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Cytochrome P450 1B1 (CYP1B1) is expressed during the malignant progression of head and neck squamous cell carcinoma (HNSCC).

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HNSCC is the most common cancer of the upper aerodigestive mucosa. The progression of head and neck cancer is believed to occur as a consequence of so-called field cancerization whereby, the entire region of tissue is exposed to carcinogenic insult which predisposes the tissue in that field to the development of multiple cancers. HNSCC's frequently show premalignant lesions that appear to undergo a continuous histological progression from normal epithelium to hyperplasia to dysplasia to carcinoma in situ to invasive carcinoma. CYP1B1 is over-expressed in a range of clinical tumors. The CYP1B1 codon 432 polymorphism, designated CYP1B1*3, has been identified as a susceptibility factor in smoking-related HNSCC. There have been few investigations into CYP1B1 protein expression during the malignant progression of cancer. This immunohistochemical study (using a specific monoclonal antibody) shows that CYP1B1 is over-expressed at a high frequency and number in HNSCC (96%, n=70), as well as in the associated pre-malignant lesions (hyperplasia 100% n=15, dysplasia 100% n=13, mild dysplasia 100% n=6). Therefore CYP1B1 could prove useful as a biomarker in early stage tumorigenesis. The protein was identified in the cytoplasm of tumor and pre-malignant cells and absent from the surrounding stroma. Sections did exhibit both inter- and intra-patient heterogeneity. We have shown that there is no significant correlation of CYP1B1 status with tumor grade, t-stage (size of tumor), lymph node involvement, tumor site, p53 and bcl-2 status and clinical outcome. CYP1B1 was strongly expressed in primary tumors and to a lesser degree in those tumors that are more differentiated, however this did not reach significance. Spectral imaging microscopy (which allows quantification of staining intensities) developed at the Gray Cancer Institute, has shown that the expression of this enzyme decreases during malignant progression and that there is a significant difference in normalised absorbance intensity between hyperplastic tissue (0.35 ± 0.12) compared to carcinoma (0.26 ± 0.10) ($p=<0.005$). The results of this study show that CYP1B1 is over-expressed in not only HNSCC but also the in the associated premalignant tissues. Future work will seek to understand tumor micro-environmental factors which may govern CYP1B1 protein expression. This work is supported by Cancer Research UK and Gray Laboratory Cancer Research Trust.