Unmet Medical Need: More Sensitive Image Acquisition and Analysis of Treatment Responses in Patients with Cancer

CT: The Need for Quantitative Imaging in Patients with Cancer

- Sensitive biomarkers of response to therapy are needed to make earlier assessments of response in the care of individual patients with cancer, as well as accelerate the development of new treatments.

- There is strong evidence that quantitative CT image analysis including volumetrics is helpful both to the individual patient and in a clinical trial.

- Volumetric image analysis appears to be a substantially more sensitive technique for detecting longitudinal changes in tumor masses than unidimensional measurements, however, this has not yet been proven. Therefore, additional studies and data need to be collected to validate volumetric CT as a biomarker for new therapies and for individual patients.

- The extraction of other features, such as density, homegeneity of density, morphology, and the like, promises to be of value in multiple therapeutic areas.
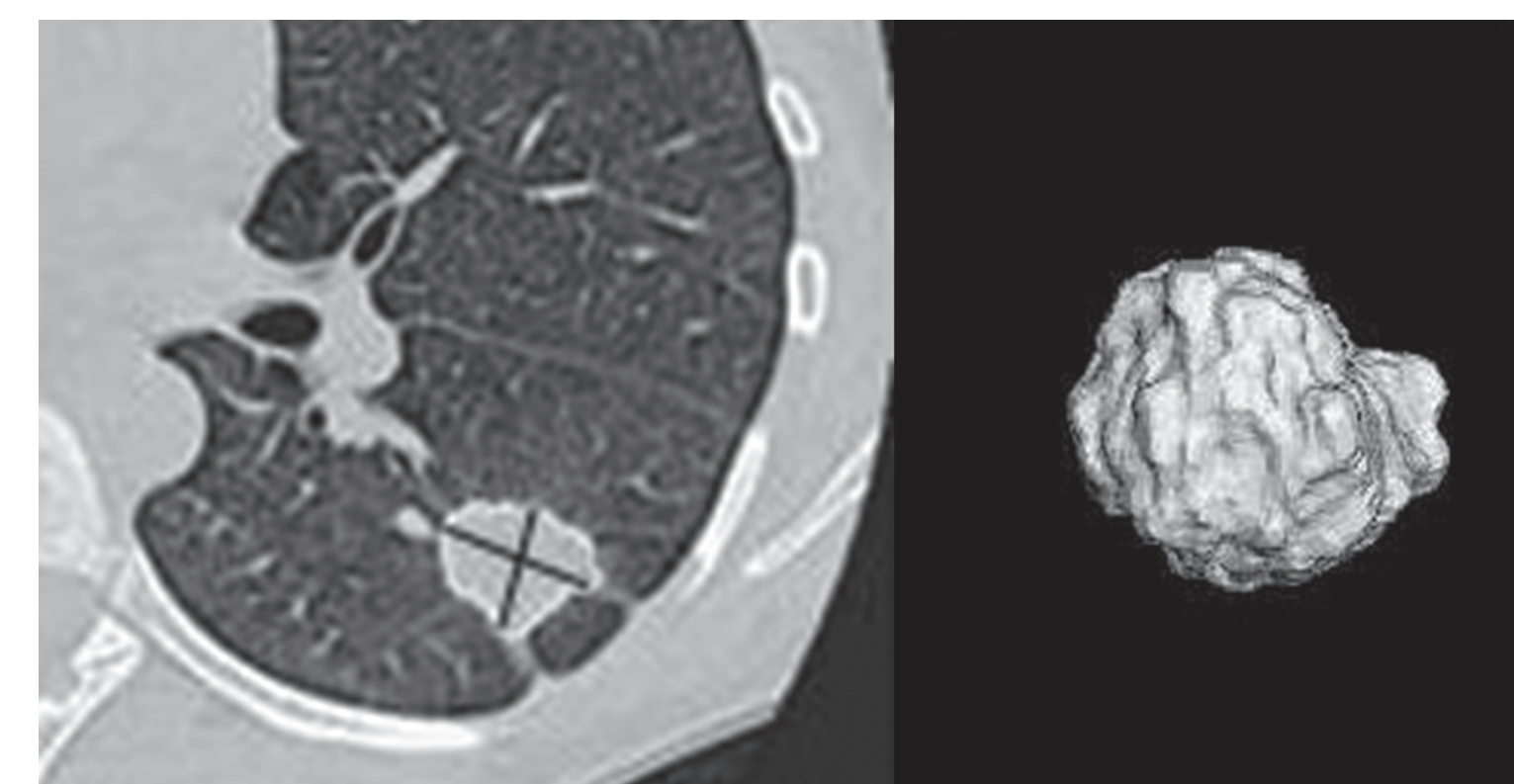
Acknowledgments

Volume Change

Pre Therapy
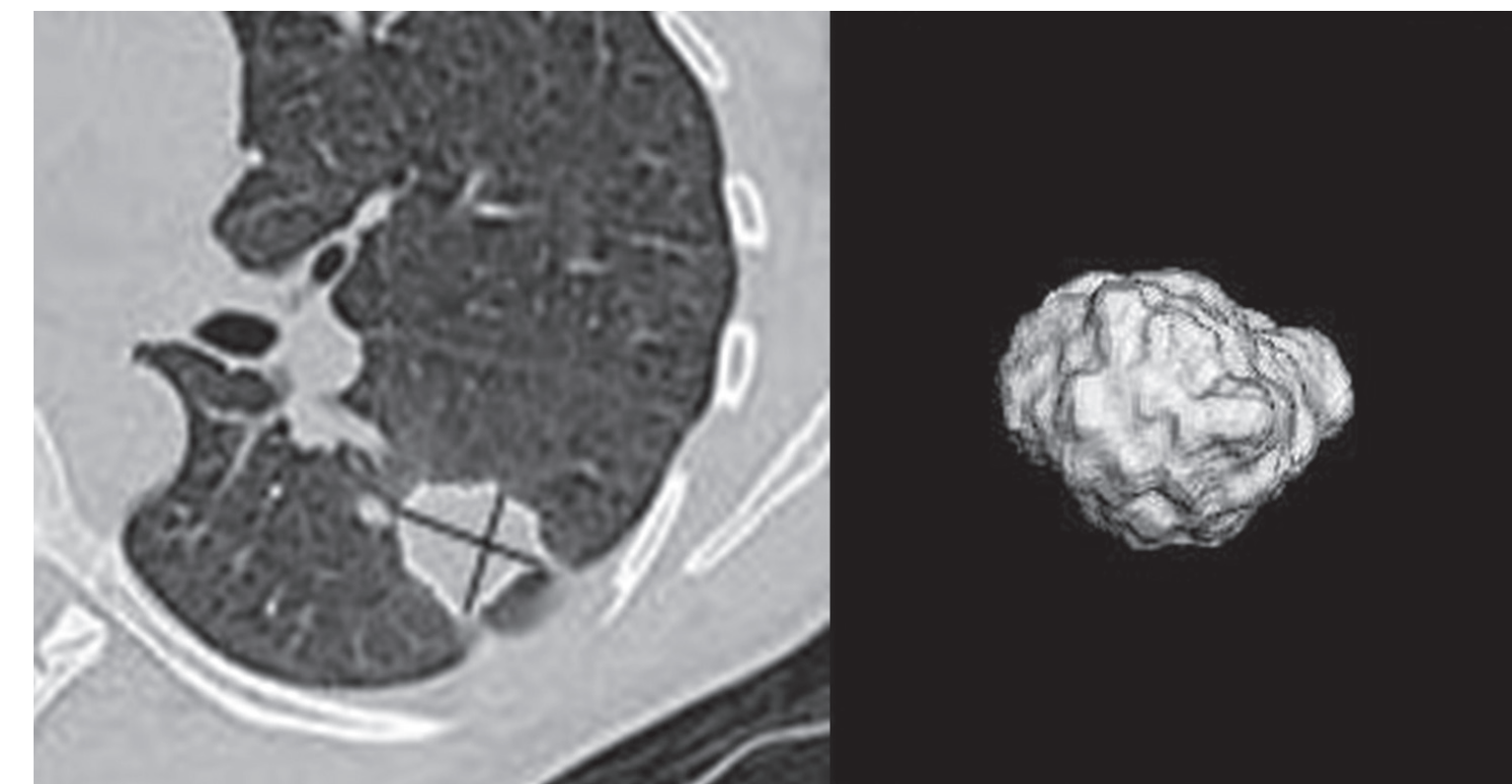
Long axis = 25.0 mm
Short axis = 20.4 mm
Volume = 3420 mm^3

Post Therapy – 24 days

Long axis = 25.9 mm
Short axis = 19.8 mm
Volume = 4608 mm^3

• Change in Long axis	4%
• Change in Volume	35%

Shows early progression which allows patients to select alternatives sooner and avoid toxicity when current treatment is futile.
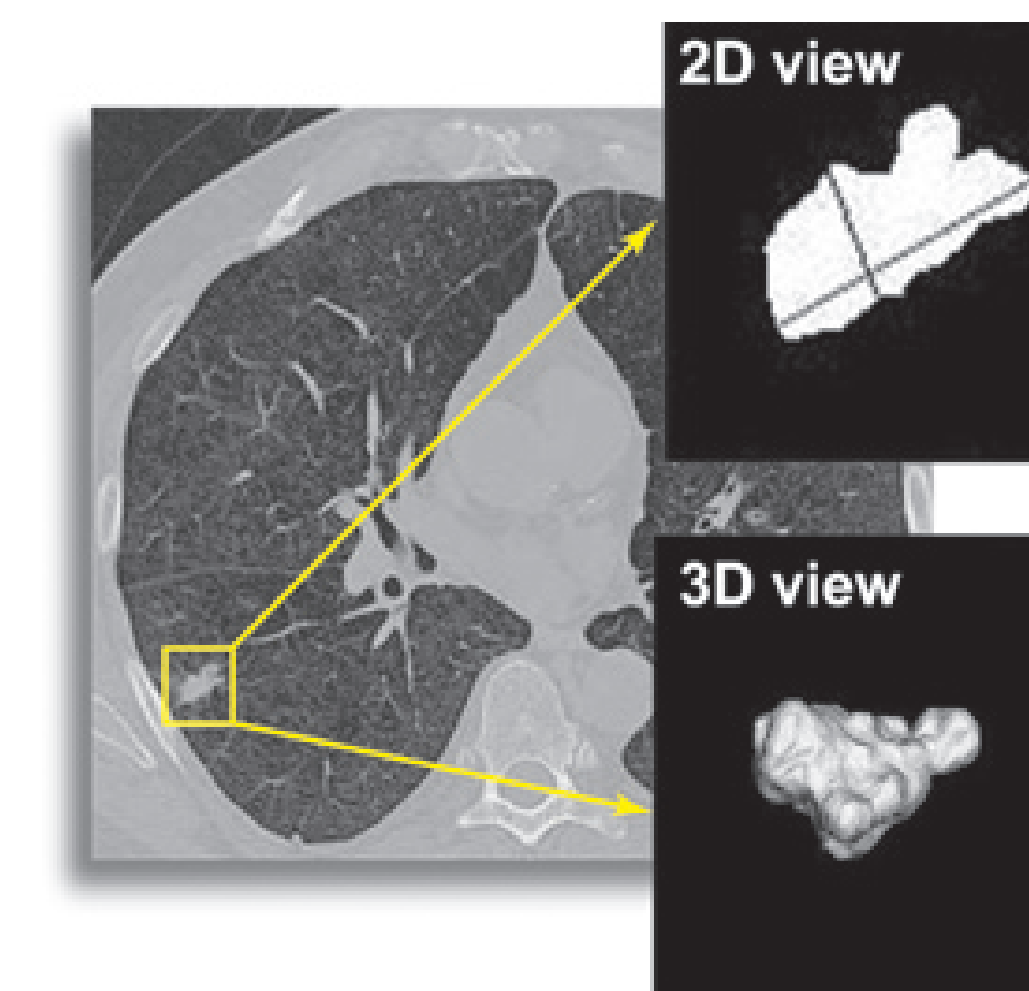
Volume Change

Pre Therapy
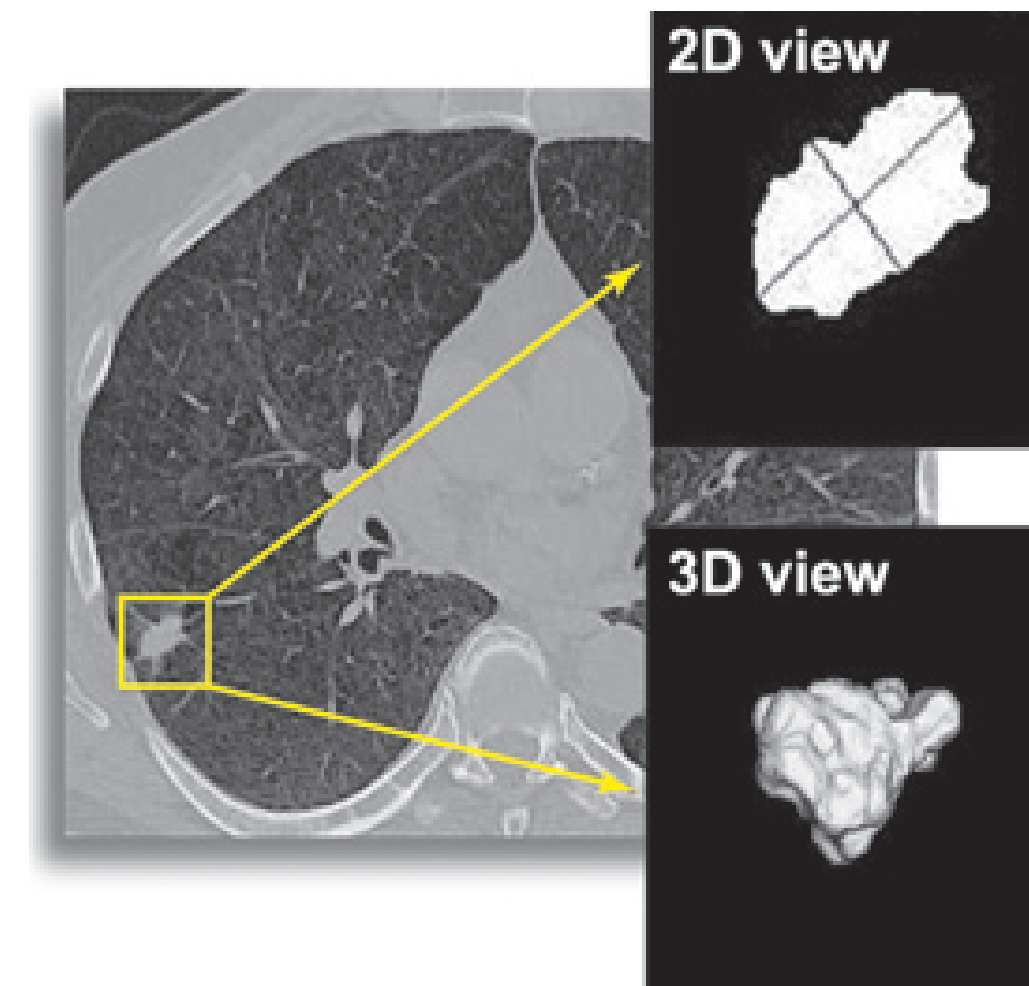
Long axis = 17.7 mm
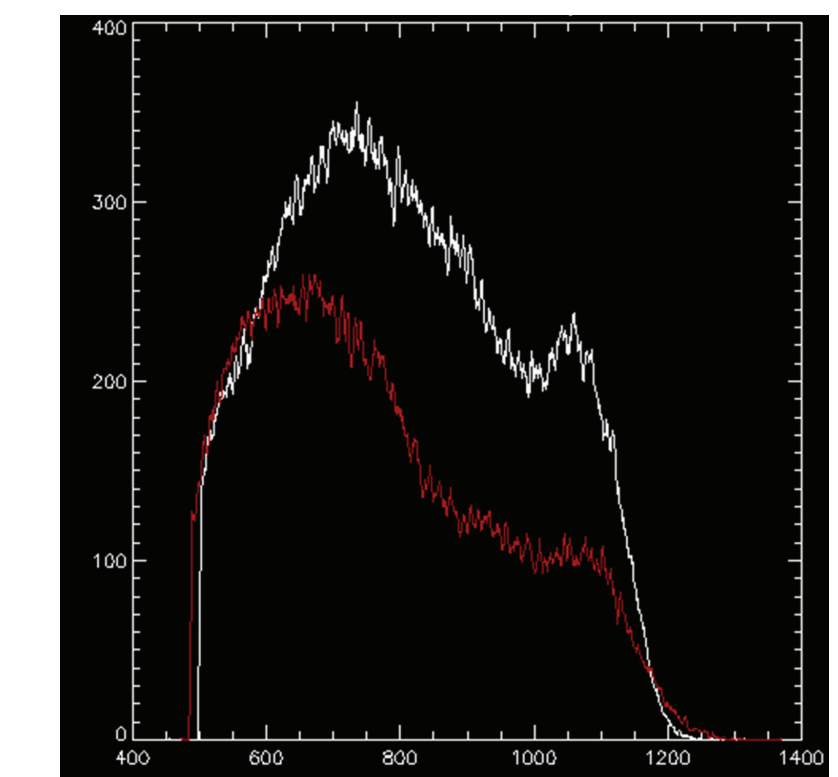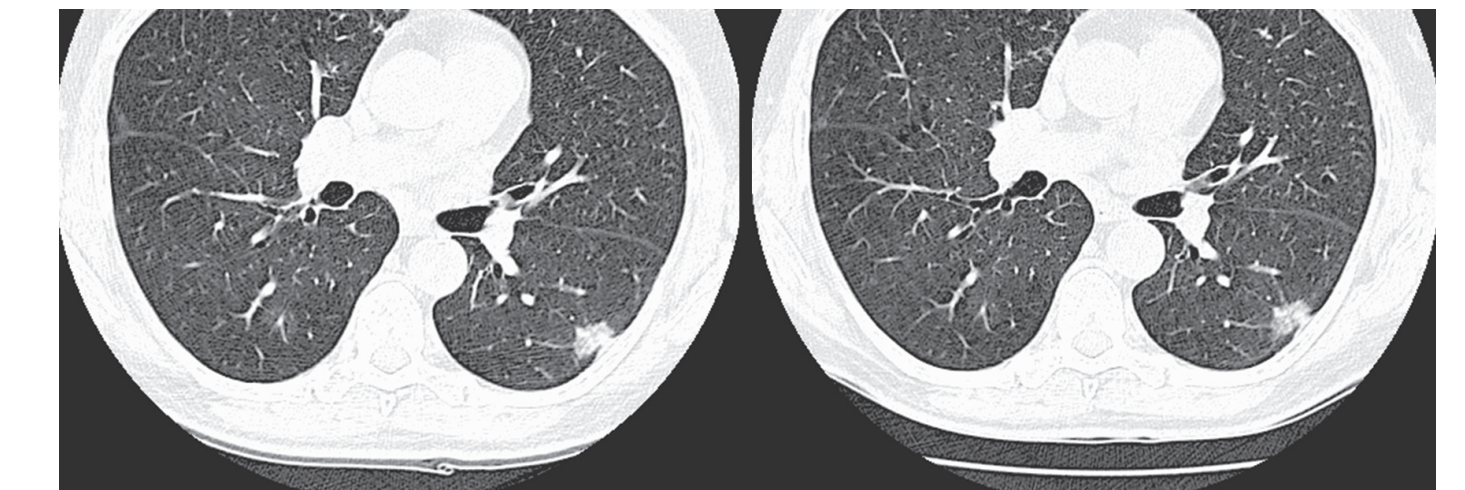Short axis = 9.6 mm
Volume = 886 mm^3

Post Therapy – 21 days

Long axis = 17.1 mm
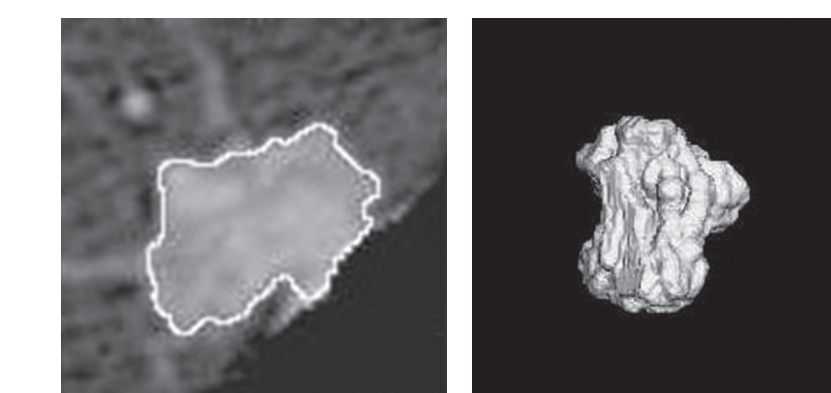Short axis = 7.4 mm
Volume = 525 mm^3

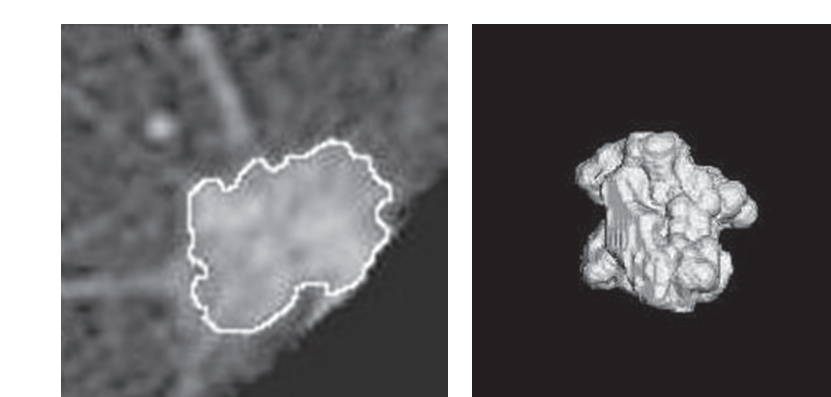|	
• Change in Long axis	3%
• Change in Volume	41%

Size and Density Change

Pixel based density at baseline (white) and after 3 weeks of therapy (red). Note a decrease in the mean density as well as volume after a targeted therapy.

Baseline

Long axis = 18.3 mm
Short axis = 12.1 mm
Volume = 2585.8 mm^3

Post Therapy – 1 month

Long axis = 17.5 mm
Short axis = 13.1 mm
Volume = 1740.1 mm^3