**Table S1. Strains used in this study**

|  |  |
| --- | --- |
| Strain Name | Genotype |
| N2 | *wild type* |
| ZM2960 | *nca-2(gk5) III; nca-1(gk9) IV* |
| CB1030 | *unc-79(e1030) III* |
| CW16 | *unc-79(ec1) III* |
| CB1272 | *unc-80(e1272) V* |
| CB1069 | *unc-80(e1069) V* |
| DR1089 | *nca-1(e625) IV* |
| MT1074 | *egl-4(n479) IV* |
| HA2753 | *unc-79(ec1) III; egl-4(n479) IV* |
| DA521 | *egl-4(ad450) IV* |
| HA2754 | *unc-79(ec1) III; egl-4(ad450) IV* |
| ZM6610 | *nlf-1(hp428) X* |
| ZM4736 | *nlf-1(tm3631) X* |
| CX14295 | *pdfr-1(ok3425) III* |
| LSC39 | *pdfr-1(lst34) III* |
| HA2792 | *pdfr-1(ok3425) III; nca-1(e625) IV* |
| HA2791 | *pdf-1(tm1996) III; pdf-2(tm4393) X* |
| LSC27 | *pdf-1(tm1996) III* |
| FX4393 | *pdf-2(tm4393) X* |
| ZM4624 | *hpIs166 [Pglr-1::chop-2(H134R)::YFP;LIN-15]* |
| ZM4620 | *nca-2(gk5) III; nca-1(gk9) IV; hpIs166* |
| ZM7212 | *nca-2(gk5) III; nca-1(gk9) IV; hpIs166; hpEx3088* |
| ZM7765 | *nca-2(gk5) III; nca-1(gk9) IV; hpIs166; hpEx3239* |
| ZM7646 | *nca-2(gk5) III; nca-1(gk9) IV; hpIs166; hpEx3197* |
| ZM7648 | *nca-2(gk5) III; nca-1(gk9) IV; hpIs166* |
| HA1133 | *rtIs26 [hsp::osm-11; elt-2p::gfp] I* |
| HA2690 | *rtIs26 I; unc-7(rt212) X* |
| CB5 | *unc-7(e5) X* |
| CB101 | *unc-9(e101) X* |
| HA2759 | *unc-9(e101) unc-7(e5) X* |
| HA3014 | *ljSi1 [Pmec-7::GCaMP6s cb-unc-119(+)] II; lite-1(ce314) X* |
| HA3020 | *ljSi1 [Pmec-7::GCaMP6s cb-unc-119(+)] II; unc-9(e101) lite-1(ce314) X* |
| HA2789 | *unc-79(ec1) III; unc-9(e101) unc-7(e5)* |
| HA2745 | *unc-79(ec1) III; unc-7(e5) X* |
| HA2746 | *unc-79(ec1) III; unc-9(e101) X* |
| HA2572 | *egl-4(ad450) IV; unc-7 (e5) X* |
| HA2574 | *egl-4(ad450) IV; unc-9 (e101) X* |
| CB138 | *unc-24(e138) IV* |
| CB719 | *unc-1(e719) X* |
| CB1598 | *unc-1(e1598) X* |
| CB0075 | *mec-2(e75) X* |
| NYL1126 | *unc-9(e101) X; yadEx555 [unc-9p::unc-9] (ref)* |
| NYL1127 | *unc-9(e101) X; yadEx556 [unc-9p::unc-9] (ref)* |
| HA2721 | *rtIs51 [hsp::unc-7; hsp::unc-9; myo-2p::mCherry] X*  |
| HA2742 | *egl-4(n479) IV; rtIs51 X* |
| HA2743 | *nca-1(e625) IV; rtIs51 X* |

**Table S2. Transgenic strains and injection pools**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Strain name | Array name | Description (Figure Panel) | Plasmids name | Plasmids description | Conc. (ng/μl) |
| HA2664 | *rtEx815* | Muscle rescue control (Fig. 2A) | pHA0649 | *myo-3p::gfp* | 10 |
| HA2665 | *rtEx816* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA2666 | *rtEx817* | pBlueScript | pBlueScript | 100 |
| HA2651 | *rtEx812* | Muscle *unc-7* rescue (Fig. 2A) | pHA775 | *myo-3p::unc-7* | 10 |
| HA2652 | *rtEx813* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA2653 | *rtEx814* | pBlueScript | pBlueScript | 100 |
| HA2662 | *rtEx821* | Pan-neuronal rescue control (Fig. 2A) | pHA802 | *aex-3p::empty* | 10 |
| HA2663 | *rtEx822* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA2664 | *rtEx823* | pBlueScript | pBlueScript | 100 |
| HA2647 | *rtEx808* | Pan-neuronal *unc-7* rescue (Fig. 2A) | pHA772 | *aex-3p::unc-7* | 10 |
| HA2648 | *rtEx809* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA2649 | *rtEx810* | pBlueScript | pBlueScript | 100 |
| HA3555 | *rtEx912* | *glr-1* expressing premotor interneuron rescue control (Fig. 2A) | pJH1737 | *glr-1p::Ca2+-insensitive YC3.60* | 50 |
| HA3556 | *rtEx913* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA3557 | *rtEx914* | pBlueScript | pBlueScript | 100 |
| HA3558 | *rtEx915* | *glr-1* expressing premotor interneuron *unc-7* rescue (Fig. 2A) | pJH1556 | *glr-1p::unc-7::Cerulean* | 50 |
| HA3559 | *rtEx916* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA3560 | *rtEx917* | pBlueScript | pBlueScript | 100 |
| HA3561 | *rtEx918* | AVA neuron rescue control (Fig. 2A) | pJH1824 | *rig-3p::wCherry* | 10 |
| HA3562 | *rtEx919* | pHA0649 | *myo-3p::gfp* | 5 |
| HA3563 | *rtEx920* | pBlueScript | pBlueScript | 100 |
| HA3564 | *rtEx921* | AVA neuron *unc-7* rescue (Fig. 2A) | pJH2452 | *rig-3p::unc-7-UrSL-wCherry* | 10 |
| HA3565 | *rtEx922* | pHA0649 | *myo-3p::gfp* | 5 |
| HA3566 | *rtEx923* | pBlueScript | pBlueScript | 100 |
| HA2637 | *rtEx800* | Muscle rescue control (Fig. 2B) | pHA0649 | *myo-3p::gfp* | 5 |
| HA2638 | *rtEx801* | pCFJ90 | *myo-2p::mCherry* | 5 |
|  |  | pBlueScript | pBlueScript | 100 |
| HA2634 | *rtEx797* | Muscle *unc-9* rescue (Fig. 2B) | pHA777 | *myo-3p::unc-9* | 5 |
| HA2635 | *rtEx798* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA2636 | *rtEx799* | pBlueScript | pBlueScript | 100 |
| HA2643 | *rtEx806* | Pan-neuronal rescue control (Fig. 2B) | pHA802 | *aex-3p::empty* | 10 |
| HA2646 | *rtEx807* | pCFJ90 | *myo-2p::mCherry* | 5 |
|  |  | pBlueScript | pBlueScript | 100 |
| HA2640 | *rtEx803* | Pan-neuronal *unc-9* rescue (Fig. 2B) | pHA770 | *aex-3p::unc-9* | 10 |
| HA2641 | *rtEx804* | pCFJ90 | *myo-2p::mCherry* | 5 |
| HA2642 | *rtEx805* | pBlueScript | pBlueScript | 100 |
| HA3567 | *rtEx924* | *glr-1* expressing premotor interneuron rescue control (Fig. 2B) | pJH1737 | *glr-1p::Ca2+-insensitive YC3.60* | 50 |
| HA3568 | *rtEx925* | pHA0649 | *myo-3p::gfp* | 5 |
| HA3569 | *rtEx926* | pBlueScript | pBlueScript | 100 |
| HA3570 | *rtEx927* | *glr-1* expressing premotor interneuron *unc-9* rescue (Fig. 2B) | pJH1848 | *glr-1p::unc-9-UrSL-wCherry* | 50 |
| HA3571 | *rtEx928* | pHA0649 | *myo-3p::gfp* | 5 |
| HA3572 | *rtEx929* | pBlueScript | pBlueScript | 100 |
| HA3573 | *rtEx930* | *unc-4* expressing motor neuron rescue control (Fig. 2B) | pHA774 | *unc-4p::wCherry* | 10 |
| HA3574 | *rtEx931* | pHA0649 | *myo-3p::gfp* | 5 |
| HA3575 | *rtEx932* | pBlueScript | pBlueScript | 100 |
| HA3576 | *rtEx933* | *unc-4* expressing motor neuron *unc-9* rescue (Fig. 2B) | pJH2141 | *unc-4p::unc-9-UrSL-wCherry* | 10 |
| HA3577 | *rtEx934* | pHA0649 | *myo-3p::gfp* | 5 |
| HA3578 | *rtEx935* | pBlueScript | pBlueScript | 100 |
| HA2665 | *rtEx824* | Heat shock promoter driven rescue control (Fig. 2C) | pHA768 | *hsp::ssGFP* | 40 |
| HA2666 | *rtEx825* | pCFJ90 | *myo-2p::mCherry* | 5 |
|  |  | pBlueScript | pBlueScript | 155 |
| HA2673 | *rtEx832* | Heat shock promoter driven *unc-7* rescue (Fig. 2C) | pHA780 | *hsp::unc-7* | 20 |
| HA2674 | *rtEx833* | pHA768 | *hsp::ssGFP* | 20 |
| HA2675 | *rtEx834* | pCFJ90 | *myo-2p::mCherry* | 5 |
|  |  | pBlueScript | pBlueScript | 155 |
| HA2676 | *rtEx835* | Heat shock promoter driven *unc-9* rescue (Fig. 2C) | pHA781 | *hsp::unc-9* | 20 |
| HA2677 | *rtEx836* | pHA768 | *hsp::ssGFP* | 20 |
| HA2678 | *rtEx837* | pCFJ90 | *myo-2p::mCherry* | 5 |
|  |  | pBlueScript | pBlueScript | 155 |
| HA2657 | *rtEx819* | Heat shock promoter driven *unc-7* and *unc-9* rescue (Fig. 2C) | pHA780 | *hsp::unc-7* | 20 |
| HA2658 | *rtEx820* | pHA781 | *hsp::unc-9* | 20 |
| HA2659 | *rtEx821* | pCFJ90 | *myo-2p::mCherry* | 5 |
|  |  | pBlueScript | pBlueScript | 155 |

Note: Strains HA3555 – HA3578 are lost.