MCI and Dementia: 5 lessons from in my first year of practice

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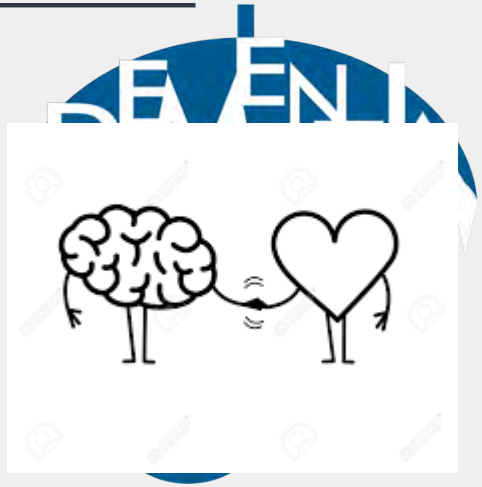
NBIMU 2018

Conflicts of Interest

- None

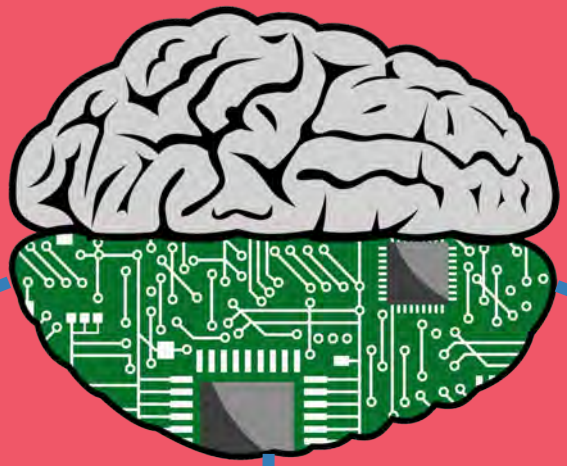
Dementia = Brain Failure

- Not a disease but a set of symptoms (syndrome) that accompany a disease
  - Alzheimer disease
  - Cerebrovascular disease
  - Lewy body disease
  - Frontotemporal degeneration syndromes
  - Chronic traumatic encephalopathy



- Good analogy is **heart failure**
  - Different pathologic subtypes (ischemic cardiomyopathy = vascular cognitive impairment)
  - Different clinical subtypes (left/right-sided HF = amnestic syndrome, dysexecutive syndrome)

Simplified way to understand dementia



Motor & coordination

- Parkinsonism
- Balance problems
- Swallowing problems
- Incontinence

Cognitive

Emotional

- Apathy
- Mood/anxiety
- Psychosis
- Aggression

- When same disease processes (neurodegenerative, vascular) affect motor or emotional networks first, we tend to think of them as different entities (Parkinson disease, ALS, depression, late-onset psychosis)

Lesson # 1: The definition of dementia has actually changed…


And it finally
makes sense!

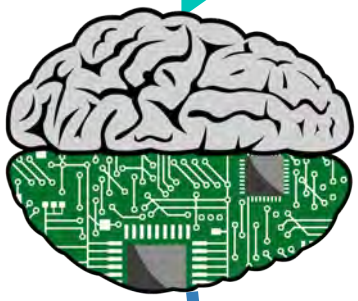
Updated diagnostic criteria (DSM-5, 2013)

DSM-IV and DSM-5 criteria for dementia

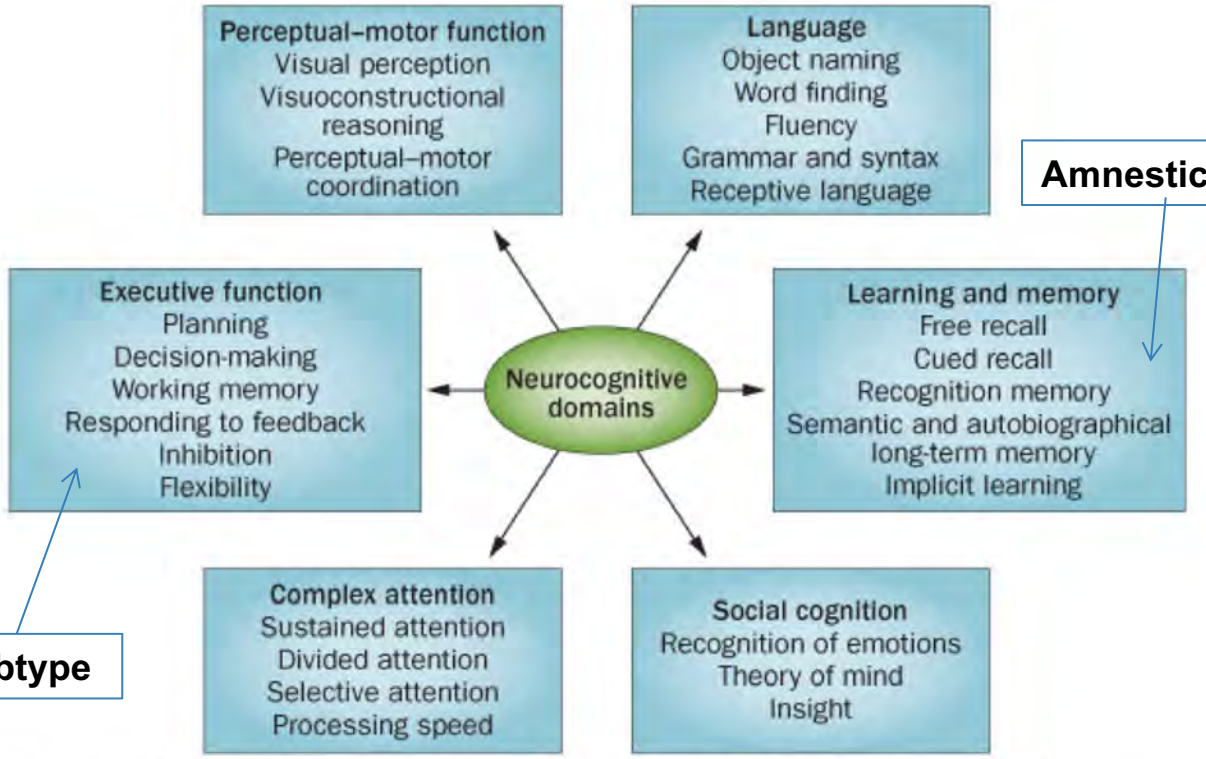
DSM-IV criteria for dementia	DSM-5 criteria for major neurocognitive disorder (previously dementia)
A1. Memory impairment **A2.** At least one of the following: - Aphasia - Apraxia - Agnosia - Disturbance in executive functioning	**A.** Evidence of significant cognitive decline from a previous level of performance in one or more cognitive domains*: - Learning and memory - Language - Executive function - Complex attention - Perceptual-motor - Social cognition
B. The cognitive deficits in A1 and A2 each cause significant impairment in social or occupational functioning and represent a significant decline from a previous level of functioning	**B.** The cognitive deficits interfere with independence in everyday activities. At a minimum, assistance should be required with complex instrumental activities of daily living, such as paying bills or managing medications.
C. The cognitive deficits do not occur exclusively during the course of delirium	**C.** The cognitive deficits do not occur exclusively in the context of a delirium
	D. The cognitive deficits are not better explained by another mental disorder (eg, major depressive disorder, schizophrenia)

- Old definition was based too much on typical Alzheimer disease

Six Cognitive Domains (Dementia requires decline in ≥1)



Cognitive



- If you're sending someone with suspected HF for an echo, want them to assess both left and right ventricles

Lesson #2: The MMSE should probably be retired…

Lesson # 4: The MMSE should probably be retired…

- What's wrong with the MMSE?
  - Developed in 1975 by a psychiatry resident (Marshal Folstein) because there was no useful tool for assessing cognition

  - Doesn't assess executive function (Like doing echocardiogram that can't see the right side of the heart)

  - Overly language-based (usually not affected in majority of cases of cognitive impairment)

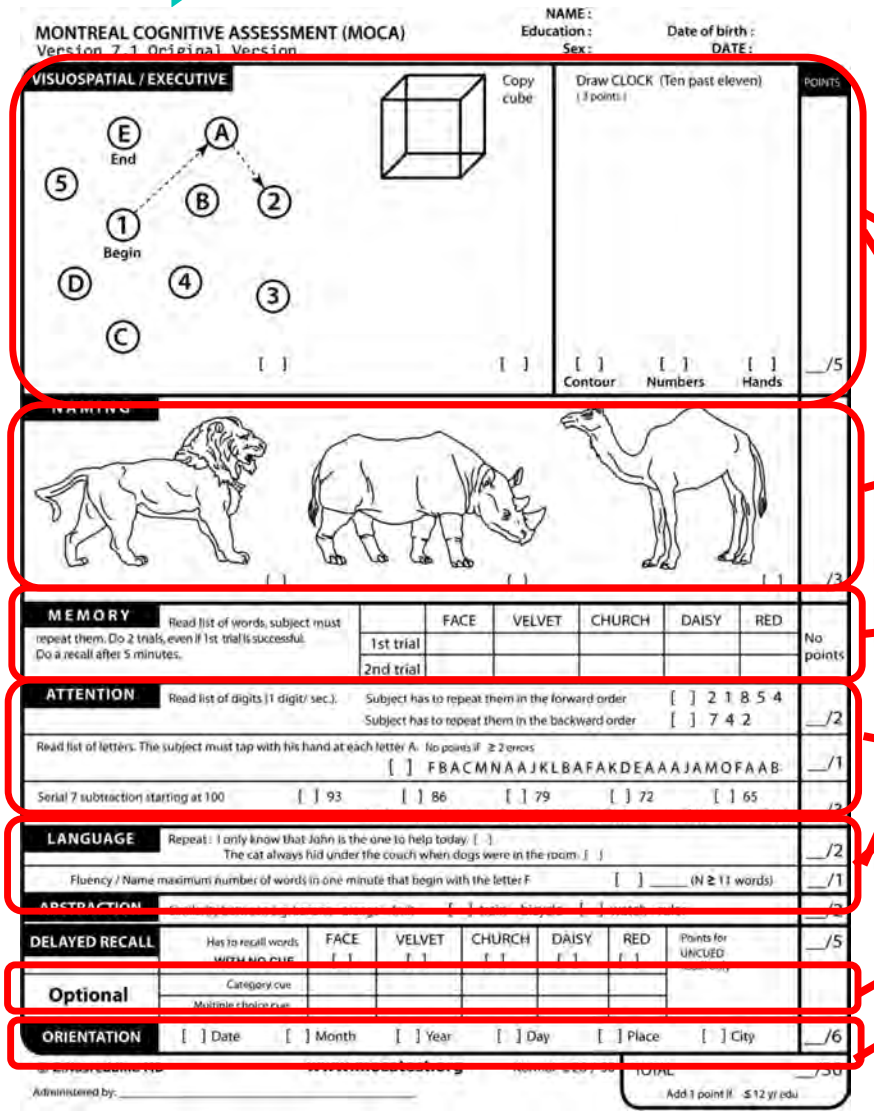
  - Visuospatial component relatively simple (not a sensitive predictor of driving safety)

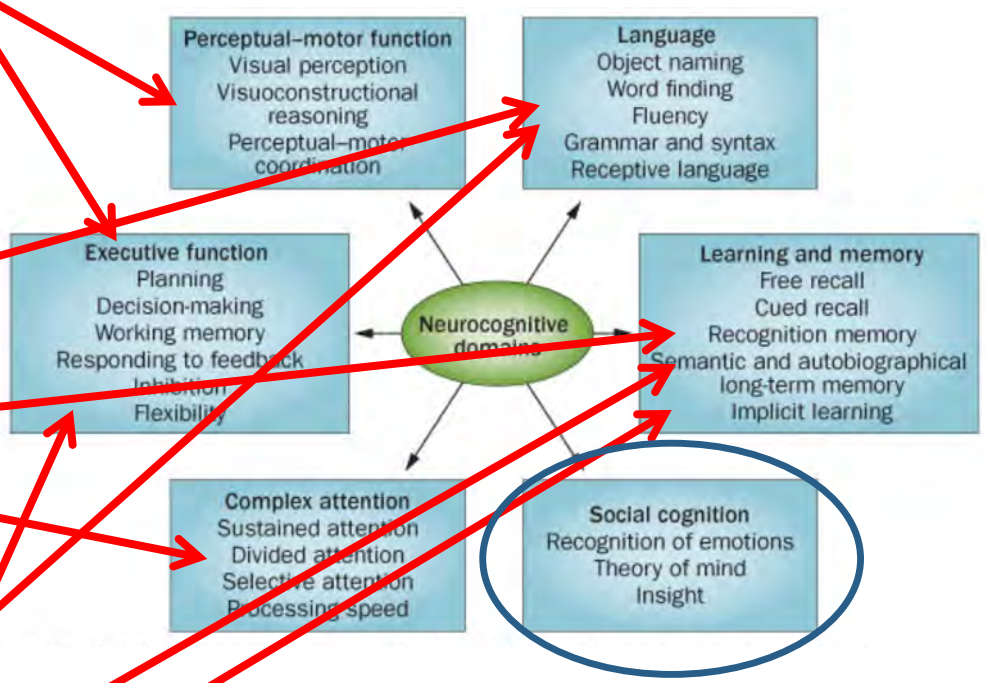
Lesson # 4: The MMSE should probably be retired…

- Montreal Cognitive Assessment (MoCA) superior to the MMSE
  - Addresses all of the deficiencies of the MMSE

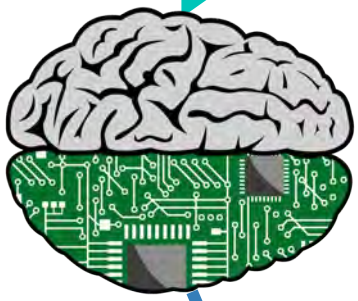
- Caution for the inexperienced…
  - Great if doing full diagnostic workup of cognitive impairment (good "physical exam" of the mind)
  - Only useful when interpreted in context of the history (shouldn't be done during delirium)
  - MoCA score in isolation about as useful as saying someone scored 21/30 on their cardiovascular exam (what?)

Like any good physical exam maneuver…

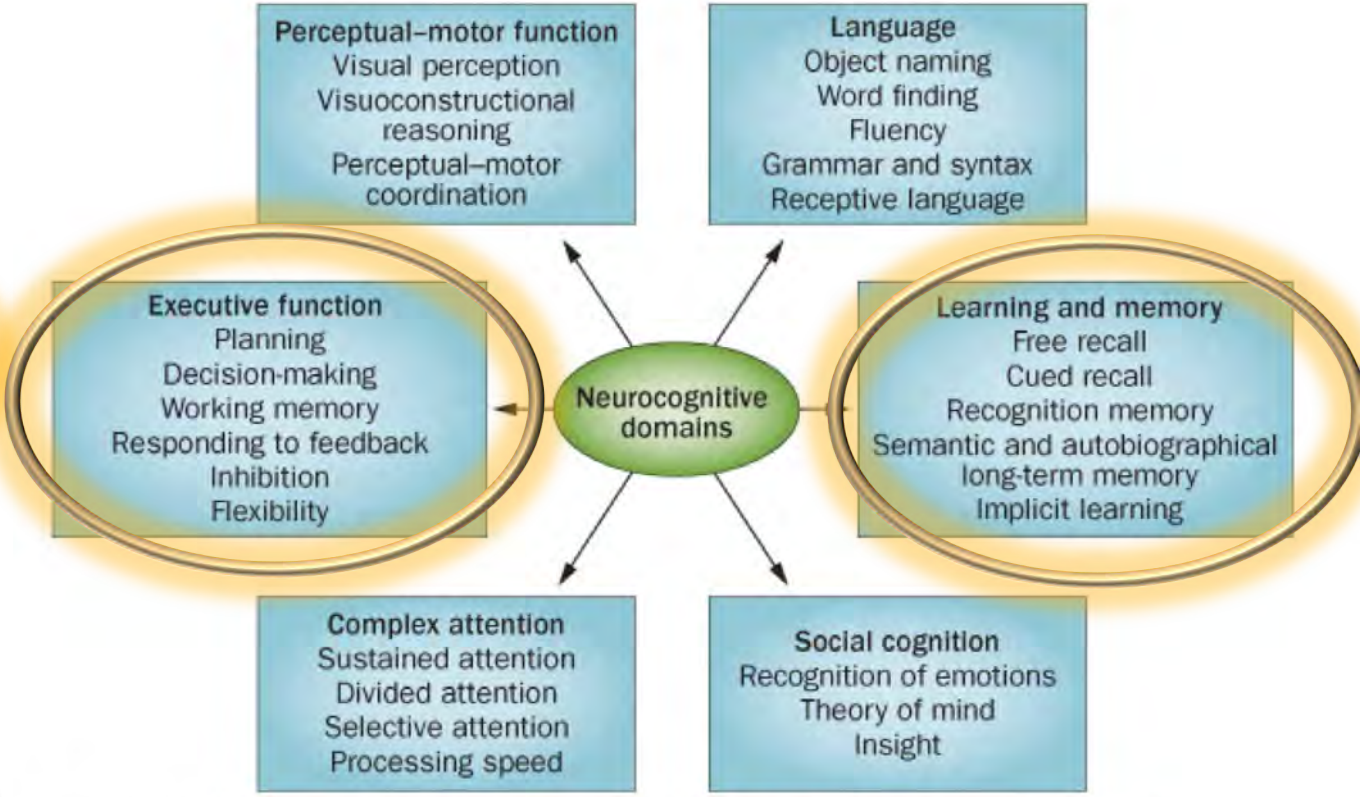




If you really just want a screening test…



Cognitive



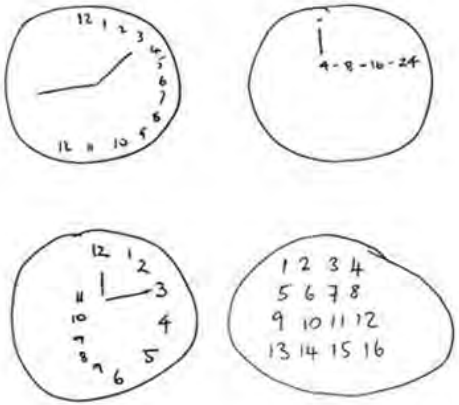
90%

If you really just want a screening test…

- Do the 3-minute “Mini-cog” screen
  - 3 word recall (Memory, Language, Attention)
  - Draw a clock (Visuospatial and Ex. Function)

Table 2. Summary: comparisons of cognitive tests ($n = 249$)

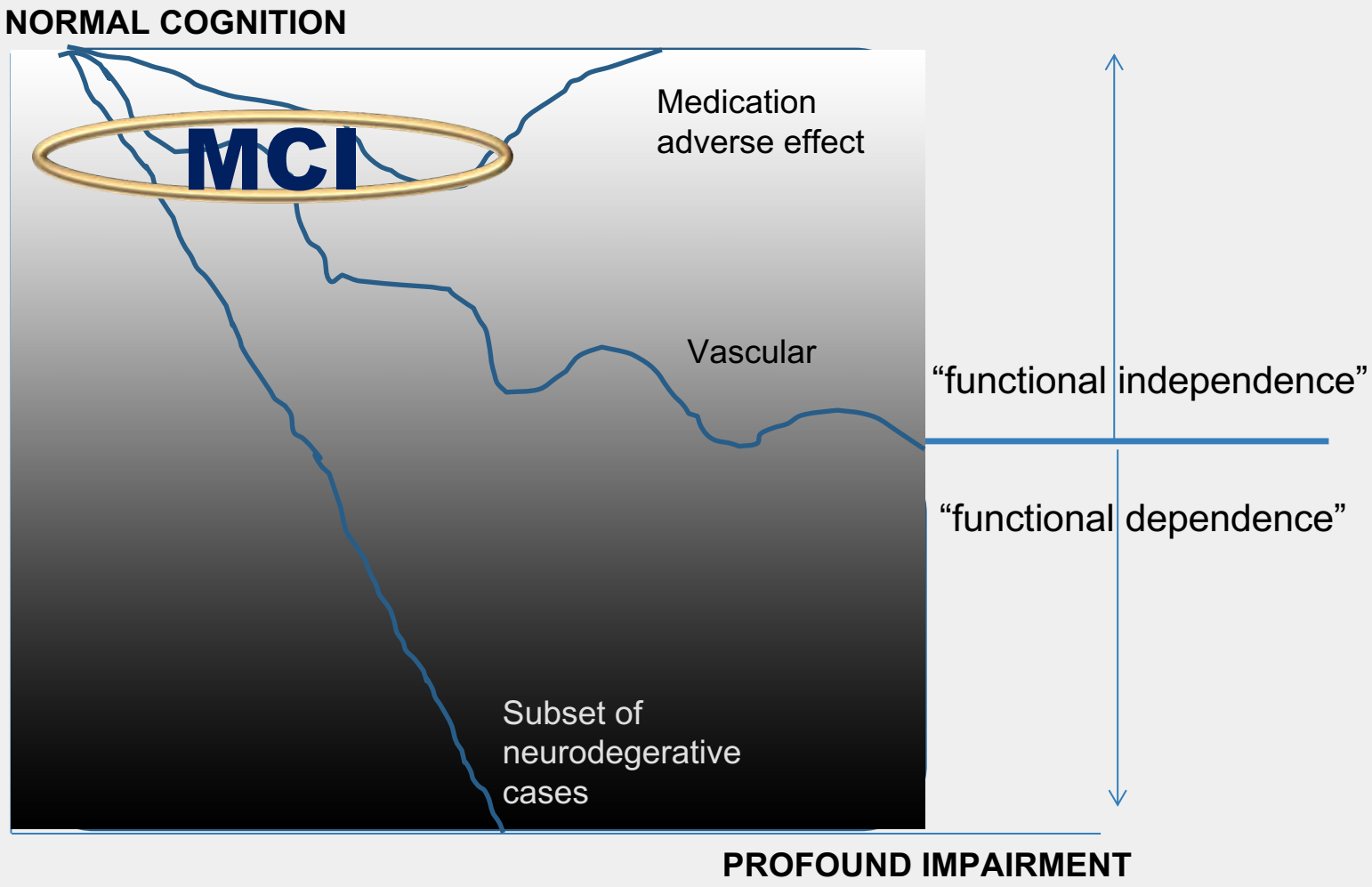
	Overall performance		
	Sensitivity	Specificity	DV§
Mini-Cog	99	93	96
Three-item recall	91	97	94
CDT	79	92	85
CASI	92	96	94
MMSE	91	92	92



Lesson # 3:
Dementia is not a monolithic disease..


And that’s good news!

Both MCI and Dementia extremely heterogeneous



Consequences of thinking about dementia as monolithic

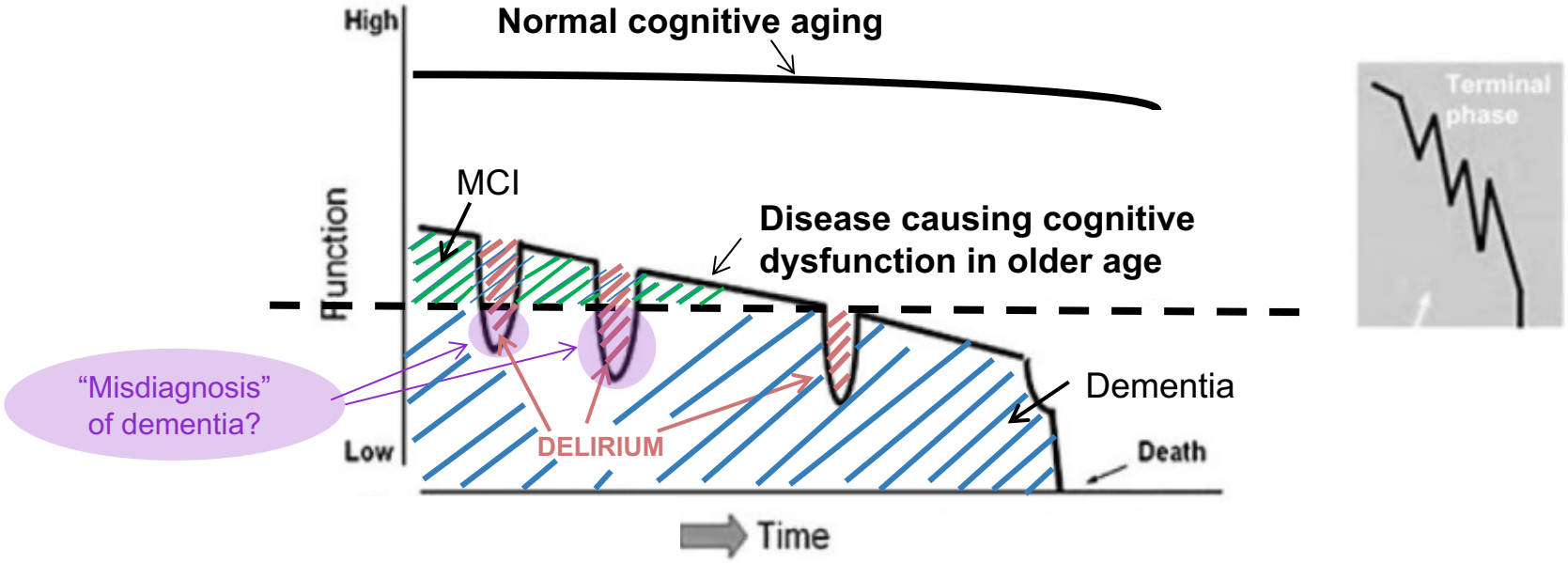
- Stigma for patients
  - Stereotyping holds severe cases to be representative of the spectrum
  - Many people with cognitive impairment delay evaluations, particularly early in the illness, when intervention would be more effective (MCI stage)

- Physicians reluctant to screen for cognitive impairment

- Our recommendations may not be appropriate for particular patients

Lesson #3: Delirium and dementia share an intimate relationship…

‘Organ system failure’ trajectory



- ***Dementia*** represents chronic brain failure (akin to congestive heart failure)
- ***Delirium*** represents acute brain injury (akin to CHF exacerbation) due to underlying medical problem, medication, traumatic brain injury

Lesson #5:
Prevention is key…

Dementia is a big problem…

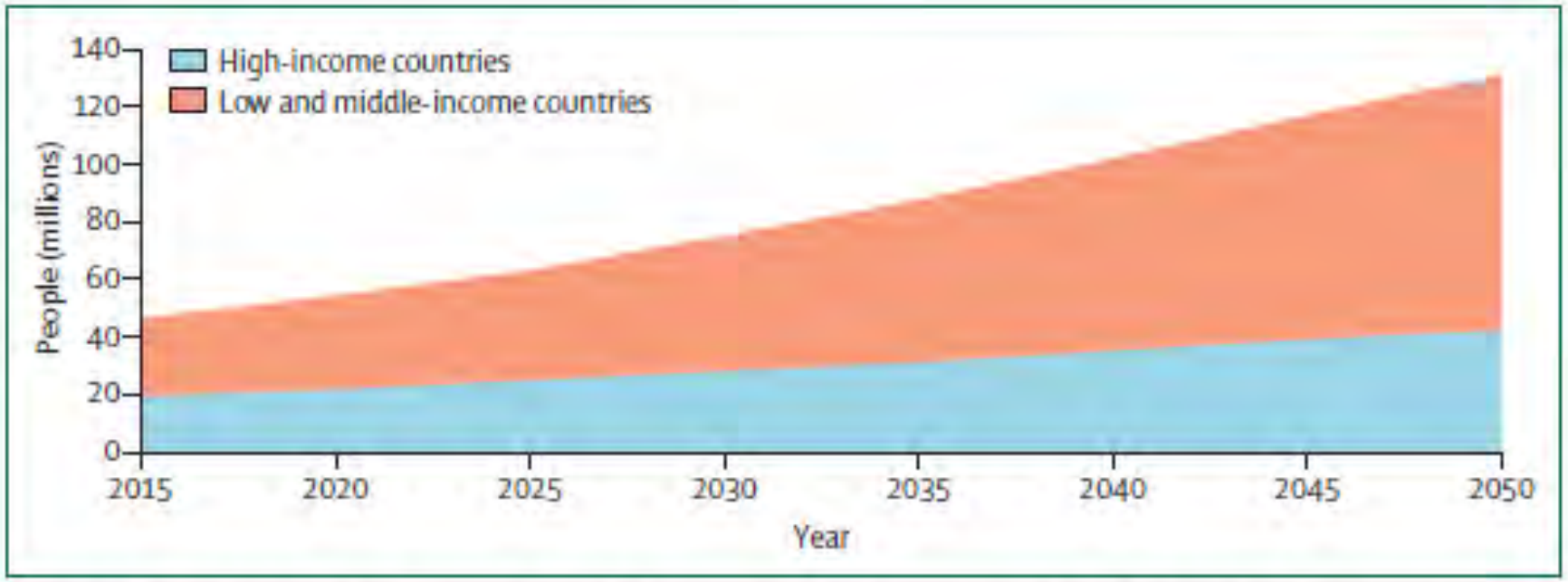
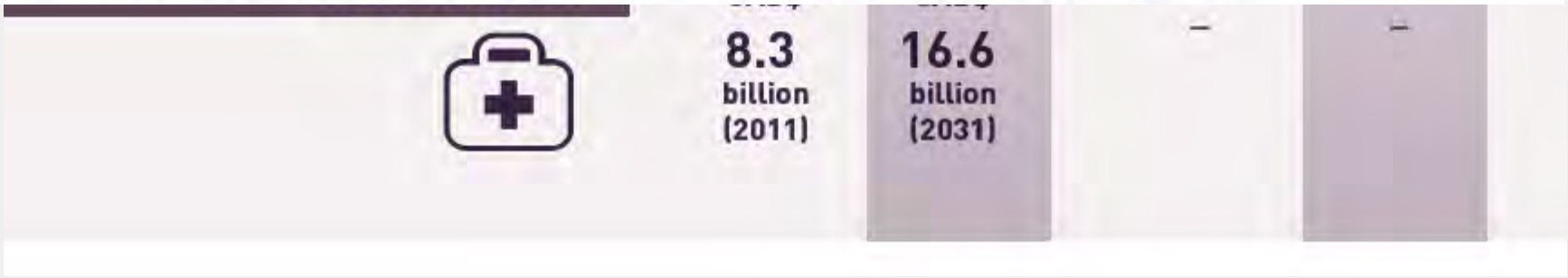
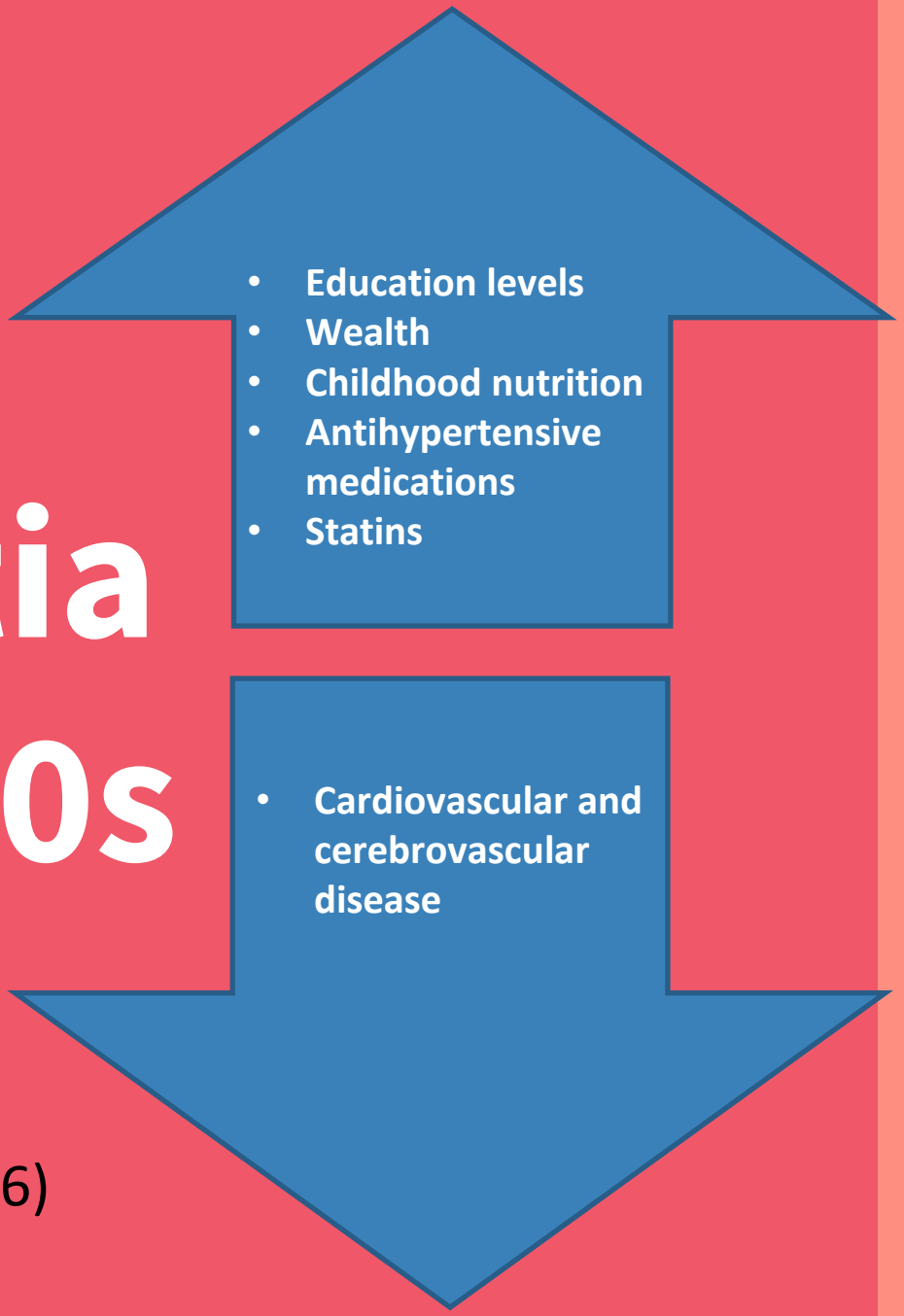


Figure 1: **Growth in numbers of people with dementia in high-income and low and middle-income countries**
Reproduced from Prince and colleagues,[1] by permission of Alzheimer's Disease International.

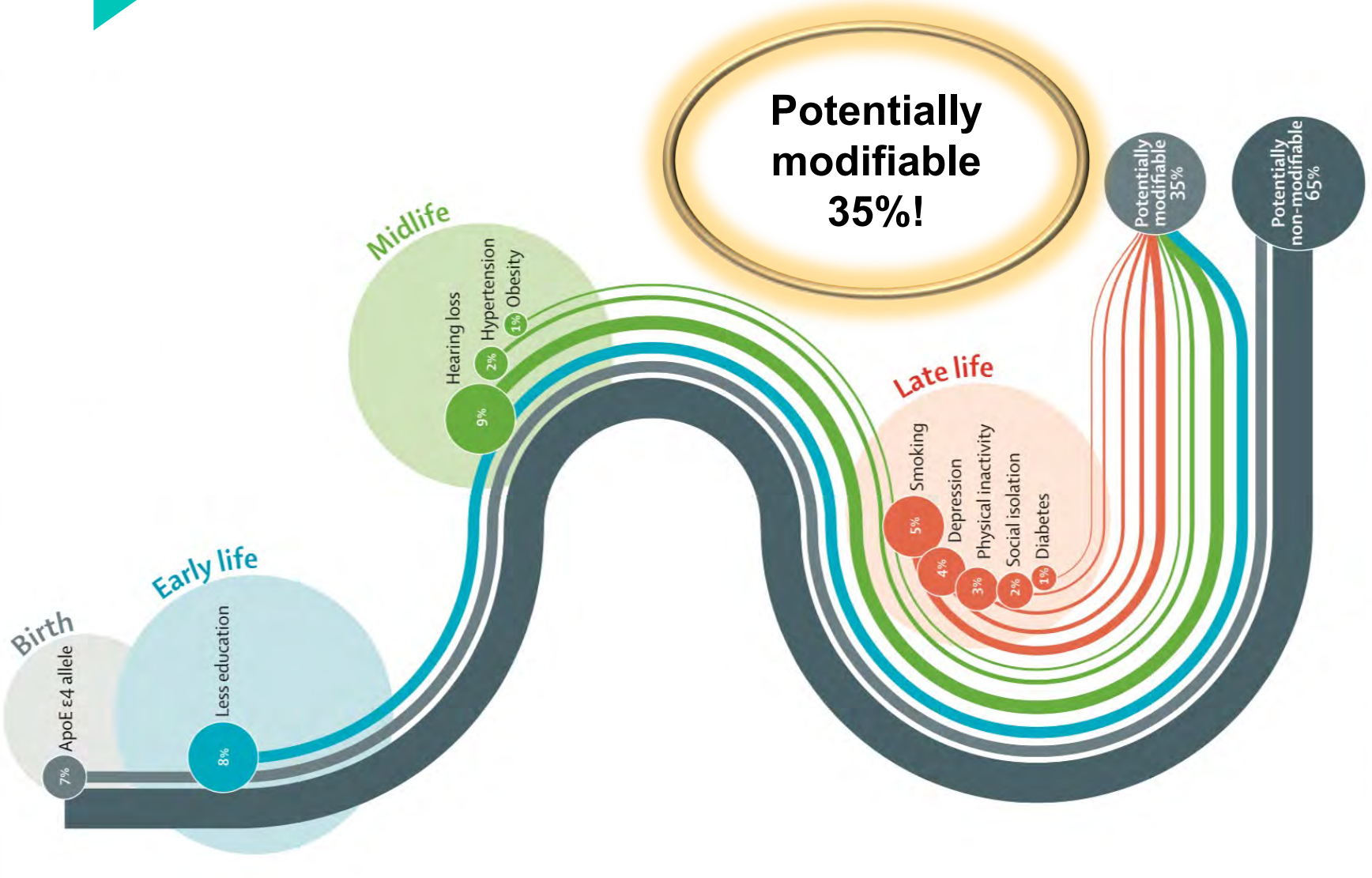


Declining incidence of dementia 1970s-2010s

~ 20% decline in incidence each decade in the Framingham Heart Study only among people with a high school education (NEJM 2016)



Life-course model of dementia (Lancet, 2017)



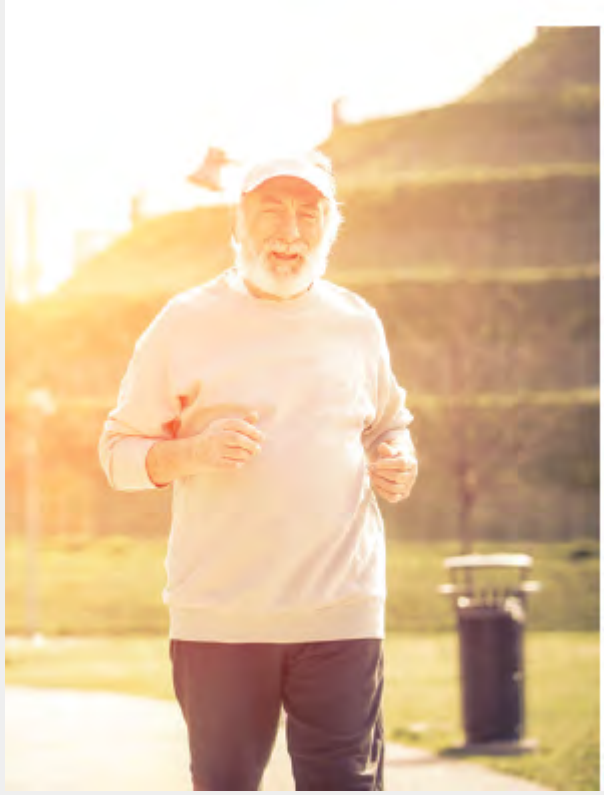
Treatment approaches for dementia

- Trials targeting Alzheimer disease pathology (amyloid, tau) have failed to meet outcomes or stopped due to safety concerns

- Best hopes lie with “personalized medicine”
  - Multimodal efforts directed to at-risk individuals based on personal risk factor profiles rather than “one-size fits all” approach
  - Dementia as a “disease of a lifetime” and need to build a better brain as we age

Preventing dementia: Key Messages

- Maximize education, socialization, happiness
- Control vascular risk factors
- Address vitamin deficiencies (B12)
- "Neuroprotection" strategies
  - Avoid head trauma (falls prevention)
  - Prevent "exacerbations" aka delirium (immunize, avoid unnecessary surgeries)
  - Minimize use of medications known to worsen cognition (anticholinergics)



Thanks!

Any questions?

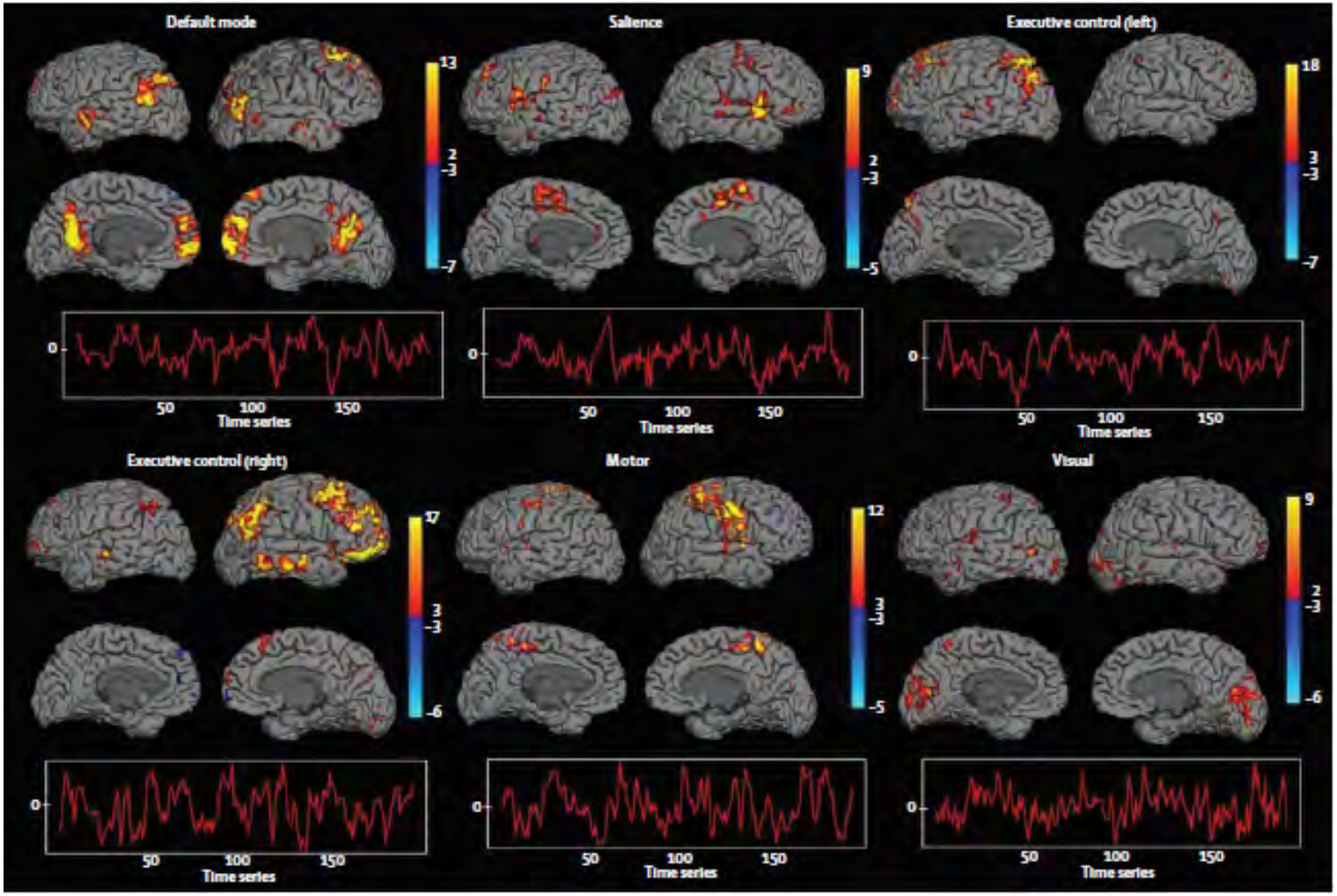
You can email me at:
Dr.Jason.Macdonald@horizonnb.ca

Updated Diagnostic criteria (DSM-5, 2013)

- **Dementia**
  - Significant decline in cognitive function in **≥ 1 cognitive domain** from previously established baseline
  - Subjective + objective evidence of cognitive dysfunction
  - Not due to delirium or other mental disorder
  - Impacts on ability to function (instrumental ADLs initially)

- **MCI**
  - Not all MCI goes on to become dementia but all dementia passes through MCI stage
  - Not felt to be impacting on function by definition
  - May be just as distressing for patients

Functional network disruption



What about cognitive training?

Annals of Internal Medicine

REVIEW

Does Cognitive Training Prevent Cognitive Decline?

A Systematic Review

Mary Butler, PhD, MBA; Ellen McCreedy, PhD; Victoria A. Nelson, MSc; Priyanka Desai, MSPH; Edward Ratner, MD; Howard A. Fink, MD; Laura S. Hemmy, PhD; J. Riley McCarten, MD; Terry R. Barclay, PhD; Michelle Brasure, PhD, MSPH, MLIS; Heather Davila, MPA; and Robert L. Kane, MD†

- In older adults with normal cognition, training improves cognitive performance in the domain trained
- Evidence regarding prevention or delay of cognitive decline or dementia is insufficient