

Oral Health and Aging

Collaborative care between
physicians and dental professionals.



Oral Health and Medication Use in the Elderly

Intersections, Implications, and Interventions



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Conflict of Interest Disclosure Form

Name: Tomás Hernán Pérez de la Ossa

Type of affiliation / financial interest:



- **Receipt of grants/research supports:** N/A
- **Receipt of honoraria and consultation fees:** Fees from SICLÉO (for this presentation)
- **Participation in a company sponsored speaker's bureau:** N/A
- **Stock shareholder:** N/A
- **Other support:** N/A

Commitment

I commit to the audience to:

- **Disclose any off-label use or unapproved indications**
- **Use both generic and brand names of medications**
- **Present NNTs, NNHs, and levels of evidence when available**
- **Report absolute risk reductions** (and not only relative risk reductions)



Oral Health and Medication Use in Older Adults

Intersections, Implications, and Interventions

By the end of this program, participants will be able to:

1

- **Identify** the main oral manifestations associated with common systemic diseases and pharmacological treatments in elderly patients.

2

- **Recognize** the bidirectional relationship between oral health and systemic health in older adults.

3

- **Apply** prevention and management strategies that promote collaboration between physicians and dental professionals.



Learning Objectives

Understand
Healthy Ageing

Recognize
Oral Health
as part of
General Health

Explain
the relationship
between ageing,
frailty and
oral health

Identify
the importance
of interdisciplinary
care

Apply
practical
concepts in
clinical practice



Oral Health and Healthy Ageing

From longevity to functional ability:
Why oral health matters

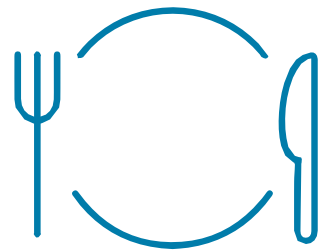


*“We are adding **years** to **life**.
Are we adding **life** to **years**?”*



Why are we talking about Oral Health?

*“The mouth is **not separated** from the body.”*



Everything
we **eat**...



Everything
we **say**...



Everything
we **smile**...



Everything
begins in the
mouth.



Population Ageing

One of the greatest achievements of humanity



Longer
life expectancy



Lower
fertility



Better
healthcare



Better
nutrition



Better
sanitation



The world's population is ageing fast

2023

○
1.1 billion

In 2023, 1.1 billion people in the world were aged 60 years or over.

2050

○
2.1 billion

That figure is projected to nearly double to 2.1 billion by 2050, representing around one in five people globally.

2060

○
2.5 billion

By the late 2060s, the number of persons aged 60 years and over will reach 2.5 billion and surpass the number of under-18-year-olds in the world.



The number of **people aged 80 years or older** is expected to more than triple between 2023 and 2060 to reach 545 million.

Spain vs UE

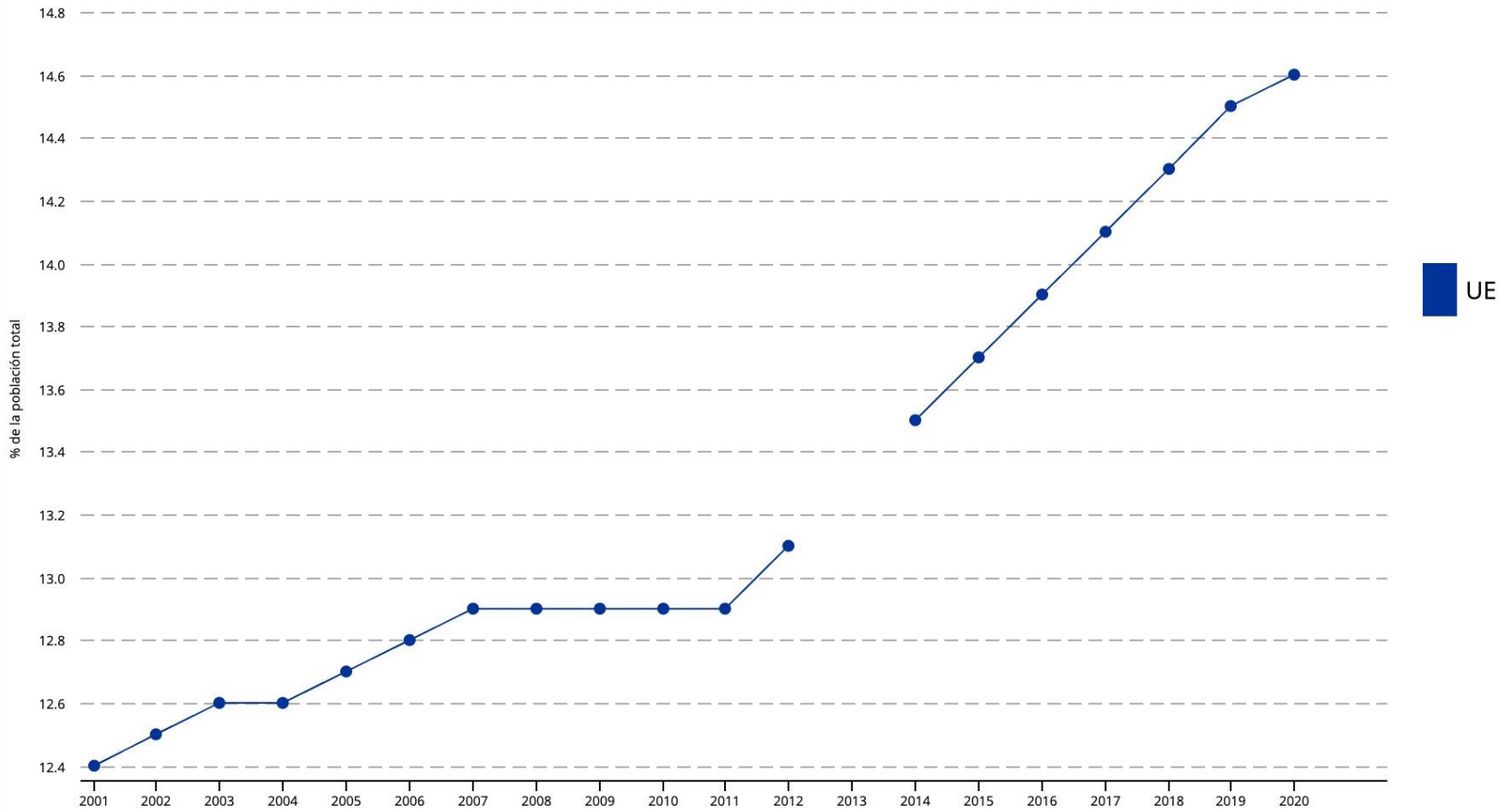
POBLACIÓN POR GRUPOS DE EDAD



Población de 65 a 79 años
(en % de la población total)

 Unión Europea

Población de 65 a 79 años



Fuente: Eurostat – [acceso al conjunto de datos](#)

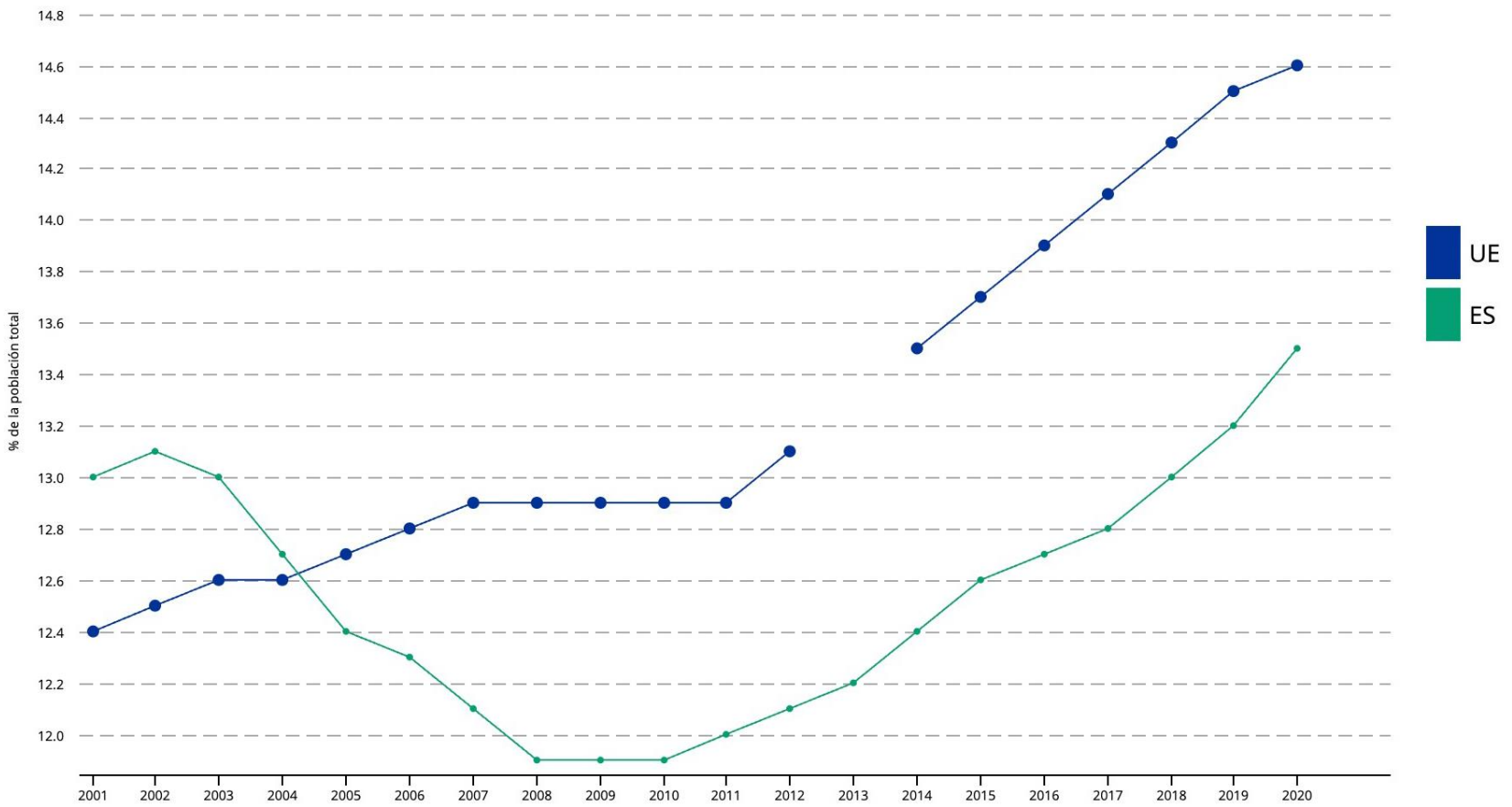
POBLACIÓN POR GRUPOS DE EDAD



Población de 65 a 79 años
(en % de la población total)

2 países seleccionados

Población de 65 a 79 años



Fuente: Eurostat – [acceso al conjunto de datos](#)

Spain vs UE

POBLACIÓN POR GRUPOS DE EDAD

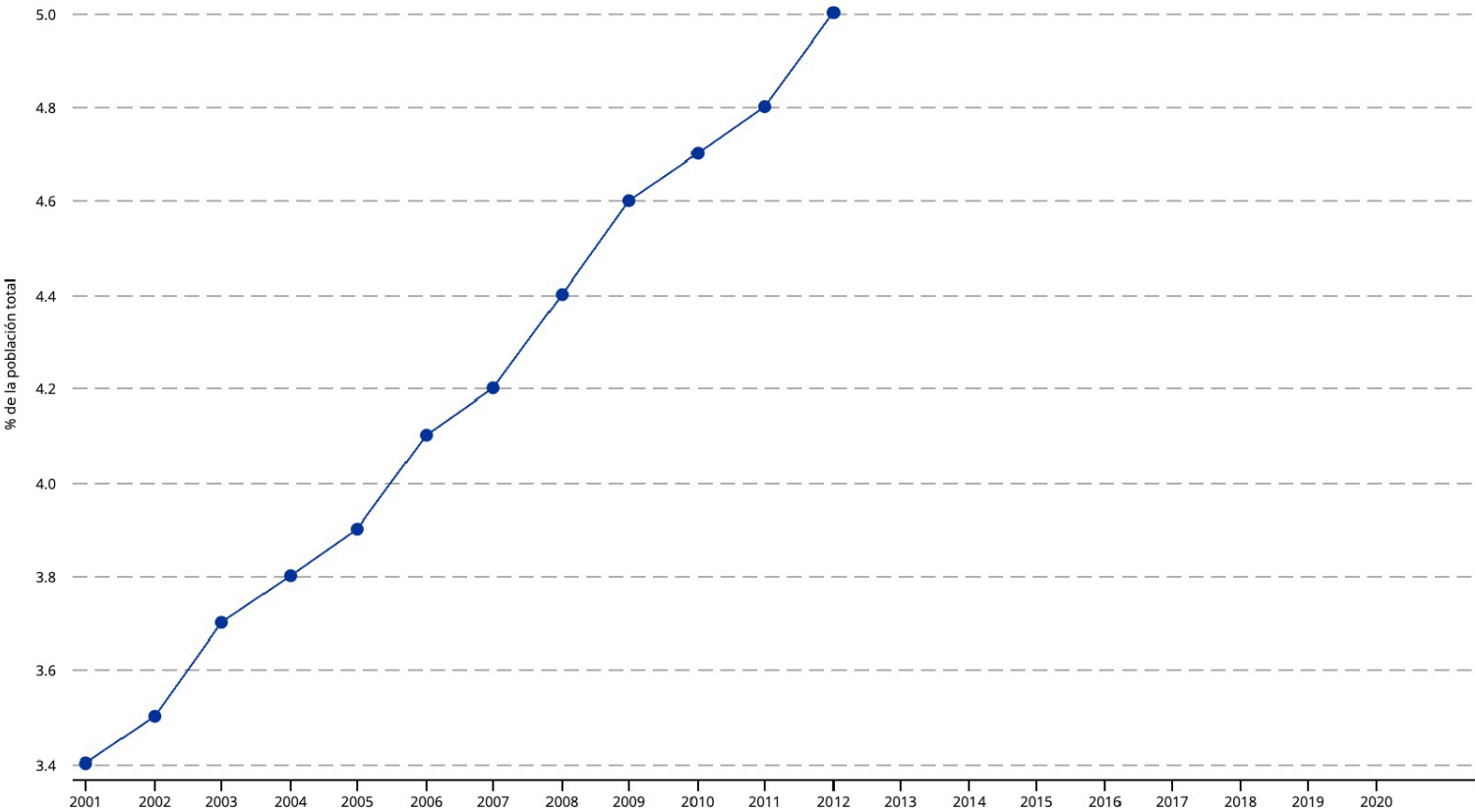


Población de 80 años o más

(en % de la población total)

 Unión Europea ▼

Población de 80 años o más ▼



Fuente: Eurostat – [acceso al conjunto de datos](#)

UE

POBLACIÓN POR GRUPOS DE EDAD

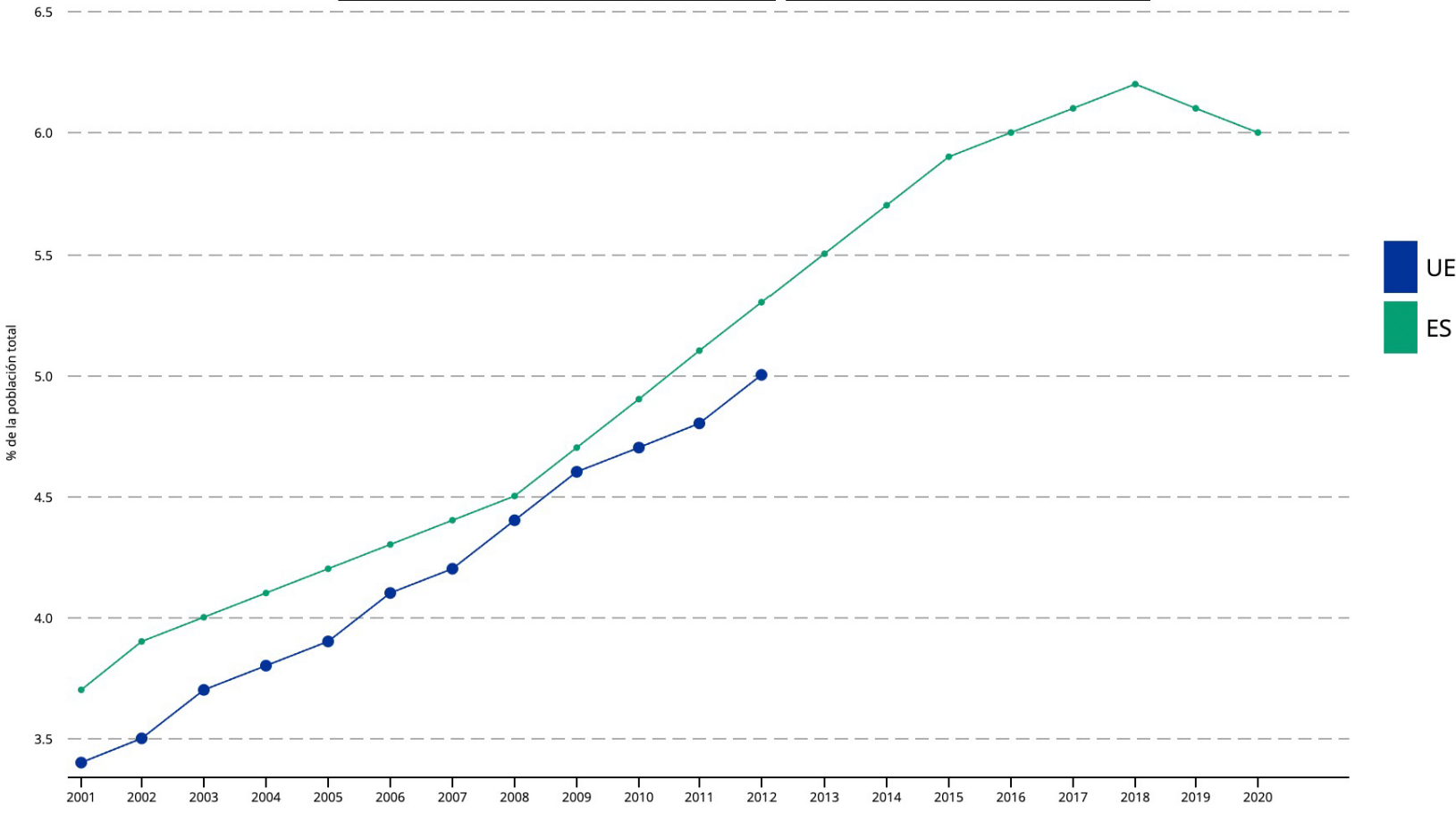


Población de 80 años o más

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Población de 80 años o más ▼



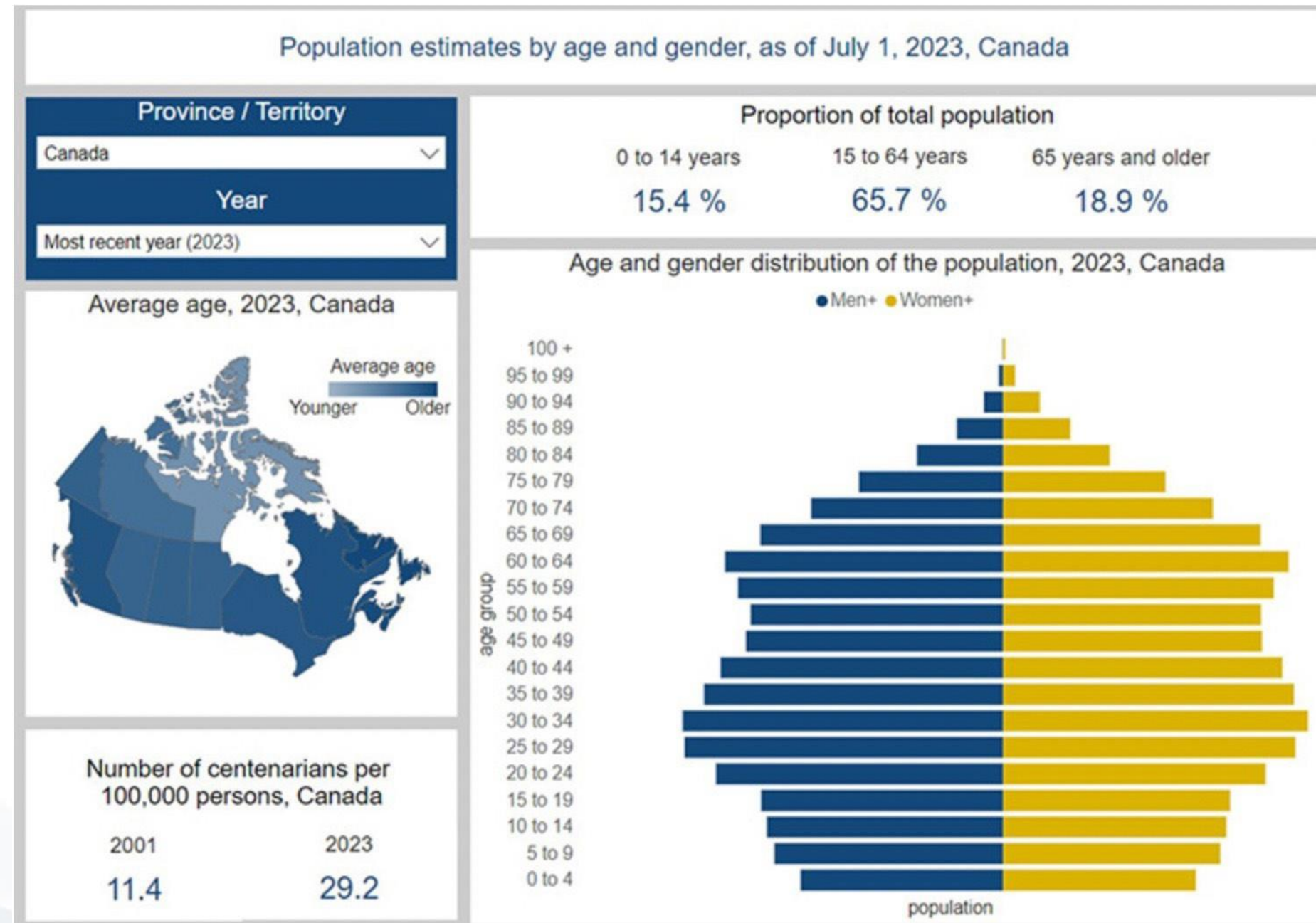
Fuente: Eurostat – [acceso al conjunto de datos](#)

UE
ES



Government
of Canada

Gouvernement
du Canada



https://www.statcan.gc.ca/en/subjects-start/older_adults_and_population_aging

Key indicators

Number of persons aged 65 years and older

(July 1, 2025)

8,108,467

Number of centenarians

12,281

(July 1, 2025)

Life expectancy at 65

(2022 to 2024)

Males: 19.43 years

Females: 22.15 years

Median age

40.6 years

(July 1, 2025)



INDICATOR	 SPAIN	 CANADA
Life expectancy at birth	≈ 84 years	≈ 82 years
Life expectancy (women)	≈ 86 years	≈ 84 years
Life expectancy (men)	≈ 81–82 years	≈ 80 years
Approx. global ranking	Among the world leaders	Among high-longevity countries
Healthcare system	Universal public healthcare (high coverage)	Universal public healthcare (provincial management)
Healthcare spending (% of GDP approx.)	≈ 10–11%	≈ 12%
Population ageing	Very high	High
Main longevity factors	Mediterranean diet, daily activity, strong social life	Healthcare quality, high income level, prevention focus
Life expectancy gap	—	≈ 2 years lower than Spain



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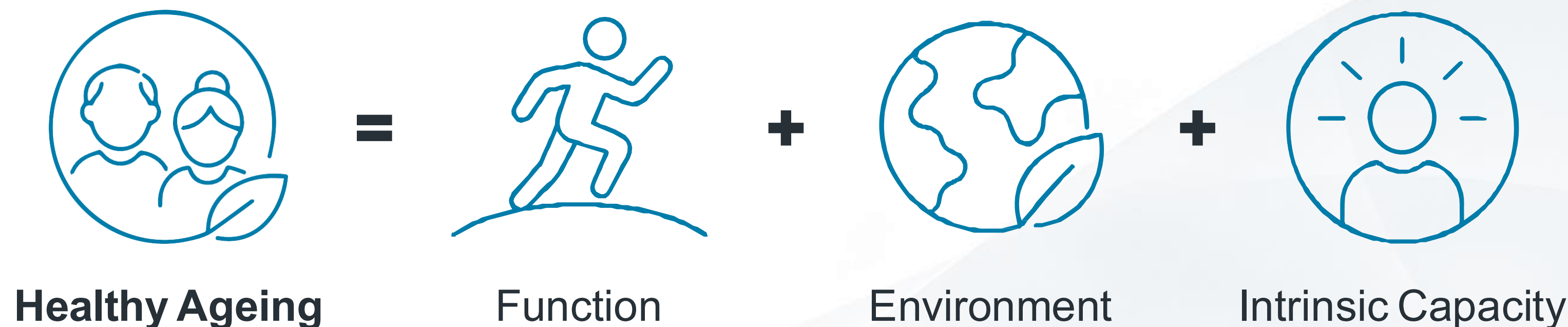


Living longer is not enough



Healthy Ageing

*“The process of developing and maintaining the functional ability that enables **wellbeing in older age.**”*



<https://www.who.int/news-room/questions-and-answers/item/healthy-ageing-and-functional-ability>



ORAL HEALTH

A foundation for overall quality of life



Good oral health is fundamental to a better life at every stage.



NUTRITION

Enables proper eating, nutrient intake, and maintenance of overall health.



SPEECH

Supports clear pronunciation, communication, and articulation.



SOCIAL INTERACTION

Facilitates confidence in relationships and active social participation.



SELF-ESTEEM

Enhances self-image, confidence, and psychological well-being.



WELL-BEING

Contributes to physical, mental, and emotional health.



HEALTHY AGEING

Supports independence, quality of life, and healthy longevity.

Oral health is multi-faceted and includes the ability to speak, smile, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex (head, face, and oral cavity).



Oral health means the health of the mouth. No matter what your age, oral health is vital to general health and well-being.

From Disease-centred Care to Person-centred Care



Physiological changes in the oral cavity

Common pathologies

Relationship between oral and systemic health

Role of the Team

Practical recommendations





Oral Manifestations of Commonly Prescribed Drugs

Aaron Glick, DDS; Vinu Sista, DDS; and Cleverick Johnson, DDS, MS
University of Texas School of Dentistry at Houston, Houston, Texas

Drugs are being prescribed with more frequency and in higher quantities. A serious adverse drug event from prescribed medications constitutes 2.4% to 16.2% of all hospital admissions. Many of the adverse drug events present intracally or periorally in isolation or as a clinical symptom of a systemic effect. Clinical recognition and treatment of adverse drug events are important to increase patient adherence, manage drug therapy, or detect early signs of potentially serious outcomes. Oral manifestations of commonly prescribed medications include gingival enlargement, oral hyperpigmentation, oral hypersensitivity reaction, medication-related osteonecrosis, xerostomia, and other oral or perioral conditions. To prevent dose-dependent adverse drug reactions, physicians should prescribe medications judiciously using the lowest effective dose with minimal duration. Alternatively, for oral hypersensitivity reactions that are not dose dependent, quick recognition of clinical symptoms associated with time-dependent drug onset can allow for immediate discontinuation of the medication without discontinuation of other medications. Physicians can manage oral adverse drug events in the office through oral hygiene instructions for gingival enlargement, medication discontinuation for oral pigmentation, and prescription of higher fluoride toothpastes for xerostomia. (*Am Fam Physician*. 2020;102(10):613-621. Copyright © 2020 American Academy of Family Physicians.)

Drugs are being prescribed with more frequency and in higher quantities per patient, with an estimated prevalence of 59% of the U.S. population taking at least one prescription medication and 15% taking five or more prescription drugs.¹ A serious adverse drug event from prescribed medications constitutes 2.4% to 16.2% of all hospital admissions with an estimated treatment cost of \$1.6 to \$5.6 billion.² Increased usage of medications leads to increased adverse drug reactions, particularly in vulnerable elderly populations.³ All of the 10 most commonly filled prescription medications⁴ have adverse effects associated with the orofacial complex, including hypersensitivity type reactions, xerostomia, paresthesia, and dysgeusia⁵ (Table 1³⁻⁵). Other adverse reactions, such as vomiting, can cause secondary oral symptoms of tooth erosion, oral mucosal erythema or edema, and subsequent increase in dental caries. Adverse effects can present as severe systemic disease, for example Stevens-Johnson syndrome. Close attention is warranted

even in seemingly mild adverse effects, such as xerostomia, because these might decrease patient compliance with prescribed drug therapies or have negative effects on quality of life.⁶ A high suspicion for medication adverse effects as a source of oral complaints can thus lead to appropriate interventions, such as stopping the causative medication, finding appropriate substitutes, and identifying serious reactions in a timely manner. The main categories of oral or perioral manifestations attributable to prescribed medications are gingival enlargement, oral hyperpigmentation, oral hypersensitivity reaction, osteonecrosis, xerostomia, and other oral or perioral conditions such as angioedema and chemical burns (Table 2).

Gingival Enlargement

Gingival enlargement (or gingival hyperplasia/hypertrophy or overgrowth) is the enlargement of gum tissue in the mouth (Figure 1). Classic drugs associated with medication-induced gingival enlargement include calcium channel blockers, anticonvulsants, and cyclosporine (Sandimmune). Erythromycin and oral contraceptives have also been implicated in gingival enlargement. The increased overgrowth of gingival tissue is related to the disruption of the degradation of collagen, which leads to a larger amount of extracellular collagen tissue within the gums. Amlodipine (Norvasc),

Additional content at <https://www.aafp.org/aafp/2020/1115/p613.html>.

CME This clinical content conforms to AAFP criteria for CME. See CME Quiz on page 585.

Author disclosure: No relevant financial affiliations.

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➤ *Am Fam Physician*. 2020 Nov 15;102(10):613-621.

Oral Manifestations of Commonly Prescribed Drugs

Aaron Glick¹, Vinu Sista¹, Cleverick Johnson¹









Successful patient care is rooted in teamwork.



Is dentistry integrated in public hospitals in Canada?

In general, **no — dentistry is not fully integrated into Canada's public hospital system** the way medical care is.

Canada's publicly funded healthcare system (Medicare) mainly covers **physician and hospital services**, but **routine dental care is usually outside the public system**. Most people receive dental care through:

- private dental clinics,
- employer dental insurance,
- out-of-pocket payments,
- or specific public programs.

However, there are some exceptions:

- **Hospital dentistry / oral surgery:** Many public hospitals have **oral and maxillofacial surgery departments** or dental services for things like:
 - jaw fractures and facial trauma,
 - serious infections,
 - cancer-related oral surgery,
 - congenital conditions,
 - medically necessary procedures requiring hospital care.

These services may be covered when they are considered part of hospital/medical treatment.

- **Emergency situations:** If a dental infection becomes a medical emergency (for example, spreading infection requiring admission), hospitals can treat the medical problem.

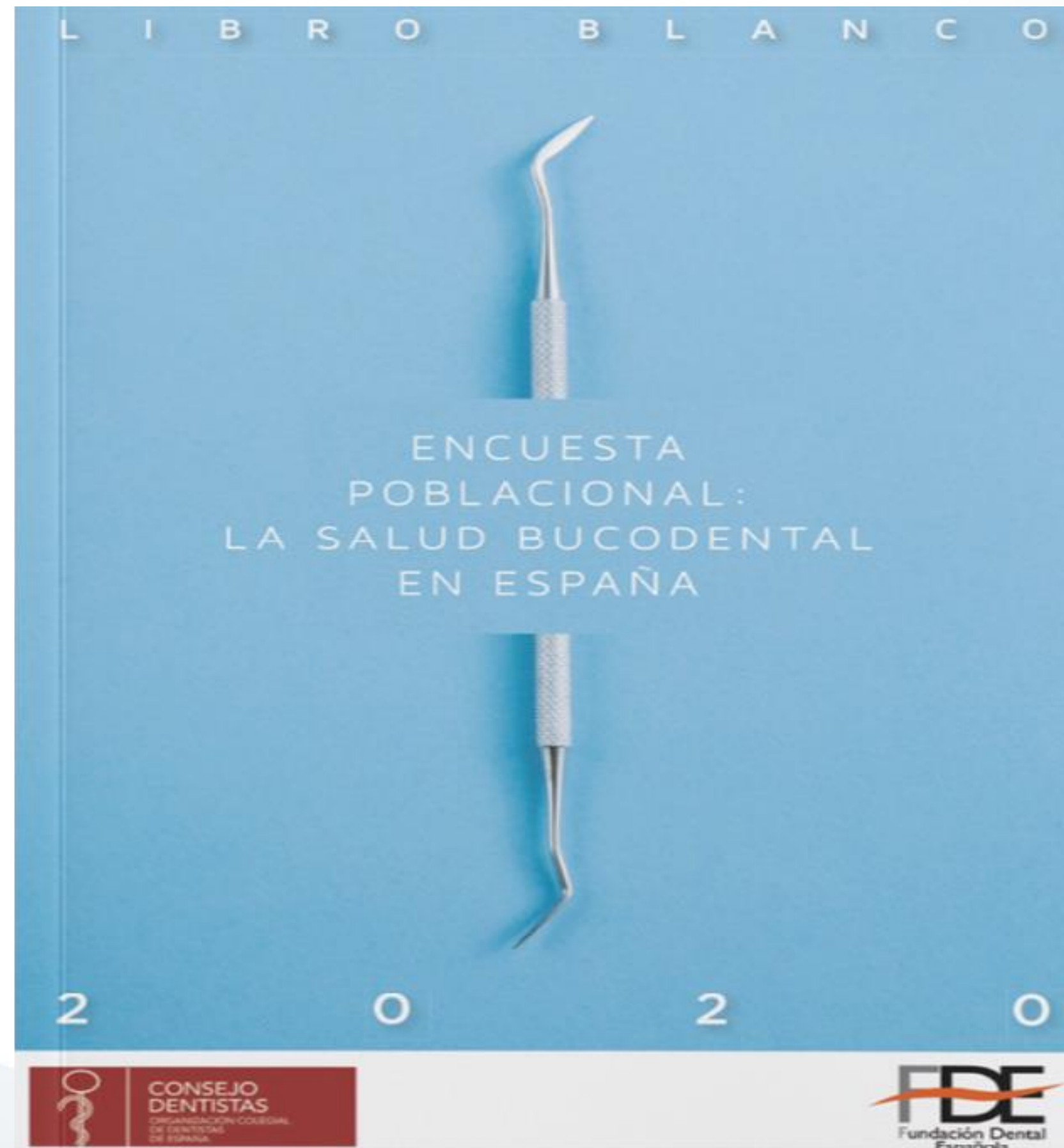
Key Points



Older Adult Patient Management & Healthy Ageing

- **Person-centered care:** Address physical, psychological, and social needs.
- **Chronic disease and medication management:** Control multimorbidity and prevent complications.
- **Prevention and functional preservation:** Promote mobility, nutrition, independence, and quality of life.
- **Early identification of risks:** Detect frailty, falls, cognitive decline, and malnutrition.
- **Multidisciplinary approach:** Coordinate healthcare professionals, patients, and caregivers.





SALUD	HÁBITOS	USO SERVICIOS	CALIDAD DE VIDA
■ EL 60% se preocupa por su salud en general y un 65% por su salud bucodental. ■ El 55% tiene algún problema de salud bucal, incrementándose frente al 2015. ■ Problemas más frecuentes: dientes sensibles, encías que sangran y caries.	■ El 20% no se cepilla los dientes al menos 2 veces al día. ■ 69% utiliza principalmente un cepillo manual, si bien, el eléctrico cada vez tiene mayor protagonismo. ■ Más de la mitad de los encuestados afirma utilizar colutorios, de manera habitual, la mayoría sin prescripción.	■ Sólo el 51% acudió al dentista en el último año. ■ El 77% acudió a una clínica dental independiente. ■ Revisión, tartrectomía, obturaciones y consulta por dolor, los tratamientos más mencionados. ■ Al 24% les ha influido mucho o bastante la crisis económica en su afluencia al dentista.	■ 6 de cada 10 adultos considera su estado oral como bueno. ■ El 41% tuvo algún episodio de dolor y el 24% algún tipo de problema en la boca. ■ En torno al 10% ven afectada su vida diaria por su estado de salud oral. ■ El 12% manifiesta que su estado oral le limita sonreír en público.



Encuesta Poblacional: La salud bucodental en España 2020. Fundación Dental Española (FDE)



► Int J Environ Res Public Health. 2023 Apr 17;20(8):5533. doi: [10.3390/ijerph20085533](https://doi.org/10.3390/ijerph20085533)

Oral Health Problems among Canadians Aged 45 to 85: Data from the Canadian Longitudinal Study on Aging Baseline Survey (2011–2015)

[Vanessa De Rubeis](#)^{1,2}, [Ying Jiang](#)², [Margaret de Groh](#)², [Lisette Dufour](#)³, [Annie Bronsard](#)³, [Howard Morrison](#)²,
[Fahad Butt](#)⁴, [Carol Walker Bassim](#)^{4,*}

Editors: Marco Mascitti, Giuseppina Campisi, Sumio Akifusa

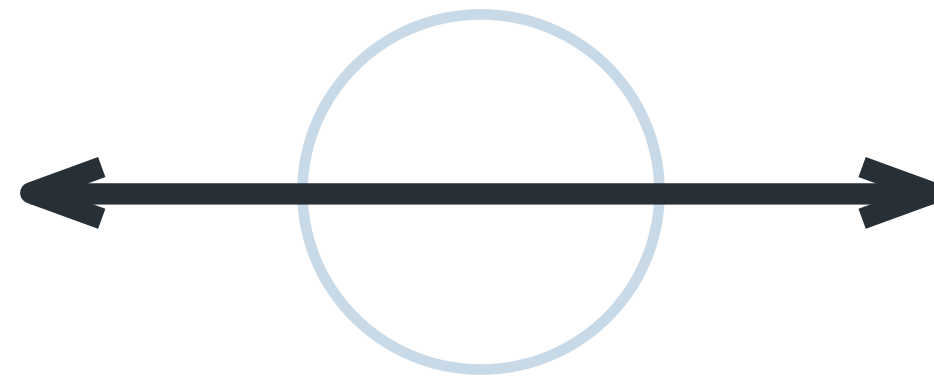
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PMCID: PMC10138597 PMID: [37107815](https://pubmed.ncbi.nlm.nih.gov/37107815/)

**Oral healthcare in older adults
is an essential component of
comprehensive health management.**



General Health

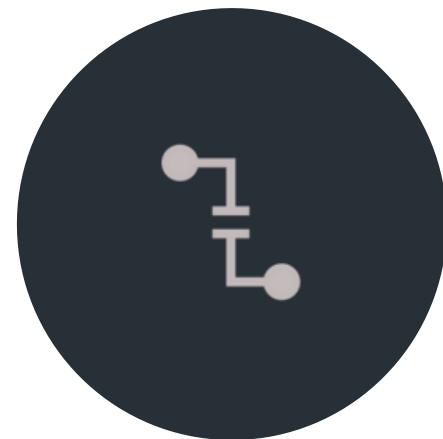


Oral Health





Importance of including dentists in multidisciplinary patient care teams.



Need for a bidirectional, coordinated relationship and joint training between dentists and geriatricians.









Does poor oral health really matter?



Quality of life

Pain and difficulty with chewing, swallowing, and eating

Avoid some foods

Diet Changes

Weight Loss

Alterations in Oral Tissues



Malnutrition & Poor Oral Health

60%

> [Arch Gerontol Geriatr.](#) 2013 Nov-Dec;57(3):398-402. doi: 10.1016/j.archger.2013.05.002. Epub 2013 Jun 10.

Association of the oral health impact profile with malnutrition risk in Spanish elders

J A Gil-Montoya ¹, G Ponce, I Sánchez Lara, R Barrios, J C Llodra, M Bravo

Affiliations + expand

PMID: 23763956 DOI: [10.1016/j.archger.2013.05.002](#)



Hospitalization and mortality > Poor Oral Health

> J Gerontol A Biol Sci Med Sci. 2014 Sep;69(9):1146-53. doi: 10.1093/gerona/glu024.
Epub 2014 Mar 3.

Nutritional risk and body mass index predict hospitalization, nursing home admissions, and mortality in community-dwelling older adults: results from the UAB Study of Aging with 8.5 years of follow-up

David R Buys ¹, David L Roth ², Christine S Ritchie ³, Patricia Sawyer ⁴, Richard M Allman ⁵,
Ellen M Funkhouser ⁶, Martha Hovater ⁷, Julie L Locher ⁸

Review > J Am Med Dir Assoc. 2011 Jun;12(5):344-54. doi: 10.1016/j.jamda.2010.12.099.

Epub 2011 Mar 21.

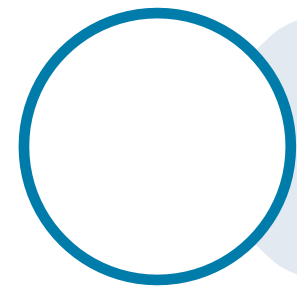
Risk factors for aspiration pneumonia in frail older people: a systematic literature review

Claar D van der Maarel-Wierink¹, Jacques N O Vanobbergen, Ewald M Bronkhorst,
Jos M G A Schols, Cees de Baat

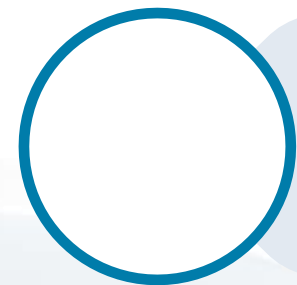
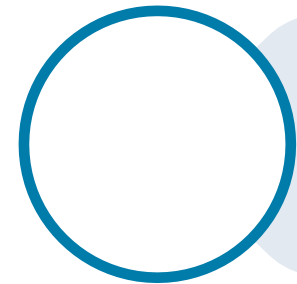
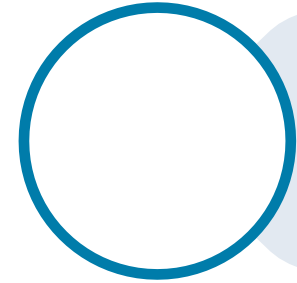
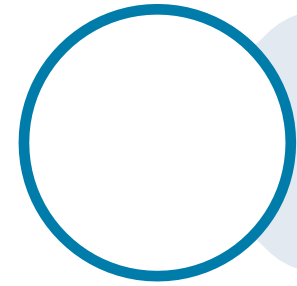
Affiliations + expand

PMID: 21450240 DOI: 10.1016/j.jamda.2010.12.099





Physiological changes in the oral cavity



Physiological changes (normal aging)

- **Decreased saliva production (hyposalivation)**
This can lead to dry mouth or xerostomia, making speaking, chewing, and swallowing more difficult.
- **Changes in the oral mucosa** Oral mucosal tissues may become thinner, more fragile, and less elastic, with a greater tendency to injury.
- **Changes in taste (hypogeusia)** Reduced sensitivity to tastes, especially sweet and salty flavors.
- **Reduced tissue repair capacity** Oral wounds heal more slowly.



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Dental Changes

Tooth wear (attrition)

Due to years of use, bruxism, or an abrasive diet.

Gingival recession

Exposes the tooth roots, making them more sensitive and more prone to root decay.

Changes in tooth color

Darkening caused by pigment accumulation and changes in dentin.

Tooth loss

It can affect chewing function, aesthetics, and speech.



Periodontal Changes

Periodontal Disease

Tooth Mobility



Changes Related to Dentures and Prostheses

Mucosal Irritation or Ulcers

Denture Stomatitis

Difficulty Adapting to Dentures



Changes Associated with Medications or Systemic Diseases

Common medications in older adults (such as anti-hypertensives, antidepressants, etc.)

Can reduce saliva production. Diseases such as diabetes, Sjögren's syndrome, Alzheimer's disease, or Parkinson's disease can also affect oral health.



Changes Associated with Medications

Common Anticholinergics

These are the most common anticholinergic medications in the dementia study categorized by application.



Antidepressants

Amitriptyline	Doxepin
Paroxetine	Imipramine
Dosulepin	Clomipramine



Antihistamines

Benadryl (Diphenhydramine)
Aller-Chlor (Chlorpheniramine)
Atarax (Hydroxyzine)



Incontinence

Oxytrol (Oxybutynin)
Detrol (Tolterodine)
VESIcare (Solifenacin)



Antipsychotic

Zyprexa (Olanzapine)
Seroquel (Quetiapine)
Trifluoperazine



► *Diagnostics* (Basel). 2025 Jan 30;15(3):320. doi: [10.3390/diagnostics15030320](https://doi.org/10.3390/diagnostics15030320) 

Calcium Antagonist-Induced Gingival Overgrowth: A Case Report and Literature Review

[Stefano Speroni](#)^{1,2,*}, [Marco Giuffrè](#)^{1,2}, [Tommaso Tura](#)^{1,2}, [Qamar Ammar Salman Al Jawaheri](#)^{1,2}, [Luca Antonelli](#)^{1,2}, [Luca Coccoluto](#)^{1,2}, [Giulia Bortune](#)^{1,2}, [Francesco Sarnelli](#)^{1,2}, [Silvio Abati](#)^{1,2}



(A) Frontal view



(B) Indirect lateral view, 2nd and 3rd quadrant



(C) Indirect lateral view, 1st and 4th quadrant

Review

> Clin Oral Implants Res. 2026 Jul 5. doi: 10.1111/clr.70151. Online ahead of print.

Effect of Medication Intake on Dental Implant-Related Outcomes–A Scoping Review

Alberto Monje^{1 2}, Maria Costanza Soldini¹, Emilio Couso-Queiruga³, Álvaro Babiano¹,
Vivianne Chappuis³

Affiliations + expand

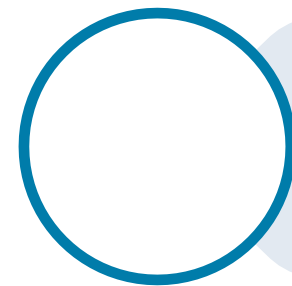
PMID: 42402755 DOI: [10.1111/clr.70151](https://doi.org/10.1111/clr.70151) 



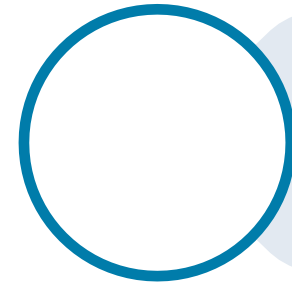
Results

- ACs, long-term NSAID use, prolonged use of PPIs, and SSRIs are associated with increased risk of implant failure and/or marginal bone loss.
- AHTNs and IMNs have no effect on implant-related outcomes. Medication-related biological implant complications are underreported in the literature.

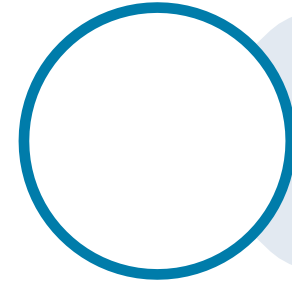




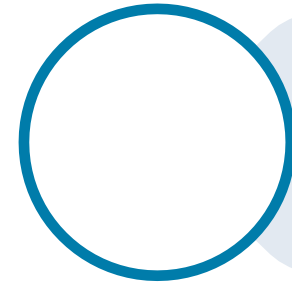
Physiological changes in the oral cavity



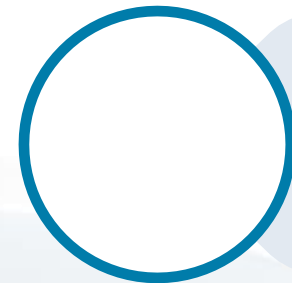
Frequent Pathologies



Physiological changes in the oral cavity



Physiological changes in the oral cavity



Physiological changes in the oral cavity



Most Common Oral Diseases in Older Adults

**Root
Decay**

**Periodontal
disease**

Xerostomia

Edentulism

**Oral mucosal
lesions**

**Problems related to
dental prostheses**

**Oral
Cancer**



Most Common Oral Diseases In Older Adults

Root Decay

- **Cause:** Exposure of tooth roots due to gum recession and decreased saliva production.
- **Frequency:** Very common in older adults.
- **Consequence:** Tooth loss if left untreated.



Periodontal Disease Gingivitis y Periodontitis

- **Cause:** Accumulation of bacterial plaque, poor oral hygiene, smoking, systemic diseases (such as diabetes).
- **Symptoms:** Bleeding gums, loose teeth, bad breath.
- **Consequence:** Loss of bone and tooth support.



Most Common Oral Diseases In Older Adults

Xerostomia (Dry Mouth)

- **Cause:** Use of medications (antihypertensives, antidepressants, etc.), radiotherapy, and autoimmune diseases such as Sjögren's syndrome.
- **Consequences:** Increased risk of dental caries, difficulty speaking, chewing, and swallowing.

Edentulism (Total Or Partial Tooth Loss)

- **Prevalence:** High among older adults, especially those who have not received regular dental care.
- **Consequences:** Nutritional difficulties, reduced quality of life, and decreased self-esteem.



Most Common Oral Diseases in Older Adults

Oral Mucosal Lesions

- **Examples:** Oral candidiasis, leukoplakia, and denture stomatitis.
- **Causes:** Poorly fitting dentures, inadequate oral hygiene, and immunosuppression.

Oral Cancer

- **Risk factors:** Tobacco use, excessive alcohol consumption, sun exposure (in the case of lip cancer), and human papillomavirus (HPV) infection.
- **Common sites:** The tongue, floor of the mouth, and gingiva.

Problems Related To Dental Prostheses

- **Examples:** Denture stomatitis, oral ulcers, pain, and poor denture stability or retention.
- **Causes:** Prolonged use without follow-up, poor oral hygiene, and changes in the underlying bone structure.



Top 5 problems a geriatrician should recognize in 30 seconds



Top 5 problems a geriatrician should recognize in 30 seconds

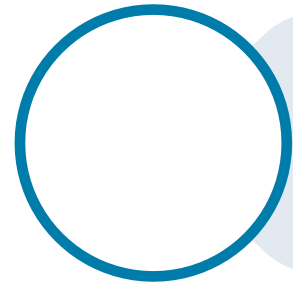
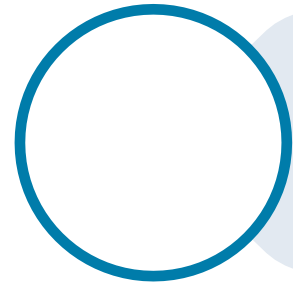
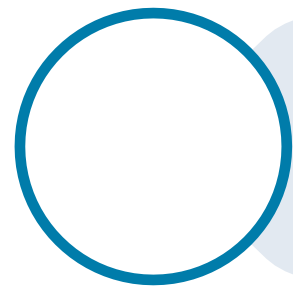
- **Xerostomia**
- **Poorly fitting denture**
- **Periodontal disease**
- **Mucosal lesions**
- **Pain while eating**



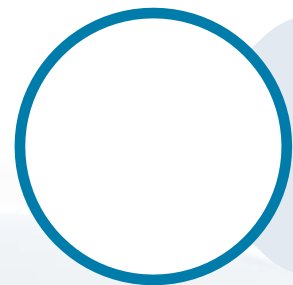
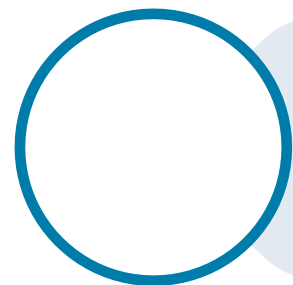
Oral examination in 2 minutes

- Lips
- Tongue
- Gums
- Teeth
- Prosthesis

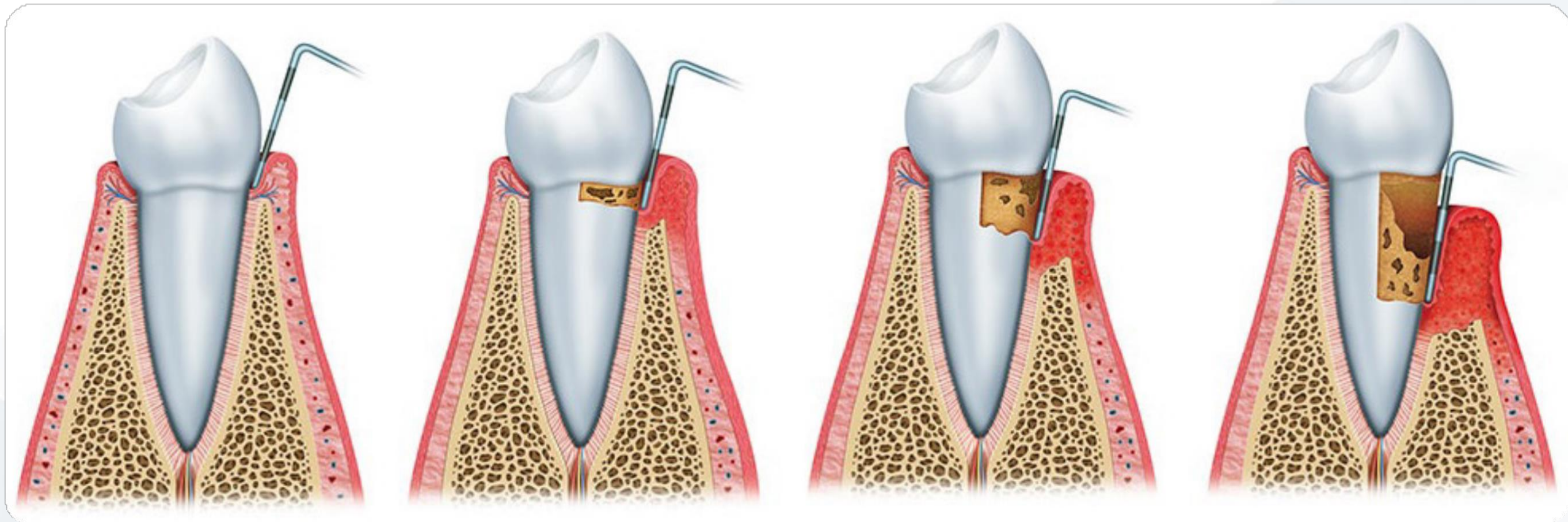




Relationship between oral and general health



Why is the diagnosis and treatment of periodontal disease important?



Why is the diagnosis and treatment of periodontal disease important?

Periodontal Inflammatory Reservoir

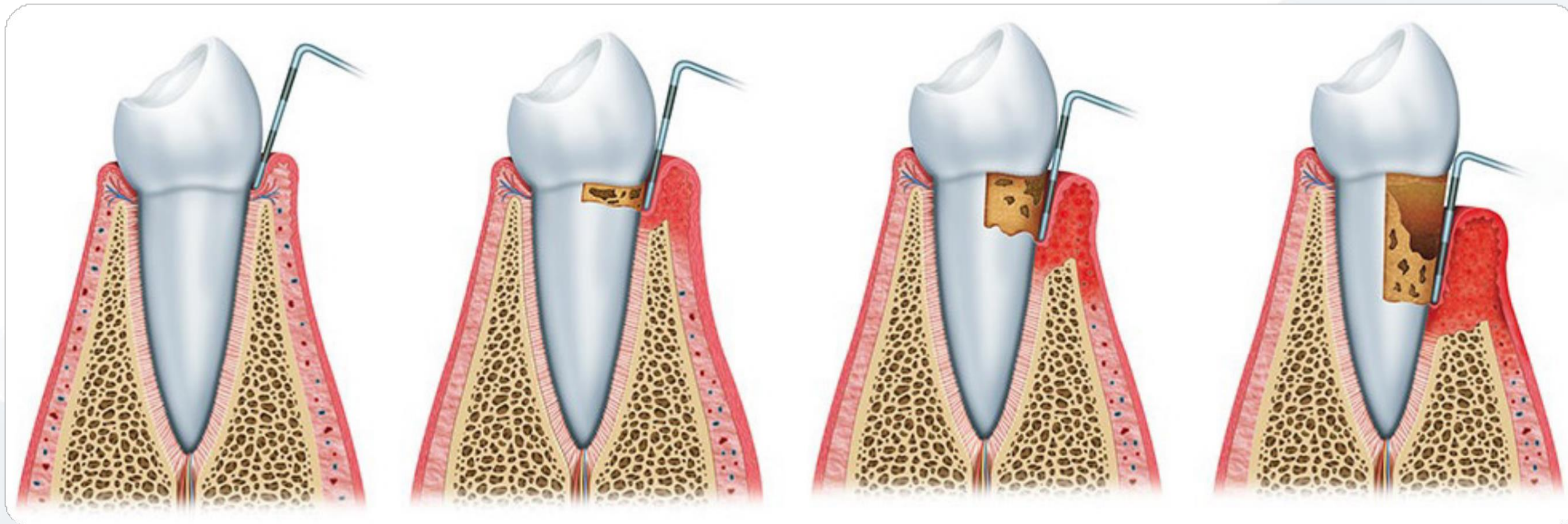
72cm²

Ulcerated Pocket Area

An Open Anatomical Wound

Severe periodontitis presents an ulcerated pocket Surface area equivalent to the palm of a hand.

Allow continous translocation of endotoxins and bacteria into the bloodstream.



What is periodontal disease?

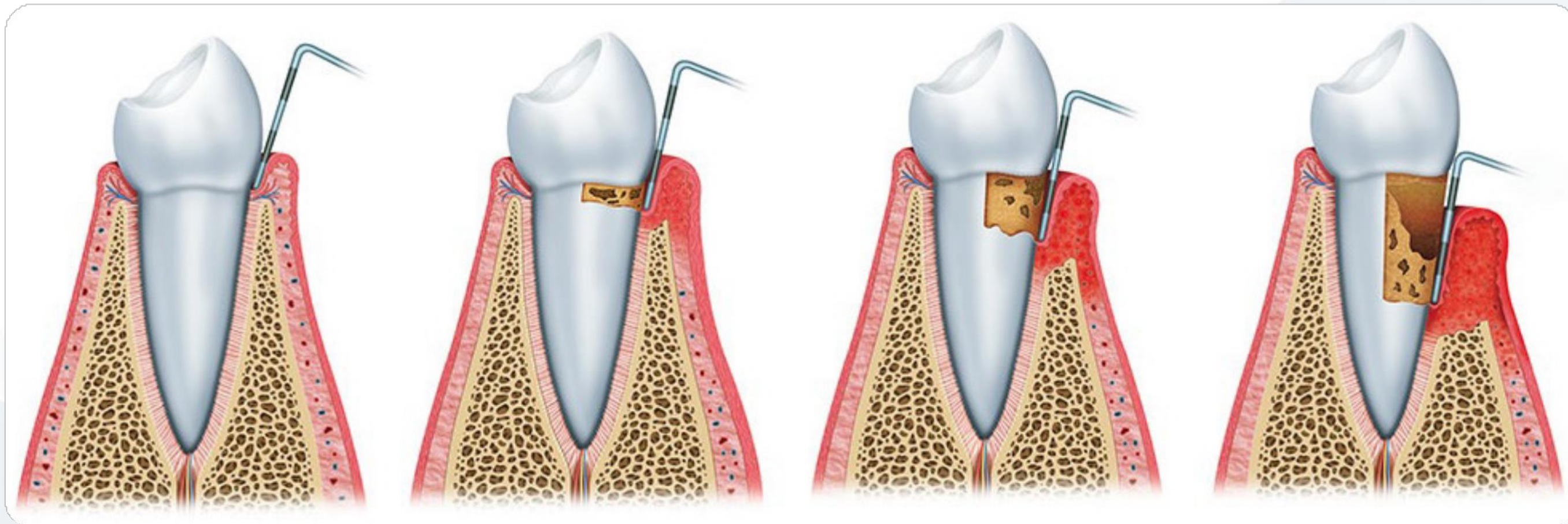
It is a chronic infection of the gums and tissues that surround and support the teeth.

Gingivitis:

Mild and reversible inflammation of the gums.

Periodontitis:

Deeper inflammation that can destroy bone and tissue, leading to tooth loss



Association between Periodontal Diseases and Cardiovascular Diseases



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DENTAID Oral Health Experts

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Association between Periodontal Diseases and Cardiovascular Diseases



The leading cause of death in adults, accounting for 30.3% of all deaths, with ischemic heart disease being the most frequent cause.

Public health objective: Reduction of prevalence

Inflammatory etiology



Association between Periodontal Diseases and Cardiovascular Diseases



One of the most common chronic conditions in humans.

Bacterial etiology

Pathogenic mechanisms: inflammatory response

Mediators have been identified in the bloodstream and can be located in different organs at a distance.

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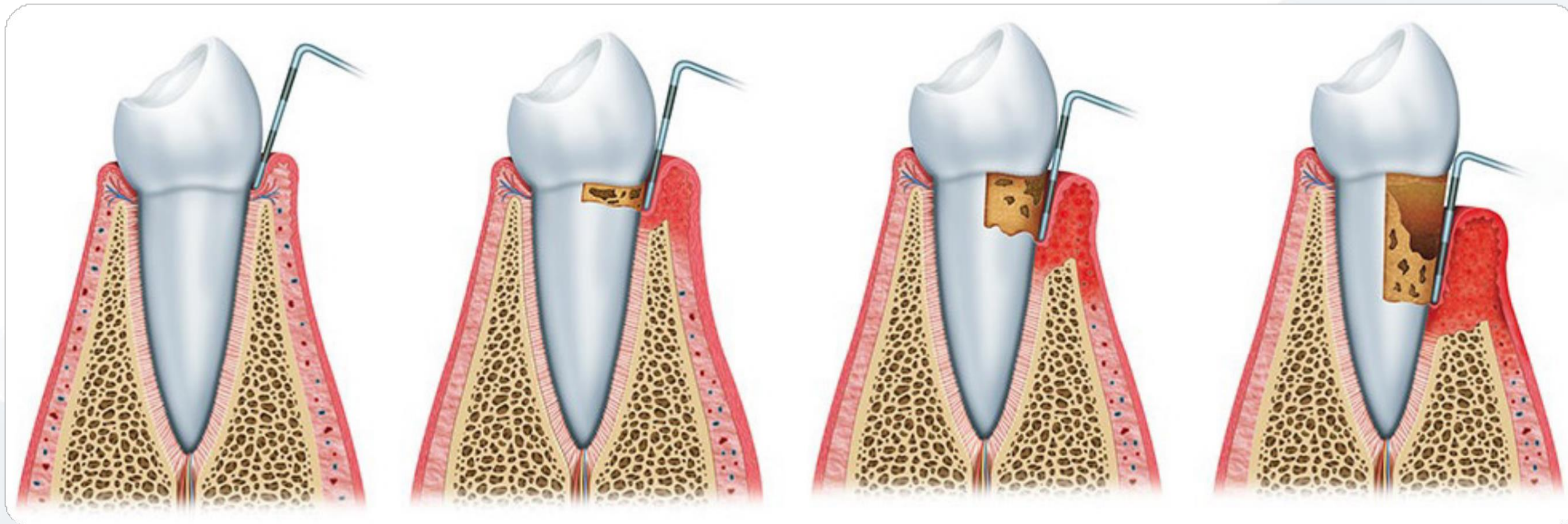
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What is the connection between periodontal disease and cardiovascular disease?



Association between Periodontal Diseases and Cardiovascular Diseases



1. Systemic Inflammation

Periodontal disease is a chronic inflammatory disease caused by bacteria that affect the gums and supporting tissues of the teeth. This inflammation can spread to the rest of the body:

Oral bacteria and their byproducts can enter the bloodstream.

This triggers a systemic inflammatory response, with increased levels of markers such as C-reactive protein (CRP) and interleukins, which are also implicated in atherosclerosis.

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Association between Periodontal Diseases and Cardiovascular Diseases



2. Atherosclerosis and Endothelial Dysfunction

Periodontal bacteria, such as *Porphyromonas gingivalis*, can:

Infiltrate atherosclerotic plaques into the arteries.

Affect the lining of blood vessels (endothelium), promoting plaque formation and increasing the risk of events such as heart attacks or strokes.

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Association between Periodontal Diseases and Cardiovascular Diseases



3. Shared Risk Factors

Both diseases share common risk factors, such as:

- Diabetes
- Obesity
- Stress
- Poor diet
- Aging

This can make it difficult to determine whether the relationship is causal or simply a co-occurrence due to these factors.

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Association between Periodontal Diseases and Cardiovascular Diseases



Scientific Evidence

Epidemiological studies show that people with periodontal disease have a 25-50% increased risk of developing cardiovascular disease.

Research has found DNA from periodontal bacteria in diseased coronary arteries.

Some periodontal interventions have demonstrated improvements in cardiovascular markers, such as a reduction in C-reactive protein (CRP).

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Conclusion



Although a definitive direct causal relationship has not been established, the association between periodontal disease and cardiovascular disease is strong. Chronic inflammation appears to be a key shared mechanism. Therefore:

Oral health care is not only important for preventing tooth loss, but also as part of a preventive strategy for cardiovascular disease.



Association between Periodontal Disease and Diabetes



scientific reports

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Bidirectional association between periodontal disease and diabetes mellitus: a systematic review and meta-analysis of cohort studies

Julia Stöhr¹, Janett Barbaresco¹, Manuela Neuenschwander^{1,2} & Sabrina Schlesinger^{1,2✉}

Periodontal disease has been reported to be associated with diabetes mellitus. However, the direction of the association and the influence of bias are not clear. Thus, the aim of this systematic review and meta-analysis was to summarize the existing evidence on the bidirectional prospective association between periodontal disease and diabetes mellitus by accounting for the risk of bias of the original studies. The literature search was conducted on the electronic data sources PubMed and Web of Science up to February 9th, 2021. We included observational studies, which investigated the prospective association between diabetes mellitus and periodontal disease or vice versa. The risk of bias of the primary studies was evaluated by applying the Quality in Prognosis Studies (QUIPS) tool. Random effects models were used to calculate summary relative risk (SRR) with 95% CI. Subgroup analyses were applied to investigate heterogeneity and the robustness of the finding. In total, 15 studies were included. The SRR for incident diabetes mellitus was 1.26 (95% CI 1.12, 1.41; I^2 : 71%, n = 10; participants = 427,620; identified cases = 114,361), when comparing individuals with periodontitis to individuals without periodontitis. The SRR for incident periodontitis was 1.24 (95% CI 1.13, 1.37; I^2 : 92%, n = 7; participants = 295,804; identified cases: > 22,500), comparing individuals with diabetes to individuals without diabetes. There were no significant differences between subgroups after stratification for risk of bias. The findings show a positive bidirectional association between periodontal disease and diabetes mellitus, and thus, underline the need for screening of patients with periodontitis regarding diabetes mellitus and vice versa. The main limitation of the study is the high unexplained heterogeneity between the studies including the different assessment methods of the disease diagnosis.

Abbreviations

BMI	Body mass index
CAL	Clinical attachment loss
CPI	Community periodontal index
CI	Confidence interval
FPG	Fasting plasma glucose
HbA1c	Haemoglobin A1c
HR	Hazard ratio
ICD	International classification of disease
OR	Odds ratio
PI	Periodontal index
PPD	Periodontal pocket depths
PI	Prediction interval
QUIPS	Quality in prognosis studies

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How does diabetes affect periodontal disease?



How does diabetes affect periodontal disease?

Increased risk of infection: Patients with diabetes, especially if it is not well controlled, have a weaker immune system, making them more susceptible to infections, including periodontal infections.

Impaired healing: Chronic hyperglycemia interferes with the body's ability to heal, making it harder for gums to recover after an infection or treatment.

Increased inflammation: Diabetes increases the inflammatory response in the body, which can worsen gum inflammation.



How does periodontal disease affect diabetes?

It makes glycemic control more difficult: Chronic gum inflammation can increase levels of proinflammatory cytokines (such as IL-6 and TNF- α), which interfere with the action of insulin.

Increased insulin resistance: This contributes to poorer blood sugar control and can make diabetes more difficult to manage.





OPEN

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Association between Periodontal Disease and Diabetes

Scientific Evidence

People with poorly controlled diabetes have a 2 to 4 times greater risk of developing periodontitis.

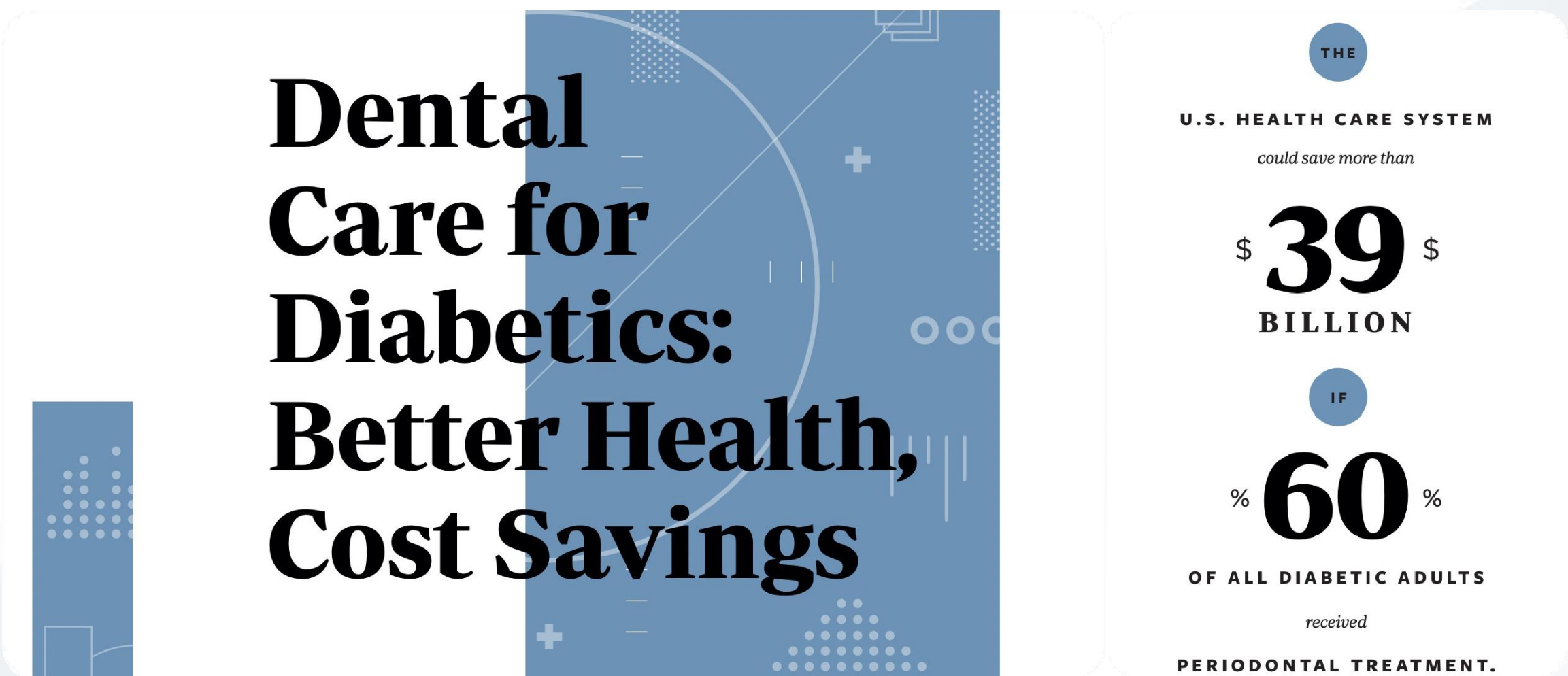
Periodontal treatment can improve glycemic control, reducing glycated hemoglobin (HbA1c) by 0.3% to 0.4% in some studies.

Association between Periodontal Disease and Diabetes

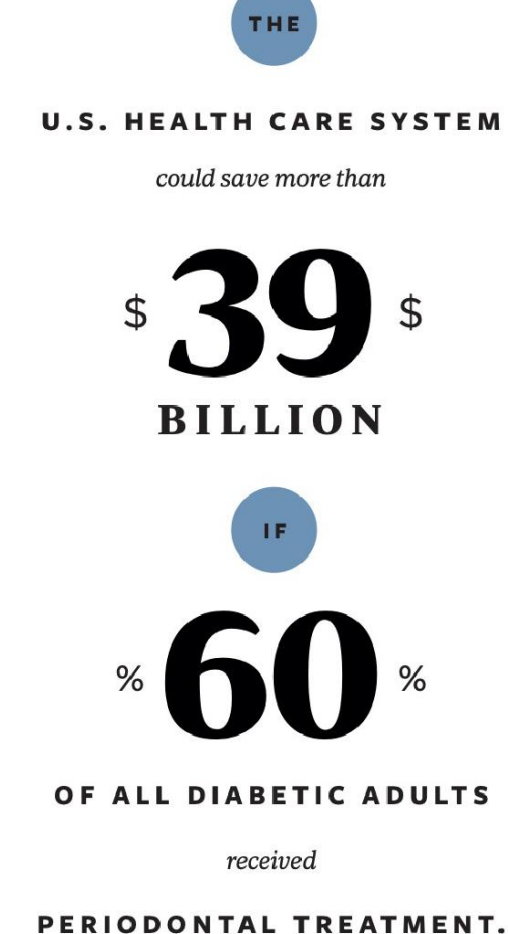
Scientific Evidence

Poor glycemic control associated with periodontal disease generates high economic and healthcare costs.

Gum inflammation makes glucose control more difficult, increasing complications and raising annual medical expenses by between \$400 and \$2,840 per patient, in addition to decreasing work productivity.



**Dental
Care for
Diabetics:
Better Health,
Cost Savings**



THE
U.S. HEALTH CARE SYSTEM
could save more than
\$ 39 \$
BILLION
IF
% **60** %
OF ALL DIABETIC ADULTS
received
PERIODONTAL TREATMENT.

Association between Periodontal Disease and Diabetes

Clinical Recommendations

Regular dental checkups for patients with diabetes.

Strict glucose control in patients with periodontitis.

Collaboration between physicians and dentists for comprehensive patient management.



Association between Periodontal Diseases and Neurological Diseases



Systematic Review

Analysis the Link between Periodontal Diseases and Alzheimer's Disease: A Systematic Review

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Abstract: The hypothesis of an infectious connection from the oro-pharyngeal sphere to the brain underlines the interest in analyzing the link between periodontal disease and Alzheimer's disease. The aim of this systematic review was to examine the link between Alzheimer's disease and periodontal disease in patients aged 65 and over. Databases (PubMed (MEDLINE), the Cochrane Library, and Embase) were analyzed for relevant references up to 21 June 2021. The authors independently selected the studies and extracted the data. The quality of included studies was checked using the National Institutes of Health's quality assessment tools. Five studies were included. The selected studies described in their results an increase in *F. nucleatum* in Alzheimer's disease patients (adjusted $p = 0.02$), and its incidence was linked to *C. rectus* and *P. gingivalis* (adjusted HR = 1.22 (1.04–1.43), $p = 0.012$) as well as *A. naeslundii* (crude HR = 2.0 (1.1–3.8)). The presence of periodontitis at baseline was associated with a six-fold increase in the rate of cognitive decline over a 6-month follow-up period (ADAS-Cog mean change = 2.9 ± 6.6). The current review suggests an association between periodontal disease and Alzheimer's disease. The treatment of periodontal disease could be a way to explore Alzheimer's disease prevention.

Keywords: Alzheimer's disease; periodontal disease; periodontitis; oral microbiota; *Porphyromonas gingivalis*

Association between Periodontal Diseases and Alzheimer's Disease

Proposed relationship:

Chronic inflammation and the spread of oral bacteria (such as *Porphyromonas gingivalis*) may contribute to:

Neuroinflammation

Deposition of beta-amyloid proteins in the brain.



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Systematic Review

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Association between Periodontal Diseases and Alzheimer's Disease

Scientific Evidence

Periodontal bacteria and their toxins have been found in the brains of Alzheimer's patients.

Studies also show that patients with periodontal disease have a higher risk of cognitive decline.



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Systematic Review

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Association between Periodontal Diseases and Multiple Sclerosis



Neuroinflammation: A Distal Consequence of Periodontitis

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X. Li^{1,2,3} , M. Kiprowska¹, T. Kansara⁴, P. Kansara¹ , and P. Li¹

Abstract

Periodontitis, a chronic, inflammatory disease, induces systemic inflammation and contributes to the development of neurodegenerative diseases. The precise etiology of the most common neurodegenerative disorders, such as sporadic Alzheimer's, Parkinson's diseases and multiple sclerosis (AD, PD, and MS, respectively), remains to be revealed. Chronic neuroinflammation is a well-recognized component of these disorders, and evidence suggests that systemic inflammation is a possible stimulus for neuroinflammation development. Systemic inflammation can lead to deleterious consequences on the brain if the inflammation is sufficiently severe or if the brain shows vulnerabilities due to genetic predisposition, aging, or neurodegenerative diseases. It has been proposed that periodontal disease can initiate or contribute to the AD pathogenesis through multiple pathways, including key periodontal pathogens. Dysbiotic oral bacteria can release bacterial products into the bloodstream and eventually cross the brain-blood barrier; these bacteria can also cause alterations to gut microbiota that enhance inflammation and potentially affect brain function via the gut-brain axis. The trigeminal nerve has been suggested as another route for connecting oral bacterial products to the brain. PD and MS are often preceded by gastrointestinal symptoms or aberrant gut microbiome composition, and alterations in the enteric nervous system accompany the disease. Clinical evidence has suggested that patients with periodontitis are at a higher risk of developing PD and MS. This nexus among the brain, periodontal disease, and systemic inflammation heralds new ways in which microglial cells, the main innate immune cells, and astrocytes, the crucial regulators of innate and adaptive immune responses in the brain, contribute to brain pathology. Currently, the lack of understanding of the pathogenesis of neurodegeneration is hindering treatment development. However, we may prevent this pathogenesis by tackling one of its possible contributors (periodontitis) for systemic inflammation through simple preventive oral hygiene measures.

Keywords: inflammation, dysbiosis, neurodegeneration, oral microbiome, periodontal disease, oral hygiene

Introduction

The incidence of periodontal disease increases with age, and in the United States, 70.1% of adults aged 65 y and older are diagnosed with some form of periodontal disease, making it the second most common oral ailment, after dental caries. Periodontitis is a severe form of periodontal disease that results in loss of tooth and damage of the jawbone structure if left untreated. The detrimental consequences of periodontitis are not limited to the oral cavity as an ever-growing number of studies show that both periodontal bacteria and inflammatory mediators induced by these bacteria can travel to distant organs and contribute to the development of various pathologies, including the brain. Periodontitis is triggered by certain Gram-negative anaerobic bacteria in dental plaque and their metabolites in addition to bacterial proteases (Kornman et al. 1997; Delima et al. 2002; Stathopoulou et al. 2010; Taguchi et al. 2015). The major periodontitis pathogens, including *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponema denticola*, *Prevotella intermedia*, and *Fusobacterium nucleatum*, stimulate proinflammatory responses not only in oral cavity. The effects of these key periodontitis pathogens on inflammation and immune responses at systemic levels have been summarized in Table 1.

Animals infected with *T. forsythia* or *P. gingivalis* exhibited significant elevations of specific IgG and IgM in the serum (Velsko et al. 2014; Chukkapalli et al. 2015). Importantly, oral epithelial cells exposed to repeated assaults by bacterial toxins, such as lipopolysaccharide (LPS) and gingipain (cysteine protease secreted by *P. gingivalis*), secrete proinflammatory cytokines, including tumor necrosis factor α (TNF- α), interleukins 1 β (IL-1 β) and 6 (IL-6), interferon γ (INF- γ), and prostaglandin E2 (PGE2), that trigger the cascade of molecular events eventually leading to gingival cell death. The cytokines can also be disseminated via the bloodstream, thus leading to

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Association between Periodontal Diseases and Multiple Sclerosis

Proposed relationship:

Some studies suggest that systemic inflammation caused by periodontal disease may exacerbate autoimmune activity and neurodegeneration in MS.

Limited but growing evidence: A higher prevalence of periodontal disease is observed in patients with MS.



Neuroinflammation: A Distal Consequence of Periodontitis

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Association between Periodontal Diseases and Multiple Sclerosis

Biological Mechanisms Involved

Systemic Inflammation: Periodontal disease produces pro-inflammatory cytokines (IL-1, IL-6, TNF- α) that can affect the central nervous system.

Bacterial Translocation: Some periodontal bacteria and toxins can enter the bloodstream and cross the blood-brain barrier.

Chronic Immune Activation: This can contribute to neurodegeneration through oxidative stress and mitochondrial dysfunction.

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Association between Periodontal Diseases and Multiple Sclerosis

Conclusion

There is a significant association between periodontal disease and several neurological diseases, especially those with inflammatory or neurodegenerative components.

Although a direct causal relationship has not yet been established in many cases, maintaining good oral health could have important long-term neurological health benefits.

X. Li^{1,2,3}, M. Kiprowska¹, T. Kansara⁴, P. Kansara¹, and P. Li¹

Abstract
Periodontitis, a chronic, inflammatory disease, induces systemic inflammation and contributes to the development of neurodegenerative diseases. The precise etiology of the most common neurodegenerative disorders, such as sporadic Alzheimer's, Parkinson's diseases and multiple sclerosis (AD, PD, and MS, respectively), remains to be revealed. Chronic neuroinflammation is a well-recognized component of these disorders, and evidence suggests that systemic inflammation is a possible stimulus for neuroinflammation development. Systemic inflammation can lead to deleterious consequences on the brain if the inflammation is sufficiently severe or if the brain shows vulnerabilities due to genetic predisposition, aging, or neurodegenerative diseases. It has been proposed that periodontal disease can initiate or contribute to the AD pathogenesis through multiple pathways, including key periodontal pathogens. Dysbiotic oral bacteria can release bacterial products into the bloodstream and eventually cross the brain-blood barrier; these bacteria can also cause alterations to gut microbiota that enhance inflammation and potentially affect brain function via the gut–brain axis. The trigeminal nerve has been suggested as another route for connecting oral bacterial products to the brain. PD and MS are often preceded by gastrointestinal symptoms or aberrant gut microbiome composition, and alterations in the enteric nervous system accompany the disease. Clinical evidence has suggested that patients with periodontitis are at a higher risk of developing PD and MS. This nexus among the brain, periodontal disease, and systemic inflammation heralds new ways in which microglial cells, the main innate immune cells, and astrocytes, the crucial regulators of innate and adaptive immune responses in the brain, contribute to brain pathology. Currently, the lack of understanding of the pathogenesis of neurodegeneration is hindering treatment development. However, we may prevent this pathogenesis by tackling one of its possible contributors (periodontitis) for systemic inflammation through simple preventive oral hygiene measures.

Keywords: inflammation, dysbiosis, neurodegeneration, oral microbiome, periodontal disease, oral hygiene

Introduction

The incidence of periodontal disease increases with age, and in the United States, 70.1% of adults aged 65 y and older are diagnosed with some form of periodontal disease, making it the second most common oral ailment, after dental caries. Periodontitis is a severe form of periodontal disease that results in loss of tooth and damage of the jawbone structure if left untreated. The detrimental consequences of periodontitis are not limited to the oral cavity as an ever-growing number of studies show that both periodontal bacteria and inflammatory mediators induced by these bacteria can travel to distant organs and contribute to the development of various pathologies, including the brain. Periodontitis is triggered by certain Gram-negative anaerobic bacteria in dental plaque and their metabolites in addition to bacterial proteases (Korhonen et al. 1997; Delima et al. 2002; Stathopoulou et al. 2010; Taguchi et al. 2015). The major periodontitis pathogens, including *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponema denticola*, *Prevotella intermedia*, and *Fusobacterium nucleatum*, stimulate proinflammatory responses not only in oral cavity. The effects of these key periodontitis pathogens on inflammation and immune responses at systemic levels have been summarized in Table 1.

Animals infected with *T. forsythia* or *P. gingivalis* exhibited significant elevations of specific IgG and IgM in the serum (Velsko et al. 2014; Chukkapalli et al. 2015). Importantly, oral epithelial cells exposed to repeated assaults by bacterial toxins, such as lipopolysaccharide (LPS) and gingipain (cysteine protease secreted by *P. gingivalis*), secrete proinflammatory cytokines, including tumor necrosis factor α (TNF- α), interleukins 1 β (IL-1 β) and 6 (IL-6), interferon γ (INF- γ), and prostaglandin E2 (PGE2), that trigger the cascade of molecular events eventually leading to gingival cell death. The cytokines can also be disseminated via the bloodstream, thus leading to

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Association between Periodontal Diseases and Stroke



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Periodontal Disease, Atrial Fibrillation and Stroke

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Abstract

Background: We recently described the association between periodontal disease (PD) and stroke risk.

Purpose: The purpose of this study was to test the association between PD, dental care utilization and incident AF, as well as AF as a mediator to PD- stroke association.

Methods: In dental Atherosclerosis Risk in Communities Study (ARIC), participants without prior AF underwent full-mouth periodontal measurements. PD was defined on an ordinal scale as healthy (referent), mild, moderate and severe. In ARIC main cohort, participants were classified as regular or episodic dental care users. These patients were followed for AF, over 17 years. Cox proportional hazards models adjusted for AF risk factors were used to study relationships between PD severity, dental care utilization and AF. Mediation analysis was used to test if AF mediated the PD- stroke association.

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Conflict(s)-of-Interest/Disclosure(s):
None

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Association between Periodontal Diseases and Stroke

Proposed relationship: Inflammation and endothelial damage caused by oral bacteria may increase the risk of cerebrovascular events.

Evidence: Epidemiological studies show that periodontitis is an independent risk factor for ischemic stroke.



Periodontal Disease, Atrial Fibrillation and Stroke

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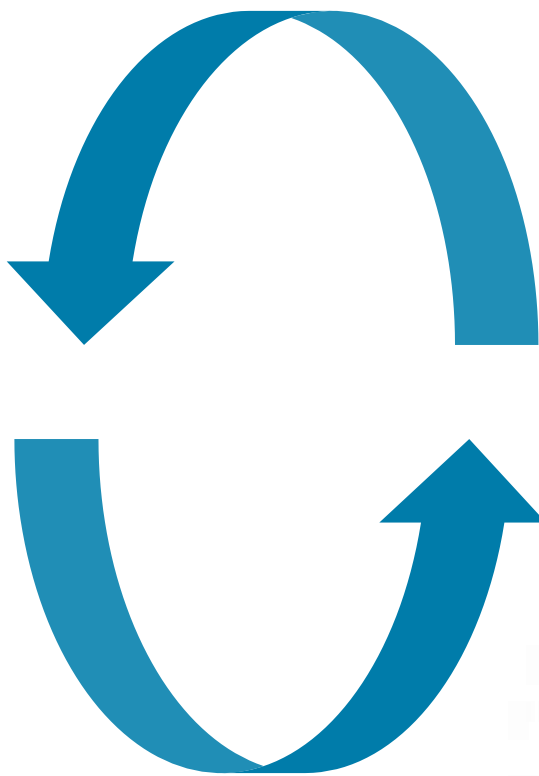
Conflict(s)-of-Interest/Disclosure(s):
None

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Association between Periodontal Diseases and Parkinson's Disease

Complex and bidirectional.

It is being studied more and more.



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Bisphosphonates and osteonecrosis of the jaws: Clinical and forensic aspects

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ARTICLE INFO

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Pathophysiology
Site specificity
Prevention
Krokodil

ABSTRACT

Objective: This manuscript aims to provide a comprehensive review of the current knowledge in the pathophysiology, diagnosis, prevention, and other relevant clinical and forensic aspects of a potentially severe complication known as medication-related osteonecrosis of the jaw (MRONJ) while synthesizing state-of-the-art information on bisphosphonates and introducing a possible differential diagnosis.

Design: An extensive search was conducted in PubMed (U.S. National Library of Medicine) without a time or language constraint, focusing on the epidemiology, pathophysiology, risk factors, site specificity, signs and symptoms, differential diagnosis, prevention, and forensic aspects of MRONJ. All types of original articles, reviews, case reports, short communications, opinion articles, guidelines, and letters to editors were considered to produce a complete review on this subject.

Results: MRONJ prevention relies on a multidisciplinary approach and is critical since truly effective treatments are lacking. This therapeutic challenge is partly due to uncertainty regarding this condition's pathophysiology. Differential diagnosis of osteonecrosis of the jaws associated with krokodil abuse, one of the most dangerous and homemade psychoactive illicit substances, should be considered.

Conclusions: Further research into the etiology and site specificity of MRONJ is encouraged, aiming to develop novel treatment prospects. Indeed, comprehending this would allow for increased efficacy and therapeutic options while emphasizing the importance of prevention. In addition, we advocate for greater consensus among the various societies regarding MRONJ's treatment and management.

1. Introduction

Bisphosphonates (BPs) are stable inorganic pyrophosphate analogs (Russell, 2011). They are typically divided into two main categories, non-nitrogen-containing bisphosphonates (non-N-BPs) and nitrogen-containing bisphosphonates (N-BPs), depending on their molecular action mechanisms (Russell, 2011). The first BP used for medical purposes was etidronate in a patient suffering from fibrodysplasia ossificans progressiva (Russell, 2011). Currently, this drug class is extensively used in the treatment of skeletal illnesses including osteoporosis, Paget's disease of bone, and in malignancy (multiple myeloma, bone metastasis, and hypercalcemia associated with malignancy) (Cremers, Drake, Ebetino, Bilezikian, & Russell, 2019).

Despite the effectiveness of BP's therapy in increasing life expectancy still being a debated matter, it has been proven to improve the life quality of patients with late stages of bone cancer (von Moos, Costa, Ripamonti, Niepel, & Santini, 2017). With widespread and long-term use of BPs, adverse effects were noted (Pazianas & Abrahamsen, 2011). One of these adverse effects is osteonecrosis of the jaws, which has attracted a lot of attention due to its severity potential (Kennel & Drake, 2009). The first description of bisphosphonate-related osteonecrosis of the jaws (BRONJ) dates back to 2003 (Marx, 2003), as painful, non-healing mandibular/maxillary exposure in patients under intravenous bisphosphonates treatment. Ever since then, several studies

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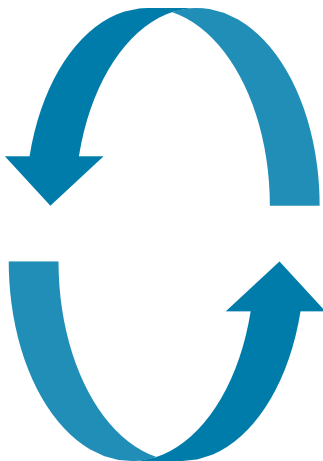
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Association between Periodontal Diseases and Parkinson’s Disease



Increased Risk of Periodontal Disease in People with Parkinson's Disease

Decreased motor skills (tremor, rigidity, bradykinesia) hinder proper oral hygiene → bacterial plaque accumulation.

Hyposalivation induced by antiparkinsonian medications → promotes bacterial growth.

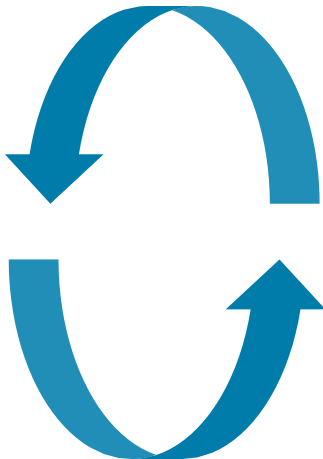
Dysphagia and sialorrhea also contribute to an altered oral environment.

Cognitive impairment or apathy can lead to neglect of oral self-care.

Consequence: Higher prevalence and severity of gingivitis and periodontitis in patients with Parkinson’s disease.



Association between Periodontal Diseases and Parkinson’s Disease



Influence of Periodontitis on Parkinson’s Disease Progression (Hypothesis Under Investigation)

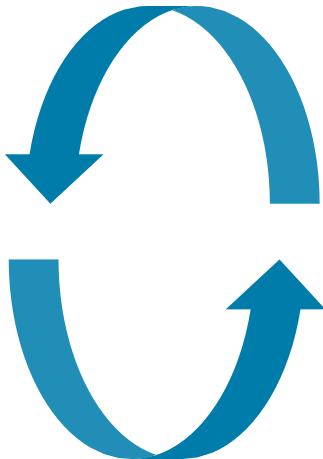
Periodontitis is a chronic inflammatory disease: it releases pro-inflammatory cytokines such as IL-6, TNF- α , and IL-1 β .

These molecules can contribute to a systemic inflammatory state that potentially affects the central nervous system.

Some studies suggest that chronic inflammation, including oral inflammation, could exacerbate neurodegeneration in diseases such as Parkinson’s.

Direct causality has not yet been established, but there is a plausible association from a pathophysiological perspective.

Association between Periodontal Diseases and Parkinson’s Disease



Scientific Evidence

Several studies have shown that patients with Parkinson’s disease present with:

- Increased gingival bleeding
- Greater periodontal attachment loss
- A greater number of lost teeth

Systematic reviews suggest a significant but inconclusive link, highlighting the need for longitudinal



Any given day...



◆ Gemini

19.7 %

✱ Claude

21.3 %

OpenAI

37.3 %

vera health

62.2 %



Encuentra la respuesta

Practica con confianza

Pregúntele cualquier cosa a Vera...



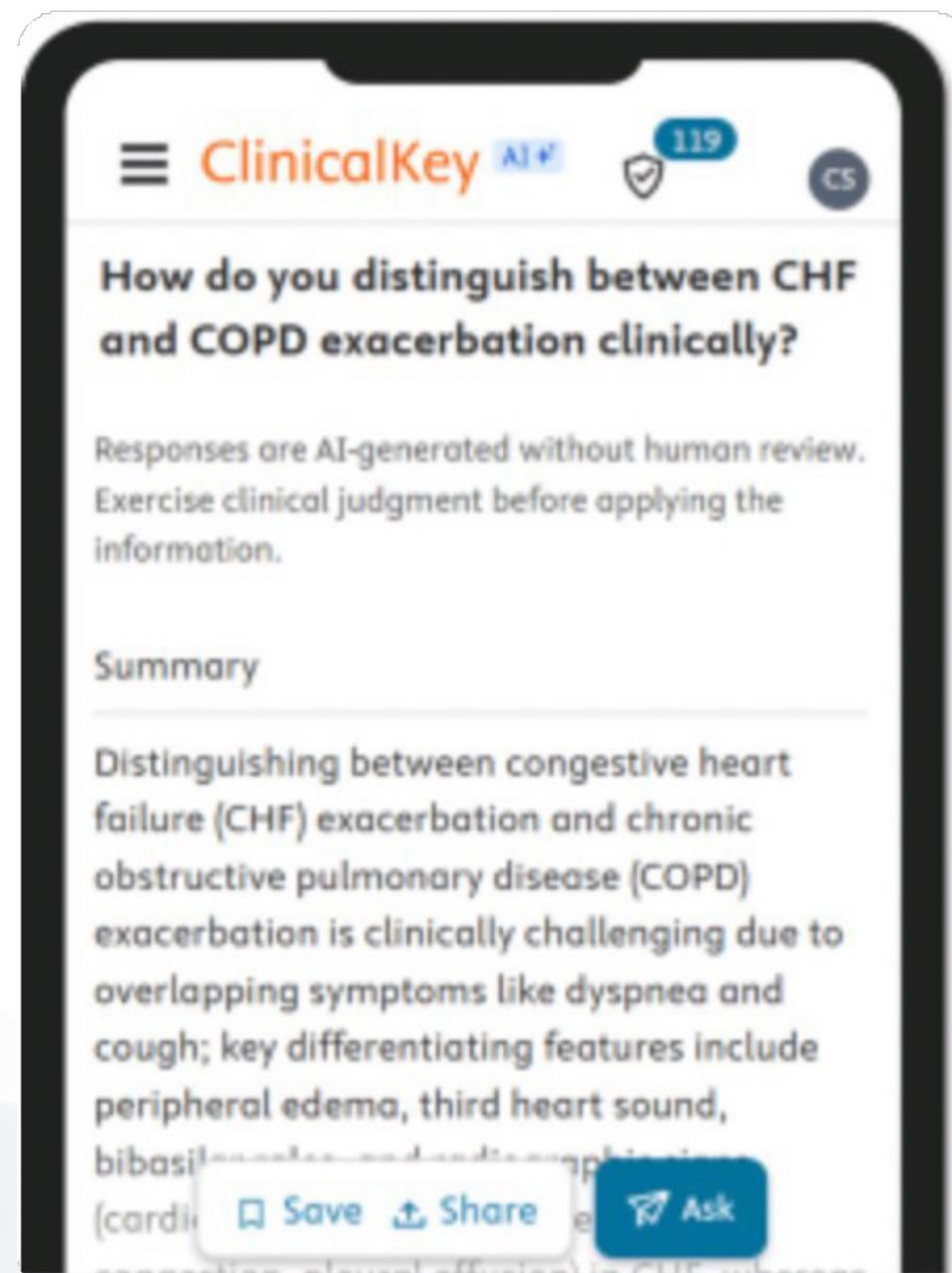
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 Esquema Terapéutico

 Cálculos Clínicos

 Duda Clínica Inmediata

 Más



Antithrombotic

Impact of direct oral anticoagulants on bleeding tendency and postoperative complications in oral surgery: a systematic review of controlled studies



Krister Johansson, DDS,^a Bengt Götrick, DDS, PhD,^b Jan Holst, MD, PhD,^c Sofia Tranæus, DDS, PhD,^d and Aron Naimi-Akbar, DDS, PhD^d

Objective. The recommendations for the management of direct oral anticoagulants (DOACs) in oral surgery are inconsistent. The present review evaluated whether DOACs increase the risk of bleeding during oral surgery and postoperative complications.

Study Design. The patients undergoing oral surgery and receiving a DOAC were compared with the patients receiving a DOAC different from the exposure, a vitamin K antagonist (VKA), or no anticoagulant. Three electronic databases were searched for eligible clinical trials and systematic reviews. The risk of bias was assessed, data were extracted, a meta-analysis was done, and the Grading of Recommendations, Assessment, Development and Evaluations certainty-of-evidence ratings were determined.

Results. Three clinical trials comparing patients receiving DOAC medication with patients on a VKA were eligible. A meta-analysis of bleeding 7 days postoperatively detected no significant differences between patients continuing DOAC or VKA medication during and after surgery. All of the point estimates favored uninterrupted DOAC over VKA therapy. Tranexamic acid was topically administered to some patients.

Conclusions. Based on an interpreted trend among 3 studies with mixed patient populations, the risk of bleeding during the first 7 postoperative days may be lower for patients on uninterrupted DOAC than VKA therapy (⊕⊕⊕⊕), but the effect size of the risk is unclear. 80 of 274 included patients experienced postoperative bleeding. (Oral Surg Oral Med Oral Pathol Oral Radiol 2023;135:333–346)

Direct oral anticoagulants (DOACs) are recommended for multiple indications, including the prevention of thromboembolism among patients with nonvalvular atrial fibrillation and prevention and treatment of deep vein thrombosis.¹ Given these indications, thrombosis during discontinuation of DOACs is a possible risk.¹ Multiple DOACs are available on the market, including rivaroxaban, apixaban, and edoxaban (direct factor Xa inhibitors) and dabigatran (a direct thrombin inhibitor). Some countries have also approved the factor Xa inhibitor betrixaban for various indications.²

Vitamin K antagonists (VKAs), including warfarin and acenocoumarol act by inhibiting the production of clotting factors II, VII, IX, and X and of regulatory factors protein C, S, and Z. For many years, VKAs have been the most common anticoagulants, and the

recommendation to continue VKA treatment during oral surgery is well established.^{3,4} The recommendations for how to treat patients receiving a DOAC before and during oral surgery, however, have been inconsistent, which may lead to varying decisions for similar cases, and possibly, an unnecessary discontinuation of DOAC with a higher attendant risk of thromboembolism.^{2,5} The principal drawback of any prophylactic or therapeutic treatment of thromboembolism is always bleeding. Although such problems are known to be less with DOACs compared with VKAs, the prevalence and severity are largely uncharted, including for oral surgery.⁶

The present systematic review evaluated whether continuing a prescribed DOAC therapy during and after oral surgery increases the risk of bleeding and other complications. The focused question was “Are there any differences in bleeding during surgery, impact on surgery, duration of surgery, or postoperative complications among oral surgery patients who receive a DOAC compared with a DOAC different than the exposure, another blood thinner such as a VKA or a platelet inhibitor, or no anticoagulant?”

Statement of Clinical Relevance

The risk of postoperative bleeding after oral surgery may be lower for patients on a direct oral anticoagulant than a vitamin K antagonist, but the certainty of evidence is low. The evidence has indicated a very low risk of extensive postoperative bleeding for both groups.

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Drug-induced osteonecrosis of the jaw

Ahdi et al. BMC Pharmacology and Toxicology (2023) 24:15
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BMC Pharmacology
and Toxicology

RESEARCH ARTICLE

Open Access

Medication-induced osteonecrosis of the jaw: a review of cases from the Food and Drug Administration Adverse Event Reporting System (FAERS)



Hardeep S. Ahdi^{*}, Thomas Adam Wichelmann, Sasirekha Pandravada and Eli D. Ehrenpreis

Abstract

Background Osteonecrosis of the jaw (ONJ) is a rare but serious adverse drug reaction (ADR) commonly associated with bisphosphonate and denosumab therapy. Prior research utilized an online, public FDA Adverse Event Reporting System (FAERS) Database to explore this ADR. This data identified and described several novel medications associated with ONJ. Our study aims to build upon the prior findings, reporting trends of medication induced ONJ over time and identifying newly described medications.

Methods We searched the FAERS database for all reported cases of medication related osteonecrosis of the jaw (MRONJ) from 2010 to 2021. Cases lacking patient age or gender were excluded. Only adults (18+) and reports from Healthcare Professions were included. Duplicate cases were removed. The top 20 medications were identified and described for April 2010–December 2014 and April 2015–January 2021.

Results Nineteen thousand six hundred sixty-eight cases of ONJ were reported to the FAERS database from 2010–2021. 8,908 cases met inclusion criteria. 3,132 cases were from 2010–2014 and 5,776 cases from 2015–2021. Within the cases from 2010–2014, 64.7% were female and 35.3% were male, and the average age was 66.1 ± 11.1 years. Between 2015–2021, 64.3% were female and 35.7% were male, and the average age was 69.2 ± 11.5 years. Review of the 2010–2014 data identified several medications and drug classes associated with ONJ not previously described. They include lenalidomide, corticosteroids (prednisolone and dexamethasone), docetaxel and paclitaxel, letrozole, methotrexate, imatinib, and teriparatide. Novel drugs and classes described between 2015–2021 include palbociclib, pomalidomide, radium 223, nivolumab, and cabozantinib.

Discussion While stricter inclusion criteria and removal of duplicate cases led to fewer overall identified cases of MRONJ when compared to prior research, our data represents a more reliable analysis of MRONJ reports to the FAERS database. Denosumab was the most frequently reported medication associated with ONJ. While unable to imply incidence rates from our data due to the nature of the FAERS database, our findings provide further description of the various medications associated with ONJ and elucidate patient demographics associated with the ADR. Additionally, our study identifies cases of several newly described drugs and drug classes that have not been previously described in literature.

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Diagnosis and treatment of medication-related osteonecrosis of the jaws: a cohort study over 20 years

Iben Poulsen¹, Sanne Werner Moeller Andersen², Simon Storgaard Jensen³, Thomas Kofod²

Affiliations + expand

PMID: 42248704 DOI: [10.1016/j.oooo.2026.04.011](https://doi.org/10.1016/j.oooo.2026.04.011)

Clinical Oral Investigations (2026) 30:156
<https://doi.org/10.1007/s00784-026-06851-6>

RESEARCH



Postoperative healing and recurrence in osteonecrosis of the jaw: influence of risk factors and surgical approach

Jonathan Mohr¹ · Katharina Pippich¹ · Claire Cherdron¹ · Jannik Ketschau¹ · Pia Erben¹ · Helena Kram¹ · Nils Krautkremer¹ · Herbert Deppe¹ · Klaus-Dietrich Wolff¹ · Lucas M. Ritschl¹

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Abstract

Objectives The aim of this study was to evaluate the outcomes of surgical and adjunctive treatments for osteonecrosis of the jaw (ONJ) and to analyze the influence of specific risk factors on postoperative wound healing and recurrence rates.

Materials and methods We retrospectively analyzed surgically treated ARONJ and ORN patients from 2012 to 2017. Demographics, comorbidities, etiology, treatments, and healing outcomes were analyzed using descriptive statistics and multivariate regression analyses.

Results *N*=194 patients met inclusion criteria. The overall postoperative healing rate was 78.4%, with wound healing disturbances occurring in 44% of cases. Healing rates were comparable between entities, with 79.4% in ORN and 77.3% in ARONJ patients achieving complete mucosal healing. Neither classical risk factors (smoking, obesity, diabetes) nor treatment regimens predicted wound healing disturbances (WHD). Risk factors for the development of ONJ were not consistently predictive of postoperative complications.

Conclusions Thorough resection with tension-free closure is central to ARONJ and ORN treatment. Close postoperative monitoring – especially within the first 100 days – is crucial, given the high early recurrence rate.

Clinical relevance The findings underscore the importance of surgical intervention – particularly complete necrotic bone resection with tension-free wound closure – as the cornerstone of effective treatment for osteonecrosis of the jaw, irrespective of its origin (ARONJ or ORN). Traditional risk factors did not predict wound-healing complications. Within the limitations of this retrospective study, common adjunctive measures did not appear to influence healing outcomes. Given the high rate of early recurrence, vigilant postoperative follow-up—especially within the first 100 days—is essential for optimal patient management.

Keywords Osteonecrosis of the jaw · Antiresorptive-related osteonecrosis of the jaw (ARONJ) · Osteoradionecrosis (ORN) · Therapeutic management · Risk factors · Wound healing disturbances

Diagnosis and treatment of medication-related osteonecrosis of the jaws: a cohort study over 20 years

Iben Poulsen, MScN,^a Sanne Werner Moeller Andersen, DDS, OMS,^a
Simon Storgaard Jensen, DDS, OMS,^{a,b} and Thomas Kofod, DDS, OMS, PhD^a

Objective. To provide a comprehensive cohort profile of patients diagnosed with medication-related osteonecrosis of the jaw (MRONJ) in the Copenhagen ONJ Cohort—a 20-year longitudinal cohort.

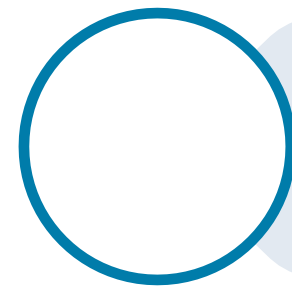
Methods. This observational cohort study included all patients diagnosed with MRONJ at the Department of Oral and Maxillofacial Surgery, Copenhagen University Hospital, between January 1, 2005, and December 31, 2024. Demographic, disease-related, and treatment variables were prospectively recorded during clinical visits and retrospectively supplemented through review of medical records. Descriptive statistics were calculated, and subgroup comparisons were performed according to antiresorptive therapy (AR) exposure or underlying disease.

Results. A total of 934 patients were included. The mean age was 71.6 years (standard deviation ±10.8), and 693 (68.4%) were female. The most common indications for AR were osteoporosis, breast cancer, prostate cancer, and multiple myeloma. Conservative management was applied in 18.1% of patients, whereas 81.9% underwent surgical interventions. Tooth removal was identified as the most frequent triggering event of MRONJ (52.9%). Differences in demographics, comorbidities, and concomitant use of systemic corticosteroids, immunosuppressive agents, and antiangiogenic medications were observed across AR-dose groups.

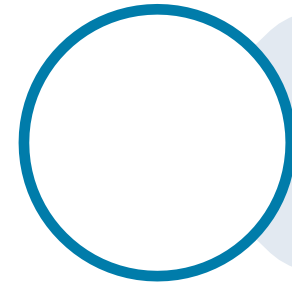
Conclusions. The Copenhagen ONJ Cohort provides robust insights into the epidemiology, risk factors, and management of MRONJ, supporting further investigation into the association between cumulative AR exposure and MRONJ development. (Oral Surg Oral Med Oral Pathol Oral Radiol 2026;000:1–15)



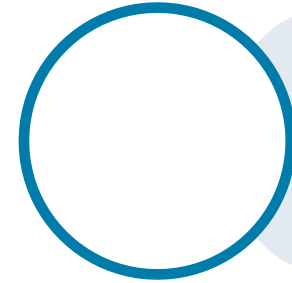




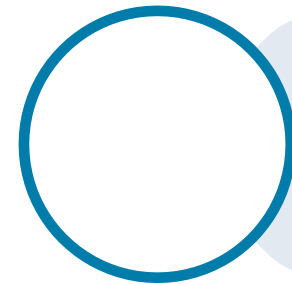
Early detection of oral problems



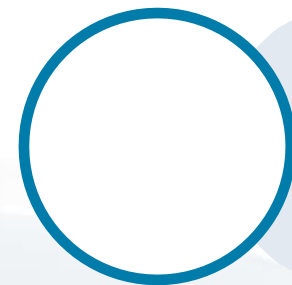
Identification of risk factors



Multidisciplinary Coordination

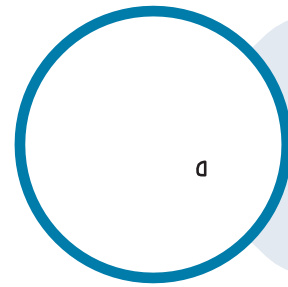


Education and Prevention



Monitoring of patients with cognitive or functional impairment





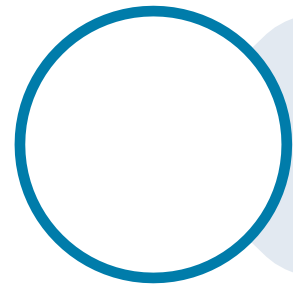
Early detection of oral problems

Observe for visible signs during clinical examination: xerostomia, halitosis, tooth mobility, oral mucosal lesions, and poorly fitting or poorly maintained dental prostheses.



Systematically assess for:

- Pain or discomfort during chewing or swallowing
- Changes in taste perception or dietary intake
- Problems with dental prostheses



Identification of risk factors

Review medical and pharmacological history:

- Polypharmacy (antidepressants, anticholinergics, antihypertensives → xerostomia)
- Systemic diseases: diabetes, Alzheimer's, Parkinson's, Sjögren's

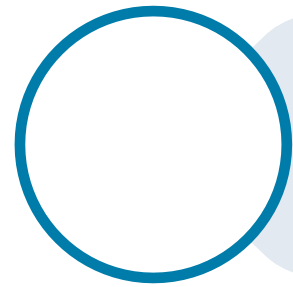


Evaluate functional impairment that prevents adequate oral hygiene (dependency, dementia, arthritis)

Review medical and pharmacological history:

- Polypharmacy (antidepressants, anticholinergics, antihypertensives → xerostomia)
- Systemic diseases: diabetes, Alzheimer's, Parkinson's, Sjögren's

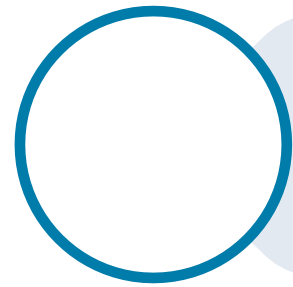
Evaluate functional impairment that prevents adequate oral hygiene (dependency, dementia, arthritis)



Multidisciplinary Coordination



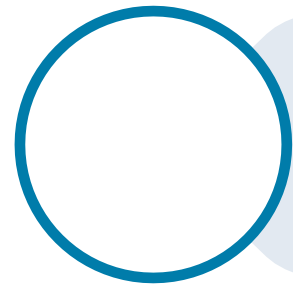
- Refer to dentistry when signs of pathology are detected.
- Work together on treatment plans (e.g., denture adjustment, assisted hygiene).
- Ensure continuity of oral care in residential facilities or home settings.



Education and Prevention



- Educate patients, family members, and caregivers about the importance of daily oral hygiene.
- Promote regular checkups with a dentist, even for dependent or institutionalized patients.
- Advise on a suitable and safe diet for oral health.



Monitoring of patients with cognitive or functional impairment



- Supervise that proper oral hygiene is being performed on patients with dementia, especially in moderate to advanced stages.
- Collaborate with caregivers on adapted hygiene techniques.

Salud bucodental para la población mayor.



MANTÉN TU BOCA SANA Y SONRÍE



Salud bucodental para la población mayor

Cuidado de los dientes

1 La salud de tu boca depende de ti. Recuerda cepillarte los dientes después de cada comida.



2 Limpia y deja secar el cepillo después de cada uso, tanto si es manual como eléctrico.



3 Recuerda renovar el cepillo dental o el cabezal del cepillo eléctrico cada 3 meses



Dysbiosis and Mouthwash Use

Review > [Curr Hypertens Rep.](#) 2017 Apr;19(4):33. doi: 10.1007/s11906-017-0725-2.

Oral Microbiome and Nitric Oxide: the Missing Link in the Management of Blood Pressure

Nathan S Bryan ¹, Gena Tribble ², Nikola Angelov ²

Affiliations + expand

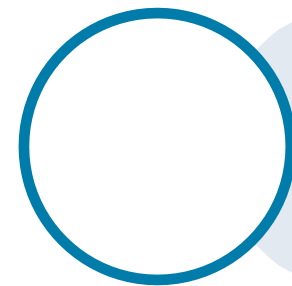
PMID: 28353075 DOI: [10.1007/s11906-017-0725-2](#)

Abstract

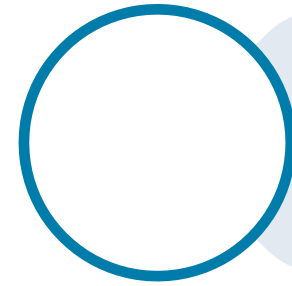
Having high blood pressure puts you at risk for heart disease and stroke, which are leading causes of death in the USA and worldwide. One out of every three Americans has hypertension, and it is estimated that despite aggressive treatment with medications, only about half of those medicated have managed blood pressure. Recent discoveries of the oral microbiome that reduces inorganic nitrate to nitrite and nitric oxide provide a new therapeutic target for the management of hypertension. The presence or absence of select and specific bacteria may determine steady-state blood pressure levels. Eradication of oral bacteria through antiseptic mouthwash or overuse of antibiotics causes blood pressure to increase. Allowing recolonization of nitrate- and nitrite-reducing bacteria can normalize blood pressure. This review will provide evidence of the link between oral microbiota and the production of nitric oxide and regulation of systemic blood pressure. Management of systemic hypertension through maintenance of the oral microbiome is a completely new paradigm in cardiovascular medicine.

Keywords: Blood pressure; Diet; Gut microbiome; Hypertension; Nitrate; Nitric oxide; Nitrite.

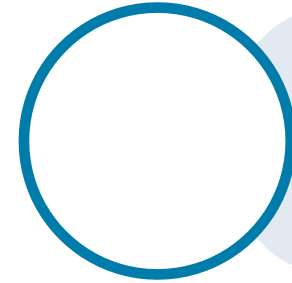
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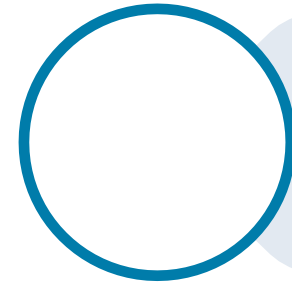
Physiological changes in the oral cavity



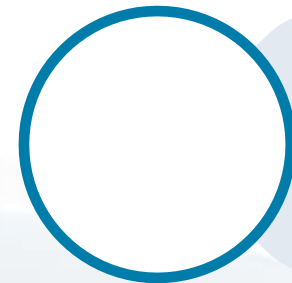
Frequent Pathologies



Physiological changes in the oral cavity



Physiological changes in the oral cavity



Practical Recommendations



General Recommendations for Oral Care in Older Adults



**Strict Oral
Hygiene
Routine**



**Use Of Saliva Substitutes
Or Saliva-Stimulating
Rinses In Cases Of
Xerostomia (Dry Mouth)**



**Regular Dental
Check-Ups**



**Proper Fitting And
Frequent Review Of
Dental Prostheses**



**A Balanced
Diet With An
Appropriate
Texture**

Conclusions



- **Oral health is an integral part of overall health, especially in older adults, where its deterioration impacts nutrition, communication, self-esteem, and quality of life.**
- The most common oral conditions in geriatrics (root caries, periodontitis, xerostomia, mucosal lesions, and edentulism) are preventable or manageable when detected early.
- There are clear bidirectional relationships between periodontal disease and systemic conditions such as diabetes, cardiovascular disease, neurodegenerative diseases, and malnutrition.
- The physiological changes associated with ageing, the use of dental prostheses, polypharmacy, and chronic diseases increase the risk of oral health deterioration.
- The geriatrician has an active and essential role in:
- It is essential to promote smooth collaboration between dentists and geriatricians, with a multidisciplinary approach and joint training, especially in residential and hospital settings.



Questions & Discussion

Thank you for your commitment to integrated geriatric care.

 @drtomashernan

