Combining R and FIJI to detect and characterize Cells on tissue slices
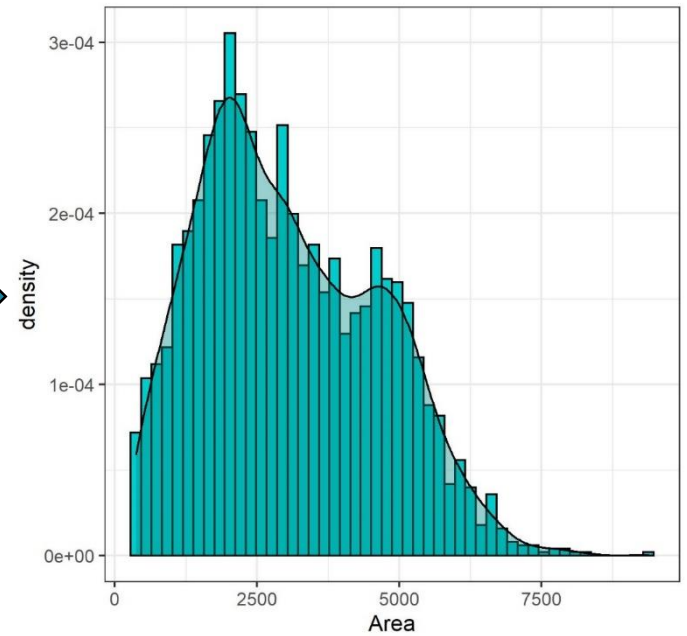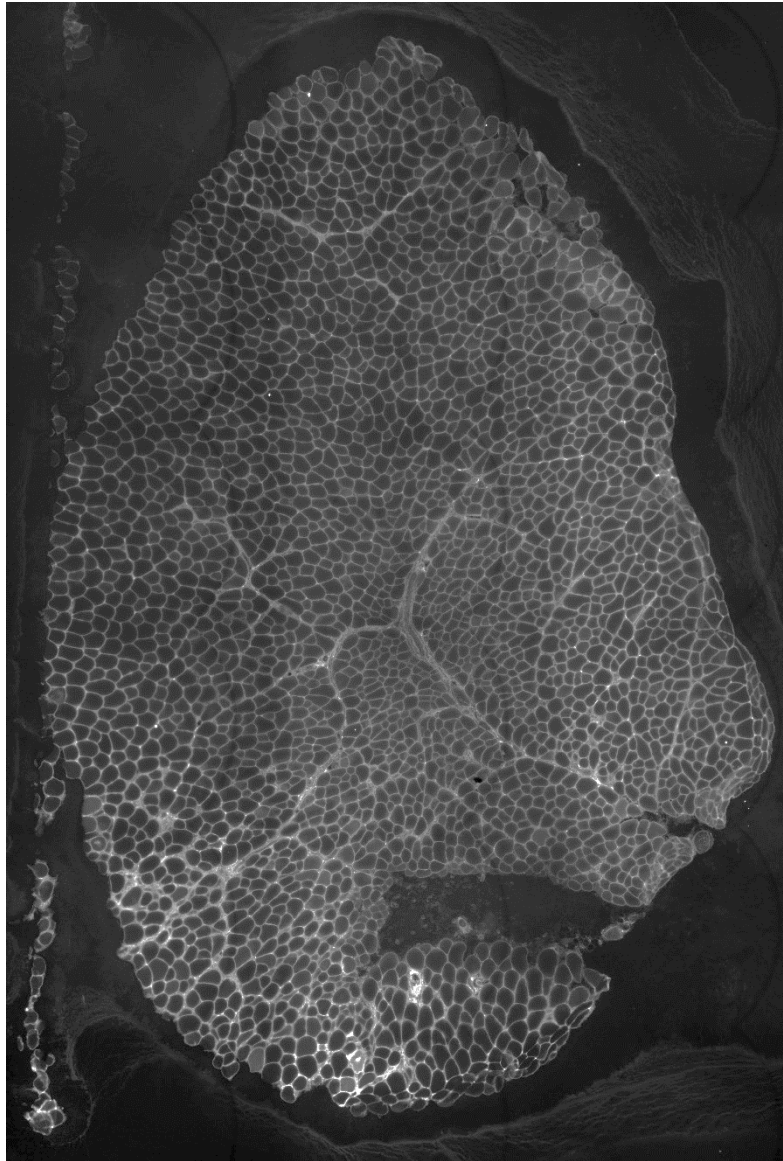
Club BioInfo

CLUET David

Objective:

Pet study for FIJI <-> R cross-talk with heavy calculations on FIJI side

Context: **Study of muscular atrophy**

Model: **Mouse *Tibialis Anterior* transversal section**

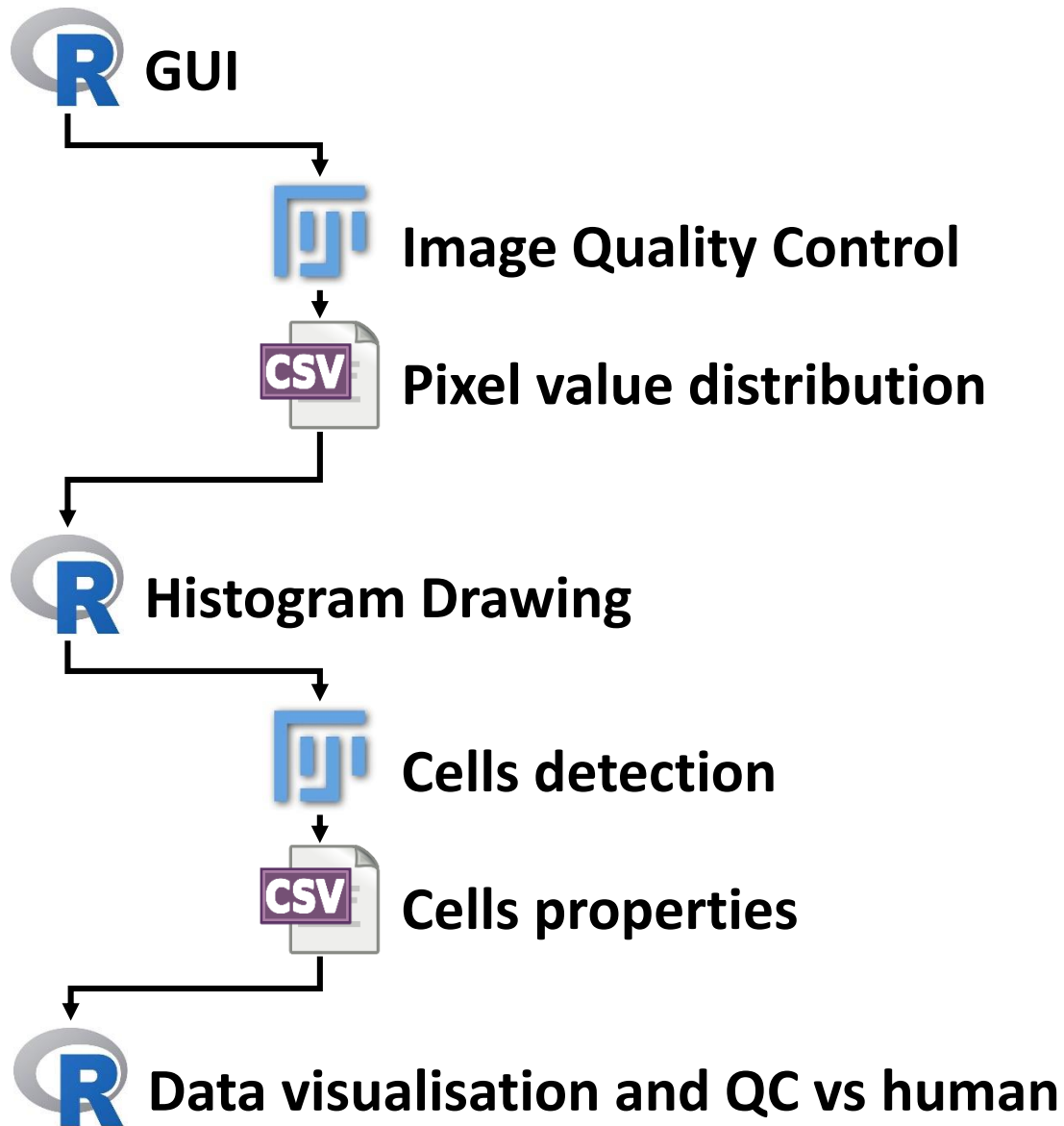Classical approach: **Manual annotation**

12h of manual annotation

- **Standard tool for image analysis**
- **Easy and fast programming**
- **Basic plot possibilities**
- **No statistics implemented**
- **No native solution for reports**

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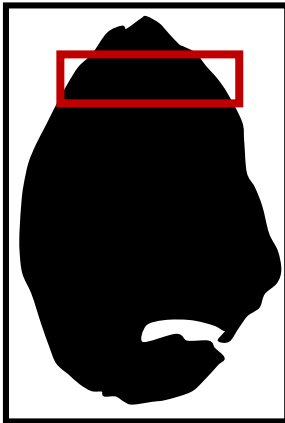
- **Standard tool for data visualization**
- **Statistics implemented**
- **ggplot!!!**
- **Rmarkdown**
- **Shiny**

R GUI

Image Quality Control

CSV **Pixel value distribution**

R **Histogram Drawing**

Cells detection
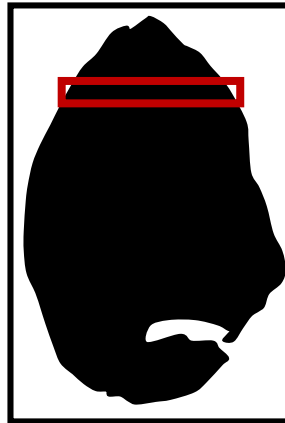
CSV **Cells properties**
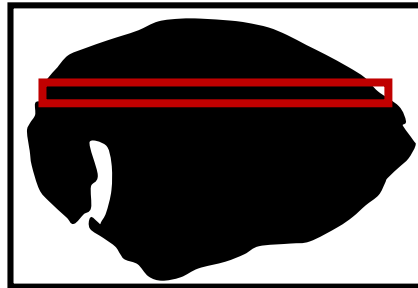
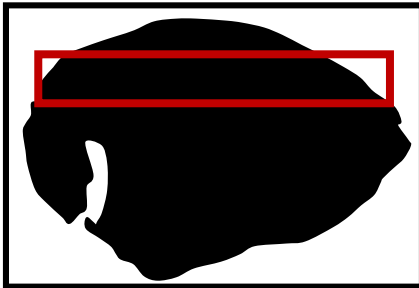**R** **Data visualisation and QC vs human**

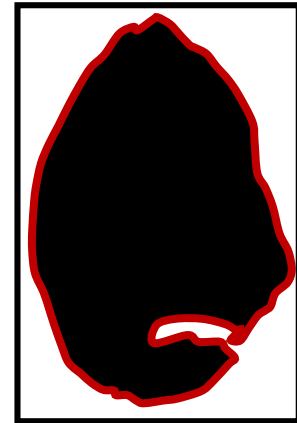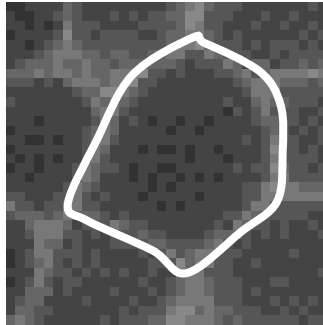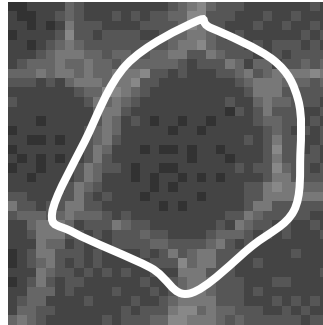# 5 candidates search engines
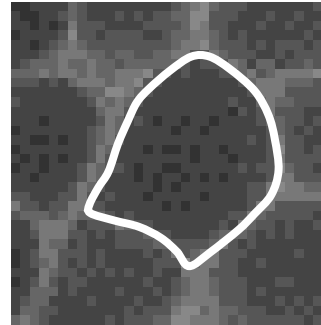
Coarse Grain

Fine Grain

Whole tissue

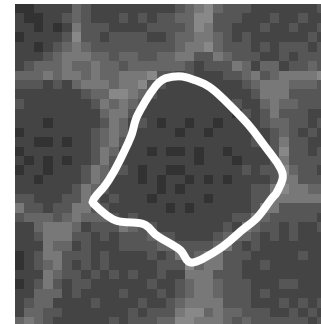# 1 local refinement engine

Candidate   Enlarged   Refinement   Validation
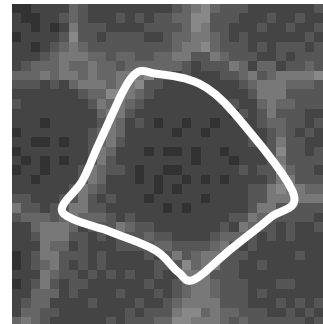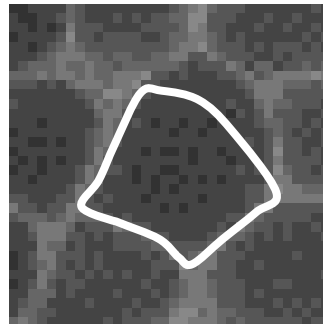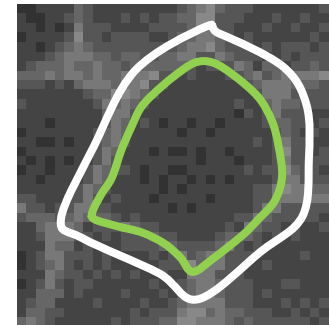
```
387  system(paste(where_is_IJ,
388                '-macro',
389                file.path(my_lcl_root,
390                          'Macros',
391                          'Initialization_cell_detection.java'),
392                paste(my_lcl_root,
393                      path_folder,
394                      image_tissue,
395                      image_membrane,
396                      display,
397                      work_on_manual_selection,
398                      perform_crop,
399                      tmin,
400                      tmax,
401                      cmin,
402                      cmax,
403                      fine,
404                      coarse,
405                      my_log_path,
406                      sep = '*'),
407                sep = ' ')
408  )
```

Cell Detection
2022/01/05 07:59:11   HUB Bioformatique du LBMC

Analysis

[1] 1

```
        Cell          Area        Circularity          X
 Min.   :   1   Min.   : 366   Min.   :0.3360   Min.   : 124.2
 1st Qu.: 682   1st Qu.:1845   1st Qu.:0.6780   1st Qu.:1224.4
 Median :1363   Median :2855   Median :0.7355   Median :1774.4
 Mean   :1363   Mean   :3056   Mean   :0.7156   Mean   :1813.4
 3rd Qu.:2044   3rd Qu.:4267   3rd Qu.:0.7794   3rd Qu.:2401.1
 Max.   :2725   Max.   :9376   Max.   :0.8766   Max.   :3529.1
        Y            MinFeret
 Min.   : 211.5   Min.   : 12.04
 1st Qu.:1998.2   1st Qu.: 41.13
 Median :2913.6   Median : 51.62
 Mean   :2840.0   Mean   : 52.31
 3rd Qu.:3661.4   3rd Qu.: 64.34
 Max.   :5149.7   Max.   :101.48
```
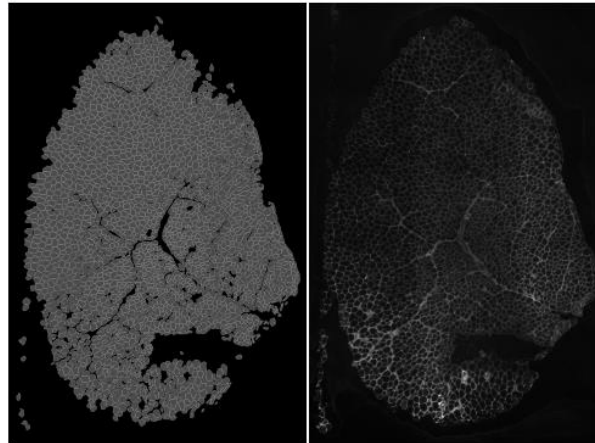
Figure 2: Original picture and detected cells

- Increase traceability (CPU type, memory, OS, softwares versions).
- Fingerprint on graphs and output files for analyses with various parameters.