Supporting Information

Extrinsic repair of injured dendrites as a paradigm for regeneration by fusion in *Caenorhabditis elegans*

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Supplementary Figures

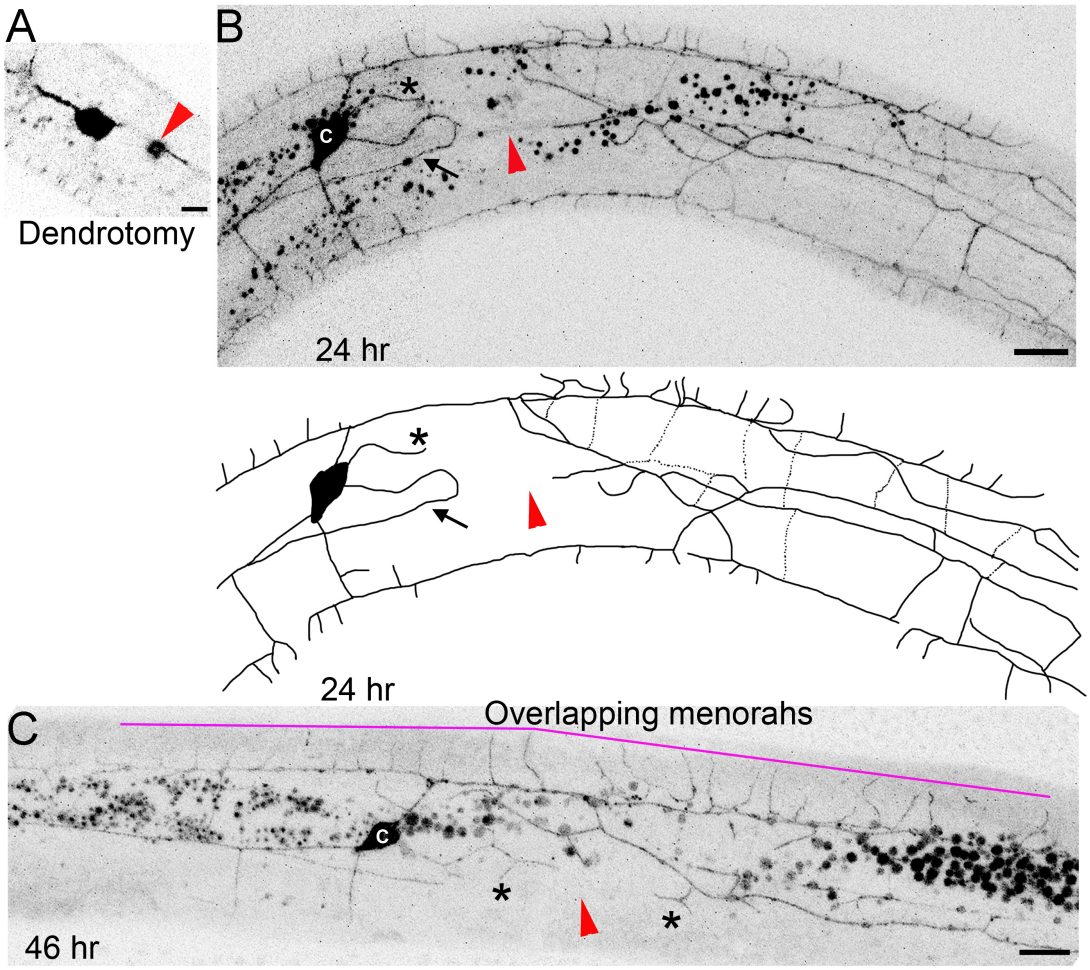
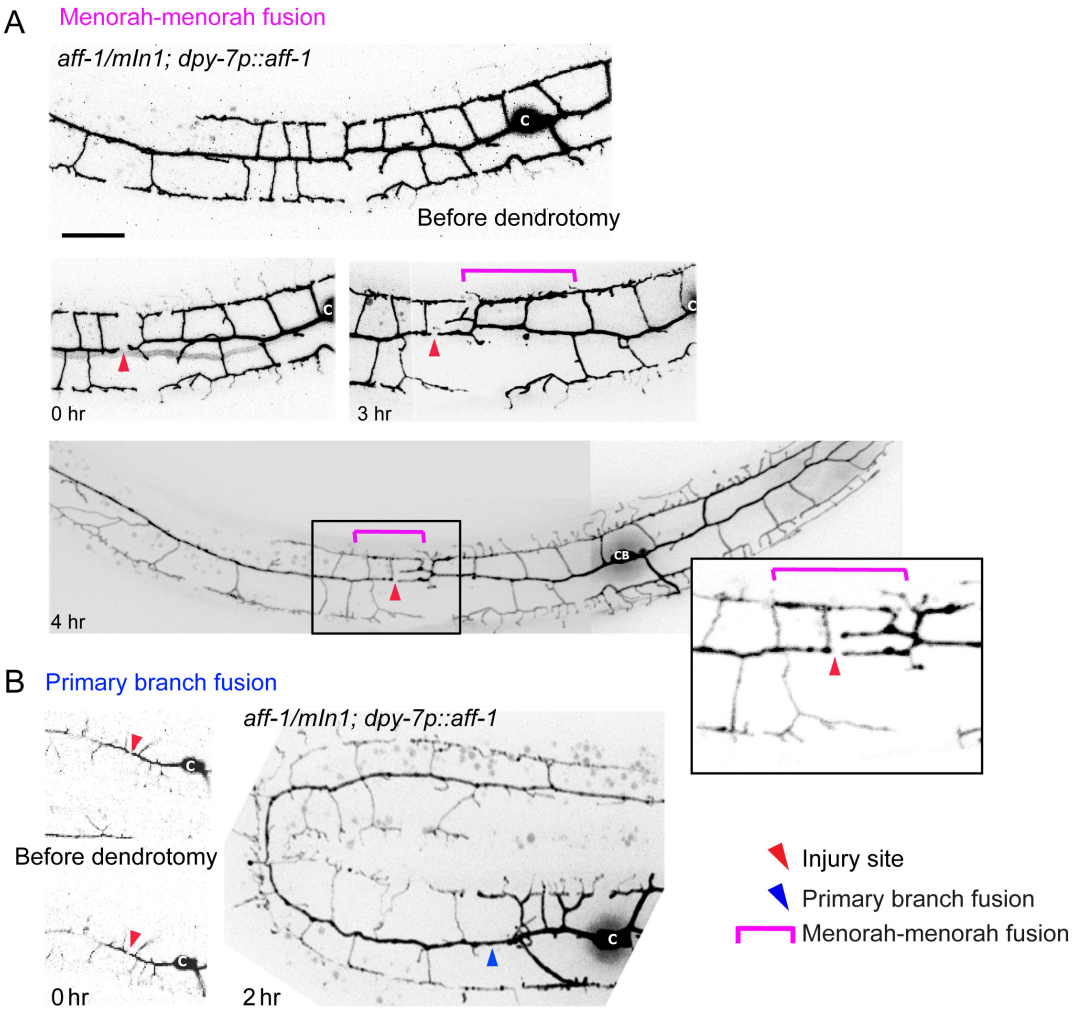
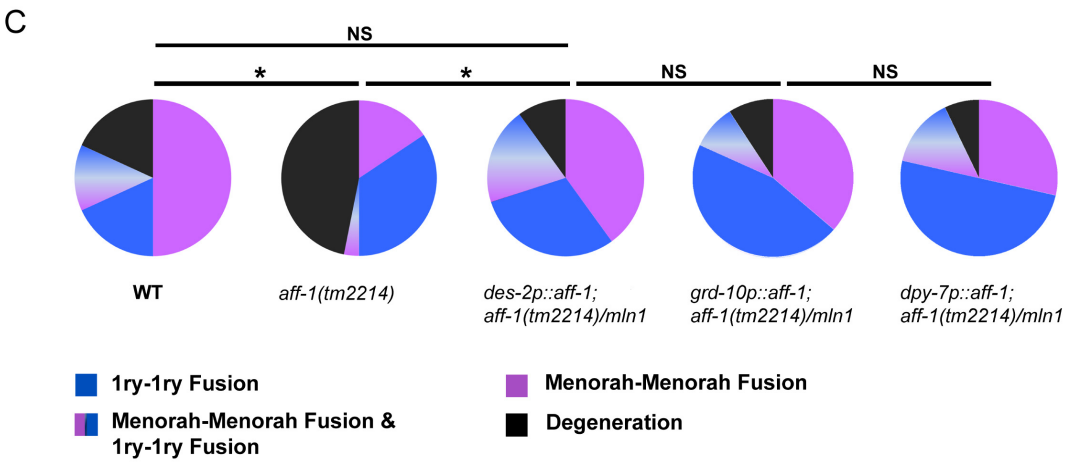


Fig S1. Dendritic injury induces hyper-branching, loss of self-avoidance and giant overlapping menorahs

(A) Wild-type animal injured (red arrowhead) at the early L4 stage, recovered and analyzed 24 **(B)** and 46 hr **(C)** post-surgery. Black arrow, retrograde branch. The degenerating branches are represented as dotted lines in the schematic tracing. Scale bars represent 5 µm **(A)** and 10 µm **(B,C).**





S2 Fig. Ectopic expression of AFF-1 does not improve PVD regeneration in heterozygous animals

(A) Regeneration by menorah-menorah fusion following PVD nanosurgery in *C. elegans aff-1(tm2214)/mln1; dpy-7p::aff-1* animals. PVD is shown before and after nanosurgery (T=0, 3, and 4 hr). PVD reconnection occurred through

fused menorahs (magenta bracket) and primary fusion did not occur (red arrowhead).

(B) Dendrite regeneration following PVD primary branch nanosurgery in *C. elegans aff-1(tm2214)/mln1; dpy-7p::aff-1* animals. PVD is shown before and after nanosurgery (T=0 and 2 hr). PVD reconnection occurred through primary fusion (blue arrowhead).

(C) Animals showing different PVD post injury consequences displayed in color coded pie graphs as Magenta- Menorah-Menorah fusion, Blue- primary-primary fusion, Magenta and Blue- Menorah-Menorah fusion and primary-primary fusion, Black-degeneration. Wild type n=22; *aff-1(tm2214)* n=32; *aff-1/mln1; des-2p::AFF-1* n=10, *aff-1(tm2214) /mln1; grd-10p::aff-1* n=11, *aff-1(tm2214)/mln1; dpy-7p::aff*-1 n=14. *P<0.05. P values for wild type and heterozygous genotypes are not significant (NS). Statistics was calculated using the Freeman-Halton extension of the Fisher exact probability test for a two-rows by four-columns contingency table, http://vassarstats.net/fisher2x4.html.

Dendrotomy site, red arrowhead; fused Menorah, magenta bracket; primary fusion, blue arrowhead. Scale bars represent 20 μm.

Supplemental movies captions

File S1. PVD dendrites touch and fuse following dendrotomy
Time lapse recording of an L4 wild-type animal just after injury. The z series images were recorded every 6 min, marker is *F49H12.4::GFP.* Arrows mark areas of fusing menorah tertiary branches. C marks PVD cell body.

File S2. A pseudo-colored presentation of depth information for File S1
Scale bar for the position in the z axis is shown at the bottom. The movie was obtained using the Zeiss LSM image browser DepthCod function.

File S3. Degeneration of the distal fragment following dendrotomy
Time lapse recording of a wild-type L4 animal after a two-photon injury. Posterior PVCR and PVCL are also marked with the *DES-2::GFP* marker and can be seen at the upper right corner. See **Fig 1G**.

File S4. Fusion and pruning during the PVD regeneration process
Intensity-values view of a time-lapse recording of an early L4 animal. Marker is *F49H12.4::GFP.* Menorahs from proximal and distal ends meet and fuse, bypassing the break induced by the two-photon injury. At the injury site growth and pruning of dendrites can be seen. Intensity scale bar is in **Fig 2D**.

File S5. AFF-1::GFP expression in PVD intact animals
Time lapse recording of *AFF-1::GFP* (cyan) expression inside and outside the seam cells (sc), and in the vulva (V) of an intact L4 animal shown in a two channels merged image. The z series images were recorded every 10 sec, PVD marker is *F49H12.4p::mCherry* (magenta). Arrows mark AFF-1 vesicles. See **Fig 4B**. The trajectory of vesicle 1 is shown in **Fig 4E**. Gut marks autofluorescent gut granules, easily distinguishable from AFF-1 vesicles in size, shape, and appearance in both channels.

File S6. AFF-1::GFP expression in PVD intact animals (zoom in of file S5)
A magnification of a single *AFF-1::GFP* vesicle near the seam cells, (“vesicle 1”).

File S7. AFF-1::GFP expression in PVD primary branch of injured animals
Time lapse recording of *AFF-1::GFP* expression (cyan) inside and outside the seam cells (sc), in the anchor cell (AC) and in the vulva (V) of a reconnected PVD L4 animal after a two-photon injury anterior to PVD cell body. T=0 is 75 min after injury. The z series images were recorded every 20 sec, PVD marker is *F49H12.4p::mCherry* (magenta). Arrows point to vesicles containing AFF-1::GFP.

File S8. Magnification of File S7
Magnification of an area with multiple vesicles, two are labeled (2,3). See **Fig 4 D-E.**

File S9. AFF-1::GFP expression in PVD intact animal
Time lapse recording of *AFF-1::GFP* (cyan) expression inside and outside the seam cells (SC) of an intact L4 animal shown in a two channels merged image. The z series images were recorded every 10 sec, PVD marker is *F49H12.4p::mCherry* (magenta). Arrows mark AFF-1 vesicles.

File S10. AFF-1::GFP expression in a degraded PVD primary branch of injured animals
Time lapse recording of *AFF-1::GFP* expression (cyan) inside and outside the seam cells (sc) of a reconnected PVD L4 animal after a two-photon injury anterior to PVD cell body, red arrowhead is the site of injury. T=0 is 75 min after injury. The z series images were recorded every 2 sec, PVD marker is *F49H12.4p::mCherry* (magenta). Arrows point to vesicles containing AFF-1::GFP.

File S11. AFF-1::GFP expression in a degraded PVD primary branch of injured animals
Time lapse recording of *AFF-1::GFP* expression (cyan) inside and outside the seam cells (sc) of a reconnected PVD L4 animal after a two-photon injury anterior to PVD cell body, red arrowhead is the site of injury. T=0 is 150 min after injury. The z series images were recorded every 2 sec, PVD marker is *F49H12.4p::mCherry* (magenta). Arrows point to vesicles containing AFF-1::GFP.