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# An update on human immunodeficiency virus and dentistry

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**Abstract**
The human immunodeficiency virus (HIV) is a retrovirus that breaks down the body's immune system leaving the patient vulnerable to a series of life-threatening opportunistic infections, neurological disorders or unusual diseases and neoplasms.
**Objective:** To evaluate the information available about the human immunodeficiency virus related to its affections in the cavity. The topics to be evaluated are epidemiology, diagnosis, treatment and oral manifestations.
**Methodology:** In order to carry out this literature review, an electronic search was necessary using PUBMED and Google Scholar with the words "HIV AND dentistry" "epidemiology, diagnosis and treatment" and "oral manifestations ".
**Results**: Its incidence worldwide is 38 million people with a high incidence rate in Africa and the European Union. Its diagnosis is by serological tests and rapid IgG tests. The treatment is Antiretroviral. Its most common oral manifestations are: Kaposi's sarcoma (KS), followed by oral candidiasis, periodontitis, necrotizing ulcerative gingivitis (NUG), necrotizing ulcerative periodontitis (NUP) and oral hairy leukoplakia (OHL).
**Conclusion:** Dentists must know the most common oral manifestations of HIV since there is a high incidence of people infected with this virus who present in dental consultation.

**Keywords:** HIV, epidemiology, diagnosis, treatment and oral manifestations

## 1. Introduction
The human immunodeficiency virus (HIV) is a retrovirus that breaks down the body's immune system leaving the patient vulnerable to a range of life-threatening opportunistic infections, neurological disorders or unusual illnesses and malignancies [1]. Last year UNAIDS reported that 680,000 people died from HIV/AIDS-related illnesses [2]. HIV is transmitted through the exchange of certain body fluids of the infected person, such as blood, breast milk, semen or vaginal secretions. It can also be transmitted from mother to child during pregnancy and childbirth [3, 4]. The causal disease is called AIDS, which stands for Acquired Immune Deficiency Syndrome [5, 6]. Lesions may be an indicator of the severity of HIV disease [7]. It is estimated that more than one third of people with HIV currently present oral manifestations [6]. Access to effective treatment in resource-rich countries has led to a marked decrease in some of the oral manifestations in the HIV-positive population, but this is not reflected in developing countries [8]. There is little concrete information on HIV conditions in the oral cavity, despite the fact that HIV affects a large part of the population and the oral cavity is likely to reflect the degree of infection in the patient. Therefore, the aim of the study was to evaluate the available information about the human immunodeficiency virus related to its conditions in the oral cavity. The topics evaluated were epidemiology, diagnosis, treatment and oral manifestations.

## 2. Materials and methods

Articles on the subject published through the PubMed, SCOPUS and Google Scholar databases were analyzed, with emphasis on the last 5 years. The quality of the articles was evaluated using PRISMA guidelines, i.e., identification, review, choice and inclusion. The quality of the reviews was assessed using the measurement tool for evaluating systematic reviews (AMSTAR-2). The search was performed using Boolean logical operators AND, OR and NOT. It was realized with the words "human immunodeficiency virus", "epidemiology", "diagnosis", "treatment", "oral manifestations". The keywords were used individually, as well as each of them related to each other.

## 3. Results & Discussion

### 3.1 Epidemiology

The emergence of HIV was in the early 1980s, the epidemic has spread widely in all regions of the world [9]. 37.7 million people are living with HIV worldwide in 2020, in the same year 1.5 million people contracted HIV infection. In 2020, about 680,000 people died of AIDS-related illnesses [2]. The total number and rates of new HIV infections are increasing every year in Europe, South America, North America and other regions over the last decade [10]. The Pan American Health Organization (PAHO) reports that there are about 2,100,000 people living with HIV in Latin America. The number of new cases of HIV infection increased by 21% from 2010 to 2019 [11]. The sub-Saharan Africa (SSA) region alone accounted for approximately 69.5% (25.5 million) of global HIV infections, and only 54.1% (13.8 million) had access to antiretroviral therapy [12, 13]. Of the total number of cases worldwide, 20% are in European Union (EU) countries and the remainder in the East of the continent [14]. In France, there are still a significant number of new infections each year, mainly among men who have sex with men and heterosexuals born in sub-Saharan Africa [9].

There are currently 37 million people infected with the human immunodeficiency virus, with the epicenter of the pandemic in Africa, followed by the European Union and the Americas.

### 3.2 Diagnostic Methods

HIV diagnostics are critical to achieving control of the epidemic and require a hybrid of conventional laboratory diagnostic tests and new technologies [15]. All HIV diagnostic tests are guided by a common principle: screen with a highly sensitive initial test and confirm reactive results with a different test that is both sensitive and highly specific [16]. HIV is detected by serological test results, such as enzyme-linked immunosorbent assay (ELISA) and dried blood spot test (DBS) [17]. ELISA is a highly sensitive immunological test used to detect and quantify substances, including antibodies, antigens, proteins, glycoproteins and hormones [18]. The World Health Organization recommends using dried blood spots (DBS) for the measurement of HIV RNA viral load (VL) whenever plasma processing is not convenient or feasible [19]. The polymerase chain reaction (PCR) is used to detect HIV RNA although IgG sensitivity tests are more common [20]. In IgG sensitivity tests, anti-HIV antibodies from patient samples bind to recombinant or synthetic HIV antigens immobilized on the solid phase of the assay. These shorten the window period at the earlier threshold of IgM detection [16]. Rapid tests are generally completed in approximately 20 to 30 minutes, making them ideal for testing and counseling in primary health care settings and mobile clinics [15]. Commercially available HIV rapid diagnostic tests such as the Multispot HIV-1 / HIV-2 Rapid Test, HIV 1/2 / O Rapid Test Device (ABON), Determine HIV 1/2 (Alere), OraQuick Rapid HIV-1/2 Antibody Test (OraSure Technologies) and DPP HIV 1/2 (Chembio) can detect and sometimes differentiate HIV-1/2 antibodies [21].

To make a proper diagnosis of HIV, serological tests and rapid tests can be performed to find out if the virus has been present in the body. If a more specific confirmation is required, a PCR, which is a highly specific test, can be performed.

### 3.3 Treatments

Anti-HIV-1 drug therapies can prevent disease progression but cannot eliminate HIV-1 viruses from an infected person [22]. Antiretroviral therapy (ART) should be initiated as soon as possible after HIV diagnosis [23, 24]. Administration of chronic combination antiretroviral therapy targeting different stages of the replicative life cycle of the human immunodeficiency virus allows for maximal and long-lasting suppression of plasma viremia [25]. This suppression has resulted in dramatically improved patient survival [26] HIV-1 replication in the blood is virtually halted upon initiation of ART. However, proliferation of infected cells prior to ART provides a self-renewing reservoir for infection during ART [27]. Long-acting antiretroviral therapy promises new options for HIV treatment beyond the current paradigm of daily oral pills [28]. Ibalizumab, a humanized IgG4 monoclonal antibody administered by intravenous infusion, blocks the entry of human immunodeficiency virus type 1 (HIV-1) by noncompetitive binding to CD4 [29]. It is the first monoclonal antibody approved for the treatment of HIV-1 infection [30]. Vitamin D supplementation and restoration to normal values in HIV-infected patients may improve immune recovery during combination antiretroviral therapy [29, 31]. The use of probiotics may prevent and attenuate gastrointestinal manifestations and improve gut-associated lymphoid tissue (GALT) immunity in HIV infection [32, 33]. A potential benefit on markers of inflammation and immune cell activation in GALT has been observed [34].

Antiretrovirals have been the treatment of choice for years; currently, long-acting antiretrovirals, which have a good prognosis for HIV treatment, are being studied. Vitamins and probiotics are often good supplements for the improvement of the HIV patient.

### 3.4 Oral Manifestations

Most non-bacterial oral or periodontal infections are related to dysregulation of the oral microbiome [35]. They are particularly sensitive to deficiencies in the adaptive immune response involving antigen presenting molecules deficient in APC, and the number of T and B cells [36]. The most common oral lesions found in HIV-positive patients were Kaposi's sarcoma (KS), followed by oral candidiasis, periodontitis, necrotizing ulcerative gingivitis (NUG), necrotizing ulcerative periodontitis (NUP) and oral hairy leukoplakia (OHL) [7, 37, 38, 39, 40]. The most frequent oral manifestation in HIV-infected children is oral candidiasis, followed by changes such as gingivitis and parotid gland enlargement [41, 42]. Kaposi's sarcoma (KS) is an angioproliferative mesenchymal angioproliferative neoplasm caused by the herpes virus [43, 44], which develops most frequently in HIV-infected individuals [45]. Oropharyngeal candidiasis is one of the most common opportunistic fungal infections among persons infected with human immunodeficiency virus (HIV) [46]. In patients with HIV infection, fungal diseases can cause ulceration in the oral

cavity, [47] however, few studies of Candida-associated oral ulcerative lesions have been performed in patients without HIV infection [48]. Leukoplakia pilosa (LH) is a mucosal disease. It is associated with Epstein-Barr virus (EBV), also known as human herpes virus 4 [49]. It most commonly presents on the lateral border of the tongue as an asymptomatic, white, wavy plaque that does not rub off [50]. It occurs most frequently in HIV-infected individuals, although it can also be seen in individuals without HIV [51]. Necrotizing ulcerative gingivitis (NUG) is a typical form of periodontal disease commonly associated with HIV positives [52]. It has an acute clinical presentation with the distinctive features of rapid onset of interdental gingival necrosis, gingival pain, hemorrhage and halitosis [40].

Oral manifestations of HIV appear due to immunosuppression and dysregulation of the microbiome leading to bacterial diseases such as Kaposi's sarcoma, NUG, candidiasis and hairy leukoplakia.

## 4. Conclusions

The human immunodeficiency virus directly affects the immune system allowing different infections to present themselves aggressively in the human body. The presence of HIV has a direct impact on the oral microbiota, being affected by opportunistic infections that appear in the oral cavity such as Kaposi's sarcoma, candidiasis, hairy leukoplakia and ulceronecrotizing gingivitis. It is important as dentists to know that these infections can occur in HIV-infected patients.

## 5. References


1 Huerta L. Editorial: Anti-infective 2020: HIV-From pathogenesis to treatment. Curr Opin Pharmacol. 2020 Oct;54:x-xii.
2 Joint United Nations Programme on HIV and AIDS (UNAIDS). AIDS by the number 2021. (Internet). Ginebra: UNAIDS. https://www.unaids.org/en
3 Hassan AS, Pybus OG, Sanders EJ, Albert J, Esbjörnsson J. Defining HIV-1 transmission clusters based on sequence data. AIDS. 2017 Jun 1;31(9):1211-1222.
4 Myburgh D, Rabie H, Slogrove AL, Edson C, Cotton MF, Dramowski A. Horizontal HIV transmission to children of HIV-uninfected mothers: A case series and review of the global literature. Int J Infect Dis. 2020 Sep;98:315-320.
5 Ratnam M, Nayyar AS, Reddy DS, Ruparani B, Chalapathi KV, Azmi SM. CD4 cell counts and oral manifestations in HIV infected and AIDS patients. J Oral Maxillofac Pathol. 2018 May-Aug;22(2):282.
6 Ottria L, Lauritano D, Oberti L, Candotto V, Cura F, Tagliabue A, Tettamanti L. Prevalence of HIV-related oral manifestations and their association with HAART and CD4+ T cell count: a review. J Biol Regul Homeost Agents. 2018 Jan-Feb;32(2 Suppl. 1):51-59. PMID: 29460518.
7 Indrastiti RK, Wardhany II, Soegyanto AI. Oral manifestations of HIV: Can they be an indicator of disease severity? (A systematic review). Oral Dis. 2020 Sep;26Suppl1:133-136.
8 Tappuni AR. The global changing pattern of the oral manifestations of HIV. Oral Dis. 2020 Sep;26 Suppl 1:22-27.
9 Lot F, Cazein F. Épidémiologie du VIH et situation chez les seniors [Epidemiology of HIV and the situation among older adults]. Soins. 2019 Apr;64(834):20-24. French.
10 Govender RD, Hashim MJ, Khan MA, Mustafa H, Khan G. Global epidemiology of HIV/AIDS: a resurgence in North America and Europe. J Epidemiol Glob Health. 2021;11(3):296-301.
11 Pan American Health Organization. OPS key facts report HIV/AIDS 2021. HIV/ AIDS. (Internet) USA: OPS; 2021 https://www.paho.org/es/temas/vihsida
12 Okano JT, Sharp K, Valdano E, Palk L, Blower S. HIV transmission and source-sink dynamics in sub-Saharan Africa. Lancet HIV. 2020 Mar;7(3):e209-e214.
13 Ghosn J, Taiwo B, Seedat S, Autran B, Katlama C. HIV. Lancet. 2018 Aug 25;392(10148):685-697.
14 World Health Organization. Report on the HIV / AIDS epidemic 2021. HIV/AIDS. (Internet) Available: https://www.who.int/news-room/fact-sheets/detail/hiv-aids.
15 Parekh BS, Ou CY, Fonjungo PN, Kalou MB, Rottinghaus E, Puren A, *et al*. Diagnosis of Human Immunodeficiency Virus Infection. Clin Microbiol Rev. 2018 Nov 28;32(1):e00064-18.
16 Hurt CB, Nelson JAE, Hightow-Weidman LB, Miller WC. Selecting an HIV Test: A Narrative Review for Clinicians and Researchers. Sex Transm Dis. 2017 Dec;44(12):739-746.
17 Karatzas-Delgado EF, Ruiz-González V, García-Cisneros S, Olamendi-Portugal ML, Herrera-Ortiz A, López-Gatell H, *et al*. Evaluation of an HIV recent infection testing algorithm with serological assays among men who have sex with men in Mexico. J Infect Public Health. 2020 Apr;13(4):509-513
18 Alhajj M, Farhana A. Enzyme Linked Immunosorbent Assay. 2021 Feb 6. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, 2021. PMID: 32310382.
19 Khamduang W, Kaewbundit A, Duangmano A, Hongjaisee S, Klinbuayaem V, Halue G, *et al*. HIV RNA measurement in dried blood spots of HIV-infected patients in Thailand using Abbott m2000 system. PLoS One. 2020 Jan 24;15(1):e0227929.
20 Yamazaki S, Kondo M, Sudo K, Ueda T, Fujiwara H, Hasegawa N, Kato S. Qualitative Real-Time PCR Assay for HIV-1 and HIV-2 RNA. Jpn J Infect Dis. 2016 Sep 21;69(5):367-72.
21 Chen H, Liu K, Li Z, Wang P. Point of care testing for infectious diseases. Clin Chim Acta. 2019 Jun;493:138-147
22 Scarborough RJ, Gatignol A. RNA Interference Therapies for an HIV-1 Functional Cure. Viruses. 2017 Dec 27;10(1):8.
23 Saag MS. HIV 101: fundamentals of antiretroviral therapy. Top Antivir Med. 2019 Sep;27(3):123-127. PMID: 31634859; PMCID: PMC6892619.
24 Phanuphak N, Gulick RM. HIV treatment and prevention 2019: current standards of care. Curr Opin HIV AIDS. 2020 Jan;15(1):4-12.
25 Pau AK, George JM. Antiretroviral therapy: current drugs. Infect Dis Clin North Am. 2014 Sep;28(3):371-402.
26 Atta MG, De Seigneux S, Lucas GM. Clinical Pharmacology in HIV Therapy. Clin J Am Soc Nephrol. 2019 Mar 7;14(3):435-444.
27 Bale MJ, Kearney MF. Review: HIV-1 phylogeny during suppressive antiretroviral therapy. Curr Opin HIV AIDS. 2019 May;14(3):188-193.
28 Rana AI, Castillo-Mancilla JR, Tashima KT, Landovitz

RL. Advances in long-acting agents for the treatment of HIV infection. Drugs. 2020 Abril;80(6):535-545.
29 Bettiker RL, Koren DE, Jacobson JM. Ibalizumab. Curr Opin HIV AIDS. 2018 Jul;13(4):354-358.
30 Blair HA. Ibalizumab: A Review in Multidrug-Resistant HIV-1 Infection. Drugs. 2020 Feb;80(2):189-196
31 Jiménez-Sousa MÁ, Martínez I, Medrano LM, Fernández-Rodríguez A, Resino S. Vitamin D in Human Immunodeficiency Virus Infection: Influence on Immunity and Disease. Front Immunol. 2018 Mar 12;9:458.
32 D'Angelo C, Reale M, Costantini E. Microbiota and Probiotics in Health and HIV Infection. Nutrients. 2017 Jun 16;9(6):615.
33 Nazir Y, Hussain SA, Abdul Hamid A, Song Y. Probiotics and Their Potential Preventive and Therapeutic Role for Cancer, High Serum Cholesterol, and Allergic and HIV Diseases. Biomed Res Int. 2018 Aug 29;2018:3428437.
34 Bandera A, De Benedetto I, Bozzi G, Gori A. Altered gut microbiome composition in HIV infection: causes, effects and potential intervention. Curr Opin HIV AIDS. 2018 Jan;13(1):73-80.
35 Heron SE, Elahi S. HIV Infection and Compromised Mucosal Immunity: Oral Manifestations and Systemic Inflammation. Front Immunol. 2017 Mar 7;8:241.
36 Peacock ME, Arce RM, Cutler CW. Periodontal and other oral manifestations of immunodeficiency diseases. Oral Dis. 2017 Oct;23(7):866-888.
37 Gannepalli A, Krishna AB, Baghirath PV, Vinay BH, Khaled S, Anjum B. Oral Manifestations in HIV-TB Co-infected Patients and Their Correlation with CD4 Count in Telangana State, India. J Int Soc Prev Community Dent. 2020 Jan 24;10(1):21-35.
38 Mirnezami M, Zarinfar N, Sofian M, Botlani Yadegar B, Rahimi H. Mucocutaneous Manifestations in HIV-Infected Patients and Their Relationship to CD4 Lymphocyte Counts. Scientifica (Cairo). 2020 Aug 11;2020:7503756.
39 Al-Hezaimi K, Javed F, Ali TS, Al-Askar M, Al-Rasheed A. Rapidly progressive periodontal disease associated with human immunodeficiency virus. J Coll Physicians Surg Pak. 2012 Mar;22(3):186-8. PMID: 22414365.
40 Malek R, Gharibi A, Khlil N, Kissa J. Necrotizing Ulcerative Gingivitis. Contemp Clin Dent. 2017 Jul-Sep;8(3):496-500.
41 Araújo JF, Oliveira AEF, Carvalho HLCC, Roma FRVO, Lopes FF. Most common oral manifestations in pediatric patients HIV positive and the effect of highly active antiretroviral therapy. Cien Saude Colet. 2018 Jan;23(1):115-122. Portuguese, English.
42 Mulder R, Mohamed N, Mathiba O. Prevalence of oral mucosal lesions in human immunodeficiency virus-infected children attending the Pediatric Infectious Diseases Clinic in Cape Town. Clin Exp Dent Res. 2021 Sep 29.
43 Cesarman E, Damania B, Krown SE, Martin J, Bower M, Whitby D. Kaposi sarcoma. Nat Rev Dis Primers. 2019 Jan 31;5(1):9..
44 Etemad SA, Dewan AK. Kaposi Sarcoma Updates. Dermatol Clin. 2019 Oct;37(4):505-517.
45 Gruffaz M, Zhang T, Marshall V, Gonçalves P, Ramaswami R, Labo N, *et al*. Signatures of oral microbiome in HIV-infected individuals with oral Kaposi's sarcoma and cell-associated KSHV DNA. PLoS Pathog. 2020 Jan 17;16(1):e1008114.
46 Aboualigalehdari E, Tahmasebi Birgani M, Fatahinia M, Hosseinzadeh M. Oral colonization by Candida species and associated factors in HIV-infected patients in Ahvaz, southwest Iran. Epidemiol Health. 2020;42:e2020033.
47 Lam-Ubol A, Rungsiyanont S, Vacharotayangul P, Sappayatosok K, Chankanka O. Oral manifestations, salivary flow rates and Candida species in Thai HIV-infected patients. J Clin Exp Dent. 2019 Feb 1;11(2):e138-e145.
48 Terai H, Ueno T, Suwa Y, Omori M, Yamamoto K, Kasuya S. Candida is a protractive factor of chronic oral ulcers among usual outpatients. Jpn Dent Sci Rev. 2018 May;54(2):52-58.
49 Greenspan JS, Greenspan D, Webster-Cyriaque J. Hairy leukoplakia; lessons learned: 30-plus years. Oral Dis. 2016 Apr;22 Suppl 1:120-7.
50 Alramadhan SA, Bhattacharyya I, Cohen DM, Islam MN. Oral Hairy Leukoplakia in Immunocompetent Patients Revisited with Literature Review. Head Neck Pathol. 2021 Sep;15(3):989-993.
51 Rathee M, Jain P. Hairy Leukoplakia. 2021 Apr 17. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan–. PMID: 32119478.
52 Fonseca RRS, Carvalho CA, Rodrigues TMS, Cavaleiro RMS, Menezes SAF, Machado LFA. Severe Necrotizing Periodontitis in an HIV-Infected Patient: Case Report and Non-Surgical Treatment. Clin Adv Periodontics. 2021 Jun;11(2):59-63.