

Electron microscopy method in medical diagnostics

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84 photographs of the oral epithelium were analyzed, 60 of them showed oral epithelium squamous cell carcinoma and the rest – healthy epithelium. The photographs were taken in 500× and 5000× magnification. For this study a Japanese electron microscope JEOL JSM 5400 was used. The authors observed great differences in the both groups of patients, mainly in the epithelium density as well as in the occurrence of “blank spaces” instead of cells. The observations confirm the usefulness of an electron microscope in medical examinations. Due to reuse of tissue segments, previously taken to pathological diagnosis in light microscope, we can limit invasive methods of diagnosis.

Key words: medical diagnosis, diagnosis of the cancer, electron microscopy

1. Introduction

Correct diagnosis has a decisive influence on an effective treatment. The reports – both ancient and contemporary – testify to the necessity of a constant searching for not only effective methods of treatment, but most of all diagnostic methods. Typical medical procedures like physical examination were appreciated most of all, so was the use of the related sciences. A present example of such a proceeding is a possibility of examining disease-changed tissue with a scanning microscopy. Taking advantage of this instrument, many scientific teams all over the world try to explain the pathologies of a human body. GUPTA and HALL [1], [3] were among those who for the first time used a scanning microscope in medical examinations. In their observations, they stressed its great usability, provided that the preparation of biological material is proper and the analysis of the results obtained is careful and precise. In order to confirm a clinical diagnosis,

GRZYBEK et al. [2] used for their examinations the tissue samples being first subjected to histopathological examination. PAWLKOWSKI [7], [9]–[13] showed the effectiveness of scanning microscopy in osteoporosis examination as well as in diagnosing the blood cell, heart, lung, pancreas and liver disorders. He also noticed that hypermineralization is connected with environmental pollution, especially in the most urbanized areas. PILCH et al. [14] examining the surface of peripheral blood lymphocytes noticed that their shapes and areas in healthy people and those suffering from larynx cancer differed significantly. DENTISTRY [4], [5], [6], [16] used scanning microscope in examining primary and permanent teeth, dental calculus and tightness of dental materials.

The aim of our study was to evaluate the usefulness of scanning microscopy in the examination of oral cavity squamous cell carcinoma.

2. Material and methods

Eighty four preparations were evaluated histopathologically at the Pathomorphology Chair and Department, Silesian Medical Academy in Zabrze. Sixty preparations were taken from the patients with the squamous cell carcinoma of oral cavity at different degrees of maturity (G1, G2, G3), and the others – from healthy people. The paraplast blocks, being cut into 4–6 μm slices with a sledge microtome of the Reichert type, were used. Then a typical procedure was applied, i.e. they were sprayed with 24-carat gold. In this paper, the results of our study of squamous cell carcinoma of the oral cavity are presented. They are based on 60 SEM photographs in 500 \times and 5000 \times magnification. Each paraplast block was taken from one patient. For the observations, the newest Japanese scanning microscope JEOL JSM 5400 was used. The control group consisted of 24 SEM pictures of the paraplast blocks taken from the patients with healthy oral cavity mucous membrane. The material representing the control group was collected during standard surgery procedures in wounds of mucous membrane of oral cavity – following injuries – or at surgical extraction of the unerupted third molar tooth. The Regional Commission for the Ethics of Scientific Research gave us permission to carry out the above study.

3. Results

The analyzed samples from the healthy and sick people differed considerably (figures 1, 2). In the control group, characteristic, regular “blank spaces” instead of cells were observed regardless of the sex and age of the people being examined (figure 3). Analyzing preparations from the patients suffering from squamous cell carcinoma of oral cavity, structural diversity was observed. “Blank spaces” instead of cells in the pictures were arranged in irregular, chaotic manner (figure 4). Evaluating neoplastic tissue preparations with 5000 \times magnification, pathologic mineralization of the sam-

ples studied was found (figure 5). In the material analyzed in the scanning microscope, no differences that could be referred to a degree of neoplasm differentiation were found.

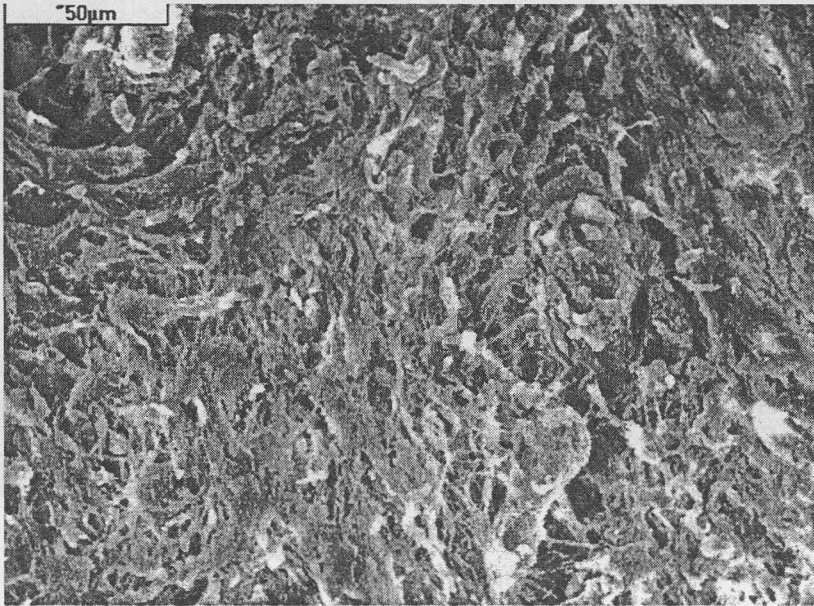


Fig. 1. Healthy oral epithelium from the group of healthy people. Approx. magn. 500×

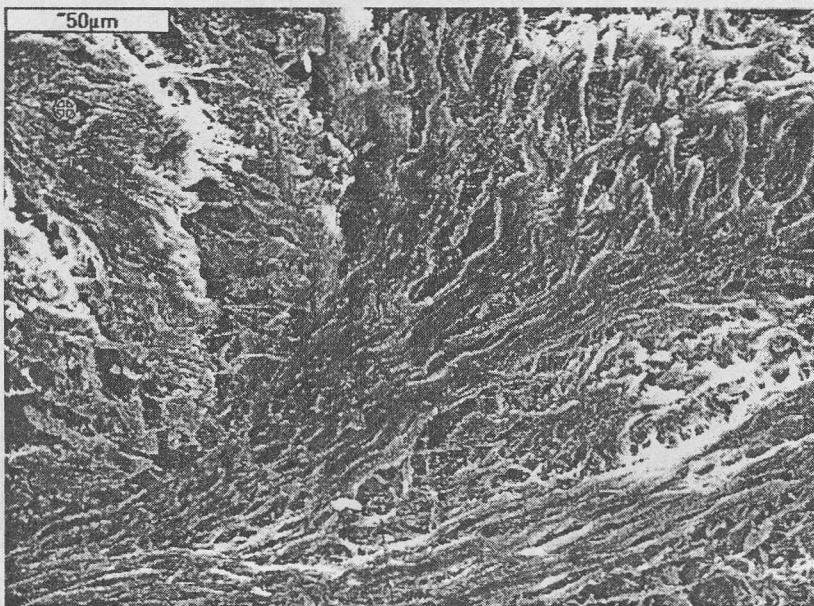


Fig. 2. Oral epithelium carcinoma. Man with buccal cancer. Approx. magn. 500×

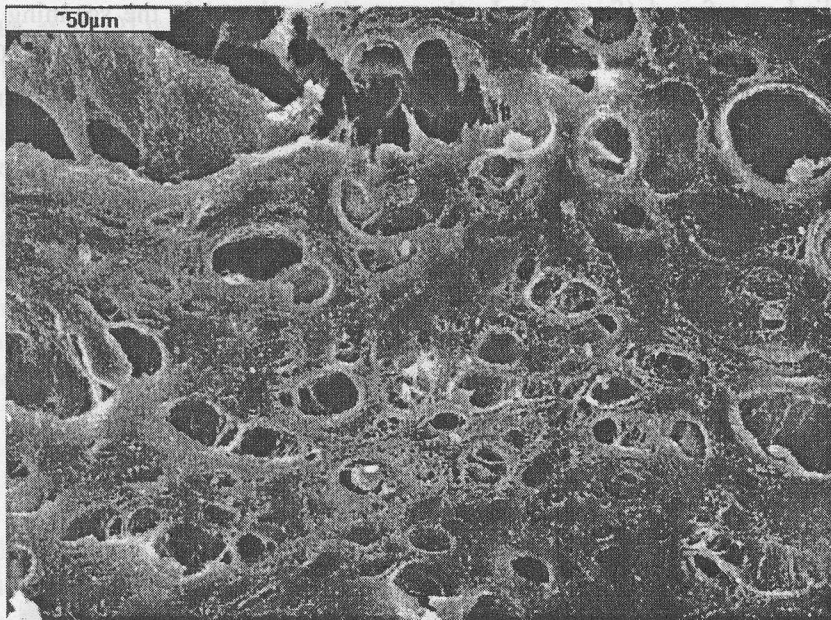


Fig. 3. Characteristic regular "blank spaces" in the group of healthy people. Approx. magn. 5000x

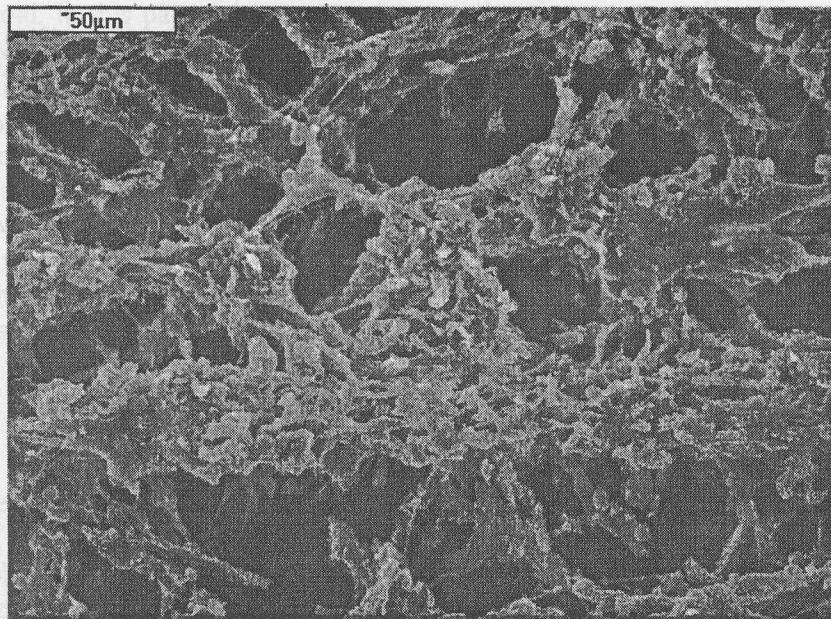


Fig. 4. Irregular "blank spaces" in the group of patients with cancer of the oral epithelium. Approx. magn. 5000x

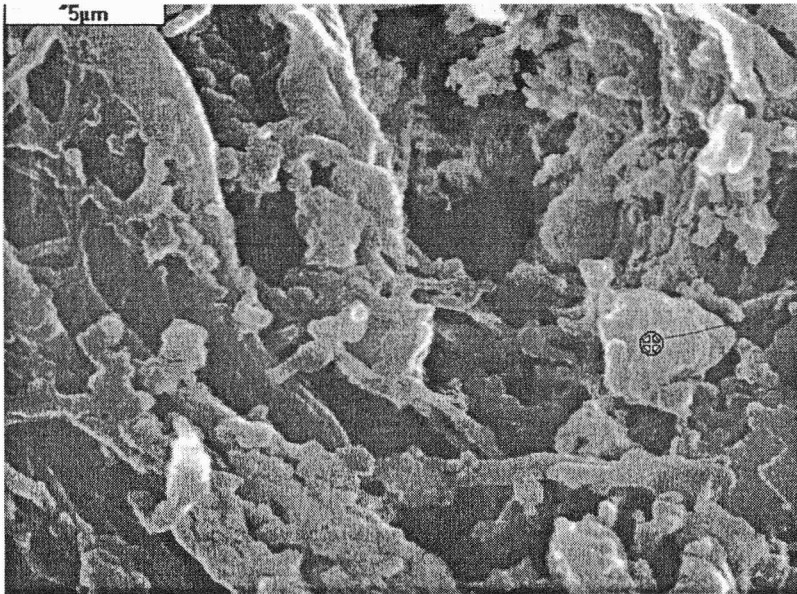


Fig. 5. Hypermineralization in the region with squamous oral epithelium carcinoma of the gingiva.
Approx. magn. 5000×

4. Discussion

Analyzing literature, we have found only a few publications relating to the studies of squamous cell carcinoma using scanning microscopy. PAWLIKOWSKI [8] noticed a hypermineralization of the lymph glands with neoplastic changes and breast cancers. He found that a grain diameter ranged from few micrometers to over a centimeter. Moreover, he observed, as we did in our study, the occurrence of irregular “blank spaces” instead of neoplastic cells. PILCH at al. [15] studying pre-neoplastic states of larynx cancer noticed that, even in this period, cells showed features characteristic of degeneration. Summing up, we found a great usefulness of scanning microscopy in examinations of squamous cell carcinoma of oral cavity. Moreover, scanning microscopy allows also limitation of tissue samples taken for histopathologic invasive diagnostics. However, complicated methods of sample preparation and availability of sophisticated devices make presently the wide application of scanning microscopy in clinical diagnosing impossible.

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