**OBJECTIVES**

We are developing a software framework built on caBIG technologies to standardize quantitative imaging assessment of tumor burden and to enable researchers to integrate and analyze a spectrum of quantitative imaging biomarkers to leverage quantitative imaging to better enable assessment of cancer and its treatment response. Our aims are (1) to create tools to reproducibly assess quantitative imaging features of tumor burden; (2) to develop methods to analyze quantitative image metadata and to help oncologists evaluate image-based quantitative criteria of treatment response; and (3) to evaluate the utility of our methods by applying them in two clinical trials and showing an improvement in response assessment in individual patients and patient cohorts.

Challenges we address:

- Poor reproducibility of image measurements
- Lack of coordination and effective communication between oncologists and radiologists in making quantitative imaging assessments
- No standards for collecting and using quantitative imaging data
- Lack of tools for recording image metadata to enable data sharing and data mining

**AIM 1: Tools and Algorithms**

**ePAD (the electronic Physician Annotation Device)** implements AIM in a rich Web client.

**AIM XML Database**

**Image Viewing and Semantic Annotation**

**AIM 2: Analysis Algorithms**

Algorithms: Automated lesion identification and segmentation on follow up CT imaging. We use the baseline scan to automatically locate and segment cancer lesions on follow up studies.

1. Identity tissue around lymph node in the baseline scan
2. Register follow-up to baseline scan
3. Recognize tissues around the lymph node in the follow-up scan
4. Segment the lymph node by region growing and clustering

**Tools for decision support:**

1. Resources for archiving/sharing images and image metadata
2. Data mining tools to discover alternative quantitative imaging biomarkers of cancer response
3. Decision support tools for evaluating patients and alternative treatments

**AIM 3: Evaluation in Clinical Trials**

**Follicular lymphoma trial**
- ECOG 2408 Randomized Phase II Trial of R-CHOP/R versus R-B-CHOP/R
- PI: Andrew Evans
- Study endpoints: CR rate after induction, DFS rate, TTP
- Response criteria: IHC criteria with six dominant lesions on CT plus PET

**Colon Cancer trial**
- Phase II Trial of Vandetinib with Capecitabine, Oxaliplatin and Bevacizumab
- PI: George Fisher, Stanford University
- Study endpoints: Response rates (RECIST 1.0), time to disease progression
- Response criteria: RECIST 1.0

**OPPORTUNITIES FOR QIN**

- Tools for managing image metadata.
- Resources for archiving images and metadata.
- Data mining tools to discover alternative quantitative imaging biomarkers of cancer response.
- Tools for decision support for treating individual patients (is the cancer responding?) and for evaluating alternative treatments (is the cohort response good?)

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