

Supplementary Materials

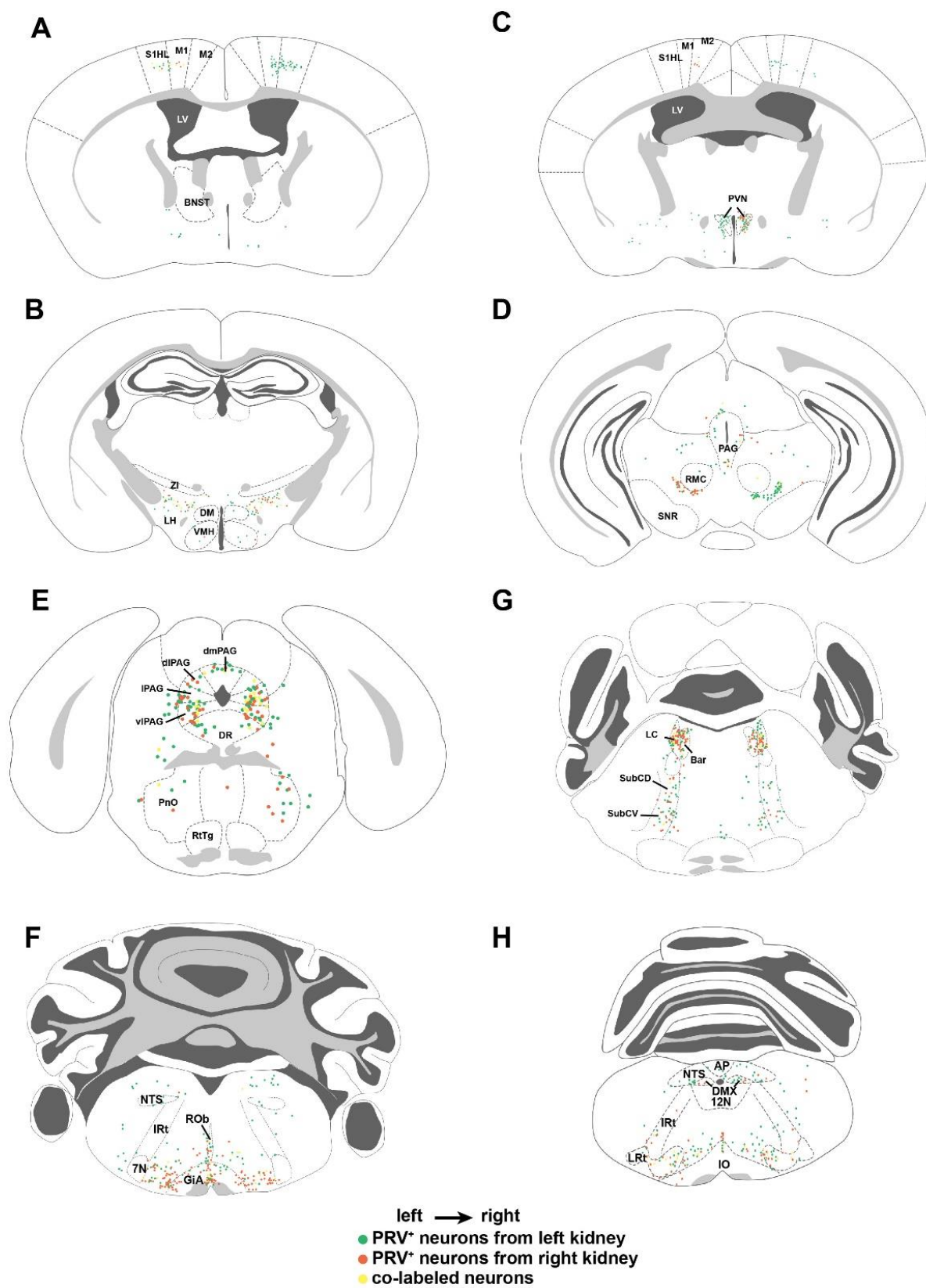


Fig. S1 Schematic diagram of the left and right kidney-related neuron distribution in the mouse brain.

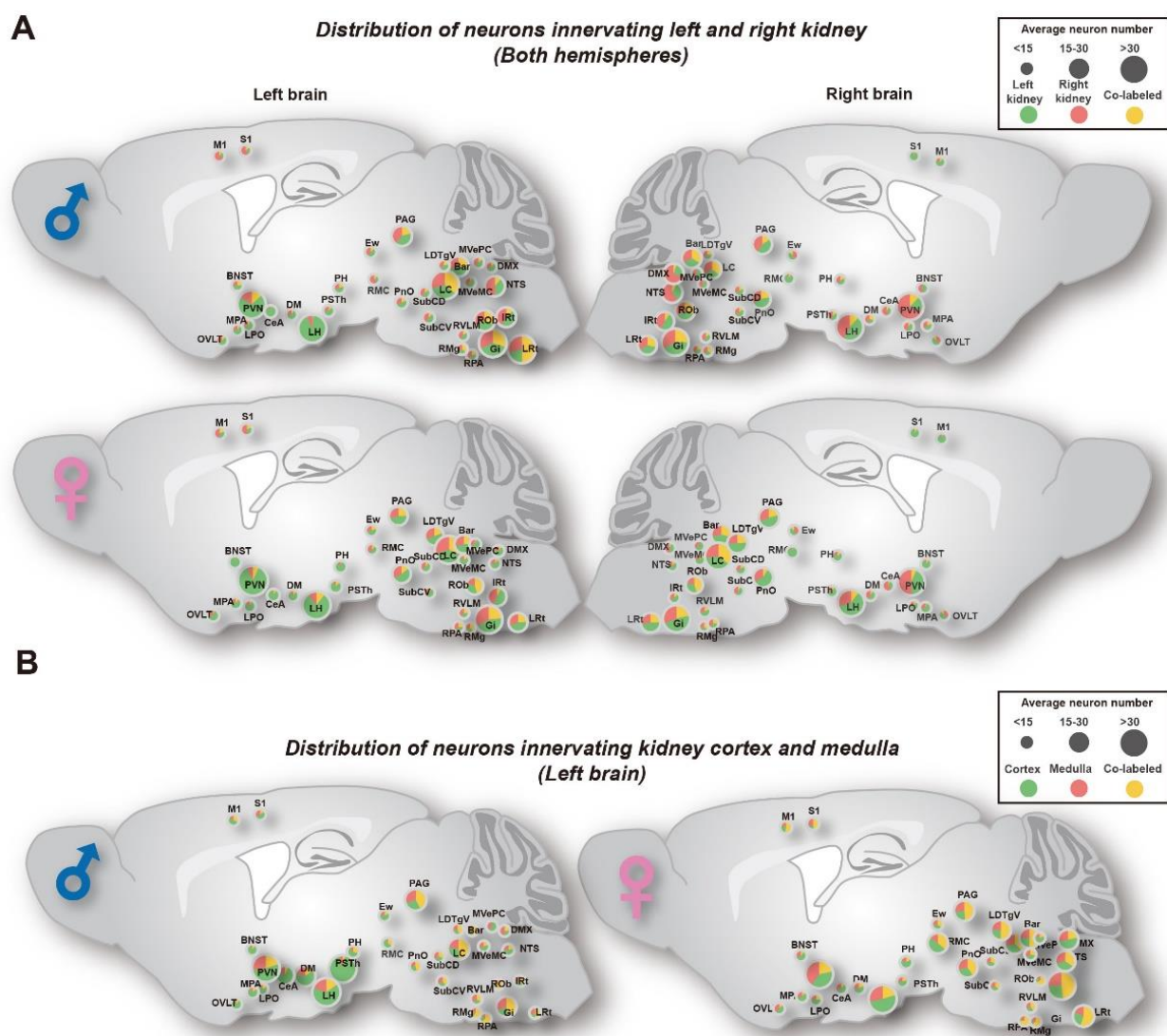


Fig. S2 Distribution of neurons innervating left and right kidneys, or the kidney cortex and medulla in male and female C57BL/6J mice. A, Distribution of neurons connecting to the left and right kidney. B, Distribution of neurons connecting to the kidney cortex and medulla.

Supplementary Tables

Table S1 Number of PRV-labeled neurons innervating the left or right kidney in each brain region. EGFP labels neurons innervating the left kidney; mRuby labels the neurons innervating the right kidney ($n = 5$). Data are shown as the mean $\pm$ SEM.

	Male						Female					
	Left brain			Right brain			Left brain			Right brain		
	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %
M1	3.483 ± 1.908	9.267 ± 6.784	15.058 ± 8.931	6.417 ± 5.688	2.300 ± 2.405	10.508 ± 9.188	2.967 ± 2.799	4.083 ± 4.074	12.480 ± 15.149	11.717 ± 8.053	1.783 ± 2.582	2.587 ± 3.601
S1	2.500 ± 2.672	5.417 ± 3.985	12.192 ± 7.235	5.967 ± 6.573	0.533 ± 0.767	7.374 ± 11.347	4.683 ± 1.649	6.883 ± 4.655	18.816 ± 13.235	10.617 ± 5.546	1.350 ± 1.137	10.301 ± 15.405
BNST	0.200 ± 0.447	0.133 ± 0.298	1.667 ± 3.727	0.067 ± 0.149	0.067 ± 0.149	0	6.200 ± 3.877	0.200 ± 0.298	0.939 ± 2.101	3.733 ± 3.897	0.867 ± 1.325	4.340 ± 9.704
CeA	9.867 ± 14.017	0.850 ± 0.914	1.078 ± 2.077	1.317 ± 1.449	2.100 ± 1.698	5.635 ± 8.723	4.383 ± 5.413	0.500 ± 0.984	2.788 ± 6.234	4.867 ± 4.730	8.233 ± 16.805	3.017 ± 3.348
MPA	5.000 ± 1.612	2.017 ± 1.677	8.060 ± 6.120	3.167 ± 1.969	2.867 ± 2.488	22.550 ± 7.565	6.35 ± 3.060	2.083 ± 1.678	8.804 ± 6.823	4.050 ± 3.028	1.867 ± 1.505	7.438 ± 10.767
LPO	2.533 ± 1.758	1.267 ± 1.256	4.000 ± 5.963	1.600 ± 1.011	1.543 ± 0.615	9.000 ± 8.608	7.050 ± 4.327	1.683 ± 1.890	12.761 ± 16.836	6.117 ± 3.272	3.583 ± 3.194	15.193 ± 14.046
PVN	38.733 ± 10.267	13.417 ± 7.708	12.599 ± 3.434	9.967 ± 4.534	26.583 ± 1.294	11.167 ± 7.955	39.367 ± 14.660	5.800 ± 3.529	7.241 ± 3.658	14.717 ± 17.938	16.967 ± 5.554	6.174 ± 1.773
LH	23.000 ± 5.927	11.133 ± 7.368	12.236 ± 5.728	17.183 ± 5.756	16.067 ± 11.388	11.734 ± 7.732	42.900 ± 25.781	9.767 ± 4.928	13.774 ± 7.982	24.823 ± 19.081	13.530 ± 7.447	10.418 ± 5.074
PSTh	4.867 ± 3.783	2.167 ± 1.167	8.231 ± 6.874	2.367 ± 2.056	2.317 ± 2.135	8.613 ± 8.172	6.150 ± 4.950	1.317 ± 2.131	7.742 ± 14.477	2.967 ± 2.174	1.333 ± 1.929	6.611 ± 7.202
DM	5.000 ± 3.758	2.300 ± 2.110	6.241 ± 8.295	4.033 ± 2.103	4.467 ± 3.324	24.952 ± 16.891	12.067 ± 6.153	2.867 ± 3.079	12.436 ± 7.595	6.400 ± 1.935	5.600 ± 5.150	6.872 ± 9.291
PH	6.700 ± 3.429	4.617 ± 3.360	15.794 ± 11.162	5.283 ± 3.392	4.533 ± 3.526	13.829 ± 6.343	4.917 ± 3.997	0.600 ± 0.548	0.784 ± 1.754	3.333 ± 2.739	1.400 ± 2.047	21.222 ± 27.923

RMC	4.050	8.133	10.990 ±9.923	11.617	1.800	14.108	6.950	6.700	11.702	19.067	1.483	2.371
	±3.812	±4.873		±6.350	±1.121	±16.713	±5.286	±3.840	±11.796	±10.882	±1.100	±2.770
IPAG	11.067	10.800	22.108	10.800	10.200	16.469	19.200	14.667	22.850	19.867	15.000	19.310
	±2.919	±2.968		±3.849	±4.741	±5.654	±7.988	±7.750	±6.407	±9.350	±8.216	±4.424
vlPAG	12.933	12.667	27.083	12.067	11.667	26.268	16.000	11.600	23.768	15.400	12.267	26.160
	±1.754	±3.333		±2.454	±4.123	±11.844	±5.831	±4.092	±9.307	±6.614	±5.499	±9.290
PnO	9.133	6.933	16.479	12.933	10.400	23.162	17.267	12.667	14.464	15.867	9.267	7.880
	±3.602	±3.427		±10.186	±6.970	±11.309	±7.002	±4.690	±10.376	±5.490	±3.370	±3.384
SubCD	7.867	7.200	17.876 ±8.929	8.933	7.400	18.928	8.333	5.533	13.426	10.200	6.533	12.629
	±2.231	±0.691		±1.553	±2.681	±7.845	±5.442	±2.399	±8.406	±8.204	±3.540	±10.051
SubCV	6.600	5.800	12.883	6.800	6.000	14.233	8.667	6.600	7.537	8.933	6.800	8.103
	±2.074	±2.142		±2.063	±2.198	±16.510	±6.625	±4.639	±5.553	±7.436	±3.159	±3.854
LDTgV	6.667	5.600	21.456±15.343	7.333	7.267	26.248	14.200	10.267	19.644	13.067	8.733	22.291
	±0.913	±1.256		±1.986	±2.350	±8.773	±5.984	±2.862	±5.222	±6.269	±2.862	±8.195
LC	25.200	23.000	38.024 ±6.834	19.000	19.067	35.199	25.700	22.333	30.638	23.100	19.433	31.388
	±3.768	±1.616		±6.566	±8.716	±5.057	±12.427	±8.003	±14.057	±14.322	±7.566	±12.176
Bar	12.600	9.800	27.940 ±8.564	11.667	11.400	33.853	14.800	11.133	22.749	12.867	10.000	26.247
	±2.278	±2.479		±2.549	±3.004	±7.279	±6.529	±4.112	±8.637	±9.239	±4.619	±9.924
MVeMC	9.400	6.067	8.977 ±7.745	8.200	6.200	4.171	8.333	3.267	16.316	7.267	3.600	13.250
	±5.565	±3.539		±4.897	±2.864	±4.038	±5.977	±2.060	±20.992	±5.713	±3.227	±4.150
Irt	10.867	9.933	13.432	11.267	9.733	15.582	10.400	8.800	8.963	9.167	6.533	13.602
	±4.350	±3.040		±5.107	±3.353	±16.394	±5.570	±3.962	±7.319	±7.506	±3.548	±9.064
GI	32.933	29.267	25.270 ±6.027	32.467	27.667	24.237	25.467	21.467	24.465	23.867	18.267	20.248
	±10.943	±6.689		±13.010	±9.542	±2.165	±10.798	±8.780	±12.881	±13.031	±7.436	±12.081
LRt	26.600	15.333	21.971 ±4.973	14.333	13.200	28.790	17.400	13.800	18.957	18.133	13.200	17.465
	±34.848	±2.248		±3.342	±3.509	±5.543	±14.880	±11.789	±12.011	±16.723	±11.890	±14.546
RVLM	5.333	4.667	17.341 ±8.341	5.400	5.133	10.721	2.600	2.733	23.204	6.333	4.400	16.959
	±2.095	±1.374		±1.801	±1.464	±8.105	±1.673	±2.074	±15.255	±7.196	±5.464	±10.578
NTS	10.800	13.400	14.298	9.600	16.333	12.789	10.867	5.333	9.585	8.833	5.417	11.060
	±5.321	±14.734		±4.850	±17.203	±15.033	±5.475	±4.333	±9.549	±6.137	±3.047	±14.519

DMX	8.000 ±0.943	5.267 ±3.811	12.518 ±9.126	4.467 ±1.726	10.867 ±4.363	6.272 ±5.778	9.667 ±5.715	4.200 ±2.912	9.251 ±14.570	6.667 ±5.132	7.533 ±3.211	6.429 ±4.386
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	Male			Female		
	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %
OVL	2.467 ±2.268	1.767 ±1.526	7.017 ±14.729	6.700 ±5.239	2.667 ±3.089	4.667 ±5.224
Ew	1.867 ±0.701	1.633 ±0.711	27.963 ±40.967	2.500 ±1.576	1.750 ±1.601	12.614 ±14.610
dmPAG	7.267 ±5.013	7.600 ±5.372	32.554 ±18.347	10.000 ±5.142	7.800 ±4.093	31.838 ±14.009
ROb	10.883 ±1.040	10.800 ±1.574	23.796 ±12.167	10.000 ±7.219	10.400 ±6.304	25.054 ±8.371
RPA	6.533 ±1.850	7.133 ±1.574	32.594 ±23.050	6.267 ±2.477	6.000 ±1.795	38.946 ±13.708
RMg	9.467 ±3.429	8.867 ±4.233	34.116 ±30.242	8.067 ±6.970	6.467 ±3.288	45.864 ±15.746

M1, Primary motor cortex; S1, Primary somatosensory cortex; OVLT, Organum vasculosum laminae terminalis; BNST, Bed nucleus of the stria terminalis; CeA, Central nucleus of the amygdala; MPA, Medial preoptic area; LPO, Lateral preoptic area; PVN, Paraventricular nucleus; LH, Lateral hypothalamic area; PSTh, Paraventricular nucleus; DM, Dorsomedial hypothalamic; PH, Posterior hypothalamic nucleus; RMC, Red nucleus, magnocellular part; EW, Edinger-Westphal nucleus; dmPAG, Dorsomedial periaqueductal gray; lPAG, Lateral periaqueductal gray; vIPAG, Ventrolateral periaqueductal gray; PnO, Oral pontine reticular nucleus; SubCD, Dorsal subcoeruleus nucleus; SubCV, Ventral subcoeruleus nucleus; LDTgV, Laterodorsal tegmental nucleus, ventral part; ROb, Raphe obscurus nucleus; RMg, Raphe magnus nucleus; RPA, Raphe pallidus nucleus; LC, Locus coeruleus; Bar, Barrington's nucleus; MVePC, Medial vestibular nucleus, parvicellular part; MVeMC, Medial vestibular nucleus, magnocellular part; IRt, Intermediate reticular nucleus; Gi, Gigantocellular reticular nucleus; LRt, Lateral reticular nucleus; RVLM, Rostral ventrolateral medulla; NTS, Solitary nucleus; DMV, Dorsal motor nucleus of the vagus.

Table S2 Number of PRV-labeled neurons innervating the kidney cortex or medulla in each brain region. EGFP labels neurons innervating the kidney cortex; mRuby labels the neurons innervating the kidney medulla ($n = 5$). Data are shown as the mean $\pm$ SEM.

	Male						Female					
	Left brain			Right brain			Left brain			Right brain		
	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %
M1	6.267	3.700	23.691	12.133	8.933	29.892	4.000	3.400	38.241	19.200	11.773	22.333
	± 8.005	± 5.207	± 31.677	± 14.983	± 13.580	± 13.545	± 3.559	± 3.022	± 28.640	± 15.830	± 7.986	± 8.429
S1	4.933	3.600	19.222	9.467	5.467	31.248	5.667	7.533	22.267	28.147	23.387	24.541
	± 8.496	± 6.954	± 21.479	± 7.999	± 3.863	± 22.678	± 9.557	± 10.558	± 32.487	± 16.511	± 31.443	± 11.873
BNST	8.917	2.467	13.927	11.683	0.717	5.902	6.633	4.233	12.913	2.200	1.300	6.190
	± 7.929	± 1.579	± 7.365	± 12.609	± 0.960	± 10.762	± 4.519	± 4.870	± 5.676	± 1.850	± 1.445	± 8.518
CeA	14.873	2.947	6.100	32.533	1.147	2.373	7.267	3.983	11.424	2.617	2.383	24.942
	± 14.200	± 2.395	± 11.259	± 36.777	± 1.440	± 3.260	± 7.733	± 5.899	± 7.959	± 1.092	± 1.965	± 42.340
MPA	6.250	1.983	16.578	8.283	0.750	1.586	5.460	2.850	10.323	3.230	2.360	11.144
	± 5.051	± 2.261	± 18.507	± 11.783	± 0.920	± 1.729	± 1.190	± 2.927	± 8.467	± 2.947	± 3.473	± 8.471
LPO	4.150	2.100	22.631	5.250	1.033	9.560	6.390	3.800	19.199	3.580	2.330	13.380
	± 1.278	± 1.140	± 21.609	± 5.499	± 0.749	± 10.783	± 2.449	± 4.578	± 11.382	± 1.825	± 2.608	± 10.615
PVN	36.333	23.900	17.621	23.817	10.233	18.738	29.900	30.417	25.340	17.567	20.100	13.423
	± 24.045	± 11.571	± 10.054	± 22.434	± 6.777	± 13.858	± 11.708	± 16.102	± 18.504	± 4.753	± 14.763	± 10.264
LH	41.200	19.333	19.336	37.067	13.467	19.726	30.983	20.633	21.686	24.583	17.400	20.228
	± 21.725	± 8.456	± 6.369	± 29.734	± 7.373	± 12.354	± 12.351	± 15.753	± 9.697	± 8.313	± 14.348	± 5.366
PSTh	24.833	1.767	3.134	27.800	2.133	5.511	6.000	3.633	26.842	1.733	1.267	2.450
	± 29.348	± 1.588	± 4.306	± 32.856	± 2.090	± 8.566	± 5.977	± 5.521	± 25.825	± 2.100	± 2.650	± 5.478
DM	8.467	4.000	16.979	9.333	2.333	11.703	8.733	5.800	10.251	5.983	5.000	15.228
	± 9.332	± 2.248	± 12.172	± 9.107	± 1.354	± 9.538	± 6.946	± 8.513	± 11.012	± 4.327	± 5.691	± 12.967
PH	6.467	3.267	10.969	4.400	1.267	8.773	6.267	2.533	8.718	4.117	2.283	10.341
	± 7.614	± 4.106	± 14.127	± 3.647	± 1.640	± 15.352	± 4.142	± 3.286	± 8.055	± 4.722	± 3.011	± 11.079

RMC	4.633	1.467	22.569	19.717	9.233	34.950	4.400	6.117	38.368	24.167	14.600	17.063
	±3.554	±1.516	±27.444	±15.675	±6.094	±19.912	±1.949	±7.118	±19.477	±6.835	±10.409	±19.068
IPAG	10.400	9.800	55.398	10.667	10.133	41.577	20.800	21.333	49.661	21.400	18.933	41.297
	±6.759	±6.935	±7.734	±8.410	±6.594	±9.196	±10.219	±14.252	±16.618	±8.355	±12.919	±9.897
vIPAG	12.333	12.867	42.374	11.800	13.067	47.862	17.733	17.867	48.410	16.667	15.600	41.216
	±6.737	±7.523	±5.463	±7.198	±7.073	±7.227	±7.949	±9.512	±16.152	±5.578	±8.163	±11.533
PnO	7.467	6.600	45.922	8.667	7.867	45.109	15.067	14.267	37.248	12.467	11.200	37.779
	±3.347	±2.929	±11.033	±1.915	±0.767	±11.127	±6.647	±8.597	±3.960	±5.146	±6.951	±4.964
SubC	5.333	5.133	29.793	5.133	4.867	35.799	11.133	9.800	38.701	10.000	8.867	36.394
D	±2.041	±2.181	±10.600	±2.411	±2.340	±19.561	±5.070	±5.776	±17.212	±5.307	±5.059	±17.733
SubC	4.733	4.600	35.739	5.533	5.467	34.654	8.333	8.267	46.194	8.467	6.467	47.029
V	±2.842	±2.910	±11.894	±2.588	±3.776	±4.373	±3.520	±5.052	±19.825	±4.628	±3.564	±21.251
LDTg	7.733	7.733	44.399	6.933	6.800	42.610	11.000	9.533	52.970	11.733	9.800	44.874
V	±2.881	±4.518	±7.351	±2.290	±2.864	±18.054	±4.275	±2.815	±13.428	±4.663	±3.556	±20.977
LC	18.267	16.800	49.712	15.933	15.133	53.539	22.267	21.967	50.587	20.367	20.767	49.122
	±7.084	±7.073	±9.402	±7.697	±6.640	±11.920	±9.224	±11.918	±9.371	±9.396	±11.142	±8.258
Bar	8.933	8.133	45.615	9.200	8.667	50.844	13.733	13.533	50.170	13.700	12.600	44.664
	±5.575	±3.856	±10.824	±5.460	±2.614	±12.807	±6.387	±8.611	±3.743	±7.725	±8.391	±13.990
MVeM	4.667	3.333	24.352	4.000	4.200	16.854	6.133	5.467	29.049	6.267	5.600	31.405
C	±1.841	±1.667	±26.947	±1.333	±1.095	±19.248	±1.742	±1.677	±24.360	±2.712	±1.906	±21.039
Irt	6.800	6.133	41.238	6.667	7.133	40.874	11.733	11.133	34.151	10.400	10.333	39.972
	±2.873	±2.765	±9.814	±2.991	±2.912	±8.137	±8.084	±8.607	±10.601	±8.295	±9.171	±12.519
GI	14.733	16.533	49.266	14.467	15.6	44.953	24.333	23.800	49.623	22.267	23.400	45.586
	±3.585	±4.350	±12.991	±6.384	±6.444	±12.383	±8.663	±6.212	±16.674	±8.105	±4.166	±9.959
LRt	10.200	11.333	53.743	9.600	10.533	44.238	19.333	17.333	54.506	17.800	17.067	45.641
	±3.469	±4.989	±23.467	±2.881	±3.564	±12.853	±6.860	±8.663	±18.495	±6.577	±7.131	±22.214
RVL	1.933	2.067	35.746	2.600	2.600	35.349	3.333	3.133	44.775	3.667	3.800	39.618
M	±1.188	±1.090	±20.499	±1.690	±0.548	±25.769	±0.667	±1.773	±29.784	±1.546	±2.834	±26.891
NTS	8.267	4.800	19.491	10.333	4.867	16.803	12.867	11.333	37.441	12.200	10.200	32.106
	±7.057	±3.587	±11.709	±9.715	±3.934	±7.185	±5.108	±4.643	±14.231	±4.482	±4.167	±10.766

DMX	6.000 ±6.595	8.133 ±6.488	19.415 ±29.501	7.867 ±8.302	7.333 ±9.664	12.057 ±7.839	14.600 ±9.014	10.533 ±12.294	19.780 ±25.554	15.400 ±12.001	9.867 ±11.843	18.692 ±24.212
OVL	Male			Female								
	EGFP	mRuby	co/total %	EGFP	mRuby	co/total %						
	6.100 ±6.784	1.433 ±1.535	8.370 ±14.219	4.800 ±3.701	3.800 ±3.213	5.536 ±5.279						
Ew dmPA G	2.267	0.997	9.167	3.267	3.033	40.629						
	±1.765	±0.796	±12.638	±2.465	±2.735	±25.409						
	5.200	4.800	60.370	11.333	10.867	49.038						
ROb	±2.610	±2.523	±13.926	±5.826	±7.418	±12.332						
	9.267	8.333	65.773	12.733	14.733	74.508						
	±4.030	±3.979	±6.897	±2.957	±4.518	±8.432						
RMg	4.267	4.200	65.221	7.333	7.200	70.200						
	±1.011	±1.121	±14.340	±2.380	±1.609	±20.973						
	3.667	3.933	55.667	5.333	6.133	67.824						
RPA	±1.434	±1.234	±14.701	±0.667	±1.677	±18.855						