

# Involvement of Neuronal IL-1 $\beta$ in acquired brain lesions in a rat model of neonatal encephalopathy

Savard et al., 2013

Presented by Charles Wasserman

## Outline

- Common sources of perinatal damage
  - Infection/Inflammation
  - Hypoxic Ischemia (HI)
- Study Methodology
- Study Findings
- Conclusion

## IL-1 $\beta$ (Interleukin-1 beta)

- Protein that is encoded by the IL1B gene in humans.
- It is an important part of the inflammatory response.
- Also involved in cell proliferation, differentiation, and apoptosis.
- Increased production of IL-1 $\beta$  causes a number of different auto-inflammatory syndromes.

## Glial Fibrillary Acidic Protein (GFAP)

- Expressed, in the CNS, in astrocyte cells.
- Involved in many CNS processes including repairing injuries in the CNS.
  - It helps form “glial scars”

## Lipopolysaccharide (LPS)

- Also known as lipoglycans and endotoxin.
- Large molecules found in bacteria and elicit strong immune response in animals.
- Causes inflammatory response and infection.

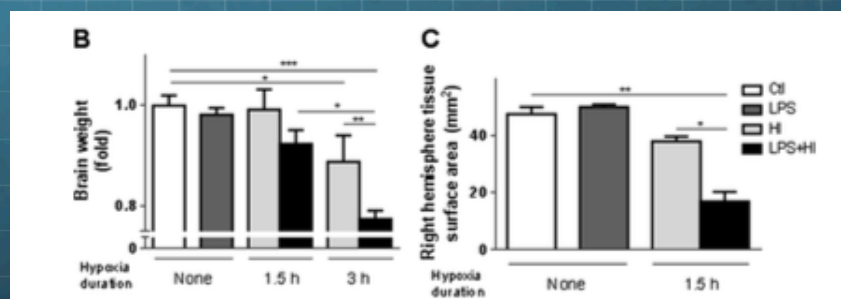
## Hypoxic-Ischemia (HI)

- Deprives the brain of oxygen, causing damage.
- Most commonly contributes in a transient nature along with infection/inflammation.
- In this study, rats were given surgery in which “ischemia was induced by a permanent ligature of the right common carotid artery under isoflurane.”

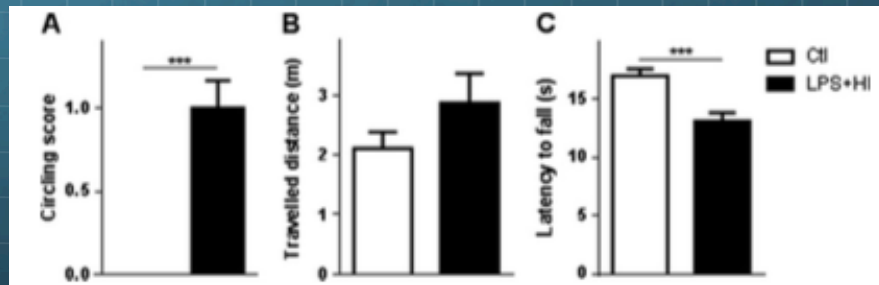
# Study Methodology

- Four randomized groups of P12 rat pups (equivalent in development to full-term human neonates).
  - Control Group
  - LPS injection only
  - HI surgery only
  - LPS injection and HI surgery
- Animals placed in an 8% O<sub>2</sub> Hypoxia chamber for 1.5 or 3 hours (removal from the chamber is time 0)
- Animals euthanized at 4h(p12), 24h(p13), 48h(p14), and 8 days (p20) post HI.

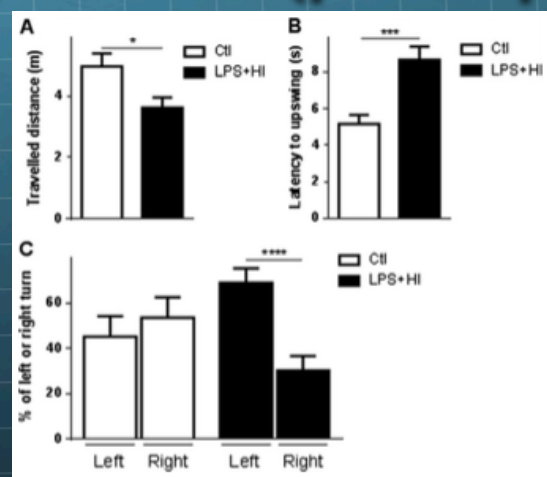
## Physical Damage (p20)



## Short-term Motor Impairment (p14 – p40)

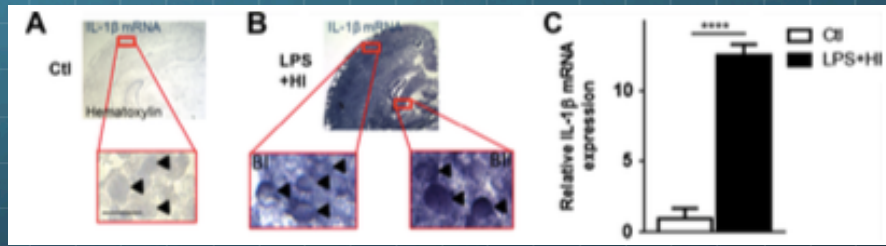


## Long-term Motor Impairment (p100 – p120)

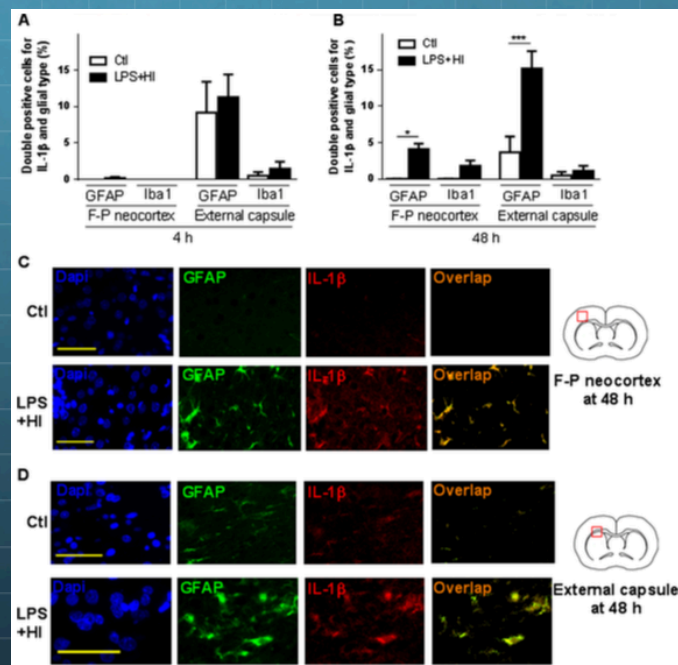




# IL-1 $\beta$ mRNA Expression



- 1 hour post HI



## Summary of Findings

- 🌐 LPS and HI is related to the expression of IL-1 $\beta$
- 🌐 Expression of IL-1 $\beta$  worsens inflammation and cerebral injury.
  - 🌐 This can result in later motor impairments

Questions?