

**Table S1. Numerical values for bar graphs in Figures 1-7 and Figures S2-S4.**

Figure	Panel		Mean	SEM +/-	n=	comparison	p-value	Bonferroni-corrected p
Figure 1	E	wt	10.34	2.1	10	wt to vezl <sup>721</sup>	4.75E-08	9.50E-08
		vezl <sup>721</sup>	39.25	1.7	10	vezl <sup>721</sup> to vezl <sup>721</sup> + vezl <sup>wt</sup> (rescue)	4.11E-10	8.22E-10
		vezl <sup>13.1</sup>	33.93	1.4	10			
		vezl <sup>721</sup> + vezl <sup>wt</sup>	10.48	1.6	12			
Figure 2	I	wt	35	1.9	14	wt to vezl <sup>13.1</sup>	0.0001727	0.000691
		vezl <sup>13.1</sup>	23.16	1.8	12	wt to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.7638	3.06
		vezl <sup>13.1</sup> + vezl <sup>wt</sup>	35.92	1.9	12	vezl <sup>13.1</sup> to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.0035	0.014
		vezl <sup>wt</sup> + vezl <sup>wt</sup>	42.1	3.1	10	wt to wt + vezl <sup>wt</sup> (OE)	0.0656	0.2624
	J	wt	10.57	1.12	14	wt to vezl <sup>13.1</sup>	0.000031	0.000124
		vezl <sup>13.1</sup>	23.87	2.5	12	wt to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.5925	2.37
		vezl <sup>13.1</sup> + vezl <sup>wt</sup>	11.49	0.76	12	vezl <sup>13.1</sup> to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.00018	0.00072
		vezl <sup>wt</sup> + vezl <sup>wt</sup>	18.93	2.1	10	wt to wt + vezl <sup>wt</sup> (OE)	0.002121	0.00848
	K	wt	0.96	0.04	14	wt to vezl <sup>13.1</sup>	2.03E-08	8.12E-08
		vezl <sup>13.1</sup>	1.59	0.075	12	wt to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.5499	2.2
		vezl <sup>13.1</sup> + vezl <sup>wt</sup>	0.94	0.076	12	vezl <sup>13.1</sup> to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	8.68E-06	3.47E-05
		vezl <sup>wt</sup> + vezl <sup>wt</sup>	0.95	0.064	10	wt to wt + vezl <sup>wt</sup> (OE)	0.6124	2.45
	L	wt	1.28	0.32	14	wt to vezl <sup>13.1</sup>	7.36E-06	2.94E-05
		vezl <sup>13.1</sup>	5.42	0.69	12	wt to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.1812	0.7248
		vezl <sup>13.1</sup> + vezl <sup>wt</sup>	2.67	0.88	12	vezl <sup>13.1</sup> to vezl <sup>13.1</sup> + vezl <sup>wt</sup> (rescue)	0.029	0.116
		vezl <sup>wt</sup> + vezl <sup>wt</sup>	7.8	1.64	10	wt to wt + vezl <sup>wt</sup> (OE)	0.000381	0.001524
Figure 3	I	wt ANF:GFP	1.24	0.11	15	wt to vezl <sup>13.1</sup> (ANF:GFP)	0.007953	
		vezl <sup>13.1</sup> ANF:GFP	1.62	0.09	10			
		wt YFP:Rab5	1.1	0.04	16	wt to vezl <sup>13.1</sup> (YFP:Rab5)	0.0001801	
		vezl <sup>13.1</sup> YFP:Rab5	1.72	0.04	10			
		wt Rab7:GFP	0.92	0.09	14	wt to vezl <sup>13.1</sup> (Rab7:GFP)	0.0001445	
		vezl <sup>13.1</sup> Rab7:GFP	1.98	0.27	12			
		wt Rab11:GFP	1.21	0.06	16	wt to vezl <sup>13.1</sup> (Rab11:GFP)	0.5895	
		vezl <sup>13.1</sup> Rab11:GFP	1.27	0.26	14			
Figure 4	E	wt Tkv:mCherry	1.02	0.04	14	wt to vezl <sup>13.1</sup> (Tkv:mCherry)	0.0004521	
		vezl <sup>13.1</sup> Tkv:mCherry	1.92	0.14	15			
		wt anti-pMAD	1.12	0.08	12	wt to vezl <sup>13.1</sup> (anti-pMAD)	0.007105	
		vezl <sup>13.1</sup> anti-pMAD	1.52	0.103	15			
Figure 5	C	wt Tkv:mCherry In	0.25	0.075	5	wt to vezl <sup>13.1</sup> (Tkv:mCherry In)	0.4253	
		wt Tkv:mCherry Out	1.05	0.063	5			
		vezl <sup>13.1</sup> Tkv:mCherry In	0.11	0.086	7	wt to vezl <sup>13.1</sup> (Tkv:mCherry Out)	0.009173	
		vezl <sup>13.1</sup> Tkv:mCherry Out	0.048	0.024	7			
	F	wt ANF:GFP In	1.23	0.2	9	wt to vezl <sup>13.1</sup> (ANF:GFP In)	0.7126	
		wt ANF:GFP Out	1.79	0.39	9			
		vezl <sup>13.1</sup> ANF:GFP In	1.37	0.32	6	wt to vezl <sup>13.1</sup> (ANF:GFP Out)	0.7807	
		vezl <sup>13.1</sup> ANF:GFP Out	1.48	0.33	6			

Figure	Panel		Mean	SEM +/-	n=	comparison	p-value
Figure 6	F	wt ANF:GFP	0.96	0.06	6	wt to vezl <sup>13.1</sup> (ANF:GFP)	0.0005902
		vezl <sup>13.1</sup> ANF:GFP	0.57	0.06	7		
		wt Tkv:mCherry	0.72	0.09	6	wt to vezl <sup>13.1</sup> (Tkv:mCherry)	0.00825
		vezl <sup>13.1</sup> Tkv:mCherry	0.28	0.03	6		
		wt mito:GFP	0.25	0.025	7	wt to vezl <sup>13.1</sup> (mito:GFP)	0.3479
		vezl <sup>13.1</sup> mito:GFP	0.234	0.013	5		
	G	wt ANF:GFP	0.12	0.03	6	wt to vezl <sup>13.1</sup> (ANF:GFP)	0.0007503
		vezl <sup>13.1</sup> ANF:GFP	0.39	0.072	7		
		wt Tkv:mCherry	0.12	0.048	6	wt to vezl <sup>13.1</sup> (Tkv:mCherry)	0.0009128
		vezl <sup>13.1</sup> Tkv:mCherry	0.55	0.067	6		
		wt mito:GFP	0.66	0.012	7	wt to vezl <sup>13.1</sup> (mito:GFP)	0.01058
		vezl <sup>13.1</sup> mito:GFP	0.25	0.025	5		

H	wt ANF:GFP (anterograde)	55.4	2.89	6	wt to vezl <sup>13.1</sup> (ANF:GFP)	8.64E-09
	vezl <sup>13.1</sup> ANF:GFP (anterograde)	93.6	1.13	7		
	wt TkV:mCherry (anterograde)	65	3.42	6	wt to vezl <sup>13.1</sup> (TkV:mCherry)	0.0009573
	vezl <sup>13.1</sup> TkV:mCherry (anterograde)	90.9	1.91	6		
	wt mito:GFP (anterograde)	48	5.07	7	wt to vezl <sup>13.1</sup> (mito:GFP)	0.3479
	vezl <sup>13.1</sup> mito:GFP (anterograde)	45.2	4.7	5		
	wt ANF:GFP (anterograde)	0.47	0.05	6	wt to vezl <sup>13.1</sup> (anterograde ANF:GFP)	0.1706
	wt ANF:GFP (retrograde)	0.37	0.03	6	wt to vezl <sup>13.1</sup> (retrograde ANF:GFP)	0.00001796
	vezl <sup>13.1</sup> ANF:GFP (anterograde)	0.34	0.063	7		
	vezl <sup>13.1</sup> ANF:GFP (retrograde)	0.02	0.0048	7		
	wt TkV:mCherry (anterograde)	0.4	0.055	6	wt to vezl <sup>13.1</sup> (anterograde TkV:mCherry)	0.000166
	wt TkV:mCherry (retrograde)	0.24	0.08	6	wt to vezl <sup>13.1</sup> (retrograde TkV:mCherry)	0.0007431
	vezl <sup>13.1</sup> TkV:mCherry (anterograde)	0.11	0.041	6		
	vezl <sup>13.1</sup> TkV:mCherry (retrograde)	0.024	0.0075	6		
	wt mito:GFP (anterograde)	0.022	0.0046	7	wt to vezl <sup>13.1</sup> (anterograde mito:GFP)	0.117
	wt mito:GFP (retrograde)	0.024	0.0061	7	wt to vezl <sup>13.1</sup> (retrograde mito:GFP)	0.166
	vezl <sup>13.1</sup> mito:GFP (anterograde)	0.015	0.0021	5		
	vezl <sup>13.1</sup> mito:GFP (retrograde)	0.017	0.0044	5		
	wt ANF:GFP (anterograde)	1.03	0.03	12	wt to vezl <sup>13.1</sup> (anterograde ANF:GFP)	0.2475
	wt ANF:GFP (retrograde)	0.77	0.03	12	wt to vezl <sup>13.1</sup> (retrograde ANF:GFP)	0.002424
	vezl <sup>13.1</sup> ANF:GFP (anterograde)	1.16	0.08	10		
	vezl <sup>13.1</sup> ANF:GFP (retrograde)	0.57	0.06	10		
	wt TkV:mCherry (anterograde)	1.55	0.07	10	wt to vezl <sup>13.1</sup> (anterograde TkV:mCherry)	0.009273
	wt TkV:mCherry (retrograde)	0.8	0.11	10	wt to vezl <sup>13.1</sup> (retrograde TkV:mCherry)	0.7723
	vezl <sup>13.1</sup> TkV:mCherry (anterograde)	1.13	0.04	11		
	vezl <sup>13.1</sup> TkV:mCherry (retrograde)	0.73	0.08	11		
	wt mito:GFP (anterograde)	0.26	0.006	10	wt to vezl <sup>13.1</sup> (anterograde mito:GFP)	0.2008
	wt mito:GFP (retrograde)	0.49	0.02	10	wt to vezl <sup>13.1</sup> (retrograde mito:GFP)	0.613
	vezl <sup>13.1</sup> mito:GFP (anterograde)	0.32	0.09	10		
	vezl <sup>13.1</sup> mito:GFP (retrograde)	0.51	0.05	14		

Figure	Panel		Mean	SEM +/-	n=	comparison	p-value
Figure 7	C	wt Rab5:mRFP	0.377	0.055	11	wt to vez <sup>t</sup> <sup>y624</sup> (Rab5:mRFP)	0.3999
		vez <sup>t</sup> <sup>y624</sup> Rab5:mRFP	0.306	0.061	9		
	D	wt Rab5:mRFP (anterograde)	6.91	0.51	9	wt to vez <sup>t</sup> <sup>y624</sup> (anterograde Rab5:mRFP)	0.0562
		vez <sup>t</sup> <sup>y624</sup> Rab5:mRFP (anterograde)	5.37	0.54	8		
		wt Rab5:mRFP (retrograde)	3.667	0.37	10	wt to vez <sup>t</sup> <sup>y624</sup> (retrograde Rab5:mRFP)	0.4655
		vez <sup>t</sup> <sup>y624</sup> Rab5:mRFP (retrograde)	4.08	0.41	8		
	G	wt Rab7:mRFP	0.25	0.03	13	wt to vez <sup>t</sup> <sup>y624</sup> (Rab7:mRFP)	0.0084
		vez <sup>t</sup> <sup>y624</sup> Rab7:mRFP	0.374	0.03	14		
	H	wt Rab7:mRFP (anterograde)	5.55	0.32	13	wt to vez <sup>t</sup> <sup>y624</sup> (anterograde Rab7:mRFP)	0.9762
		vez <sup>t</sup> <sup>y624</sup> Rab7:mRFP (anterograde)	5.56	0.32	13		
		wt Rab7:mRFP (retrograde)	3.83	0.24	12	wt to vez <sup>t</sup> <sup>y624</sup> (retrograde Rab7:mRFP)	0.0472
		vez <sup>t</sup> <sup>y624</sup> Rab7:mRFP (retrograde)	3.12	0.23	13		
	K	wt Rab11:mRFP	0.251	0.045	10	wt to vez <sup>t</sup> <sup>y624</sup> (anterograde Rab11:mRFP)	0.2256
		vez <sup>t</sup> <sup>y624</sup> Rab11:mRFP	0.324	0.038	14		
	L	wt Rab11:mRFP (anterograde)	6.45	0.57	11	wt to vez <sup>t</sup> <sup>y624</sup> (anterograde Rab11:mRFP)	0.9091
		vez <sup>t</sup> <sup>y624</sup> Rab11:mRFP (anterograde)	6.36	0.57	11		
		wt Rab11:mRFP (retrograde)	4.4	0.4	11	wt to vez <sup>t</sup> <sup>y624</sup> (retrograde Rab11:mRFP)	0.9618
		vez <sup>t</sup> <sup>y624</sup> Rab11:mRFP (retrograde)	4.42	0.36	11		
Figure 7	Rab area (μm <sup>2</sup> ) per axon (alternative normalization of data in C, G, K)	wt Rab5:mRFP	19.46	3.79	11	wt to vez <sup>t</sup> <sup>y624</sup> (Rab5:mRFP)	0.156
		vez <sup>t</sup> <sup>y624</sup> Rab5:mRFP	27.8	4.18	9		
		wt Rab7:mRFP	13.73	3.21	11	wt to vez <sup>t</sup> <sup>y624</sup> (Rab7:mRFP)	0.0181
		vez <sup>t</sup> <sup>y624</sup> Rab7:mRFP	24.65	2.85	14		
		wt Rab11:mRFP	14.4	2.57	8	wt to vez <sup>t</sup> <sup>y624</sup> (Rab11:mRFP)	0.7501
Supp Fig 2	E	wt	2.25	0.11	13	wt to vez <sup>t</sup> <sup>13.1</sup>	3.25E-08
		vez <sup>t</sup> <sup>13.1</sup>	1.15	0.09	14		
Supp Fig 3	B	wt	32	1.3	11	wt to vez <sup>t</sup> <sup>13.1</sup>	0.0000137
		vez <sup>t</sup> <sup>13.1</sup>	18.17	1.8	7		
		wt + hVezt	29.25	1.9	8		
		vez <sup>t</sup> <sup>13.1</sup> + hVezt	18.3	1.1	13	wt to vez <sup>t</sup> <sup>13.1</sup> + hVezt	5.27E-08
Supp Fig 4	G	wt (anti-p150)	0.737	0.048	40	wt to vez <sup>t</sup> <sup>y624</sup> (anti-p150)	0.0224
		vez <sup>t</sup> <sup>y624</sup> (anti-p150)	0.911	0.057	28		
		wt (anti-Dync1h1)	0.841	0.089	11	wt to vez <sup>t</sup> <sup>y624</sup> (anti-Dync1h1)	0.3055
		vez <sup>t</sup> <sup>y624</sup> (anti-Dync1h1)	0.968	0.082	13		
		wt (anti-CytoC)	0.856	0.057	14	wt to vez <sup>t</sup> <sup>y624</sup> (anti-CytoC)	0.6339
		vez <sup>t</sup> <sup>y624</sup> (anti-CytoC)	0.895	0.059	13		