Savitskiy I., Magdenko A., Orel K., Mizevich Y., Dvoretsky R. Investigation of bookal epithely in various pathological states: review of literature. Journal of Education, Health and Sport. 2017;7(3):483-489. eISSN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.439541
http://ojs.ukw.edu.pl/index.php/johs/article/view/4370

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26.01.2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 21.03.2017. Revised 22.03.2017. Accepted: 23.03.2017.

УДК 616.01/09:61.616-002:616-006:616.24-002-08

INVESTIGATION OF BOOKAL EPITHELY IN VARIOUS PATHOLOGICAL STATES: REVIEW OF LITERATURE

I. Savitskiy, A. Magdenko, K. Orel, Y. Mizevich, R. Dvoretsky

Odessa National Medical University
Mykolaiv Regional Oncology Center
Odessa Regional Clinical Hospital

Abstract

The work analyzes the scientific works of foreign and domestic scientists over the past 10 years, devoted to the study of buccal epithelium in various pathological conditions. It has been established that the BE study is becoming more popular because it is non-invasive, painless and highly informative, and is characterized by the convenience of collecting the material. Currently, there are two main areas of research: the first is based on the study of changes in intracellular microelectrophoresis and electrokinetic activity of cells of the BE; The second - on the selection and study of markers in the dynamics, specific for specific diseases. Both directions can be promising for the diagnosis of various pathological conditions of organs and systems.

Key words: buccal epithelium, pathological condition, diagnosis, marker.

Relevance. The study of buccal epithelium (BE) has a number of advantages in comparison with other methods of laboratory diagnostics due to the fact that the method is noninvasive, painless and highly informative, and is characterized by the convenience of

collecting the material [1, 6, 8, 11]. At present, BE studies play a significant role in the diagnosis of various pathological conditions [1 6, 8, 9, 11].

The aim of the work is to prove the feasibility of studying BE as a specific marker for the diagnosis of various pathological conditions. When works that contain data on BE is analyzing, two main aspects can be distinguished: 1) the study of the electrokinetic activity of buccal cells; 2) study and identification of specific biochemical and physiological markers of BE, characteristic for various pathological processes.

The first direction

The method of BE studies consists in carrying out its comparative characteristics in normal and pathological conditions, revealing changes in the structure of nuclei: changes in their electronegativity under the influence of microelectrophoresis, the relationship between the shape of the nuclei and the state of cell membranes, and the specificity of cell placement in the cytoplasm, their fixation with active and inactive Nuclei. This method is based on intracellular microelectrophoresis and electrokinetic activity of BE, according to the recommendations of Shahbazov VG et al. [11].

In this direction, a large number of scientific works were analyzed, both foreign and domestic authors.

When studying the electrokinetic activity index of BE nuclei in hypertensive patients, it was shown that in patients with HB a statistically significant decrease in the activity of this indicator relative to the control group was noted. In the work the authors also paid attention to the change in the morphostructure of the cell, specifically - nuclei with the determination of the percentage of shifting electroactive nuclei [6].

The BE study is used in assessing the health status of women and men of reproductive age living in ecologically unfavorable regions. According to the literature, foreign authors used the micronuclear test - the most informative for studying unfavorable environmental factors on the functional state of the organism and the associated toxic effects. The micronucleus counting in BE was carried out according to the method of A.A. Amanbekov [1]. The authors analyzed 1000 separately lying epitheliocytes of BE, among which the number of cells with micronuclei and other anomalies of the nucleus was taken into account.

Micronuclei is rounded chromatin body with a continuous smooth edge. As a rule, a spontaneous level of buccal epitheliocytes with micronuclei was taken, not exceeding (according to the literature sources) a level of 1.22% [1]. The results of the study showed that the average frequency of micronuclei in BE cells in residents of the region with unfavorable

environmental factors is higher than the spontaneous incidence of epitheliocytes with micronuclei in individuals who are not exposed to adverse xenobiotic effects.

Also, a study was made of the effect of stress on the body of medical students using the BE cell counting technique. The results of the study indicate the accumulation of specific cells in the intercellular space, which in further study may correlate with the development of stress states. In addition, this marker can be used to characterize the ratio of biological and calendar age, as evidenced by an approximately equal ratio of cells with an oval and elongated form of nuclei, as well as the predominance of cells with a thickened membrane of nuclei [8].

When assessing the biological age by the method of Shakhbazov V. (1986) in patients with diabetes mellitus, it was possible to detect a significant change in the electrokinetic characteristics of the BE nucleus compared with that of healthy people [9]. In the study of changes in BE in women with childbearing 20-30 years with congenital malformations and normal. The authors found that in puerperas with fetal congenital malignancies, the frequency of cells with karyopyknosis, respectively, was 1.3 times ($p > 0.05$), and with a karyolysis of 2.5 times ($p < 0.001$), exceeds the similar parameters in parturient women without congenital malformations in fetus. According to the authors, the data obtained can serve as one of the criteria for identifying groups at increased risk of congenital malignancies formation in the fetus [10].

The analysis of parameters of epithelial cells in smears from the mucous membrane of the cheek of patients with lung cancer was carried out. The results of the study showed a disturbance in the normal course of maturation and differentiation of the epithelium of the oral mucosa, significant structural and functional changes in buccal epitheliocytes. The authors presented the following research method: 200 smears of flat epithelium were counted in each smear, taking into account the degree of differentiation and destruction.

In the smear cytogram, maturation indices were calculated - percentage ratio in the smear of surface and intermediate cells, keratinization - the percentage of non-nuclear cells, the colonization index of BE was determined - the average number of adherent bacterial cells on one epitheliocyte. Degree of destruction of epithelial cells was evaluated taking into account the following morphological criteria: zero class of destruction - cells with normal nucleus and cytoplasm structure; 1st class - cells with partial (not more than 1/2), destructive cytoplasmic damage and normal nucleus structure; 2 nd class - cells with significant (more than 1/2), but not complete destruction of the cytoplasm and partial destructive damage to the nucleus; 3rd class - cells with complete destruction of the cytoplasm and significant, but not

complete destructive damage to the nucleus; 4 th class - cells with complete destruction of the nucleus and cytoplasm) [5].

It was established that apoptosis and changes in the nuclear structure of BE correlate with similar parameters in bronchial epithelial cells in children suffering from atopic bronchial asthma, changes in BE correspond to the pattern found in bronchial epithelium [9].

The second direction implied studying the specificity of the proposed markers for the investigated diseases.

- VEGF endothelial growth factor expression has been studied in BE as a marker of body aging. The study was conducted in three groups according to the WHO age classification: 1 group - 45-59 years, 2 group - 60-74 years and 3 group - 75-89 years. The technique, which was based on an immunocytochemical reaction with antibodies to VEGF, was performed by the avidin-biotin immuno-peroxidase method. Based on the results obtained, the authors concluded that a decrease in the expression of the VEGF vascular endothelial growth factor in EB reflects the general mechanisms of metabolic slowdown and a decrease in metabolism in the aging of the organism [12].
- In the study of BE for differential diagnosis of Crohn's disease and ulcerative colitis, the expression of chemokines CXCL8, CXCL9 and CXCL10 was studied. It is proved that BE can be used in differential diagnosis of inflammatory bowel processes in children. It was found that in children with Crohn's disease in BE a level of expression of the transcription factors CXCL8, CXCL9 and CXCL10 was increased, whereas in the other groups such differences were not observed in comparison with the control [9]. Of particular value are works aimed at identifying specific changes in BE in cancer processes.
- In carcinoma, the presence of changes in the expression of E-codrin and capexin-D has been established [9, 15].
- Immunohistochemical study of BE with antibodies to marker S100A7 allows to predict the dynamics of growth of malignant neoplasms of the neck and head [9, 14].
- In the study of patients with different localization of tumor processes, a significant increase in the area of expression of the factor of PCNA cell proliferation in EB was revealed [9].
- According to the authors, the most informative marker of oncogenic pathology in the analysis of EB is the glycoprotein CD64, which reflects a decrease in the level of cytolysis of tumor cells in the body [9].

- At the systemic level, the signs of neoplasm development are: a decrease in the ability of cells to terminal differentiation (marker Chx10) and suppression of RON protein expression involved in antitumor protection of the organism [4, 9].

A number of authors note the importance of studying the adhesive interaction of BE with microorganisms. Normally, its obligate microflora is streptococci, most often S.oralis and S.songius. Detection of the presence and superiority of the majority of atypical microorganisms, most often candida, indicates a violation of the homeostasis of the oral mucosa. Also, an increase in adhesion to candidiasis is observed in patients with diabetes mellitus, infected with the immunodeficiency virus, and with chemotherapy of malignant tumors [2]. In the literature it is noted that the most active attachment of candida cells to epithelial cells was observed in the follicular phase of the menstrual cycle, which may be due to the increased keratinization (keratinization) of cells under the influence of estrogen hormones. According to D.W. Williams et al., It is the keratinized buccal cells that have the maximum ability to adhere to C. albicans [13]. The above provides an opportunity to identify the presence of candida flora, even with a small number of herbs.

There are also a number of works aimed at studying the changes that occur in BE with diseases of the teeth and oral cavity. Thus, in inflammatory diseases of the oral cavity (periodontitis, gingivitis), there was a change in the degree of differentiation of BE and a decrease in the amount of sialic acid in the cell membranes [9]. The electrophoretic activity of BE cells in caries in children was studied. It was found that in healthy children the percentage of electrophoretic activity of BE cells increases with age, while in subcompensated form of caries it is noted that it decreases, which progresses in decompensated form [3].

Conclusions

1. The BE study is becoming increasingly popular for the study of various pathologies. The method is characterized by convenience, painlessness, highly informative and non-invasive.

2. Currently, there are two main areas of research: the first is based on the study of changes in intracellular microelectrophoresis and electrokinetic activity of BE cells; The second - on the selection and study of markers in the dynamics, specific for specific diseases. Both directions can be used to diagnose various pathological conditions of organs and systems.

List of references

1. Amanbekova AU Evaluation of the cytogenetic status of industrial workers by the micronuclear test method in buccal epithelium (Methodological recommendations) / A. Amanbekova, N. Dyusembaeva, J. Zavotpayev. - Astana, 2008. - P. 7-8.

2. Buccal epithelial cells as a tool for clinical laboratory studies / M. Abadzhidi, T. Makhrova, I. Mayanskaya [and others] // Nizhny Novgorod Medical Journal. - 2003. - № 3-4. - C.8-12.

3. Denisova O. Electro-phoretic activity of the clay of the buccal epithelium at the different stages of the activity of caries: Dis. On the Cms basis of science. Graduating cms / O. Denisova. - Київ, 2001. - 13 с.

4. Immunocytochemical study of buccal epithelium: optimization of diagnosis of breast cancer / S. Konovalov, O. Litvyakova, N. Lin'kova [and others] // Molecular medicine. - 2012. - No. 6. - P. 57-59.

5. Morphofunctional state of buccal epitheliocytes in patients with lung cancer // O. Bochkareva, E. Krasnozhenov, V. Goldberg [and others] // Siberian Oncological Journal. - Tomsk, 2013. - № 3 (57). - P. 57-60.

6. Myachina OV Electrokinetic activity of buccal epithelium cells in patients with essential hypertension / O. Myachina, A. Zuykova, A. Pashkov / Siberian Medical Journal. - 2012. - T. 27, № 2. - C. 120-122.

7. Ryzhavsky B. Changes in buccal epithelium in some diseases in children / B. Ryzhavsky, G. Kholodok // Klin. Lab. diagnostics. - 1995. - № 2. - P.39-40.

8. Savitsky I. Complex research of influence of stress on an organism of medical students / I.Savitsky, V.Zdorikova, L.Chernysh // Actual problems of transport medicine. - 2016. - No. 3 (45). - P.113-116.

9. Signal molecules in buccal epithelium: optimization of diagnosis of socially significant diseases / M. Pal'tsev, I. Kvetnoy, V. Polyakova [and others] // Molecular medicine. - 2012. - № 5. - P. 3-8.

10. Comparative evaluation of changes in the buccal epithelium of the puerperas with congenital malformations of the fetus living in conditions of chemical contamination of the environment / A. Korsakov, V. Troshin, I. Sidorov [and others] // Public health of the Russian Federation. - 2014. - №5. - C. 45-49.

11. Shahbazov V. Method of determining the biological age of a person // Patent No. 1169614 (USSR), A 61 B 10/00. Published in 30.10.81

12. Expression of VEGF in buccal epithelium as a marker of organism aging / E. Sedov, N. Lin'kova, A. Durnova [and others] // Health is the basis of human potential: problems and ways to solve them. - 2013. - №2. - P. 690.

13. Adherence of Candida albicans to oral epithelial cells differentiated by Papanicolaou staining / D. W. Williams, R. Walker, M. Lewis [et al.] // J. Clin. Pathol. – 1999. – Vol. 52. – P. 529–531.

14. Nuclear S100A7 is associated with poor prognosis in head and neck cancer / S. Tripathi, A. Matta, J. Kaur [et al.] // PLoS One. – 2010. – Vol. 3. – P. 123–129.

15. The expression of E-cadherin and cathepsin-D in normal oral mucosa, oral epithelial dysplasia and oral squamous cell carcinoma: A comparative analysis between immunohistochemistry and routine histopathology / T. Yogesh, T. Narayan, B. Shreedhar [et al.] // J. Oral. Maxillofac Pathol. – 2011. – Vol. 15 (3). – P. 288–294.