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Mayo Clinic Urolithiasis O'Brien Grant Imaging Core

Director: Cynthia H. McCollough, PhD

Purpose of Imaging Core …

- Provide five key functions in support of Mayo's O'Brien Urology Cooperative Research Center
- Directly support Projects 1, 2, and 3
  - Provide support for pilot projects, when applicable
- Four key functions:
  - 1) Dual-energy CT scanning of specimens or patients
  - 2) Dual-energy CT analyses using custom software
  - 3) Spectral CT scanning of *ex-vivo* specimens
  - 4) Coordination of micro-CT scanning with Dr. Jim Williams (Indiana University)

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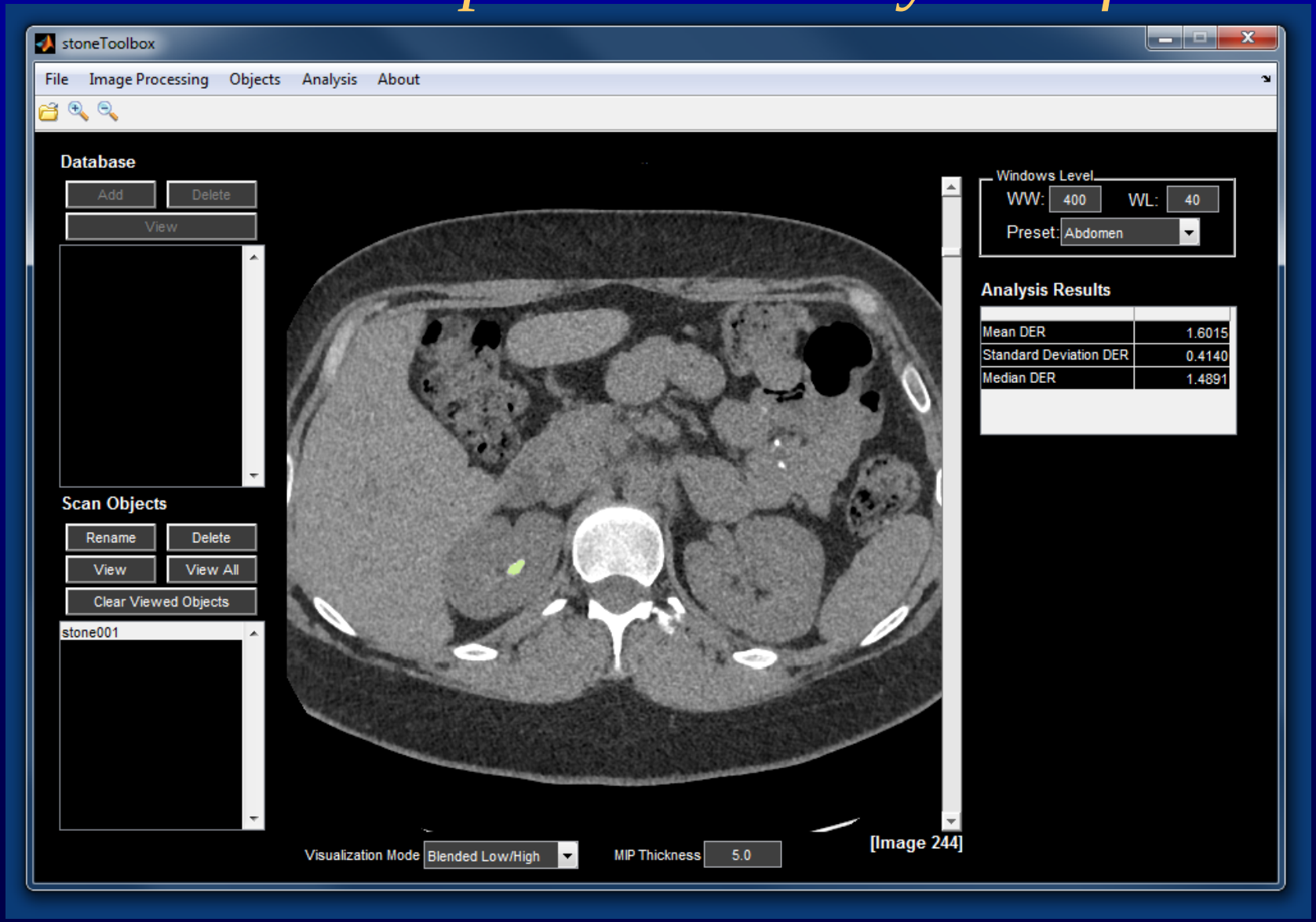
In-house developed stone analysis software



In-house software measurements

- Stone volume
- Max stone dimension
- Stone height, width and length
- Dual energy ratio (related to stone type)
  - Primak, Andrew N., et al. "Noninvasive differentiation of uric acid versus non–uric acid kidney stones using dual-energy CT." *Academic radiology* 14.12 (2007): 1441-1447.
  - Qu, Mingliang, et al. "Dual-energy dual-source CT with additional spectral filtration can improve the differentiation of non-uric acid renal stones: an ex vivo phantom study." *AJR. American journal of roentgenology* 196.6 (2011): 1279.
  - Qu, Mingliang, et al. "Urinary stone differentiation in patients with large body size using dual-energy dual-source computed tomography." *European radiology* 23.5 (2013): 1408-1414.
- Surface curvature (related to stone type)
  - Duan, Xinhui, et al. "Differentiation of calcium oxalate monohydrate and calcium oxalate dihydrate stones using quantitative morphological information from micro-computerized and clinical computerized tomography." *The Journal of urology* 189.6 (2013): 2350-2356.

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Patient Name:
Scan Date:

Dimensions
l: 14.4 mm
w: 14.9 mm
h: 9.2 mm
Max: 15.8 mm

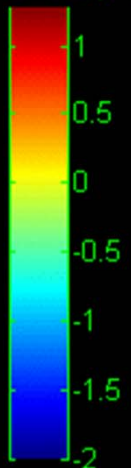
Volume
862 mm3

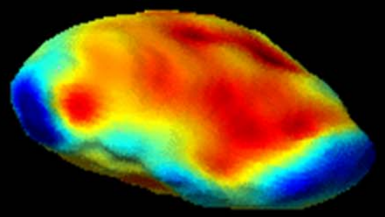
CT Number (Mean/SD)
High kv: 1038/29 [HU]
Low kv: 1659/62 [HU]

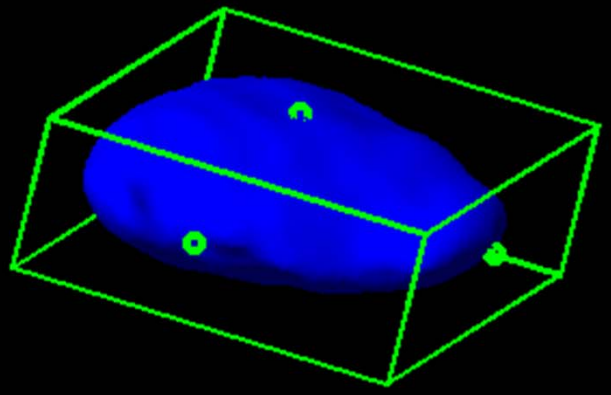
Composition
DE Ratio: 1.59
COX

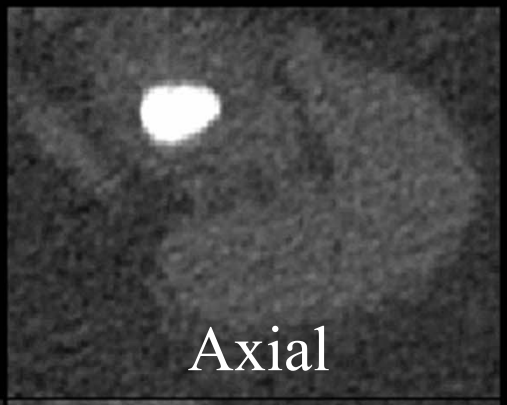
Curvature
FWHM: 0.154
COM

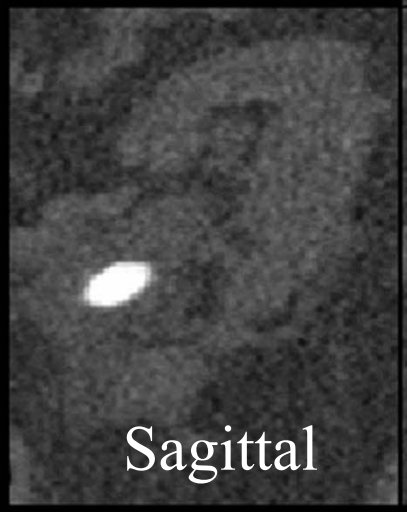
Heterogeneity
Metric
Interpretation

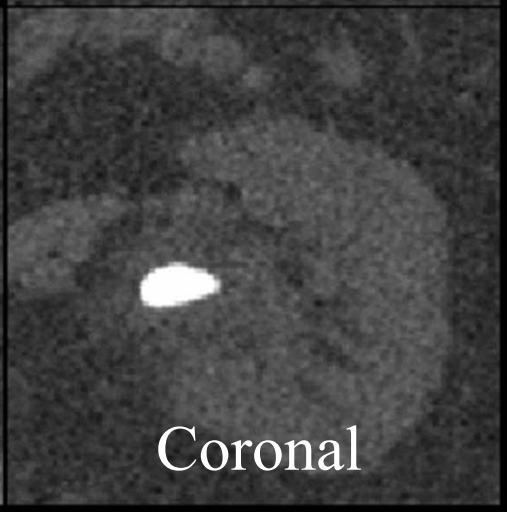












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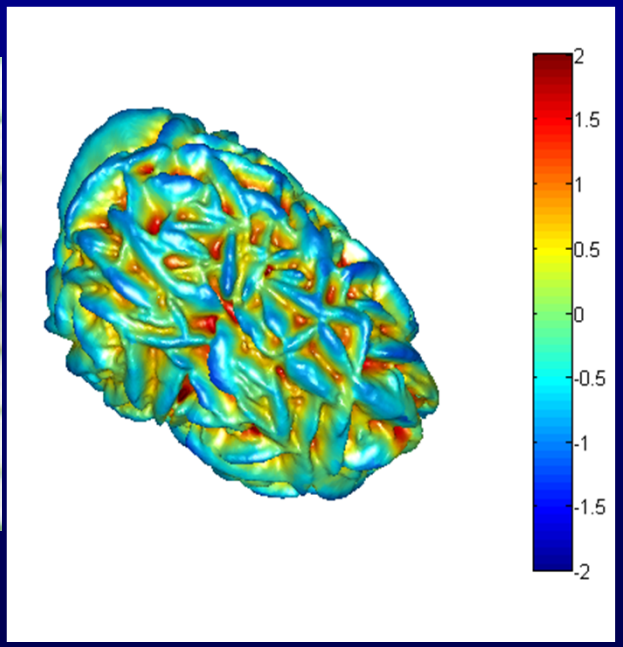
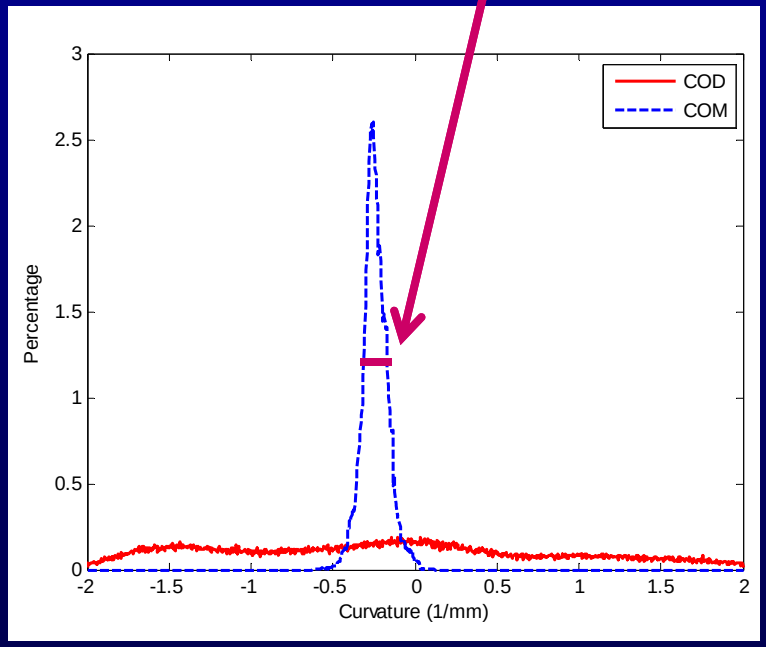
Shape index: Quantifies surface morphology

Shape index
≡ Full width at half maximum





Surface curvature map

Surface curvature histogram

For additional information, please visit
http://mayoresearch.mayo.edu/ctcic