

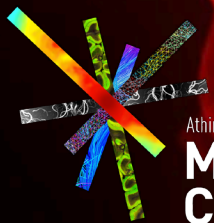
# In-vivo imaging of neuroinflammation in Gulf War Illness

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For Biomedical Imaging



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GENERAL HOSPITAL



HARVARD  
MEDICAL SCHOOL

# Is Gulf War Illness linked to neuroinflammation?



**Extreme temperature changes**

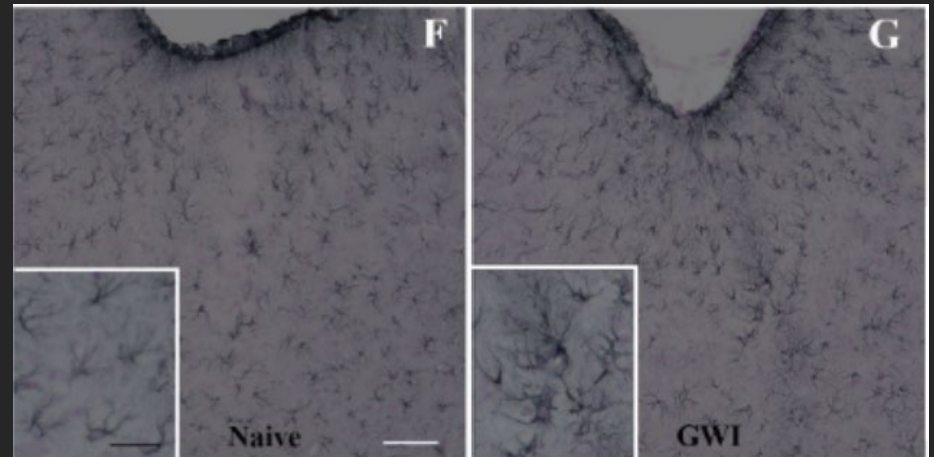
**Sleep deprivation**

**Physical exertion**

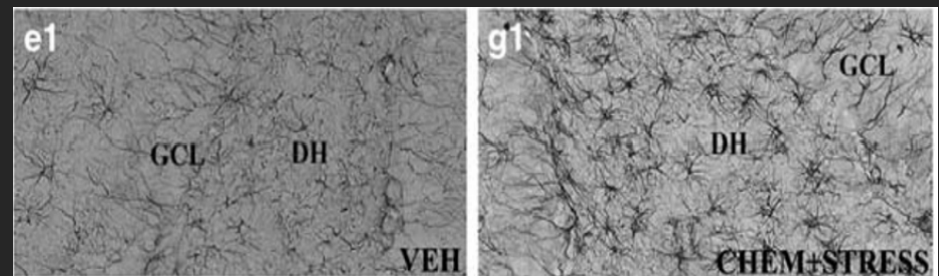
**Nerve gas – sarin**

**Pesticides**

**Pyridostigmine Bromide pills**



Madhu et al., *Brain Behavior and Immunity* 2019

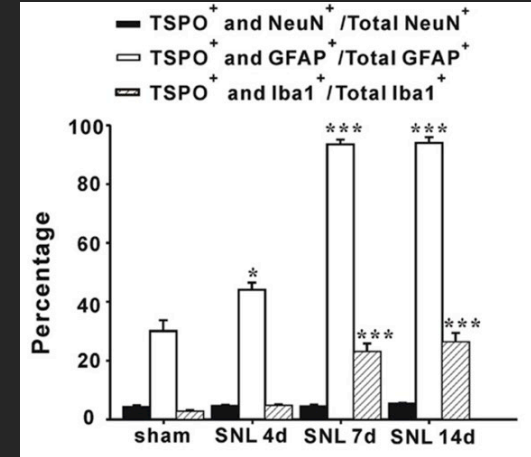


Parihar et al., *Neuropsychopharmacology* 2013



# 18 kDa translocator protein (TSPO)

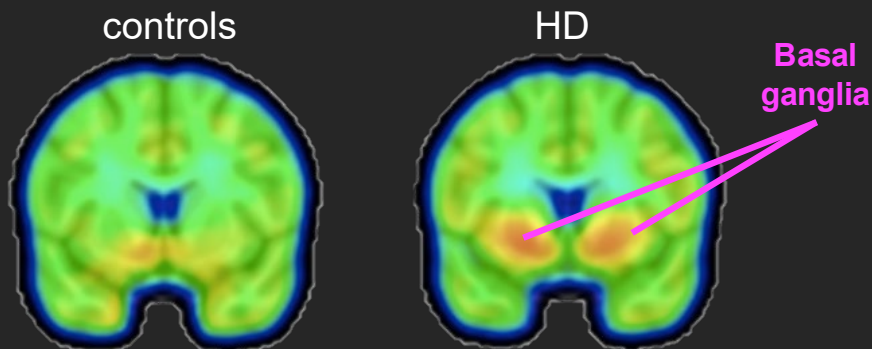
- Very low basal expression in the healthy CNS
- Upregulated by **activated microglia and astrocytes**
  - Experimental autoimmune encephalomyelitis / MS
  - HIV encephalitis
  - Ischemia
  - Alzheimer's Disease
  - Animal pain models
  - etc



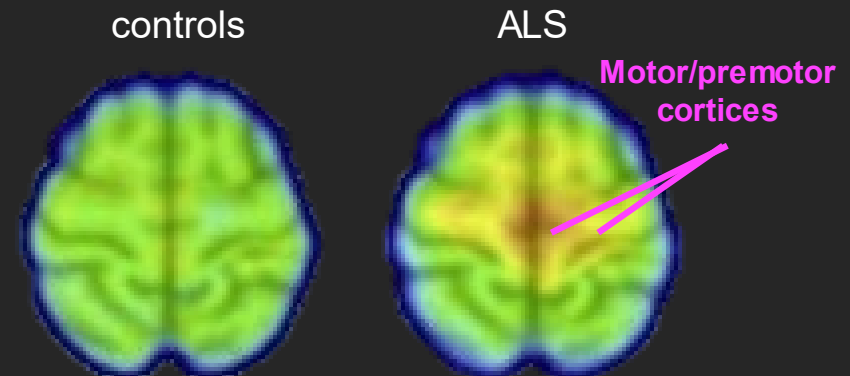
Wei et al., J Neurosci 2013

- Can be imaged using **Positron Emission Tomography (e.g., [<sup>11</sup>C]PBR28)**

## Huntington's disease



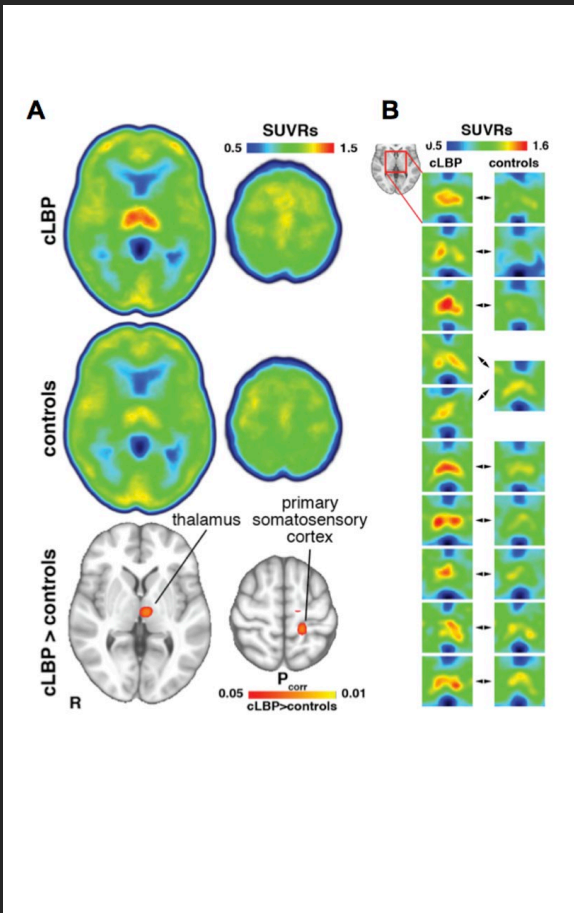
## Amyotrophic Lateral Sclerosis



# TSPO in pain disorders

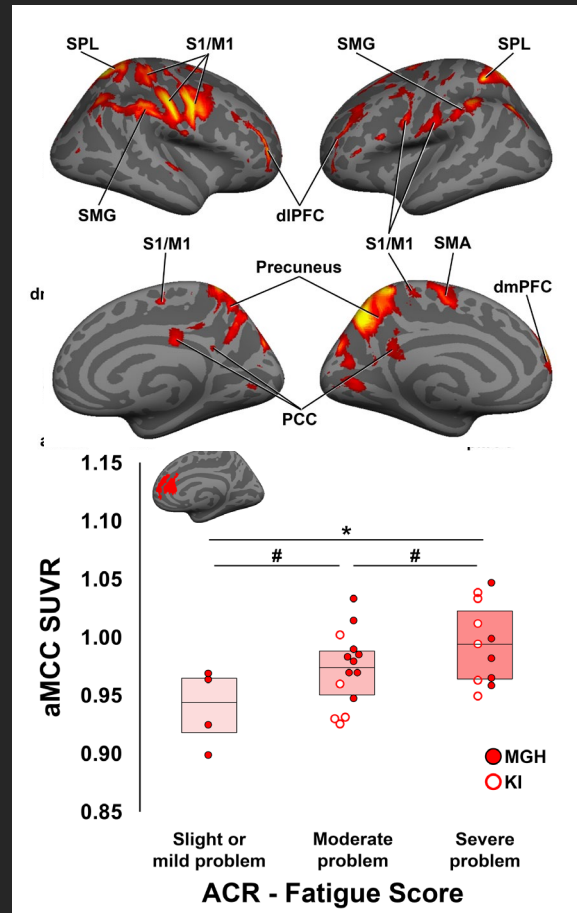
## Chronic low back pain

Loggia et al, Brain 2015



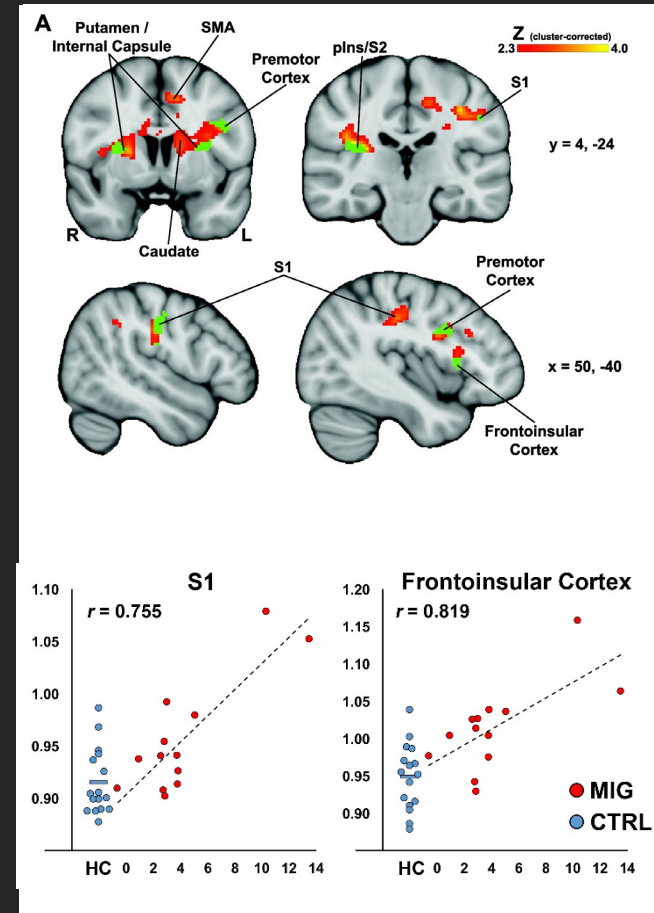
## Fibromyalgia

Albrecht et al, Brain Behav Immun 2018



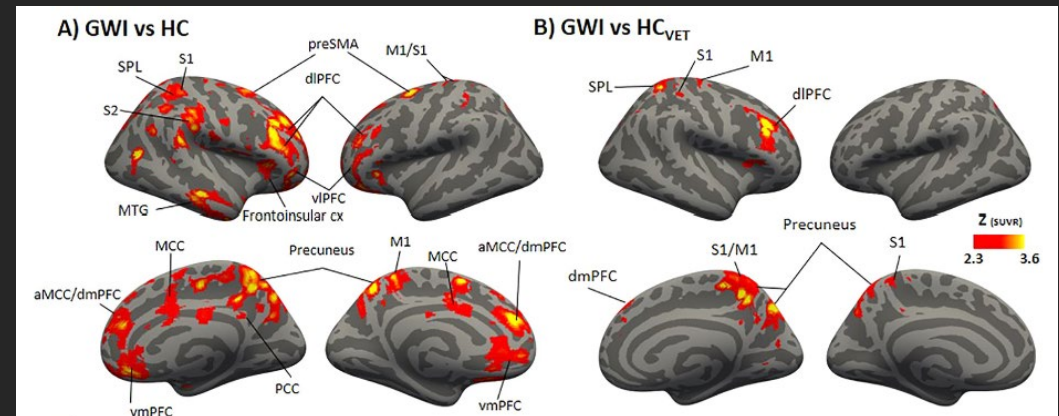
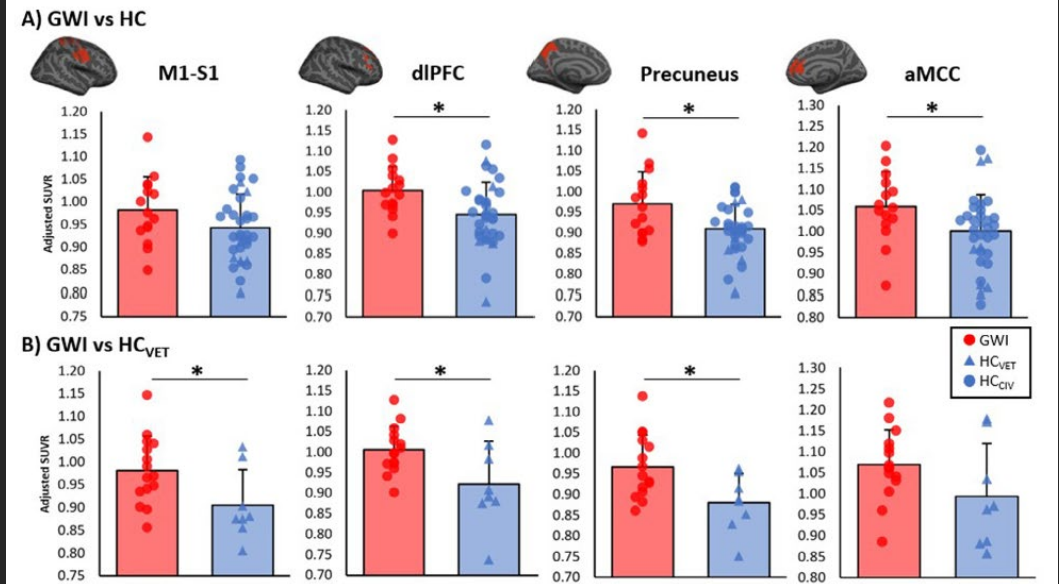
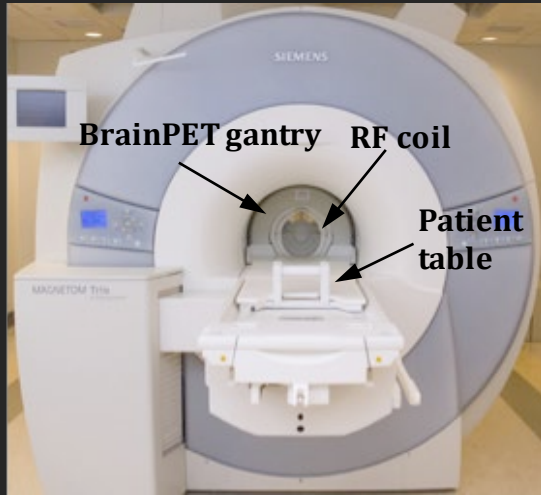
## Migraine

Albrecht et al, Neurology 2018



# TSPPO elevations in GWI

15 veterans with GW  
33 healthy controls (8 GW veterans)

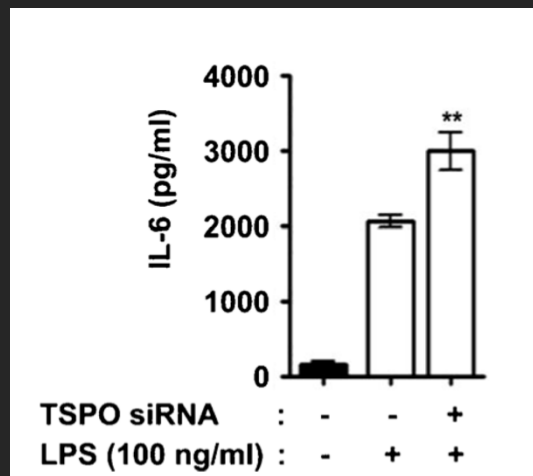


# Implications

- Biomarkers
- Therapy (glial modulators? TSPO agonists?)

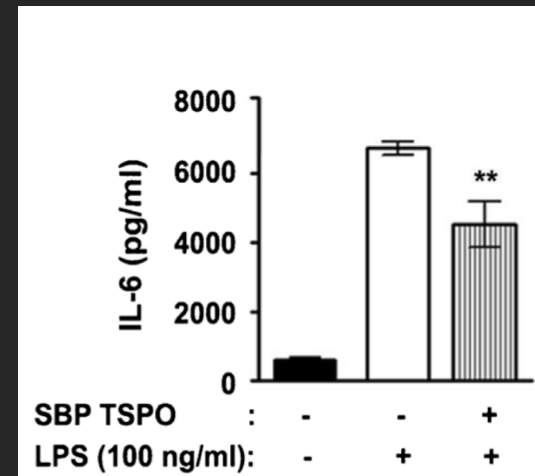
TSPO knock-down:

↑ **inflammation**



TSPO overexpression

↓ **Inflammation**





# Thanks to...

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