AbstractID: 3871 Title: Longitudinal correlations in a small-animal PET studies.

Purpose:

One area of interest in the rapidly developing field of small-animal imaging is preclinical evaluations of cancer therapeutics. It is clear that longitudinal imaging studies reduce the number of animals necessary for such evaluations by following a single cohort over multiple timepoints. However, there is additional benefit to longitudinal data for comparisons between timepoints. Of particular interest in preclinical studies are comparisons between the disease status at the onset of treatment and later timepoints after treatment has been completed. Positive correlations between timepoints add statistical power to tests of differences. In this work, we investigate correlations in quantitative features across timepoints in small-animal positron emission tomography (PET) images of a mouse model of breast cancer.

Method and Materials:

We investigate a mammary intraepithelial neoplasia outgrowth (MIN-O) model in FVB mice. Transplant development in these animals is similar to the neoplastic progression of breast carcinoma from preinvasive ductal carcinoma in situ to invasive carcinoma in humans. A cohort of mice were imaged 5 times on a dedicated small-animal PET scanner after injection of a commonly used radiotracer (FDG). After reconstruction, quantitative features such as functionally active volume, maximum uptake and total uptake were computed as markers of development.

Results:

Quantitative features document development of disease in these animals over time. Positive person correlation coefficients ranging over 0.3 and > 0.9 have been observed between timepoints for the extracted features. This leads to substantial gains in statistical power.

Conclusion:

Features extracted from volumetric PET images in the MIN-O mouse model correspond with development of disease. Because of the variability in disease progression and proliferation between lesions, there is a considerable statistical advantage to longitudinal studies. Correlations between timepoints measured for this work lead to quantifiable gains in statistical power.

Conflict of Interest (only if applicable):

None.