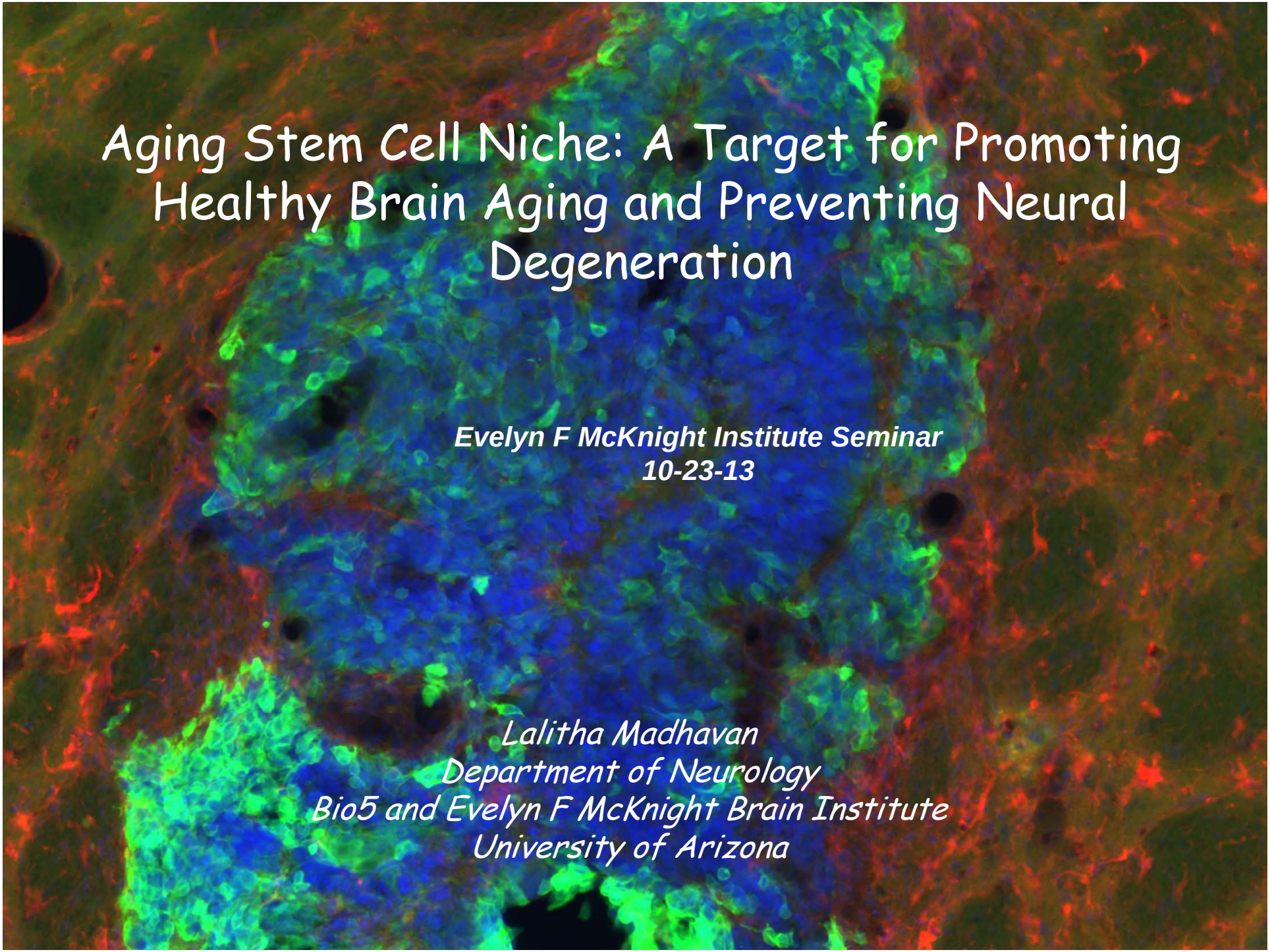


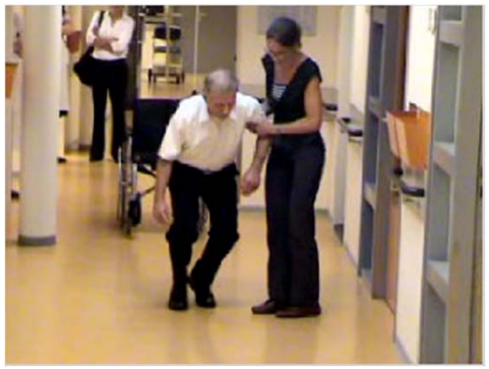
Aging Stem Cell Niche: A Target for Promoting Healthy Brain Aging and Preventing Neural Degeneration

Evelyn F McKnight Institute Seminar
10-23-13

Lalitha Madhavan
Department of Neurology
Bio5 and Evelyn F McKnight Brain Institute
University of Arizona

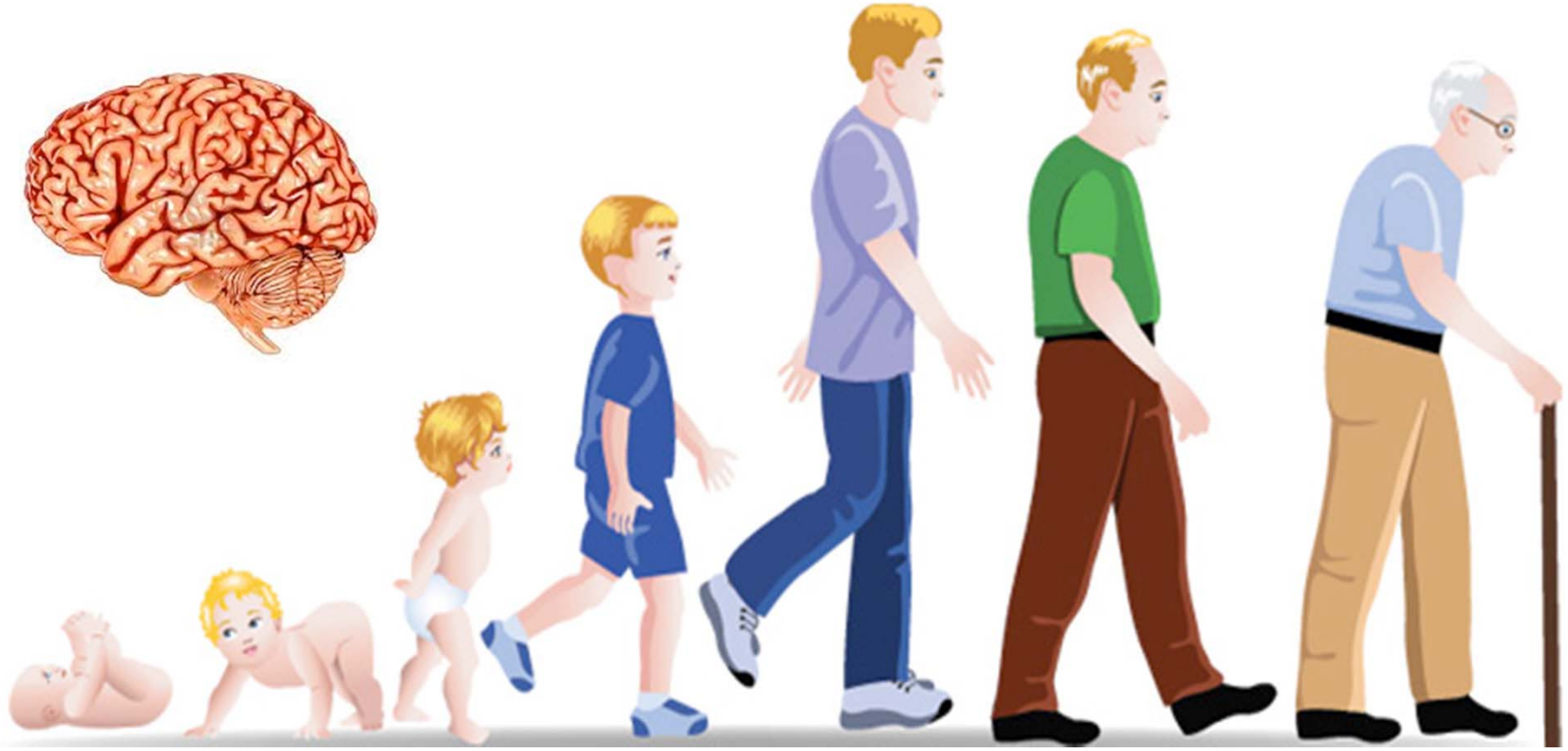
Aging and Neural Degeneration

Alzheimer's Disease

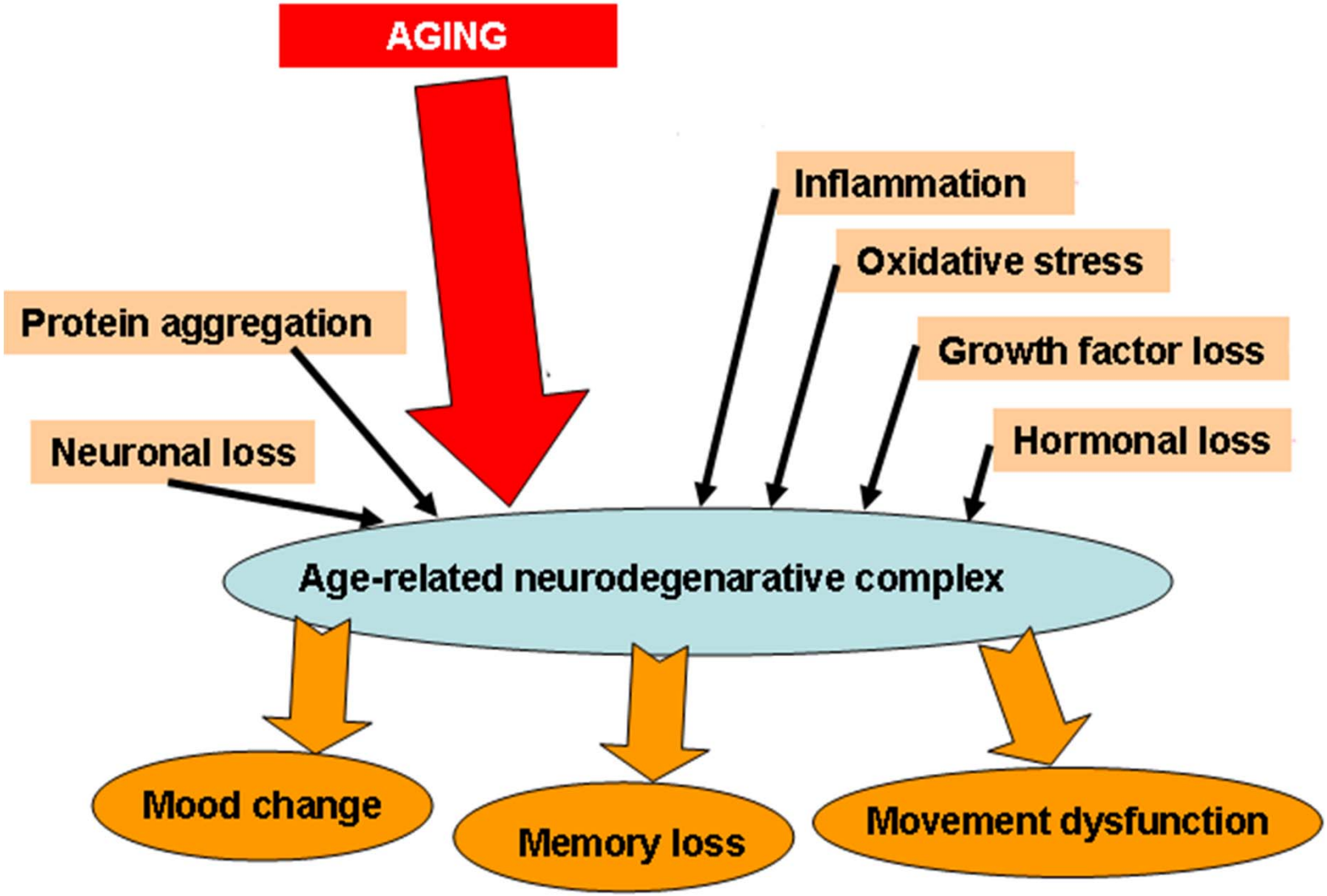


Parkinson's Disease

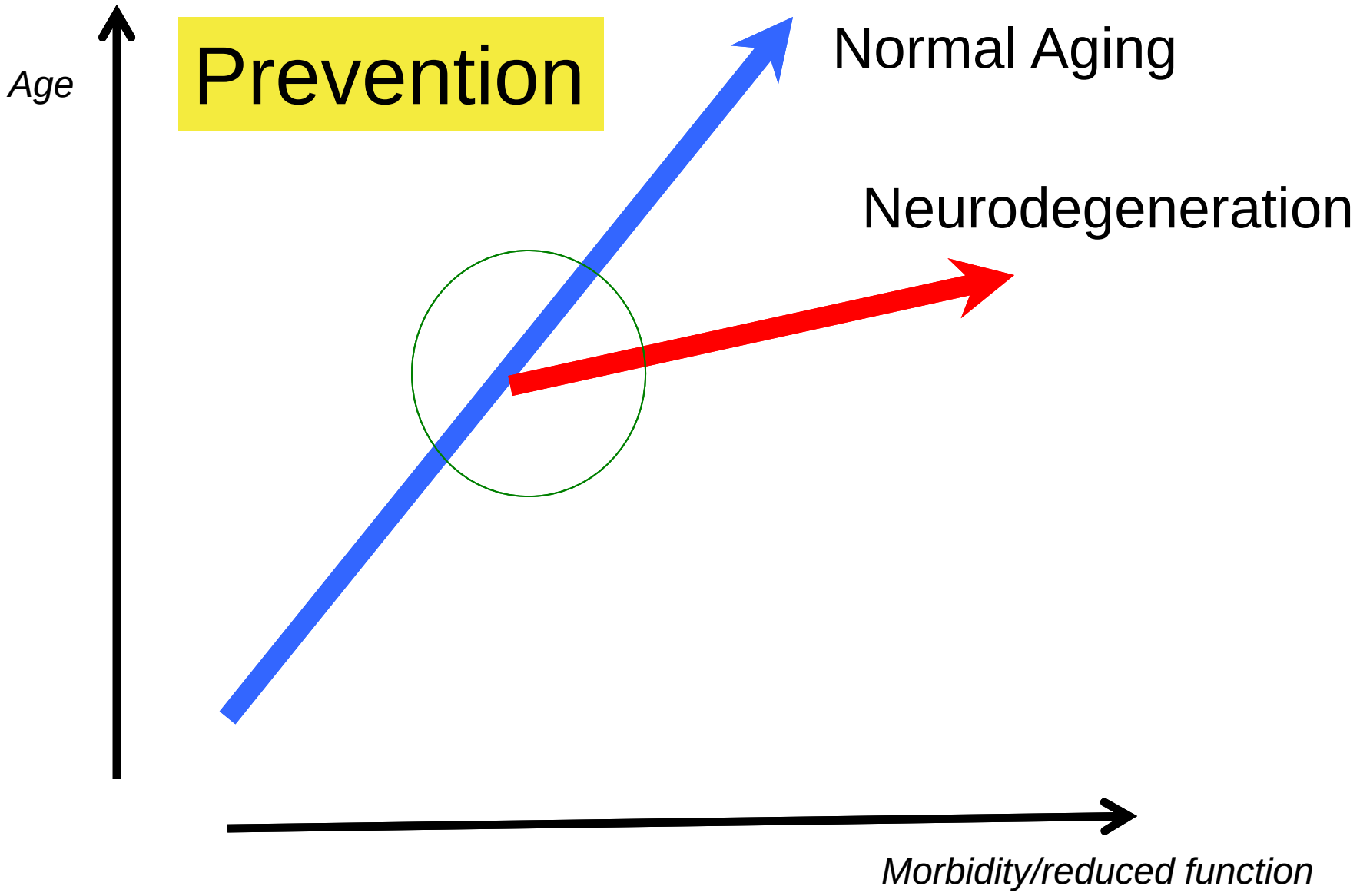
Normal Aging



Aging and Neural Degeneration



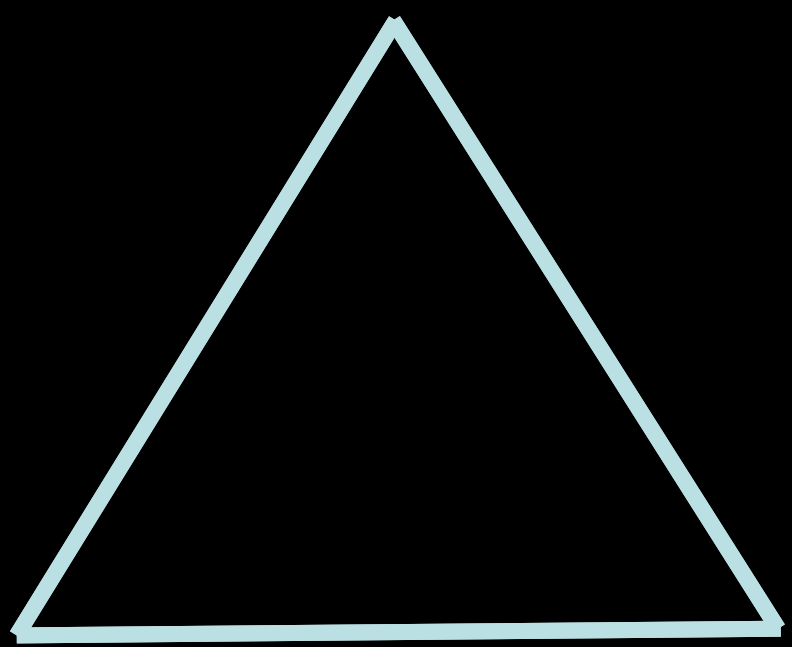
Aging and Neural Degeneration



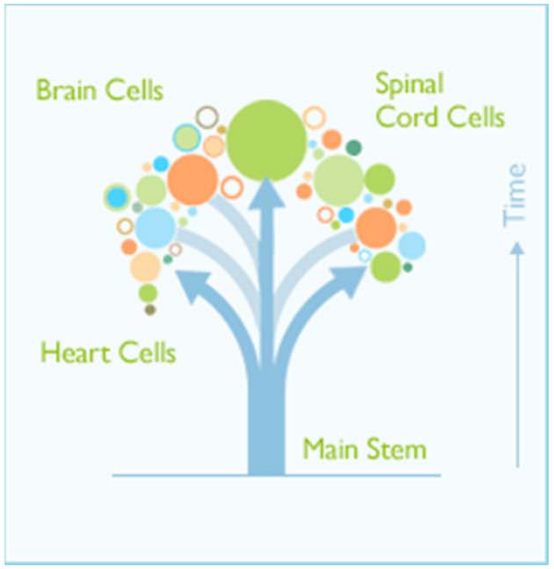
Stem cells, Aging, Neural Degeneration

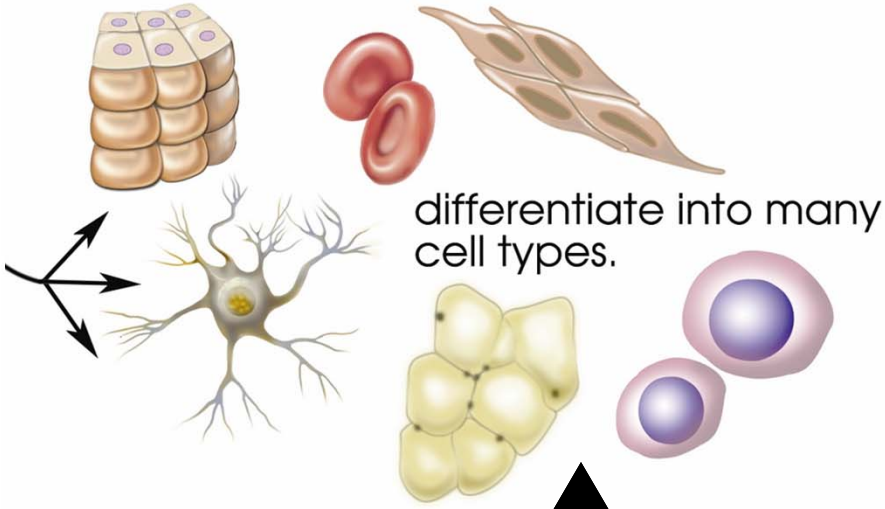
Adaptation ⊣ Ageing ← Neurodegeneration

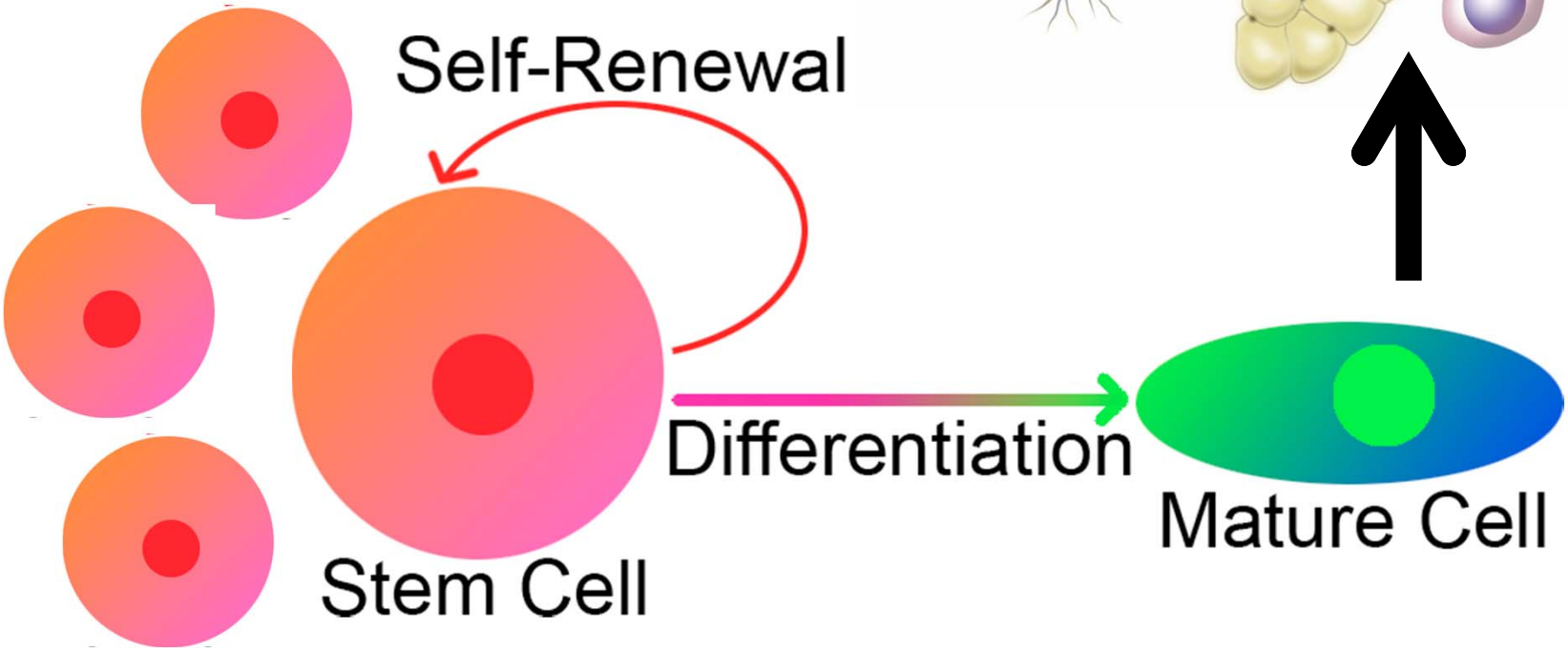
"Plasticity"



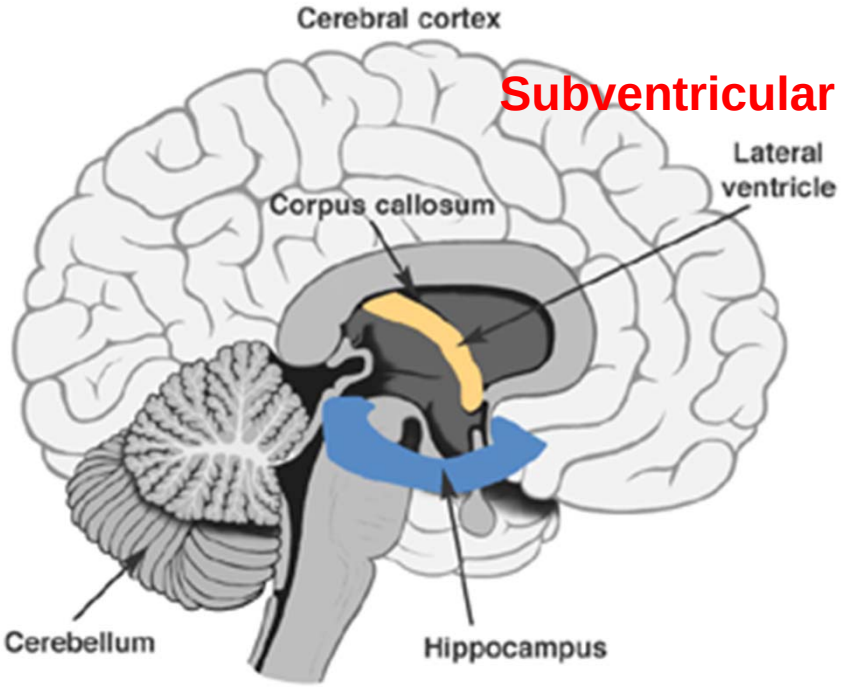
STEM CELLS


Brain Cells
Spinal Cord Cells
Time
Heart Cells
Main Stem


differentiate into many cell types.


Self-Renewal
Differentiation
Mature Cell
Stem Cell

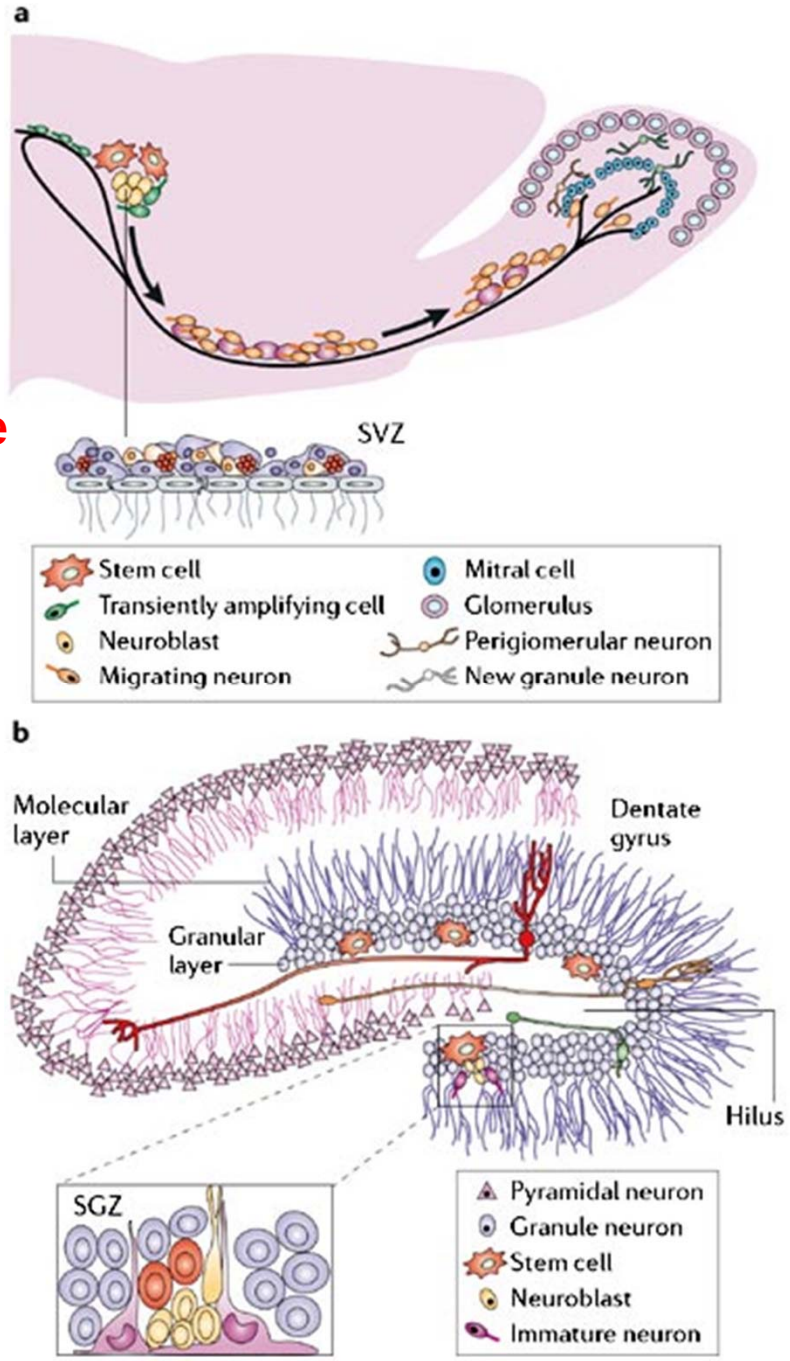
Stem cells and Aging



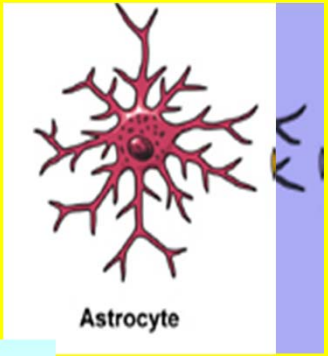
Human Brain

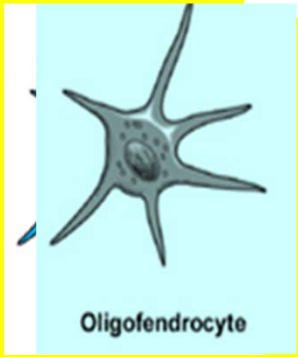
Subventricular Zone

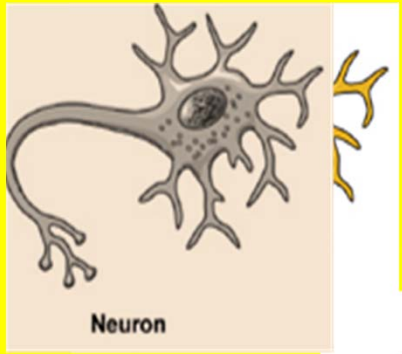
Subgranular Zone

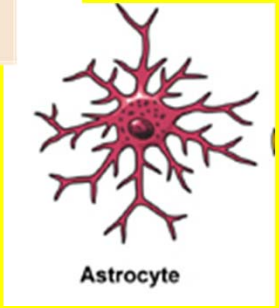


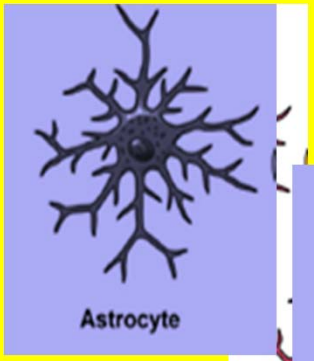
STEM CELL


Astrocyte


Oligofendrocyte


Neuron


Astrocyte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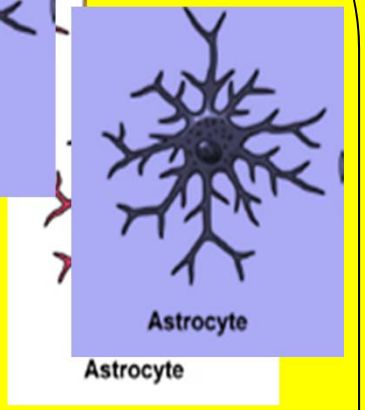
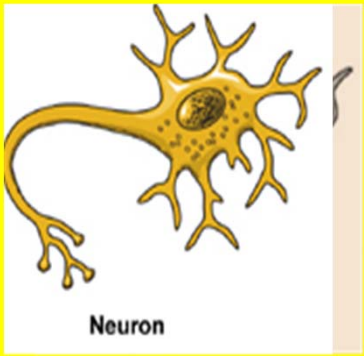
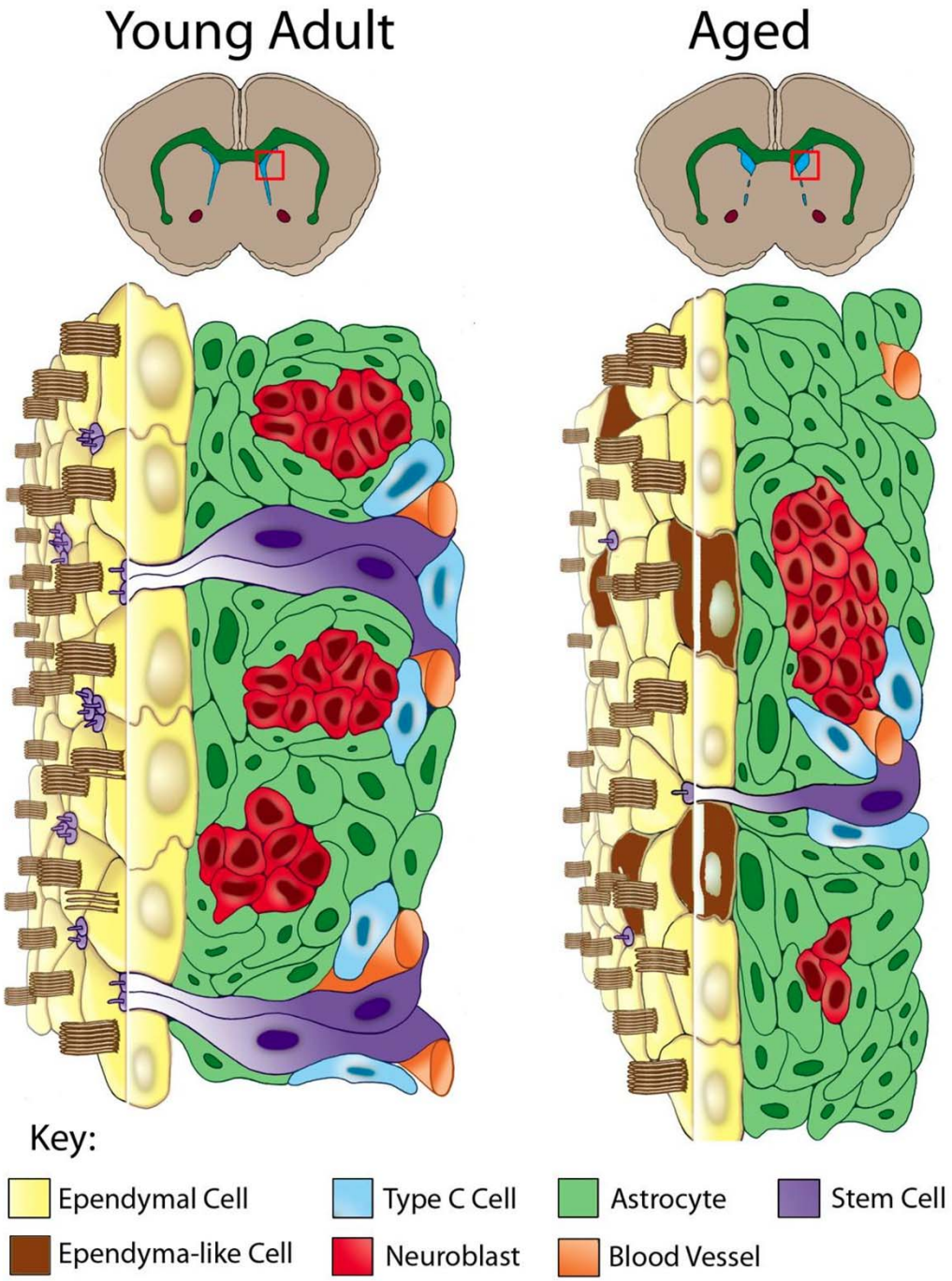

Astrocyte
Astrocyte

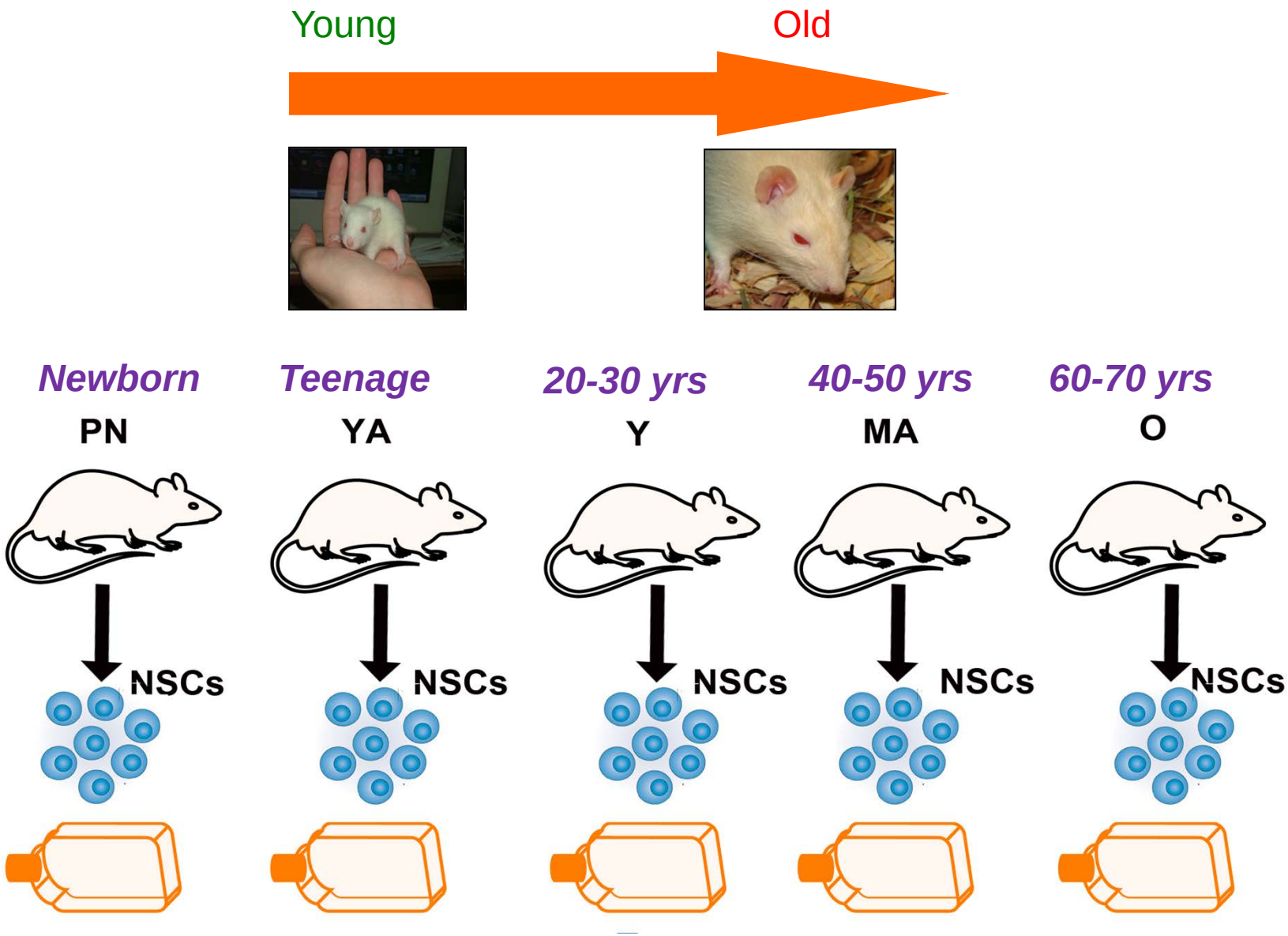
Oligofendrocyte


Neuron

Stem cells and Aging

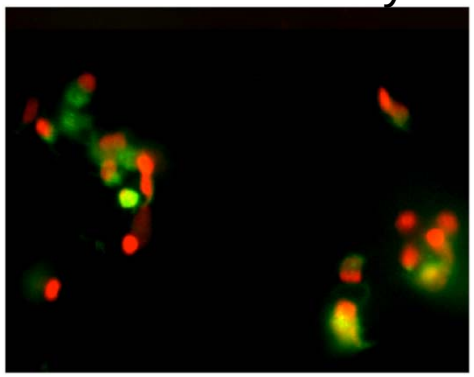


Neural Stem cells and Aging

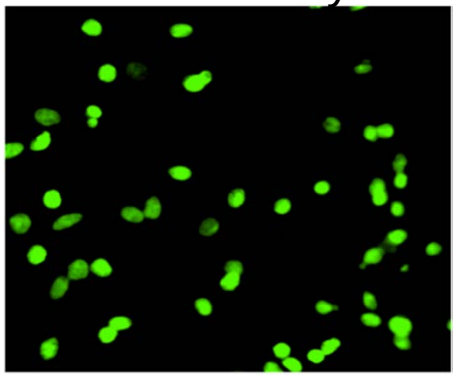


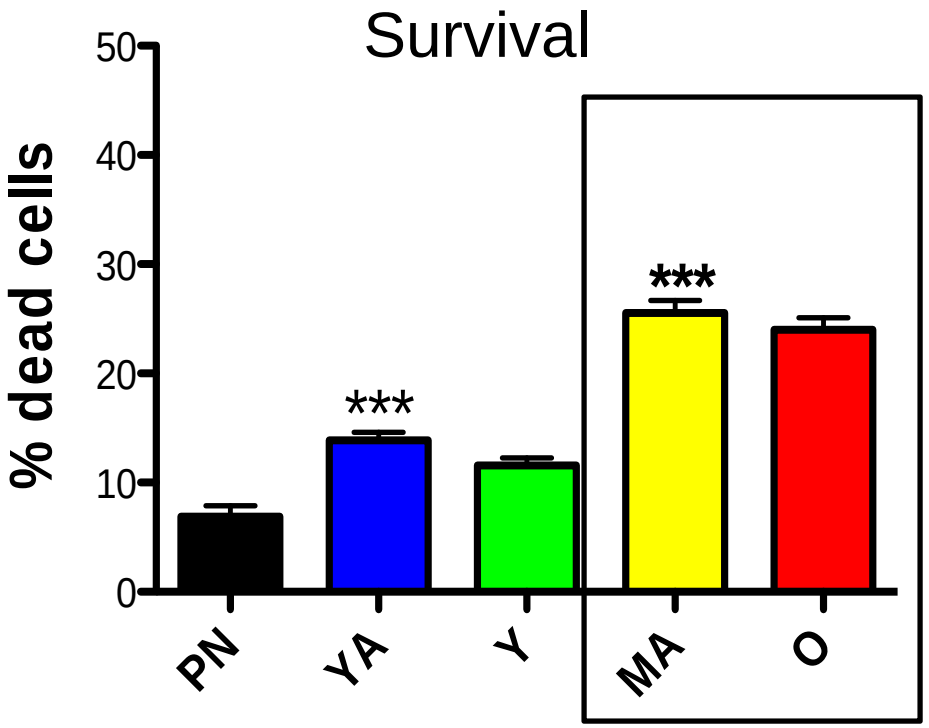
Neural Stem cells and Aging

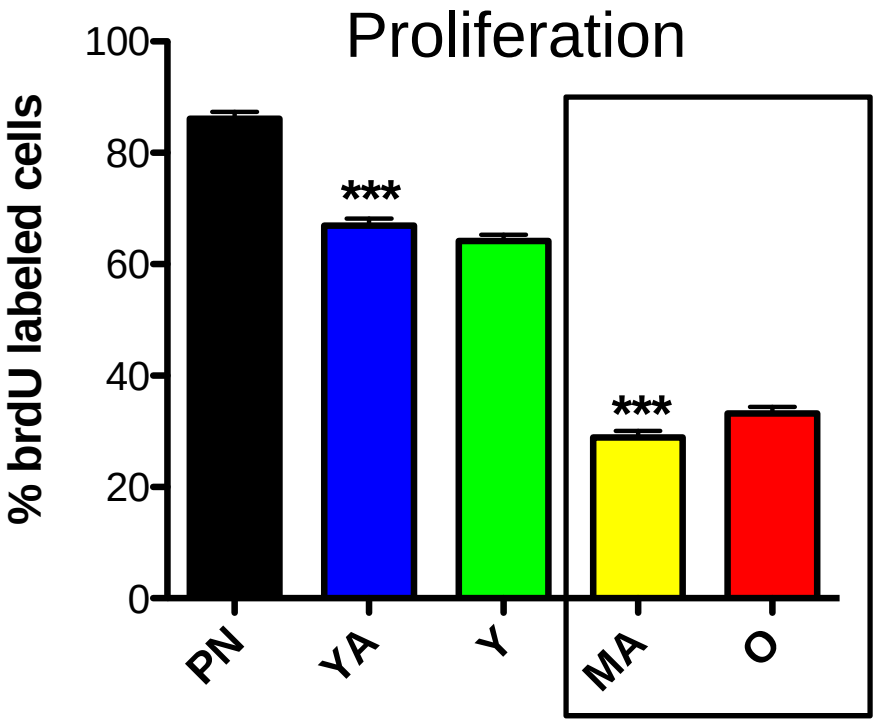
Live-dead assay



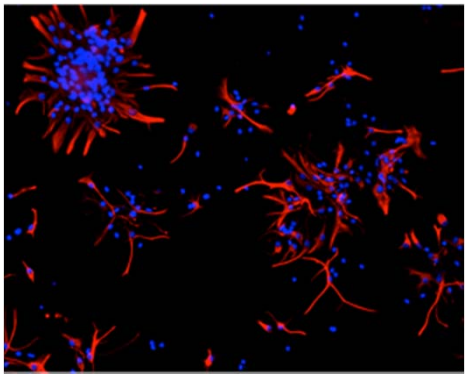
BrdU assay



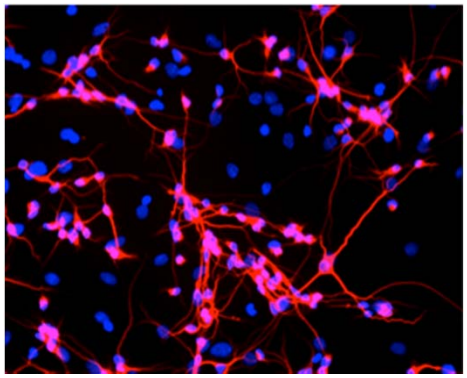




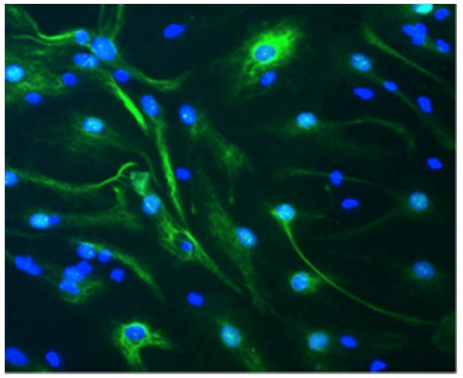
Neural Stem cells and Aging



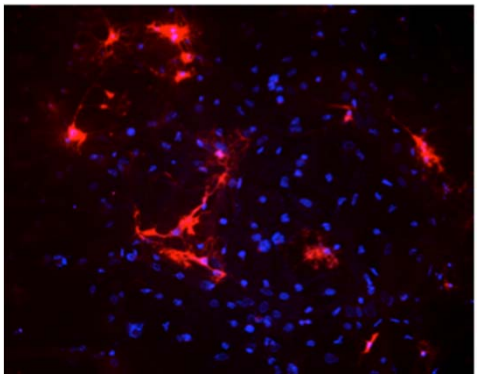
Nestin precursors



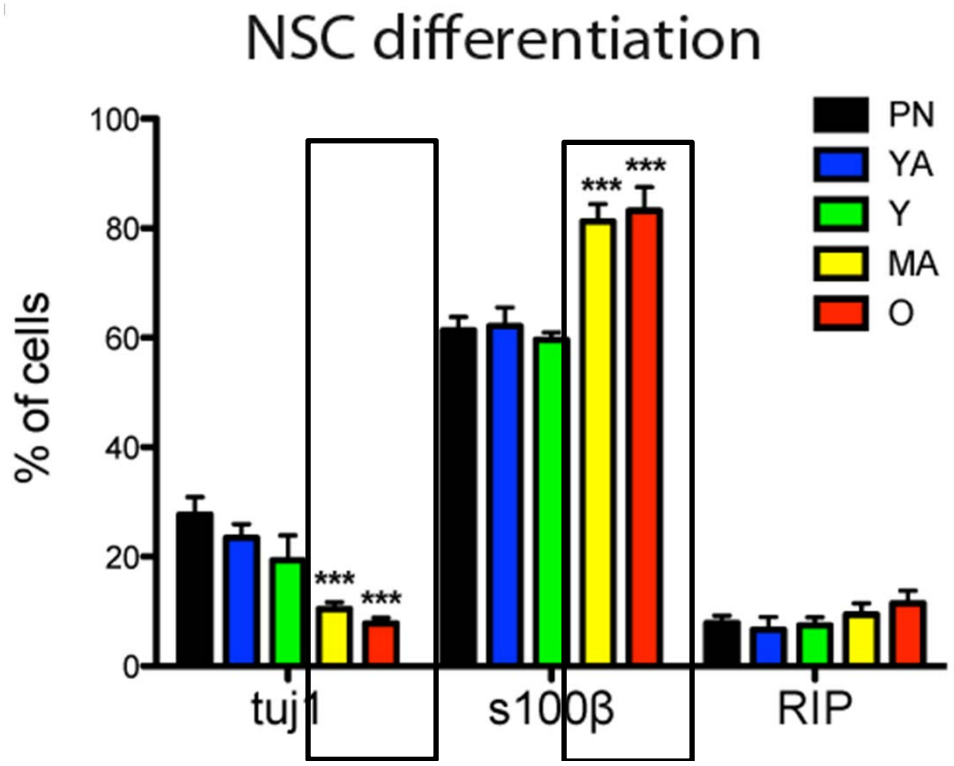
Tuji neurons



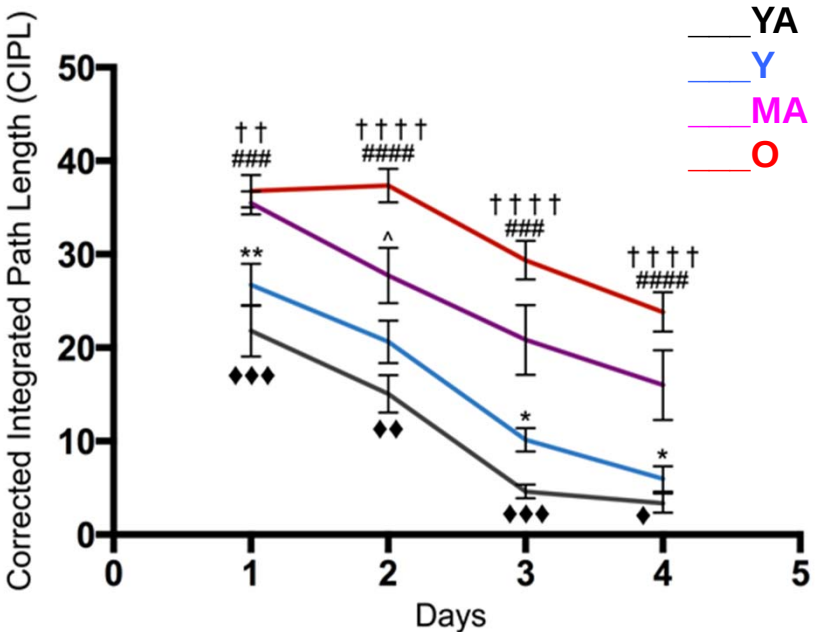
S100β astrocytes

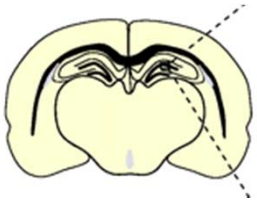


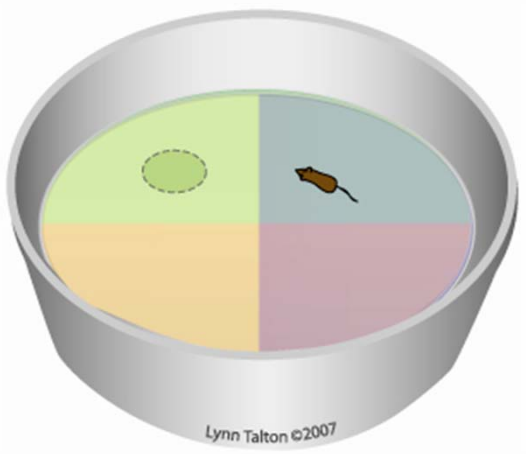
RIP oligos

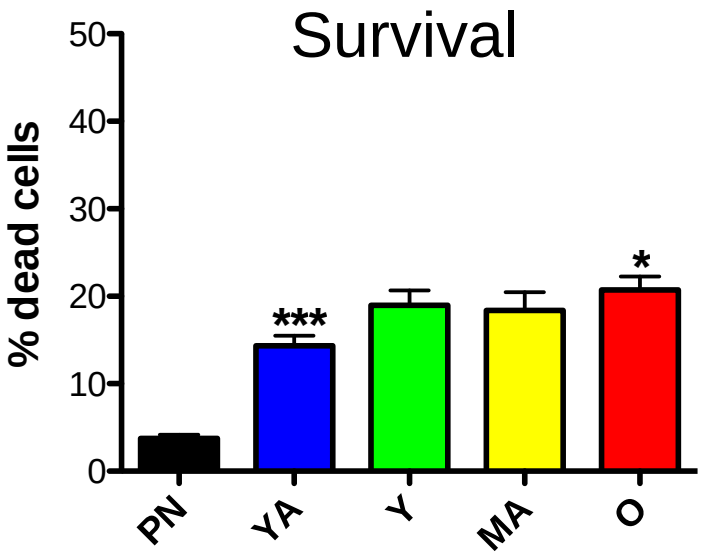


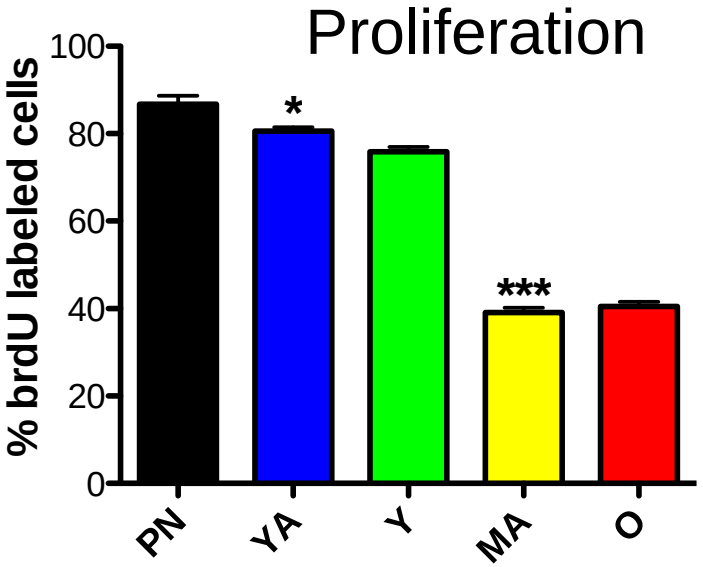
Neural Stem cells and Aging



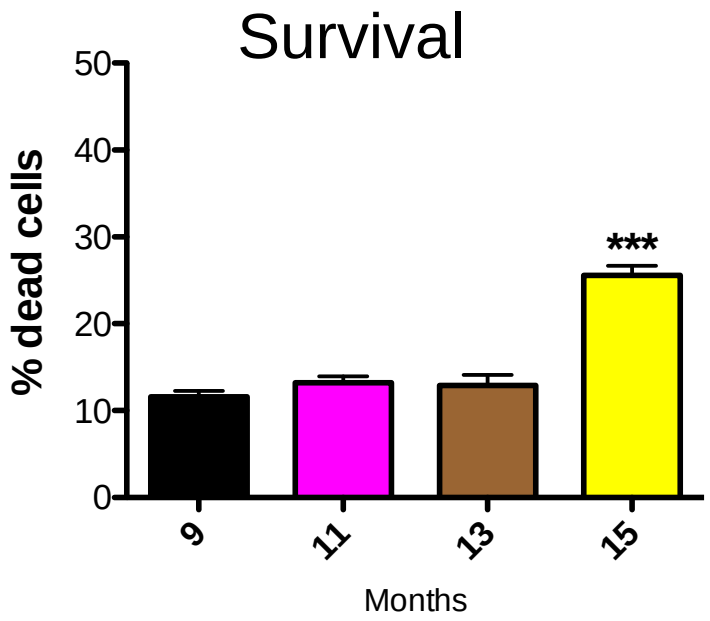


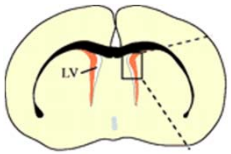


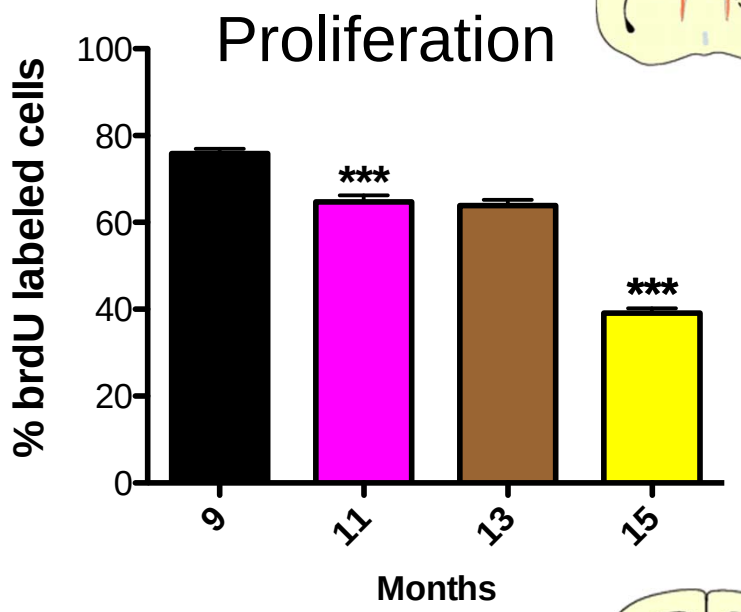


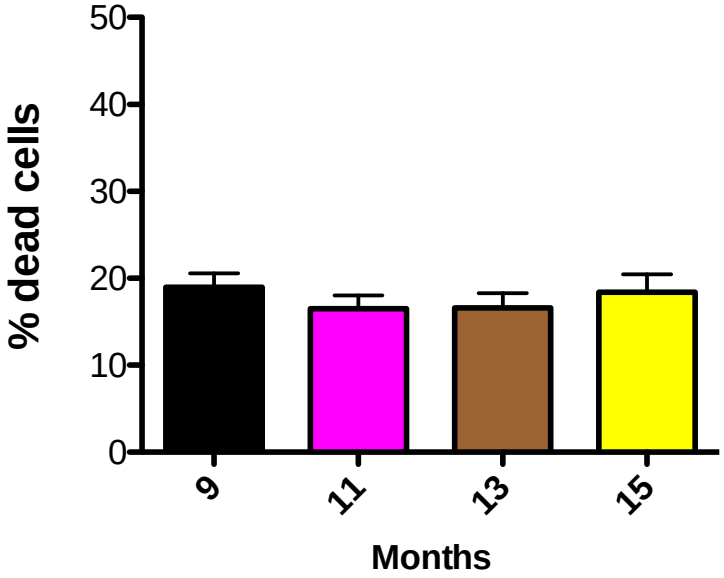


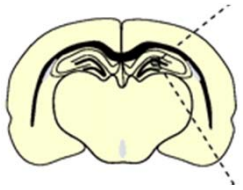
Neural Stem cells and Aging

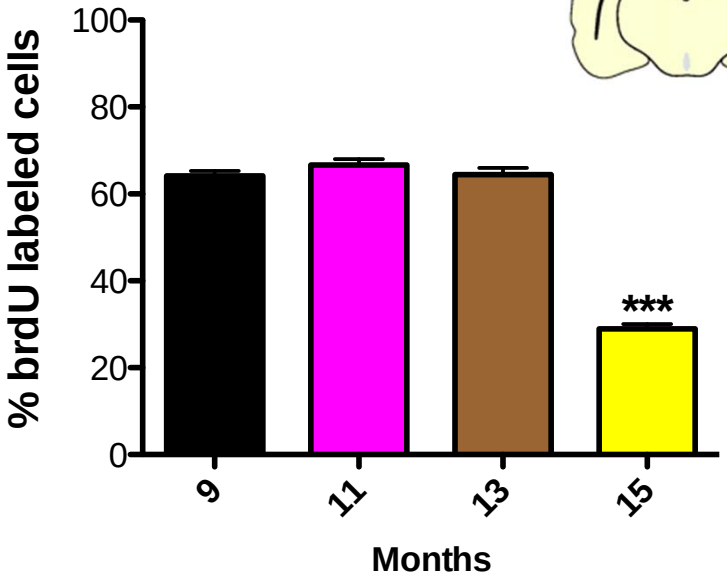








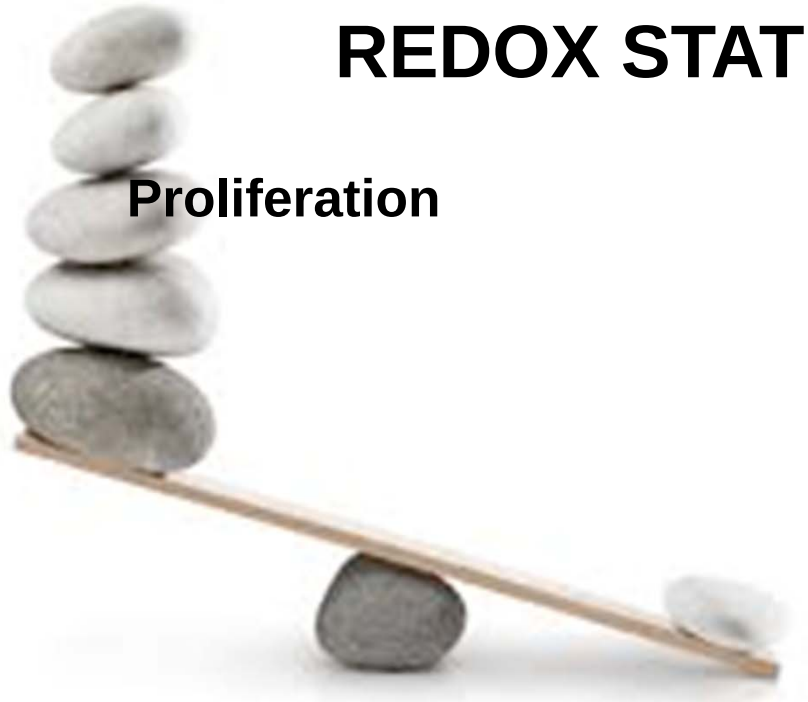




Neural Stem cells and Aging

Young → Old

Oxidative Stress

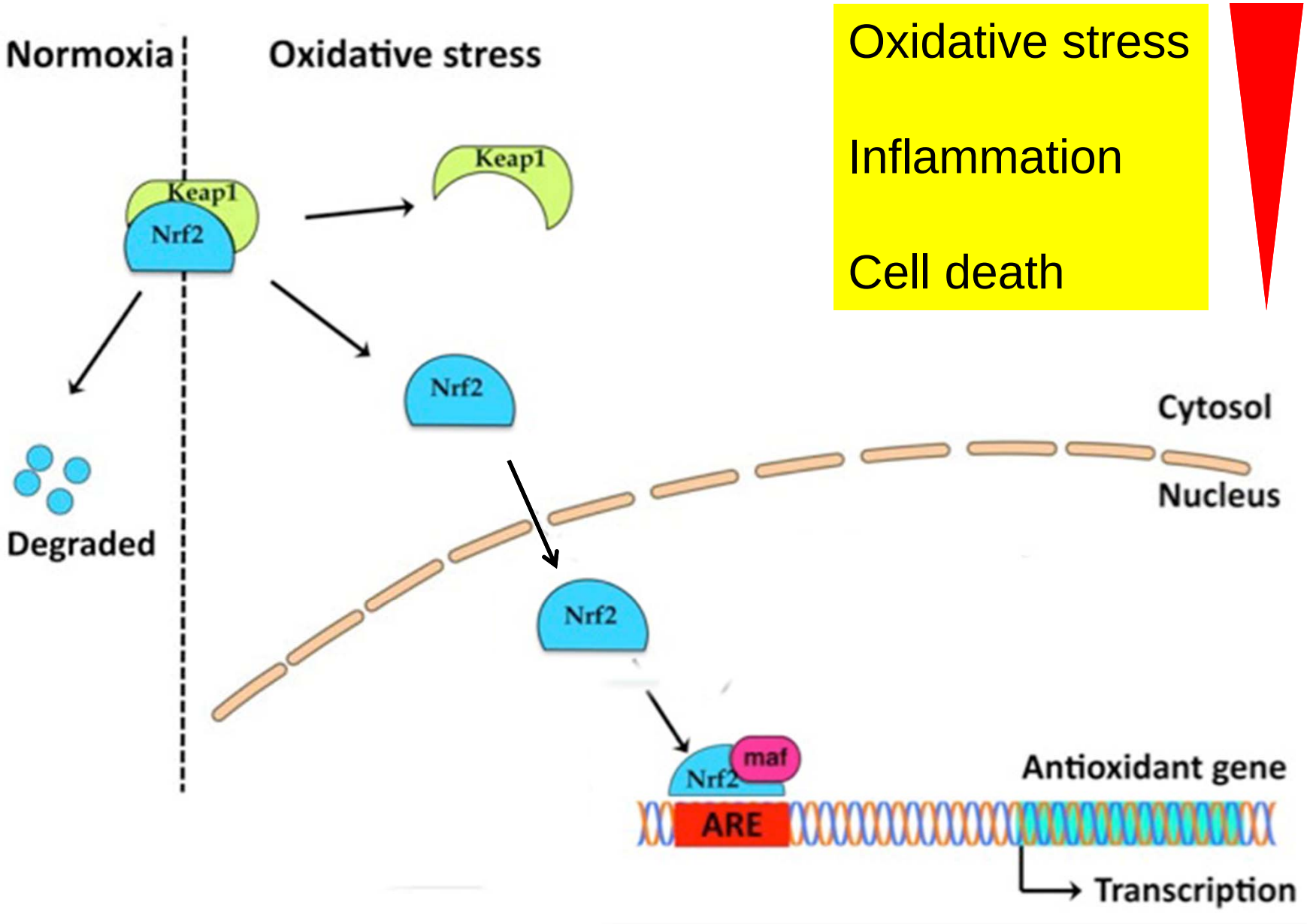


REDOX STATUS

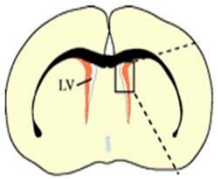
Proliferation

Differentiation

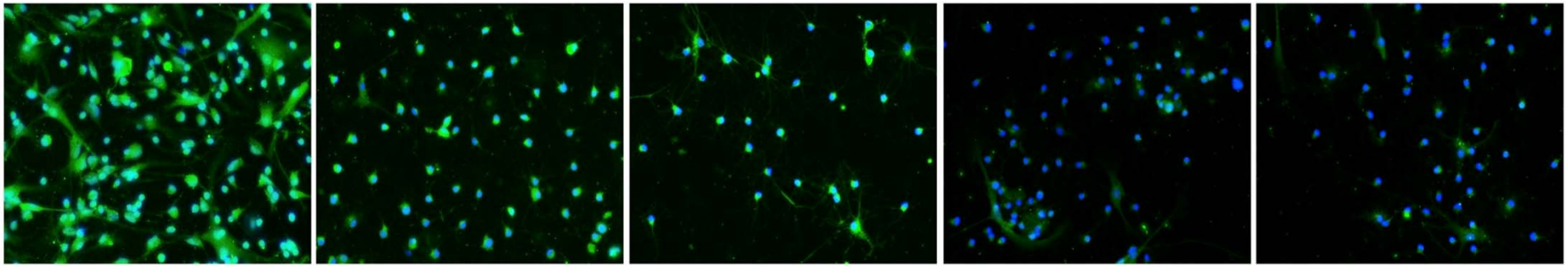
Neural Stem cells and Aging



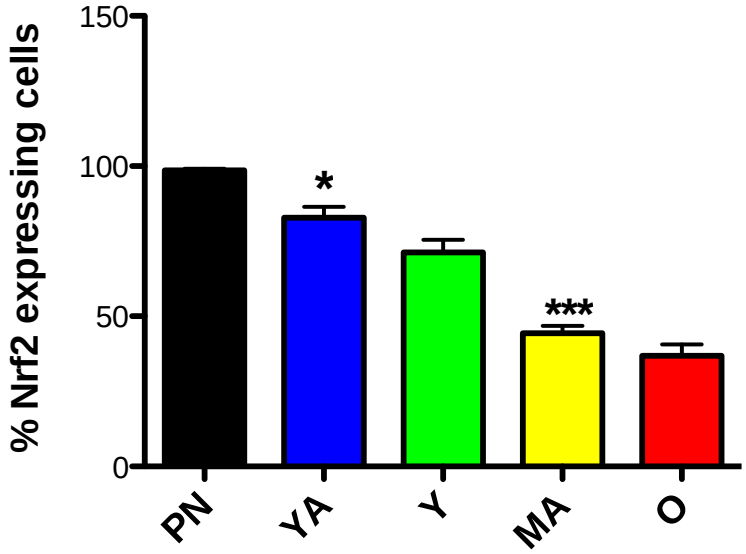
Neural Stem cells and Aging



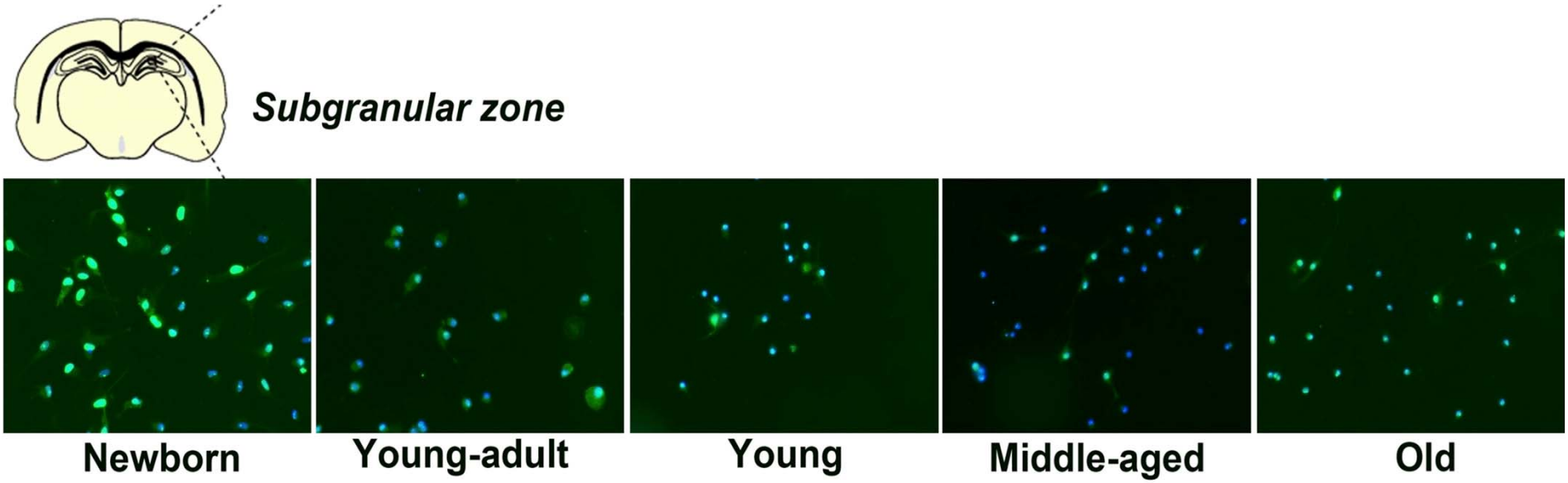
Subventricular zone

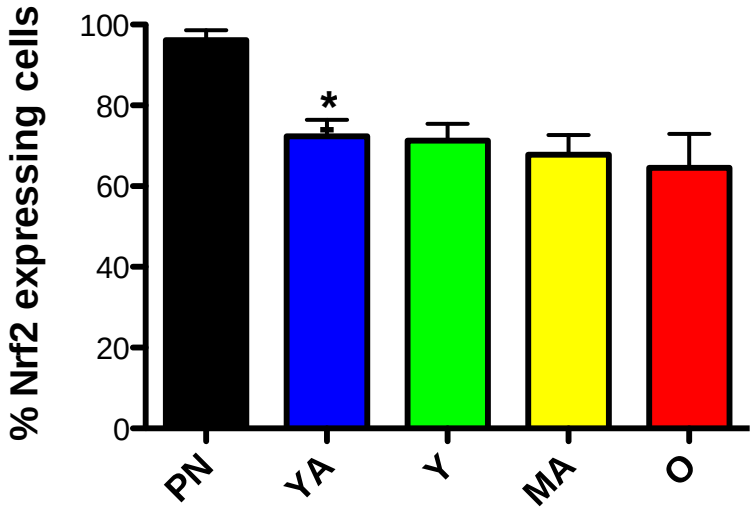


Newborn **Young-adult** **Young** **Middle-aged** **Old**

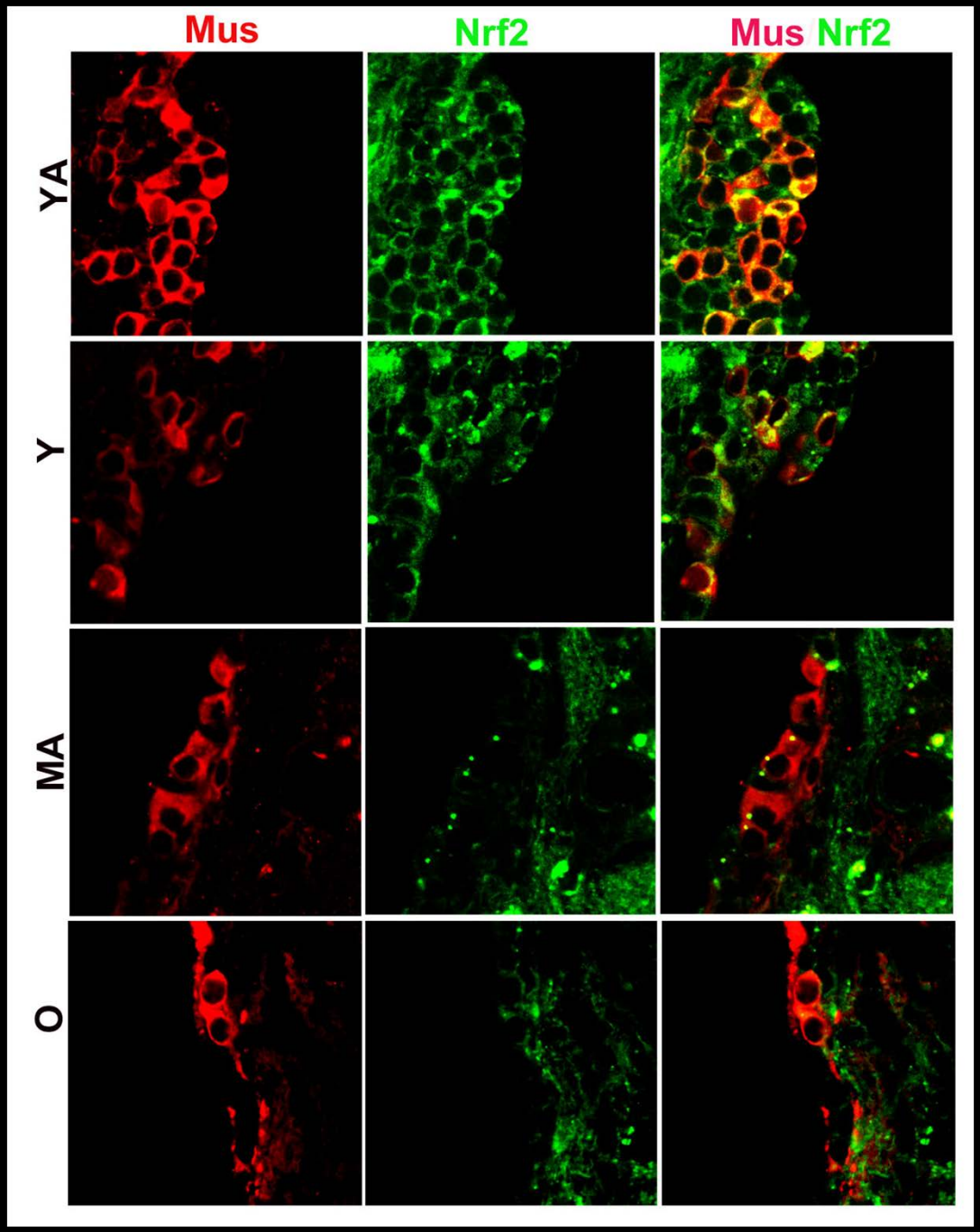


Neural Stem cells and Aging

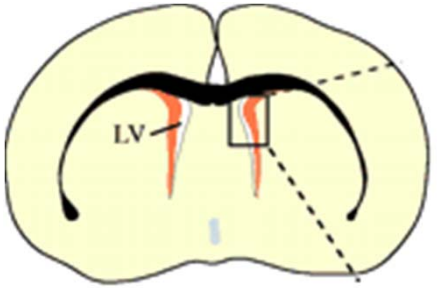




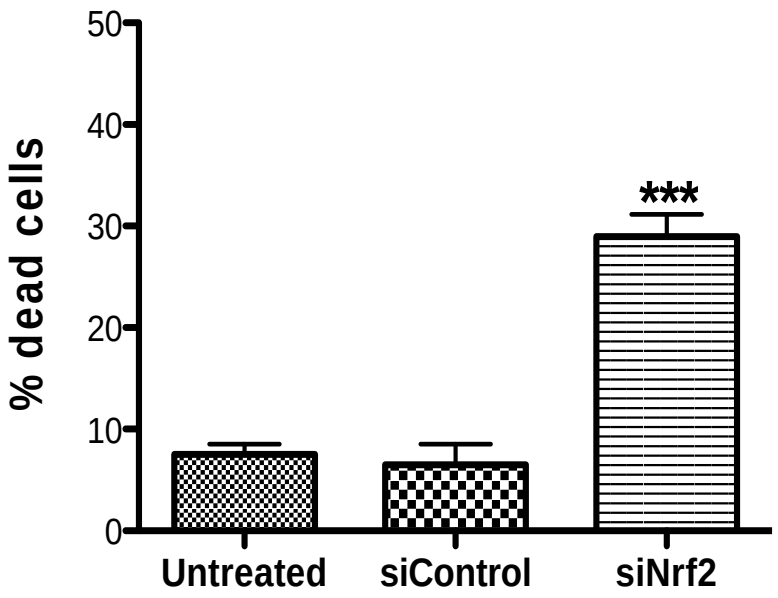
Neural Stem cells and Aging



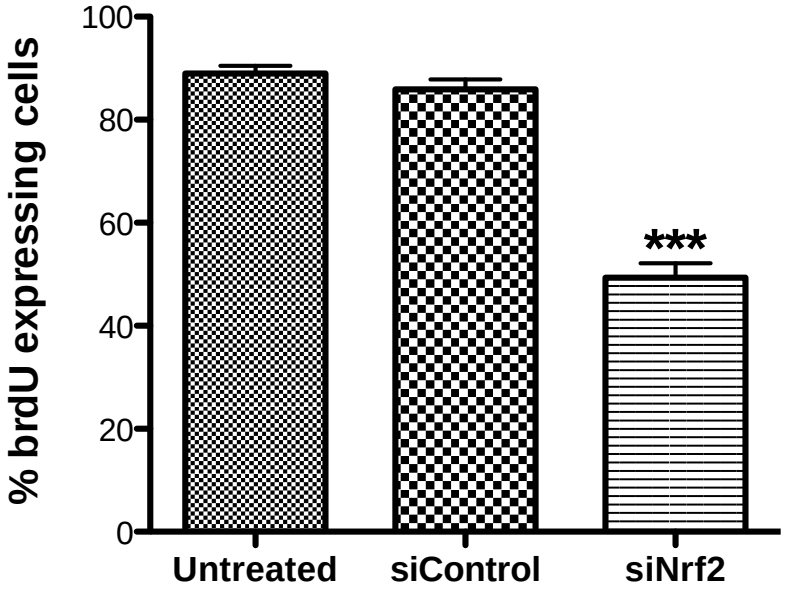
Neural Stem cells and Aging



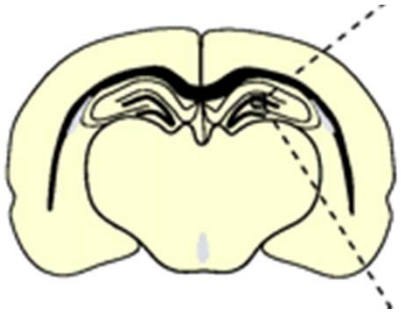
Survival

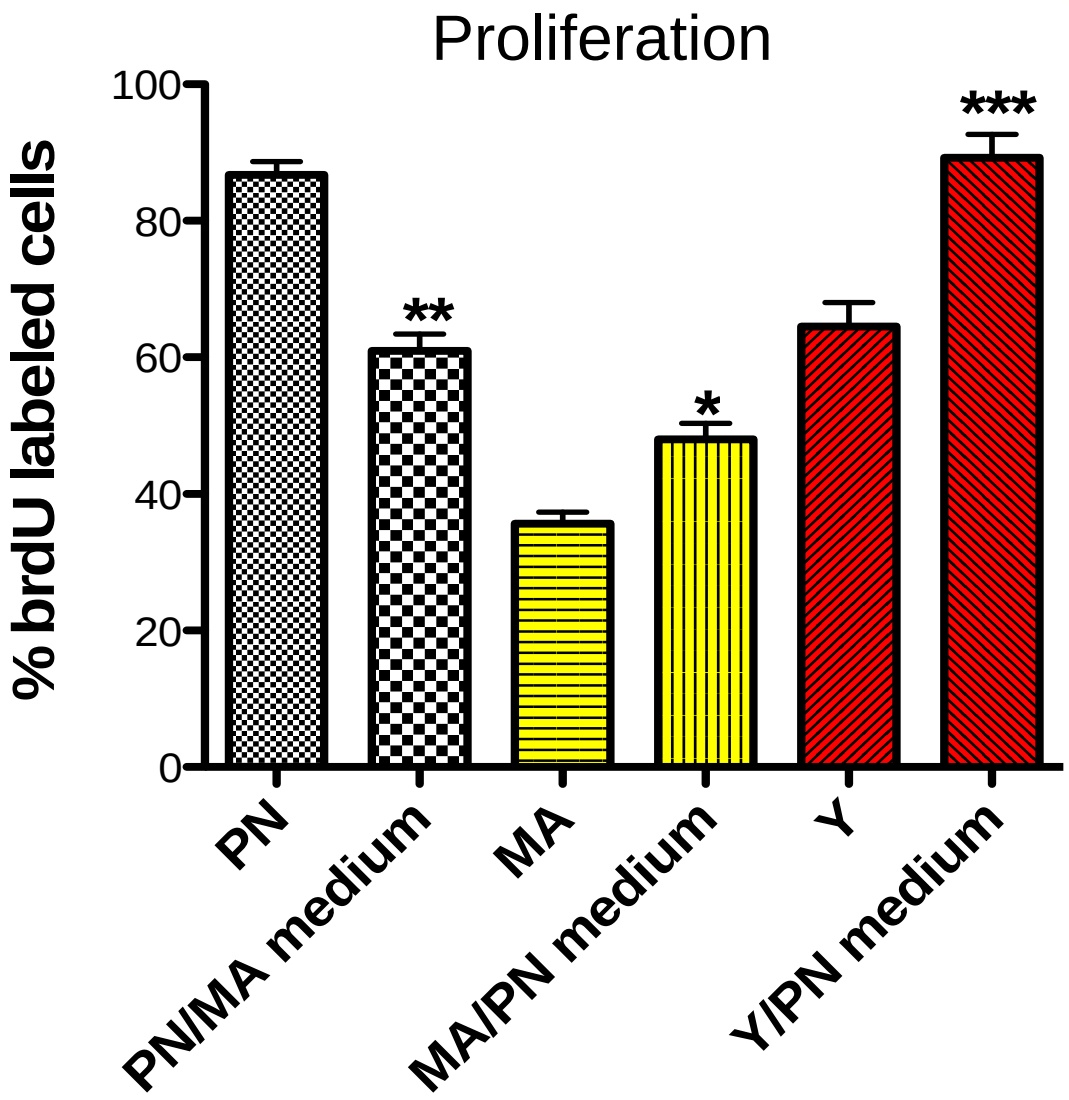


Proliferation

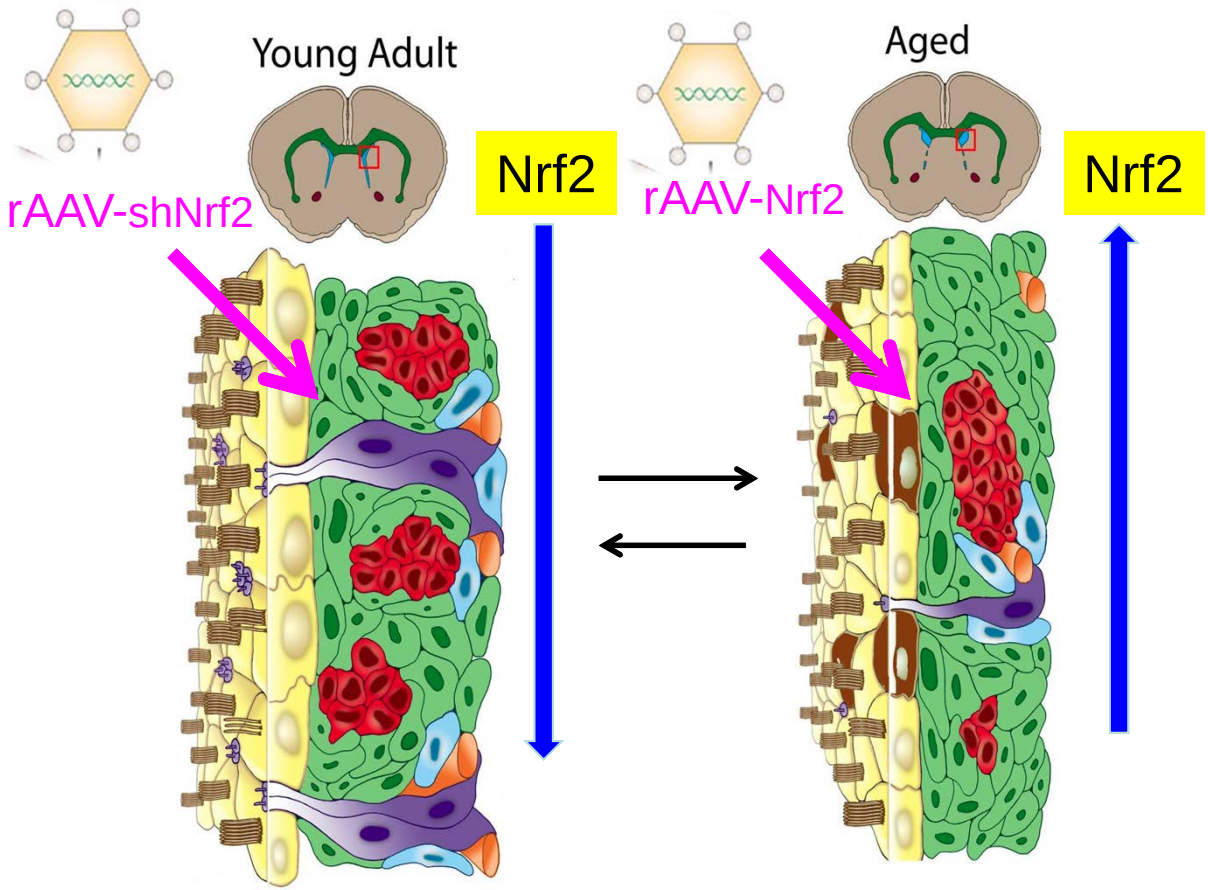


Neural Stem cells and Aging



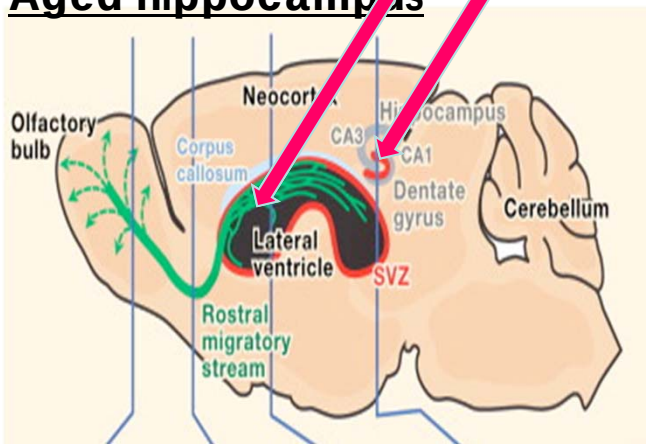


Neural Stem cells and Aging



"Young" NSCs with High Nrf2

Aged hippocampus



Nrf2 as a plausible target?

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Lab members

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Kate Smith
Abhi
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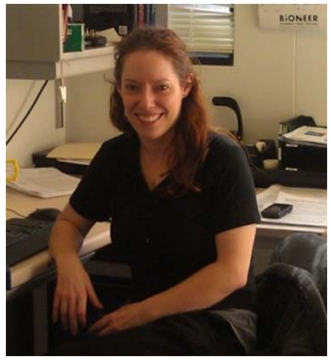
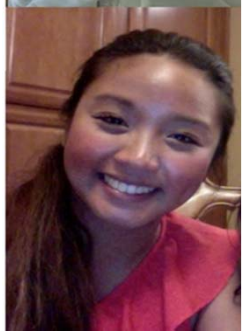
Kayla Ann Yu





Barnes Lab
Carol Barnes
Jim Lister
Ajay Upreti

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