

Bio-impedance analysis of mucosal tissues of the oral cavity: a comparison between healthy patients and patients affected by oral lichen planus

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Aim.

Lichen Planus is a chronic inflammatory autoimmune disease that may affect the skin, the mucous membranes of the oral cavity and also other mucosae. The prevalence is estimated to be around 1–2% among population worldwide and oral manifestations may appear under various aspects, namely reticular, plaque-like, erosive, atrophic or bullous. The buccal mucosa, the tongue and the gingivae are the most commonly involved, but other areas may be affected too. Erosive OLP shows the highest risk of malignant transformation among the various subtypes. Bioelectrical Impedance analysis is a method used for an accurate evaluation of tissues composition. The bioelectrical impedance data are a combination of capacitive and resistive type elements which, as a result, provide reactance and resistance. Reactance (X_c) should be representative of the opposition of body tissues to the flow of electrical current or voltage and resistance (R) should be representative of the conduction of fluid of the direct or alternating current. According to resistance and reactance, a phase angle (PA, ϕ) is calculated. PA values may range from 90° to 0° and a correlation between PA values and body cell mass is demonstrated. For example, if a tissue would have been composed of cells membranes only, it would have higher resistance, lower capacitance and a PA value of 90° , whereas a tissue composed mainly by fluids would show lower resistance, higher capacitance a PA value of 0° . According to these evidences, the PA values of neoplastic tissue are expected be lower than those of normal tissue. The aim of the present study is to compare the values of bioimpedance analysis of healthy patients to the values of patients affected by OLP and, if possible, to establish some cut-off values, which could be related to an higher or lower risk of malignant transformation.

Materials and Methods.

Bioelectrical impedance analysis and PA measurements have been obtained using a special device, (Akern, Bia 101 Anniversary). The measurements were carried out by the same clinician. We evaluated 57 consecutive cases affected by reticular LP already confirmed at the histological examination (case-group) and 60 healthy patients (control-group). The measurements have been performed in the buccal mucosae, the tongue, hard palate and upper anterior gingiva.

Results.

Reactance and resistance of hard plate and gum were generally higher in the case-group than in the control-group the results are statistically significant. The mean resistance of hard plate was $75,7 (\pm 13,8)$ for the control-group and $80,6 (\pm 16,7)$ for the case group ($p 0,044$) and the mean reactance was $14,5 (\pm 5,5)$ for the control group and $17,0 (\pm 6,3)$ for the case group ($p 0,020$). The mean resistance of gum was $59,0 (\pm 13,8)$ in the control group and $78,6 (\pm 30,5)$ in the case group ($p < .0001$) and the mean reactance was $13,6 (\pm 5,7)$ in the control group and $19,6 (\pm 11,8)$ in the case group ($p < .0001$).

In the case group the mean phase angle of healthy mucosae and reticular lesions were higher than the phase angle of erosive lesions. The mean phase angle of mucosae with no lesions was $12,6 (\pm 1,2)$, of reticular lesions was $12,4 (\pm 1,7)$ and of erosive lesions was $11,1 (\pm 0,6)$. There were no statistically significant differences between healthy mucosae and reticular lesions ($p 0,79$) but there were statistically significant differences between healthy mucosae than erosive lesions ($p 0,005$) and reticular lesions than erosive lesions ($p 0,04$).

Discussion.

These results provide evidence of the usefulness of bioimpedance assay for the characterization of healthy and clinically OLP affected mucosa. Bioimpedance is a valid aid in the early detection and clinical monitoring of the suspicious lesions which could lead to a potentially malignant evolution.

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Keywords: Oral lichen planus (OLP), Bioimpedance analysis (BIA), Precancerous lesions, Oral Cancer (OC), oral mucosa

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