

AbstractID: 8578 Title: Association of Texture Features to Structure and Function in a Simple Tumor Model and Potential Application to Treatment Response Monitoring using FDG-PET

**Purpose:** PET images carry information about structure and function of a tumor. When acquired longitudinally this information becomes invaluable for response monitoring and possibly adaptation of therapy. In this work, texture features are used to characterize structural and functional information in PET images and their change over time.

**Methods:** Haralick texture features based on second-order image statistics were computed for PET images of a longitudinal treatment response monitoring study of non-Hodgkin lymphoma patients. The performance of 4 features was investigated: two features characterizing spatial homogeneity within a region of interest (energy and homogeneity) and two features characterizing local variations (contrast and correlation). Observed changes of these features over time were compared against those of a computer-generated tumor model consisting of spheroids of well-defined stochastic structural and functional properties.

**Results:** The texture features allow to well differentiate between irregular structures arising from random functional properties (spheroid *activity*) and irregular structures caused by spatial randomness (spheroid *displacements*). All investigated features were fairly insensitive to changes in spatial randomness, however, they strongly indicate changes in activity patterns. The features of the Non-Hodgkin lymphoma over time are mostly dominated by spatial tumor shrinkage and to a lesser extent by changes in uptake distribution.

**Conclusions:** The use of simulated structures proves very valuable in gaining understanding of the various texture features.