

Aurobindo College of Dentistry

Indore, Madhya Pradesh
INDIA



MODULE PLAN

- ✘ Topic : Defence Mechanism of Gingiva
- Subject: Periodontics
- Target Group: Undergraduate Dentistry
- Mode: Powerpoint – Webinar
- Platform: Institutional LMS
- Presenter: Dr.Rajesh Kumar

INTRODUCTION

- The gingival tissue is constantly subjected to mechanical & bacterial aggressions.
- Resistance to these action is provided by:
 1. Epithelium
 2. gingival crevicular fluid
 3. saliva

1 .THE ROLE OF THE GINGIVAL EPITHELIUM

- **The role of gingival epithelium in defence by its degree of keratinization & turn over rate.**
- **Epithelium constitutes a continuous lining of stratified squamous epithelium.**
- **Principle cells of this epithelium is keratinocytes.**
- **Other cells are non keratinocytes which includes langerhan's cells,merkel cells & melanocytes.**

- **The main function of the epithelium is to protect the deep structure while allowing selective interchange with oral environment. This is achieved by proliferation & differentiation of the keratinocytes.**
- **Differentiation of keratinocytes by keratinization process which leads to production of an orthokeratinized superficial horny layer which is made up of mainly keratin protein.**
- **This layer makes intact barrier between the oral environment & deep layers.**

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- **Other protein keratolinin & involucrin forms a chemically resistant structure (envelop) located below the cell membrane.**
 - **The upper most cells of the stratum spinosum contains dense granules known as keratinosomes or odland bodies which are modified lysosomes. They contain large amount of acid phosphatase.**
 - **Acid phosphatase activity is related to the degree of keratinization.**

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- **Langerhans cells located among keratinocytes at supra basal levels. They belong to the mononuclear phagocyte system as modified monocytes.**
 - **They have an important role in immune reaction as antigen presenting cells for lymphocytes.**

2. GINGIVAL CREVICULAR FLUID (GCF)

- **GCF is secreted by sulcular epithelium in gingival sulcus.**
 - **Method of collection of GCF includes:**
 - 1. Use of absorbing paper strips**
 - 2. Twisteel threads**
 - 3. Micropipettes**
 - 4. Intra crevicular washing**

COMPOSITION OF GCF

- **It contains:**
 - **Cellular elements**
 - **Electrolytes**
 - **Organic compounds**
 - **Metabolic & bacterial products**
 - **Enzymes & enzymes inhibitors**

A. CELLULAR ELEMENTS

1. Epithelial cells:

- Oral sulcular epithelium & junctional epithelium are constantly renewing & shed cells will be found in GCF.**
- Fluid originated from areas with more severe gingivitis contains a much higher proportion of these cells thus confirming the possible stimulating effect of inflammation upon the renewal of sulcular or junctional epithelium.**

2. LEUKOCYTES

- **The major site of entrance of leukocytes in oral cavity is the gingival sulcus.**
- **Number of leukocytes increase with the intensity of inflammatory process.**
- **Their main function is phagocytic & killing of bacteria therefore they constitute a major protective mechanism.**

3. BACTERIA

- ✦ Bacteria cultured from GCF is similar those grown from adjacent dental plaque.
- ✦ Eg. Strepto sanguis
 - Actinomyces viscosus
 - Porphyromonas gingivalis
 - Porphyromonas endodontalis
 - Camphylobacter rectus
 - Prevotella intermedia

B. ELECTROLYTES

- **Na, k, F have been studied in GCF.**
- **Ca, Mg, phosphate ion, chlorine ion have also been determined in known amount in GCF.**

C. ORGANIC COMPOUNDS

- Mainly 3 substances reported in crevicular exudate.

1. Carbohydrates

- ④ Glucose
- ④ Hexamine
- ④ Hexuronic acid

2. Proteins



- **5 proteins alpha, beta, alpha 1, alpha 2 globulin & albumin were reported in GCF.**
- **IgG, IgA & IgM immunoglobulin are present in GCF.**
- **These immunoglobulins might significantly contribute the oral defence mechanism.**

3.Lipids:

- ✘ Gingival fluid contains many classes of phospholipids as well as neutral lipids.**

D. METABOLIC & BACTERIAL PRODUCTS

1. Lactic acid:

-  **Lactic acid present in gingival fluid was reported positively correlation to both the degree of inflammation & intensity of gingival fluid flow.**
-  **Its origin considered mainly tissue origin.**

2. Hydroxyproline:

- Hydroxyproline is a major break down products of collagen.**
- Its presence in gingival fluid is on indicator of the rate of progression of periodontal disease.**

3. Prostaglandins:

- It is a component of inflammatory reaction.**
- Inflamed gingiva show more concentration of prostaglandins.**
- It causes vasodilatation, bone deposition & inhibition of collagen synthesis.**


4. Endotoxins:

- Endotoxins released from gram negative bacteria are highly toxic to gingival tissue & pathogenic factor in periodontal disease.**

5.Cytotoxic substance:

- Cytotoxic substance like hydrogen sulphide which is toxic metabolite of bacteria origin also reported in gingival fluid & causes gingival inflammation.**

6. Antibacterial factor:

-  **Antibacterial factor like leukocytes & flow of crevicular fluid is able to remove various kinds of bacteria from gingival pocket.**

E. ENZYME & ENZYME INHIBITOR:

1. Acid phosphatase:

- The main source of acid phosphatase in crevicular area are probably the PMNs & desquamating epithelial cells.**
- Acid phosphatase is bactericidal.**
- It attacks teichoic acid which is 1 of the components of the bacterial all wall.**

2. Alkaline phosphatase :

- ✘ The concentration of this enzyme is significantly correlated with pocket depth.**
- ✘ This enzyme present in PMNs, exclusively in specific or secondary granules.**

3. Beta glucuronidase:

- Beta glucuronidase is probably responsible for the final degradation of the oligosaccharides produced initially by the action of hyaluronidase.**
- Beta glucuronidase also found in plaque bacteria.**

4. LYSOZYME:

- **Lysosome, found in PMNs, has bactericidal properties.**
- **The free enzyme may contribute to pocket formation by its detrimental effect upon epithelial cell stickiness & lytic activity of connective tissue.**
- **It also accelerates the local release of intracellular bacterial enzyme.**

CLINICAL SIGNIFICANCE OF GCF:

- **Gingival fluid is an inflammatory exudate.**
- **Its presence in clinically normal sulcus can be explained by the fact that gingiva that appears clinically normal exhibits inflammation when examined microscopically.**

A. General health & gingival fluid:

(i) Circadian periodicity:

- **There is a gradual increase in gingival fluid amount from 6.00 AM to 10.00 PM & decrease afterwards.**

(ii) Sex hormones:

- **Female sex hormones increase the gingival fluid flow, probably they enhance vascular permeability.**
- **Clinical investigations have been shown an exacerbation of gingivitis during pregnancy, menstrual cycle & at puberty.**

B. Measurement of gingival inflammation:

- **Increased GCF is a sign of inflammation.**

C. Influence of mechanical stimuli:

- **Chewing, vigorous gingival brushing, intrasulcular placement of paper strips increased the production of GCF.**

D. Periodontal therapy:

- **There is an increase in gingival fluid production during the healing period after periodontal therapy.**

E. Smoking:

- **Smoking causes a marked increase in gingival fluid.**

DRUGS IN GCF:

- **Some antibiotics**
- **Eg. Tetracyclin, metronidazole, are detected in GCF.**

Functions of GCF:

- a) It washes the Sulcus, carries out shed Epithelial cells.**
- b) It contains many Anti Microbial Agents.**
- c) It contains Neutrophils and Macrophages for Phagocytosing Bacteria.**
- d) It transports Immunoglobulins and other immune factors to destroy Microorganisms.**
- e) The monitoring of GCF and its contents is used diagnostically to access the severity of Gingival Inflammation, effectiveness of Oral Hygiene, response of tissue to Oral Hygiene.**

3. THE ROLE OF SALIVA

- ④ Salivary secretion are protective in nature because they maintain the oral tissue in a physiologic state.
- ④ Saliva exerts major influences:
 - On plaque by mechanically cleansing the expose oral surfaces.
 - By buffering acids produced by bacteria.
 - By controlling bacterial activity.

× **Saliva contains:**

(i) Antibacterial factor:

- **Saliva contains lysozymes, myeloperoxidase, lactoperoxidase, glucoproteins, mucins & antibodies etc.**

(ii) Buffers & coagulation factor:

- **Salivary buffer bicarbonate – carbonic acid system maintain the physiologic pH of oral cavity.**
- **Saliva contains coagulation factor- factor viii, ix, x, PTA & hagman factor that hasten blood coagulation & protect wound from bacterial invasion.**

(iii) Leukocytes:

- **Leukocytes reach the oral cavity migrating through the gingival sulcus.**
- **PMNs leukocytes chiefly found in saliva that causes the phagocytosis.**

Summary:

As we have seen that various component act in defence of Gingiva.

Example:

- a) Sulcular Fluid**
- b) Gingival Epithelium**
- c) Saliva**
- d) Leukocytes etc.**

The Sulcular fluid is one of the most important component of defence mechanism.

These component acts through various mechanisms and enzymes resist against the mechanical and bacterial aggressions and maintain the Gingival health.

THANK-
YOU