CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Common Illness and Conditions Associated in Elderly Neurological Disorders

FH JOANNEUM University of Applied Sciences
jamk University of Applied Sciences
SANTA MARIA HEALTH SCHOOL
UNIVERSIDADE DA CORUÑA

Co-funded by
the European Union

Intended Learning Outcomes

At the end of this lecture, students will be able to:

- understand the impact of aging on the nervous system.
- identify common neurological disorders in the elderly.
- discuss diagnostic and management strategies.
- recognize the role of physiotherapists in managing neurological conditions in aging populations.

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Introduction

- Aging is associated with progressive neurodegenerative and cerebrovascular changes.
- Neurological disorders are a major contributor to disability-adjusted life years (DALYs) in elderly (GBD 2019 Ageing Collaborators, 2022)
- It estimates ~9 million deaths annually are linked to neurological disorders (Ding et al., 2022).
- Elders with more than 3 abnormal neurological signs have increased mortality (Intzitari et al. 2008).
- Increasing numbers of neurological signs are associated with higher rates of falls and functional impairment (Ferrucci et al. 2004).

- GBD 2019 Ageing Collaborators, 2022. Global, regional, and national burden of diseases and injuries for adults 70 years and older: systematic analysis for the Global Burden of Disease 2019 Study. *BMJ*, *376*.
- Ding, C., Wu, Y., Chen, X., Chen, Y., Wu, Z., Lin, Z., Kang, D., Fang, W. and Chen, F., 2022. Global, regional, and national burden and attributable risk factors of neurological disorders: The Global Burden of Disease study 1990–2019. *Frontiers in public health*, *10*, p.952161.
- Inzitari M, Pozzi C, Ferrucci L, et al. Subtle neurological abnormalities as risk factors for cognitive and functional decline, cerebrovascular events, and mortality in older community-dwelling adults. Arch Intern Med. 2008;168:1270–6. doi: 10.1001/archinte.168.12.1270.
- Ferrucci L, Bandinelli S, Cavazzini C, et al. Neurological examination findings to predict limitations in mobility and falls in older persons without a history of neurological disease. Am J Med. 2004;116:807–15. doi: 10.1016/j.amjmed.2004.01.010.

FH JOANNEUM University of Applied Sciences · jamk University of Applied Sciences · SANTA MARIA HEALTH SCHOOL · UNIVERSIDADE DA CORUÑA

Co-funded by
the European Union

Introduction-Contd.

- Worldwide, in 2016

  - more than 80 million stroke survivors in the world

  - 43.8 million people with dementia

  - 45.9 million patients with an active epilepsy

  - 6.1 million individuals with Parkinson's disease (Dumurgier and Tzourio., 2020)

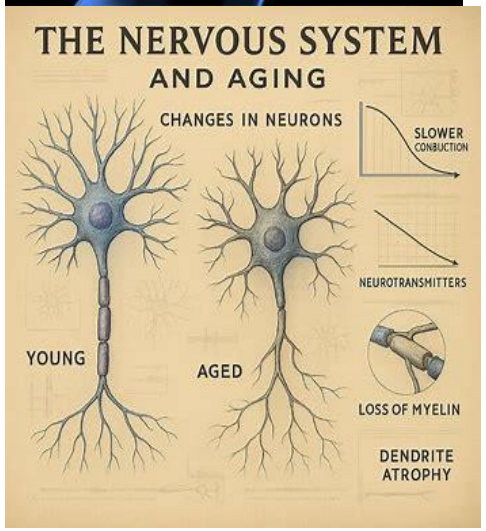
Dumurgier, J. and Tzourio, C., 2020. Epidemiology of neurological diseases in older adults. *Revue neurologique*, *176*(9), pp.642-648.

Co-funded by
the European Union

Neurological Changes with Aging

- Loss of neurons, particularly in cerebral cortex and hippocampus.
- Decrease in neurotransmitter levels.
- Decline in neuroplasticity and cognitive reserve.
- Slower nerve conduction velocity.
- Brain atrophy.

(Lee and Kim, 2022; Raz et al., 2005; Svennerholm, Boström, Jungbjer, 1997; Yankner et al., 2008)



CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Aging Process in the Brain

frontiers | Frontiers in Aging Neuroscience

REVIEW
published: 30 June 2022
doi: 10.3389/fnagi.2022.931536

Normal Aging Induces Changes in the Brain and Neurodegeneration Progress: Review of the Structural, Biochemical, Metabolic, Cellular, and Molecular Changes

Jiseon Lee and Hee-Jin Kim

Department of Neurology, Hanyang University Hospital, Seoul, South Korea

Aging is accompanied by many changes in brain and contributes to progressive cognitive decline. In contrast to pathological changes in brain, normal aging brain changes have relatively mild but important changes in structural, biochemical and molecular level. Representatively, aging associated brain changes include atrophy of tissues, alteration in neurotransmitters and damage accumulation in cellular environment. These effects have causative link with age associated changes which ultimately results in cognitive decline. Although several evidences were found in normal aging changes of brain, it is not clearly integrated. Figuring out aging related changes

OPEN ACCESS

Edited by:
Suzana Makpol,
Hospital Chancellor Tuanku Muhriz,

https://pmc.ncbi.nlm.nih.gov/articles/PMC9281621/

FH JOANNEUM University of Applied Sciences · jamk University of Applied Sciences · SANTA MARIA HEALTH SCHOOL · UNIVERSIDADE DA CORUÑA

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Classification of Neurological Disorders in Older Adults (ICD-10)

According to the International Classification of Diseases, 10th revision (ICD-10):

1. Inflammatory diseases of the CNS
2. Systemic atrophies primarily affecting the CNS
3. Extrapyramidal and movement disorders
4. Other degenerative diseases of the nervous system
5. Demyelinating diseases of the CNS
6. Episodic and paroxysmal disorders
7. Nerve, nerve root, and plexus disorders
8. Polyneuropathies and other disorders of the PNS
9. Diseases of the myoneural junction and muscles
10. Cerebral palsy and other paralytic syndromes
11. Other disorders of the nervous system

https://icd.who.int/browse10/2019/en#/VI

FH JOANNEUM University of Applied Sciences | jamk University of Applied Sciences | SANTA MARIA HEALTH SCHOOL | UNIVERSIDADE DA CORUÑA

Co-funded by
the European Union

Common Neurological Disorders in Elderly

- Dementia and associated conditions
- Alzheimer's Disease
- Parkinsons' Disease
- Stroke
- Peripheral Neuropathy
- Epilepsy
- Multiple Sclerosis

Co-funded by
the European Union

Dementia and Associated Disease

- Progressive neurodegenerative disorder.
- Leads to a wide range of symptoms depending on area of the brain affected.
- These include many conditions, such as

  -Alzheimer's disease

  -frontotemporal dementia

  -chronic traumatic encephalopathy (CTE)

  - Lewy body dementia

  - limbic predominant age-related TDP-43 encephalopathy (LATE)

Co-funded by
the European Union

Alzheimer's Disease

- Progressive neurodegenerative disorder affecting memory and cognition.
- Alzheimer's disease pathology involves:
  - amyloid plaques
  - tau tangles
  - neuronal loss
  - synaptic failure
  - brain atrophy

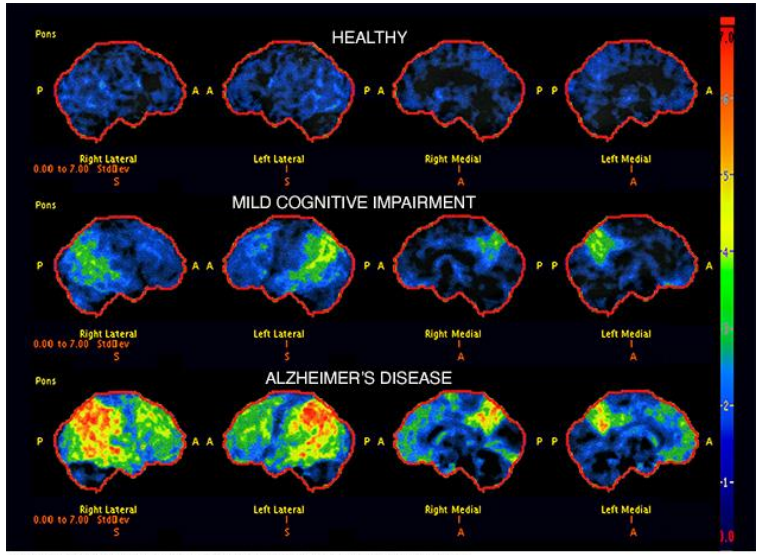
Source: https://health.gov.ag/elementor-15906/

Co-funded by
the European Union

Alzheimer's Disease-Contd.

- **Diagnosis:** MMSE, MoCA, MRI, CSF biomarkers.
- **Management:**

- cholinesterase inhibitors
- cognitive therapy
- caregiver support

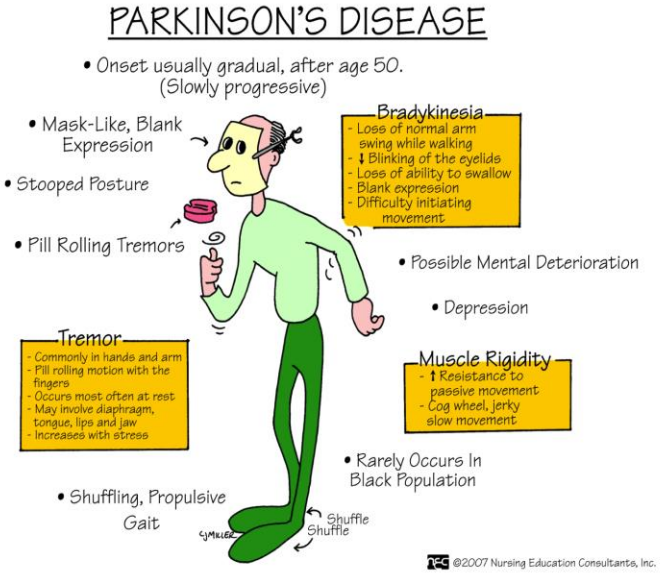


Source: https://www.mayoclinic.org/diseases-conditions/alzheimers-disease/multimedia/img-20543518?utm_source=chatgpt.com

Parkinson's Disease

- A neurological syndrome characterized by tremor, hypokinesia, rigidity and postural instability.
- Occur due to dopamine deficiency in substantia nigra.

Source: https://www.patientsengage.com/conditions/parkinsons-disease-shaking-palsy?page=8



Co-funded by
the European Union

Parkinson's Disease-Contd.

- **Diagnosis:** Clinical criteria
- **Management:**

  -levodopa

  -dopamine agonists

  - physiotherapy

  - fall prevention

Co-funded by
the European Union

Stroke

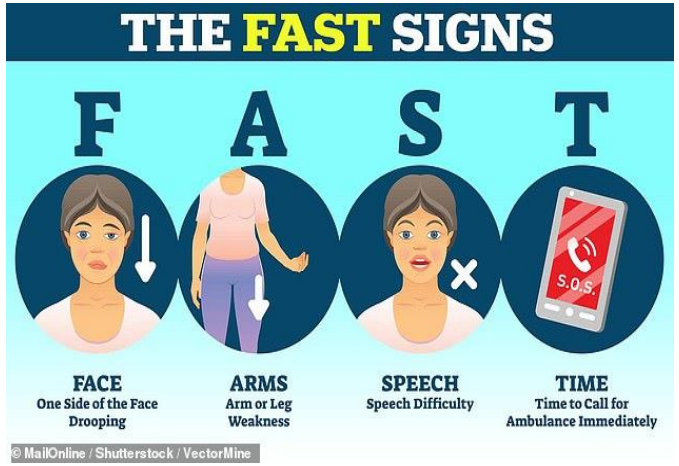
- A sudden neurological deficit caused by disruption of blood supply to the brain.
- Types: Ischemic (85%), Hemorrhagic (15%).

-Ischemic: Thrombus/embolus blocks artery → infarction

-Hemorrhagic: Vessel rupture → bleeding → ↑ICP and ischemia

- **Symptoms:** Hemiplegia, aphasia, facial droop, visual deficits.
- **Diagnosis:** CT/MRI, NIH Stroke Scale, carotid doppler

Stroke-Contd.



Source: https://www.dailymail.co.uk/health/article-14037607/warning-life-threatening-signs-stroke-easily-missed.html

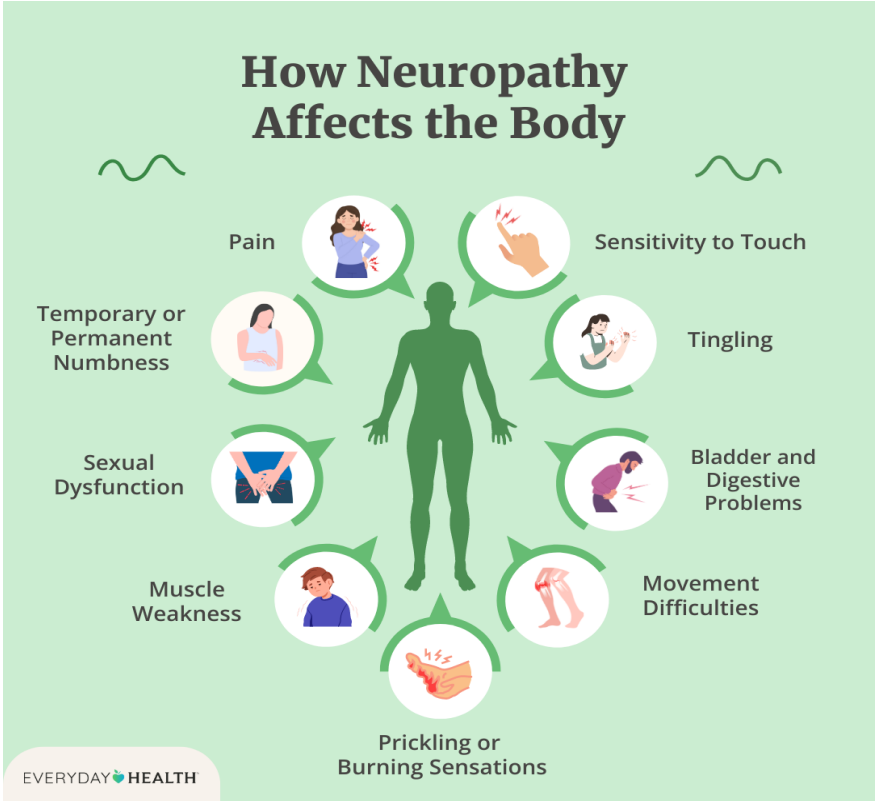
Management:

- Ischemic: IV thrombolysis (within 4.5h), thrombectomy
- Hemorrhagic: BP control, possible surgery
- Supportive care: fluids, O2, antiplatelets, anticoagulants
- Physiotherapy and occupational therapy

Peripheral Neuropathy

- Peripheral nerve damage causing sensory/motor symptoms.
- Caused by: Diabetes, B12 deficiency, alcohol, cancer.

Source: https://www.everydayhealth.com/neuropathy/guide/symptoms/



Co-funded by
the European Union

Peripheral Neuropathy-Contd.

- Diagnosis: NCS/EMG
- Management:

- Pain control
- Physiotherapy
- Occupational therapy
- Psychological support

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Epilepsy in Older Adults

- It is characterized by recurrent, unprovoked seizures due to abnormal neuronal discharges in the brain.
- Patient experiences recurrent unprovoked seizures
- People over 65 years of age have the highest incidence of epilepsy (Lee, S K. 2019).
- Often subtle and atypical compared to younger patients.
- Focal seizures more common than generalized.

Lee, S.K., 2019. Epilepsy in the elderly: treatment and consideration of comorbid diseases. *Journal of epilepsy research*, *9*(1), p.27

FH JOANNEUM University of Applied Sciences · jamk University of Applied Sciences · SANTA MARIA HEALTH SCHOOL · UNIVERSIDADE DA CORUÑA

Co-funded by
the European Union

Epilepsy in Older Adults-Contd.

Etiology in the Elderly

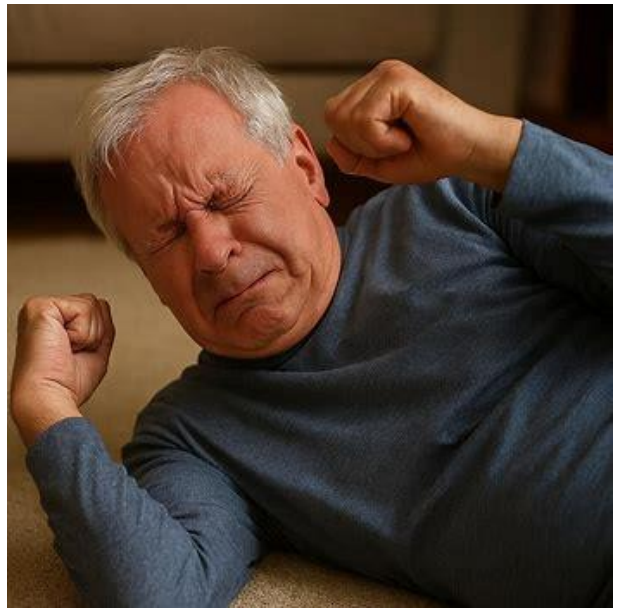
- Cerebrovascular disease (stroke) → most common cause.
- Neurodegenerative disorders: Alzheimer's, dementia with Lewy bodies.
- Brain tumors.
- Traumatic brain injury.
- Metabolic/toxic causes: Electrolyte imbalance, medications, alcohol withdrawal.
- Idiopathic/cryptogenic in some cases.

Co-funded by
the European Union

Epilepsy in Older Adults-Contd.

Clinical Features in Older Adults:

- Brief confusion or staring spells
- Memory lapses
- Speech arrest
- Involuntary automatisms (lip smacking, fumbling)
- Falls without clear convulsions
- Postictal confusion may mimic dementia or delirium.



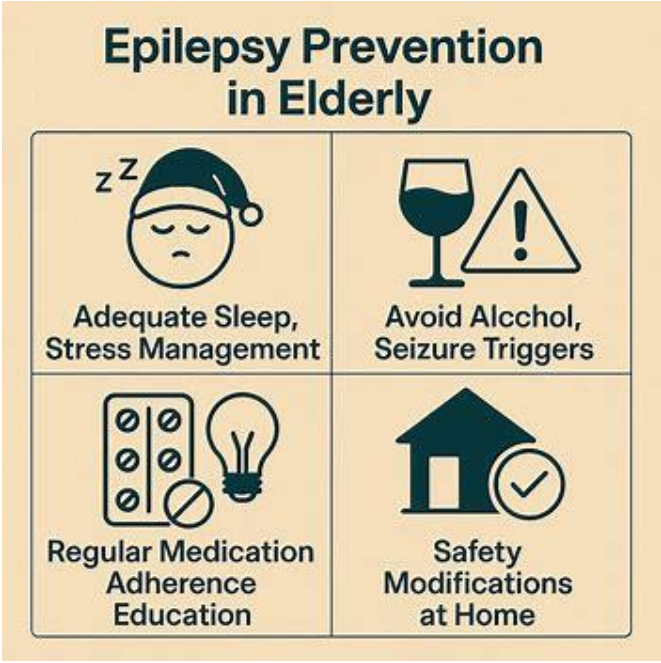
Source: AI-generated image of elderly created using ChatGPT (OpenAI, 2025).

Epilepsy in Older Adults-Contd.

Diagnosis: History, EEG, Neuroimaging (MRI)

Management

- pharmacological Mx
- nonpharmacological Mx
- Physiotherapy Mx



Source: AI-generated image of epilepsy in elderly created using ChatGPT (OpenAI, 2025).

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Diagnostic Tools used in common Neurological Disorders Older Adults

- Cognitive Tests: MMSE, MoCA
- Imaging: MRI, CT, PET
- EEG, lab workup (B12, TSH, glucose, etc.)
- Functional tests: TUG, Berg Balance, 6MWT

Source: AI-generated image of elderly created using ChatGPT (OpenAI, 2025).

FH JOANNEUM University of Applied Sciences · jamk University of Applied Sciences · Santa Maria Health School · Universidade da Coruña

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Role of Physiotherapy in management of common Neurological Disorders in Older Adults

- Promote neuroplasticity
- Improve the postural awareness
- Cognitive stimulation
- Gait and balance training
- Enhance quality of life and functional independence
- Fall prevention
- Improve sensation and proprioception
- Prevent deformities and injury
- Strength and endurance rehab
- Assistive device prescription
- Training caregivers
- Community re-integration

FH JOANNEUM University of Applied Sciences
jamk University of Applied Sciences
SANTA MARIA HEALTH SCHOOL
UNIVERSIDADE DA CORUÑA

Co-funded by
the European Union

Multidisciplinary Management

Source: AI-generated image created using Bing.AI (OpenAI, 2025).

Co-funded by
the European Union

Summary

- Neurological disorders are common and impactful in aging.
- Early recognition and interdisciplinary care are vital.
- Physiotherapy improves outcomes and independence.
- Preventive strategies can slow progression.

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

References

- GBD 2019 Ageing Collaborators, 2022. Global, regional, and national burden of diseases and injuries for adults 70 years and older: systematic analysis for the Global Burden of Disease 2019 Study. *BMJ*, *376*.
- Ding, C., Wu, Y., Chen, X., Chen, Y., Wu, Z., Lin, Z., Kang, D., Fang, W. and Chen, F., 2022. Global, regional, and national burden and attributable risk factors of neurological disorders: The Global Burden of Disease study 1990–2019. *Frontiers in public health*, *10*, p.952161.
- Dumurgier, J. and Tzourio, C., 2020. Epidemiology of neurological diseases in older adults. *Revue neurologique*, *176*(9), pp.642-648.
- Svennerholm L, Boström K, Jungbjer B. Changes in weight and compositions of major membrane components of human brain during the span of adult human life of Swedes. Acta neuropathologica. 1997 Sep 1;94(4):345-52.
- Lee J, Kim HJ. Normal Aging Induces Changes in the Brain and Neurodegeneration Progress: Review of the Structural, Biochemical, Metabolic, Cellular, and Molecular Changes. Front Aging Neurosci. 2022 Jun 30;14:931536. doi: 10.3389/fnagi.2022.931536. PMID: 35847660; PMCID: PMC9281621.
- World Health Organization, 2006. *Neurological disorders: public health challenges*. World Health Organization.

FH JOANNEUM University of Applied Sciences · jamk University of Applied Sciences · SANTA MARIA HEALTH SCHOOL · UNIVERSIDADE DA CORUÑA

CAPAGE
Capacity for Active Ageing

Co-funded by the European Union

Thank you

FH JOANNEUM University of Applied Sciences
jamk University of Applied Sciences
SANTA MARIA HEALTH SCHOOL
UNIVERSIDADE DA CORUÑA