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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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IMPROVEMENT OF THE METHODOLOGY OF BIOMATERIAL COLLECTION FOR THE DIAGNOSIS OF THE ORAL CAVITY MUCOSA DISEASES

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Abstract.

Aim: To improve the methodology for collecting material from lesions of the oral mucosa for exfoliative cytological examination.

Material and methods: A group of patients diagnosed with B37.0 Candida stomatitis was examined. To clarify the diagnosis, various methods of collecting biological material from the tongue of patients were used, namely, the method using a cytobrush with subsequent fixation of cytological material on a slide. The microbiota of the back of the tongue was analyzed in 12 patients with glossitis and 12 healthy subjects (the control group). The microscopic method of research was used - using an immersion microscope MICROmed@XS-3330, and the morphological and tinctorial properties of microorganisms were determined. In ten fields of view, the number of leukocytes, the nature of epithelial cells, and the presence of various microorganisms were detected and counted. A comparison of the quality of the use of the microscope method for the study of the tongue microbiota of patients with candidal glossitis was performed under the conditions of taking pathological material using a dental scalpel and an oral cytobrush. For a reasonable interpretation of the results and determination of their significance, a statistical analysis was performed to determine the frequency of detection of microorganisms in patients with glossitis and healthy subjects, depending on the nature of the material taken from the back of the tongue using a dental scalpel or cytobrush.

Results: The studies showed that the etiologic structure of glossitis pathogens was dominated by *Candida* yeast-like fungi, but cases of leptotrichosis aetiology were observed (16.7%). Monococci and gram-negative monobacteria were detected in all studied groups. An increase in the diversity of microorganisms was found when the material was taken with a cytobrush. The microbiota of all subjects differed depending on the type of instrument used for sampling. Thus, in the group of healthy individuals, the interdental brush helped to detect twice as many streptococci as a scalpel. In patients with candidiasis, a brush biopsy showed a 2.7-fold increase in gram-positive diplococci, twice as many streptococci and gram-positive bacilli, three times as many staphylococci, 2.25 times as many clusterforming gram-negative cocci, and 2.3 times as many gram-negative diplococci.

Conclusions: A significant increase in the diversity of microorganisms was observed with the cytobrush compared to the use of a dental scalpel. In patients with glossitis, the accumulation of keratinized epithelial cells was significantly higher compared to the presence of young cells in healthy subjects, regardless of the method of sampling.

Key words. Cytobrush, microbiota, candidiasis, oral mucosa, glossitis.

Introduction.

Diagnostics of diseases of the oral mucosa is always a complex and urgent problem in the practice of a dentist. Examination of the oral cavity is traditionally considered to be the necessary and best approach to detecting pathologies of the oral mucosa. It is a non-invasive method that can be quickly performed by many healthcare professionals without any additional cost to the patient. However, the evidence for visual inspection as an effective screening method remains controversial [1]. Experts have concluded that there is currently insufficient evidence to support or refute the use of oral examination as an effective screening test [2]. For the diagnosis of many inflammatory diseases of the oral mucosa, precancerous and oncological pathologies, blistering, and fungal lesions, exfoliative cytology is used for additional research methods [3,4]. It is considered an important method of morphological diagnosis, which allows assessment of the nature of the pathological process, changes in tissue reactivity and disease dynamics.

Aim: Our work was aimed to improve the methodology for collecting material from lesions of the oral mucosa for exfoliative cytological examination.

Materials and Methods.

Recognizing the main limitations of oral exfoliative cytology and the desire to improve the quality of smears and the sampling procedure by modifying the sampling tools to reduce the number of false-negative results, we proposed the use of a device for obtaining material from the surface of the tongue. The device is based on an interdental brush made of high-quality hypoallergenic materials: the villi are made of nylon, and the rod is made of a medical alloy that does not undergo oxidation. The device consists of two elements: a holder handle, which can be long or short; and a working part containing villi. The neck can be easily bent in either direction for comfort when taking material, and the nylon villi penetrate anatomical structures and can capture more cells from the lesion. This design of the interdental brush made it possible to make a device in the form of an oval brush on a rigid base, which increased the quality and area of sampling during exfoliative cytology (Figure 1).

This cytobrush also proved to be less traumatic for patients than scalpels. Currently, there are no similar patented systems for oral exfoliative cytology in Ukraine.

We examined a group of patients diagnosed with B37.0 Candida stomatitis (ICD). To clarify the diagnosis, we used different methods of collecting biological material from the back of the tongue of patients: using a dental scalpel, which is

Figure 1. *The sterile brush biopsy instrument.*

classical [5], and the cytobrush proposed by us with subsequent fixation of the cytological material on a slide.

The microscopic examination was performed at the Department of Microbiology, Virology, and Immunology of Poltava State Medical University (PSMU). Despite numerous studies in recent years, the tongue microbiota of patients with candidal glossitis remains insufficiently studied [6]. Therefore, to achieve the aim of this study, we compared the quality of the microscopic method for studying the tongue microbiota of patients with candidal glossitis when taking pathological material using a dental scalpel and an oral cytobrush. The microbiota of the back of the tongue was analyzed in 12 patients with glossitis and 12 healthy subjects (control group).

Smears were made by the thick drop method and stained by Romanowski-Gyemza and Gram stains. The microscopic method was used to determine the morphological and tinctorial properties of microorganisms using a MICROmed@XS-3330 immersion microscope. In ten fields of view, the number of leukocytes, the characteristics of epithelial cells, and the presence of various microorganisms were detected and counted.

For a reasonable interpretation of the results and to establish their significance, statistical analysis was performed to determine the frequency of detection of microorganisms in patients with glossitis and healthy subjects, depending on the nature of the material taken from the back of the tongue using a dental scalpel or cytobrush.

Results.

We found that the tongue microbiota of patients with candidal glossitis differs significantly from that of healthy subjects. In addition, the microscopic picture of the microbiota of almost every subject changed depending on the nature of the material taken from the back of the tongue using a dental scalpel or brush biopsy. For example, in one healthy subject, when the material was taken with a scalpel, epithelial cells of varying degrees of keratinization were found in ten fields of view, single and in layers, a large number of gram-positive monococci and gram-negative cocci, and many gram-negative rod-shaped bacteria. Gram-positive streptococci and gram-negative filamentous bacteria were present in small numbers, as well as single gram-positive bacilli. When a cytobrush was used on the same subject, the microscopic picture was generally consistent, but we also saw gram-positive yeast-like fungi of the genus Candida. Similarly, in the examination of a patient with candidal glossitis, when the material was taken with a scalpel in ten fields of view, we found epithelial cells of varying degrees of keratinization, many polymorphonuclear neutrophils, large numbers of gram-negative rod-shaped bacteria, many adherent gram-positive monococci on the epithelium, gram-positive lanceolate diplococci, and gram-negative filamentous bacteria. With the help of a dental brush biopsy, the smear showed mainly layers of keratinized epithelium, pseudocolocytes, and the presence of more than 10 leukocytes in each field of view. In addition to the above microorganisms, clusters of gram-negative cocci, gram-positive yeast-like fungi, and gram-negative spiral bacteria were additionally observed. In patients with leptotrichosis, the microscopic picture did not differ depending on the type of instrument used for sampling collection and was represented by layers of keratinized epithelium, mainly gram-negative bacillus-like bacteria, gram-positive monococci and gram-negative filamentous bacteria in large numbers.

Table 1 shows the data on the frequency of detection of microorganisms in patients with glossitis and healthy subjects, depending on the method of taking material from the back of the tongue using a dental scalpel or cytobrush (interdental brush biopsy).

Table 1. *The frequency of detection of microorganisms in patients with glossitis and healthy subjects depending on the method of taking the sample.*

Microorganisms/ groups to be tested	**Control, scalpel**	**Control, cytobrush**	**Glossitis, scalpel**	**Glossitis, cytobrush**
gram-positive monococci	12 (100)	12 (100)	12 (100)	12 (100)
gram-positive diplococci	4 (33,3)	7 (58,3)	3 (25)	8 (66,7)
gram-positive streptococci	4 (33,3)	8 (66,7)	2 (16,7)	4 (33,3)
gram-positive staphylococci	2 (16,7)	3 (25)	1 (8,3)	3 (25)
gram-positive bacilli	4 (33,3)	5 (41,6)	1(8,3)	2 (16,7)
gram-positive branched filamentous bacteria	2 (16,7)	3 (25)	3 (25)	5 (41,6)
gram-negative cocci	5 (41,6)	7 (58,3)	4 (33,3)	9 (75)
gram-negative diplococci	1 (8,3)	2 (16,7)	3 (25)	7 (58,3)
gram-negative rod-shaped bacteria	12 (100)	12 (100)	12 (100)	12 (100)
gram-negative filamentous bacteria	7 (58,3)	5 (41,6)	6 (50)	8 (66,7)
gram-negative spiral bacteria	1 (8,3)	2 (16,7)	2 (16,7)	3 (25)
gram-positive yeast-like fungi	4 (33,3)	5 (41,6)	10 (83,3)	12 (100)
young epithelium	3 (25)	5 (41,6)	1 (8,3)	1 (8,3)
keratinized epithelium	3 (25)	2 (16,7)	7 (58,3)	8 (66,7)
epithelium of varying degrees of keratinization	6 (50)	5 (41,6)	4 (33,3)	3(25)

The analysis showed that a large number of gram-positive monococci and gram-negative rod-shaped bacteria were observed in the microbiota of all subjects. In patients with glossitis, in addition to the above microorganisms, yeast-like fungi were also predominantly detected.

The microbiota of all subjects differed depending on the type of instrument used for sampling. Thus, in a group of healthy individuals, an interdental brush helped to detect twice as many streptococci as a scalpel. In patients with candidiasis, a brush biopsy showed a 2.7-fold increase in gram-positive diplococci, twice as many gram-positive streptococci gram-positive bacilli, three times as many gram-positive staphylococci, 2.25 times as many gram-negative cluster-shaped cocci, and 2.3 times as many gram-negative diplococci.

Thus, both in a group of healthy individuals and in patients with candidal glossitis, the microbiota of the back of the tongue differs significantly depending on the type of instrument used to take pathological material. Thus, a significant increase in the diversity of microorganisms was observed with the use of an interdental brush compared to the use of a dental scalpel.

Regarding cytological studies, it can be stated that in patients with glossitis, the accumulation of keratinized epithelial cells significantly prevailed compared to the presence of young cells in healthy subjects, regardless of the biopsy method.

The studies showed that the etiologic structure of glossitis pathogens was dominated by gram-positive yeast-like fungi of the genus Candida, but cases of leptotrichosis aetiology were observed (16.7%). Gram-positive monococci and gram-negative monobacteria were detected in individuals of all groups. An increase in the diversity of microorganisms was found when the material was taken with a cytobrush.

Discussion.

Candida albicans is the main causative agent of fungal diseases in humans and can often exist as a commensal in the oral cavity, intestines, or genital tract of most people, controlled by the local microbiota, epithelial barriers, and immune defence. Changes in the control system or functional impairment of these species-specific defences can lead to excessive fungal growth and the development of mucosal infections, particularly of the oropharynx, and patients with severe immunodeficiency may be susceptible to life-threatening systemic fungal infections [7].

In recent years, scientists have increasingly focused their attention on the critical importance of the microbiota in maintaining human immunity and protecting against many dental diseases, including candidal glossitis [6]. Studies show that the vast majority of cases of candidiasis are associated with serious microbiota disorders. Irrational antibiotic therapy plays a particularly important role in the spread of fungal infections, leading to the suppression of autochthonous bacteria, which are the main competitors of fungi in humans. They prevent yeast-like fungi from attaching to mucosal cell receptors, compete with them for food sources, block the penetration of Candida fungi through the mucosal barrier, inhibit their growth through the synthesis of antifungal compounds, and enhance the body's antifungal immune response.

When the microbiota is in a normal state, the immune system is fully functional, the full range of protective functions of resident microorganisms is realized, and fungi have little chance of increasing their populations and manifesting pathogenic properties. The risk of developing fungal infections increases dramatically in a pathological change of the composition and functions of the microbiota. Dysbiosis leads to significant immune disorders. Under conditions of dysbiosis, fungi of the *Candida* genus, without meeting resistance from the immune system and resident bacteria, can significantly increase their presence in the body and affect the mucous membranes of the oral cavity, oesophagus, gastrointestinal tract, and genitourinary system.

Oropharyngeal candidiasis is one of the most common manifestations of local dysbiosis and can occur in acute or chronic form. The predisposing factors for the development of glossitis include nutritional deficiencies, salivary hypofunction, smoking, wearing dentures, and T-cell immunity dysfunction, often in the elderly. Many acute cases are caused by treatment with broad-spectrum antibiotics [4,8]. The importance of the interaction between yeast-like fungi and the host microbiota in the transition from *C. albicans* commensalism to pathogenicity and the various factors that influence the composition of the oral microbiota and fungal colonization, and antifungal immunity are widely recognized. The study of the tongue microbiota of patients with candidal glossitis will provide opportunities for targeted complex therapy, including the use of not only antifungal antibiotics, but also probiotics, immunomodulators, antiseptics, and herbal remedies [9-11].

A significant addition to the study of the microbiota in the normal state and the development of infectious pathology of the oral cavity has been made using the latest methodical and methodological approaches, in particular, using genome sequencing and metaproteomics. However, to solve such a problem as improving the methodology for collecting material from lesions of the oral mucosa for exfoliative cytological examination, our data obtained by microscopic examination, firstly, correspond to the literature, and secondly, are sufficient to compare the results of using different tools for taking material [5,8,12].

The appearance and proportion of epithelial and other cells depend on the anatomical site of the oral cytology specimen. Atypical changes in epithelial cells are observed in ulcers and nonspecific inflammation due to irritation. Inflammation of the oral mucosa can be acute or chronic, infectious, or non-infectious in origin. Clinically, it manifests itself in the form of ulceration or erosion, which, in turn, are diffuse or localized, single or multiple [12]. As a result of inflammation, there is an increased rate of epithelial cell desquamation, so much so that the superficial and intermediate epithelial layers are partially or even completely replaced by deeper parabasal squamous cells. The background of an infectious smear from the oral cavity can be protein or hemorrhagic with the presence of polymorphonuclear leukocytes, eosinophils, mast cells, macrophages, lymphocytes, and plasma cells, depending on the type and cause of the infection, as well as the nutritional and immune status of the person. In chronic inflammatory processes, moderate phagocytosis is detected, and in acute inflammatory processes, active phagocytosis is detected, the number of keratinized cells and the keratinization index increase, cellular

and nuclear polymorphism are present, atypical forms of division are detected, and the number of mitoses is increased [12].

In dental practice, certain difficulties in the use of traditional diagnostic methods have been identified, which are associated with the peculiarities of the anatomical structure of various parts of the oral mucosa. The first researchers recognized the main limitations of oral exfoliative cytology and sought to improve the quality of smears. Thus, in gynaecology, after using a cytobrush in the diagnosis of dysplastic lesions of the cervix, the introduction of softer endocervical brushes significantly improved the ability to collect epithelial cells. However, in dental practice, recognizing the main limitations of oral exfoliative cytology and the desire to improve the quality of smears, trying to reduce the number of false-negative results, we proposed the use of an economical device for obtaining material from lesions, simplifying the procedure for taking samples by modifying the instruments for diagnosis. Thus, the use of the proposed cytobrush is an affordable, easy-to-use, economical method of taking material from the back of the tongue for obtaining a reliable and quick answer when studying the oral microbiota in the diagnosis of glossitis.

Conclusion.

Thus, in both groups of healthy individuals and patients with candidal glossitis, the microbiota of the back of the tongue differs significantly depending on the type of instrument used to take pathological material. Thus, a significant increase in the diversity of microorganisms was observed with the use of a cytobrush compared to a dental scalpel.

Regarding cytologic studies, it can be stated that in patients with glossitis, the accumulation of keratinized epithelial cells significantly prevailed compared to the presence of young cells in healthy subjects, regardless of the method of sampling.

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Conflict of interest.

The authors declare no conflict of interest regarding this article.

The authors declare that this work does not create any conflict of interest for any person or institution.

Compliance with Ethics Requirements.

The authors declare that all procedures of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008.

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REFERENCES

1. Bezshapochnyy S, Podovzhnii O, Polianska V, et al. Opportunities and prospects of microbiological diagnosis of ent organs mycoses (review). Georgian Med News. 2020;308:36-43.
2. Perepelova T, Faustova M, Dvornyk V, et al. The level of dysbiosis of the oral cavity depends on the type of dental prosthesis of the patient. Bratisl Lek Listy. 2023;124:599-603.
3. Neumann FW, Neumann H, Spieth S, et al. Retrospective evaluation of the oral brush biopsy in daily dental routine – an effective way of early cancer detection. Clinical oral investigations. 2022;26:6653-6659.
4. Yang G, Wei L, Thong BK.S, et al. A Systematic Review of Oral Biopsies, Sample Types and Detection Techniques Applied in Relation to Oral Cancer Detection. Biotech. 2022;11:5.
5. Petrushanko TA, Tchereda VV, Loban GA. The screening diagnostic of micro ecological disorders of oral cavity. Klinicheschеskaya Laboratornaya Diagnostika. 2014;2014:48-50.
6. Xin Lyu, Hui Zheng, Xu Wang, et al. Oral Microbiota Composition and Function Changes During Chronic Erythematous Candidiasis. Front Cell Infect Microbiol. 2021;11:691092.
7. Bezshapochnyy SB, Zachepylo SV, Polianskaya VP, et al. Opportunistic fungal infections of ent organs. Part 2. Vestn Otorinolaringol. 2019;84:74-81.
8. Vila T, Sultan AS, Montelongo-Jauregui D, et al. Oral Candidiasis: A Disease of Opportunity. J. Fungi. 2020;6:15.
9. Ananieva MM, Faustova MO, Loban GA, et al. Microbiological aspects of chlorophyllipt extract used for prevention of candida postoperative complications. Euro Mediterranean biomedical journal. 2018;13:178-80.
10. Gancho OV, Moshel TM, Boychenko OM, et al. Herbal medicines antimicrobial effect. Georgian Medical News. 2022;328:88-91.
11. Gancho OV, Bublii TD, Kostirenko AP, et al. Antimicrobial effect of citrate buffer with antibiotic. EUMJ. 2022;10:80-87.
12. McRae MP, Modak SS, Simmons GW, et al. Point-of-care oral cytology tool for the screening and assessment of potentially malignant oral lesions. Cancer cytopathology. 2020;128:207-220.