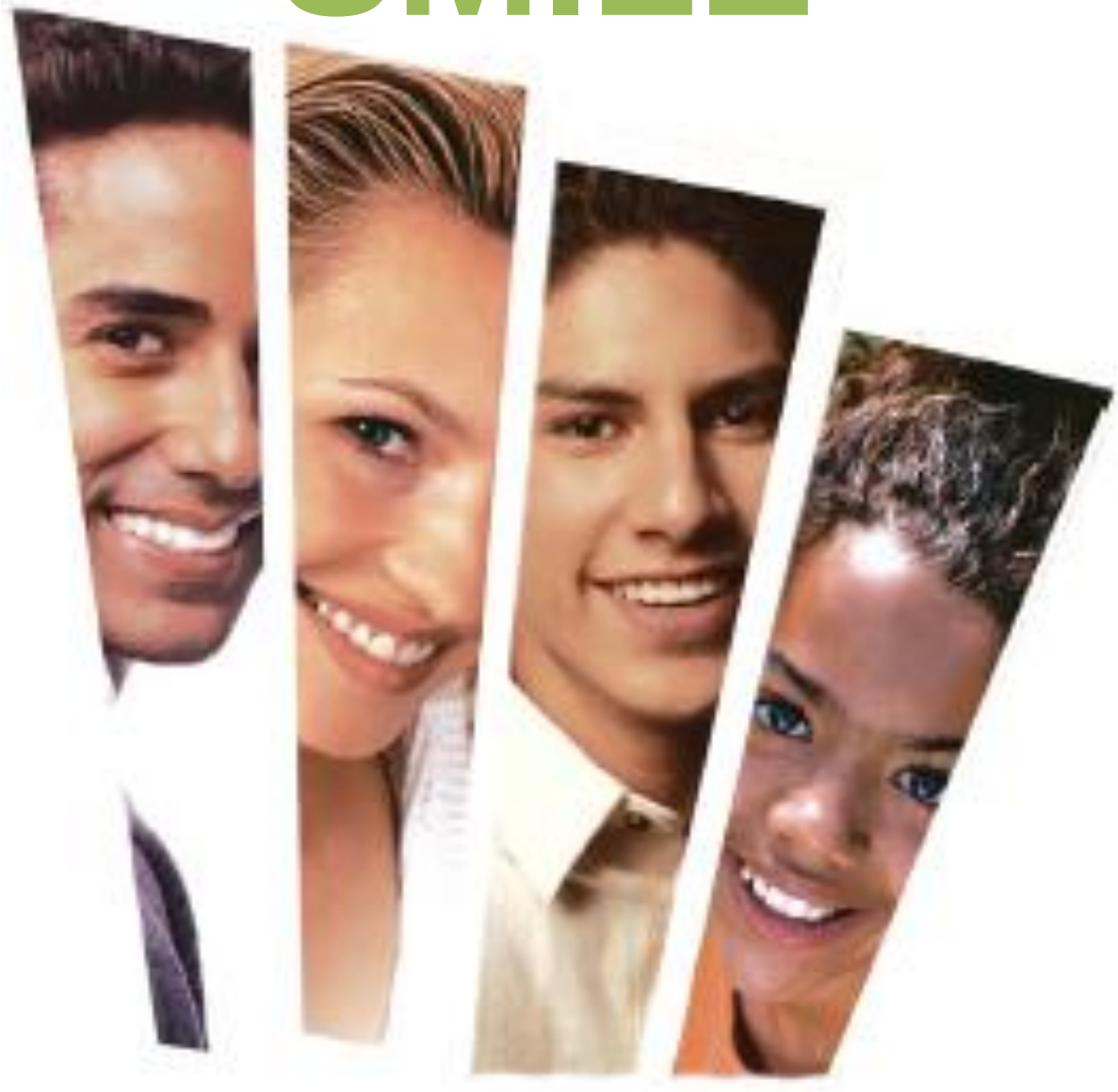
HEALTHY SMILE



RESEARCH WORK
2n Batxillerat
Course 2014-2015

Be true to your teeth and they won't be false to you.
-Soupy Sale.

SUMMARY.

1. INTRODUCTION.

The health of your teeth and mouth is related in many ways to the health and general welfare. The ability to chew and swallow food is essential to get the necessary nutrients and enjoy a good health. Apart from the consequences on the nutritional status, poor dental health can also affect negatively the capacity of communication and self-esteem. You must not forget that your teeth and tongue help you to form words, controlling the flow of air that comes out from the mouth and a smile is the facial expression that we first see in other people. In addition, dental diseases cause economic and social problems because the treatments are costly and imply absences to school (children) and work (adults).

Until the twentieth century, to take care of the teeth it was something more of beauty than health. It was believed that with age it was normal to lose teeth and only the upper class families used toothpaste and mouthwash to take care of their oral health, although they didn't use these products every day. Also, going to the dentist was not something usual.

Today, the reality is different. Studies show that with a good oral hygiene and visiting the dentist regularly, you can prevent the formation of plaque (invisible masses of harmful germs found in the mouth and stick to your teeth), causing of dental caries and gums diseases, and therefore, you can preserve your teeth for life.

Currently, there are many campaigns aimed at caries prevention and everyone is aware of the important role of oral hygiene products. On the market, there are many different toothpastes and mouthwashes which have different components depending on the needing. For this reason, this work includes a fairly detailed explanation of the main components of oral care products: toothpastes, mouthwashes and gels.

1.1. MOTIVATION.

When I was a child, I even didn't understand this profession too much, I used to play that I extracted my doll's teeth, so, it is a theme which I have always been interested in. As I grew up I realized that I'm not that typical observer person who looks at you straight in the eye. I focus my glance on other people's teeth, which can be considered a habit or a mania. This habit or mania combined with my way of having fun of my childhood, did not take long time to become something very serious, so, when I was given the opportunity to work on any theme from my interest, I thought quickly about dentistry.

As I've been working on this field, I have understood that dentistry goes further than dental caries and the annoying noise of its machinery. Very

soon, I knew what attracted me the most: the reason of the importance of teeth in our lives.

It is clear that a piece of work about the world of dentistry does not imply it has to be written in English, well, I will explain the reason of the decision to do it in this language.

As we all know, English is currently considered the most important language in the world, either by those who speak it as a first or second language. This language is also considered the main element of communication between different cultures.

In addition of being the number one global language, it is a language that I had always wanted to get to master perfectly. Therefore, this piece of work not only has enriched more my vocabulary, but also in the field that I like, with which I want to continue my formation and on which I would like to work one day.

In short, it has been my passion for the world of dentistry and my interest in the English language which has led me to do a piece of work with these characteristics.

1.2. METHODOLOGY.

The research of information in both books and Internet is a basic method of this work, this is the most typical thing and at the same time, uninteresting. So, I tried to do my piece of work in order to contain a high amount of practice part. Besides, I'll try to evoke all the knowledge I've gained about the teeth and, in general, about the world of dentistry, throughout my life. The structure of this piece of work is divided into two clearly differentiated parts:

- **Theoretical part:** It consists on the explanation and comprehension of the parts, the tissues and the components of a tooth. It shows clearly the three main oral hygiene products (toothpastes, mouthwashes and gels) and their components. In addition, are reflected the most important oral diseases although in a more extensive way the dental caries, since is the disease which is the most predominant in general.

- **Practical part:** There were a surveys which were distributed among students from ESO and from Batxillerat in the INS Antoni Pous i Argila to determine and find out about their oral health and the frequency they visit the dentist.

The second part involves the elaboration of ecological toothpaste covering the needs of the students from the institute. Besides, I have included the ingredients and their quantities with the intention of being useful for that people interested in preparing the same toothpaste.

The third part consists in giving a talk to students from TAS, in the same institute, explaining the most important in dentistry (teeth and its tissues, how to brush the teeth correctly etc.). In addition, with these same students, it was took a plaque control so that students see that with only a simple brushing is not achieved an impeccable hygiene.
Finally, two dentists were interviewed, basically, to conclude this piece of work with professional opinions.

All these aspects lead to a working structure following this scheme: introduction, theoretical work, practical works and finally the conclusions and the annexes.

2. AIMS.

The aims of this piece of work are:

- Meeting the classification, morphology and histology of the teeth.
- Depth knowledge of each of the four dental tissues (composition, characteristics, etc.).
- Understanding the major diseases that we can suffer in our mouth.
- Analyzing if the students from INS Antoni Pous i Argila take care of their teeth or not.
- Knowing which is the oral health of the students form INS Antoni Pous i Argila.
- Knowing all the components of the products used in oral hygiene to make sure that people who read this piece work are going to meet which is the appropriate product for their problems.
- Meeting the main oral diseases to be able to recognize which one predominate in students from INS Antoni Pous i Argila.
- As it will have met the components of toothpastes and have known which disease is the most predominant in school students; elaborate toothpaste that works to prevent this diseases.

3. TEETH AND ITS TISSUES.

The teeth, components of the masticator apparatus, are hard anatomical organs, calcified, attached to upper and lower maxillary through a special type of articulation called gomphosis, which is formed by the dental cement and the alveolar bone, both of them are united by the insertion periodont. Above the bone, there is the gum, which also sustain the teeth and it's called protection periodont.

Tooth is formed by phosphorus and calcium, which give it hardness.

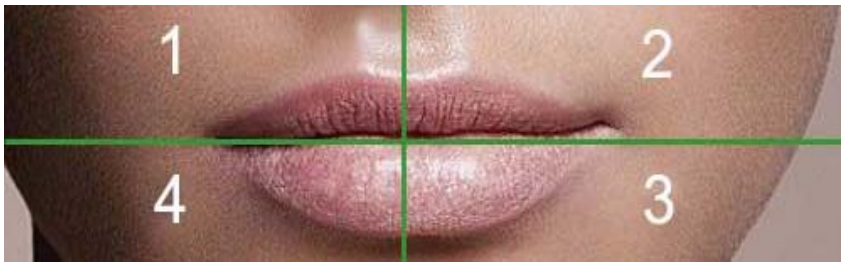
In the mouth, food is chewed by teeth and mixed, with the help of the tongue, with the saliva. In this moment it starts the decomposition process of the food in simple nutrient substances. This process is previous to digestion. The role of teeth is mechanical, they are the responsible of crushing the food and, after that the saliva, which contains an enzyme called amylase, starts the decomposition of the carbohydrates before ending up in the stomach.

The main function of the teeth is chewing, but in some animals they have other functions apart from chewing, like gnawing, digging, fighting, etc.

In the human being, apart from chewing, teeth are involved in the articulation of language, acting as a point of support against which the tongue presses to make certain sounds.

3.1. CLASIFICATION.

Permanent teeth have anatomical structures and a clear and defined functionality for each dental group. These groups are arranged in the dental alveoli forming an arch. Each arcade can be divided in two semi arcades or quadrants (I, II, III, IV).

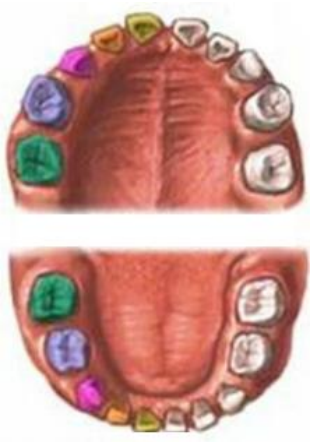


Depending on the age of the person, the dentition can be temporary or permanent:

- **Temporary teeth:** The first dentition, which is the temporary one, begins to be lost at the age of 8 or 9. A child's mouth, between 6

months and 6 or 7 years, contains 20 temporary teeth, called primary teeth, and it consists in the following teeth types:

1. 8 molars (4 first molars and 4 second molars).
2. 4 cuspids
3. 8 incisors (4 central incisors and 4 lateral incisors).



- **Permanent teeth:** At the age of 8 or 9, the temporary dentition begins to be lost, and the permanent dentition starts its formation. The permanent dentition consists in a total of 32 dental pieces.

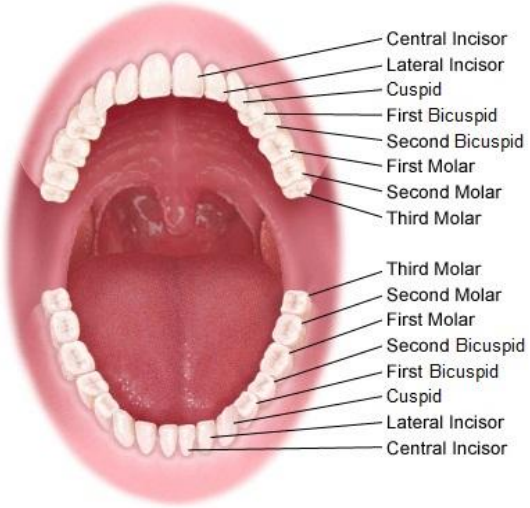
By the function, teeth can be divided into four parts:

- **Incisors:** They are a total of eight teeth, two in each quadrant, which have a sharp part. Their function is cutting the food. It contains a chronicle crown and only one root. As I said there are eight incisors, and each incisor is called in different way depending on their position in the mouth. There are:
  - Two maxillary central incisors.
  - Two maxillary lateral incisors.
  - Two mandibular central incisors.
  - Two mandibular lateral incisors.

- **Cuspids:** They are four, one for each quadrant, and they have a cusp form ending in a tip shaped. Their function is to shatter the food. They also have only one root, but their roots are strong and thick. There are two types of cusps:
  - Two maxillary cuspids.
  - Two mandibular cuspids.

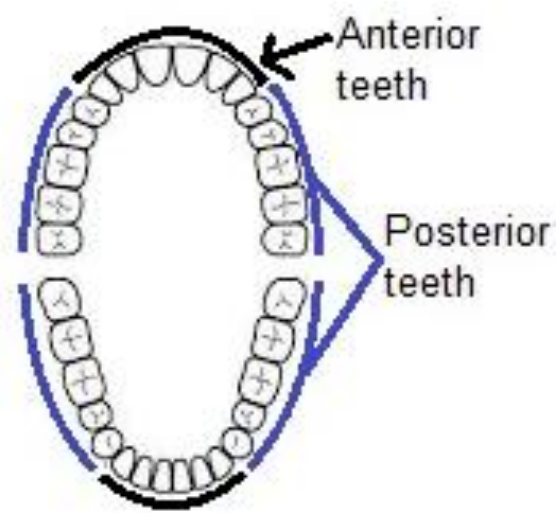
- **Bicuspids:** Are also a total of eight teeth, two in each quadrant, which have a form of two cusps ending in a tip shaped. Their function is crushing the food. They can have one or two strong and thick roots. There are:
  - Two maxillary first bicuspids.
  - Two maxillary first bicuspids.
  - Two mandibular second bicuspids.
  - Two mandibular second bicuspids.

- **Molars:** They are a total of twelve teeth, three for each quadrant, and they have a form of a wide cusp. Their function is the same as premolar. They have two, three or four roots. There are:
  - Two maxillary first molars.
  - Two maxillary second molars.
  - Two maxillary third molars.
  - Two mandibular first molars.
  - Two mandibular second molars.
  - Two mandibular third molars.



Teeth also can be divided by their position in the mouth:

- **Anterior teeth:** formed by the incisors and the canines. They are helpful to make dental and labiodental sounds.
- **Posterior teeth:** formed by the premolars and molars.



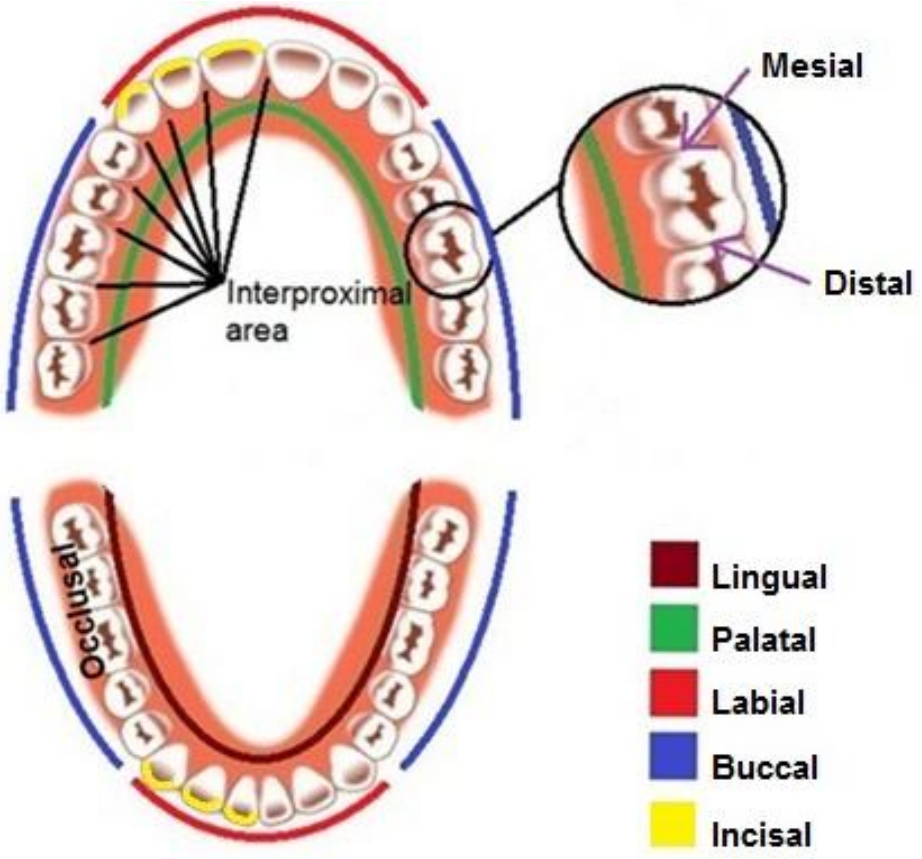
A tooth has different surfaces. The surfaces of the teeth are:

- **Proximal surface:** The proximal tooth surfaces are formed by the contact of two adjacent teeth. The mesial surface of one tooth keeps in contact with the distal surface of the tooth beside the first to form the proximal contact. The two surfaces that come into contact with each other are called the proximal surfaces.
  - **Mesial surface:** It is the side of the tooth closest to the middle (midline) of the dental arch.
  - **Distal surface:** It is the side of the tooth that is farthest away from the arch middle (midline).
- **Lingual and palatal surface:** This is the surface of a tooth that is closest or next to your tongue. On the upper teeth, is called the palatal surface. On the lower teeth, it's called the lingual surface.
- **Facial surface:** The facial surface is a generic term for both the posterior and anterior teeth. The facial surface refers to both the buccal and labial surfaces of the teeth collectively.
  - **Labial Surface:** The labial surface is the portion of the anterior tooth that faces the lip.
  - **Buccal surface:** The buccal surface of the tooth is the portion of the posterior tooth that faces the cheek.
- **Occlusal surface:** The surface of the tooth that occludes with the tooth of the opposite arch is known as occlusal surface. In other words, the

occlusal surface is the section of the posterior teeth that is used as the hewing surface.

- **Incisal surface:** The cutting edges of the anterior teeth, incisors and cuspids, which come into contact with those of the opposite teeth during protrusive occlusion[1].

- **Interproximal space:** The interproximal space is the area above the proximal contact, towards the gingival. This space is usually filled with unattached gum.



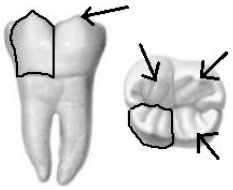
3.2. MORPHOLOGY.

In the same tooth, there are morphological differences:

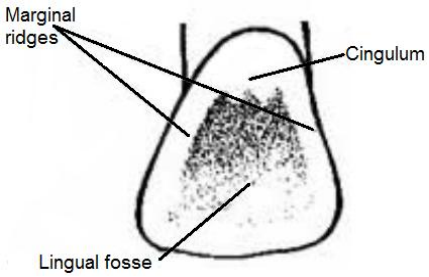
3.2.1. CROWN.

The crown of the tooth is the part that you can see above your gingiva line. The part of the tooth that is covered by enamel and formed by dentine and dental pulp, is called the “anatomical crown”. The crown can become longer as you get older because gums recede and periodontal diseases can destroy the tissue of the gum. If this happens, your teeth are going to look longer even they haven’t grown. If your gums recede, then your tooth roots are going to be more exposed. This also can make

the tooth become loose and unstable. The anatomical crown also can get smaller as we age because the enamel wears over time. There are some people that the process of wear occurs quickly because of an incorrect bite (malocclusion) or habits such as grinding the teeth. The crown of teeth has irregularities:



- **Cusps:** They are structures with pyramidal form in the occlusal surface. Depending of the tooth varies the number of cusps.
- **Mamelons:** Rounded and small prominences of the Incisal surface.
- **Cingulum:** Bulbous convexity in the cervical area of the palatal surface of the anterior teeth.



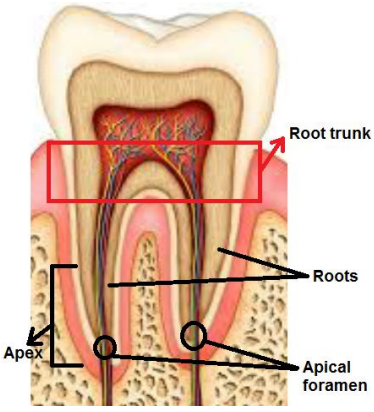
- **Lingual fosse:** Excavations fairly deep of the anterior teeth located below the cingulum.
- **Marginal ridges:** Ridges are any linear, flat elevations on teeth. On anterior teeth, they are located on the mesial and distal borders of the lingual surface; on posterior teeth, they are located on the mesial and distal borders of the occlusal surface.

3.2.2. NECK.

It is the point of the tooth that joins the crown and the root. Also, it is the point of separation between the enamel and the dental cement. It coincides with the boundary of the gum.

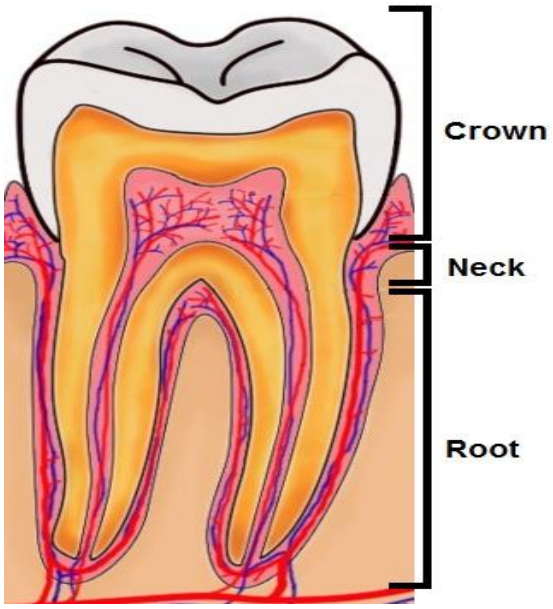
3.2.3. ROOT.

The root of the tooth is the part that extends into upper and lower jawbones. Different types of teeth have different root formations. Some teeth, such as incisors and cuspids, have a single root. But, molars may have two or three roots depending on their type and location in the mouth. The root of teeth has different parts:



- **Root trunk:** Common part of the root portion of the teeth.

- **Root or roots:** Independent parts of the root trunk.
- **Apex:** Is the most distal portion of the root.
- **Apical foramen:** the apical foramen is a small opening located at the end of each root. Through this opening pass blood vessels and nerves to enter to the tooth.



3.3. HISTOLOGY

Teeth are specializations of epithelial and connective tissue that mineralize and the result of that mineralization are the hardest tissues of the body.

This hardness makes them essential in personal identification mechanisms in deceased's, and at the same time they are an important element in palaeontology and evolutionary biology.

From the histological point of view, the tooth is composed by four tissues; three of them are hard and are called enamel, dentine and cement, in descending order of hardness. The three of them are harder than bone. The only tissue which is soft is the dental pulp, which is characterized by having a rich vascularisation, which gives the tooth sensibility.

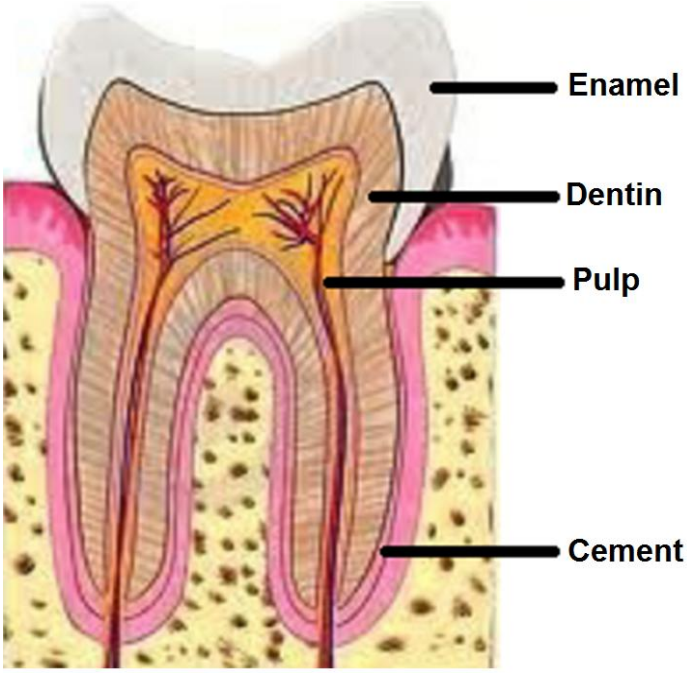
Two of the hard tissues are external: enamel, which is at the crown of the tooth, and cement, located in the root.

Inside both of them, stands dentine, this tissue is involved in the formation of the two portions and refines a cavity occupied by the dental pulp. The visible portion of the crown is involved in the masticatory work, because it has a sufficiently hard tissue (enamel) to withstand pressures due to the support that it receives by the dentine, which has elasticity for preventing fractures.

In the root portion, cement ensures the position of the tooth. Inside, it borders with pulp cavity which provides the nutrition of the tooth.

Here's each of the tissues of the tooth. To do so in a clear and structured way, we're going to differentiate dental and periodontal tissues:

3.3.1. DENTAL TISSUES.



3.3.1.1. ENAMEL.

Enamel is an epithelially derived hard, protective covering of teeth. When enamel is fully formed, it is the most highly mineralized extracellular matrix known. It is very brittle, even though it presents resistance to withstand determinate pressures without fracturing.

A. PHYSICAL CHARACTERISTICS OF ENAMEL.

Enamel is the hardest substance of the body; its hardness is comparable to mild steel. The hardness of enamel based on Knoop scale is approximately 343. Surface of enamel is more mineralized and hard than inner enamel.

Enamel is the unique calcified structure in the body that is totally acellular, unlike other calcified structures.

B. COMPSITION OF ENAMEL.

By weight, enamel consists of approximately 96% of inorganic material and 4% of organic material and water.

By volume, it consists of approximately 12% of inorganic material and 88% of organic material and water.

The organic component forms the matrix and the inorganic component comprises of various minerals. The organic matrix of enamel is made from non-collagenous[2] proteins and enzymes.

The 90% of the enamel proteins are amelogenins[3] and the 10% are non-amelogenins. The different types of non-amelogenins associated with formation of enamel are ameloblastin, enamelin and tuftelin.

The primary function of the organic material is to direct the growth of enamel crystals.

The inorganic component of enamel is comprised almost entirely of hydroxylapatite crystals[4]. Enamel hydroxylapatite crystals are the largest hydroxylapatite crystals of all the calcified tissues in the body.

In addition to hydroxylapatite crystals, enamel also contains carbonates and trace elements.

These crystals are susceptible to dissolution by acids and therefore provide the basis for dental caries.

Enamel is translucent and varies in colour from light yellow to whitish.

It varies in thickness, with maximum over cusps (2.5 mm) to a feather edge at the cervical line. Thickness of enamel in primary teeth is nearly half than that in permanent teeth.

Although enamel is an extremely hard tissue, it is partially permeable to some fluids, bacteria and other products of the oral cavity. The permeability of enamel is due to the presence of cracks and microscopic spaces on the surface of enamel which allows penetration of fluids. Its permeability decreases and its hardness increases with age.

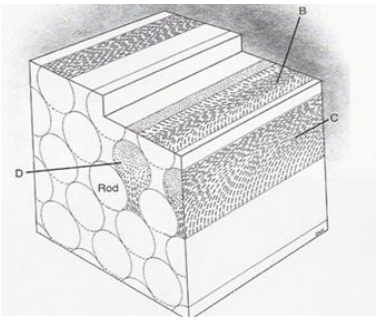
C. STRUCTURE OF ENAMEL.

❖ ROD AND INTERROD OF ENAMEL.

Rods and interrods are the fundamental units of teeth enamel. They are built from closely packed and long ribbon like hydroxylapatite crystals.

The rod is shaped like a cylinder with a wide head portion, a neck and a thinner tail portion. Each rod is formed by four ameloblasts[5].

Enamel rods are connected one to another in a determined way that they appear like ‘keyholes’. The head of one rod attached to the necks of two neighbouring rods.



Rods are formed proximally perpendicular to dentino-enamel junction (DEJ) and curve slightly towards the cusp tip.

The diameter of the rod at the outer surface is double the diameter at DEJ. And the length of most rods is much longer than the thickness of enamel.

Crystals that surround each rod are called **interrod enamel.**

Rod and interrod enamel is formed from the Tomes process[6] of Ameloblasts. The crystals making up the rod and interrod enamel have same composition but are oriented in different direction.

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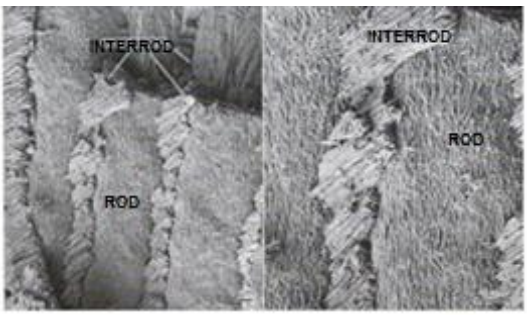
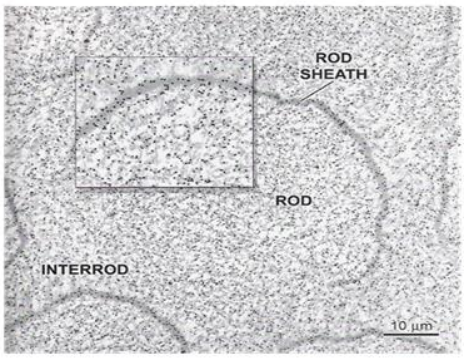


The boundary between rod and interrod enamel is marked by a narrow space filled with organic materials known as **rod sheath.**

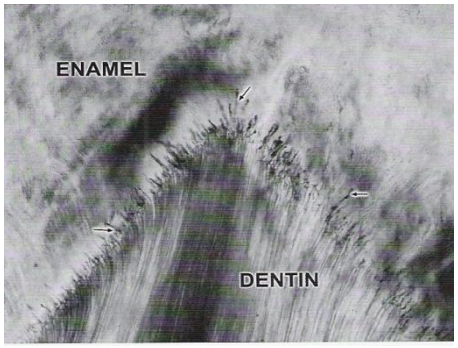


D. HISTOLOGICAL FEATURES OF ENAMEL.

❖ ENAMEL SPINDLES.

Enamel spindles originate from the DEJ.

Before enamel forms, some developing odontoblasts process[7] extend into the ameloblast layer, and when enamel formation begins become trapped to form enamel spindles.



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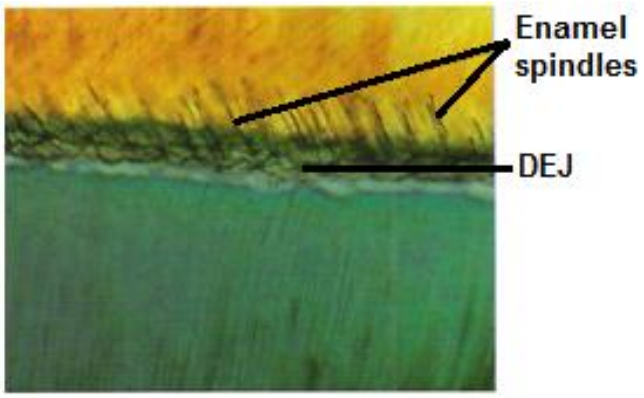
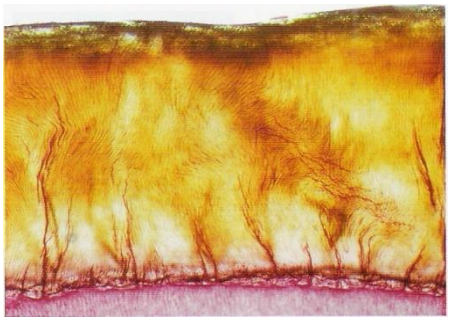


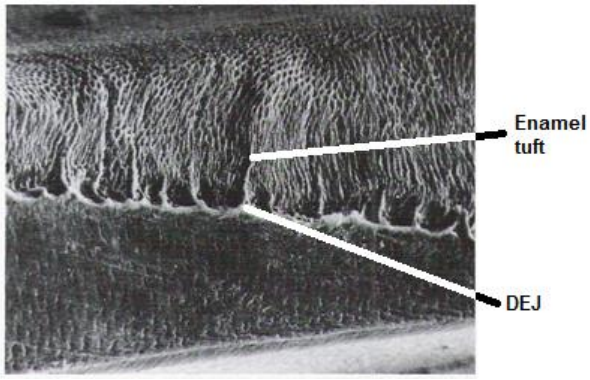
❖ ENAMEL TUFTS.

Enamel tufts also originate from the DEJ; run a short distance in the enamel or sometimes to one half of the thickness.

They represent a protein (enamelin) rich areas in the enamel matrix that fail to mature.

They are formed during the formative stages of enamel. And also, they are considered to be ‘faults’ by some researchers while others consider them to be necessary to anchor dentine to enamel.



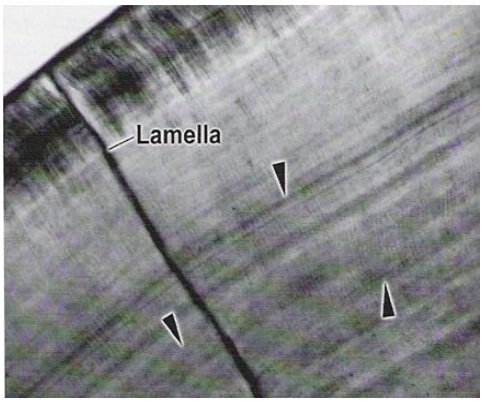


❖ ENAMEL LAMELLAE.

Enamel lamellae extend from the surface to varying depths of the enamel. They are faults that develop as a result of failure of maturation process.

Enamel lamellae are filled with organic material and water. There are three types of lamellae:

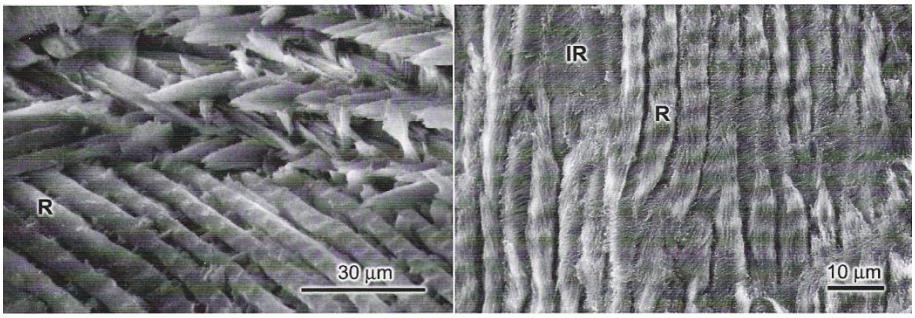
- **Type A:** Composed of poorly calcified rod segments.
- **Type B:** Filled with degenerated epithelial cells and formed before tooth eruption (before they grow).
- **Type C:** Filled with organic matter and formed after eruption.



❖ CROSS STRIATIONS.

Cross striations are periodic bands that appear along the full length of enamel rod. Because of this, the enamel rod appears like a ladder with cross striations being the rungs of the ladder.

They appear at regular intervals that are in agreement with the rate of enamel deposition (which is approximately 4µm per day).



❖ STRIAE OF RETZIUS.

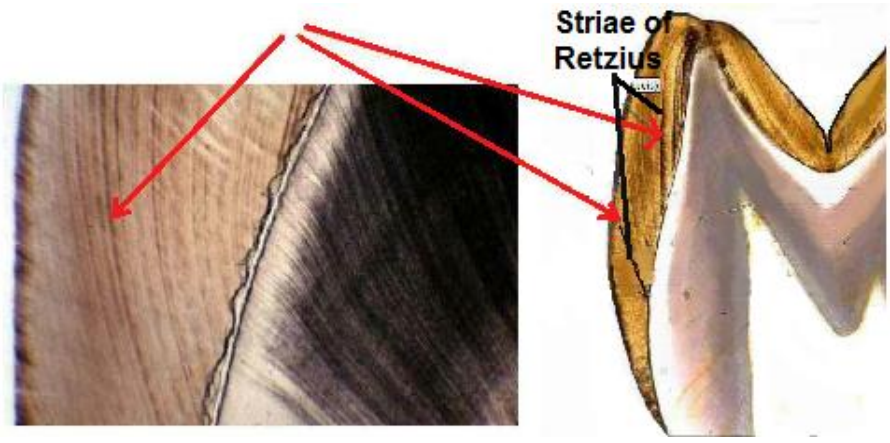
In ground cross sections Striae of Retzius appear like concentric growth rings similar to those found in trees.

In ground longitudinal sections they appear to be dark line extending from the DEJ to the tooth surface.

Along the Striae Retzius fewer enamel crystals are found and this is related to physiologic disturbances in the body.

Neonatal line is a Striae of Retzius that forms at birth.

Striae of Retzius often extend from the DEJ to the outer surface of the enamel, where they end in shallow furrows know as **perikymata** (or imbrication lines).



❖ GNARLED ENAMEL.

Most enamel rods follow an undulating way from DEJ to the tooth surface. But in the cusps tips of molars groups of enamel rods twist about one another. This twisting pattern of enamel rod is known as gnarled enamel.

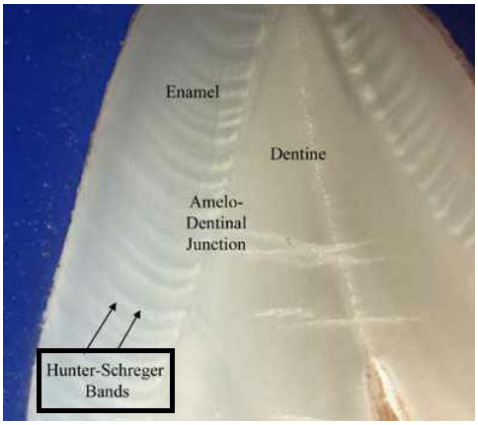
Gnarled enamel makes the enamel strong and more resistant to fracture.

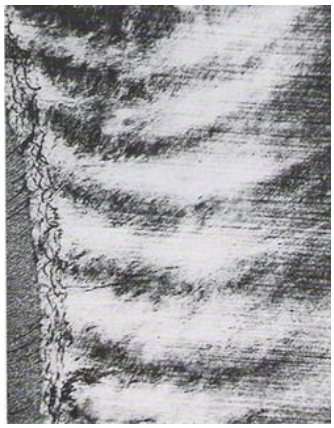
❖ **HUNTER-SCHREGER BANDS.**

Hunter-Schreger bands are optical phenomena and are seen in reflected light.

They can be seen in ground longitudinal sections as alternating dark and light bands.

The dark bands correspond to the cross sectional enamel rods (diazones) and the light bands represent the longitudinally sectioned interrod enamel (parazones).





E. DEFECTS OF ENAMEL FORMATION.

Generally there three conditions which affect enamel during its formative stages.

- Defects caused by **febrile disease.**
- Defects caused by **tetracycline.**
- Defects caused by **excess fluoride.**

3.3.1.2. DENTINE.

Dentine is a calcified tissue of the body, and along with enamel, cementum and pulp is one of the major components of teeth. A dentine layer forms the bulk of dental mineralized dental tissue.

Dentine is capped by a crown made of highly mineralized and protective enamel, and in the root, it covered by cementum, a structure implicated in the attachment of the teeth to the bony socket.

Unlike enamel, dentine is a vital tissue containing the cell processes of odontoblasts and neuron.

A. PHYSICAL CHARACTERISTICS OF DENTINE.

Dentine has great tensile strength. Its color is pale yellow and is a bit harder than bone.

Dentine provides an elastic basis and color for enamel. It also provides as a chamber, protective barrier for the vital pulp tissues and resiliency to the crown which is necessary to withstand the forces of mastication.

Based on Knoop scale, hardness for dentine is approximately 68.

B. COMPOSITION OF DENTINE.

On the weight basis, dentine is less mineralized than enamel (96% in weight) but more than cementum (about 65% in weight).

By weight, 70% of dentine consists of the mineral hydroxylapatite, 20% is organic material and 10% is water.

By volume, it consists in 40-45% of mineral phase, 30% of organic material and between 20-25% of water.

The organic matrix of dentine is collagenous.

The principal organic component of dentine is hydroxylapatite crystals.

C. STRUCTURE OF DENTINE.

Physiologically and anatomically, dentine is a complex structure. Within what is named as a “whole dentine”, different types of dentins have been indentified, even within single species.

Phylogenetic studies have revealed that during evolution, originally dentine analogues were very similar to bone, with osteoblast[8]/odontoblast[9]-like cells located within alveoli, as it is the case for osteocytes[10] surrounded by bone within lacunae. This organization called osteodentine[11], is still observed during tooth development in some mammalian species such as rodents, and as reparative dentin in humans.

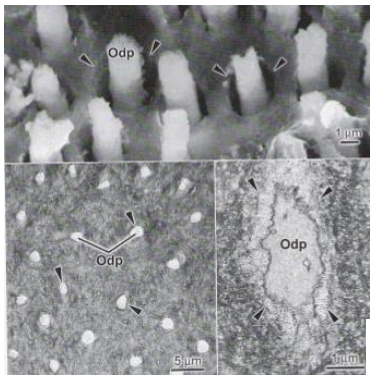
Odontoblasts polarize, elongate and start to display two distinct parts: a cell body and a process. During the next step of evolution, the cell bodies are located outside the mineralized tissue, along the border of the mineralization front, and along processes occupy the lumen of dentine tubules.

Dentine is packed with dentinal tubules that reserve its entire thickness, contain odontoblastic process and nerve fibres. The odontoblastic processes have numerous side branches that exist in the lateral branches of the dentinal tubules.

Dentin tubules- Odontoblastic processes removed.

In contrast with bone, dentine is not vascularised, except in some fish teeth where the existence of vasodentine[12] is well-documented. When mammalian odontoblasts become terminally polarized, they produce an orthodentine[13], with cell bodies located outside the predentine[14]/dentine layer at the periphery of the pulp and cell processes crossing the predentine and extending inside dentine tubules up to the dentino-enamel junction. Tubules are characteristic of the orthodentine.

The diameter tubules vary between 2 and 4 micrometres. The number of dentine tubules is about 18 000 and 21 000 tubules per mm^2. They are more numerous in the inner third layer than the outer third layer of dentine.



Odontoblastic process.

D. CLASSIFICATION OF DENTINE.

Depending on its time development, dentine is classified as: primary dentine, secondary dentine and tertiary dentine.

- **Primary dentine:** the most prominent dentine in the tooth lies between the enamel and the pulp chamber.
- **Secondary dentine:** is formed after root formation is complete, normally after the tooth has erupted and is functional. It grows much slower than the primary dentine. The growth of this type of dentine causes the decrease in the size of pulp chamber with age; this is why cavity preparation in young patients is risky which may lead to exposing the pulp.
- **Tertiary dentine:** is a dentine that formed as a reaction to external insult such as caries. The dentine is formed from a pre-existing odontoblast.
  Tertiary dentine formation is a regarded as an important defence mechanism of the pulp-dentine complex in response to either pathological or physiological insults. The presence of tertiary dentine reduces dentine permeability.

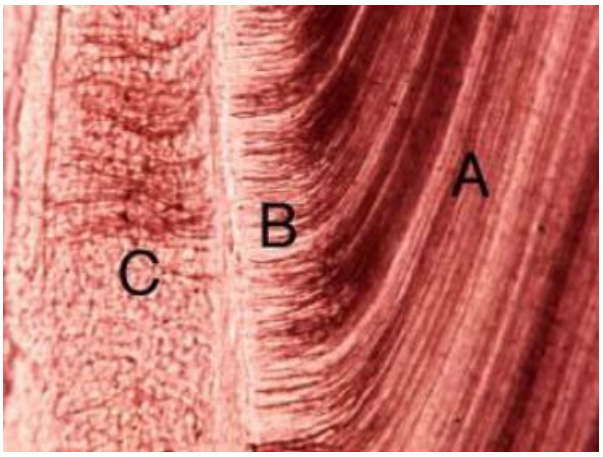
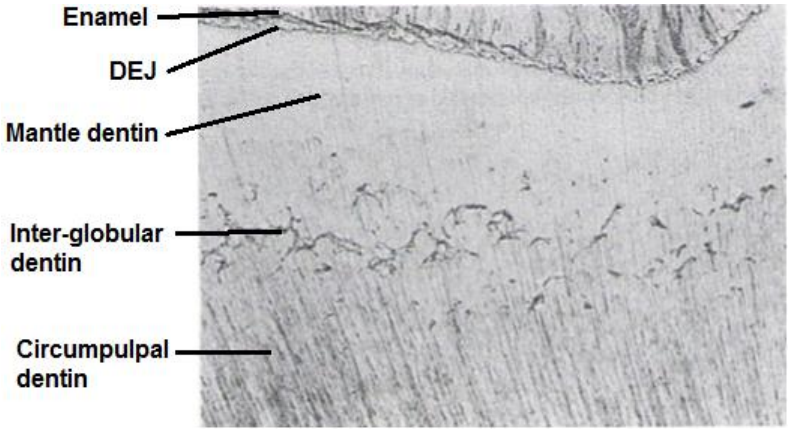


Image x:
A: Primary dentin
B: Secondary dentin
C: Tertiary dentin

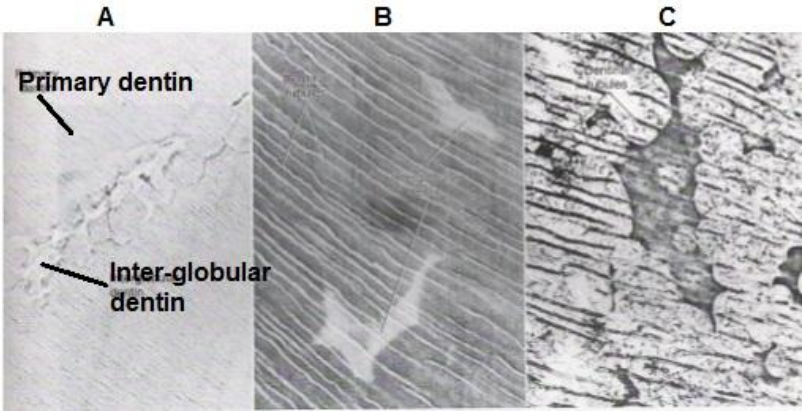
E. TYPES OF DENTINE.

There are many types of dentine:

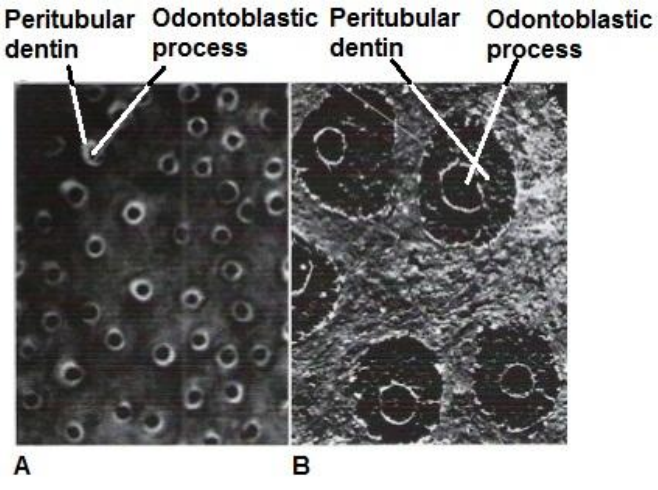
- **Predentine:** Predentine is the first deposited layer of un-mineralized matrix of dentine.
- **Mantle dentine:** The outer layer of dentine that mineralizes first. It lies near the DEJ.
- **Circumpulpal dentine:** The bulk of dentine underlying the mantle dentine.



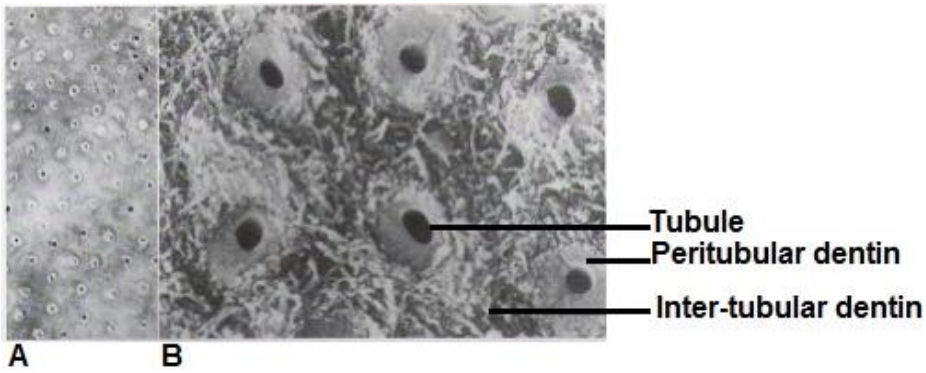
- **Inter-globular dentine:** Dentine separating the mantle dentine and the circumpulpal dentine is hypto-mineralized and is called inter-globular dentine.



- **Intra-tubular dentine:** dentine surrounding and nearest to each tubule is hyper-mineralized and is called intra-tubular dentine or peri-tubular dentine.
  If there is an increase of mineralization of intra-tubular dentine the tubule gets occluded and the resulting dentine is called **sclerotic dentine** or transparent dentine.
  If odontoblasts die as a result of injury or old age the tubule are referred to as dead tracts.



- **Inter-tubular dentine:** The dentinal matrix that lies between the intra-tubular dentine.



- **Tomes granular layer:** In the roots near the cement-dentinal junction there are hypto-mineralized areas of dentine around the dentinal tubule called the Tomes granular layer.

F. HISTOLOGICAL FEATURES OF DENTINE.

❖ INCREMENTAL GROWTH AND VON EBNER LINES.

Dentinogenesis proceeds rhythmically, with alternating phases of activity and quiescence. These phases are represented in formed dentine as incremental lines and can be best seen in longitudinal ground sections of the teeth. These lines are also called as **incremental growth lines.** The incremental lines run roughly at right angles to the dentinal tubules and generally mark the normal linear pattern of dentine deposition. However, controversy exists concerning the difference between the descriptions and explanations of these structures by authorities.

Lines related to disturbances in dentinogenesis or the rhythmic deposition of dentine is called **Von Ebner lines.** These Von Ebner lines run at roughly right angles to the dentinal tubules. Dentine matrix is laid down at a rate of 4 µm per day. More severe changes in orientation occur approximately every 5 days, accounting for the presence of the Von Ebner lines.

Examination of ground sections of primary teeth dentine showed incremental lines at an angle to the dentinal tubules in 10 (66.7%) specimens (Figure-1) and, in five (33.3%) specimens, incremental lines were at right angles to the dentinal tubules, whereas in permanent teeth dentine incremental lines were roughly at a right angle to the dentinal

tubules in all the 15 (100%) specimens (Figure-2). This shows that there is a difference in the incremental pattern of primary tooth dentine to that of permanent tooth dentine.

Image 1

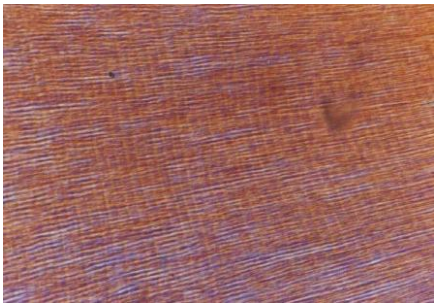
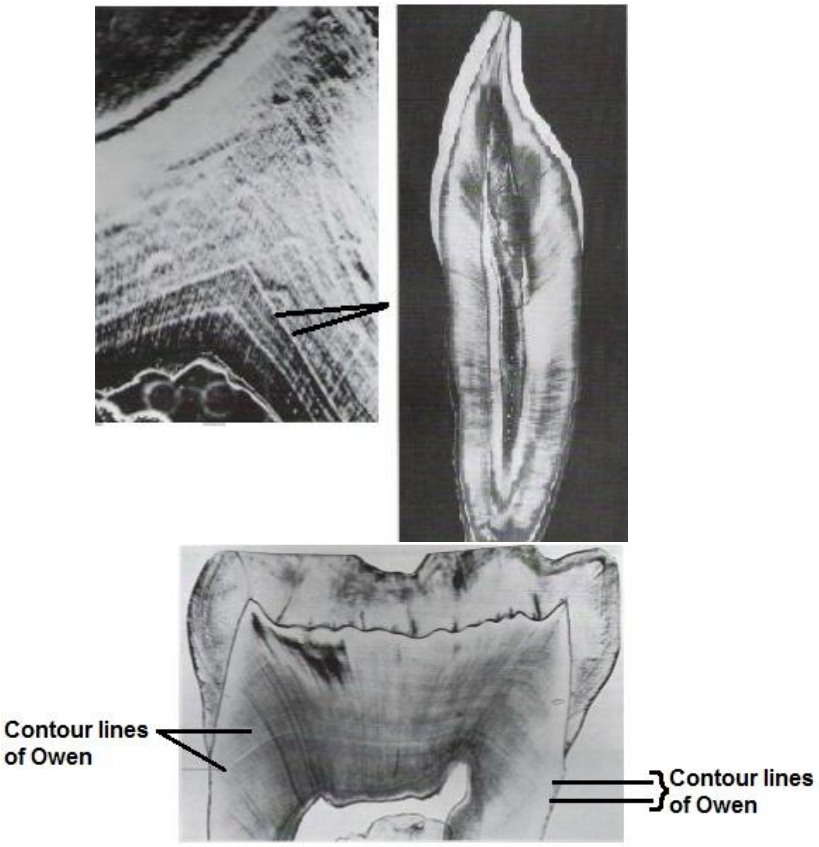


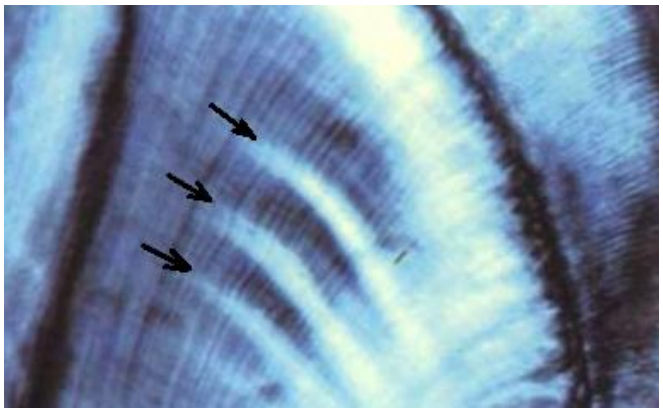
Image 2



❖ CONTOUR LINES OF OWEN.

During development of dentine, variations in the metabolism of the organism cause variations in the amount of organic material deposited in the dentine, just as occurs in the enamel.

Changes in the coloration of dentine are called **contour lines of Owen** and they represent normal physiological alterations in the pattern of mineralization.



3.3.1.3. CEMENT.

Dental cement is a connective tissue highly mineralized and similar to bone but it differs in avascularisation. It covers the dental dentine at the level of the root of the tooth forming a hard, opaque and yellowish layer.

Unlike bone, the dental cement is a tissue without innervations and it is harder than bone.

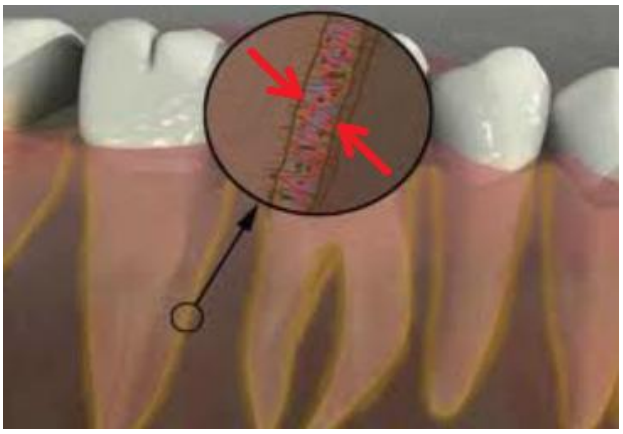
The main functions of the dental cement are to attach the tooth to the alveoli, to keep the occlusal relations and to keep the periodontal space.

A. PHISICAL CHARACTERISTICS OF CEMENT.

Cement has less hardness than dentine and enamel, but its hardness is similar to lamellar bone. Its colour is a nacreous white, darker and more opaque than enamel, but it is less yellowish than dentine.

Dental cement has less permeability than dentine, in spite of its higher content of organic material and its minor density. Even so, the dental cement is a permeable tissue, and this is demonstrated by the ease with which it is impregnated with medicated or food pigments.

The cement joins the enamel at the cervix of the tooth. The point at which they join is called the cement-enamel junction (CEJ). In most teeth the cement overlaps the enamel for a short distance. But in some teeth, the enamel meets the cement in a sharp line. In a few, a gap may be present between the enamel and the cement, exposing a narrow area of root dentine. Such areas may be very sensitive to thermal, chemical, or mechanical stimuli.



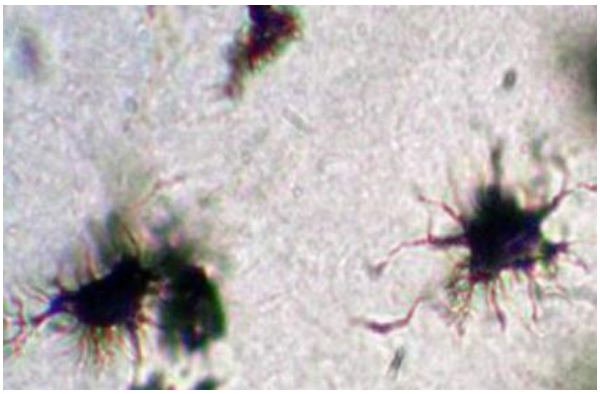
B. COMPOSITION OF CEMENT.

The dental cement is formed mainly by cementoblasts which is the organic material; it consists in a 55%. The inorganic material consists in a 45%, and the main component of the inorganic material is hydroxylapatite.

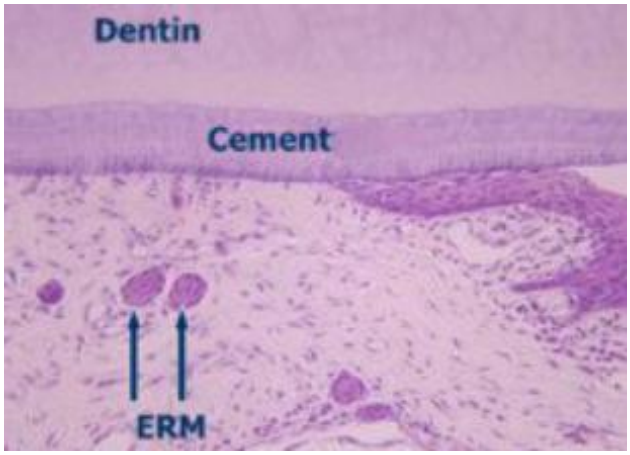
We can say that the dental cement has to main components (cementoblasts and cementocytes); although there are two other components that we need to mention (epithelial rests of Malassez and cementoclasts or odontoclasts).

- **Cementoblasts:** Is a biological cell that forms the follicular cells around the root of the tooth and they're fastened to the cement surface, from de periodontal ligament side. Its biological function is cementogenesis (formation of dental cement).
  In a functional tooth, the cementoblasts are considered structural members of periodontal ligament. These can be in an active or inactive state.

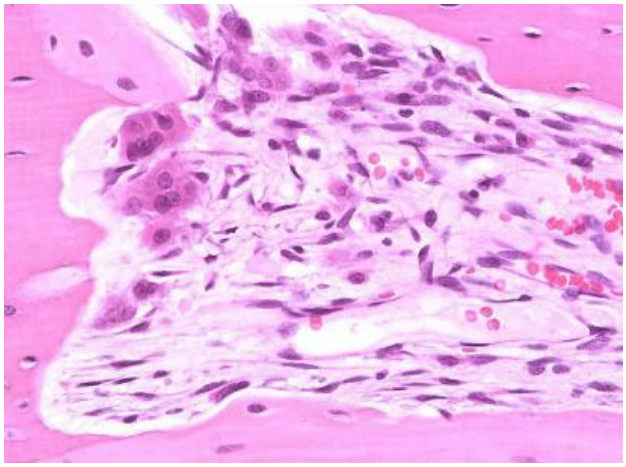
- **Cementocytes:** When the cementoblasts are trapped in the mineralized cement, they are called cementocytes. These stay in the cavities which are called cementoplasts.



- **Epithelial rests of Malassez:** The epithelial rests of Malassez (ERM) are a part of the periodontal ligament cells around a tooth. It is considered that these cell rests proliferate to form epithelial lining of various odontogenic cysts such as radicular cyst under the influence of various stimuli.



- **Cementoclasts o odontoclasts:** An odontoclast, also called cementoclasts, is cytomorphologically the same as an osteoclast and is involved in cement resorption.



C. TYPES OF CEMENT.

There are three forms of classification that are used to designate different types of dental cement:

1. Primary and secondary
2. Cellular and acellular
3. Fibrillar and afibrillar

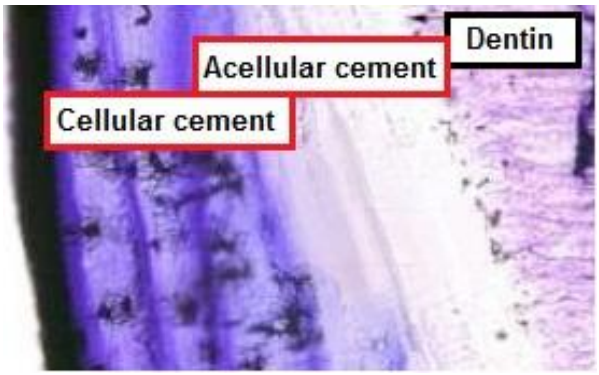
In general, primary cement, which is the first cement formed during root formation is acellular. It is used to join the cement that's left with the dentine. This joining puts the collagen fibres in the most mineralized zone which is called the hyaline layer. To designate the hyaline layer it has been used the term "intermediate cement", but it is a completely inappropriate word that fell out of use really fast.

The origin of the hyaline layer is controversial, but there is recent evidence, which is the most used, suggests that it may be formed by the cells of the root sheath[16], which submit an epithelial-to-mesenchymal transformation, which take place before the fragmentation.

Secondary cement may be either acellular or cellular. The term "cellular" means that the cementocytes are present inside the dental cement. The functions of secondary cement are:

- To adapt the dental root to changes that the tooth suffers
- To provide anchorage through the insertion of periodontal ligament fibres.

Fibrillar cement means that the collagen fibres are present in the cement. Compared, afibrillar cement is a mineralized ground that occupies a very short distance onto the enamel surface at the cervix of the tooth.



3.3.1.4. PULP.

Dental pulp is an unmineralized oral tissue composed of soft and living connective tissue and cells called odontoblasts. Also, the central pulp cavity of each tooth is occupied by vascular, lymphatic and nervous elements.

The dental pulp is a part of the dentine-pulp complex (endodontium). The vitality of the dentine-pulp complex depends on the activity of the pulp cells and the signalling processes that regulate the cell behaviour.

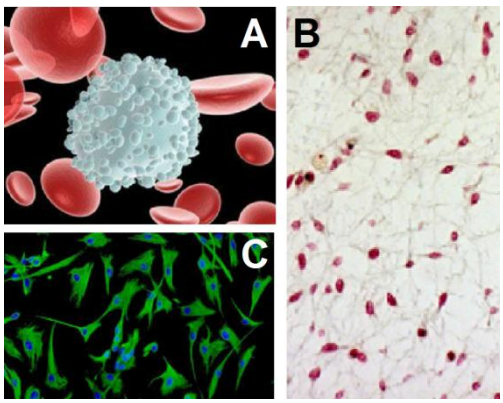
By either weight or volume, the majority of the pulp, the 75-80% approximately, is water. A part from the pulp stones, that we found inside the pulp cavity of aged teeth, there is no inorganic material in normal dental pulp. The pulp cavities of molar teeth are larger than the pulp cavities of incisors, for example.

The pulp cavity extends through the root of the tooth as the root canal which opens into the periodontium through the apical foramen. The blood vessels, nerves, etc. of dental pulp enter and leave the tooth through this foramen.

A. HISTOLOGY OF PULP.

The dental pulp, as all connective tissues, contains:

- **Cells:** Dental pulp, as all dental tissues, requires cells for its maintenance and its defence. The main cells are the fibroblasts and mesenchymal cells which are undifferentiated. Although they aren't as important as the first ones, in the dental pulp are also present cells like, macrophages, lymphocytes, etc.



A. Lymphocytes
B. Mesenchymal cells
C. Fibroblasts

- **Fibrous matrix:** The collagen fibres are present in a dispersed way. They are dispersed randomly around the higher density of blood vessels and nerves.
- **Ground substance:** The environment that surrounds both cells and fibres of the pulp is rich in proteoglycans, glycoproteins and large amounts of water.

The large number of the mesenchymal cells inside the pulp facilities the recruitment of new cells to replace others when they are lost, specifically odontoblasts. Odontoblasts comprise the outermost layer of the pulp.

B. TYPES OF PULP.

There are two types of dental pulp:

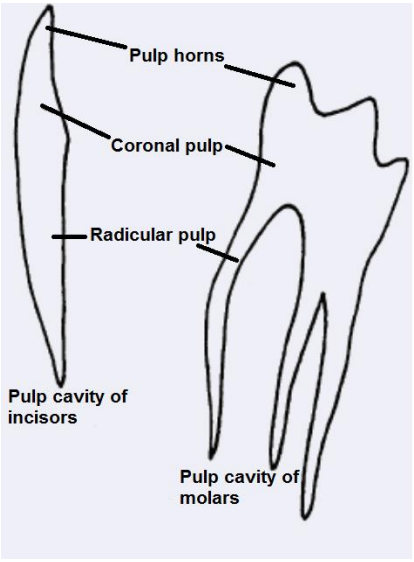
❖ CORONAL PULP.

The coronal pulp occupies the crown of the tooth and has five surfaces, occlusal, mesial, distal, buccal and lingual.

Pulp horns are protrusions of the pulp that extend up into the cusps of the tooth. With age, pulp horns diminish and the coronal pulp decrease in volume due to continued (secondary) dentine formation. At the cervix of the tooth the coronal pulp joins the second type.

❖ RADICULAR PULP.

The radicular pulp extends from the cervix to the apex of the tooth. Molars and premolars exhibit multiple radicular pulps. This pulp is tapered and conical. Similarly to the coronal pulp, it also decreases in volume as we get older due to the continued dentine formation.



C. FUNCTIONS OF PULP.

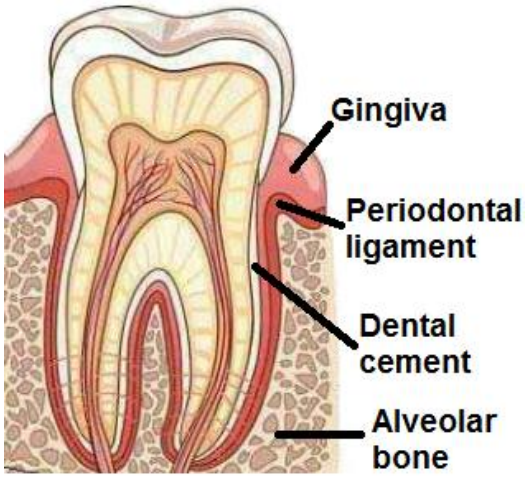
The primary function of dental pulp is to provide vitality to the tooth. Dental pulp also has several other functions:

- Very nearly in development the future pulp interacts with surrounding tissues and initiates tooth formation.
- The odontoblasts of the outer layer of the pulp organ form the dentine that surrounds and protects.

3.3.2. PERIODONTAL TISSUES.

The periodont is formed by two types of tissues: the protection periodont and the insertion periodont.

- **Protection periodont:** The protection periodont is formed by those tissues assigned to protect the insertion periodont. It is formed by the gum.
  The gum is part of the buccal mucosa that surrounds the neck of the teeth and covers the alveolar bone.
- **Insertion periodont:** Are those tissues which are responsible of maintaining the tooth in its socket. It is formed by three different tissues: the dental cement, the periodontal ligament and the alveolar bone.
  The dental cement is a specialized calcified substance covering the root of the tooth.
  The periodontal ligament is a structure of conjunctive tissue which surrounds the root and joins it with the alveolar bone. It also helps to make resistance to possible shocks and it can transmit forces exerted on the teeth to the adjacent nerves.
  The alveolar bone is the jawbone that covers the root of the tooth.



4. HYGIENE AND DENTAL CARE.

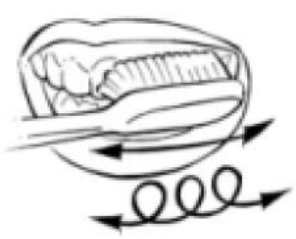
According to the WHO (world health organization), is understood as a good health care by the absence of diseases and disorders that affect the mouth and the oral cavity.

The most important preventive measures to maintain a good oral health are:

- Use of fluoride
- Correction of the malocclusion
- Follow a balanced diet
- Appropriate oral hygiene

According to the National Oral Hygiene Information Centre (NOHIC), they have studied a series of steps to keep teeth and gums healthy, but the most important step is a proper brushing of teeth. Let's see how to brush your teeth in right way:

1. Start by brushing your teeth from the upper jaw. Brush first the buccal and labial surfaces and then the palatal one. Both outside and inside, the brush should be placed between teeth and gums at an angle of approximately 45 degrees.
2. Then continue by cleaning the upper incisors: you should brush them with small circular movements towards the molars and return to the starting point. Continue with the rest of the teeth on the other side of the upper jaw (the other quadrant). On the inner part you must move the brush in small circles, exerting pressures from the front to the back.
3. After that, you should clean the occlusal surface. You must place the brush vertically and move it with a soft pressing forward and backward
4. Finally you must brush the teeth of the lower jaw following the same steps.
5. To prevent oral diseases is necessary to clean the interproximal spaces once a day, if possible the night before brushing.




A very important part of the dental hygiene is to make a careful cleaning of the teeth after every meal. With brushing and the use of toothpastes and mouthwashes we achieve remove the dental plaque and have a bright and healthy teeth and good taste in your mouth. Let us know a little more about these products:

4.1. TOOTHPASTES.

The toothpaste is a product of very common use today for oral hygiene and especially for the hygiene of the teeth.

Egyptians were the first to create toothpaste. It is known that to produce it, they used to use finely ground pumice, salt, pepper, water, eggshell, myrrh and wood hedgehog.

Until few years ago the toothpaste was considered more for cosmetic effect than for therapy. Today they have incorporated substances with a beneficial effect for teeth and gums.

4.1.1. TOOTHPASTES COMPOSITION.

Today toothpastes include a total of 13 different components each of which has its specific mission. Thus, in toothpaste we can find:

A. DETERGENTS.

The detergents are agents whose aim is to reduce surface tension, penetrate and solubilise the deposits that are on the teeth, and so facilitate the dispersion of active agents of the toothpaste.

The main detergents are:

- Sodium lauryl sulphate, which is compatible with fluoride.
- Sodium N-lauroyl sarcosinte, which has an antibacterial action.

B. ABRASIVES.

The abrasives are substances that remove deposits accumulated on the teeth during the brushing. The toothpaste should have an index of abrasion between 50 and 200 RDA (radioactive dentine abrasion).

The most used abrasives are:

- sodium bicarbonate
- sodium carbonate
- sodium benzoate
- sodium phosphate

- calcium phosphate
- Metaphosphate sodium
- Aluminum hydroxide

C. MOISTURIZERS AND HUMECTANTS.

They are substances that avoid the hardening of the toothpaste. The most common are:

- Glycerine
- Sorbitol
- Xylitol
- 1,2 propylene glycol

D. FLAVOURING AND SWEETENERS.

The flavourings are substances that give flavour to toothpaste. Mainly used:

- Mint
- Menthol
- Eucalyptus
- Strawberry
- Cinnamon

The sweeteners used to give a sweet flavour to the toothpastes are:

- Sucrose
- Saccharine
- Xylitol

E. COLORANTS.

The colorants used in toothpastes are basically the same as those used in food and beverages. They are divided into:

- **Natural colorants:** They are obtained from plant pigments as carotenes and xanthophylls. The most outstanding are curcumin (E100), riboflavin (E101), chlorophyll (E140) and carminic acid (E120).
- **Artificial colorants:** They're products which are obtained by chemical synthesis. Examples of artificial colorants are tartrasine (E102) and amaranth (E123).

F. CONSERVATIVES.

The most common are:

- Sodium silicate
- Formaldehyde
- Benzoate
- Hydroxybenzoate

G. THERAPEUTIC SUBSTANCES.

They are classified into antiplaque substances and enhancers of enamel resistance.

❖ ANTIPLAQUE SUBSTANCES.

They are agents that act on the bacterial plaque removing it and preventing the tooth form the formation of another bacterial plaque. Also it acts eliminating microorganisms. The most common are:

- Chlorhexidine
- Triclosan
- Hexetidine
- Zinc citrate

❖ ENHANCERS OF ENAMEL RESISTENCE.

It is used to prevent tooth decay, tooth sensitivity and as a active agent against bacterial plaque.

- Sodium fluoride
- Monofluorophosphate sodium
- Potassium fluoride
- Amine fluoride

H. ANTI-SENSITIVE SUBSTANCES.

To combat the sensitivity to temperature changes, acids, sweets or simple effect of friction on the dental surface, anti-sensitive substances are added to the toothpastes. These are:

- Potassium Nitrate
- Fluor
- Strontium chloride

- Potassium Chloride
- Dibasic sodium citrate

I. WHITENER SUBSTANCES.

They give your teeth a whiter colour. The most used are:

- Carbamide peroxide
- Sodium Bicarbonate
- Triphosphate pentasòdic

J. ANTI-INFLAMMATORY SUBSTANCES.

They are indicated for substances with gingival inflammation which favours the regeneration of the mucosa. The most common are:

- Allantoin
- Aldioxa
- Provitamin B5
- Vitamin E and P
- Hyaluronic Acid

K. ENZYMES.

They act on the metabolism of bacterial plaque in cases of dry mouth generating a flow of ions which is essential to have it in the saliva. The most used are:

- Glucose oxidase
- Amiloglucosa oxidase
- Lactoperoxidase
- Glucolactoperoxidase

L. SUBSTANCES RICH IN CALCUIM.

The presence of calcium promotes a remineralisation mechanism. It is use: the calcium glycerophosphate.

M. NATURAL SUBSTANCES.

There are many plant substances that act on the mouth and produce a good breath. Some of them are:

- Castor oil
- Salvia
- Myrrh

- Extract from Rheum Palmatum

4.2. MOUTHWASHES.

The mouthwash is an aqueous or hydroalcoholic solution with the same active ingredients that toothpastes but in lower concentrations.

Anton van Leeuwenhoek discovered the bodies that were deposited on the tooth surface. To see if he could destroy the organisms he first tested with samples of bacteria that were suspended in a watery canal near his home. What he did was prepare a mixture of brandy and vinegar. The result was effective.

Then he decided to test the effectiveness of the compost rinsing his own mouth with the same mixture, vinegar and brandy. The result was not what he expected. He found that the bodies were still on the tooth surface since the compost hadn't adhered enough on it.

In the sixties, Harald Leo showed that a compost based on chlorhexidine prevent the development of dental plaque because it adheres to the tooth surface for longer time.

4.2.1. MOUTHWASHES COMPOSITION.

They have almost the same composition as toothpaste, but mouthwashes don't contain abrasives.

4.2.2. TYPES OF MOUTHWASHES.

The most important are:

- Mouthwash for prevention of caries
- Bacterial plaque mouthwash
- Mouthwash against halitosis

4.3. GELS.

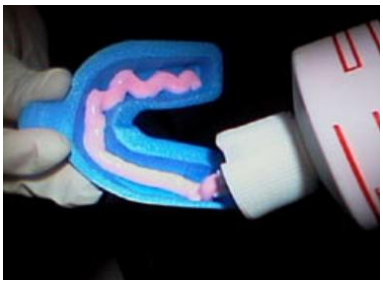
Gels are thicker than mouthwashes and more fluid than toothpastes. They aren't packaged in tubes and also, they carry less amount of surfactant (less foam).

Those gels used in the professional level are thicker and they're used to prevent dental caries, they have a therapeutic action, they act for longer than normal toothpastes and are recommended to leave it on the tooth surface for a while.

4.3.1. GELS COMPOSITION.

Since gels are the same as toothpastes but more fluid, they contain the same components.

4.3.2. TYPES OF GELS.



Gels for professional use are:

- Chlorhexidine gel carriers for caries
- Gel carriers of fluorinol, potassium nitrate and sodium fluoride for insensitivity.

5. TOOTH DECAY AND DENTAL DESEASES.

The teeth decay can be analyzed from an aesthetic point of view (colour) or from a health standpoint.

As for the colour, coffee, wine and an abuse of tobacco are factors that can influence in the tooth pigmentation although there are foods, considered healthy (citric acid), which can stain the enamel. Taking antibiotics such as tetracycline may cause teeth staining. These brown stains may persist even after a visit to the dentist.

To combat these effects the treatment is simple: reduce the consumption of coffee, wine and tobacco and, in general, anything that can stain your teeth, as well as maintain a good oral hygiene.

Concerning health, we can find lots of oral diseases. We can mention several aspects, ranging from nonspecific infections to oral manifestations of illnesses like diabetes or Aids.

5.1. DENTAL CARIES.

Caries can be defined as the progressive and localized destruction of the teeth. It is also a chronic evolution disease that affects the calcified tissues of the teeth.

The main consequences of caries are:

- Important pain.
- Early loss of teeth that results in abnormal eruptions, poor positioning of healthy teeth and jaw deformation, among others.
- Loss of the efficiency of chewing and this leads to alterations in digestion.
- Difficulty in speaking for anomalies that it can cause in the mouth.

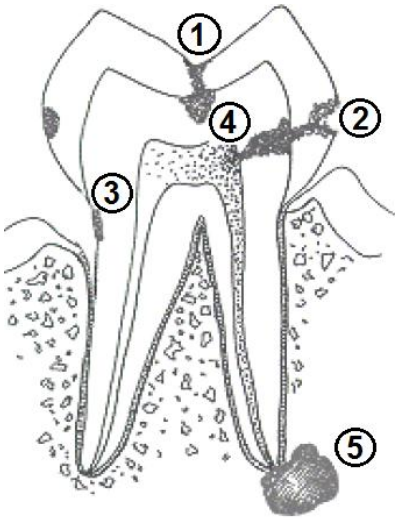
5.1.1. WHY CARIES OCCURS?

The teeth are surrounded by saliva which is neutral or slightly alkaline (pH between 7 and 7.5). At the same time the enamel hydroxylapatite is covered by a group of bacteria (Strephtococcus mutans) forming a layer which is invisible and is attached to the teeth: the bacterial plaque.

These are the bacteria that transform fermentable sugars from different food and drink, in lactic acid and/or acetic making the environment surrounding the tooth becomes acid. If the pH decreases below 5.5, begins the process of demineralization and the ions of calcium and phosphate from the hydroxylapatite come out of the enamel to the mouth. Saliva, which has alkaline properties, helps the pH to increase again, the plaque becomes saturate from the mineral and the hydroxylapatite becomes deposited on the tooth once again.

If remineralisation does not occur at the sufficient speed, due to different reasons (abuse of certain foods and beverages, hereditary factors, poor hygiene ...) demineralization prevails and causes the appearance of dental caries.

Dental caries can occur in different tooth areas. If it isn't treated promptly in the outermost regions (1,2,3 from the image X) can affect the pulp (4) and continue through the root canal until the root (5) where the infection can spread to the rest of the body.



5.1.2. FACTORS ASSOCIATED WITH THE APPEARANCE OF DENTAL CARIES.

The three main factors are:

5.1.2.1. MICROBIAL FACTORS.

We divide them into two groups:

- **Dental plaque:** Defined as a cluster of bacteria, organic matter and inorganic substance constituting a film joined to the tooth surface which is only removed with the intervention of a professional.
- **Microorganisms:** They benefit from adhesion mechanisms:
  - Aggregation of saliva: Glycoproteins with a high molecular weight from the saliva and calcium dissolvent captions that can add microorganisms by electrostatic interactions.
  - Direct link between species through specific receptors.
  - Extracellular polysaccharides: mechanisms of adherence of Streptococcus mutans.
  - Receivers of specific location of the microorganisms in the oral mucosa.

5.1.2.2. HOST FACTORS.

- **Age:** The number of dental pieces with caries increases with age.
- **Family association:** Is related to oral hygiene and nutrition. Genetic factors can also influence.
- **Constitutional factors:** They're divided in two:
  - Saliva: its antibacterial factors and mechanical barriers which we divide in salivary flow, flaking epithelial cells and chewing movements.
  - Tooth characteristics: as it can be the presence of fluoride in enamel.
- **Nutritional factors:** food has effects on salivary composition and the composition of the tooth.

5.1.2.3. ENVIRONMENTAL FACTORS.

They're divided in three groups:

- **Socioeconomic level:** to visit a dentist at least once a year, involves a significant expense. There are some people who can't afford it.

- **Diet:** A diet rich in sugars cause the appearance of acid metabolites that attack the enamel or insoluble metabolites that contribute to the formation of dental plaque. A diet with a deficit in vitamins A, C, D and calcium and phosphates cause an imperfect mineralization of the enamel that predisposes the formation of dental caries.
- **Dental hygiene:** It is necessary to brush the teeth after every meal for about two minutes. In addition to a good brushing using toothpaste (better if it contains fluoride), it must be used a dental floss to clean the interproximal spaces.

5.1.3. PREVENTION OF DENTAL CARIES.

To prevent caries were marked some objectives:

- Ensure that the teeth are resistant to the aggressions. The fluoride present in some foods helps the tooth to be harder due to its non-enzymatic action that inhibits the formation of acids and produces a bacteriostatic effect.
- Delete the imperfections of the teeth.
- Preserve the tooth during all the life against environmental damages.

The ways of preventing caries are:

5.1.3.1. INCREASE OF ENAMEL RESISTANCE.

Fluoride acts on the already formed enamel remineralizing the incipient lesions, increasing the resistance and appears to have an action on the bacterial flora inhibiting the enzymatic activity of microorganisms which are of responsible of dental caries.

5.1.3.2. DECREASE OF ACID ATTACK.

The fundamental importance of diet in dental caries has been proved in numerous studies. The compounds present in our diet, responsible of most caries cases, are the carbohydrates.

The carbohydrates in the diet are energetic substances for bacterial microorganisms present in the dental plaque. They can be fermented after their storage at the surface of the tooth as extracellular polymers of glucose and fructose.

Anaerobic fermentation of sugars involves the production of organic acids such as lactic deposited on the plaque. For this reason, after each consumption of sugar, the pH of saliva and plaque decreases.

The acid pH leads to a demineralization of the tooth. If these periods of demineralization are too frequent in relation with remineralization periods, the result will end in dental caries.

Therefore, to reduce the acid attack it is important to limit the consumption of cryogenic[17] food and its contact with the tooth. The cryogenic potential of a food is influenced by its content of fermentable carbohydrates.

5.1.3.3. REDUCTION OF BACTERIA IN THE MOUTH.

Dental caries can be prevent and avoid keeping the teeth free of plaque.

- **Personal oral hygiene:** The practices include the elimination of dental plaque by brushing the lingual, buccal and interproximal tooth surfaces.
- **Professional prophylaxis:** It is used in cases that have been accumulated much dirt on the teeth and can't be removed with brushing.

5.2. PERIODONTAL DESEASE.

5.2.1. GINGIVITIS.

Gingivitis is a bacterial infection of the gums, usually caused by an accumulation of plaque. It is the result of an incorrect brushing which allows the dental plaque to remain on the gingival line of the teeth.

The main consequences of gingivitis are:

- Bleeding gums.
- Bright red or purple gums.
- Sensitive gums but painless.

5.2.1.1. TYPES OF GINGIVITIS.

Simple gingivitis: Inflammation of the gums and teeth move. For this reason often the gums bleed when you brush your teeth or eat. Gums

have a bright red colour and the infection causes the appearance of numerous small ulcers, white or yellow in the oral cavity.

Scaly gingivitis: It is an unknown process and painful which often affects women during menopause. This disease consists that the outer layers of the gums separate from the tissue that connects the gum to the tooth, exposing the nerve endings.

Leukaemia gingivitis: Is the first manifestation of the disease in almost 25% of children affected by leukaemia. Infiltration of leukemic cells into the gum causes gingivitis, and gets worse due to the inability of the immune system to fight infection.

5.2.1.2. PREVENTION AND TREATAMENT OF GINGIVITIS.

The simple gingivitis can be prevented with a good oral hygiene, daily brushing and dental floss. It can be used a toothpaste containing pyrophosphate. In a case that is very coarse, only a professional can remove it. In the case of scaly gingivitis that develops during menopause, it is useful the hormone replacement therapy. To prevent bleeding in case of gingivitis caused by leukaemia, instead of using the toothbrush, use gauze or sponge.

5.2.2. PERIODONTITIS.

It is the main cause of tooth loss in adults. It is an inflammation and infection of the gums. The inflammation occurs between the gums and the teeth, where ulcers are filled with plaque. The inflammation of the soft tissue catches the plaque in the ulcer, where bacteria can proliferate without any obstacle. Eventually, this continuous inflammation causes the destruction of tissues and bone surrounding the teeth.

If periodontitis is not diagnosed early, dental support is retracted, the teeth lose their support and end up falling.

The main consequences of periodontitis are:

- Haemorrhage
- Inflammation of the gums and halitosis.
- Periodontitis usually does not cause pain until the teeth are outcrop enough to move when you bite.

The main causes of periodontitis are:

- **Smoke:** It decreases blood flow that reaches the gums and nicotine promotes the helps in the formation of dental plaque.
- **Alcohol abuse:** It can cause the dryness of the buccal mucosa and kill cells that form it, and sometimes can cause the loss of the balance between the microorganisms of the mouth, which facilitates bacterial growth.
- **Medications:** Oral contraceptives, anticonvulsant drugs, steroids and certain anticancer drugs.

5.2.2.1. TREATAMENT.

The aim of the treatment is to reduce inflammation, eliminate the ulcers and correct the causes that have caused it.

It is recommendable to carry out a complete dental cleaning that may involve the use of various instruments to relieve and remove the deposits that are formed on the teeth.

Unlike gingivitis, which usually disappears with good oral hygiene, periodontitis requires professional treatment. In deep cavities can be placed filaments impregnated with antibiotics, in order to a high concentration of drug can arrive directly to the diseased area.

2. FIELD RESEARCH.

6.1. DETERMINATION OF THE ORAL HEALTH OF THE STUDENTS FROM THE INS ANTONI POUS.

6.1.1. AIMS.

- Knowing the oral hygiene of students from INS Antoni Pous i Argila.
- Meeting the frequency of use of mouthwash, toothpaste and dental floss among the students.
- Knowing the regularity with which they visit the dentist.
- Investigating the affectation degree of dental diseases.
- Realizing a comparative study by sex.

6.1.2. METHODOLOGY.

It was developed a survey with closed, simple and multiple responses, considering the students sex to make comparisons. The type of questions was basically about dental problems, products they use and dental visits.

It was realized a total of 290 surveys in different academic years from the INS Antoni Pos: 1st ESO (54 students, 18,6%), 2nd ESO (51 students, 17,6%), 3rd ESO (53 students, 18,3%), 4th ESO (53 students, 18,3%), 1st Batxillerat (40 students, 13,8%) and 2nd Batxillerat (39 students, 13,4%). The age of the students from the different academic courses, which were the samples in this piece of work, is between 12 and 18. As for sex 152 respondents were women (52,4%) and 138 men (47,6%).

Once the surveys were made and answered the results were emptied to make tables and graphs to analyze them.

Next the survey model which was used is shown.

SURVEY OF ORAL HIGIENE HABITS.

Course: Age: Sex:

1. How many times a day do you brush your teeth?
   - ☐ Never.
   - ☐ Occasionally, not every day.
   - ☐ Once a day.
   - ☐ Twice a day.
   - ☐ Three times a day or more.

2. How many times a day do you use dental floss?
   - ☐ Never.
   - ☐ Occasionally, not every day.
   - ☐ Once a day.
   - ☐ Twice a day.
   - ☐ Three times a day or more.

3. How many times a day do you use a mouthwash?
   - ☐ Never.
   - ☐ Occasionally, not every day.
   - ☐ Once a day.
   - ☐ Twice a day.
   - ☐ Three times a day or more.

4. When was the last time you visited the dentist?
   - ☐ I've never been to the dentist.
   - ☐ For more than two years.
   - ☐ Between 1 and 2 years.
   - ☐ Between 6 months and 1 year.
   - ☐ Less than 6 months.

5. With which regularity do you visit the dentist?
   - ☐ Never.
   - ☐ I have a no regular fixed; I only go when I want/ when I need.
   - ☐ Once a year.
   - ☐ Every six months.
   - ☐ Every month.

6. Which of these treatments/problems you've had?
   - ☐ Caries.
   - ☐ Orthodontic.
   - ☐ Exodontia
   - ☐ Endodontic.
   - ☐ Dental filling

6.1.3. RESULTS.

1st ESO	MEN					WOMEN				
	A	B	C	D	E	A	B	C	D	E
1st question	1	4	3	6	6	0	3	8	13	10
2nd question	14	4	2	0	0	19	9	3	2	1
3rd question	5	10	2	2	1	7	9	7	5	7
4th question	0	1	7	6	6	0	0	4	15	15
5th question	1	10	3	6	0	0	13	6	12	2
6th question	9	2	5	1	2	14	5	8	2	6

In general the students from this course wash their teeth every day, not just once but two or three (85.2%), although there are some other students who never wash them or only occasionally; these, but, are a minority (14.8%).

Dental floss and mouthwash are products that are little known and not too used among students of this course. The vast majority never uses mouthwash or dental floss, they never use them or if they use them, is occasionally (71.3%). However, a small proportion of students use these products (28.7%).

The visits to the dentist and their frequency are a fact quite common among the students of this course. Many go there every month, every six months or once a year (76.6%) and not necessarily when they have some pain. The other students (23.1%) have never gone or they only go when they are needed.

Finally, the dental caries is the most common disease (42.6%), preceded by exodontia treatment (24.1%). Orthodontic, endodontic and dental fillings are not as common but there is also a minority with these treatments (33.3%).

Generally there is no difference between men and women; although there is an important exception, the use of mouthwash. Women (42,6%) use the mouthwash much more than men (31,5%).

2nd ESO	MEN					WOMEN				
	A	B	C	D	E	A	B	C	D	E
1st question	2	5	8	14	1	0	0	6	10	5
2nd question	20	7	2	1	0	13	5	1	2	0
3rd question	8	9	6	6	0	7	8	2	4	0
4th question	1	4	7	6	12	0	2	5	5	9
5th question	2	12	7	3	6	0	11	5	3	3
6th question	9	9	7	2	9	8	6	2	1	5

Students from 2nd of ESO, have a certain resemblance to the 1st, but only in some aspects.

Students of the second year, like the first, wash their teeth often, mostly twice or three times during the day (87%) and others (13%) washed them occasionally or never.

Students of this course almost never use neither mouthwash nor dental floss (86.3%). The other part, use them once or twice a day (13.7%).

Most students visit frequently the dentist (68.6%), the other part of students never go or they only go when they want and/or need (31.4%).

As to diseases and/or treatments that these students suffer or receive, it is important to say that every student suffers from minimal an illness or treatment. Like the students from the first year, the most common disease is the dental caries (33.3%), preceded by orthodontic treatment (29.4%) and after that the dental filling (27.4%). The other treatments are quite low (9.9%).

Like the first one, the difference between men and women is not very important.

3rd ESO	MEN					WOMEN				
	A	B	C	D	E	A	B	C	D	E
1st question	3	3	13	7	0	0	0	7	16	4
2nd question	21	4	1	0	0	14	9	2	2	0
3rd question	9	9	4	3	1	8	10	6	1	1
4th question	1	5	2	9	10	1	0	4	9	13
5th question	2	19	1	2	2	1	11	6	5	3
6th question	16	2	7	4	5	16	10	5	1	6

Until now, the difference between men and women was not significant but, as you can see in this table, things are different.

Most men of this course don't brush their teeth t too often; in fact, there is no one who brushes its teeth three times a day, unlike women. In general, we see that 74% of women brush their teeth at least twice a day, however, only 26.9% of the men brushed them twice a day.

If we talk about the use of oral hygiene products (dental floss and mouthwash), however, we find that there is much difference between men and women. We found that 79.2% of students rarely or never use these products, the 40.6% of them are men and 38.6% are women.

Talking about visits to the dentist and their regularity is something distributed. There are many students who visit often the dentist and in a regularly way (51%) and students who visit the dentist no too much and irregularly (49%).

The most common disease, as in the two previous cases, it is dental caries (60.4%) and after this there are the orthodontics and the extractions with an equal percentage of 22.6%.

4th ESO	MEN					WOMEN				
	A	B	C	D	E	A	B	C	D	E
1st question	0	1	10	13	3	0	0	5	12	9
2nd question	15	6	2	3	1	11	8	3	4	0
3rd question	7	8	6	5	1	5	7	8	5	1
4th question	0	3	7	3	12	0	3	2	6	15
5th question	2	19	1	5	3	0	11	5	5	5
6th question	9	10	7	2	6	16	8	9	5	9

First of all, we must say that the difference between men and women is not the same case with as previous (3rd ESO); the difference between men and women is not such great.

The number of students who brush their teeth at least once a day, is really high, constitute 98.1% and others, who never brushed their teeth or their do but only sometimes, constitute the 1.9%.

Nevertheless, it doesn't succeed the case with oral hygiene products. Only 36.8% of students use mouthwash and dental floss regularly, the other 63.2% never use them or only occasionally.

We can say that regularity with which they visit the dentist is good (68.9%), although, there is a percentage that never goes to the dentist or they don't often (31.1%).

Like the three previous cases, the most abundant disease is dental caries (47.2%). And after, all the other treatments constitute 52.8%.

1st Bat	MEN					WOMEN				
	A	B	C	D	E	A	B	C	D	E
1st question	1	6	7	5	4	0	0	2	6	10
2nd question	15	6	1	0	0	10	6	2	0	0
3rd question	11	6	2	1	2	5	7	5	1	0
4th question	0	8	4	3	7	0	0	3	10	5
5th question	1	15	3	1	1	0	5	9	3	1
6th question	15	3	4	6	10	6	9	6	2	4

Even though previously it has already seen some differences between men and women, but, is here will be more clearly.

Brushing teeth differs slightly in men and women. The 88.9% of women brush their teeth twice or more a day, 11.1% brush them once a day and there is no woman who does not brush her teeth every day. Instead the men, only 40.9% of the men brush their two or more times a day, 31.8% of brush them once a day and the other 27.3% is brush them occasionally.

In general, both men and women do not use much of oral hygiene products. The 82.5% of students never use them or they just used it occasionally and only 17.5% use them usually.

If we talk about the visits to the dentist and the regularity of these visits, we observe a significant difference between men and women. The 86.1% of women visit the dentist regularly, but, only the 45.5% of men do the same. The other 13.9% of women and the 54.4% of men do not visit the dentist very often.

Finally, it must be said that once again, dental caries is the most abundant disease. The 68.8% of men have dental caries but only 33.3% of women suffer it. It is also considerable the number of dental fillings in both men and women (22.2%), but especially in men (45.5%).

2nd Bat	MEN					WOMEN				
	A	B	C	D	E	A	B	C	D	E
1st question	0	0	2	10	1	0	1	3	8	14
2nd question	10	2	0	0	0	17	6	1	0	2
3rd question	5	8	0	0	0	6	13	4	2	1
4th question	0	3	4	6	0	1	5	3	7	10
5th question	0	11	2	0	0	1	13	3	5	3
6th question	7	6	4	0	2	14	8	10	5	11

Finally, the results of the surveys responded by students of 2nd of Batxillerat are quite similar to the previous cases. Anyway, once again we must differentiate the men from the women, but not in all cases.

Both the percentage of men such as women who brush their teeth twice or more times a day is the same (84.6%). The other 15.4% brush their teeth once a day or occasionally.

The use of oral hygiene products among students of 2nd of Batxillerat is pretty low. Most people (85.9%) never use mouthwash or dental floss in their oral hygiene or they only use it occasionally. The other 14.1% use it on a daily basis, but only once or twice a day and some exceptional cases, more than twice.

Their visits to the dentist are regular, I mean, the students neither go a lot nor never go. The 15.4% of men visit the dentist regularly and often, the other 84.6% when they need it and there is no man who has never visited a dentist. The 39.7% of women visit the dentist regularly and often, the 48.7% do not have a regular time to go and the other (11, 6%) has never been to the dentist.

The most common disease, once again, is dental caries (58.8%). After come orthodontics, the exodontia and dental fillings with an equal percentage (35.9%). The endodontics treatment is lower (12.8%).

6.1.4. CONLUSIONS.

Comparing all the courses at the same time, we do not observe many differences.

Students who most wash their teeth are those form the 4th ESO (98.1%) after them, the courses 1st and 2nd ESO and 2nd Batxillerat (≃85%).

In general all students from all the courses don't use the oral hygiene products a lot. The average of all the students who do not use oral hygiene products as are mouthwash and dental floss is 78%.

Both the visits to the dentist and their regularly are similar in all courses. Most people go to the dentist when they need it and not so regulated and or to go for revisions. There are people who have never gone there.

The clearest result obtained form these surveys is that students from INS Antoni Pous have serious problems with dental caries. Most people have caries or had it. The other problems are present but are not as common or abundant in all students.

6.2. INTERVIEWS TO PROFESSIONALS

Name: Dra. Maria Espadamala.

Profession: Odontologist.

Studies: Dentistry.

Specialization: Paediatric Dentistry.

1. What does dentistry study?

Dentistry is the science that studies the teeth diseases, as well the oral cavity, such as would be the lips, the gums and the rest of the mouth. It also studies all the diseases and their treatments.

2. Why did you decide to be a dentist?

I've always been interested in the subject of health sciences. That I wanted to study something related to health science, that it was very clear, but I was a bit lazy to study medicine because they're so many years. As a child I had carried orthodontics and I used to go to the dentist every month, and I have always been interested in that he did to me. And this is why I chose dentistry.

3. Which are the qualities that are considered essential to be a dentist?

The first "quality" is obviously to be interested in health science. It is also very important the empathy with the patients because most of them come here nervous and scared.

4. Which are the basic and necessary cares that everyone should carry out regularly?

Obviously the daily hygiene is very important.

The minimum is brushing your teeth twice a day, if you do that three times is already perfect. What damages our mouth, rather than the amount of sugar we eat, is mostly the hours which that sugars spend in our mouth. Therefore, it is important to brush after every meal, but especially after depending on what foods. It is also important to take care of what we eat, a diet control.

5. At what age a child should start brushing your teeth and visit a dentist?

There is a quote that says: "When the teeth appear, the dental caries already can appear." So, if there is no tooth, there is no caries, that's for sure. But from the moment that teeth appear in the mouth caries also can occur. This means that, if there is a child that has teeth with only a year, he can have caries if there is no good hygiene or diet control.

Even, there is a trend that began in the US, in the American Paediatric Dentistry, which recommends that the visits to the dentist should begin in the first year of life. Perhaps, this is a bit extreme, but I had seen so many cases of children who are less than two years with a lot of dental caries.

In short, I think we could begin to clean the child's teeth when they're two or three years, that is the age at which molars appear.

6. Which are the most common oral diseases? Depending on the age varies the disease?

The most common and frequent diseases are dental caries and periodontal disease. Malocclusion is a pathology or an unsightly effect.

Both of them can perfectly occur at any age. But, dental caries is most common in children and teenagers, because it is caused due to an absence of hygiene and an uncontrolled diet; these may are more difficult to control at these ages. In contrast, periodontal disease is most common among adults because it is a progressive disease. What I mean is that due to periodontal disease you can end up losing your teeth, but this doesn't happen in a year, but in a few. Therefore, it affects adults.

In children, when there isn't a good oral hygiene only the gums bleed, but if this is accumulated for five, ten, fifteen years teeth end up moving and people lose them. So, periodontal disease starts in childhood and it is manifested in adults.

7. In which cases do you suggest an endodontic?

Endodontic is the treatment that is carried out when the tooth nerve is affected in such a way that it also affected the vascular tissue, which is the pulp.

For example, if a tooth is fractured (whatever it was the reason) and that fracture reaches the nerve, the patient is submitted to an endodontic.

Other cases can be: a dental caries that has been progressing up and it reached to the nerve; due to necrosis (you lose the vitality of the tooth due to any reason). Necrosis can occur for two reasons: if the patients teeth were hit years ago or also by a deep dental obturation which eventually end up annoying.

8. Which are the factors to consider when you're going to extract a tooth?

The only requirement should be if the teeth can't be reconstructed once again, but the problem is that here there is an important economic requirement.

If we do not consider the economy, we should only remove those teeth which are set in a way that they have no function. An example of this would be the wisdom teeth that sometimes are placed in a way that they're not useful at all.

The last case in which we should extract a tooth is in the case of periodontitis.

9. At what age should people consider if they need or not orthodontic?

It depends on the origin of the problem. If the malocclusion is osseous or dental.

If the problem is that the bone does not grow sufficiently should be treated as soon as possible.

When we talk about a dental problem, if there is a crooked tooth, when one tooth is enfilade above the other, etc. is resolved when the person has completed the permanent dentition.

10. The effectiveness of orthodontic has an age limit?

With adults the only dental problems which can be corrected are those that are dental, not osseous.

Sometimes you get more limited because what could have been resolved during growth, now it is too late. For example, if you want to correct a problem, depending on what adults, the only alternative is surgery.

Therefore, orthodontics itself has no limits but sometimes the person who has it.

11. Many people, especially at a certain age, do not use orthodontics due to the unaesthetic effect that could it have. Are there any other alternatives?

Well, apart from the brackets we all know, there are:

- The metal brackets and its advantage is that the effect is a bit faster.
- There are also brackets made of ceramic or white resin. These are less showy but are have a slower effectiveness.
- Another alternative is called Invisalign. It is formed by transparent small cubes that are changed every month to give the same form as the teeth. This alternative only is useful to correct minor problems.
- And finally there is the lingual orthodontics. Are basically the same as classical orthodontics but instead of placing it on the facial surface, it is placed on the lingual surface.

12. Is there any contradiction that could make that a patient can't be submitted to orthodontic treatment?

First, if the mouth is not healthy it is not recommended to start an orthodontic treatment.

Patients who have periodontitis, hereditary or genetic pathologies that prevent the braces do their function; are not usually submitted to orthodontics.

13. What measures should people with orthodontic treatment adopt to obtain the expected results?

The most important measure is a very profound hygiene when, because when someone has brackets is easier for him to accumulate stuck in his teeth or brackets. Therefore, the hygiene is very important.

And also, patients got to do everything that their dentist recommends. Sometimes the patient is entrusted to do something but he doesn't because it hurts, or the patient is lazy, etc. In these cases it is much more difficult to get good results.

14. Is there any key to achieve the "perfect smile"?

The famous people, in who we see that perfect smiles, wear artificial ceramic covers. So, that perfect smile we see everywhere is false.

The key of having a beautiful smile, however, is to care your teeth from very small, to avoid everything that stain teeth, such as smoking, abuse of coffee, tea, infusions, etc. and prevent that children put their finger in their mouth or to have a soother even if they're old.

15. What consequences can have the dental interventions only for beauty?

Myself, I'm not interested in anything related with dentistry only for beauty, because I think we're health professionals not aestheticians.

When people put gold covers, lime its teeth to align them, etc. what is being done is an attack on the tooth, in particular on the enamel. We attack a tooth only to get a beauty effect. What that kind of people forgets is that, the teeth which were submitted to aesthetic interventions are going to be weaker than the other teeth and have more risk of caries.

16. What is your opinion about the fact if the Social Security should or not cover the expenses of bucodental treatments?

I would support that Social Security covers all the preventive part. If I had to choose what should be covered, it enters the regular reviews and the buccal hygiene to everyone.

17. What are the main developments in the field of dentistry in the last ten years?

Generally, dental implants have improved a lot these years. Before, if someone wanted to put an implant had two options: the movable apparatus or bridges. But today, people have more possibilities.

18. Does fashion exist in the world of dentistry?

Yes, unfortunately they exist. Personally, I believe that as a health science which it is, health should prevail over any other treatment or intervention.

Name: Dra. Baños

Profession: Odontologist.

Studies: Dentistry.

Specialization: Aesthetic dentistry

1. What does dentistry study?

   Generally studies the system which is called stomatognatic. The stoma is the mouth, that means that dentistry refers to everything that is related to the mouth, chewing and all soft and hard tissues of the mouth.

2. Why did you decide to be a dentist?

   I always liked science and dentistry combines science with aesthetic, which are two things that I always liked.

3. Which are the qualities that are considered essential to be a dentist?

   I think they are basically three: manual dexterity, patience and poise.

4. Which are the basic and necessary cares that everyone should carry out regularly?

   Basically, what we all know, the brushing, but a well done brushing.

   It is necessary to do not go to bed without brushing your teeth, especially if you have ingested sugars.

   Another thing which is really important is to visiting the dentist at least once a year to determine the oral health of the patient.

5. At what age a child should start brushing your teeth and visit a dentist?

   Until recently, it was said up to three years, but can begin brushing your teeth when you're very small.

   And as for the dental visits, children should start visiting the dentist early, to make sure that there is no genetic pathology.

6. Which are the most common oral diseases? Depending on the age varies the disease?

   Yes, every age has a more common disease.

In children, the most common is the inflammation of the gums and dental caries. In teenagers, especially orthodontics, gingivitis and gum inflammation. Finally, in adults the most common is the periodontal disease.

7. In which cases do you suggest an endodontic?

In those cases where dental caries are very deep and the tooth has sensitivity, that means that the caries has reached the nerve or almost. These diseases are irreversible. The only way to solve this problem is by endodontic treatment.

8. Which are the factors to consider when you're going to extract a tooth?

Any tooth that is affected by caries in a way that has also affected the bone and the gum, you must think about removing it.

9. At what age should people consider if they need or not orthodontic?

We must differ between orthodontics and orthopaedics.

Orthopaedics is that typical removable appliance that helps in the development of a jaw. This treatment should be between 4 and 6 years.

Orthodontics is used to move teeth that have come out but are twisted. It could be carried out once permanent dentition has erupted completely. In this case, between 12-14 years.

10. The effectiveness of orthodontic has an age limit?

No. Today you can put orthodontics at any age.

11. Many people, especially at a certain age, do not use orthodontics due to the unaesthetic effect that could it have. Are there any other alternatives?

There are no alternatives, but there are many other types of orthodontic. There are: the most normal and typical lingual orthodontics, invisalgn and brackets which can be ceramic, transparent, made of composite, sapphire, etc.

12. Is there any contradiction that could make that a patient can't be submitted to orthodontic treatment?

I wouldn't submit a patient to orthodontic if he has periodontal disease.

13. What measures should people with orthodontic treatment adopt to obtain the expected results?

Use special brushes both for orthodontic or interproximal spaces.

Also, it is important to use oral hygiene products such as mouthwash with fluoride. And finally, it is necessary to visit the dentist every month for controlling the dental caries and other diseases.

14. Is there any key to achieve the "perfect smile"?

To people, the perfect smile is that they see in magazines. The perfect smile for dentists is a healthy correctly functioning smile.

15. What consequences can have the dental interventions only for beauty?

I am not in favour of doing anything that might harm the patient in the future. But if we take the right precautions and we follow the instructions you also can make aesthetic interventions without any problem.

16. What is your opinion about the fact if the Social Security should or not cover the expenses of bucodental treatments?

I think it depends on what expenses. An older person who needs a complete denture but it is not covered by the Social Security and a child to who a prevention treatment of caries is not covered, seems terrible.

17. What are the main developments in the field of dentistry in the last ten years?

I think what has revolutionized the world is the adhesive dentistry. Before everything was done with wire but now with adhesives or taxed acids can rebuild half tooth without problem.

18. Does fashion exist in the world of dentistry?

Yes. But not only those about which had we talked before. Many years ago, for example, it was best to have the natural colour tooth, now everything is very white.

6.2.1. CONCLUSIONS FROM THE INTERVIEWS.

It is amazing and at the same time interesting to see how two people who have had the same formation or, at least they had the same studies, can think and see things in such different ways when they talk about their profession.

Looking at the two interviews with the two dentists, we see that the common answers are those which talk about general terms, such as the importance of brushing the teeth, the importance of the using oral hygiene products and especially the importance of maintaining regular visits to the dentist.

Considering that one is specialized in aesthetic dentistry and the other in Paediatric dentistry we can understand the different opinions and responses. A clear example of this difference is the answers to the question number fifteen: the first is not in favour of making any intervention only for aesthetic purposes; however, the second dentist, apart from that her specialization is aesthetic, she says that she's in favour of make any aesthetic intervention unless if it affects the patient facing the future.

In conclusion, depending on the perspective from which you look the questions, we can understand both answers.

7. LABORATORY WORK.

In the laboratory work has been carried out two different types of practices: a preparation of toothpaste and a control bacterial plaque.

7.1. TOOTHPASTE ELABORATION.

As we have seen in section 6.1.3 (the results of the surveys), the most common disease among students from INS Antoni Pous is the dental caries. For this reason, I decided to prepare a toothpaste, the main purpose of which is to prevent caries.

Elaborate a toothpaste require to meet their components and know which kind of them are you going to use to make your toothpaste functioning as you expect. Therefore, section 4.1.1 (composition of toothpastes) is basically the composition of toothpastes and the function of each component.

For some reason, I don't know which; I decided to prepare ecological toothpaste.

Below is a list of all the components used to produce this toothpaste and next there are all the steps need to be followed.

Ingredients:

→ 100 mL of water

→ 1 teaspoon of calendula

→ 1 teaspoon of salvia

→ 130 grams of calcium carbonate

→ 40 grams of glycerine

→ 1/2 teaspoon of salt

→ ½ teaspoon of sodium bicarbonate

→ 8/10 drops of essential oil of eucalyptus

1. Take the 100 mL of water in a saucepan and put them to heat.
2. Add a small teaspoon of calendula (dry petals). And add the teaspoon of salvia.
3. Boil it for about five minutes and then you can remove it from heat and let it stand covered another five minutes.

4. Once cooled this infusion, sneaked it to a recipient where it will be mixed with the other ingredients.
5. Add 130 grams of calcium carbonate. First take a small amount and add it while you move it. When you can see that the paste has a good consistency, add 40 grams of glycerine and add the rest of calcium carbonate and stir until you got smooth paste.
6. Finally add half a teaspoon of salt and half a teaspoon of bicarbonate, and then continue stirring the paste.
7. Finally you can add about 8 or 10 drops of essential oil of eucalyptus.

7.2. PLAQUE CONTROL.

Sometimes we brush our teeth and then when we look at the mirror and think that they're very clean, well, not always is true. To prove my affirmation I have carried out a plaque control with TAS students.

Before demonstrating my affirmation, I've made them a little introduction to the world of dentistry explaining the more general terms such as teeth and its tissues, morphology and so on.

The practice was to take a picture of the student's teeth before the control and ask how they see their teeth. Once done, give them the pills which are especially for plaque control (pills containing a reddish colour, and which adhere to the teeth everywhere where bacterial plaque is) and those students see that their teeth were not as clean as they seemed. Finally, explain briefly how to make a good brushing accompanied with dental floss.

8. GENERAL CONCLUSIONS.

These are general conclusions of my research work, but to see more detailed them, they are present at the end of the practical works.

The general conclusions are:

- The role of teeth in the mouth is purely mechanical. They're the responsible for crushing food and the saliva, which contains an amylase enzyme, begins the decomposition of carbohydrates and immediately they end up in the stomach. Maintain good oral health is essential to start the digestion.

- The outer layer of the tooth, the enamel, is formed by a very hard mineral, hydroxylapatite (CA_{10} $(PO_4)_6$ $(OH)_2$). This is in a constant process of demineralization and remineralisation. An increase in acidity by any intake of acid food, for example, promotes demineralization but the saliva with a pH close to 7, counteracts this effect preventing the dissolution of enamel. If this process of demineralization-remineralisation occurs at a speed appropriate tooth does not deteriorate.

- Dental caries is the most common disease of the teeth in general and in the students in my school. There are several factors that influence in its appearance (abuse of certain foods and beverages, hereditary factors, poor hygiene ...) but reduce the consumption of sugar helps its prevention.

- The results obtained from the surveys; show that students from the INS Antoni Pous i Argila, part of not having a good oral health, they do not frequently visit the dentist, they only go when they need.

I would to make a comment regarding the responses obtained in the interviews. The fact is that I think dentists are health professionals and not aestheticians, as she said one of the dentists. Making dental interventions in the teeth only for aesthetic purpose is incorrect and unacceptable from my point of view.

Making this piece of work has been a very rewarding task for me. It has helped me to study deeper about a field I am interested in and besides I have been able to improve my English.

Finally, it is important to say that doing this piece of was interesting and at the same time oppressive.

9. GLOSSARY.

Protrusive occlusion: occlusion that results when the mandible is protruded forward from centric position.

Non-collagenous: Not elongated fibril unlike collagenous.

Amelogenins: A series of closely related proteins involved in amelogenesis.

Hydroxylapatite crystals: is a naturally occurring mineral formed by calcium.

Ameloblasts: Are cells present only during tooth development that deposit tooth enamel.

Tomes process: are a histological landmark identified on an ameloblast.

Odontoblasts process: Is an extension of a cell called an odontoblast.

Osteoblast: are cells with single nuclei that synthesize bone.

Odontoblast: is a cell of neural crest origin that is part of the outer surface of the dental pulp.

Osteocytes: is the most commonly found cell in mature bone.

Osteodentine: A hard substance, somewhat like bone, which is sometimes deposited within the pulpcavity of teeth.

Vasodentine: A modified form of dentine, which is permeated by blood capillaries.

Cryogenic: something that origins caries.

10. ACKNOWLEDGEMENTS.

On the front page of this piece work it usually appears the name of one or two people because if I want to put the name of all the people who have helped make this possible, I'm missing pages.

It seems silly that this part of the work is the most important and delicate for me.

I want to begin by thanking God for the support he gave to me and for being the most important reason why this work has been possible.

I know that people say this in relationships, but I want to thank the woman of my life, my mother. For being the person who not only gave me the best moral support, but simply for her presence in my life.

My father, who not only gave me the life but the man who has fought for what I am today and arrive where I arrived in this life.

To my friends, who already know who they are. They are my firm land, what makes me feel I'm home and they're in my particular cosmos the same that the Sun is in this universe.

Thanks to TAS students but especially to their teacher, I.S. for giving me your time and helping me in everything I needed and basically, for putting from your part.

To all the teachers I've had throughout my life. They are the richest source of information which I could never have.

To Dra. M.E. and Dra. M.B. those two dentists, who took from their time and dedicated it to me.

And finally, but not least important, I thank the engine of this piece work, the most essential component, thank you J.M.G.

I apologize if I left someone who has been an important part too.

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12. ANNEXES.

Some pictures took during the practical part.


white