



The Quantitative Imaging Network

From Imaging and Analysis to Clinical Decision Support
Robert J. Nordstrom, Ph.D.
Director, The Quantitative Imaging Network



10 Years



AAPM Annual Meeting
 July 29 – Aug 2, 2018
 Nashville, TN

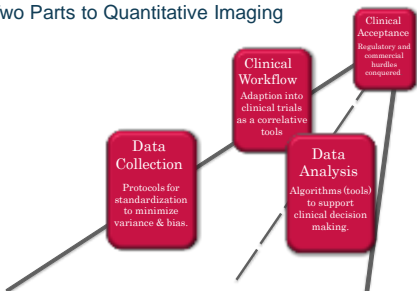
Quantitative Imaging

Quantitative imaging is the extraction of quantifiable (measurable) features from medical images for the assessment of normal or the severity, degree of change, or status of a disease, injury, or chronic condition relative to normal

- Treatment planning
- Prediction of outcome
- Measurement of progression

The Goal: Create the condition where all imaging scanners perform as measuring instruments.

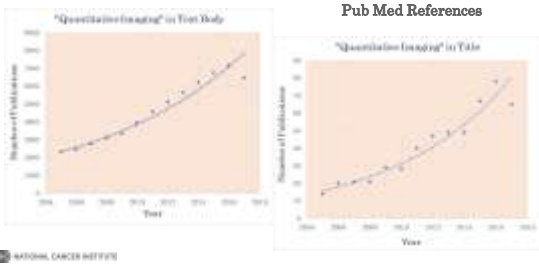
Two Parts to Quantitative Imaging



Quantitative Imaging Levels of Performance



Growth in Quantitative Imaging



QIN: Joining Imaging, Analytics, and Informatics

Measuring or predicting response to cancer therapies in clinical trials.

Supporting clinical decision making

NATIONAL CANCER INSTITUTE

Accomplishments of the Network

- Over 450 peer reviewed publications on methods, standards, and decision support tools for clinical workflow.
- 4 separate journal issues dedicated to QIN efforts
 - Magnetic Resonance Imaging 30(9) Nov 2012
 - Translational Oncology 7(1) February 2014
 - Tomography 2(4) December 2016
 - Journal of Medical Imaging to be published Dec 2017 – January 2018
- More than 67 analytical tools under development and validation
 - Benchmarking taking place in addition to increased validation studies
- Data-sharing, consensus-driven environment
- National and international recognition of the value of quantitative imaging.

Tool View

Tool name	Type	Initial description
...
...
...
...
...
...

The Tool Catalog



The Tool Catalog & Benchmarking

From Dr. Lowy

A Modified Definition of Precision Medicine

Interventions to prevent, diagnose, or treat a disease (e.g., cancer), based on a molecular and/or mechanistic understanding of the causes, pathogenesis, and/or pathology of the disease.

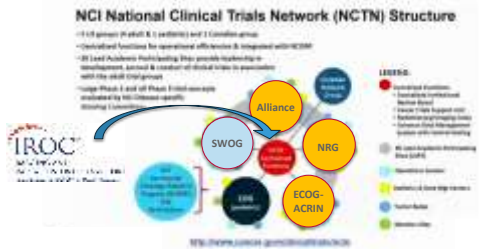
Where the individual characteristics of the patient are sufficiently distinct, interventions can be concentrated on those who will benefit, sparing expense and side effects for those who will not.

Quantitative imaging can be an important player in stratifying patient characteristics for appropriate interventions.

But this can only have value if quantitative imaging takes a place as a reliable tool in clinical workflow.

The Great Divide

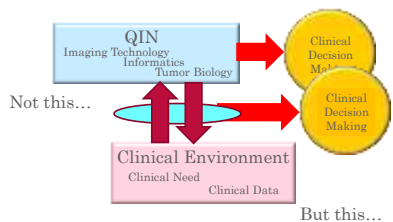




QIN tools are working in clinical trials

- **NCT02154490 Lung-MAP: Biomarker-Targeted Second-Line Therapy in Treating Patients With Recurrent Stage IV Squamous Cell Lung Cancer**
Radiomics tools to assess response to therapy
- **A081704 PD-inhibitor (Nivolumab) and Ipilimumab followed by nivolumab vs. VEGF TKI cabozantinib with nivolumab in metastatic untreated Renal Cell Cancer (PDIGREE)**
Volumetric / Necrosis / Radiomics tools to assess predictive and prognostic imaging biomarkers of response and progression
- **ALLIANCE A021802 - Randomised, Double Blinded Phase III Study of Cabozantinib versus Placebo in Patients with Advanced Neuroendocrine Tumors after Progression on Everolimus (CABINET)**
Volumetric / Necrosis / Radiomics tools to assess predictive and prognostic imaging biomarkers of response and progression
- **A Randomised Phase 2 Study of Peptide Receptor Radio-Immune Therapy (PRRIT) in Gastro-Enterio-Pancreatic Tumors, with Somatostatin Receptor Expression, and have progressed on Somatostatin Analog Therapy**
Auto PERCIST tool

QIN does not operate alone...



The QIN Team

- Robert Nordstrom, QIN Director, CIP
- Keyvan Farahani, Deputy Technical Director, CIP
- Pushpa Tandon, Deputy Administrative Director, CIP
- Yantian Zhang, Program Director, CIP
- Darrell Tata, Program Director, CIP
- Huiming Zhang, Program Director, CIP
- Lori Henderson, Program Director, CIP
- George Redmond, Program Director, CIP
- Jacek Capala, Program Director, RRP
- Bhadransain Vikram, Branch Chief, RRP
- John Freymann, Contractor
- Justin Kirby, Contractor