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A REVIEW ON ESOPHAGITIS INDUCED MODEL

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ABSTRACT

The term esophagitis is any inflammation of the squamous esophageal epithelium, irritation, or swelling in the lining of the esophagus also known food pipe and body canal tube (the tube that carries food from the throat to the stomach). Esophagitis is the most common caused by the Gastrooesophageal reflux disease (GERD) is also known gastric reflux or acid reflux disease. GERD is delineated as a condition that spring up due to reflux of gastric contents into the esophagus leading to mucosal damage and oxidative stress; the condition may be asymptomatic or result in symptoms. The commonness of GERD is estimated to be 10-20% in western countries, making it one of the most predominant gastrointestinal disorders. It may be acute or chronic. The GERD has three unique phenotypic presentations:

- Non erosive reflux disease (NERD) 50-70% - Presence of troublesome symptoms in absence of mucosal breaks at endoscopy.
- Erosive esophagitis 15% - endoscopically visible breaks of distal esophageal mucosa.
- Barrett's esophagus 20-40% - replacement of squamous epithelium by columnar epithelium in distal esophagus.

Researchers used various model randomly for new antiulcer drug screening. Corrosive esophagitis was formed without general anesthesia & laparotomy.

Keywords: Esophagitis, Gastroo Esophageal Reflux Disease (GERD), Non Erosive Reflux Disease (NERD), Erosive Esophagitis, Barrett's Esophagus

INTRODUCTION

Esophagitis was first reported by Quinke in 1879. Whereas peptic ulcer of esophagus was described by Jackson in 1927. Simillarly Winklestein is first reported peptic esophagitis as a new clinical entity in 1935, he proposed associated with duodenal ulcer and suggested it as a part of ulcer diathesis as in the duodenitis and antral gastritis seen in association with a peptic ulcer **[1]**. The term esophagitis is any inflammation of the squamous esophageal epithelium, irritation, or swelling in the lining of the esophagus also known food pipe and body canal tube (the tube that carries food from the throat to the stomach) **[2]**. Esophagitis is the most common caused by the Gastric esophageal reflux disease (GERD) is also known gastric reflux or acid reflux disease which is caused by mucosal damage when the lower esophageal sphincter (LES) open spontaneously for varying period of time or does not close properly, then stomach contents & acid coming up from the stomach to esophagus [**3]**. If esophagitis caused by GERD, the disease is also called **reflux esophagitis**.

It may be acute or chronic **[4]**.The acute esophagitis can be catarrhal or phlegmonous with hoarseness, dysphagia, odynophagia like symtomps while the chronic esophagitis may be hypertrophic or atrophic with replacement of squamous epithelium by columnar epithelium in distal esophagus lead to VCD attacks, aspiration pneumonia esophageal stricture and dysfunction of esophagus like symptomps **[5]** and may also cause of adenocarcinoma **[6]**.

Some of the autoimmune disorder such as eosinophilic esophagitis also causes this condition.

According to their causes and factors there are various types of esophagitis named **(Table 1)**. The infection or irritation may cause the esophagus to become inflamed & may also form ulcers.

Barrett's esophagus is a condition when replacement of squamous epithelium by columnar epithelium in distal esophagus. It happened when the lining of the esophagus (the long muscular tube of the gut that leads from the back of the mouth to the stomach) is damaged by stomach acid and changed to a lining similar to that of the stomach, it can develop after years of gastroesophageal reflux. Sometime, this type of conditon may also cause of cancer of the esophagus **[9]**.

The three dominant pathophysiologic mechanisms which involve in gastroesophageal junction incompetence are:

1) Transient lower esophageal sphincter relaxations (tLESRs)
2) A hypotensive lower esophageal sphincter (LES)
3) Anatomic disruption of the gastroesophageal junction, often associated with a hiatal hernia **[10]**.

Transient lower esophageal sphincter relaxations (tLESRs) constituent the major machanism of acid reflux **[11]**.

The GERD has three unique phenotypic presentations **[12]**:

1) Non erosive reflux disease (NERD) 50-70% - Presence of troublesome symptoms in absence of mucosal breaks at endoscopy.
2) Erosive esophagitis 15% - endoscopically visible breaks of distal esophageal mucosa.
3) Barrett's esophagus 20-40% - replacement of squamous epithelium by columnar epithelium in distal esophagus **[13]**.

Some time it causes the formation of adenocarcinoma **[14]**.

Table 1: Causes and Factors there are Various Types of Esophagitis

S. NO.	TYPES OF ESOPHAGITIS	CAUSES AND FACTOR
1	**Reflux Esophagitis**	**Alcohol abuse, Cigarette smoking, Hiatal Hernia, obesity and pragnancy Vomiting, hyperacidity.**
2	**Drug-Induced Esophagitis**	**Alendronate (in ostoporosis), tetracycline, doxycycline, and vitamin C, NSAIDS and above medicine is taken with plenty of water.**
3	**Erosive Esophagitis**	**Esophagitis due to Detergents Pesticides Mechanical lubricants and industrial additives.** **Esophagitis due to Chemical injury caustic, or alkaline, acid solutions for example (persons who attempt suicide by ingestion of any alkaline or caustic, acid solutions substances). [7]**
4	**Eosinophilic Esophagitis**	**Chronic cough and asthma, food allergies, atopic dermatitis, hypersenstivity**
5	**Infectious Esophagitis**	**Fungi Candida species (esophageal candidiasis), mucomycosis, aspergillosis, Bacteria like *Mycobacteriium tuberculosis* and *Mycobacterium avium-intracellulare*, yeast (especially Candida infections), or viruses such as herpes or cytomegalovirus** **HIV Persons with weakened immune systems and some medications (such as carticosteroids and testosteron) may develop infections that lead to esophagitis [8].**

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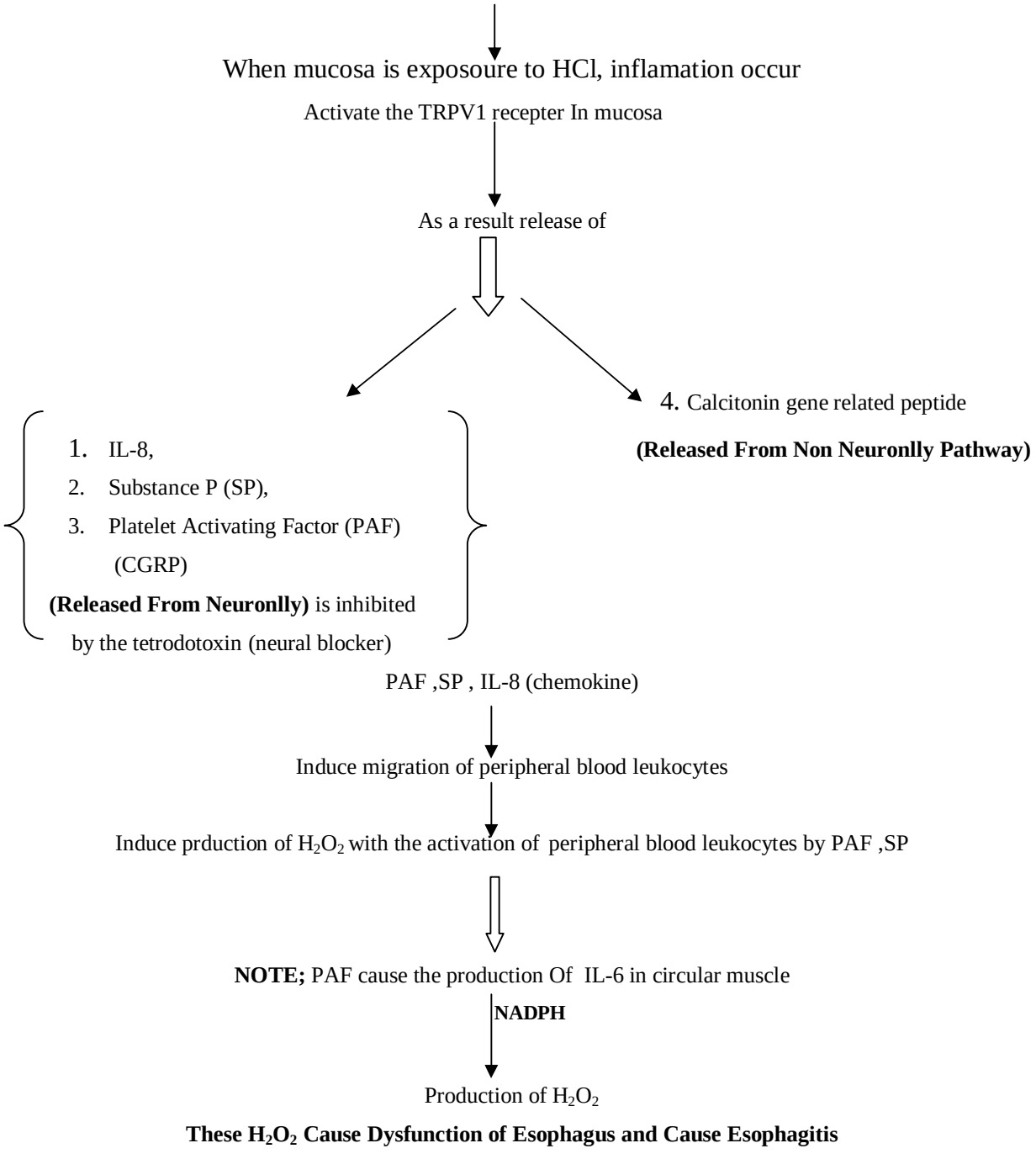
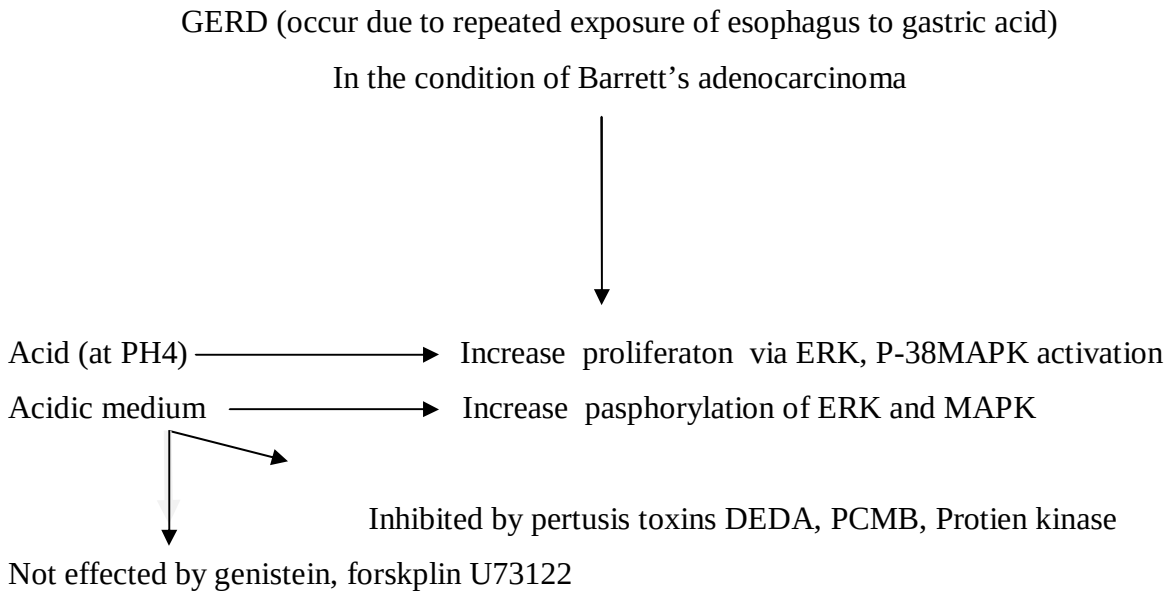
Machanism of Esophagitis [15]

GERD is examined by mucosal response in the presence of Hcl in esophageal lumen. Epithelial cells have TRPV1 receptor mRNA and protein and capsaicin is the against of the TRPV1 and release PAF



The Mechanism of Map Kinase Activation Under Acidic Condition in Feline Esophageal Smooth Muscle Cells [16]



There are various models are used to induced esophagitis:

1) **NaOH Induced Esophagitis**

NaOH is used traditionaly for checking esophagitis model. 20-30% solution of NaOH produced corrosive esophagitis or caustic esophageal burn(CEB) followed by sub-mucosal collagen increase, muscularis mucosa and tunica muscularis damage of gastroesophageal tract. NaOH nutralized the acid (HCl) in stomach. As a result there is increase of GIT p^H .After one day ingestion of NaOH, drugs are administered orally to check the effect of drug on esophagus. In CEB increased the lipid peroxidation and also decreased the antioxidant enzyme **[17]**. Researchers used this model randomly for new antiulcer drug screening. Corrosive esophagitis was foemed without general anesthesia & laparotomy **[18]**. Corrosive esophagitis is treated by the mitomycin-c which preventing the collagen accumulation step in esophagitis. Heparin is also used for the treatment of esophagitis with more effective in inflammation andgranulation formation by fibroblastic activity inhibition stricture development **[19]**. Ibuprofen **[20]** and CAPE **(**caffeic acid phenethyl ester) is also effective in CEB by the healing

of esophagus and may decrease the stricture development **[21]**.

2) **Alcohol Induced Esophagitis**

Alcohol induced may cause the impair function of esophageal muscle and interfera with GIT segment by the secretion of gastic acid. Alcohol abuse is important of bleeding in mucosa (i.e., hemorrhagic) gastric lesions that can destroy parts of the mucosa and inhibit the absorption of nutrient in small intestine. this condition may cause the tranportation of the toxic sabstances which lead to liver damage **[22]**. Alcohol induced also cause ANE (Acute Necrotizing Esophagitis) by prolonging mucosa contact with the ethanol and ANE is also caused by inducing lactic acidosis and low systemic perfusion and causes black esophagus or acute necrotizing esophagitis, (a circumferential blackening and dark pigmentation of the esophagus on endoscopy and mucosal necrosis on histology and that is usually distal with a sharp demarcation at the gastroesophageal border.) This condition is known as achalasia **[23]**. Black esophagus is known to the gastroenterology community **[24]** alcoholism revealed person suffer from a high rate of inflammatory lesions in the esophagus (esophagitis) and developing epithelial leukoplakias and dysplasias. The regular use of alcohol may be development of esophageal precancer and cancer **[25]**.

3) **Pills Induced Esophagitis**

The main causes drug-induced esophagitis first recognized in 1970. Esophagitis is caused by pills (testosterone) when the mucosa prolonged time contact with drug contents. Some drugs such as

- alendronate (Fosamax in ostoporosis),
- antibiotics such as tetracycline (Sumycin, Tetracyn), doxycycline (Vibramycin), trimethoprim sulfa (Bactrim, Septra)
- vitamin C,
- and some anti-inflammetry such as NSAIDS(ibuprofen, Advil, Motrin, Indocin, Aleve, Naprosyn, Lodine, Relafen and others) cause the esophagitis.
- Other catogory of drugs as potassium chloride, Zidovudine (AZT) Theophylline (Theo-Dur and others) quinidine preparations, Quinidine gluconate (Quinaglute),

and iron also caused the esophagitis **[26]**

Drug induced esophagitis occurs in two conditions.

- First, a pill becomes stuck in the esophagus and slowly dissolves while remaining in contact with the delicate esophagus lining.
- Secondly, the pill must be one known to cause esophagus damage **[27]**.

4) Esophagitis Induced by Acid and Pepsin

Acid and pepsin is also used for checking esophagitis model. Pepsin is produced in only in stomach and also found in middle ear in otitis media effusions.Pepsin and bile acid playing a role in esophagitis developed many years ago.It mightly play a major role in peptic ulcer which may lead to development of H_2RA **[28]**. 25 to 50 µ g/ ml perfusion of acidified pepsin for 60 min/day cause esophagitis characterized by diffuse erosion/ulceration, inflammation, bleeding, and reactive epithelial changes, superficial epithelial loss, mild/absent inflammation, and epithelial reactive changes including increased cell proliferation, basal hyperplasia, and papillomatosis **[29]**. High-grade esophagitis was associated with Free radicals generation (mucosal superoxide anion generation) in the pathogenesis of esophageal mucosal damage **[30]**.

5) Esophagitis Induced by Pylorous Ligation

Pylorous ligation is used traditionaly for checking esophagitis model. By this model Esophagitis is induced by ligating the transitional region between the forestomach and the glandular portion with a 2-0 silk thread and covering the duodenum near the pylorus ring **[31]**.

6) Esophagitis Induced by Pancreatic Trypsin

Pancreatic trypsin is also used for checking esophagitis model. It can stimulate the production of inflammatory mediators, including chemokines and prostaglandins from human esophageal epithelial cells in vitro **[32]**.

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