



*I can
prevent*
DELIRIUM

Understand delirium as a factor to consider when planning dental care for older people

Dr Adelina McLeod
Newcastle Hospitals NHS Foundation Trust
Consultant Geriatrician
GMC 7075205



Goals of the session

- Better understand what delirium is and why delirium is a critically important syndrome
- Understand how to screen for, assess and treat a patient with delirium
- Formulate ideas as to how you can prevent delirium
- Recognise your skills in delirium assessment and recovery from delirium



Questions:

- What is delirium?
- What is the 1 year mortality associated with Delirium?
- Does post operative delirium cause long term cognitive impairment?

Slido

- <https://app.sli.do/event/gudBxxMjEB47obvXrDPQyZ>



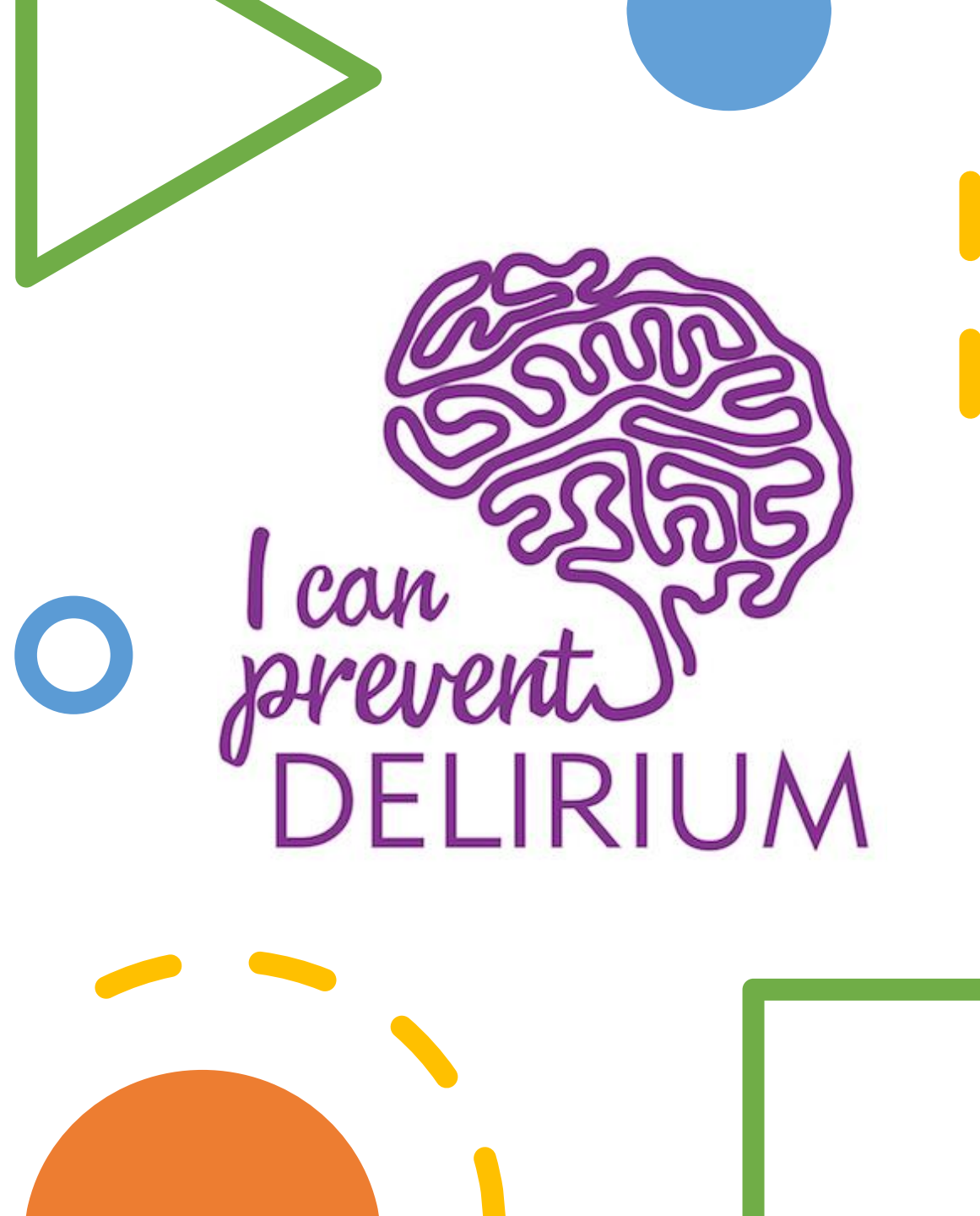


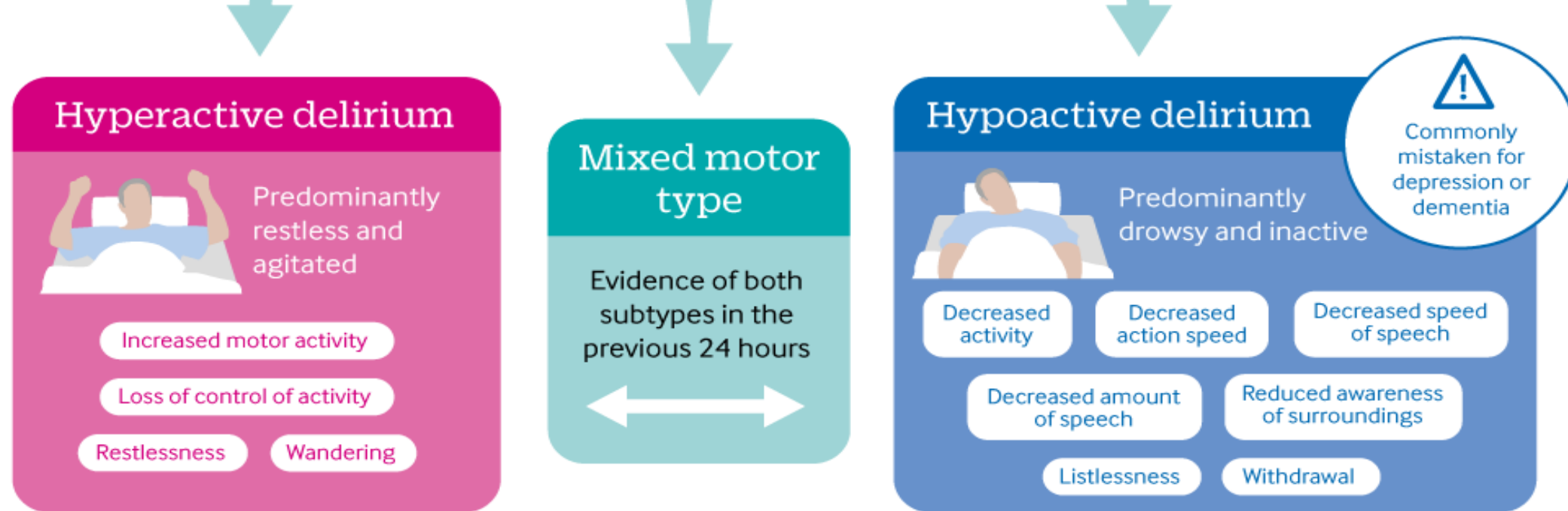
1 year Mortality

35-50%

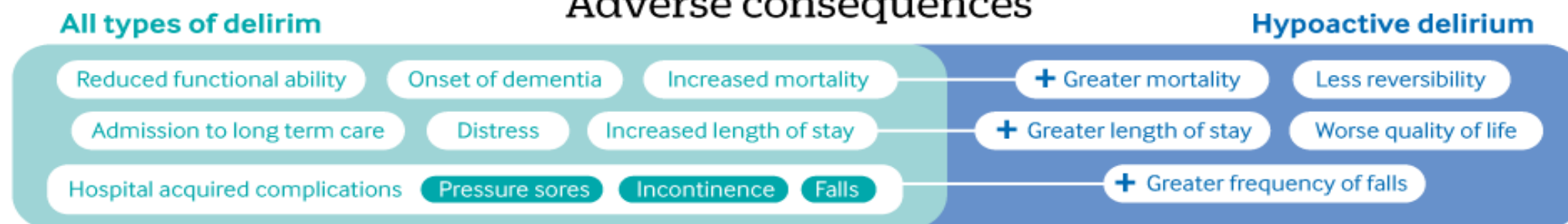
DSM-5

- Disturbance of consciousness that affects the ability to focus sustain and shift **ATTENTION**
- Disturbance of **COGNITION** (e.g. memory deficit, disorientation, language disturbance, perceptual disturbance)
- Occurs over a short period of time and will **FLUCTUATE**
- A direct consequence of a general medical condition,





Adverse consequences



* DSM-5 = Diagnostic and Statistical Manual of Mental Disorders (fifth edition)

thebmj

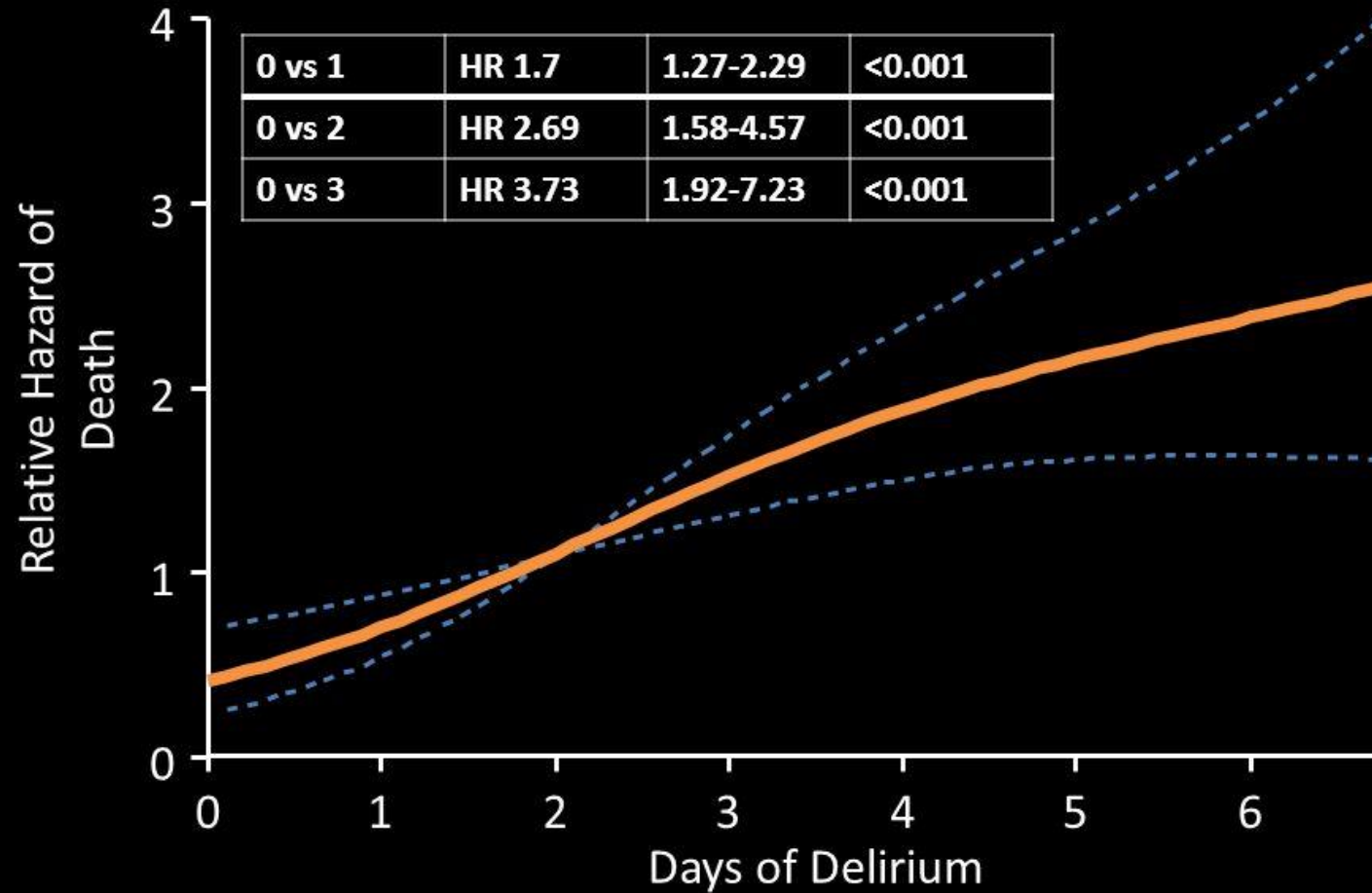
Read the full
article online

<http://bmj.co/delirium>

© 2017 BMJ Publishing group Ltd.

Disclaimer: This infographic is not a validated clinical decision aid. This information is provided without any representations, conditions or warranties that it is accurate or up to date. BMJ and its licensors assume no responsibility for any aspect of treatment administered with the aid of this information. Any reliance placed on this information is strictly at the user's own risk. For the full disclaimer wording see BMJ's terms and conditions: <http://www.bmj.com/company/legal-information/>

Delirium Duration & Mortality



Shehabi Y, et al. CCM 2010; 38:2311–2318

Not all Confusion is delirium!



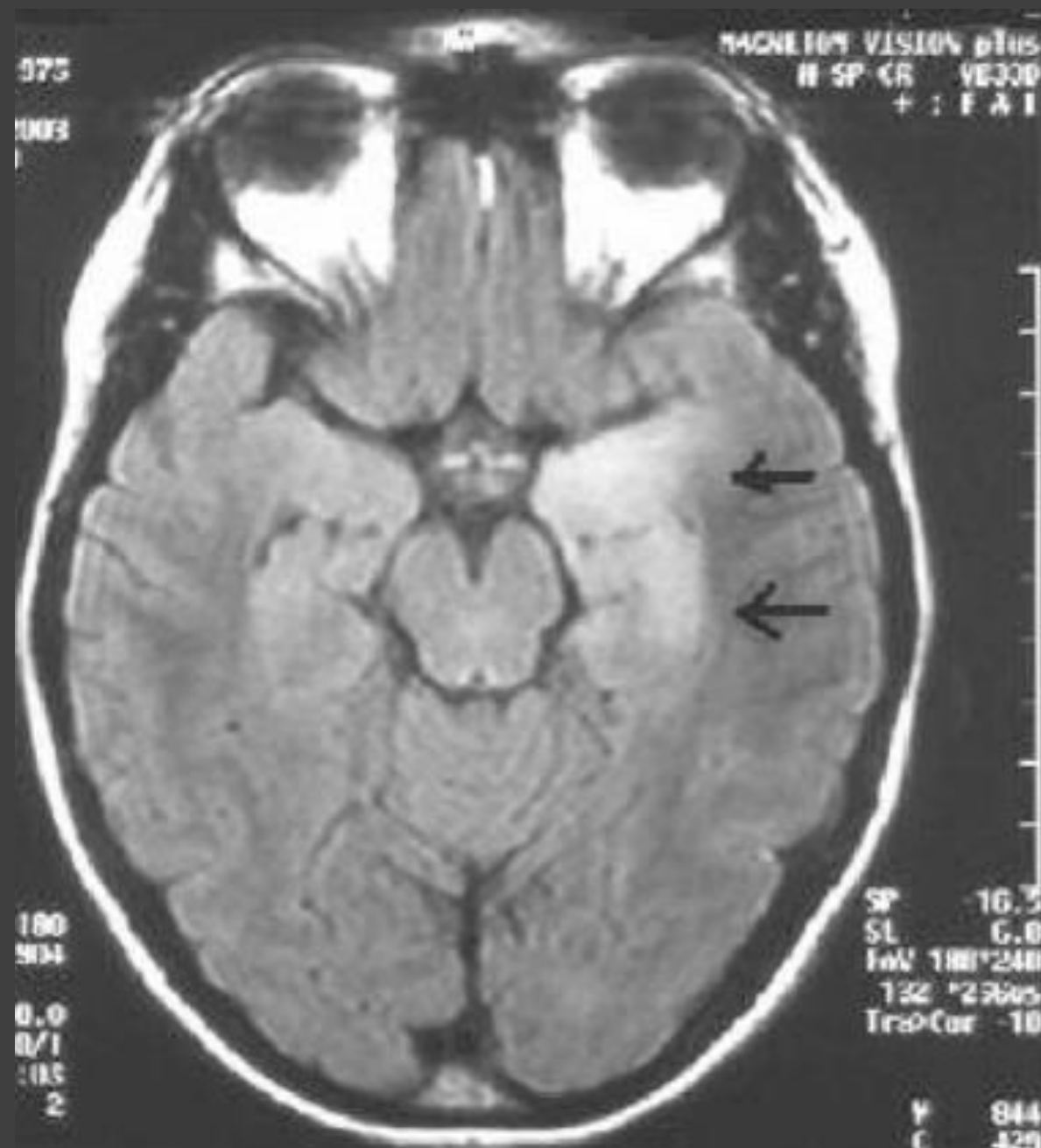


Case Study:

- 72 male
 - 'Confused'
 - Normal cognition
 - Dental Pain
 - Sodium 129
-
- Delirium secondary to hyponatremia due to dehydration and thiazide diuretics admit for rehydration

Collateral from wife

- 2 week history of 'confusion'
- At a family event, unable to recognise the faces of his grandchildren
- On day of admission, was unable to recognise car
- Thought that letter box was a new and unusual invention
- Attention was normal, focus on history throughout
- Sleep wake cycle was normal
- Orientated
- No fluctuation
- 'Dental Pain' episode witness: decerebrate posturing noticed, focal seizure



REQUEZ LACIN
SE
01-JAN-1975
22:09
30-SEP-2003
IMAGE 39
SER 1-3
RF 1.27



DSM-5

- Disturbance of consciousness that affects the ability to focus sustain and shift **ATTENTION**
- Disturbance of **COGNITION** (e.g. memory deficit, disorientation, language disturbance, perceptual disturbance)
- Occurs over a short period of time and will **FLUCTUATE**
- A direct consequence of a general medical condition,



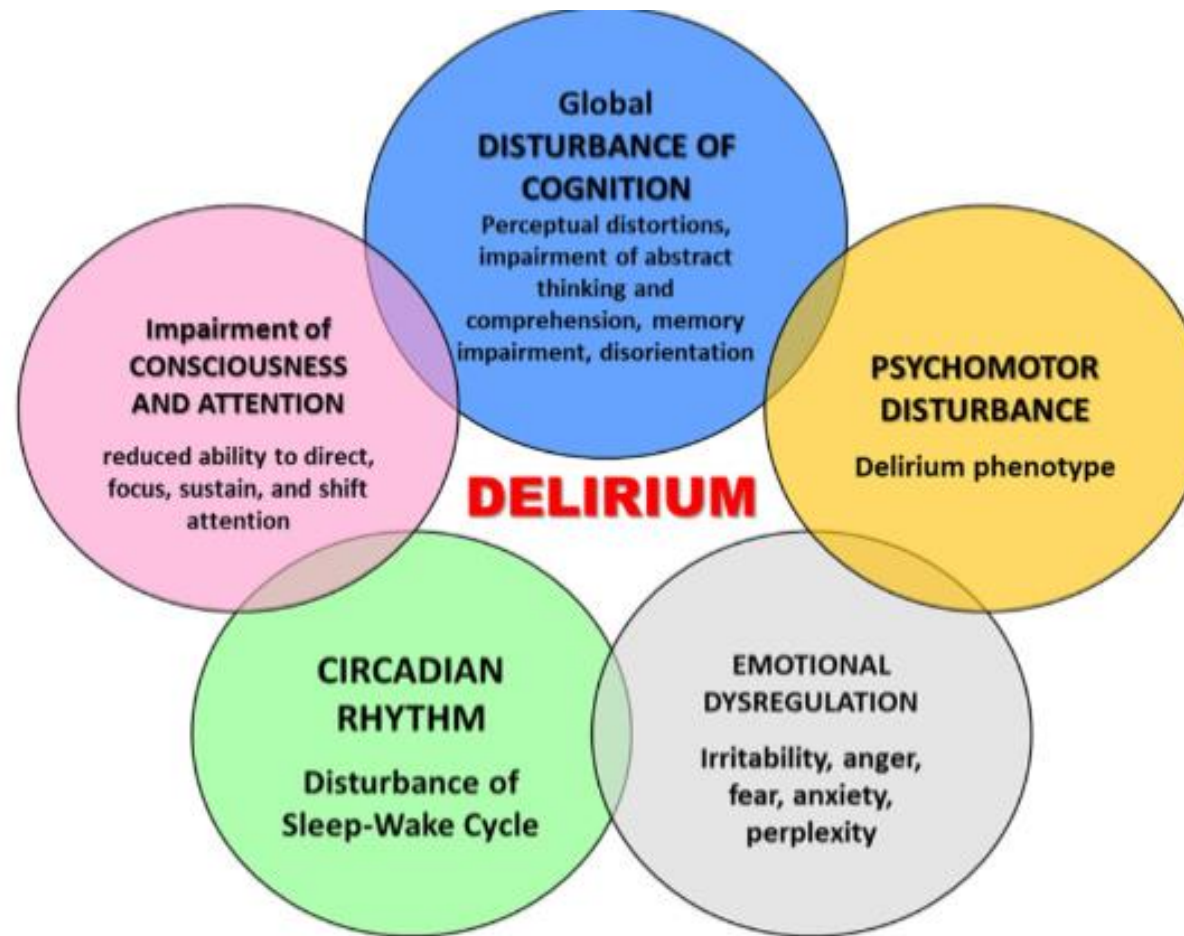


FIGURE 1 Delirium core domains. The phenomenon of delirium has 5 core domains: cognitive deficits (characterized by perceptual distortions, impairment in memory, abstract thinking and comprehension, executive dysfunction, and disorientation), attentional deficits (characterized by disturbances in consciousness and a reduced ability to direct, focus, sustain, and shift attention), circadian rhythm dysregulation (characterized by fragmentation of the sleep-wake cycle), emotional dysregulation (characterized by perplexity, fear, anxiety, irritability, and/or anger), and psychomotor dysregulation (which confers the various phenotypic presentations) [Colour figure can be viewed at wileyonlinelibrary.com]



Neurotransmitter Changes in Delirium

Acetylcholine	Arousal, Attention, Memory, Motivation
Dopamine	Reward, Motivation, Attention, Learning
Noradrenaline	Alertness, Vigilance, Restless, Anxious, Poor Focus
Glutamate	Excite
Serotonin	Emotional Processing, Sleep/wake
GABA	Inhibitory process, reduced unwanted movements



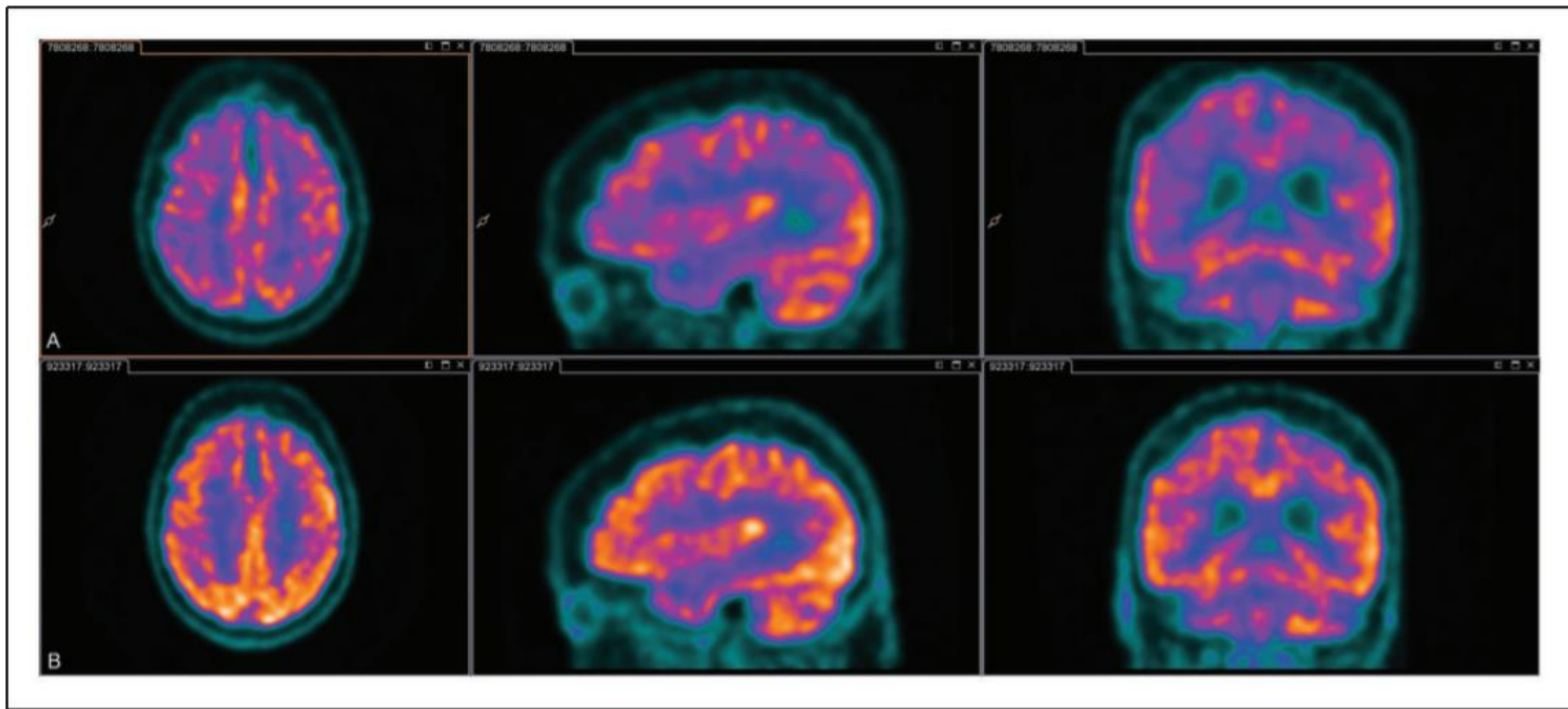
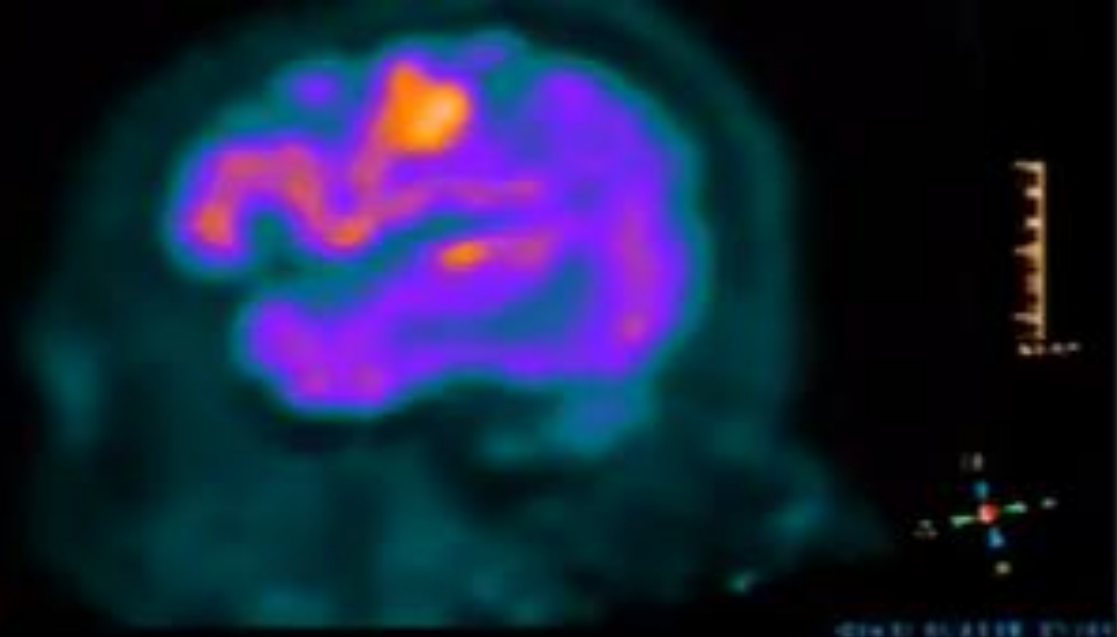
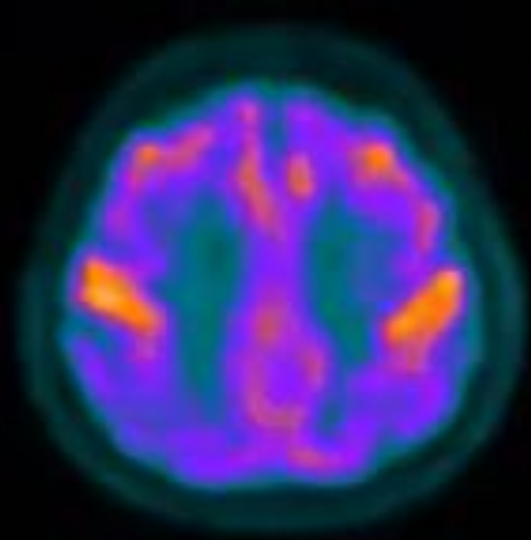
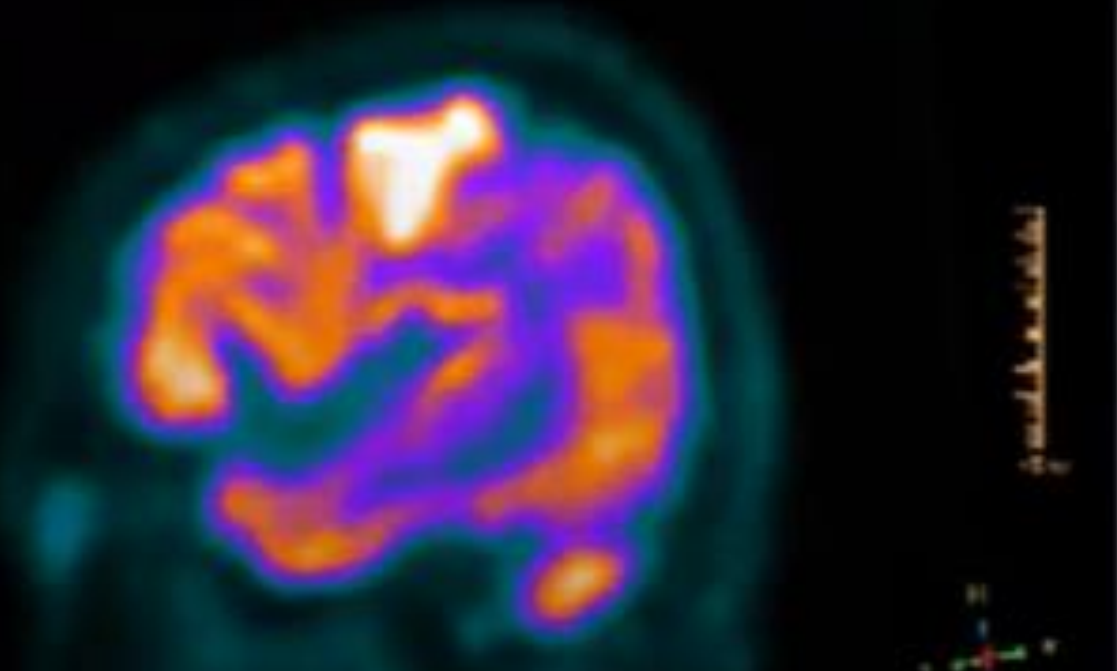
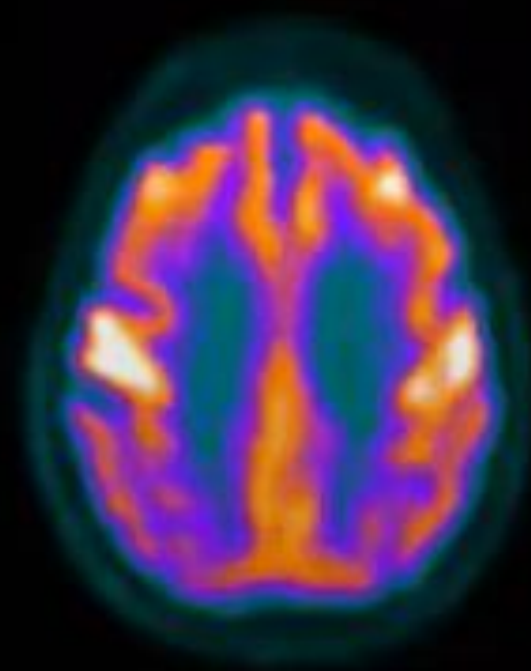


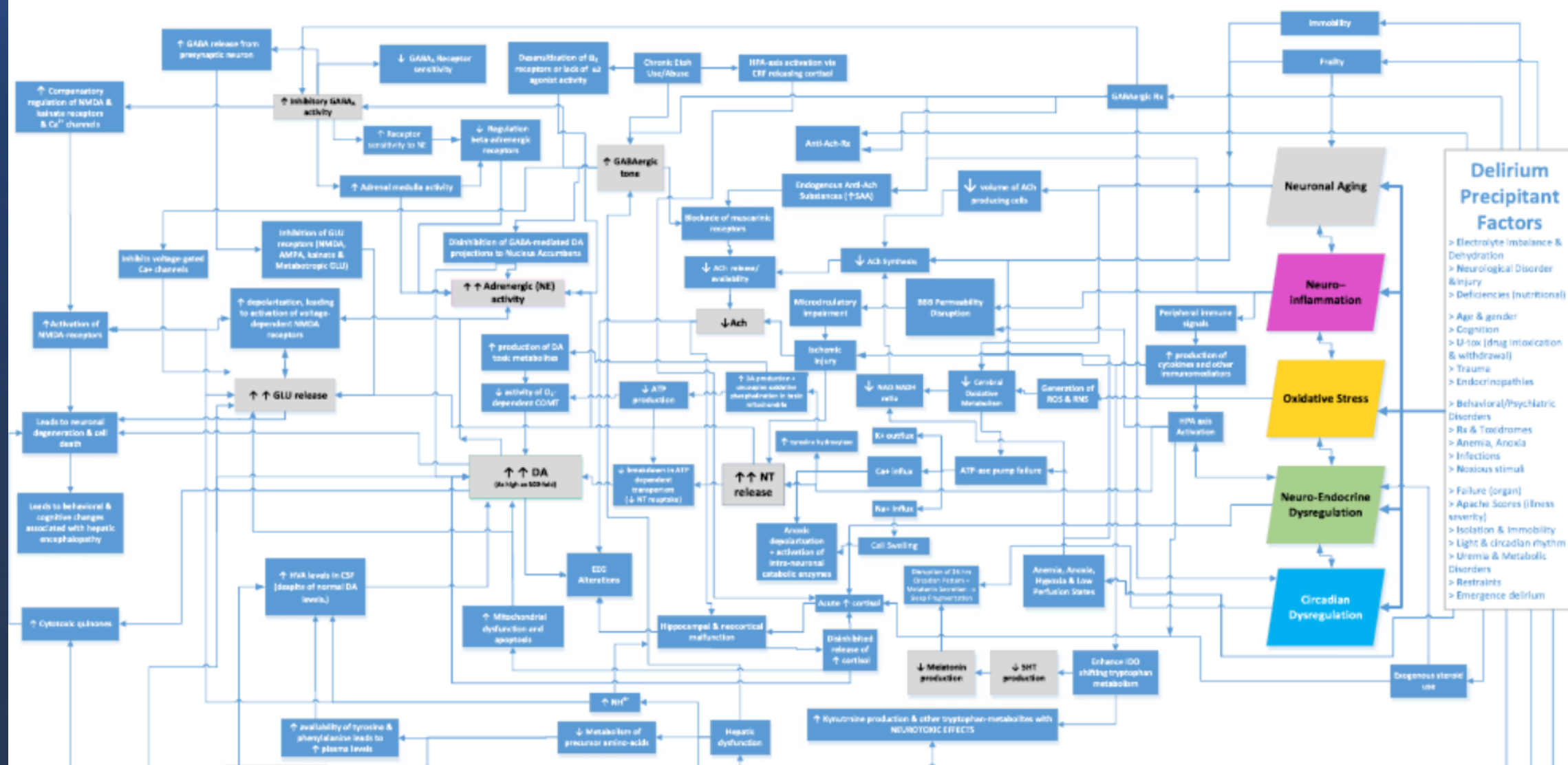
Figure 1. 2-¹⁸F-fluoro-2-deoxy-D-glucose positron emission tomography during and after delirium. Legend: The top row (a) is the delirium scan, while the bottom row (b) is the scan taken after delirium. Darker colours indicate lower metabolism. The top row illustrates marked global hypometabolism during delirium. The bottom row illustrates an overall improvement, but not normalisation,

Delirium



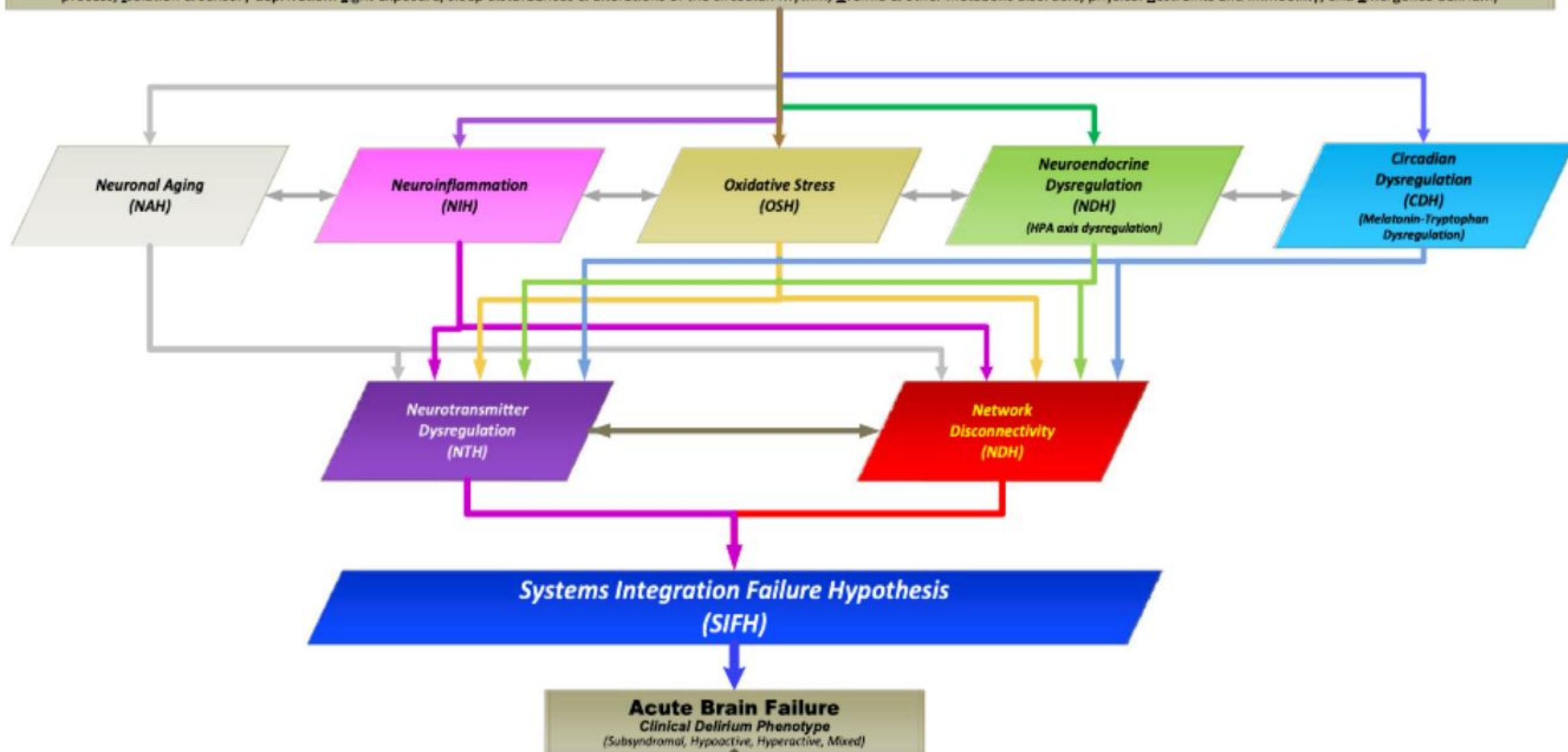
Post-delirium





Precipitants of Delirium – “End Acute Brain Failure”

[Electrolyte and fluid imbalance; Neurological disorders and injuries; (nutritional) Deficiencies; Age; baseline Cognitive functioning; U-tox or acute substance intoxication & withdrawal states; bodily Trauma & surgery; Endocrinopathies; Baseline psychiatric disorders; Rx or medications and various toxidromes; Anoxia or decreased oxygenation states; Infections; Noxious stimuli; (organ) Failure; Apache Score = severity of medical illness process; Isolation & sensory deprivation: Light exposure, sleep disturbances & alterations of the circadian rhythm; Uremia & other metabolic disorders; physical Restraints and immobility; and Emergence delirium)



Neuronal ageing

Neuronal Loss

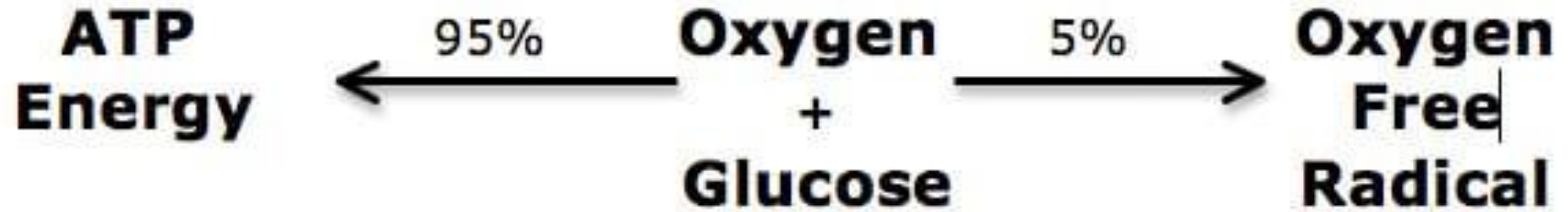
Age related decline in white matter integrity

Age related changes in cerebral blood flow

Age related changes in metabolic rate

‘Leaky’ blood brain barrier



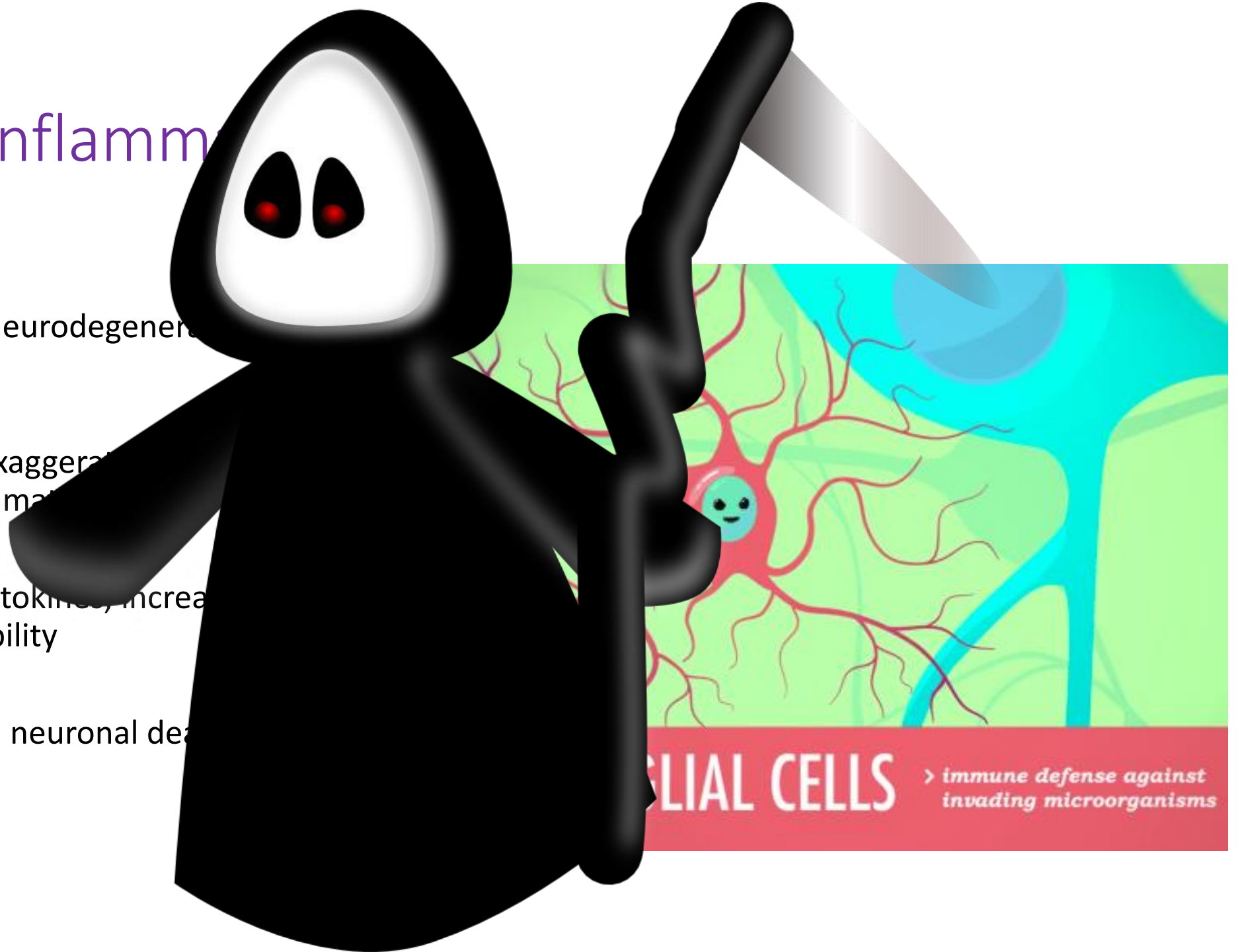


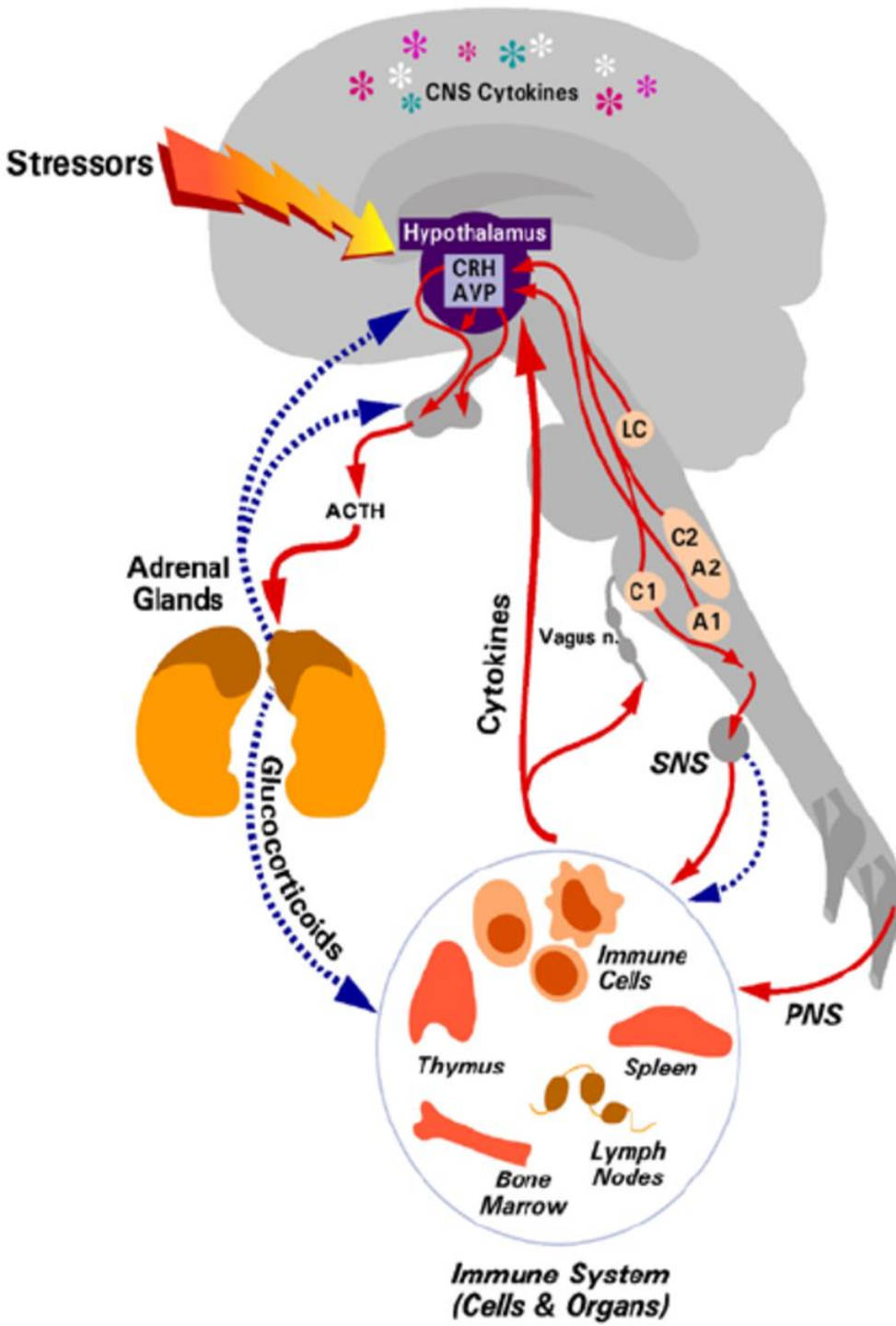
Oxidative stress

- Brain is a highly metabolic organ
- Also very delicate due to high lipid content in myelin
- Very little antioxidant capacity

Neuro-inflamm

- 'Primed' by neurodegenerative processes
- Triggers an exaggerated systemic inflammatory response
- Release of cytokines, increased vessel permeability
- Ischemia and neuronal death





Aberrant Stress Response

- Chronic activation of glucocorticoid receptors in the brain
 - This can inhibit glucose transport into neurons
 - Increase cytokine production
 - Exacerbate the breakdown of cytoskeleton proteins (TAU)
-
- Impairs the ability of neurons to survive after metabolic insults

Circadian Rhythm dysregulation

- Chronic sleep deprivation is a physiological stressor
- Increases inflammatory processes in the brain
- Increases evening cortisol
- Increases blood pressure
- Elevated insulin levels and blood glucose



PINCHME	Mechanism
Pain	Stress response Glucocorticoid release via (HPA) Multiple pathways to neuronal damage
Infection	'Leaky' Blood brain barrier Primed microglial cells Exaggerated inflammatory response
Nutrition	Direct: Lack of Glucose Indirect: Chronic physiological stress
Constipation	Pain (See above) Nutrition
Hydration, Hypo/hyper glycaemia Hypoxia	Impacts cerebral metabolism Oxidative stress
Medications	Anticholinergic medications Blood brain barrier Directly Toxic, Polypharmacy
Environment	Stress response Sleep/Wake



So what can I do?

Recognise at risk people:

Older

Dementia

Parkinson's Disease (plus other neurodegenerative diseases)

Insulin resistance

Sensory impairment

Frailty: Rockwood Frailty assessment CSF 5 or above

Plan:

Does this need done now? if not can I optimise the patient?

Is there a non-surgical alternative?

How can we optimise the anaesthetic event?

How can we reduce stress during the procedure?

Post Procedure

Highlight risk

Delirium Leaflet

Think about support network

Clinical Frailty Scale

 1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.	 7 Severely Frail – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).
 2 Well – People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.	 8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.
 3 Managing Well – People whose medical problems are well controlled, but are not regularly active beyond routine walking.	 9 Terminally Ill – Approaching the end of life. This category applies to people with a life expectancy <6 months, who are not otherwise evidently frail.
 4 Vulnerable – While not dependent on others for daily help, often symptoms limit activities. A common complaint is being "slowed up", and/or being tired during the day.	
 5 Mildly Frail – These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.	
 6 Moderately Frail – People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.	

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

I can
prevent
DELIRIUM

Multicomponent Prevention/Treatment of Delirium

SENATOR Project




*I can
prevent*
DELIRIUM

Screening for delirium

CIRCLE

[1] ALERTNESS

This includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. Observe the patient. If asleep, attempt to wake with speech or gentle touch on shoulder. Ask the patient to state their name and address to assist rating.

Normal (fully alert, but not agitated, throughout assessment)	0
Mild sleepiness for <10 seconds after waking, then normal	0
Clearly abnormal	4

[2] AMT4

Age, date of birth, place (name of the hospital or building), current year.

No mistakes	0
1 mistake	1
2 or more mistakes/untestable	2

[3] ATTENTION

*Ask the patient: "Please tell me the months of the year in backwards order, starting at December."
To assist initial understanding one prompt of "what is the month before December?" is permitted.*

Months of the year backwards	Achieves 7 months or more correctly	0
	Starts but scores <7 months / refuses to start	1
	Untestable (cannot start because unwell, drowsy, inattentive)	2

[4] ACUTE CHANGE OR FLUCTUATING COURSE

Evidence of significant change or fluctuation in: alertness, cognition, other mental function (eg. paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs

No	0
Yes	4

4 or above: possible delirium +/- cognitive impairment

1-3: possible cognitive impairment

0: delirium or severe cognitive impairment unlikely (but

delirium will usually be 4/4 AT information is essential

4AT SCORE

Resources

<https://madeinheene.hee.nhs.uk/PG-Dean/Faculty-of-Patient-Safety/Delirium-Project/Delirium-Resources>

Videos and patient information leaflets

<https://dementia-united.org.uk/delirium-toolkit-training-resources/>

Has translated patient information videos in 10 different languages

BGS website: [Delirium Hub | British Geriatrics Society](#)

SIGN 157

Risk reduction and
management of delirium

Delirium: diagnosis, prevention and management

Implementing NICE guidance

July 2010

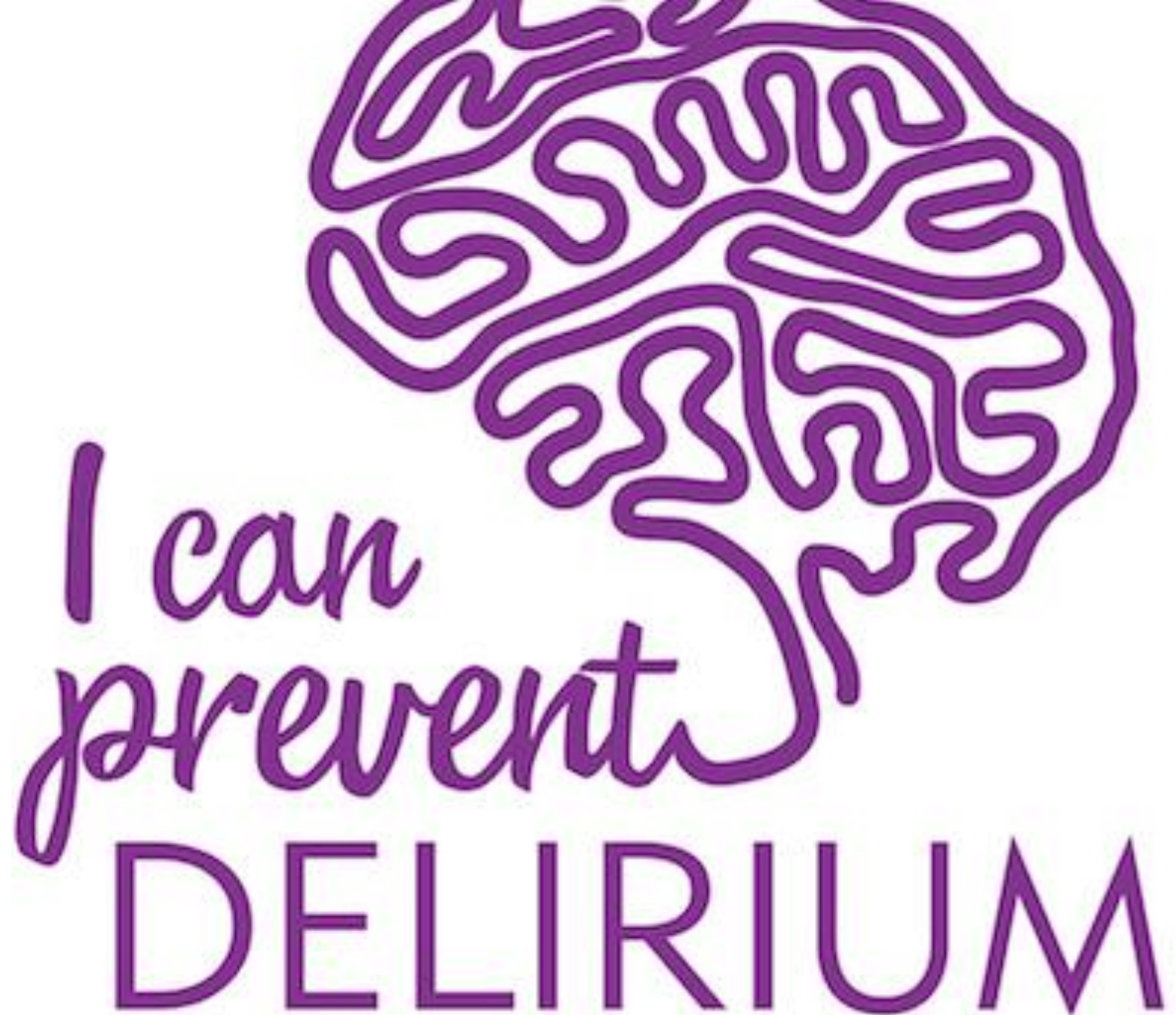
•NICE clinical guideline 103

A stylized graphic of a human brain composed of thick, purple, swirling lines that form the gyri and sulci of the brain.

I can
prevent
DELIRIUM

Summary

- Delirium is an acute brain failure
- It is important as it has a high risk of mortality causing cognitive decline and increases risk of institutional care
- Treatment is multimodal
- TELL THE GP!
- Post delirium review is important to support patients, screen for complications and screen for dementia



References/Resources

- Abraha I, Trotta F, Rimland JM, Cruz-Jentoft A, Lozano-Montoya I, Soiza RL, et al. Efficacy of Non-Pharmacological Interventions to Prevent and Treat Delirium in Older Patients: A Systematic Overview. The SENATOR project ONTOP Series. PLoS ONE. 2015;10(6):e0123090.
- Aung Thein, M.Z., Pereira, J.V., Nitchingham, A. *et al.* A call to action for delirium research: Meta-analysis and regression of delirium associated mortality. *BMC Geriatr* **20**, 325 (2020). <https://doi.org/10.1186/s12877-020-01723-4>
- Australian Government. (n.d.) Delirium care pathways retrieved from [https://www.health.gov.au/internet/main/publishing.nsf/Content/FA0452A24AED6A91CA257BF0001C976C/\\$File/D0537\(1009\)%20Delirium_combined%20SCREEN.pdf](https://www.health.gov.au/internet/main/publishing.nsf/Content/FA0452A24AED6A91CA257BF0001C976C/$File/D0537(1009)%20Delirium_combined%20SCREEN.pdf)
- Flacker JM, Lipsitz LA Neural mechanisms of delirium: current hypotheses and evolving concepts. *Flacker JM, Lipsitz LA J Gerontol A Biol Sci Med Sci.* 1999 Jun; 54(6):B239-46.
- MacLulich, A. M., Ferguson, K. J., Miller, T., de Rooij, S. E., & Cunningham, C. (2008). Unravelling the pathophysiology of delirium: a focus on the role of aberrant stress responses. *Journal of psychosomatic research*, 65(3), 229–238. doi:10.1016/j.jpsychores.2008.05.019
- Maldonado, J. R. (2018). Delirium pathophysiology: An updated hypothesis of the etiology of acute brain failure. *International journal of geriatric psychiatry*, 33(11), 1428-1457.
- NICE (2010) Delirium: prevention, diagnosis and management. Retrieved from <https://www.nice.org.uk/guidance/CG103/chapter/1-Guidance#interventions-to-prevent-delirium>
- Salluh, J. I., Wang, H., Schneider, E. B., Nagaraja, N., Yenokyan, G., Damluji, A., ... & Stevens, R. D. (2015). Outcome of delirium in critically ill patients: systematic review and meta-analysis. *bmj*, 350, h2538.
- SIGN guideline 157 (2019). Delirium retrieved from <https://www.sign.ac.uk/sign-157-delirium.html>
- Trzepacz P, van der Mast R. The neuropathophysiology of delirium. In: Lindsay J, Rockwood K, Macdonald A, editors. *Delirium in Old Age*. Oxford University Press; Oxford: 2002. pp. 51–90.
- Witlox J, Eurelings LS, de Jonghe JF, et al. Delirium in elderly patients and the risk of post discharge mortality, institutionalization, and dementia: a meta-analysis. *JAMA* 2010;304:443-51
- Huang H, Li H, Zhang X, Shi G, Xu M, Ru X, Chen Y, Patel MB, Ely EW, Lin S, Zhang G, Zhou J. Association of postoperative delirium with cognitive outcomes: A meta-analysis. *J Clin Anesth.* 2021 Dec;75:110496. doi: 10.1016/j.jclinane.2021.110496. Epub 2021 Sep 2. PMID: 34482263.

Questions!