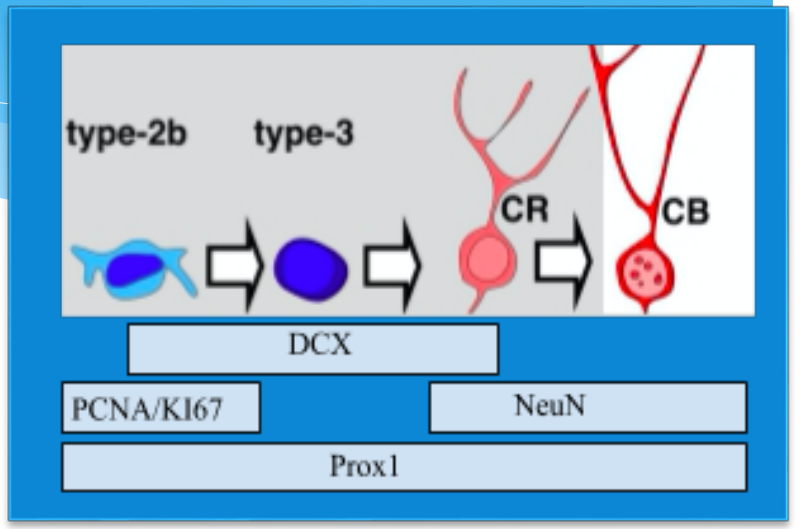
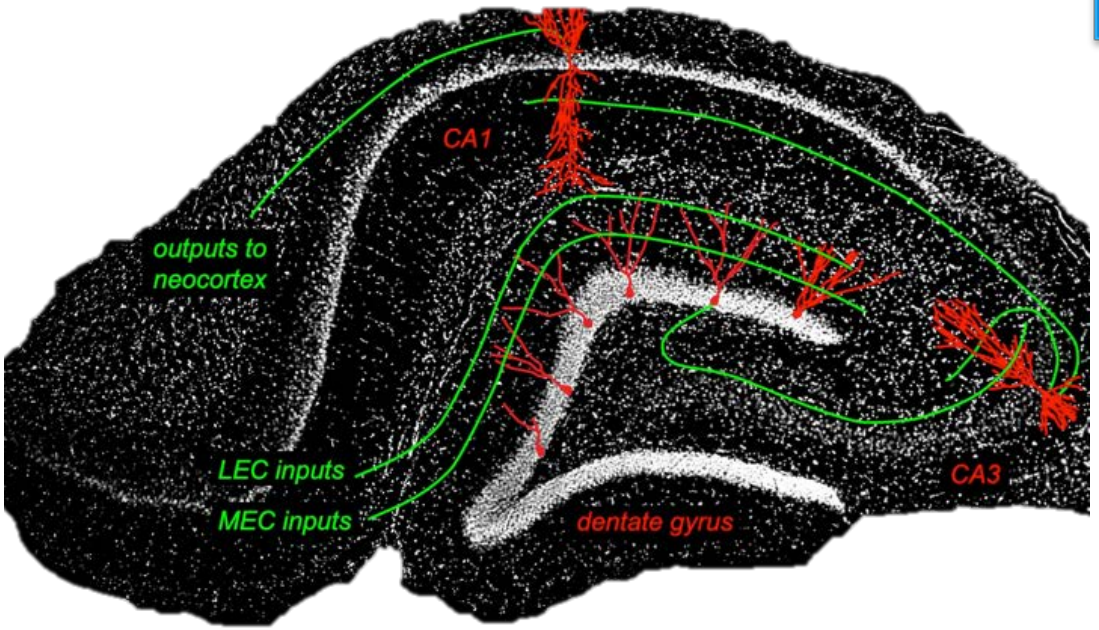
Short term increases in neurogenesis

Sex and treatment effects

Neurogenesis

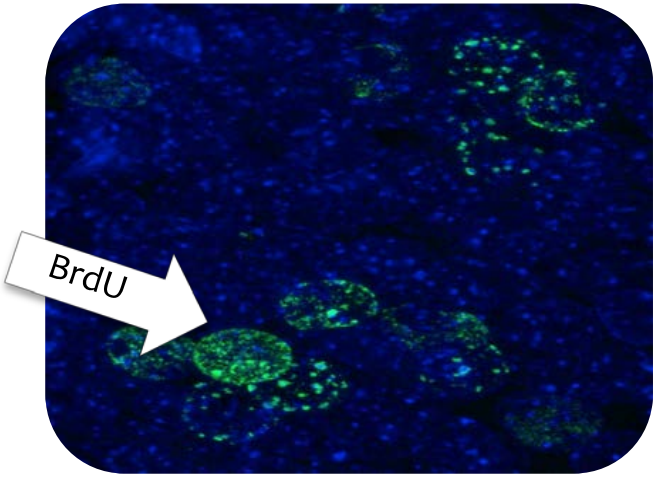
* Process of creating new & functionally integrated neurons
* Up to 40% of the total neuronal population is added in rodents during adulthood

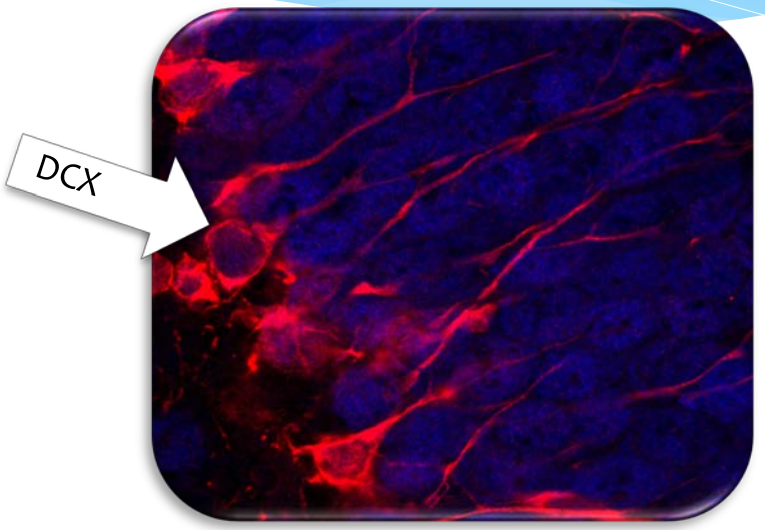




* Occurs in two places in the adult rodent brain: Sub-granular zone and Sub-ventricular zone
* Can use markers to label new cells to birth date their addition

Markers of Neurogenesis



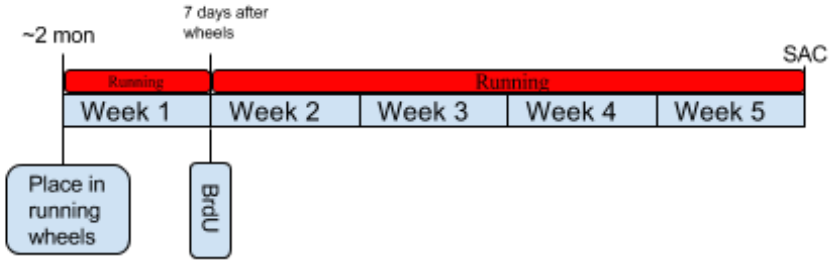


BrdU is a marker of cell division that is incorporated into the DNA of dividing cells

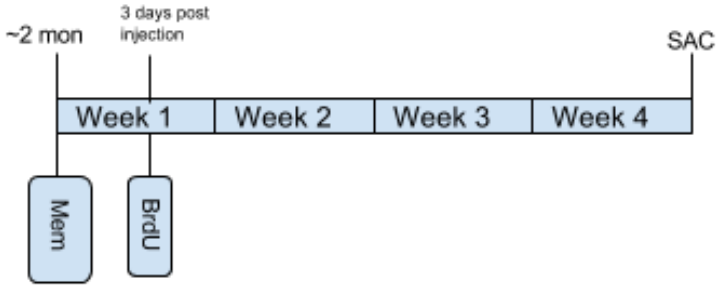
Doublecortin (DCX) is a maker of immature neurons, labels new neurons from 7 -21 days birth of the cell

Methods

Running:



Memantine:

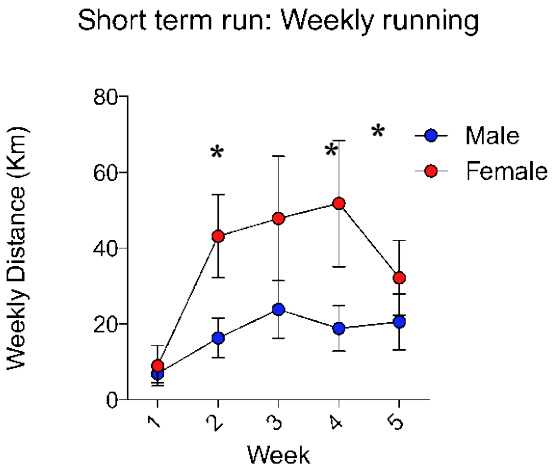


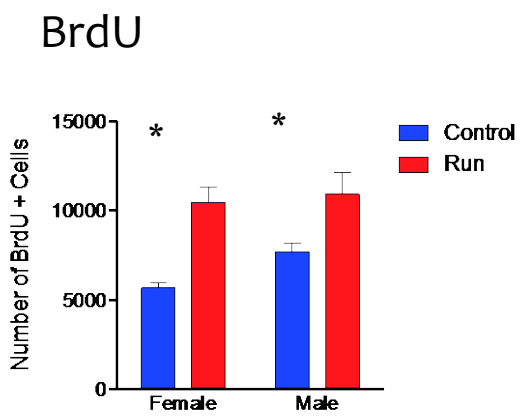
- Male and Female Long-Evans Rats
- ~2 months of age
- Received 50 mg/kg BrdU

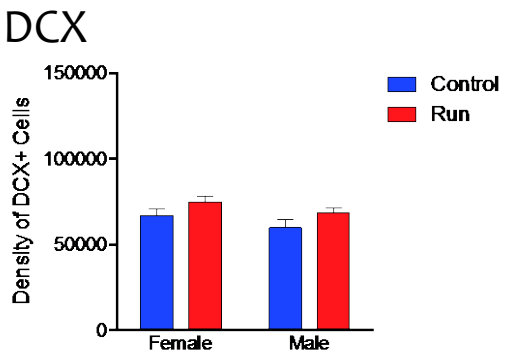
- Running: pair housed free access to running wheels for 5 weeks

- Memantine: approved Alzheimer's drug found to block NMDA receptors
  - Given single I.P. injection (35 mg/kg)

Results: Running



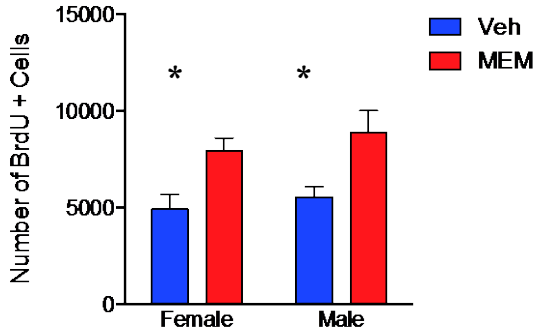




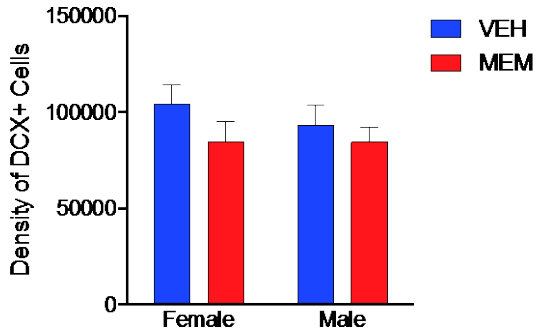
* Females run significantly more than males
* Initially running increases neurogenesis, this addition is higher in females
* Effect is transient. At end of treatment, levels of neurogenesis are returned to control

Results: Memantine

BrdU



DCX



* Initially we saw increased neurogenesis
* There was no difference between sexes
* Effect is transient. Levels are not better than controls are end of treatment

Conclusions

* Both running and memantine increase adult neurogenesis over the short term but show transient effects
  * Would using a mixture of both methods increase our ability to increase neurogenesis?
* Females show significantly higher increases in neurogenesis from running than males
  * Do females show increased rates of neurogenesis because of increased running?