KARMENscience

advanced life science image analysis

**Astrocyte / Stem cells / Puncta / Sholl
Colocalization + Z-slice / Counting / Statistic**

DEMO REPORT

www.karmenscience.ai

For: prof. XXX Lab, YYY university

DELIVERY data - export

All of the DELIVERY results from KARMENscience analysis can be downloaded
from the following pCloud link: https://xxxxxxx

Folder structure	Sub-folder structure
DATA_02_MAPPED_IMAGES_2x2	export_01_DAPI
DATA_02_MAPPED_IMAGES_4x1	export_02_NeuN_DAPI
animations	export_03_SOX2_NeuN
	export_04_A-Syn_DCX_NeuN
	export_05_A-Syn_DCX_DAPI
	export_06_SYN
	export_07_DCX
	export_08_GFAP

Two mapped fields were
2 x 2 field
4 x 1 field
* all of the results of this DELIVERY are
given in two separate folders

All of the presented DELIVERY results –
exports from the analysis could be used
for research and research-related needs
of xxxx in any form (research paper,
presentation, poster, web, etc.)

**For every aspect and the occasion
presenting any of this DELIVERY
result, we ask you to use the
reference to KARMENscience –
karmenscience.ai . Thank you!**

DAPI

background: blue = original DAPI image
contours: grey = DAPI cells*

Link folder: „export_01_DAPI".

*DAPI cells are verified with the H2AX marker – classified as the dead cells and were removed from further analyses
**a number near the segment indicates a cluster of that number of cells.

Z-series (3D/2D) projections
3D projection of each of the 7 slices
Tracing of the central position of each segmented cell
Determination of the number and the position of the segmented cell

Table: z-series_XxX_DAPI.csv
Z1-Z7 slices,
positions (x y) of each and every cell on the slice
DAPI total number

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
2	Z1_01_DA	68 2494	2114 2490	2101 2496	3281 2480	2690 2475	665 2474	1100 2469	1791 2466	3158 2462	2232 2463	1251 2460	3052 2455	1439 2454	1441 2467	1675 2444	2025 2440	2455 2
3	Z2_01_DA	69 2493	2116 2489	2104 2494	3279 2481	2691 2475	665 2474	1100 2469	1794 2465	3158 2462	2232 2463	1251 2460	3052 2454	1438 2453	1441 2466	1675 2444	2024 2441	2454 2
4	Z3_01_DA	70 2493	2115 2488	2102 2495	3279 2481	2689 2473	665 2474	1100 2468	1794 2465	3158 2462	2230 2463	1250 2459	3052 2452	1438 2455	1442 2468	1676 2446	2025 2440	2455 2
5	Z4_01_DA	70 2494	2116 2487	2103 2493	3279 2480	2690 2474	664 2474	1100 2469	1793 2466	3159 2461	2229 2462	1250 2459	3051 2452	1438 2456	1443 2468	1676 2446	2025 2440	2455 2
6	Z5_01_DA	70 2494	2116 2486	2104 2492	3280 2480	2690 2474	665 2473	1100 2468	1793 2466	3159 2461	2229 2462	1251 2459	3052 2451	1438 2457	1443 2470	1676 2447	2024 2440	2456 2
7	Z6_01_DA	70 2494	2116 2485	2104 2492	3280 2480	2690 2474	665 2473	1099 2468	1794 2466	3159 2462	2228 2462	1251 2461	3052 2451	1438 2458	1443 2470	1676 2448	2024 2440	2456 2
8	Z7_01_DA	69 2494	2116 2485	2103 2492	3281 2480	2690 2474	665 2473	1099 2468	1793 2466	3159 2461	2228 2462	1250 2463		1437 2460	1440 2473	1675 2449	2025 2440	
9	DAPI: 602	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16	:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

NEUN

background picture:
blue = original DAPI image
green = original NeuN image
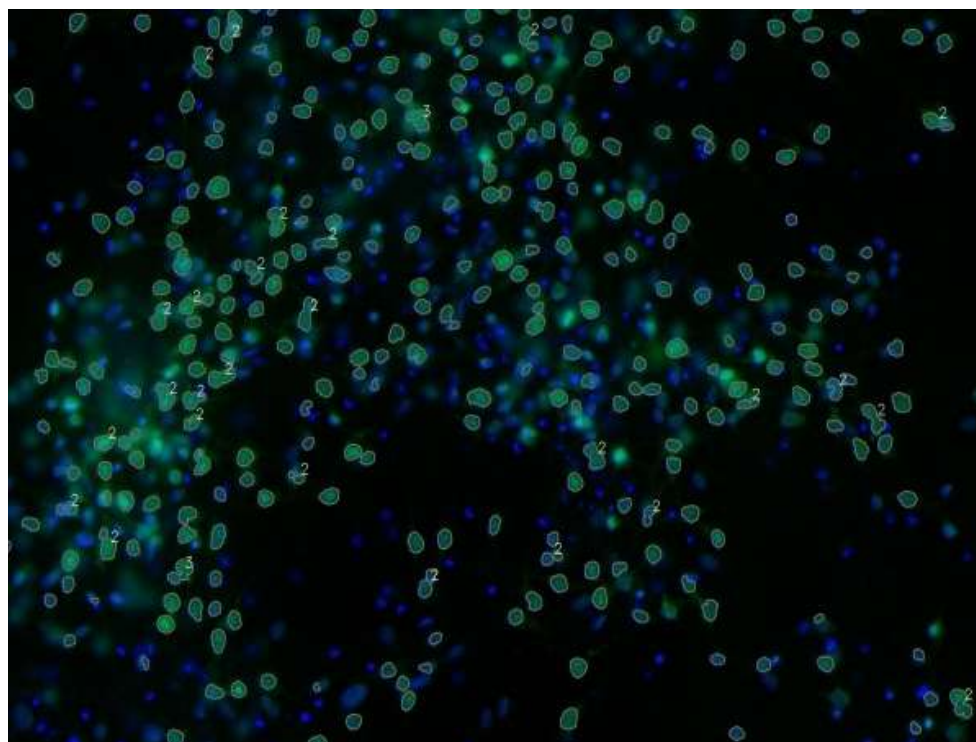contours:
grey = NEUN cells
NEUN cells are verified with the DAPI*
cells.
Link folder: „export_02_NeuN_DAPI".

*DAPI cells are verified with the H2AX
marker – classified as the dead cells
and were removed from further
analyses
**a number near the segment
indicates a cluster of that number of
cells.

Z-series (3D/2D) projections
3D projection of each of the 7
slices
Tracing the central position of each
segmented cell
Determination of the number and
the position of cells
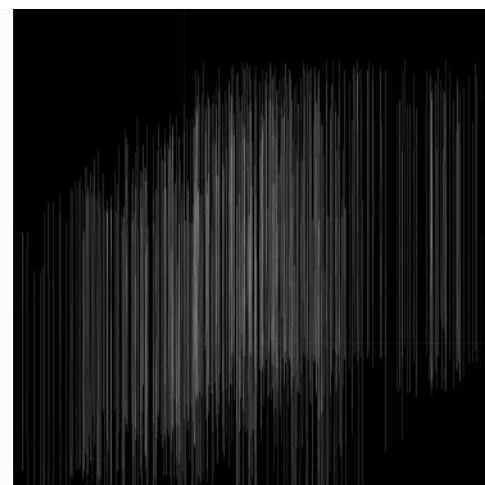
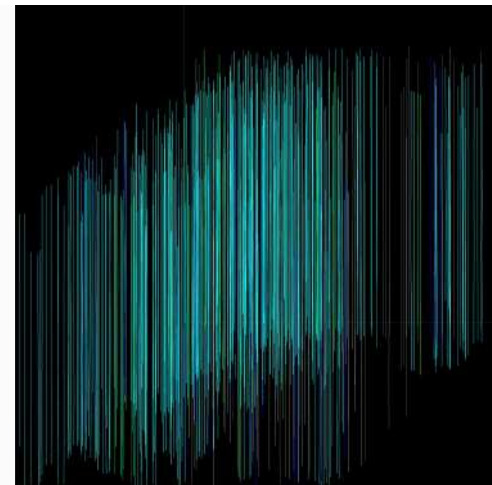### Table: z-series_XxX_DAPI.csv
Z1-Z7 slices,
positions (x y) of each and every cell on the slice
NEUN total number

	A	B	C	D	E	F	G	H
1		1	2	3	4	5	6	
2	Z1_01_DAPI.png	119 2492	3160 2458	1258 2455	1442 2454	2028 2438	1680 2442	1213 24
3	Z2_01_DAPI.png	119 2492	3160 2458	1257 2456	1443 2451	2028 2438	1680 2442	1213 24
4	Z3_01_DAPI.png	116 2492	3161 2459	1253 2457	1442 2455	2029 2438	1680 2445	1212 24
5	Z4_01_DAPI.png	117 2492	3161 2459	1256 2457	1443 2458	2028 2437	1681 2443	1211 24
6	Z5_01_DAPI.png	117 2492	3162 2459	1257 2456	1443 2461	2028 2437	1681 2443	1212 24
7	Z6_01_DAPI.png	116 2492	3162 2460	1257 2458	1443 2462	2028 2438	1681 2445	1212 24
8	Z7_01_DAPI.png	118 2493	3161 2461	1257 2458	1443 2459	2029 2438	1680 2446	
9	NeuN: 444	1	1	1	1	1	1	

NEUN + SOX2 COLOCALIZATION

background picture:
green = original NeuN image
blue = original SOX2 image (enhanced signal)
contours:
grey = NeuN cells
red = "SOX2 positive" NeuN cells
NEUN cells are previously verifiyed with the DAPI* cells
Link folder: „export_03_SOX2_NeuN",

*DAPI cells are verified with the H2AX marker –classified as the dead cells and were removed.
**a number near the segment indicates a cluster of that number of cells.

Z-series (3D/2D) projections
3D projection of each of the 7 slices
Tracing of the central position of each segmented cell
Determination of the number of cells
2 colours (gray/red cells)

Table: z-series_XxX_DAPI.csv
Z1-Z7 slices,
positions (x y) of each and every cell on the slice
NEUN total number
SOX2 positive NeuN cells number

	1	2	3	4	5	6	7	8
Z1_01_DAPI.png	119 2492	3160 2458	1258 2455	1442 2454	2028 2438	1680 2442	1213 2434	2461 2427 1329
Z2_01_DAPI.png	119 2492	3160 2458	1257 2456	1443 2451	2028 2438	1680 2442	1213 2434	2462 2426 1329
Z3_01_DAPI.png	116 2492	3161 2459	1253 2457	1442 2455	2029 2438	1680 2445	1212 2434	2463 2424 1329
Z4_01_DAPI.png	117 2492	3161 2459	1256 2457	1443 2458	2028 2437	1681 2443	1211 2434	2461 2425 1329
Z5_01_DAPI.png	117 2492	3162 2459	1257 2456	1443 2461	2028 2437	1681 2443	1212 2434	2460 2427 1328
Z6_01_DAPI.png	116 2492	3162 2460	1257 2458	1443 2462	2028 2438	1681 2445	1212 2434	2460 2426 1328
Z7_01_DAPI.png	118 2493	3161 2461	1257 2458	1443 2459	2029 2438	1680 2446		2460 2426 1329
NeuN: 444	1	1	1	1	1	1	1	1
:0	0	0	0	0	0	0	0	0
:0	0	0	0	0	0	0	0	0
SOX2 positive NeuN: 271	0	1	1	0	1	0	0	0
:0	0	0	0	0	0	0	0	0
:0	0	0	0	0	0	0	0	0
:0	0	0	0	0	0	0	0	0
:0	0	0	0	0	0	0	0	0

NEUN + DCX + A-SYN COLOCALIZATION DUBBLE

background picture:
green = original A-SYN image (enhanced signal)
red = original DCX image
Contours → segmented objects:
grey = NeuN cells
blue = "DCX positive" NeuN cells
green = "A-SYN positive" NeuN cells
cyan = "DCX and A-syn positive NeuN

**NEUN cells are previously verified with the DAPI* cells
*DAPI cells are verified with the H2AX marker –classfied as the dead cells and were removed.
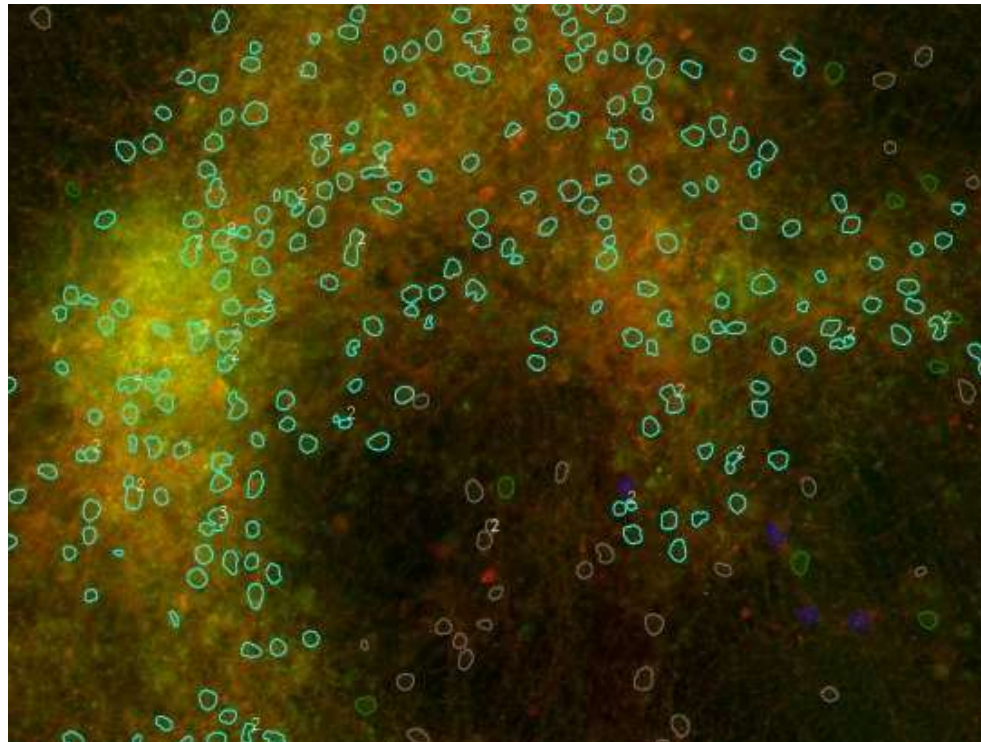
Z-series (3D/2D) projections
3D projection of each of the 7 slices
Tracing of the central position of each segmented cell
Determination of the number of cells
4 colours (grey/blue/green/cyan cells)

Table: z-series_XxX_DAPI.csv
Z1-Z7 slices,
positions (x y) of each and every cell on the slice
NEUN total number
DCX positive NeuN cells number
A-SYN positive NeuN cell number
Both DCX and A-SYN positive NeuN cell number

	A	B	C	D	E	F	G	H
1		1	2	3	4	5	6	7
2	Z1_01_DAPI.png	119 2492	3160 2458	1258 2455	1442 2454	2028 2438	1680 2442	1213 2434 246
3	Z2_01_DAPI.png	119 2492	3160 2458	1257 2456	1443 2451	2028 2438	1680 2442	1213 2434 246
4	Z3_01_DAPI.png	116 2492	3161 2459	1253 2457	1442 2455	2029 2438	1680 2445	1212 2434 246
5	Z4_01_DAPI.png	117 2492	3161 2459	1256 2457	1443 2458	2028 2437	1681 2443	1211 2434 246
6	Z5_01_DAPI.png	117 2492	3162 2459	1257 2456	1443 2461	2028 2437	1681 2443	1212 2434 246
7	Z6_01_DAPI.png	116 2492	3162 2460	1257 2458	1443 2462	2028 2438	1681 2445	1212 2434 246
8	Z7_01_DAPI.png	118 2493	3161 2461	1257 2458	1443 2459	2029 2438	1680 2446	246
9	NeuN: 444	1	1	1	1	1	1	1
10	DCX positive NeuN: 353	1	1	1	1	0	1	1
11	A-SYN positive NeuN: 348	1	1	1	1	0	1	1
12	: 0	0	0	0	0	0	0	0
13	DCX and A-syn positive NeuN: 332	1	1	1	1	0	1	1

DAPI + DCX + A-SYN

background picture:
green = original A-SYN image
(enhanced signal)
blue = original DCX image
Contours → segmented objects:
grey = DAPI cells
blue = "DCX positive" DAPI cells
green = "A-SYN positive" DAPI cells
cyan = "DCX and A-syn positive" DAPI

*DAPI cells are verified with the H2AX
marker –classifed as the dead cells and
were removed
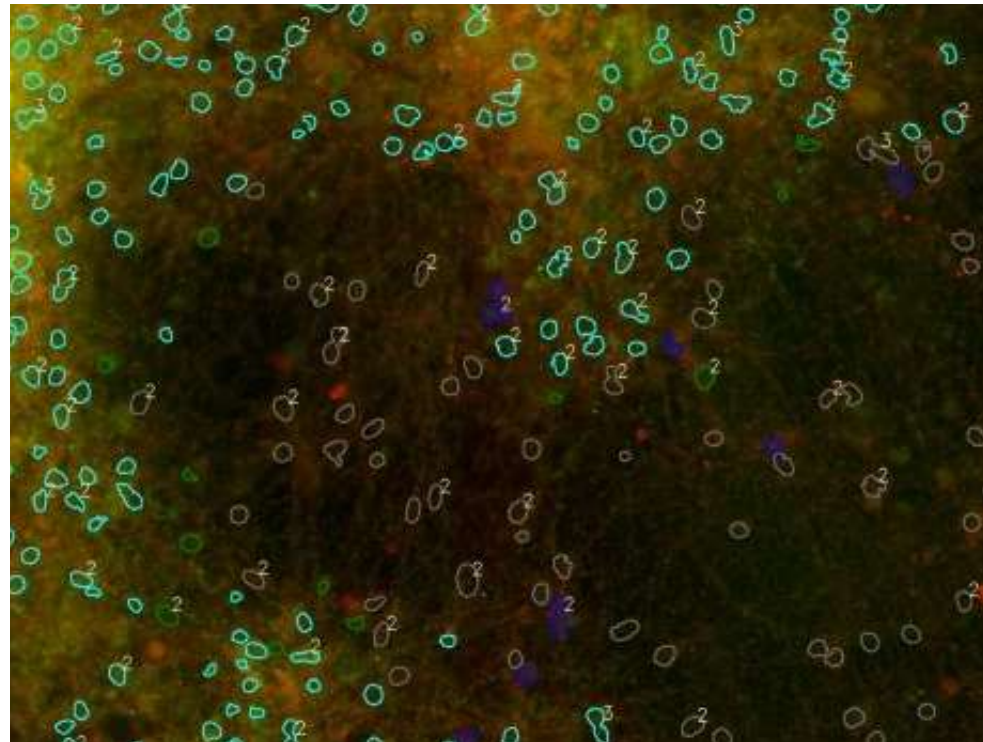
Z-series (3D/2D) projections
3D projection of each of the 7 slices
Tracing of the central position of
each segmented cell
Determination of the number of
cells
4 colours (grey/blue/green/cyan
cells)
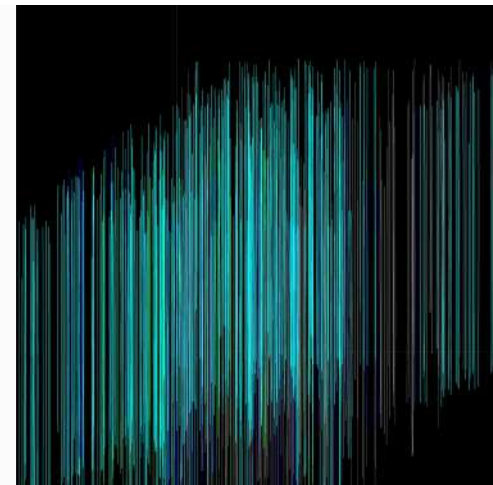
Link folder: „export_05_A-
Syn_DCX_DAPI"

**Table: z-series_XxX_A-
Syn_DCX_DAPI.csv**
Z1-Z7 slices,
positions (x y) of each and every cell
on the slice
DAPI total number
DCX positive DAPI cells number
A-SYN positive DAPI cell number
Both DCX and A-SYN
positive DAPI cell number

	A	B	C	D	E	F	G
1		1	2	3	4	5	
2	Z1_01_DAPI.png	68 2494	2114 2490	2101 2496	3281 2480	2690 2475	665 24
3	Z2_01_DAPI.png	69 2493	2116 2489	2104 2494	3279 2481	2691 2475	665 24
4	Z3_01_DAPI.png	70 2493	2115 2488	2102 2495	3279 2481	2689 2473	665 24
5	Z4_01_DAPI.png	70 2494	2116 2487	2103 2493	3279 2480	2690 2474	664 24
6	Z5_01_DAPI.png	70 2494	2116 2486	2104 2492	3280 2480	2690 2474	665 24
7	Z6_01_DAPI.png	70 2494	2116 2485	2104 2492	3280 2480	2690 2474	665 24
8	Z7_01_DAPI.png	69 2494	2116 2485	2103 2492	3281 2480	2690 2474	665 24
9	DAPI: 602	1	1	1	1	1	
10	DCX positive DAPI: 410	1	0	0	0	0	
11	A-SYN positive DAPI: 399	1	0	0	0	0	
12	: 0	0	0	0	0	0	
13	DCX and A-syn positive DAPI: 379	1	0	0	0	0	
14	: 0	0	0	0	0	0	

SYN

background picture:
green = original SYN image
Contours → segmented objects:
yellow = SYN (punctated
synapses segments)
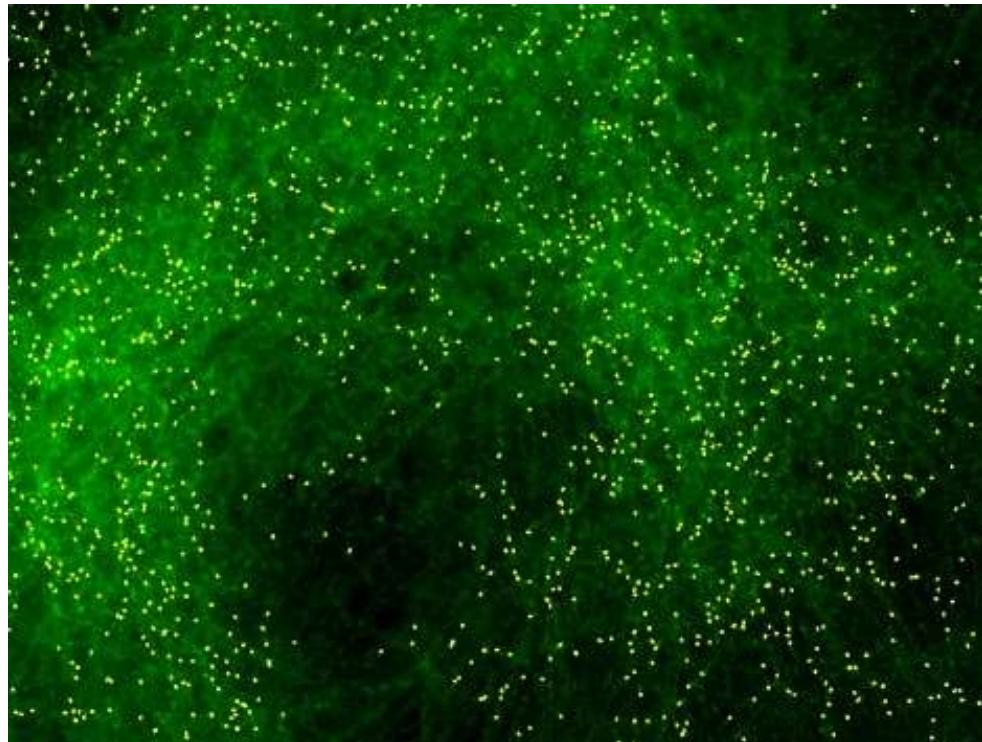
### Z-series (3D/2D) projections

3D projection of each of the 7 slices
Tracing of the central position of
each segmented syn (max 2 slices /
SYN)
Determination of the number of SYN
3D/2D projection of z-series
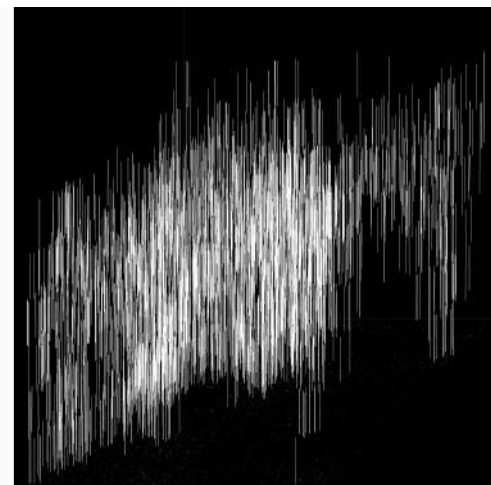
Link folder: „export_06_SYN"

Table: „z-series_XxX_SYN.csv"
Z1-Z7 slices,
positions (x y) of each and every Syn on
the slice
SYN total number

|	A	B	C	D	E	F	G	H
1		1	2	3	4	5	6	
2	Z1_01_DAPI.png	3109 2483	2938 2482	170 2483	3041 2478	1597 2474	1400 2474	1477
3	Z2_01_DAPI.png		2937 2482	170 2483				
4	Z3_01_DAPI.png							
5	Z4_01_DAPI.png							
6	Z5_01_DAPI.png							
7	Z6_01_DAPI.png							
8	Z7_01_DAPI.png							
9	SYN: 13588	1	1	1	1	1	1	
10	: 13588	1	1	1	1	1	1	
11	: 13588	1	1	1	1	1	1	
12	: 13588	1	1	1	1	1	1	
13	: 13588	1	1	1	1	1	1	
14	: 13588	1	1	1	1	1	1	
15	: 13588	1	1	1	1	1	1	
16	: 13588	1	1	1	1	1	1	
17								

SYN

Additional table: syn_coordinates.csv

Created for 3D Spatial distribution

For each determined SYN writes 3D coordinates (x,y,z) /(1.5 µm/z)

Each SYN, if traced on 2 consecutive z-slices, was positioned halfway on the z coordinate

	A
1	x,y,z
2	3109,2483,4
3	2938,2482,6
4	170,2483,6
5	3041,2478,4
6	1597,2474,4
7	1400,2474,4
8	1477,2472,4
9	121,2472,8
10	210,2459,6
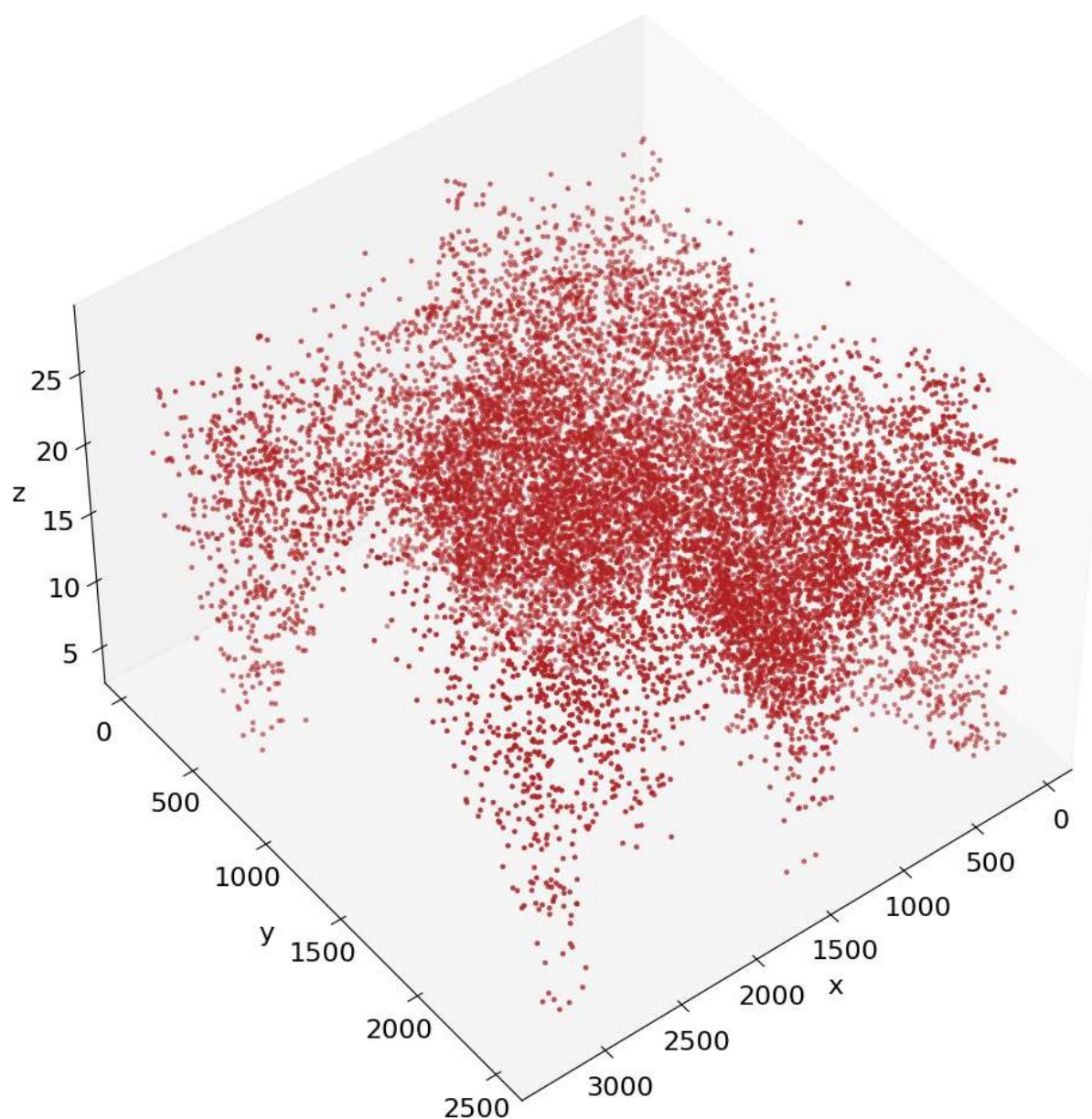
3D Spatial animation is on the folder „animations"
-„SYN_spatial_distribution.gif"

DCX

background picture:
green = original DCX image
contours:
grey = DCX (punctuated precursor segments)
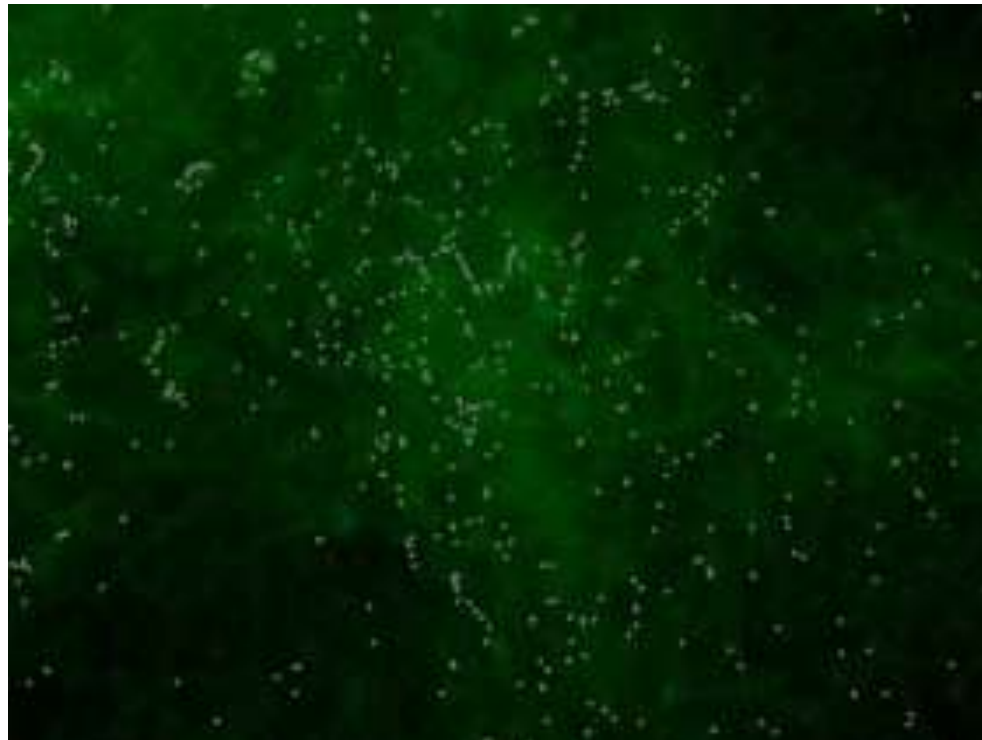
Z-series (3D/2D) projections
3D projection of each of the 7 slices
Tracing the central position of each segmented DCX segment (max 2 slices / DCX)
Determination of the number of DCX precursors
3D/2D projection of z-series
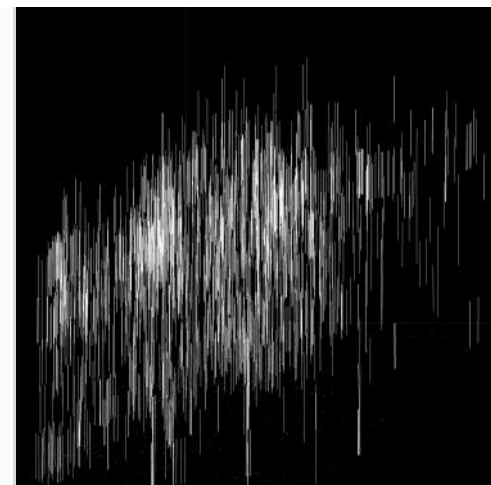
Link Folder : „export_07_DCX"

Table: „z-series_XxX_DCX.csv"
Z1-Z7 slices,
positions (x y) of each and every DCX segment on the slice
DCX total number

	A	B	C	D
1		1	2	
2	Z1_01_DAPI.png	1322 2485	242 2483	1385 248
3	Z2_01_DAPI.png			1385 248
4	Z3_01_DAPI.png			
5	Z4_01_DAPI.png			
6	Z5_01_DAPI.png			
7	Z6_01_DAPI.png			
8	Z7_01_DAPI.png			
9	cells: 10549	1	1	

DCX

Additional table: dcx_coordinates.csv

Created for 3D Spatial distribution

For each determined DCX segment writes 3D coordinates (x,y,z) /(1.5 µm/z)

Each DCX, if traced on 2 consecutive z-slices, was positioned halfway on the z coordinate

	A
1	x,y,z
2	3109,2483,4
3	2938,2482,6
4	170,2483,6
5	3041,2478,4
6	1597,2474,4
7	1400,2474,4
8	1477,2472,4
9	121,2472,8
10	210,2459,6
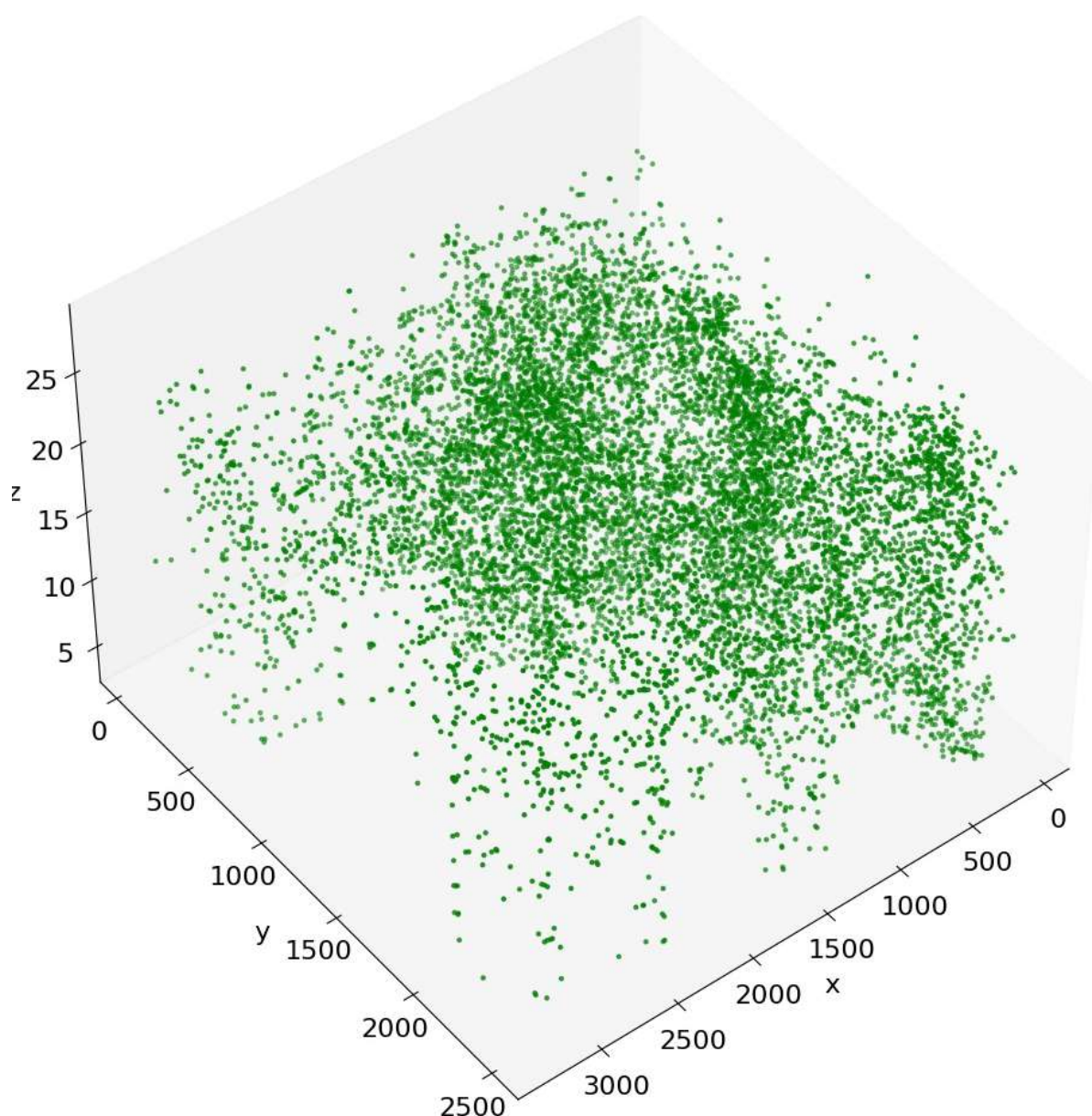
3D Spatial animation is on the folder „animations"
-„DCX_spatial_distribution.gif"

DCX + SYN

This is just a cool 3D spatial animation of both the DCX and SYN marker segment.
This simulation is based on real, measured data; after fully automatic image analysis of 7 z-slices on 2 markers; tracing algorithm, and 3D detection of the very small PSF structures on the images.

	A
1	x,y,z
2	3109,2483,4
3	2938,2482,6
4	170,2483,6
5	3041,2478,4
6	1597,2474,4
7	1400,2474,4
8	1477,2472,4
9	121,2472,8
10	210,2459,6

	A
1	x,y,z
2	3109,2483,4
3	2938,2482,6
4	170,2483,6
5	3041,2478,4
6	1597,2474,4
7	1400,2474,4
8	1477,2472,4
9	121,2472,8
10	210,2459,6
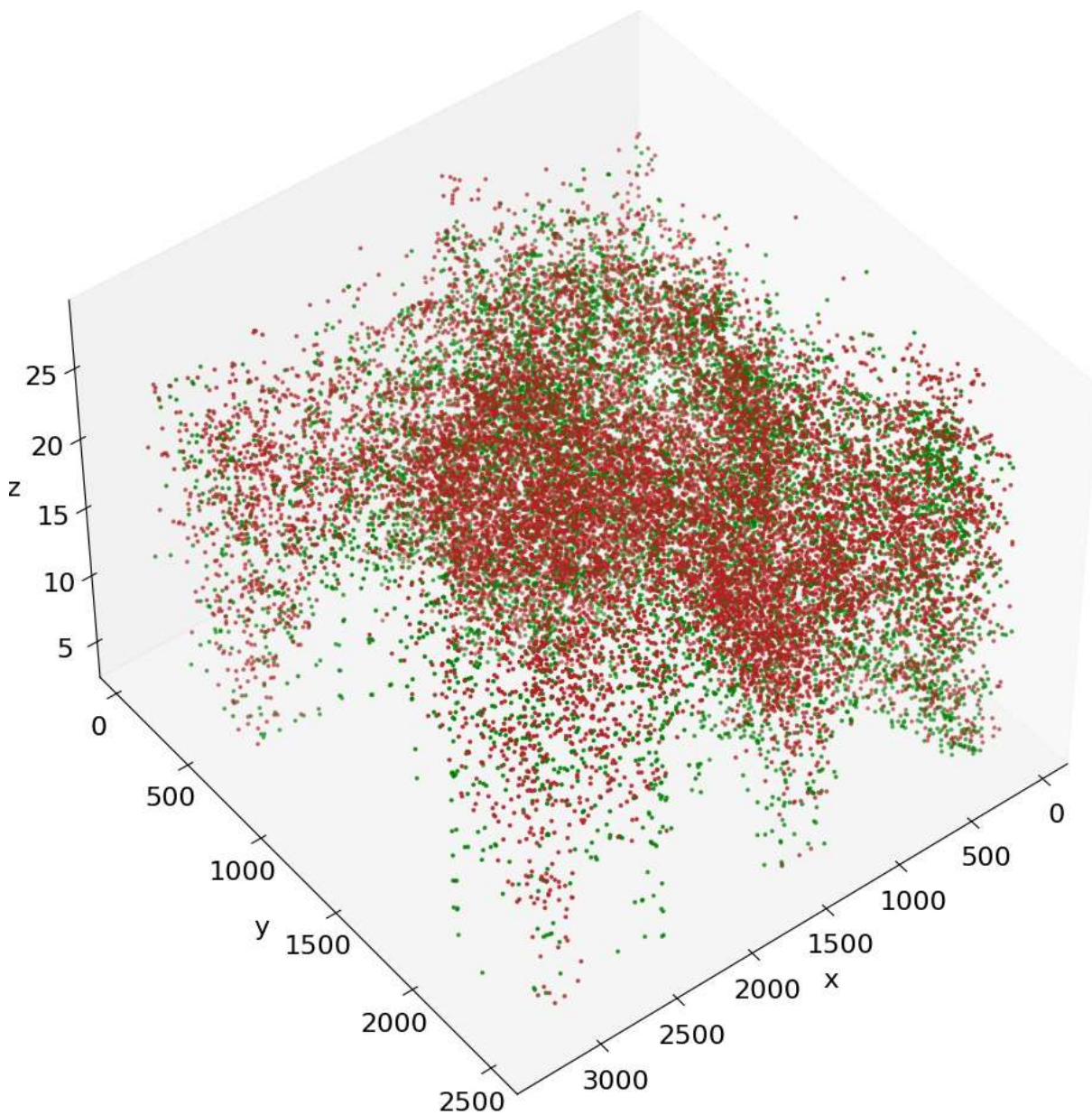
3D Spatial animation is on the folder „animations"
-„DCX_and_SYN_2x2_spatial_distribution.gif"

GFAP - SHOLL ANALYSIS

Link folder : „export_08_GFAP_2x2"

background picture:

red = original GFAP superimposed image (maximal projection of 7 slices)

Blue =DAPI original superimposed image (maximal projection of 7 slices)

Contours → segmented objects

yellow = astrocytes

Pink = position of the nuclei (verified with the DAPI*)

Green = Sholl radiuses

Tables: Z_GFAP_4x1_ShollData.csv

For each INDIVIDUAL (only) astrocyte, concentric circles around the nuclei count intersections with the skeleton of the branches yielding Sholl Intersection Profile.

*DAPI cells are verified with the H2AX marker – classified as the dead cells and were removed)
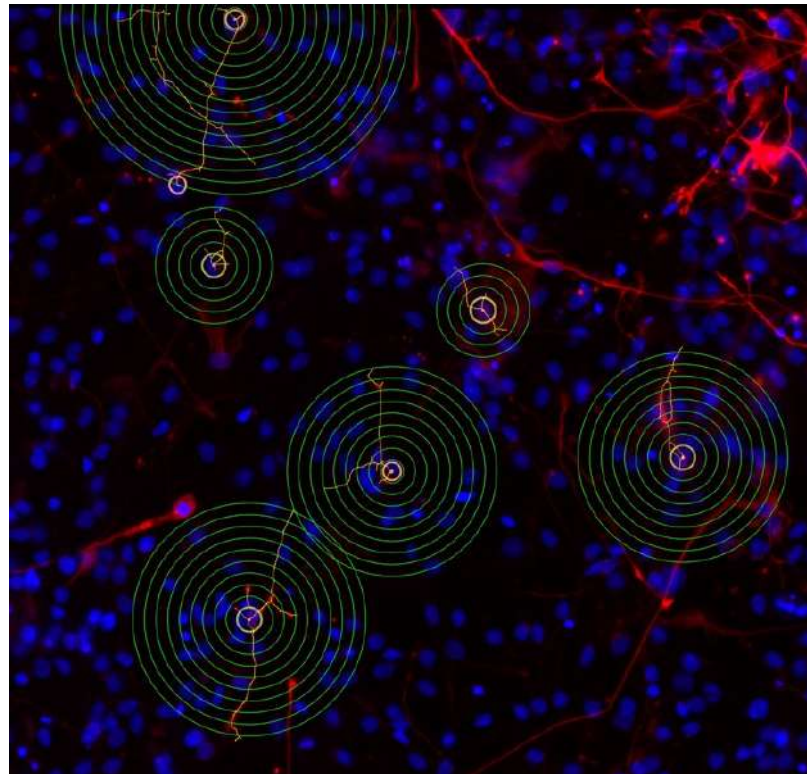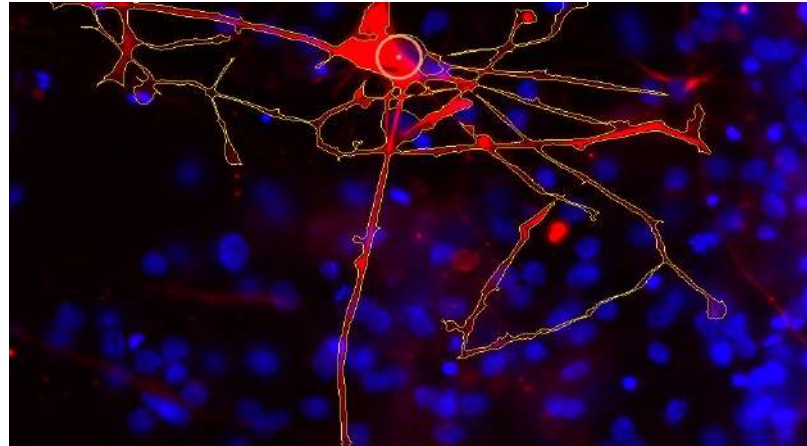
	A	B	C	D	E	F	G	H	I
1	subject	image	cell_ID	unique_cell_ID	radius	intersections	type	subtype	DIV
2		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	21	2		subtype	0
3		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	42	1		subtype	0
4		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	63	1		subtype	0
5		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	84	1		subtype	0
6		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	105	1		subtype	0
7		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	126	1		subtype	0
8		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	147	1		subtype	0
9		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	168	1		subtype	0
10		Z_GFAP_4x1	82	.div-0.Z_GFAP_4x1.82	189	1		subtype	0

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