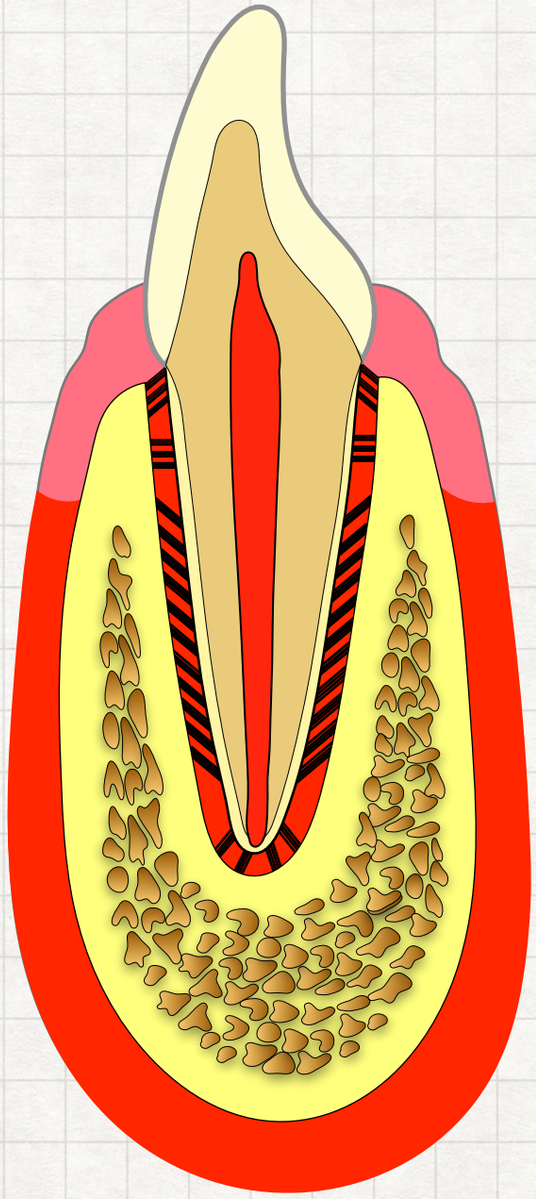
PHYSIOLOGY OF THE

TOOTH ANATOMY

Dr. Sherif Hassan

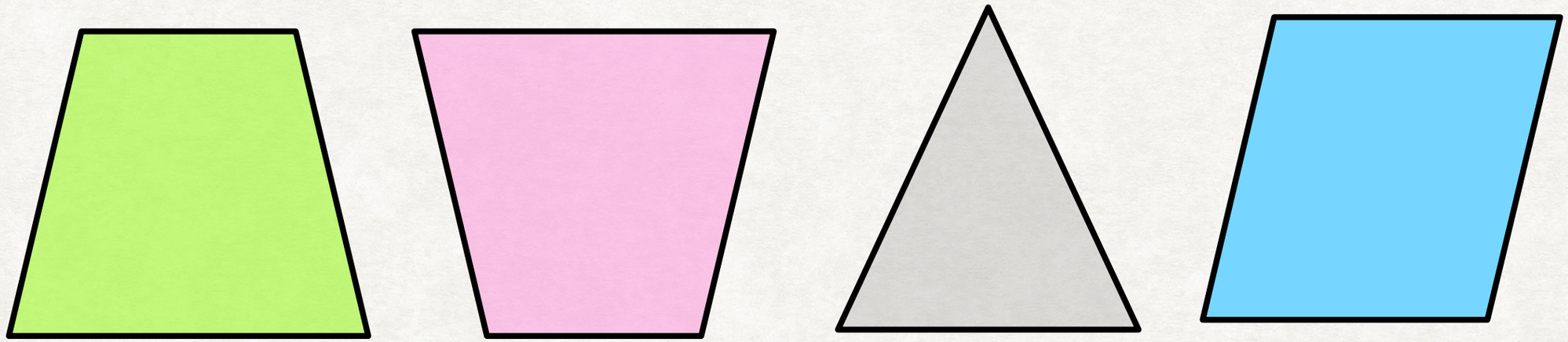
2025



Summery of geometric shapes

GEOMETRIC CROWN OUTLINE

- All surfaces of the teeth take a specific geometric shape.
- This gives each surface a suitable shape to perform the required functions.
- These geometric shapes are in the form of a trapezoid, triangle and rhomboid.

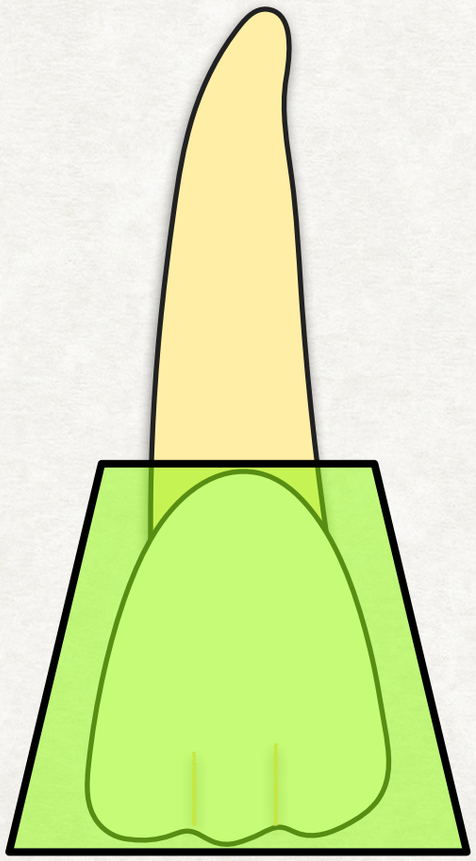


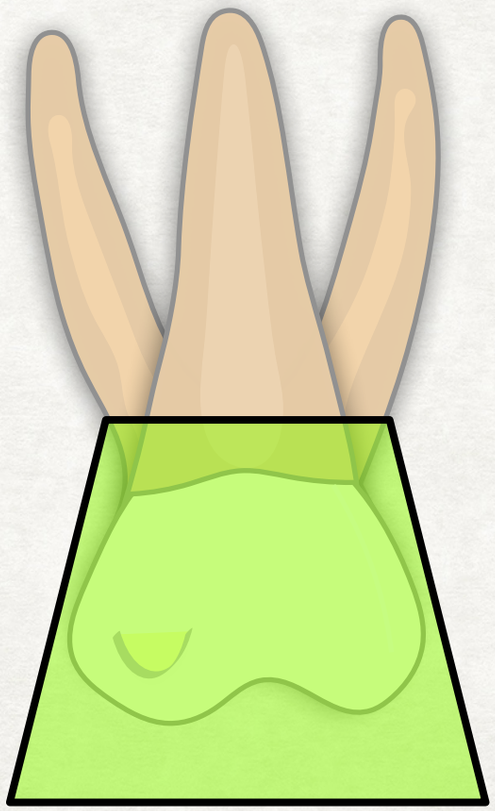
Geometric form of labial, buccal and Lingual Aspects

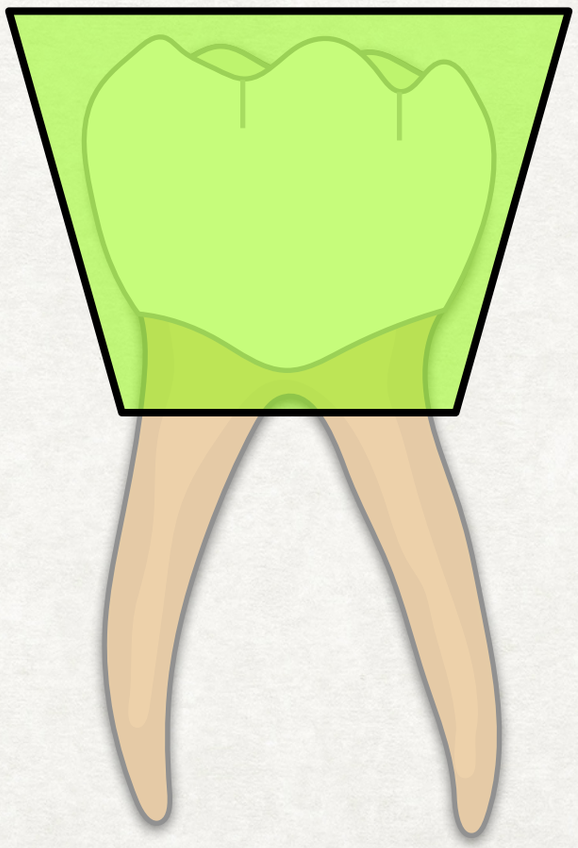
TRAPEZOID SHAPE

Arrangements:

- The short side is located cervically.
- The long side is located incisally or occlusally.







Significances:

1. Make a contact area between teeth.

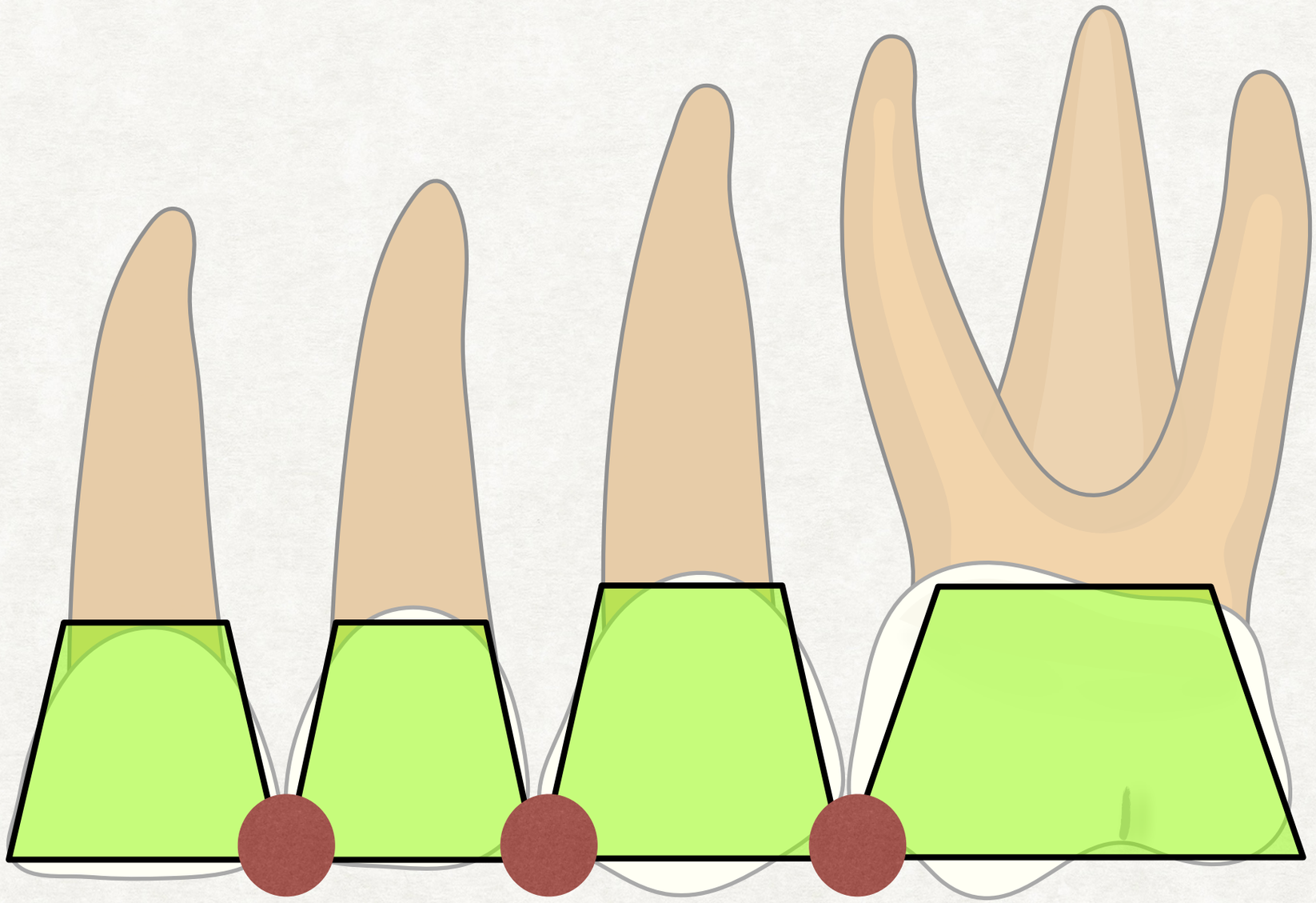
2. Strengthen the dental arch.

3. Provide area for the interdental gingiva below the contact area.

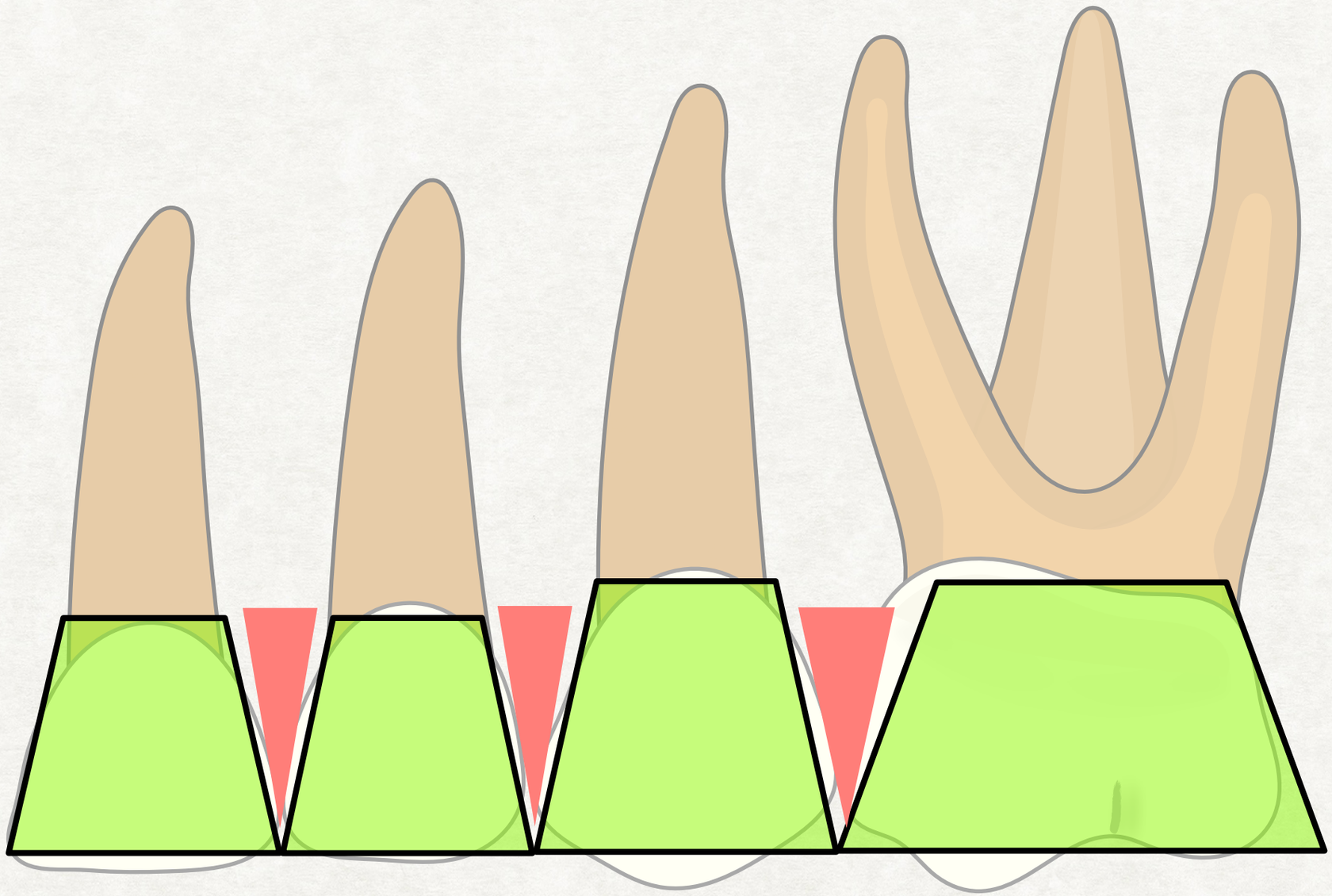
4. Provide area for alveolar bone and periodontal ligament between teeth.

5. Provide area for sufficient blood vessels and nerve supply to the teeth.

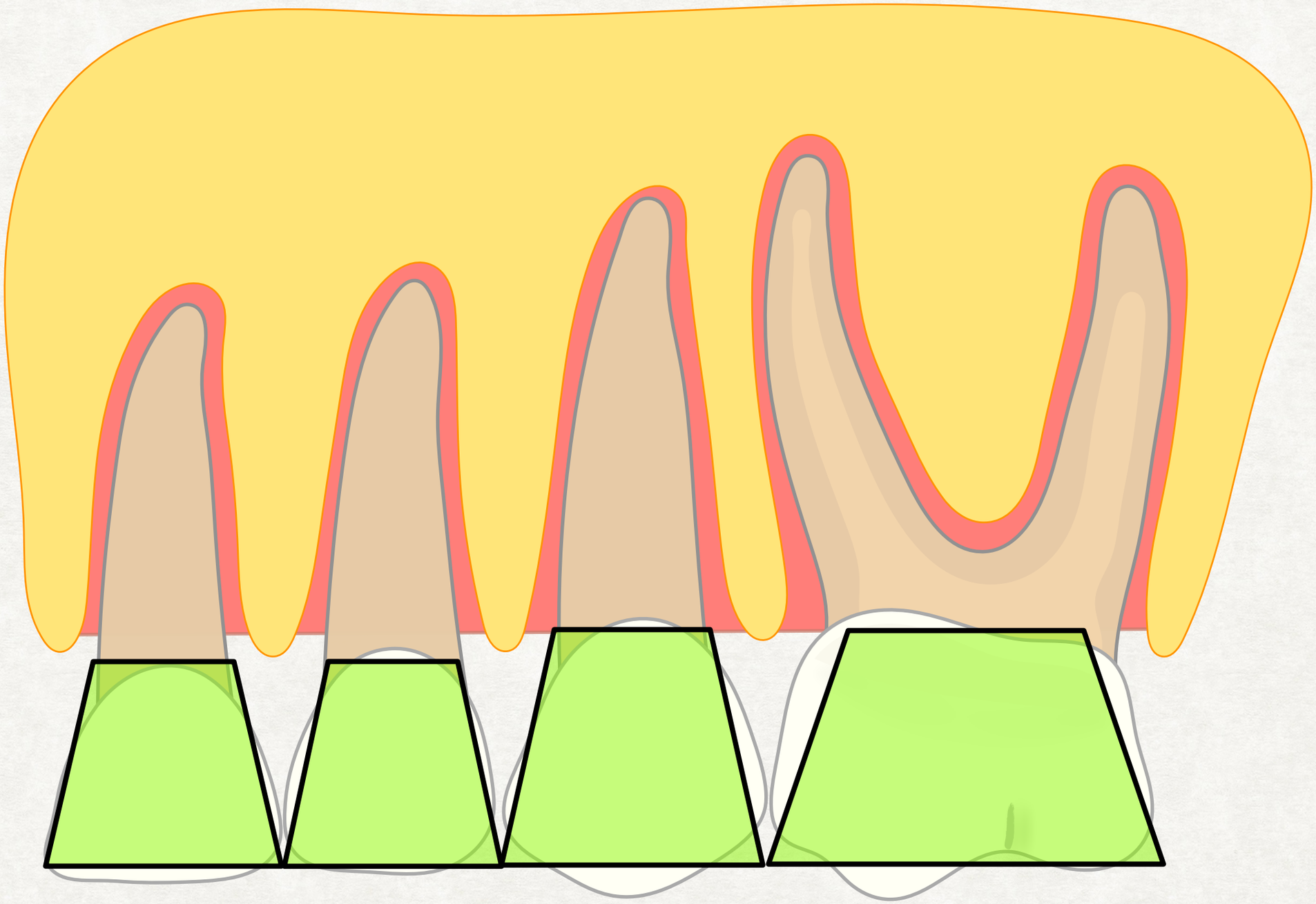
- Provide contact area between teeth to strengthen the dental arch.



- Provide area for the interdental gingiva below the contact area.



- Provide area for alveolar bone and periodontal ligament between teeth.

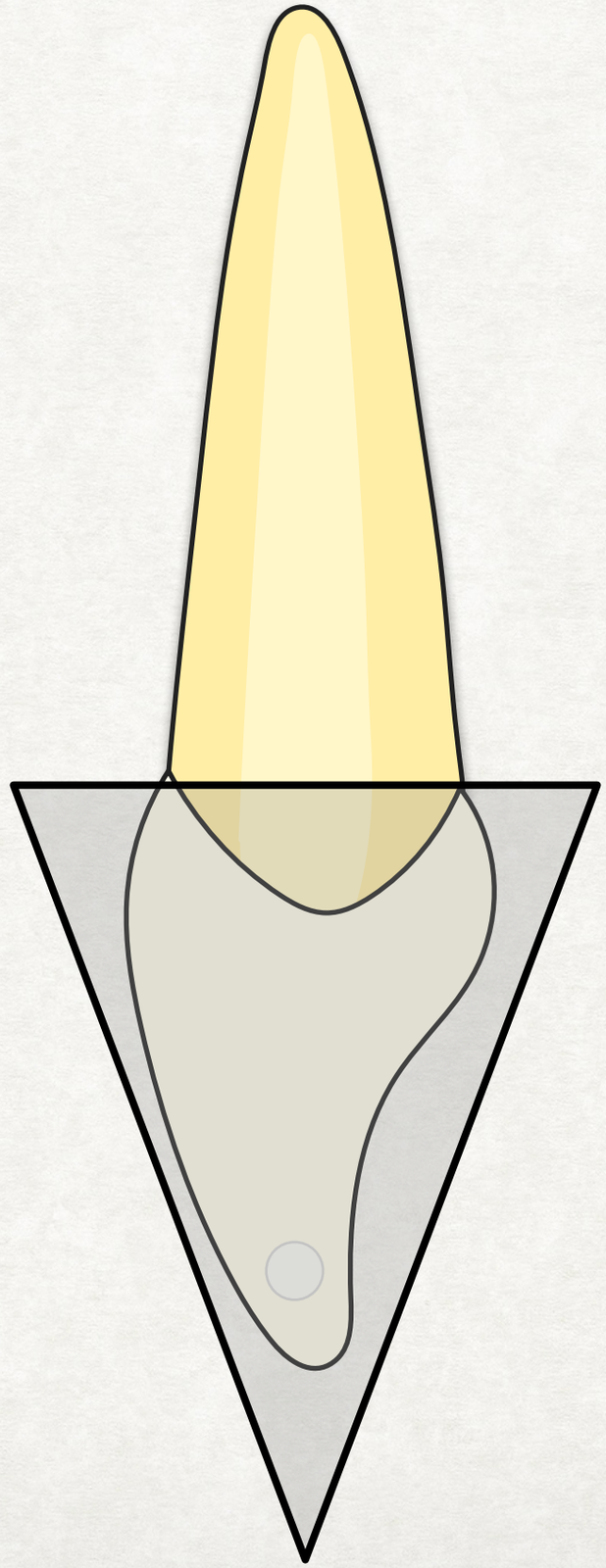


Geometric form of proximal aspect of anterior teeth

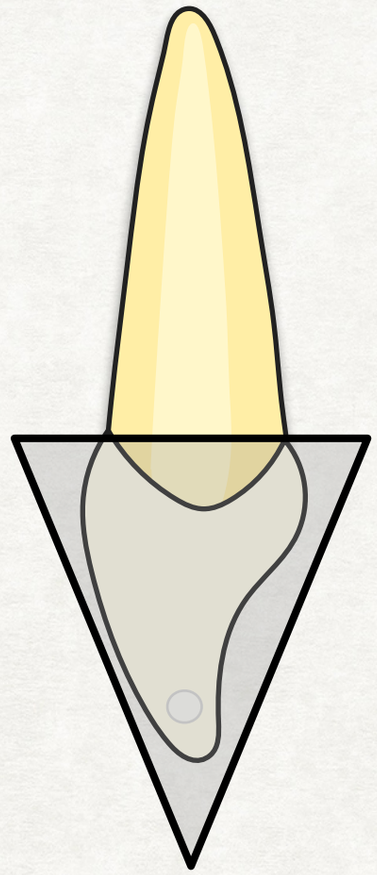
TRIANGULAR SHAPE

Arrangements:

- The apex of the triangle is located incisally.
- The base of the triangle is located cervically.



Significances:



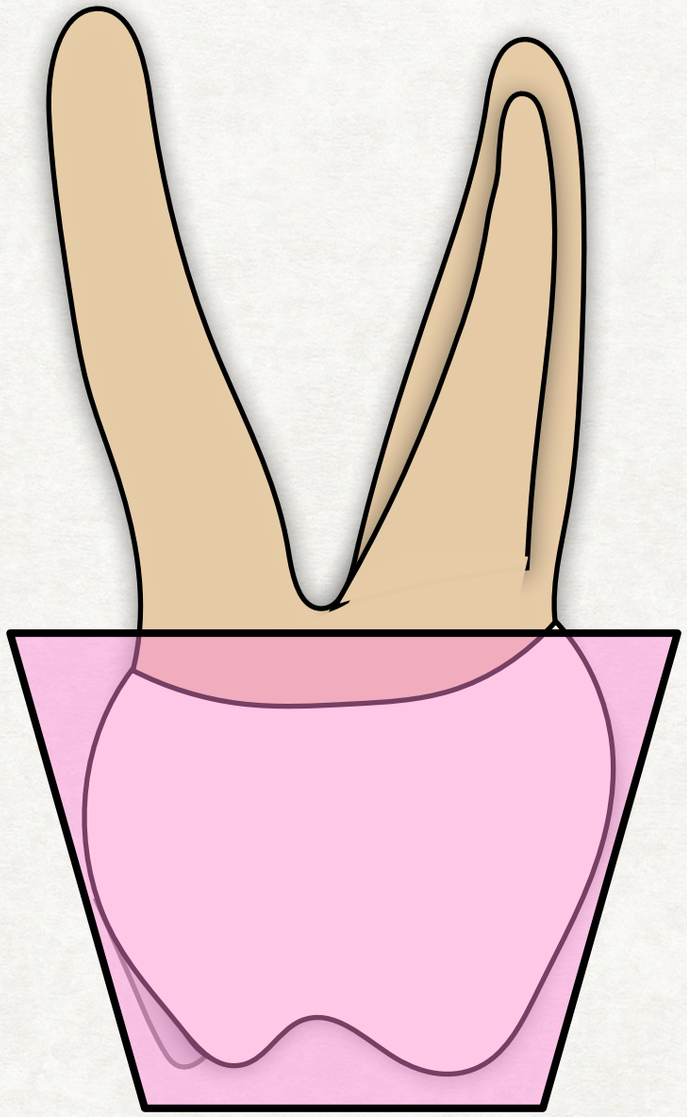
1. Make easy incision of the food by the teeth.
2. Provide a sharp cutting end at the incisal surface.
3. Strengthen the crown on wide base.
4. Distribution of the cutting force at narrow incisal surface to wide cervical area.
5. Provide self cleaning to the tooth surfaces.

Geometric form of proximal aspect of maxillary posterior teeth

TRAPEZOID SHAPE

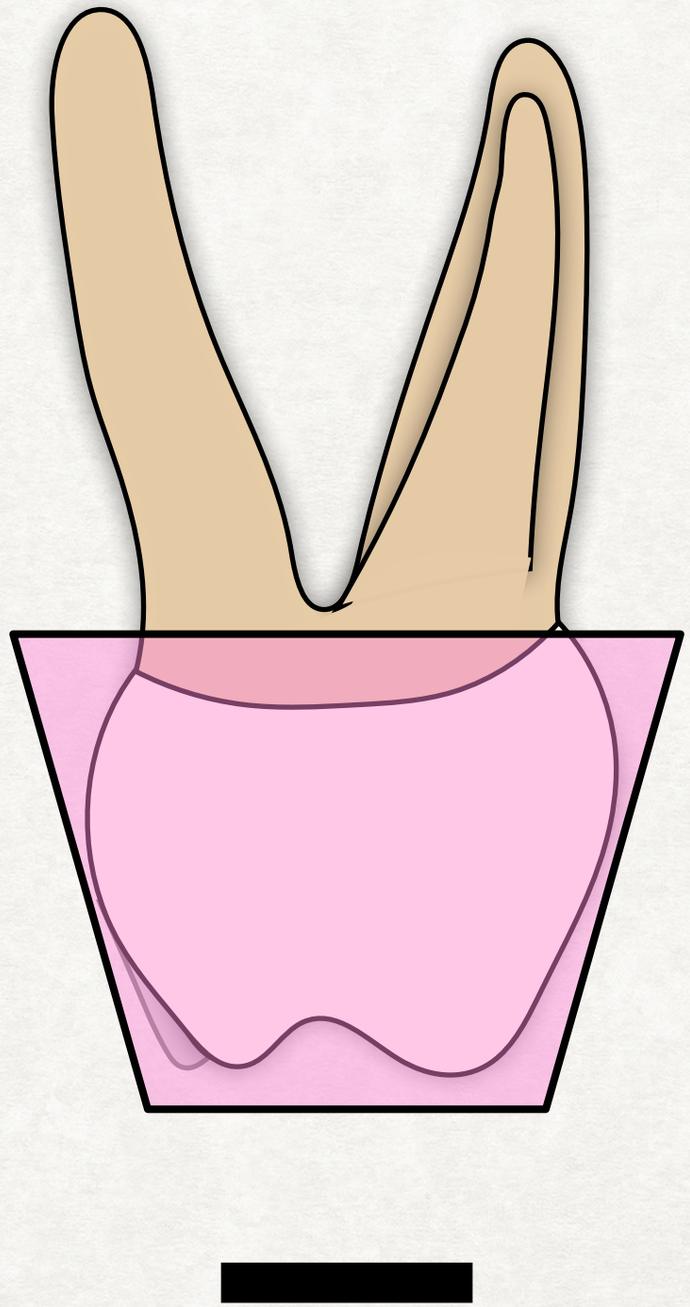
Arrangements:

- The short side is located occlusally.
- The long side is located cervically.



Significances:

1. Provide a narrow occlusal surface which reduce the caries incidence.
2. Give Strength to the tooth from narrow occlusal to wide cervical area.
3. Distribution of the masticatory force from narrow occlusal surface to wide cervical area.
4. Provide self cleaning of buccal and lingual surfaces.



Geometric form of proximal aspect of mandibular posterior teeth

RHOMBOIDAL SHAPE

Arrangements:

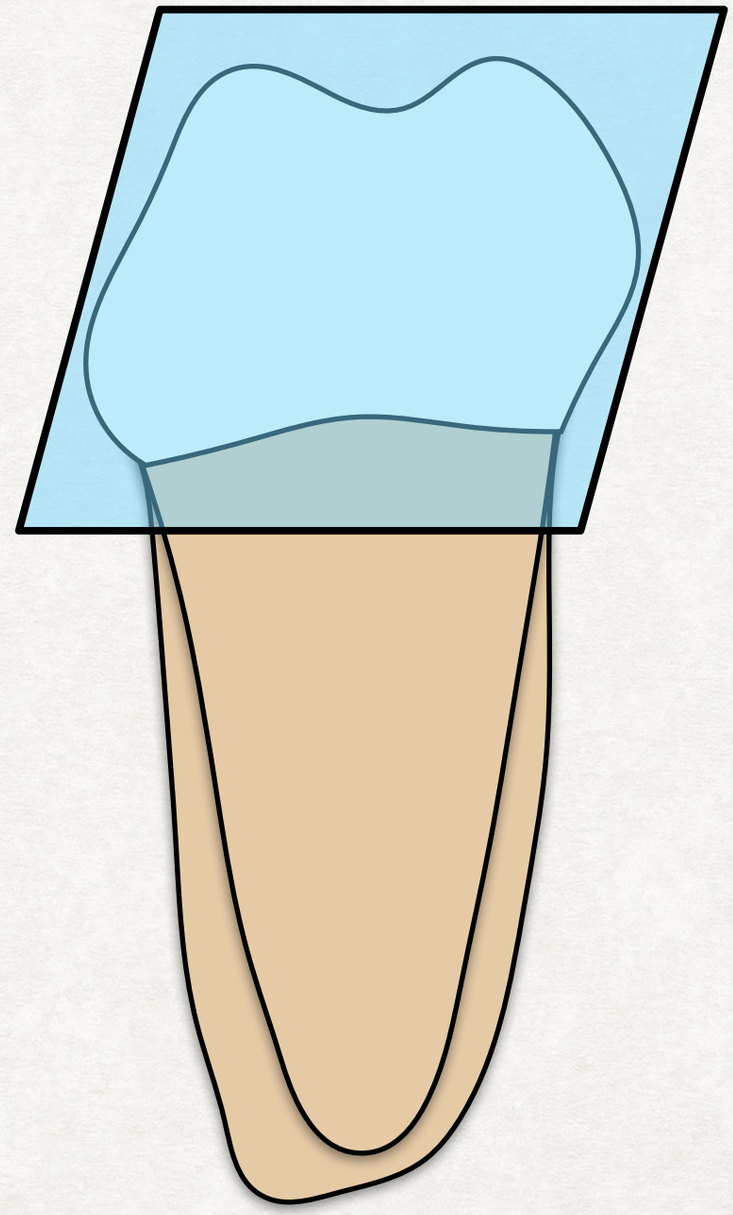
- **Inclined lingually.**
- **Has two acute angles:**

  Occlusolingual angle.

  Cervicobuccal angle.
- **Has two obtuse angles:**

  Occlusobuccal angle.

  Cervicolingual angle.



Significances:

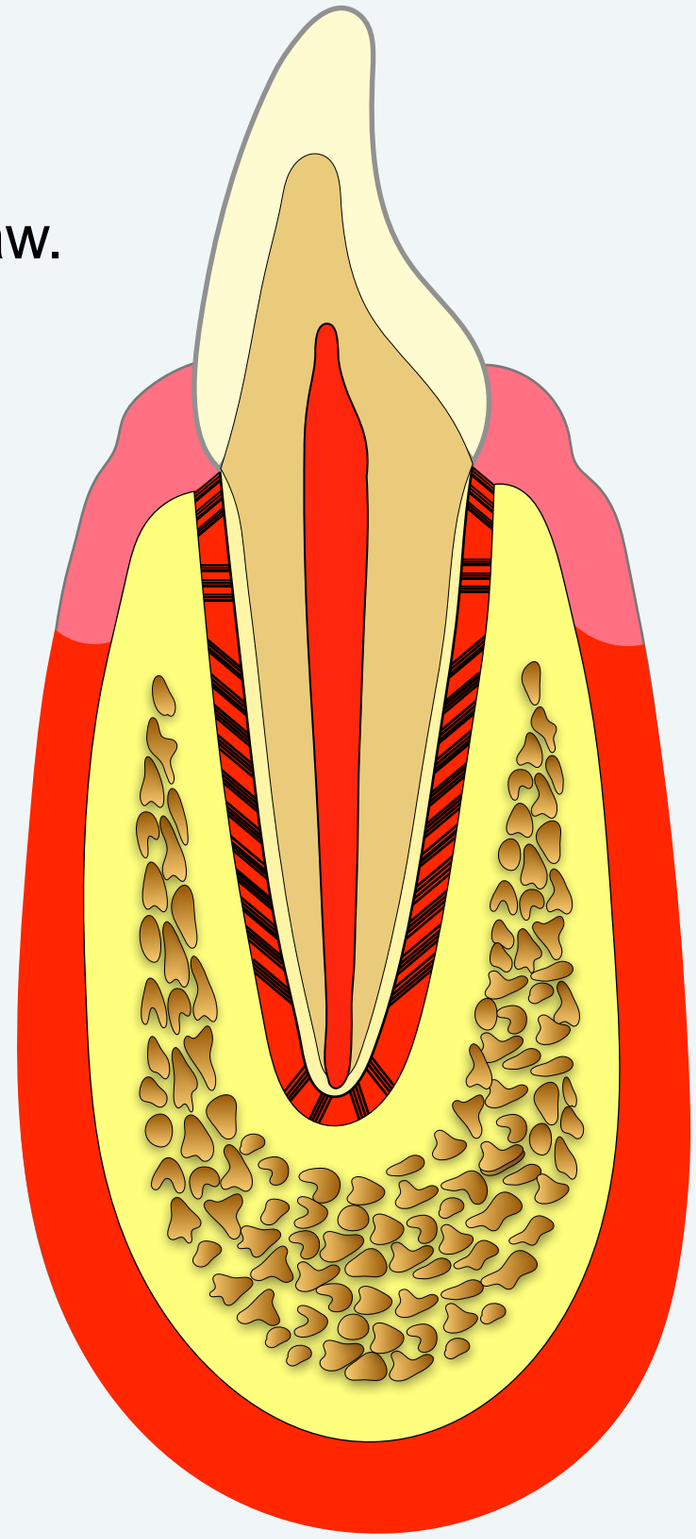
1. Provide maximum intercuspation between upper and lower teeth. (Imp)
2. Reduce caries incidence of the posterior teeth.
3. Strengthen the tooth.
4. Distribution of the masticatory force from narrow occlusal surface to wide cervical area.
5. Provide self cleaning buccal and lingual surfaces.
6. Protection of lip, check and tongue from trauma during mastication.

WELCOME

Periodontium

Definition:

Periodontium is the system of attachment of the tooth to the jaw.

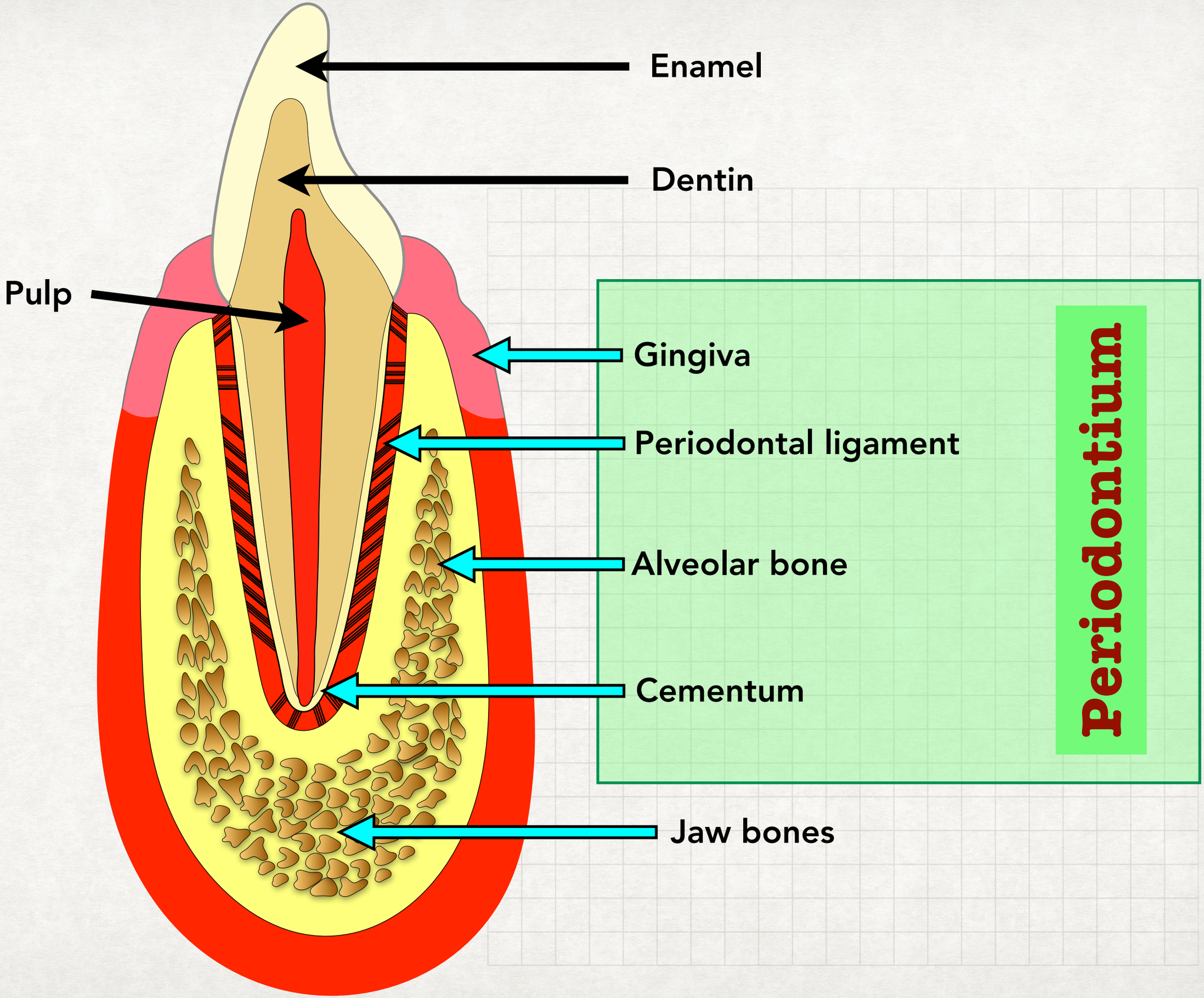


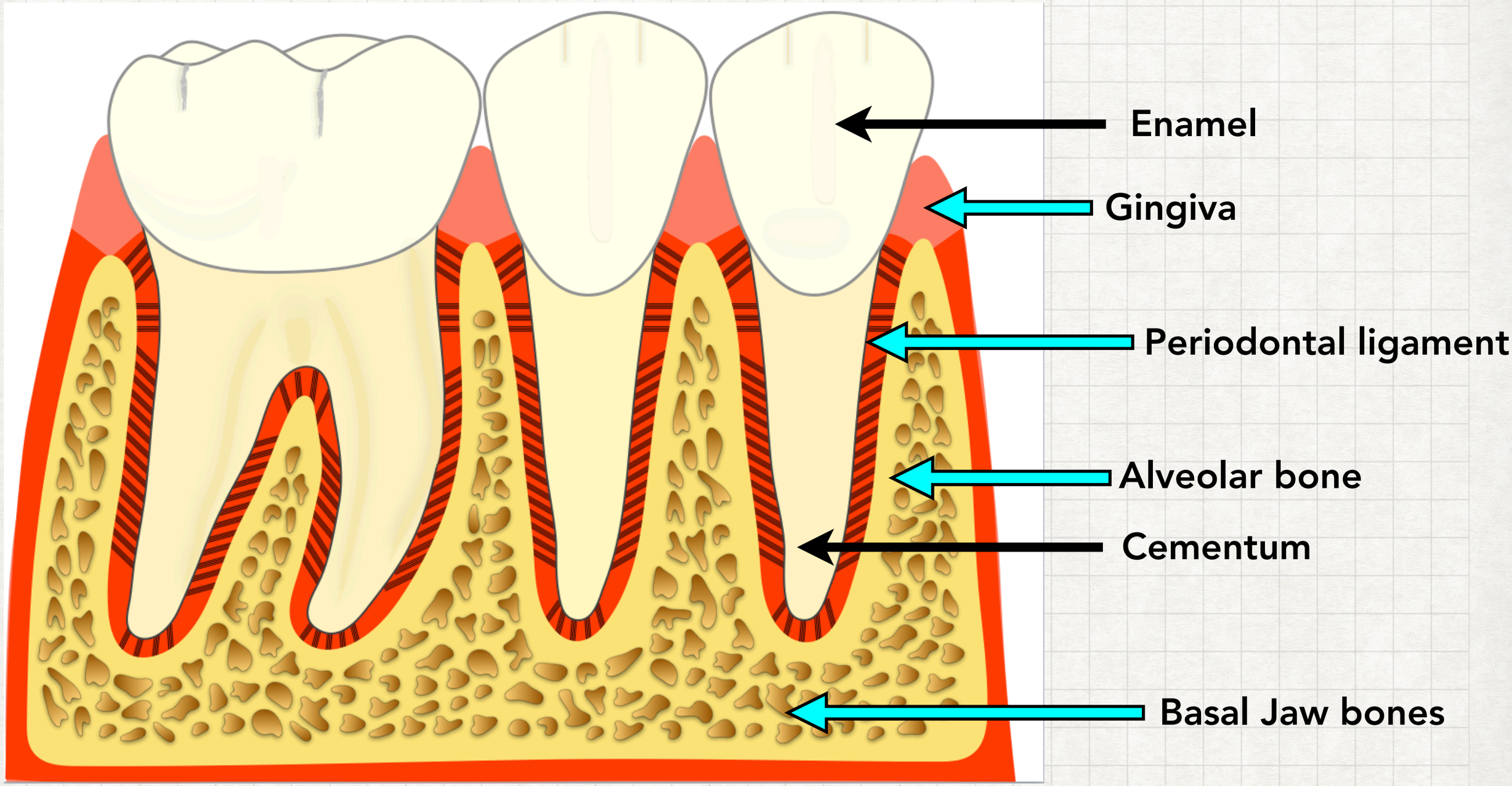
Periodontium include four members:

Two Soft Tissues		Two hard Tissues
Gingiva	1 3	Cementum
Periodontal Ligament	2 4	Alveolar bone

Note:

- Periodontium is important in maintaining the tooth within the jaw.


Enamel
Dentin
Pulp
Gingiva
Periodontal ligament
Alveolar bone
Cementum
Jaw bones
Periodontium


Enamel
Gingiva
Periodontal ligament
Alveolar bone
Cementum
Basal Jaw bones

Structure of teeth and periodontium

Enamel:

Enamel is the hard tissue that cover the crown.

Cementum:

Cementum is the hard tissue that cover the root.

Dentin:

- Dentin is the hard tissue that form the main bulk of the tooth.
- Dentin is covered by enamel at crown and by cementum at root and encircling the pulp.

Pulp:

- The dental pulp is a loose delicate connective tissue occupying the cavity in the center of tooth and surrounded by dentin.

Alveolar bone:

Alveolar bone is a part of the Jaw bone (mandible or maxilla) that form the sockets in which the teeth withstand in their Position.

Periodontal ligament:

Periodontal ligament is a dense fibrous connective tissue that fill the space between root and alveolar bone.

Gingiva:

Gingiva is part of the oral mucosa that encircle and attach to the neck of the tooth and part of alveolar bone.

Healthy state of the Periodontium

- All members of the periodontium must be in good health in order to be able to perform their primary function, which is responsible for keeping the tooth in place.

How to maintain the healthy state of the periodontium?

PERSONAL FACTORS

- Nutrition.
- Home cleaning.
- Dental care.

ANATOMICAL FACTORS PROTECTING THE PERIODONTIUM

1. Proximal contact relation (contact area).
2. Inter-proximal space.
3. Embrasure (spillway).
4. Facial and lingual contour of the crown.

Contact area

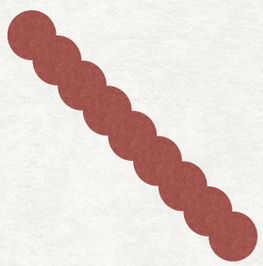
Definition:

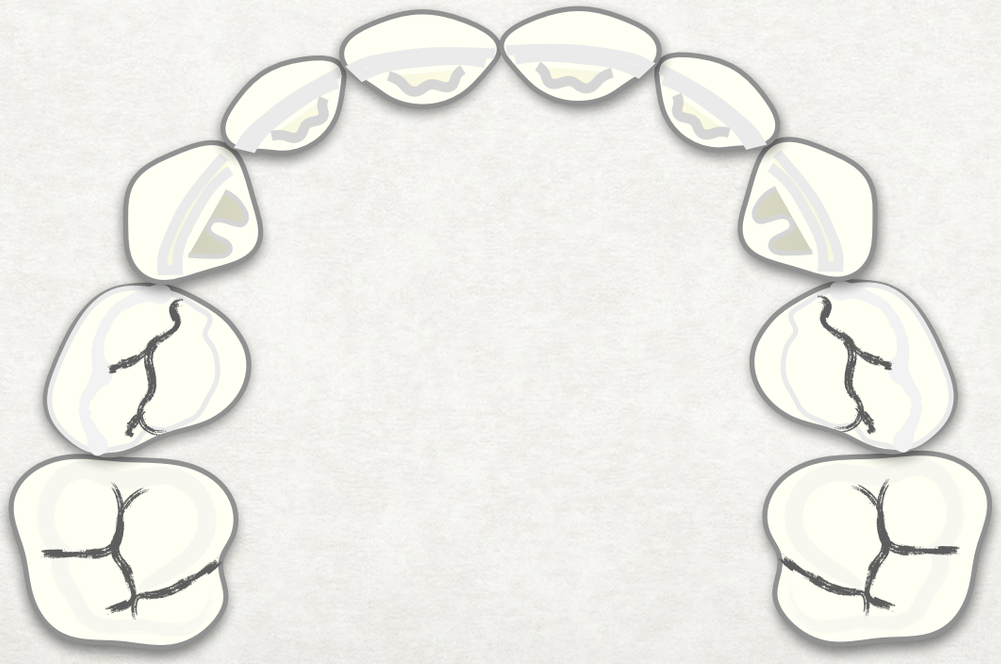
- Contact area is a contact relation between the adjacent teeth in the same dental arch.
- Contact relation is composed of two adjacent contact areas:

  1. Mesial contact area of tooth and
  2. Distal contact area adjacent tooth.

Exceptions:

1. Third molar has no distal contact area.
2. Mesial contact area of central incisors meet mesial contact area of adjacent central incisor.





Properties of contact area

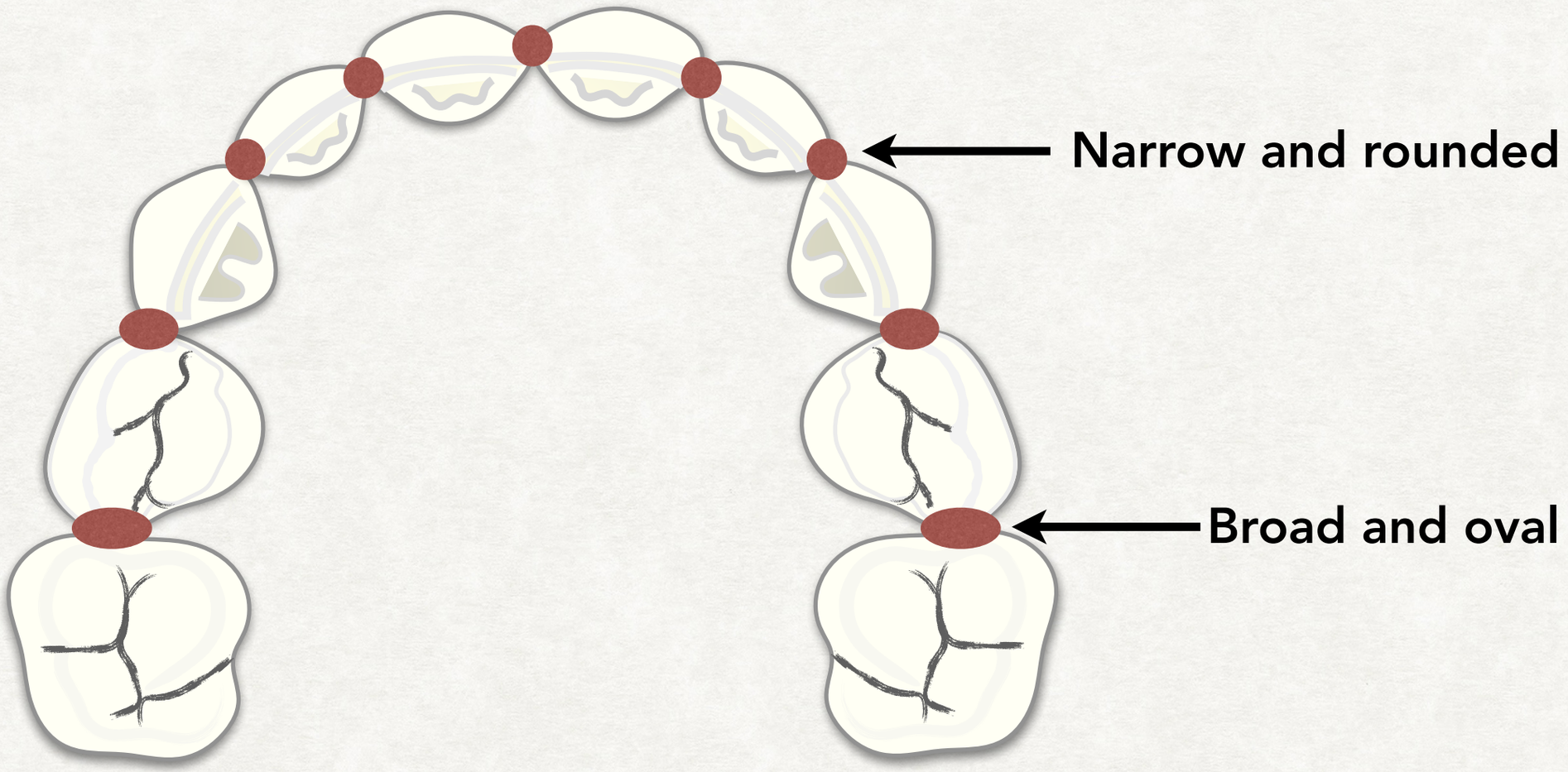
- **Contact areas of anterior teeth are:**

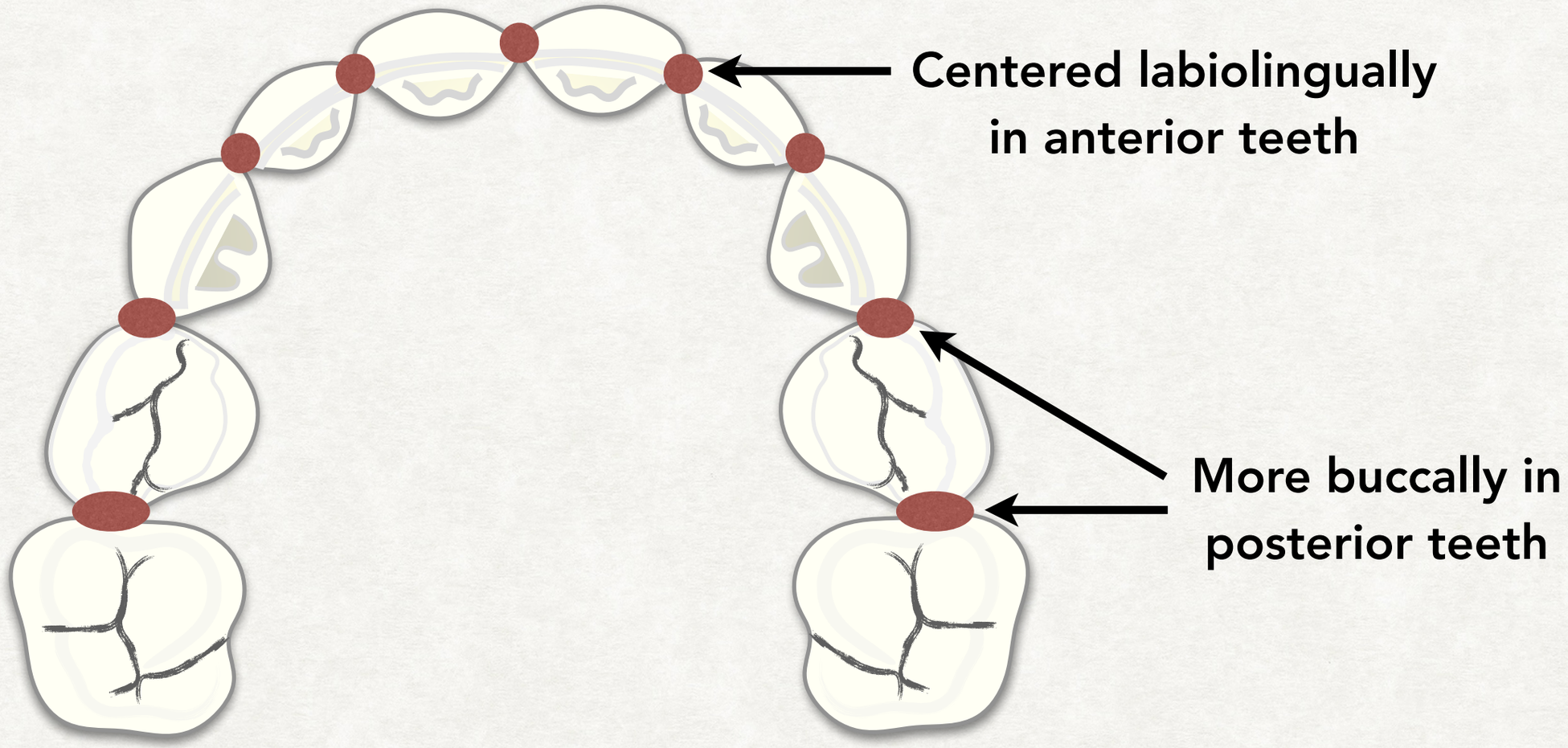
1. Narrow.
2. More incisally.
3. Centered labiolingually.
4. The distal contact area are located more cervically than mesial one

- **Contact areas of posterior teeth are:**

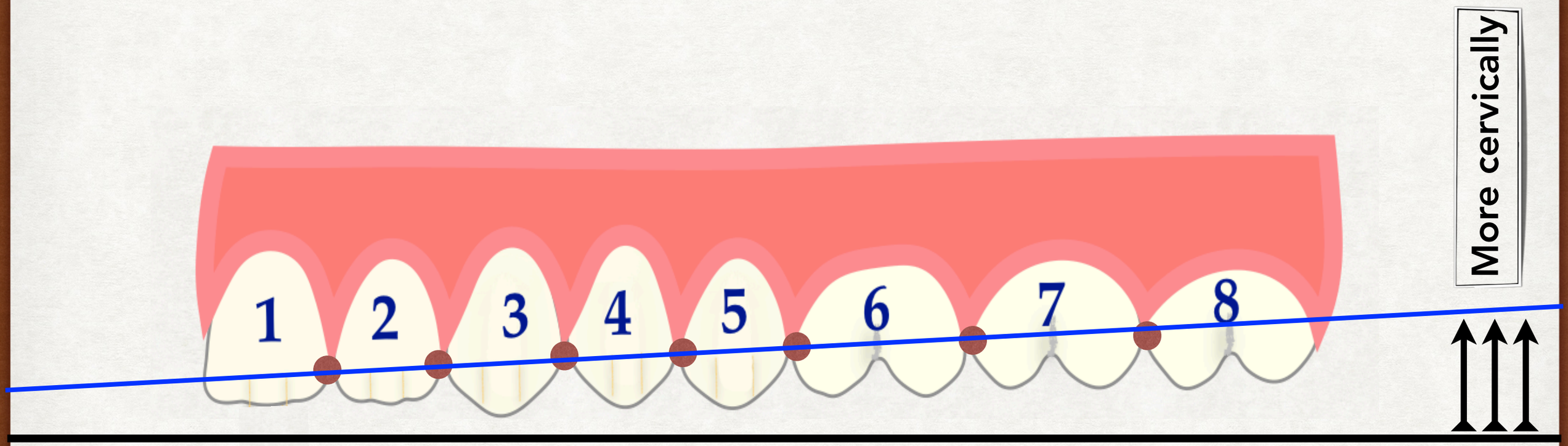
1. Broad.
2. More cervically.
3. Situated more buccally.
4. The distal contact area are located more cervically than mesial one

1. Contact area is narrow in anterior teeth and broad in posterior teeth.

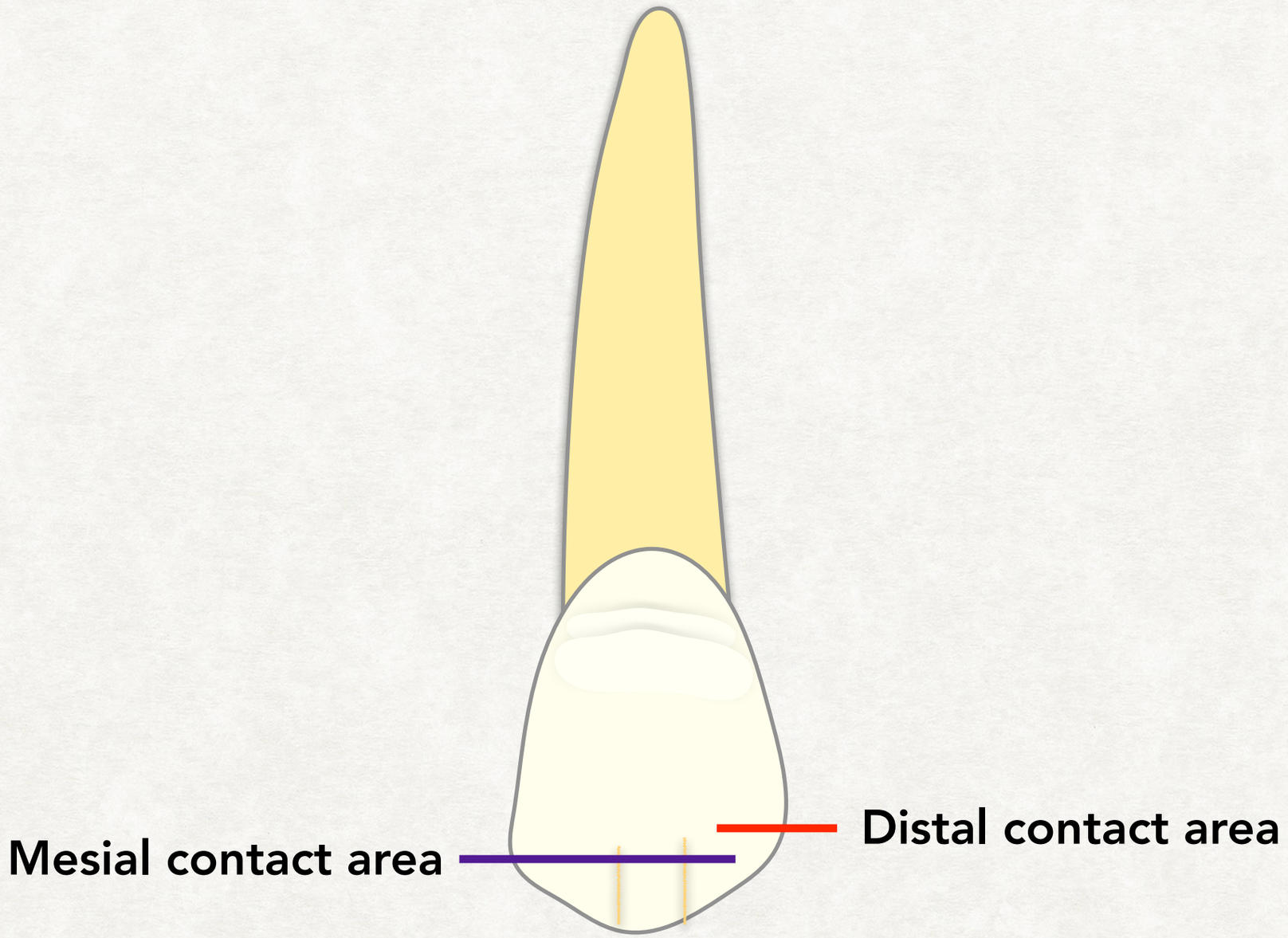



Centered labiolingually
in anterior teeth
More buccally in
posterior teeth

Contact area located more incisally at anterior teeth and more cervically at posterior teeth.



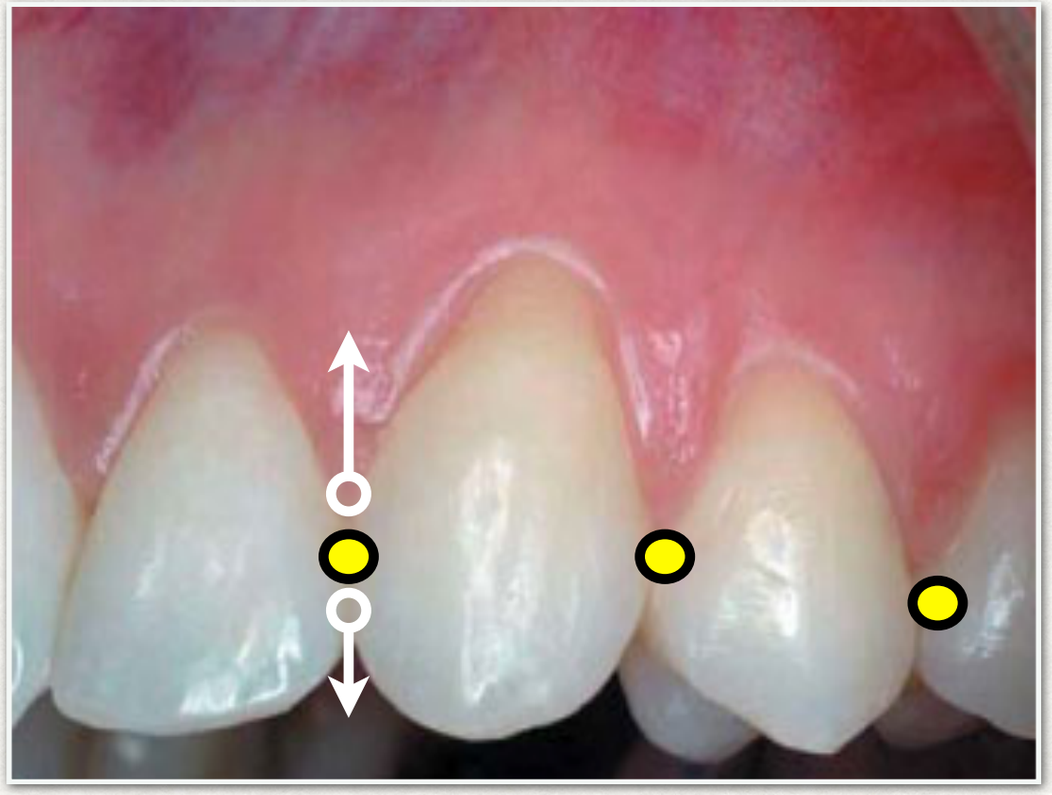
In the same tooth, distal contact area is located more cervically



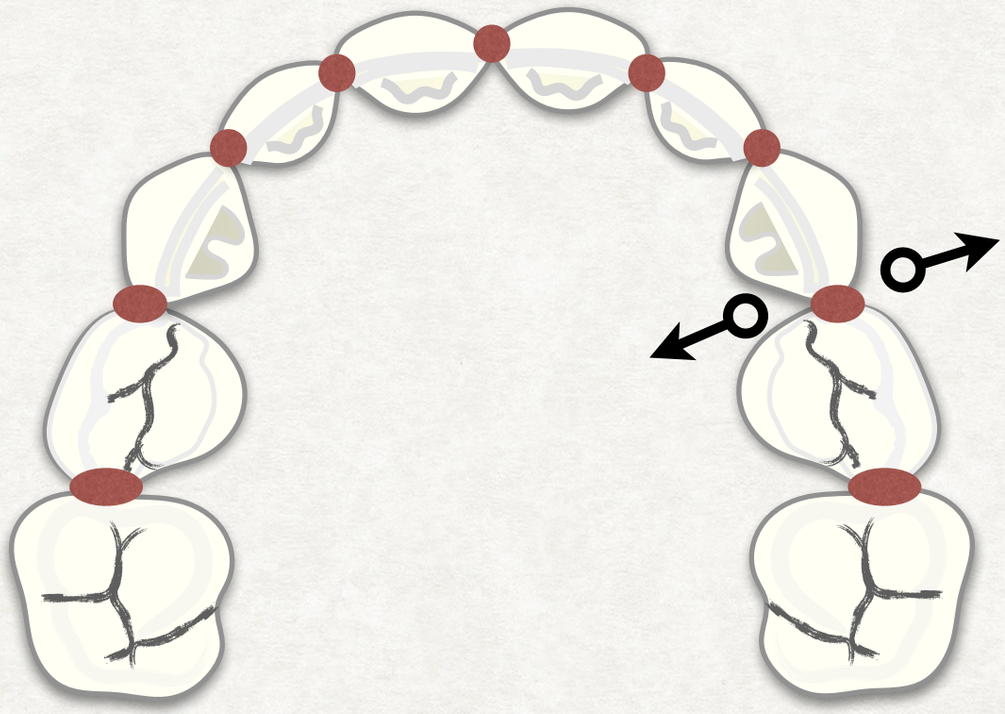
Contact area will observed from two aspects:

1. Facial and lingual to shows its position from cervical to incisal or occlusal.

2. Incisal or occlusal aspects to shows its position labial or buccal to lingual.



Labial and buccal view



Incisal or occlusal view

Significances of Contact Area:

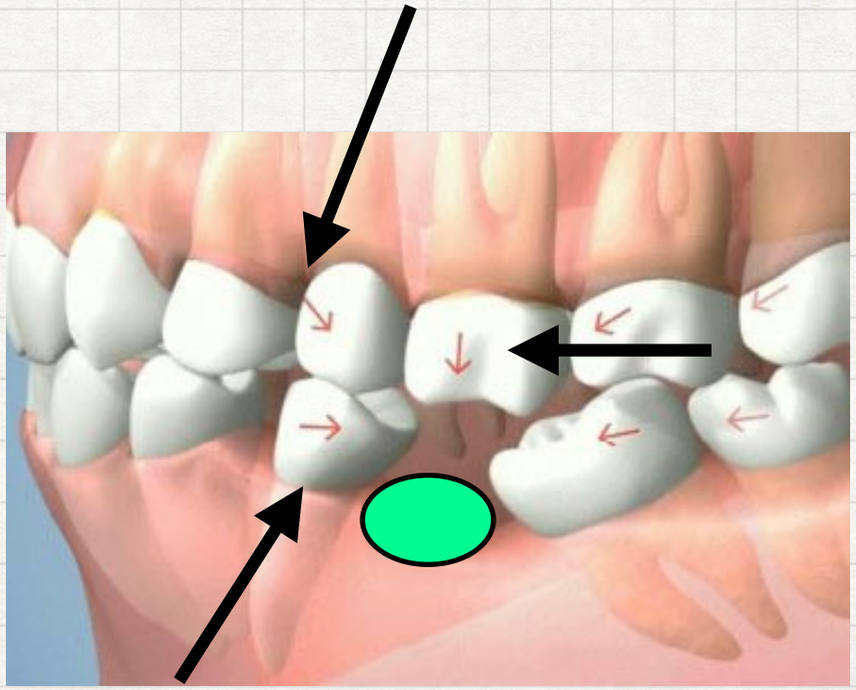
1. Prevent food accumulation at the proximal area between teeth.
2. Stabilization of dental arch, in which all teeth are contacted together.
3. Distribution of masticatory force on all teeth.
4. Protect the gingiva from trauma by food.

Sequence of open contact:

1. Food accumulation between teeth.
2. Gingival inflammation.
3. Periodontal ligament inflammation.
4. Begin to resorb alveolar bone.
5. looseness of the tooth.

Effect of extraction of one tooth on the contact area dental arch

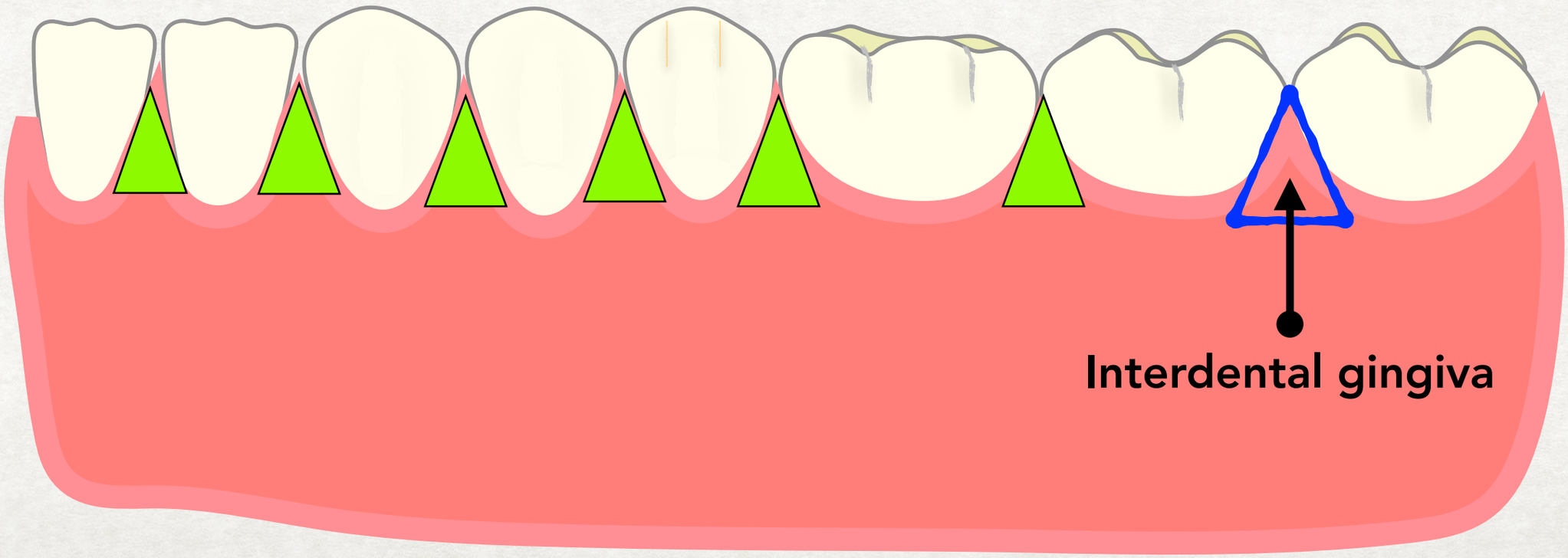
1. Opening of contact area between teeth upper and lower.
2. Migration of the adjacent teeth toward the extracted area
3. Super eruption of the opposing tooth.
4. Disturbance in occlusion.
5. Gingivitis and periodontitis.

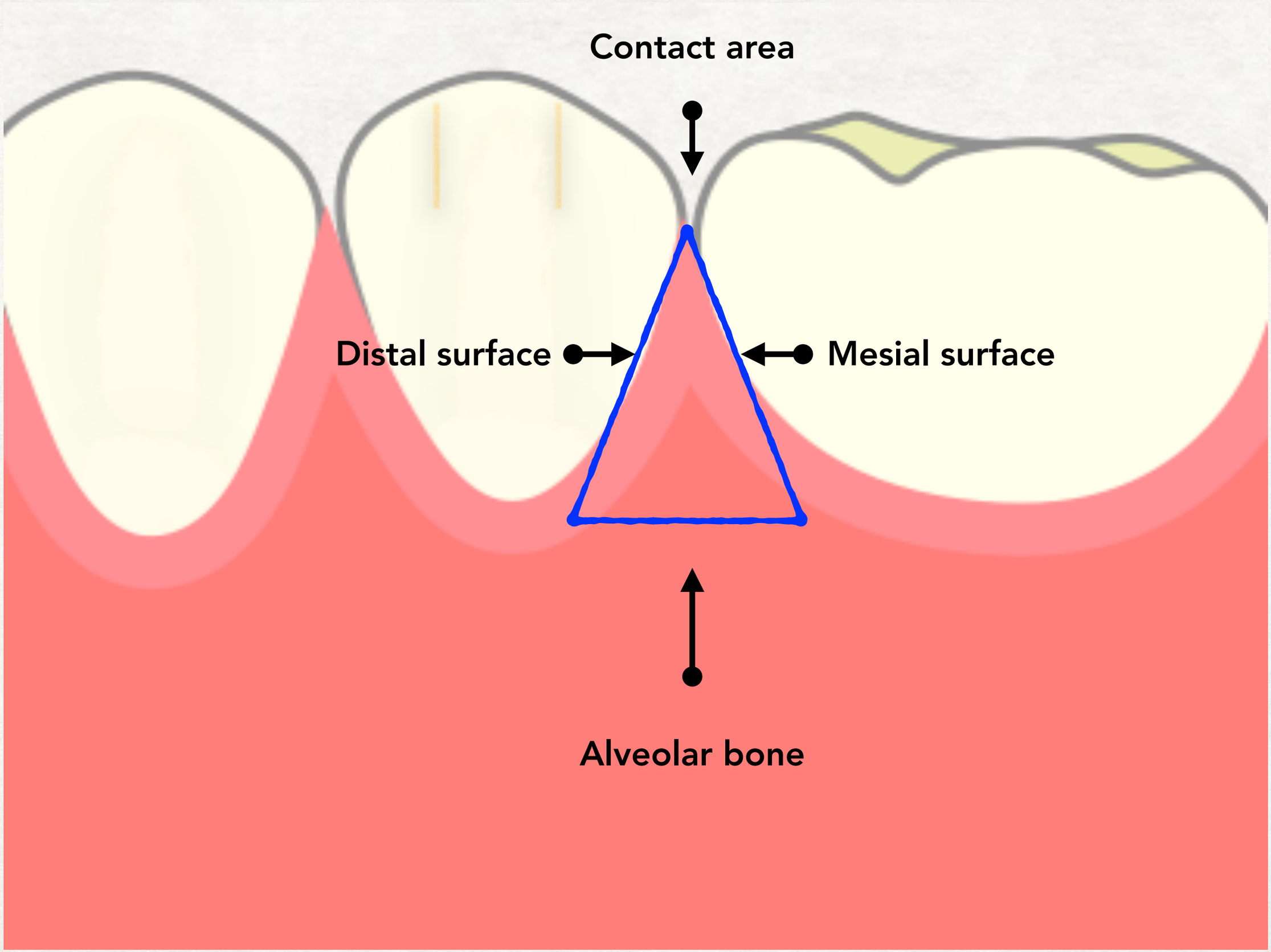


Interproximal space

Definition:

- Inter proximal space is a triangular space found between two adjacent teeth.
- The base of the triangle is the alveolar bone,
- The apex of the triangle is the contact area.
- The sides of the triangle is the proximal surfaces of adjacent teeth.
- Inter proximal space is filled by part of the gingiva termed inter-dental papilla.




Contact area
Distal surface
Mesial surface
Alveolar bone

Factor affecting the Inter-proximal space:

1. Three dimension:

- **In anterior teeth**, inter proximal space take a pyramidal shape.
- **In posterior teeth,** inter proximal space take a tent shape.

2. Neck of the teeth:

- **Constricted neck** leads to more wide interproximal space.
- **Wide neck** leads to more narrow interproximal space.

Significances of Interproximal space:

1. Room for interdental papilla which prevent food accumulation.
2. Room for sufficient alveolar bone and periodontal ligament between roots.
3. Provide proper Blood and nerve supply to periodontium.

Embrasure (spill way)

Definition:

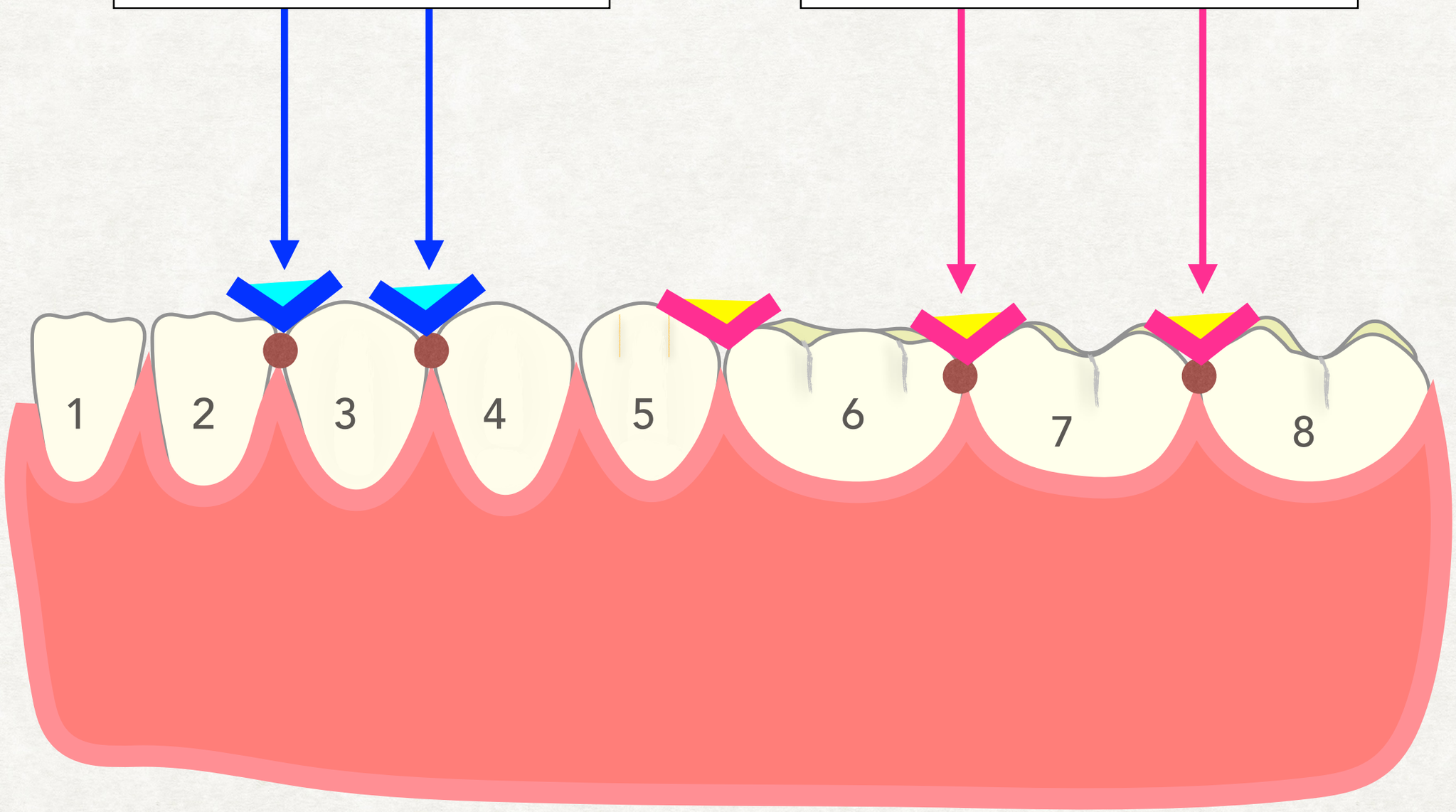
- Embrasure is the scape way space radiated from the contact area between two adjacent teeth in all directions
- It form a valley that widen out as it leave the contact area (diverge from contact area to outside).
- It form the spill way for food escapement during mastication.

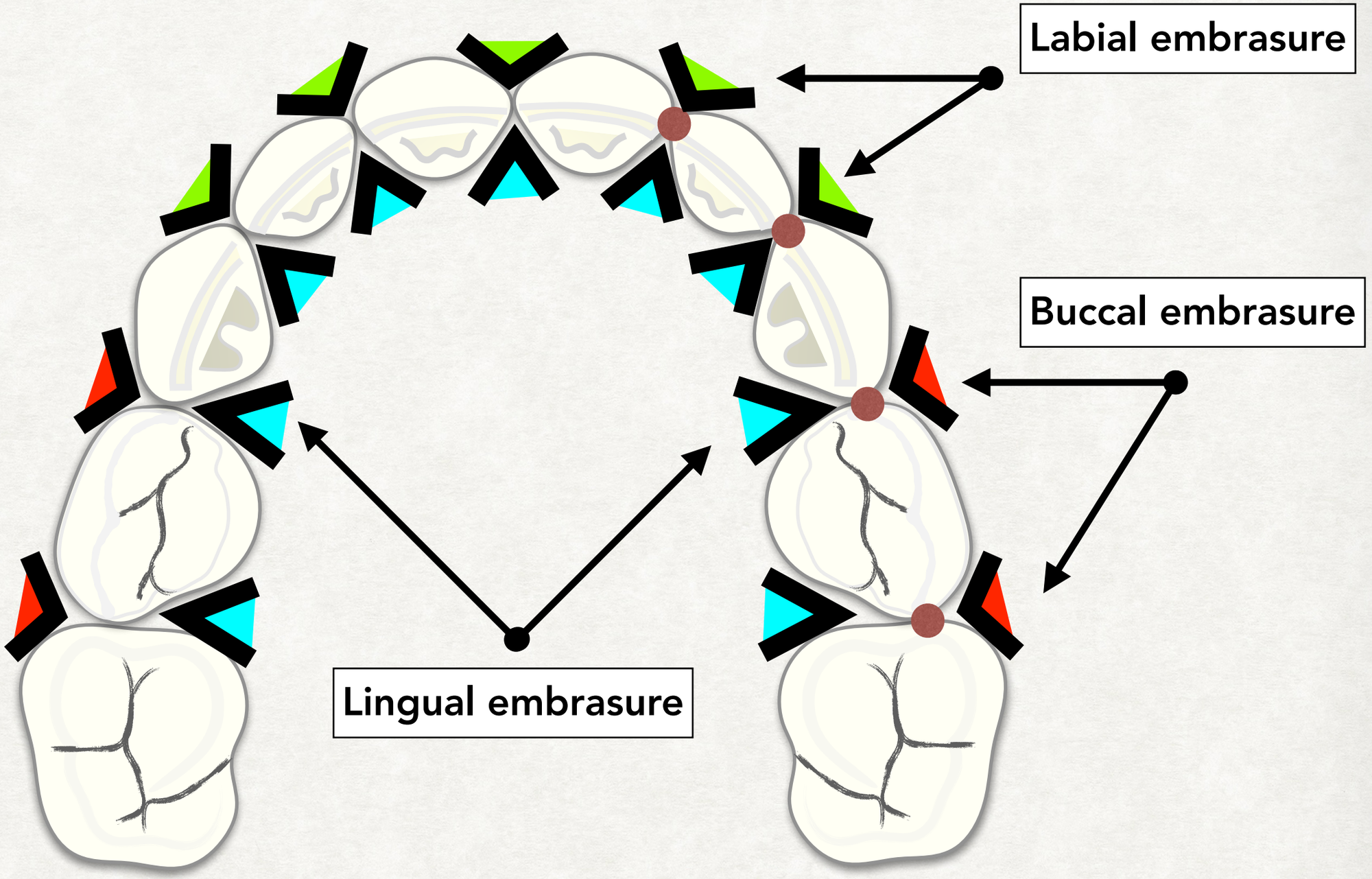
Types:

- **Embrasure named** according to their escapement from any surface:
  1. Incisal and occlusal embrasure.
  2. Labial and buccal embrasure.
  3. Lingual embrasure.
  4. **No cervical embrasure.** **WHY?**
- **B**ecause the cervical area is filled by interdental gingiva.

Incisal embrasure in anterior teeth

Occlusal embrasure in posterior teeth




Labial embrasure
Buccal embrasure
Lingual embrasure

Significances of embrasure:

1. Escapement of food during mastication.
2. Prevention of food accumulation.
3. Protect the gingiva form frictional trauma.
4. Allowing massage for the gingiva.
5. Distribution of masticatory force on teeth.
6. Fade out of masticatory force on teeth.
7. **Provide dental Hygiene,** exposing the proximal surfaces to tooth brushing for cleaning, While the only hidden part of the tooth is the contact area.

Labial, Buccal and Lingual Contour of Crown.

Definition:

1. Labial and buccal contour of crown is a uniform curvature found at cervical third and termed cervical ridge.
2. Lingual contour of crown of anterior teeth is a uniform curvature found on cervical third of the crown termed cingulum.
3. Lingual contour of crown of posterior teeth is a uniform curvature found on middle third of the crown.

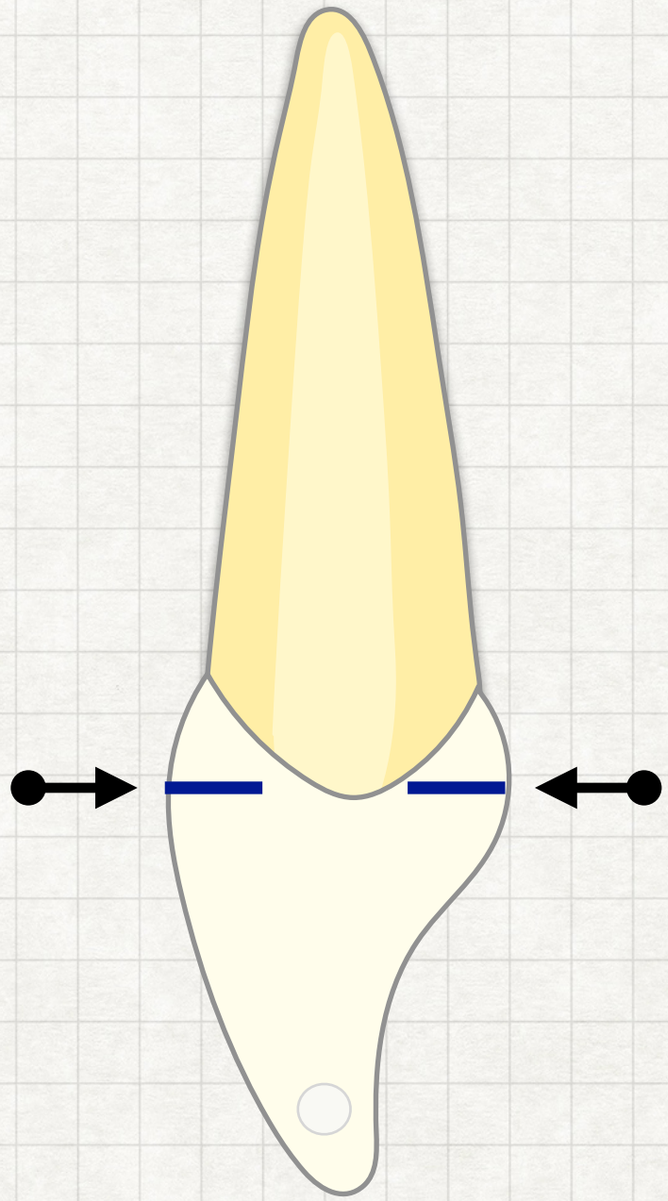
In deciduous teeth:

- Deciduous teeth have greater curvature than in permanent.
- All labial, buccal, and lingual contours of deciduous teeth are located at cervical thirds.

Permanent anterior teeth

Labial outline

Lingual outline



Maximum of convexity on cervical third

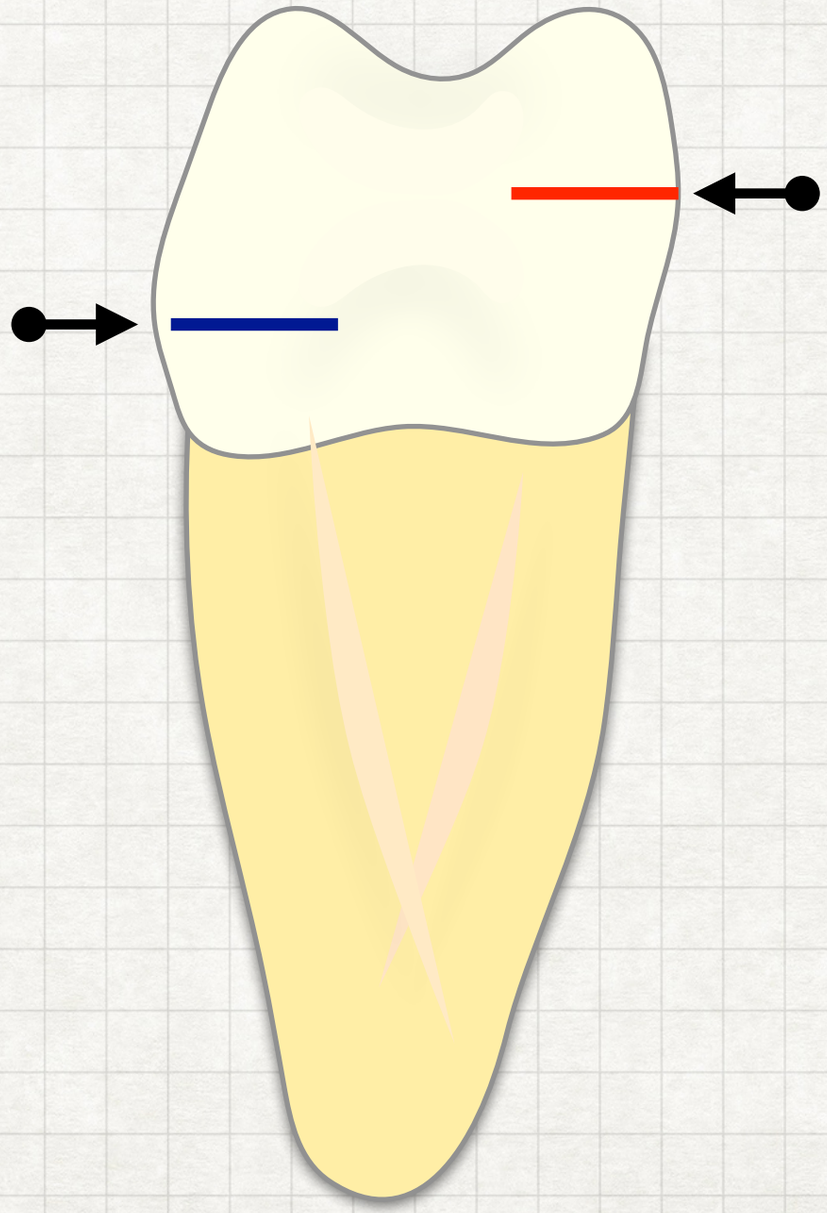
Maximum of convexity on cervical third

Permanent posterior teeth

Buccal outline

Lingual outline

Maximum of convexity on cervical third

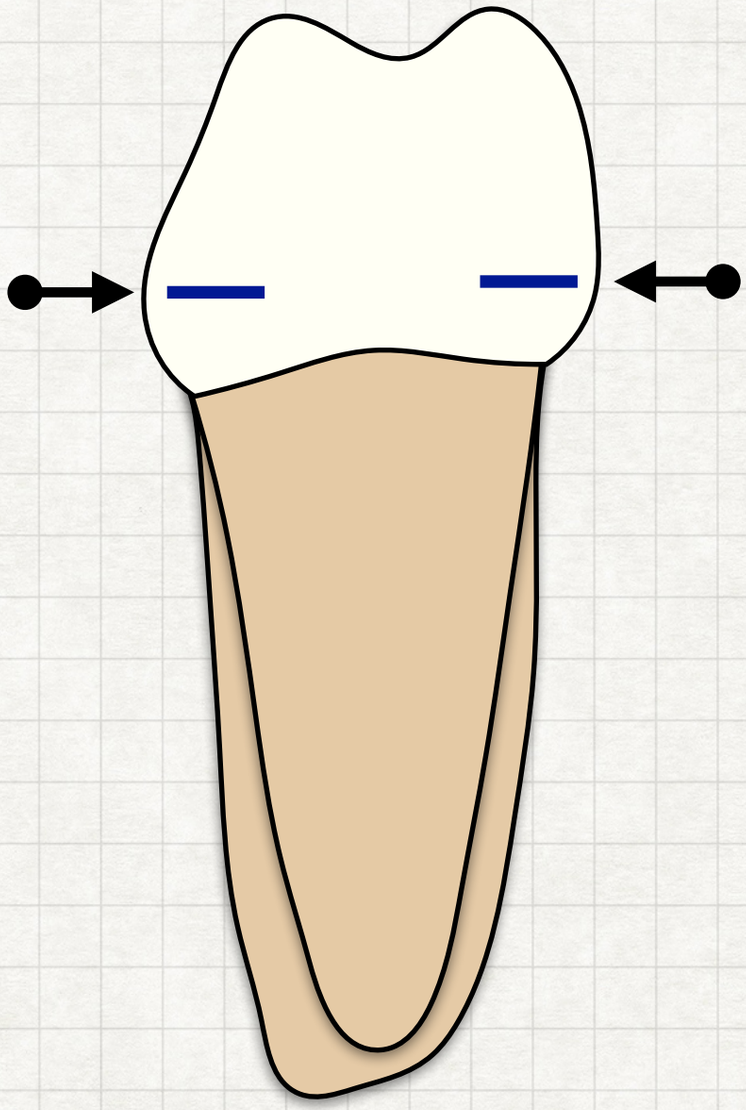


Maximum of convexity on middle third

All deciduous teeth (anterior and posterior)

Buccal outline

Lingual outline



Maximum of convexity on cervical third

Maximum of convexity on cervical third

Significances:

1. Give an area of gingival tissue to seat under the contour.

2. Deflect the chewed food along the gingiva.

3. provide self cleaning of the tooth.

4. Prevent irritation to the gingiva by food.

5. Physiologic massage to the gingiva by the chewed food.

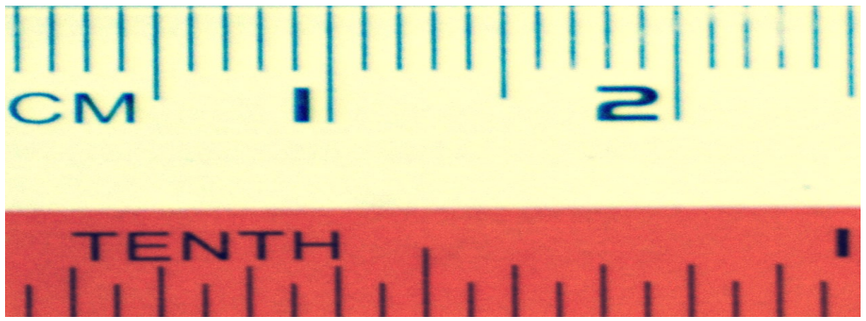
6. Provide greater thickness of the teeth to resist fracture.

Under contour leads to:

1. Accumulation of food and bacteria between tooth and gingiva.
2. Traumatic irritation to the gingival by chewed food.
3. Trauma lead to gingival recession and diseases of preiodontium.

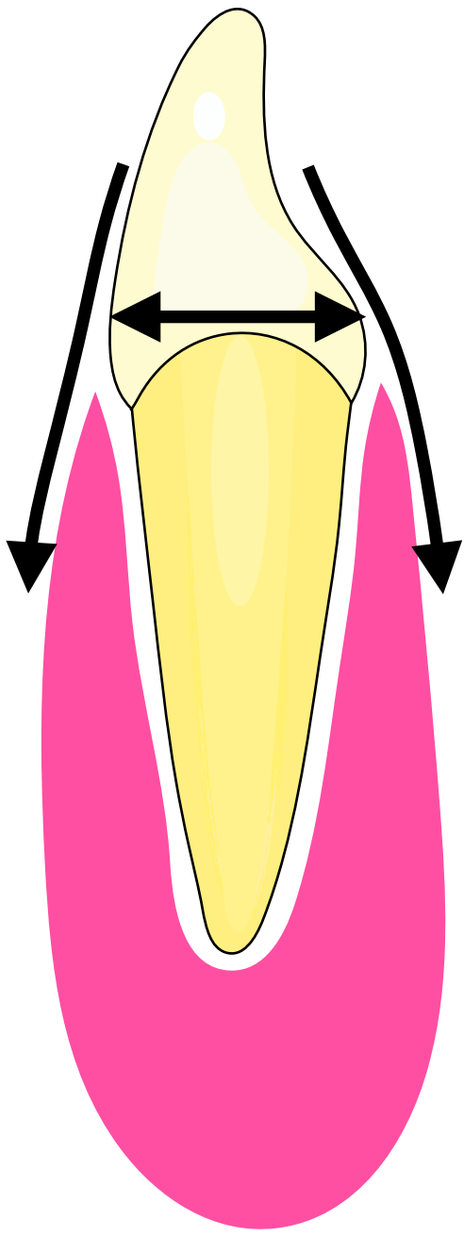
Over contour leads to:

1. Loss of physiologic massage to the gingiva by the chewed food leading to not healthy gingiva.
2. Accumulation of food around the gingival margins.



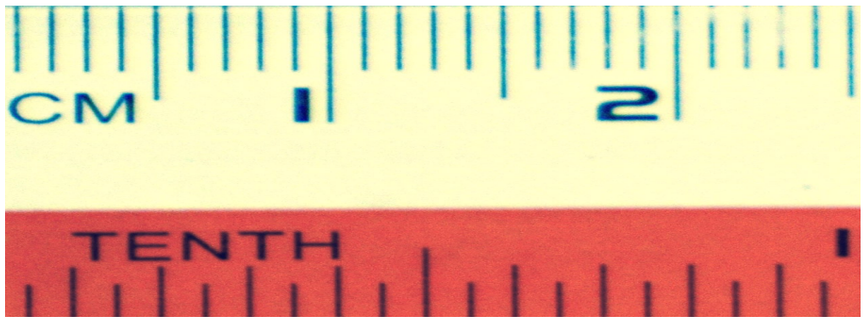
Normal contour
Normal cervical ridge
Normal cingulum

Massage to gingiva

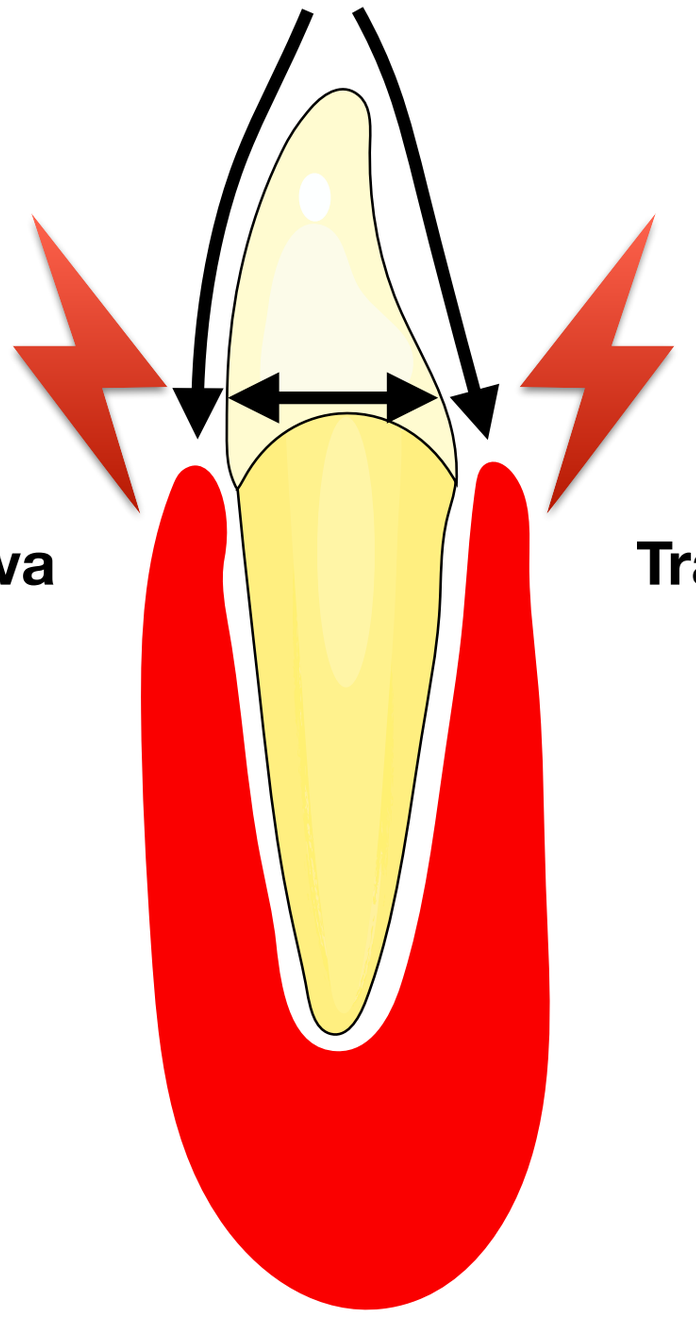


Massage to gingiva

Under contour

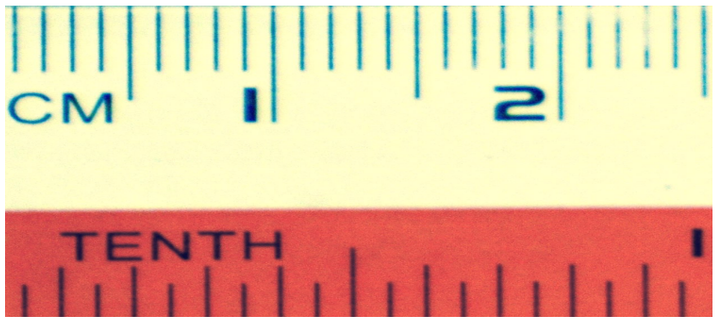


Trauma to gingiva

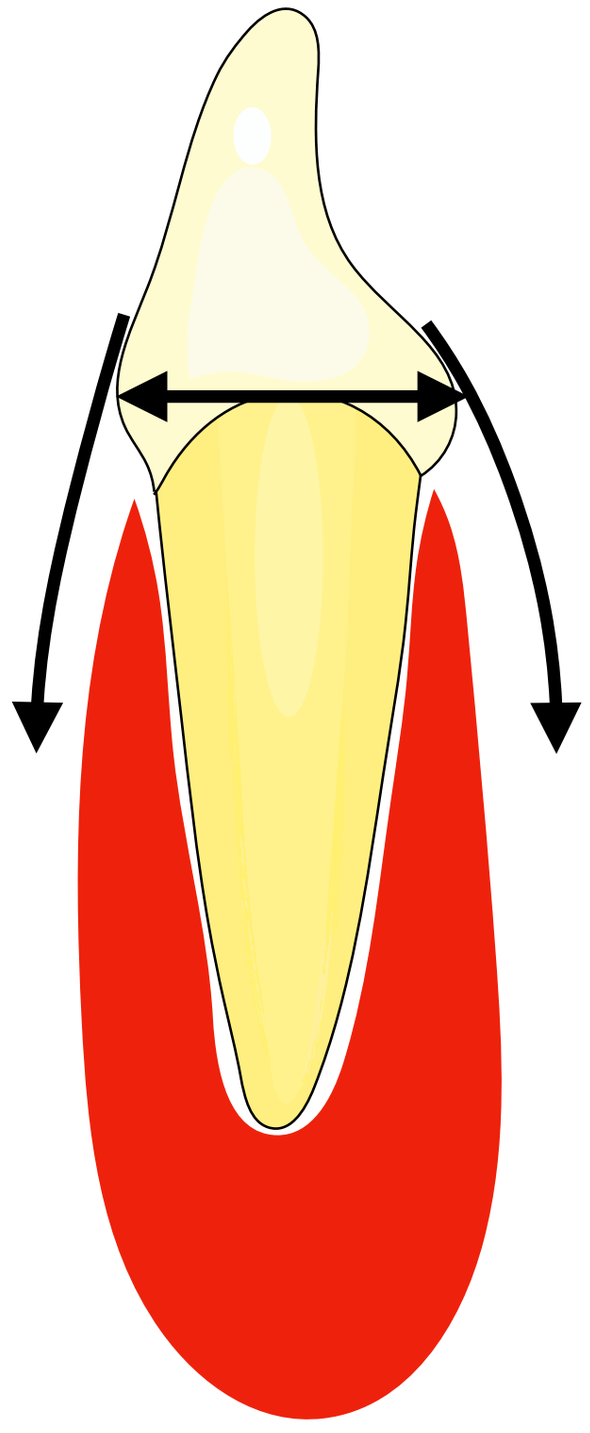


Trauma to gingiva

Over contour



No massage to gingiva
And food accumulation



No massage to gingiva

WELCOME