

## Photodynamic Diagnosis Using Photofrin<sup>®</sup> for Induced Malignant Oral Lesions in an Animal Model

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**Objective:** The prognosis of patients suffering from oral cancer can be improved by early diagnosis. Exact demarcation of tumor margins could contribute to optimal results in surgical excision and reconstruction. Therefore, this study evaluates Photofrin<sup>®</sup> with protoporphyrin IX (PPXI) fluorescence as a new diagnostic procedure for the detection of oral neoplasms in animal models. The aim of this study is to assess these parameters, which can be extended to clinical applications for human oral neoplasms.

**Methods:** Fourteen male Golden Syrian hamsters were included in this study. 0.5% D.M.B.A (9,10 dimethyl-1, 2-benzanthracene), was brushed onto the cheek pouches bilaterally daily for 2 weeks. Hamsters with oral neoplasms received 2.5mg/kg Photofrin<sup>®</sup> intravenously. After a period of 3 hours, the neoplasms underwent fluorescence illumination ( $\lambda_{ex} = 380-420$  nm). A quantitative analysis of the fluorescence contrast between the neoplastic and surrounding tissues was performed using the RGB Mode (Red, Green, Blue) and the GS (Gray Scale). Statistical analysis was performed by means of ANOVA test for multiple comparisons.

**Results:** Analysis of the 14 hamsters' 28 biopsies revealed that 4 (14%) displayed squamous hyperplasia (1 mild, 3 severe) and 24 (86%) displayed squamous cell carcinoma. The sensitivity of neoplastic tissue evaluated using the RGB and GS modes combined reached 92% in the macroscopic study, and 93% in the microscopic study. The specificity of neoplastic tissue evaluated using the RGB and GS modes combined reached 95% in the macroscopic study, and 97% in the microscopic study. The difference between healthy tissue and the lesions as a group is statistically significant.

**Conclusions:** Light-induced fluorescence detection using Photofrin<sup>®</sup> provides a sensitive technique for the early identification of malignant neoplasms in the oral cavity of our animal models.

**Key words:** Photofrin<sup>®</sup>, photodynamic diagnosis, oral neoplasms, hamster

If oral cancer is detected and treated early, the surgical success rate will be better than that of most other types of cancer. Here in Taiwan, one of the primary causes of death is malignant tumor, with almost one third (27.08%) of all deaths as a result of malignancies.<sup>1</sup> Of these malignancies, oral cancer ranks seventh, representing 4.7% of

the annual death rate, and occurring mostly in the middle-aged patients (mean 58 years). The inability to detect oral cancer early is estimated to result in 10,000 deaths annually, and less than 50% of these patients survive for more than five years.

Leukoplakia is the most frequently occurring pre-

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Received for publication: April 22, 2005

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