Evaluations of neo-adjuvant chemotherapy responses in breast cancer patients using vascularization analysis

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According to American Cancer Society (ACS) statistics, breast cancer is the most common cancer among women in the USA and many other counties, and it is also the second leading cause of cancer death in women. The angiogenesis is widely accepted as a process for the growth of cancers. Tumor vascularization has been proved to be an important factor that correlated with tumor malignancy, and it would be used as a factor to estimate the effect of the neo-adjuvant chemotherapy prior to surgery. In this study, high-definition flow (HDF) power Doppler ultrasound (US) is performed to investigate blood flow and solid directional flow information in breast tumors. Various features are extracted for evaluating the correlation between the vascularity changes and neo-adjuvant chemotherapy effect, includes six vascularity quantization features, three morphological features and two vascular direction features. The proposed method utilizes 3D Gaussian lowpass filter to reduce the noise and speckles and applies a 3D thinning algorithm for extracting vascularity centerlines. Support Vector Machine (SVM) was also used to help predict the pathologic complete response (PCR) rate according to these features and over 75% PCR patients can be distinguished in our dataset before the chemotherapy treatment or after first treatment. Early treatment prediction using the 3D HDF Doppler ultrasound could lead to early decision making for these patients in order to obtain a better result. This study aims to evaluate vascularity changes in three-dimensional (3D) HDF power Doppler ultrasound images during neo-adjuvant chemotherapy of breast cancer in patients.

Biography

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