

Exploring Central Pain Mechanisms in Toothache

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Aims:

- To find if toothache is caused by nerve damage rather than just inflammation
- Rats were induced with pulpitis to see if c-Fos was expressed in the trigeminal tract of the rat brain stem

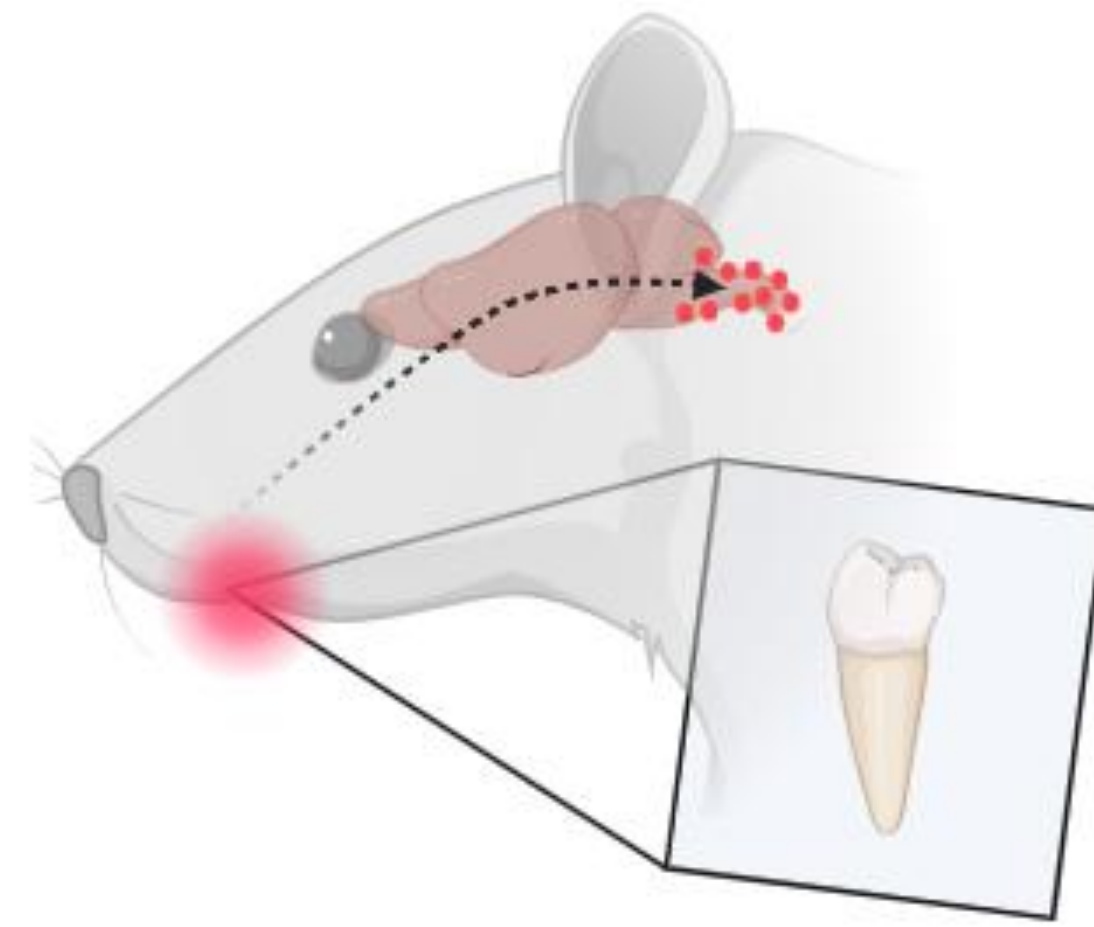


Figure 1. Created in [BioRender.com](https://www.biorender.com/). The model used induced toothache to see if c-Fos was expressed in the brain stem.

Methods:

- Cryo-sectioning, immunohistochemistry, microscopy
- Pulpitis was induced on day 0
- T0 rat brain fixation was on day 0
- T2 rat brain fixation was on day 2

| Rat Number | Rat Group |
|------------|------------------|
| 1-3 | T2 sham |
| 4-6 | T0 sham |
| 7-9 | T2 pulpitis |
| 10-12 | T0 pulpitis |
| 13-15 | Positive Control |

Results:

The ipsilateral side of the brain stem demonstrated c-Fos staining in both T0 and T2 groups. The contralateral side had some staining, but this was less than the ipsilateral side. More staining was seen in the pulpitis rats compared to the sham rats.

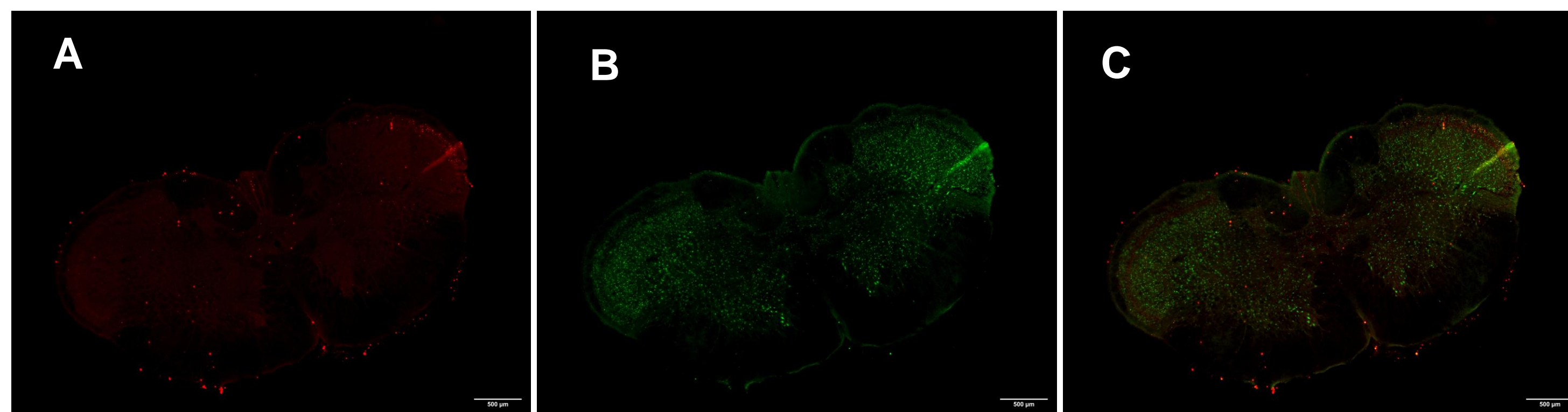


Figure 2. Section of a positive control rat brain stem: (A) C-Fos staining only (red), (B) neuron staining only (green), (C) c-Fos (red) and neuron (green) staining.

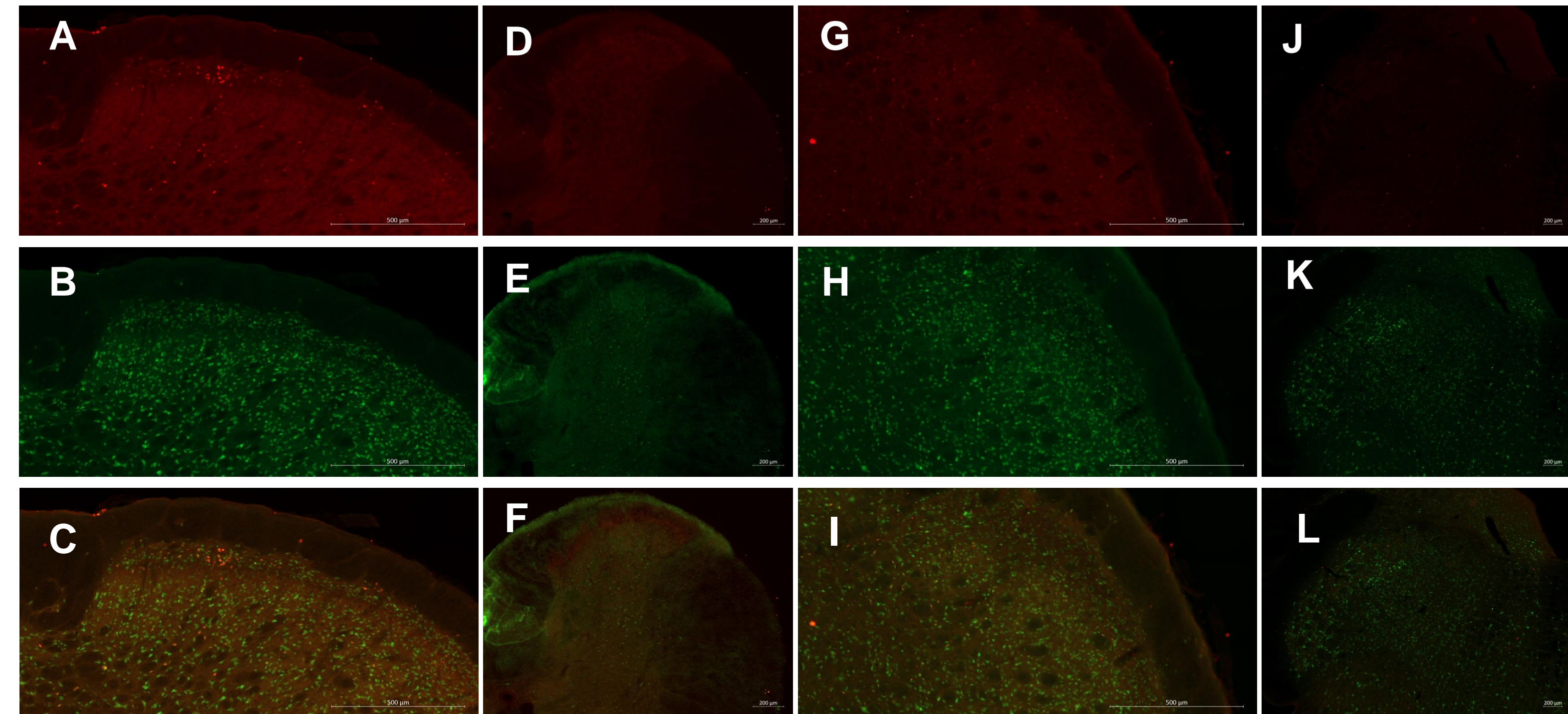


Figure 3. Ipsilateral trigeminal tract with c-Fos (red), neurons (green) and both. (A-C) T0 pulpitis samples had c-Fos staining. (D-F) T0 sham had no c-Fos expression. (G-I) T2 pulpitis samples expressed c-Fos. (J-L) T2 sham had no c-Fos expression.

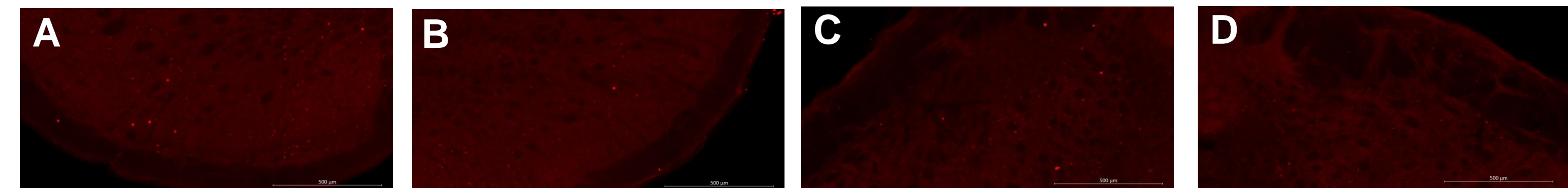


Figure 4. (A) The T0 pulpitis ipsilateral side has more c-Fos compared to the (B) T0 pulpitis contralateral side. (C) The T2 pulpitis ipsilateral side has more c-Fos than the (D) T2 pulpitis contralateral side.

Conclusion:

T0 and T2 samples had c-Fos expression which suggested toothache is caused by nerve damage rather than inflammation alone. Some contralateral staining occurred due to possible severe neuronal activation, but more c-Fos was seen on the ipsilateral sides. The results indicate that toothache may respond better to nerve damage treatment compared to the traditional anti-inflammatory treatment route.

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