

# Johns Hopkins Engineering

## Methods in Neurobiology

### Molecular Basis of ALS



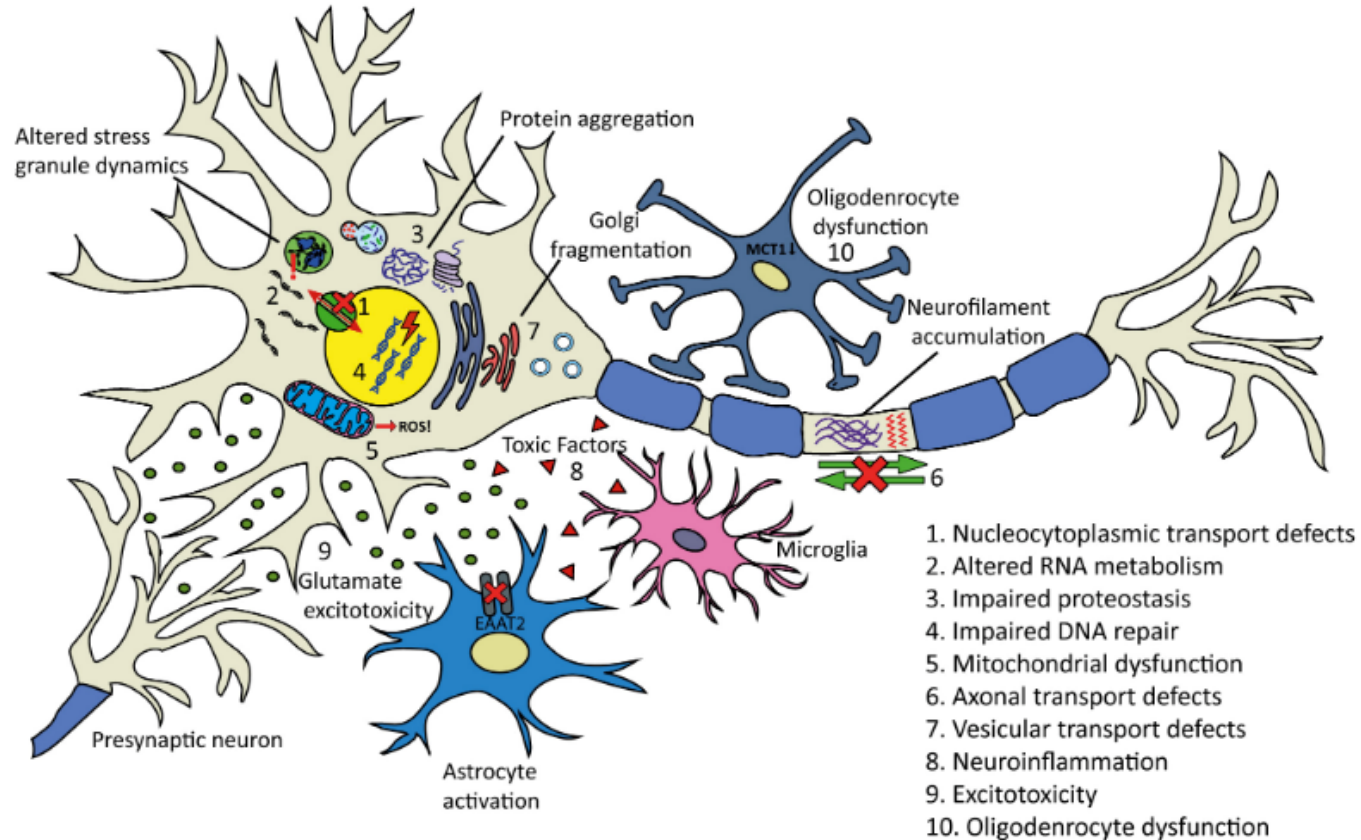
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# ALS as a type of motor neuron disease (MND)

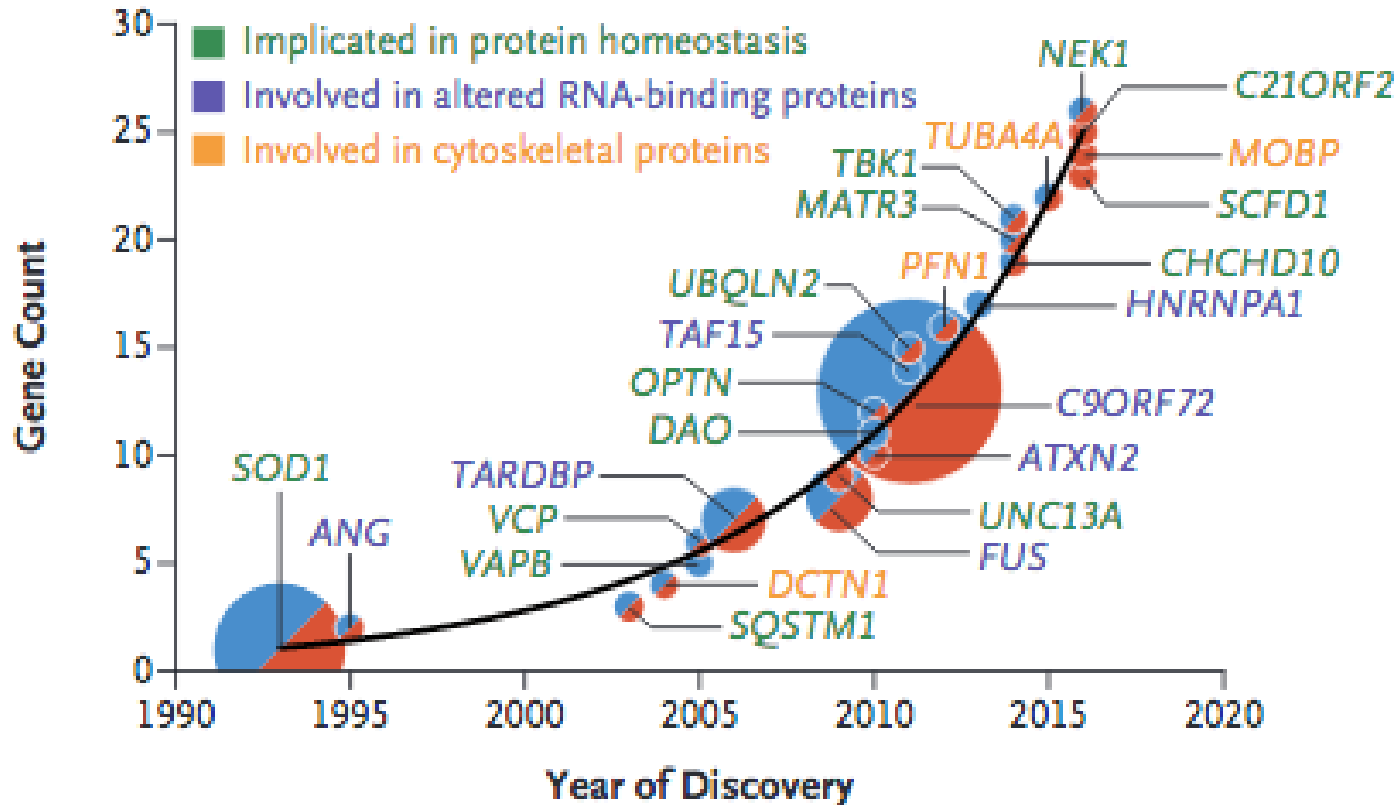
Summary of Different Types of Motor Neuron Disease (MND) Based on the Involvement of Either the Upper or Lower Motor Neurons (MN).

MND Type	Upper MN Involvement	Lower MN Involvement
ALS	Yes	Yes
PLS	Yes	None
PMA	None	Yes
PBP	Some	Mostly

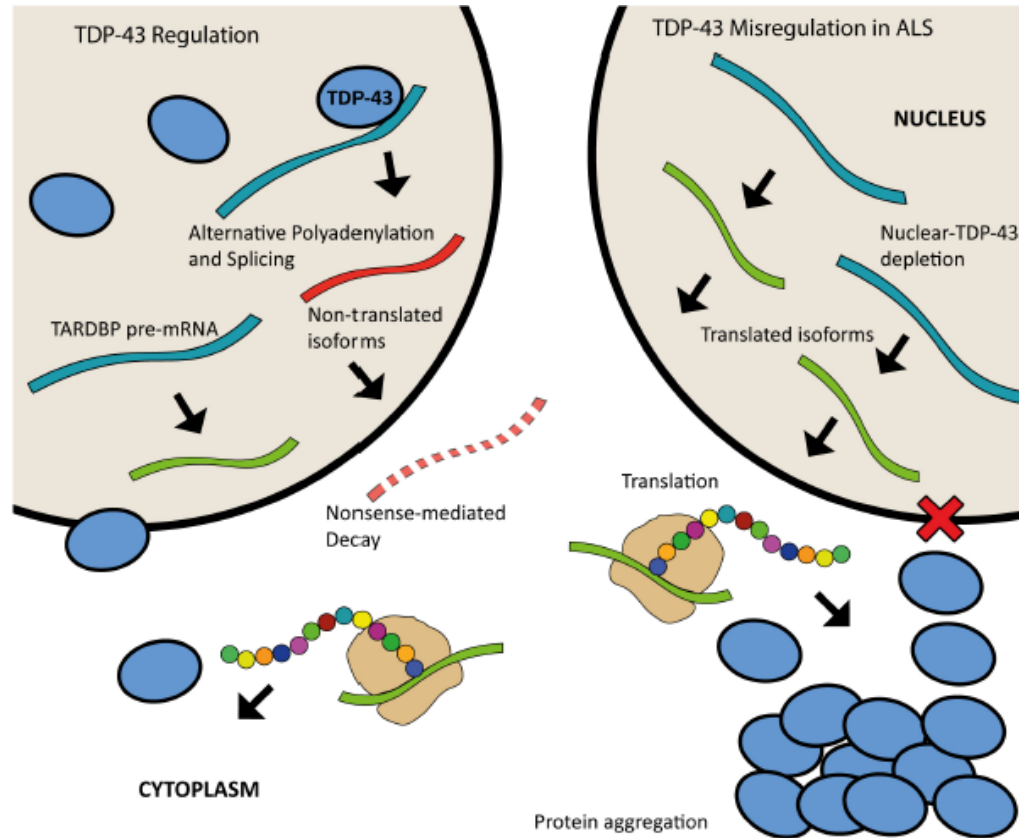
# Proposed mechanisms of disease



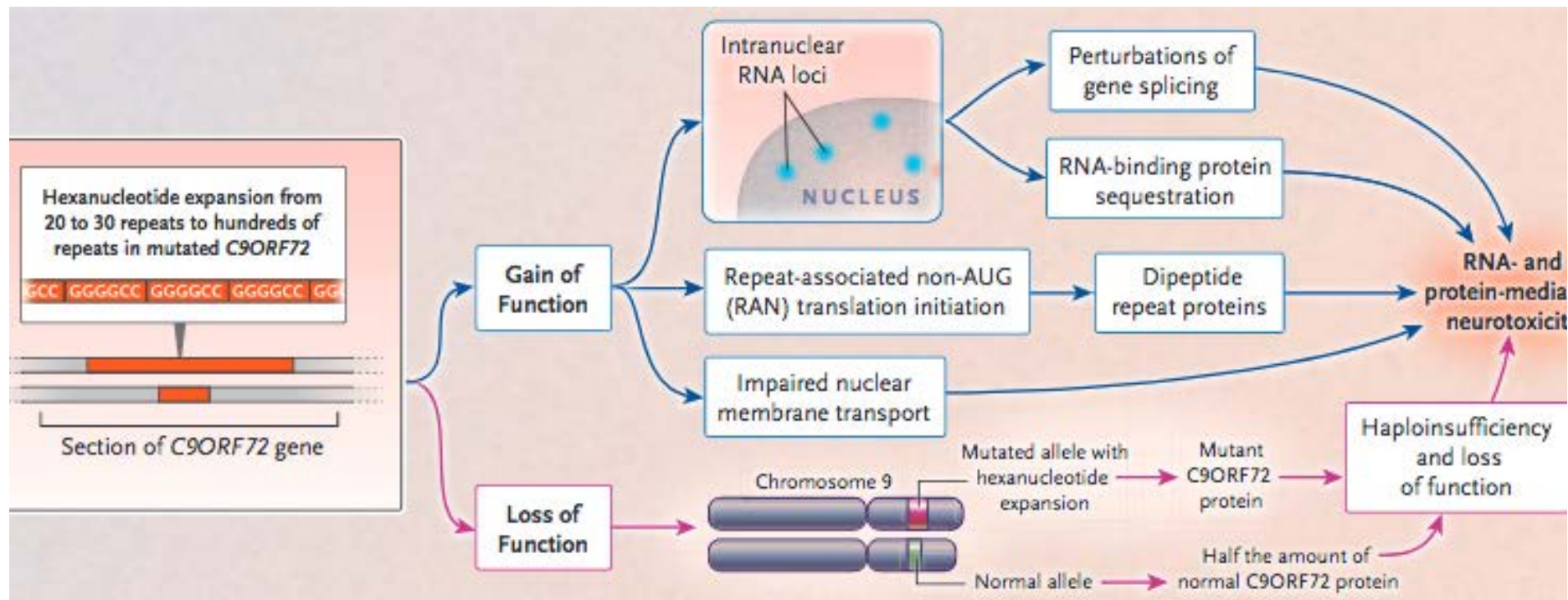
# ALS gene discovery



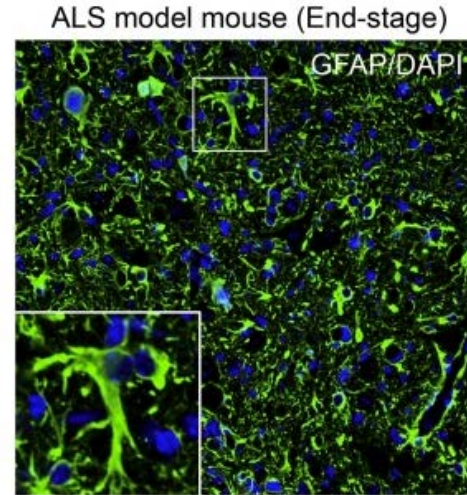
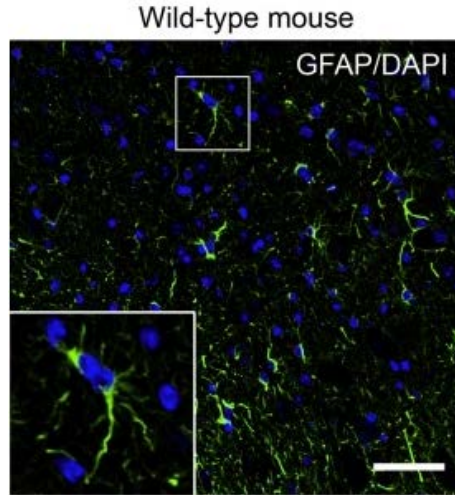
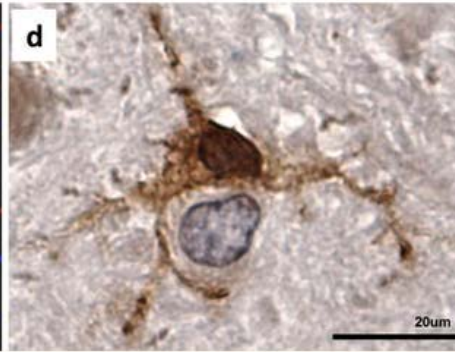
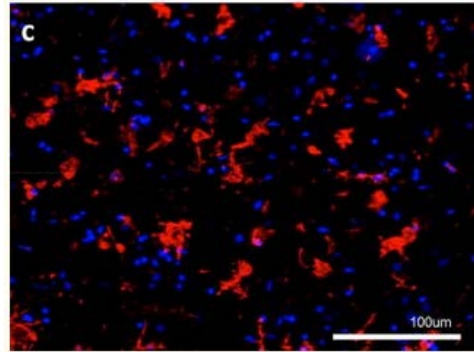
# TAR Binding domain protein 43 (TDP43)



# C9ORF72

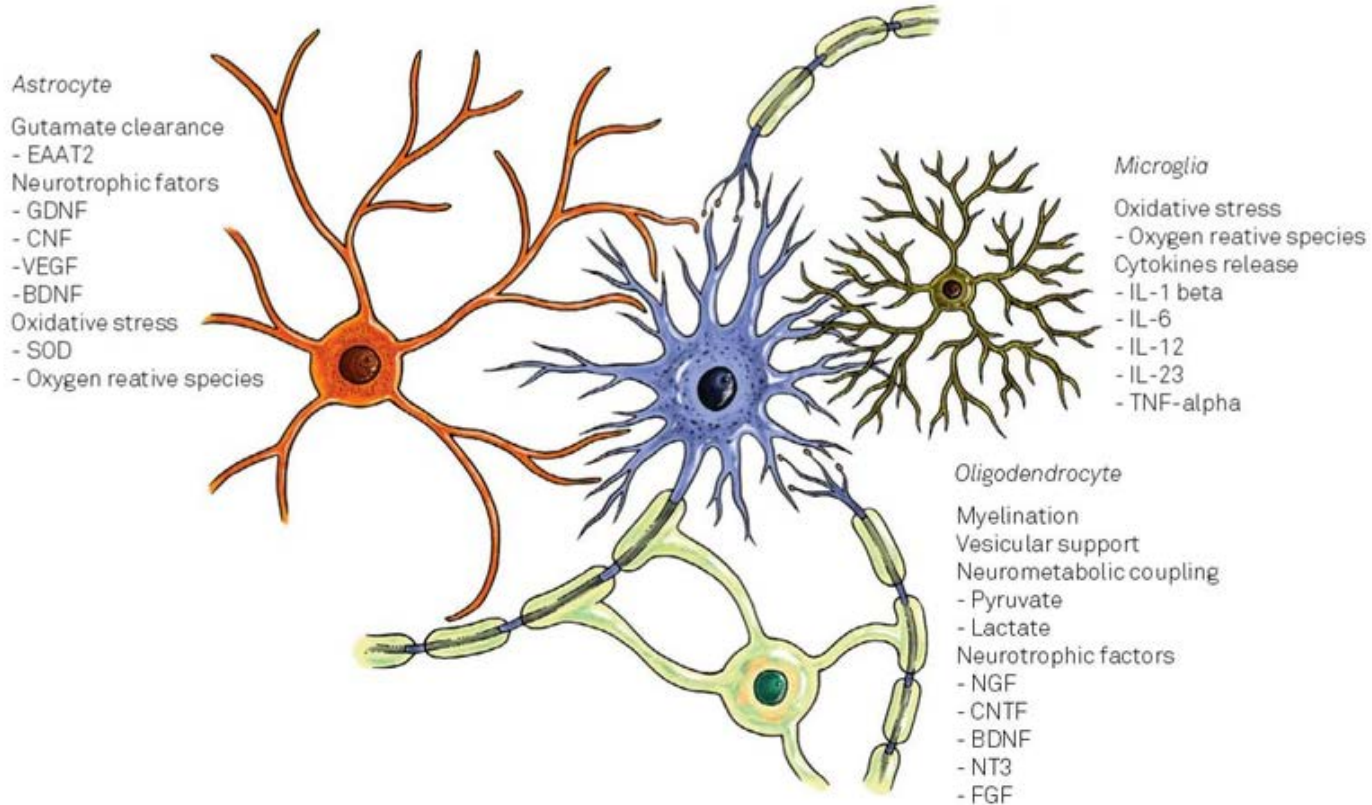


# Neuroinflammation in ALS





# Neuroinflammation in ALS





# FDA approved drugs for ALS

- Riluzole: reduces extracellular glutamate
- Edaravone: antioxidant
- No real treatment! We need a cure!



# References

Slide	Reference
2	Goldstein, R. 2018 Across the Motor Neuron Disease spectrum in 1700 words. ALS Therapy Institute <a href="https://www.als.net/news/across-the-motor-neuron-disease-spectrum-in-1700-words/">https://www.als.net/news/across-the-motor-neuron-disease-spectrum-in-1700-words/</a>
3,5	Mejzini, R., Flynn, L. L., Pitout, I. L., Fletcher, S., Wilton, S. D., & Akkari, P. A. 2019. ALS Genetics, Mechanisms, and Therapeutics: Where Are We Now?. <i>Frontiers in neuroscience</i> , 13, 1310.
4,6	Brown RH, Al-Chalabi A. 2017 Amyotrophic Lateral Sclerosis. <i>N Engl J Med</i> . 377(2):162-172.
7	McCauley, M. E., & Baloh, R. H. 2019 Inflammation in ALS/FTD pathogenesis. <i>Acta neuropathologica</i> , 137(5), 715–730. Yamanaka, K., Komine, O. 2018 The multi-dimensional roles of astrocytes in ALS. <i>Neuroscience Research</i> , 126: 31-38.
8	Souza, Paulo Victor Sgobbi de, Pinto, Wladimir Bocca Vieira de Rezende, Rezende Filho, Flávio Moura, & Oliveira, Acary Souza Bulle. 2016 Far beyond the motor neuron: the role of glial cells in amyotrophic lateral sclerosis. <i>Arquivos de Neuro-Psiquiatria</i> , 74(10), 849-854.
9	Ice bucket challenge: Where did the money go? ALS News. 09/12/19 Packard Center, Johns Hopkins School of Medicine <a href="https://www.packardcenter.org/news-and-media/news/ice-bucket-challenge-where-did-the-money-go">https://www.packardcenter.org/news-and-media/news/ice-bucket-challenge-where-did-the-money-go</a>



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