The story behind cognitive impairment and Lupus Brain Fog

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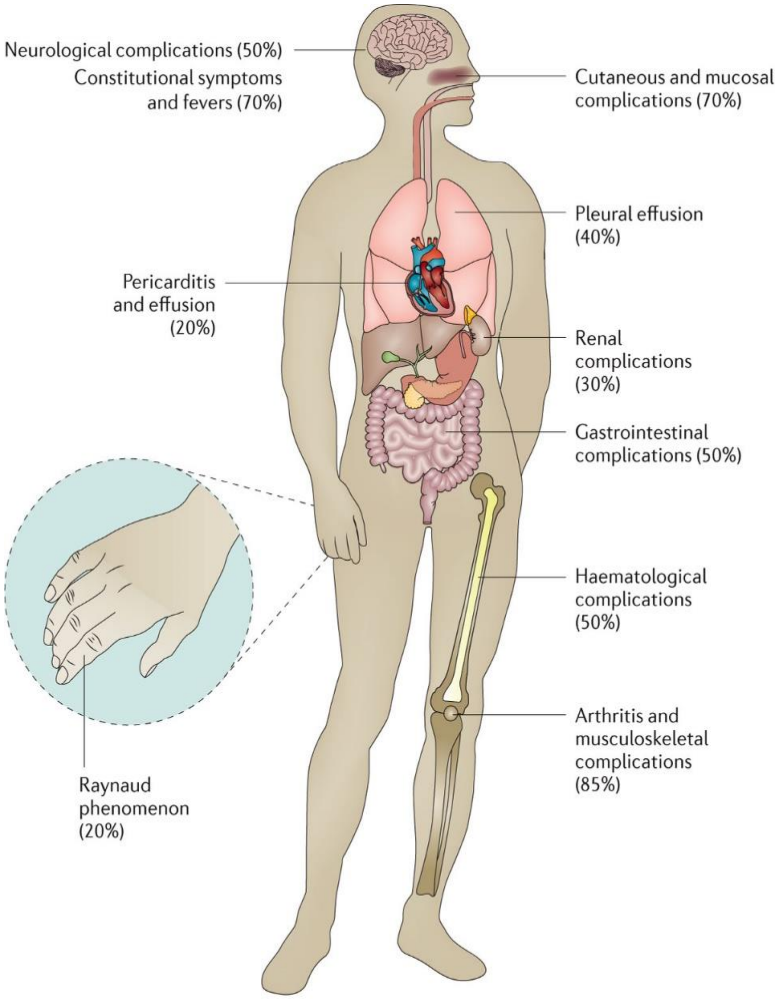
Systemic Lupus Erythematosus (SLE)

SLE is a long term condition that can affect multiple systems in the body.

Typical malar rash SLE

Nature Reviews | Disease Primers

Different systems involved in SLE



Nature Reviews | Disease Primers

SLE

- Skin
- Joints
- Kidneys
- Heart
- Lungs
- Brain
- Blood vessels

Brain involvement in SLE - neuropsychiatric SLE (NPSLE)

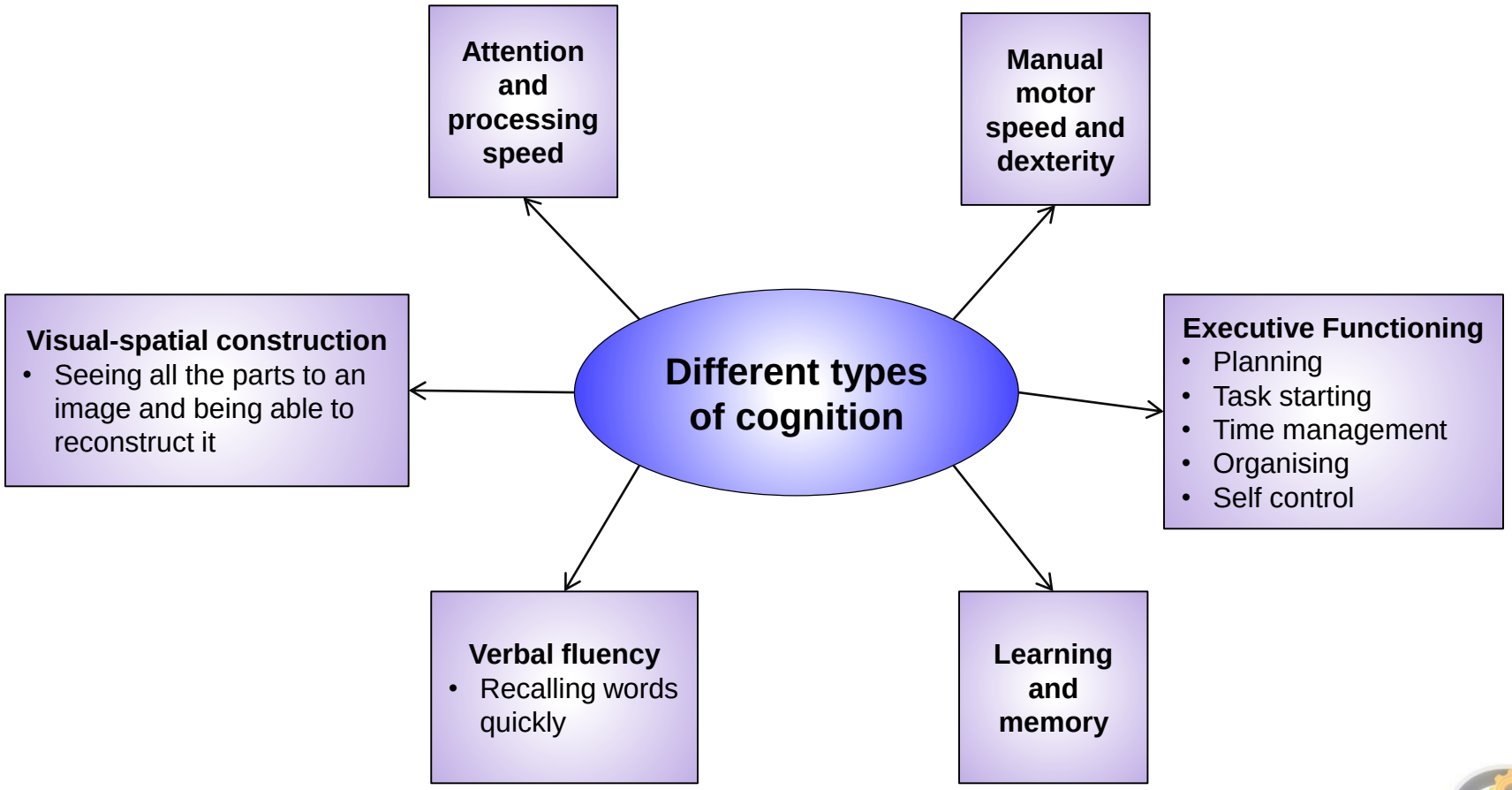
The American College of Rheumatology (ACR) has described 19 manifestations defined as NPSLE.

NPSLE occurs in 14% -75% of SLE patients.

Cognitive dysfunction/impairment is one of the most common manifestations.

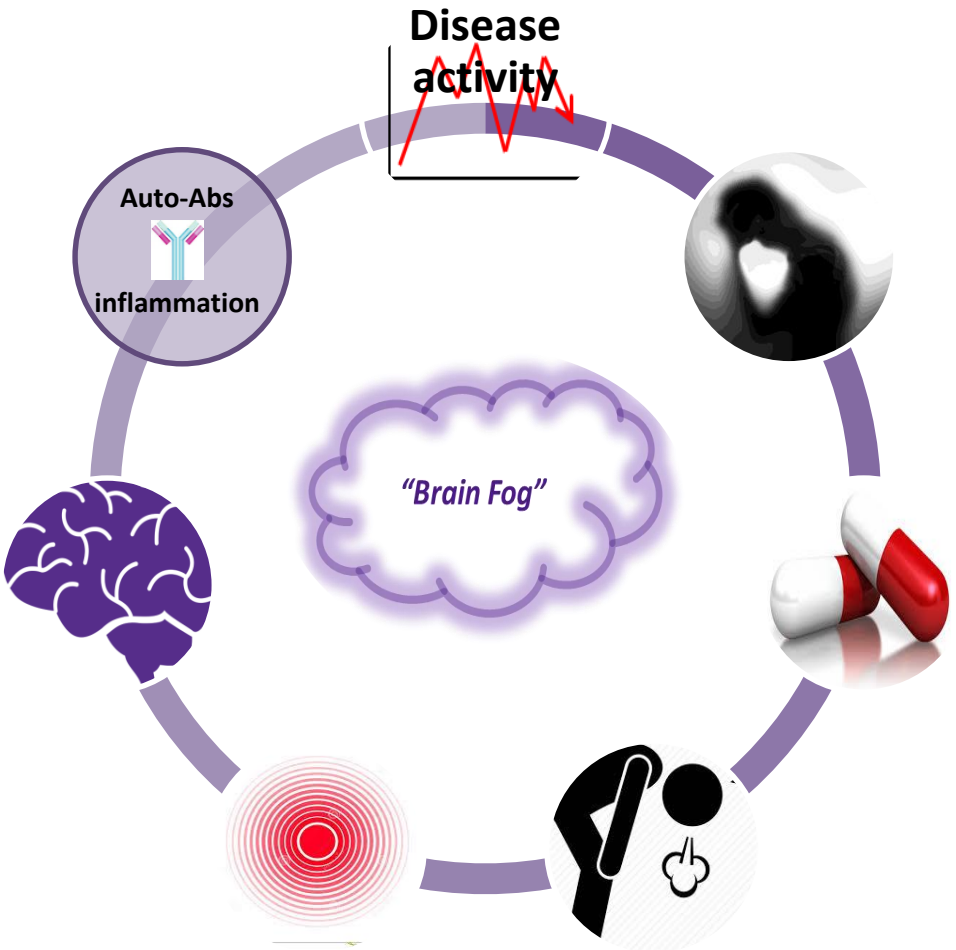
19 NPSLE manifestations
Asceptic meningitis
Cerebrovascular disease
Demyelinating syndrome
Headache
Movement disorder
Myelopathy
Seizure disorders
Acute confusional state
Anxiety disorder
Cognitive dysfunction
Mood disorder
Psychosis
Acute inflammatory polyradiculoneuropathy
Autonomic disorder
Single/multiplex mononeuropathy
Myasthenia gravis
Cranial neuropathy
Plexopathy
Polyneuropathy

Definition of Cognitive Impairment (CI)

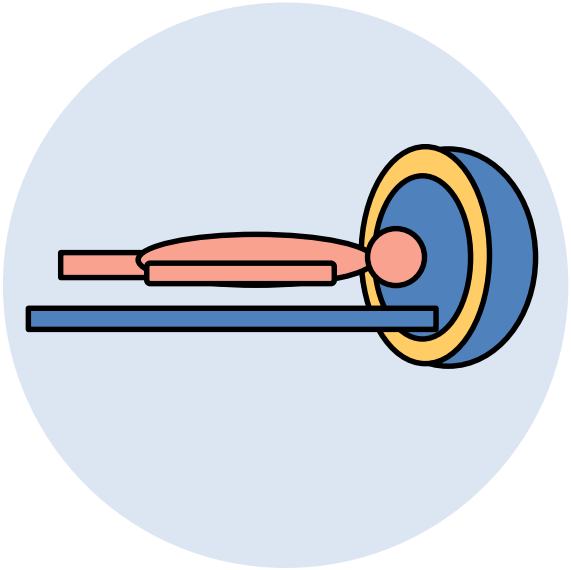


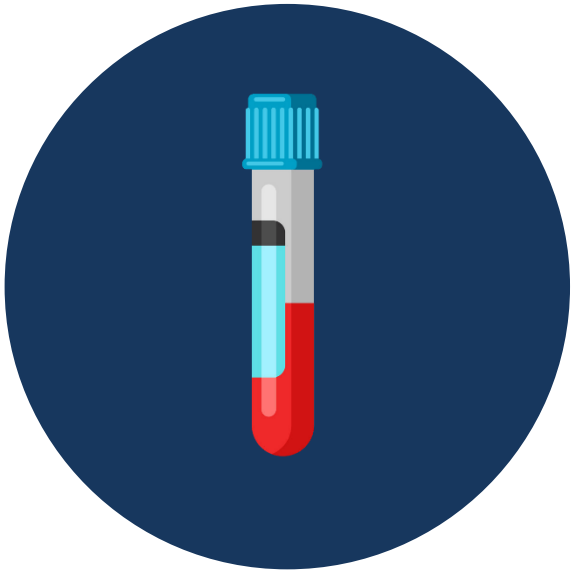
ACR definition: "significant deficits in any or all of the main cognitive functions"

Possible causes of cognitive impairment



Research at the clinic





Our work:
Prevalence and measurements

- Prevalence of CI in SLE
  - 38% SLE patients have CI
  - 2.8 times more likely in SLE than general population
  - 1.8 times more than RA patients


HA Rayes


C Tani

- Measurements of CI in SLE
  - ACR have a set of tests but not consistently used
  - Screening and computerized tests


Kimberley Yuen

Traditional cognitive testing versus computerised

Traditional: ACR Battery

- 11 Tests
- Trained psychometrist
- 1 hour
- Scoring takes 30 min & its done by a psychometric
- Cost!

Vs.

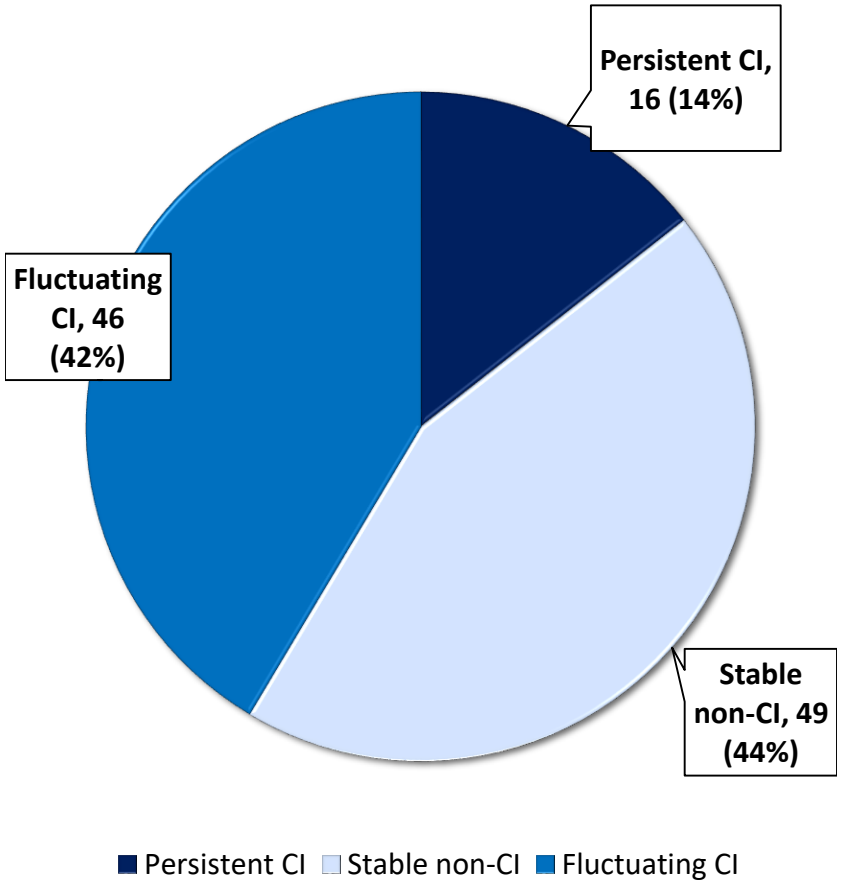
Computerised: ANAM (v4) GNS

- 15 Tests
- One-to-one with computer (applied by nonexpert for CI)
- Relatively rapid, feasible & practical
- 45 min
- Scoring is automatic

Our work:
Cognitive impairment over time

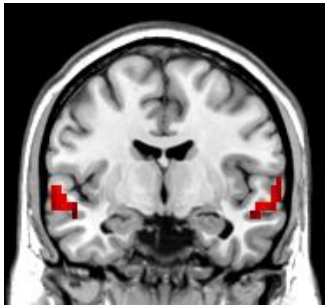
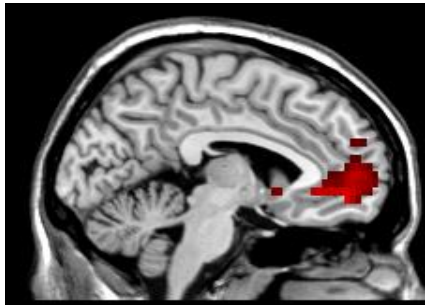
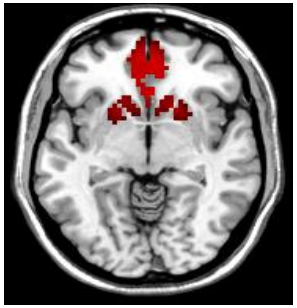
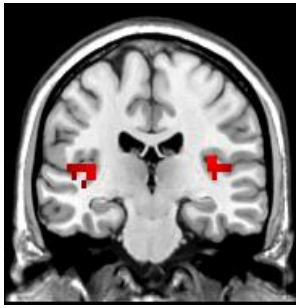
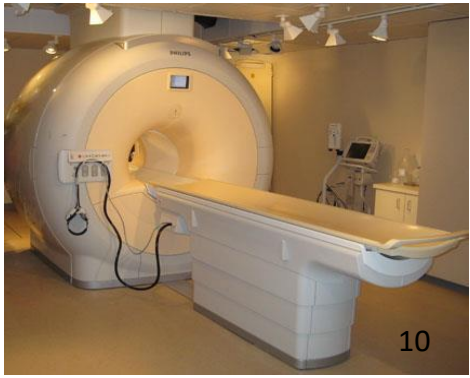

Tayer-Shifman

- 56% of SLE patient likely to experience CI over one year
- Majority of individuals with SLE experience stability in cognitive function over time
- Individuals were more likely to improve in cognition than to experience declining cognitive function
- Aspects affecting cognitive improvement:
  - × Disease severity
  - × Depression
  - ✓ Increasing age
  - ✓ Higher education



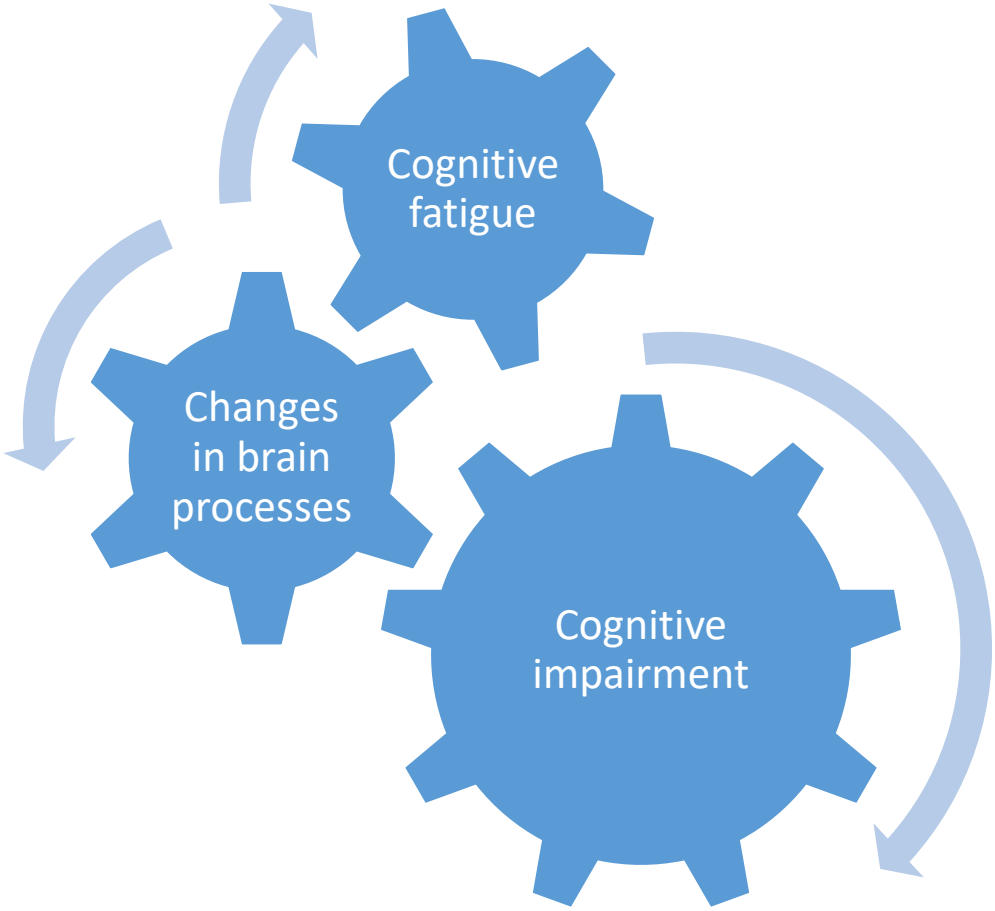
Our work:
Brain imaging

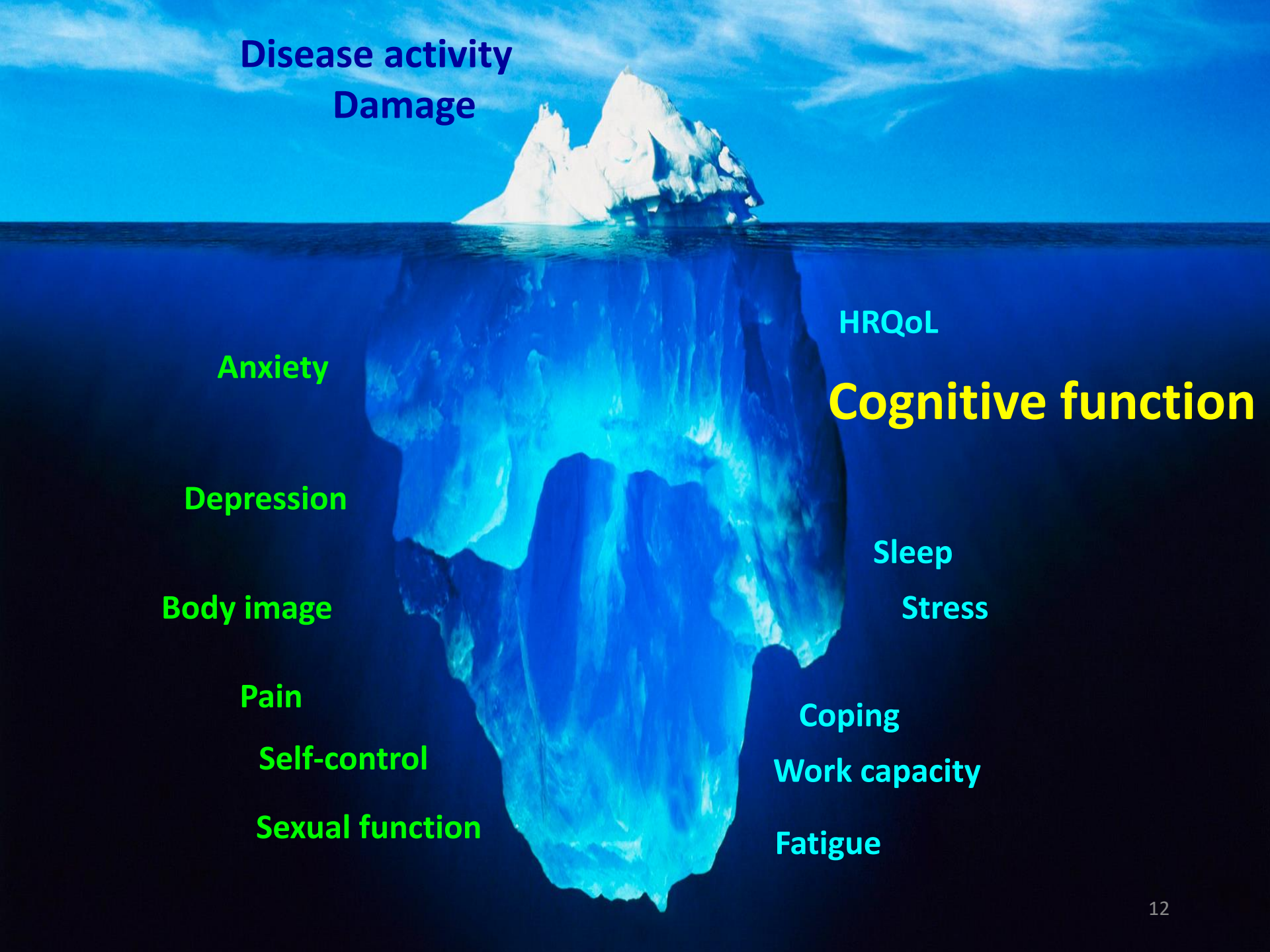
- SLE clinical brain scans rarely associated with CI
- fMRI: brain scanning
  - Measures how the brain works during cognitive tasks
- Cognitive function maintained but brain having to work harder

Cognitive impairment and brain fog in SLE

Are brain fog and cognitive impairment the same thing?



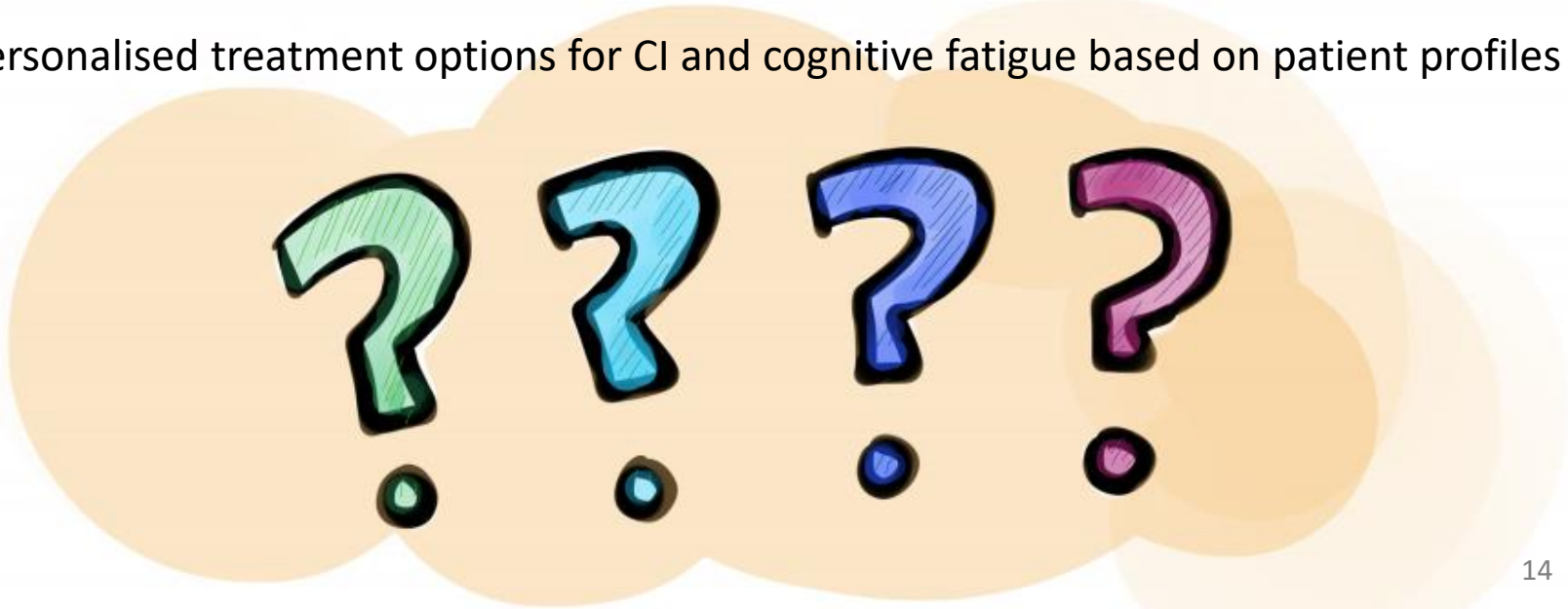

Disease activity
Damage
HRQoL
Anxiety
Cognitive function
Depression
Sleep
Body image
Stress
Pain
Coping
Self-control
Work capacity
Sexual function
Fatigue

What we know so far

1. **High prevalence of CI in SLE**
2. **No one tool being used to look at CI in SLE**
   - **Computerised tasks could be useful, easier and quicker**
3. **How people with SLE are affected by CI over time has a specific pattern**
4. **Many factors affect CI in SLE and this can be different depending on the individual**
5. **Not everyone has obvious CI but may experience “brain fog”, this could be cognitive fatigue**

Areas needing more research

1. Uniformed measure of cognitive impairment and fatigue
2. Fully understand how CI in SLE is experienced over time by patients
3. Work with SLE patients to further understand their cognitive impairment and fatigue
4. Identify new ways to group patients with CI in SLE based on potential causes
5. Personalised treatment options for CI and cognitive fatigue based on patient profiles



Ongoing work and future research plans

- New methods to better understand CI and cognitive fatigue in SLE
  - AI models
  - fMRI
  - Eye-tracking measures
  - Computerised assessments and remote studies
  - International consensus on CI measures in SLE
- Understand what makes someone susceptible to CI in SLE
- What is the long-term outlook for those with CI in SLE
- **Exploring treatment options**

Treatment

- Current:
  - Coping strategies
  - Treating underlying conditions
    - Poor sleep quality
    - Depression
    - Fatigue
- Ongoing research:
  - Medical therapies
  - Rehabilitation

Thank you

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