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WE-D-9A-05: Medical Hyperspectral Imaging for the Detection of Head and Neck Cancer in Animal Models

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Abstract

Purpose:

The objective of this study is to develop hyperspectral imaging technology and advanced image analysis methods for the detection of head and neck cancer.

Methods:

A head and neck tumor xenograft model was used in the experiment. The M4E head and neck cancer cells with green fluorescence protein (GFP) were injected into nude mice. Hyperspectral images were acquired from the tumor-bearing mice using a CRI Maestro invivo imaging camera. The wavelength setting was defined within the range of 450–950 nm with 2 nm increments. Two advanced image classification methods were developed to classify normal and cancer tissue on hyperspectral images. In the first method, a tensor-based computation and modeling framework was proposed for the analysis of hyperspectral images for cancer detection. In the second classification method, support vector machines were incorporated into a minimum spanning forest algorithm for differentiating cancer tissue from normal tissue. The classification results were validated by the GPP images of the same animals.

Results:

The tensor-based classification method can distinguish between malignant tissue and healthy tissue with an average sensitivity of 97.0% and an average specificity of 91.4% in tumor-bearing mice. The minimum spanning forest algorithm also achieved a high accuracy of more than 97.0% in the animal model.

Conclusion:

The hyperspectral imaging and classification technology has been demonstrated in animal models and can have many potential applications in cancer research and management.

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Citing Literature

Number of times cited according to CrossRef: 2

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