GRADING THE DEGREE OF EPITHELIAL DYSPLASIA IN ORAL PRECANCEROUS LESIONS USING THIRD HARMONIC GENERATION MICROSCOPY

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Leukoplakia is a premalignant lesion with areas of keratosis appearing as adherent white patches on the oral mucosa. Oral leukoplakia more commonly occurs in smokers, but often the cause is unknown. No interventions have been proven to reduce the risk of cancer developing in an area of leukoplakia while the vast majority of oral leukoplakia will remain benign. The chance of transformation into oral squamous cell carcinoma varies from almost 0% to about 20%, and this may occur over 1 – 30 years. Dysplasia is the most important predictor of malignant change, while physical biopsy is the mostly accepted way to identify histopathologic features associated with varying degrees of increased risk of malignant transformation. With a low transforming rate into malignancy but with a large population, it is thus highly desirable to have a noninvasive mean to regularly grade the degree of epithelial dysplasia in oral precancerous lesions for prognosis.

HGM has been applied to in vivo human oral mucosa diagnosis and is with the advantages including high penetration, lowest photodamage, and high resolution1. In this present study, we collected surgical specimens from 23 subjects and our study focused on leukoplakia, erythroplakia and normal mucosa, to evaluate the potential of HGM for histopathological early cancer detection. Beside the observed histopathologic features, our results further indicate that the cell density of moderate, severe dysplasia and carcinoma in situ were significant higher than hyperplasia and mild dysplasia at one-third of the epithelium. The cell density of severe dysplasia and carcinoma in situ were significant higher than hyperplasia, mild and moderate dysplasia at two-third of the epithelium. All evaluations of HGM were confirmed by H&E stained biopsy images. We conclude that HGM is with the capability as the noninvasive mean to grade the degree of epithelial dysplasia in precancerous lesions.