostaglandin is named using the prefix ‘PG’ followed by a letter A to K depending on the nature and position of the substituents on the ring. Thus PGA to PGE and PGJ have a keto group in various positions on the ring, and are further distinguished by the presence or absence of double bonds or hydroxyl groups in various positions in the ring. PGF has two hydroxyl groups while PGK has two keto substituents on the ring. PGG and PGH are bicyclic endoperoxides. An oxygen bridge between carbons 6 and 9 distinguishes prostacyclin (PGI). Thromboxane A (TXA) contains an unstable bicyclic oxygenated ring structure, while thromboxane B (TXB) has a stable oxane ring. In addition, all prostaglandins have a hydroxyl group on carbon 15 and a trans double bond at carbon 13 of the alkyl substituent (R2). Further, a numerical subscript (1 to 3) is used to denote the total number of double bonds in the alkyl substituents, and a Greek subscript (α or β) is used
with prostaglandins of the PGF series to describe the stereochemistry of the hydroxyl group on carbon 9.

![Prostanoic Acid Nomenclature](image)

**Figure No 1. Nomenclature of Prostanoic Acid**

**Biosynthesis of prostaglandins**

Archidonic acid (5,8,11,14-Ecostetraenoic acid) is the precursor for most of the prostaglandins in human. It occurs in the endoplasmic reticulum. Release of archidonic acid from membrane bound phospholipids by phospholipase A2-this reaction occurs due to a specific stimuli by hormones such as epinephrin or bredikinine. Oxidation and cyclization of archidonic acid to PGH2 by reduced glutathion dependent peroxidase. PGH2 serves as the immediate precursor for the synthesis of a number of prostaglandins, including prostacyclins and thromboxanes. Blood vessel endothelial cells especially produce prostacyclins inhibits platelet aggregation at 1-10nM concentrations. Potent vasodilator (5X PGE), Uterine muscle relaxation, Inhibit gastric acid secretion like PGEs. Fish oils are high in polyunsaturated fatty acids such as eicosapentaenoic acid (5 double bonds). This gives rise to PGI3 and TBX3 which are richer in unsaturation. The resulting TBX3 are less active than the corresponding TBX2 in promoting platelet aggregation. (figureno1) This is thought to decrease the incidence of heart attacks in individuals who consume fish as a major protein source.
The fatty acid arachidonate is often esterified to OH on C2 of glycerophospholipids, especially phosphatidyl inositol. Arachidonate is released phospholipids by hydrolysis catalyzed by Phospholipase A2. (figure no 3)

- This enzyme hydrolyzes the ester linkage between a fatty acid and the OH at C2 of the glycerol backbone, releasing the fatty acid & a lysophospholipid as products.
- Corticosteroids are anti-inflammatory because they prevent inducible Phospholipase A2 expression, reducing arachidonate release.  

Figure No 2. Biosynthetic pathway of prostanoids
There are multiple Phospholipase A₂ enzymes, subject to activation via different signal cascades. The inflammatory signal platelet activating factor is involved in activating some Phospholipase A₂ variants. Attempts have been made to develop drugs that inhibit particular isoforms of Phospholipase A₂ treating antiinflammatory diseases. Success has been limited by the diversity of Phospholipase A₂ enzymes, and the fact that arachidonate may give rise to inflammatory eicosanoids in different tissues. Prostaglandin H₂ Synthase catalyzes the committed step in the “cyclic pathway” that leads to production of prostaglandins, prostacyclin and thromboxanes. Different cell types convert PGH₂ to different compounds. Synthase PGH₂ is a heme-containing dioxygenase, bound to ER membranes. (A dioxygenase incorporates O₂ into a substrate). PGH₂ Synthase exhibits 2 activities: cyclooxygenase & PGH₂ Synthase (expressing both cyclooxygenase & peroxidase activities) is sometimes referred to as...
Cyclooxygenase, abbreviated COX. The interacting cyclooxygenase and peroxidase reaction pathways are complex A peroxide (such as that generated later in the reaction sequence) oxidizes the heme iron. The oxidized heme accepts an electron from a near by tyrosine residue (Tyr385). The resulting tyrosine radical is proposed to extract a H atom from arachidonate, generating a radical species that reacts with O₂. The signal molecule ·NO (nitric oxide) may initiate prostaglandin synthesis by reacting with superoxide anion (O₂⁻) to produce peroxynitrite, which oxidizes the heme iron enabling electron transfer from the active site tyrosine. Prostaglandin synthesis in response to some inflammatory stimuli is diminished by inhibitors of Nitric Oxide Synthase. (figure no 3) Non-steroidal anti-inflammatory drugs (NSAIDs), such as aspirin and derivatives of ibuprofen, inhibit cyclooxygenase activity of PGH₂ Synthase. They inhibit formation of prostaglandins involved in fever, pain, & inflammation. They inhibit blood clotting by blocking thromboxane formation in blood platelets. Ibuprofen and related compounds block the hydrophobic channel by which arachidonate enters the cyclooxygenase active site. Aspirin acetylates a serine hydroxyl group near the active site, preventing arachidonate binding. The inhibition by aspirin is irreversible. However, in most body cells re-synthesis of PGH₂ Synthase would restore cyclooxygenase activity. Thromboxane A₂ stimulates blood platelet aggregation, essential to the role of platelets in blood clotting⁹,¹⁰,¹¹.

**PG Present in Fish Oils**

Fish oils are high in polyunsaturated fatty acids such as eicosapentaenoic acid (5 double bonds). This gives rise to PGI₃ and TBX₃ which are richer in unsaturation. The resulting TBX₃ are less active than the corresponding TBX₂ in promoting platelet aggregation. This is thought to decrease the incidence of heart attacks in individuals who consume fish as a major protein source⁹.

**Function of prostaglandins**

**Thromboxanes**
- Thromboxanes (Tx) are extremely potent stimulators of platelet aggregation.
- Txs are produced by platelets.
- The pathway of Tx-stimulated platelet aggregation is extremely sensitive to inhibition by acetylsalicylic acid.
- Uterine muscle.
- Nonpregnant – contraction.
• Vasoconstrictor

**PGE\(_2\)**

PGEs are vasodilators for arterioles, pre-capillary sphincters, postcapillary venules Blood pressure decreases
• Blood flow to organs increases
• Cause hypotension
• Suppress immune response (PGE\(_2\) prevents B cells from maturing to B plasma cells.
• Uterine muscle
• nonpregnant – relaxation
• pregnant – low conc – contraction – high – relaxation
• Inhibit gastric acid secretion (volume, acidity, pepsin activity)
• Stimulate water and electrolyte exit to small intestine.
• PGE\(_2\) is probably involved in affecting pyrogen-induced fever.

**PGF\(_2\)**

• It is a potent constrictor in pulmonary veins and arteriesPGF\(_{2a}\) has different effects in different tissues
• but doesn’t alter blood pressure
• Uterine muscle
• contraction
• In general, PGs shorten intestinal transit time\(^{12}\)

**PGI\(_2\)**

• Blood vessel endothelial cells especially produce prostacyclins
• inhibits platelet aggregation at 1-10nM concentrations
• Potent vasodilator (5X PGE)
• Uterine muscle relaxation
• Inhibit gastric acid secretion like PGEs

**PGD\(_2\)**

• PGDs cause vasodilation in low concentrations and vasoconstriction in high concentrations(figure no 12)
• May be involved in sleep.\(^{13,14}\)
Receptors

- Prostaglandin receptors are specified by the same letter code. E.g., receptors for E-class prostaglandins are EP. Thromboxane receptors are designated TP. Multiple receptors for a prostaglandin are specified by subscripts (E.g., EP$_1$, EP$_2$, EP$_3$, etc.) Different receptors for a particular prostaglandin may activate different signal cascades.

- Prostaglandins & related compounds are transported out of the cells that synthesize them. Most affect other cells by interacting with plasma membrane G-protein coupled receptors. Depending on the cell type, the activated G-protein may stimulate or inhibit formation of cAMP, or may activate a phosphatidyl inositol signal pathway leading to intracellular Ca$^{++}$ release. (figure no 5)

- Effects of a particular prostaglandin may vary in different tissues, depending on which receptors are expressed. E.g., in different cells PGE$_2$ may activate either stimulatory or inhibitory or G-proteins, leading to either increase or decrease in cAMP formation. 12,13,14

Figure No 4. Phylogenetic Tree of Lipid G Protein–Coupled Receptors

Figure modified with permission from Shimizu (181).
Effects of Aspirin and other Pain Killers: - When you see that prostaglandins induce inflammation, pain, and fever, what comes to mind but aspirin. Aspirin blocks an enzyme called cyclooxygenase, COX-1 and COX-2, (figure no 4) which is involved with the ring closure and addition of oxygen to arachidonic acid converting to prostaglandins. COX-1 is essential for thromboxane formation in blood platelets, and for maintaining integrity of the gastrointestinal epithelium. COX-2 levels increase in inflammatory diseases such as arthritis. Inflammation is associated with up-regulation of COX-2 & increased amounts of particular prostaglandins. COX-2 expression is increased in some cancer cells. 

![Diagram of COX enzyme activity]

**Figure No 5. Ratio of Cox1 and Cox2 for Nsaid NSAIDs as inhibitors of COX-1 and COX-2**

There are two COX enzymes COX-1 and COX-2.11 These proteins are structurally distinct, have the same molecular weight, and show 60% homology of their DNA.16 Their difference resides in their substrate binding sites, which are smaller in COX-1 than in COX-2. The active site of COX lies in a narrow hydrophilic tunnel composed of an active inner site and protected by an outer area that is made up of three α helices. NSAIDs attach to these outer helices and temporarily prevent the passage of arachidonic acid from reaching the active site and triggering the production of prostaglandins.17 COX-1 is constitutively expressed in most cells and is involved in physiological processes. In the GI tract, prostacyclin and PGE2 exert a protective effect by reducing acid secretion, vasodilatation of blood vessels of gastric mucosa, and stimulation of mucus production, which acts as a barrier. In the kidneys, prostaglandins play a key role in regulating blood flow and enhancing organ perfusion. COX-
1 expression is also found in fetal and amniotic cells, uterine epithelium in early pregnancy, and the central nervous system and is believed to exert complex integrative functions. On the other hand, COX-2 was considered to be induced by inflammation and the presence of proinflammatory cytokines and mitogens. It has been suggested that the anti-inflammatory action of NSAIDs is due to the inhibition of COX-2, whereas COX-1 inhibition is associated with unwanted effects related to interference of the regulatory and protective mechanisms.

However, recent studies have indicated that COX-2 is also constitutively expressed in the brain and, in particular, in the hippocampus and cortical glutaminergic neurons, as well as in the kidneys, uterus, and prostate. Similarly, COX-1, despite its constitutive expression, is shown to participate in inflammation (e.g., lipopolysaccharide-induced inflammation) where it might be inducible. According to the results of various studies on the ranking scheme in terms of COX-2 selectivity, one can consider rofecoxib, celecoxib, and meloxicam as posing the higher COX-2 selectivity, followed by ibuprofen, diclofenac, and piroxicam. Aspirin, indomethacin, and ketorolac have the lowest COX-2 selectivity.

Role In CNS

Neuroinflammation and Neurodegeneration

Neuroinflammation plays a key role in the progression or resolution of pathological conditions. Inflammatory responses in the brain parenchyma have been associated with the etiopathogenesis of different neurological disorders, including central nervous system (CNS) infection, brain ischemia, multiple sclerosis, Alzheimer’s disease, and Parkinson’s disease.

Sleep

Infused into the cerebral ventricles PGD₂ induces natural sleep activating of DPI Receptor and secondary release of adenosin

Neurotransmission

PGE compound inhibit the release of norepinephrine from sympathetic nerve ending. nsaid increase norepinephrine release

Allergic

Motion shicknes, pain condition proucing prostaglandines biosynthesis leading to the formation of PGE₂ in hypothalamus, along with histamin and bradikinin cause pain.
Cancer
There has been significant interest in the role of prostaglandins and COX-2 in the development of malignancies. NSAIDs reduced colon cancer by 40-50%.

Pregnancy and Prostaglandins
Prostaglandins are sometimes used in the induction or labor. The prostaglandin PGE2, administered vaginally, causes the uterus to contract, sometimes triggering labor and the onset of regular contractions. PGE2 also primes the cervix for delivery and labor. The prostaglandin Misoprostol (PGE1) can also be used in induction of labour and are more commonly used because they can be administered both vaginally or orally. Women normally need two doses of prostaglandin, given four to six hours apart, for the cervix to be ready for delivery and labour contractions to occur regularly."\(^{28,29}\)

Glaucoma and Prostaglandins
Glaucoma refers to a group of diseases that affect the optic nerve and can cause blindness. Prostaglandin analogs are prescription eye drops used to treat glaucoma. Prostaglandin analogs reduce the inflammation inside the eye by relaxing muscles around the eye. As the muscles relax, the eye is allowed to excrete fluid more efficiently. As the pressure and inflammation inside the eye reduces, the possibility of nerve damage and blindness is reduced as well. Side effects associated with prostaglandin analogs are stinging and burning when the drops are put in the eye and darkening of the eye due to an increase of pigmentation."\(^{28,29,30}\)

Mens Health and Prostaglandins
Prostaglandins are important for men's health and problems with erectile dysfunction. Prostaglandin E1 is produced during erection by the muscle cells in the penis. Prostaglandin activates an enzyme that initiates calcium release by the smooth muscle cells, which relaxes them and allows blood flow. During erectile dysfunction, the prostaglandin is not being produced, causing the muscle not to receive adequate blood flow. Erectile dysfunction medications release prostaglandin E1 into the blood stream, allowing the prostaglandin E1 to relax the muscle to receive adequate blood flow, and then causing the erection."\(^{29,30}\)

Other uses of Prostaglandins
Prostaglandins are used to create blood clots when a blood vessel is damaged. The body naturally produces the prostaglandins that are released to the walls of blood vessels when this
is needed. However, during extreme injury, prostaglandins can be injected into the body, to help with the clotting of the blood in the particular area\textsuperscript{30, 31}

**Protective Pharmacological Roles**

Protective roles of prostaglandins include the regulation of inflammation in case of injury or infection, blood clot formation in damaged blood vessels, blood clot destruction in healthy blood vessels, inhibition of stomach acid production, and secretion of protective mucus in the stomach and gut.\textsuperscript{30, 31, 32}

**Clinical Applications**

The numerous clinical uses of prostaglandins include the initiation of childbirth or abortion, the management of newborns with certain heart defects, the prevention and treatment of peptic ulcers, and the treatment of glaucoma, impotence and pulmonary hypertension.\textsuperscript{30, 31, 32}

**Prostaglandins & Hair Growth**

Hair, specifically eyelashes and eyebrows, will show growth within eight to twelve weeks of prostaglandin usage. Hair growth on the head can take longer.

**Lung**

PGE\textsubscript{2} can have anti-inflammatory and anti-asthmatic effects by activating the EP3 receptor. The role of PGD\textsubscript{2} is more complex, but it may be pro-inflammatory.\textsuperscript{32, 33}

**Inflammatory Response Activation**

Prostaglandins are produced when tissue is injured and white blood cells rush to the site to minimize the effects of injury. Prostaglandins function to activate an inflammatory response, which is the body's way of neutralizing an infection caused by internal or external stimuli (burns, toxins, frostbite, radiation and splinters).\textsuperscript{32, 33}

**Clotting**

Blood clots when vessels are injured. According to an article published by the Department of General Internal Medicine and Nephrology at the Universitäts-Klinikum in Steglitz, Germany, titled "Thromboxane B2 Blood Levels and Incipient System Clotting in Heparin Free Hemodialysis," thromboxane is a type of prostaglandin that promotes blood clotting and causes vasoconstriction (constriction of blood vessels).\textsuperscript{33, 34}
**Induction of Labor**

Prostaglandins play a vital role in childbirth. They facilitate uterine activity and cervical ripening. According to the article titled "Cervical Ripening with Prostaglandin E2 Vaginal Suppositories," prostaglandin gel is applied on an unripe cervix to induce labor. It is typically used in hospitals and left for anywhere between four to 12 hours. Prostaglandin suppositories play the same role as prostaglandin gel and are applied every six hours, until the onset of labor pains.\(^{34,35}\)

**PGD\(_2\) Anti platelet aggregartory**

Bronchoconstrictor, Evokes renin release, Mainly secreted by mast cells, Constituent of slow release substance of anaphylaxis, Slowly metabolised (figure no 12)

![Figure No. 6. PGD\(_2\) analogous used for bronchoconstriction](image)

**Eporostenol sodium (PGX)**

It has been employed as an anticogulent in dialysis procedure. It has also been used in the hemolytic-uraemic syndrome.

**PGI\(_2\)**

Inhibitor of platelet aggregator, Mild bronchodilator, Inhibits histamine release, Evokes renin release, Produced by vascular endothelium, Maintains patency of ductus arteriosus, Hypotensive (more than PGE\(_2\)), PGI\(_2\) Analogues, treprostinil, iloprost, pvd, Pul. Hypertension, (Combination with PGE\(_2\)).\(^{35,36}\)

**Gemeprost (PGE Analogous)**

Passarice are preferred prostaglandines for the induction of therapeutic abortion during the first trimester. Geoprost pessaries often and dilate into cervix to facilitate trans cervical operation procedure.\(^{35,36,37}\)

**Prostsglndines the smooth muscle**

PGE 2 PGI2 is ateriolar smooth muscles promot relaxed, git smooth muscle relaxed,
preparation available carboprost tromethamine perental 250 mg and 83 mg tromethamine per ml ampules lantanoprost(xalatan) topical 0.005% ophthalmic solution travaprost (travantan) ophthalmic solution 0.004%unproston 0.15% zefirleukast (accolate) oral 10,20 mg tablet

Figure No 7. PGE₂ Analogus Doorpost Used For Induction of Labor

PGE₂ (Dinoprpostone) Prostin
E₂ for induction/ augmentation of labour, mid term abortion. peptic ulcer used in stable analogous

Vegal gel
(1mg or 2mg in 2.5ml) 1mg inserted into posterior formix, followed by 1-2 mg after 6 hour if required.

Vaginal tab (3mg)
Oral tablet primopost 0.5mg tab max 1.5 per hrs Cervical gel cerviprime (0.5mg in 2.5ml prefilled) Intravenous solution (1mg/ml in 0.75ml amp and 0.5 amp) Gemeprost cervagum 1mg veginal pessary.

Misoprostol
Orally active (400mcg) used along with methotrexate and mefepristone (ectopic). Misoprostol [Cytotec] a methylated derivative of PGE₁(figure no 9) approved for use in patients taking high doses of non steroidal antiinflammatory drugs (NSAIDs) to reduce gastric ulceration Cx ripening . II trimester abortion, mensural regulation 

Figure No 8. Misoprostol Cervical Cream Used For Labor Induction
Smooth Muscle
Bronchodilator, Relaxes smooth muscles

GIT
Contracts longitudinal muscles, mucus production, blood flow, Helps in ulcer healing

Role in inflammation
Vasodilatation, Chemotaxis, Permeability, Exudation, Lysosomal degradation

CNS
Sensitizes nerves to pain, Rise on body temperature, Sedation, Rigidity

dysmenorrhea
this disorder is attributed to increased endometrial synthesis of PGE$_2$ and PGF2 alpha during menstruation, with uterine contraction leading to ischaemic pain, nsaid (asprin, indomethacin) effectively inhibit the formation of these PGs, and offer relief in 75-85 per cent of case $^{37,38}$.

Alprostadil PGE$_2$ (prostin) used for Treat Erectile Dysfunction
Alprostadil belongs to a group of medicines called vasodilators. These drugs can increase blood flow by expanding blood vessels. This medicine is identical to a naturally occurring substance found in the body that helps keep the blood vessels open and increases blood flow. Alprostadil helps treat ED by increasing the blood flow to the penis, thus causing an erection.

Alprostadil can be given either by injection or as a suppository. When given as a suppository, the drug is placed into the opening at the tip of the penis. When injected, a needle and syringe is used to inject the drug directly into the penis. $^{38}$ Alprostadil PGE$_2$ (prostin) it is employed temporarily to maintain potency of duct ateriosus in management of congenital heart disease, management of congenital heart disease (figure no.7) Renal vasodilatation, Na$^+$/water K$^+$ excretion, Chloride reabsorption, Antagonizes action of ADH, Renin release, Hyperprostaglandin E, syndrome/Bartter, Contracts the uterus, Softening of cervix, Facilitates sperm movement.$^{41,42}$
Figure No 10. PGE₂ Analogous Used For Uterine Contraction

Figure No 11. Dinoprost Inj. BP
proprietary name prostaman prostin F12 alpha Dinoprost trometamol bp-contract in uterine muscles (figure 13) dinoprost F2a are used to induced labour and terminated pregnancy (powerful oxytocic effect) same gemeprost E1 or carbopros.⁴²,⁴³

Figure No 12. PGF₂α Analogous Used For Dinoprost Ophthalmic Solution

PGF₂α
Dinoprostone F₂ alpha intraamniotic injection 5mg/ml in 4ml amp. induction of labour. Carboprost prostodin 0.25 mg in (figure no 12) 1 ml amp Carboprost Tromethamine) [Hemabate].

PGF₂α analogues
Contracts the human uterus, Bronchoconstriction, Contracts longitdinal muscles, Induces ocular inflammation, Decreases iot by increasing US out flow, Increases in Hepato Renal Syndrome, PPH, II trimester abortions, Glaucoma and Contracts the human uterus.⁴²,⁴³
ADR
Cvs collapse, anaphylaxis, pulmonary hypertension, discoloration 44,45,46

Figure No 13. PGF2α analogus hemabate used for induction of labor

Prostaglandin Drug Products Used Worldwide47,48,49

<table>
<thead>
<tr>
<th>Prostaglandin Drug Indication</th>
<th>General Therapeutic</th>
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<tr>
<td>Carboprost trometamol</td>
<td>Abortifacient</td>
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<td>Gemeprost</td>
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<td>Sulprostone</td>
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CONCLUSION
NSAIDs have been used successfully for centuries for the alleviation of pain and inflammation and continue to be used every day by millions of patients worldwide. The recent discovery of the well-praised COX-2 selective inhibitors showed that these agents have a more complex effect not solely bound to analgesia and inflammation present in prostaglandines in mammalian, act as local hormones prostaglandines are really synthesized cell membrane through arachidonic acid released cyclooxygenase pathway to released prostaglandines, cox are major role play in inflammation, induced fever, since cox are inhibited cannot some symptoms released, but PGs important in our body, help in microphagus indused
pain cardiovascular in vesodilator function result in increase blood flow and decreased periferal resistance to lower in blood pressure. PGs agent in treatment of hypertension, mostly used medical termination of pregnancy and induction of labour, regulation of gastric acid, influence in immune system, platlet agrigation, therapeutically used in drug alloprostil directly inject corpus cavernosum and available in suppository form. misoprostol used peptic ulcer cytotec tablet formed, carboprost induced labour abortion, dinoprost cervidil direct incert vagina 10mg uterine muscles contract action, lantoprost used in opthalmic preparation. PGs induced in colon cancer but nsaid reduced malignancies, prostaglandines present in plant goganian plexaura hormonella carbin coral, contain 0.2 to 1.3 percent of prostaglandins.

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