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Editorial

By Dr David Muscat

Dear colleagues,

As we approach the end of the year we can all look back with relief that our lives go on as normal after the Covid episode not so long ago.

This year, the DAM has been involved in several events as well as CBCT courses.

There have been many events organised by dental suppliers as well as the ITI study club.

Digital Technology seems to be the order of the day. There are opportunities today and incentives to invest in ones clinic like never before.

The DAM is organising a Christmas party on 5th December. The AGM date will be announced in due course.

The cover picture is by Dr Noel Manche and is from a watercolour painting of his that depicts boats at Il-Menqa in Marsalforn Gozo.

David

Dr David Muscat B.D.S. (LON)
Editor

40 YEAR ANNIVERSARY OF **BART ENTERPRISES**

The Dental Association of Malta Committee

From left to right: Doctors Nicholas Busuttil Dougall, Brenda Mifsud Ceci, Adam Bartolo, David Muscat, Thomas Grixti, Noel Manche, Gabrielle Ferriggi and Simon Muscat. Dr Edward Fenech is missing from this photo.

GLANDULAR ODONTOGENIC CYST — A DIAGNOSTIC CHALLENGE

A case report by Mattea Maresca
Supervisor: Mr Nicolas Bezzina
University of Malta, Department of Dental Surgery

ABSTRACT

Background: Glandular odontogenic cyst (GOC) is a rare odontogenic developmental cyst exhibiting features of glandular differentiation, with a relative prevalence between 0.012 and 1.3%. It generally presents in middle-aged patients with a slight preference for males. Radiographically it commonly occurs as a multilocular radiolucency associated with root resorption, displacement and cortical perforations.

Case presentation: A 26-year-old female presented with an asymptomatic swelling on the buccal mucosa in the lower left premolar region. An OPG followed by a CBCT was taken, showing a unilocular radiolucent lesion between the roots of teeth 34 and 35. Histopathological diagnosis presented a dilemma due to the presence of various features commonly seen in odontogenic keratocyst (OKC) and even in GOC. The final diagnosis was that of an odontogenic cyst, most in keeping with a GOC.

Conclusions: Radiographically and microscopically, GOC mimics other cysts and tumours of the jaws, particularly lateral periodontal cysts, OKC, ameloblastoma and central mucoepidermoid carcinoma. Adequate evaluation of the available literature is essential for definitive diagnosis and appropriate treatment regimens are essential due to the high recurrence rate and aggressive potential of GOC.

KEYWORDS

- Glandular odontogenic cyst
- Odontogenic Keratocyst
- Central mucoepidermoid carcinoma

INTRODUCTION

Glandular odontogenic cyst (GOC) is a developmental jaw cyst originating from remnants of the dental lamina containing features of glandular differentiation in the epithelial lining (Nel et al., 2022). GOC is rare, accounting to 0.2% of all jaw cysts submitted for histopathological analysis. (de Arruda et al., 2024)

Most lesions appear as a well-defined unilocular or multilocular radiolucency often associated with root resorption, displacement of teeth and expansion or perforation of the surrounding bone. It presents more frequently in the anterior mandible (70%) compared to the maxilla (30%) and has a great tendency to cross the midline (de Campos et al., 2023).

Treatment options for any jaw cyst always depend on a definitive diagnosis obtained via histopathological analysis. GOC presents a histopathological dilemma due to overlapping in characteristics with other lesions, of particular importance is intraosseous mucoepidermoid carcinoma (MEC).

MEC is the most prevalent type of salivary gland tumour that develops in the jaw. It rarely occurs in the mandible but when it presents as such, it is commonly seen as an asymptomatic swelling in the anterior region of the mandible. Additionally, it presents very similar radiographic and microscopic features to GOC (da Silva et al., 2022).

Immunohistochemistry and the analysis of the Mastermind like (MAML)-2 gene rearrangement aid in differentiating these lesions but reports on these are limited (Maruyama et al., 2021).

This paper presents a case of a GOC in a 26-year-old female patient, that radiographically resembled a lateral periodontal cyst, located between the roots of teeth 34 and 35 and histology, presented features of an odontogenic keratocyst (OKC). The aim of this case report is to highlight the enigmatic nature of GOC and address the challenges encountered in its radiographic and histopathological diagnosis.

Figure 1: Orthopantomogram

CASE PRESENTATION

A 26-year-old female patient was referred to Mater Dei Hospital, Dental Department by her general dental practitioner (GDP) after noticing an asymptomatic swelling of unknown evolution. The lesion presented buccally, on the lower left premolar area.

Medical and drug history:
Patient had a clear medical and drug history and no drug allergies.

Social history:
The patient was a non-smoker and did not consume alcohol.

Extra-oral examination:
Extra orally, no visible swelling or facial asymmetry was observed.
Intra-oral examination:
Intraoral examination identified a solitary, hard swelling on the buccal mucosa of the lower left first premolar area. The swelling was approximately 1cm in size.

On palpation, the swelling was hard, and no tenderness was noted. Cold test was used to confirm vitality of teeth 34 and 35 and a normal pulpal response was obtained.

Investigations:
Initially, her GDP took an orthopantomogram (OPT) to locate the lesion (Fig 1). This was followed by a cone beam computed tomography (CBCT) scan (Fig 2) at the Dental Department to evaluate the full dimension of the lesion. The radiographic findings are listed in Table 1.

Continues on page 7.

TABLE 1: RADIOGRAPHIC FINDINGS

IMAGING MODALITY	
Orthopantomogram (Fig 1)	• Unrestored dentition • Unilocular radiolucency with a well-defined border situated between roots of teeth 34 and 35
CBCT (Fig 3)	• A round, unilocular hypodense lesion with a sclerotic rim located in the posterior region of the left body of the mandible between tooth 34 and 35 (Fig 2a) • Lesion measures 1.43cm x 1.3cm x 1.9cm (Fig 2c) • Lesion extends antero-posteriorly from the root of 34 to root of 35 causing displace-ment and extends from level of the alveolar ridge to superior aspect of the mandibular canal. (Fig 2a,c) • Thinning of the buccal plate can be seen. (Fig 2b,c)

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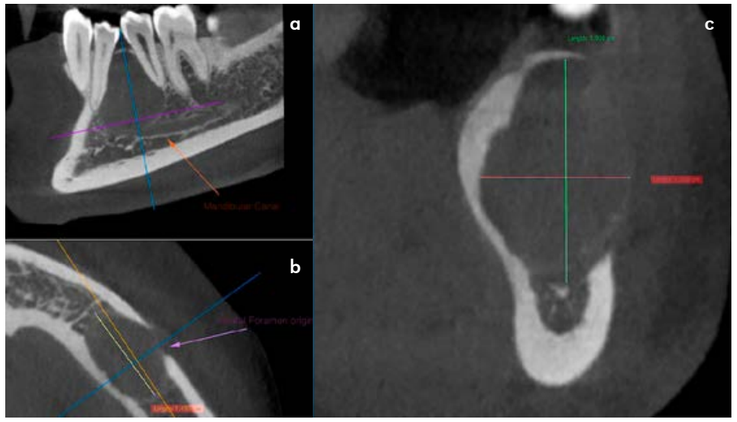

Figure 2: CBCT scan showing a) sagittal b) axial c) coronal views of a unilocular lesion within the body of the mandible

Figure 3: 3D CBCT reconstruction

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TREATMENT

A two-sided flap from 33-36 region was done, the lesion was exposed, and the thin buccal bone was removed. Upon exposure, cheese-like contents oozed from the cystic lesion which deflated and detached inferiorly when enucleated. The specimen was then sent for histology, the area was irrigated with saline and closed primarily with sutures.

DIFFERENTIAL DIAGNOSIS

A differential diagnosis of Lateral Periodontal Cyst (LPC), Botryoid Cyst and Unicystic Ameloblastoma was given.

HISTOPATHOLOGY REPORT

Sections show a cystic cavity which is lined by thick, predominantly non-keratinised stratified squamous epithelium with areas of parakeratinisation that have a corrugated surface (Figure 6). The basal cell layer is prominent and cuboidal to low columnar. Ameloblast-like cells are not identified. When not parakeratinised, the superficial epithelial cells are cuboidal to polygonal and have abundant eosinophilic to granular cytoplasm. Scattered mucocytes are readily seen in the superficial layers of the epithelium (Figure 4 and 5). Definite intraepithelial microcysts or glandular structures are not identified. Individual cell keratinisation is noted, however definite ghost cells are not identified. Numerous desquamated keratinocytes, many showing intracytoplasmic keratinisation, are present in the cyst lumen. Calcified Rushton bodies are readily seen. Occasional solid islands of stratified squamous epithelium with a prominent basal layer and daughter cysts (Figure 7) are noted in the cyst wall.

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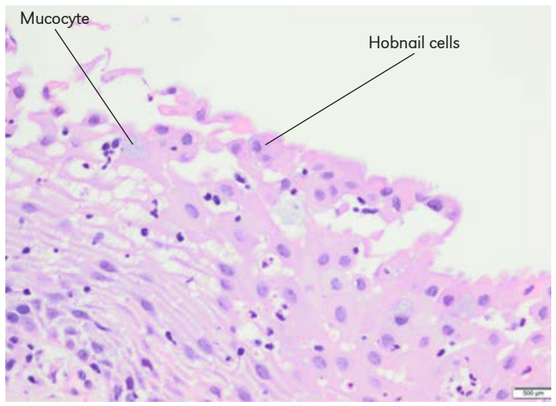

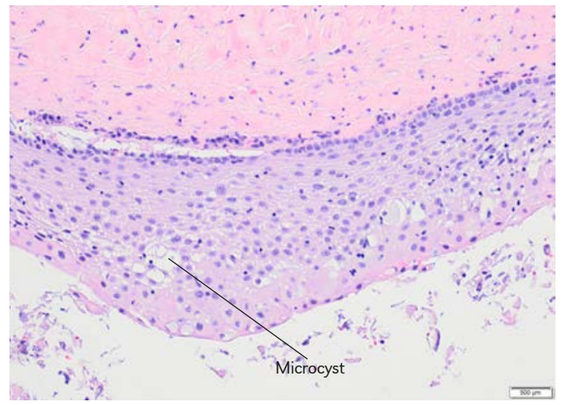

Figures 4 & 5: Photomicrographs (x500 magnifcation) showing histopathological features commonly seen in a GOC – ciliated cuboidal epithelial cells with granular cytoplasm (hobnail cells), scattered mucocytes and microcysts.

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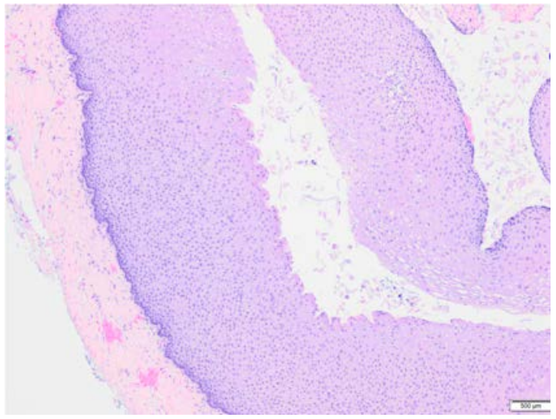

Figure 6: Photomicrograph (x500 magnifcation) showing histopathological features resembling an OKC – parakeratinised corrugated epithelium

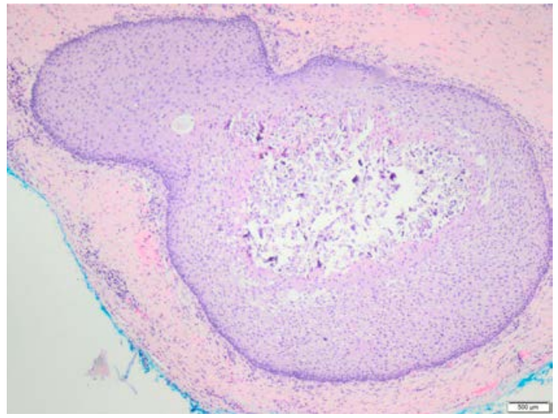

Figure 7: Photomicrograph (x500 magni□cation) showing a daughter cyst

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The features are those of an odontogenic cyst which is difficult to classify. Overall, the features favour a glandular odontogenic cyst with some features reminiscent of odontogenic keratocyst. We considered a calcifying odontogenic cyst in the differential diagnosis however, the lack of ameloblast-like cells and ghost cells argue against the diagnosis.

DIAGNOSIS

The histology result concluded the findings of an odontogenic cyst, most in keeping with a glandular odontogenic cyst.

DISCUSSION

Glandular odontogenic cyst (GOC) was initially described as a "sialo-odontogenic cyst" by Padayachee and Van Wyk in 1987. However, Gardner et al. observed that the cysts' epithelial lining consisted solely of glandular elements, with no involvement of salivary tissue, thereby being classified as a distinct entity.

Consequently, the World Health Organisation (WHO) officially adopted the name "Glandular Odontogenic Cyst" (Vichare et al., 2021).

Only 169 cases of GOC have been reported in the literature up until 2017, and it accounts for only 0.012% to 1.3% of all jaw cysts (Chrcanovic & Gomez, 2018). GOC typically presents as a slowly expanding lesion within bone, commonly affecting the anterior mandible and sometimes extending across the midline.

It is more commonly seen in middle-aged adults and has a slight male predilection. Small cysts are typically asymptomatic while larger ones may cause paresthesia and pain due to their enlargement. In this case, the lesion presented in the premolar region of a young female patient and was asymptomatic. Radiographically, GOC presents commonly as a multilocular radiolucency, with well-defined margins and a sclerotic rim.

Frequently it presents with root resorption, root displacement, expansion and perforation of the cortical plates. However, the lesion doesn't pertain any pathognomonic radiographic features. In this report, the lesion presented as a unilocular radiolucency with a well-defined sclerotic rim causing root displacement (Figure 2 and 3).

Unicystic ameloblastoma, LPC, OKC, central giant cell granuloma and MEC have similar radiographic characteristics as GOC (Aslam et al., 2024; Heiliczer et al., 2023).

The variability in clinical and radiographic presentation of GOC, highlights the crucial role of histopathological diagnosis in identifying this lesion.

Biopsies are essential to confirm the diagnosis of jaw cysts, as the appropriate treatment differs depending on the specific type of cyst or tumour.

However, definitive diagnosis of GOC can be difficult to make due to an overlap in microscopic characteristics between GOC, botryoid cyst, LPC, OKC, dentigerous cyst with metaplasia and low grade MEC. These lesions make it challenging to discern whether the lesion is a true GOC or a cyst with GOC-like features (Heiliczer et al., 2023).

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To address this problem, Gardner et al., 1988 has depicted eight histopathological features in GOC and this was further elaborated in an earlier study by Kaplan et al., 2008 that proposed a list of microscopic criteria for diagnosis of GOC.

Kaplan et al., 2008 divided these criteria into two; major and minor, where the presence of all five major criteria such as epithelial spheres within the lining, non-keratinised stratified squamous epithelium, eosinophilic cuboidal cells (so-called hobnail cells) that are sometimes ciliated and the identification of mucous cells with duct-like structures are considered mandatory for the diagnosis while the four minor criteria of ciliated cells, papillary proliferation, vacuolated cells and multicystic architecture were considered not mandatory, but would support the diagnosis.

However, Fowler et al., 2011 proposed that meeting all the major criteria is not necessary for making a diagnosis. They consolidated all microscopic features into ten parameters and determined that, the presence of seven or more features was strongly predictive of a GOC diagnosis.

When five or less parameters were met, the diagnosis would be a "GOC mimicker". Additionally, the presence of hobnail cells is necessary for diagnosis, but are not diagnostic of GOC if other factors are not present (Yanduri et al., 2017).

The 2022 WHO classification of odontogenic cysts does not specify a minimum number of criteria necessary for diagnosis, as not all features are present in all cases of GOC, but the presence of more features provide greater confidence in the diagnosis. The latest updated mandatory criteria are the presence of hobnail cells and epithelium of variable thickness. The most challenging differential diagnosis for GOC is intraosseous MEC, as both can present with multiple cyst-like structures lined by mucous producing cells. Identifying the MAML2 gene rearrangement is crucial for distinguishing between these two lesions.

While this approach remains widely accepted, there has been one reported case of GOC with a MAML2 rearrangement, hence suggesting the need of further research to clarify these findings (Soluk-Tekkesin & Wright, 2022).

Histologically, this case presented a diagnostic challenge as it presented various features which are commonly seen in different types of odontogenic cysts. Some sections showed areas of parakeratinisation with corrugated surfaces and the presence of daughter cysts in the cyst wall which are common features of an OKC. However, the presence of hobnail cells, mucocytes and epithelium with variable thickness are diagnostic features as described previously of a GOC. Based on these histopathological findings, the diagnosis was most in keeping with a GOC.

Although GOC is relatively rare, correct diagnosis is important because of its substantial growth potential and localised aggressive behavior with cortical perforation and a propensity to recur, at a rate of 21-55% even after 7 years of treatment (Heiliczer et al., 2023).

Higher recurrence rates were noticed in instances where the lesion affects the mandible and in larger sized lesions. Additionally, the modality of treatment performed influences the recurrence. Incomplete removal of the lesion during surgery may leave cyst remnants, increasing the risk of recurrence, similar to the behavior observed in OKC. There is no consensus about which treatment modality is more suitable for GOC. Treatment types range from enucleation, curettage, peripheral osteotomy and resection.

Conservative treatment methods such as enucleation and curettage are associated with much higher recurrence rates when compared to resection which has an almost negligible recurrence risk. Small lesions are commonly enucleated while aggressive approaches are reserved for larger or recurrent GOCs.

However, regardless of the treatment provided, it is recommended to follow up the lesion for at least three years with a preference for up to seven years. (Peraza Labrador et al., 2024).

Many attempts over the years have been made to redefine the diagnostic microscopic criteria necessary for GOC, with the last update being in 2022. This shows the challenge that experts face in the histopathological diagnosis of this lesion and that not all necessary criteria have been universally accepted over the years.

CONCLUSION

GOC is a rare lesion with unique histopathological features. While diagnosis is usually straightforward when all the key criteria are met, challenges can arise due to overlapping microscopic characteristics with other lesions.

The most important differential of GOC is MEC. Adequate diagnosis is essential to determine the appropriate treatment options based on the lesion's size and potential for recurrence. Keeping up to date with the most recent research and guidelines enables dentists to deliver optimal care.

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Continues from page 11.

Regularly assessing evolving practices, improves the ability to accurately diagnose, treat, and manage GOCs, leading to improved patient outcomes and overall healthcare quality.

NOTES ON PATIENT'S CONSENT

The patient provided both verbal and written informed consent for the participation in the research study. Documentation of this consent is available upon request.

ACKNOWLEDGEMENTS

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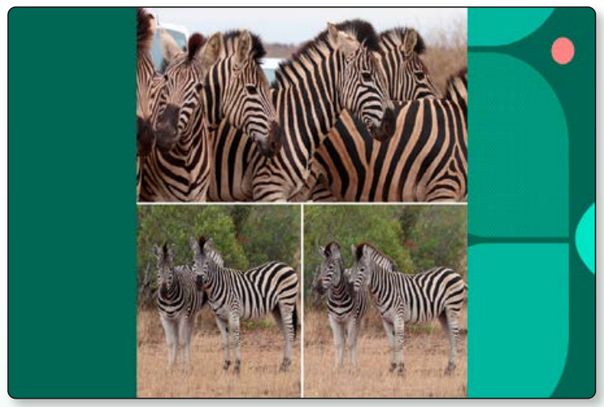
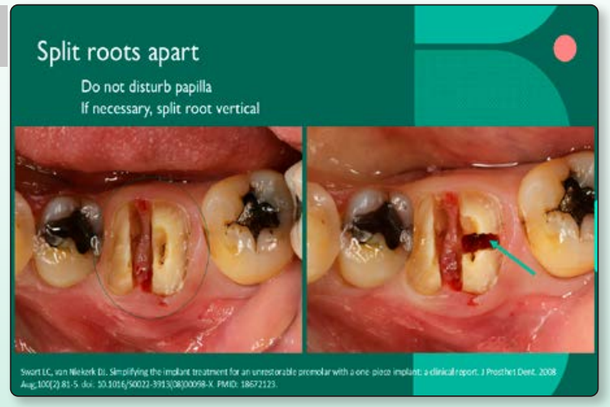
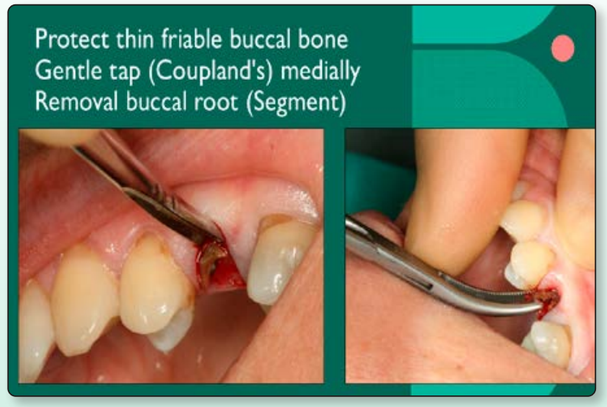
CRITICAL DECISION-MAKING AND ATRAUMATIC EXTRACTIONS IN IMPLANT DENTISTRY

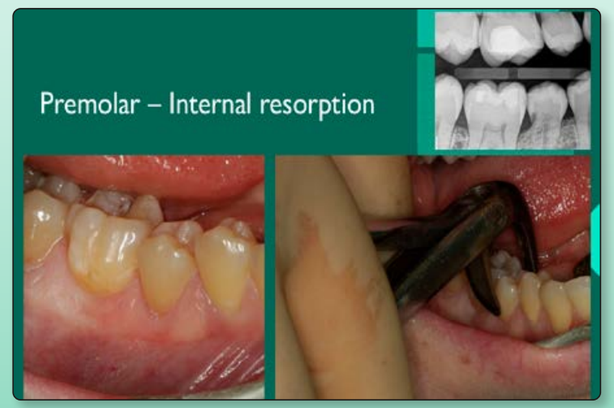
DEFINING BOUNDARIES AND ENHANCING OUTCOMES

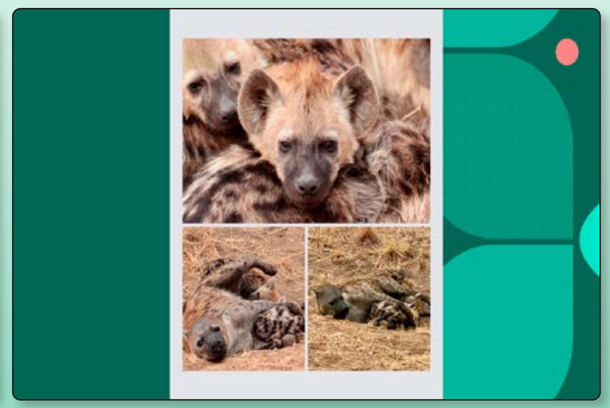
By Blackie Swart: MFOS Private Practice











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CRITICAL DECISION-MAKING AND ATRAUMATIC EXTRACTIONS IN IMPLANT DENTISTRY

DEFINING BOUNDARIES AND ENHANCING OUTCOMES

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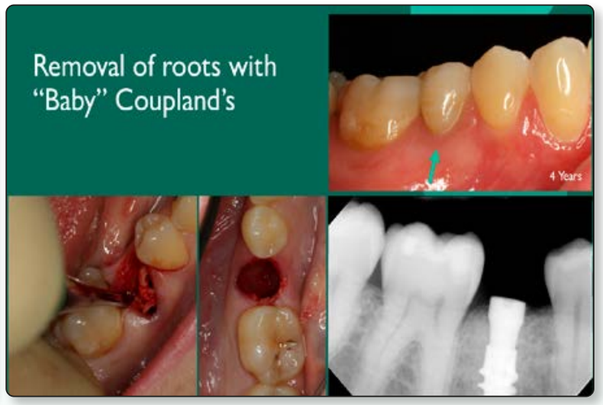
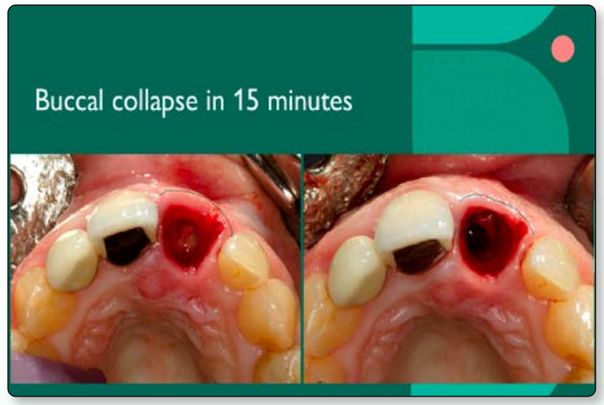
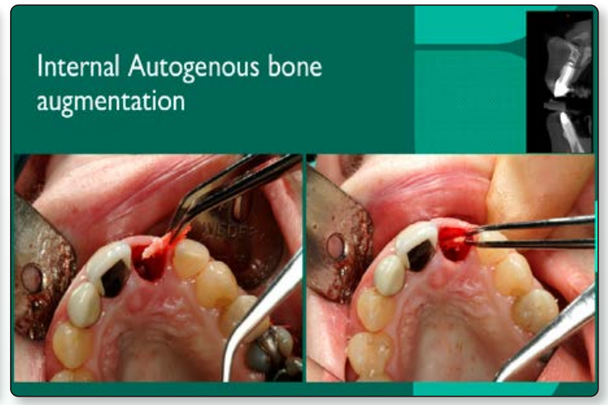
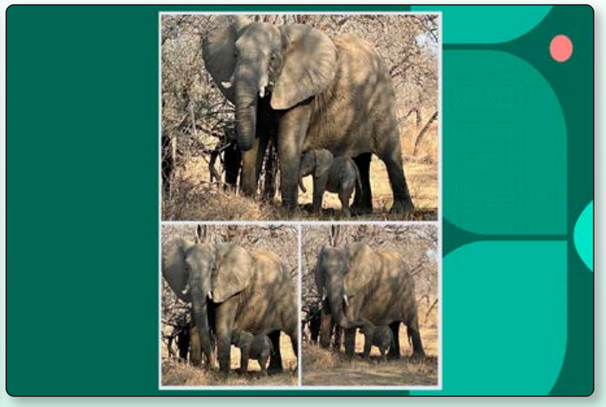
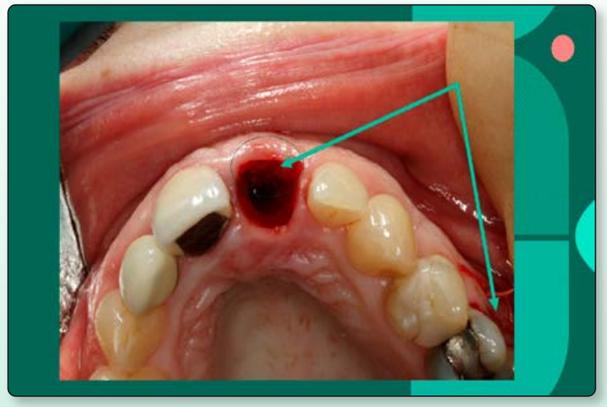
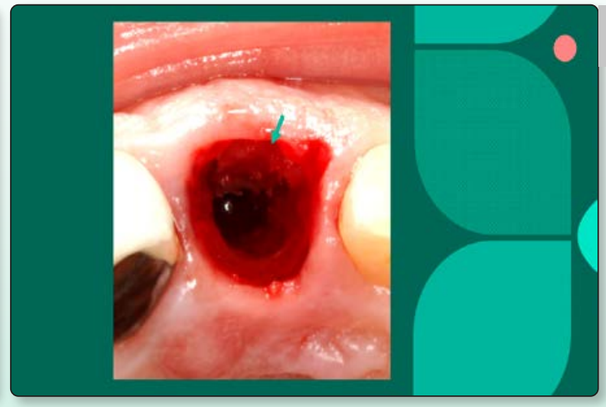


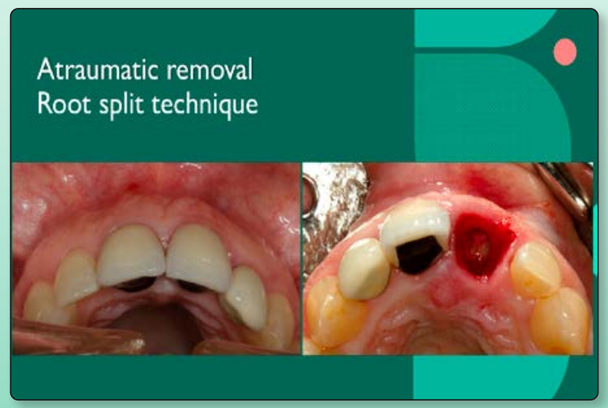


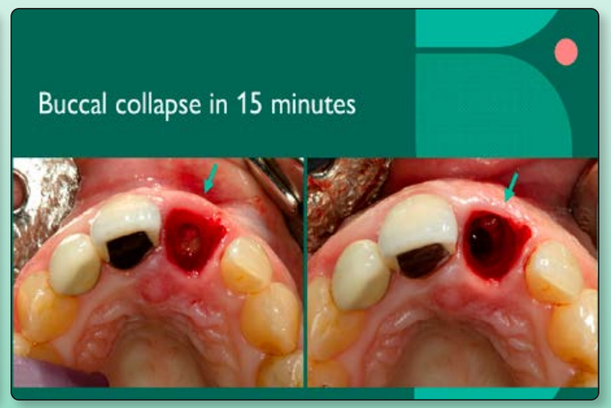


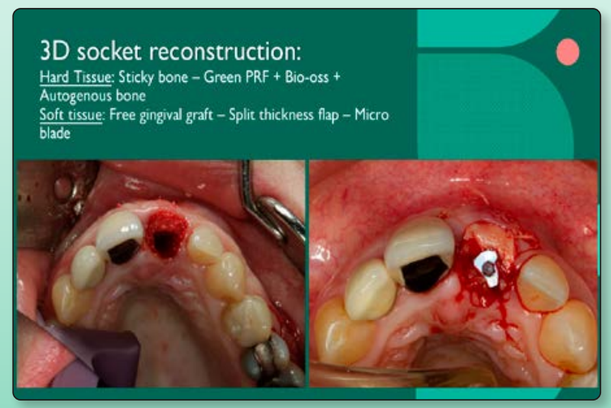


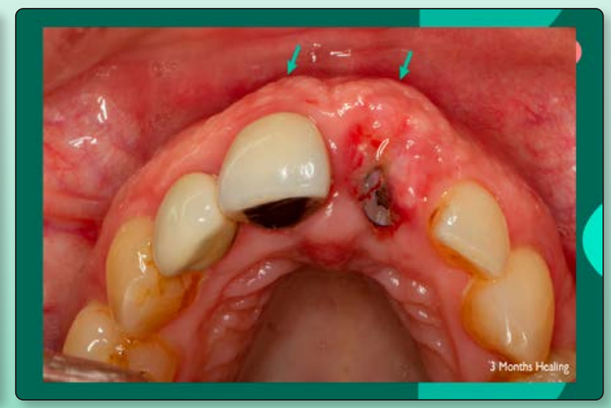












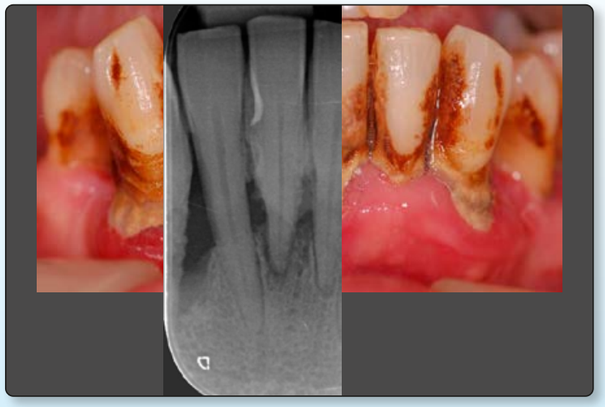
FROM BALANCE TO BREAKDOWN: INFLAMMATORY AND IMMUNE RESPONSES IN PERIODONTITIS

By Edward J Sammut BChDMSc MClinDent(Perio) MFDS MRD RCSEd

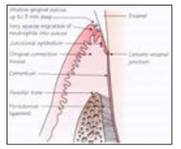
From Balance to Breakdown: Inflammatory and Immune responses in Periodontitis
Edward J Sammut BChD MSc MClinDent (Perio) MFDS MRD RCSEd

- *"…sometimes, on the surface of the teeth, both inside and outside and below the gums, rough scales are deposited; these are ugly in appearance and are black, green or yellow. Thus, corruption begins to affect the gums and the teeth enter a state of loss of protection."*

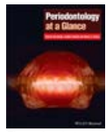
Kitab al-tasrif vol XXX chapters 28-35
Abu I'-Qasim Khalaf ibn 'Abbas al-Zahrawi (c. 930-1013 AD)
Known as **Albucasis** (Andalucia, Spain)



Page and Schroeder (1976)
Pathogenesis of Inflammatory Periodontal Disease: A summary of Current Work

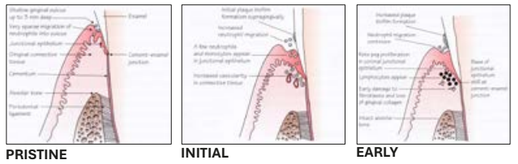


PRISTINE



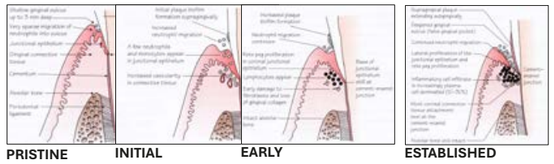
These drawings were copied from this book, which I recommend.

Page and Schroeder (1976)
Pathogenesis of Inflammatory Periodontal Disease: A summary of Current Work



PRISTINE INITIAL EARLY

Page and Schroeder (1976)
Pathogenesis of Inflammatory Periodontal Disease: A summary of Current Work



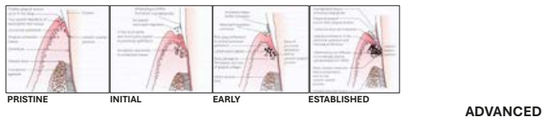
PRISTINE INITIAL EARLY ESTABLISHED

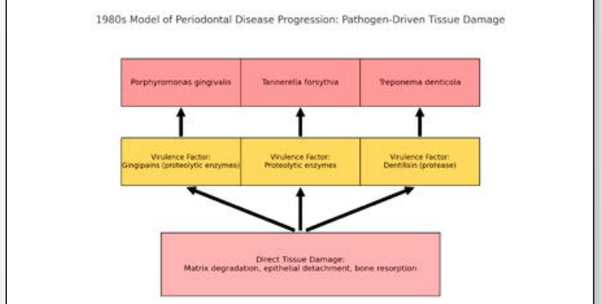
FROM BALANCE TO BREAKDOWN: INFLAMMATORY AND IMMUNE RESPONSES IN PERIODONTITIS

Continues from page 29.

Page and Schroeder (1976)

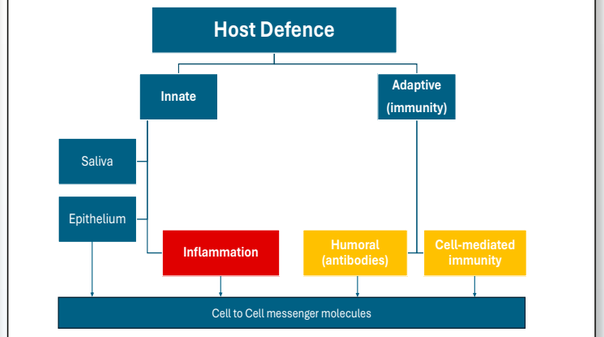
Pathogenesis of Inflammatory Periodontal Disease: A summary of Current Work



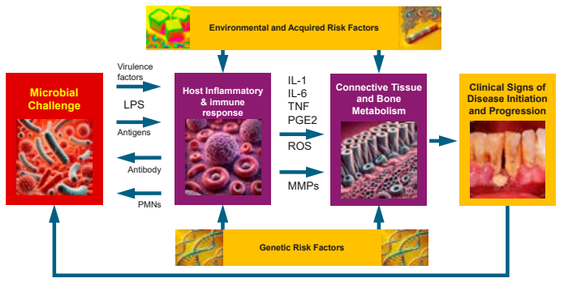


The Red Complex

- *Porphyromonas gingivalis*
- *Tannerella forsythia*
- *Treponema denticola*



Pathogenesis of Periodontitis (Page and Kornman,1997)



What bacteria?

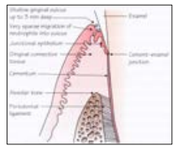
Specific plaque hypothesis
(Loesche, 1976,1979)

Non-specific plaque hypothesis
(Theilade, 1986)

Ecological plaque hypothesis
(Marsh, 2003)

EPITHELIUM AS PART OF INNATE DEFENCE

- Physical barrier
- Keratinisation
- "weakness"? at junctional epithelium

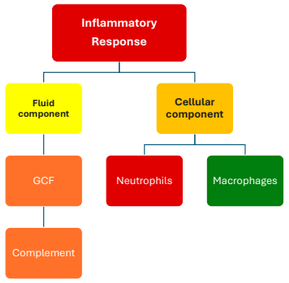


Keratinocytes are able to "sound the alarm"

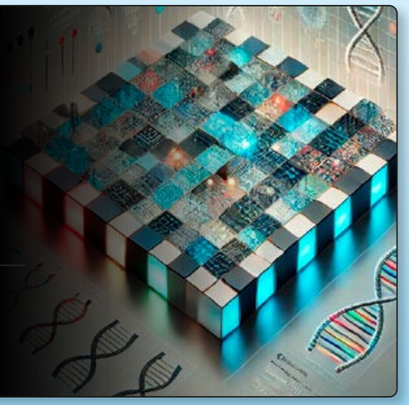
- Detect PAMPs
- Express cytokines
  - Call in the defences
- Express defensins
  - Activate dendritic cells
  - Antimicrobial effects

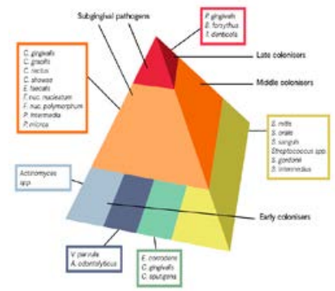
Langerhans cells

- Tissue macrophage
- Presents antigens to the adaptive system
- Helps decide: is this me, my own bug or a pathogen?



DNA-DNA checkerboard hybridization



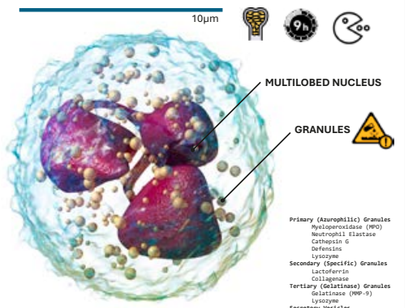


Adapted from Socransky *et al* 1998

185 subjects
168 diseased
25 controls
13,261 plaque samples
40 species
Analysed to look for complexes

Red Complex: This complex was strongly associated with clinical measures of periodontal disease severity.
Orange Complex: These bacteria were often found together and linked to disease progression.
Yellow Complex: Consisted mainly of Streptococcus species, commonly found in healthy periodontal sites.
Green Complex: Included species associated with early colonization.
Purple Complex: Comprised early colonizers in plaque formation.

MY FAVOURITE CELL



Primary (Azurophilic) Granules
Myeloperoxidase (MPO)
Neutrophil Elastase
Cathepsin G
Defensins
Lysozyme
Secondary (Specific) Granules
Lactoferrin
Collagenase
Tertiary (Gelatinase) Granules
Gelatinase (MMP-9)
Lysozyme
Secretory Vesicles

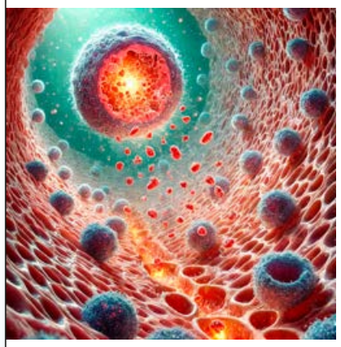
Blausen.com staff (2014). "Medical gallery of Blausen Medical 2014". *WikiJournal of Medicine* 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436.

Phagocytosis, Degranulation and Extracellular Traps Release by Neutrophils—The Current Knowledge, Pharmacological Modulation and Future Prospects May 2021
Frontiers in Pharmacology 12 Barbara Gierlikowska Albert Stachura Wojciech Gierlikowski Urszula Demkow

Continues on page 32.

FROM BALANCE TO BREAKDOWN: INFLAMMATORY AND IMMUNE RESPONSES IN PERIODONTITIS

Continues from page 31.



Neutrophil Elastase and Secretory Leucocyte Proteinase Inhibitor in the GCF and Saliva of Smokers and Non-Smokers with Chronic Periodontitis – a pilot study.

KING'S College LONDON

M1 state

Pro-inflammatory

- Cytokine production
- First response and pathogen killing – same as neutrophils
- Bone resorption through signalling to osteoclasts

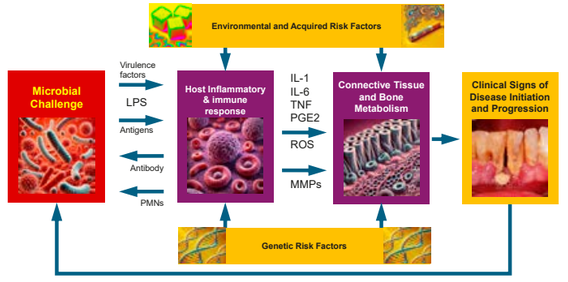
- Antigen presentation
- Activation of T-Cells
- Adaptive system amplification

M2 state

Pro-resolution

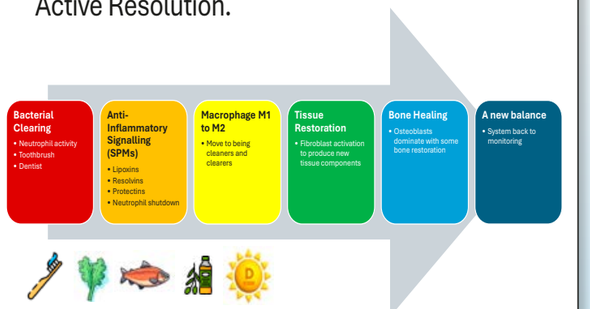
- Anti-inflammatory mediators
- *Efferocytosis* (eat up dead/dying neutrophils and other debris)
- Fibroblast and osteoblast promotion to produce new tissue

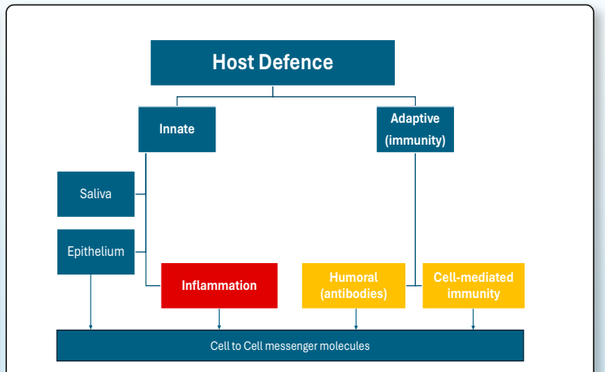
Pathogenesis of Periodontitis (Page and Kornman,1997)

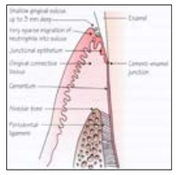


- Communities in different niches
- Specific clones can appear and disappear
- Commensals provide colonization resistance
- Co-evolution with us
- Evidence from intestinal studies
- Commensals essential for normal development and function
- Controlled inflammation is normal and healthy

Cleaning and Healing. Active Resolution.







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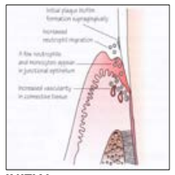


INITIAL

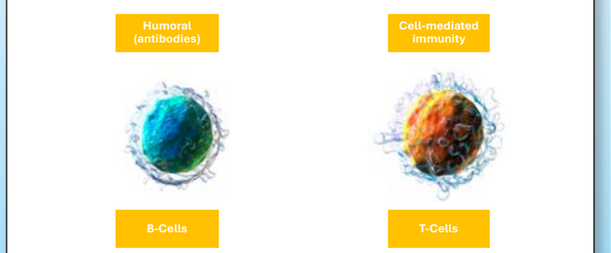
Neutrophil transit is orchestrated and programmed by both host and bacterial signals

What bacteria?

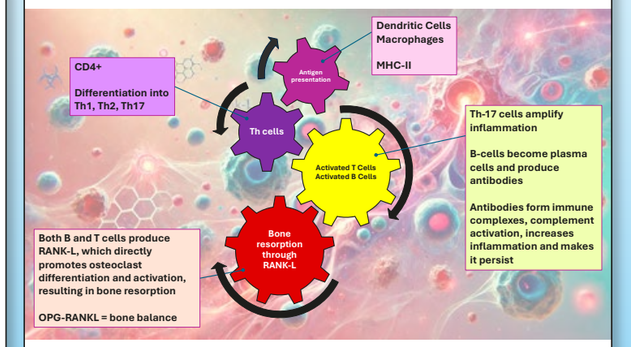
Ecological plaque hypothesis (Marsh, 2003)

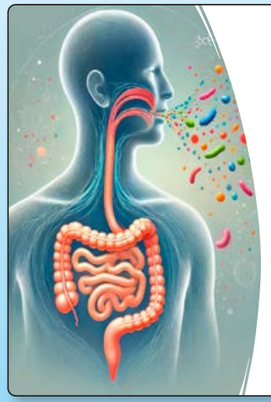
Keystone pathogen concept (Hajishengallis et al 2011)

Polymicrobial synergy and dysbiosis (PSD) (Hajishemgallis and Lamont 2012)

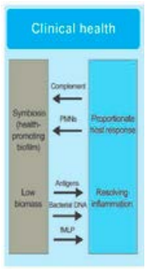


Blausen.com staff (2014). "Medical gallery of Blausen Medical 2014". *WikiJournal of Medicine* 1 (2). DOI:10.15347/wim/2014.010. ISSN 2002-4436.





Bacteria are essential for health



From Meyle and Chapple 2015

The Nexus Between Periodontal Inflammation and Dysbiosis
Thomas E Van Dyke[1], P Mark Bartold[2], Eric C Reynolds[3]
Front Immunol. 2020 Mar 31;11:511.

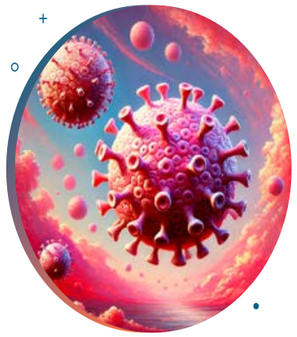
What if ....?!

- Dysbiosis happens **because of** inflammation?
- The ecological plaque hypothesis already suggested that the biofilm was under selective influence from the pocket environment and therefore from inflammation there
- In health and gingivitis, organisms self-regulate through interspecies competition resulting in microbial homeostasis
- Excess inflammation results in tissue swelling and an anaerobic environment rich with tissue breakdown products, plasma proteins, haemoglobin – selecting for the gram negative, proteolytic consortium of organisms

Continues on page 34.

FROM BALANCE TO BREAKDOWN: INFLAMMATORY AND IMMUNE RESPONSES IN PERIODONTITIS

Continues from page 33.



Viruses

Key author: Jørgen Slots

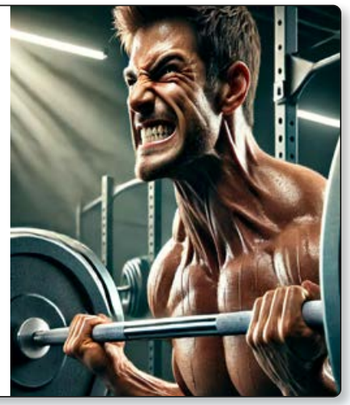
- CMV, EBV, HSV-1 in high numbers in progressive periodontitis
- Difficulty with picking the "active" pocket to assess
- Post-treatment very little viral detection from pockets
- Socioeconomic and racial patterns
- Direct and indirect pathogenesis
- Synergism with bacteria

Mechanical Stress and Inflammatory Mediators:
- release of pro-inflammatory cytokines such as interleukin-1β (IL-1β) and tumor necrosis factor-alpha (TNF-α).

Activation of Matrix Metalloproteinases (MMPs):
- High occlusal forces have been shown to activate MMPs

Oxidative Stress:
- Mechanical overloading can induce oxidative stress in periodontal tissues.

Vascular Changes:
- Alterations in blood flow within the periodontal ligament, leading to ischemia and subsequent inflammatory responses.



Other ways to cause inflammation

- Systemic
  - Poorly controlled Diabetes
  - Autoimmune
  - Hormonal/pregnancy
- Smoking
  - Oxidative stress
  - Impaired / altered responses
- Genetic / Epigenetic factors
- Nutritional deficiency
- Local irritants
- Medications
- Stress
- Chronic microtrauma
- Orthodontics

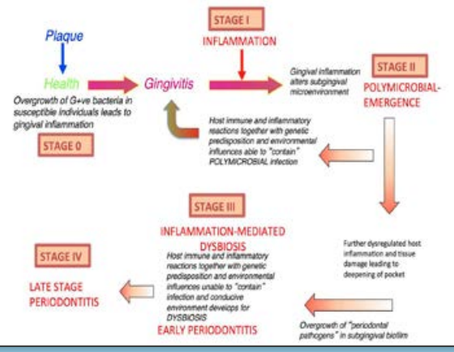
Conversion to dybiosis

- Severe periodontitis
  - Excess inflammation with oxidative stress and excess cytokine production
  - Inflammation predicts disease progression
  - Overgrowth of pathogens occurs after disease onset

frontiers in Immunology

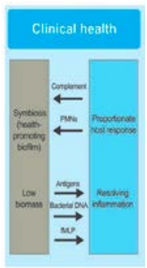
The Nexus Between Periodontal Inflammation and Dysbiosis
Thomas E Van Dyke[1], P Mark Bartold[2], Eric C Reynolds[3]
Front Immunol. 2020 Mar 31:11:511.

Inflammation-Mediated Polymicrobial-Emergence and Dysbiotic-Exacerbation (IMPEDE)



- Probiotics
- Prebiotic
- Targeted antibiotic

- Oral hygiene
- Removal of overhangs
- Removal of calculus



- Diabetes control
- Smoking cessation
- Stress management

- Diet/exercise/sleep
- Inflammation modulation (SPMs?)
- Occlusion

THE BART ENTERPRISES HANDS ON WORKSHOP ON REGENERATIVE MINIMAL INVASIVE DENTISTRY IN DENTAL CARIES AND MOLAR HYPOMINERALISATION

By Professor Rocio Lazo, Specialist in Paediatric dentistry

Summarised by Dr David Muscat

The course featured the enabling of regeneration of carious lesions in enamel without removal of the lesion and not using the drill.

Regeneration of the affected dentine in carious lesions was described.

MIH was tackled in detail regarding its treatment as well as preventing post eruptive enamel breakdown in molars.

Minimally invasive dentistry was described and treatment options and alternatives in restorative materials were described. Regenerative treatment protocols were described.

In treatment it is always important to remove the infected dentine. The Strontium ion is the most active in the periodic table so this is utilised.

It is possible to remove necrotic pulp in molars without LA. In order to kill bacteria one can use 2% chlorhexidine from Septodont for one minute. After this one can use bio-dentine in the pulp chamber.

Fluoride varnish only penetrates 25-30 microns so will not affect the body of the lesion, but it will only arrest the lesion and it will not deal with the white spot.

MOLAR INCISOR HYPOMINERALISATION

This presents with a new challenge. There are proteins in the MIH enamel namely serum albumin, type 1collagen, antitrypsin and anti thrombin. These will inhibit crystal growth so are removed.

Fluoride only prevents caries but does not prevent the breakdown of enamel. The clinical evidence for using fluoride for remineralisation is low. You need to get minerals in and fluoride is not the ion you need to use in MIH.

Strontium is the most bioactive ion of the periodic table and it has the same properties as calcium. Strontium is found in Brazil nuts and Himalayan salt.

BRix 3000 is used for the removal of caries. This is placed in the cavity and excavate out the infected dentine. This is the deproteination stage. Infected dentine is necrotic so you do not feel pain. When you cut dentine and cut collagen you get pain.

In the past SDF Silver Diamine Fluoride 38% was used in schools on carious teeth so as to counter sensitivity but it stained. The penetration is in the region of 50 microns.

Potassium Iodide can also be used for interdental caries. Do not use on infected dentine as you are only arresting caries.

The best is a combination of SDF and KI. Do not use SDF close to the pulp as it may cause a necrotic pulp due to its deep penetration.

PROCEDURE FOR TREATMENT WITH MINIMAL CARIES

1. DEPROTEINATION for one minute – removal of albumins and carbons. Papain is used. If one uses sodium hypochlorite then only proteins are removed not carbons.
2. ETCHING WITH PHOSPHORIC ACID – this allows better penetration of Strontium as the etching opens up the porosities. Do this for 15-20 seconds. Rinse and dry.
3. APPLICATION OF STELA PRIMER – use one drop and leave it for one minute and then blow air and dry.This is the most important step.
4. Apply Stela flowable so it penetrates pits and fissures. Use for 1.5 minutes. However one needs to wait for four minutes and check the occlusion.

PROCEDURE FOR CARIES IN DENTINE

1. Use Papain gel – remove infected dentine
2. Use series of instruments and scoop out and remove the infected dentine.
3. Use Stela primer –one drop on floor/walls/ enamel. – 5 seconds and air dry fro 2-3 seconds.
4. Restore with Stela- you will get a shiny surface. Wait for four minutes to check the occlusion
5. After four minutes you may add Riva Light cured composite material on top.

PAYMENT FORM

NAME:

Registration Number Medical Council:

Dr .....

Cheques for 75 euro are to be made payable to the Dental Association of Malta. Please note that membership renewals received after 1st July 2026 will incur an additional 25 euro administrative fee.

PAY:

Dental Association Of Malta,
Federation of Professional Associations
The Professional Centre,
127, Sliema Road,
Gzira GZR1633

Bank account: 4002375181-7 DENTAL ASSOCIATION OF MALTA
IBAN: MT54 VALL 2201 3000 0000 4002 3751 817
Bank's BIC: VALLMTMT
Bank: Bank of Valletta plc
Balluta Branch, St Julian's – Malta

DENTSPLY SIRONA TOUR 2025 MADLIENA COTTAGE

Lecturer: Dr Laura Abdriukaitiene

A Bart Enterprises event

On Friday 17th October a well attended seminar was held. The event featured a presentation and a hands on demonstration re Instrumentation of different anatomies, irrigation and obturation. Key Dentsply opinion leaders Dr Adrienne Busuttil and Dr Maria Xuereb also attended.

The lectures stressed the importance on deciding which instruments to use in particular scenarios. One must take into account root canal anatomy and clinical conditions. Hidden curves and dimensions of roots must be noted and planned for.

The lecturer went through diagnostics and treatment planning, precise case evaluation, creating individual treatment protocols and selecting the appropriate mechanical instrumentation and chemical disinfection sequences. Understanding the latest instrument design and metallurgy is vital in ensuring debridement and medication of diverse root canal anatomies.

One needs to know the parameters of endodontic instruments for safe and effective treatment , negotiation and shaping. Irrigation protocols also need to match different root sealers.

TAKE HOME POINTS

1. CHELANTS
   - Important for the dissolution of inorganic components and removal of the smear layer.
   - 15-17% EDTA
   - 10-40% Citric Acid
   - Ethidronic acid (HEDP)
   - EDTA should not be mixed with NaOCl .
   - HEDP has to be freshly made every time. Dual rinse HEDP with 2 - 5.25% NaOCl .
2. Bio Root is a hydraulic GC sealer with no shrinkage. With resin based there is shrinkage.
3. With curved roots K Files should be pre-bent.
4. Irrigation with NaOCl with a concentration of 0.5-8.25% at a temperature of 50-60 degrees C(in the canal the temperature will rise to 120 degrees C)one must irrigate for 40 minutes.
5. When dealing with upper incisors with open apices one can use a collagen sponge at the apex which you can push into place with a plugger.
6. When you have long canals it is better to use a reciprocal system. With this system you have an increased apical taper.

   This is the deep shape philosophy. A sufficient deep shape is important for a successful disinfection. With Pro Taper Ultimate you start and finish with 0ne file. It is a game changer. There is greater flexibility than the previous generations of ProTaper.
7. With the X-Smart Pro+ you have working length control-you measure the working length as there is an integrated apex locator that gives a precise working length reading.

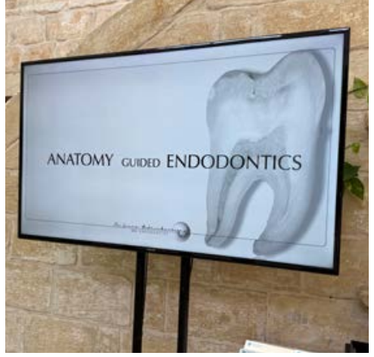
   The Dynamic Accuracy technology reads the measurement signal accurately while shaping, with auto-reverse function to keep the file on the desired target.

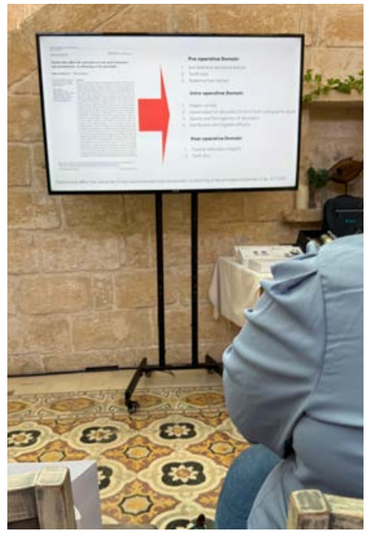
   You can pre set the torque limit. You can use both continuous rotation as well as reciprocating modes.

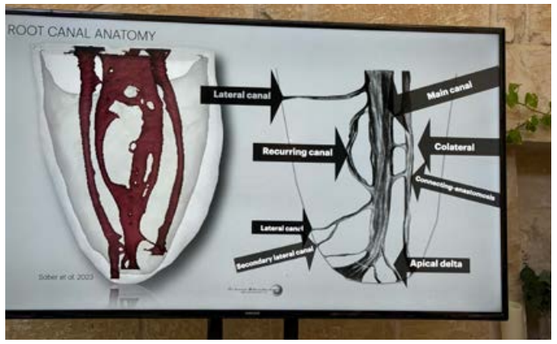
Pro Taper Ultimate files are more resistant to unwinding than Edge Taper Platinum files.

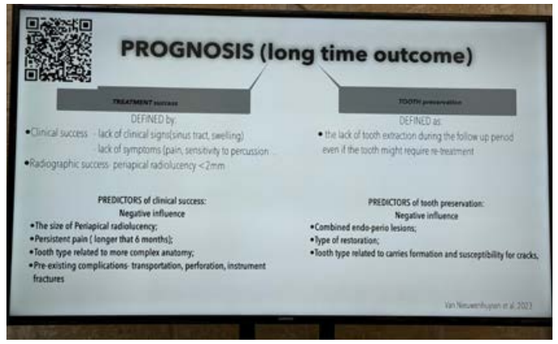
Pro Taper Ultimate full sequence is also available in hand files.

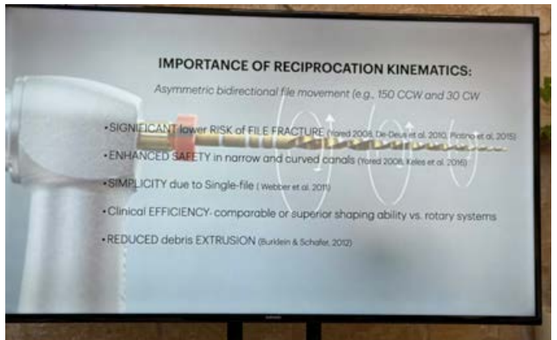
The irrigation needle has two lateral openings aimed at dentinal walls and the end is closed to avoid extrusion at the apex.











THE CED CONFERENCE IN BRUSSELS

14 November 2025

CED COUNCIL OF EUROPEAN DENTISTS

On 14 November 2025 Dr David Muscat International Relations Officer of the Dental Association of Malta attended the CED General Meeting in Brussels. Several topics were discussed and voted upon such as a statement on Medical Neutrality, summary of the CED working groups and Task Forces updates on the work forces. Documents were adopted on Ageing and Oral Health as well as on Athletic mouthguards.

Surveys on dental abutments, adverse reactions reporting, Corporate Dentistry and Dental X Ray inspections were presented.

By Dr David Muscat
Dental Association of Malta

CED RECOMMENDATION ON CUSTOM-MADE ATHLETIC MOUTHGUARDS

INTRODUCTION

The Council of European Dentists (CED) is a European not-for-profit association which represents over 340,000 dentists across Europe.

The association was established in 1961 and is now composed of 32 national dental associations from 30 European countries.

The CED's core mission is to promote the interests of the dental profession in the EU. This includes attention to priority issues for dentistry, such as patient safety.

In this recommendation paper, the CED will focus on preventive measures against orofacial injuries that athletes may encounter during sports activities.

As is well known, whether recreational or competitive, sports and athletic activities provide substantial benefits for physical, mental, and psychological well-being.

However, athletes are at an elevated risk of sustaining traumatic dentofacial injuries (TDIs), particularly in high-contact sports.

Besides this, studies show that up to 15% of all sports participants experience TDIs, with the risk significantly higher among individuals who do not use protective sports mouthguards.[1]

As a result, athletes may face various post-traumatic complications, some of which may even be irreversible. In addition to that functional, physical, or significant aesthetic problems, psychological and financial consequences may also arise.

For instance, athletes suffering from dentofacial injuries may experience long-term difficulties in chewing, speaking, and maintaining oral hygiene, which can significantly affect their quality of life and potentially hinder their professional athletic performance and career progression.

Furthermore, considering the young age of child athletes, their limited ability to protect themselves from potential trauma during sports activities makes them one of the groups most affected by traumatic dental injuries.

The growing awareness of these risks has led to the development of preventive oral care programs and the recommendation of protective appliances, particularly custom-made mouthguards (CMSs).

These devices are proven to minimize the risk of traumatic dental injuries by absorbing and redistributing the force of impacts, stabilizing the jaw, and separating oral structures to prevent soft tissue damage.

For this reason, their adoption should be considered a shared responsibility among athletes, coaches, parents, sports organizations, and dental professionals.

CMSs are individually manufactured, removable devices designed to resist deformation, mitigate dental trauma, and protect the surrounding oral and facial structure.

'While any mouthguard is better than no mouth guard' compared to over-the-counter (OTC) or boil-and-bite alternatives, CMSs offer superior protection against impact forces, better retention and fit, greater comfort and wearability during performance, as well as improved communication and breathing capability during sports.

Among the responsibilities of dentists are educating patients, athletes, parents, coaches, and school officials about dental injury risks and preventive strategies, as well as encouraging the fabrication and use of CMSs.

Continues on page 32.

[1] Avgerinos S, Stamos A, Nanussi A, Engels-Deutsch M, Cantamessa S, Dartevelle J-L, et al. Position Statement and Recommendations for Custom-Made Sport Mouthguards. Dent Traumatol. 2025;41(3):246-51. doi:10.1111/edt.13019. CED-DOC-2025-040-E

CED RECOMMENDATION ON CUSTOM-MADE ATHLETIC MOUTHGUARDS

Continues from page 31.

CED RECOMMENDATIONS

In light of the above findings, the CED recommends the following actions:

- Implement early dental screening programs for athletes of all ages and levels.
- Integrate oral health education into athlete health assessments and sports medicine curricula.
- Engage health professionals, health and sports educators, sports federations, field dentists and policymakers to emphasize the importance of using mouthguards in sports, and, accordingly, develop awareness campaigns.
- Promote the use of CMSs as the gold standard for contact and collision sports athletes due to their superior safety profile.
- Encourage national sporting association to push for an obligatory use of CMSs as part of their national strategies and advocacy activities.
- Encourage insurance companies to include CMSs as obligatory for their coverage for specific sports at professional level .
- Furthermore, the CED highlights the need for promotion of use of Custom-Made Sports Mouthguards at both supranational and national levels, aiming at:
  - » Mandating the promotion of oral protection in organized sports across EU Member States.
  - » Standardizing the recommendation of mouthguards by licensed dentists.
  - » Standardizing the fabrication of mouthguards by licensed dentists and lab technicians.
  - » Supporting research, education, and policy development focused on preventing sports-related orofacial injuries.

In conclusion, dental injuries sustained during sports are highly preventable.

CED has the opportunity to take a leading role in safeguarding the oral health of athletes through the formal endorsement of custom-made sports mouthguards.

The abovementioned recommendations will serve as a crucial step in aligning national policies, raising public awareness, and protecting athletes from lifelong oral complications.

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CED WHITE PAPER: AGEING AND ORAL HEALTH

INTRODUCTION

The Council of European Dentists (CED) is a European not-for-profit association which represents over 340,000 dental practitioners across Europe through 33 national dental associations and chambers in 31 European countries.

Established in 1961 to advise the European Commission on matters relating to the dental profession, the CED key objectives are to promote high standards of oral healthcare and dentistry, and effective patient-safety centred professional practice.

As part of its work, the CED aims to accelerate the prevention of diseases and the promotion of oral and dental health across the life course. Oral health and general health remain inextricably linked and associated oral and general conditions disproportionately impact the older age group.

DEFINITIONS AND GUIDELINES

There is no universally accepted definition of an "older person" in the literature. The World Health Organization (WHO) and the United Nations typically define older adults as those over the age of 60 years old, whereas many European Union countries set the threshold at 65.

Demographic shifts in the EU are significant, with the proportion of the population aged 65 and over, increasing from 16% in 2000 to more than 21% in 2023, with projections of an increase to nearly 30% by 2050[1].

This growing ageing population gives rise to significant economic and social challenges, including increased strains on existing health systems and particularly on primary care providers such as dental practitioners. The CED also highlights the additional challenges relating to the ageing of the dental workforce across Europe, with heightened risks of workforce shortages, unavailability of care and increased financial burden of oral diseases.

With rising life expectancy and evolving retirement ages, distinctions are now being made between "young old" (65–74 years), "middle old" (75–84 years), and the "oldest old" (85+ years)[2].

Healthy ageing/ Healthy Longevity

While overall life expectancy has improved, the quality of these additional years remains a major concern - over 40% of EU citizens aged 65 and older live with at least two chronic conditions. In its 2015 World Report on

Ageing and Health, the WHO highlights the profound impact of population ageing on health systems, workforce and budgets. The report affirms that, through effective policies and services, old age does not always imply dependence but can instead offer new opportunities for older adults, their families, and society at large[3].

Healthy ageing involves not only remaining free from disease, including oral disease, but involves maintaining quality of life, functional ability, and bring benefits to individuals, families and communities[4].

Dependant Older Adults

Dependant older adults, as persons dependant on professional or informal home support or nursing home staff to carry out routine daily and oral hygiene, are particularly vulnerable to oral conditions and diseases[5].

Continues on page 34.

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[2] Cohen-Mansfield J, et al. CALAS Team. 2013. The old, old-old, and the oldest old: continuation or distinct categories? An examination of the relationship between age and changes in health, function, and wellbeing. Int J Aging Hum Dev. 77:37–57

[3] World Health Organisation. (2015). World report on ageing and health. Available: https://www.who.int/publications/i/item/9789241565042

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[5] Andersen, C. et al. (2025). Prediction of oral diseases in care dependent older people. BMC Oral Health 25, 60.

CED WHITE PAPER:
AGEING AND ORAL HEALTH

Continues from page 33.

Dependency is understood as temporary or chronic functional disability where an individual is unable to perform a task previously performed alone.

Dependant older adults may experience decline in oral health for various reasons including poorer diet and impaired oral hygiene. Older adults may also experience increased difficulties in receiving appropriate and timely oral care due to, for example, lack of informed valid consent, cognitive impairment, communication barriers between carers, dependant adults and legal guardians, and power of attorney obligations leading to delays in care.

Oral Health and General Health

The FDI World Dental Federation defines oral health as multi-faceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease.

Oral health status affects healthy ageing in older adults, being closely linked to general health, cognitive health, nutritional health and psychological health.

Furthermore, oral and general health are closely interconnected and maintain a bidirectional relationship by impacting one another. Many chronic diseases manifest orally, often sharing common risk factors with oral health issues.

Deteriorating oral health in older age groups poses significant challenges, with high levels of dental disease, strained oral healthcare systems, and the need for robust policy interventions.

According to the Global Burden of Disease, Injury and Risk Factor Study (GBD), oral disorders affect more than 280 million adults aged 70 years and above and rank as the 22nd leading cause of global disability adjusted life-years (DALYs)[6].

The 2024 WHO Bangkok Declaration, "No Health without Oral Health"[7] calls for the urgent promotion, prevention, and management of oral diseases. This need for accelerated action must therefore be integrated into general efforts around the fight against non-communicable diseases in the European Union. Currently, the European Union however fails to address acute oral health diseases within initiatives and policies around healthy ageing. For decades, our profession has championed the view that oral health is an integral component of overall health and quality of life.

CHRONIC CONDITIONS AND ORAL HEALTH IN OLDER PERSONS

Bacteria present in dental plaque contribute to dental caries, and periodontal disease. These bacteria and inflammatory mediators may also contribute to systemic inflammation across the body.

For instance, there is an established association between periodontal disease and cardiovascular disease, and a bidirectional relationship with diabetes. Many chronic systemic diseases and oral diseases also share common risk factors thus increasing the risk of developing comorbidities.

Dental Caries and dental diseases

Root surface caries is a disease process more common in older adults8. It is important to note that dental diseases may become more complex to manage in older adults, causing the development of wider diseases, difficult to control. These can include reduced manual dexterity, reduced access to dental services, complex restorations, and insufficient saliva production (xerostomia).

Periodontal Disease

Periodontal disease in older adults represents a lifetime of periodontal destruction exacerbated by poor oral health. In this age group, periodontal disease often presents as clinical attachment loss and gingival recession thus exposing root surfaces to caries.

Toothwear

Toothwear (including erosion, attrition, abrasion and abfraction), is a chronic disease impacting older adults with increased risks of developing wider oral health issues. In some cases, erosive toothwear may be symptomatic of underlying pathologies, including acid reflux (GERD).

Frailty

Frailty is a disorder affecting many daily activities, characterised by diminished physiological reserves and reduced resistance to stress. The FDI has developed a practical frailty guide for dentists and dental teams to use during consultations with patients aged 65 and over[9].

Poor oral health can be an early indicator of frailty. Preserving or enhancing oral function may improve nutritional and functional status in older adults and could potentially reduce the risk of mortality and other adverse outcomes, including dementia and Alzheimer's disease[10].

Oral Cancer

Mortality from oral and oropharynx cancer significantly impacts the over 65 age group[11]. However, oral cancer is one of the cancers with the lowest survival rate in the European Union, due to late detection.

Sugar – a risk factor for caries and other NCDs

Sugar consumption is a leading cause of caries, including amongst older adults, particularly those in care homes[12]. Reducing sugar intake can alleviate the pain and suffering caused by preventable conditions and decrease related morbidity[13].

Moreover, both poor oral health and excessive sugar consumption are common risk factors for several major non-communicable diseases, including obesity, type 2 diabetes, insulin resistance, cardiovascular diseases, Alzheimer's, dementia, and several types of cancer.

Respiratory disease

In frail older adults, bacteria from the mouth can be aspirated into the lungs, increasing the risk of aspiration pneumonia. Studies suggest that regular oral hygiene interventions in this population may lower the incidence of aspiration pneumonia among dependent older adults living in nursing homes[14].

Malnutrition

Oral diseases and nutrition are inherently connected with a person's oral health status affecting dietary choices, and in turn, influencing the risk of oral disease. Interventions to prevent malnutrition, as a key factor in poor oral health in older adults, vary according to the level of dependance and various care settings. It is estimated to affect approximately one quarter of European adults over 65[15].

Continues on page 36.

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CED WHITE PAPER: AGEING AND ORAL HEALTH

Continues from page 35.

Saliva and Xerostomia

Saliva plays a crucial role in maintaining oral health. A high percentage of older patients are prescribed multiple medications (polypharmacy) to manage chronic systemic disease. However, this can have a significant negative impact on saliva production.

Managing this complexity often requires enhanced collaboration and coordination between medical and dental professionals.

This condition can significantly affect mastication, swallowing, speech, taste, and increase the risk of dental caries. It is essential to diagnose and manage xerostomia carefully.

CED RECOMMENDATIONS

CED welcomes the publication of the 2024 Health at a Glance Report on health workforce shortages and health longevity and the acknowledgement of the interconnected issues of ageing of the European population and the growing burden on already stretched health care services.

The European Union must however take urgent action to make oral health an integral part of European public health policy and initiatives aiming to improve healthy ageing and tackling widespread conditions among older adults.

CED takes the view that ageing and oral health have a multifaceted complexity that require a multi-disciplinary and integrated approach bringing together EU institutions, Member States, dentists, doctors, public health professionals, healthcare workforce, patient groups and other relevant stakeholders.

The CED calls to:

Integrate oral health in all EU health policies and initiatives for healthy ageing

- Acknowledge oral health as a key factor for healthy ageing and an integral part of general health across all EU policies and initiatives addressing healthy ageing and non-communicable diseases.

  Promotion, prevention and management of oral diseases across the life course, including for autonomous and dependent older adults, needs urgent action.

- Address common risk factors and barriers among older adults through unified public health policies. This includes targeted and accelerated efforts for tackling unhealthy diets, tobacco, and harmful alcohol consumption, as well as addressing social and commercial determinants of oral health.

Target education and professional qualifications towards oral care for older adults

- Promote and develop high quality postgraduate education for dental specialists in gerodontology and enhance gerodontology competences among general practitioners[16]. The European Commission must therefore strengthen and define clinical training requirements under Directive 2005/36/EC, with mandatory training dedicated to oral care of frail older adults in undergraduate, postgraduate and continuing education training programmes.

  Furthermore, more emphasis should be placed on developing positive attitudes as well as interdisciplinary and interprofessional training towards oral healthcare of older adults.

- Expand oral health education to non-dental healthcare practitioners, as well as to carers, both formal and informal, including family members and friends who work with older people, to improve integrated care. Oral health promotion, prevention and assessment should be integrated across undergraduate, postgraduate curricula as well as continuing professional development training for both health- and social care workers.

Improve workforce conditions and interprofessional collaborative care

- Invest into strategies for recruiting and retaining adequate and qualified care and healthcare workforce by improving working conditions for all care and healthcare professionals specialised in older adults and dependant older adults.

- Promote interprofessional collaboration between dental and non-dental healthcare professionals. This strategy highlights the need to "put the mouth back in the body" and encourage positive attitudes towards care for older adults.

- Improve availability and accessibility of healthcare professionals to their older patients' electronic health records (EHR) and enhance access of these records to the ageing population.

- Integrate oral health into general and mental health assessments for older adults, recognising the bidirectional link between oral conditions, physical wellbeing, and mental health, particularly in the context of prevention and early intervention.

Establish a dedicated oral health strategy for healthy ageing

- Introduce nutritional standards and training in hospitals, nursing homes, home assistance services and within family care settings.

  Develop nutritional recommendations for catering services and ensure appropriate implementation of daily sugar intake recommendations.

- Ensure stakeholder engagement in oral health policy development. Policies for improved accessibility to oral care services should consider illness, mobility, care dependency, oral health literacy, geographic isolation and social determinants of health.

- Ensure availability and affordability of emergency and routine examinations as well as comprehensive oral healthcare services offered through home support services and institutional healthcare settings such as nursing homes, residential care, assisted living, and long-term care.

  Continuity of professional dental care and oral health interventions must be established when transitioning from independent living to residential or care homes.

- Promote evidence-based fluoride interventions and initiatives.

- Encourage oral health literacy and citizen empowerment on oral health and oral healthcare needs of older adults.

  This includes ensuring that the mouth, teeth and prosthodontic appliances of dependant older adults are cleaned daily in family and home care, residential care and nursing homes by formal or informal carers.

- Enhance early detection of oral cancers among older adults across the EU. Older adults should be informed of the need for regular examinations by a dentist (and, when appropriate, by an oral healthcare professional, under the supervision of a dentist).

- Systematic cancer screening must also be carried out for older adults, with or without predisposing risk factors.

CONCLUSIONS

Older adults are more prone to a wide range of oral conditions, including chronic diseases and co-morbidities, significantly affecting both oral and general health levels. Integrating specific oral health needs and conditions of older, and dependant older adults must therefore be central to all disease prevention strategies formulated at European and national levels.

Oral health must imperatively be considered under healthy ageing policies and action plans, including the Union's priorities for long-time care, as well as in education and workforce policies for care and healthcare professionals, and through the development of a comprehensive oral health strategy for healthy ageing.

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THE ITI STUDY CLUB

The ITI study club met at The Bridge at The Barcelo Fortina Hotel on Wednesday 12 November 2025.

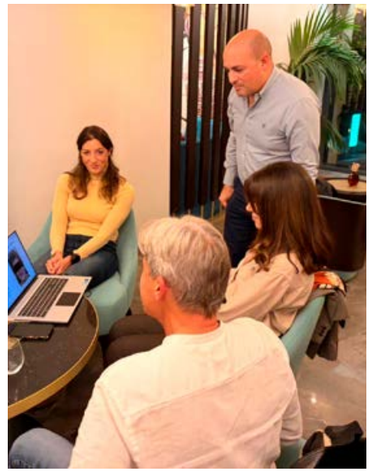
There were several interesting challenging cases that were presented.

- A myxoma in a lower molar socket
- An implant case in a mandible following removal of an oral carcinoma and radiotherapy
- A case of implants with immediate loading on a patient with very little bone
- Replacement of an upper canine and posterior quadrant with sinus lift
- A case of a very deep overbite

The event was extremely well attended.

The ITI study club offers an opportunity to learn something new and useful about implant dentistry, meet peers and benefit from their knowledge and experience. There are 750 study clubs around the world.

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