

# MeasureSpindles

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These ImageJ plugins measure mitotic spindle size (area and perimeter) and spindle shape (roundness, compactness, aspect ratio, circularity, fit ellipse) in fluorescence microscopy images with labelled microtubules or labelled microtubules and centrosomes.

The assay uses a combination of fluorescence intensity, tubeness and edge detections to faithfully identify spindles.

Before using these plugins, you must install the Canny-Deriche filtering edge detection plugin in your ImageJ plugins folder. Documentation and the ImageJ plugin can be found here: [http://imagejdocu.tudor.lu/doku.php?id=plugin:filter:edge\\_detection:start](http://imagejdocu.tudor.lu/doku.php?id=plugin:filter:edge_detection:start).

## Image requirements:

Images must be single channel (for microtubules only) or dual channel (for microtubules and centrosomes), projected grayscale images and a single time-point (if you are interested in a measurement through individual optical slices or through time, do not hesitate to contact me to make those modifications).

Here is a short description of the provided plugins:

### 1) MeasureSpindles\_.ijm

- Runs through a folder of images and saves the measurements in a user defined folder
- Runs on single channel, projected, single time point image
- Measures spindle size and shape based on microtubule label and a centrosome label
- Saves measurements as a .xls file and segmentation images as TIFFs
- Can easily be expanded to run across optical sections and/or time points

### 2) MeasureSpindles\_TS\_.ijm

- Runs on single channel, projected, single time point image
- Measures spindle size and shape based on microtubule label and a centrosome label
- Allows you to quickly see what is being segmented and see how changing different parameters in the code change the shape of the identified object

### 3) 4) MeasureTubulin\_.ijm and MeasureTubulin\_TS\_.ijm

- Same as 1) and 2) respectively, expect these plugins run on spindles stained for tubulin only

### ADD ONS:

Two additional plugins are useful in running this assay as efficiently as possible:

A. SpindleInABox\_VB\_.ijm

- Saves a 115x115 pixel image of the cell you select in a given image
- Runs through an entire folder of images
- Saves a RAW image (all channels and slices) in a folder
- Saves a maximum intensity projection image in a second folder

B. draw\_feret\_line\_.ijm

- In the current project, we used Feret's Diameter to measure spindle length. To determine what Feret's Diameter is in a given image, use this plugin.
- Works on one of the segmented images from plugins 1 or 3 above.

### REFERENCES:

If you use this plugin, please cite:

TBA

ImageJ macro installation:

<https://imagej.nih.gov/ij/docs/guide/146-31.html>