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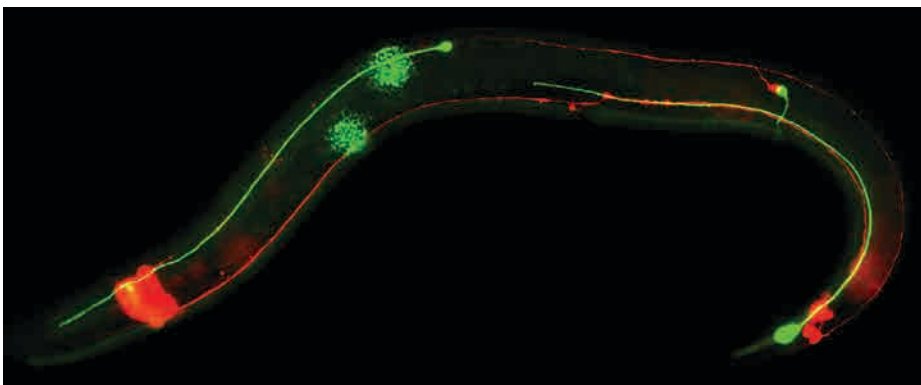
WEB neumannlab.com

The overarching goal of our laboratory is to understand how our nervous systems remain intact and functional over our lifetimes. Genetic mutations and nerve injuries can cause degeneration of the nervous system, a hallmark of neurodegenerative disorders such as motor neuron, Alzheimer's, Parkinson's, and Charcot-Marie-Tooth diseases. Despite the importance of this process, we lack a complete understanding of the molecules and mechanisms employed by neurons to preserve their axons over a lifetime, which has hampered the development of effective therapies.

Injuries to the nervous system, such as spinal cord injuries, can inflict lifelong disabilities due to ineffective repair of the damaged nerve fibres. To understand the basic molecular mechanisms regulating axonal regeneration we study highly effective repair mechanisms in the nematode *C. elegans* due to its simplified and exceptionally well-characterised nervous system.

Research Projects

1. Cellular and molecular mechanisms of axonal regeneration
2. Modelling Charcot-Marie-Tooth disease in *C. elegans*
3. Uncovering novel genes involved in degeneration of the nervous system



Green and red fluorescent proteins allow visualisation of specific subsets of neurons in the nematode *C. elegans*.

Selected significant publications:

1. Nichols AL, Meekop E, Linton C, Giordano-Santini R, Sullivan RK, Donato A, Nolan C, Hall DH, Xue D, **Neumann B**, Hilliard MA. 2016. The apoptotic engulfment machinery regulates axonal degeneration in *C. elegans* neurons. *Cell Rep.* 14(7):1673-83.
2. **Neumann B**, Coakley S, Giordano-Santini R, Linton C, Lee ES, Nakagawa A, Xue D, Hilliard MA. 2015. EFF-1-mediated regenerative axonal fusion requires components of the apoptotic pathway. *Nature* 517(7533): 219-222.
3. **Neumann B**, Hilliard MA. 2014. Loss of MEC-17 leads to microtubule instability and axonal degeneration. *Cell Rep* 6(1): 93-103.
4. **Neumann B**, Nguyen KC, Hall DH, Ben-Yakar A, Hilliard MA. 2011. Axonal regeneration proceeds through specific axonal fusion in transected *C. elegans* neurons. *Dev Dyn* 240(6): 1365-1372.
5. Kirszenblat L, **Neumann B**, Coakley S, Hilliard MA. 2013. A dominant mutation in *mec-7/β-tubulin* affects axon development and regeneration in *Caenorhabditis elegans* neurons. *Mol Biol Cell* 24(3): 285-296.