Sensory Neurons Regulate Oxidative Stress Resistance via the *daf-7/TGFβ* Pathway

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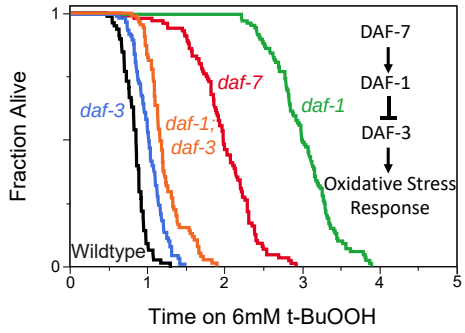
Background

In the environment, worms are exposed to harmful conditions, such as high temperature or oxidants. Cellular responses to oxidative stress are well-understood. We want to understand how these cellular signals are integrated to coordinate a response to oxidative stress at the organismal level. Understanding how worms mitigate oxidative damage could reveal strategies used by humans to cope with oxidative stress and ways that oxidative damage can lead to disease.

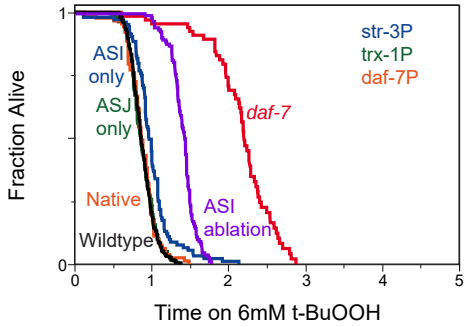
TGFβ mutations affect survival on oxidant

We performed a screen of candidate receptors on 6mM tert-butyl peroxide by utilizing a cluster of flatbed scanners called the Lifespan Machine[1]. *daf-7* mutants live twice as long as wildtype under these conditions.



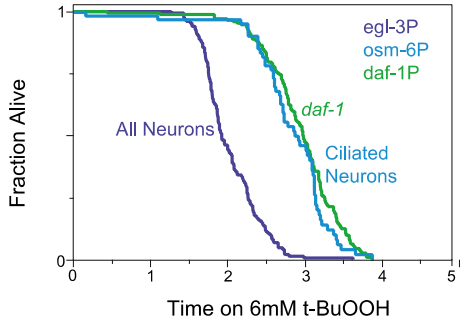
Sensory neurons respond to oxidants by sending DAF-7

In a *daf-7*(-) background, *daf-7* rescue under an ASI- or ASJ-specific promoter or the native promoter was sufficient to return to wildtype survival. Ablation of ASI was sufficient reduce survival.



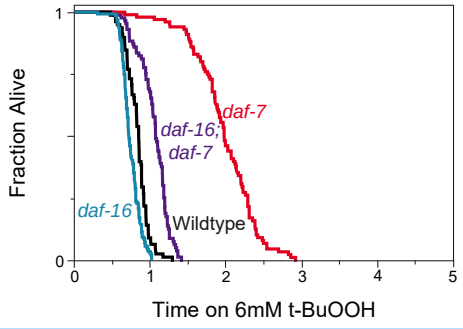
Other neurons receive the DAF-7 signal

In a *daf-1*(-) background, expressing *daf-1* in all neurons partially rescued the phenotype. Expression under a promoter specific to sensory neurons had no effect.



Downstream response involves DAF-16

The increased survival seen in *daf-7*(-) worms occurs via DAF-16-dependent and –independent mechanisms.



Conclusions & Future Directions

The *daf-7/TGFβ* pathway plays a role in regulating a worm's response to oxidative stress.

We will further explore upstream inputs and downstream effectors of this pathway.

Acknowledgements

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References

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