Bioimpedance for Oral Cancer Detection in Clinical Practice and its Applicability in Developing Nations

Sir,

Oral cancer is the most common type of cancer found worldwide. It is of significant health concern and becomes more deadly in the absence of early detection, resulting in poorer prognosis. Developing nations face greater challenge with inadequate resources and limited access to trained pathologists. A promising novel method of early detection is “Bioimpedance” which can be employed at a community level.

Bioimpedance is a measure of the electrical properties of biological tissues. It is a measure of opposition to the flow of applied current through tissue. Thus Bioimpedance signal provides information about electrochemical processes occurring in the tissue and can be employed in assessing the tissue for monitoring its physiological changes. The electrical properties of tissue mainly depend on the frequency of the applied electric field which is seen as $\alpha$, $\beta$ and $\gamma$ dispersion. The $\gamma$ and $\beta$ dispersion regions are of medical significance as they indicate changes occurring between pathological and normal tissue.

Depending on the source of electricity, it allows two distinguishable responses: an active response from ionic activity inside the cells, and passive response occurs when tissues are stimulated through an external current source. Disposable probes of silver and copper can be used.

It has been demonstrated that malignant tissues have low Bioimpedance values than healthy tissues. This change in the electrical impedance depends on various cellular processes such as increased content of intracellular water and salt, an altered permeability of cellular membrane, cellular orientation and their altered packing density.

In the last two decades, Bioimpedance has been successfully introduced in the clinical diagnosis of breast and cervical cancer. But there exists meagre evidence regarding its practice in screening and detection of oral cancers. Researchers have conducted studies using Bioimpedence on oral cancers and have observed lower impedance current in the oral cancer tissue. This reduction in impedance can be attributed to loss of intercellular junctions with wide extracellular spaces seen in cancer cells.

Therefore, Bioimpedance can be of utmost utility in developing nations of South East Asian origin, where limited organisational and economic factors hamper the screening and early detection of oral cancers. Due to its non-invasiveness, reliability, immediate results and low cost, Bioimpedance can be adopted by dentists to improve the future of oral health care and, therefore, reduce the mortality rate associated with delayed detection of oral cancers in this part of the world.

REFERENCES


Manas Bajpai, Manika Arora and Betina Chandolia
Department of Oral and Maxillofacial Pathology, NIMS Dental College and Hospital, NIMS University, Shobha Nagar, Jaipur-Delhi Highway, Jaipur-303121 (Rajasthan), India.
Correspondence: Dr. Manika Arora, Senior Lecturer, Department of Oral and Maxillofacial Pathology, NIMS Dental College and Hospital, NIMS University, Shobha Nagar, Jaipur-Delhi Highway, NH-11C, Jaipur 303121 (Rajasthan), India.
E-mail: aroramani07@gmail.com

Received: January 16, 2016; Accepted: March 10, 2016.