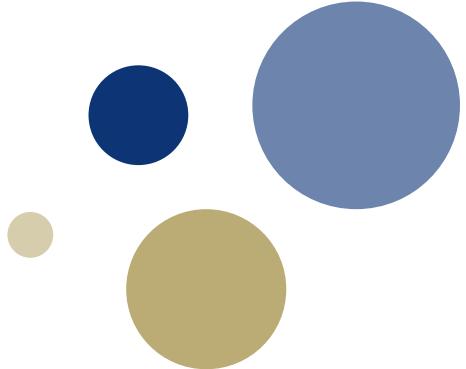




Kunnskap for en bedre verden



# Betennelsestilstand i CFS/ME

Kan kronisk betennelse være en forklaringsmodell for Kronisk utmattelsessyndrom (CFS/ME)?

Av PhD-kandidat Nina Groven



**Main Supervisor: Solveig Klæbo Reitan**

**Co-supervisors:**

**Egil Andreas Fors**

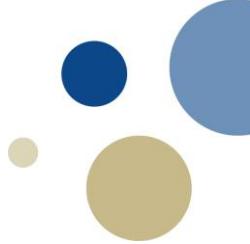
**Valentina Cabral Iversen**

**Faculty of Medicine and Health Sciences**

**Department of Mental Health**



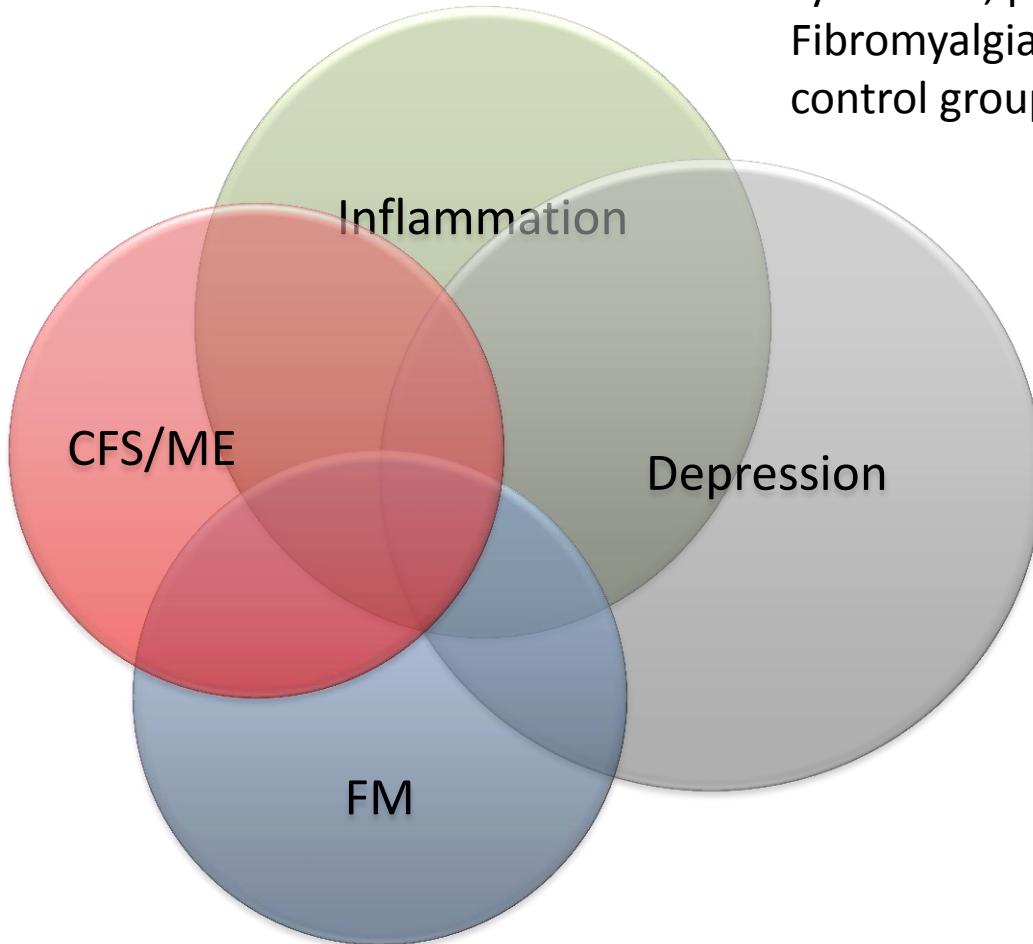
# Agenda



- PhD-prosjekt:
- Immunity and Psychiatric Symptoms of Patients with Chronic Fatigue Syndrome and Fibromyalgia
  - Mål for studien
  - Bakgrunn
    - Neuropsykoimmunologi
    - Immunopsykiatri
  - Metode
- CRP
- Resultater
- Konklusjon

# Primary aim

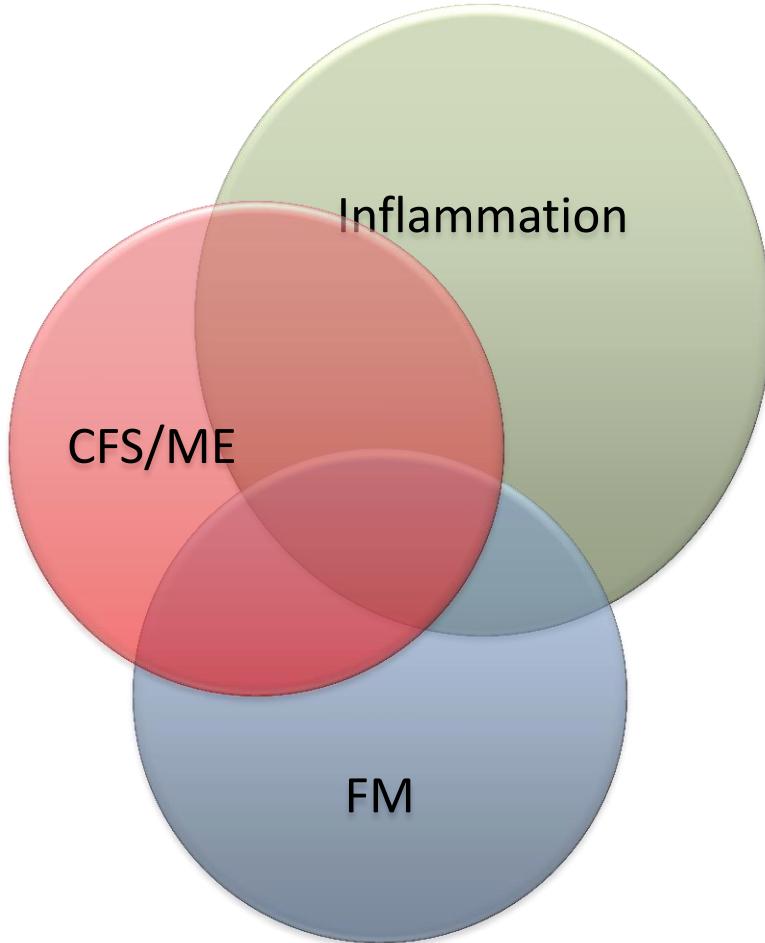
Investigate association between immune profiles and depression among patients with chronic fatigue syndrome, patients with Fibromyalgia and a healthy control group.



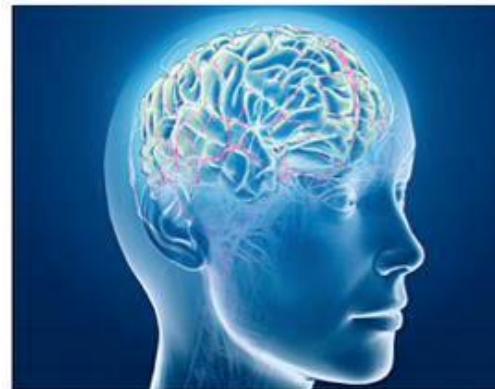
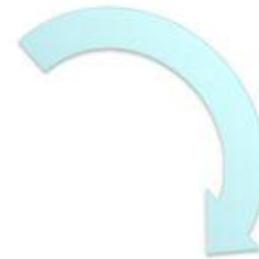
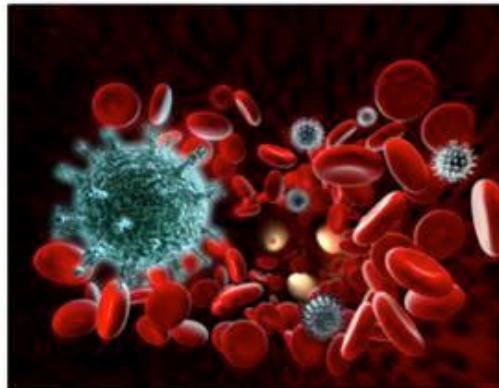
# Secondary aim

To reach the primary aim, a secondary aim will be explored:

- Compare immunological markers between CFS/ME, FM and healthy controls.



# Psykoneuroimmunologi vs. Immunopsykiatri



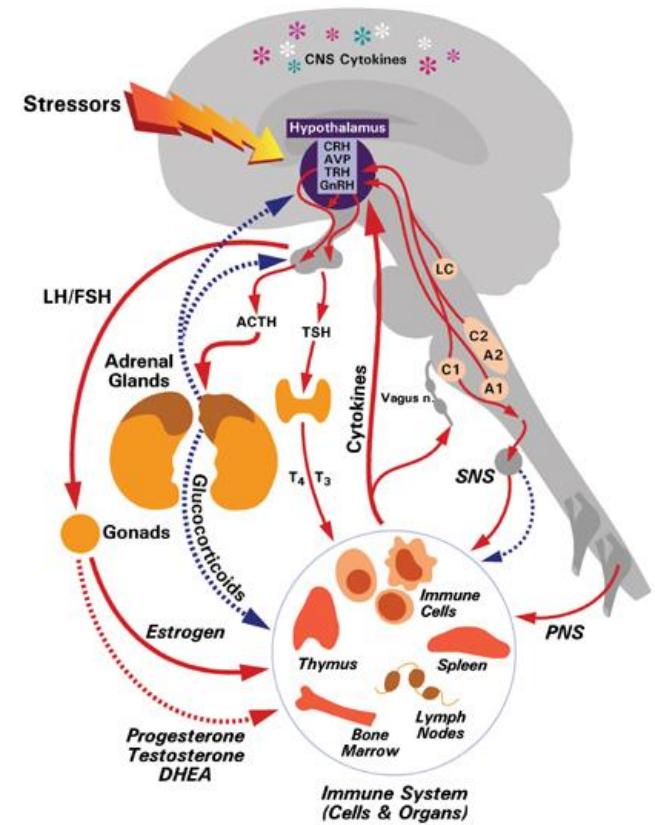
<https://twitter.com/ParianteSPILab>  
**Carmine M. Pariante** Retrieved 05.04.17

# Psykoneuroimmunologi

vs.

## Immunopsykiatri

- Bidirectional relationship between brain and immune system:
  - Psychological and neural phenomena influence the immune system

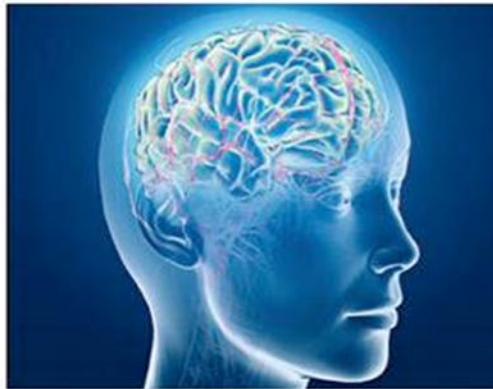
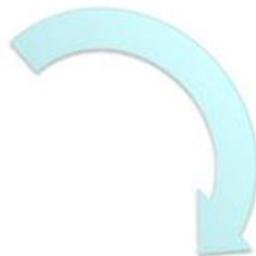
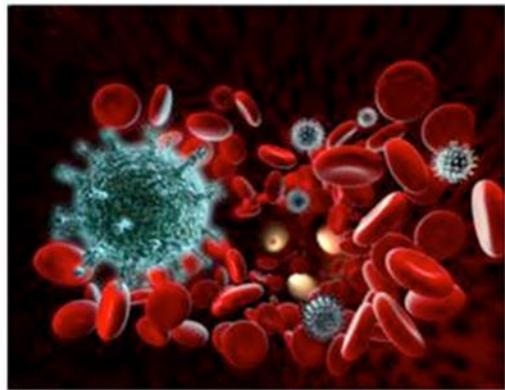


# Psykoneuroimmunologi vs. Immunopsykiatri

- Immunomodulation on brain:
  - Peripheral immune mechanism govern behaviours and emotions



# Innganger til CNS



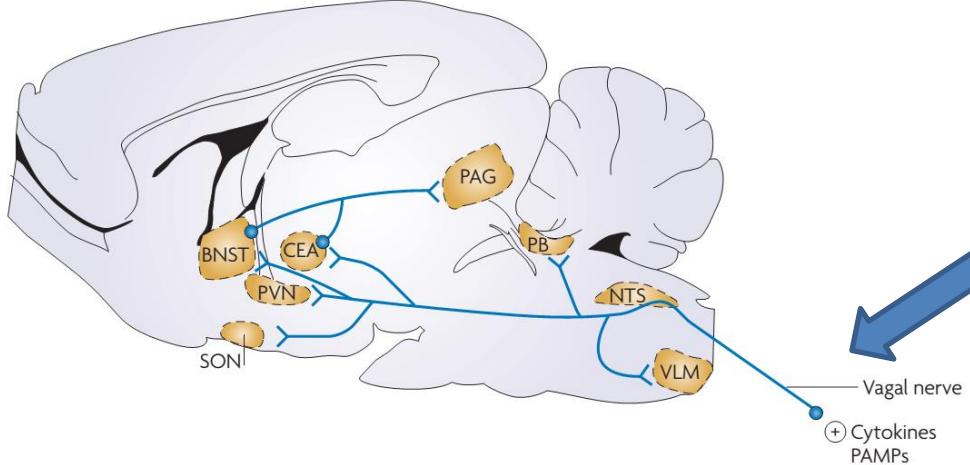
BBB

**Blod-Hjerne-barrieren**

Banks 2006, Neurologic clinics. The blood-brain barrier in psychoneuroimmunology

# Innganger til CNS

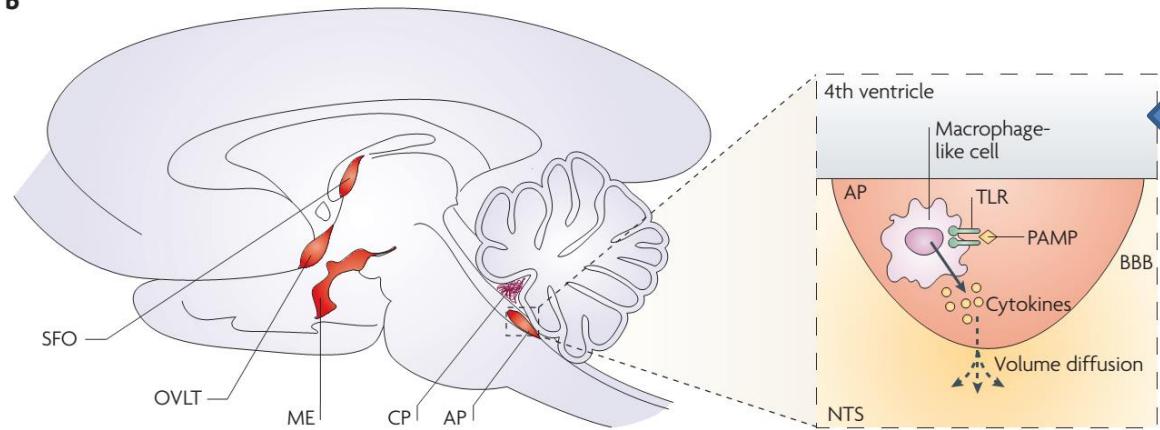
a



1. BBB (Blod-Hjerne-barrieren)

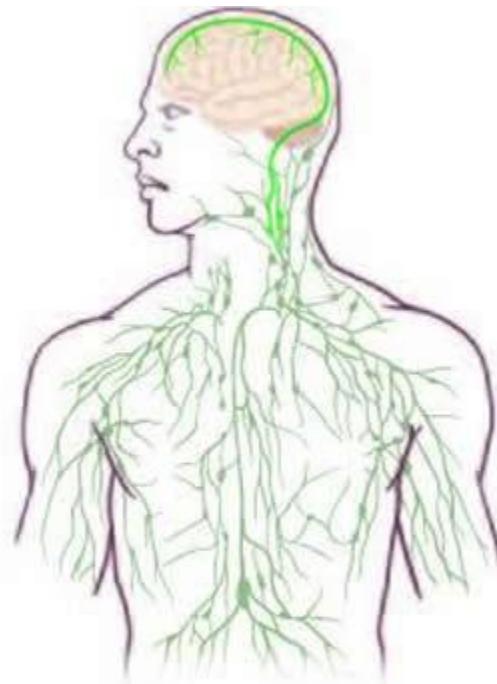
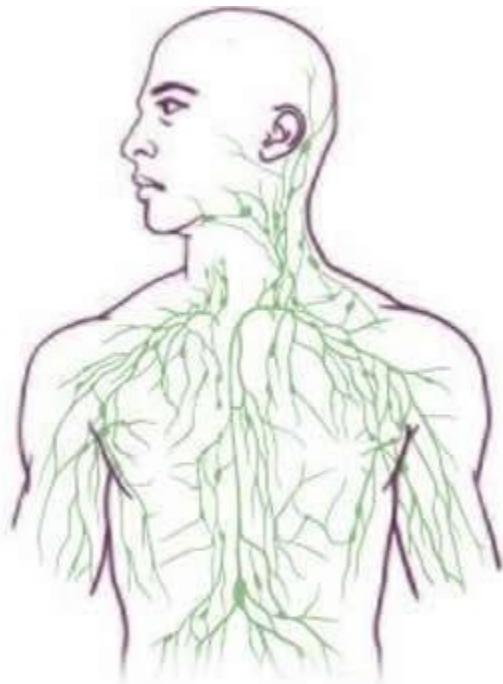
2. Reseptorer på perifere nerver

b



3. Områder som ikke har  
BBB  
Cytokiner diffunderer inn

### 3. Lymfesystem i hjernen...



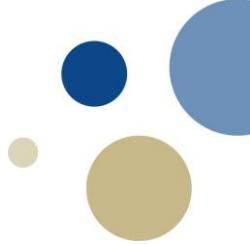
Maps of the lymphatic system: old (left) and updated to reflect UVA's discovery. Image credit: University of Virginia Health System.

Neurosciencenews:

<http://neurosciencenews.com/lymphatic-system-brain-neurobiology-2080/>

Louveau et al 2015. Nature. Structural and functional features of central nervous system lymphatic vessels

# Medtode



- Inklusjon av ca. 165 deltagere i studien.
- 3 grupper med i overkant av 50 i hver gruppe:
  - CFS/ME
  - FM
  - Kontroller

# Lab-arbeid

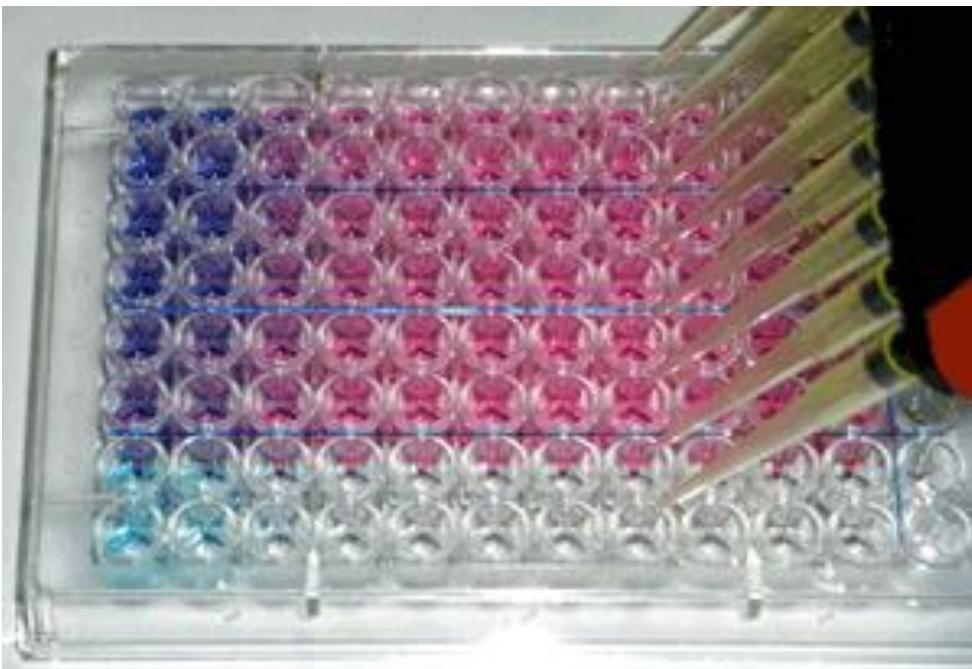
- Blodprøver
  - Plasma
  - Nedfrys (Biobank)
  - Analysert for generale markører
    - Elektrolytter
    - Hormoner
    - Infeksjoner (gjennomgåtte/pågående)
  - Rheumatiske faktorer
  - Immunsystem
    - IgM, IgG, IgE, **hsCRP**



**Ina Møller** Staff Engineer  
Department of Biomedical Laboratory Science, Department of Neuroscience and Movement Science, Department of Circulation and Medical Imaging, NTNU



# Labanalyse



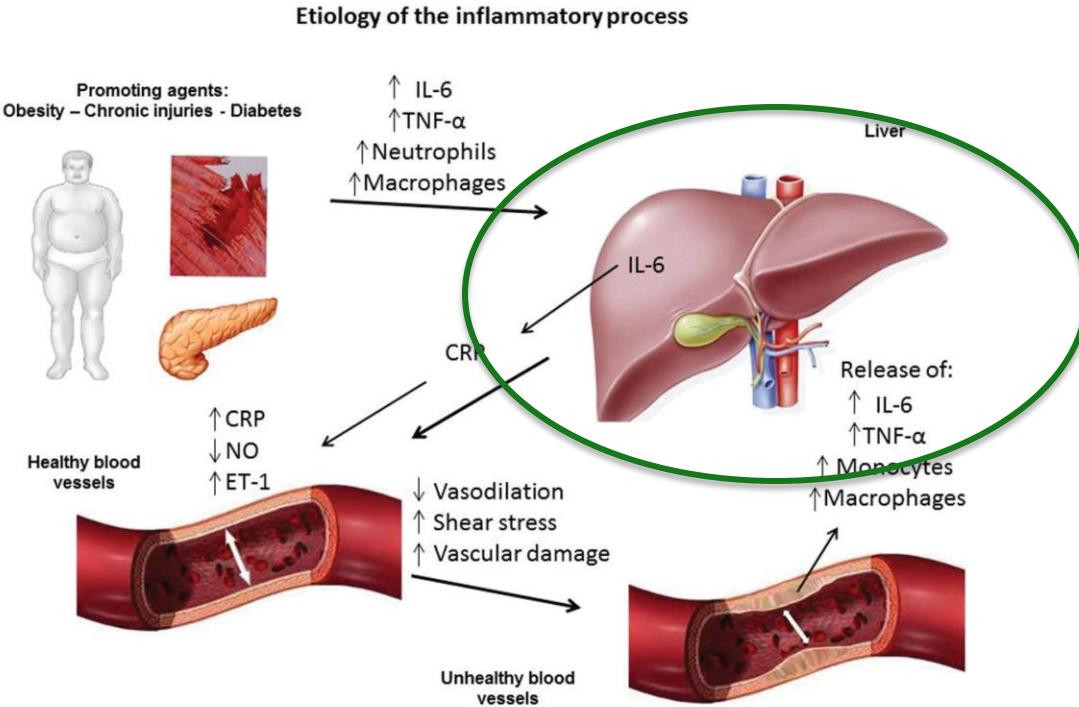
Astrid Kamilla Stunes  
Researcher  
Department of Clinical and Molecular  
Medicine, Department of Biology

## Multiplex

Analyse av flere  
cytokiner samtidig  
(f.eks. 10-30  
cytokiner)

<http://www.rockland-inc.com/custom-antibody-conjugation.aspx>

# hsCRP



- Produseres ved stimuli (infeksjon, traume m.m.)
  - Auto-immune sykdommer
  - Depresjon
  - Virus

Teixeira, B.C., et al., *Inflammatory markers, endothelial function and cardiovascular risk*. Jornal Vascular Brasileiro, 2014. **13**: p. 108-115.

# CRP

- Betennelse
- Serum
- hsCRP <5 mg/L
- Autoimmune sykdommer
- Depresjon
- Virus



# hsCRP

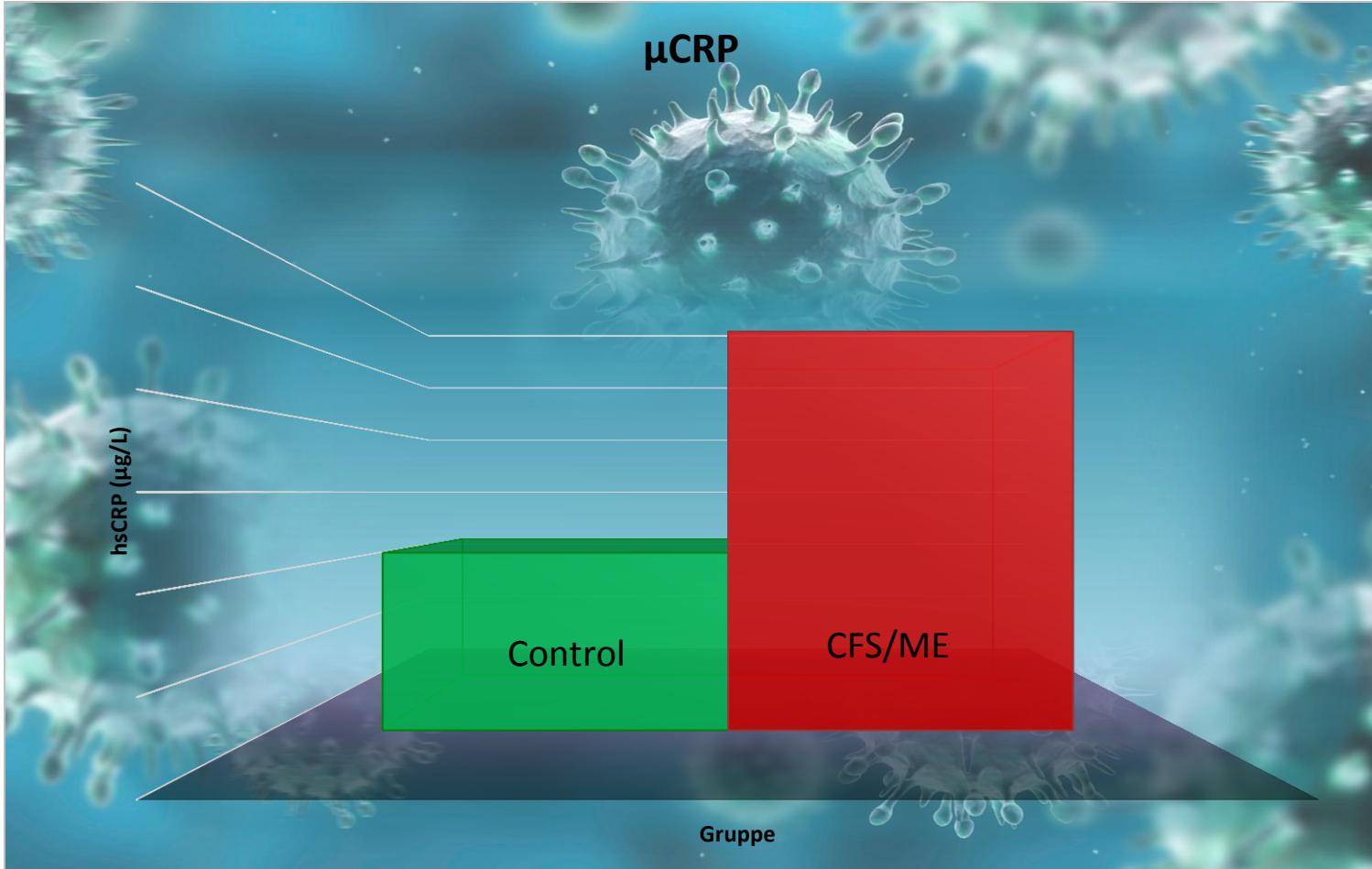


- Normal: 0 – 10 mg/L
- Virus infeksjon: 10 – 40 mg/L
- Bakteriell infeksjon: 40 – 200 mg/L
- Alvorlig infeksjon: > 200 mg/L

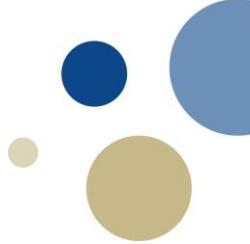


# Resultat

Graf: eksempel på gjennomsnitt.

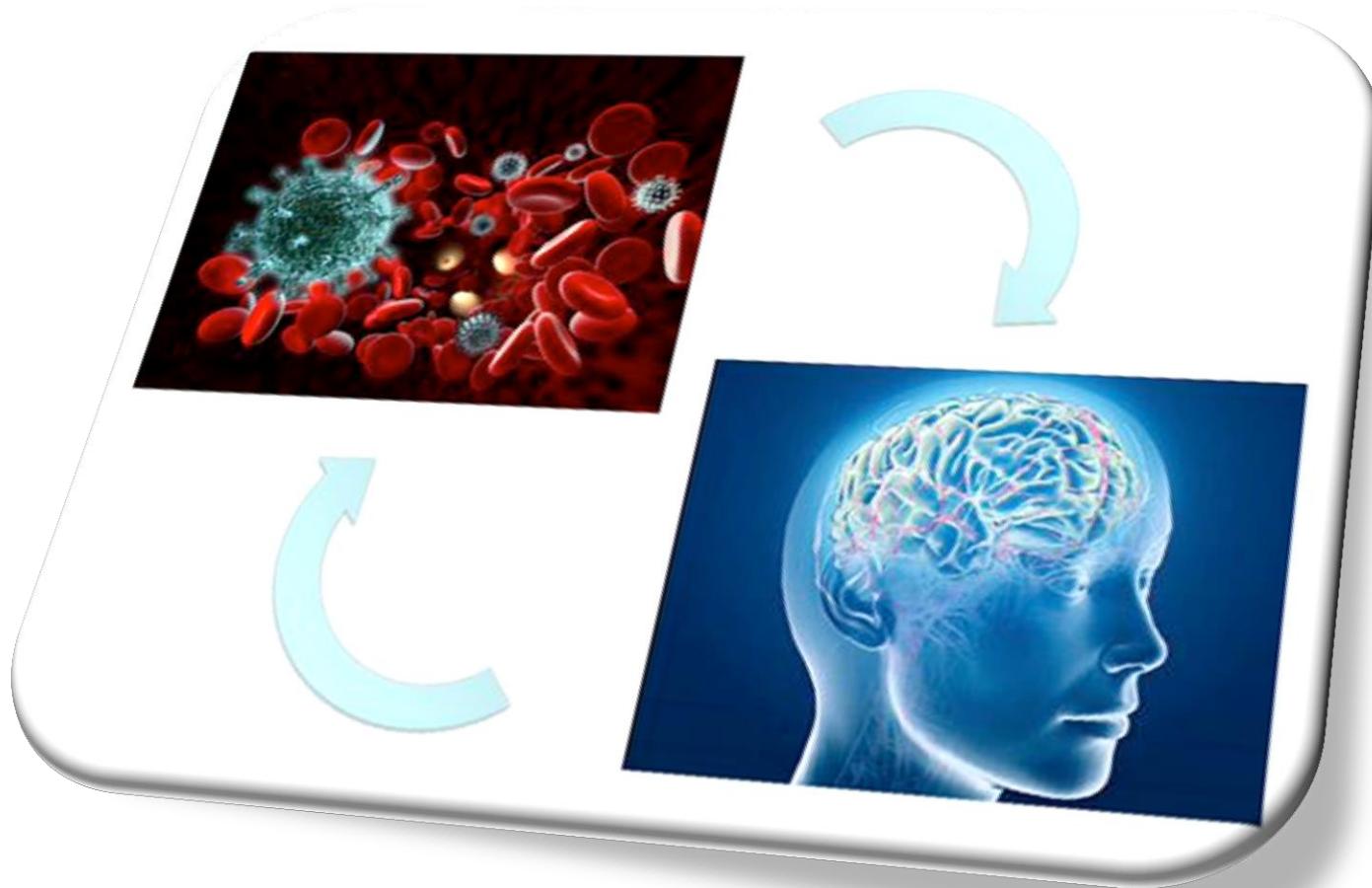


# Konklusjon



- Kan kronisk betennelse være en forklaringsmodell for Kronisk utmattelsessyndrom (CFS/ME)?
  - Tja... Hadde det bare vært så enkelt:
    - Normalområdet for CRP (0 – 10 µg/L)
    - Flere immunologiske faktorer må undersøkes.
- Hva skjer om vi sammenligner med andre komplekse lidelser (f.eks. fibromyalgi)?
- Kan man finne andre årsaker til betennelse?

# Konklusjon



# Collaborators

- Solveig K. Reitan



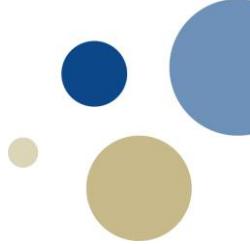
- Valentina C. Iversen



- Egil A. Fors



- Linda R. White



 **NTNU**  
Norwegian University of  
Science and Technology

 **ST. OLAVS HOSPITAL**  
UNIVERSITETSSYKEHUSET I TRONDHEIM

## Acknowledgements:

Ina Møller, A. Kamilla Stunes

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