Introduction

- Measures of microvascular dynamics of breast tissue:
  - Can distinguish between women with and without breast cancer (CA) with high diagnostic sensitivity and specificity (each >95%; NIH:1-103).
  - An important exploratory factor is that a volume of tissue extending far from the borders of the tumor participates in the abnormal response.
  - Hypothesis: performance of the tumor-diagnosing optical metrics may be related to the impact of tumor-associated phenotypes on the microvasculature of the affected breast.
  - Includes angiogenesis, apoptosis, invasiveness, proliferation, stiffness

Data Analysis

1. Previous analysis (NIH:01-103) of data from a 46-subject (28 with active breast CA/IRS3 breast imaging study yielded:
   - 22 multi-variable metrics that are highly sensitive and specific breast-CA predictors
   - 11 of them have no missing independent-variable values for any subject

2. Linear regression computations:
   - Using the 11 predictors as regressors, and either age or body-mass index (BMI) as the dependent variables
   - Yield statistically significant correlations for both age and body-mass index (BMI) when data for the cancer and non-cancer subgroups are evaluated separately

3. New optical index

4. Hypothesis: cancer-status predictors are influenced by differences between the tumor phenotypes of the subgroups.

Conclusions

1. Predictors derived from diffuse optical tomography time series successfully discriminate among breast-CA and non-CA subjects because they consider dynamic features that are correlates of breast-CA tumor phenotypes.

2. The mathematical correlations observed here suggest the feasibility of developing noninvasive optical techniques to estimate the properties of interest (e.g., tumor grade, Her2 status, etc.)

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