

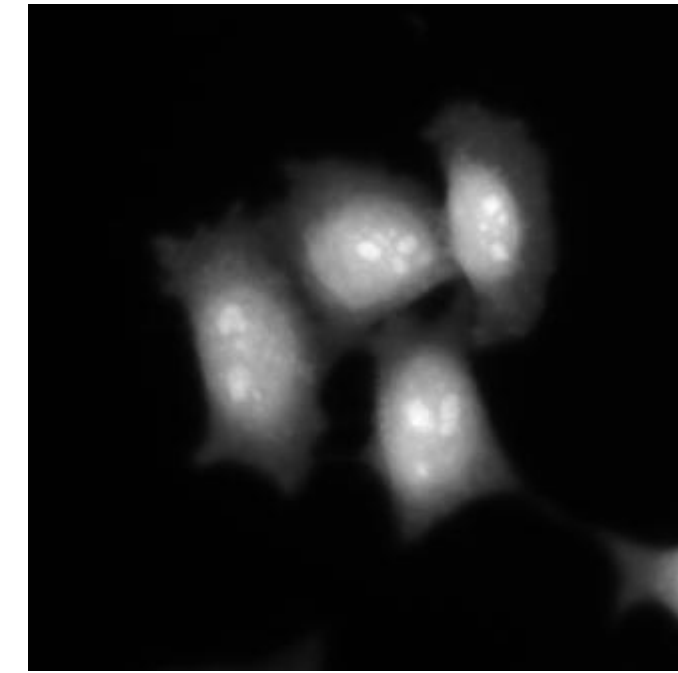
Region Of Interest

Image Processing & Analysis for Life Scientists

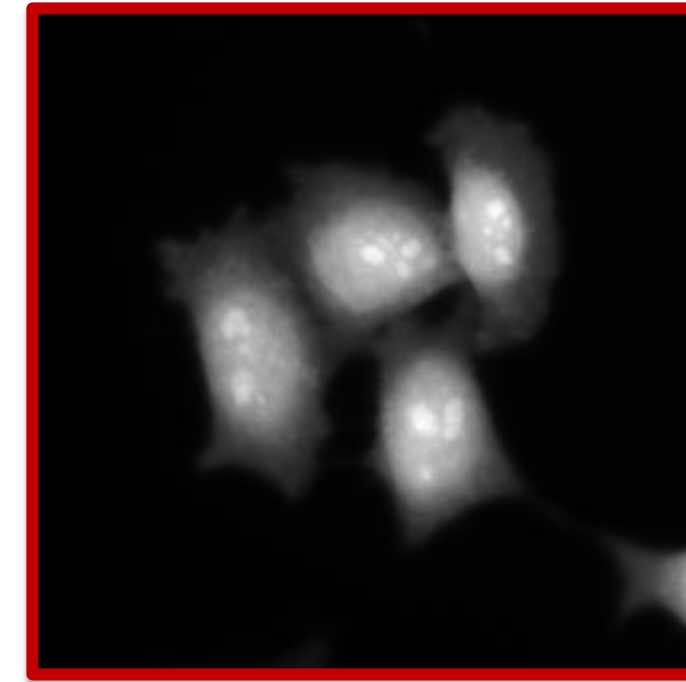
Olivier Burri, Romain Guiet & Arne Seitz

- Motivation
- Region of Interest (ROI) Operation
- Limitations

Motivation

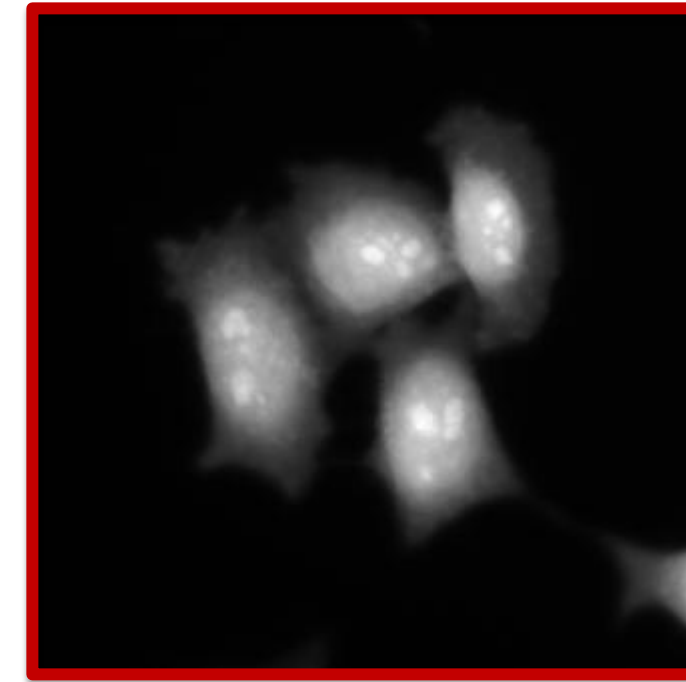


Protein X



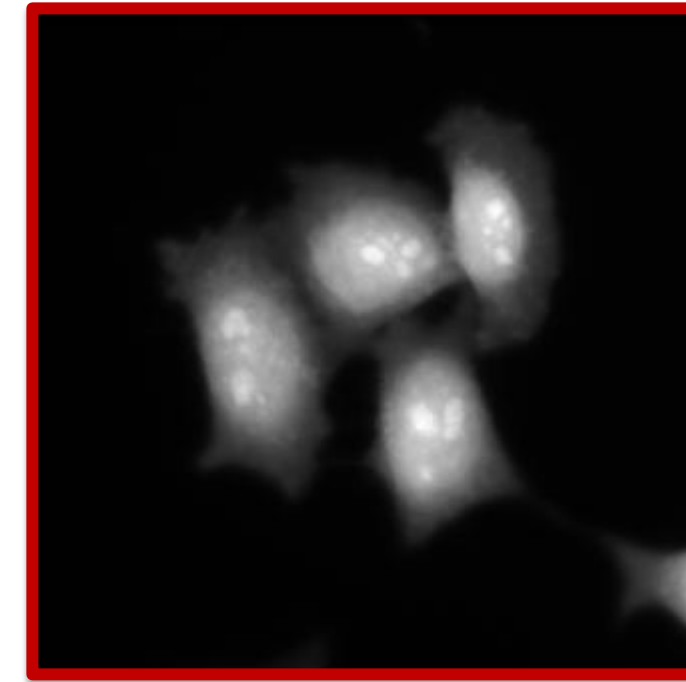
Protein X

- Measure the Pixels Intensities



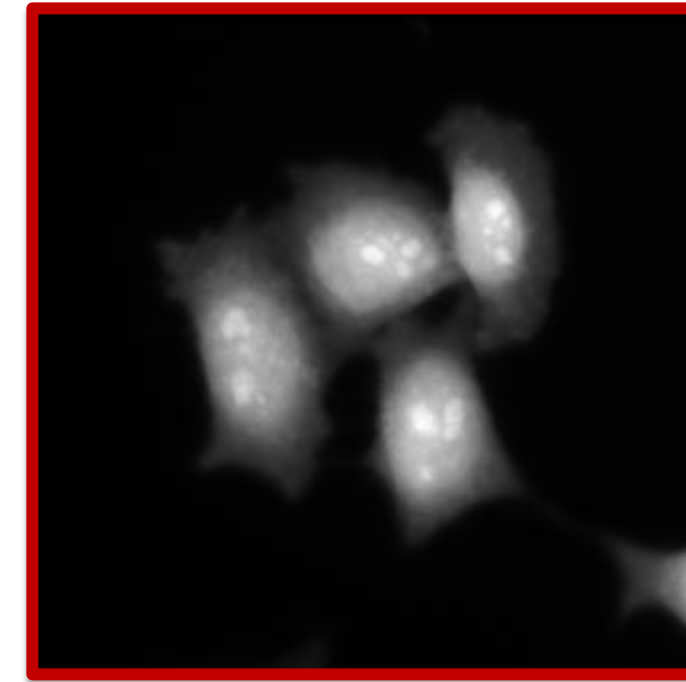
Protein X

- Measure the Pixels Intensities
- Value will be "diluted" by background



Protein X

- Measure the Pixels Intensities
- Value will be "diluted" by background
- Value will vary with the cell density

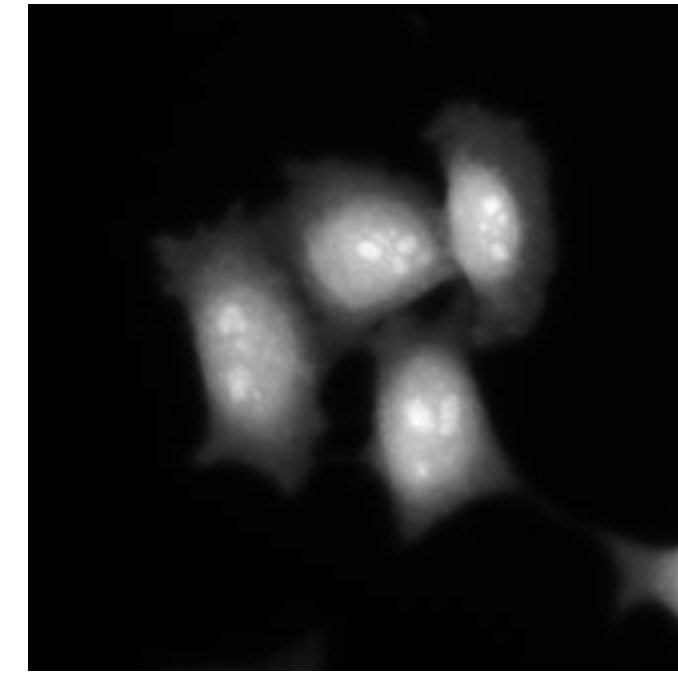


Protein X

- Measure the Pixels Intensities
- Value will be "diluted" by background
- Value will vary with the cell density



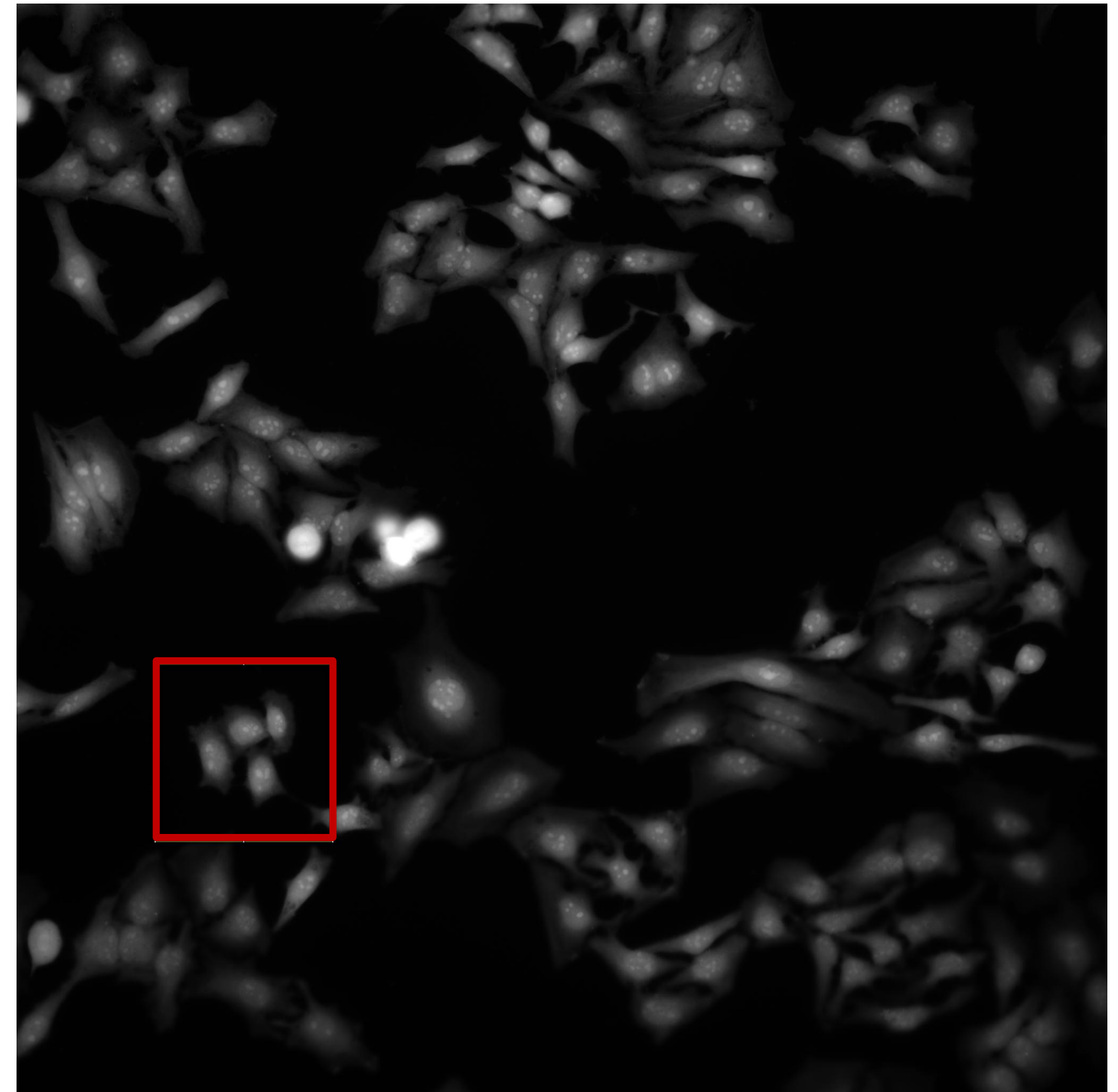
Define Area to Measure



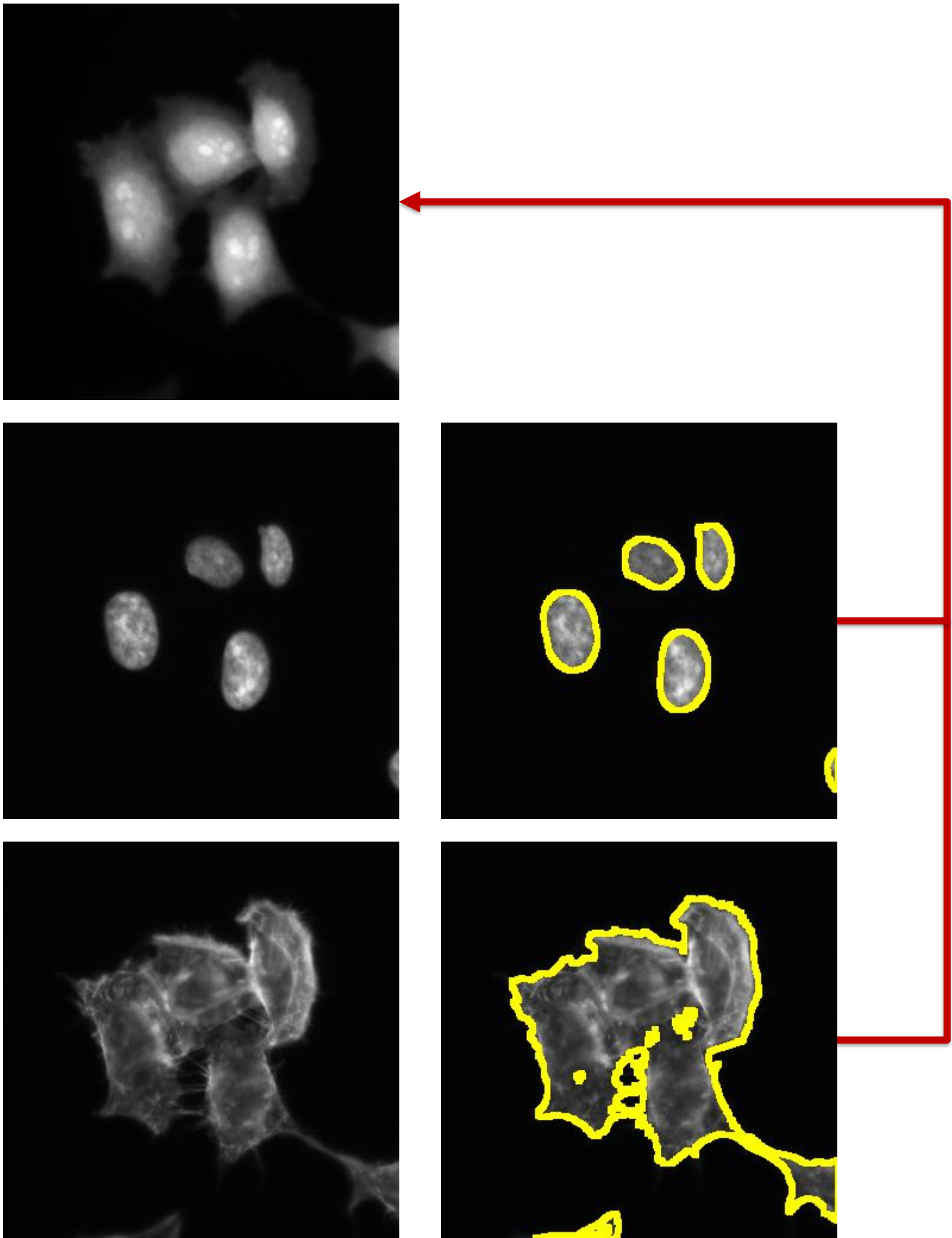
Protein X

Localisation ?
Nuclei VS Cytoplasm

Motivation

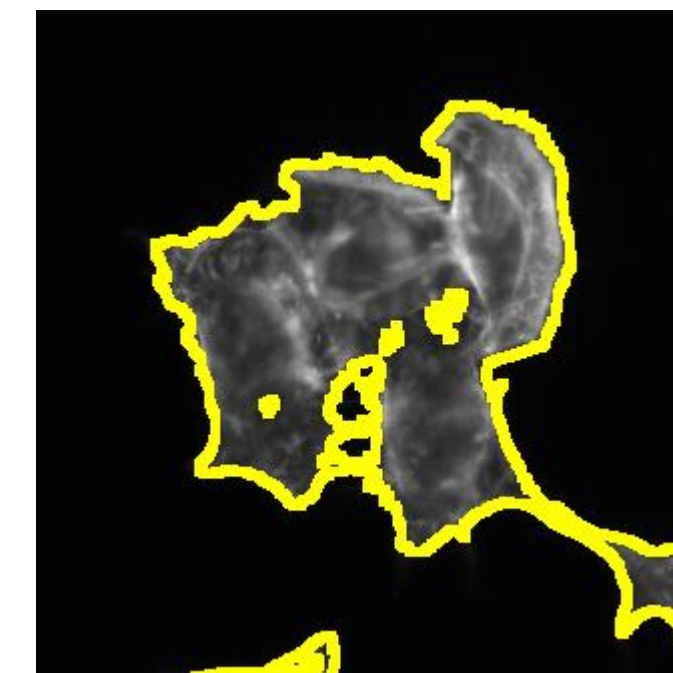
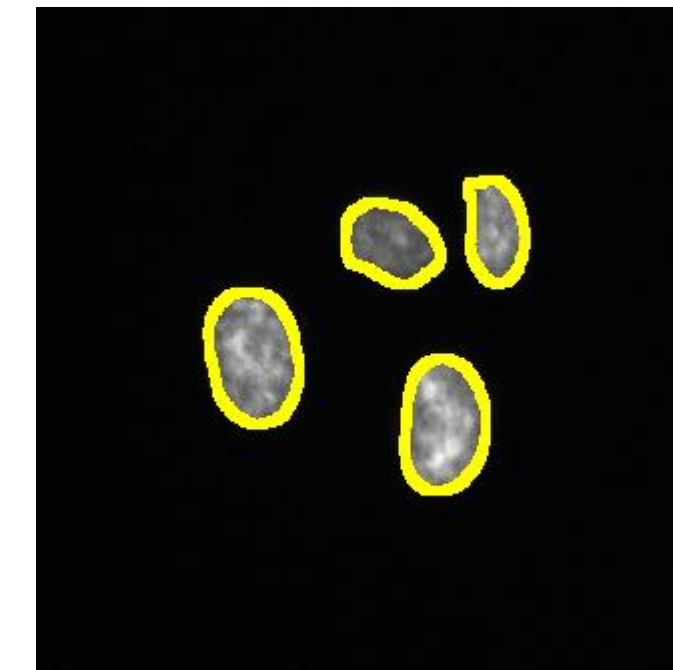
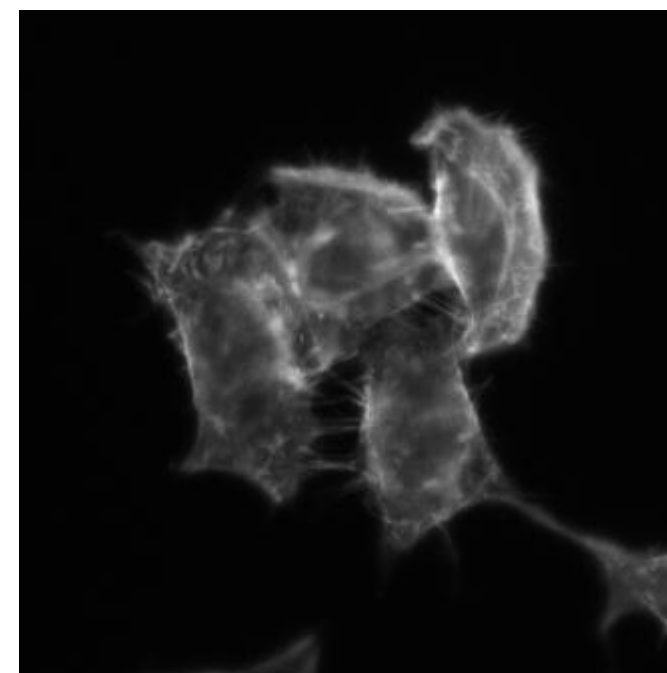
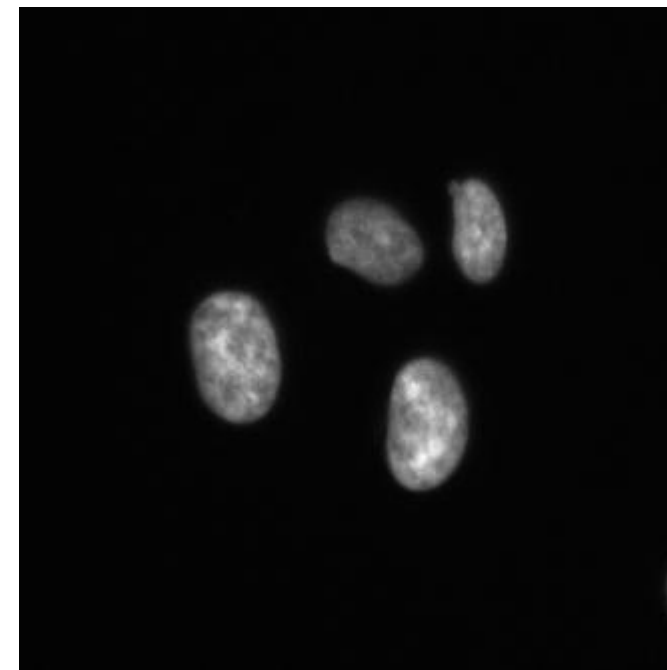
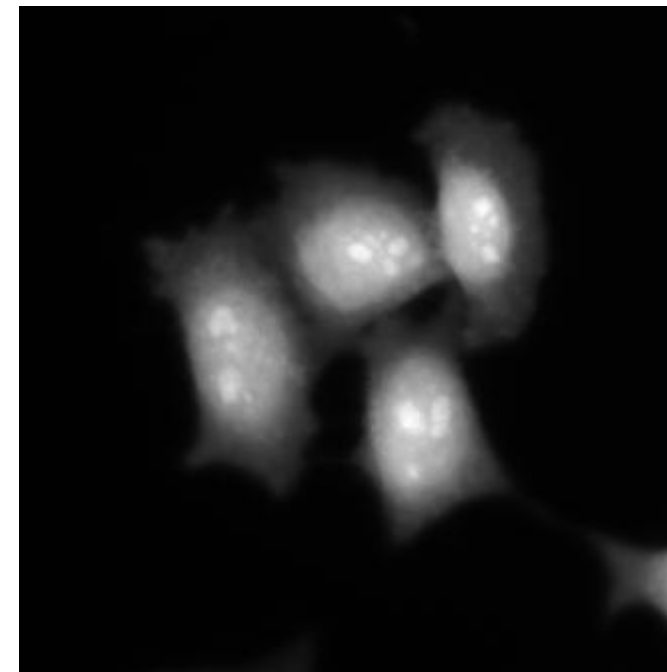


Motivation

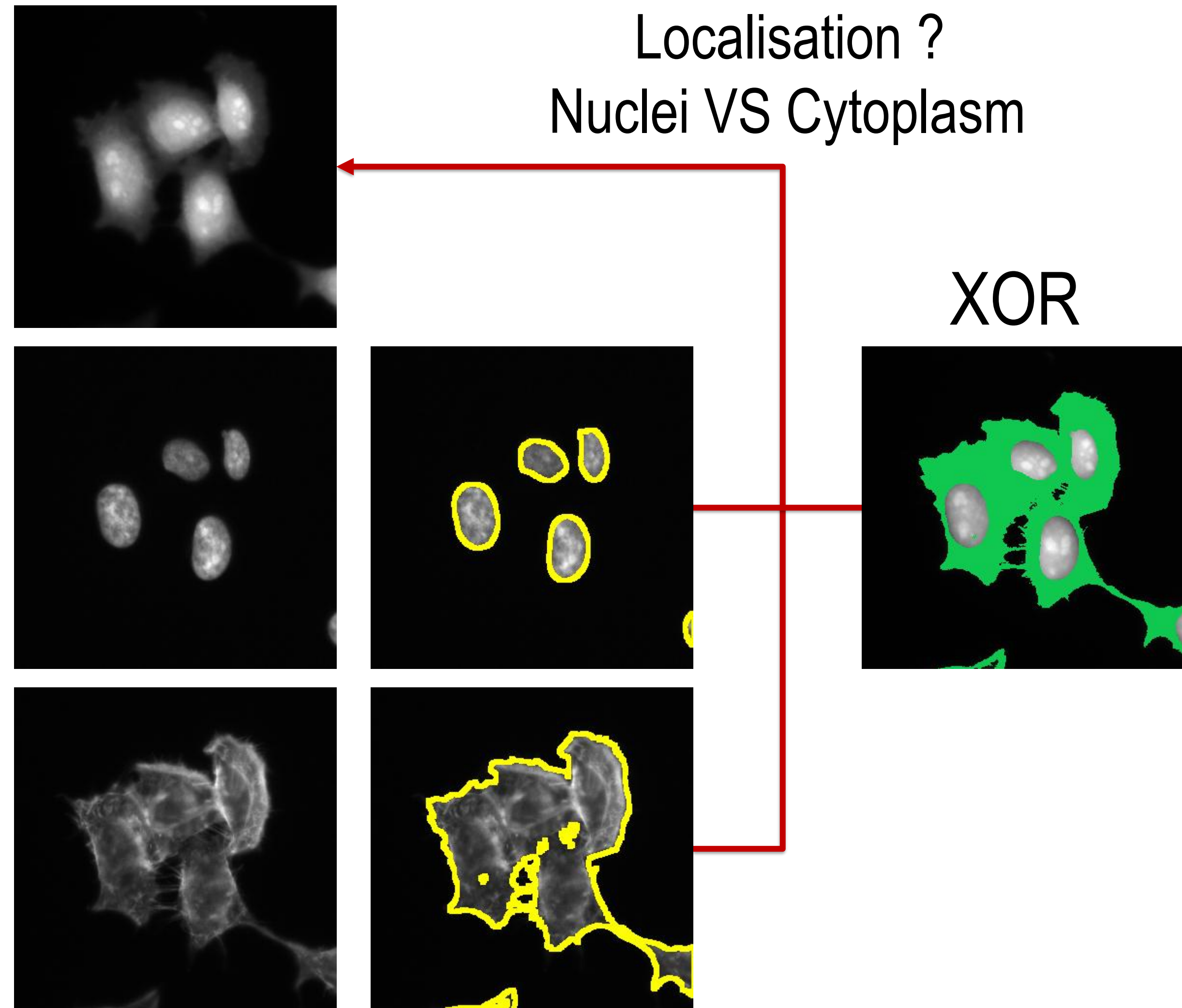


Motivation

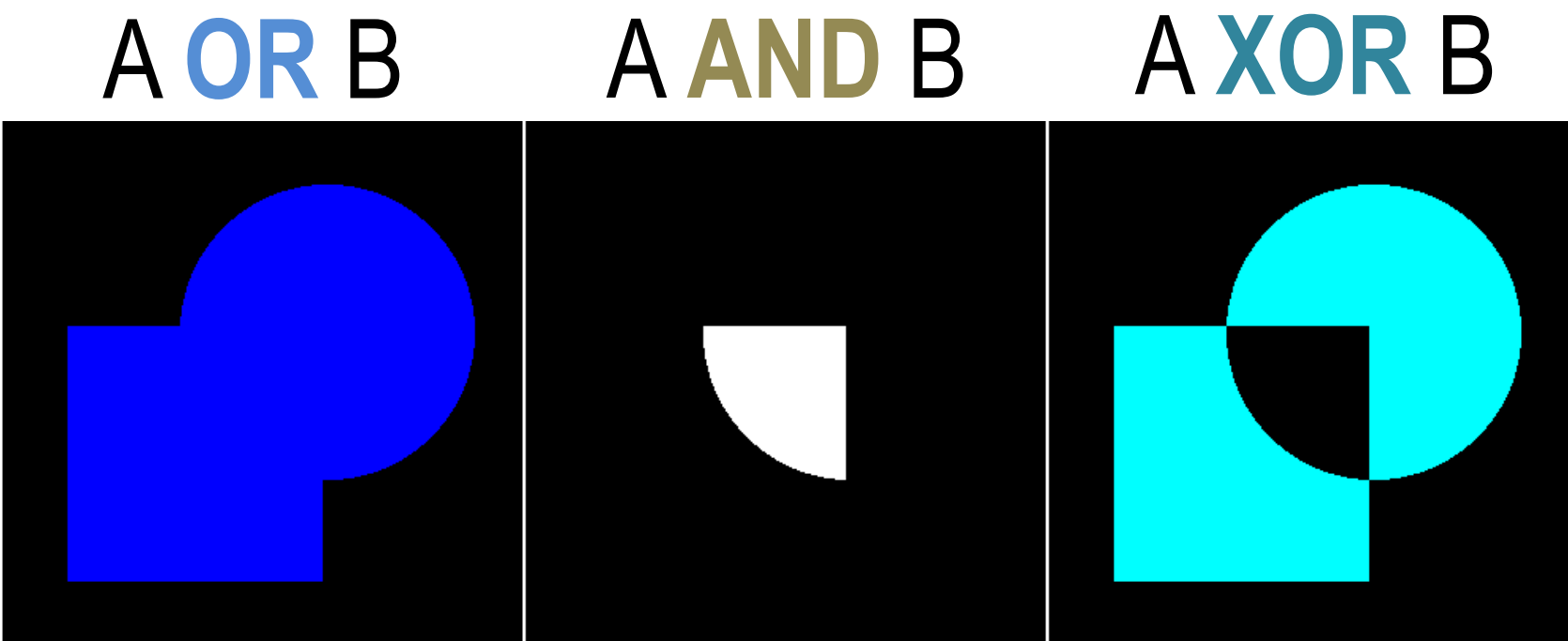
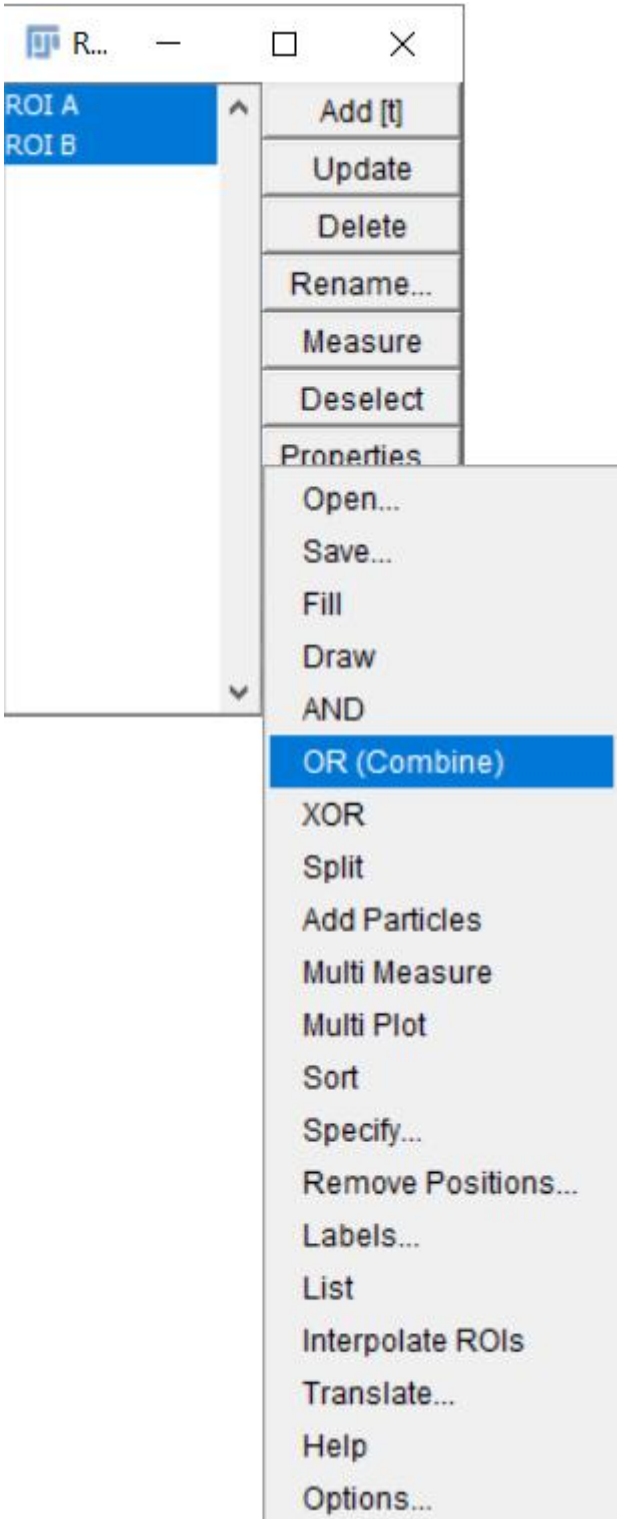
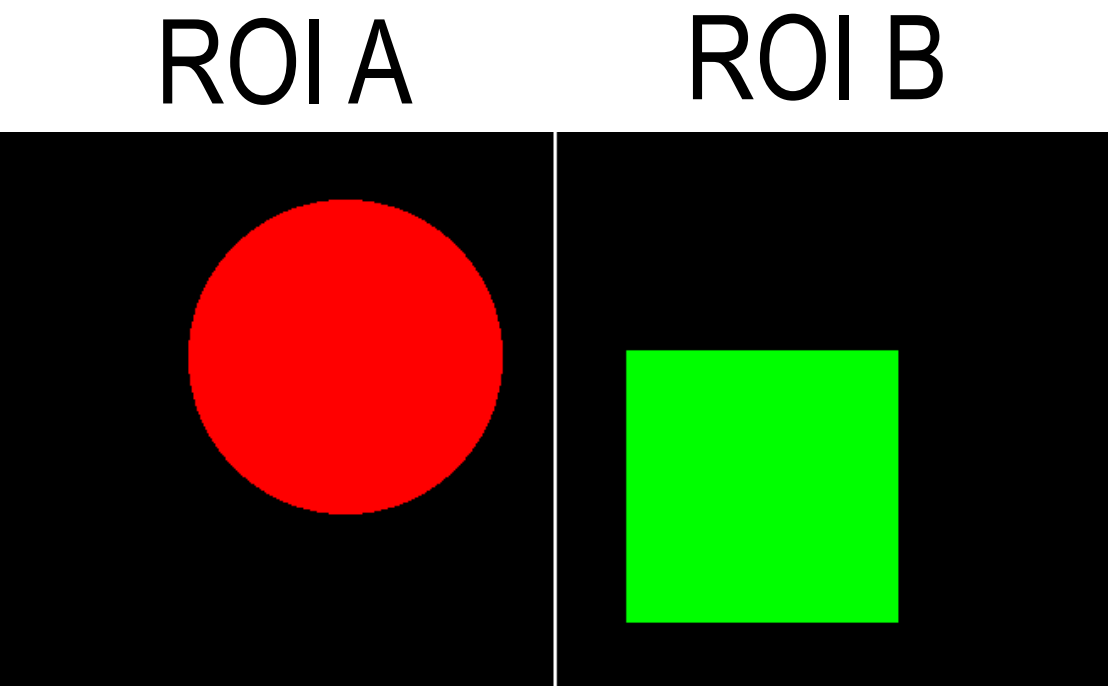
Localisation ?
Nuclei VS Cytoplasm



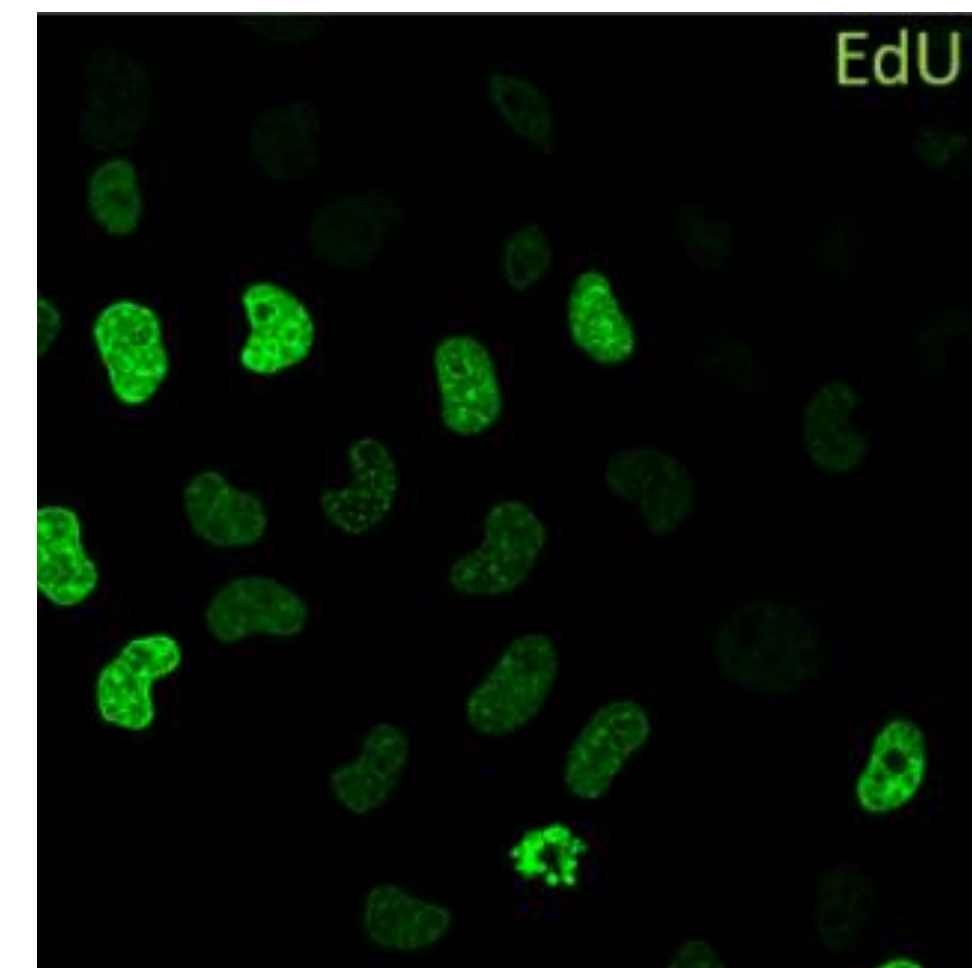
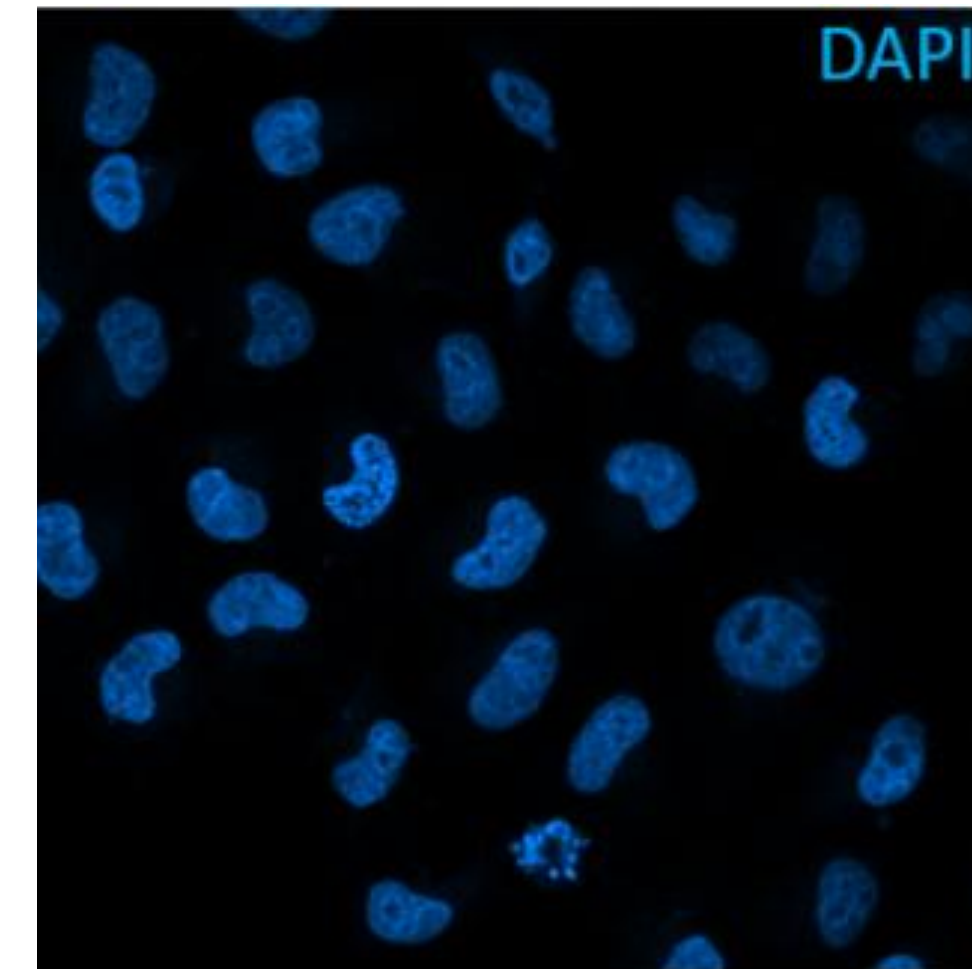
Motivation



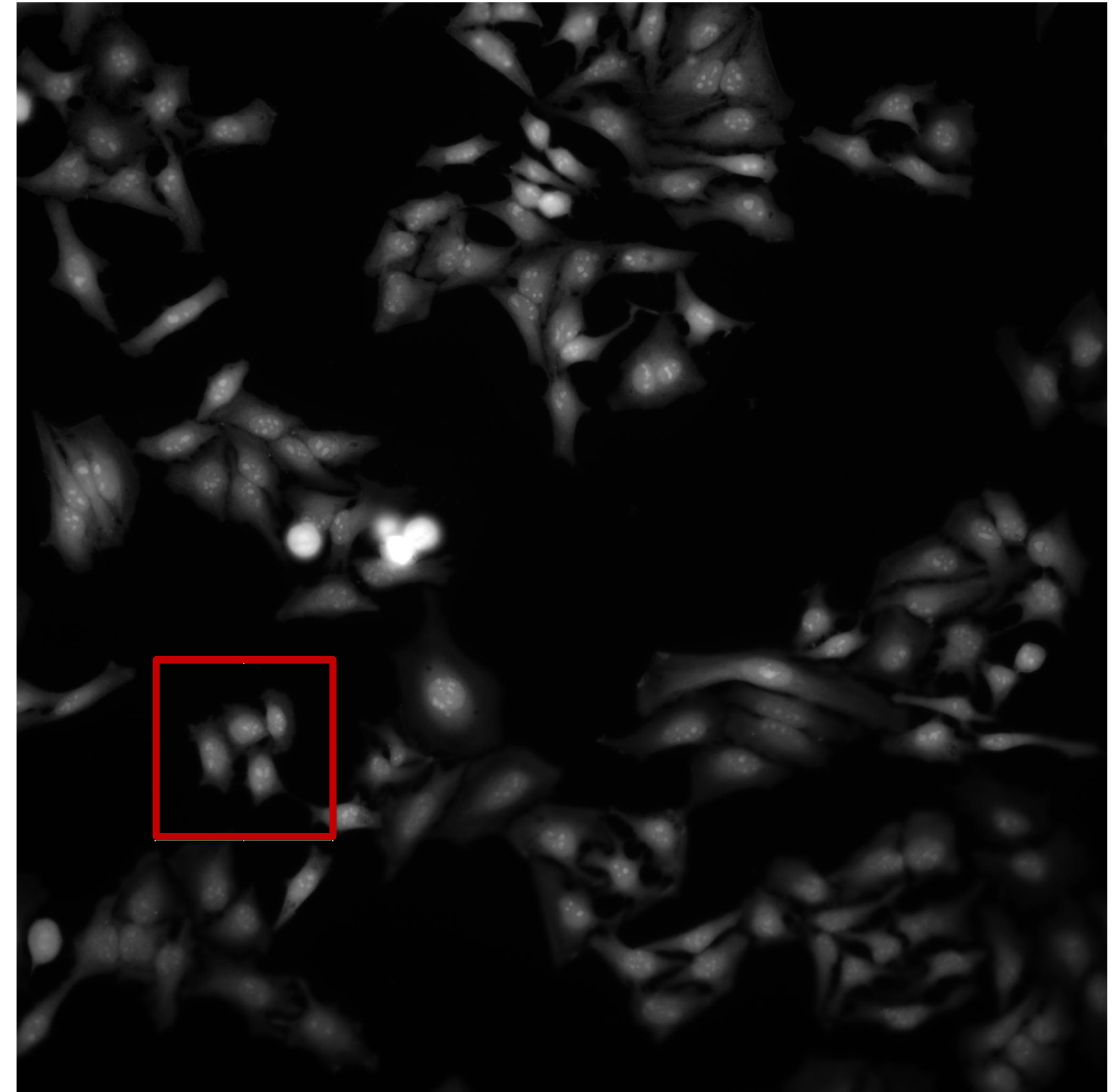
ROI Operations



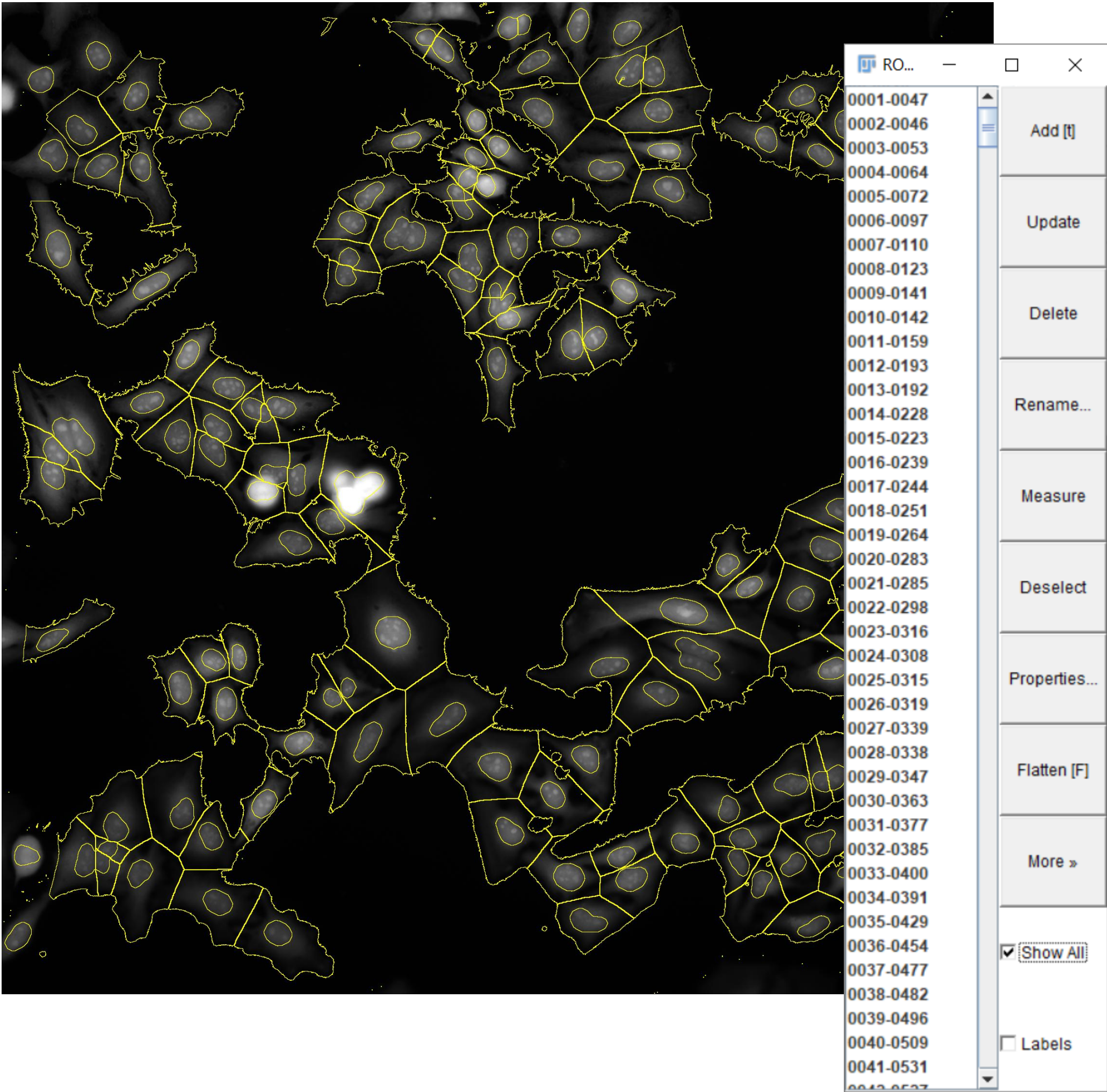
Individual ROIs



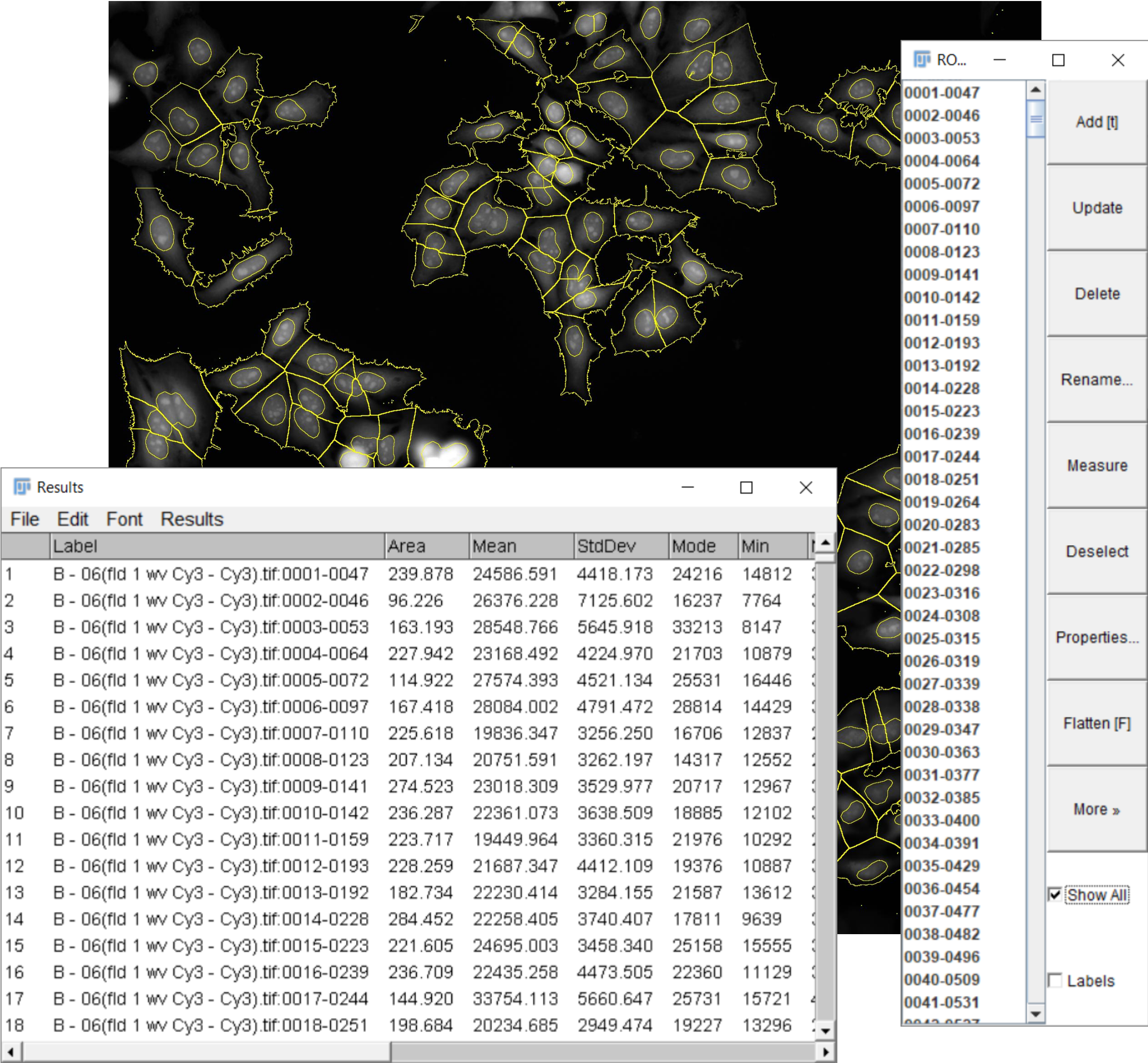
Individual ROIs



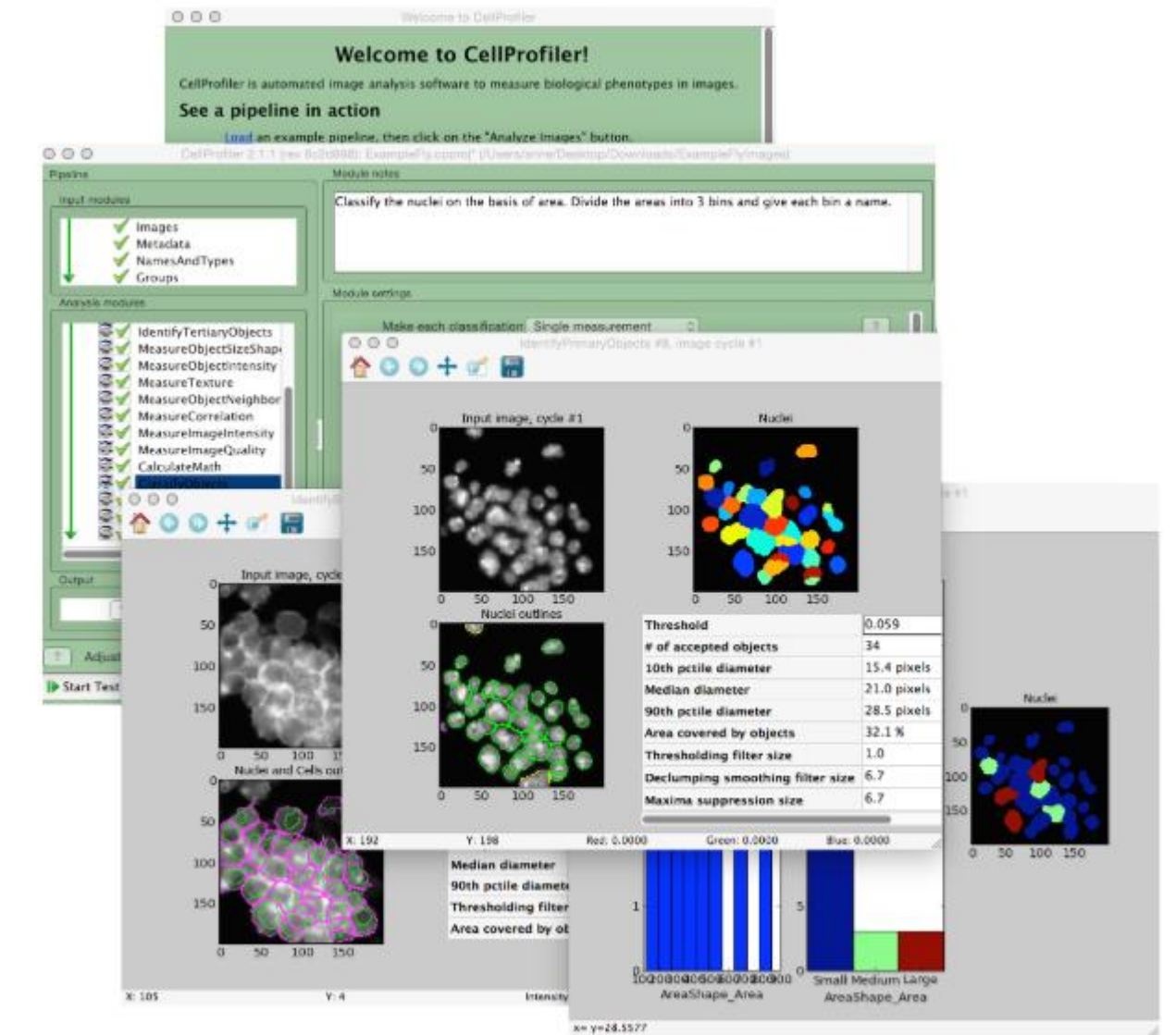
Individual ROIs



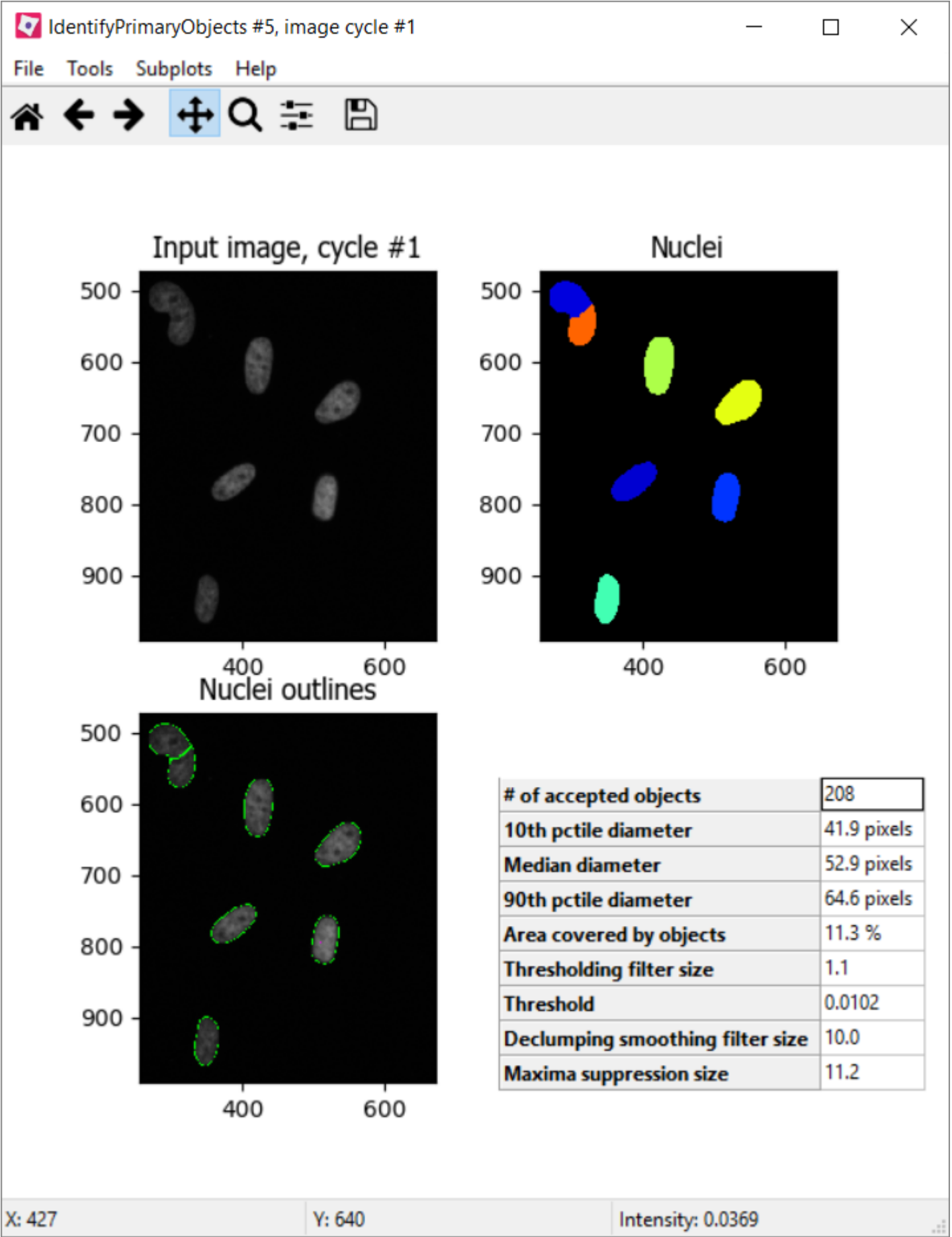
Individual ROIs



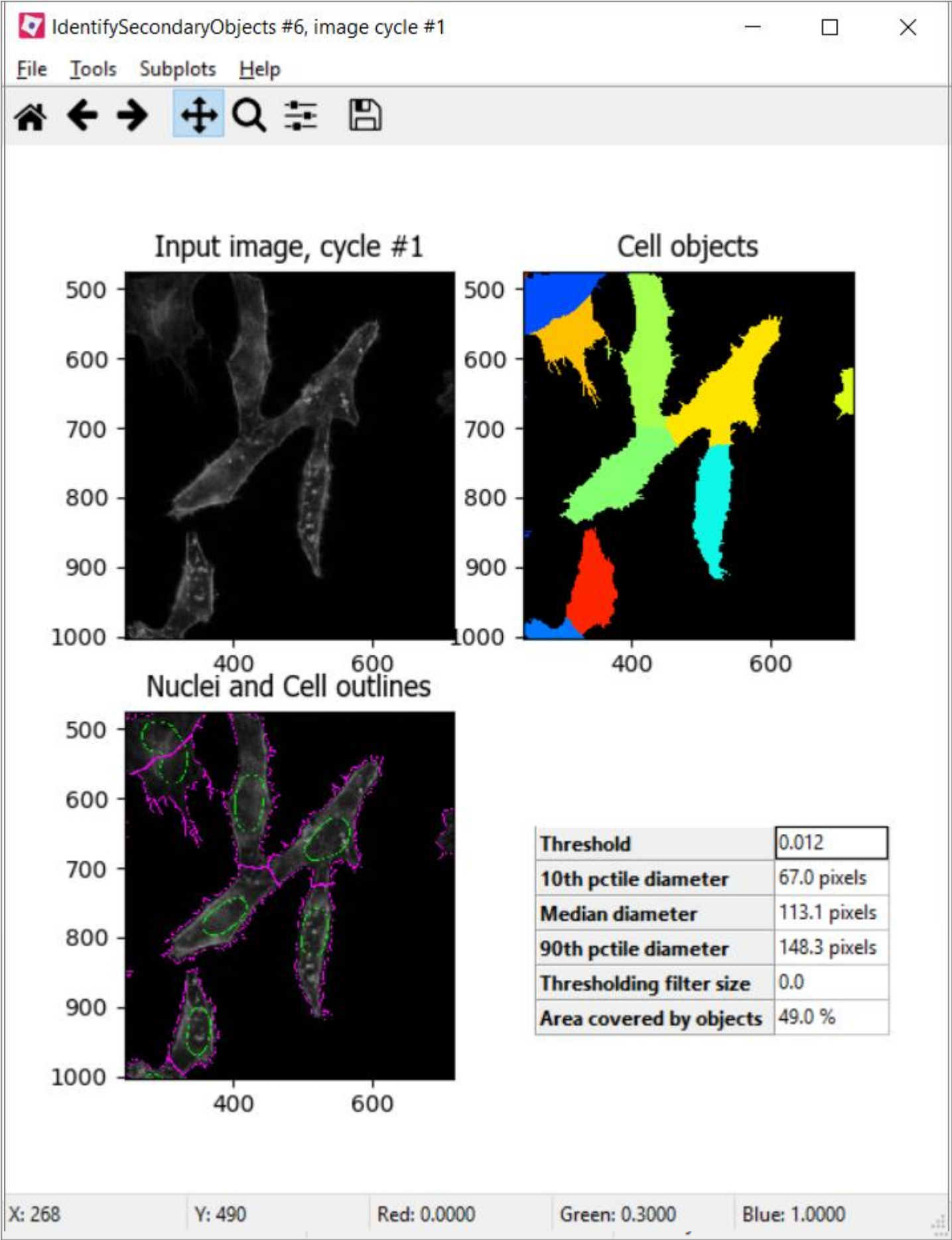
CellProfiler



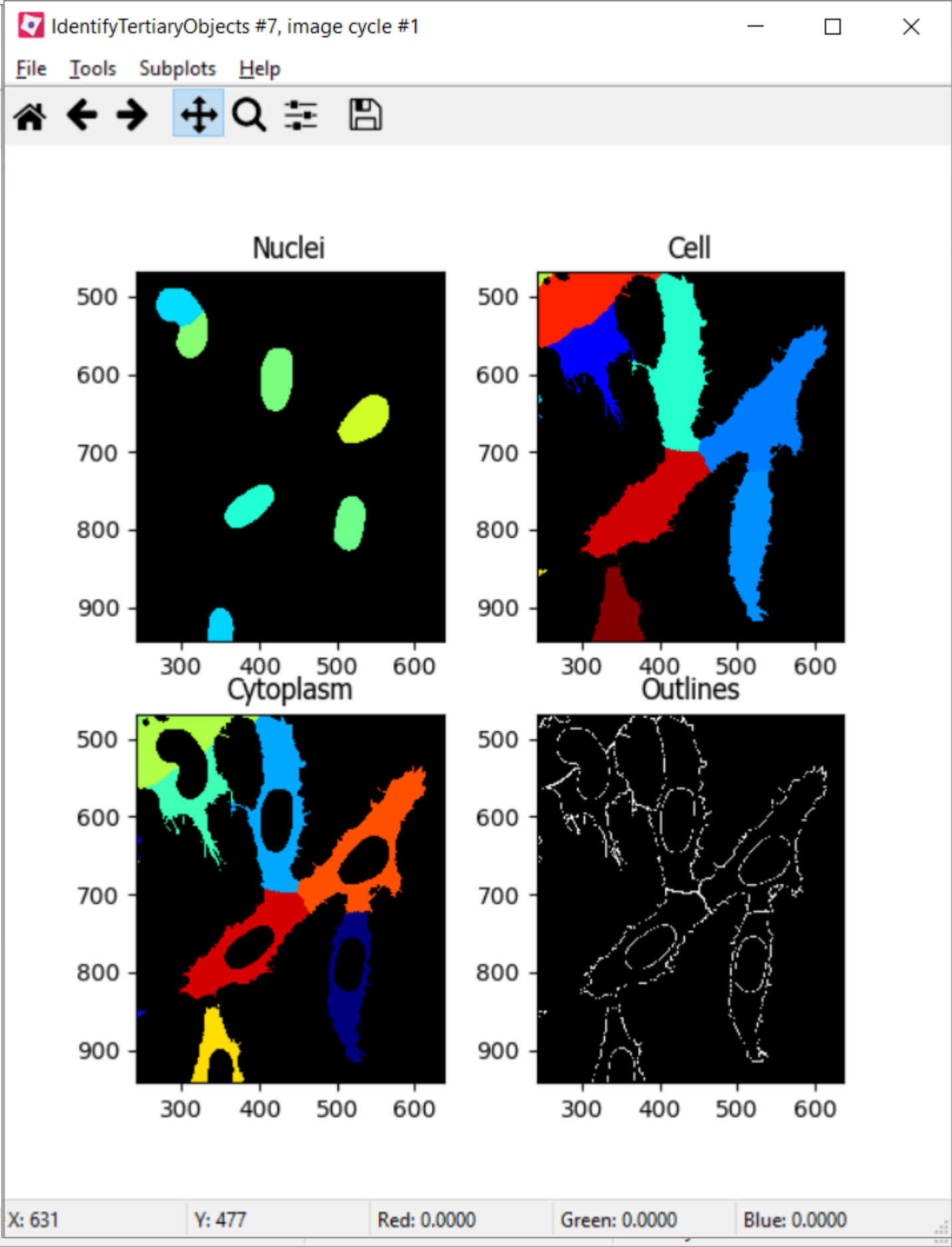
Cell Profiler



Cell Profiler



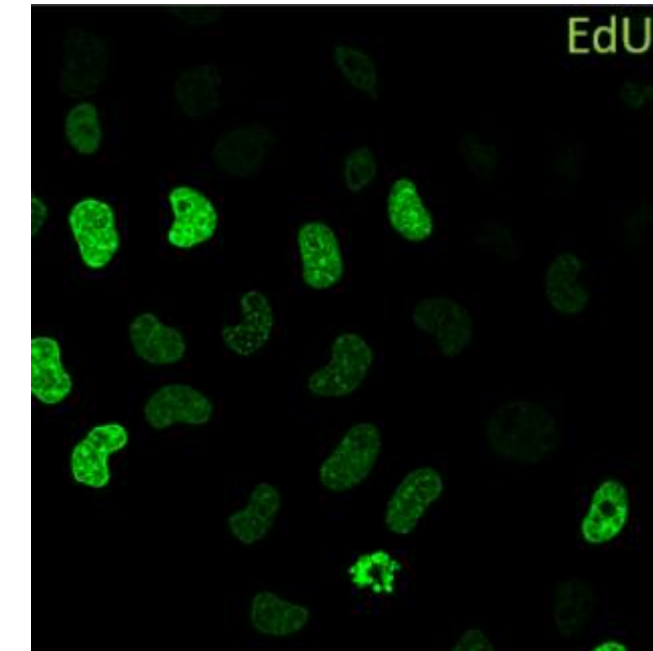
Cell Profiler



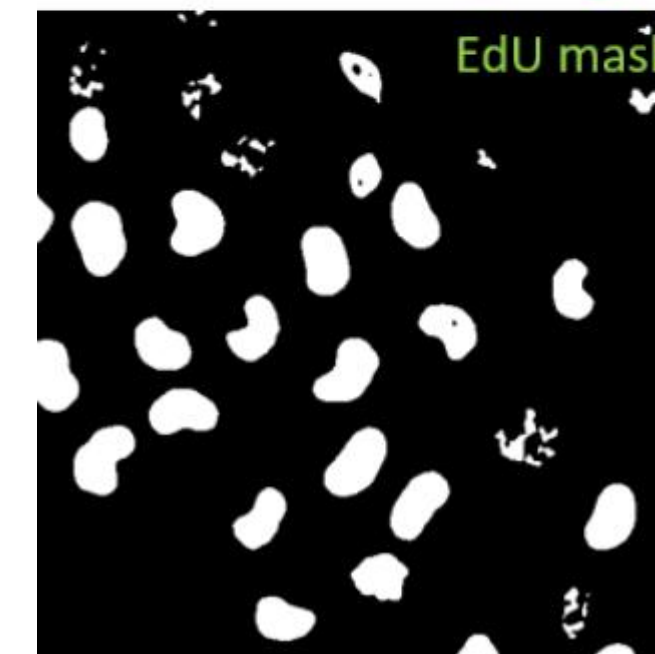
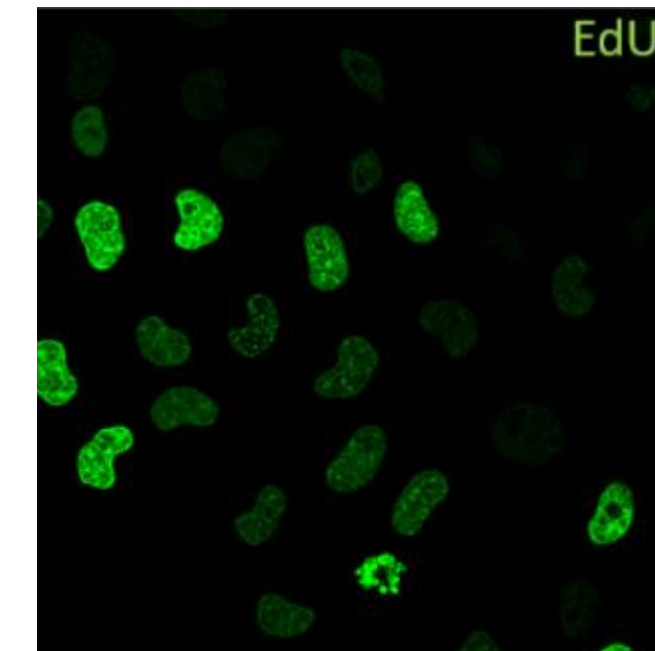
- Need for ROIs
- ROI Manipulation
- CellProfiler an adapted solution for Complex Objects Relationships

Of the Necessity Having Independant Channels

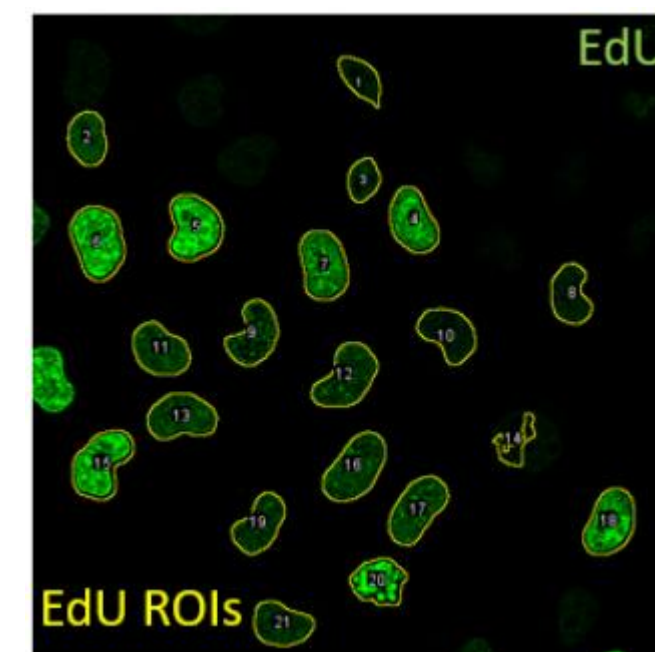
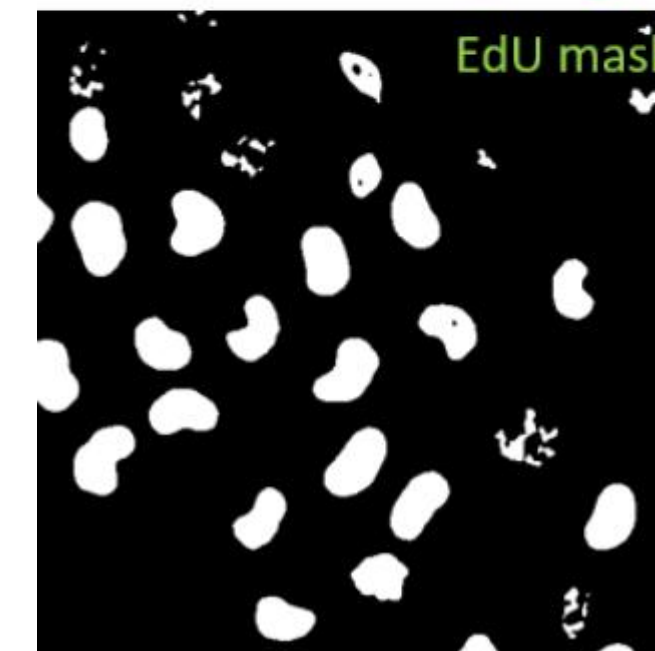
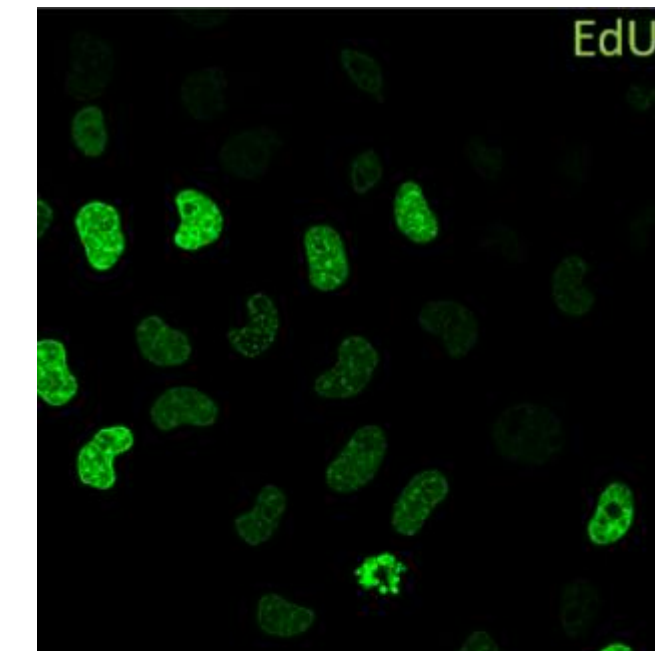
Why do we need Independent Channels ?



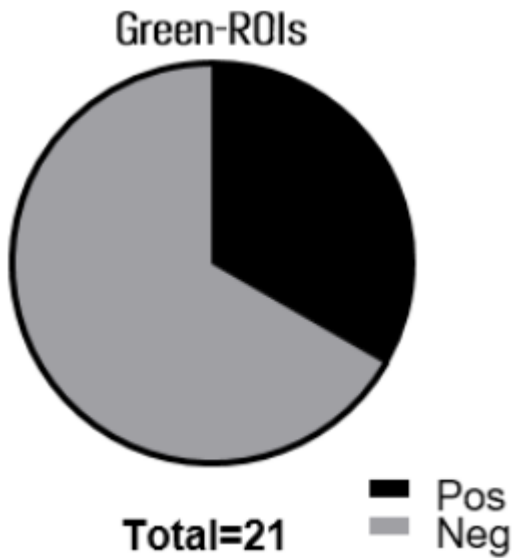
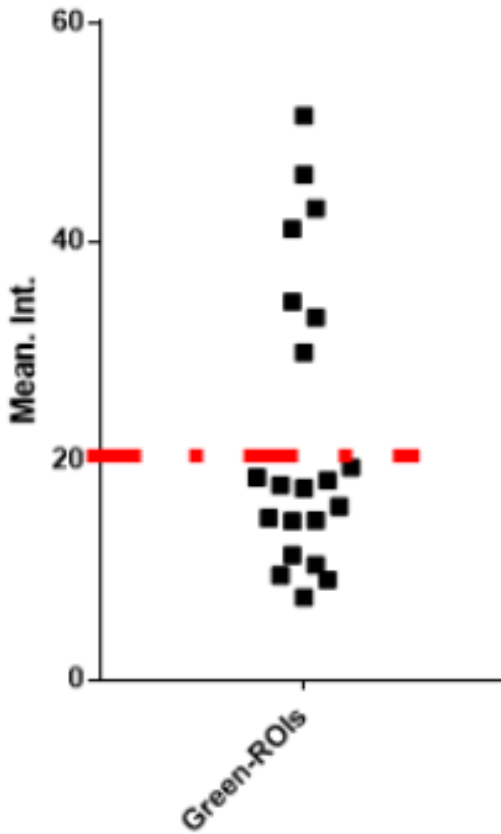
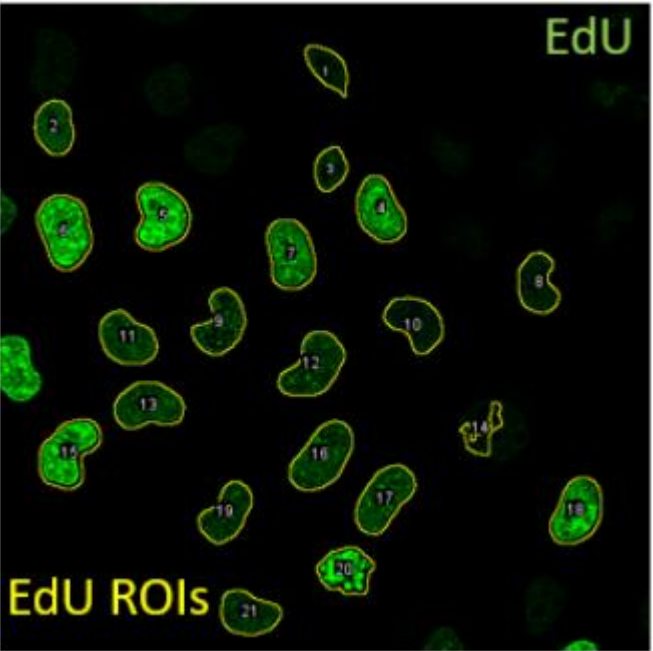
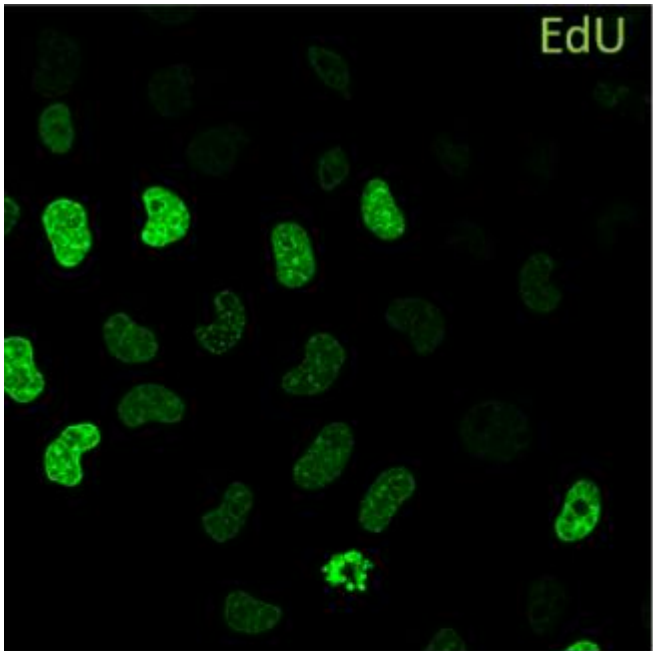
Why do we need Independent Channels ?



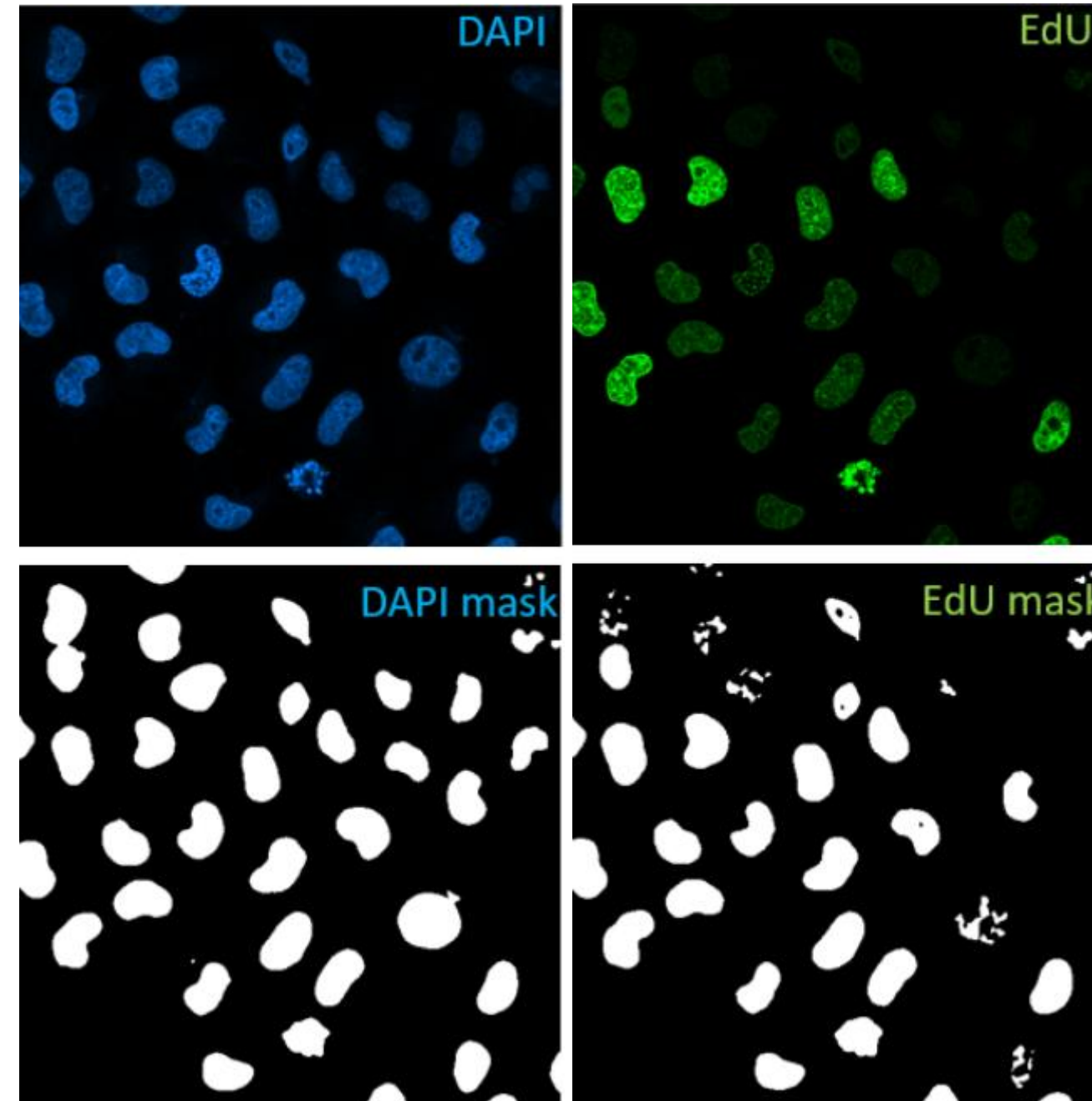
Why do we need Independent Channels ?



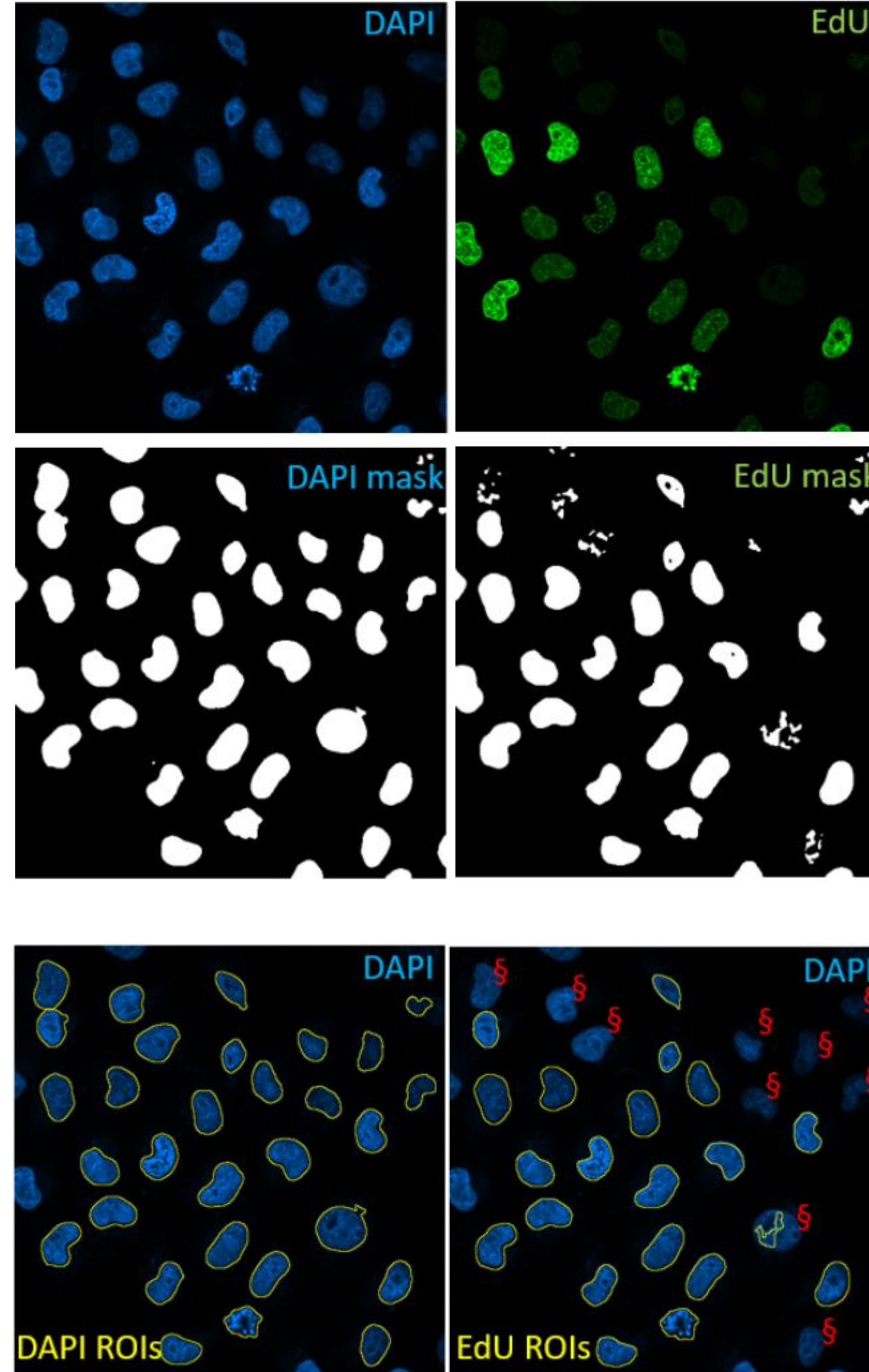
Why do we need Independant Channels ?



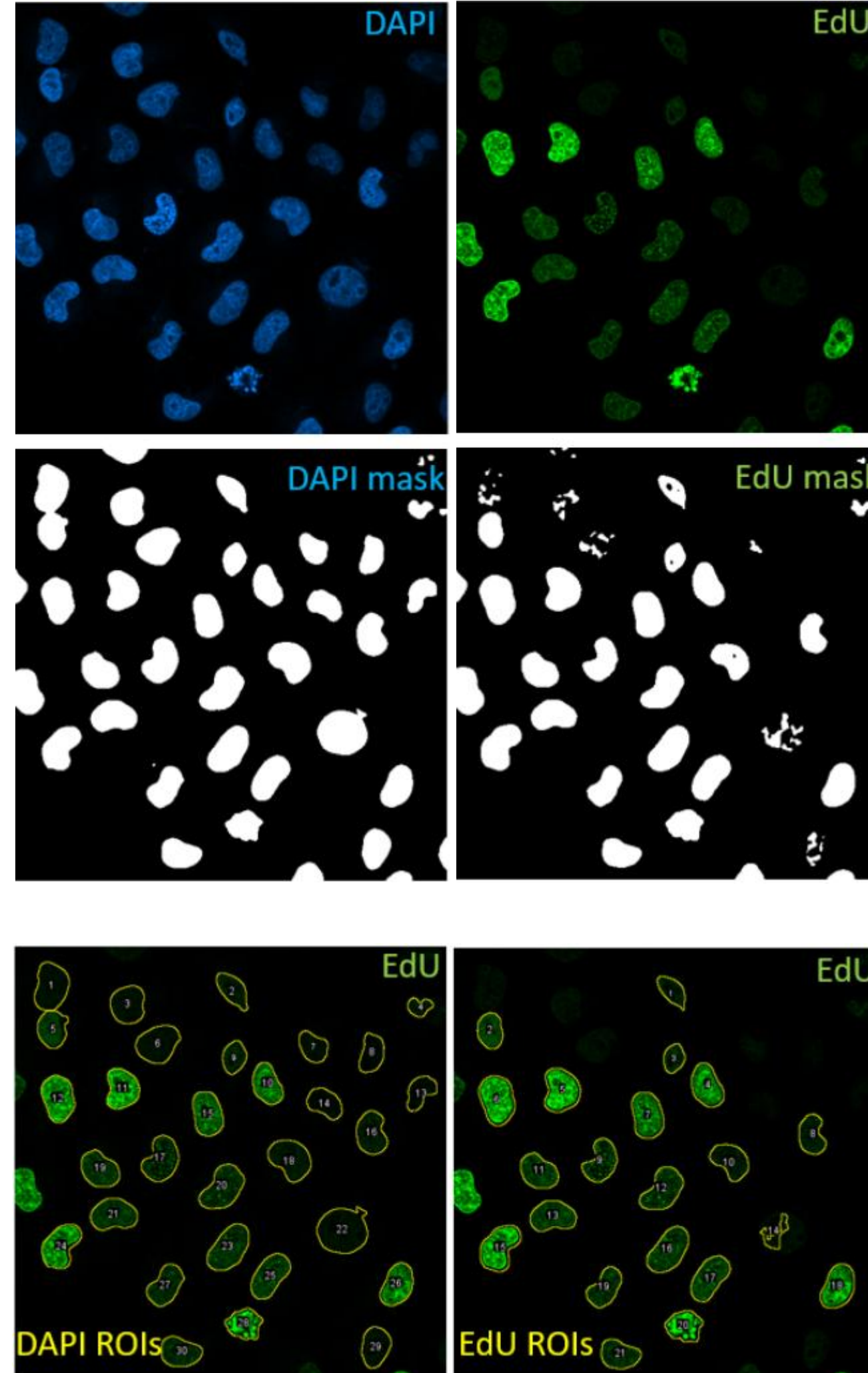
Why do we need Independent Channels ?



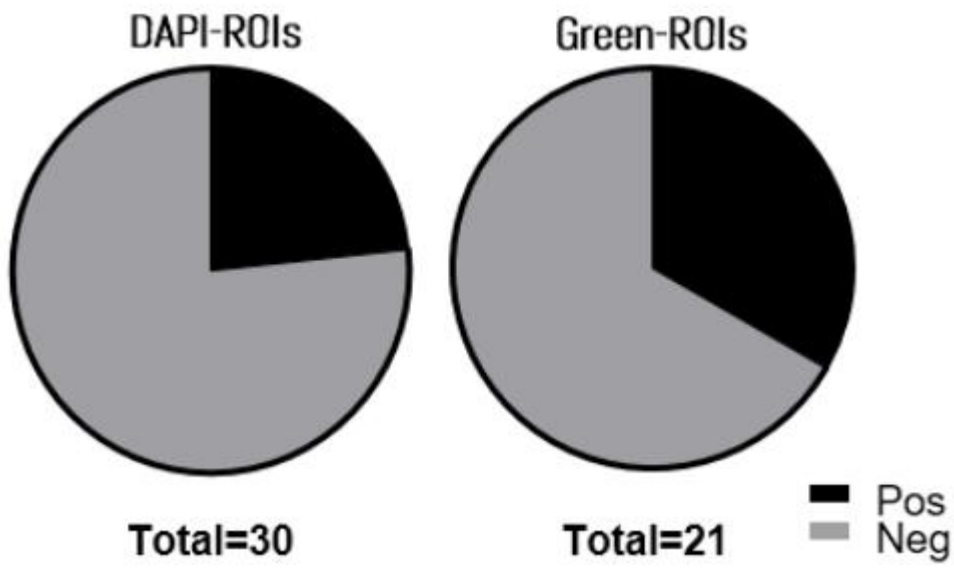
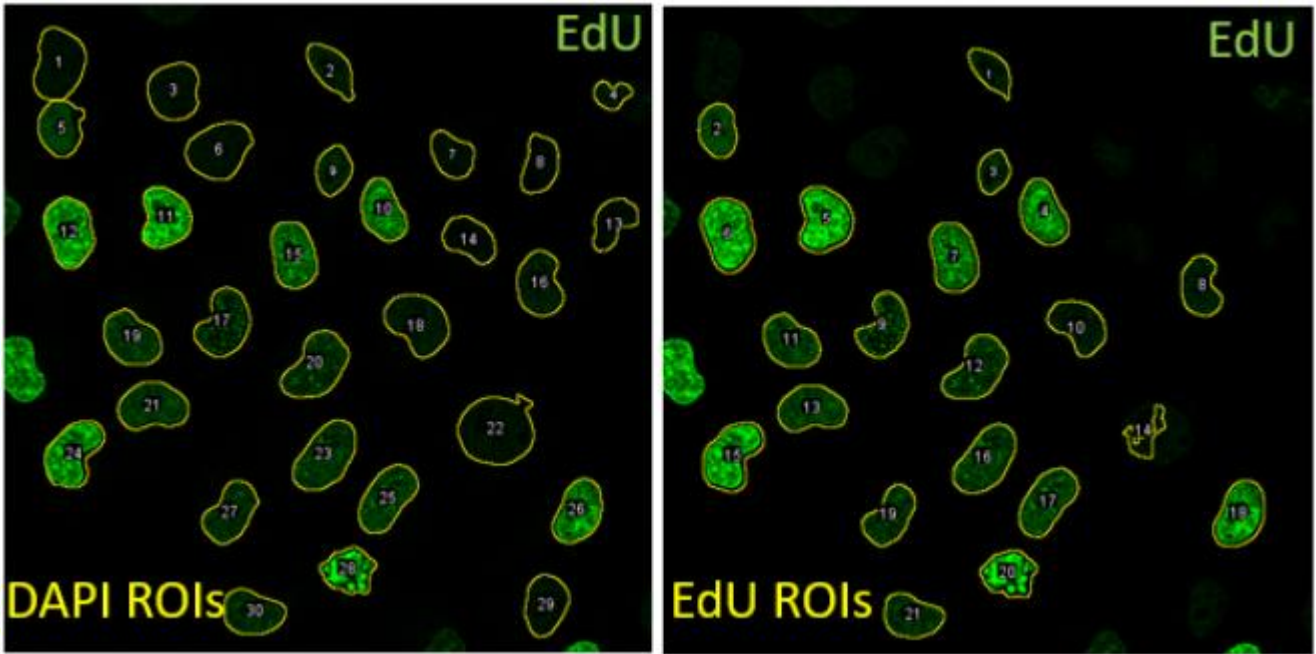
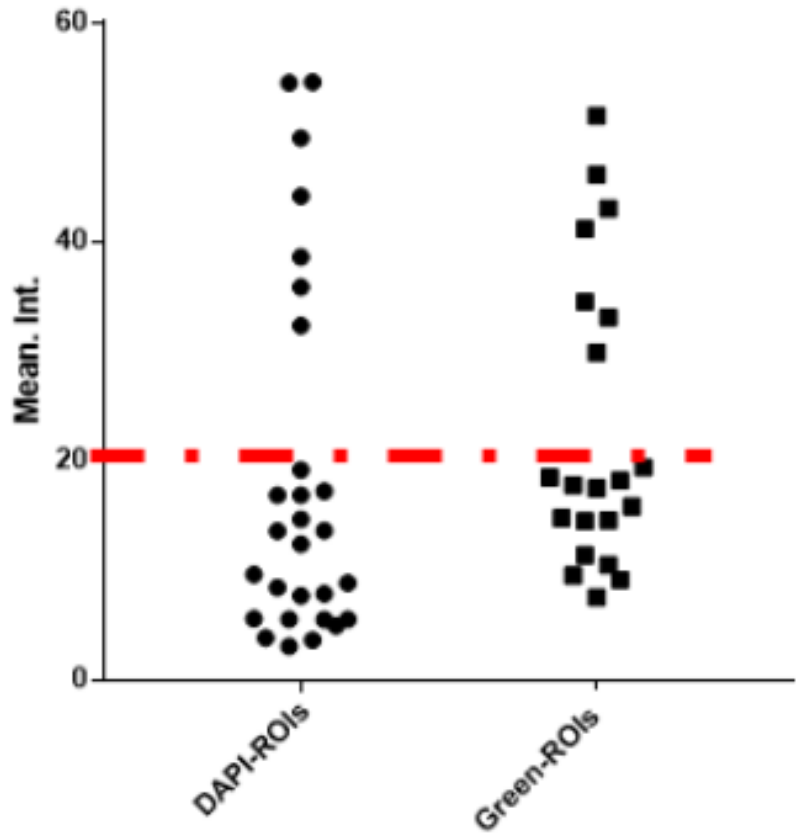
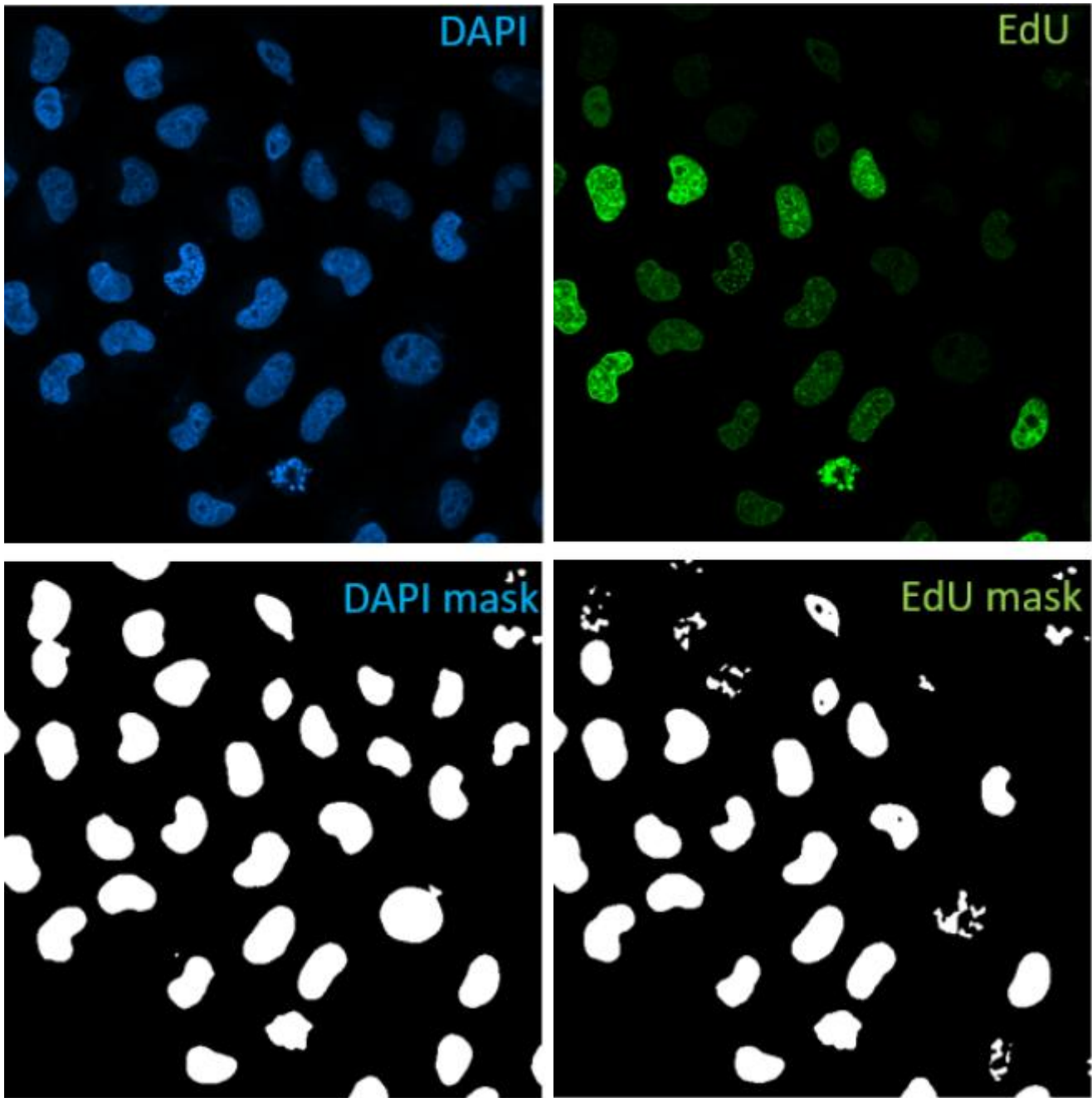
Why Do we need Independant Channels ?



Why Do we need Independent Channels ?

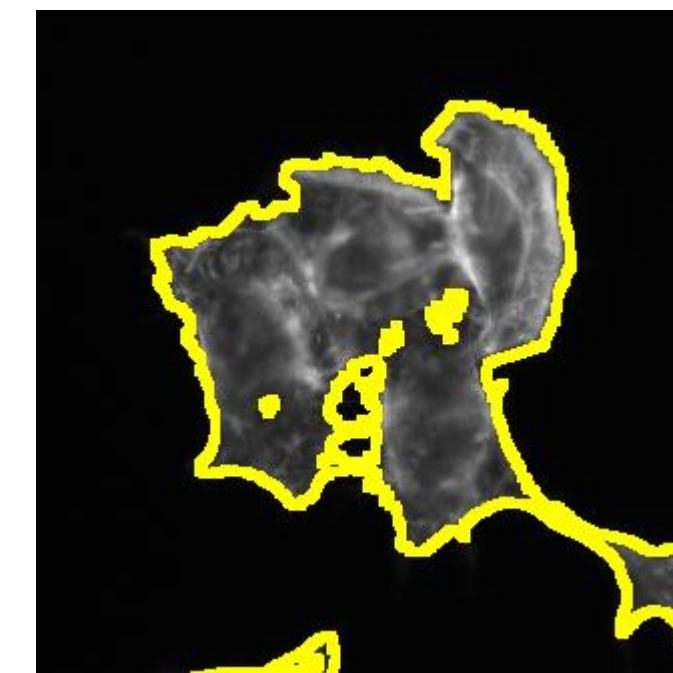
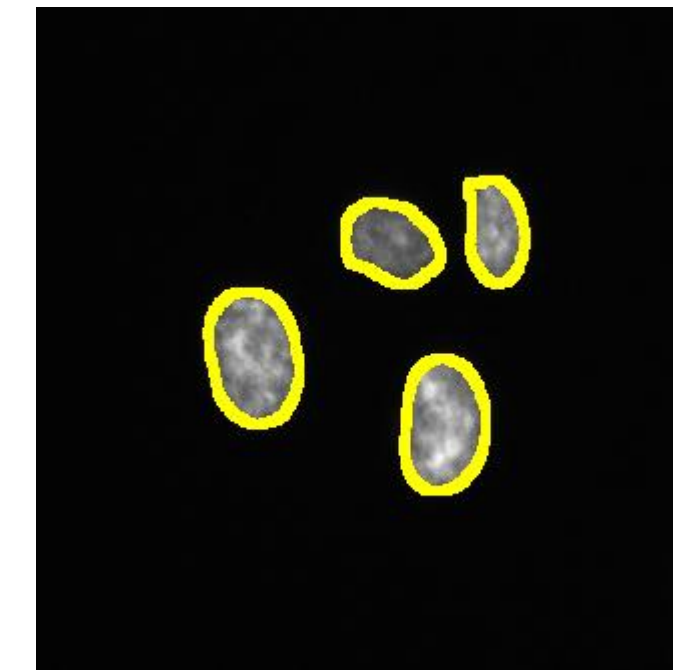
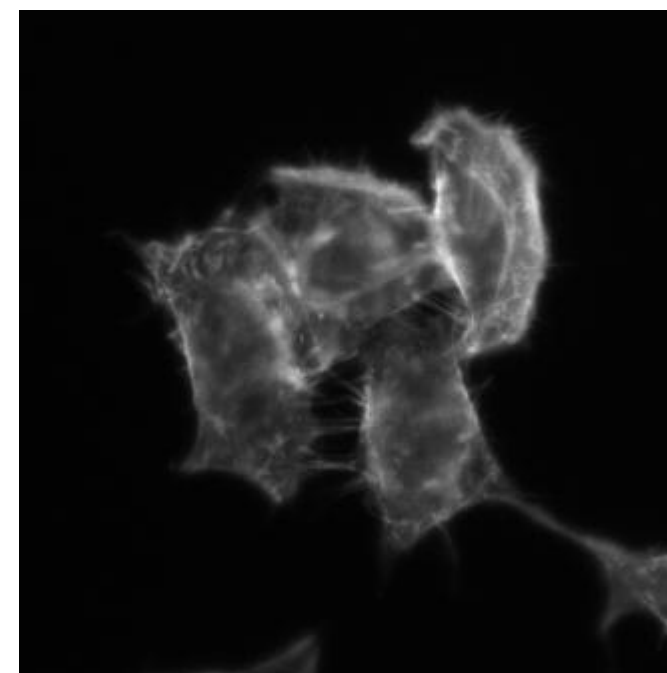
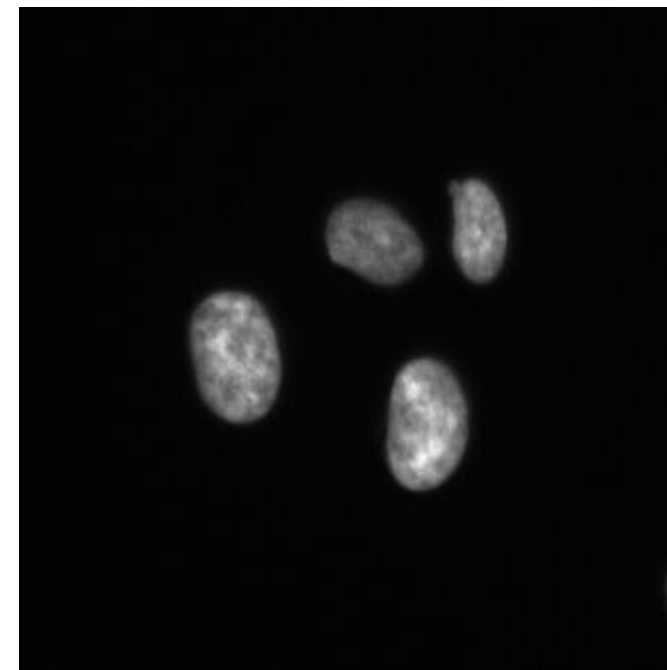
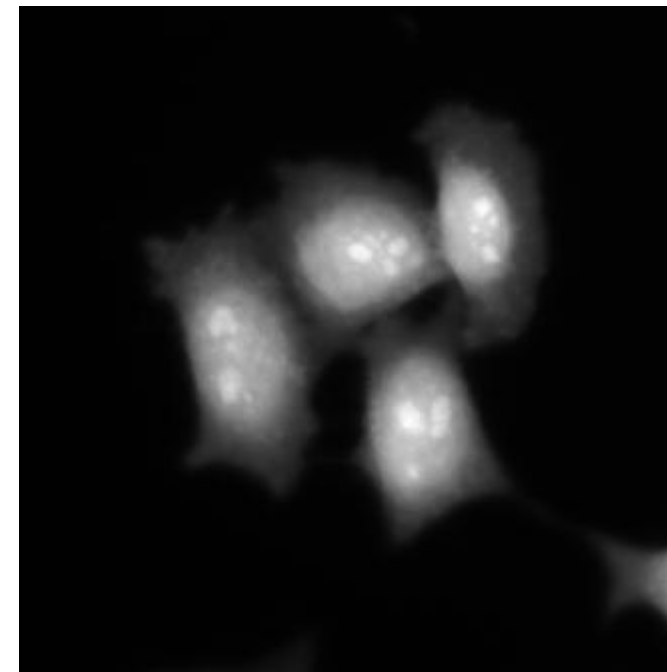


Why Do we need Independant Channels ?



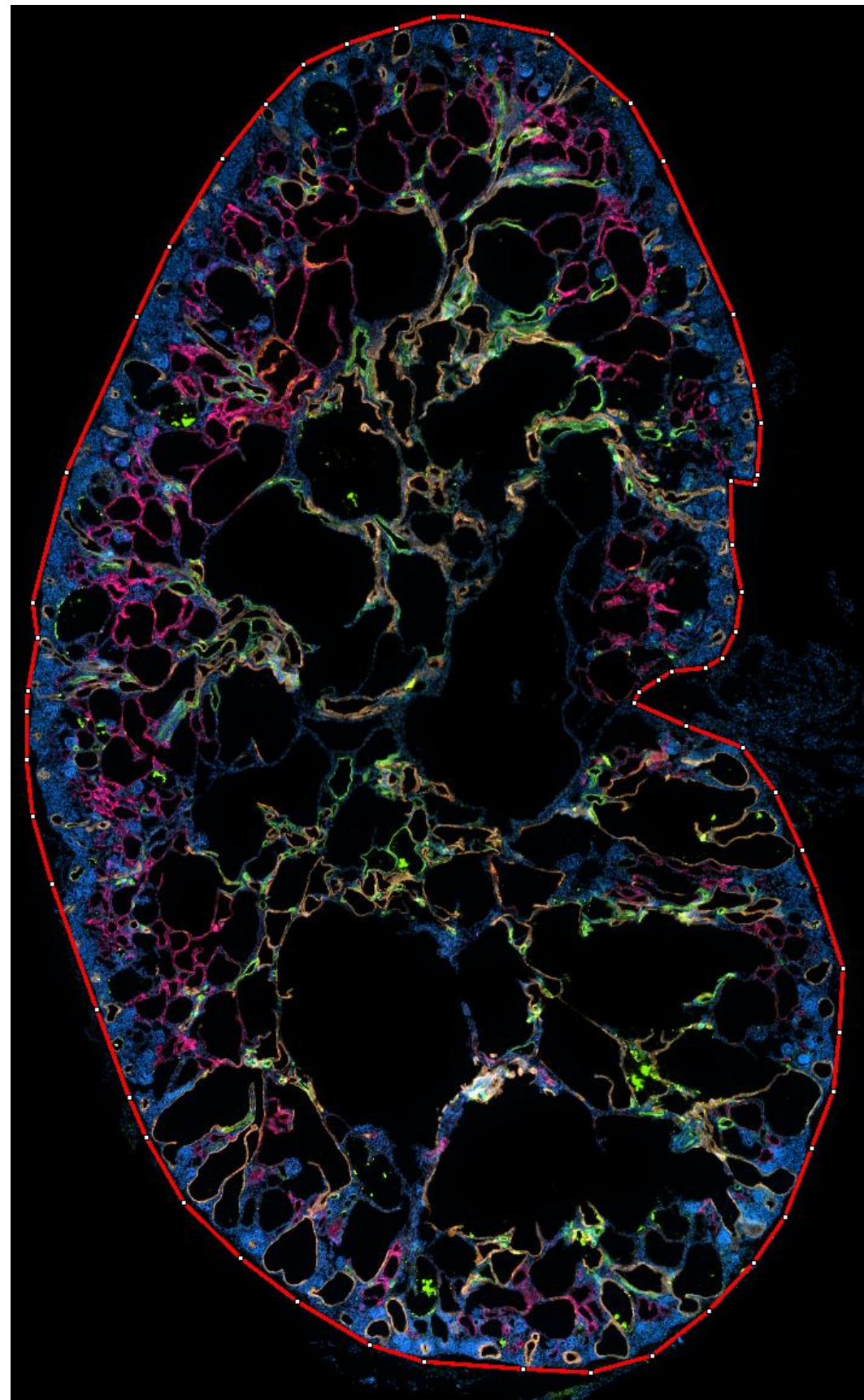
Motivation

Localisation ?
Nuclei VS Cytoplasm

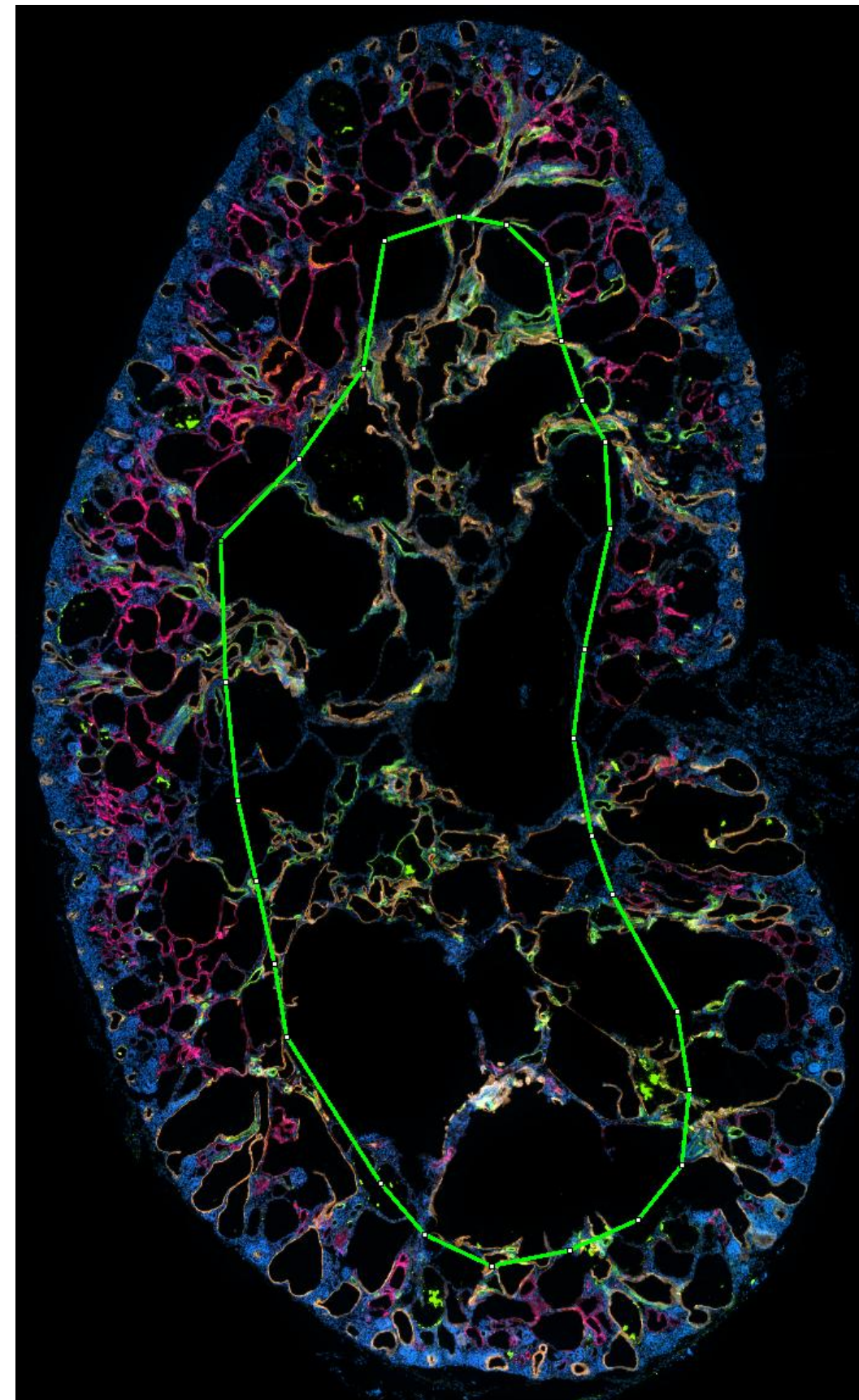


Exercices

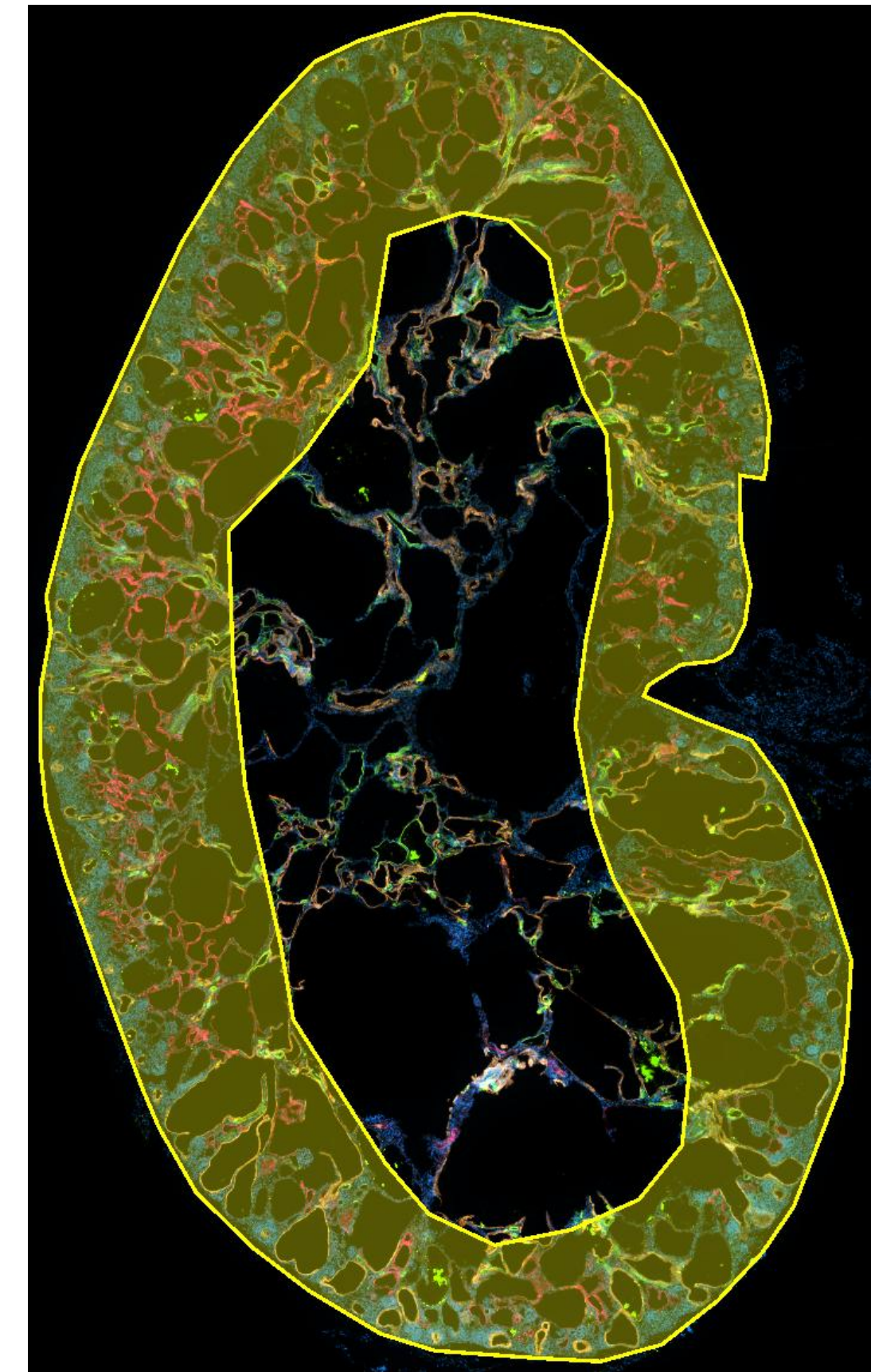
Life Science Example



Kidney

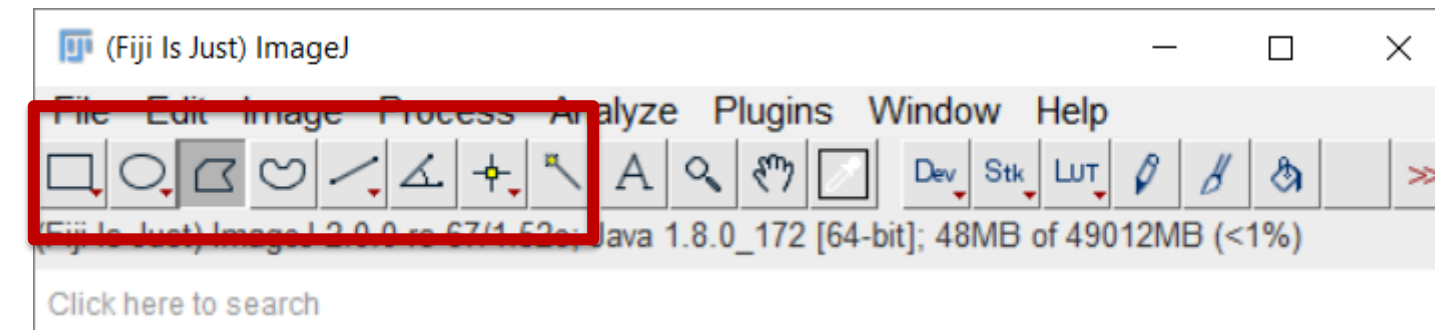


Medula

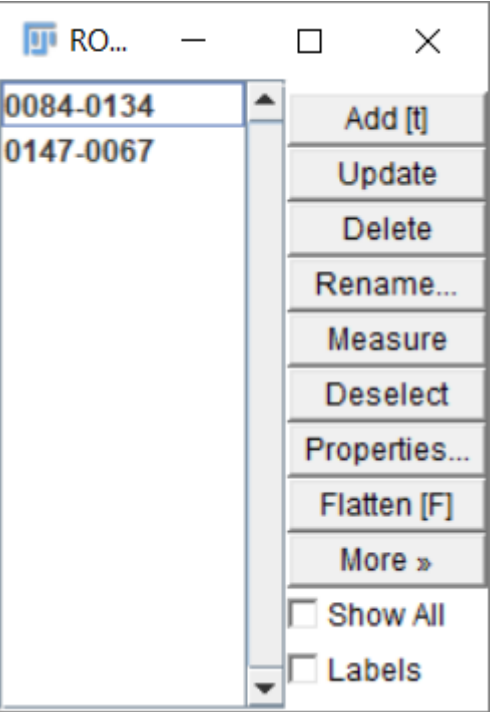
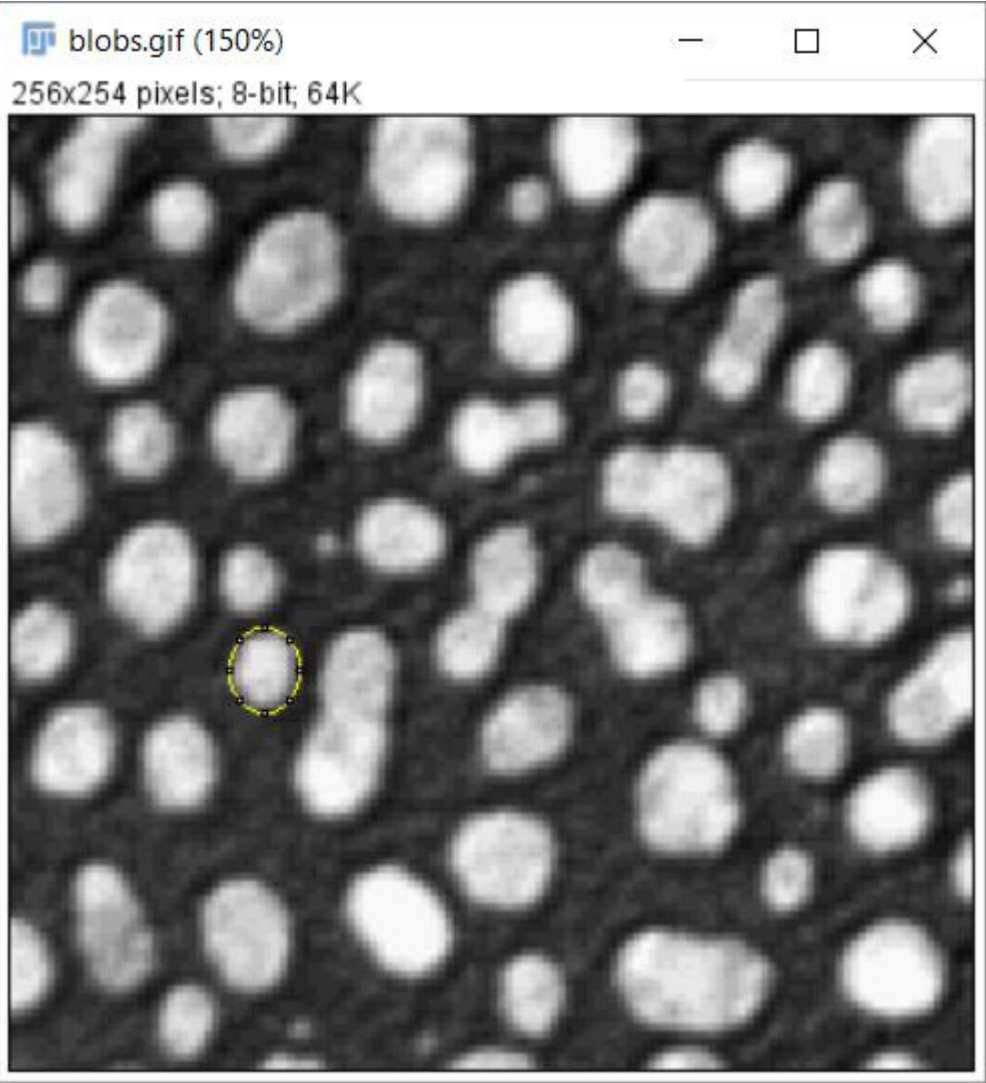


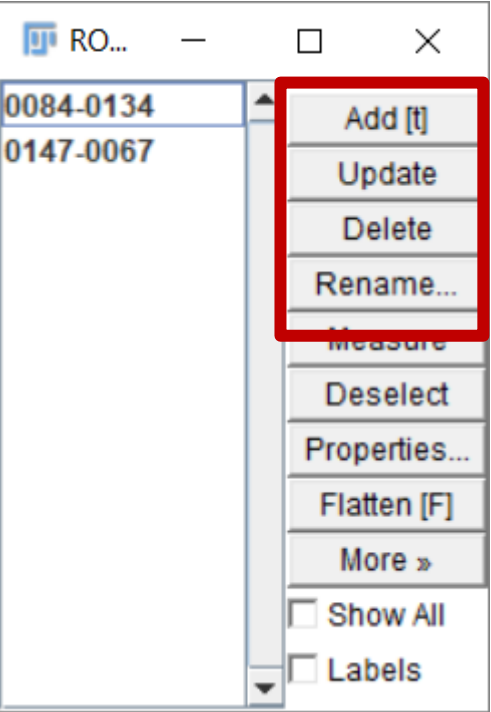
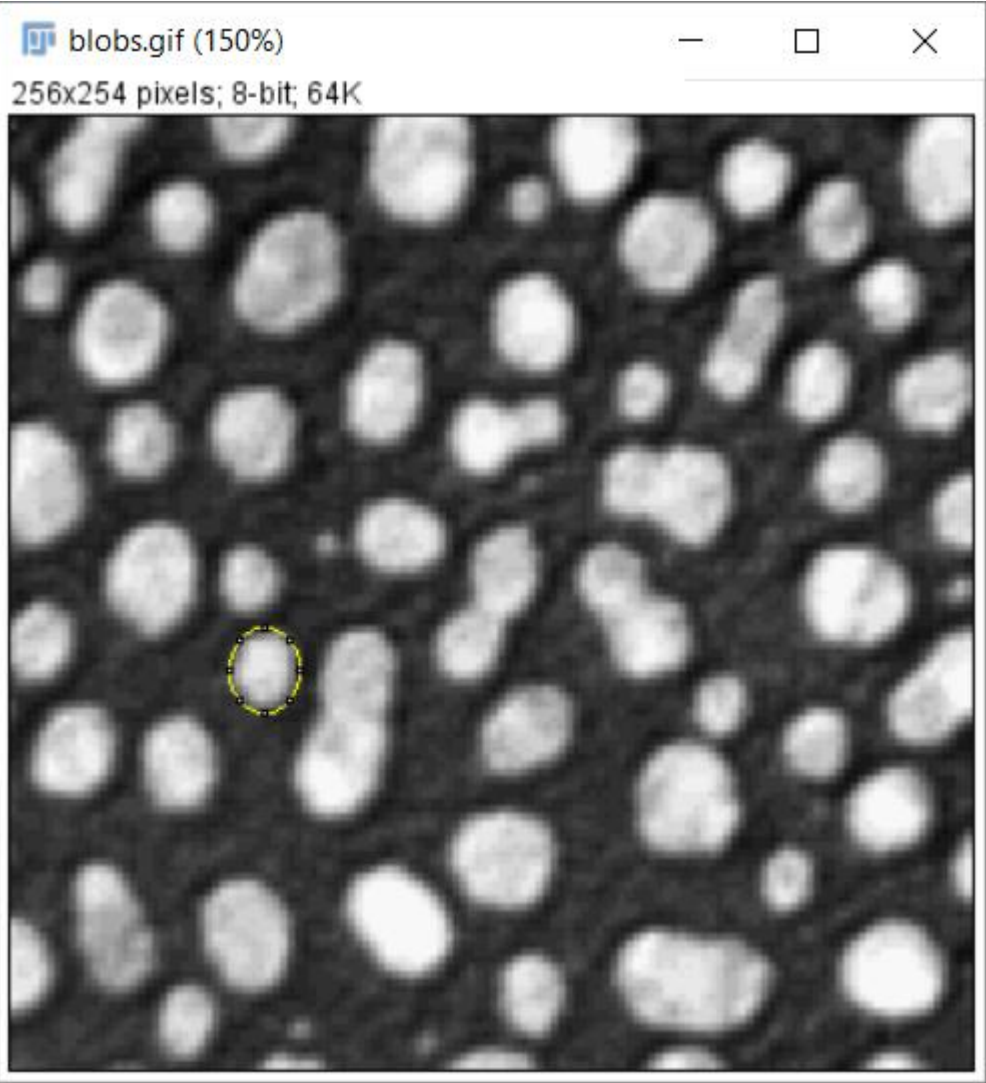
Cortex
Kidney XOR Medula

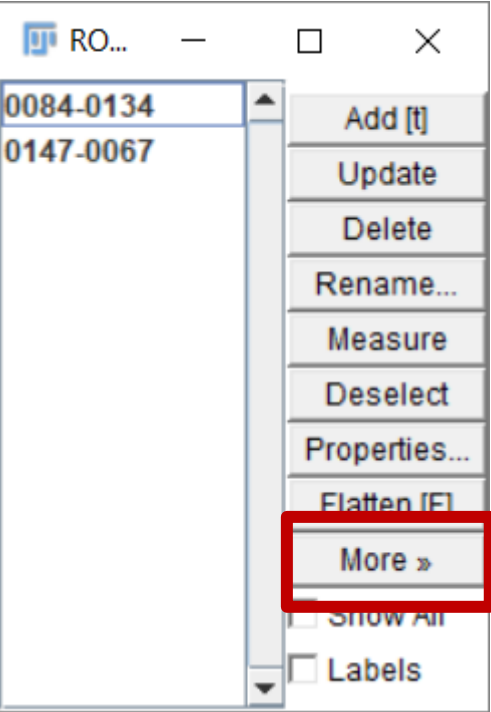
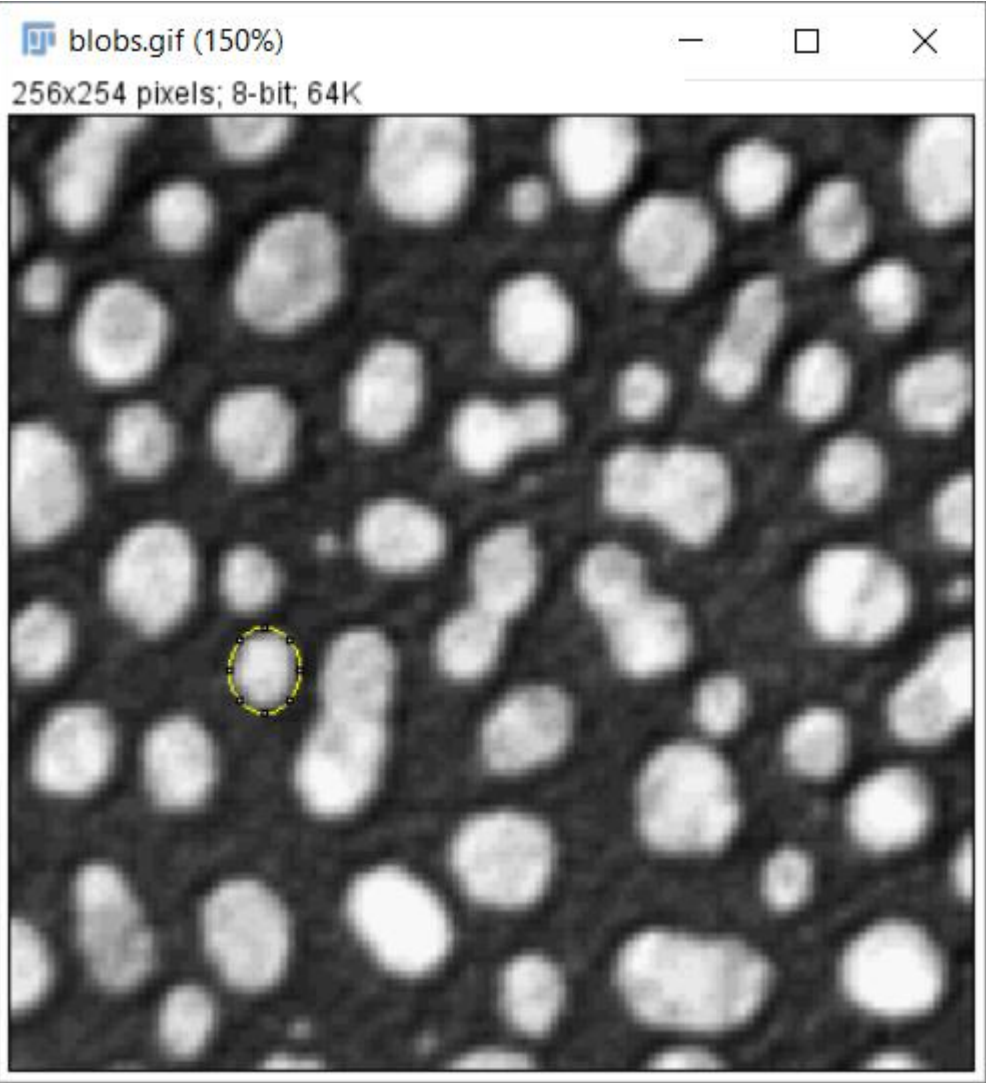
Region Of Interest : Type



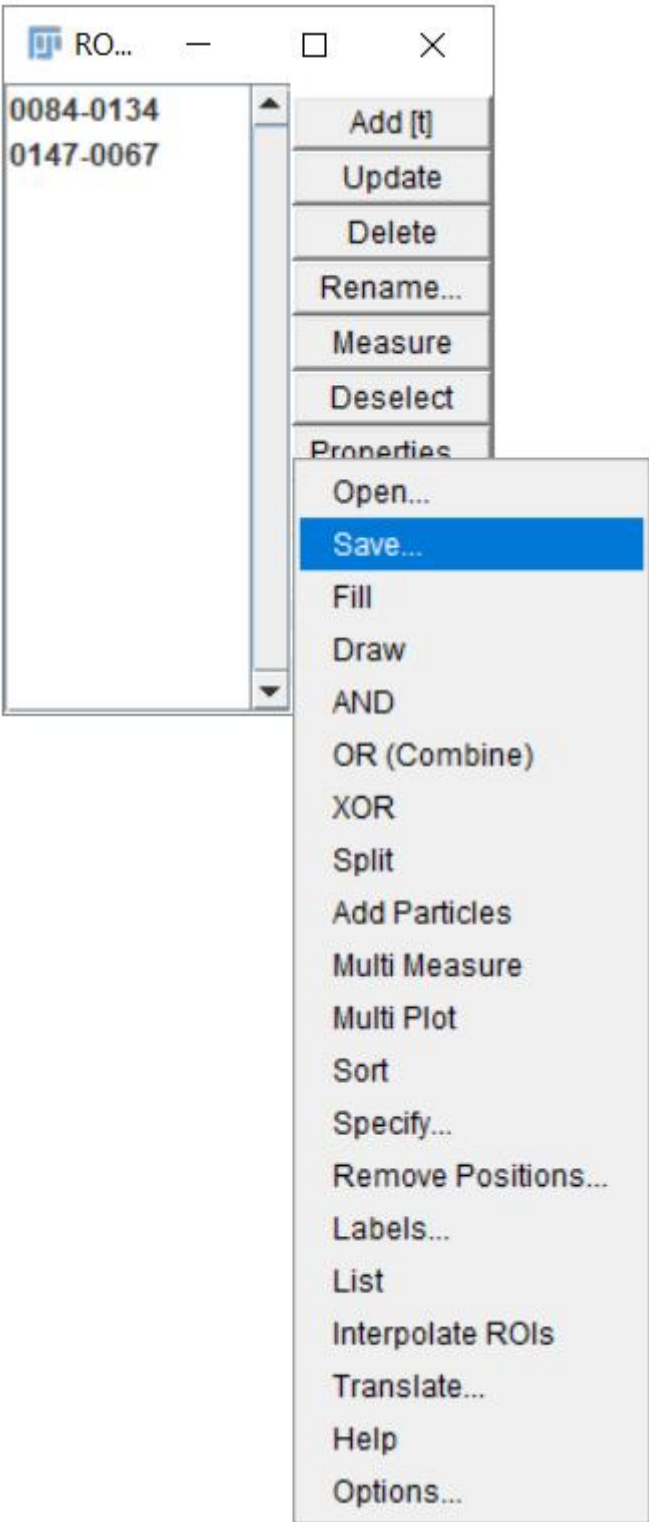
- Point
- Line
- Area
 - Rectangle
 - Oval
 - Polygon



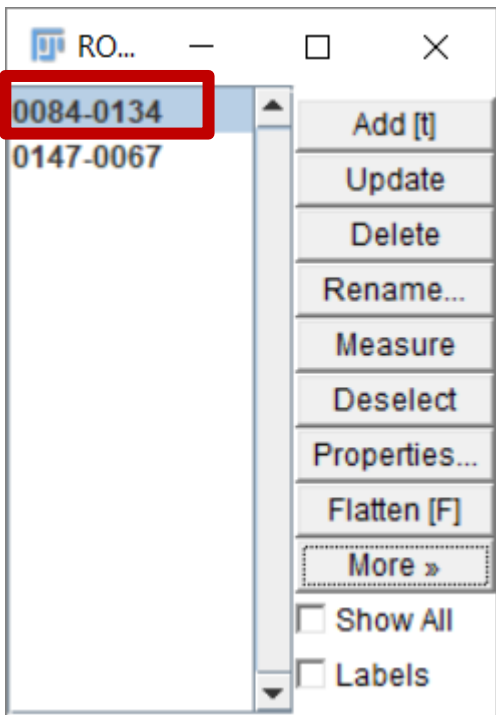
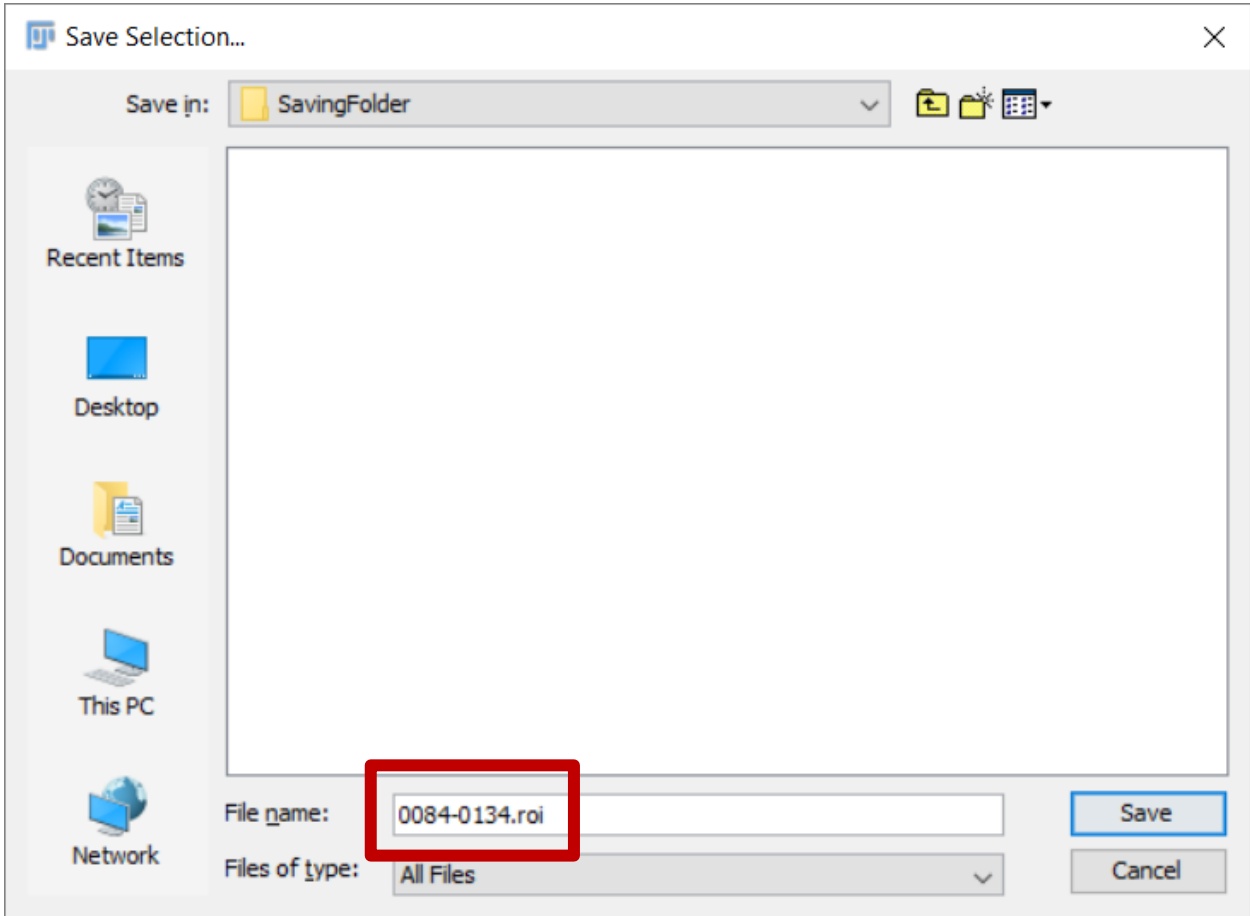




Saving ROI(s)

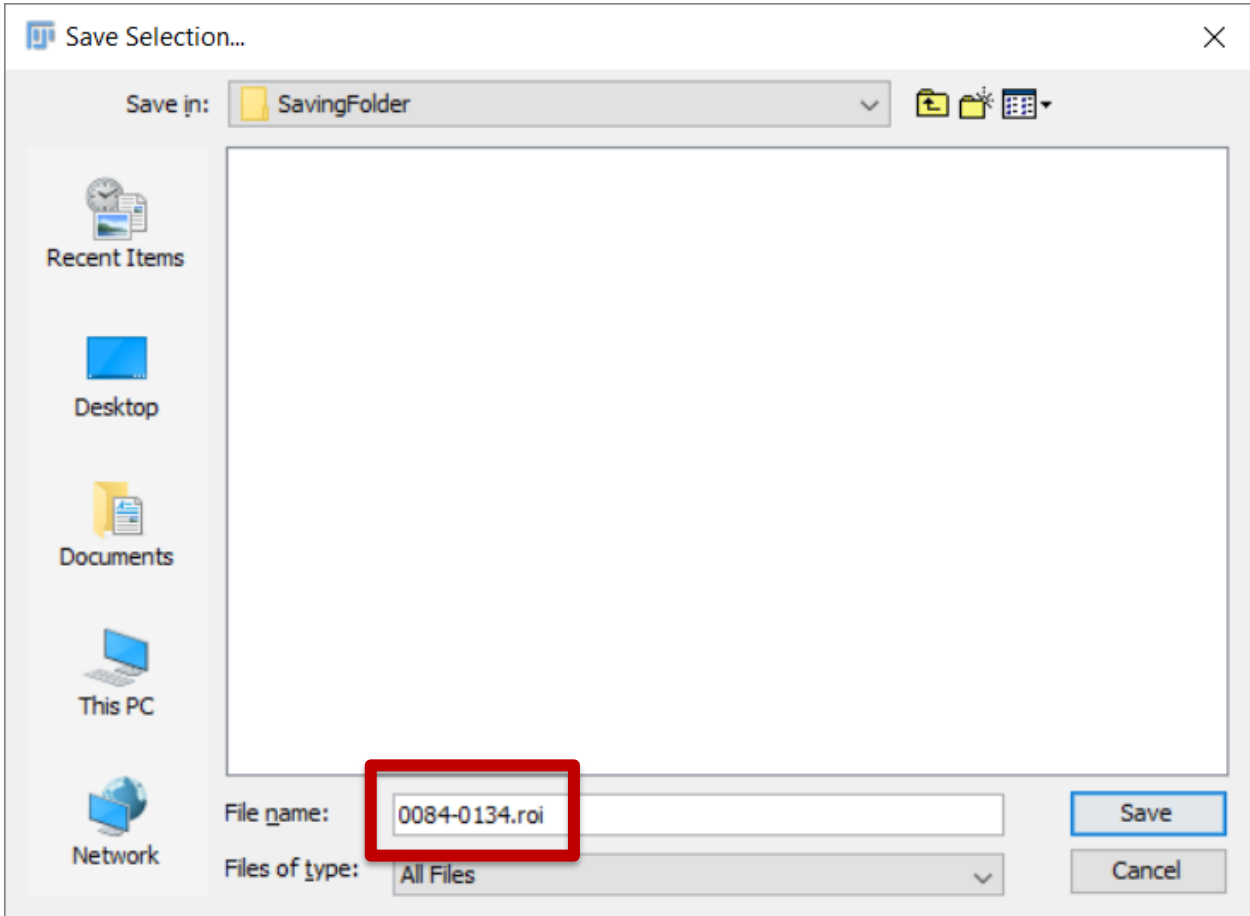


Saving ROI(s)

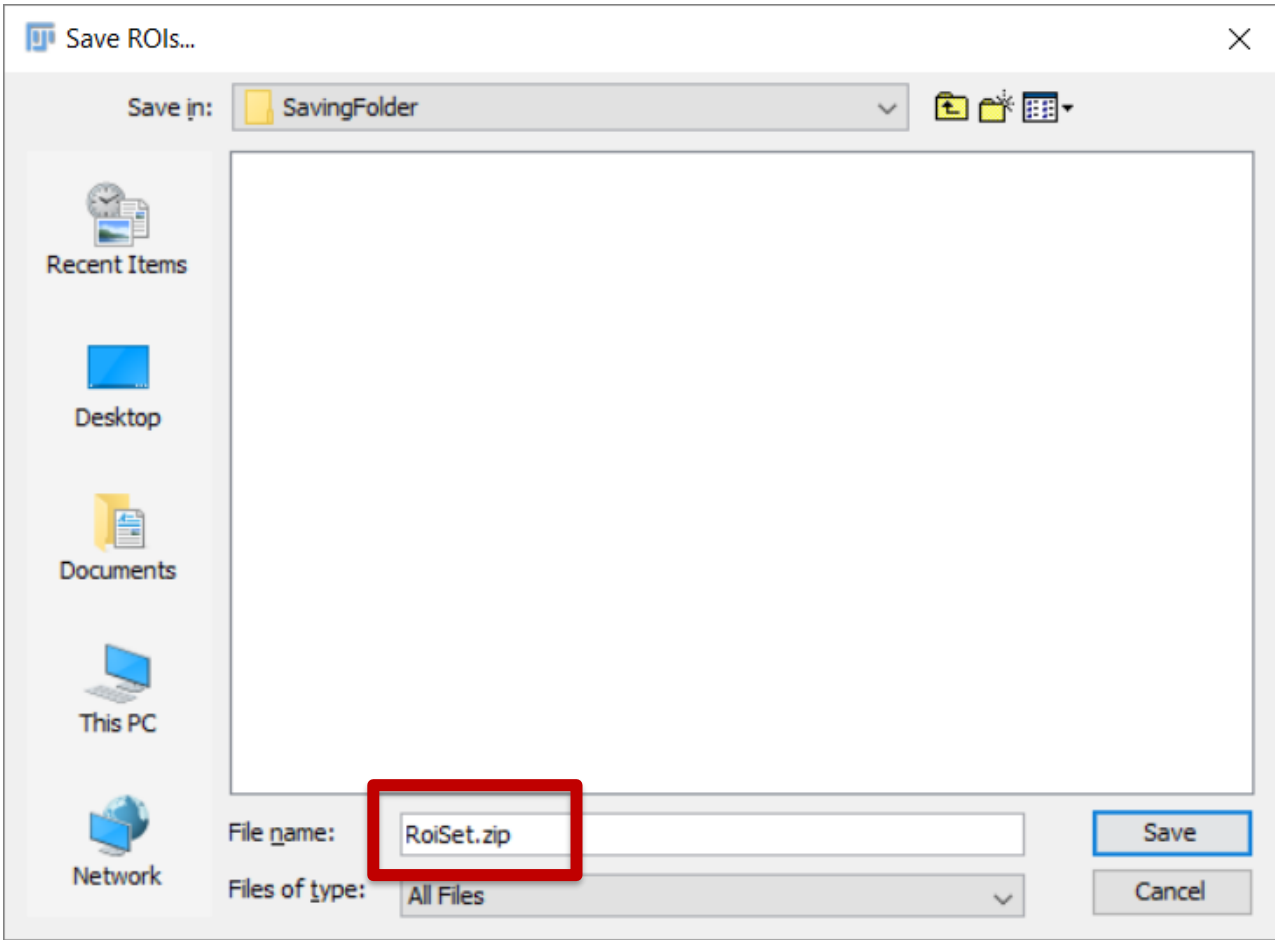
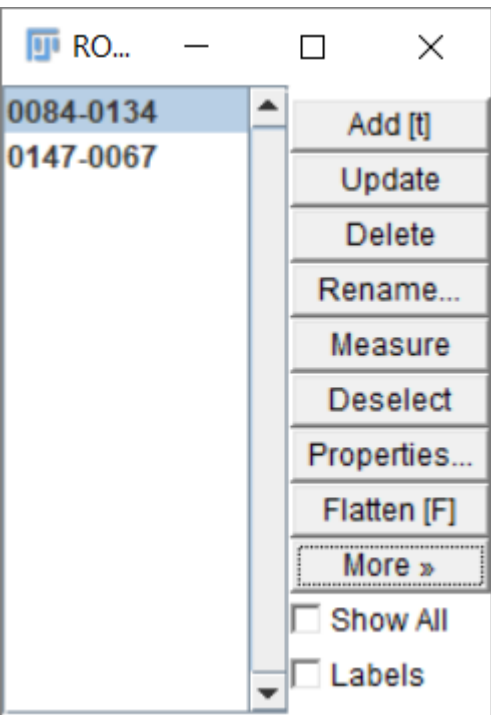


0084-0134.roi

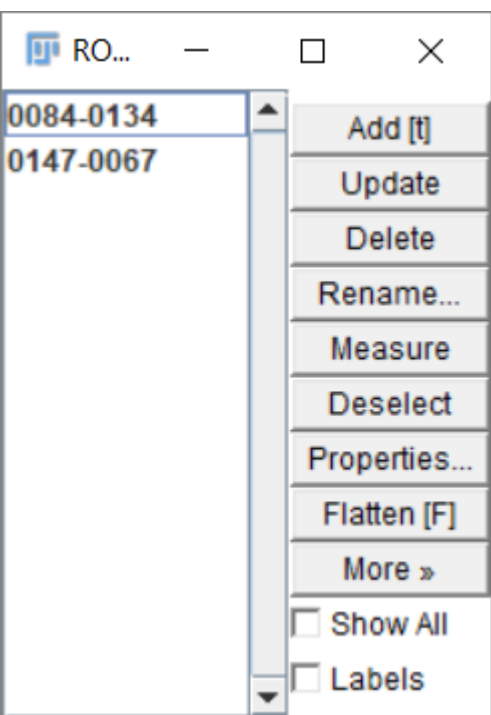
Saving ROI(s)



0084-0134.roi



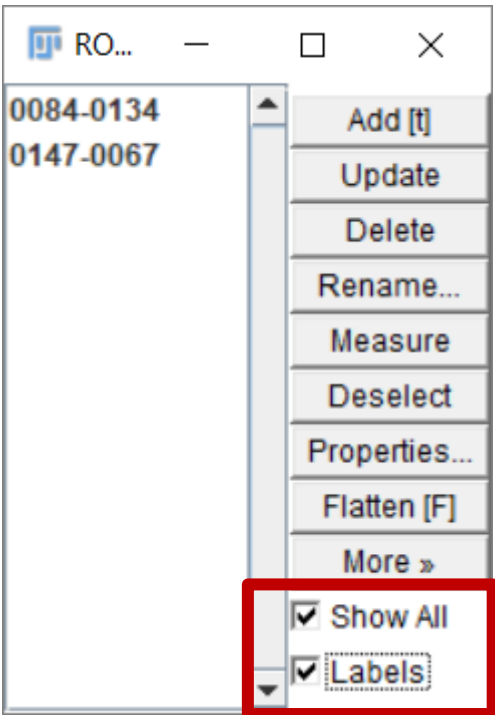
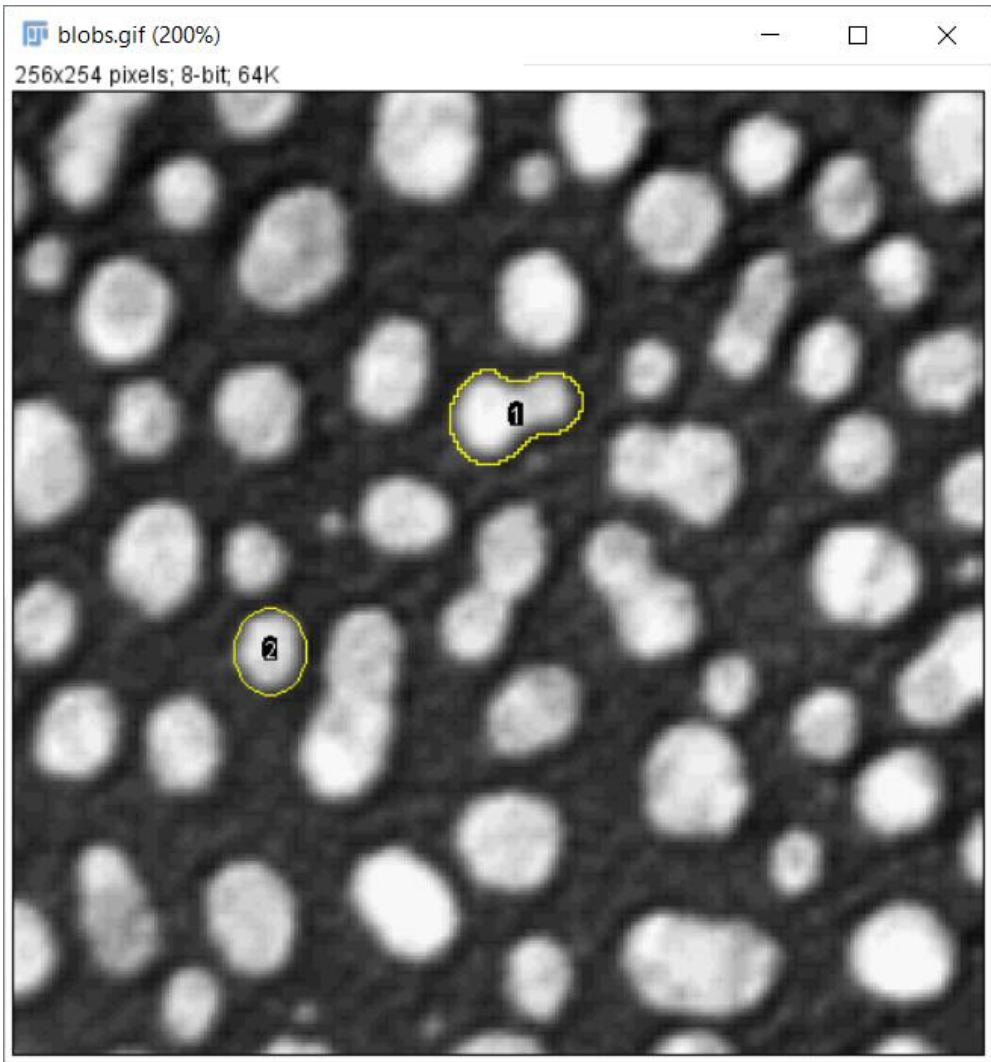
RoiSet.zip



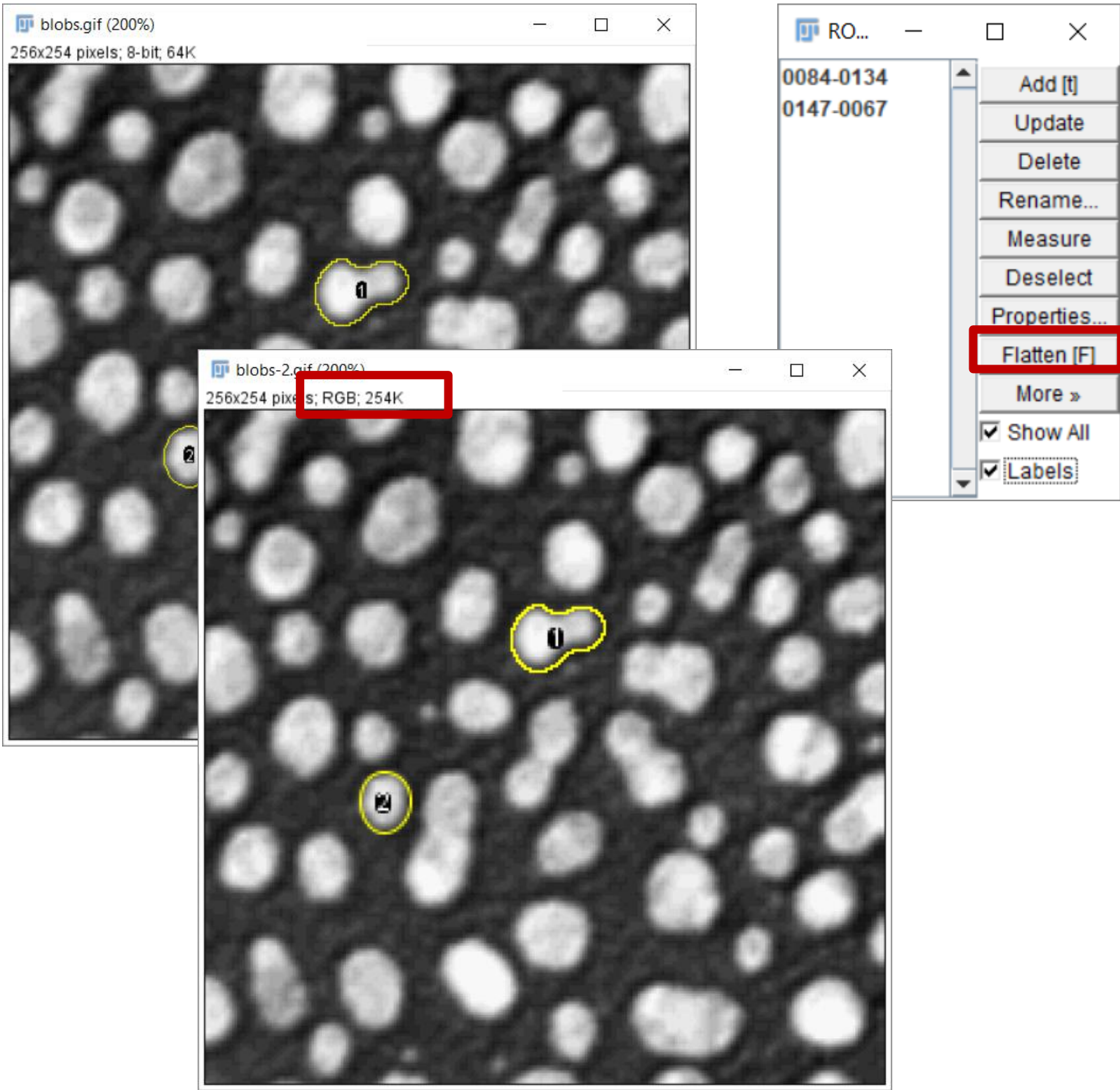
└ 0084-0134.roi
0147-0067.roi

What Else ?

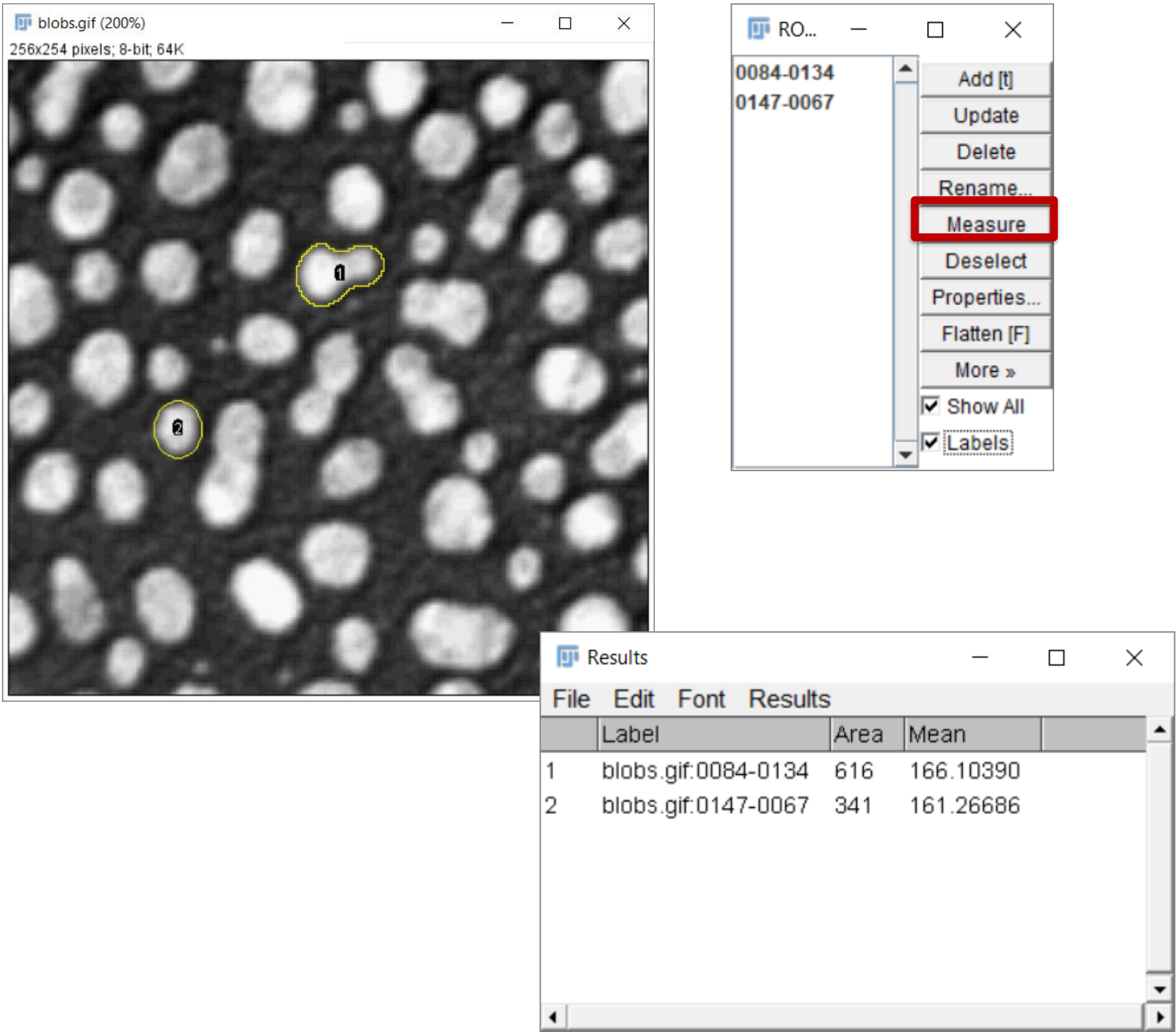
Display ROIs & Labels



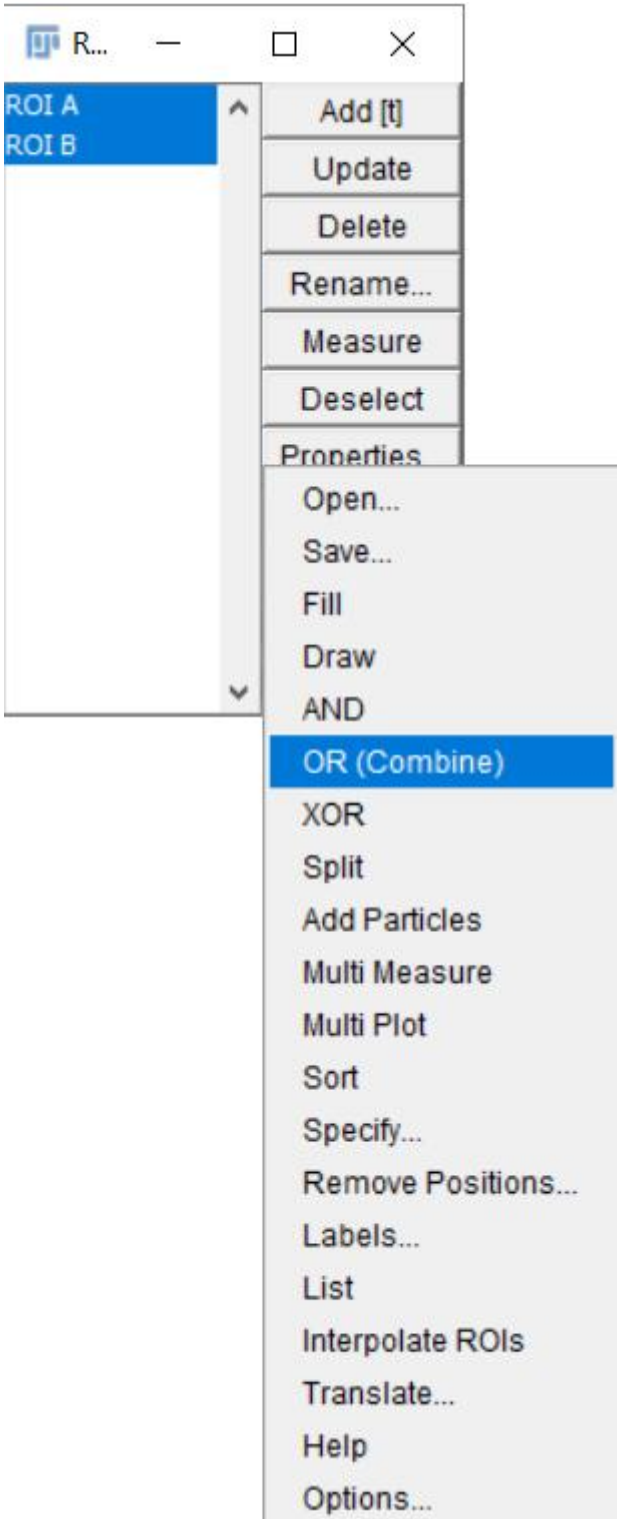
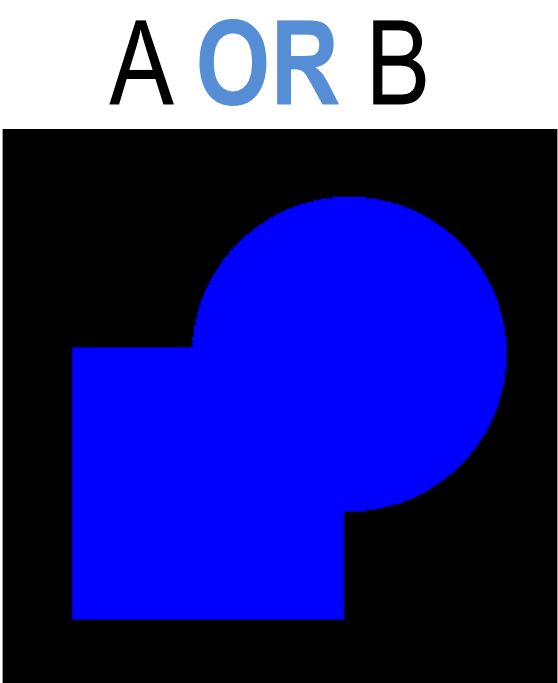
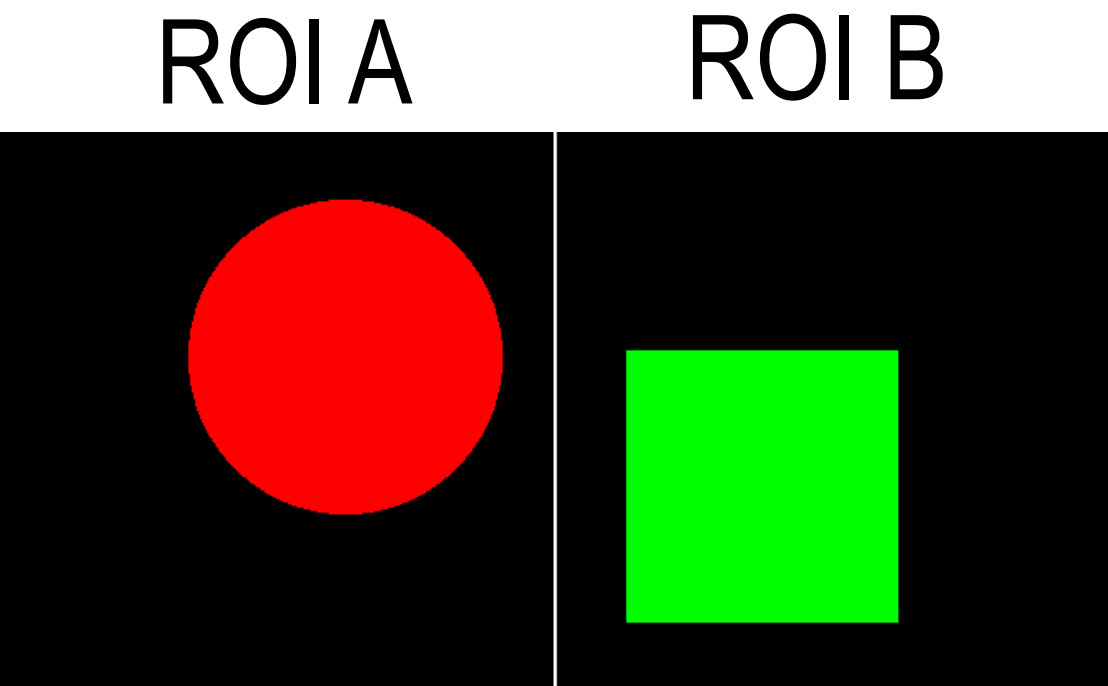
Flatten ROIs (& Labels)



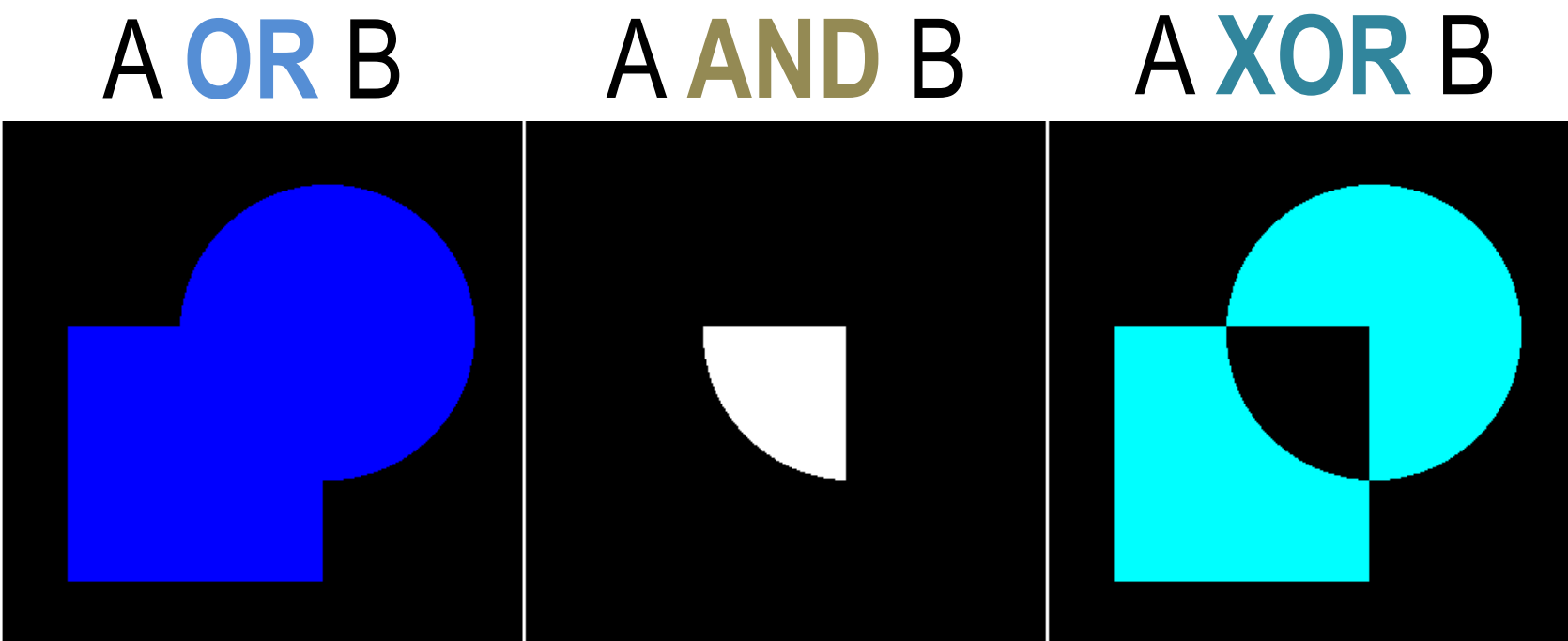
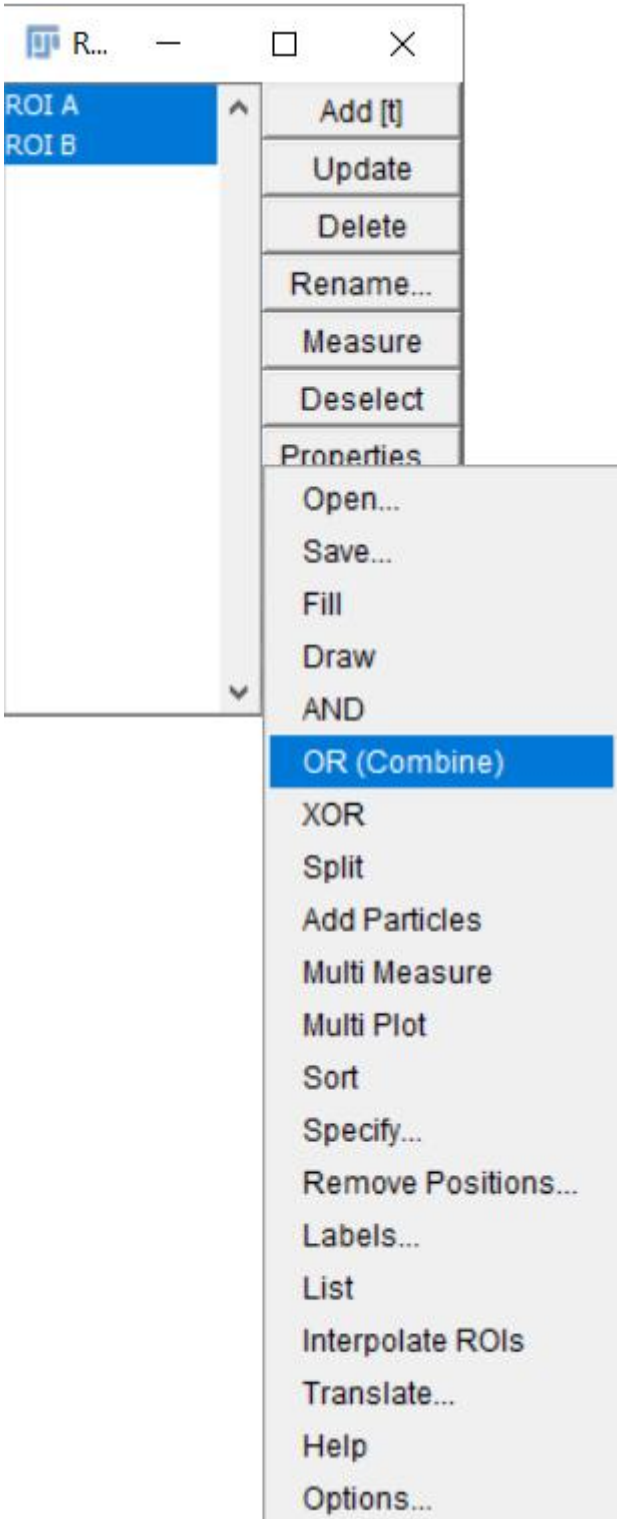
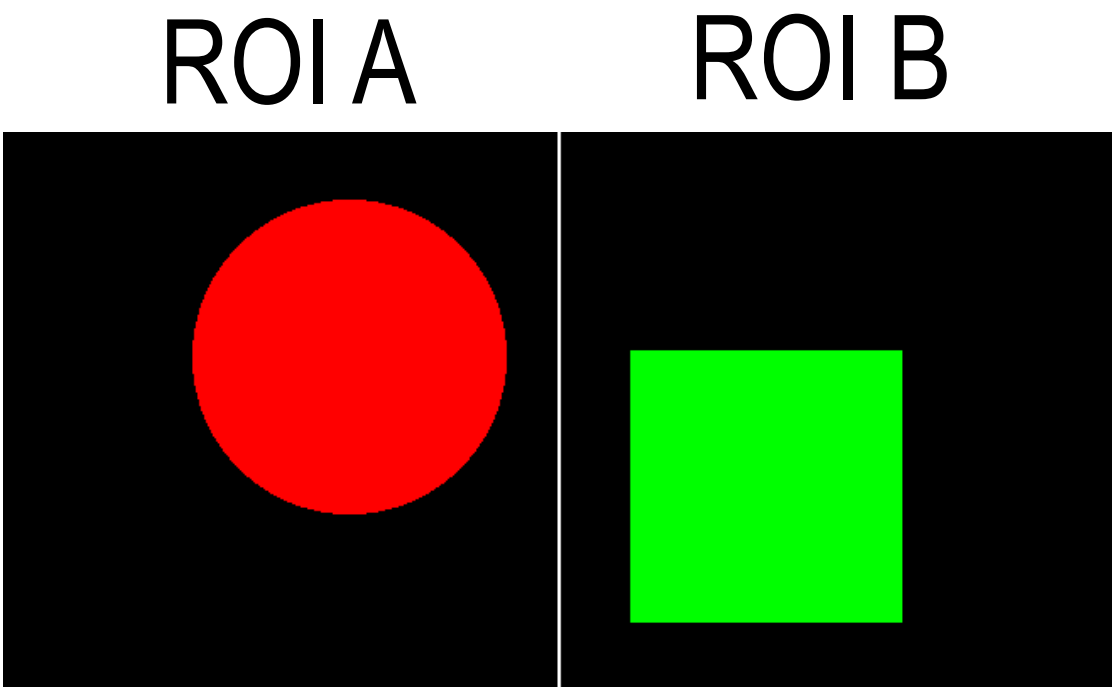
Measure ROIs



ROI Operations



ROI Operations



Macro Language

```
roiManager("OR")  
roiManager("AND")  
roiManager("XOR")
```

roiManager("OR")
roiManager("AND")
roiManager("XOR")

ROI Manager Functions

These functions run ROI Manager commands. The ROI Manager is opened if it is not already open. Use *roiManager("reset")* to delete all ROIs on the list. Use *setOption("Show All", boolean)* to enable/disable "Show All" mode. For examples, refer to the [RoiManagerMacros](#), [ROI Manager Stack Demo](#) and [RoiManagerSpeedTest](#) macros.

roiManager("and")

Uses the conjunction operator on the selected ROIs, or all ROIs if none are selected, to create a composite selection.

roiManager("add")

Adds the current selection to the ROI Manager.

roiManager("add & draw")

Outlines the current selection and adds it to the ROI Manager.

roiManager("combine")

Uses the union operator on the selected ROIs to create a composite selection. Combines all ROIs if none are selected.

roiManager("count")

Returns the number of ROIs in the ROI Manager list.

roiManager("delete")

Deletes the selected ROIs from the list, or deletes all ROIs if none are selected.

roiManager("deselect")

Deselects all ROIs in the list. When ROIs are deselected, subsequent ROI Manager commands are applied to all ROIs.

Roi.getCoordinates(xCoord,yCoord)

Roi.setName

...

ROI Functions

Use these functions to get information about the current selection or to get or set selection properties. Refer to the [RoiFunctionsDemo](#) macro for examples. These functions require ImageJ 1.48h or later.

Roi.contains(x, y)

Returns "1" if the point x,y is inside the current selection or "0" if it is not. Aborts the macro if there is no selection. Requires 1.49h. See also: [selectionContains](#).

Roi.getBounds(x, y, width, height)

Returns the location and size of the selection's bounding rectangle.

Roi.getCoordinates(xpoints, ypoints)

Returns, as two arrays, the x and y coordinates that define this selection.

Roi.getDefaultColor

Returns the current default selection color.

Roi.getStrokeColor

Returns the selection stroke color.

Roi.getFillColor

Returns the selection fill color.

Roi.getName

Returns the selection name or an empty string if the selection does not have a name.

Roi.getProperty(key)

Returns the value (a string) associated with the specified key or an empty string if the key is not found.

Roi.setProperty(key, value)

Adds the specified key and value pair to the selection properties. Assumes a value of "1" (true) if there is only one argument.

roiManager("OR")

roiManager("AND")

roiManager("XOR")

ROI Manager Functions

These function run ROI Manager commands. The ROI Manager is opened if it is not already open. Use *roiManager("reset")* to delete all ROIs on the list. Use *setOption("Show All", boolean)* to enable/disable "Show All" mode. For examples, refer to the [RoiManagerMacros](#), [ROI Manager Stack Demo](#) and [RoiManagerSpeedTest](#) macros.

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Adds the current selection to the ROI Manager.

roiManager("add & draw")

Outlines the current selection and adds it to the ROI Manager.

roiManager("combine")

Uses the union operator on the selected ROIs to create a composite selection. Combines all ROIs if none are selected.

roiManager("count")

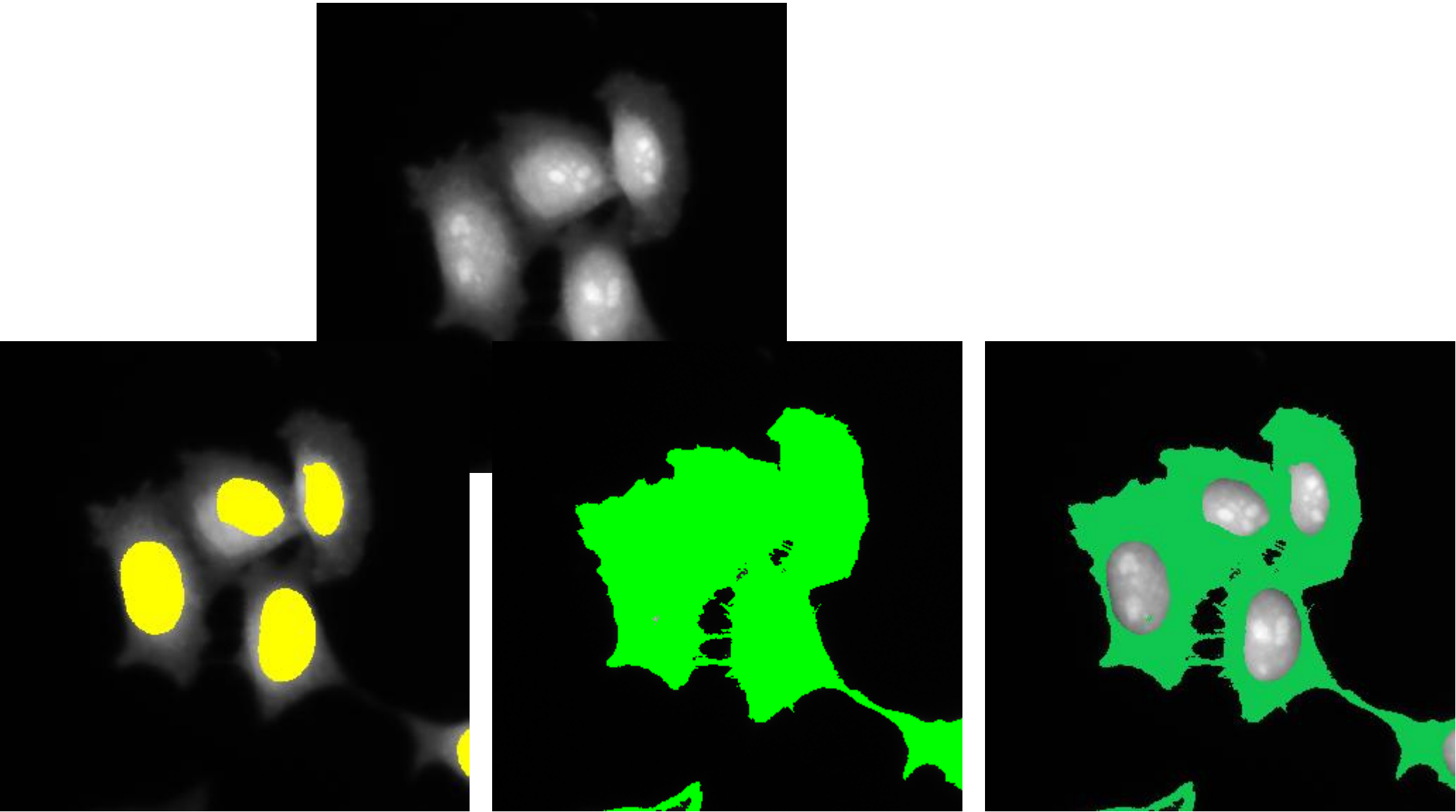
Returns the number of ROIs in the ROI Manager list.

roiManager("delete")

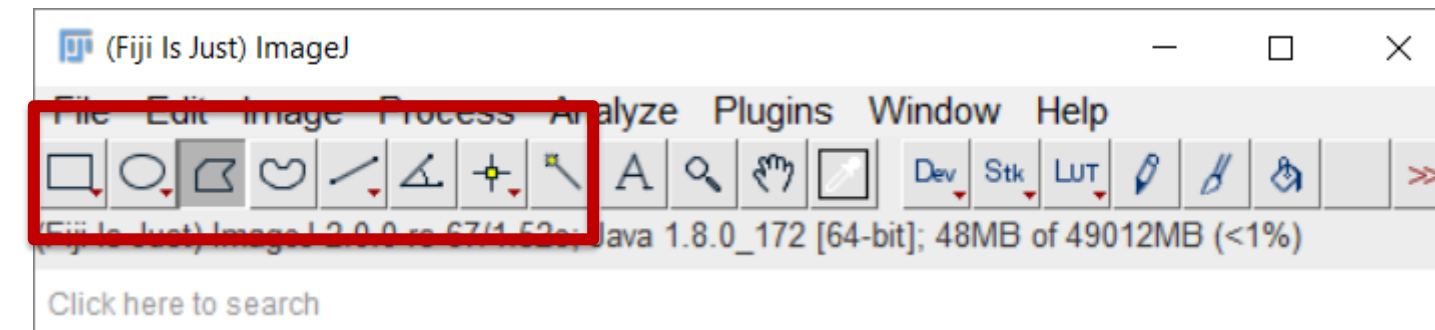
Deletes the selected ROIs from the list, or deletes all ROIs if none are selected.

roiManager("deselect")

Deselects all ROIs in the list. When ROIs are deselected, subsequent ROI Manager commands are applied to all ROIs.

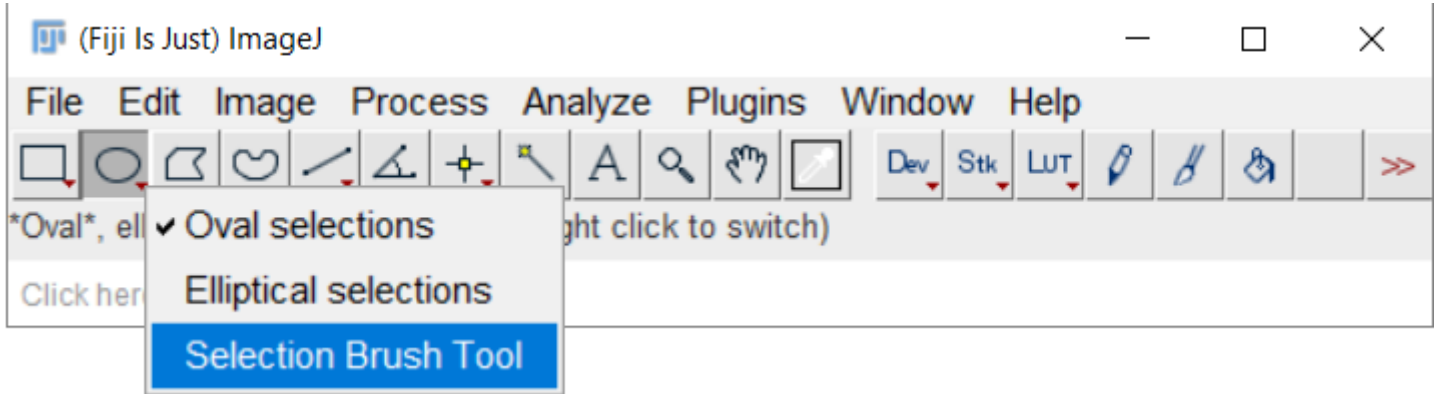


Region Of Interest : Type



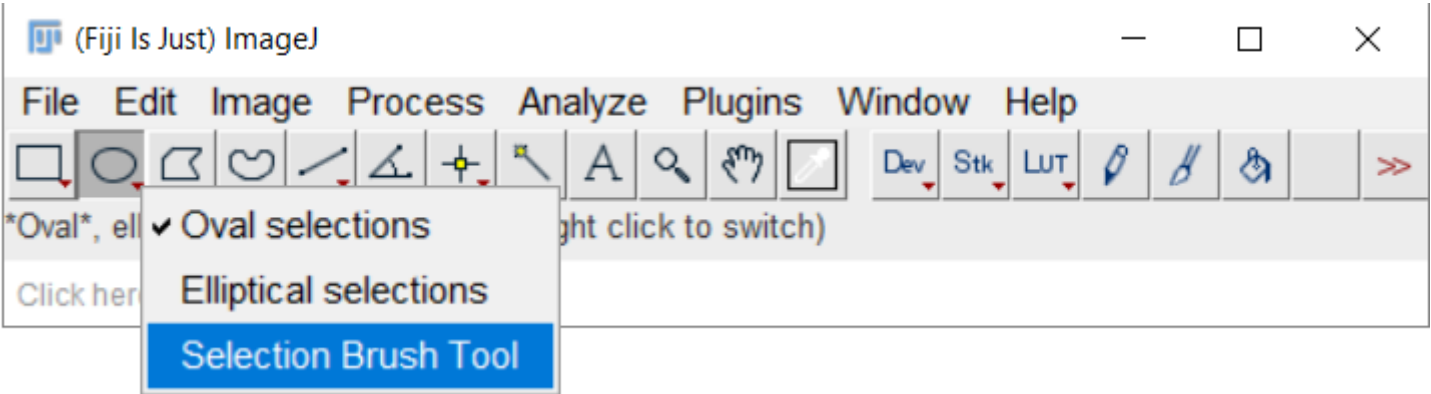
- Point
- Line
- Area
 - Rectangle
 - Oval
 - Polygone

Region Of Interest : Subtype

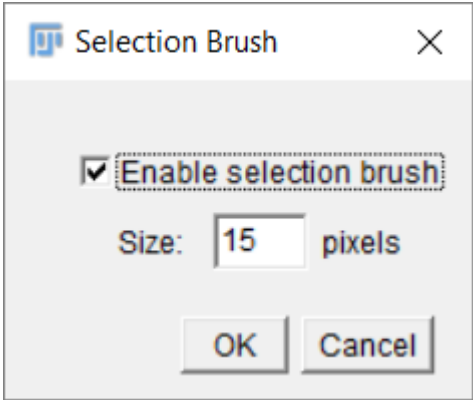
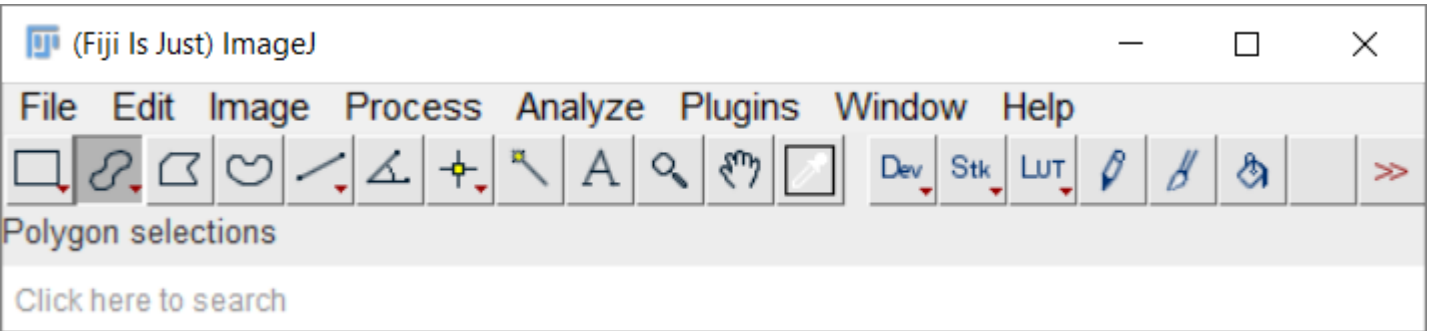


Right Click

Region Of Interest : Options

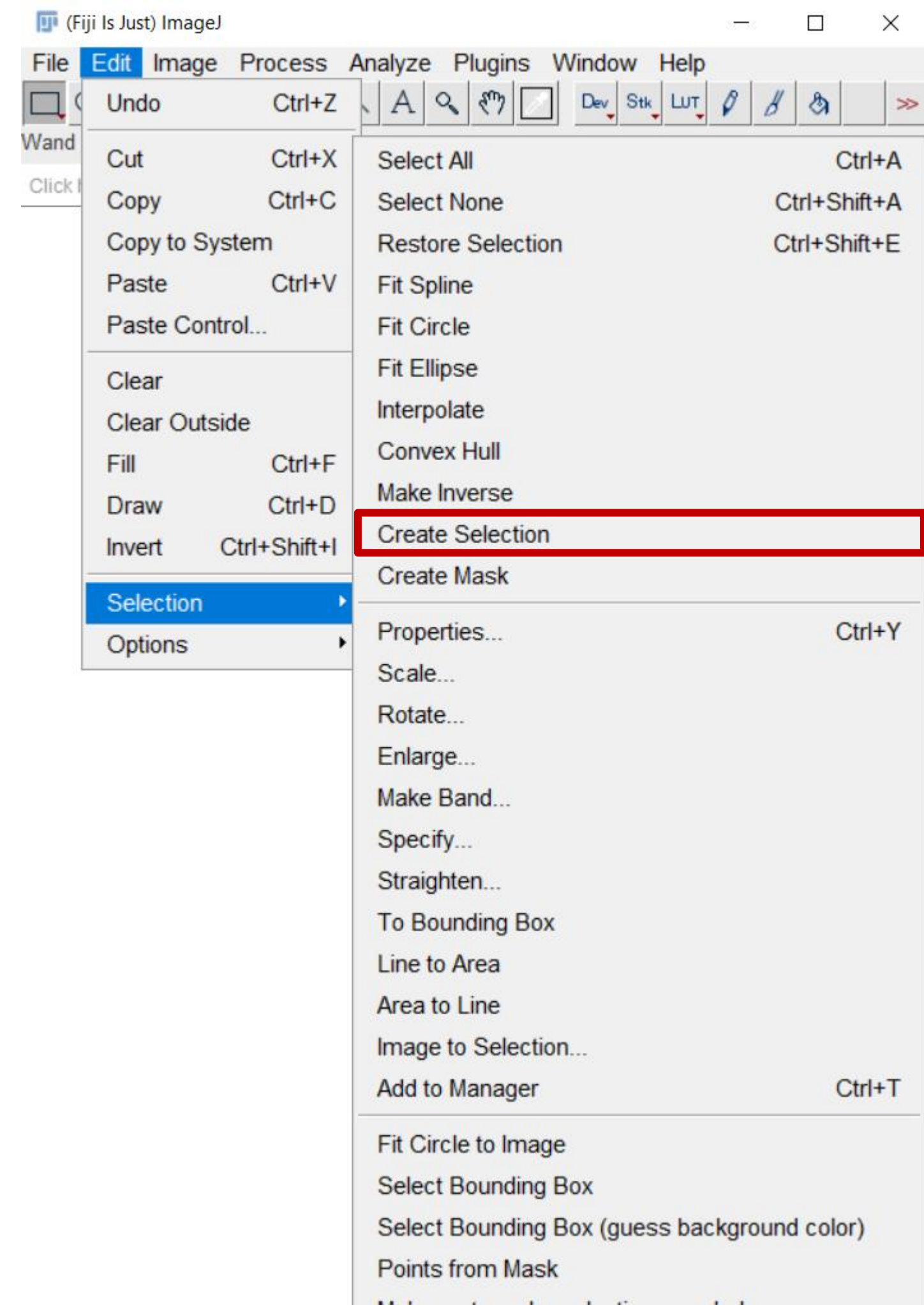


Right Click



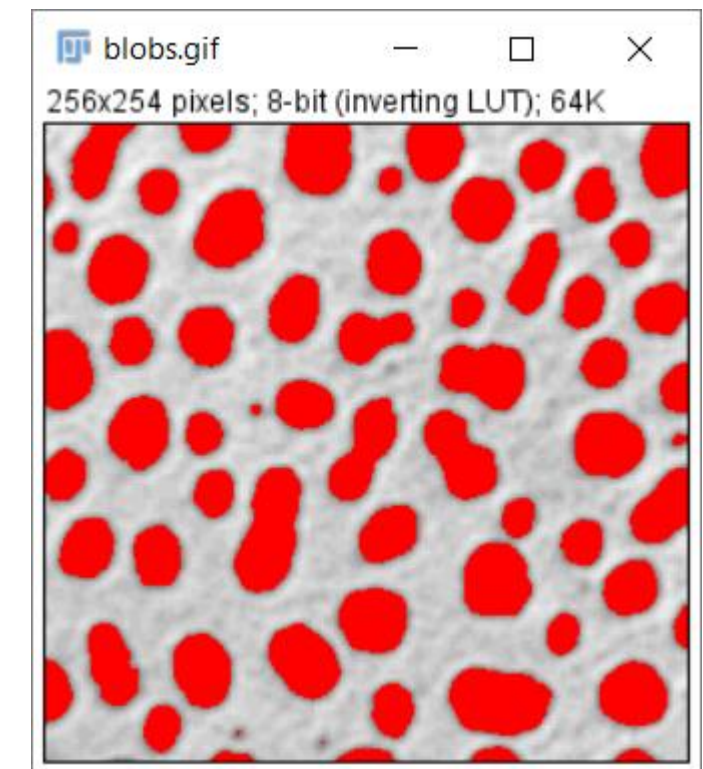
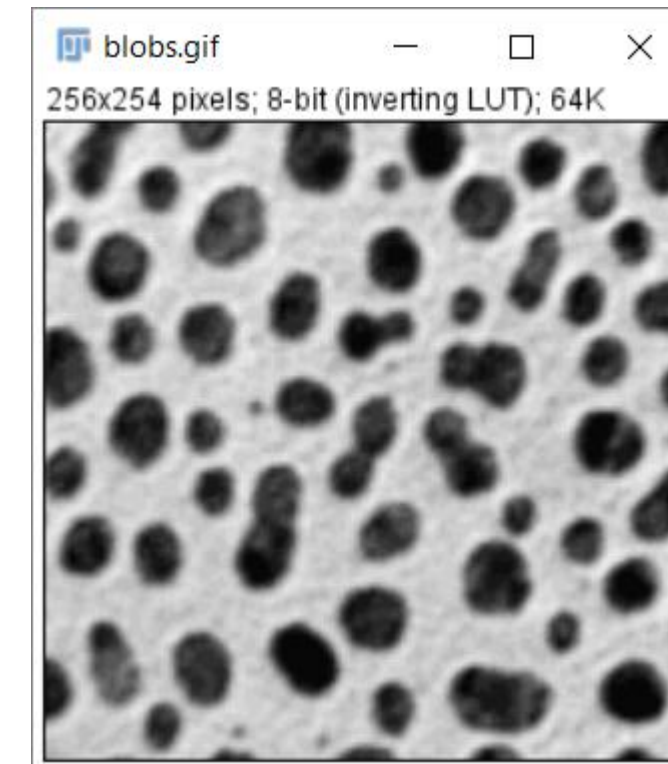
Double (Left) Click

Create Selection from Mask

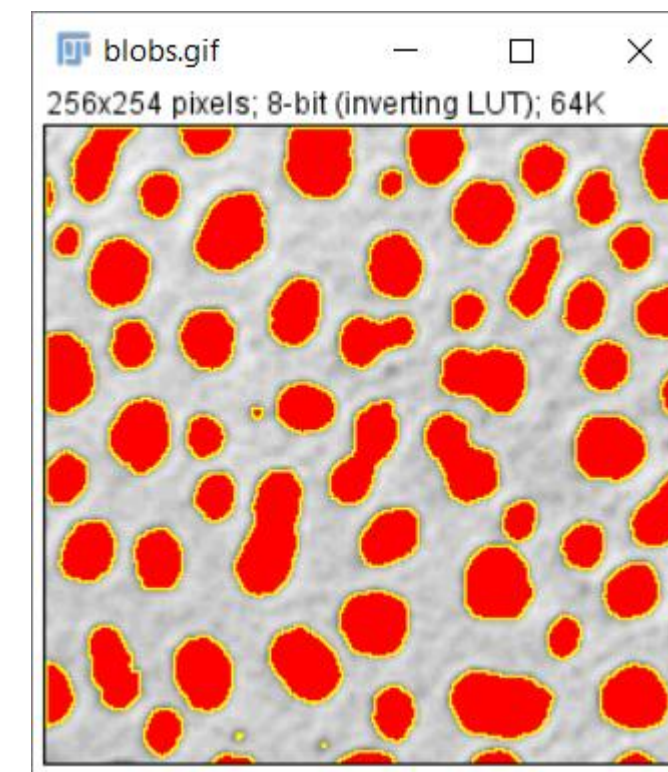


Create Selection from Mask

Thresholding

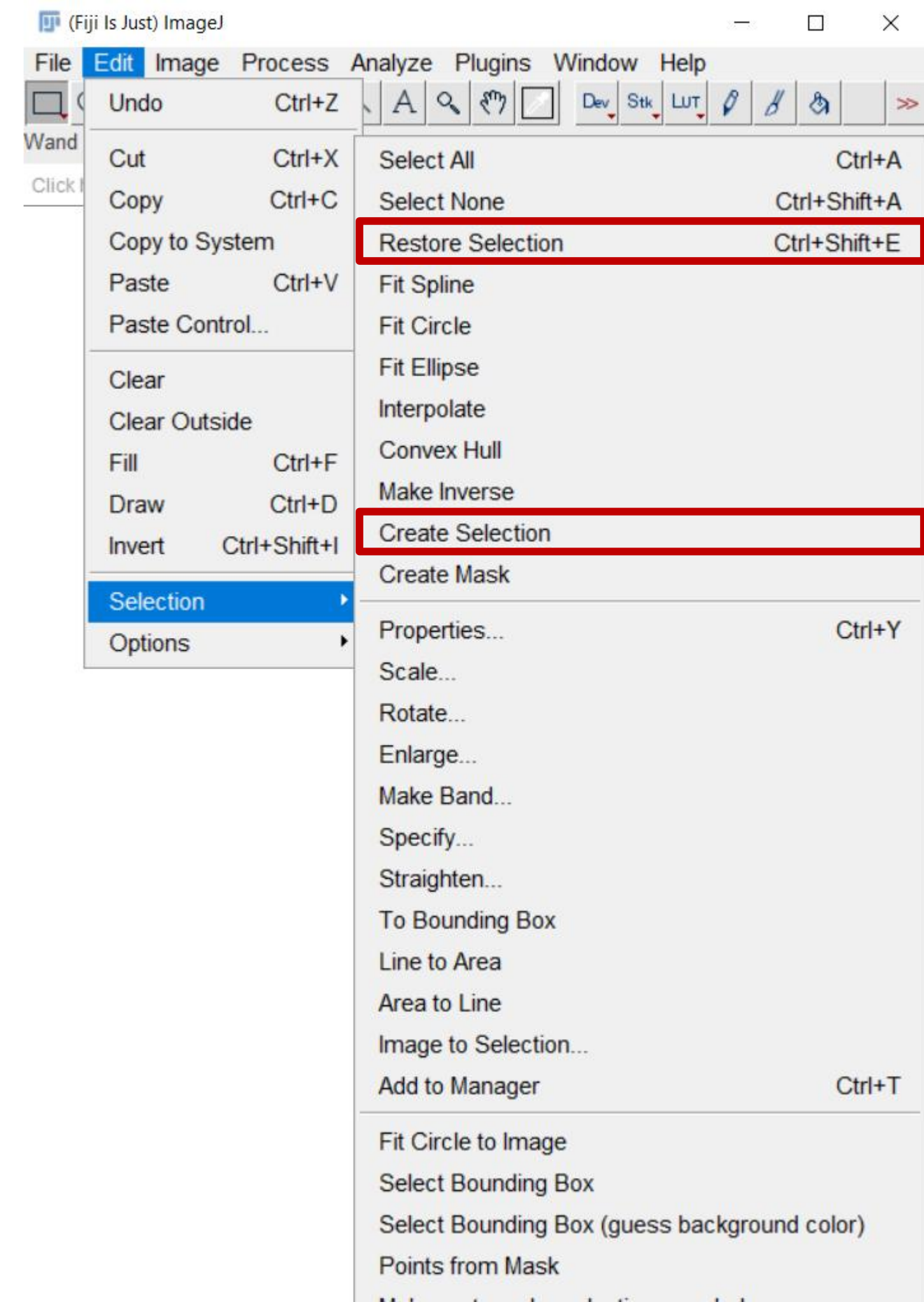


Create Selection

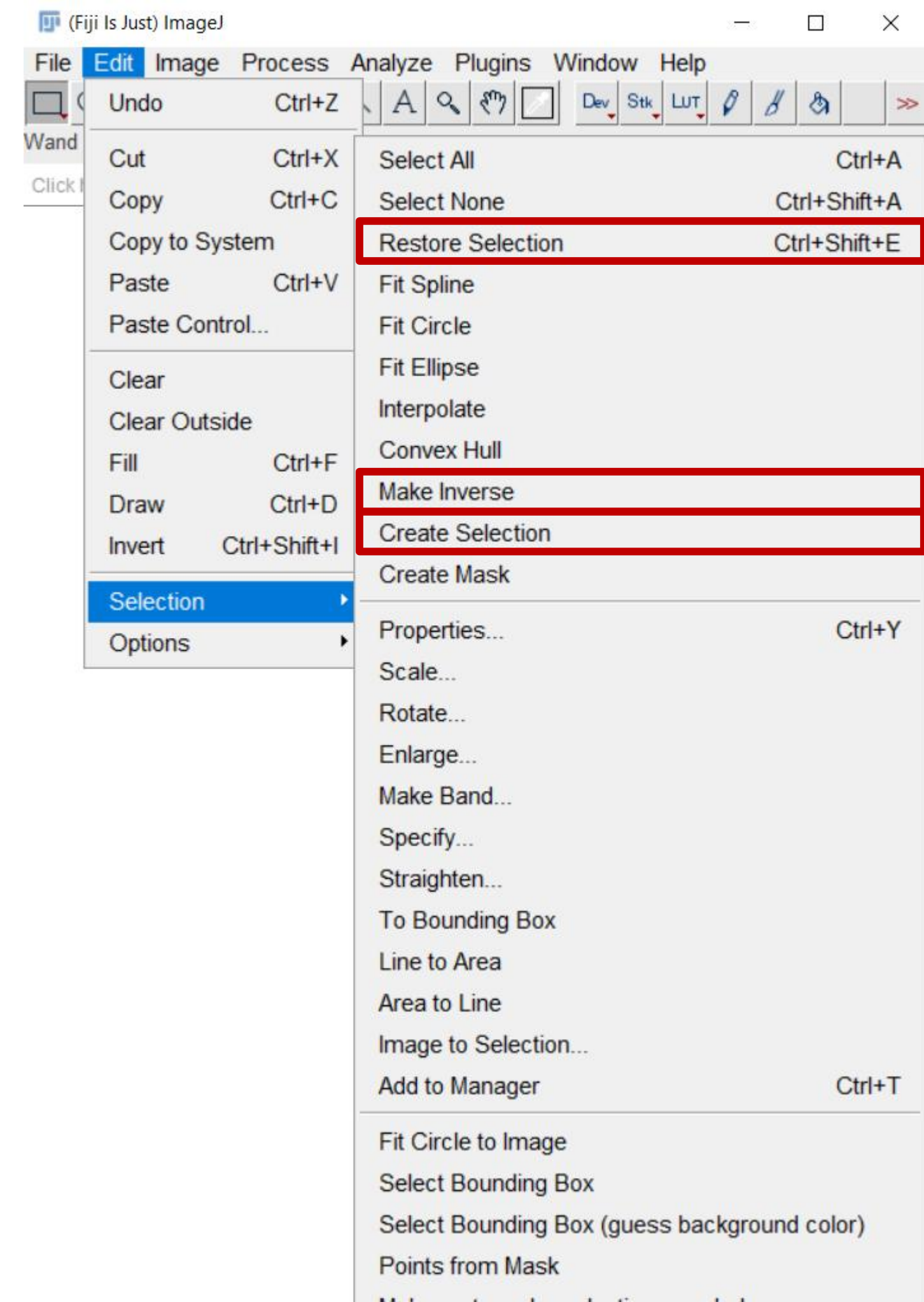


One Unique ROI

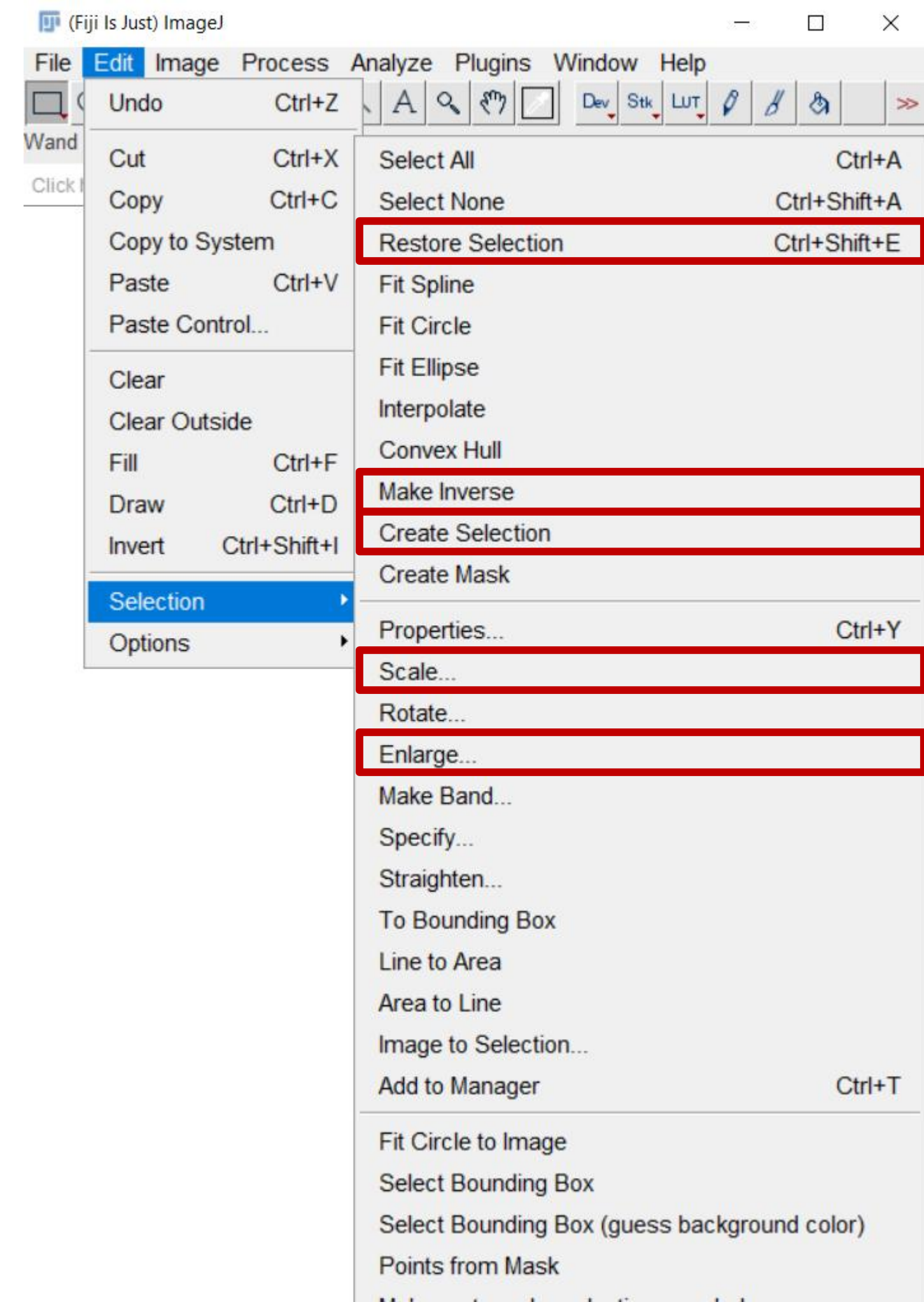
[Manipulating Selections]



[Manipulating Selections]



[Manipulating Selections]



[Manipulating Selections]

