In vivo Autofluorescence Spectroscopy of Oral Premalignant and Malignant Lesions: Distortion of Fluorescence Intensity by Submucous Fibrosis

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Abstract

BACKGROUND AND OBJECTIVES: To test whether autofluorescence spectroscopy can be used for the diagnosis of oral neoplasia in a high-risk population, we characterized the in vivo autofluorescence spectra from oral submucous fibrosis (OSF) lesions and oral premalignant and malignant lesions in both OSF and non-OSF patients. STUDY DESIGN/MATERIALS AND METHODS: Autofluorescence emission spectra were measured under the excitation wavelength of 330 nm, using a Xenon lamp-based fluorospectrometer coupled to a handheld optical fiber probe. Autofluorescence spectroscopies were analyzed among patients with OSF lesions, and oral lesions of epithelial hyperkeratosis (EH), epithelial dysplasia (ED), and squamous cell carcinomas (SCC) and normal oral mucosa (NOM) of healthy volunteers. RESULTS: We found that the most intensely autofluorescence emission peaks occurred at 380 nm and 460 nm. For comparing the spectral patterns among different groups of oral lesions and NOM, ratios of the area under the spectrum of 460+/-10 nm to that under the spectrum of 380+/-10 nm (denoted as A(460+/-10nm)/A(380+/-10nm)) were calculated. The mean ratio values increased gradually from OSF to NOM, to EH and ED, and to SCC. The ANOVA test showed significant differences in the ratio value among all categories of samples ($P<0.01$). On the other hand, we found that EH, ED, and SCC lesions on OSF patients had distorted autofluorescence intensity. The mean ratio values of EH, ED, and SCC between non-OSF and OSF patients show significant differences. Furthermore, an ANOVA test showed NOM is not distinguishable from EH and ED lesions on oral fibrotic mucosa ($P>0.05$). CONCLUSIONS: Autofluorescence spectroscopy can be used to diagnose EH, ED, and SCC lesions in non-OSF patients but not in OSF patients.