Characterizing the source of microglia proliferation after ischemic preconditioning

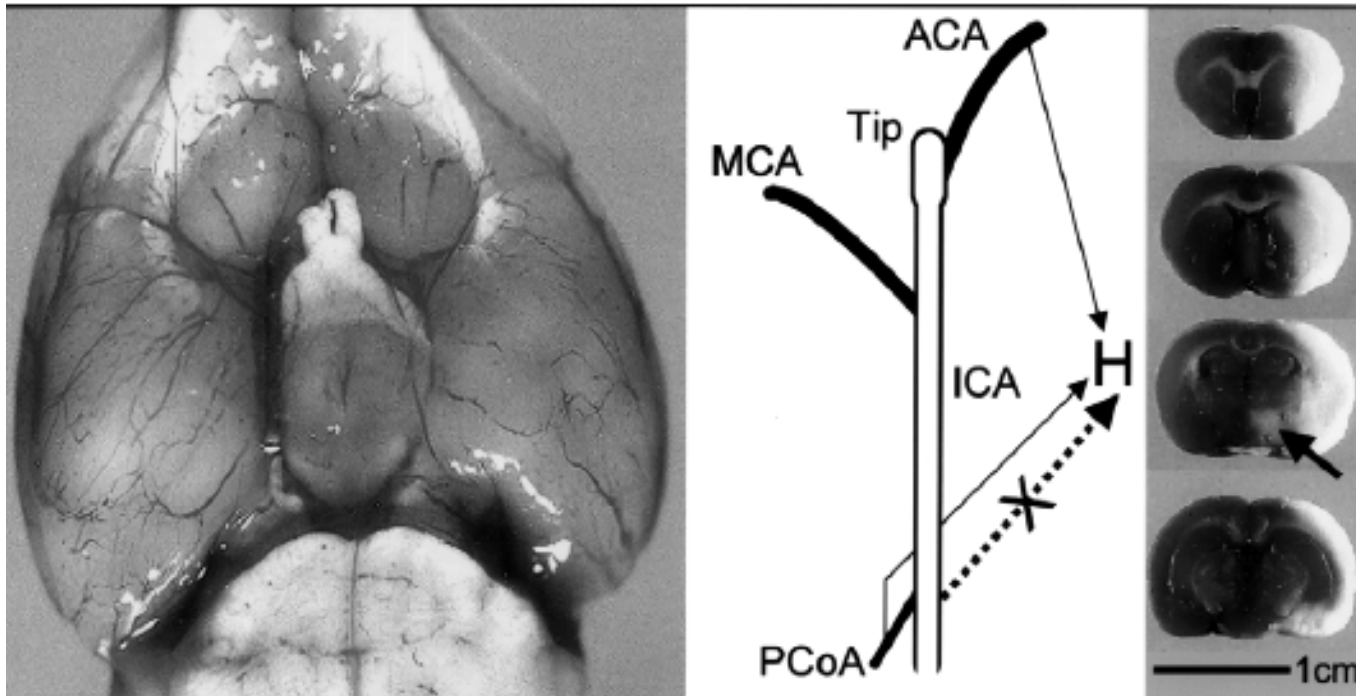
BY: RACHEL CHERNOFF

Ischemic stroke

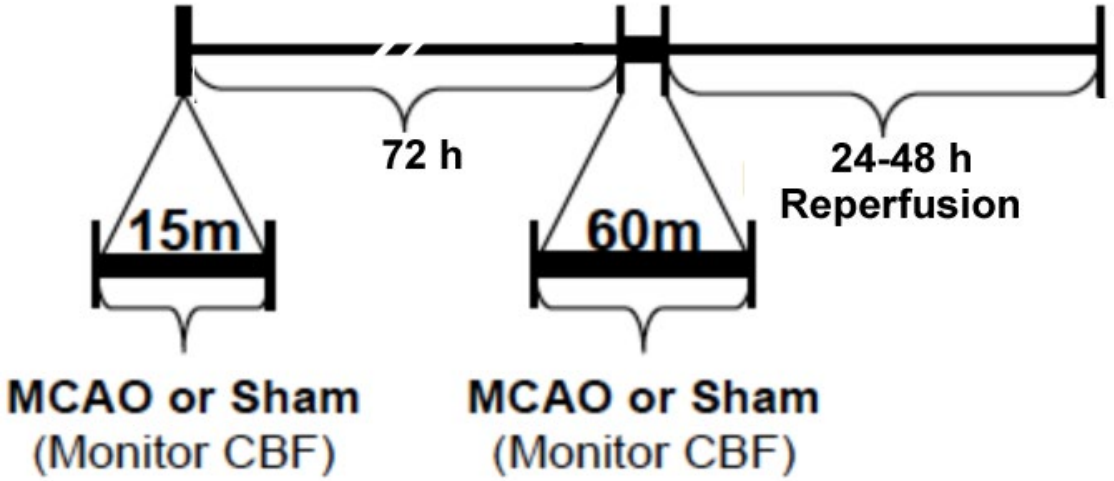
- Most common type of stroke→ 88% (Stroke center)
- 80% are middle cerebral artery occlusion strokes (Chiang et. al 2011)
- Full occlusion of the middle cerebral artery can cause paralysis, sensory loss to the lower part of the face, arm, and hand as well as visual defects and even death
- Possible way to prevent damage following stroke is ischemic preconditioning

Ischemic preconditioning

A brief exposure to ischemia to protect against injurious effects of long term ischemia.

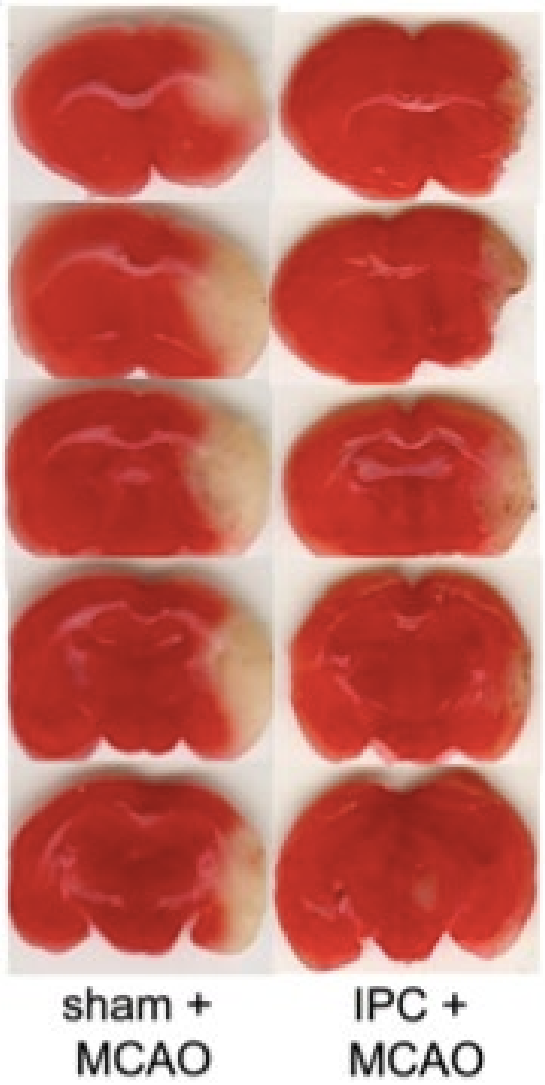


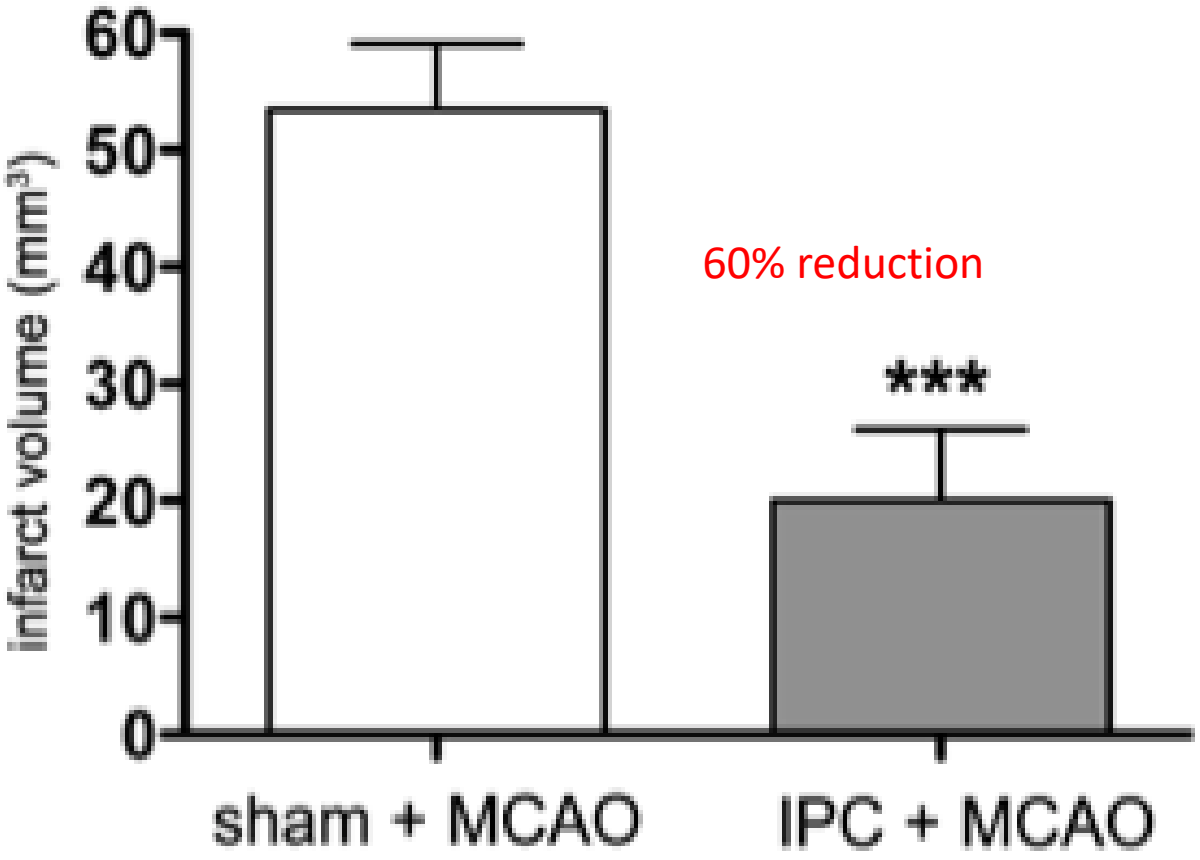
McDonough et al. *J. Neurosci* (2017)



Gerriets T. et al. *J.Neurosci Meth* 122: 201-211 (2003)

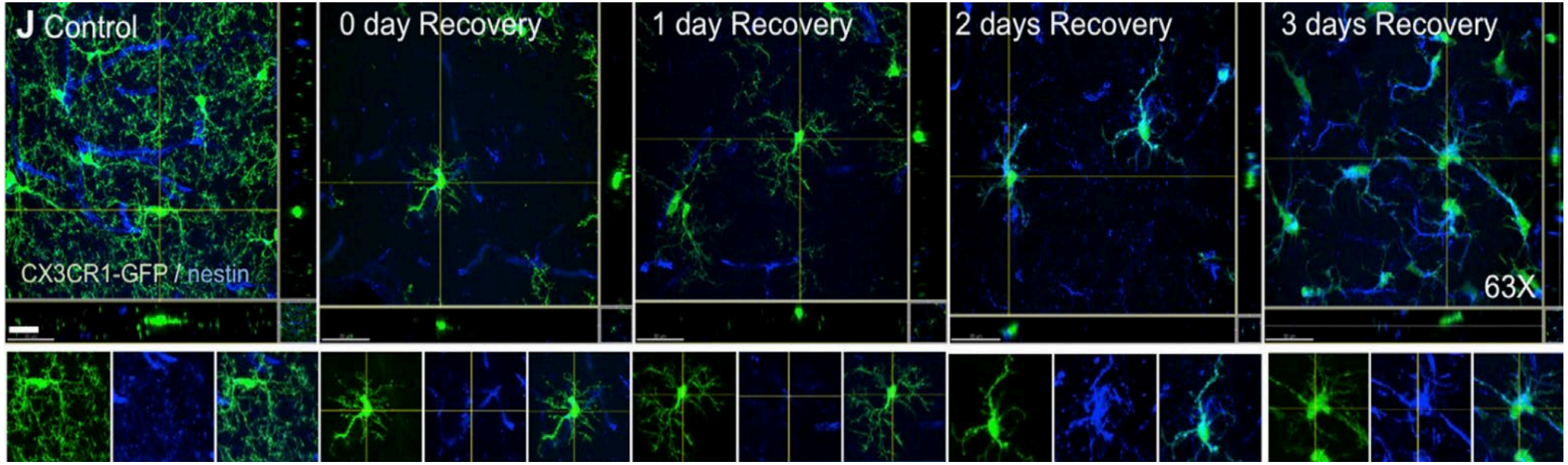
Ischemic preconditioning



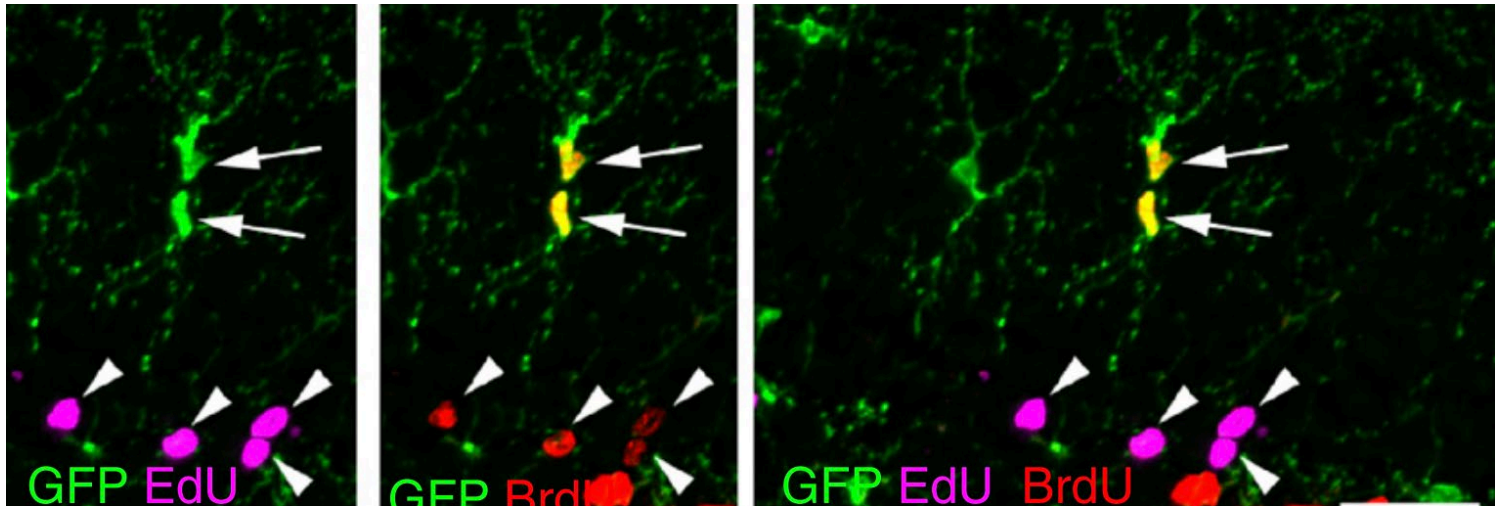


Courtesy of the Weinstein Lab

Microglia proliferation



Elmore et. al. 2014



Huang et al. 2018

Aim

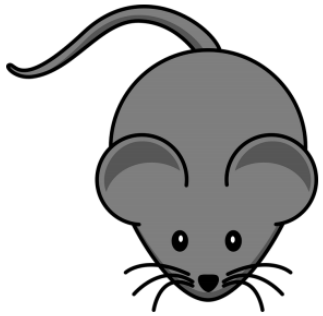
- To further elucidate the source of microglia proliferation using ischemic preconditioning to induce microglia proliferation.

Hypothesis

- Microglia will proliferate from a combination of a progenitor cell population and adult microglia.

Methods

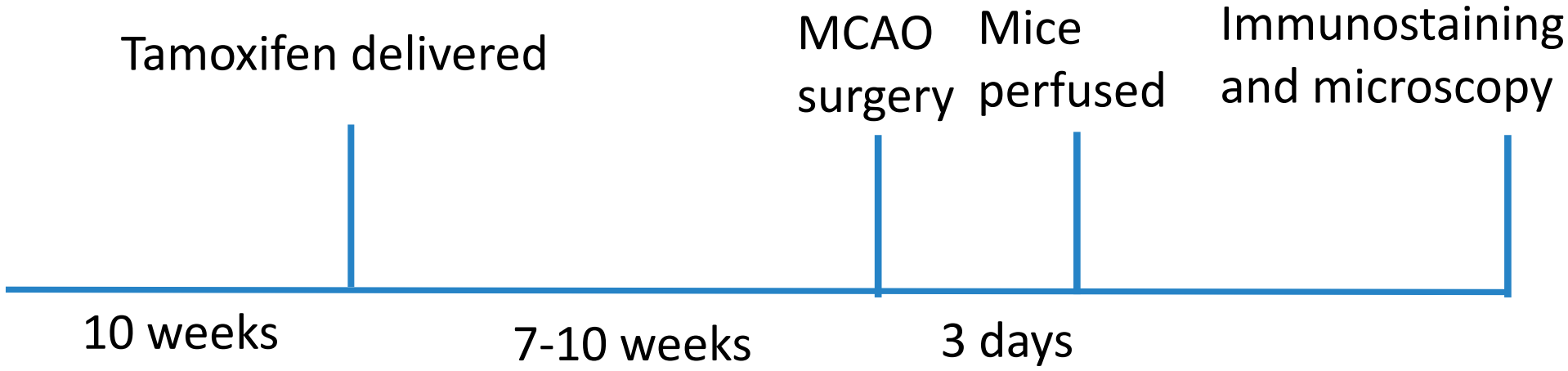
CD133 +/-
TdTomato +/-



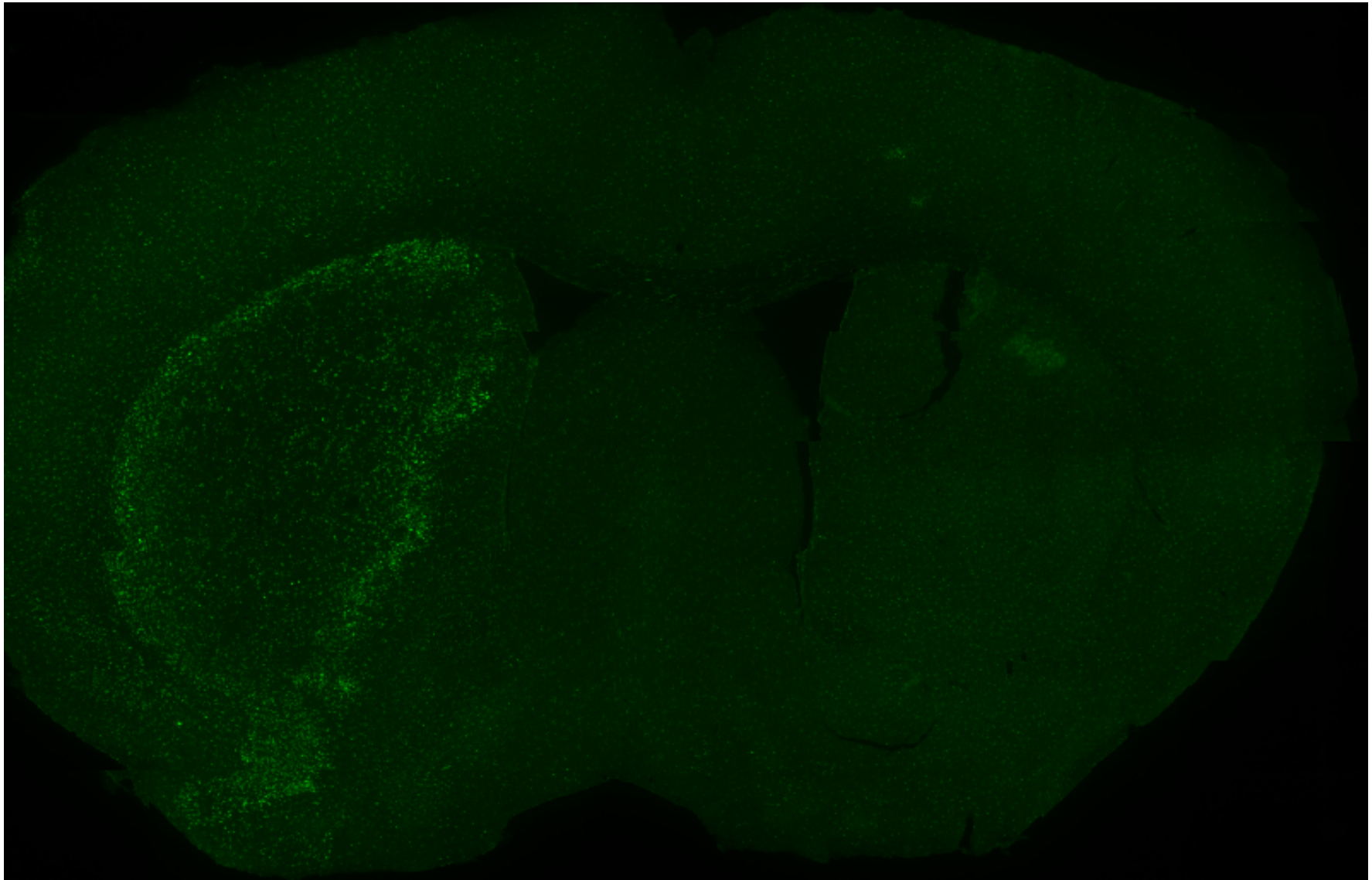
+

MCAO

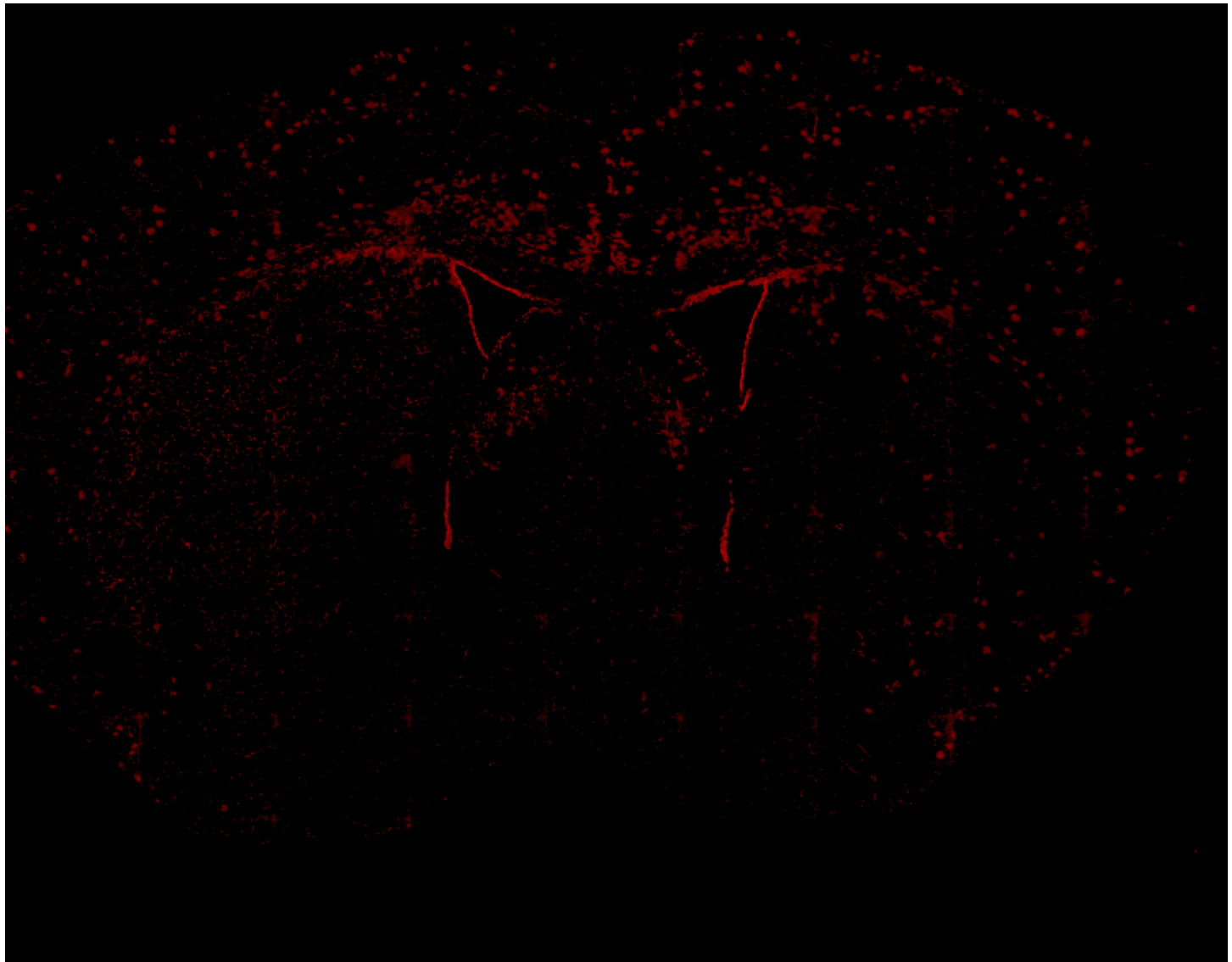
7 males
6 females



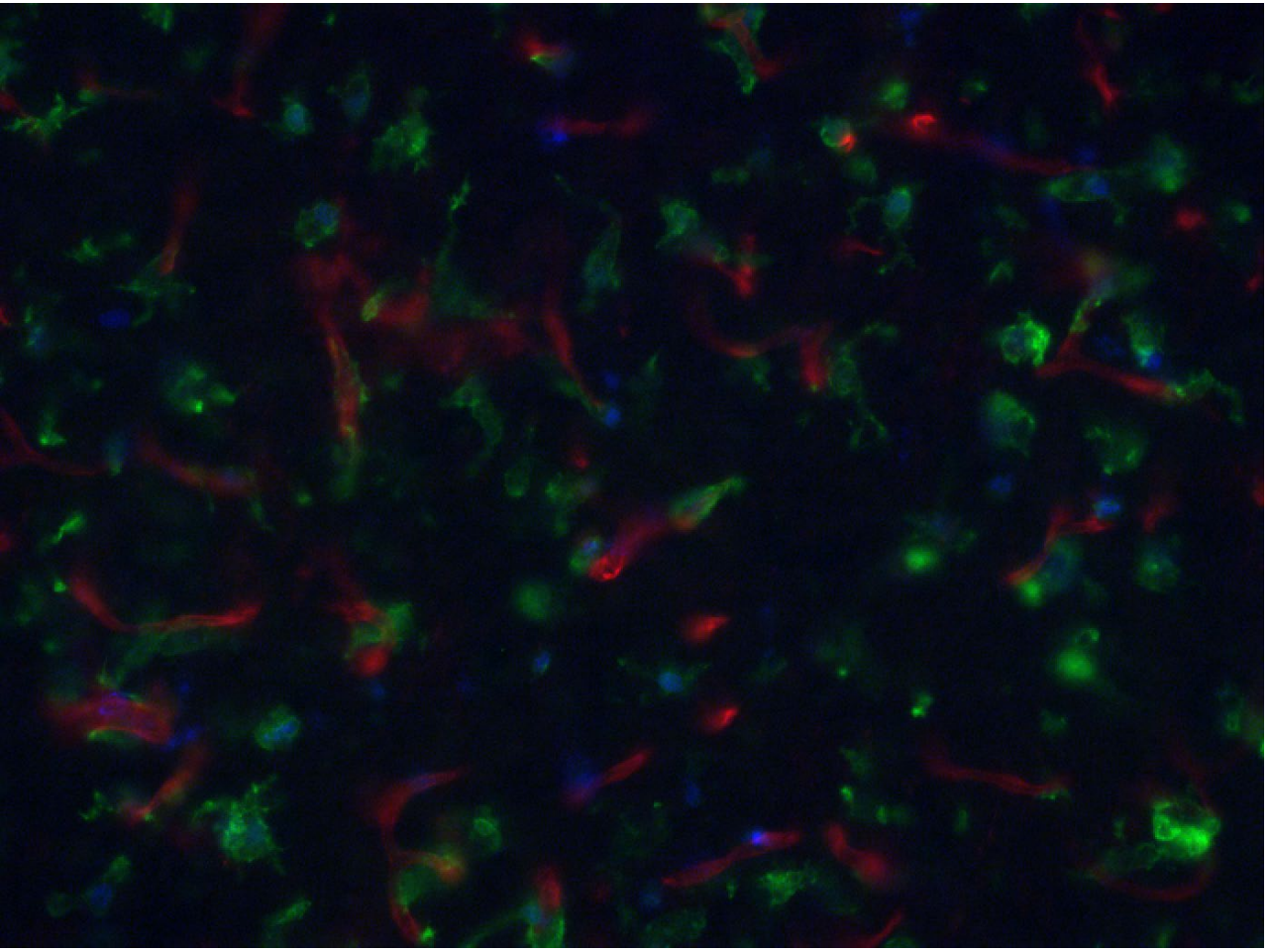
Increased proliferation of microglia



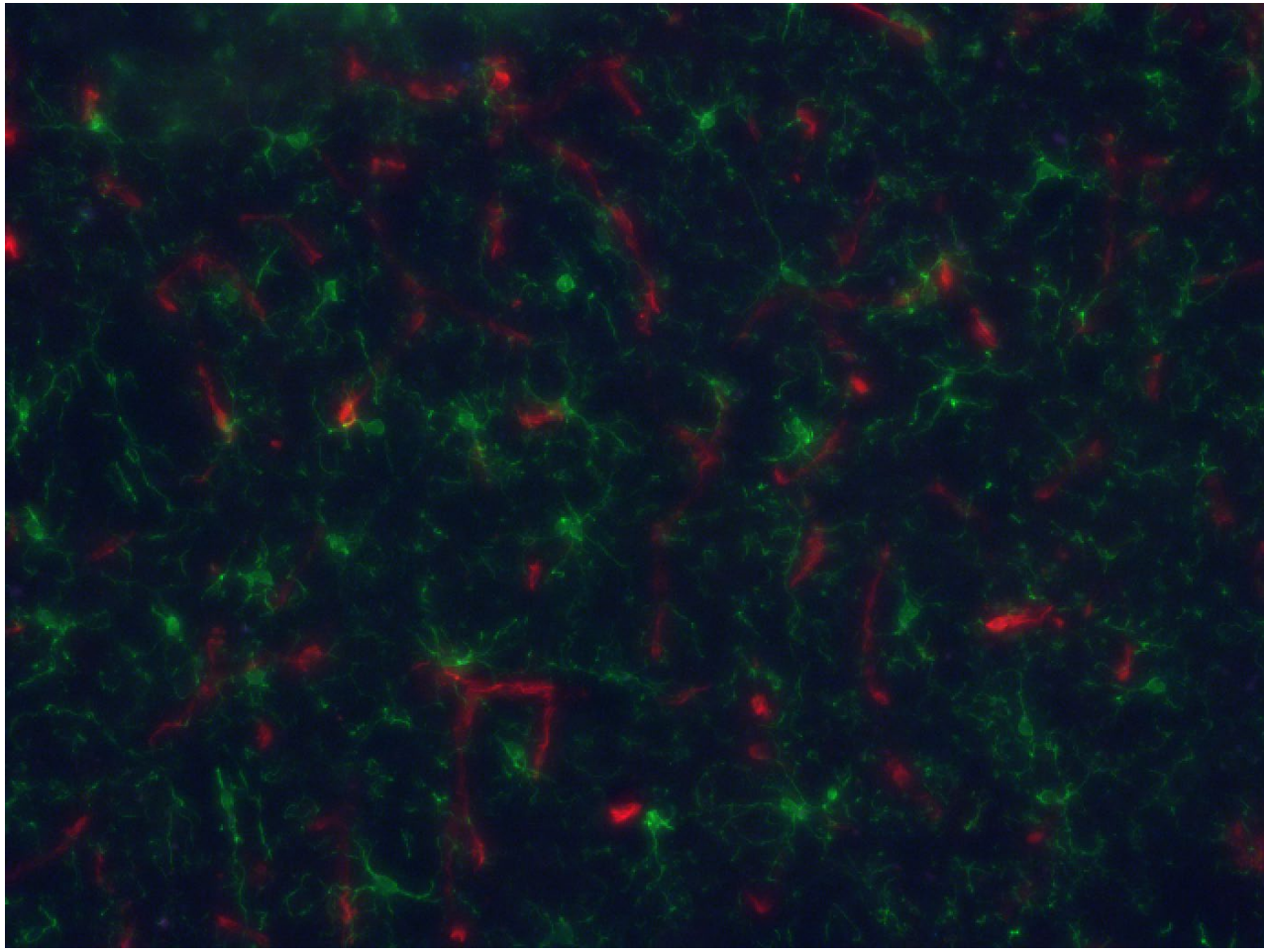
Increased proliferation from CD133 positive cells



Morphology shift

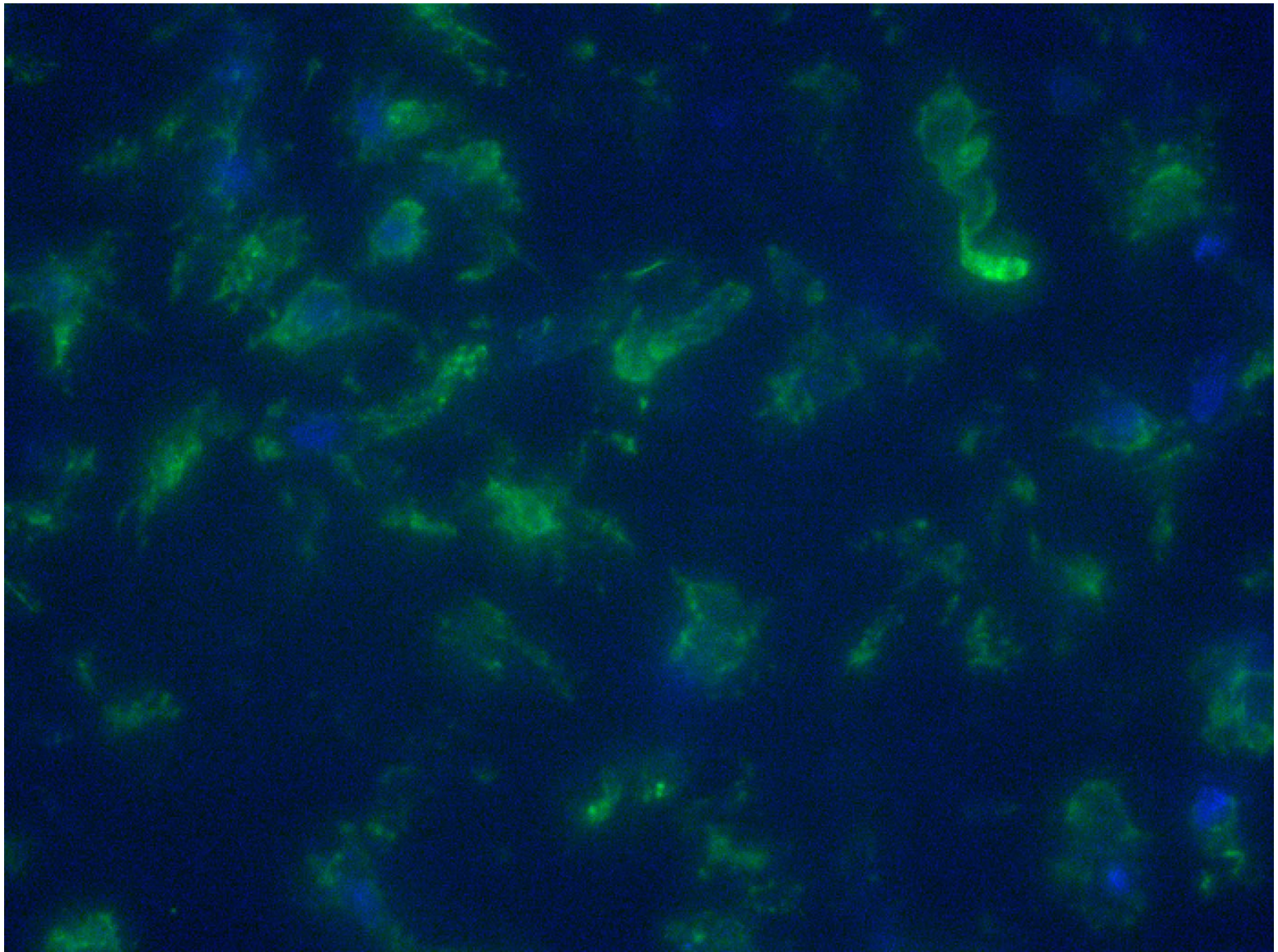


Ipsilateral

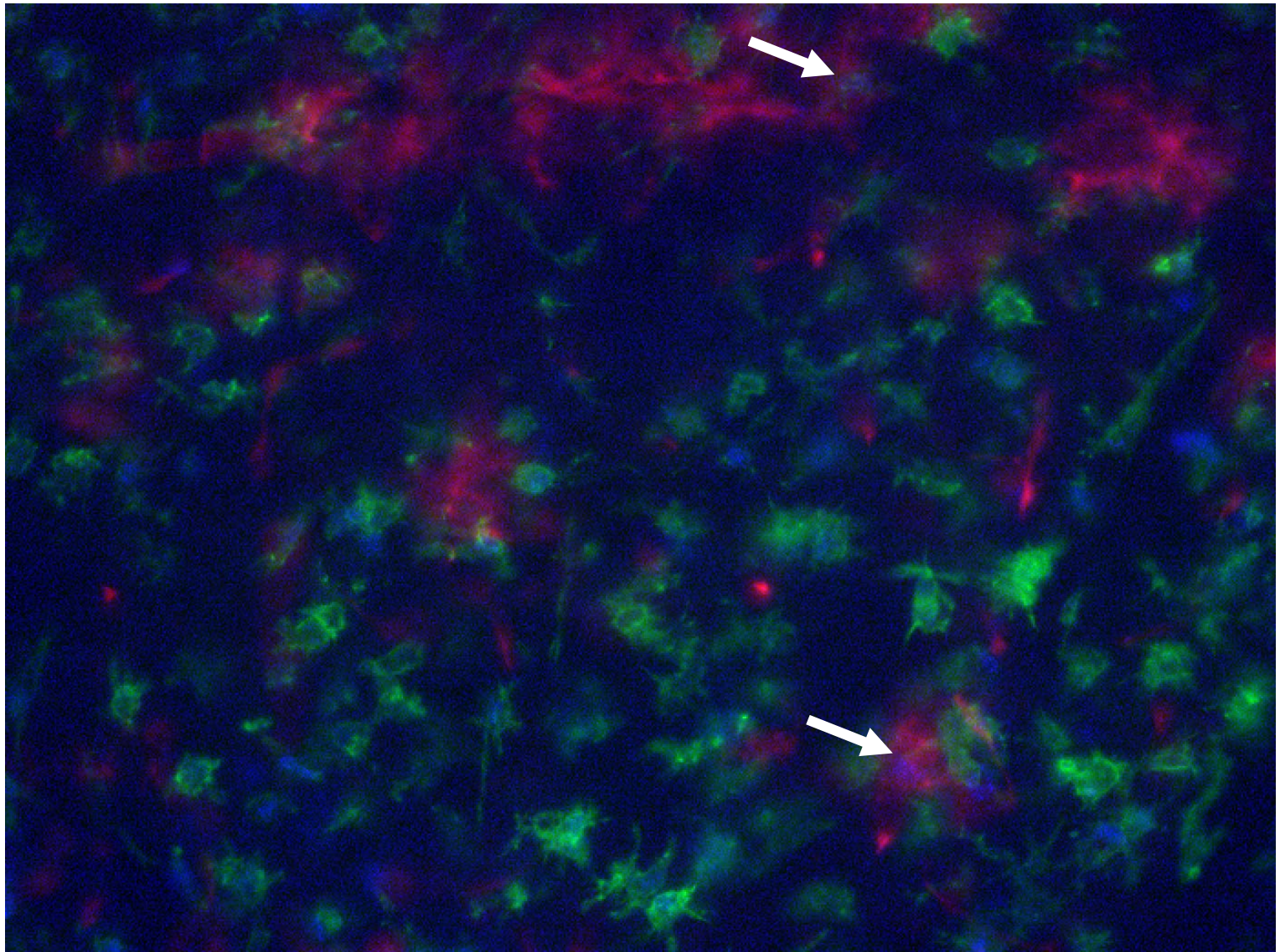


Contralateral

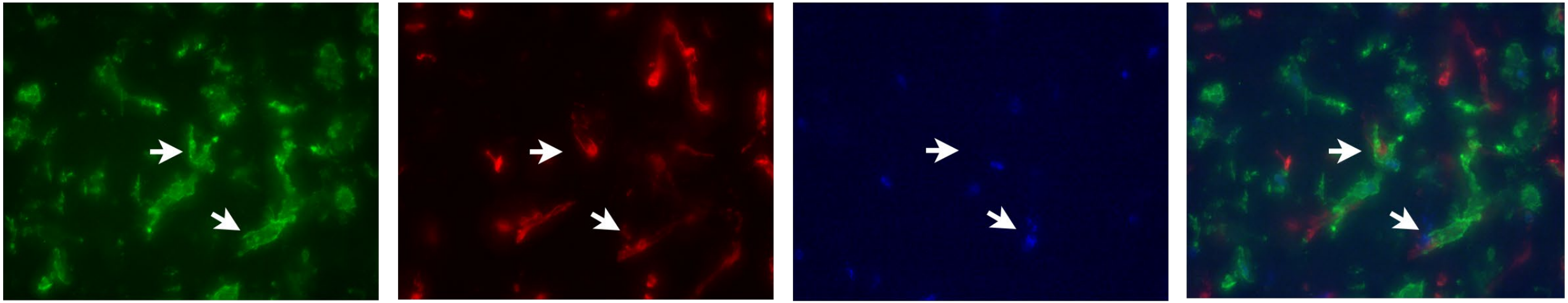
Microglia that have proliferated



CD133 positive cells that have proliferated



Possible microglia progenitor daughter cells



Conclusions

- Increased microglia proliferation in ipsilateral hemisphere
- Increased proliferation from CD133 positive cells in ipsilateral hemisphere
- Proliferation occurs from CD133 positive progenitors
- Microglia proliferation primarily stems from other microglia
- There is still a possibility that small percentage of microglia proliferate from progenitor population

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