White matter injury and repair

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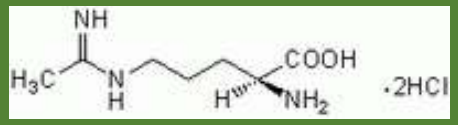
White matter lesions are common, understudied, and can result in cognitive impairment

- **Over 90% of aged individuals have white matter hyperintensities[1].**
- **White matter damage can result in cognitive impairments that are dependent upon the location of the injury[2-3].**

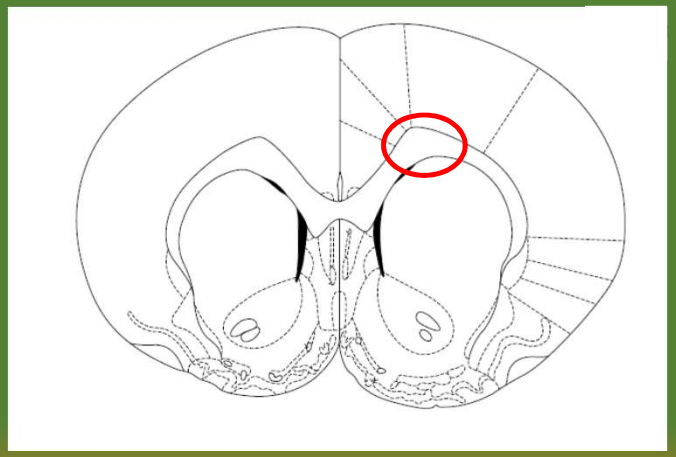
1 J Neurol Neurosurg Psychiatry 2001:70;9-14 2 Rev Méd 1901;21:281-298. 3 Lancet Neurol 2002;1:426-436.

Generation of a novel vasoconstrictor white matter injury model

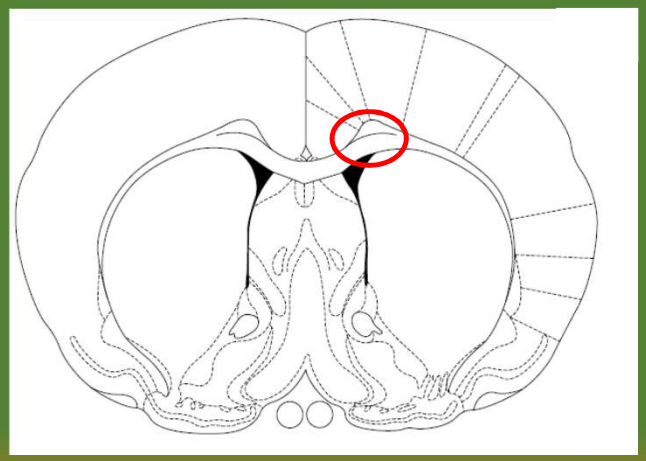
L-NIO



AP +1.5 mm
ML 2.0 mm
DV 2.8 mm

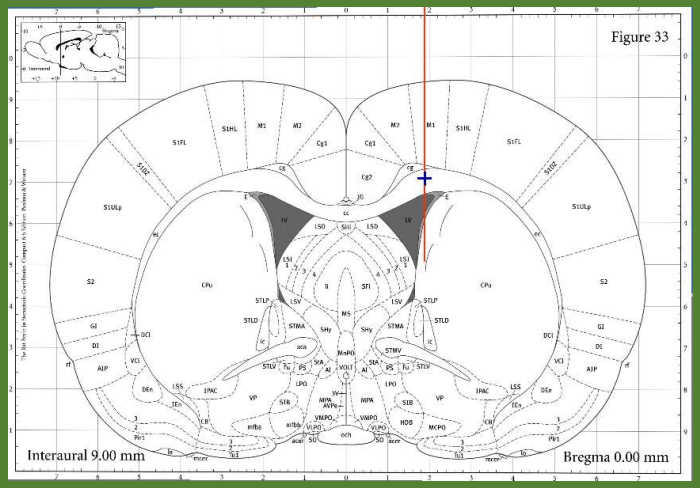


AP 0 mm
ML 2.0 mm
DV 2.8 mm

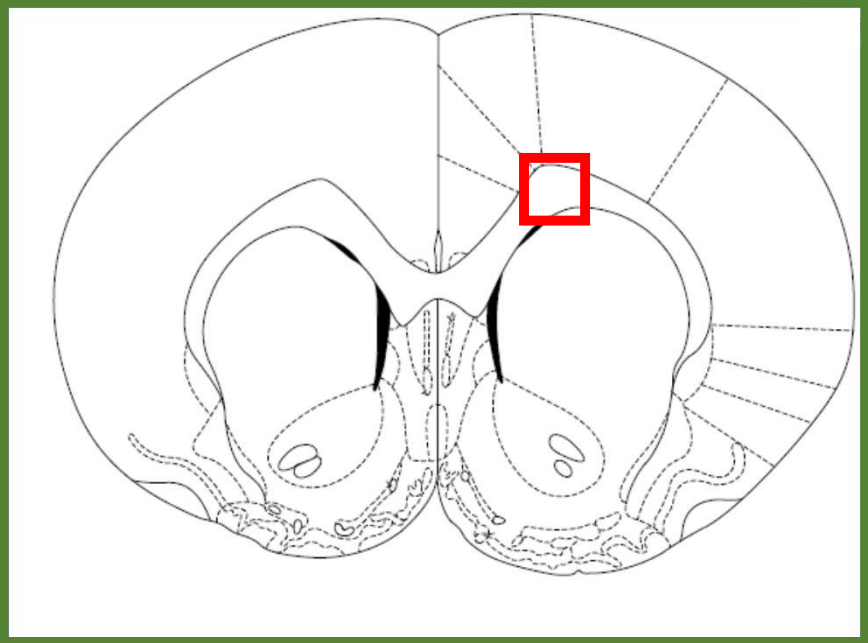


https://www.emdmillipore.com/US/en/product/L-N%E2%81%B5-(1-Iminoethyl)ornithine,-Dihydrochloride---CAS-159190-44-0---Calbiochem,EMD_BIO-400600?bd=1

Neurostar injection system can focally target white matter tracts



L-NIO injection causes glial scar formation and axonal injury

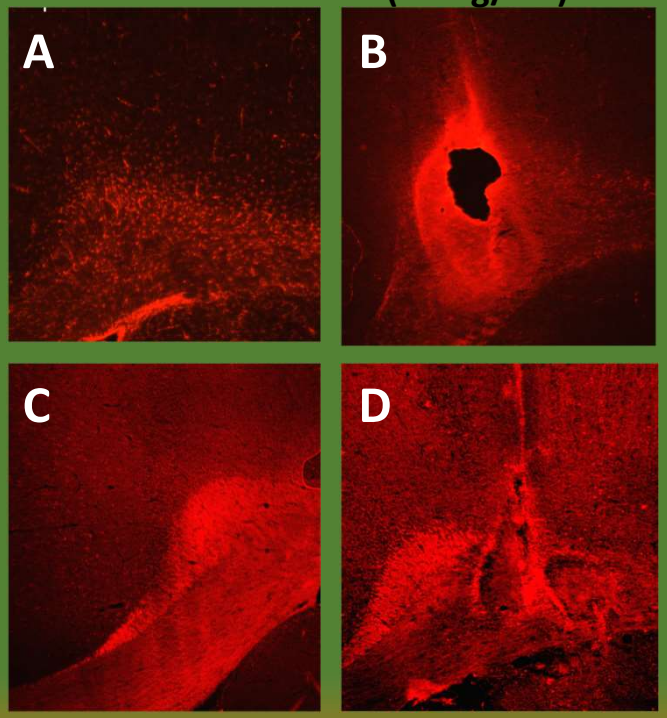


Saline Injection

L-NIO Injection (27mg/mL)

GFAP (Reactive astrocyte marker)

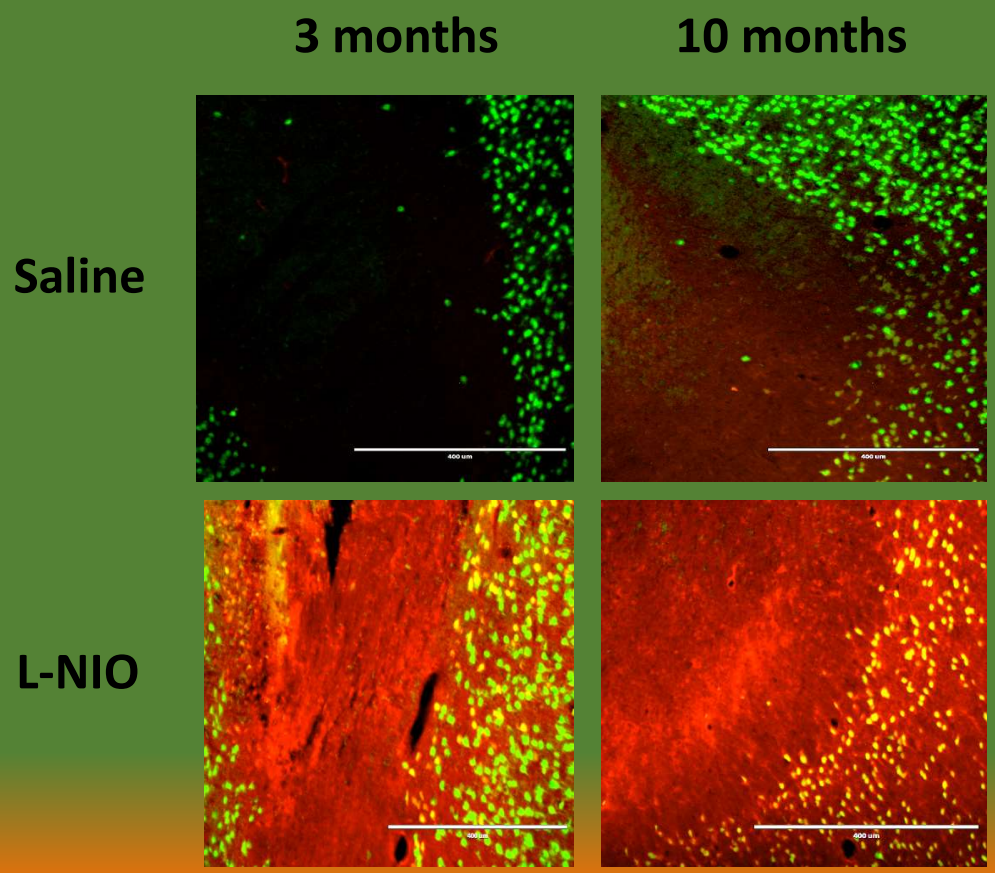
B3 Tubulin (Neuronal Axon marker)



Hypothesis

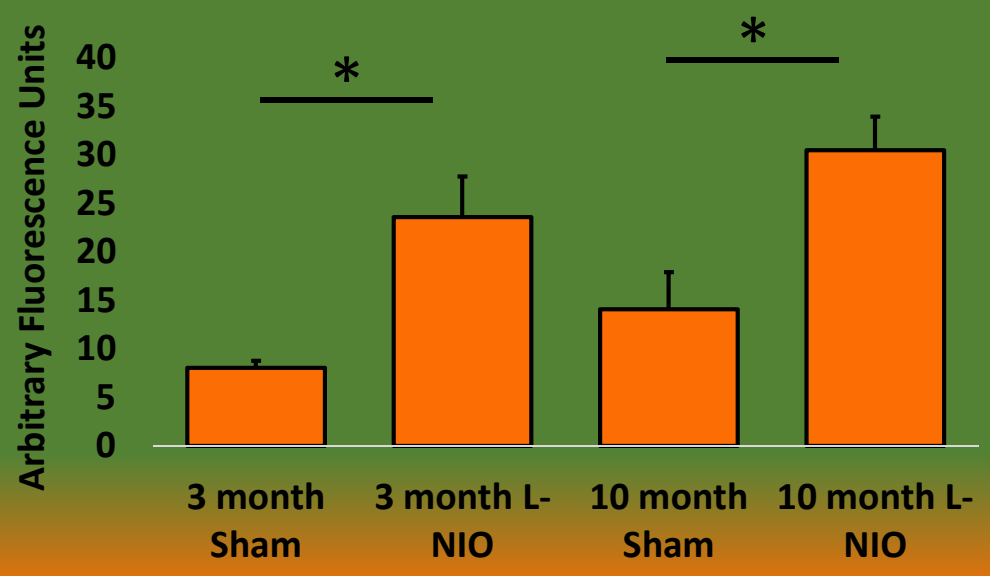
L-NIO injection into white matter will create similar injuries in young and middle-aged rats.

L-NIO injection triggers cell death in white matter tracts

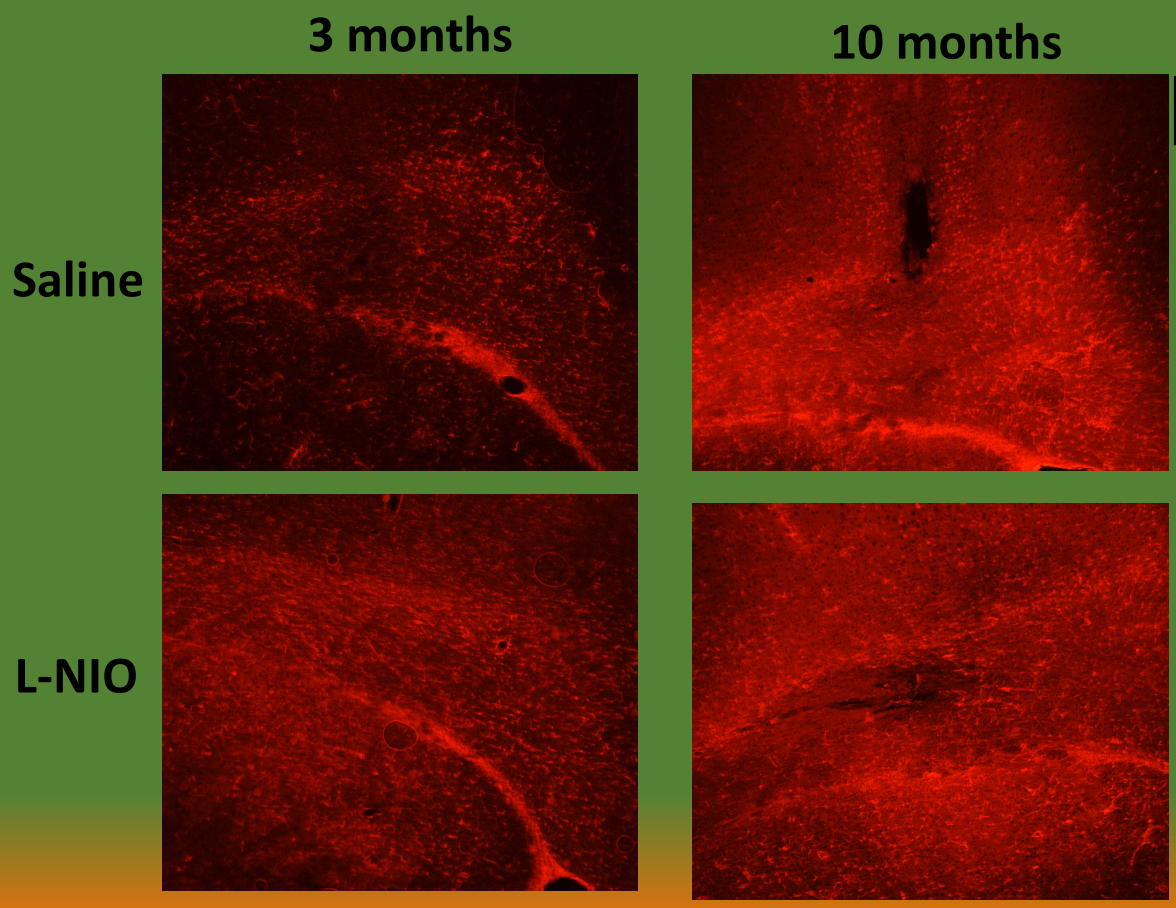


Green: NeuN

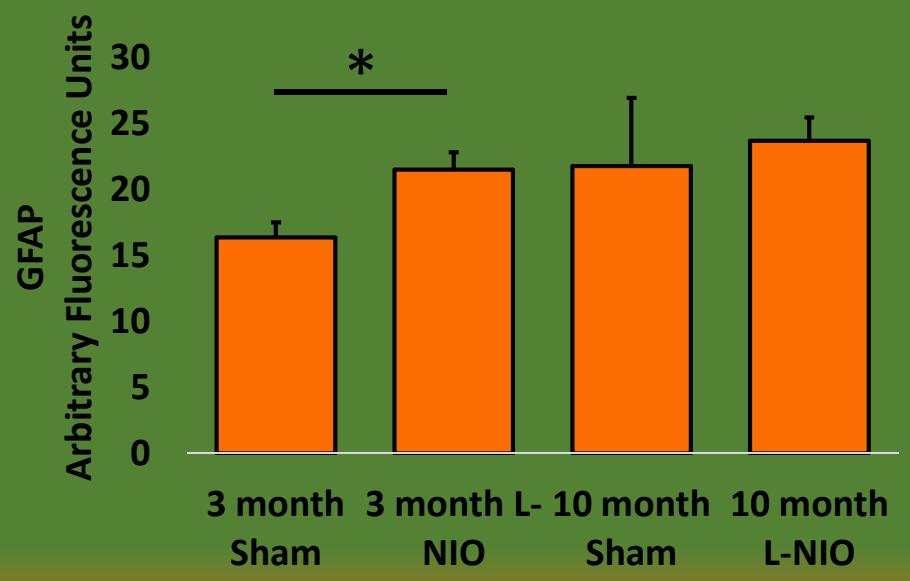
Red: Apoptosis Inducing Factor



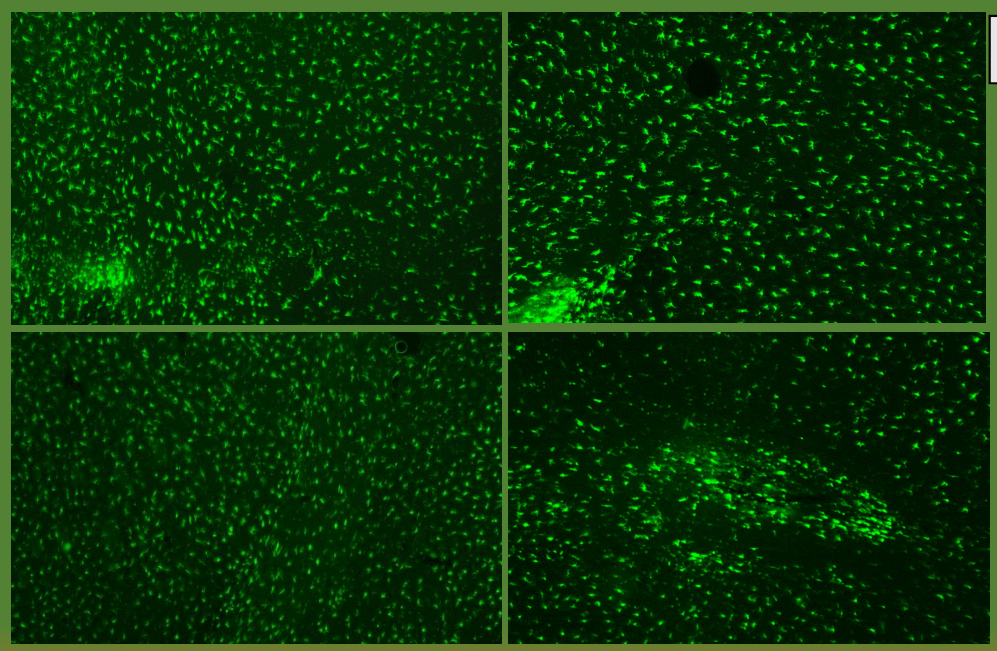
Glial scar marker is increased in young animals following L-NIO injection

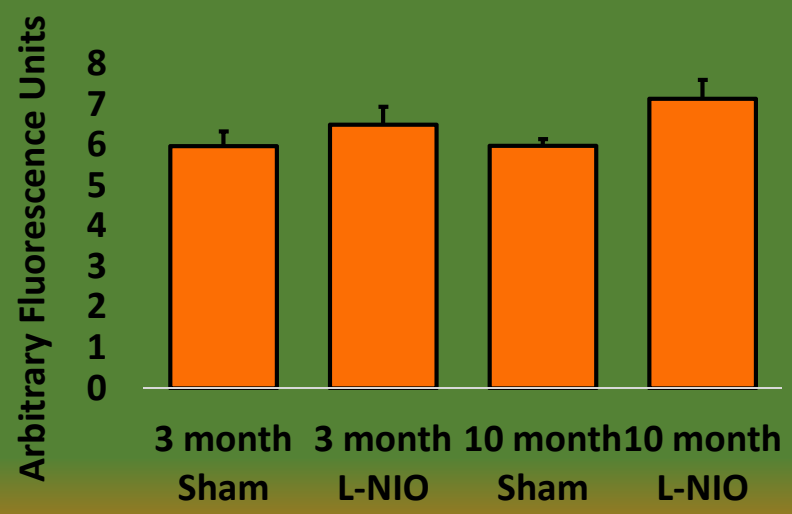


Red: Glial Fibrillary Acidic Protein



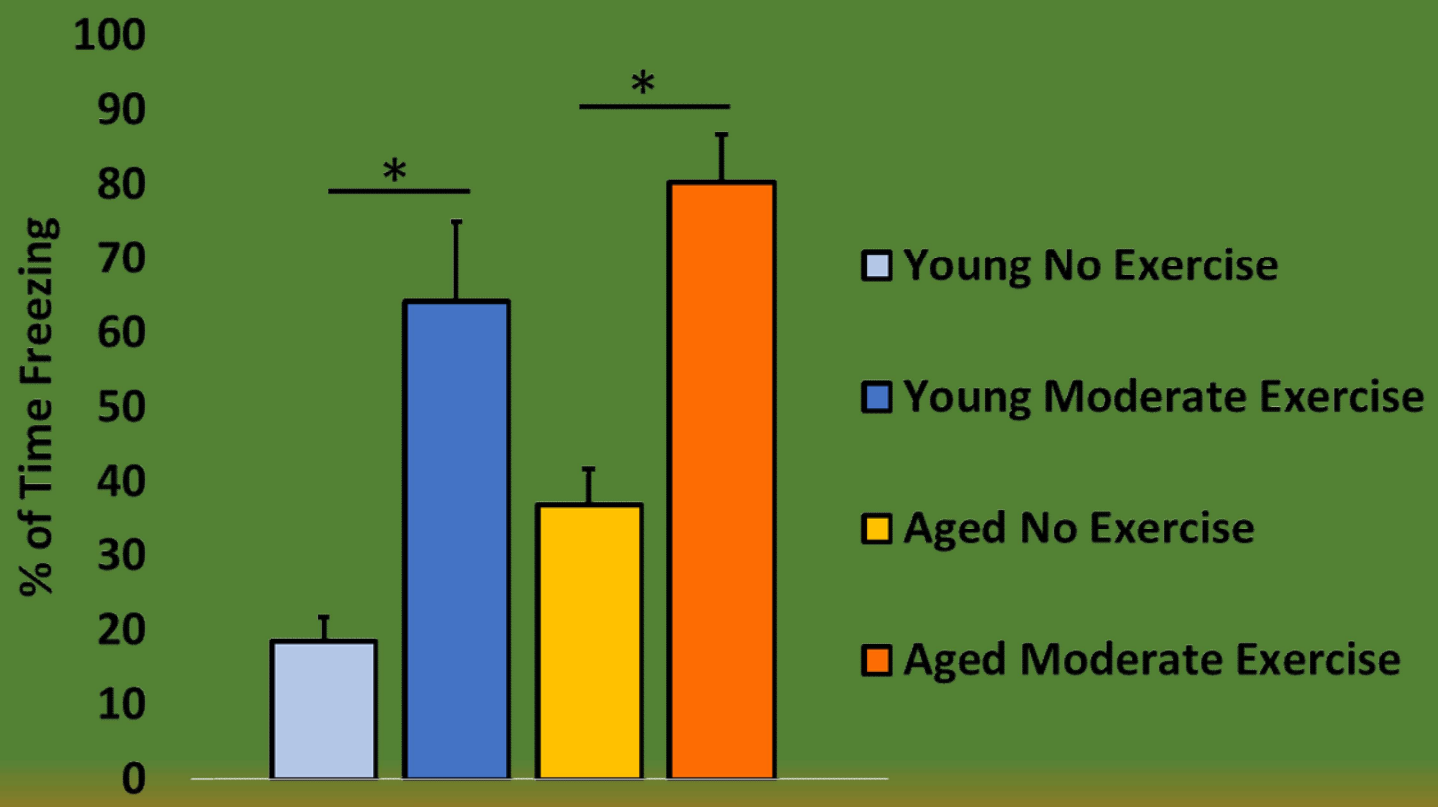
Microglial marker is not increased following L-NIO injection



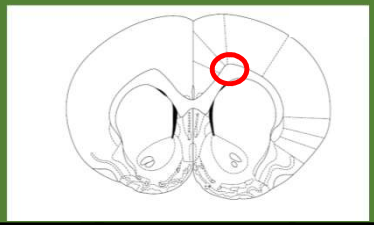


What can improve cognitive recovery following white matter injury?

Exercise improves cognitive recovery in young and old rats following stroke



Future experiments: treatment of white matter injury with exercise



Handling	L-NIO White Matter Injury	Recovery	Forced Treadmill Exercise	Cognitive deficit measurements	Histology
(3 days)	0	1 - 7	8 - 12	13-20	28

Day :

Summary

- **L-NIO injection causes a focal white matter injury.**
- **The profile of the injury is different between young and middle-aged animals.**
- **Exercise may be a potential treatment to promote repair and cognitive recovery following injury.**

Thank you!

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