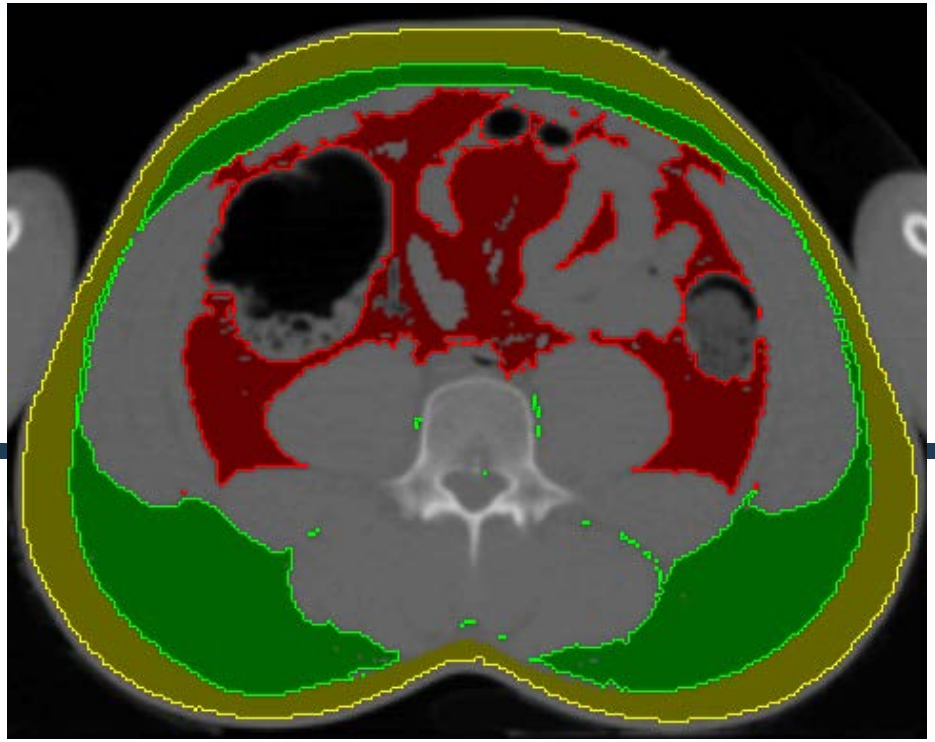
Analyze Webinar – October 27, 2011

Quantification of Abdominal Adipose Tissue in CT



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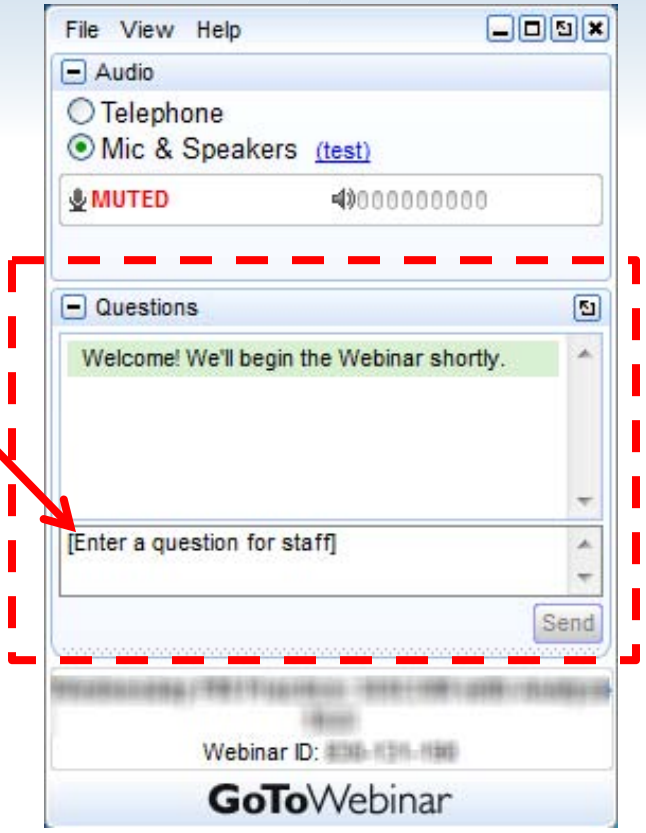
Webinar Agenda

- Estimated Duration: 30 minutes
- Webinar Agenda:
  - Segment visceral, deep subcutaneous and superficial subcutaneous adipose tissues
  - Measure the defined regions and export statistics
  - Questions & Answers
- Webinar Objectives:
  - To show how to segment CT data by thresholding
  - To provide information about segmentation tools available in the Region of Interest module
  - To show how to obtain and export region volume and other statistics

Adipose Tissue Quantification

- Questions during the Webinar
  - Use “Questions” pane of your GoToWebinar control panel
- After the Webinar
  - Webinar registrants will receive an email from Analyze Webinars that contains a link to the recording tomorrow



Adipose Tissue Quantification

- Abdominal adipose tissue is a key indicator of metabolic conditions that link obesity with several diseases, including:
  - Type 2 diabetes
  - Coronary heart disease
  - Stroke
- Analyze provides semi-automated segmentation and quantification of adipose tissue:
  - Visceral Adipose Tissue
  - Deep Subcutaneous Adipose Tissue
  - Superficial Subcutaneous Adipose Tissue

Steps to Adipose Tissue Quantification

1. Remove all non-adipose tissue via thresholding.
2. Partition the adipose tissue into the following regions:
   - Visceral Adipose Tissue (VAT)
   - Deep Subcutaneous Adipose Tissue (DSAT)
   - Superficial Subcutaneous Adipose Tissue (SSAT)
3. Calculate quantitative statistics and export for further analysis.

Removing Non-Adipose Tissue

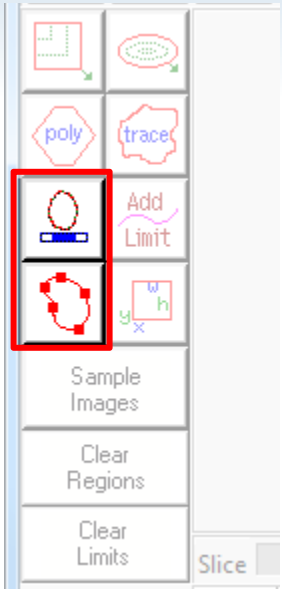
- The threshold range for adipose tissue in CT is approximately -190 to -30 HU.
- Removing non-adipose tissue
  - Assign all voxels below ~ -190 HU to an object
  - Assign all voxels above ~ -30 HU to the same object
- Region of Interest Threshold Tool
  - Tools > Threshold

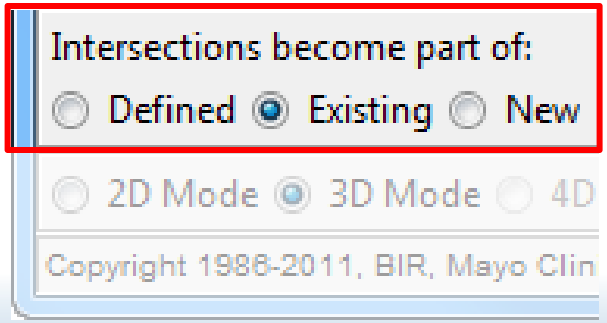
Voxels below -190 shown in white

Voxels above -30 shown in white

Defining VAT, DSAT and SSAT

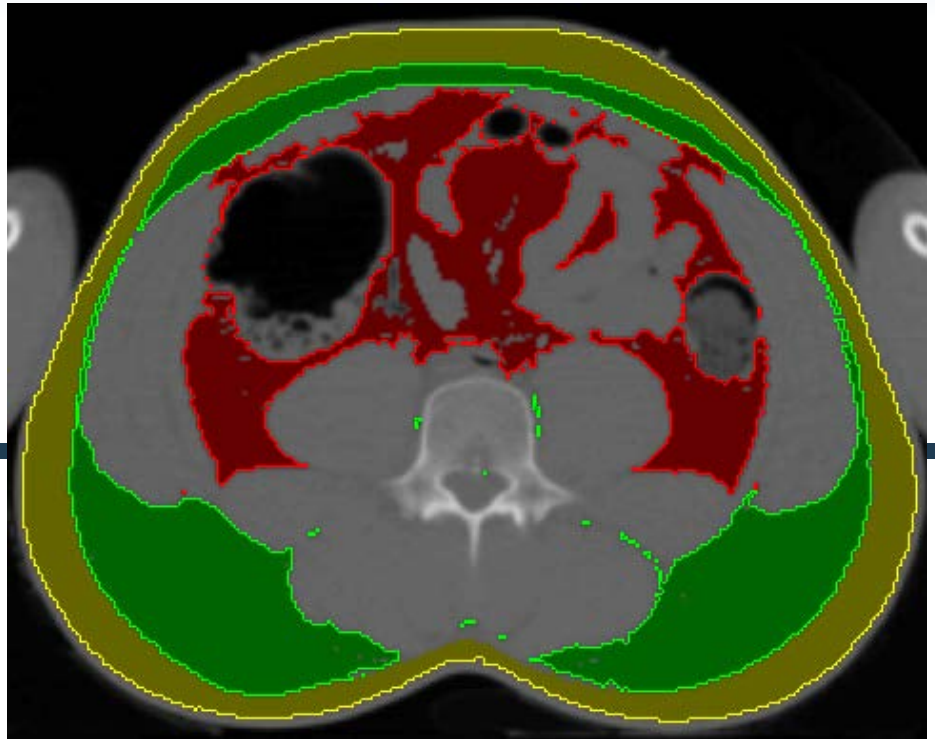
- Defining VAT, DSAT
  - Spline: trace around the VAT.
- Define SSAT
  - Auto Trace
- Note: **Intersections become part of: *Existing***





Quantification of Abdominal Adipose Tissue in CT

Demonstration

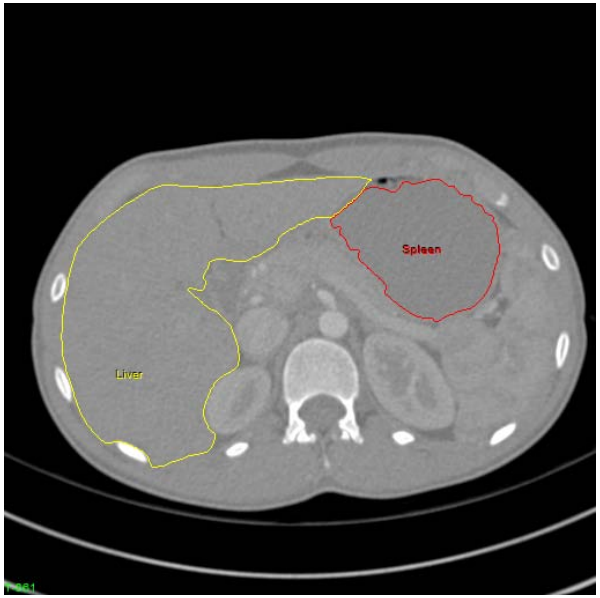


Related Applications

- Intrahepatic Lipid Content (IHL), or liver fat content estimation
  - *Koska et al (American Journal of Clinical Nutrition, 2008)* [1]
- Define and sample to derive the mean intensity value for the following regions:
  - Liver
  - SubQ Adipose Tissue
  - Spleen
- Intrahepatic lipid content (IHL) can then be estimated by using the formula:

$$IHL = 100 * (AI_{Liver} - AI_{Spleen})/(AI_{SAT} - AI_{Spleen})$$

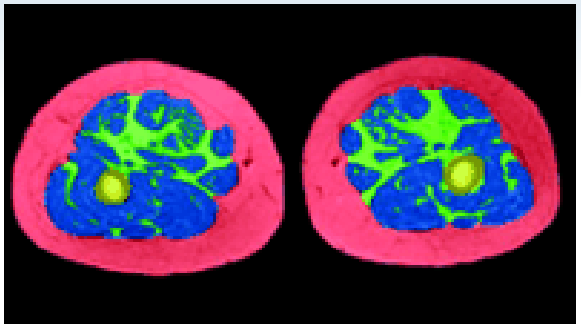
where *AI* equals the average intensity (mean).



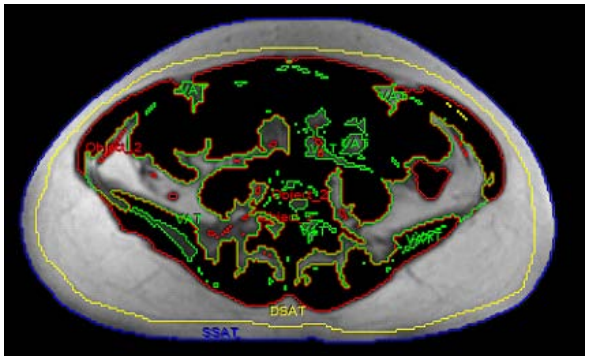
[1]Koska, Juraj . "Increased fat accumulation in liver may link insulin resistance with subcutaneous abdominal adipocyte enlargement, visceral adiposity, and hypoadiponectinemia in obese individuals." *American Journal of Clinical Nutrition*. 87.2 (2008): 295-302. http://www.ajcn.org/content/87/2/295.full.

Related Applications

- Other Anatomy
  - Thigh
  - Calf
- Adipose Tissue Quantification in MRI
  - Water-suppressed
  - T1-Weighted MRI



Source: Journal of Applied Physiology, 2004.



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Questions?

Conclusion

- Watch for a link to the AnalyzeDirect website tomorrow
- Other helpful documents and protocols - www.analyzedirect.com/support/resourcecenter.asp
- Evaluate Analyze 10.0 free for 30 days - www.analyzedirect.com/evaluate
- Contact me: **Aimee McMaster**

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