



## Clinical and morphological indicators of halitosis in cats

**Mariia Kulida\***

PhD in Veterinary Sciences, Associate Professor  
National University of Life and Environmental Sciences of Ukraine  
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine  
<https://orcid.org/0000-0001-8937-1972>

**Jakub Nicpoń**

Doktor of Habilitation in Veterinary Sciences, Profesor  
Wroclaw University of Environmental and Life Sciences  
50-375, 25 Norwid Str., Wroclaw, Poland  
<https://orcid.org/0000-0002-8168-6301>

**Pavel Solonin**

PhD in Veterinary Sciences, Associate Professor  
National University of Life and Environmental Sciences of Ukraine  
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine  
<https://orcid.org/0000-0003-0119-6490>

**Vitaly Oliynyk**

Chief Physician  
Small Animal Veterinary Clinic "VetGeneration Holosiiiv"  
03127, 9/10 Heroiv Oborony Str., Kyiv, Ukraine  
<https://orcid.org/0000-0001-5343-6500>

**Abstract.** The relevance of this study is due to the increasing number of complaints from cat owners presenting to veterinary clinics regarding the occurrence of unpleasant odours from the oral cavity (halitosis) in their pets. Accordingly, the article focuses on identifying diseases and their clinical manifestations most commonly associated with the development of halitosis in cats. To assess the presence and progression of halitosis, case histories were collected, and clinical examinations of the oral cavity were performed. The most frequent oral pathologies accompanied by unpleasant odours were identified. It was found that in 27% of the examined animals, halitosis developed against the background of chronic gingivostomatitis. In 14% of cases, it was associated with stomatitis and dental calculus, while in 13% it resulted from tooth resorption. Viral diseases of the oral cavity

### **Suggested Citation:**

Kulida, M., Nicpoń, J., Solonin, P., & Oliynyk, V. (2024). Clinical and morphological indicators of halitosis in cats. *Ukrainian Journal of Veterinary Sciences*, 16(1), 104-122. doi: 10.31548/veterinary1.2025.104.

\*Corresponding author



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

were diagnosed in 11% of the animals. Gingivitis (8%), periodontitis (7%), and oral neoplasms (7%) were among the least frequently diagnosed conditions in cats with halitosis. Morphological and biochemical blood studies in animals with chronic gingivostomatitis accompanied by halitosis revealed specific changes in haematological parameters, corresponding to underlying pathological processes. According to the results of clinical analysis of native blood from cats with chronic gingivostomatitis and clinical signs of halitosis, the white blood cell count increased by 88.6% ( $P < 0.001$ ), eosinophils by 1.7 times ( $P < 0.05$ ), while the number of platelets and red blood cells decreased by 1.5 times ( $P < 0.001$ ) and 1.2 times ( $P < 0.05$ ), respectively, in comparison with clinically healthy animals. These patterns indicate pronounced destructive changes in the cells of the oral mucosa and associated tissues and organs. This material is of practical relevance for veterinary practitioners and is important for use in the diagnosis and prognosis of diseases presenting with halitosis, as well as in selecting an optimal treatment strategy and monitoring its effectiveness

**Keywords:** oral cavity; gingivitis; stomatitis; chronic gingivostomatitis; tongue ulcer; squamous cell carcinoma

---

## Introduction

Throughout 2024, a common concern raised by cat owners when visiting veterinary clinics was the presence of bad breath in their animals. This odour of exhaled air from the mouth, often described as offensive and pungent to humans, can either be a consequence of the animal's diet or may indicate the presence or development of specific underlying diseases. Therefore, in cases of persistent bad breath in a cat, it is recommended to consult a veterinary professional to determine the cause of the halitosis. Halitosis is defined as the unpleasant odour detected in an animal's breath upon exhalation by a person in close proximity.

According to J. Guilherme-Fernandes *et al.* (2024), halitosis in animals can be categorised as either physiological or pathological. Physiological halitosis typically occurs after the consumption of liquids or food and lasts for a few hours. In approximately 90% of these cases, the unpleasant smell originates solely from the oral cavity. J.M. Croft *et al.* (2022) have shown that this is primarily caused by the metabolic products of Gram-negative anaerobic bacteria (volatile sulphur compounds)

present in the oral cavity, which break down proteinaceous substances found in saliva, shed epithelial cells, and food debris.

Pathological halitosis, as noted in the research by M. Soltero-Rivera *et al.* (2023), manifests as a clinical sign in a variety of diseases. The most common of these in cats are dental and gum disorders. According to the findings of these authors, between 50% and 90% of cats over four years of age experience some form of acute dental pathology. In their study, P. Kamlangchai *et al.* (2024) indicated that in chronic gingival and periodontal diseases in cats, specifically gingivostomatitis and periodontitis, the unpleasant odour from the animal's mouth is not just an initial symptom but also serves as an important indicator of the underlying issue.

The majority of bacteria within the oral microbiota, as established by P. Dai *et al.* (2024), exist in a symbiotic relationship, maintaining a dynamic balance. When this balance is disrupted, it can lead to disease. Indeed, disruption of the oral microbiota can play a crucial role in the development of oral tissue diseases and, consequently, be a cause of halitosis. The microbial

population of the oral cavity, according to the research of P.M. Oba *et al.* (2024), significantly influences periodontal disease. These authors suggest that investigating the oral microbiota can be used in conjunction with assessments of odour, dental plaque, and gingivitis to evaluate the impact of dental lesions on the animal's oral health. Microbial plaque is the aetiological agent of gingivitis, periodontitis, and halitosis, as noted in the study by E. Cunha *et al.* (2022), who demonstrated that controlling dental plaque plays a vital role in maintaining the physiological health of the oral cavity.

In their research, Y. Wei *et al.* (2024) reported that halitosis was observed in cases of gingivostomatitis resulting from various infectious or systemic diseases, including feline calicivirus, feline immunodeficiency virus, and feline leukaemia virus. Given the genetic diversity of the virus, these authors suggest that its wide spectrum of clinical presentations poses significant challenges in the diagnosis, treatment, and prevention of gum disease. A range of causes for halitosis not directly related to oral tissue damage was identified by D.H. Kim *et al.* (2023), including pathologies of the ear, nose, and throat, pulmonary conditions, gastrointestinal disorders, metabolic disturbances (such as renal failure and diabetes mellitus), and the administration of certain medications.

The findings of a study by U.I. Voloboieva & D.D. Bilyi (2024) have demonstrated that the prevalence of dental pathology in companion animals is on the rise, affecting over 70% of animals. Furthermore, the frequency with which oral cavity pathologies are detected is significantly influenced by the diagnostic methods employed: detection rates range from 20%-25% without general anaesthesia to 80%-100% with the use of anaesthesia.

Scientists have investigated specific pathological conditions within the oral cavity that are characterised by halitosis in animals.

However, there remains a lack of comprehensive data regarding the findings of clinical examinations in affected animals and the corresponding changes in haematological parameters. These parameters reflect the progression of pathological processes within the animal's oral cavity and could play a crucial role in the diagnosis and prognosis of these conditions, as well as in guiding the selection of the most effective treatment strategies and monitoring their outcomes. Considering the widespread occurrence of oral pathology and the numerous potential causes of halitosis in animals, accurate differential diagnosis is essential. This study aimed to determine the informative value of clinical research methods in identifying the underlying causes of pathological halitosis in domestic cats.

### **Literature Review**

Animal owners often perceive the offensive odour emanating from their pets' mouths as a mere inconvenience, failing to recognise that halitosis is frequently a symptom of underlying pathological conditions. According to J.G. Anderson & P. Hennet (2022) and U.I. Voloboieva *et al.* (2023), the majority of oral cavity diseases are identified through clinical examination, taking into account the animal's medical history. For more precise diagnostic differentiation, procedures such as gingival probing (in cases of periodontitis) or radiographic imaging of the head and jaw region are indicated. J.M. Croft *et al.* (2022) established that the primary cause of halitosis in animals is linked to the presence of bacteria within the oral cavity, which results from inflammatory processes leading to the development of gingivitis and periodontitis.

Building on the findings of C.M. Bollen & T. Beikler (2012), who noted that pathological halitosis is a symptom of disease, E. Cunha *et al.* (2022) discovered that gingival inflammation of varying severity is the primary aetiological

factor in the development of unpleasant breath in cats. Furthermore, research by A. Di Cerbo *et al.* (2015) indicates that physiological halitosis can occur in cats aged 5-7 months, associated with the inflammatory process in the gums during the transition from deciduous to permanent teeth. This information should be considered when taking a patient's history. According to research by D.O.L. Carvalho *et al.* (2025), the health of tissues within the oral cavity of animals is significantly influenced by dental diseases. These authors demonstrated that, depending on the severity of the underlying pathological process, dental conditions can clinically manifest as difficulty in eating, a reduced appetite, weight loss, and the presence of excessive salivation.

Regarding the presentation of pain, S. Taylor *et al.* (2024) noted that cats often conceal signs of discomfort, even when suffering from serious dental conditions such as periodontitis, chronic gingivostomatitis, apical periodontitis, and viral infections. However, in cases of purulent periodontitis, for example, which elicits a strong pain response in the animal, indicators of pain can be identified through changes in the cat's behaviour. The animal may become lethargic, lose its appetite, and avoid having its face touched. Chronic pain can also be caused by damaged teeth (due to dental caries or mechanical trauma), which can significantly impact the animal's quality of life and may clinically present as emaciation and dehydration.

M.X. Rodrigues *et al.* (2019) investigated periodontitis as a common and significant health concern in domestic cats. The composition of the subgingival microbiota in cats diagnosed with chronic periodontitis, aggressive periodontitis, and chronic gingivostomatitis has been insufficiently characterised. These researchers identified several key genera previously implicated in periodontal diseases (for example, *Treponema* and *Filifactor*) and also

found in the oral microbiota (for example, *Moraxella* and *Capnocytophaga*) of healthy cats. Analysis of phylogenetic beta-diversity revealed that the microbiota of periodontally healthy cats differed from that of affected cats. While most of the bacterial genera known to be associated with periodontal disease were also identified in healthy cats, they were present in significantly lower relative abundance. Notably, alpha-diversity was found to be higher in the disease groups compared to their healthy counterparts. These findings suggest a pathological mechanism involving opportunistic behaviour by certain microorganisms.

M. Soltero-Rivera *et al.* (2024) drew attention to the specifics of feline chronic gingivostomatitis (FCGS). This condition is a debilitating disease for cats and presents a challenge for both veterinary surgeons and cat owners. It is an immune-mediated disorder associated with chronic viral infection in patients exhibiting higher alpha-diversity in their subgingival microbiome. These authors highlighted the multifactorial aetiology of FCGS, where clinical diagnosis relies on the examination of inflammatory lesions within the oral tissues and histological confirmation, rather than molecular diagnostic results. This limitation hinders the potential for early diagnosis. Research by D.O.L. Carvalho *et al.* (2025) has indicated that the aetiology of chronic gingivostomatitis remains to be fully elucidated. There is evidence potentially pointing towards a viral origin. Currently, dental extraction is the standard treatment approach, and cats that do not respond to this therapy may require lifelong medical management and, in some instances, euthanasia. Investigating the symptomatology of viral diseases, A.C. Fontes *et al.* (2023) noted that feline calicivirus is linked to a wide array of clinical presentations, particularly chronic gingivostomatitis, which is a common oral pathology in cats. R. Hofmann-Lehmann *et al.* (2022)

observed that calicivirus infection is a major predisposing factor for the development of pathology in the gingiva and oral mucosa of cats, although the precise pathogenesis of caliciviro-sis is not yet fully understood.

Diseases affecting the oral cavity, as demonstrated by N. Khomyn *et al.* (2020), such as fibrous periodontitis, can have a prolonged asymptomatic course, often only being detected during radiographic examination. In advanced cases, animals were observed to develop fistulae in the infraorbital region (the location of the fourth upper premolar tooth). Research findings from D.H. Kim *et al.* (2023) and M.K. Park & K.H. Song (2024) have shown that halitosis, salivation, reduced appetite, and an animal's reluctance to eat hard food can all indicate the presence of various oral pathologies in cats, including not only dental and oral mucosal lesions with ulceration, but also the formation of fistulae within the oral cavity, tissue necrosis, and the breakdown of neoplastic tissue.

Several scientific studies (Kamlangchai *et al.*, 2024; Soltero-Rivera *et al.*, 2024) have presented the results of developing and evaluating different treatment approaches for animals with oral pathologies of various origins. For instance, L.D.C. Araujo *et al.* (2022) and M. Zhang *et al.* (2024) reported that a composite probiotic used in their study modulated the oral microbiota in cats, supporting beneficial or commensal bacteria while inhibiting the growth of pathogenic ones, suggesting its potential for improving oral health in felines. A.J. Villatoro *et al.* (2022) proposed a novel treatment strategy for feline chronic gingivostomatitis, based on the use of mesenchymal stem cells and their regenerative and immunomodulatory properties. Research by C. Ohira *et al.* (2025) has established a strong link between halitosis and periodontal diseases, attributing it to volatile sulphide compounds, such as

hydrogen sulphide and methyl mercaptan, produced by periodontal bacteria in the oral cavity. Furthermore, they suggest that oral administration of catechin may prevent periodontal diseases in both dogs and cats. According to D.O.L. Carvalho *et al.* (2025), surgical intervention, involving the extraction of molar and premolar teeth, is considered a preferable approach to prevent bacterial proliferation, halt the most intense inflammation, and improve the patient's quality of life. However, K. Oskarsson *et al.* (2021) pointed out that there is currently a lack of comprehensive information regarding the outcomes of communication between veterinary staff and pet owners concerning dental health and the prevention of dental pathologies in animals.

Therefore, pathological halitosis is a common symptom of numerous diseases, not only those localised within the oral cavity but also conditions affecting other organs and tissues. Establishing the underlying cause (aetiology) of halitosis necessitates a combination of various diagnostic approaches, including physical examination, laboratory tests, and instrumental investigations. The issue of early diagnosis remains a significant area of focus. Regarding the treatment of animals with pathologies associated with halitosis, several therapeutic modalities have been proposed, including antibiotic therapy, probiotics, stem cell therapy, and surgical intervention. Drawing upon the research findings presented in peer-reviewed publications, this article has outlined the most common clinical presentations of oral cavity diseases in cats, where the initial observation by owners is frequently the presence of an unpleasant odour from the mouth.

## **Materials and Methods**

The research was conducted from August to December 2024 at the VetGeneration Holosiiv private veterinary clinic in Kyiv, Ukraine. To

identify pathologies localised within the oral cavity of cats and associated with the presence of halitosis, a thorough collection of medical histories and a comprehensive clinical examination were performed on 428 animals. The results of this process enabled the determination of the most prevalent pathologies among those examined. Ten animals diagnosed with chronic gingivostomatitis (the most frequently recorded condition) were selected for further investigation. During the study, blood samples were collected (from the lateral subcutaneous vein of the forearm) for the analysis of morphological and biochemical parameters to assess the overall health status of the patients.

For the complete blood count, biological samples were collected into tubes containing the anticoagulant ethylenediaminetetraacetic acid and analysed using a Heska Element HT veterinary haematology analyser (USA). This analyser was used to determine the following blood parameters: red blood cell count, white blood cell count, platelet count, haemoglobin concentration, and haematocrit level. For biochemical analyses, blood samples were stabilised with heparin and subsequently centrifuged for 10-15 minutes at a speed of 1,500-2,500 revolutions per minute. Following centrifugation, the supernatant – blood plasma – was collected, and the following biochemical parameters were measured: the activity of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP), as well as the concentration of glucose, creatinine, and urea nitrogen. These selected parameters were measured using a Fujifilm DRICHEM NX600 (Japan) automated biochemical analyser, specifically designed for veterinary clinics. Statistical analysis of the haematological data was performed using a personal computer with the BAF – Veterinary Medicine software and individual patient dental records. The Student's t-test was employed to determine

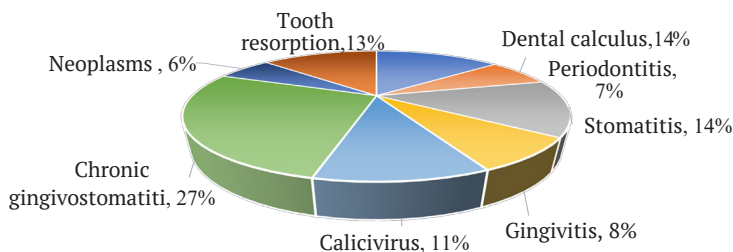
statistical significance, with significance levels set at  $P < 0.05$ ,  $P < 0.01$ , and  $P < 0.001$ .

The scientific research involving animals adhered to the guidelines of the European Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes, approved in Strasbourg in 1986 (European convention..., 1986), and the Law of Ukraine No. 3447-IV "On the Protection of Animals from Cruelty" (2006). All necessary procedures on the animals were conducted following the ARRIVE guidelines, ensuring compliance with the guiding principles of Directive of the European Parliament and of the Council No. 2010/63/EU (2010) on the protection of animals used for scientific purposes.

## Results and Discussion

Given that pathological halitosis can be a symptom of various systemic disorders, a study was conducted on animals to determine the underlying causes of this unpleasant breath. The examination commenced with a visual assessment of the oral tissues, with particular attention paid to the teeth (presence of dental plaque or calculus, caries), gums (evidence of inflammation, ulcers, neoplasms), and the mucous membrane. The pathologies identified in the oral cavity of cats with halitosis following clinical examination are presented in Figure 1.

Chronic gingivostomatitis was the most frequently diagnosed condition associated with halitosis among the cats examined, accounting for 27% of cases. Stomatitis, dental calculus, and tooth resorption were identified as the primary causes of halitosis in 14%, 14%, and 13% of cases, respectively. The lowest prevalence of halitosis was observed in cats with gingivitis (8%), periodontitis (7%), and oral cavity neoplasms (6%). The proportion of feline viral diseases among all examined animals reached 11%.

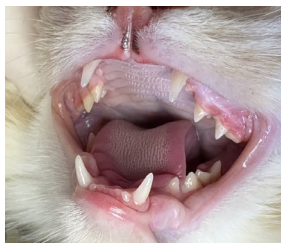


**Figure 1.** Prevalence of oral cavity diseases in cats with halitosis

*Note:* pathologies are presented as percentages and depicted using different colours

*Source:* authors' development

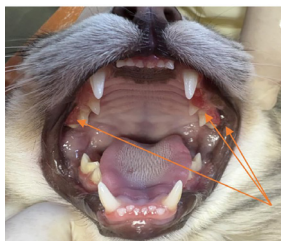
During the oral examination of cats exhibiting halitosis, attention was paid to the condition of the gingival mucosa, the dentition (tooth crowns), and the tongue. Notably, cases were observed during the study where halitosis was recorded in an animal in the absence of any apparent tissue lesions within the oral cavity (Fig. 2), as well as in cases of gingivitis (Fig. 3).



**Figure 2.** Oral cavity condition of a clinically healthy cat

*Note:* absence of pathological changes in the oral cavity of a cat with halitosis

*Source:* authors' photo



**Figure 3.** Gingivitis in a cat (moderate severity)

*Note:* arrows indicate areas of gingival recession

*Source:* authors' photo

Example 1. Semen, a 5-year-old male mixed-breed cat weighing 4 kg, is housed in an apartment. The clinical history revealed that the owners had noticed persistent bad breath for over a month prior to the consultation. Clinical examination of Semen (Fig. 2) revealed no pathological changes within the oral cavity tissues. The oral mucous membranes were pale pink, wellmoisturised, and free from swelling, rashes, or lesions. Discussions with the owners indicated frequent changes in the cat's diet to provide variety, as well as inconsistent portion sizes. Based on this information, further investigation was recommended, including a thorough clinical examination and both general and biochemical blood analyses, to determine the underlying cause of the pathological halitosis.

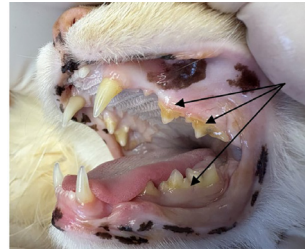
According to D.H. Kim *et al.* (2023), numerous causes of halitosis are not directly related to lesions of the oral tissues, including kidney disease, pancreatic disease, and diabetes mellitus. Research has established that renal disease, particularly in the form of chronic kidney disease, is associated with elevated blood urea nitrogen levels and a reduced rate of saliva production, which can predispose to halitosis. Furthermore, these authors identified several other metabolic conditions linked to enzymatic and transport abnormalities (such as trimethylaminuria) that result in the systemic production of volatile, unpleasant odours that are detectable in the breath.

Example 2. Baks, a 3.8-year-old male mixed-breed cat weighing 5.2 kg, is housed in an apartment. The clinical history revealed that the owners had noticed persistent bad breath for over two months before seeking veterinary attention. The cat became less interested in eating and preferred soft food, with frequent salivation observed. During the clinical examination of the animal (Fig. 3), areas of swelling and redness were noted in the mucous membrane of the oral cavity. Recession of the gums was also observed, where the gums began to separate from the crown of the tooth, creating an ideal space for the accumulation of food particles and bacteria. The findings, in this case, are consistent with the research of D.H. Kim *et al.* (2023), who noted that depending on the severity of gingivitis, cats may completely stop eating, turn their head unusually while eating, and exhibit bad breath.

According to M.K. Park & K.H. Song (2024), gingivitis is characterised by swelling and redness in the gum area, causing discomfort for the animals during feeding. In severe cases, bleeding from the gingival margins was also observed. Y. Wei *et al.* (2024) demonstrated that gingivitis resulting from systemic diseases can be accompanied by the spread of inflammation or ulceration from the gum tissues to the oral mucosa. These researchers noted that gingivitis, with subsequent inflammation of the remaining periodontal tissues, can lead to chronic oral infection, bacteraemia, pain, and ultimately, tooth loss. However, with adequate plaque control and thorough, consistent dental care at home, gingivitis is a reversible and manageable condition.

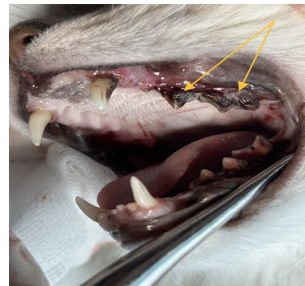
The oral cavity naturally contains bacteria that are typically non-pathogenic. However, if left undisturbed on the teeth, these bacteria multiply and form a soft, sticky film known as dental plaque. Subsequently, if this plaque is not removed, it can thicken and harden into dental

calculus. This plaque develops on the teeth and gums, where bacteria utilise nutrients and produce acids and toxins that can damage tooth enamel and irritate the gums. During the clinical examination of cats with halitosis, patients were observed with changes characterised by the accumulation of dental plaque (Fig. 4) and the formation of dental calculus (Fig. 5).



**Figure 4.** Dental plaque in a cat  
*Note:* arrows indicate areas of creamy-coloured dental plaque deposits

*Source:* authors' photo



**Figure 5.** Dental calculus in a cat  
*Note:* arrows indicate areas of black dental calculus deposits

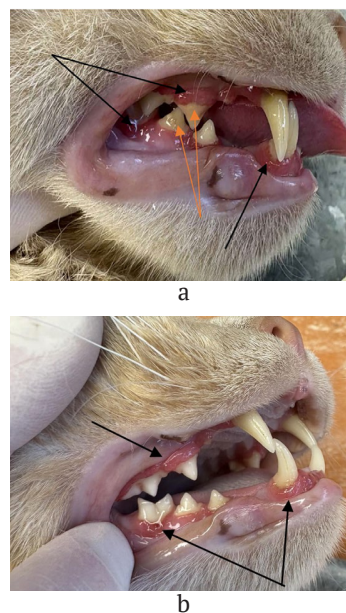
*Source:* authors' photo

Example 3. Bublyk, a mixed-breed cat, 5 years old, weighing 5.8 kg, is housed in an apartment. According to the medical history, the owners noticed a persistent unpleasant odour from the cat's mouth over the course of the year. The cat consumed only soft food. During the clinical examination of the animal (Fig. 4), areas of creamy-coloured plaque accumulation were observed on the crowns of the

teeth, which consisted of a soft film of bacteria, saliva, and food that had formed on the tooth surfaces. J.M. Croft *et al.* (2022) established that while the bacteria in the feline oral cavity are generally considered commensal, inflammation only occurs when dental plaque, which harbours these bacteria, accumulates above the gum line, in the subgingival region, and at the base of the tooth. Furthermore, research by P. Dai *et al.* (2024) has demonstrated that pathologies within the oral cavity arise in a state of imbalance in its microflora.

Example 4. Begemot, a mixed-breed cat, 4.2 years old, weighing 4 kg, is housed in an apartment. According to the medical history, the owners noticed an unpleasant odour from the cat's mouth for a month. The cat consumed dry food but chewed primarily on the right side, with excessive salivation. During the clinical examination of the animal (Fig. 5), it was found that on the left side of the upper jaw, there was a hard, calcified black plaque on the teeth, known as dental calculus. This hard plaque was pressing on the gum tissues, causing pain and inflammation. C.M. Bollen & T. Beikler (2012) demonstrated that when dental plaque hardens through the absorption of minerals from both saliva and the gingiva itself, it transforms into dental calculus. Dental calculus has a rough surface to which pathogenic bacteria can readily attach. Therefore, it is not the calculus itself, but the bacteria colonising its surface, that triggers the inflammatory response. L.D.C. Araujo *et al.* (2022) noted that pathogenic bacteria accumulating on and below the gum line produce substances capable of damaging the cells forming the barrier between the gums and teeth. This allows bacteria access to the connective tissue beneath the teeth, leading to gingival inflammation and pain. M. Zhang *et al.* (2024) investigated that cats with a robust immune system may not exhibit an inflammatory response to the proliferation of pathogenic bacteria.

In the absence of routine oral examinations in animals, timely treatment of gingivitis, and the removal of dental plaque and calculus from the tooth crowns, oral diseases can progress to a chronic state. Indeed, among the cats examined in this study, the highest number of animals presented with clinical signs of chronic gingivostomatitis (Figs. 6a, 6b).



**Figure 6.** Condition of the gums and teeth in a cat with chronic gingivostomatitis

*Note:* a - before treatment, black arrows indicate inflamed and swollen tissues of the oral cavity; orange arrows indicate the presence of dental plaque on the crowns of the teeth; b - after treatment, arrows indicate a reduction in the inflammatory process in the gum area following treatment and the dentition after the removal of dental plaque

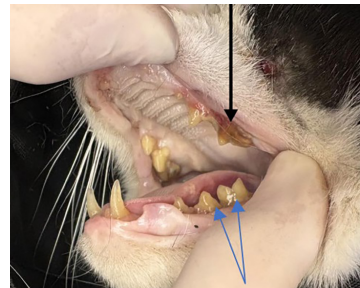
*Source:* authors' photo

Example 5. Vaska, a mixed-breed cat, 9 years old, weighing 3.2 kg, is housed in an apartment. According to the history, the owners had noticed an unpleasant smell in the cat's mouth for over two years. The cat eats very poorly, only soft food, and is losing weight. It

has become more aggressive. During the clinical examination of the animal (Figs. 6a, 6b), it was observed that the mucous membranes of the gums and oral cavity were inflamed, hyperaemic with bleeding areas, and swollen in the area of the gums and palate. Dental plaque was noted on the surface of the tooth crowns. During feeding, the cat exhibited salivation, pain, and enlargement of the mandibular lymph nodes. According to A.C. Fontes *et al.* (2023), feline gingivostomatitis is a common chronic inflammatory condition of the oral cavity with a not fully understood aetiopathogenesis, characterised by persistent, severe inflammation of the oral mucous membranes. The age, sex, and breed of the animal do not appear to influence the likelihood of developing chronic gingivostomatitis. M. Soltero-Rivera *et al.* (2024) established that the mucous membrane in cats suffering from gingivostomatitis is typically bright red, friable in texture, nodular, and prone to bleeding. P. Dai *et al.* (2024) found that the inflammation of the mucous membrane is most often symmetrical and bilateral, frequently accompanied by purulent discharge within the oral cavity, affecting the gums, the buccal mucosa, and the palate. The mandibular lymph nodes are usually enlarged. During yawning and eating, affected animals may vocalise in pain, stop abruptly, and twitch. The behaviour of these cats often changes. As P. Kamlangchai *et al.* (2024) reported, animals may become excessively aggressive or, conversely, consistently hide and avoid human interaction. In differentiating gingivostomatitis from periodontitis and gingivitis, L. Bashor *et al.* (2024) noted that gingivostomatitis invariably involves inflammation of the soft palate and pharynx, whereas, in periodontal diseases, inflammation is confined to the gums and tissues surrounding the teeth.

In the absence of treatment for the aforementioned conditions, the pathological process

can extend to periodontitis, which may lead to the development of pathological tooth mobility and eventual tooth loss. Lesions associated with the progressive loss of tooth structure are most commonly observed at the neck of the tooth, where the crown meets the gum line. A cavity may form in the tooth, but often in the early stages, the problem may not be visually apparent and can only be diagnosed through radiography. In the initial phases of resorption, the animal may not exhibit any overt clinical signs. During the examination of cats with halitosis in this study, cases of tooth resorption were documented (Figs. 7, 8).



**Figure 7.** External tooth resorption in a cat (crown involvement)

**Note:** the black arrow indicates the location of the affected tooth, and the blue arrows point to dental plaque  
**Source:** authors' photo



**Figure 8.** Internal tooth resorption in a cat (root involvement)

**Note:** the site of the pathological process within the oral cavity was identified during clinical examination  
**Source:** authors' photo

Example 6. Smurfik, a mixed-breed cat, 6 years old, weighing 4.6 kg, is housed in an apartment. The medical history revealed that the owners had noticed an unpleasant smell in the cat's mouth for a month. The cat frequently refused food, and when eating, it chewed on the right side of its mouth with excessive salivation. It constantly tried to paw at its mouth. During the clinical examination (Fig. 7), a tooth lesion was detected, along with the presence of hard plaque on the tooth crown, inflammation, and bleeding of the gums around the affected tooth. Slight tooth mobility and a pink defect in the tooth at the junction with the gums were noted. J.G. Anderson *et al.* (2023) observed that by the time such a defect is detected, the tooth is often already significantly compromised. These types of resorptive lesions can vary in severity, ranging from relatively small defects at the gum line to extensive defects in the enamel of the tooth crown. Tooth resorption is not always associated with gingivitis. L. Bashor *et al.* (2024) established that tooth resorption is a process whereby the tooth structure is destroyed, starting from within and progressing to adjacent tissues. Tooth resorption is the most common cause of tooth loss in cats, with 30% to 70% of cats showing evidence of this destructive process. The underlying cause of tooth resorption remains unknown.

Example 7. Nafania, a mixed-breed cat, 6 years old, weighing 5.4 kg, is housed in an apartment. The medical history revealed that the owners had noticed an unpleasant smell in the cat's mouth for a week. The cat cried in pain during meals and refused solid food. During the clinical examination (Fig. 8), a defect was found on the inner surface of the tooth crown, and the area of the gums around the affected tooth was inflamed and painful. M.X. Rodrigues *et al.* (2019) demonstrated that tooth resorption is associated with significant pain, which leads to cats being reluctant to eat or refusing food altogether. Affected cats may also exhibit

excessive salivation, turn their head to the side while eating, and become very irritable. Establishing a definitive diagnosis requires a thorough examination of the oral cavity and teeth, careful inspection for any lesions, and, if necessary, radiographic evaluation.

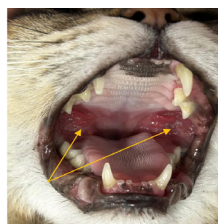
Among the causes of halitosis identified in the animals were infectious pathologies and neoplasms, both of which were associated with excessive salivation, a reduced appetite, and bleeding from the pathologically altered tissues. Oral tumours are often painful, particularly during feeding. A common initial sign of an oral tumour is a reluctance to eat, which is frequently accompanied by weight loss. Lesions of the oral cavity tissues were observed, specifically the appearance of ulcers on the tongue in cases of feline calicivirus infection (Fig. 9) and soft tissue neoplasms within the oral cavity (Fig. 10).



**Figure 9.** Lesions of the tongue and upper palate due to calicivirus in a cat

**Note:** arrows indicate the location of ulcers on the tongue and upper palate

**Source:** authors' photo



**Figure 10.** Soft tissue neoplasm in the oral cavity of a cat

**Note:** arrows indicate areas of tissue affected by the neoplasm

**Source:** authors' photo

Example 8. Simba, a mixed-breed cat, aged 5.5 years, weighing 5.8 kg, is housed in an apartment. According to the medical history, the owners noticed an unpleasant odour from the animal's mouth for a week. The cat completely refused food and exhibited excessive salivation. During the clinical examination (Fig. 9), numerous ulcers were found on the tongue and oral mucosa, along with inflammation in the gingival areas around the crowns of the teeth. Y. Wei *et al.* (2024) demonstrated that cats can be infected with FCV via the nasal, oral, or conjunctival routes. The primary site of viral replication is the oropharynx. Transient viraemia occurs three to four days post-infection, during which time the virus can be detected in many other tissues. FCV causes necrosis of epithelial cells, leading to the formation of vesicles on the tongue that subsequently develop into ulcers. In affected areas, the mucosa is infiltrated with neutrophils. Healing typically occurs within two to three weeks, although it can take considerably longer in some cases. A.C. Fontes *et al.* (2023) noted that the clinical signs can vary depending on the specific FCV strain, the age of the affected cat, and its living conditions. While some infections may be subclinical, a typical syndrome involving ulcers on the tongue and a relatively mild acute respiratory illness is commonly observed.

Example 9. Nora, a mixed-breed cat, aged 5 years, weighing 4.7 kg, is housed in an apartment. According to the medical history, the owners noticed an unpleasant odour from the animal's mouth for several days. The cat continually sat by its food bowl but did not eat, smacked its mouth, and there was a noticeable increase in saliva production. During the clinical examination (Fig. 10), tissue overgrowth was found in the oral cavity with swelling of the surrounding tissues, which was characterised by occasional bleeding. Cytological examination diagnosed an epithelial tumour (non-keratinising squamous cell carcinoma). According to J.G. Anderson *et al.* (2023) and D.H. Kim *et al.* (2023), this type of cancer is common in cats. It is particularly aggressive and tends to spread rapidly to adjacent tissues. This pathology is often associated with visible growths or ulcerated defects in the oral cavity, swelling of the oral tissues, excessive salivation, and loss of appetite and weight, all of which are consistent with the findings in this case.

Analysis of the patients' clinical histories revealed a considerably wide range of disease symptoms (clinical presentation). Indeed, chronic gingivostomatitis was the most frequently diagnosed condition among the examined animals presenting with halitosis. Table 1 presents the results of the clinical analysis of native blood from cats with halitosis attributed to chronic gingivostomatitis.

**Table 1.** Changes in morphological indicators of native blood in cats with halitosis due to chronic gingivostomatitis ( $m \pm m$ ,  $n = 10$ )

Blood parameters, units of measurement	Affected animals	Clinically healthy animals
White blood cells, $10^9/L$	$23.2 \pm 1.8^{***}$	$12.3 \pm 1.0$
Platelets, $10^9/L$	$286.0 \pm 14.3^{***}$	$420.0 \pm 17.4$
Red blood cells, $10^{12}/L$	$6.9 \pm 1.4^*$	$8.5 \pm 0.6$
Haematocrit, %	$42.0 \pm 3.5$	$48.0 \pm 1.3$
Haemoglobin, g/L	$145.0 \pm 12.2$	$162.0 \pm 11.6$
Eosinophils, %	$3.1 \pm 0.4^*$	$1.8 \pm 0.3$

**Note:**  $^*P < 0.05$ ;  $^{***}P < 0.001$ , the difference is statistically significant compared to clinically healthy animals

**Source:** authors' development

According to the data presented in Table 1, leukocytosis was observed in the native blood of animals with chronic gingivostomatitis. Specifically, affected cats showed an 88.6% increase in white blood cell count ( $P < 0.001$ ) compared to clinically healthy animals. This leukocytosis in cats with halitosis suggests the presence of an infection within the body. Thrombocytopenia was also recorded in the native blood of the examined cats, with a 1.5-fold reduction in platelet count ( $P < 0.001$ ) compared to clinically healthy animals. These animals also presented with erythrocytopenia, showing a 1.2-fold reduction in red blood cell count ( $P < 0.05$ ), which may indicate the development of anaemia.

However, the haematocrit and haemoglobin levels in the blood of these cats remained within the physiological range. The 1.7-fold increase in eosinophil count (eosinophilia) in the blood of cats with oral cavity pathology ( $P < 0.05$ ) suggested the presence of an inflammatory process with an allergic component. Furthermore, as the condition progresses to a chronic form, the symptoms of inflammation change, significantly increasing the detriment to dental and overall health. Therefore, an investigation was conducted into the effect of chronic gingivostomatitis on the quantitative parameters of biochemical indicators in the blood plasma of cats with halitosis (Table 2).

**Table 2.** Changes in biochemical indicators in the blood plasma of cats with halitosis due to chronic gingivostomatitis ( $M \pm m$ ,  $n = 10$ )

Parameter	Affected animals	Clinically healthy animals
Aspartate aminotransferase, U/L	56.3 ± 2.2***	40.0 ± 2.3
Alanine aminotransferase, U/L	90.0 ± 10.3	90.0 ± 6.0
Alkaline phosphatase, U/L	45.4 ± 2.3***	62.3 ± 4.2
Gamma-glutamyl transpeptidase, U/L	1.2 ± 0.4**	5.3 ± 1.2
Glucose, mmol/L	6.3 ± 1.1*	4.6 ± 1.3
Creatinine, µmol/L	186.6 ± 12.3***	70.0 ± 3.8
Urea nitrogen, mmol/L	10.2 ± 2.2***	5.3 ± 0.9

**Note:** \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$  compared to clinically healthy animals

**Source:** authors' development

Table 2 shows that the activity of aspartate aminotransferase in the blood plasma of cats with oral cavity pathologies was 1.4 times higher ( $P < 0.001$ ) compared to clinically healthy animals. This increase in aminotransferase activity in the blood plasma of cats with chronic gingivostomatitis may indicate damage to the myocardium and muscle tissue. The activity of alanine aminotransferase in the blood of cats with oral cavity pathologies remained within the physiological range, suggesting no significant changes in liver function. The activity of alkaline phosphatase in the blood plasma of

cats with oral cavity pathologies was 1.4 times lower ( $P < 0.001$ ) compared to clinically healthy animals. This decrease in alkaline phosphatase activity in the blood of affected cats may indicate a disturbance in bone metabolism. The activity of gamma-glutamyl transferase in the blood plasma of cats with oral cavity pathologies was 4.4 times lower ( $P < 0.01$ ) compared to clinically healthy animals, which could suggest alterations in the function of the hepato-biliary system. Additionally, the concentration of glucose in the blood plasma of cats with oral cavity pathologies was 1.4 times higher ( $P < 0.05$ )

compared to clinically healthy animals. The increased concentration of this carbohydrate in the blood of affected cats may be a consequence of stress, inflammatory processes, or metabolic disturbances. The creatinine concentration in the blood of these cats was 2.7 times higher ( $P < 0.001$ ) compared to clinically healthy animals. An elevated creatinine concentration in the blood plasma primarily indicates impaired renal filtration capacity. Concurrently, the urea nitrogen content in the blood of cats with oral cavity pathology was 1.9 times higher ( $P < 0.001$ ) compared to clinically healthy animals, further supporting the development of renal complications.

Therefore, based on the results of the haematological and biochemical investigations conducted, it can be concluded that oral cavity pathology manifesting as halitosis has a generalised impact on the health of affected cats. The development of this group of diseases may also occur in conjunction with functional impairments of the heart, kidneys, and hepato-biliary system. Halitosis is most frequently associated with chronic gingivostomatitis. Gingival inflammation with the formation of lesions or ulcers around the teeth and on the mucous membrane is a polyetiologiological condition with a pathogenesis linked to systemic pathological processes arising from dysfunctions in the body's most vital systems.

## Conclusions

Clinical examination methods are informative in determining the causes of halitosis in cats. The clinical history revealed that, along with the presence of bad breath, owners frequently observed a decrease in their pet's appetite, difficulty eating, or even a complete refusal to eat. Increased salivation, smacking, and attempts to paw at the mouth were noted in almost all the cats examined. The animals had often experienced weight loss and had become more

aggressive, likely due to the pain associated with their oral pathologies. The results of the clinical examinations of cats with halitosis showed that 8% of the animals had gingivitis, clinically characterised by hyperaemia and swelling of the gingival mucosa around the tooth crowns, along with moderate salivation. Periodontitis was diagnosed in 7% of the cats. This condition caused damage to the tissues surrounding the tooth, affecting the tooth itself. Dental calculus, formed by the hardening and mineralisation of dental plaque – a soft film of bacteria, saliva, and food debris on the tooth crown surface – was recorded in 14% of the animals, with the same prevalence as stomatitis. Tooth resorption was noted in 13% of the animals, which typically presented with poor food intake, frequent pawing at the mouth, and salivation. In these cases, the affected tooth was often mobile and required extraction as it acted as a source of infection within the oral cavity. In 11% of cats, halitosis was associated with viral infection, manifesting as ulcers on the tongue, oral mucosa, and palate. Neoplasms were diagnosed in 6% of the examined cats, with cytological examination of the oral tissues identifying squamous cell carcinoma. The most frequent diagnosis associated with halitosis in cats was chronic gingivostomatitis (27%), characterised by typical clinical signs such as lethargy and apathy, redness and swelling of the gums, intermittent gingival bleeding, and the formation of lesions and ulcers on the mucous membranes. However, halitosis in animals may not always be due to local oral pathologies. Underlying systemic diseases, such as heart, kidney, and hepato-biliary disorders, as well as anaemia, can also be significant causes of halitosis in cats, as supported by the results of the morphological and biochemical blood analyses. Leukocytosis ( $23.2 \pm 1.85 \cdot 10^9/L$ ,  $P < 0.001$ ) and eosinophilia ( $3.1 \pm 0.4\%$ ,  $P < 0.05$ ) indicated the presence of

infection and an inflammatory reaction with an allergic component in these animals.

Future research will focus on evaluating the effectiveness of preventative and treatment strategies for cats with pathological processes in the oral cavity. Comprehensive studies are also planned to identify the early impact of oral lesions on other organ systems within the body.

## Acknowledgements

None.

## Funding

The study received no funding.

## Conflict of Interest

None.

## References

- [1] Anderson, J.G., & Hennet, P. (2022). Management of severe oral inflammatory conditions in dogs and cats. *The Veterinary Clinics of North America. Small Animal Practice*, 52(1), 159-184. [doi: 10.1016/j.cvsm.2021.09.008](https://doi.org/10.1016/j.cvsm.2021.09.008).
- [2] Anderson, J.G., et al. (2023). The oral microbiome across oral sites in cats with chronic gingivostomatitis, periodontal disease, and tooth resorption compared with healthy cats. *Animals*, 13(22), article number 3544. [doi: 10.3390/ani13223544](https://doi.org/10.3390/ani13223544).
- [3] Araujo, L.D.C., Furlaneto, F.A.C., da Silva, L.A.B., & Kapila, Y.L. (2022). Use of the probiotic *Bifidobacterium animalis* subsp. *lactis* HN019 in oral diseases. *International Journal of Molecular Sciences*, 23(16), article number 9334. [doi: 10.3390/ijms23169334](https://doi.org/10.3390/ijms23169334).
- [4] Bashor, L., et al. (2024). Impacts of antiretroviral therapy on the oral microbiome and periodontal health of feline immunodeficiency virus positive cats. *Viruses*, 17(2), article number 257. [doi: 10.3390/v17020257](https://doi.org/10.3390/v17020257).
- [5] Bollen, C.M., & Beikler, T. (2012). Halitosis: The multidisciplinary approach. *International Journal of Oral Science*, 4(2), 55-63. [doi: 10.1038/ijos.2012.39](https://doi.org/10.1038/ijos.2012.39).
- [6] Carvalho, D.O L., et al. (2025). The association of infectious and parasitic pathogens in the etiology of chronic stomatitis and feline gingivostomatitis: A multifactorial approach. *Revista Caderno Pedagógico*, 22(1), article number e13636. [doi: 10.54033/cadpedv22n1-242](https://doi.org/10.54033/cadpedv22n1-242).
- [7] Croft, J.M., Patel, K.V., Inui, T., Ruparell, A., Staunton, R., & Holcombe, L.J. (2022). Effectiveness of oral care interventions on malodour in dogs. *BMC Veterinary Research*, 18, article number 164. [doi: 10.1186/s12917-022-03267-8](https://doi.org/10.1186/s12917-022-03267-8).
- [8] Cunha, E., Tavares, L., & Oliveira, M. (2022). Revisiting periodontal disease in dogs: How to manage this new old problem? *Antibiotics (Basel, Switzerland)*, 11(12), article number 1729. [doi: 10.3390/antibiotics11121729](https://doi.org/10.3390/antibiotics11121729).
- [9] Dai, P., Yang, M., Du, J., Wang, K., Chen, R., Feng, X., Chen, C., & Zhang, X. (2024). Epidemiological investigation of feline chronic gingivostomatitis and its relationship with oral microbiota in Xi'an, China. *Frontiers in Veterinary Science*, 11, article number 1418101. [doi: 10.3389/fvets.2024.1418101](https://doi.org/10.3389/fvets.2024.1418101).
- [10] Di Cerbo, A., Pezzuto, F., Canello, S., Guidetti, G., & Palmieri, B. (2015). Therapeutic effectiveness of a dietary supplement for management of halitosis in dogs. *Journal of Visualized Experiments: JoVE*, (101), article number e52717. [doi: 10.3791/52717](https://doi.org/10.3791/52717).
- [11] Directive of the European Parliament and of the Council No. 2010/63/EU "On the Protection of Animals Used for Scientific Purposes". (2010, September). Retrieved from <https://eur-lex.europa.eu/eli/dir/2010/63/oj/eng/>.

- [12] European Convention for the Protection of Vertebrate Animals Used for Research and Other Scientific Purposes. (1986, March). Retrieved from [https://zakon.rada.gov.ua/go/994\\_137](https://zakon.rada.gov.ua/go/994_137).
- [13] Fontes, A.C., Vieira, M.C., Oliveira, M., Lourenço, L., Viegas, C., Faisca, P., Seixas, F., Requicha, J.F., & Pires, M.A. (2023). Feline calicivirus and natural killer cells: A study of its relationship in chronic gingivostomatitis. *Veterinary World*, 16(8), 1708-1713. doi: [10.14202/vetworld.2023.1708-1713](https://doi.org/10.14202/vetworld.2023.1708-1713).
- [14] Guilherme-Fernandes, J., Fonseca, A.J.M., Aires, T., Lima, S.A.C., Maia, M.R.G., & Cabrita, A.R.J. (2024). Unveiling the effects of shrimp hydrolysate as a dietary ingredient in healthy adult Beagle dogs. *Journal of Animal Science*, 102, article number skae280. doi: [10.1093/jas/skae280](https://doi.org/10.1093/jas/skae280).
- [15] Hofmann-Lehmann, R., et al. (2022). Calicivirus infection in cats. *Viruses*, 14(5), article number 937. doi: [10.3390/v14050937](https://doi.org/10.3390/v14050937).
- [16] Kamlangchai, P., Kampa, N., Srithunyarat, T., Seesupa, S., Hoisang, S., Kaenkangploo, D., Jitasombuti, P., Nonthakotr, C., Boonbal, N., & Jitpean, S. (2024). Assessing the potential efficacy of 830-nanometer low-level laser therapy in cats: Extraoral applications. *Veterinary World*, 17(5), 1124-1129. doi: [10.14202/vetworld.2024.1124-1129](https://doi.org/10.14202/vetworld.2024.1124-1129).
- [17] Khomyn, N., Mysak, A., Tsisinska, S., Pritsak, V., Nazaruk, N., & Khomyn, M. (2020). Comprehensive treatment of dogs with chronic generalized periodontitis in remission. *Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies. Series: Veterinary Sciences*, 22(98), 57-62. doi: [10.32718/nvlvet9810](https://doi.org/10.32718/nvlvet9810).
- [18] Kim, D.H., Kwak, H.H., & Woo, H.M. (2023). Prevalence of feline chronic gingivostomatitis in feral cats and its risk factors. *Journal of Feline Medicine and Surgery*, 25(1), article number 1098612X221131453. doi: [10.1177/1098612X221131453](https://doi.org/10.1177/1098612X221131453).
- [19] Law of Ukraine No. 3447-IV “On the Protection of Animals from Cruelty”. (2006, February). Retrieved from <https://zakon.rada.gov.ua/go/3447-15>.
- [20] Oba, P.M., Sieja, K.M., Schauwecker, A., Somrak, A.J., Hristova, T.S., Keating, S.C.J., & Swanson, K.S. (2024). Effects of a novel dental chew on oral health outcomes, halitosis, and microbiota of adult dogs. *Journal of Animal Science*, 102, article number skae071. doi: [10.1093/jas/skae071](https://doi.org/10.1093/jas/skae071).
- [21] Ohira, C., Kaneki, M., Shirao, D., Kurauchi, N., & Fukuyama, T. (2025). Oral treatment with catechin isolated from Japanese green tea significantly inhibits the growth of periodontal pathogen *Porphyromonas gulae* and ameliorates the gingivitis and halitosis caused by periodontal disease in cats and dogs. *International Immunopharmacology*, 146, article number 113805. doi: [10.1016/j.intimp.2024.113805](https://doi.org/10.1016/j.intimp.2024.113805).
- [22] Oskarsson, K., Axelsson Puurtinen, L., & Penell, J.C. (2021). Dental problems and prophylactic care in cats-knowledge and perceptions among Swedish cat owners and communication by veterinary care staff. *Animals*, 11(9), article number 2571. doi: [10.3390/ani11092571](https://doi.org/10.3390/ani11092571).
- [23] Park, M.K., & Song, K.H. (2024). Case report: Allogeneic feline umbilical cord-derived mesenchymal stem cell transplantation for feline oral squamous cell carcinoma. *Frontiers in Veterinary Science*, 11, article number 1443110. doi: [10.3389/fvets.2024.1443110](https://doi.org/10.3389/fvets.2024.1443110).
- [24] Rodrigues, M.X., Bicalho, R.C., Fiani, N., Lima, S.F., & Peralta, S. (2019). The subgingival microbial community of feline periodontitis and gingivostomatitis: Characterization and comparison between diseased and healthy cats. *Scientific Reports*, 9(1), article number 12340. doi: [10.1038/s41598-019-48852-4](https://doi.org/10.1038/s41598-019-48852-4).

- [25] Soltero-Rivera, M., Shaw, C., Arzi, B., Lommer, M., & Weimer, B.C. (2024). Feline chronic gingivostomatitis diagnosis and treatment through transcriptomic insights. *Pathogens (Basel, Switzerland)*, 13(3), article number 192. doi: [10.3390/pathogens13030192](https://doi.org/10.3390/pathogens13030192).
- [26] Taylor, S., Gruen, M., KuKanich, K., Lascelles, B.D., Monteiro, B.P., Sampietro, L.R., Robertson, S., & Steagall, P.V. (2024). 2024 ISFM and AAEP consensus guidelines on the long-term use of NSAIDs in cats. *Journal of Feline Medicine and Surgery*, 26(4), article number 1098612X241241951. doi: [10.1177/1098612X241241951](https://doi.org/10.1177/1098612X241241951).
- [27] Villatoro, A.J., Martín-Astorga, M.D.C., Alcoholado, C., Kazantseva, L., Cárdenas, C., Fariñas, F., Becerra, J., & Visser, R. (2022). Secretory profile of adipose-tissue-derived mesenchymal stem cells from cats with calicivirus-positive severe chronic gingivostomatitis. *Viruses*, 14(6), article number 1146. doi: [10.3390/v14061146](https://doi.org/10.3390/v14061146).
- [28] Voloboieva, U.I., Bilyi, D.D., & Stotskyi, O. (2023). Prevalence and risk factors of dental disease in dogs (overview). *Bulletin of Sumy National Agrarian University. The Series: Veterinary Medicine*, 3(62), 21-28. doi: [10.32782/bsnau.vet.2023.3.3](https://doi.org/10.32782/bsnau.vet.2023.3.3).
- [29] Voloboieva, U.I., & Bilyi, D.D. (2024). Clinical rationale of diagnostic approaches in the dental examination of dogs. *Theoretical and Applied Veterinary Medicine*, 12(2), 24-30. doi: [10.32819/2024.12009](https://doi.org/10.32819/2024.12009).
- [30] Wei, Y., Zeng, Q., Gou, H., & Bao, S. (2024). Update on feline calicivirus: Viral evolution, pathogenesis, epidemiology, prevention and control. *Frontiers in Microbiology*, 15, article number 1388420. doi: [10.3389/fmicb.2024.1388420](https://doi.org/10.3389/fmicb.2024.1388420).
- [31] Zhang, M., Cui, Y., Mei, X., Li, L., Wang, H., Li, Y., & Wu, Y. (2024). Effect of dietary composite probiotic supplementation on the microbiota of different oral sites in cats. *Veterinary Sciences*, 11(8), article number 351. doi: [10.3390/vetsci11080351](https://doi.org/10.3390/vetsci11080351).

## Клініко-морфологічні ознаки в котів за галітозу

### Марія Куліда

Кандидат ветеринарних наук, доцент  
Національний університет біоресурсів і природокористування України  
03041, вул. Героїв Оборони, 15, м. Київ, Україна  
<https://orcid.org/0000-0001-8937-1972>

### Якуб Ніцпонець

Доктор габілітований ветеринарних наук, професор  
Вроцлавський університет наук про навколишнє середовище та життя  
50366, вул. Норвіда, 25, м. Вроцлав, Польща  
<https://orcid.org/0000-0002-8168-6301>

### Павел Солонін

Кандидат ветеринарних наук, доцент  
Національний університет біоресурсів і природокористування України  
03041, вул. Героїв Оборони, 15, м. Київ, Україна  
<https://orcid.org/0000-0003-0119-6490>

### Віталій Олійник

Головний лікар  
Ветеринарна клініка дрібних тварин «VetGeneration Holosiiv»  
03127, вул. Героїв Оборони, 9/10, м. Київ, Україна  
<https://orcid.org/0000-0001-5343-6500>

**Анотація.** Актуальність дослідження зумовлена збільшенням скарг власників котів при зверненні до ветеринарних клінік щодо випадків появи в цих тварин неприємного запаху з ротової порожнини (галітозу). У зв'язку з цим, матеріал статті присвячено питанням встановлення захворювань та їх клінічних проявів, на тлі яких найчастіше виникає галітозу у котів. Для оцінки розвитку галітозу в цих тварин проводили збір анамнезу та клінічний огляд порожнини рота. Визначено найпоширеніші патології, що розвиваються в ротовій порожнині, які супроводжуються появою неприємного запаху. Встановлено, що у 27 % досліджених тварин галітозу виникав на тлі хронічного гінгівостоматиту, в 14 % котів він розвивався внаслідок прояву стоматиту та зубного каменю, у 13 % випадків його причиною була резорбція зуба, у 11 % особин діагностували вірусні захворювання ротової порожнини. Найрідше у тварин з галітозом діагностували гінгівіт (8 %), пародонтит (7 %) та новоутворення (7 %) в порожнині рота. Морфологічні та біохімічні дослідження крові у тварин із хронічним гінгівостоматитом, що супроводжувався галітозом, дозволили виокремити маркерні зміни гематологічних показників та їх відповідність патологічним процесам. Так, за результатами клінічного аналізу нативної крові в котів за хронічного гінгівостоматиту з клінічним проявом галітозу відмічали збільшення кількості лейкоцитів на 88,6 % ( $P < 0,001$ ), еозинофілів в 1,7 раза ( $P < 0,05$ ) та зменшення кількості тромбоцитів в 1,5 раза ( $P < 0,001$ ), еритроцитів в 1,2 раза ( $P < 0,05$ ) порівняно з клінічно здоровими тваринами. Встановлені закономірності свідчать про наявність виражених деструктивних змін у клітинах слизової оболонки ротової порожнини та взаємопов'язаних тканин і органів. Матеріал статті становить

практичну цінність для практикуючих ветеринарних лікарів та важливий для використання у діагностиці і прогнозуванні перебігу захворювань з клінічним проявом галітозу, виборі оптимальної стратегії лікування та моніторингу його ефективності

**Ключові слова:** ротова порожнина; гінгівіт; стоматит; хронічний гінгівостоматит; виразка язика; плоскоклітинний рак