



Applied Chest Imaging Laboratory

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# Lung Lesion Analyzer

A Chest Imaging Platform Slicer Extension module

# Overview

- Goal: localize, segment and analyze lung lesions and their surroundings
- Localize:
  - The module includes Maximum Intensity Projection tools in order to help to localize the lesions faster.
- Segment:
  - Starting from a landmark in the lesion, the module performs an automatic segmentation
- Analyze:
  - Choose between dozens of metrics not only in the lesion, but also in custom radius spheres surrounding it



# Lung Lesion Analyzer

3DSlicer

Modules: Lung lesion analyzer

▶ Help & Acknowledgement

▼ Case selector

Input volume: None

▶ Enhance visualization (mlr)

▼ Results of the analysis

Save Open Export Clean cache

Additional comments:

▶ Advanced parameters

▼ Case selector

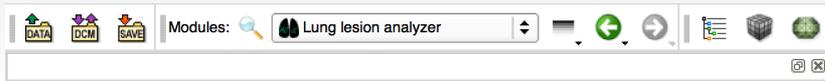
Input volume: None

1001\_UVM\_CANCER

1- Select an input CT image



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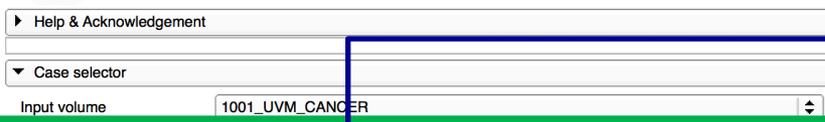


2- Locate nodule.

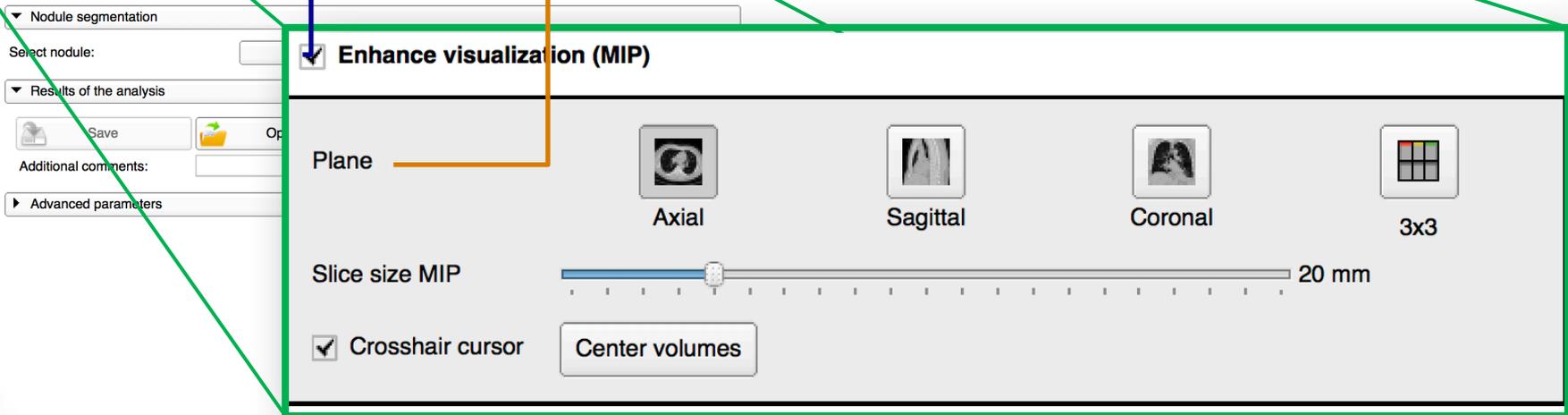
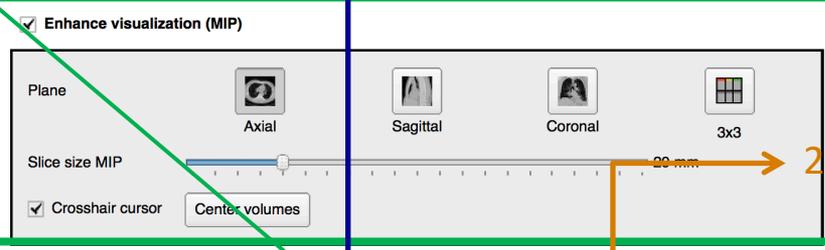


2.1- If desired enable Enhance visualization to see the Maximum Intensity Projection.

*Tip: check MIP viewer module for more details*



2.2- When MIP is enabled, select the desired projection



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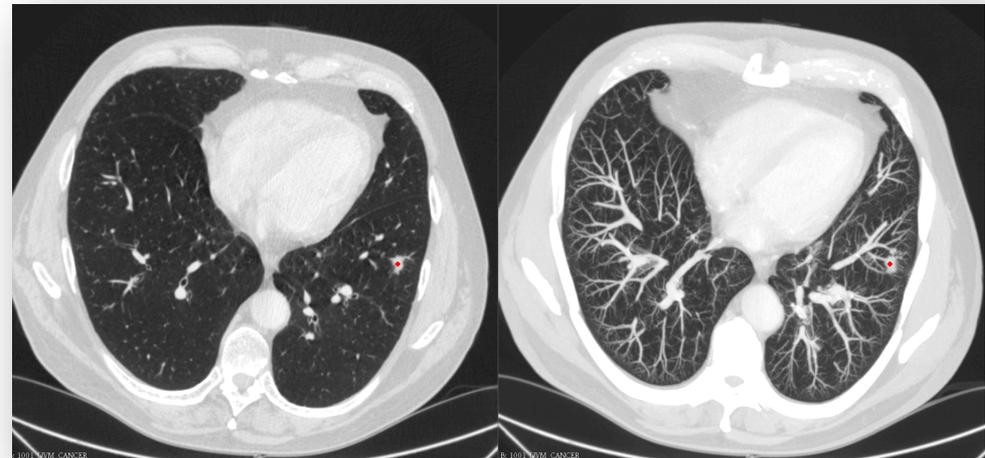
## 3- Place Seeds

3.1- Click on "New nodule" and click on a point that is clearly inside the lesion to add a new detected nodule.

*Tip: localize the nodule on the MIP view but add it in the regular window. (view picture)*

3.2- If known, select the lesion type. (Nodule/Tumor).

3.3- If needed, click remove nodule and place a new one.



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## 4- Segment Nodule

▼ Nodule segmentation

Select nodule: Nodule 2 + New nodule

Lesion type:  Unknown  Nodule  Tumor

Seeds / Axis:

-101.962, -145.929, -224.146 (Center)

Max. lesion radius (mm) 30

**Segment nodule** Nodule labelmap 1001\_UVM\_CA...eLabelmap\_2

Remove nodule

Select a threshold:

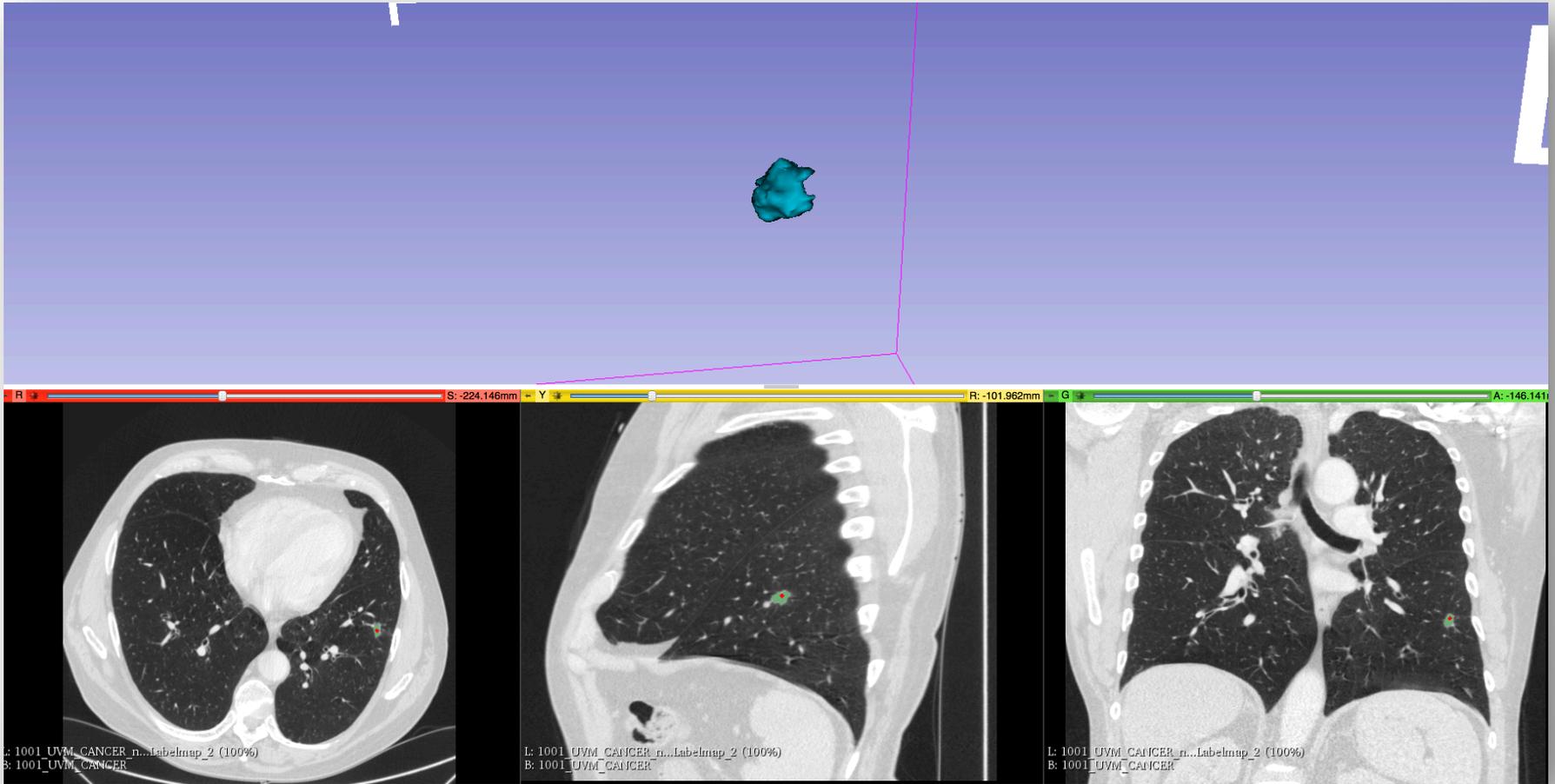
4.1- Click segment nodule to start the segmentation

4.2- If desired, after the segmentation process is complete, move the bar to fine tune the segmentation



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Expected results.



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## 5- Run analysis

5.1- Select all the desired parameters for the selected nodule.

First-Order Statistics     Morphology and Shape     Texture: GLCM     Texture: GLRL

<input checked="" type="checkbox"/> Voxel Count	<input checked="" type="checkbox"/> Mean Deviation
<input checked="" type="checkbox"/> Gray Levels	<input checked="" type="checkbox"/> Root Mean Square
<input checked="" type="checkbox"/> Energy	<input checked="" type="checkbox"/> Standard Deviation
<input checked="" type="checkbox"/> Entropy	<input checked="" type="checkbox"/> Ventilation Heterogeneity
<input checked="" type="checkbox"/> Minimum Intensity	<input checked="" type="checkbox"/> Skewness
<input checked="" type="checkbox"/> Maximum Intensity	<input checked="" type="checkbox"/> Kurtosis
<input checked="" type="checkbox"/> Mean Intensity	<input checked="" type="checkbox"/> Variance
<input checked="" type="checkbox"/> Median Intensity	<input checked="" type="checkbox"/> Uniformity
<input checked="" type="checkbox"/> Range	

Structures to analyze:

15 mm radius

20 mm radius

25 mm radius

Other (mm sphere radius)   Show

    Analyze all nodules

5.2- Select all the desired radius of the sphere around the nodule to analyze.

5.3- Click on "Analyze" to run the analysis.

*Tip: the result will show the parameters of the selected nodule.*



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Structures to analyze:

- 15 mm radius  Show
- 20 mm radius  Show
- 25 mm radius
- Other (mm sphere radius)   Show
- Analyze all nodules

 Analyze!

5.4- Click on Show to highlight a sphere

Expected results.



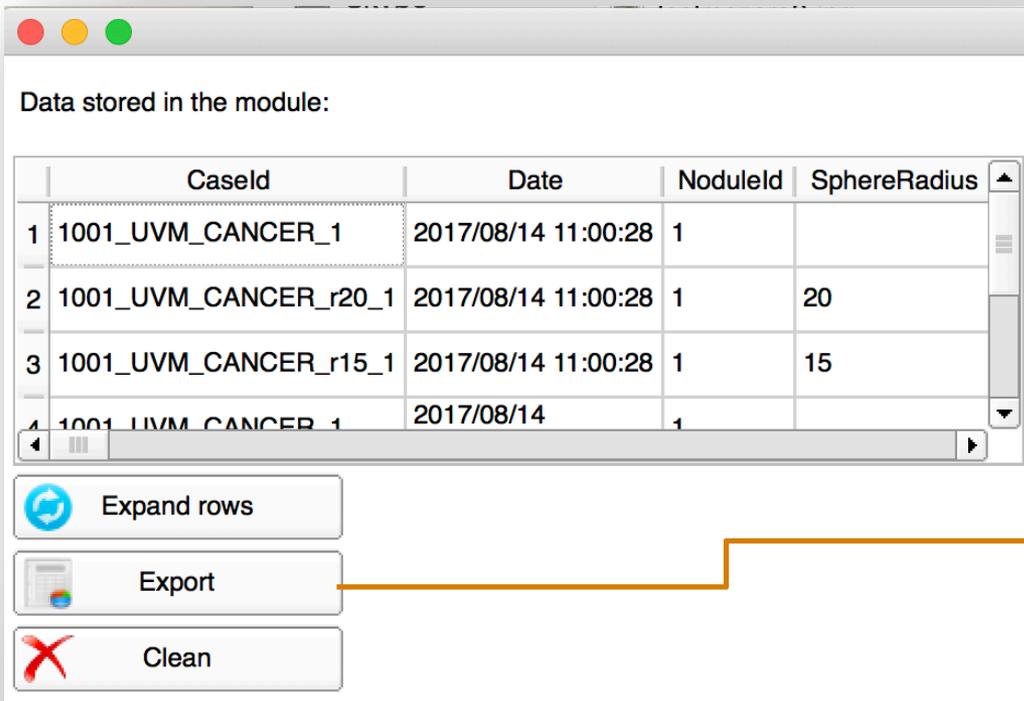
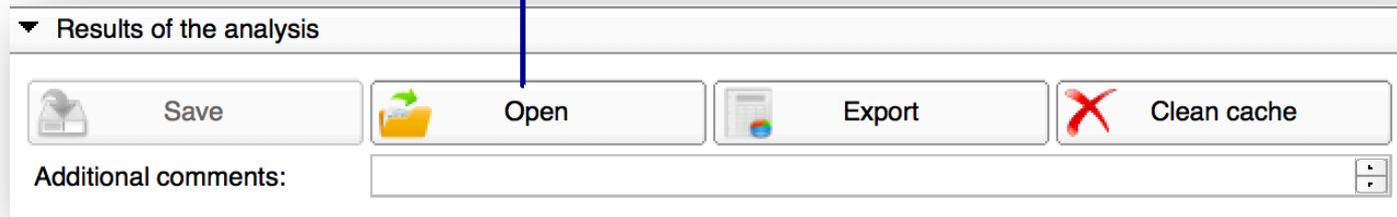
5.5- To obtain the parameters for all the placed nodules, enable analyze all nodules and start analysis.



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6- Export data.

6.1- Click "Open" to view a table with the results  
*Tip: Export data if desired.*



6.2- Export data file.  
*Tip: Save the file with .csv extension.*



# Lung Lesion Analyzer

- The Lung Lesion Analyzer is part of the Chest Imaging Platform extension for 3D Slicer ([www.chestimagingplatform.org](http://www.chestimagingplatform.org))
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