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# Dose accumulation for adaptive radiation therapy

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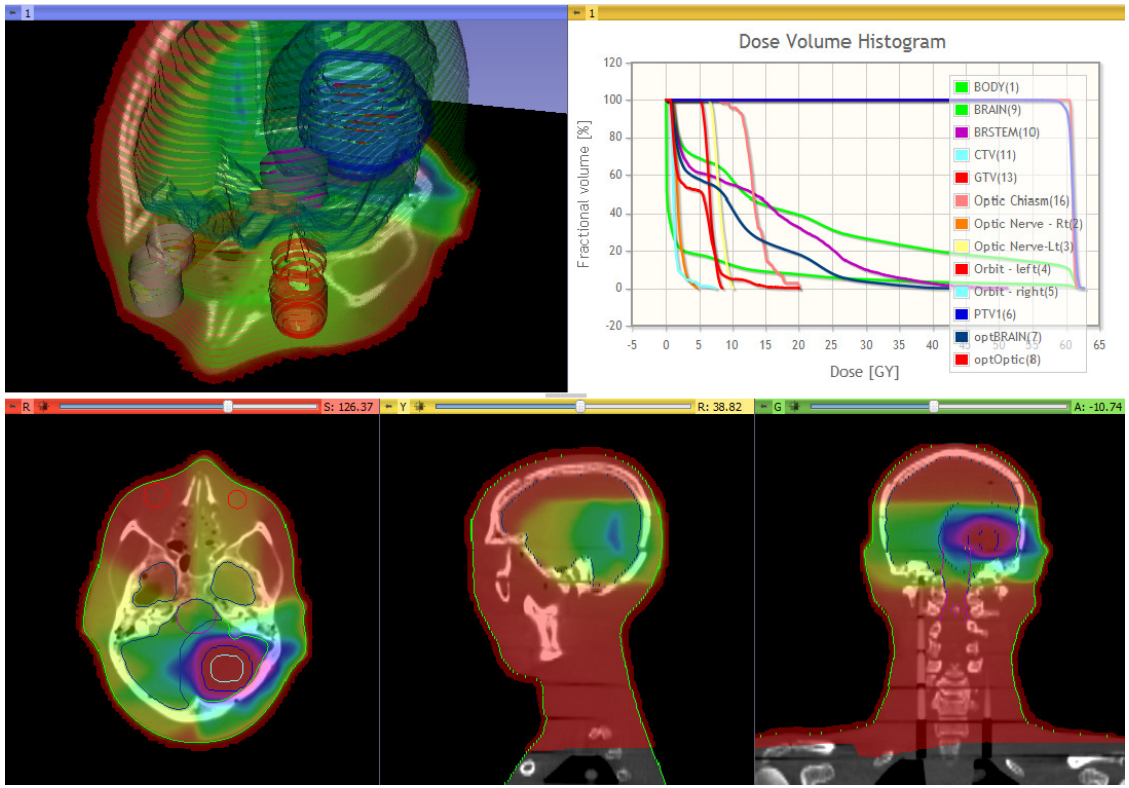
# Learning Objective

This tutorial demonstrates how to perform dose accumulation for adaptive radiation therapy



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# Pre-requisite

This tutorial assumes that you have completed the following tutorial:

Data Loading and 3D Visualization

Sonia Pujol

http://www.slicer.org/slicerWiki/index.php/Documetation/4.1/Training#Slicer4_Data_Loading_and_3D_Visualization



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# Material

This tutorial requires the installation of the Slicer 4.1 with RT extension 0.3 release and the tutorial dataset. They are available at the following locations:

**Slicer4.1 RT extension 0.3** download page:

https://www.assembla.com/spaces/slicerrt/wiki/Download

**Tutorial dataset**:

https://www.assembla.com/spaces/slicerrt/documents/bMuwgYTKur4yP-acwqjQWU/download/bMuwgYTKur4yP-acwqjQWU



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# Platforms

Currently only tested on Windows Platform

Work in progress …



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# Overview

- Part 1: Loading and visualization
- Part 2: Rigid registration
- Part 3: Bspline deformable registration
- Part 4: Dose accumulation
- Part 5: DVH comparison


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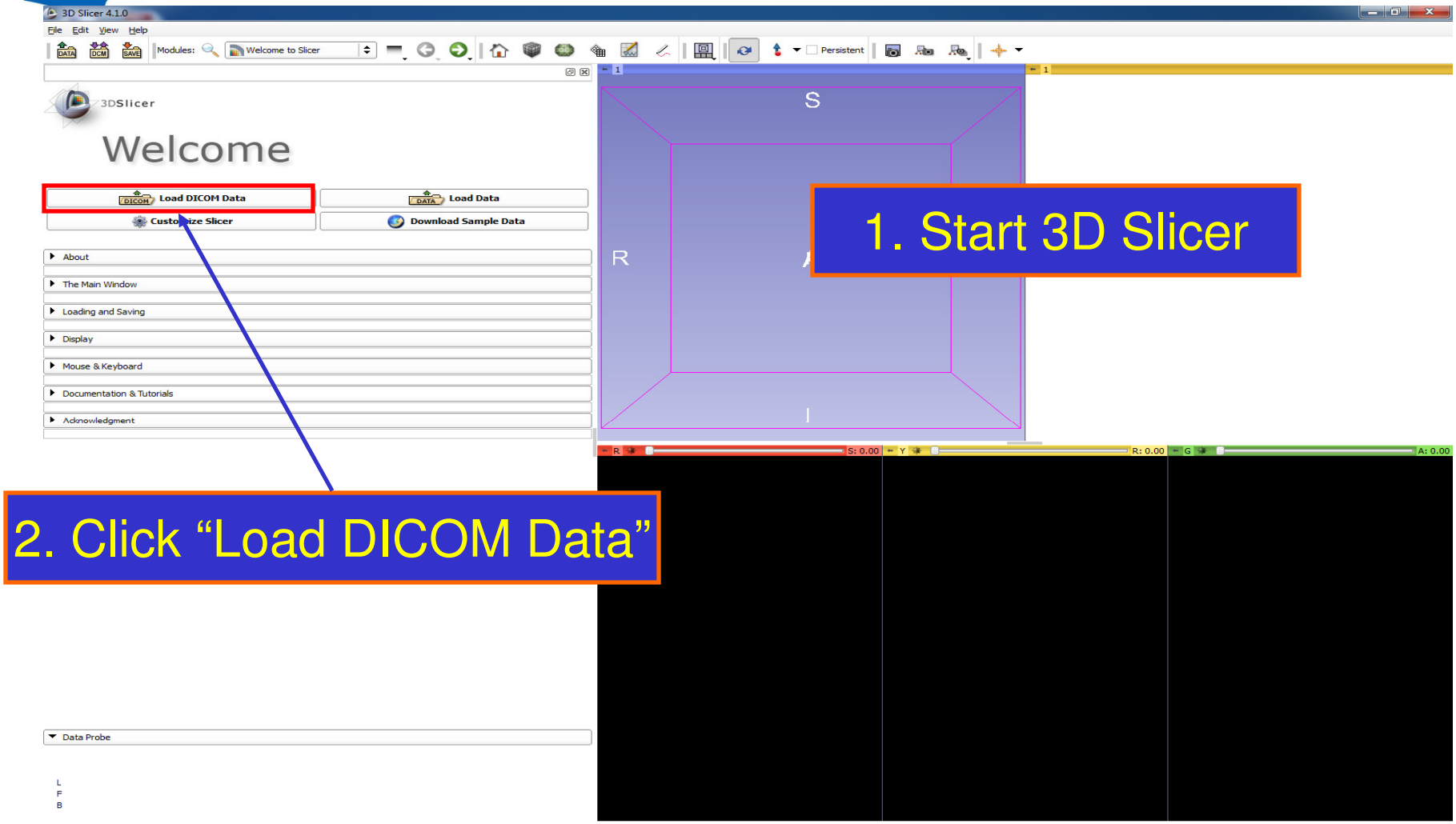
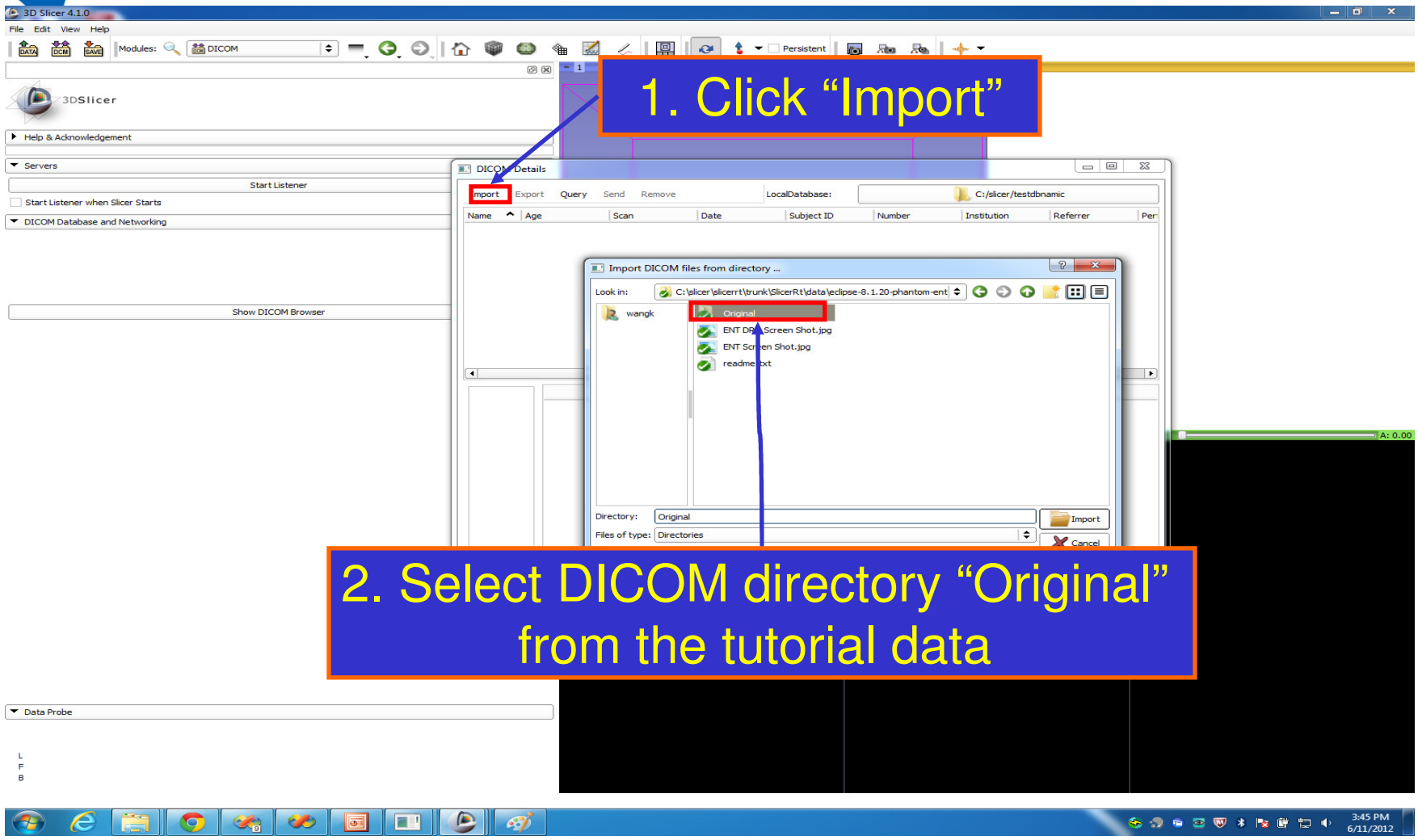
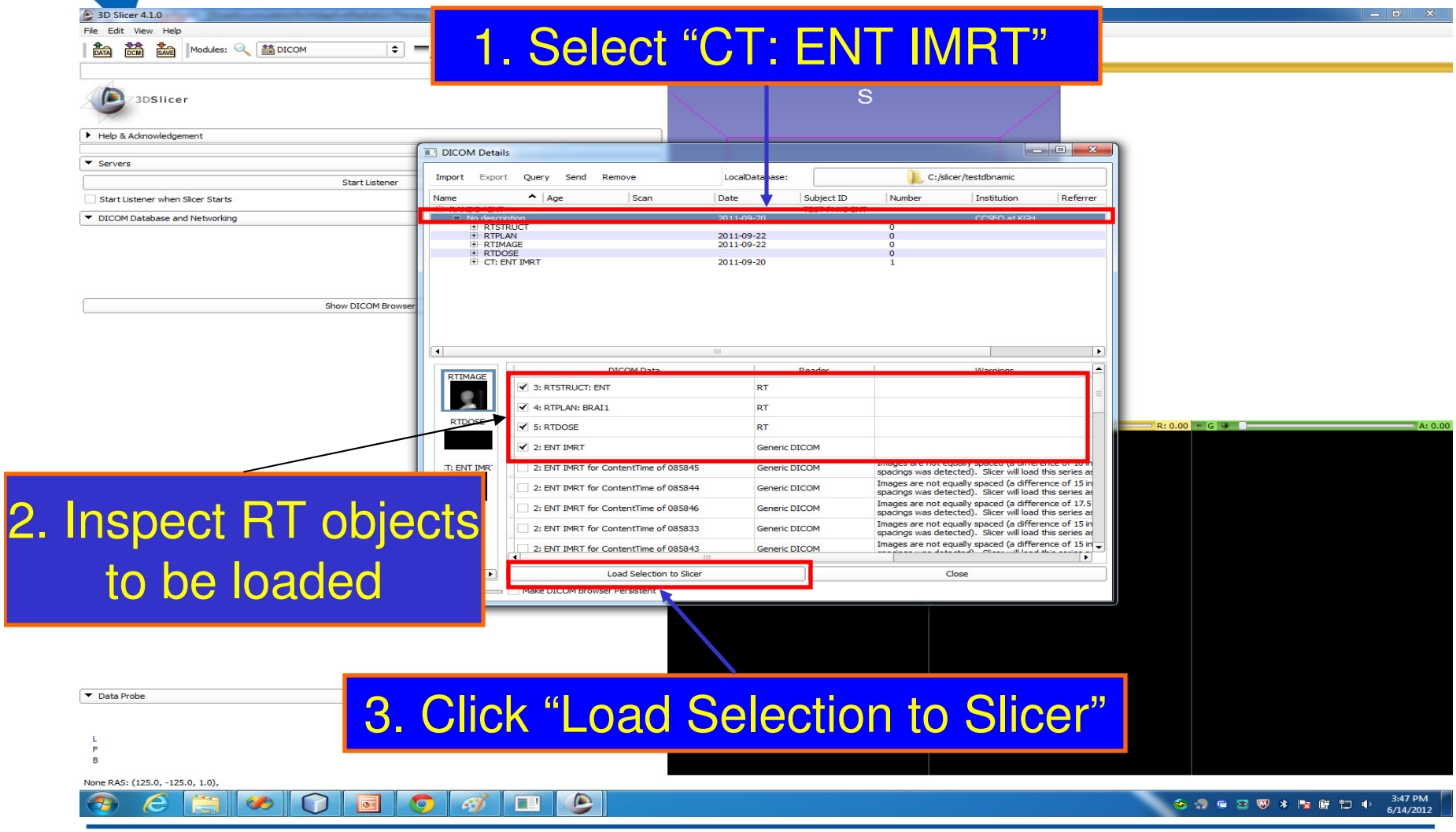
# Loading DICOM-RT data



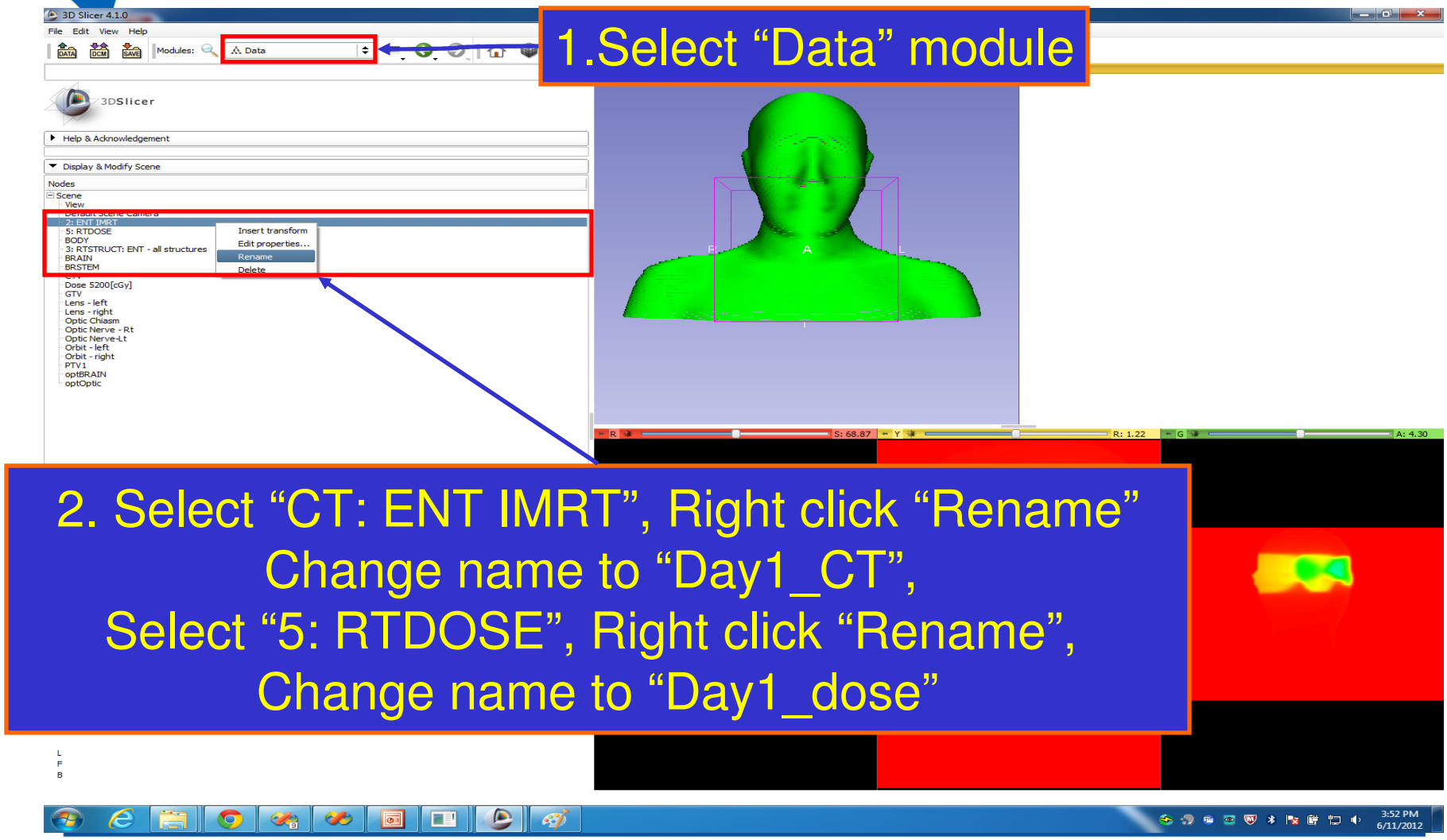
# Loading DICOM-RT data



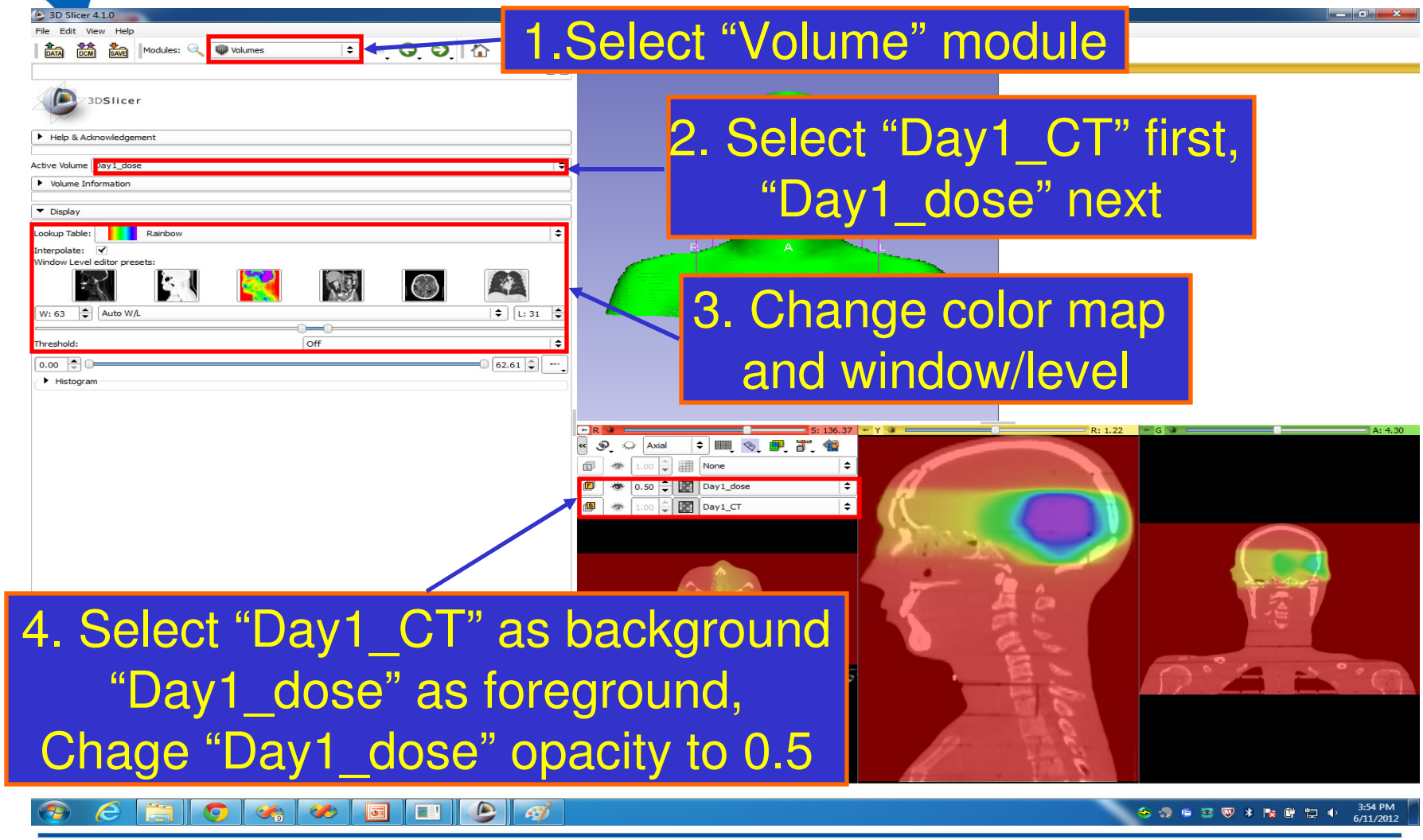
# Loading DICOM-RT data



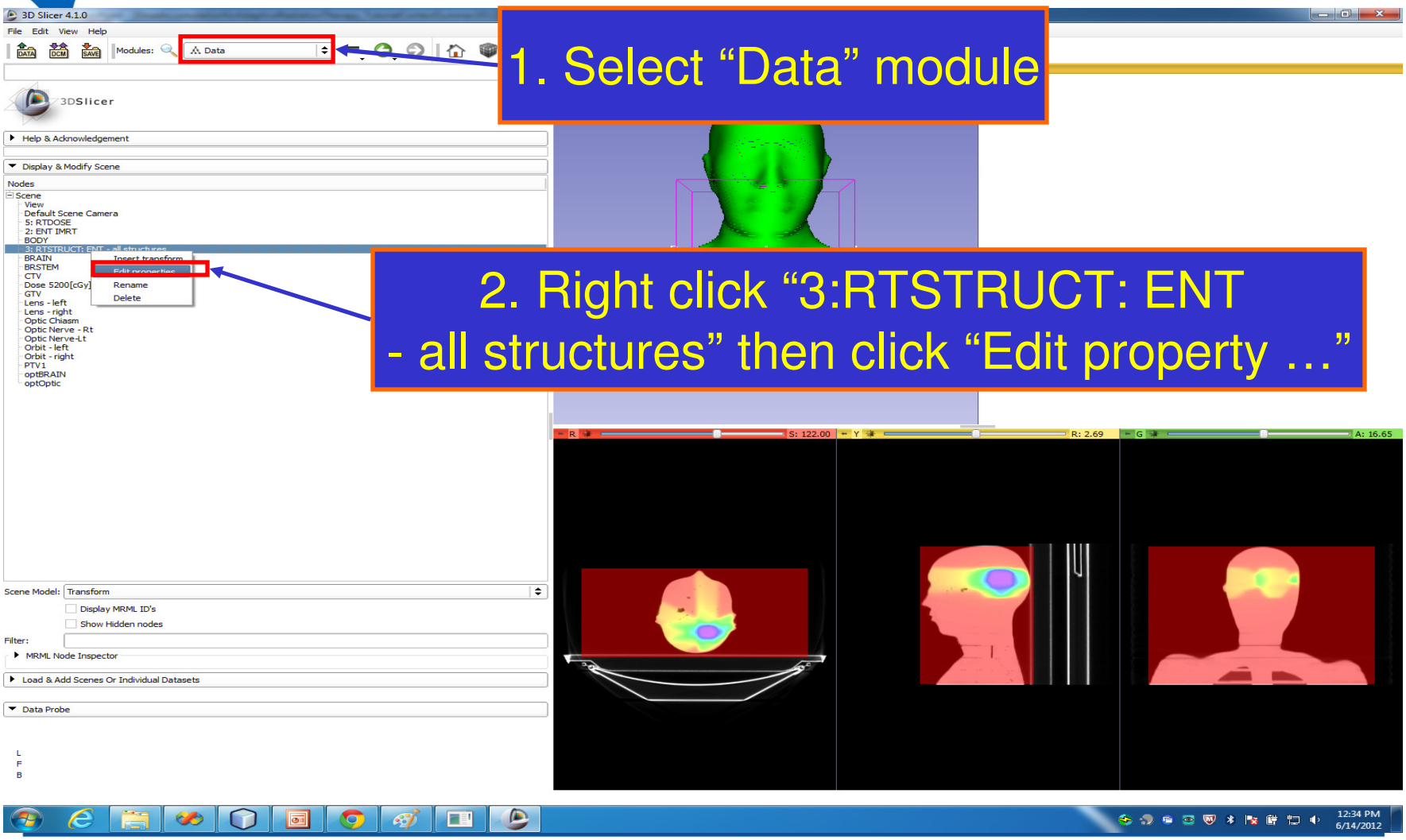
# Loading DICOM-RT data



# Visualization of DICOM-RT data



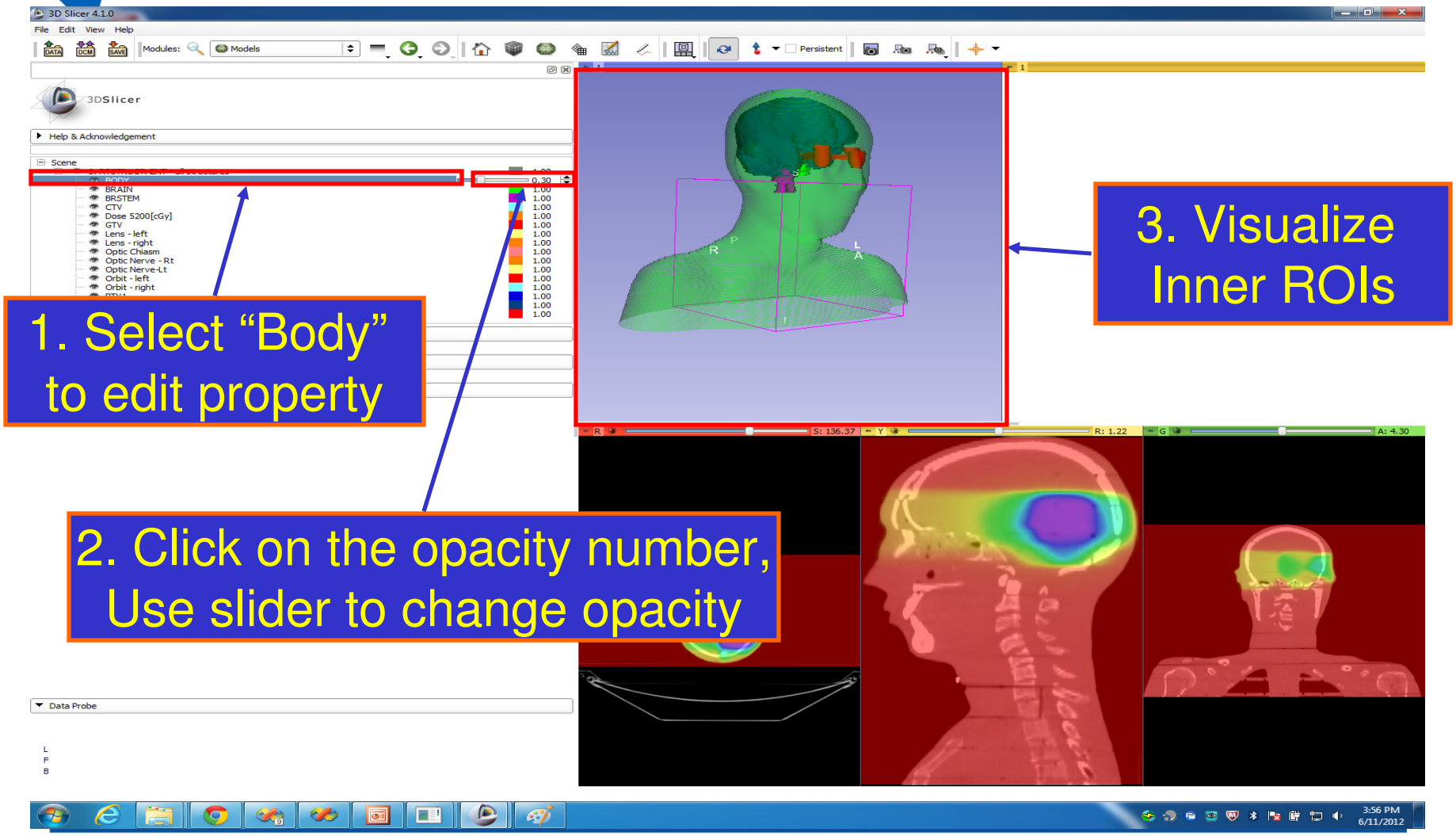
# Visualization of DICOM-RT data




1. Select “Data” module

2. Right click “3:RTSTRUCT: ENT - all structures” then click “Edit property …”

# Visualization of DICOM-RT data

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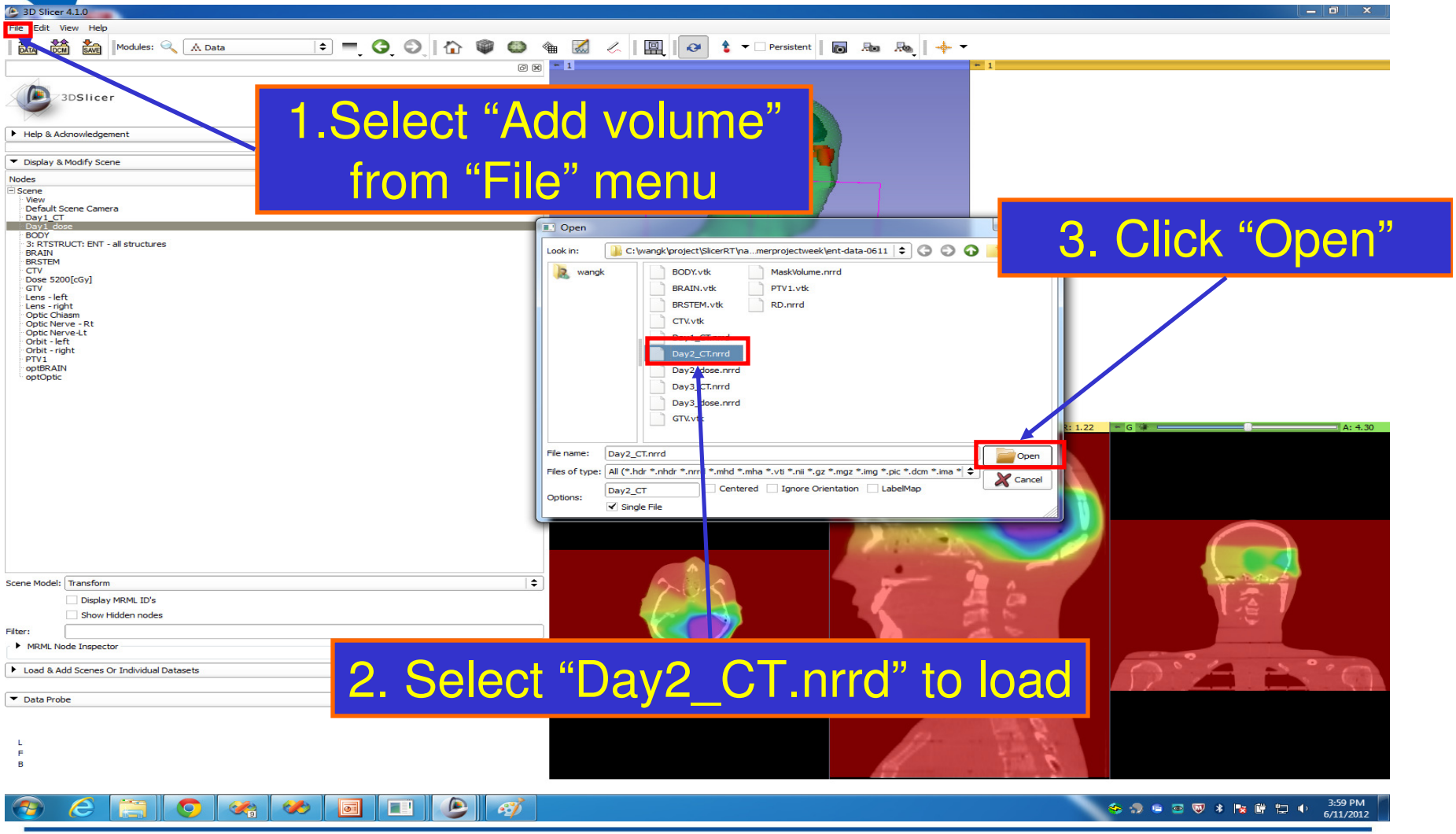
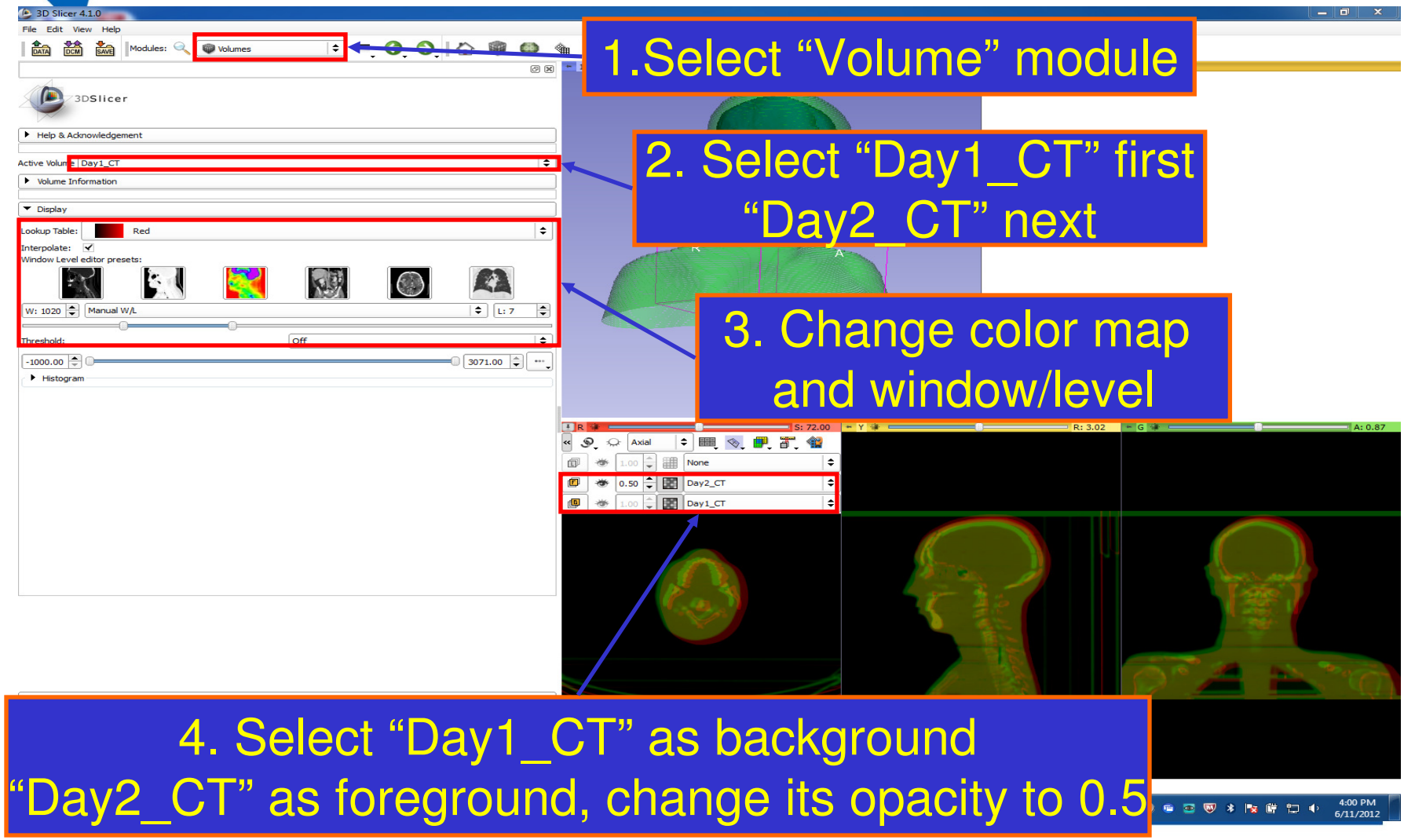
# Loading Day2 data



# Visualizing deformation



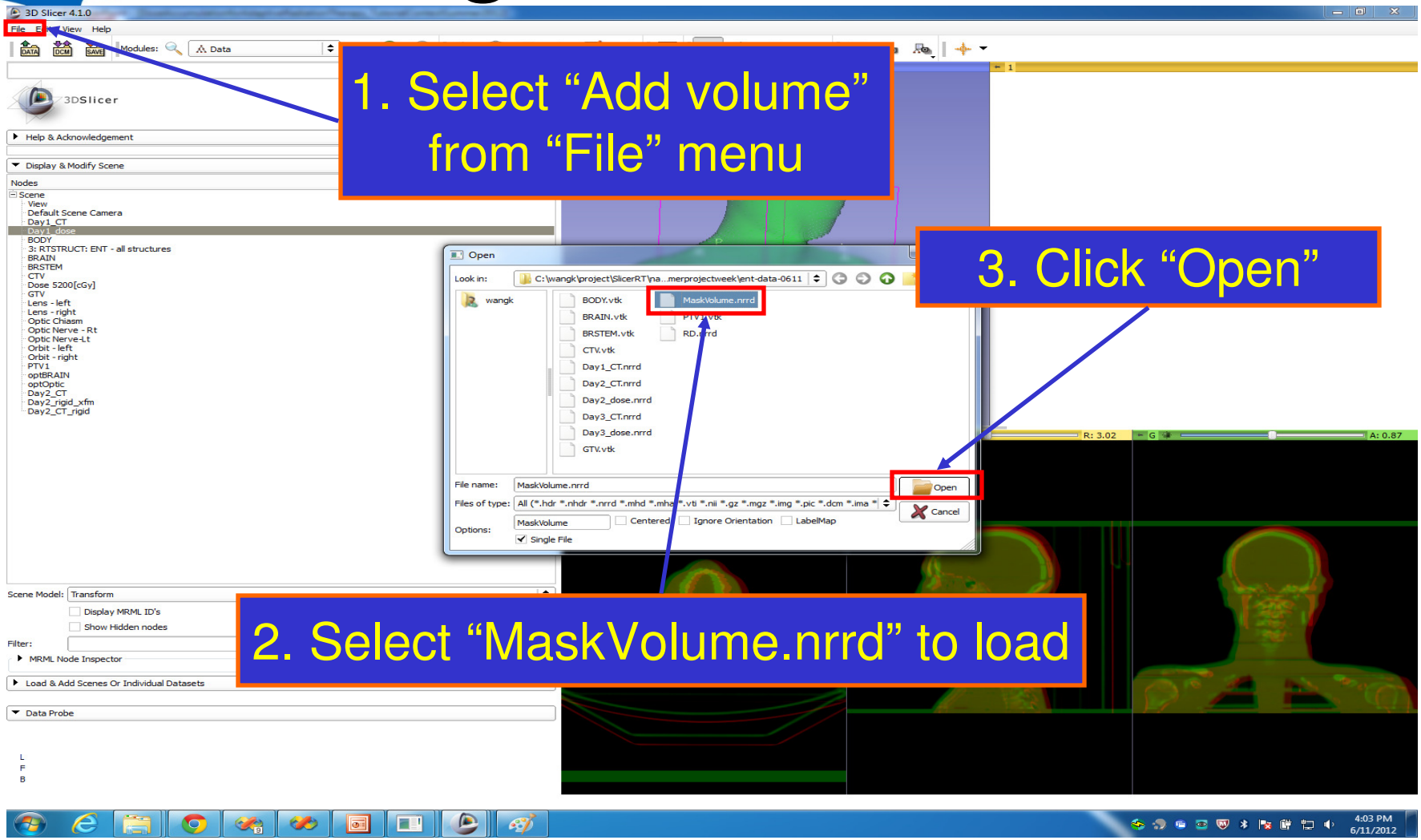

1.Select “Volume” module

2. Select “Day1_CT” first
“Day2_CT” next

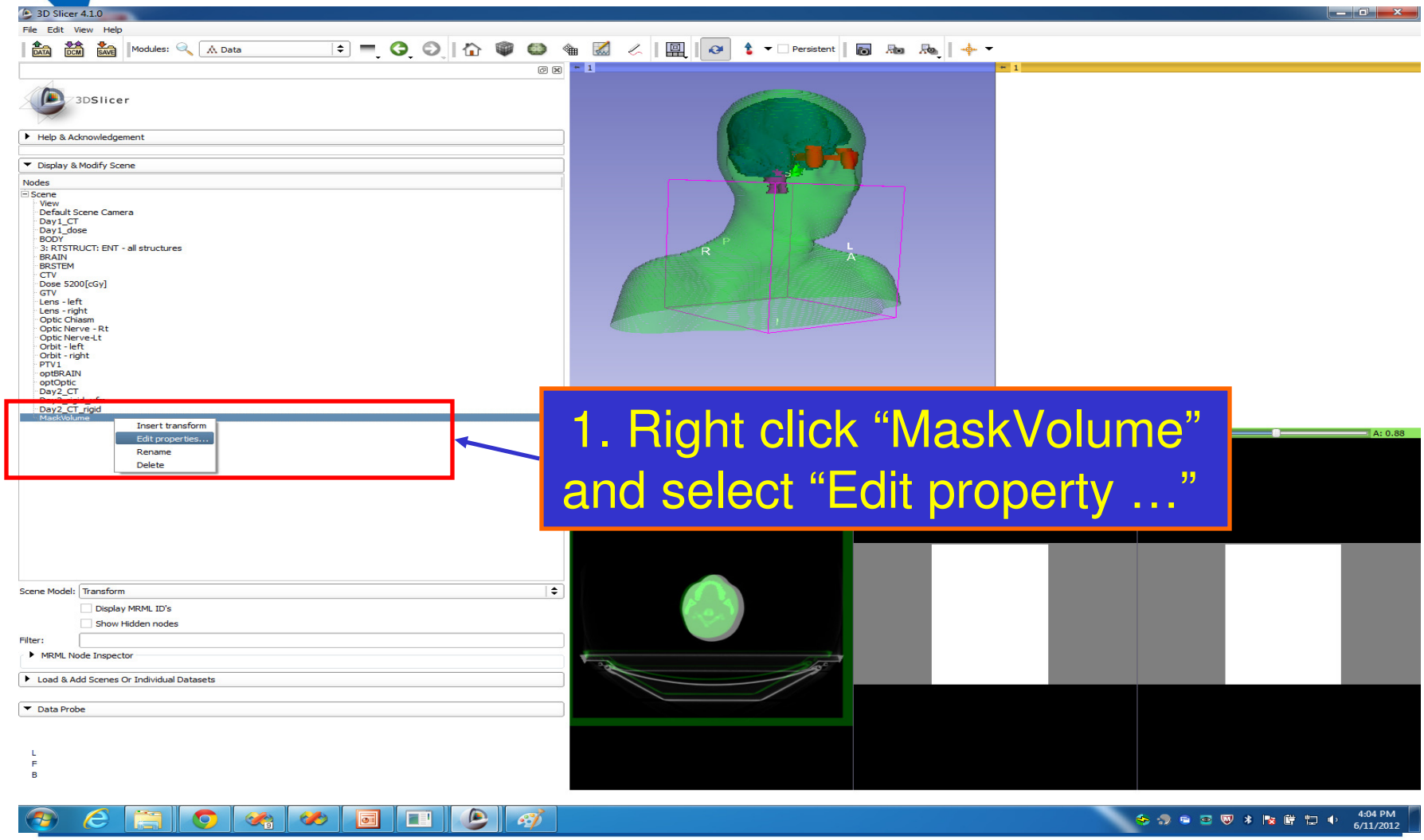
3. Change color map
and window/level

4. Select “Day1_CT” as background
“Day2_CT” as foreground, change its opacity to 0.5

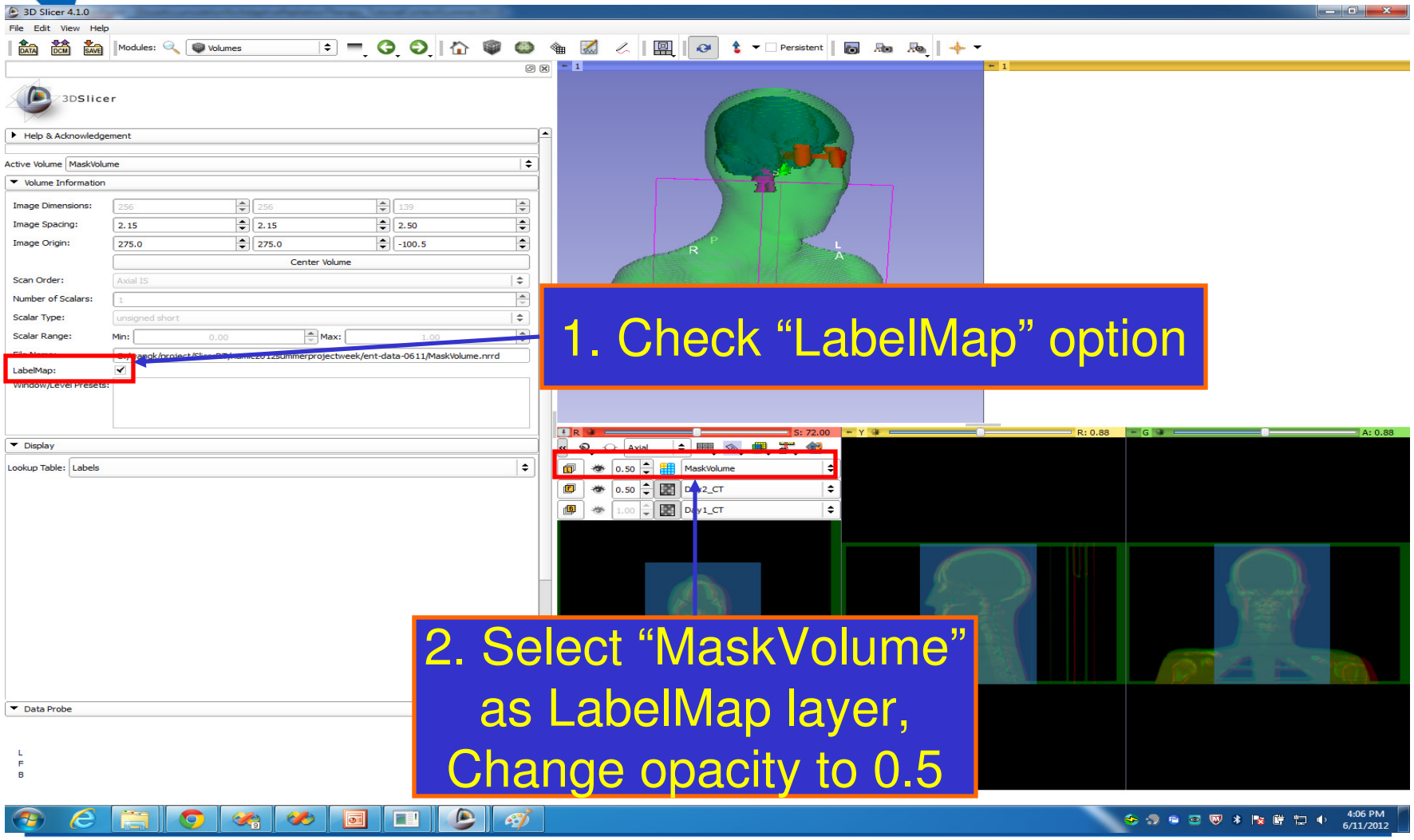
# Loading Mask volume



# Loading Mask Volume



# Visualizing Mask Volume



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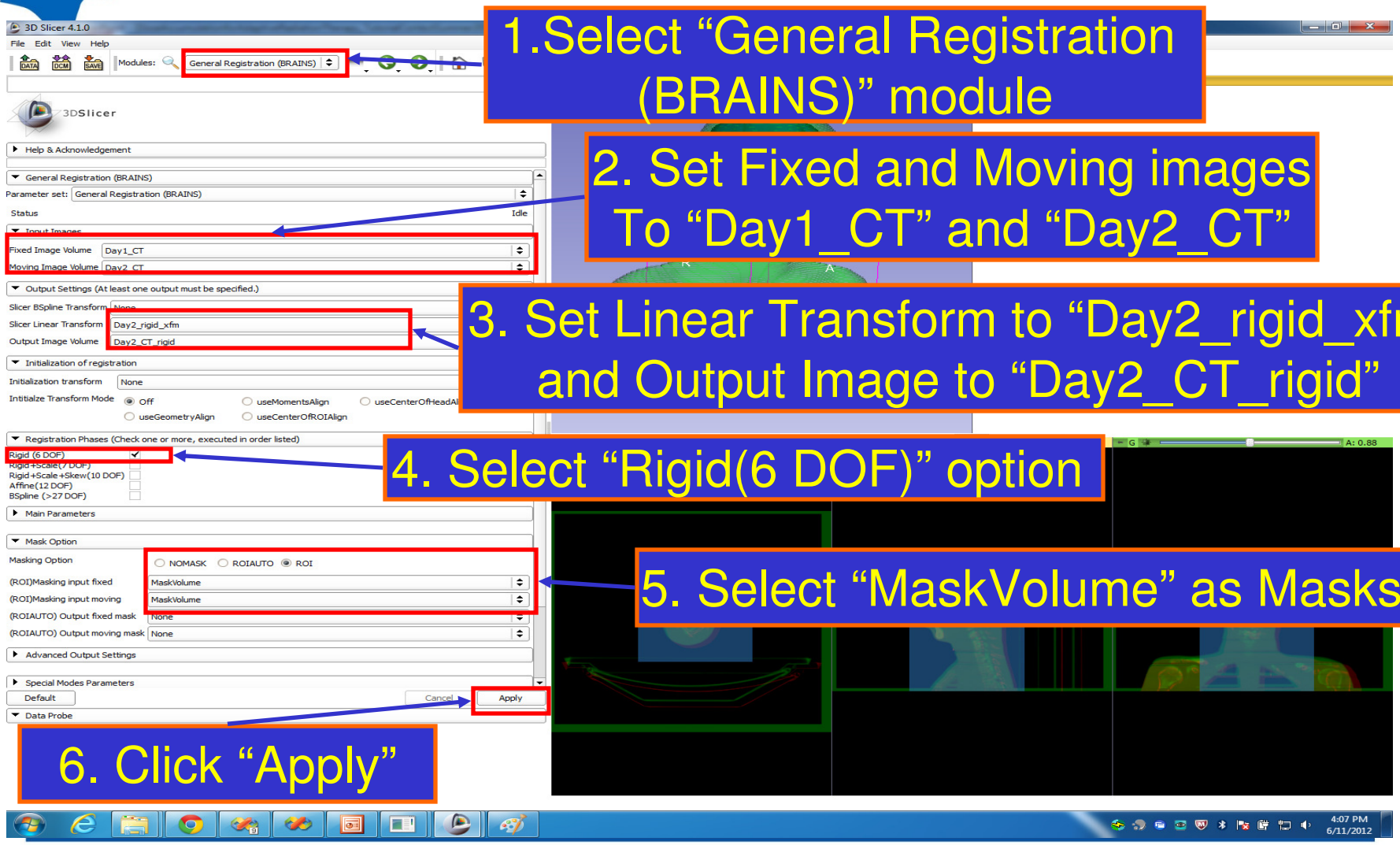
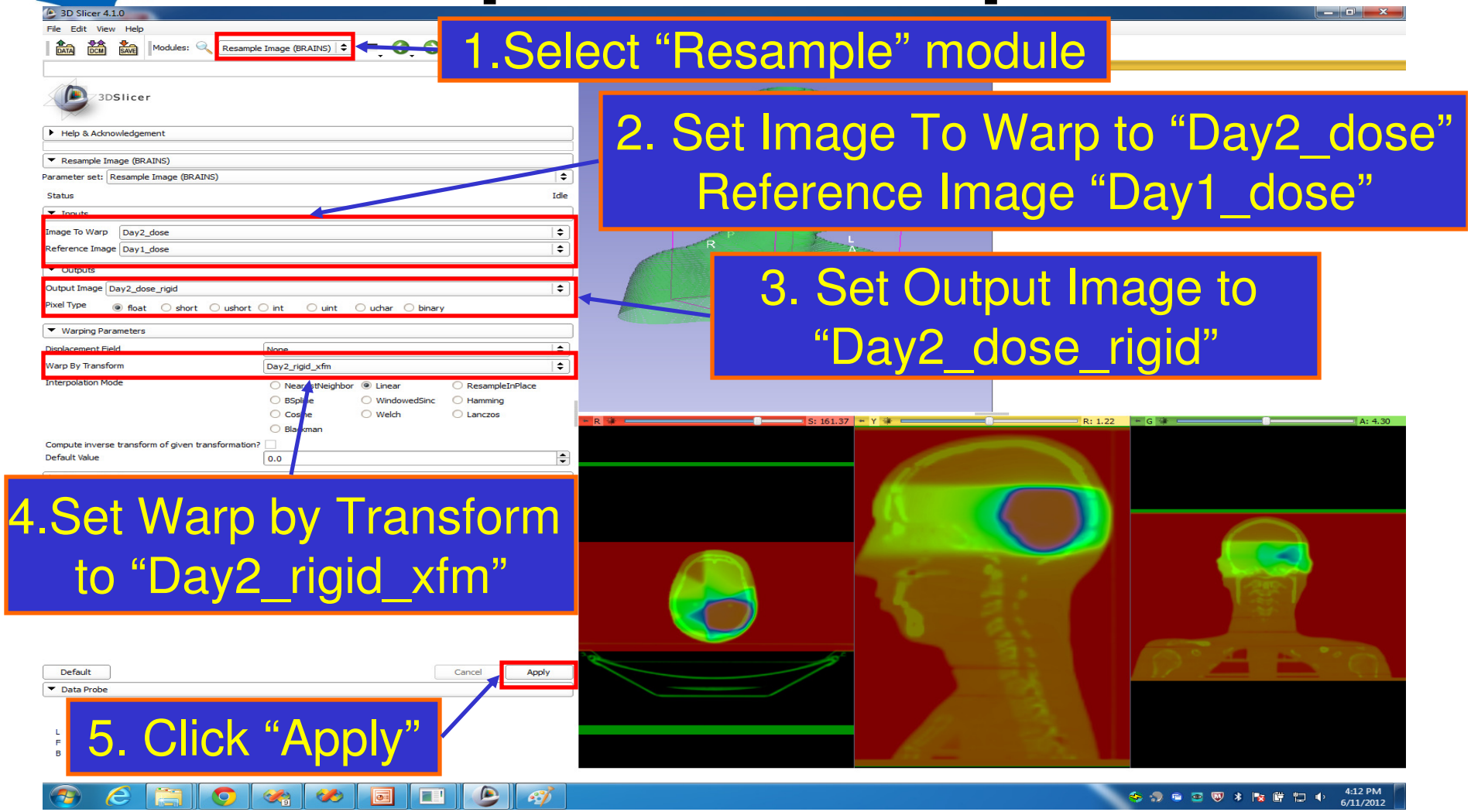
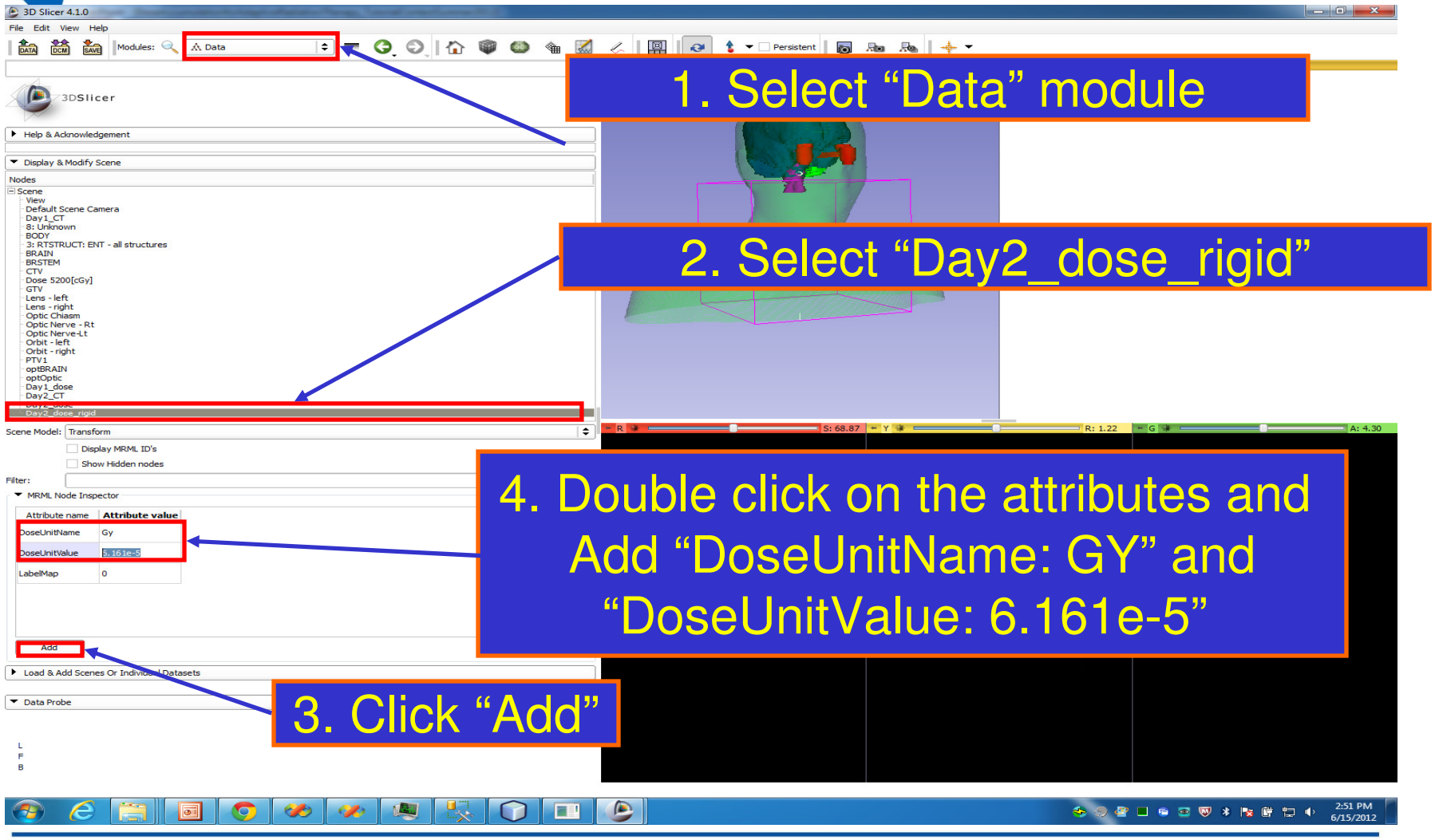
# Rigid registration



# Resample dose map



# Add dose attributes



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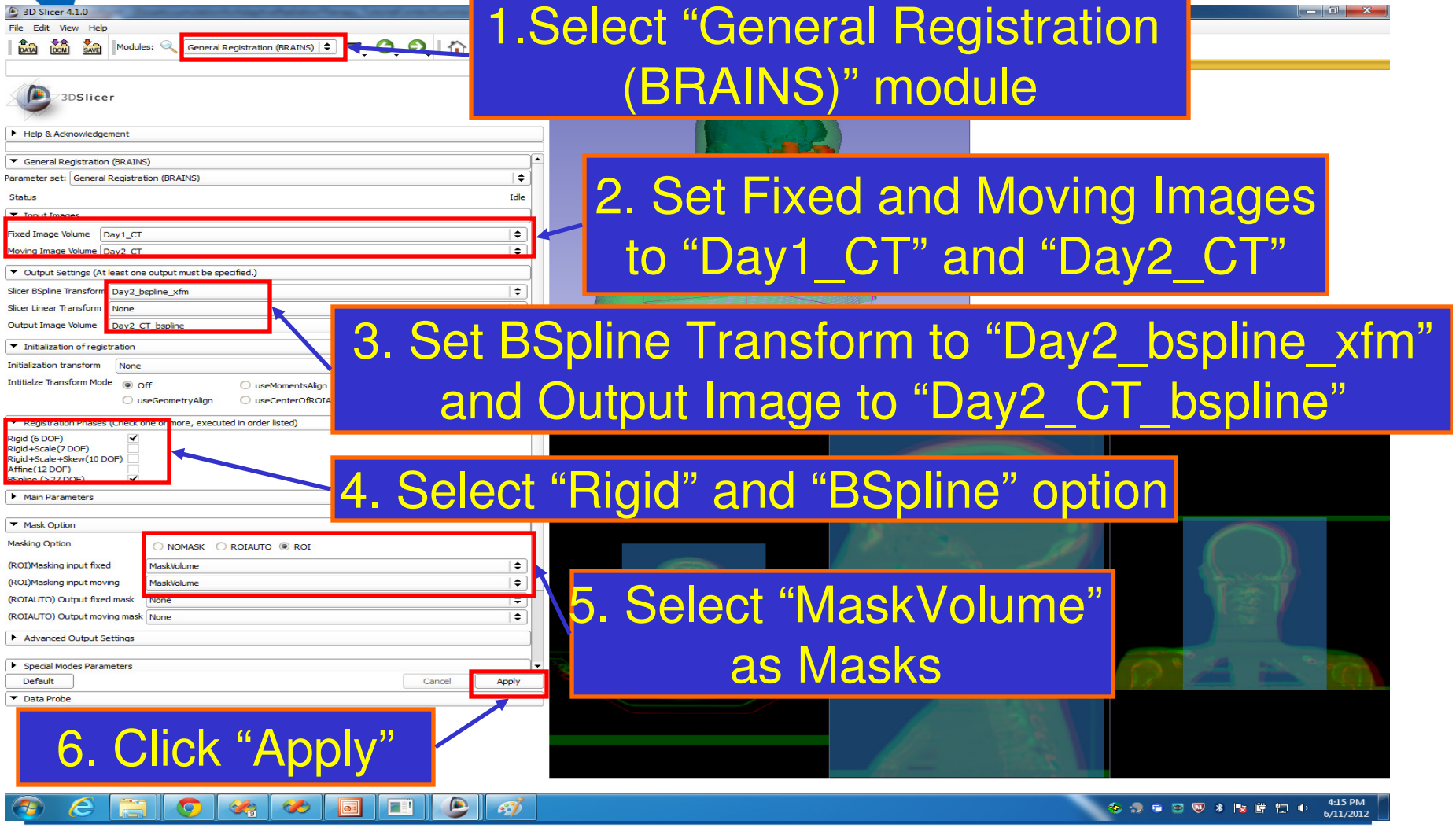
# Deformable Registration




1.Select “General Registration (BRAINS)” module

2. Set Fixed and Moving Images to “Day1_CT” and “Day2_CT”

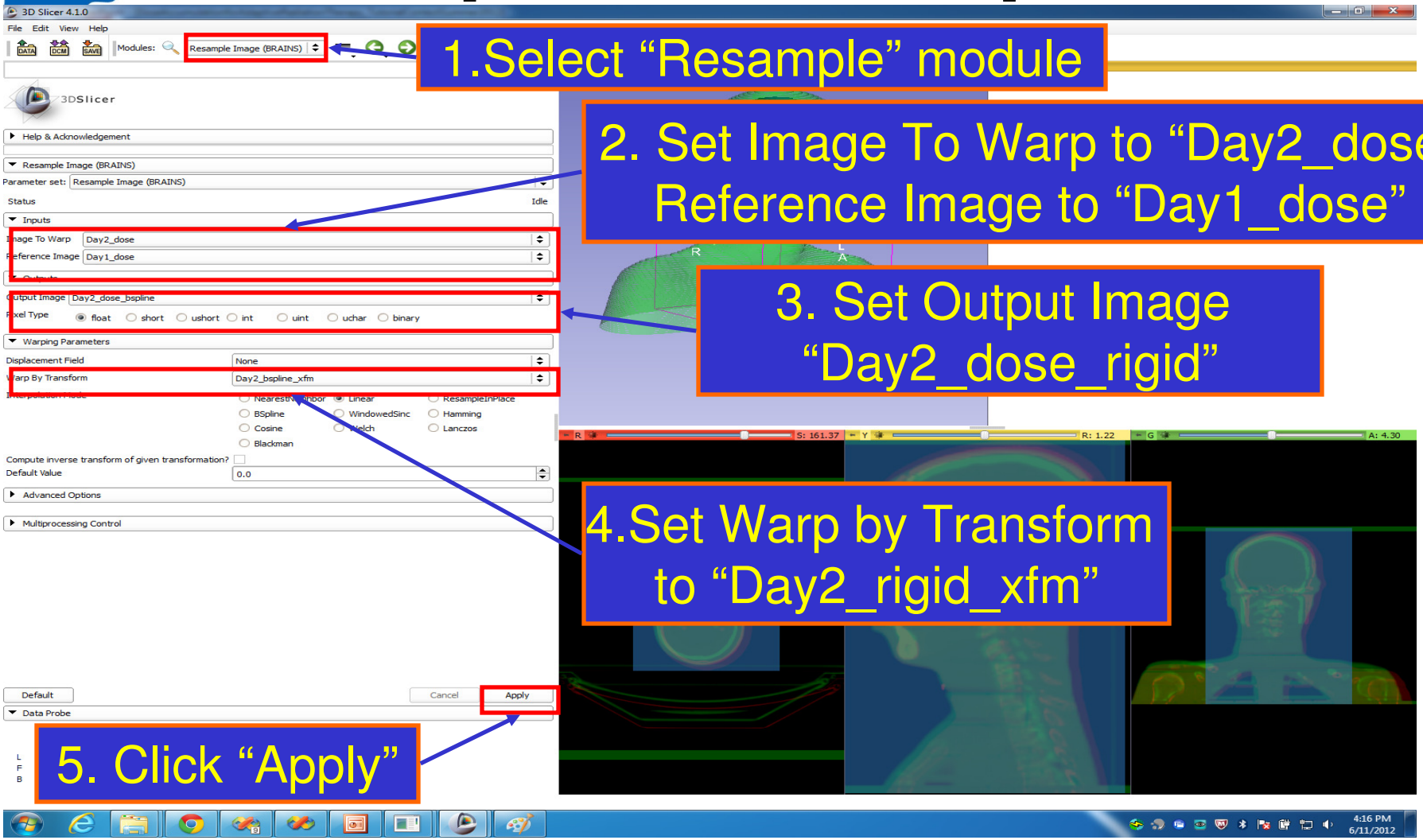
3. Set BSpline Transform to “Day2_bspline_xfm” and Output Image to “Day2_CT_bspline”

4. Select “Rigid” and “BSpline” option

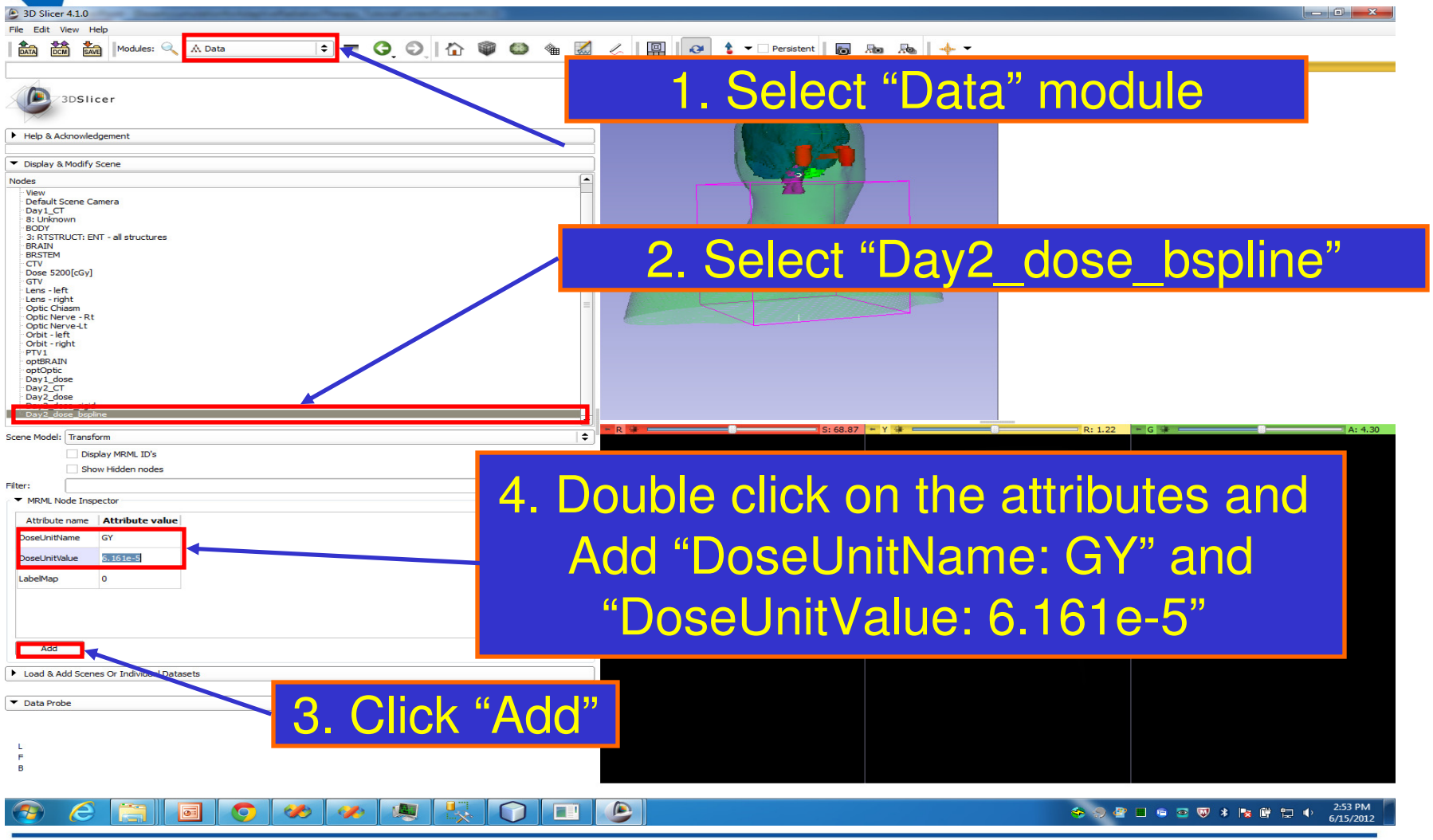
5. Select “MaskVolume” as Masks

6. Click “Apply”

# Resample dose (BSpline)



# Add dose attributes



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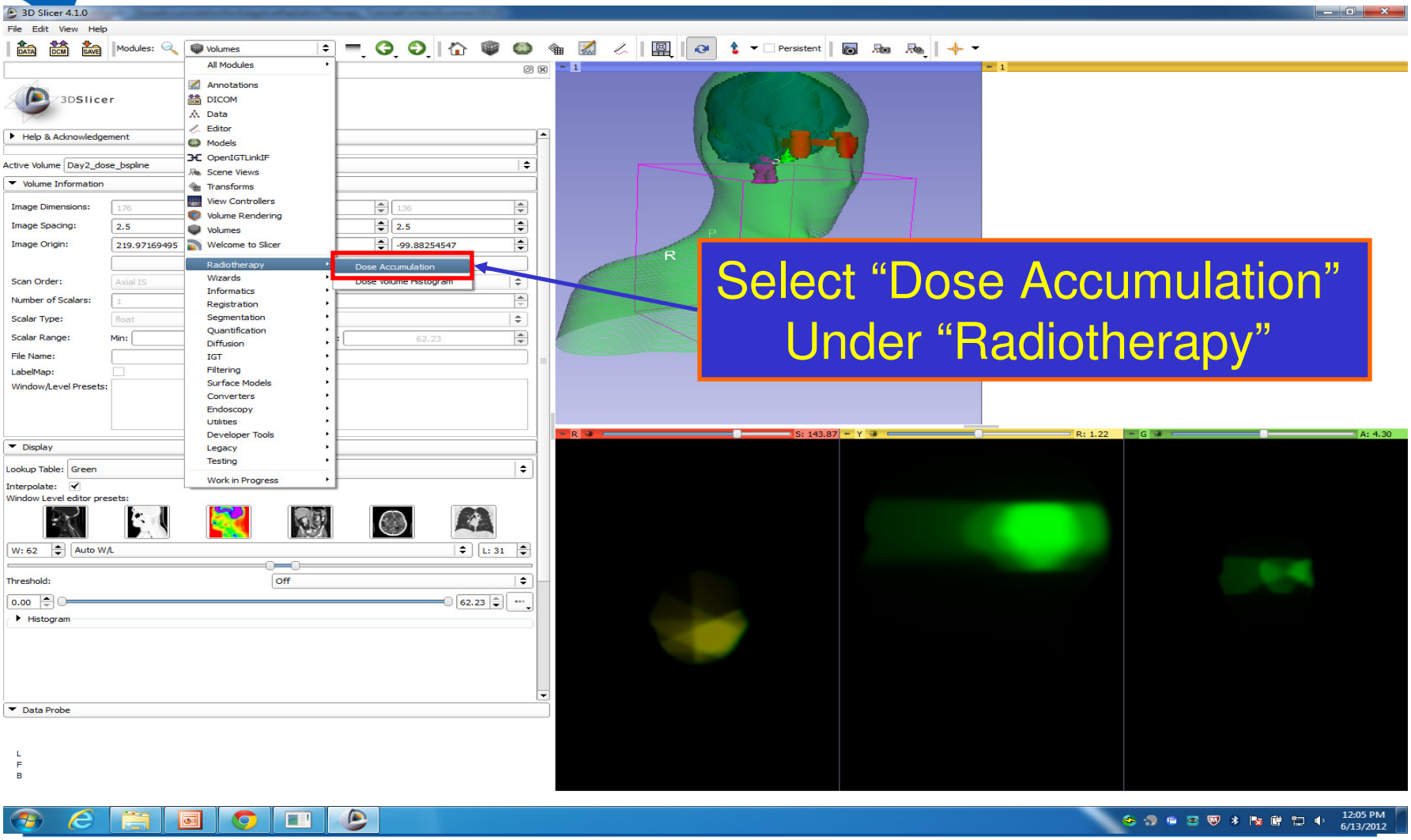
# Dose Accumulation

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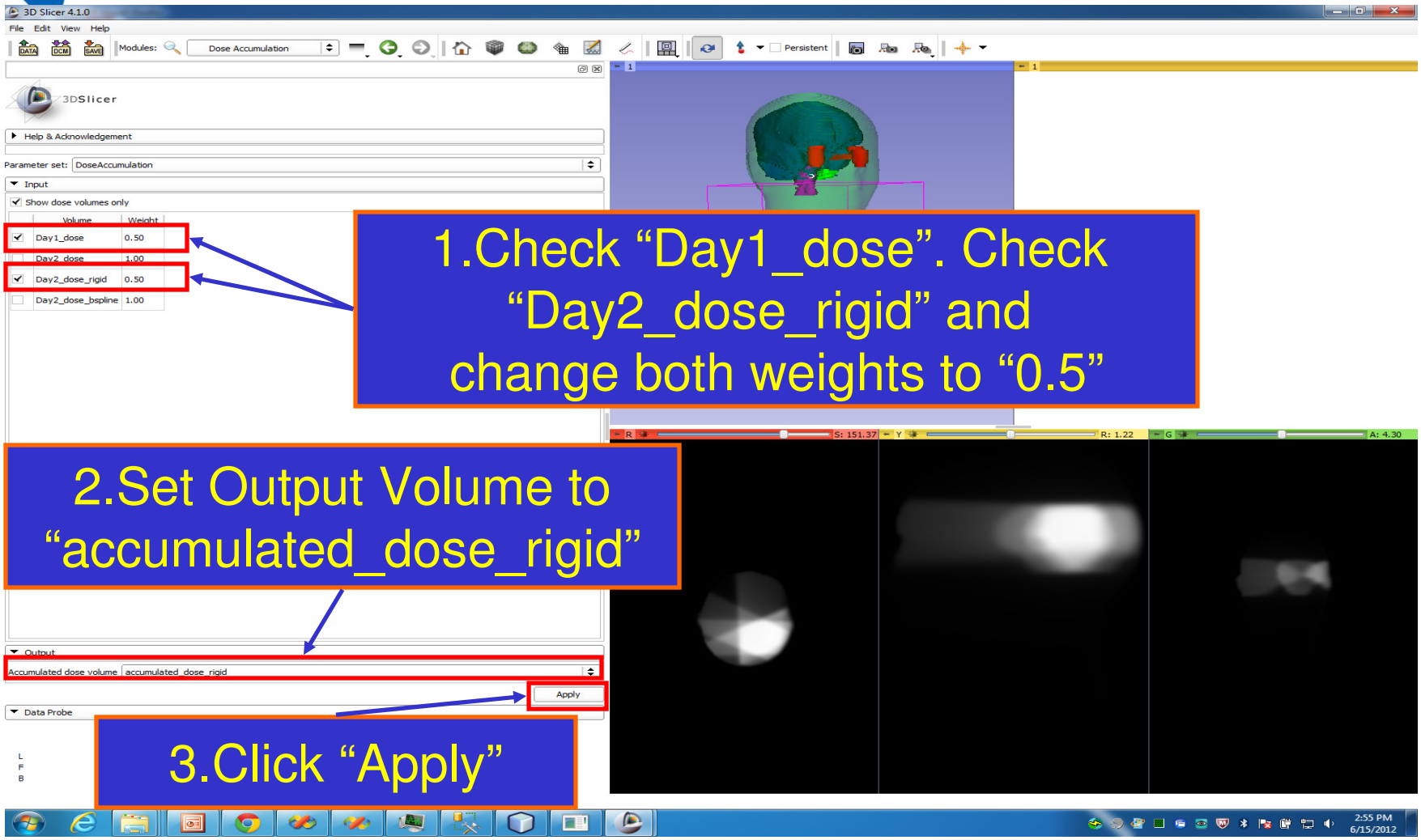
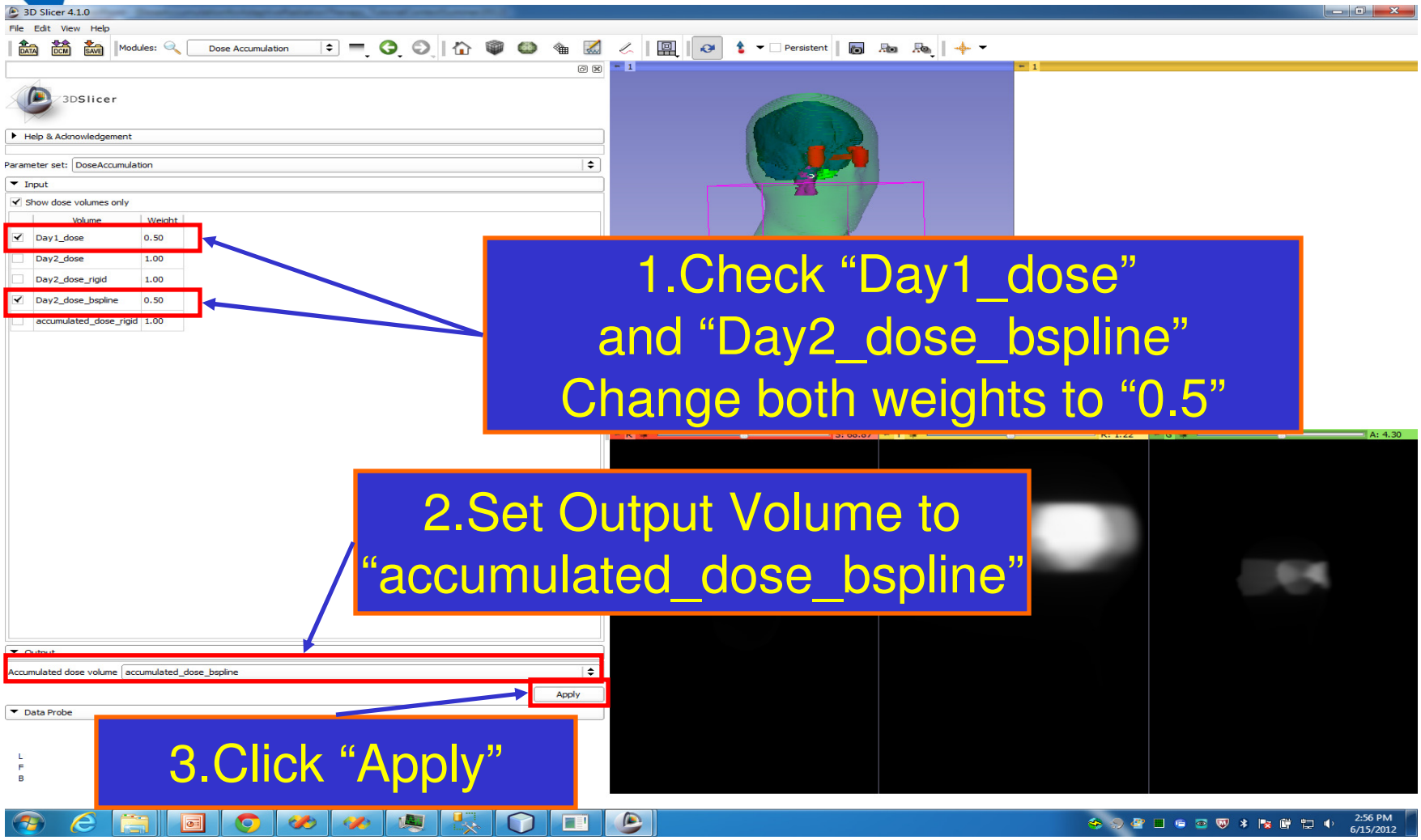
# Dose accumulation (rigid)



# Dose accumulation (BSpline)



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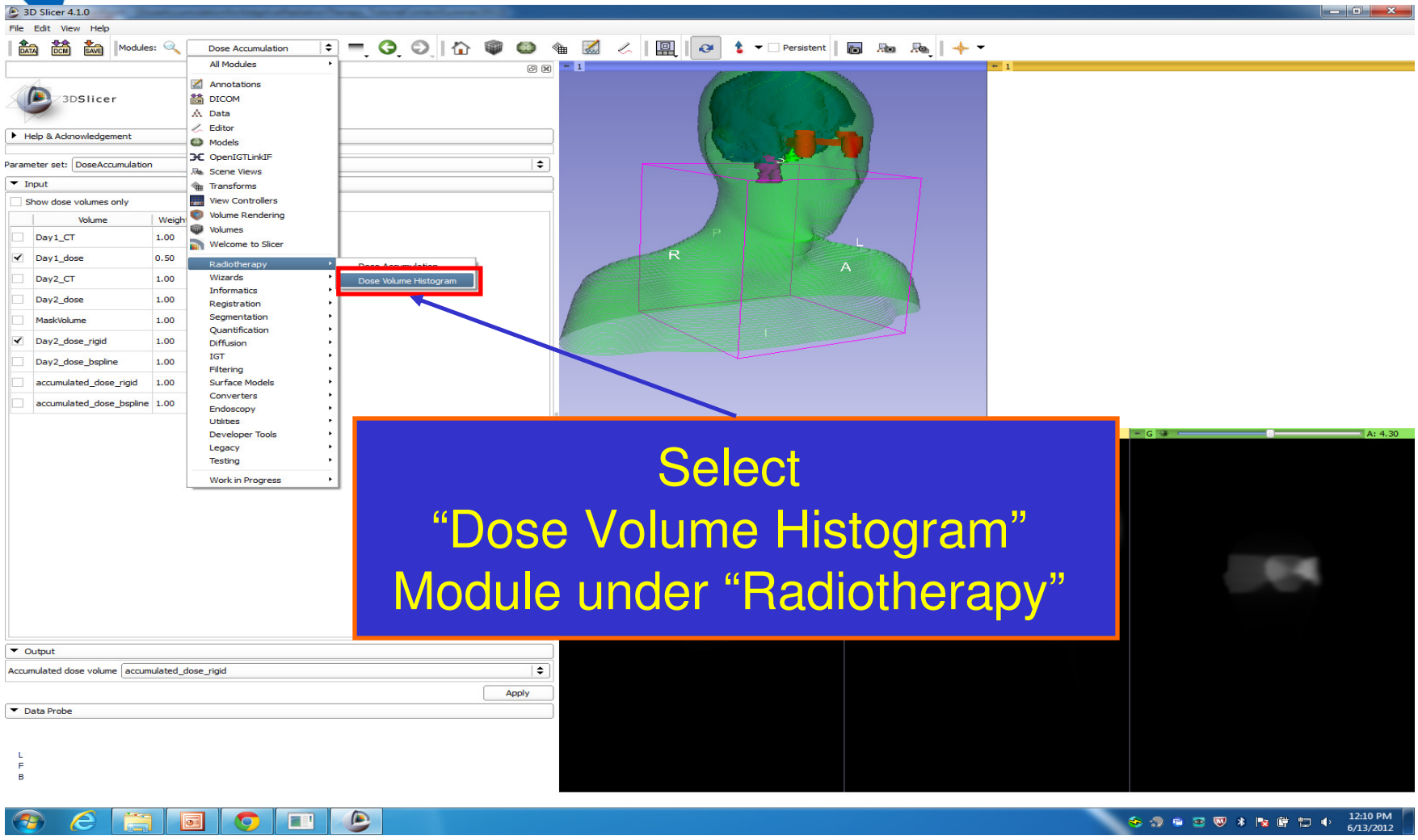
# DVH comparison



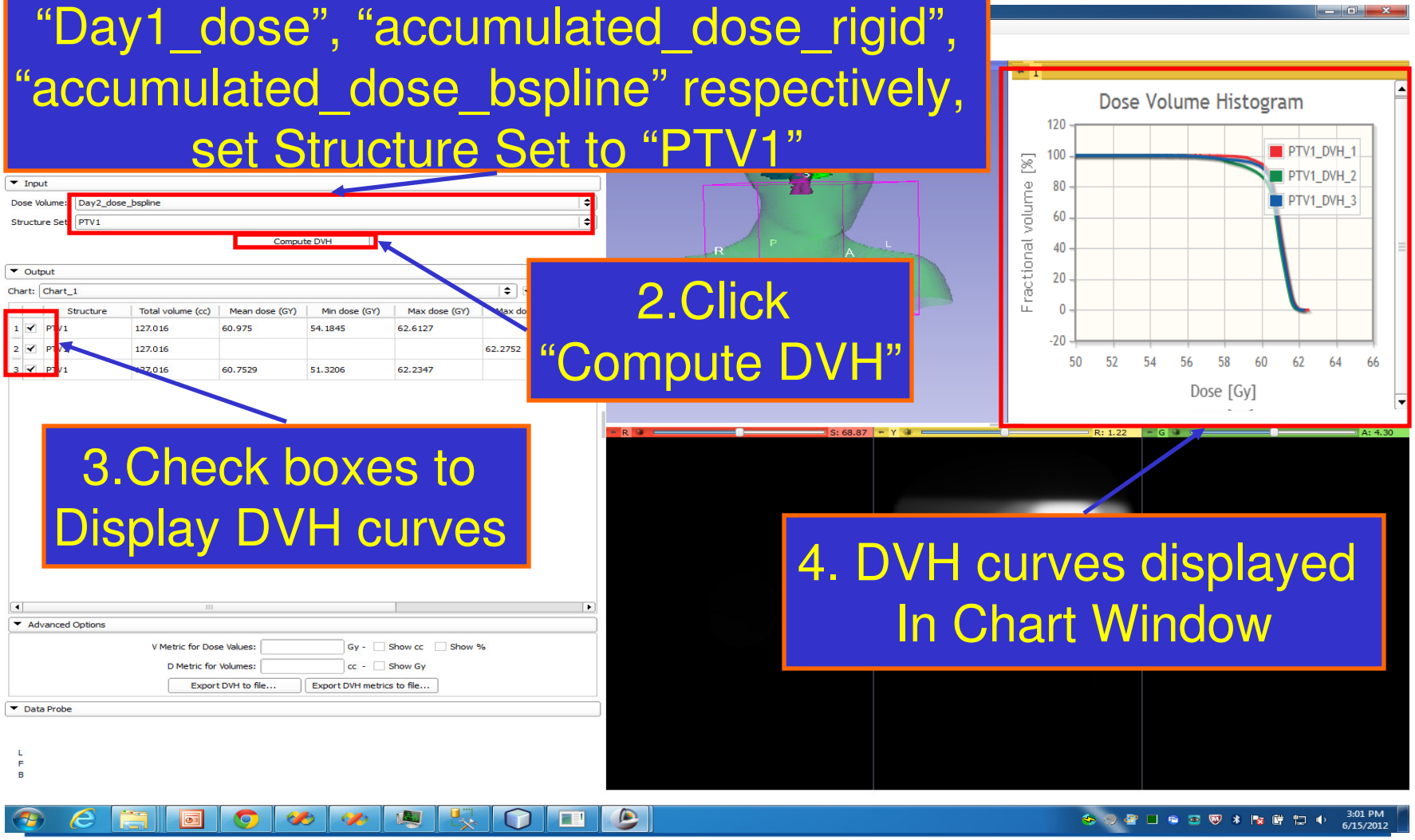
# DVH comparison

1.Set Dose Volume to "Day1_dose", "accumulated_dose_rigid", "accumulated_dose_bspline" respectively, set Structure Set to "PTV1"

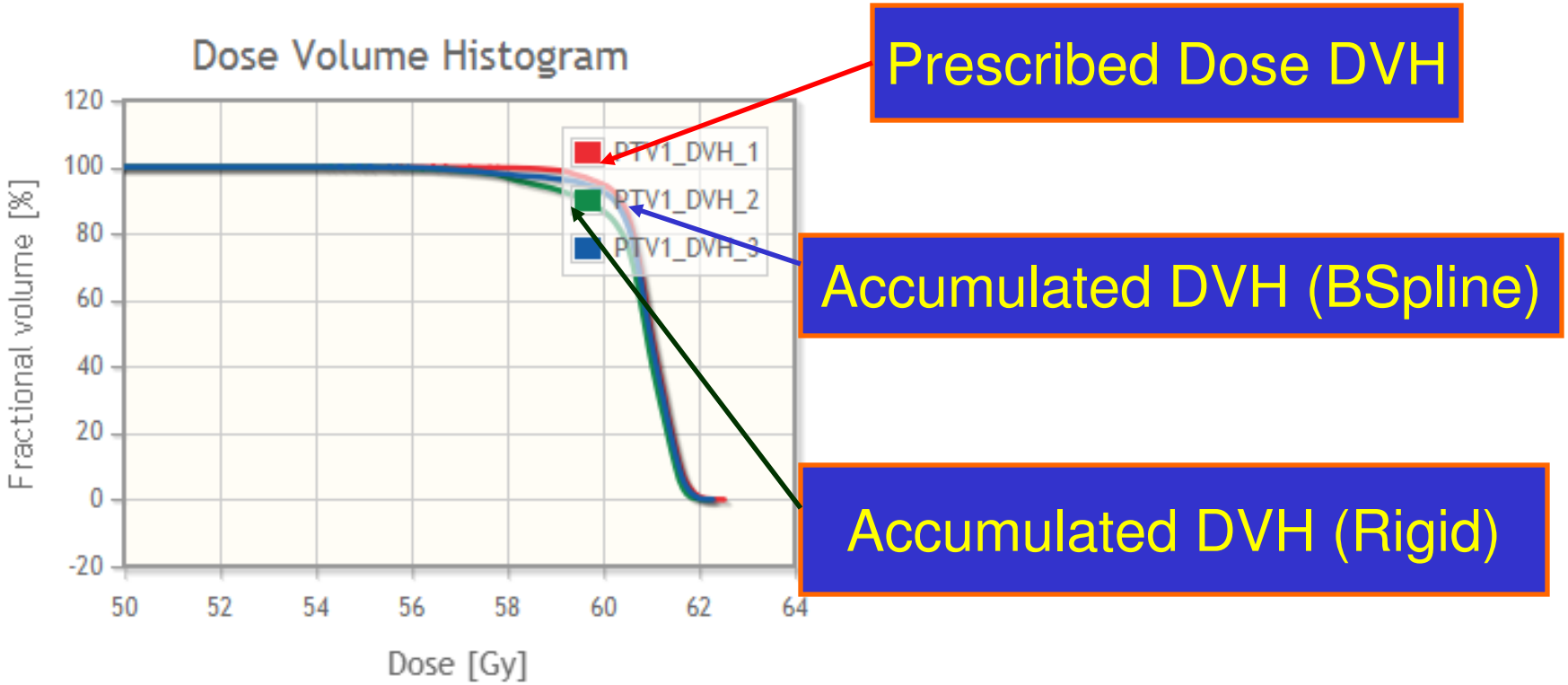
2.Click "Compute DVH"

3.Check boxes to Display DVH curves

4. DVH curves displayed In Chart Window



# DVH comparison



# Conclusion

In this tutorial, we have demonstrated:

1. DICOM-RT import
2. RT data visualization
3. Day to day CT/Dose volume registration
4. Dose accumulation
5. DVH computation and comparison



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# Acknowledgments

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