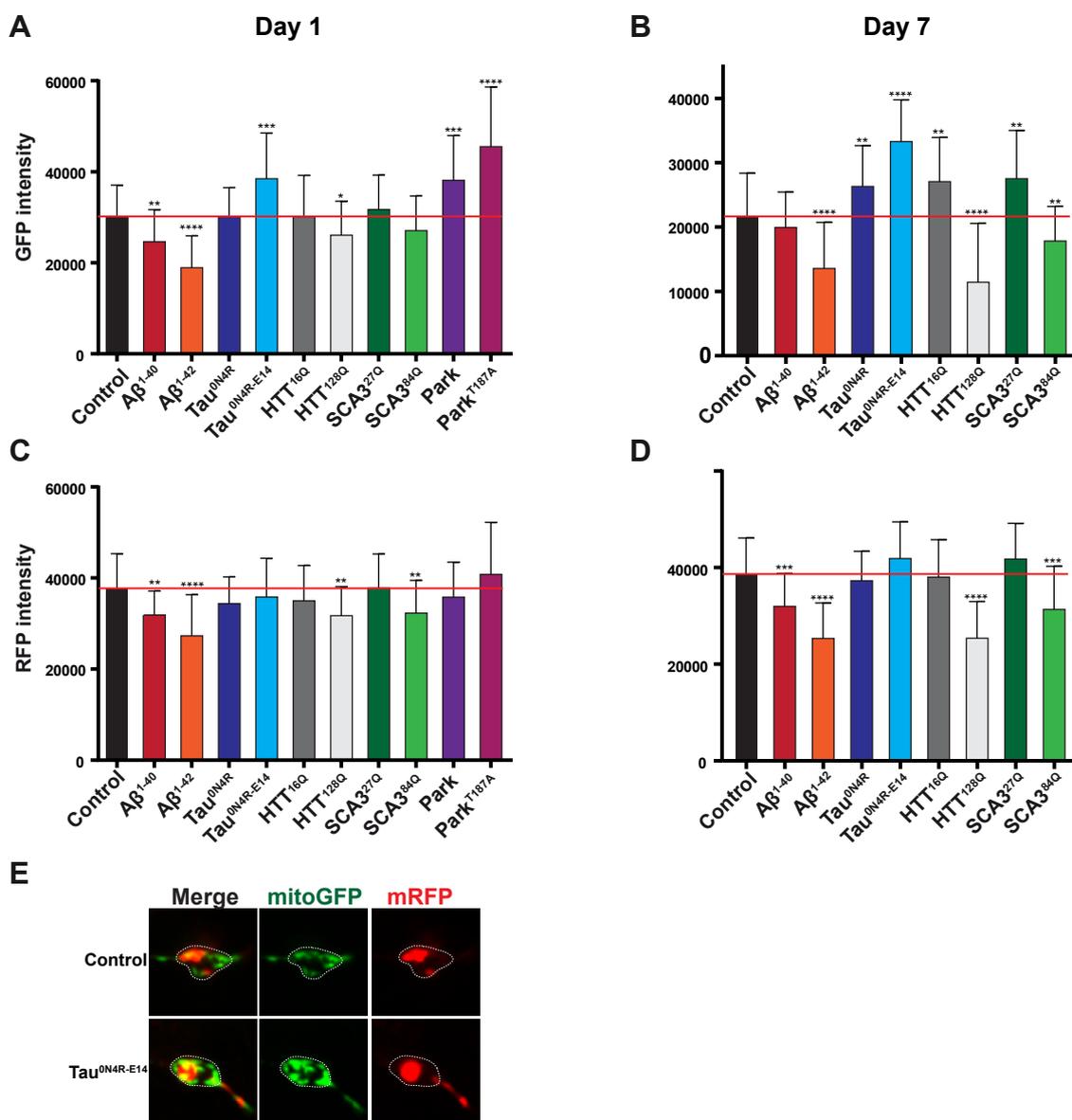


Supplemental Figure 1

Mitochondrial distribution in fly motor neuron axonal projections and terminals is affected by some neurodegenerative disease proteins

(A-P) Control (*attP65B2*) and *UAS* lines crossed to *OK371-Gal4*, *UAS-mitoGFP*; *UAS-mRFP* to direct expression glutamatergic motor neurons innervating the fly leg femur, and to enable analysis of mitochondrial distribution. Panels show representative confocal images of projected sections through a femur region (red box in Figure 6I) after Day 1 and Day 7, at +29°C. In control, mitochondria are evenly dispersed along axons tracts, and show similar morphology. In A β^{1-42} , there is an apparent loss of many axons (red mRFP) and mitochondria.



Supplemental Figure 2

mitoGFP and mRFP intensity measurements in cell bodies

Control (*attP65B2*) and UAS lines crossed to *OK371-Gal4*, *UAS-mitoGFP*; *UAS-mRFP* to direct expression to glutamatergic motor neurons innervating the fly leg femur, and to enable analysis of mitochondrial distribution (same dataset as in Figure 5). mitoGFP and mRFP intensities were measured using Image J software. 2 sensory cells from tarsus 4, and 3-5 cells from tarsus 5 was measured per leg, choosing cells in the mid Z-stacks to avoid lack of intensity due to the cuticle autofluorescence. Cells were chosen that had a clear mRFP signal. (A-D) Graphs shows mean mitoGFP (A) and mRFP (C) intensity values on day 1 ($n < 30$ cells, $n < 5$ legs) and on day 7 (B,D) ($n < 31$ cells, $n < 6$ legs; SD \pm mean; * $p < 0.05$ ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.001$; Student's two-tailed T-test, pair-wise against control). (E) Example of a control, and Tau^{0N4R-E14} expressing sensory cell in which intensity measurements were performed for mitoGFP and mRFP on Day 1 after eclosion.

Supplemental Table 1**Summary of expression analysis of fluorescent marker proteins in fly leg using the *OK371-Gal4* driver**Bloomington stock numbers (BL number), and signal levels/specificity for the indicated protein in adult sensory or motor neurons (expressed using *n-Syb-Gal4* or *OK371-Gal4*).

BL number	Cellular marker	Larval expression (<i>n-Syb-Gal4</i>)	Adult sensory cell bodies (<i>OK371-Gal4</i>)	Adult axons/terminals (<i>OK371-Gal4</i>)
6921	UAS-nSyb-eGFP	Strong CNS scaffold, PN	Strong	Strong
6925	UAS-Syt-eGFP	Strong CNS scaffold, PN	Weak/no expression	Staining synaptic terminals
7255	UAS-GFP-Cnn1	No expression	N/A	N/A
8505	UAS-Rab4-mRFP	Strong	Strong	Weak
8506	UAS-Rab11-GFP	Strong CNS scaffold, weak PN	Strong	Strong
8507	UAS-Grasp65-GFP	Strong CNS, weak PN	Weak	Weak
8731	UAS-eGFP-drAtg5	No expression	N/A	N/A
9763	UAS-YFP-Rab3	Weak, CNS scaffold	N/A	N/A
9784	UAS-YFP-Rab9	No expression	N/A	N/A
9898	UAS-GFP-KDEL	Weak	Weak	Weak
23251	UAS-YFP-Rab6	Strong, PN	Strong	Strong
23269	UAS-YFP-Rab4	No expression	N/A	N/A
23641	UAS-YFP-Rab7	No expression	N/A	N/A
23650	His2Av-mRFP1	Strong, leaky	N/A	N/A
23651	His2Av-mRFP1	Weak, leaky	N/A	N/A
24104	UAS-YFP-Rab1	Strong, PN	Strong	Strong
26266	UAS-koi.GFP	Weak	N/A	N/A
28881	UAS-GFP-SKL	Strong, robust MN terminals	Strong	None
29712	UAS-gammaCop-eGFP	No expression	N/A	N/A
29713	UAS-gammaCop-mRFP	No expression	N/A	N/A
30728	NRE-eGFP	No expression	N/A	N/A
30902	UAS-GFP-Golgi	Weak	N/A	N/A
30903	UAS-Ggal/LYZ-GFP-KDEL	Strong	Strong	None
30907	UAS-RFP-Golgi	Weak	N/A	N/A
30910	UAS-RFP-KDEL	Strong, no PN	Strong	Weak/none
33062	UAS-DenMark	Strong, no clear scaffold	Strong	None
35544	UAS-Lifect-GFP	Strong, CNS scaffold, no PN	Weak	Weak/None
35545	UAS-Lifect-Ruby	Strong, CNS scaffold, weak PN	Strong	Strong
36351	QUAS-nSyb-mCherry	No expression	N/A	N/A
37749	UAS-GFP-mCherry-Atg8	Weak	N/A	N/A
37750	UAS-mCherry-Atg8	Weak	N/A	N/A
27391	UAS-mCD8-ChRFP	N/A	Strong	Weak
27392	UAS-mCD8-ChRFP	N/A	Strong	Weak/Medium
55093	lexAop-UAS-mOrange.CAAX	N/A	Weak	Weak/none
32197	10xUAS-IVS-myrGFP	N/A	Strong	Weak
32198	10xUAS-IVS-myrGFP	N/A	Strong	Strong
32186	10xUAS-IVS-mCD8-GFP	N/A	Weak/sparse	Strong
42714	UAS-GFP-LAMP1	N/A	Strong	Strong
7118	UAS-myr-mRFP	N/A	Strong	Strong
8442	UAS-mito-HA-GFP	N/A	Strong	Strong
Allan et al., 2003	UAS-nmEGFP	N/A	Strong	None

Supplemental Table 2

Quantification of axon sections without mitochondria

Confocal z-stacks of the adult femur were analyzed for 20 μ m gaps without mitochondria in axons. Only ParkT187A showed a number of such gaps.

<u>Day 1</u>	<u>Ctrl</u>	<u>ON4R</u>	<u>E14</u>	<u>1-40</u>	<u>1-42</u>	<u>htt16Q</u>	<u>htt128Q</u>	<u>SCA3-27Q</u>	<u>SCA3-84Q</u>	<u>Park</u>	<u>ParkT187A</u>
	0	0	0	0	0	0	0	0	0	0	4
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	2
	0	0		0	0	0	0	0	0	0	
		0		0	0			0	0	0	
		0						0	0		
								0			
<u>Day 7</u>	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	0	0	0	0	0	0		
	0		0	0	0	0	0	0			
			0		0						