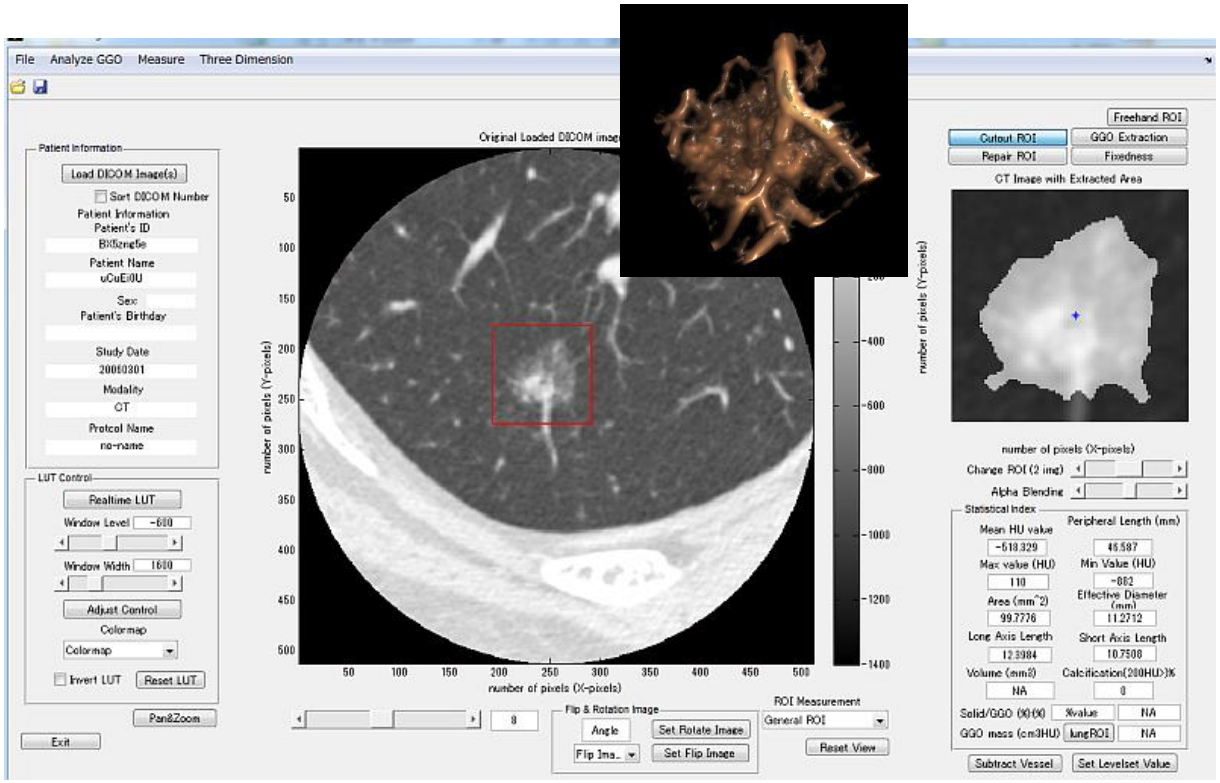
WatchinGGO:

Ground Glass Opacity Analyzer for Lung Cancer Research and Education using Computed Tomography.

Tumor Imaging Biomarker for Researchers



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Quantitative measurement for solid nodule, mixed GGOs and pure GGOs.

Image and Volume analysis of nudules and GGOs.

Automatic or semi-automatic extraction of GGOs using user-selectable segmentation.

Automatic closs measure of diameter in GGOs (auto long and short axis)

Shape and Density discripter using 2D and 3D texture measures.

Auto selection of maximum area slice of GGO and min GGO

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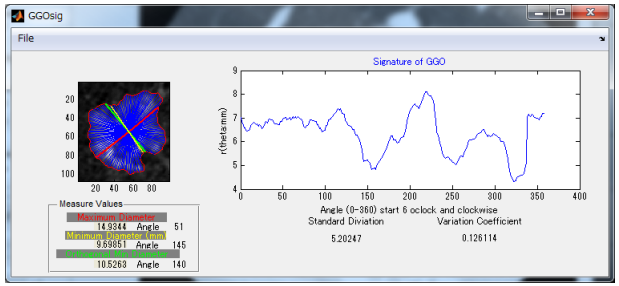
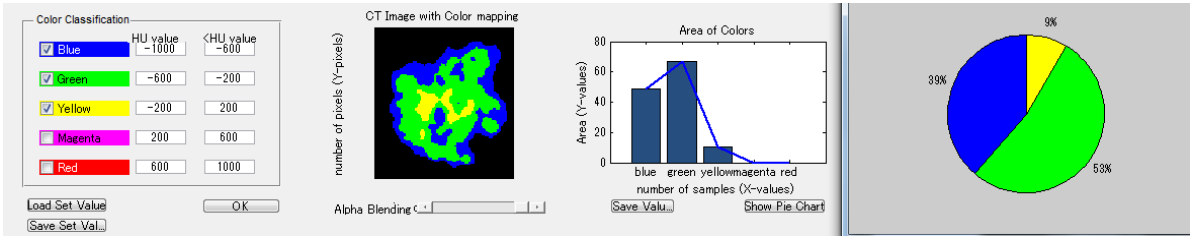
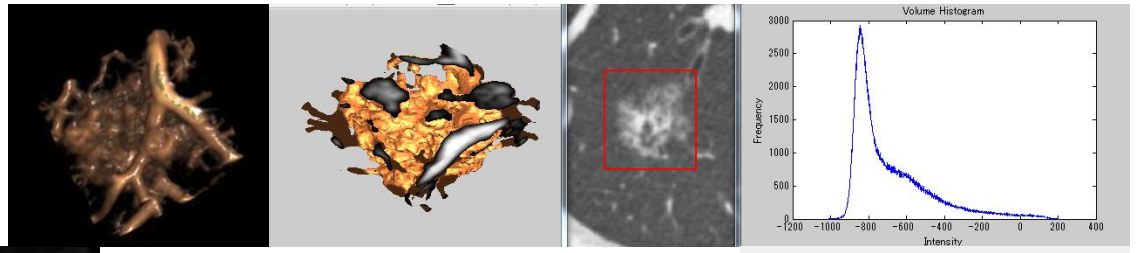


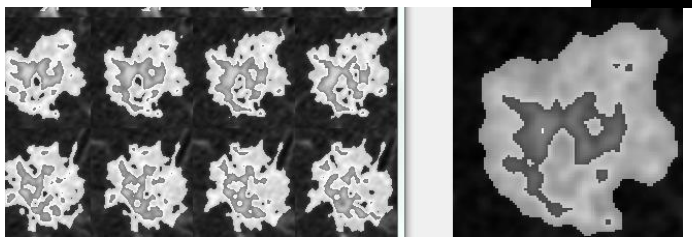
Automatic closs measure of diameter in GGOs (long and short axis) and shape curves show the dregree of complex of tumor shape.



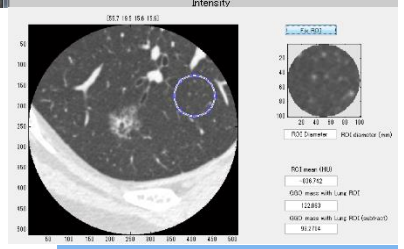
Quantitative density analysis for solid nodule, mixed GGOs and pure GGOs.

Three dimensional volume histogram for each images, VOI, GGOs.





subtract solid or vessels. Percent rate between pure GGOs and solid parts



GGO mass index

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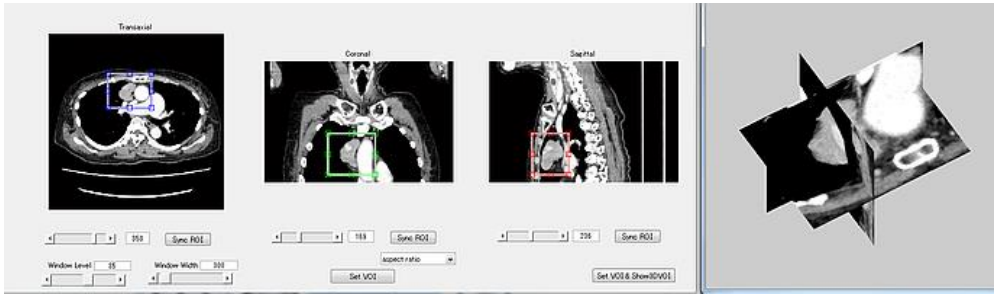
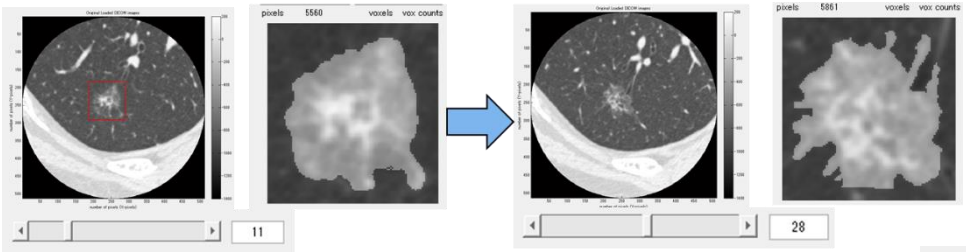
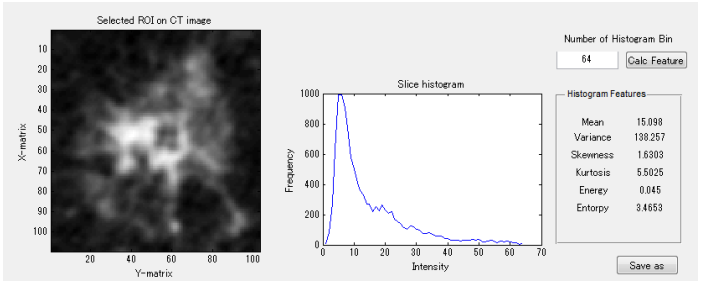


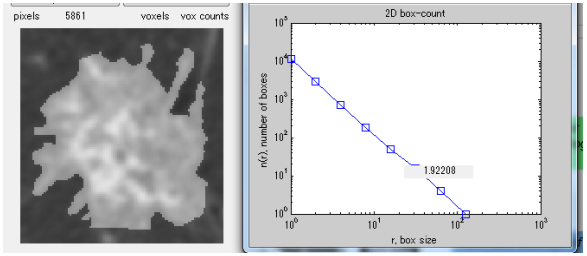
Orthogonal MPR selection of tumor VOI
3D slice superimpose of three orthogonal slices



Automatic selection of maximum area of mixed GGOs

GGO texture measure.
Lung tumor imaging biomarker





Fractal Analysis of GGOs

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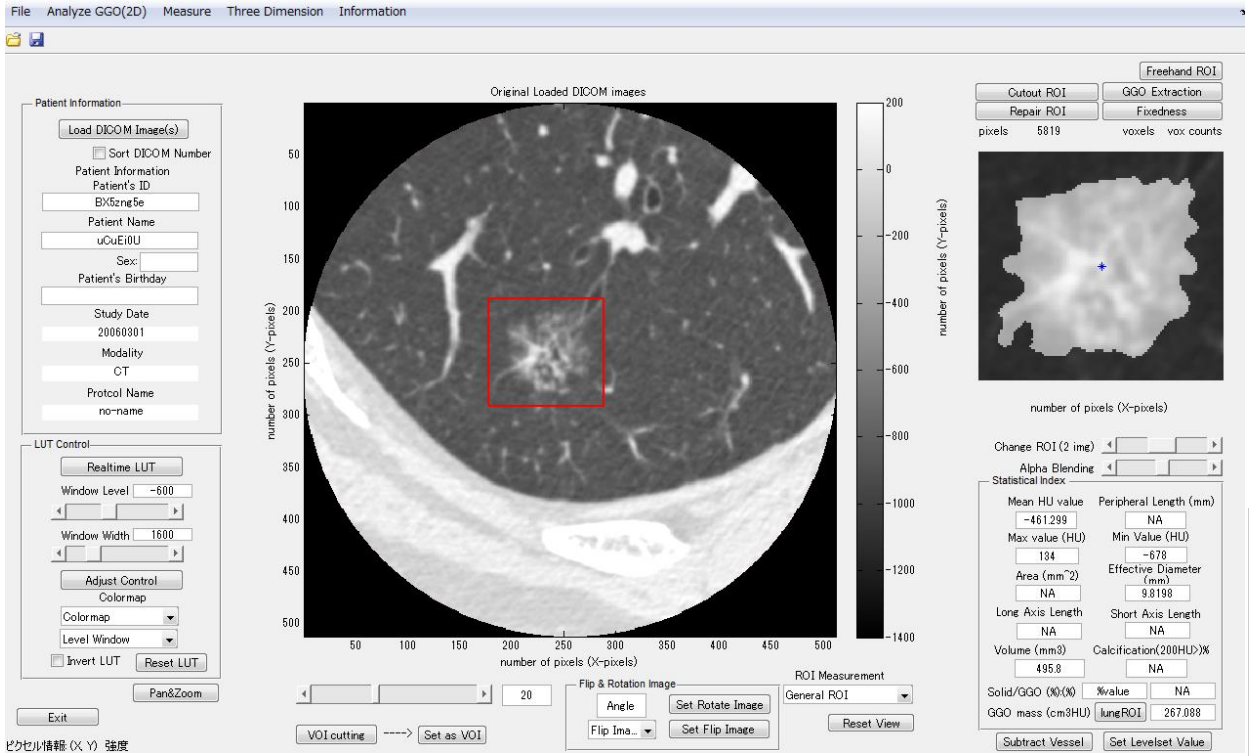
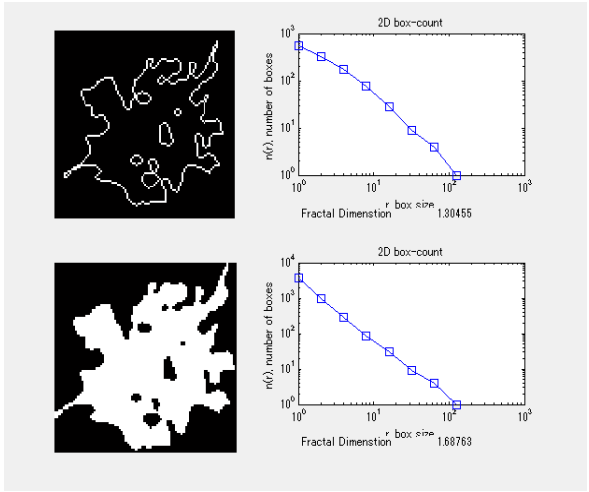
Fractal Analysis of Cancer Tumor





2D contour, 2D binary and 3D binary Fractal Dimension using Box-counting

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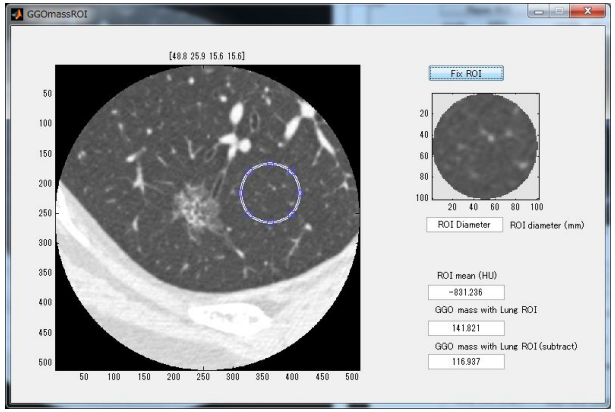

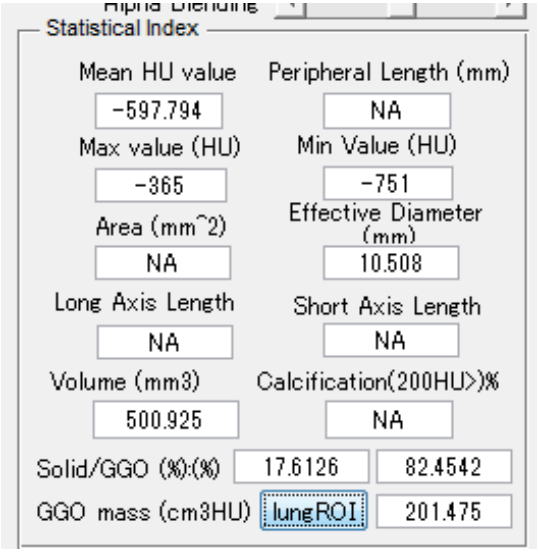

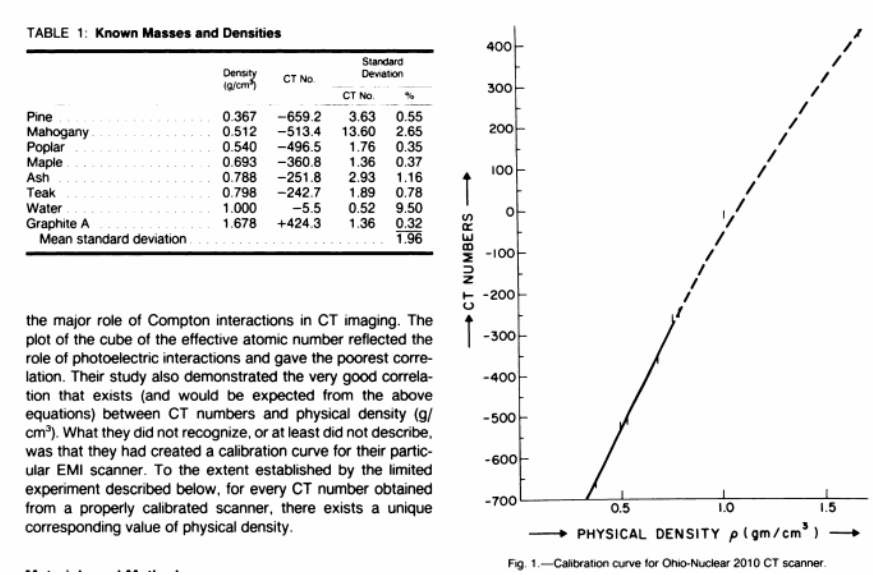

TABLE 1: **Known Masses and Densities**

	Density (g/cm³)	CT No.	Standard Deviation CT No.	Standard Deviation %
Pine	0.367	−659.2	3.63	0.55
Mahogany	0.512	−513.4	13.60	2.65
Poplar	0.540	−496.5	1.76	0.35
Maple	0.693	−360.8	1.36	0.37
Ash	0.788	−251.8	2.93	1.16
Teak	0.798	−242.7	1.89	0.78
Water	1.000	−5.5	0.52	9.50
Graphite A	1.678	+424.3	1.36	0.32
Mean standard deviation				1.96

the major role of Compton interactions in CT imaging. The plot of the cube of the effective atomic number reflected the role of photoelectric interactions and gave the poorest correlation. Their study also demonstrated the very good correlation that exists (and would be expected from the above equations) between CT numbers and physical density (g/cm³). What they did not recognize, or at least did not describe, was that they had created a calibration curve for their particular EMI scanner. To the extent established by the limited experiment described below, for every CT number obtained from a properly calibrated scanner, there exists a unique corresponding value of physical density.

Fig. 1.—Calibration curve for Ohio-Nuclear 2010 CT scanner.

CT quotient (CTQ = CT number +1,000, mg/mL)

CT number (HU) = [weight (mg)/volume (mL)]−1,000

GGO-mass (cm3 HU)= (HU+1000) × Volume

Mull RT. Mass estimates by computed tomography: physical density from CT numbers. AJR Am J Roentgenol 1984;143:1101–1104.

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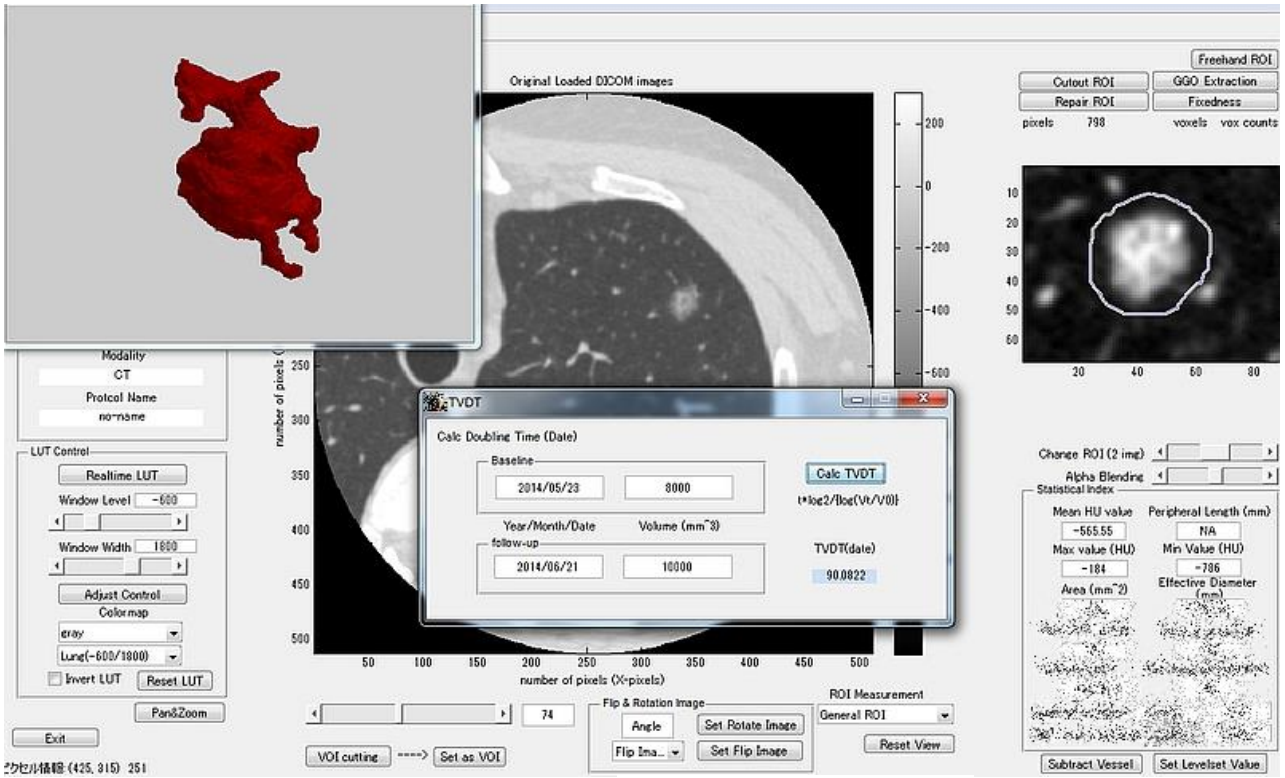
The volume
doubling times were calculated using the method originally described by Schwartz



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