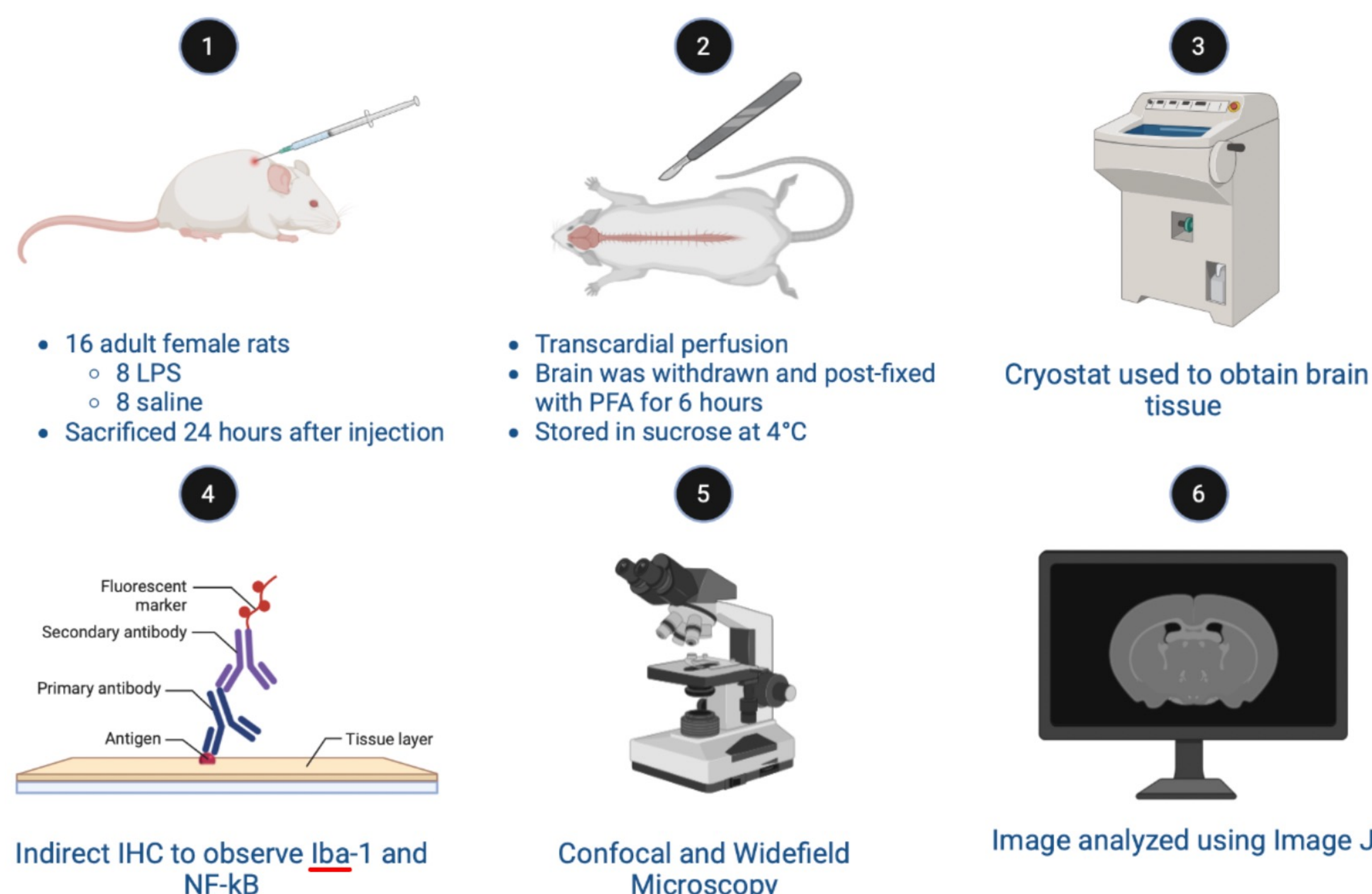


Introduction

- AD is the most common neurodegenerative disease and is the third leading cause of death amongst older people.¹
- Hallmark of AD are neurotoxic Amyloid Beta plaques that activate microglia.²
 - Previous treatments blocking AB overproduction have been unsuccessful.
- NF-kB is a neuroinflammatory gene associated with the regulation of aging and proliferation, and its overactivation has been linked AD.¹
 - Previous studies on NF-kB inhibition have reported success in reducing AD-like pathology
- Majority of the scientific literature uses male rats creating a knowledge gap of AD pathology in females.⁴
- Dentate Gyrus is one of the brain regions where Alzheimer's starts.³
- This paper seeks to evaluate the relationship between Alzheimer's and NF-kB through LPS-induced neuroinflammation and using Iba-1 marker to evaluate if NF-kB is colocalized with activated microglia in female rat brains.**

Methods



Results

LPS Treatment Influenced Hippocampal (DG) Microglial Morphology

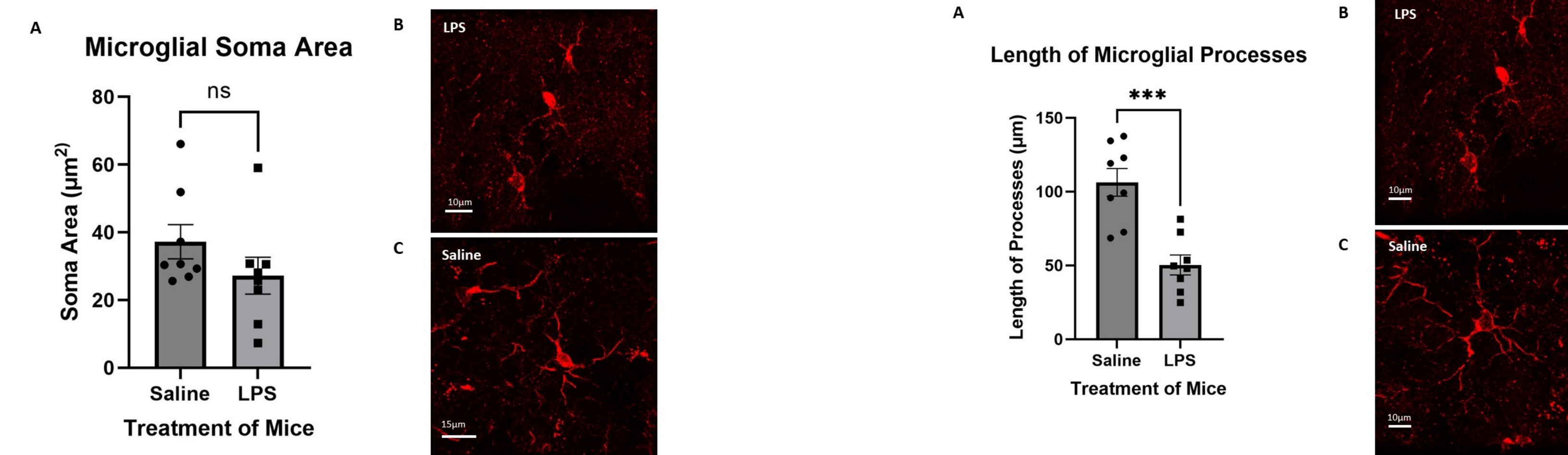


Figure 1. Microglial soma areas in female rats are not affected upon LPS-induced challenge. (a) Quantitative analysis of microglial soma areas. (b) Iba-1 staining of LPS-treated rat. (c) Staining for Iba-1 was performed on a control rat treated with saline.

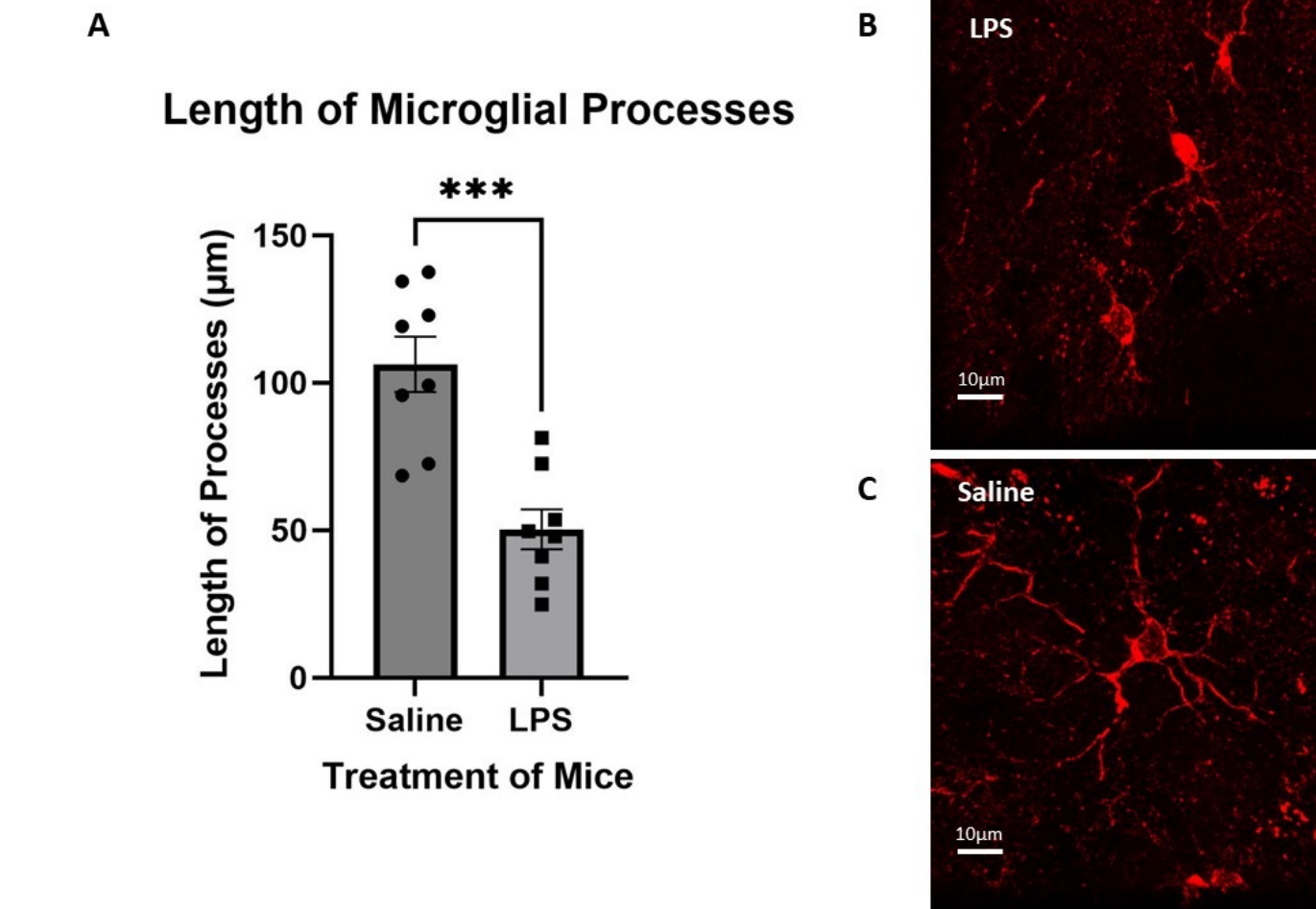


Figure 2. Microglial branch lengths in female rats are impacted upon LPS-induced challenge. (a) Statistical analysis comparing saline-treated and LPS-treated group microglial process lengths. (b) Staining of Iba-1 in LPS-treated rat. (c) Staining of Iba-1 in saline-treated control rat.

Treatment Influences Expression of Microglia and NF-kB in Rat DG

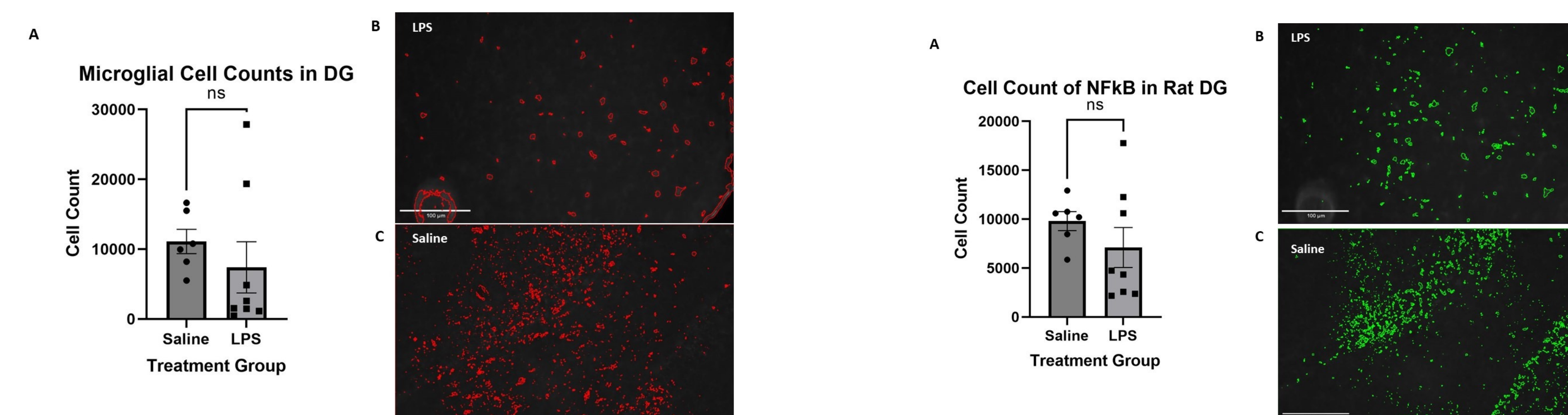


Figure 3. Microglial cell counts in the DG not affected by LPS treatment. (a) Statistical analysis of cell count numbers of microglia in the DG for both treatment groups (b) Masked image of analyzed 20X widefield image with red indicating a microglial cell in LPS animal (c) Masked image of analyzed 20X widefield image with red indicating a microglial cell in saline animal

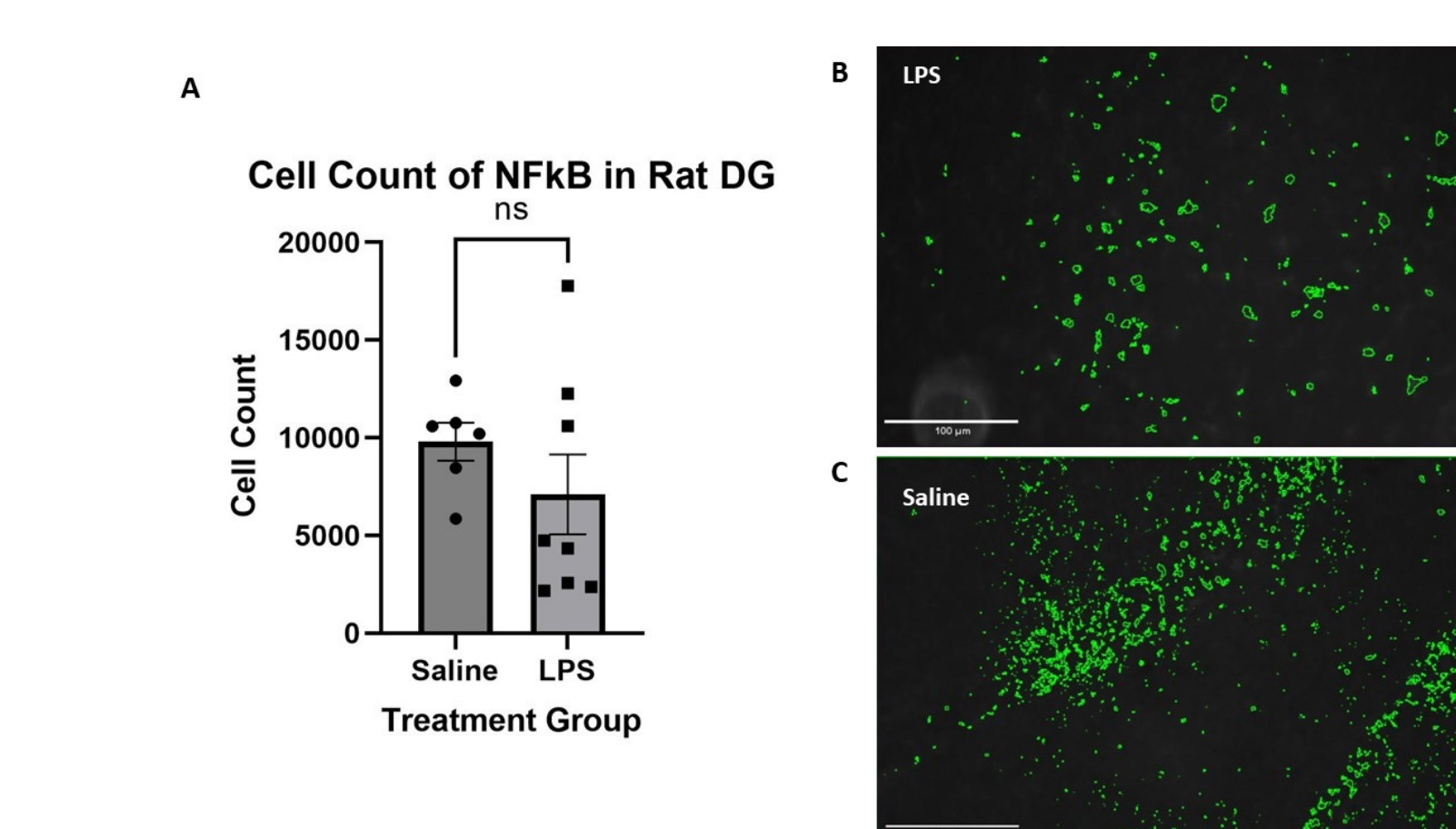


Figure 4. Cell Counts of NF-kB are not significantly altered following LPS challenge (a) Statistical analysis of cell count numbers of microglia in the dentate gyrus for both treatment groups (b) Masked image of analyzed 20X widefield image with green indicating NF-kB expression in LPS animal (c) Masked image of analyzed 20X widefield image with green indicating NF-kB cell expression in saline animal

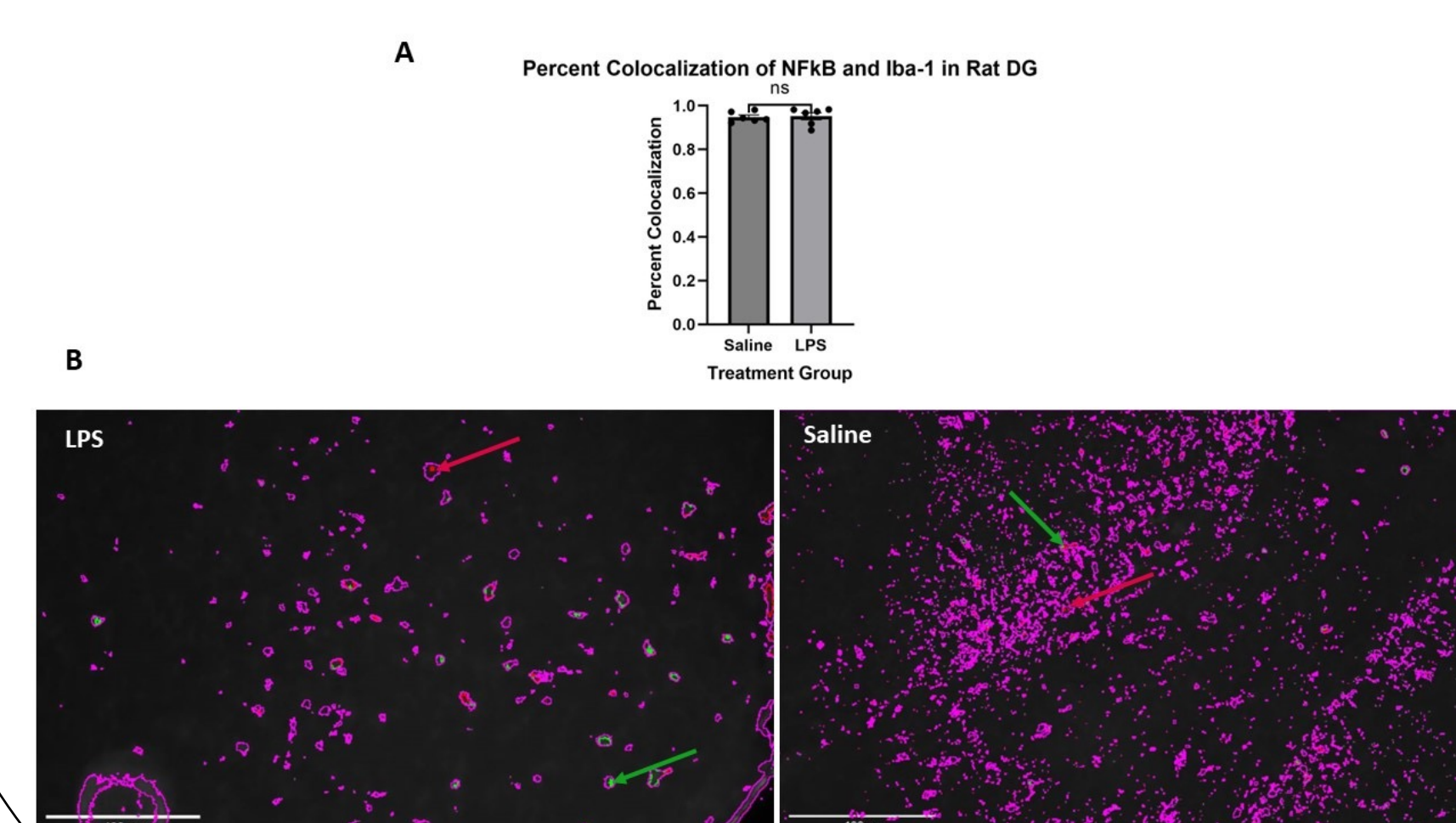


Figure 5. LPS treatment does not indicate significant difference in percent colocalization of proportional areas of NF-kB and Iba-1 in DG. (a) Statistical t-test data of percentage of area of NF-kB colocalized with Iba-1 in treatment groups (b) Masked image indicating Iba-1 (red), NF-kB (green), and combined (magenta) proportional areas in LPS animal (c) Masked image indicating Iba-1 (red), NF-kB (green), and combined (magenta) proportional areas in saline animal. Arrows indicate the staining corresponding to arrow color.

Conclusion

- The objective of this study was to determine whether LPS-induced inflammation results in any change in microglial morphology in the DG, which would indicate the progression of microglia into an activated state.
- After running an independent sample t-test to assess the differences between LPS and saline groups, it was found that the mean microglial soma area for the saline group was larger on average than that of the LPS group.
- A large effect size with process lengths of the saline group was also found after running an unpaired sample t-test when assessing microglial process lengths. In addition to microglial morphology, this study sought to identify whether microglia expression is affected by LPS treatment.
- Cell counts following Iba-1 and NF-kB staining showed higher numbers of microglia in the saline group than that of the LPS group, however, although this difference is large, it is not statistically significant.

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