



UW MMPC Nephrology, Macrovascular and Microvascular Core

Nephrology, Macro/Micro-Vascular Core – current services offered

- Necropsy
- Tissue processing and sectioning
- Histology, Immunohistochemistry
- Morphometric quantification (variety of tissues)
- In Situ hybridization
- Electron and confocal microscopy
- Mouse blood pressure measurements

Nephrology and Microvascular Component Services Provided

- Services to researchers: 60% from UW, 40% outside investigators
- Process, sections & stains paraffin blocks and frozen tissue
 - aortic sinus
 - Kidney, liver
 - fat
 - pancreas
- Histologic and immunohistochemical staining of sinus, kidneys & livers, pathology analysis of kidneys, quantification of atherosclerotic lesions
 - MOVATS, H&E, PAS, silver methenamine, oil red O, picrosirius red
 - IHC for macrophages, T cells, B cells, actin, WT-1
- Mouse blood pressure measurements

Study examples:

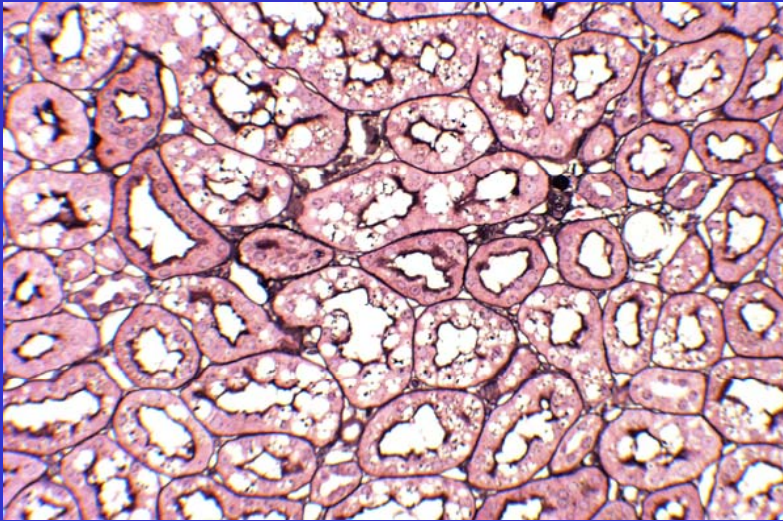
Moshe Levi, University of Colorado, AMDCC member

Models of diabetic atherosclerosis and nephropathy

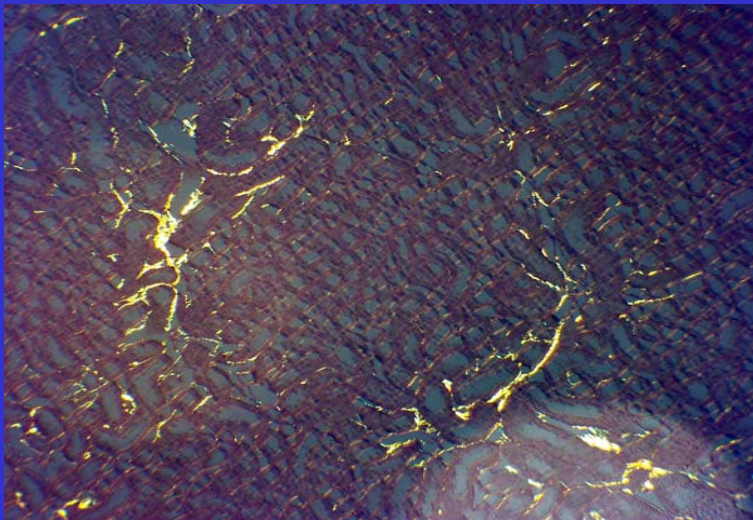
- DBA mice
- NON mice
- ApoE-/- (+/- Western diet, +/- uninephrectomy, +/- 5/6 nephrectomy)

DBA Mice

Tubular vacuoles



Interstitial fibrosis

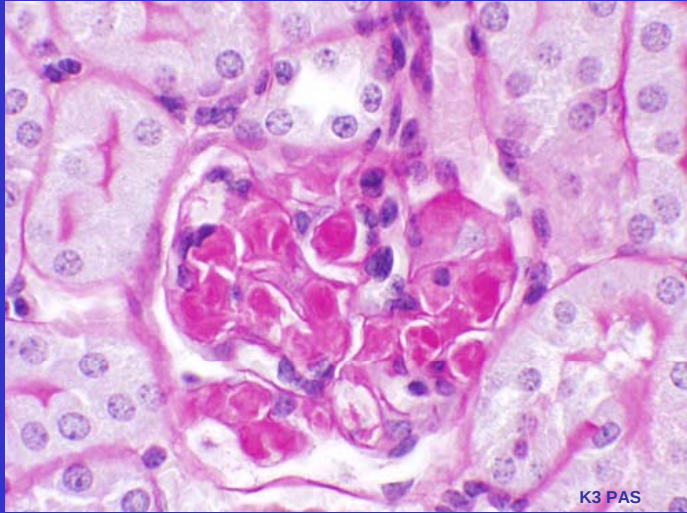


Sirius Red score

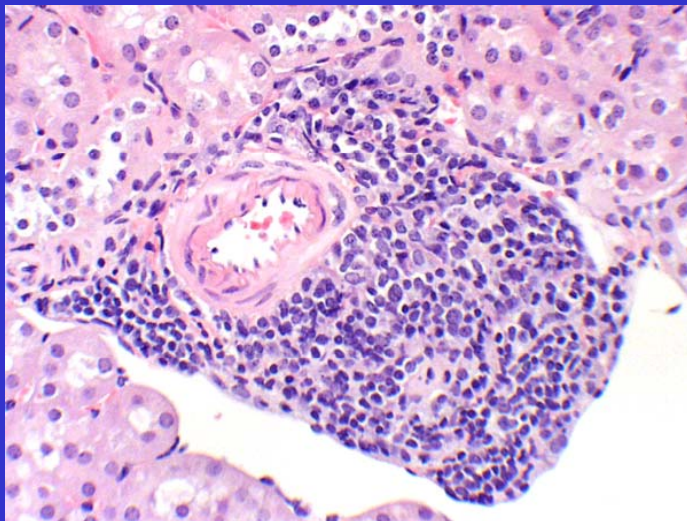
Group 1	Group 2	Group 3	Group 4
K68 ++/+	K76 +	K84 +++	K92 +
K69 +	K77 +	K85 +/-	K93 +++
K70 ++/+	K78 +	K86 +++/++	K94 +++
K71 ++	K79 +	K87 +/-	K95 ++
K72 ++	K80 ++	K88 +++	
K73 +	K81 +	K89 +	
K74 +	K82 ++	K90 ++	
K75 ++	K83 +++	K91 +	

NON Mice

Glomerular thrombi



Perivascular inflammation



Sirius Red score

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
K1 +/-	K7 +	K13 ++	K19 +	K25 ++	K31 +	K34 ++
K2 +/-	K8 +	K14 ++	K20 +	K26 +	K32 +	K35 ++
K3 ++	K9 +	K15 ++	K21 +	K27 +	K33 +	K36 ++
K4 ++	K11 +	K16 ++	K22 +	K28 +		K37 ++
K5 ++	K12 ++/+	K17 +	K23 +	K29 +		K38 ++
K6 ++		K18 +	K24 ++	K30 +		K39 ++
						K40 +
						K41 +

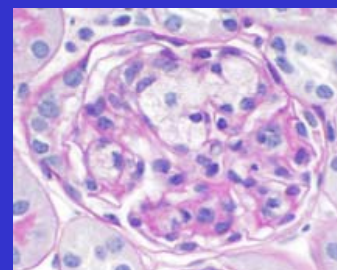
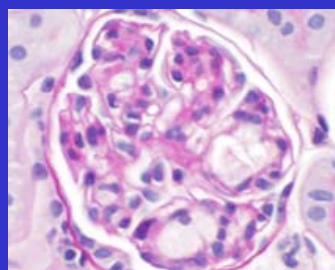
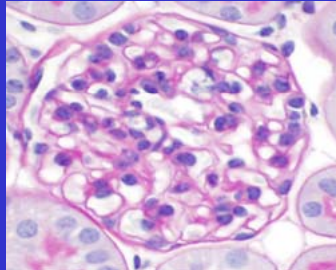
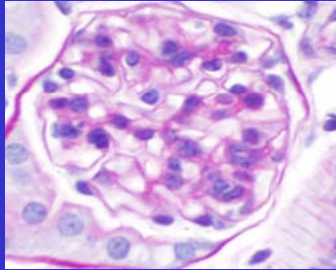
ApoE ^{-/-} Mice

Control

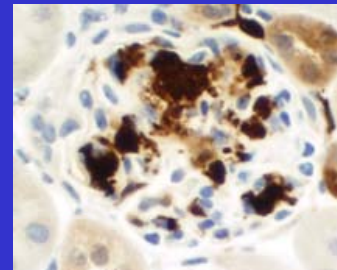
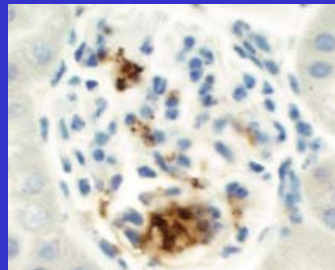
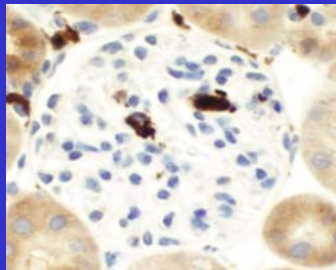
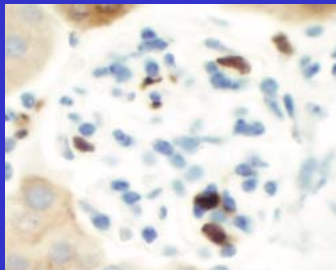
Western

Western
+ UniNx

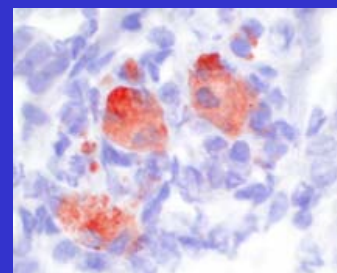
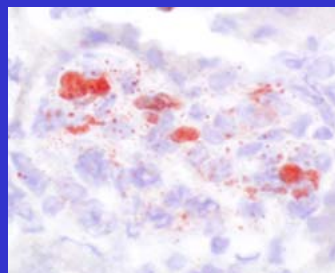
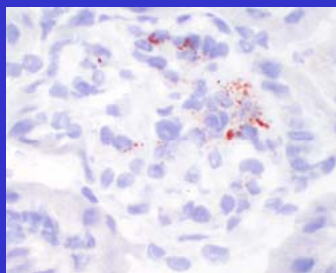
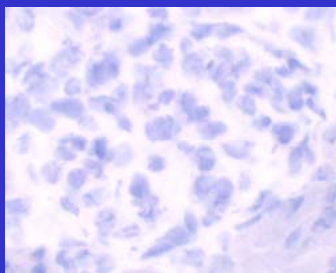
Western
+ 5/6 Nx



PAS



Mac-2



Oil red O

Study examples:

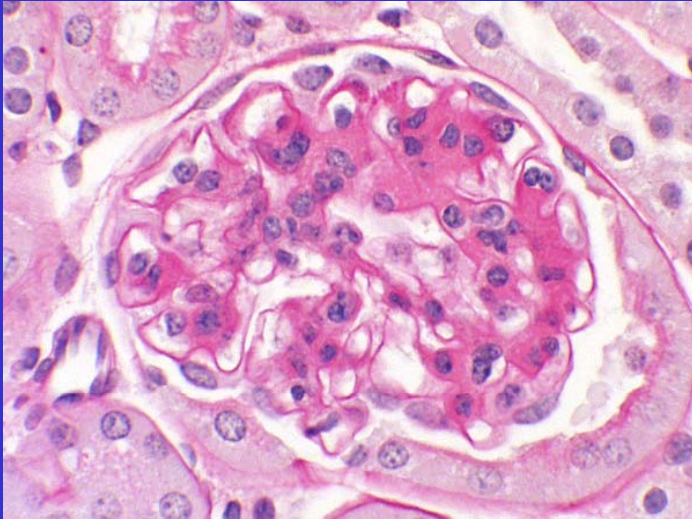
Jackson Laboratory, AMDCC member

Models of diabetic atherosclerosis, nephropathy & neuropathy

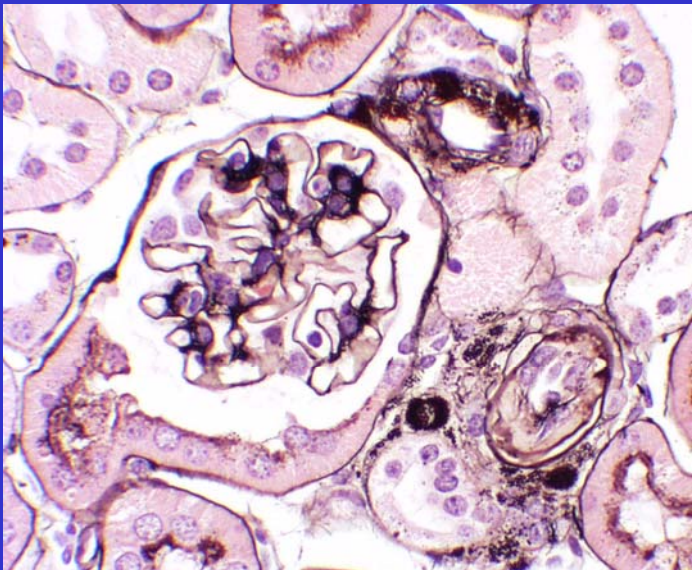
- FVB db/db mice

FVB db/db Mice

Mesangial expansion



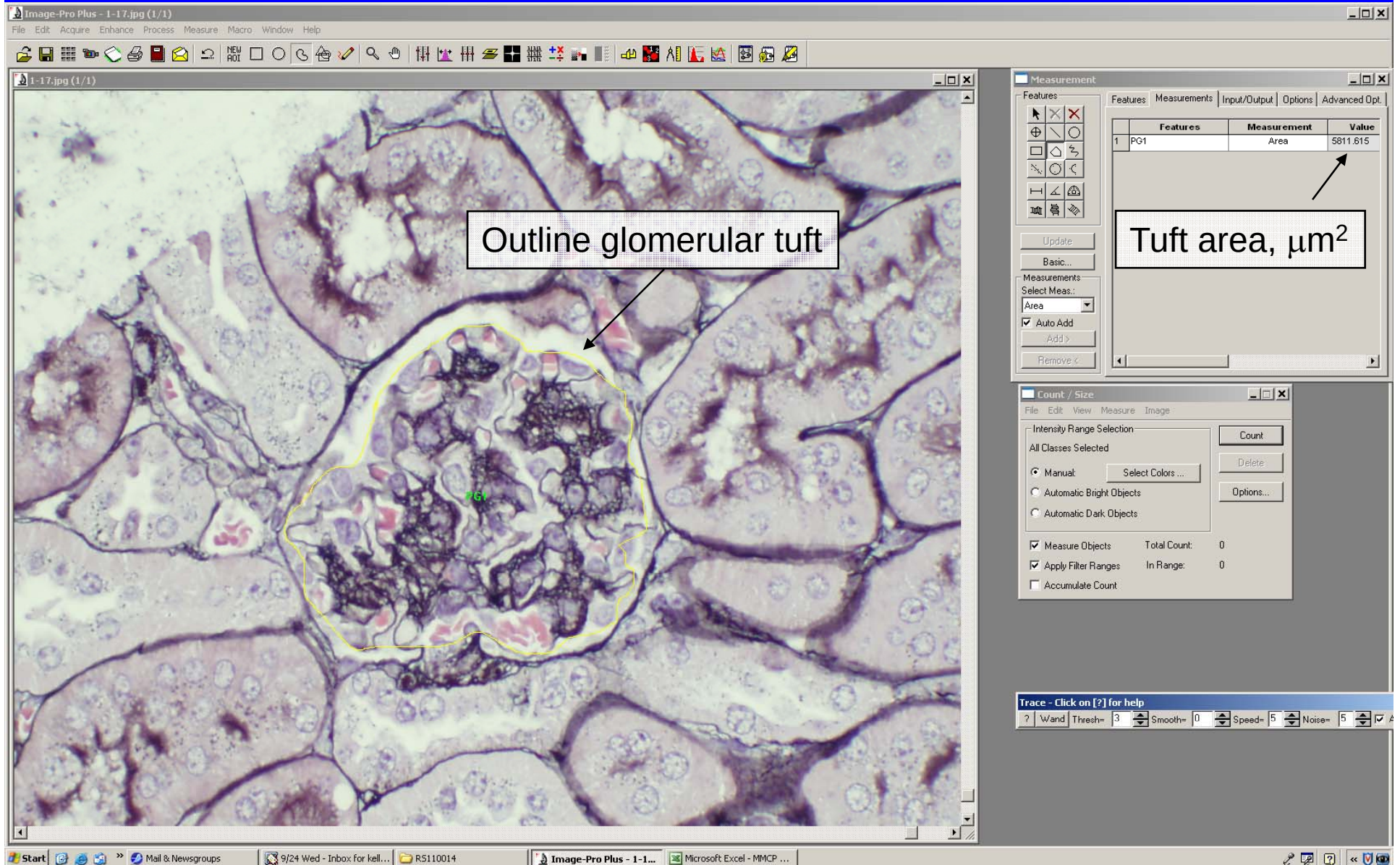
Arteriolar lesions



Animal No	Glom. Mean Area μm^2	Glom. Mean Matrix μm^2	Mean Matrix/Glom	Genotype
7715	436.3	4919	8.80%	+/?
7729	409.7	3701	10.90%	+/?
7730	451.6	4205	10.80%	+/?
7746	298.1	4196	7.10%	+/?
7747	366.9	4490	8.00%	+/?
7637	261.9	3692	6.90%	+/?
7714	565.2	6665	8.10%	db/db
7728	576.4	7227	8.00%	db/db
7731	529.3	6471	8.20%	db/db
7740	603.5	8010	7.80%	db/db
7741	469.5	5788	8.20%	db/db
7780	725.7	6700	10.60%	db/db
7800	510.5	4832	10.10%	db/db
7801	427.7	4740	8.80%	db/db
7808	581.9	6608	9.10%	db/db
7809	480.1	8491	8.10%	db/db
7638	521.9	6809	7.70%	db/db

Images opened in Image Pro Plus program

- Use measurement tool to outline glomerulus to determine glomerular tuft area



Use segmentation tool to pick colors of interest to count

- Outline glomerular tuft to define area of interest

The screenshot displays the Image-Pro Plus software interface. The main window shows a histological image of a glomerular tuft, which is outlined in green. The surrounding tissue is stained red. The software interface includes a menu bar (File, Edit, Acquire, Enhance, Process, Measure, Macro, Window, Help) and a toolbar with various icons for image manipulation and measurement.

The **Measurement** window is open, showing a table with the following data:

Features	Measurement	Value
1 PG1	Area	5811.615

The **Segmentation** window is also open, showing a histogram of the image data. The histogram has a red curve and a green curve. The x-axis is labeled from 0 to 255. The y-axis is labeled from 0 to 101. The window includes options for **Class 1**, **New**, **Del**, **R**, **G**, **B**, and **RGB**. There are also checkboxes for **Show All** and **Preview**, and buttons for **Create Preview Image**, **Class Color on Transparent**, **File...**, **New Mask**, **Apply Mask**, and **Close**.

Use segmentation tool to count colors of interest within glomerular tuft

- Export data to excel

The screenshot displays the Image-Pro Plus software interface. The main window shows a histological image of a glomerular tuft. A green outline highlights the tuft, and red segmentation marks the internal structures. The Measurement window on the right shows a table with the following data:

Features	Measurement	Value
PG1	Area	5811.615

The Count / Size window on the right shows the following data:

Count	Size
159	39

Annotations with arrows point to the 'Count' button in the Count / Size window and the 'DDE To Excel' option in the menu.

Count

Export data to Excel

Counted area data is exported to Excel spreadsheet

- Add glomerular area measured in Image Pro

Microsoft Excel - MMCP MERCK DATA.xls

Type a question for help

100% Arial 10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47

A B C D E F G H I J K L M N O P Q R S T U V W X Y

#Total Cou 42 #Total Cou 62 #Total Cou 39

6479.2 5422.3 5811.6

Obj# Area Obj# Area Obj# Area

33.13929 31.21419 76.54581

0.779209 12.42151 203.9694

16.31755 43.72737 15.17165

2.016776 6.233671 1.145895

11.32145 45.28579 2.887656

30.34331 0.779209 24.52216

25.34721 32.77261 1.10006

125.6818 2.062612 0.458358

6.508686 0.779209 33.64349

13.88825 6.7837 0.687537

3.254343 0.504194 0.458358

0.458358 2.979328 17.73846

0.916716 0.641701 2.337627

0.870881 0.458358 0.504194

2.016776 0.458358 182.1974

0.458358 5.408626 0.504194

3.529350 6.508686 1.10006

0.458358 1.283403 21.77201

4.171059 6.141999 5.663641

1.42091 2.84182 3.071

9.717193 1.145895 1.145895

1.604254 5.591969 0.641701

20.12192 2.475134 13.10904

17.32594 3.804373 4.766925

41.57309 1.695925 1.833433

87.08805 0.825045 9.30467

7.379566 2.887656 30.98501

2.933492 0.504194 74.11652

0.733373 5.2429298 2.016776

3.666865 0.825045 14.0716

0.825045 87.08805 103.7264

49.54852 6.921208 2.429298

1.329239 62.38255 0.458358

0.458358 11.59646 73.61232

3.575194 12.42151 0.458358

0.595866 21.22198 1.054224

5.91282 59.95325 2.291791

0.504194 4.49191 12.55901

0.641701 3.025164 3.804373

32.81844 0.733373

5.408626 29.05991

2.154283 2.154283

110014 Kelly Summary RS109402 RS109403 RS109404 RS109408 RS109407 RS109409 RS109412 RS109419 RS109410 RS109420 RS109418 RS109417 RS109414 RS110005 RS109421 RS110010 RS110021 RS110022

Draw AutoShapes Circular

Ready Circular NUM

Start Mail & Newsgroups 9/24 Wed - Inbox for kell... RS110014 Image-Pro Plus - 1-17.jp... Microsoft Excel - MMC... Microsoft PowerPoint - [...]

Continue until 15 glomeruli are measured

- Sum areas counted to determine total matrix area

Microsoft Excel - MMCP MERCK DATA.xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

100%

Average =SUM(B5:B67)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Glom #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16							
2	Glom Area	6479.2	5422.3	5811.6	6079.3	6905.99	5499.1	6754.2	5207.3	48888.1	5316.8	5730.8	5275.7	6375.8	4509.3	4647.4	5676.8							
3	% Matrix	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area							
4	Matrix Area	=SUM(B5:B67)																						
5		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18							
6		0.779209	12.42151	203.9694	0.895866	101.4805	87.31723	24.65967	41.80227	26.4931	25.39304	43.54403	26.17225	14.48412	0.458358	6.187835	19.11353							
7		16.31755	43.72737	15.17165	0.870881	434.661	8.43379	1.145895	36.76032	34.10184	2.887656	0.962552	1.10006	17.09676	157.3544	1.329239	2.154283							
8		2.016776	6.233671	1.145895	3.937716	248.8426	0.595866	7.333731	1.97094	0.687537	10.45057	10.58807	21.40532	0.825045	260.2558	0.595866	23.05541							
9		14.23415	45.38670	3.987656	1.6835	0.687537	5.408626	6.141999	0.779209	0.458358	4.950268	0.641701	3.39185	1.145895	2.108448	3.896044	70.1288							
10		30.34331	0.779209	24.52216	26.30976	0.504194	2.291791	111.106	0.504194	3.437686	24.93468	21.08447	3.162671	3.300179	36.9895	78.33341	2.154283							
11		25.34721	32.77261	1.10006	3.529358	240.7297	2.933492	2.933492	26.4931	1.695925	0.962552	1.283403	1.145895	0.458358	1.008388	2.475134	21.08447							
12		125.6818	2.062612	0.458358	39.05212	0.641701	12.32983	13.10904	3.025164	1.650089	0.504194	3.39185	370.9951	6.141999	33.04762	18.56351	1.650089							
13		6.506866	0.779209	33.64349	17.87597	2.016776	2.337627	100.7013	0.641701	2.016776	17.37177	24.24715	0.504194	14.48412	1.512582	0.962552	0.504194							
14		13.88825	6.7837	0.687537	3.529358	0.504194	5.454462	1.329239	1.283403	50.00687	11.73397	1.833433	1.650089	28.23486	3.116835	0.779209	35.75194							
15		3.254343	0.504194	0.458358	3.483522	3.666865	103.0847	0.687537	1.191731	0.504194	33.13929	100.8388	0.733373	2.750149	0.916716	0.595866	26.30976							
16		0.458358	2.979328	17.73846	0.458358	0.641701	2.566806	0.55003	8.662969	50.19022	3.666865	72.23724	2.200119	0.504194	3.437686	4.996104	29.65577							
17		0.916716	0.641701	2.337627	3.850209	0.687537	2.016776	4.49191	3.94188	0.779209	0.641701	2.016776	0.962552	3.346014	22.27621	11.96315	3.758537							
18		0.870881	0.458358	0.504194	1.008388	25.80566	4.629417	2.887656	4.812761	0.825045	77.14168	1.008388	1.42091	41.8481	10.81725	0.687537	48.12761							
19		2.016776	0.458358	182.1974	1.879268	5.225283	0.779209	5.91282	6.692029	46.52335	6.004492	0.733373	0.779209	1.191731	0.733373	3.025164	0.504194							
20		0.458358	5.408626	0.504194	6.921208	0.825045	2.337627	0.779209	0.458358	0.504194	2.795985	1.787597	10.58807	1.191731	0.55003	14.8508	13.88825							
21		3.529358	6.506866	1.10006	0.641701	124.6276	12.60405	0.779209	2.106448	3.403522	1.925104	0.641701	92.54251	1.033433	3.896044	4.583581	102.2139							
22		0.458358	1.283403	21.77201	0.641701	92.77169	2.429388	0.458358	1.925104	7.242059	10.67974	0.458358	0.458358	6.829536	149.1039	1.97094	25.02636							
23		4.171059	6.141999	5.683641	0.641701	5.729477	0.779209	35.24774	3.208507	32.49759	18.426	35.29358	1.191731	1.283403	6.279607	1.191731	1.329239							
24		1.42091	2.84182	3.071	11.22977	0.779209	2.337627	6.508686	10.35889	143.1911	3.896044	0.595866	0.458358	0.504194	2.612642	1.008388	4.400238							
25		9.717193	1.145895	1.145895	43.03963	1.650089	1.191731	2.200119	19.66356	3.483522	0.962552	4.904432	0.825045	3.804373	2.245955	0.687537	1.191731							
26		1.604254	5.591969	0.641701	3.162671	0.779209	0.458358	5.546134	1.650089	43.1315	0.825045	3.071	0.641701	3.116835	13.01737	0.641701	3.116835							
27		20.12192	2.475134	13.10904	26.67645	2.795985	0.458358	57.15726	58.62401	2.750149	8.387954	47.07338	3.071	1.512582	4.216895	0.458358	51.7028							
28		17.32594	3.804373	4.766925	0.687537	0.55003	4.171059	1.10006	1.375075	3.896044	1.10006	3.025164	1.695925	5.91282	0.962552	39.60215	2.750149							
29		41.57309	1.695925	1.833433	7.837924	1.695925	48.44846	1.512582	35.58859	2.108448	1.833433	5.546134	1.741761	4.812761	0.962552	5.225283	0.55003							
30		87.08805	0.825045	9.30467	1.604254		2.704313	10.17555	1.741761	67.42448	0.595866	0.641701	1.237567	4.033552	9.625522	1.10006	9.350507							
31		7.379566	2.887656	30.98501	1.558418		1.145895	15.21749	0.595866		78.92928	0.870881	29.70161	2.154283	57.38644	69.57877	5.225283							
32		2.933492	0.504194	74.11652	73.70399		3.346014	1.054224	1.237567		16.6384	0.870881	0.687537	0.595866	0.458358	2.979328	3.712701							
33		0.733373	2.429298	2.016776	13.42989		18.19682	31.81006	1.237567		1.879268	4.308567	2.750149	0.55003	7.88376	4.49191	24.98052							
34		3.666865	0.825045	14.0716	3.162671		6.554522	0.55003	1.97094		0.687537	0.595866	0.458358	23.14709	34.05601	1.008388	12.78819							
35		0.825045	87.08805	103.7264	3.116835		9.258835	6.233671	0.687537		0.779209	153.1375	0.504194	0.733373	0.962552	4.675253	35.24774							
36		49.54852	6.921208	2.429298	12.10066		0.55003	1.512582	28.8073		1.650089	1.283403	0.504194	43.81904	1.42091	1.512582	1.695925							
37		1.329239	62.38255	0.458358	1.512582		43.26901	2.933492	32.31425		0.504194	5.271119	12.87986	0.825045	4.125223	1.925104	10.4964							
38		0.458358	11.59646	73.61232	2.062612		0.870881	0.55003	11.50479		1.10006	0.595866	0.825045	3.071	2.933492	2.429298	0.687537							
39		3.575194	12.42151	0.458358	4.675253		2.750149	1.833433	10.4964		0.916716	2.062612	150.204	1.283403	1.329239	1.008388	5.683641							
40		0.595866	21.22198	1.054224	6.46285		4.446074	0.641701	1.329239		0.595866	0.55003	0.458358	22.27621	0.825045	11.91731	2.245955							
41		5.91282	59.95325	2.291791	1.10006		0.504194	19.38855	6.187835		0.641701	85.39212	66.50777	25.66806	4.904432	56.24055	17.18843							
42		0.504194	4.49191	12.55901	1.329239		5.454462	41.29807			2.245955	84.15456	0.687537	8.387954	1.145895	11.45895	11.36728							
43		0.641701	3.025164	3.804373	82.4128		0.962552	0.458358			0.55003	0.595866	1.42091	2.154283	1.329239	1.329239								
44		32.81844	0.733373		11.82564		3.483522	4.996104			1.375075	1.283403	58.07398	9.763029	2.704313	188.2019								
45		5.408626	29.05991		88.78397		0.779209	6.371178			0.55003	0.641701		2.750149	1.008388	23.00958								
46		2.154283	2.154283		18.93019		2.016776	47.66925			0.687537	1.375075		4.812761	1.237567	2.291791								
47			0.595866		1.512582		1.054224	0.458358			5.683641	0.733373		30.71		43.22318								

110014 Kelly | 109418 Kelly | Summary | R5109402 | R5109403 | R5109404 | R5109408 | R5109407 | R5109409 | R5109412 | R5109419 | R5109410 | R5109420 | R5109418 | R5109417 | R5109414 | R5110005 | R5109421 | R5110010 |

Start | Mail & Newsgroups | 9/24 Wed - Inbox for kelly... | R5110014 | Image-Pro Plus - 1-8.jpg... | Microsoft Excel - MMC... | Microsoft PowerPoint - [...]

Average glomerular area, % matrix and matrix area

- Determine standard deviations and SEM

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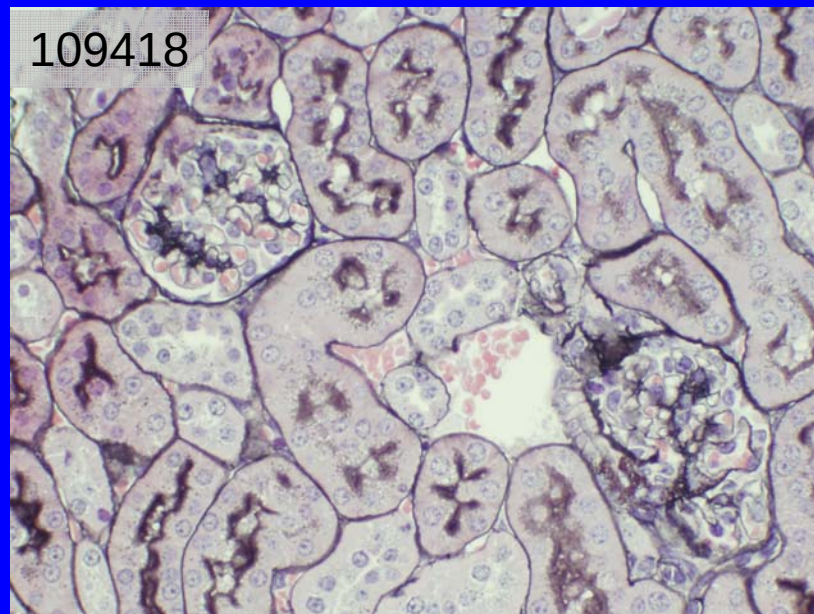
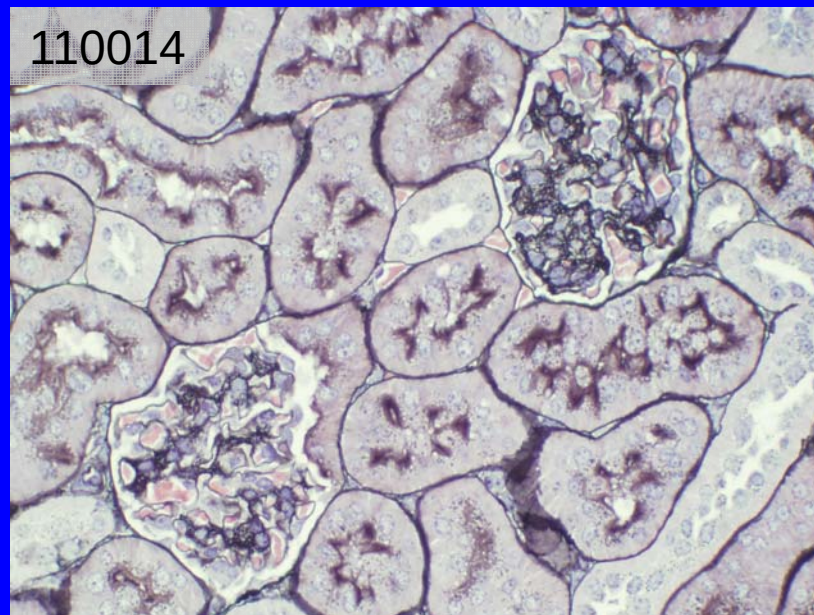
100% Arial 10 B I U

R8

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Glom #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			Average			
2	Glom Area	6479.2	5422.3	5811.6	6079.3	6905.99	5499.1	6754.2	5207.3	4888.1	5316.8	5730.8	5275.7	6375.8	4509.3	4647.4	5676.8		Glom Area	5661.231			
3	% Matrix	8.933428	13.1329	16.31022	11.60428	18.81222	11.49167	11.36768	7.635048	10.83609	13.22883	18.79246	18.77064	10.78139	19.0914	14.75062	11.9531		% Matrix	13.59325			
4	Matrix Area	578.8147	712.1052	947.8847	705.4591	1299.17	631.9384	767.7957	397.5799	529.6787	703.3506	1076.958	990.2828	687.3997	860.8884	685.5205	678.5534		Matrix Area	765.8363			
5		33.13929	31.21419	76.54581	154.7876	0.870881	24.10964	21.77201	25.94307	0.595866	212.0823	200.715	114.5437	12.60485	9.671357	16.13421	47.76092						
6		0.779209	12.42151	203.9694	0.595866	101.4805	87.31723	24.65967	41.80227	26.4931	25.39304	43.54403	26.17225	14.48412	0.458358	6.187835	19.11353						
7		16.31755	43.72737	15.17165	0.870881	434.661	8.43379	1.145895	36.76032	34.10184	2.887656	0.962552	1.10006	17.09676	157.3544	1.329239	2.154283						
8		2.016776	6.233671	1.145895	3.987716	248.8426	0.595866	7.333731	1.97094	0.687537	10.45057	10.58807	21.40532	0.825045	260.2558	0.595866	23.05541						
9		11.32145	45.28579	2.887656	3.116835	0.687537	5.408626	6.141999	0.779209	0.458358	4.950268	0.641701	3.39185	1.145895	2.108448	3.896044	70.1288						
10		30.34331	0.779209	24.57216	26.30976	0.504194	2.291791	111.106	0.504194	3.437686	24.93468	21.08447	3.162671	3.300179	36.9896	78.33341	2.154283						
11		25.34721	32.77261	1.10006	3.529358	240.7297	2.933492	26.4931	1.695925	0.962552	1.283403	1.145895	0.458358	1.008388	2.475134	21.08447							
12		125.6818	2.062612	0.458358	39.05212	0.641701	12.32983	13.10904	3.025164	1.650089	0.504194	3.39185	370.9951	6.141999	33.04762	18.56351	1.650089						
13		29.650866	0.779209	33.64349	17.87597	2.016776	2.337627	100.7013	0.641701	2.016776	17.37177	24.24715	0.504194	14.48412	1.512582	0.962552	0.504194						
14		13.88825	6.7837	0.687537	3.529358	0.504194	5.454462	1.329239	1.283403	0.500687	11.73397	1.833433	1.650089	28.23486	3.116835	0.779209	35.75194						
15		33.254343	0.504194	0.458358	3.483522	3.666865	103.0847	0.687537	1.191731	0.504194	33.13929	100.8388	0.733373	2.750149	0.916716	0.595866	26.30976						
16		0.458358	2.979328	17.73846	0.458358	0.641701	2.568806	0.55003	8.662969	50.19022	3.666865	72.23724	2.200119	0.504194	3.437686	4.996104	29.65577						
17		0.916716	0.641701	2.337627	3.850209	0.687537	2.016776	4.49191	3.94188	0.779209	0.641701	2.016776	0.962552	3.346014	22.27621	11.96315	3.758537						
18		53.0870881	0.458358	0.504194	1.008388	25.80556	4.629417	2.887656	4.812761	0.825045	77.14168	0.825045	1.42091	41.8481	10.81725	0.687537	48.12761						
19		2.016776	0.458358	182.1974	1.879268	5.225283	0.779209	5.91282	6.692029	46.52335	6.004492	0.733373	0.779209	1.191731	0.733373	3.025164	0.504194						
20		58.0458358	5.408626	0.504194	6.921208	0.825045	2.337627	0.779209	0.458358	0.504194	2.795985	1.787597	10.58807	1.191731	0.55003	14.8508	13.88825						
21		59.3529358	6.508686	1.10006	0.641701	124.6276	12.60485	0.779209	2.108448	3.483522	1.925104	0.641701	92.54251	1.833433	3.896044	4.583581	102.2139						
22		61.0458358	1.283403	21.77201	0.641701	92.77169	2.429298	0.458358	1.925104	7.242059	10.67974	0.458358	0.458358	6.829536	149.1039	1.97094	25.02636						
23		65.4171059	6.141999	5.683641	0.641701	5.729477	0.779209	35.24774	3.208507	32.49759	18.426	35.29358	1.191731	1.283403	6.279507	1.191731	1.329239						
24		67.142091	2.84182	3.071	11.22977	0.779209	2.337627	6.508686	1.355889	143.1911	3.896044	0.595866	0.458358	0.504194	2.612642	1.008388	4.400238						
25		68.9171931	1.145895	1.145895	43.03983	1.650089	1.191731	2.200119	19.66356	3.483522	0.962552	4.904432	0.825045	3.804373	2.245955	0.687537	1.191731						
26		69.1604254	5.591969	0.641701	3.162671	0.779209	0.458358	5.546134	1.650089	43.1315	0.825045	3.071	0.641701	3.116835	13.01737	0.641701	3.116835						
27		72.20.12192	2.475134	13.10904	26.67645	2.795985	0.458358	57.15726	58.62401	2.750149	8.387954	47.07338	3.071	1.512582	4.216895	0.458358	51.7028						
28		76.17.32594	3.804373	4.766925	0.687537	0.55003	4.171059	1.10006	1.375075	3.896044	1.10006	3.025164	1.695925	5.91282	0.962552	39.60215	2.750149						
29		78.41.57309	1.695925	1.833433	7.837924	1.695925	48.44846	1.512582	35.56859	2.108448	1.833433	5.546134	1.741761	4.812761	0.962552	5.225283	0.55003						
30		86.87.08805	0.825045	9.30467	1.604254		2.704313	10.17555	1.741761	67.42448	0.595866	0.641701	1.237567	4.033552	9.625522	1.10006	9.350507						
31		87.7.379566	2.887656	30.98501	1.558418		1.145895	15.21749	0.595866	78.92928	0.870881	29.70161	2.154283	57.38644	69.57877	5.225283							
32		92.2.933492	0.504194	74.11652	73.70399		3.346014	1.054224	1.237567		16.6384	0.870881	0.687537	0.595866	0.458358	2.979328	3.712701						
33		93.0.733373	2.429298	2.016776	13.42989		18.19682	31.81006	1.237567		1.879268	4.308567	2.750149	0.55003	7.88376	4.49191	24.98052						
34		96.3.666865	0.825045	14.0716	3.162671		6.554522	0.55003	1.97094		0.687537	0.595866	0.458358	23.14709	34.05601	1.008388	12.78819						
35		101.0.825045	87.08805	103.7264	3.116835		9.258835	6.233671	0.687537		0.779209	153.1375	0.504194	0.733373	0.962552	4.675253	35.24774						
36		102.49.54852	6.921208	2.429298	12.10066		0.55003	1.512582	28.83073		1.650089	1.283403	0.504194	43.81904	1.42091	1.512582	1.695925						
37		103.1.329239	62.38255	0.458358	1.512582		43.26901	2.933492	32.31425		0.504194	5.271119	12.87996	0.825045	4.125223	1.925104	10.4964						
38		104.0.458358	11.59646	73.61232	2.062612		0.870881	0.55003	11.50479		1.10006	0.595866	0.825045	3.071	2.933492	2.429298	0.687537						
39		105.3.575194	12.42151	0.458358	4.675253		2.750149	1.833433	10.4964		0.916716	2.062612	150.204	1.283403	1.329239	1.008388	5.683641						
40		107.0.595866	21.22198	1.054224	6.46285		4.446074	0.641701	1.329239		0.595866	0.55003	0.458358	22.27621	0.825045	11.91731	2.245955						
41		110.5.91282	59.95325	2.291791	1.10006		0.504194	19.38655	6.187835		0.641701	85.39212	66.50777	25.66806	4.904432	56.24055	17.18843						
42		112.0.504194	4.49191	12.55901	1.329239		5.454462	41.29807			2.245955	84.15456	0.687537	8.387954	1.145895	11.45895	11.36728						
43		113.0.641701	3.025164	3.804373	82.4128		0.962552	0.458358			0.55003	0.595866	1.42091	2.154283	1.329239	1.329239							
44		115.32.81844	0.733373		11.82564		3.483522	4.996104			1.375075	1.283403	58.07398	9.763029	2.704313	188.2019							
45		117.5.408626	29.05991		88.78397		0.779209	6.371178			0.55003	0.641701		2.750149	1.008388	23.00958							
46		121.2.154283		2.154283	18.93019		2.016776	47.66925			0.687537	1.375075		4.812761	1.237567	2.291791							
47			0.595866		1.512582		1.054224	0.458358			5.683641	0.733373		30.71		43.22318							

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Example of morphometry results



	110014	109418
Glom Area	5661.2306	2607.84
% Matrix	13.593248	8.515978
Matrix Area	765.83627	218.2885
STD		
	713.46047	569.1596
	3.7337131	3.328407
SEM	223.41975	81.88974
	178.36512	142.2899
	0.9334283	0.832102
	55.854936	20.47244