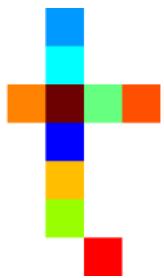


0406 - Easy & error-free reporting of population statistics on Tercen



This guide covers all the steps to easily create & download report-ready graphs for all the statistics of your FlowJo gated populations without risky cut & paste into graphing tools.

- 1 Back to the FlowJo workspace to export all the statistics (count & percentages) we have calculated for all our gated populations across the four samples.

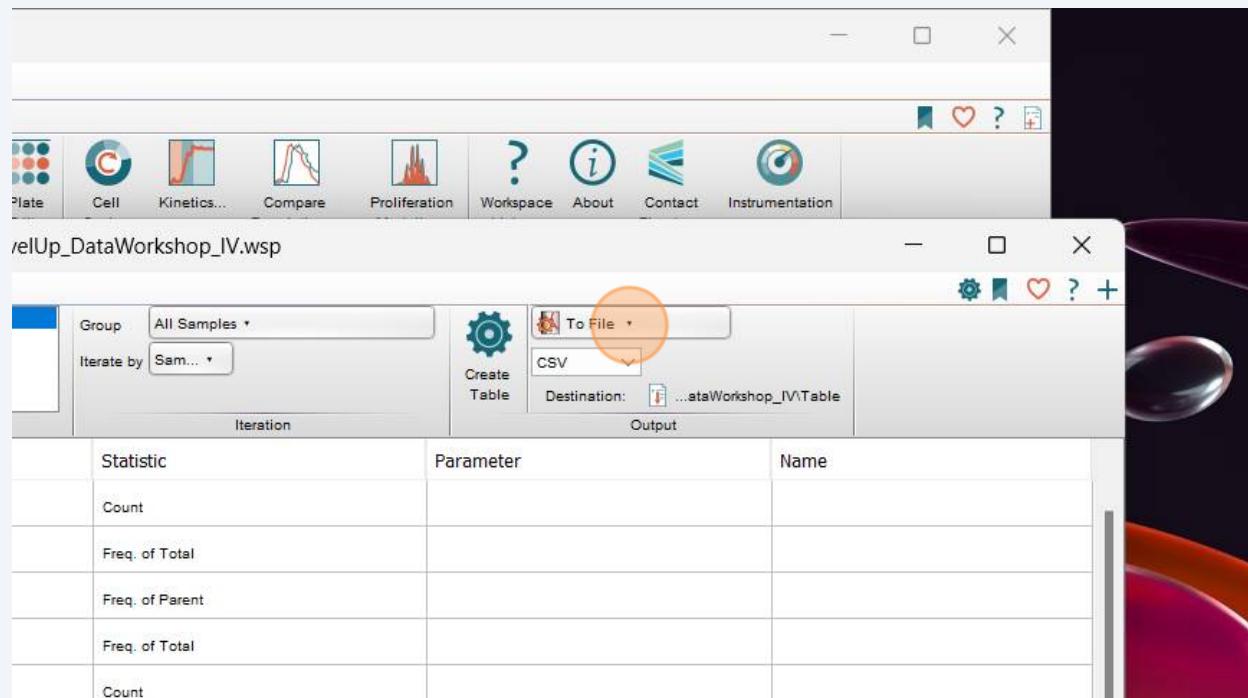
Click on the **Table Editor**.

The screenshot shows the FlowJo software interface with the following details:

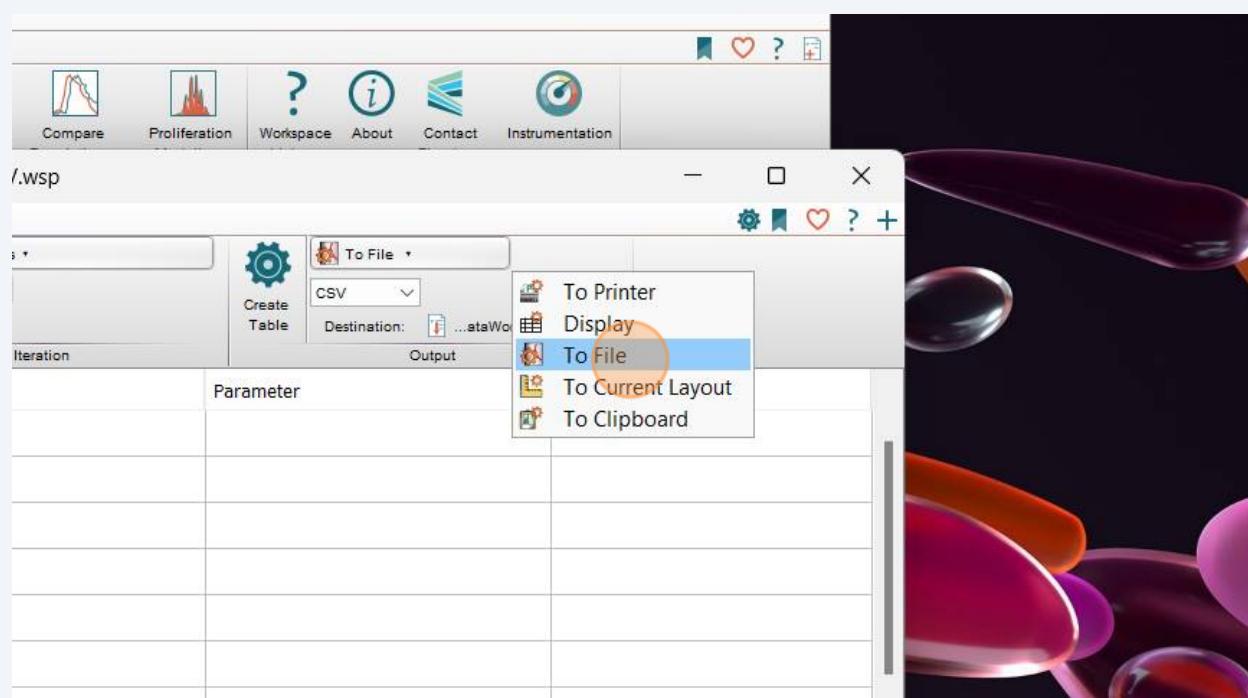
- Title Bar:** Tercen_Roche_LevelUp_DataWorkshop_IV.wsp
- Toolbar:** Includes icons for FlowJo, File, Edit, Workspace (highlighted with a red circle), Tools, Configure, New Workspace, Add Samples..., Create Group..., Table Editor (highlighted with a red circle), Layout Editor, Preferences..., Add Keyword, Annotate Experiment..., Plate Editor, Cell Cycle..., Kinetics..., Compare Populations..., and Proliferation Modeling..
- Workspace Area:**
 - Group:** All Samples (selected)
 - Lymphocytes:** Freq. of Total
 - Live:** Freq. of Parent, Freq. of Total
- Table Editor Panel:** Shows "Open the Table Editor" and "Shortcut Key: Ctrl+T".
- Data Table:** A hierarchical tree view of data:
 - LD1_NS+NS_A01_exp.fcs
 - Σ Count
 - Lymphocytes
 - Σ Freq. of Total
 - Live
 - Σ Freq. of Parent
 - Σ Freq. of Total
 - Singlets

2 Lets us export the existing Table.

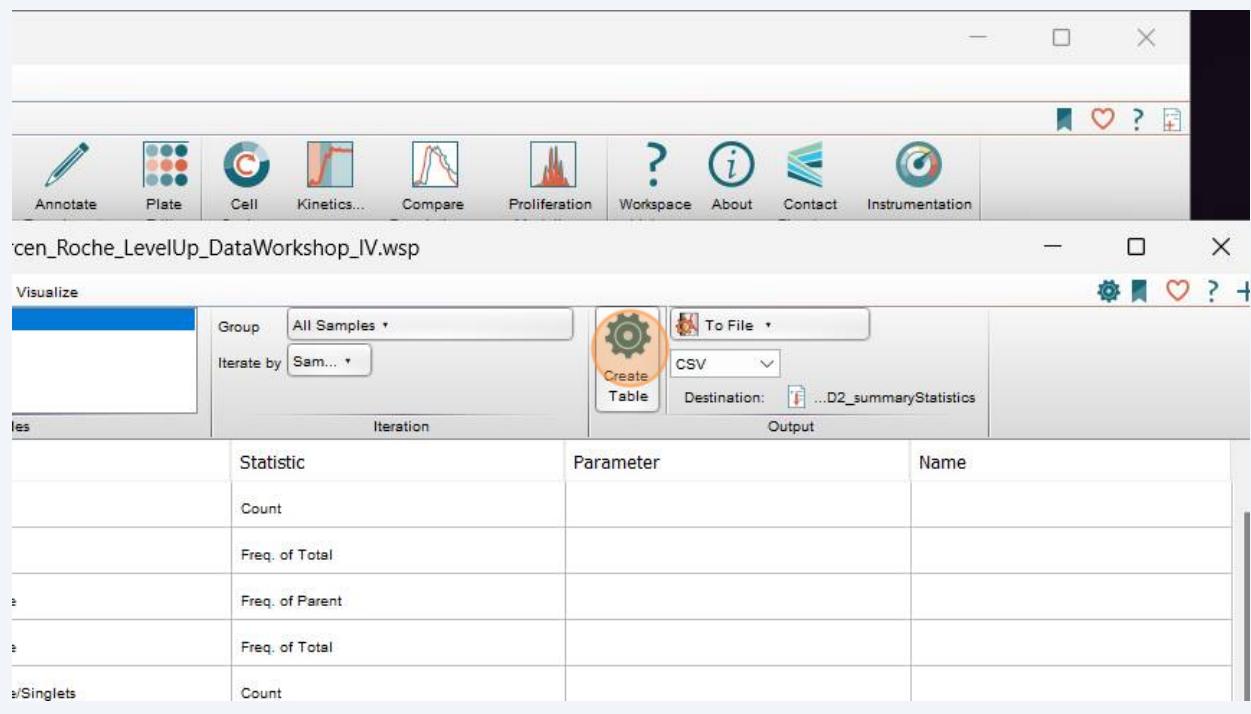
Make sure that you export **To File** and that the format of the exported file is **CSV**. Decide where the file should be saved by modifying the **Destination**.



3 Click here:



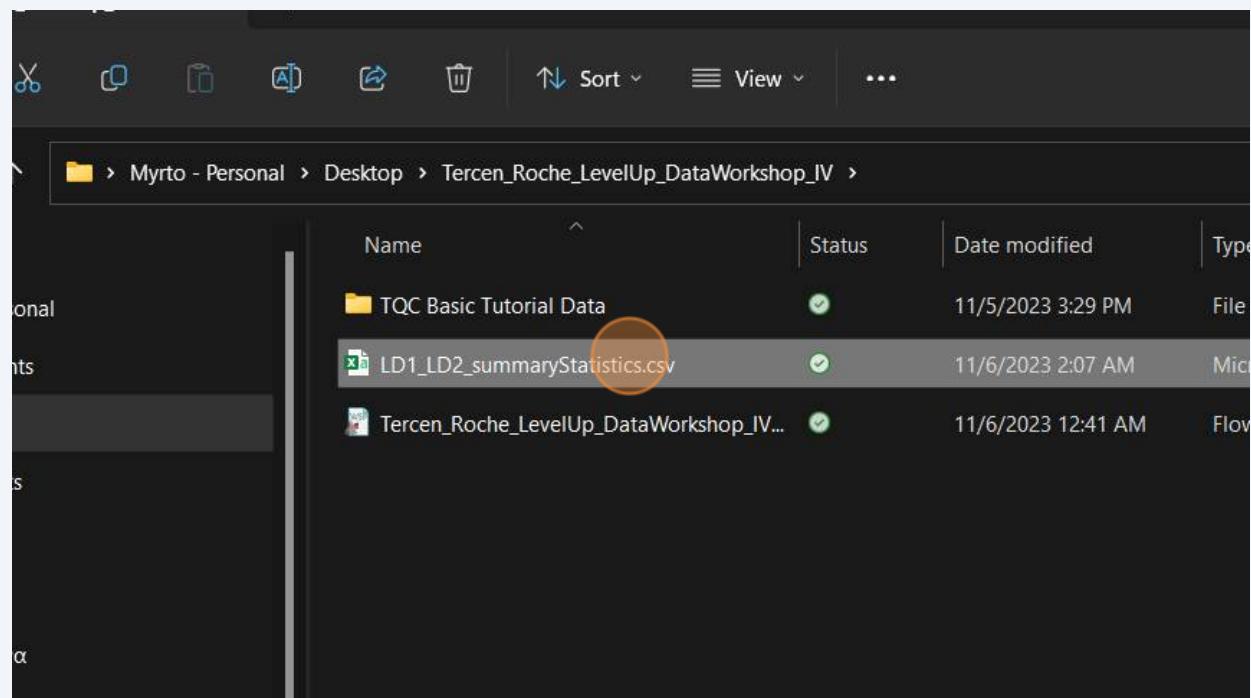
- 4 Click on **Create Table** to export the statistics into a .csv file



The screenshot shows the Tercen Roche LevelUp Data Workshop software interface. At the top, there is a toolbar with various icons: Annotate, Plate, Cell, Kinetics..., Compare, Proliferation, Workspace, About, Contact, and Instrumentation. Below the toolbar, the title bar displays the file name: 'Tercen_Roche_LevelUp_DataWorkshop_IV.wsp'. The main window has a header 'Visualize' and several dropdown menus and buttons. One of the buttons is labeled 'Create Table' with a gear icon, which is highlighted with a red circle. The 'Output' section shows a dropdown menu set to 'CSV' and a destination path '...D2_summaryStatistics'. Below this, there is a table with columns: 'Statistic', 'Parameter', and 'Name'. The table contains several rows of data.

	Statistic	Parameter	Name
	Count		
	Freq. of Total		
	Freq. of Parent		
	Freq. of Total		
#Singlets	Count		

- 5 On your compute's *File Browser* navigate to where the file has been saved.
Right-click on the file to open it with Excel.



The screenshot shows a Windows File Explorer window. The address bar indicates the path: 'Myrto - Personal > Desktop > Tercen_Roche_LevelUp_DataWorkshop_IV >'. The main area displays a list of files and folders. One file, 'LD1_LD2_summaryStatistics.csv', is highlighted with a red circle. The file is a Microsoft Excel spreadsheet (XLSX) located at '11/6/2023 2:07 AM'.

Name	Status	Date modified	Type
TQC Basic Tutorial Data	✓	11/5/2023 3:29 PM	File
LD1_LD2_summaryStatistics.csv	✓	11/6/2023 2:07 AM	Microsoft Excel Document
Tercen_Roche_LevelUp_DataWorkshop_IV...	✓	11/6/2023 12:41 AM	Flow

6 First thing let us delete the last two rows of the spreadsheet that contain the Mean and SD values. We will calculate those per condition on Tercen.

Select rows 6 & 7, right-click and select **Delete**

Click on cell A1 to add a header name. Name it **filename**.

Save the file and then read its contents on the Tercen Project for this workshop using the **delimited text operator**.

1	A	B	C	D	E	F	G	H	I	J
2	LD1_NS+N	250342	87.2	97	84.6	211494	99.8	84.5	166738	78.8
3	LD1_PI+PI	244977	89	97.1	86.4	211407	99.9	86.3	173185	81.9
4	LD2_NS+N	330780	81.4	80.1	65.3	215394	99.8	65.1	170820	79.3
5	LD2_PI+PI	275465	83.2	78.4	65.2	179437	99.9	65.1	150544	83.9
6	Mean	275391	85.2	88.2	75.4	204433	99.8	75.2	165322	81
7	SD	39245	3.51	10.3	11.7	16767	0.058	11.7	10205	2.38
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										



Unless you have taken the time to modify the FlowJo Table Editor's columns, they can be by default very long and not looking pretty on graphs.

For example, in our dataset we have a column called

Lymphocytes/Live/Singlets/CD3+/Q3: CD4+ , CD8-/Perforin+ | Freq. of Parent (%)

Following a process like the one partly showed in the step below we have already created a file called **cell population annotation**, which you can find uploaded on the Tercen project for this workshop.

7 Please, do not go into creating this annotation file. This is just to show you how it was created.

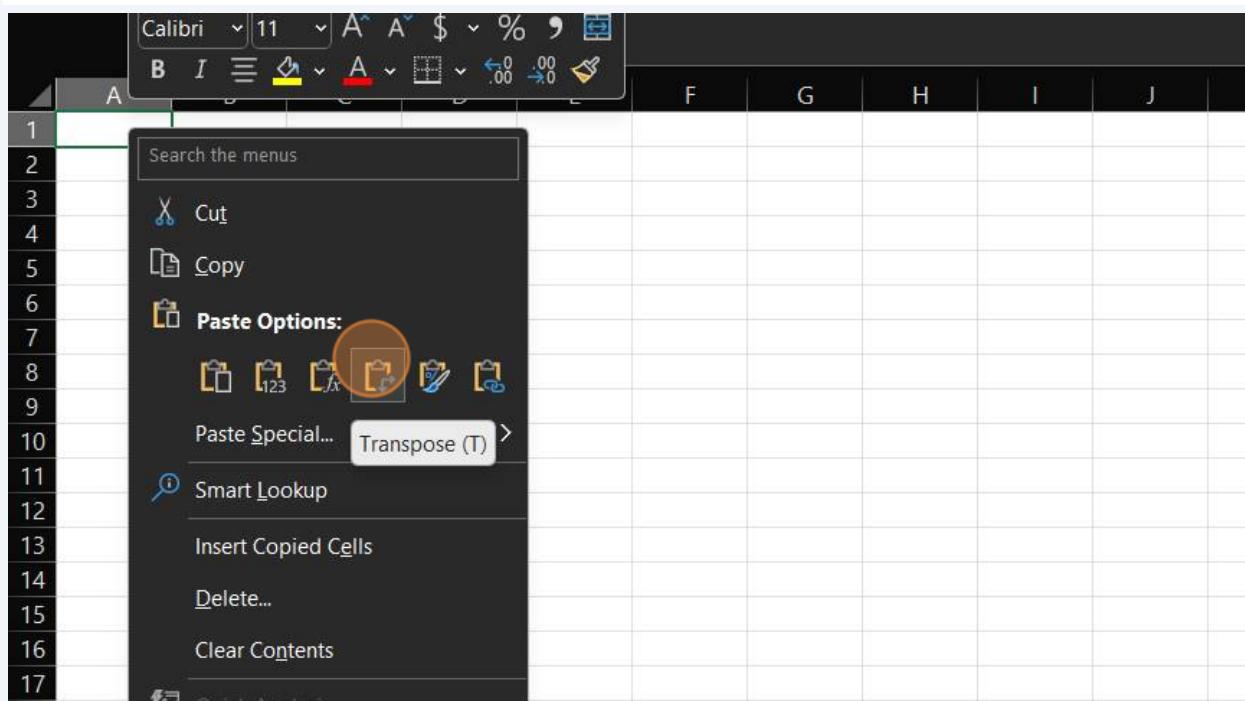
A screenshot of a Microsoft Excel spreadsheet. The ribbon at the top shows the 'Clipboard' tab selected. The table below has 11 rows and 10 columns. Row 1 contains column headers: 'Count' followed by nine 'Lymphocyte' counts. Rows 2 through 5 contain data for 'LD1_NS+N', 'LD1_PI+PI', 'LD2_NS+N', and 'LD2_PI+PI' respectively. The data includes counts like 250342, 244977, etc., and various Lymphocyte percentages.

	A	B	C	D	E	F	G	H	I	J
1	Count	Lymphocyte	Lyn							
2	LD1_NS+N	250342	87.2	97	84.6	211494	99.8	84.5	166738	78.8
3	LD1_PI+PI	244977	89	97.1	86.4	211407	99.9	86.3	173185	81.9
4	LD2_NS+N	330780	81.4	80.1	65.3	215394	99.8	65.1	170820	79.3
5	LD2_PI+PI	275465	83.2	78.4	65.2	179437	99.9	65.1	150544	83.9
6										
7										
8										
9										
10										
11										

A screenshot of the same Microsoft Excel spreadsheet with a context menu open over the first row of data. The menu is triggered by a right-click on cell A1. The 'Copy' option is highlighted with a red circle. Other options visible in the menu include 'Cut', 'Paste Options:', 'Paste Special...', 'Insert', 'Delete', and 'Clear Contents'. The rest of the spreadsheet and ribbon are visible in the background.

	A	B	C	D	E	F	G	H	I	J
1	Count	Lymphocyte	Lyn							
2	97	84.6	211494	99.8	84.5	166738	78.8			
3	97.1	86.4	211407	99.9	86.3	173185	81.9			
4	80.1	65.3	215394	99.8	65.1	170820	79.3			
5	78.4	65.2	179437	99.9	65.1	150544	83.9			

The screenshot shows a Microsoft Excel spreadsheet window. The title bar displays the sheet name "LD1_LD2_summaryStatistics". A "New sheet" button is highlighted with a red circle. The status bar indicates "Select destination and press ENTER or choose Paste". The ribbon menu is visible, showing the "Clipboard" tab selected, with options for Paste, Cut, Copy, Format Painter, and Undo/Redo. The "Font" tab is active, showing "Calibri" font, size "11", bold "B", italic "I", underline "U", and color "Yellow". The "Alignment" tab is also visible. The worksheet area shows rows 1 through 40 and columns A through J. Cell A1 is selected and highlighted with a red circle. The formula bar shows the address "A1".



A screenshot of the Microsoft Excel ribbon interface. The ribbon tabs at the top include Home, Insert, Page Layout, Formulas, Data, Page Break Preview, and Help. The clipboard section of the Home tab is highlighted, showing options for Cut, Copy, Paste (with a dropdown arrow), Format Painter, and Clipboard. Below the ribbon is the formula bar with cell reference A1. The main workspace shows a table of data in rows 2 through 9, with the first column (A) highlighted by a green vertical bar. The columns are labeled A, B, C, D, E, F, G, H, I, J. The data includes:

	Count
2	Lymphocytes Freq. of Total (%)
3	Lymphocytes/Live Freq. of Parent (%)
4	Lymphocytes/Live Freq. of Total (%)
5	Lymphocytes/Live/Singlets Count
6	Lymphocytes/Live/Singlets Freq. of Parent (%)
7	Lymphocytes/Live/Singlets Freq. of Total (%)
8	Lymphocytes/Live/Singlets/CD3+ Count
9	Lymphocytes/Live/Singlets/CD3+ Freq. of Parent (%)

A	B	C	D
ocytes Freq. of Total (%)			
ocytes/Live Freq. of Parent (%)			
ocytes/Live Freq. of Total (%)			
ocytes/Live/Singlets Count			
ocytes/Live/Singlets Freq. of Parent (%)			
ocytes/Live/Singlets Freq. of Total (%)			
ocytes/Live/Singlets/CD3+ Count			
ocytes/Live/Singlets/CD3+ Freq. of Parent (%)			
it (%)			
(%)			
Parent (%)			
Total (%)			

	A	B	C	D
Display name				

	Alignment	Number
r total		
	B	C
Display name		
# count		
% Lymphocytes over total		 (Ctrl) ▾

AutoSave (off) LD1_LD2_summaryStatistics.csv

Home

	A	
1	FlowJo header	Display name
2	Count	# count
3	Lymphocytes Freq. of Total (%)	% Lymphocytes over total
4	Lymphocytes/Live Freq. of Parent (%)	%Live
5	Lymphocytes/Live Freq. of Total (%)	
6	Lymphocytes/Live/Singlets Count	

AutoSave (off) LD1_LD2_summaryStatistics.csv

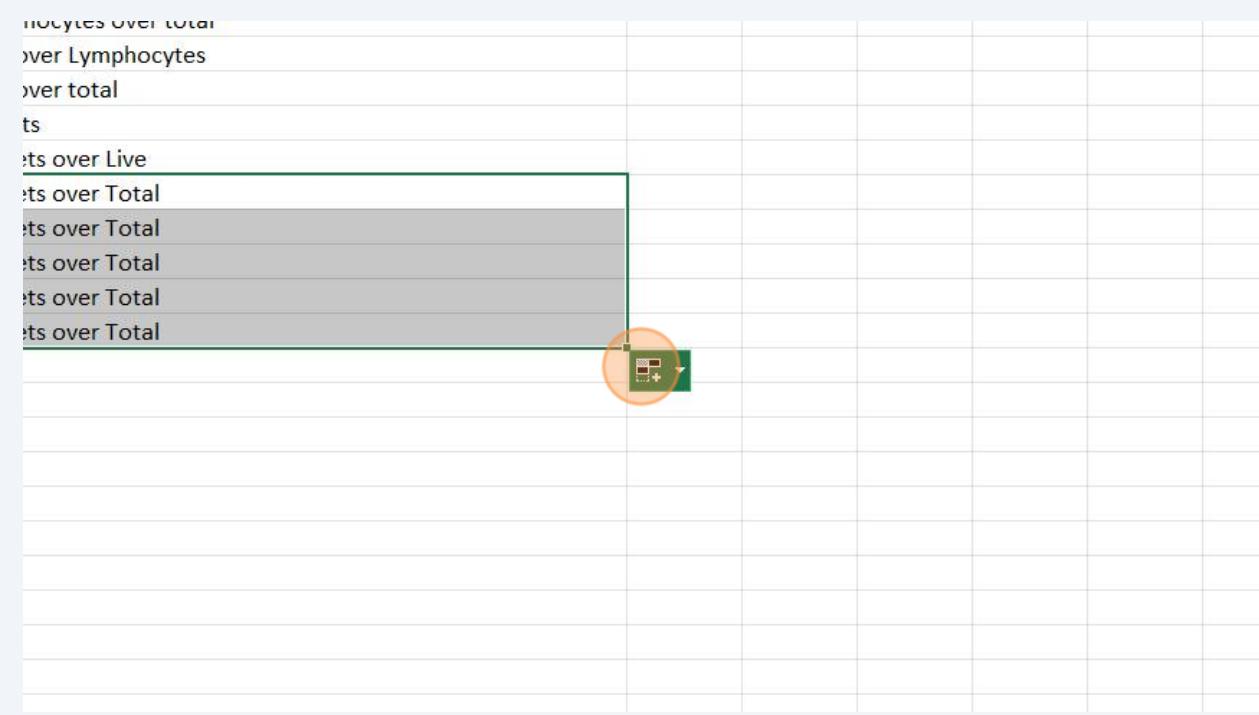
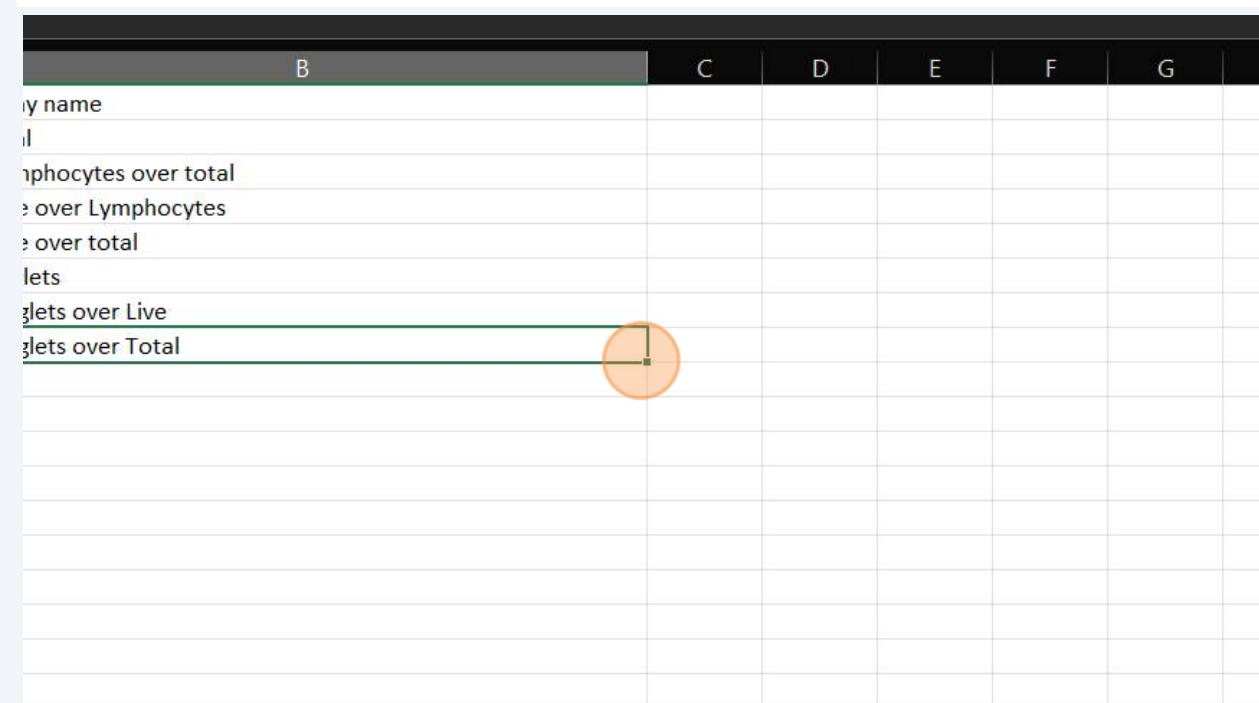
Home

	A	
1	FlowJo header	Display name
2	Count	# count
3	Lymphocytes Freq. of Total (%)	% Lymphocytes over total
4	Lymphocytes/Live Freq. of Parent (%)	% Live
5	Lymphocytes/Live Freq. of Total (%)	
6	Lymphocytes/Live/Singlets Count	

Screenshot of Microsoft Excel showing a table with two columns, A and B. The table contains six rows of data. The first row is a header. Rows 2 through 6 are data entries. The cell in B4 is currently selected and highlighted with a green border. The formula bar shows "% Live". The "Home" tab is selected in the ribbon.

	A	B
1	FlowJo header	Display name
2	Count	# count
3	Lymphocytes Freq. of Total (%)	% Lymphocytes over total
4	Lymphocytes/Live Freq. of Parent (%)	% Live
5	Lymphocytes/Live Freq. of Total (%)	
6	Lymphocytes/Live/Singlets Count	

The formula bar shows "% Live". The "Home" tab is selected in the ribbon. The font, alignment, and number formats are visible in the ribbon tabs.



r Total			
	Copy Cells Fill Formatting Only Fill Without Formatting Flash Fill		

	B	C	D
Display name			
# total			
% Lymphocytes over total			
% Live over Lymphocytes			
% Live over total			
# Singlets			
% Singlets over Live			
% Singlets over Total			
% CD3+ ove/Singletsive/Singlets/CD3+ Count			
% CD3+ ove/Singletsre Parent			
% CD3+ ove/Singletsr Total			
Count			
eq. of Parent (%)			
eq. of Singlets (%)			
eq. of Total (%)			
Count			
eq. of Parent (%)			
eq. of Singlets (%)			
ea. of Total (%)			

AutoSave (Off) LD1_LD2_summaryStatistics.csv

Home

Cut Copy Format Painter
Paste
Clipboard

Font: Calibri 11pt, Bold, Italic, Underline, Text Color: Yellow, Alignment: Center

B9 : % CD3+ over Singlets / CD3+ Count

A	Display name
1 FlowJo header	
2 Count	# total
3 Lymphocytes Freq. of Total (%)	% Lymphocytes over total
4 Lymphocytes/Live Freq. of Parent (%)	% Live over Lymphocytes
5 Lymphocytes/Live Freq. of Total (%)	% Live over total
6 Lymphocytes/Live/Singlets Count	# Singlets

AutoSave (Off) LD1_LD2_summaryStatistics.csv

Home

Cut Copy Format Painter
Paste
Clipboard

Font: Calibri 11pt, Bold, Italic, Underline, Text Color: Yellow, Alignment: Center

B10 : # CD3+

A	Display name
1 FlowJo header	
2 Count	# total
3 Lymphocytes Freq. of Total (%)	% Lymphocytes over total
4 Lymphocytes/Live Freq. of Parent (%)	% Live over Lymphocytes
5 Lymphocytes/Live Freq. of Total (%)	% Live over total
6 Lymphocytes/Live/Singlets Count	# Singlets

AutoSave (off) LD1_LD2_summaryStatistics.csv

Home

Cut Copy Format Painter
Paste
Clipboard

Font: Calibri 11pt, Bold, Italic, Underline, Font Color (Yellow), Alignment (Center)

Alignment: Wrap Text, Merge & Center

B11 : % CD3+ over Singlets

Formula Bar: A

		Display name
1	FlowJo header	
2	Count	# total
3	Lymphocytes Freq. of Total (%)	% Lymphocytes over total
4	Lymphocytes/Live Freq. of Parent (%)	% Live over Lymphocytes
5	Lymphocytes/Live Freq. of Total (%)	% Live over total
6	Lymphocytes/Live/Singlets Count	# Singlets

AutoSave (off) LD1_LD2_summaryStatistics.csv

Home

Cut Copy Format Painter
Paste
Clipboard

Font: Calibri 11pt, Bold, Italic, Underline, Font Color (Yellow), Alignment (Center)

Alignment: Wrap Text, Merge & Center

B13 : % CD4- CD8+

Formula Bar: A

	Display name
1	FlowJo header
2	# total
3	% Lymphocytes over total
4	% Live over Lymphocytes
5	% Live over total
6	# Singlets

- 8 Let us know go back to the Tercen project for this workshop to create plots for the summary statistics exported from FlowJo.

Click New workflow.

The screenshot shows a user interface for a project management tool. At the top, there are two tabs: "Project" and "Activities". Below the tabs, the title "Workshop IV - MAK" is displayed, followed by the subtitle "Tercen FlowJo synergy & Reporting". A horizontal toolbar contains several icons: "New data set", "New workflow" (which has an orange circle around it), "New file", and "Upload". Below the toolbar, there is a list of files and folders:

- Tercen_Roche_LevelUp_DataWorkshop_IV.zip
- README.md
- Preliminary Flow Template - LD1 & LD2
- PDFs

- 9 Under the *Installed* tab select **Summary statistics of gated cell populations**

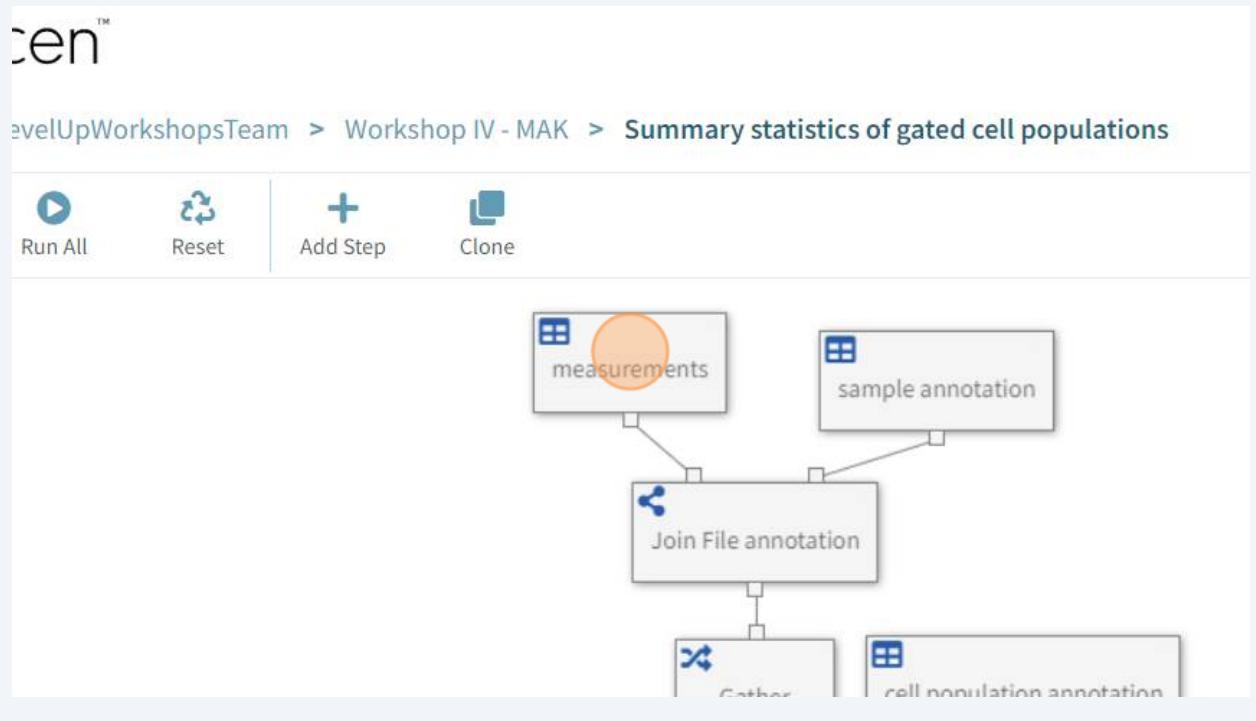
Click **Ok**

The screenshot shows the "Installed" tab of a software interface. At the top, there is a search bar and a checkbox labeled "Display latest version only". Below the search bar, there is a list of installed workflows:

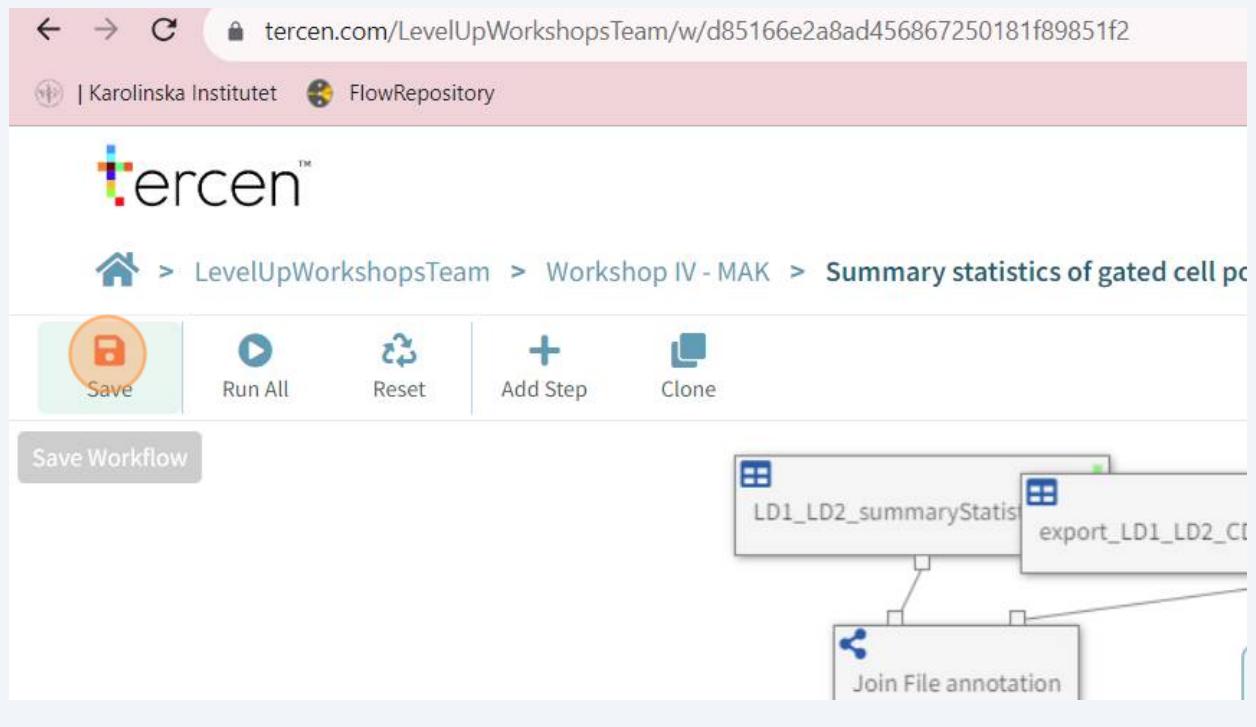
- Summary statistics of gated cell populations** (highlighted with an orange circle)
 - A template workflow to plot various summary statistics exported from the FlowJo Table
- Preliminary Flow Template 0.0.1
 - A template to perform clustering (Phenograph) and dimension reduction (UMAP) on flc
- Simple 1.0.1

- 10** Attach the required tables to the workflow to run the analysis:

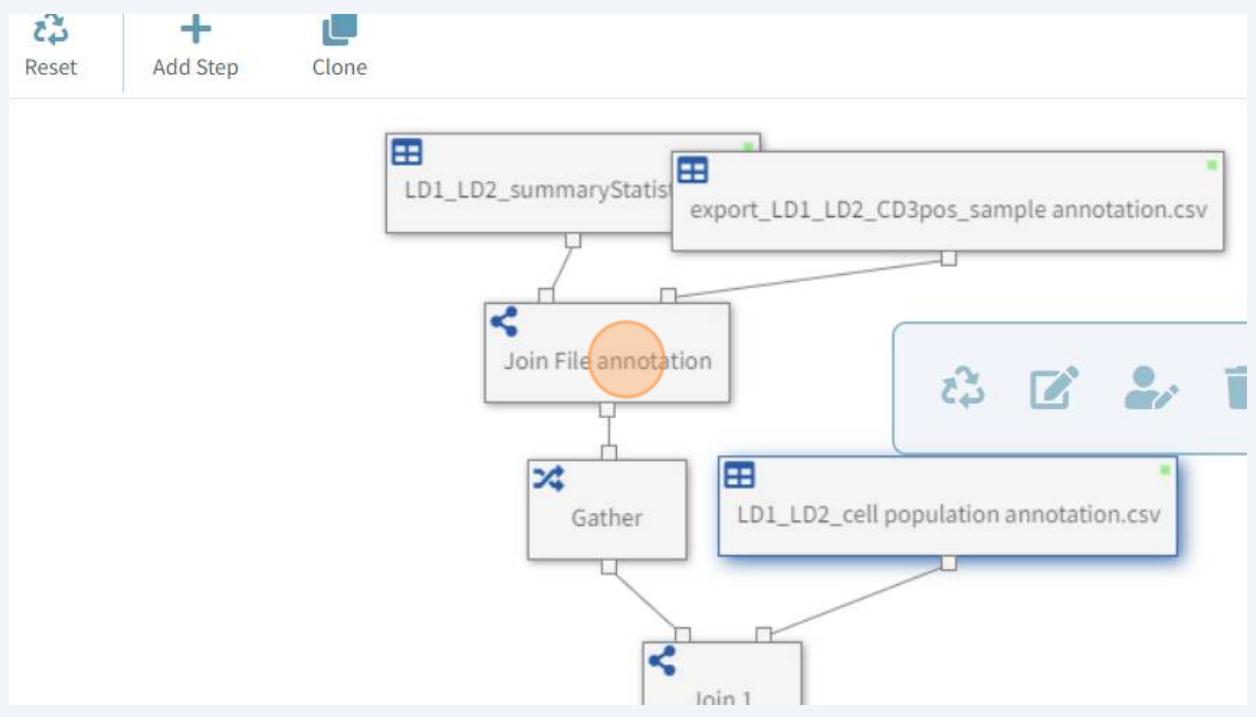
- **measurements** : the exported statistics from FlowJo
- **sample annotation** : the same file we used in previous workflows called *export_LD1_LD2_CD3pos_sample annotation.csv*
- **cell population annotation** : the file called *LD1_LD2_cell population annotation.csv*



11 Save your progress so far!



12 Click "Summary statistics of gated cell populations"

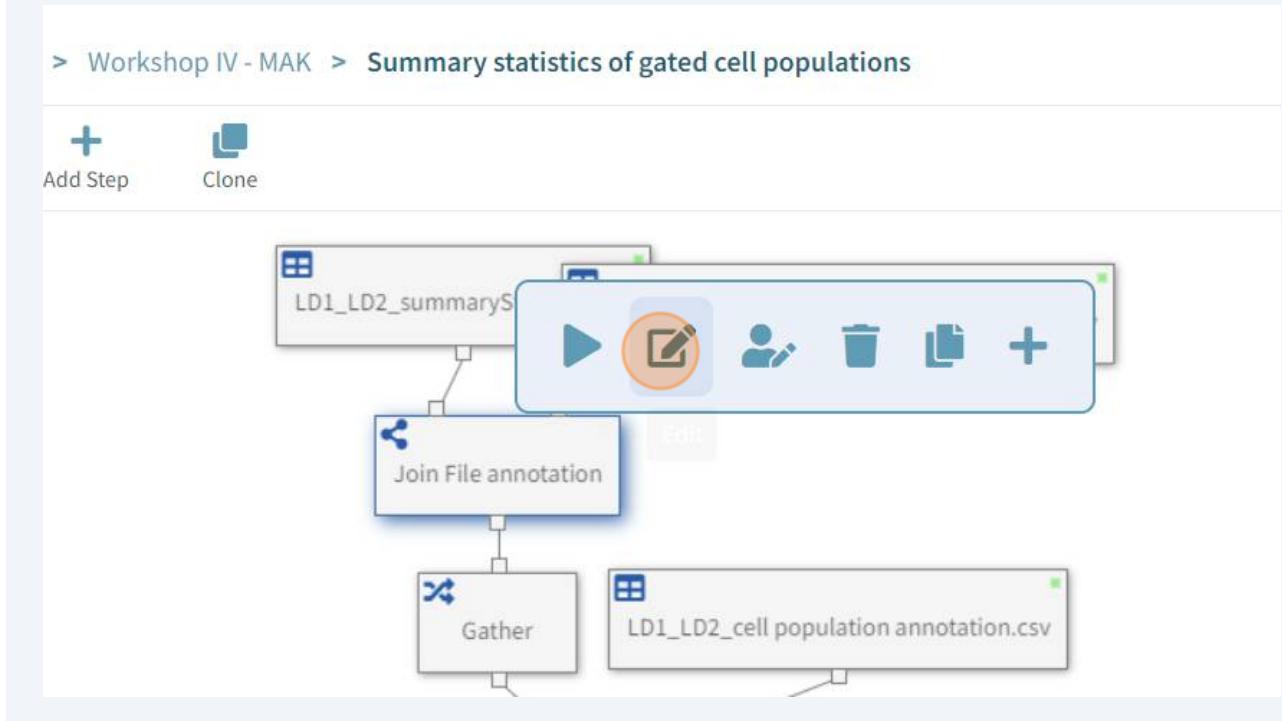


13

Let us edit the Join File annotation step. Click **Edit** and select the columns which contain the filenames. These are the keys for the Join step.

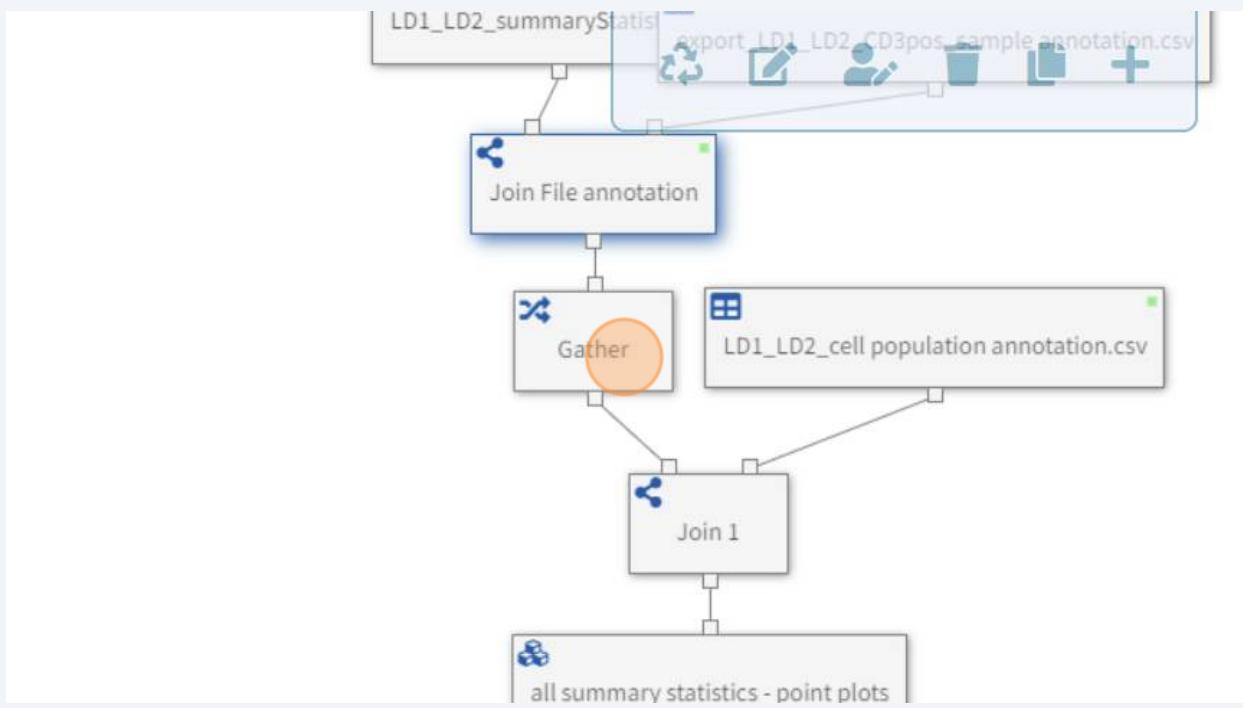
Note that the sample annotation file has two columns that contain filenames. You want to choose the **Original filename**.

Click **Save & Run Step**



14 Then click on the Gather step and select **Edit**.

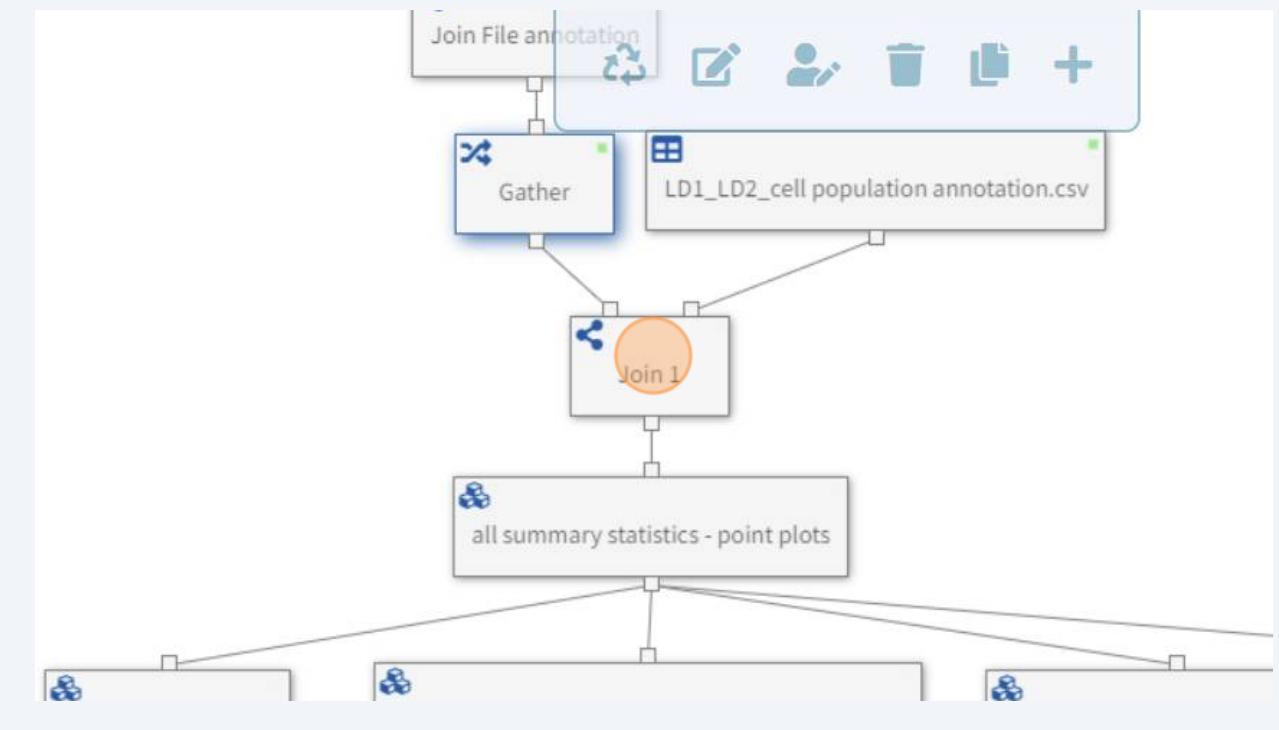
Make sure all the available statistics have been selected. Then click **Save & Run Step**.



15

Finally click on the **Join 1** step and check that the correct columns have been selected in order to join the FlowJo header names to their respective shorter versions, as explained in [Step 7](#)

Click **Save & Run Step**



16

Save again your progress.

← → C tercen.com/LevelUpWorkshopsTeam/w/d85166e2a8ad456867250181f89851f2

| Karolinska Institutet | FlowRepository

tercen™

Home > LevelUpWorkshopsTeam > Workshop IV - MAK > Summary statistics of gated cell populations

Save Run All Reset Add Step Clone

Save Workflow

```
graph TD; LD1[LD1_LD2_summaryStatistics] --> CI[export_LD1_LD2_CI]; CI --> JFA[Join File annotation]
```

17 Then click **Run All**

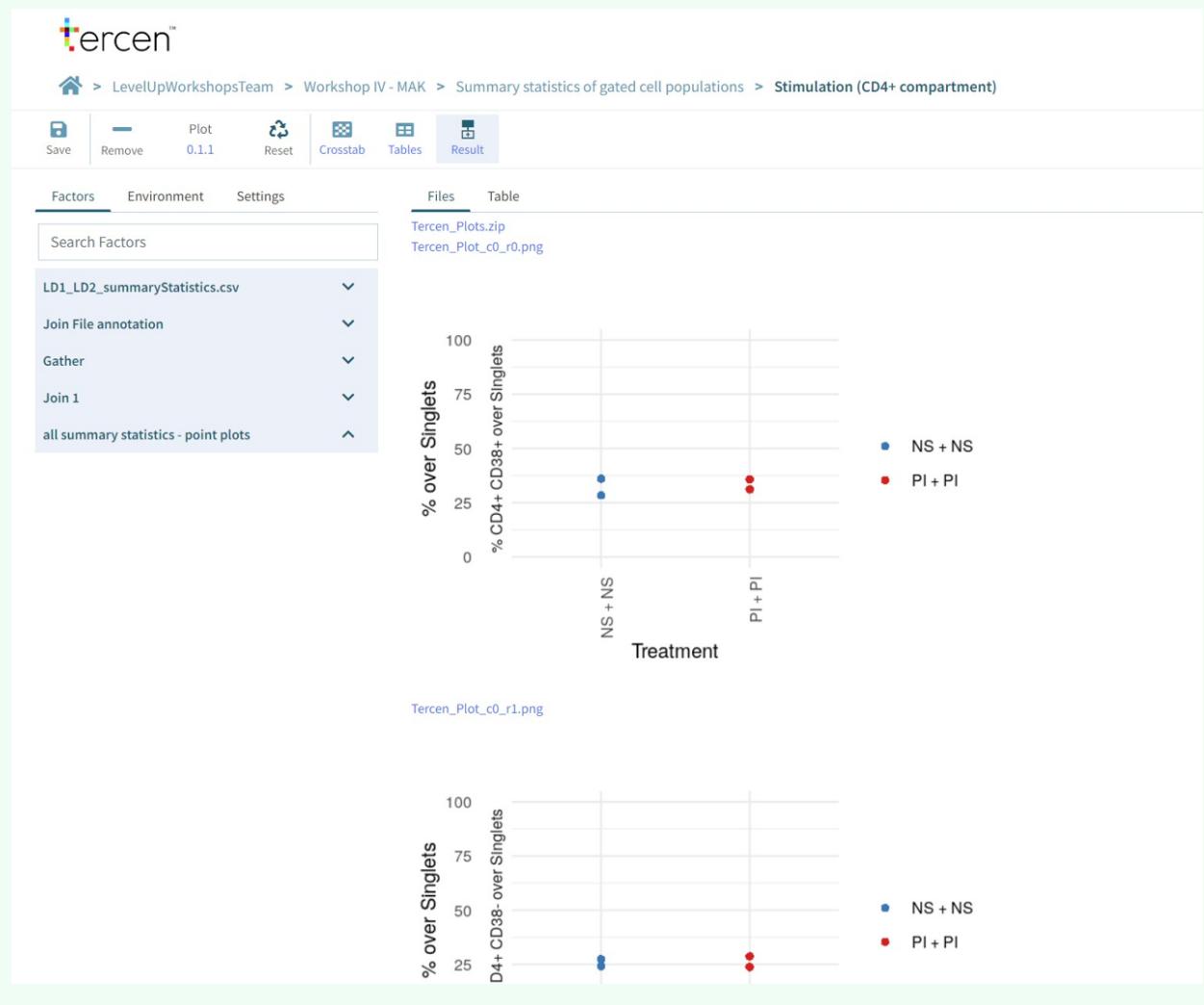
The screenshot shows the tercen FlowRepository interface. At the top, there are navigation icons (back, forward, search) and a URL bar showing tercen.com/LevelUpWorkshopsTeam/w/d85166e2a8ad456867250181f89851f2. Below the URL is a header with a user icon, 'Karolinska Institutet', and 'FlowRepository'. The main area features the tercen logo and a breadcrumb navigation path: Home > LevelUpWorkshopsTeam > Workshop IV - MAK > Summary statistics of gated cell populations. A toolbar below the path includes 'Save' (blue folder icon), 'Run All' (play button icon, highlighted with an orange circle), 'Reset' (recycle bin icon), 'Add Step' (plus icon), and 'Clone' (clone icon). A large 'Run All' button is centered below the toolbar. To the right, a workflow diagram is displayed, consisting of three nodes connected by arrows: 'LD1_LD2_summaryStatistics' (a box with a blue grid icon), 'export_LD1_LD2_CI' (a box with a blue grid icon), and 'Join File annotation' (a box with a blue file icon).



And now your chance to explore further the plot operator in Tercen.

Let us assume we would like to create some point plots for the activation markers within . We will focus on the % over Singlets.

Create a new data step in the workflow and try to recreate the following figures using the plot operator.



18

Hurray!