Module 5311 (Special Needs Dentistry)

Neurodegenerative disease



15 Sep 2025
2-4 PM (WA Time)
Online

Dr David Lim

Lecturer, Dental School, UWA

BDS (SG), MSc SCD (UCL), PG Dip Con Sed D (KCL), GC Geront (SUSS), Dip ACEdu (SUSS), FiADH, MFTD MFDS RCSEd

Acknowledgements to
Dr Jee-Yun Leung
Ms Lee Yan Shan (Singapore General Hospital)
Dr Daniel Sundaresan
Associate Professor Mina Borromeo
Dr Mathew Lim
Dr Claudia Lopez Silva

UWA
PERTH · AUSTRALIA

Acknowledgement of Country

We acknowledge the Traditional Custodians of this land.
We acknowledge the waterways, the land, the sky and
all who inhabit this place, Country.
We acknowledge their ancestors, and Elders and
recognise those who continue to protect and promote
Aboriginal and Torres Strait Islander cultures.
We acknowledge the past and stand together
for our future.

Learning Objective

1. Understand the specific characteristics and dental needs of individuals with common neurodegenerative diseases (e.g.

2. epilepsy, cerebral palsy, acquired brain injury (stroke/ trauma), Parkinson's disease, motor neurone disease, multiple sclerosis, Huntington's disease, spina bifida, including

3. communication strategies, behavioural considerations, and appropriate treatment adaptations to ensure effective dental care

4. + dysphagia

Dysphagia

- Dysphagia is difficulty swallowing
  1. oropharyngeal dysphagia
  2. esophageal dysphagia
  3. functional dysphagia
- NOT DYSPHASIA

Death of woman, 73, who choked on ondeh-ondeh a tragic misadventure: Coroner

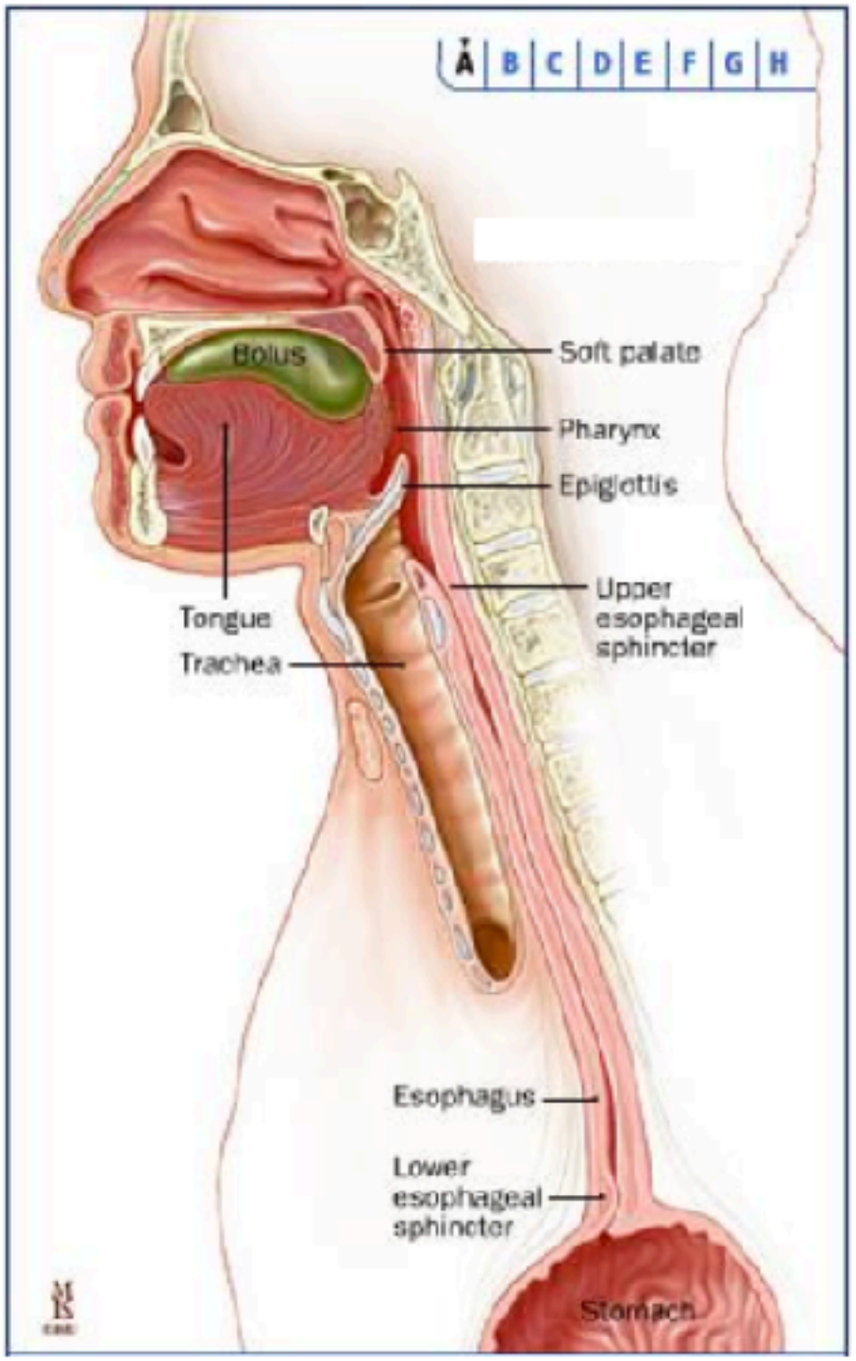


The death of a woman who died choking on ondeh-ondeh was found to be a tragic misadventure, the state coroner reported on Sept 6, 2016. PHOTO: ST FILE

Hospital patient dies after being given regular meals instead of soft diet



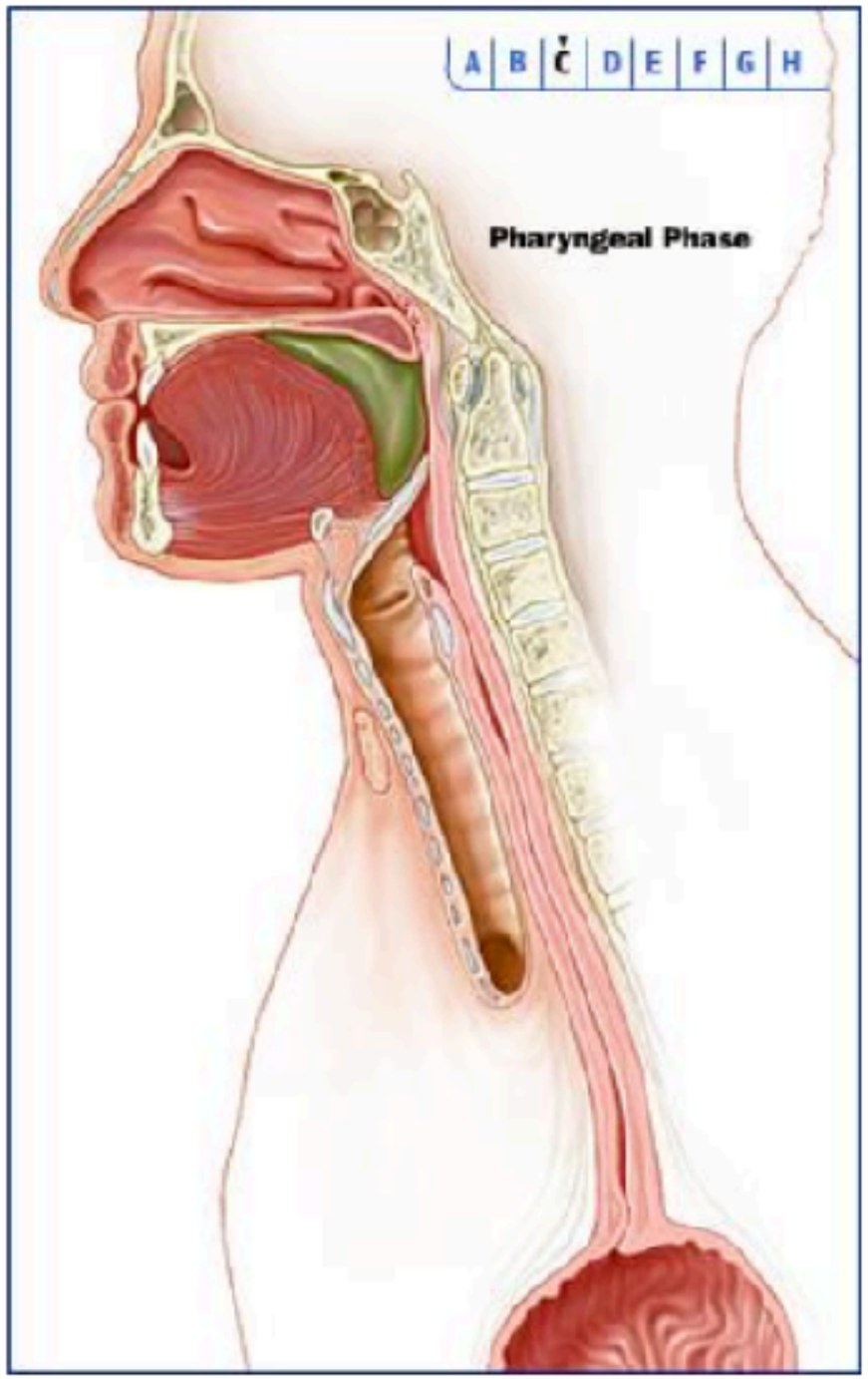
The death of Mr Simon Lee, who was warded in Ng Teng Fong General Hospital (pictured) in 2018, was ruled an unfortunate misadventure. PHOTO: ST FILE



Oral phase

- Tongue moves food around mouth
- Back of tongue raises to prevent premature spillage
- Teeth grinds and chews food
- Food moistened with saliva
- Cohesive bolus formed
- Tongue pushes it to back of pharynx

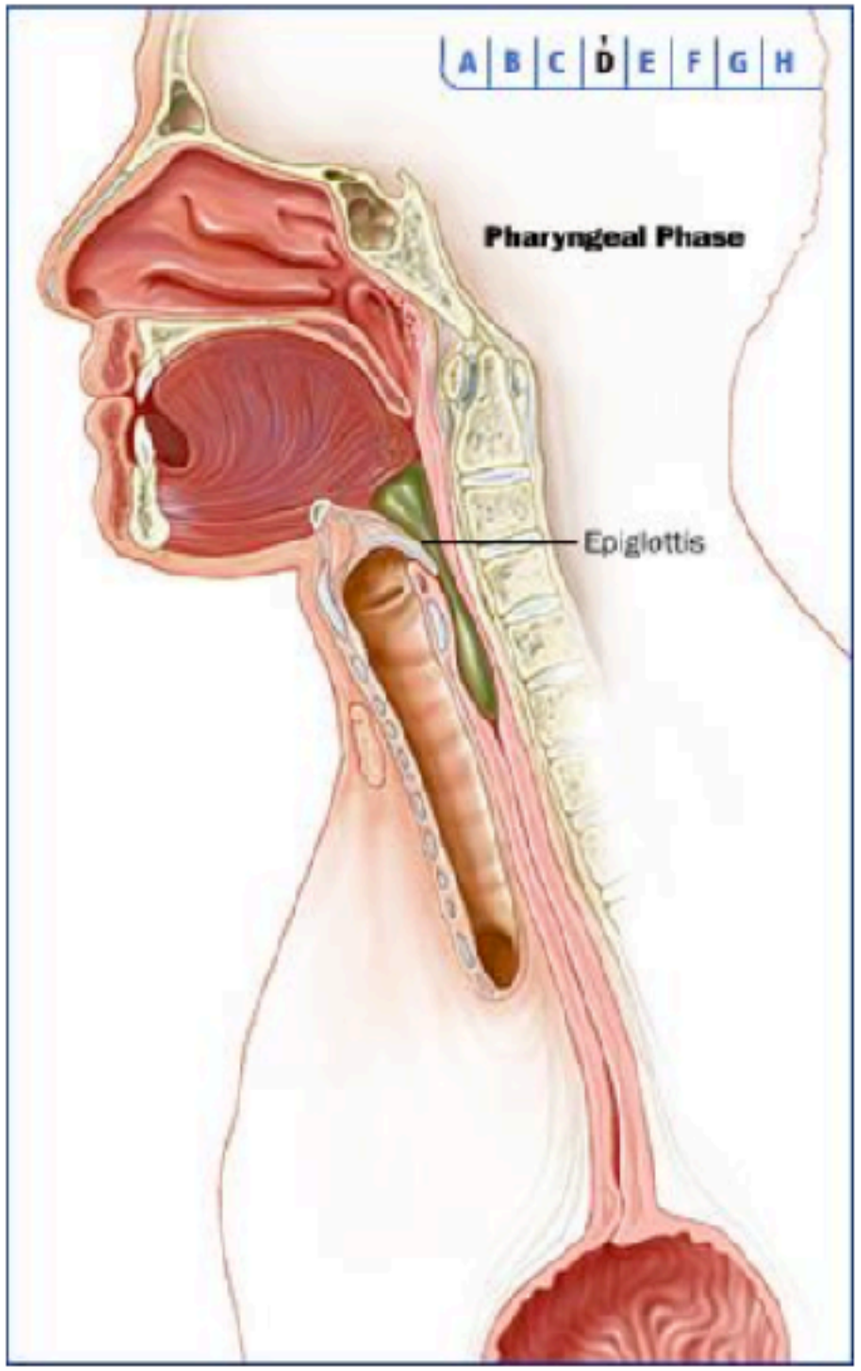
Singapore General Hospital



Pharyngeal phase

- Swallow reflex initiated
- Tongue blocks oral cavity
- Soft palate blocks nasal cavity
- Vocal folds close

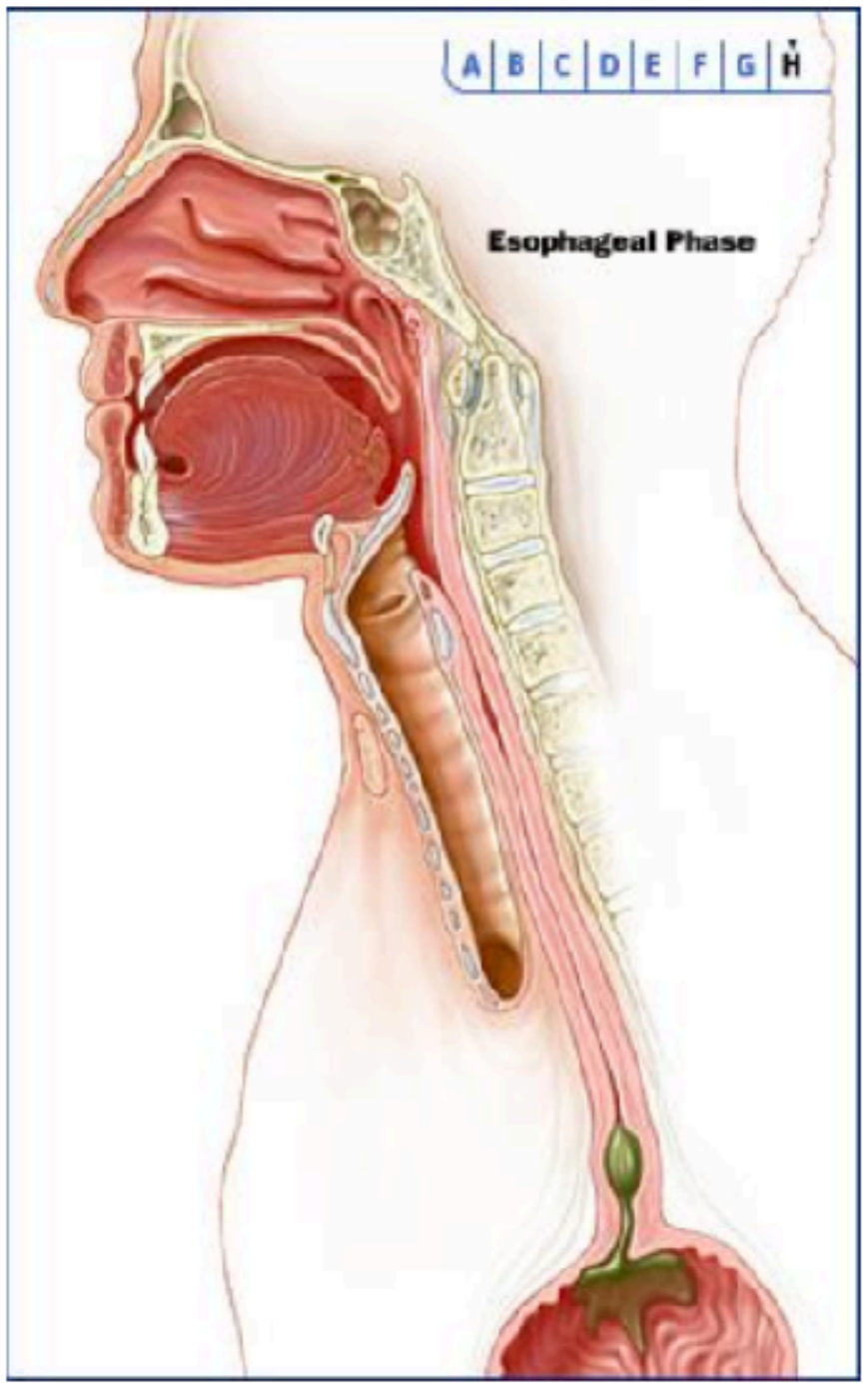
Singapore General Hospital



Pharyngeal phase

- Epiglottis flips over
- Upper esophageal sphincter opens

Singapore General Hospital



Esophageal phase

- Larynx moves back to original position
- Peristalsis

Singapore General Hospital

CAUSES OF DYSPHAGIA

MUSCULAR DISORDERS

Affects muscle strength

e.g. muscular dystrophy, myasthenia gravis

NEUROLOGICAL DISORDERS

Affects how the brain controls our swallow reflex and muscle movements

e.g. stroke, Parkinson's disease, Multiple sclerosis

REDUCED RESPIRATORY FUNCTION

Affects coordination between breathing and swallowing

e.g. COPD

AGEING / DECONDITIONING

Weakened muscles and/or impaired coordination

e.g. prolonged hospital stay

ANATOMICAL CHANGES

e.g. obstruction in the throat or esophagus due to cancer,

changes after surgery,

changes to teeth structure.

MEDICATION / TREATMENT EFFECTS

can cause dry mouth

e.g. Xerostomia post radiation

COGNITIVE CHANGES

Affects awareness of food and drinks during feeding

e.g. dementia, conditions affecting cognition

CONGENITAL & DEVELOPMENTAL ISSUES

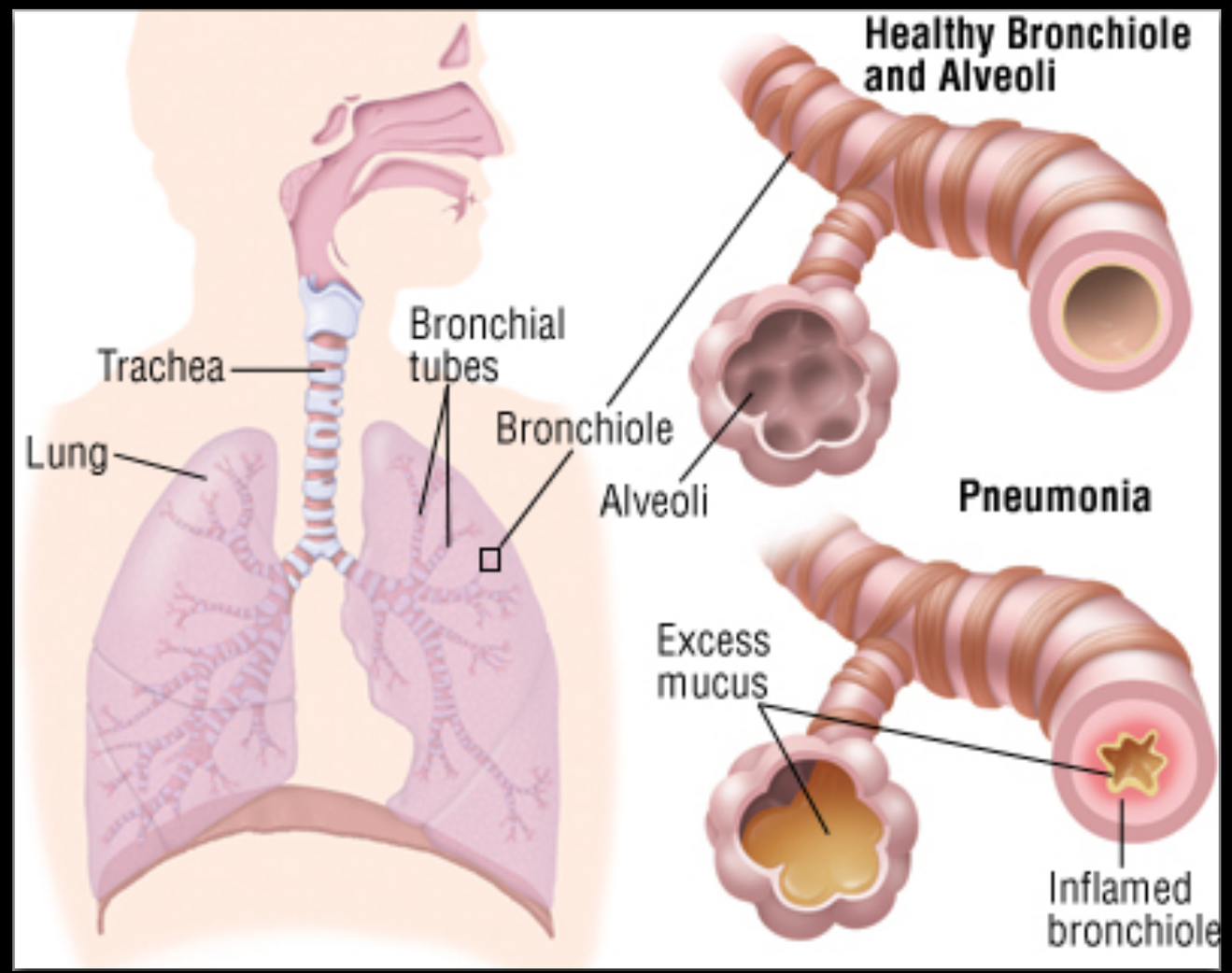
Affects anatomy, cognition and feeding posture

e.g. cerebral palsy, learning difficulties, cleft lip and palate

Dysphagia can result in

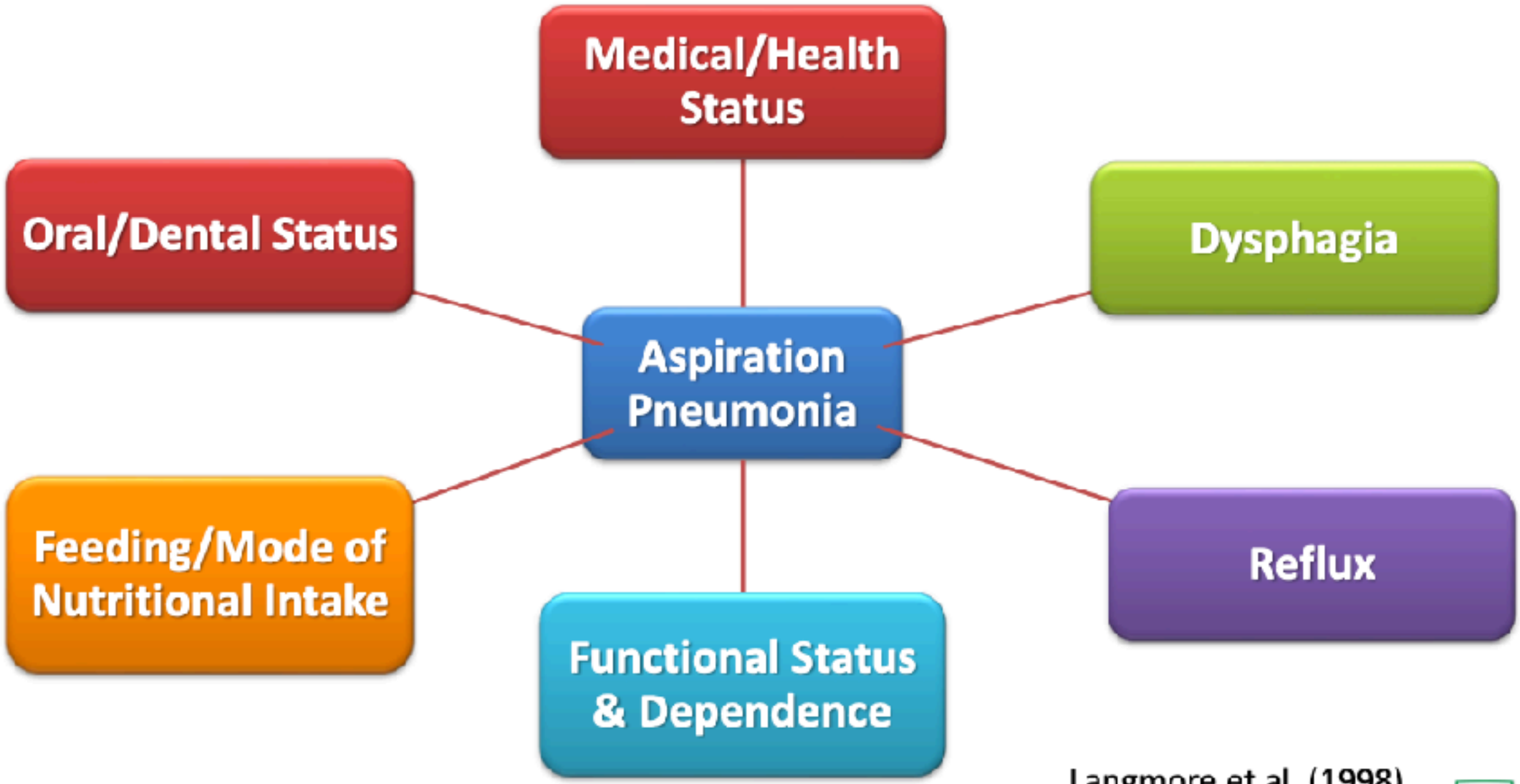
- Choking
- Aspiration
- Pneumonia

Mortality ~20%



Lim 2016, drugs.com

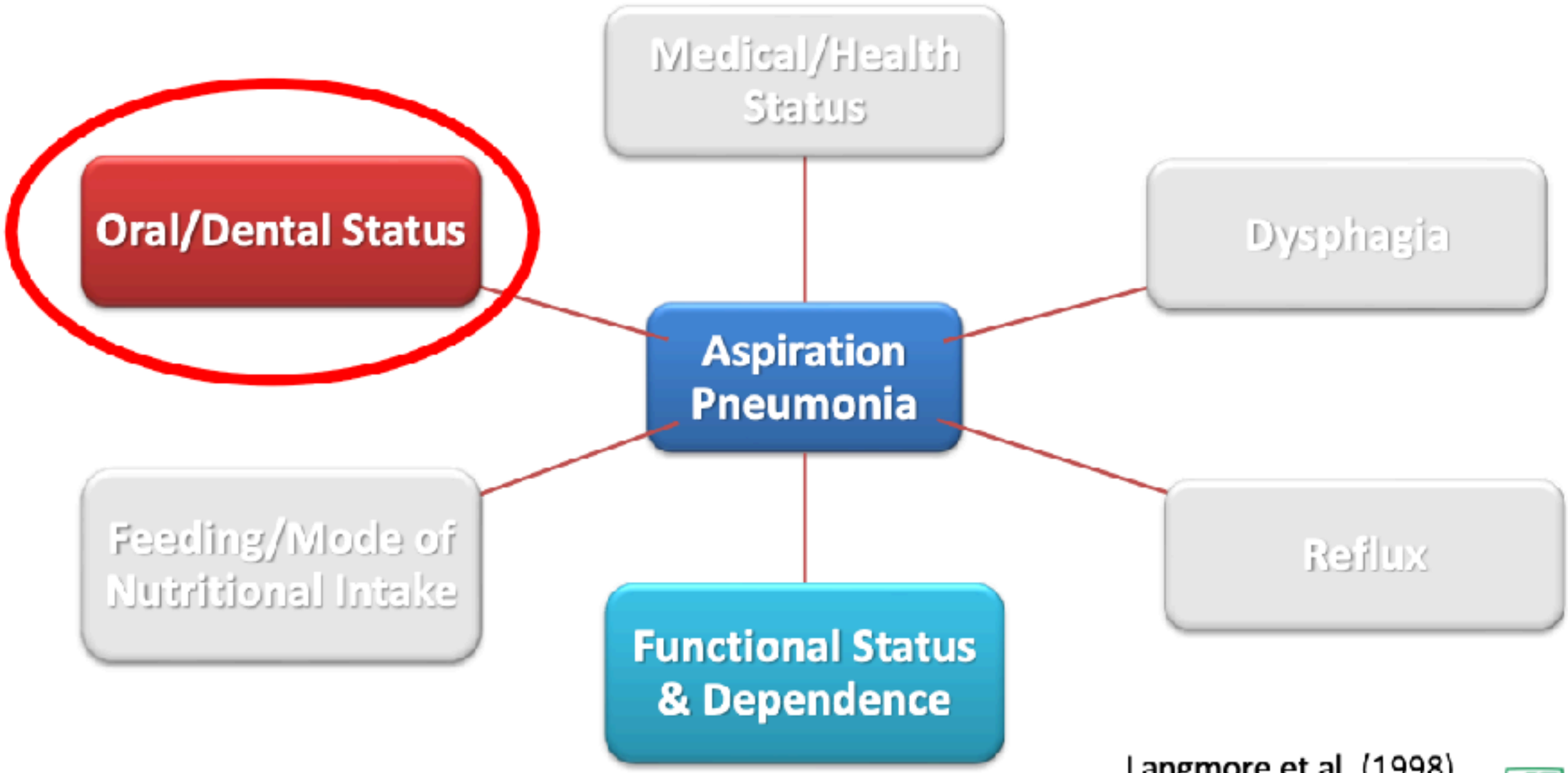
Causes of aspiration pneumonia



Langmore et al. (1998)

Singapore General Hospital

But… These are the strongest predictors of aspiration pneumonia



Langmore et al. (1998)

Singapore General Hospital

Dysphagia

Dental Management

- Oral hygiene against pneumonia
- Manage caries risk (as a result of dietary modifications)
- Prosthetic considerations



- 5 “R”s chair side



- Oral facial exercises/massages
- Seek help from Physician / SALT / OT

(Chung et al., 2014; Durham et al., 1993, Perez-Lloret et al., 2012; Sakar et al., 2013; Smith et all., 2012; Knipfer et al., 2014; www.kapitex.com)

Oral hygiene against pneumonia

Aspiration pneumonia/ ?Health care associated pneumonia

- Leading cause of death and hospitalisation in nursing homes
- Represents about 1% of Australian deaths

- Dysphagia recognised risk factor – insufficient as sole cause
- Also patients who are immobile, altered consciousness, comorbidities, increasing age
- Oral health may be a predictor of respiratory-related deaths

- Nocturnal denture wearing associated with 2.3 fold increase in risk
- Periodontal disease increases risk by 3.9 times
- Improved oral hygiene could prevent one in ten deaths

Respirology

ORIGINAL ARTICLE

Impact of aspiration pneumonia in patients with community-acquired pneumonia and healthcare-associated pneumonia: A multicenter retrospective cohort study

KOSAKU KOMIYA,[1,2] HIROSHI ISHII,[1] KENJI UMEKI,[1] SHUNJI MIZUNOE,[4] FUMITO OKADA,[2] TAKESHI JOHKOH[5] AND JUN-ICHI KADOTA[1]

[1]Internal Medicine 2 and [2]Radiology, Faculty of Medicine, Oita University, [3]Clinical Research Center of Respiratory Medicine, Tenshindo Hetsugi Hospital, [4]Respiratory Medicine, Oita Prefectural Hospital, Oita, and [5]Radiology, Kinki Central Hospital of Mutual Aid Association of Public School Teachers, Hyogo, Japan

ABSTRACT

Background and objective: **Aspiration pneumonia is one of the common presentations of community-acquired pneumonia (CAP) and healthcare-associated pneumonia (HCAP). However, its significance has not yet been fully evaluated due to the difficulties associated with the diagnosis of this condition. This study aimed to evaluate the impact of objectively defined aspiration pneumonia on patients' prognosis with CAP and HCAP.**

SUMMARY AT A GLANCE

Aspiration pneumonia, which is defined as having risk factors for aspiration and evidence of gravity-dependent opacities on CT, was strongly associated with mortality after adjusting for the category of pneumonia, performance status and treatment failure due to resistant pathogens.





Dry secretions on
palate of elderly patients



- Seek help from Physician / SALT / OT

- Oral hygiene against pneumonia



IDDSI framework

- International Diet Dysphagia Standardization Initiative
  https://iddsi.org/

- A global standard with descriptions and testing methods for texture-modified foods and fluids for people with dysphagia.



Management of impaired swallowing and oral implications

- Manage caries risk (as a result of dietary modifications)

Many of the strategies can increase risk of decay and periodontal disease

- Fortified diets and supplements
- Altered food texture
- Food thickeners
- Management of sialorrhea
- Crushed medications



INGREDIENTS

Maltodextrin (Corn, Potato), Thickener (Xanthan Gum), Mineral Salt (Potassium Chloride). **Made on equipment that also processes products containing Milk.**

Prosthetic considerations

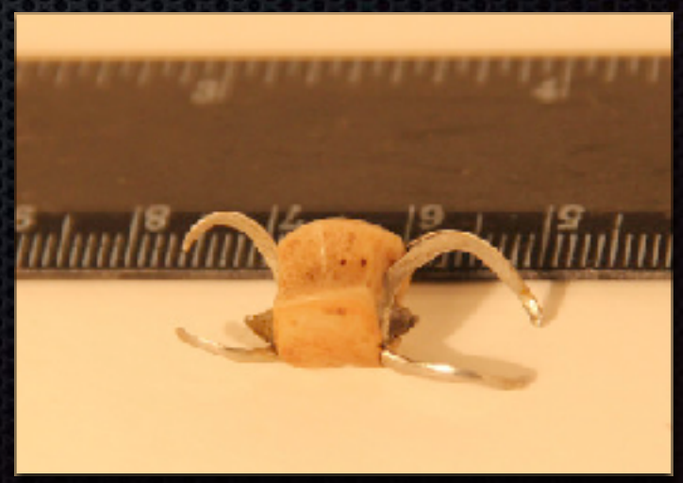




Loose dentures affect function

- **risk of ingestion & aspiration**
- speech
- mastication
- swallowing





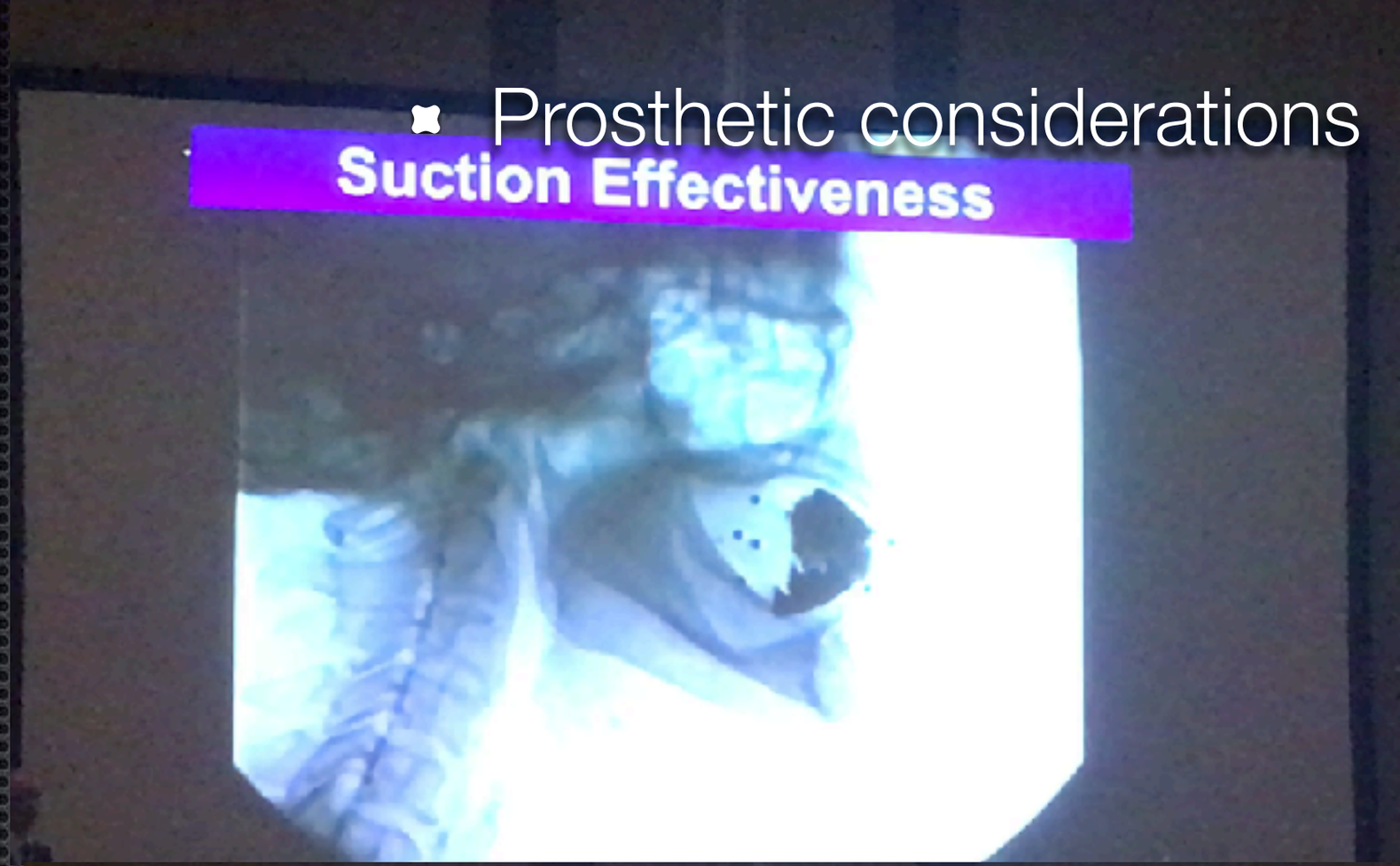
sciencedirect.com, Gachabayov et al., 2015

- Prosthetic considerations

Effective vs non-effective dentures on swallowing

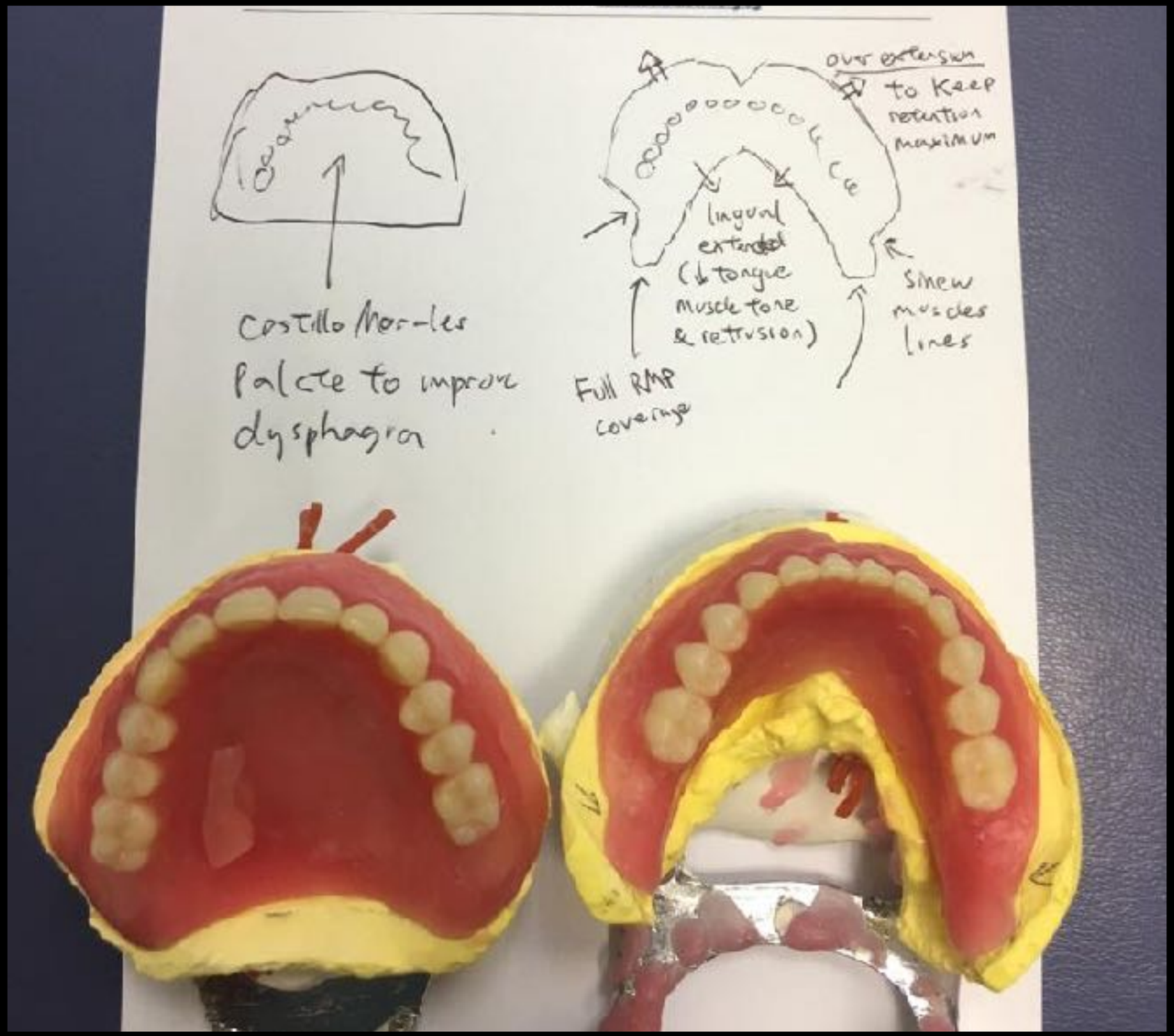
- tongue is free to ‘pack’ bolus & free to swallow
- increased distribution of food
- prevents cheek/lip biting
- stabilisation of mandible during swallowing

From SEMD by Dr Jiro Abe



- Prosthetic considerations

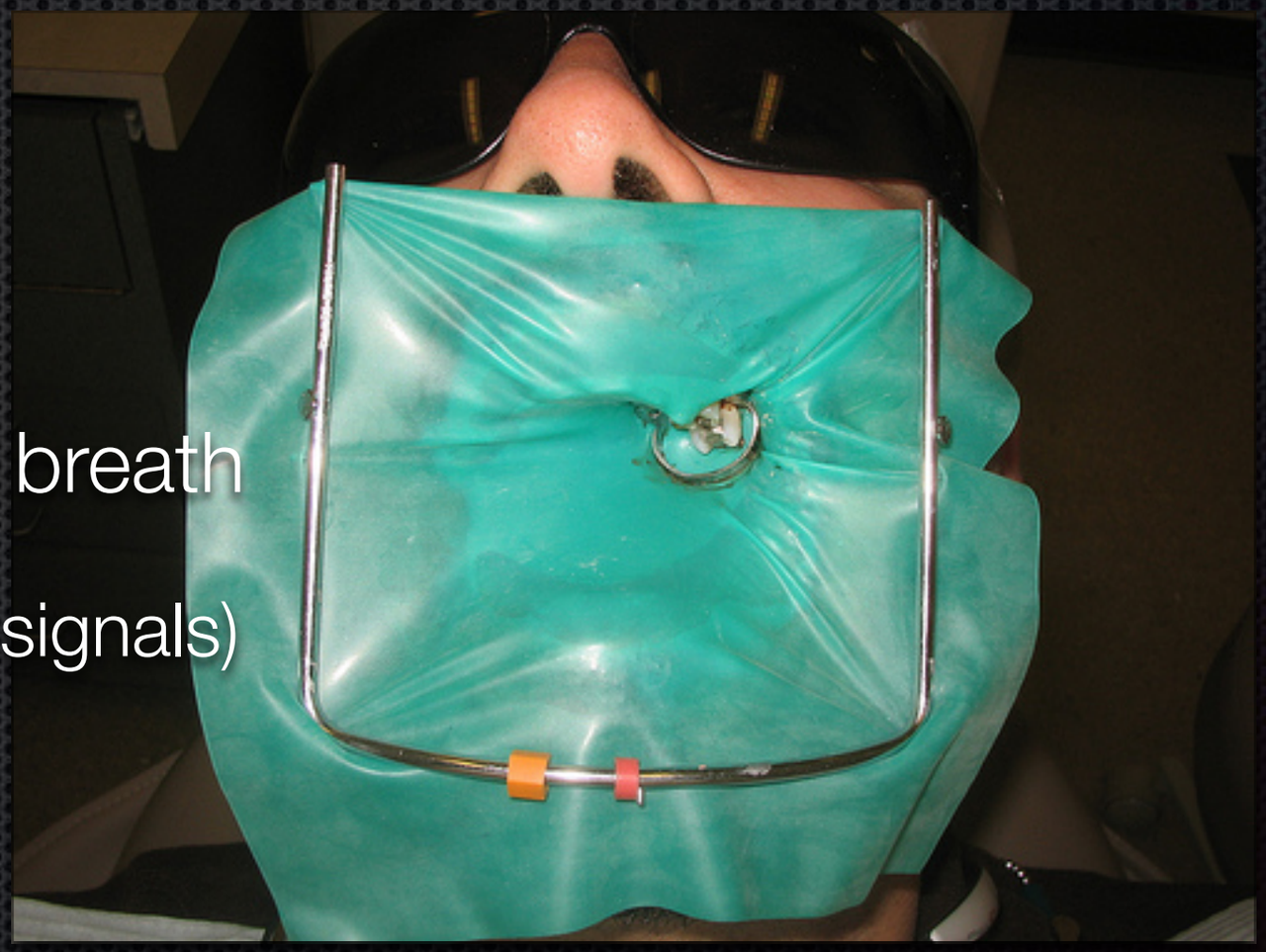
Palatal Augmentation may help swallowing

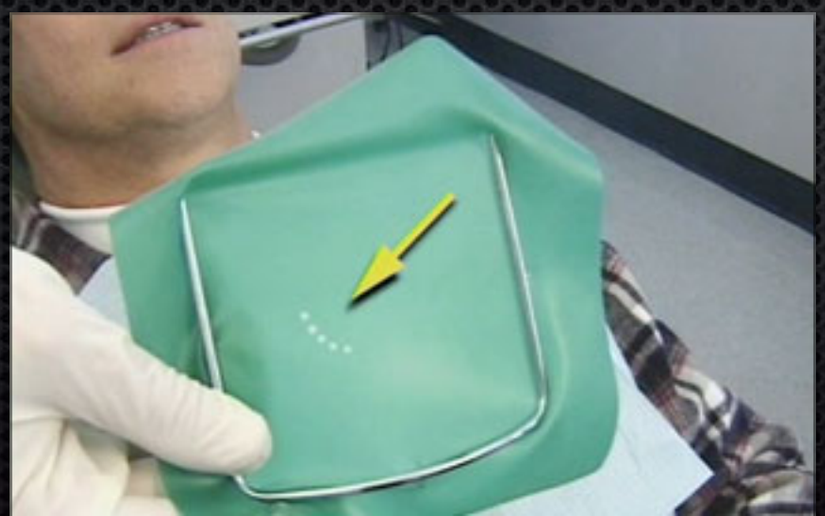


- 5 “R”s chair side

Dysphagia special care chair side

- Rubber dam
- Reduce aerosol/fluids/foam
- Recline no more that 45*
- Recall if fever, shortness of breath
  Usfirst sign of pneumonia
- Respect the patient (e.g. stop signals)





- 5 “R”s chair side

Dysphagia special care chair side











Levels of Oral Health Care

Orofacial training principles:



pinterest.com

Ieto et al effects of oropharyngeal exercises on snoring

Learning Objective

1. Understand the specific characteristics and dental needs of individuals with common neurodegenerative diseases (e.g.

2. epilepsy, cerebral palsy, acquired brain injury (stroke/ trauma), Parkinson's disease, motor neurone disease, multiple sclerosis, Huntington's disease, spina bifida, including

3. communication strategies, behavioural considerations, and appropriate treatment adaptations to ensure effective dental care

4. + dysphagia

	Where to find basic info
Epilepsy	Slides
Cerebral palsy	Slides
Stroke	Dougall & Fiske 2008 https://www.nature.com/articles/sj.bdj.2008.891
Parkinson's disease	Slides
Motor neurone disease	Tay & Borromeo 2014 https://onlinelibrary.wiley.com/doi/10.1111/
Multiple sclerosis	Slides
Huntington's	Slides
Acquired brain injury	Kothari et al., 2020 https://www.tandfonline.com/doi/epdf/
Spina Bifida	Gary et al., 2012 https://onlinelibrary.wiley.com/doi/10.1111/

How to learn about conditions

	Epilepsy	Cerebral palsy, stroke, acquired brain injury,, parkinson, multiple sclerosis,
Definition		
Epidemiology		
Clinical features		
Aetiopathogensis		
Diagnosis / Types		
Management / Prognosis		
Oral findings		
Emergencies		
ACCESS		

What is epilepsy?

- **Group of disorders of brain function causing LOSS OF CONSCIOUSNESS and usually LOSS OF MOTOR AND SENSORY FUNCTION.**
- **General term for conditions with recurring SEIZURES.**
- **Prevalence: 1% of the population**
- **Young, mentally or physically impaired usually affected.**

World Health Organization

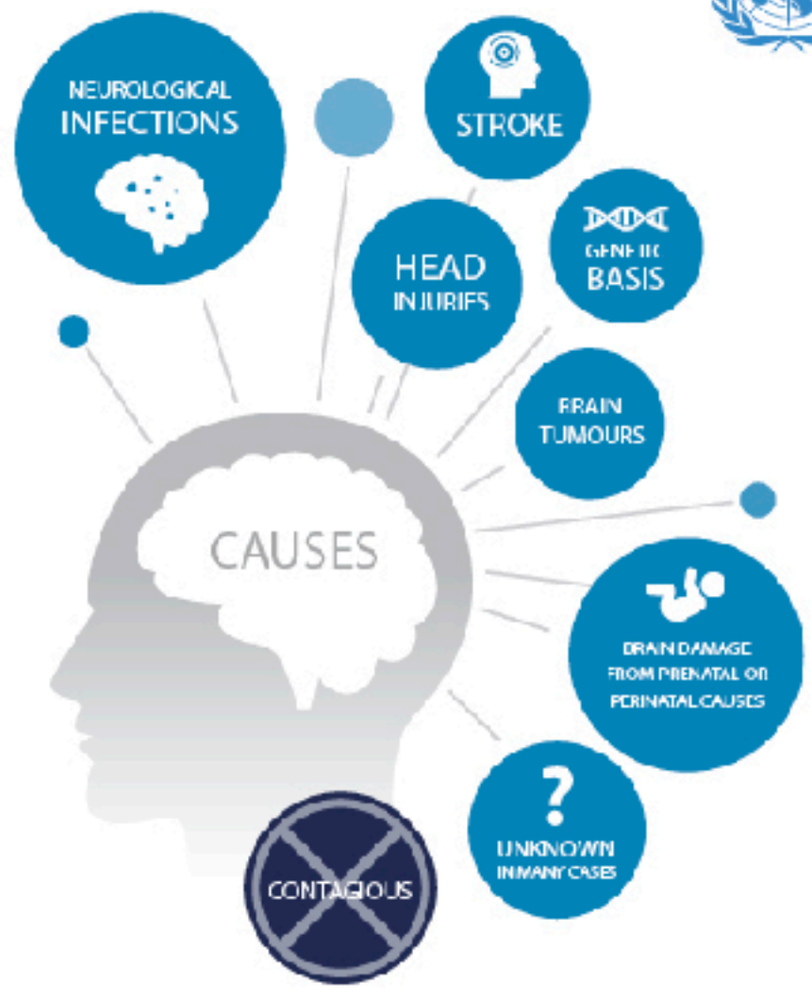
WHAT IS epilepsy?

A NEUROLOGICAL CONDITION characterized by *recurrent seizures*

Seizures are due to *brief disturbances* in the *electrical functions* of the brain



Epilepsy affects people of all ages



Types of epilepsy

Variety of patterns.

Generalised-

- Tonic clonic: LOC, distinct phases, under 5 mins
- Absences: brief period of unresponsiveness <30s

Types of epilepsy

Variety of patterns.

Partial seizures-

- Simple (Jacksonian epilepsy) - motor, sensory, or psychic features
- Complex (Temporal lobe epilepsy) - impaired consciousness + repetitive acts

youtube - monicque1979able

TYPICAL SEIZURE [FIT]: GRAND MAL SEIZURE

Defined sequence:

Warning or **'AURA'** – can be mood change, irritability, brief hallucination, headache

TONIC PHASE:

- **Total body tonic spasm**
- **Loss of consciousness**
- **Fall, danger of injury**
- **Pallor, dilation of pupils, head and spine extension**
- **Glottic and respiratory muscle spasm**
- **May be incontinence and biting of lips or tongue**

CLONIC PHASE:

- **Follows tonic phase**
- **Repetitive jerking movements of trunk, limbs, tongue, lips**
- **Profuse salivation**
- **Bruxism, tongue biting, vomiting**
- **Tachycardia, hypertension, flushing**
- **Clonus is followed by flaccid semi-coma for 10-15 minutes**

Afterwards…….

- **Confusion and headaches**
- **Patient may sleep for up to 12 hours or more before full recovery. Most seizures end without mishap.**

Major effects:

- **trauma,**
- **respiratory embarrassment**
- **brain damage**
- STATUS EPILEPTICUS **[Alternate tonic-clonic phases repeatedly without regaining of consciousness.] Associated with inhalation of vomit and saliva, brain damage or death.**

Petit mal (absence seizures)

- In children
- Sudden transient arrest of movement, attention, speech

[ABSENCE]

GENERAL MANAGEMENT OF TONIC-CLONIC EPILPESY

- **Prophylactic anticonvulsants e.g. Carbamazepine, Phenytoin, Lamotrigine**

ORO-DENTAL COMPLICATIONS:

- **Injuries caused by fit**
- **Laceration of tongue or buccal mucosa**
- **Injuries to face[lacerations, haematomas, fractures]**
- **Subluxation or loss of teeth**
- **Phenytoin- causes gingival fibrous hyperplasia of interdental papillae**

DENTAL CONSIDERATIONS

- **Epileptics have good and bad phases**
- **Dental treatment preferably in good phase when attacks are infrequent [important to get detailed history. Ask** “When was the last seizure?”
- **Schedule appointment in early hours of the day-Short sessions**
- **Avoid known triggers like bright lights [keep dental light out of patient’s eyes, use dark safety glasses] and extreme noises**
- **Keep oral cavity free of debris, keep equipment and instruments away from area around patient.**

If patient has seizure in dental chair

- **Treatment should be stopped and dental instruments, removable prostheses [only if possible] and cotton wool rolls/gauze rolls should be removed immediately from the mouth**
- **Help patient into the supine position. Loosen tight clothing**
- **Not necessary to restrain the patient or move him/her to the floor; neither is it necessary to place an object in the patient's mouth (e.g. to stop them swallowing their tongue).**
- **Preventing injury is the main goal**
- **Call for emergency help [ambulance]**
- **Some patients fall into a deep sleep after seizure. If so, monitor closely especially for airway obstruction**
- **Lie patient on side to maintain airway – face rotated to allow vomit to be expelled from mouth and prevent inhalation.**
- **If the seizure lasts more than 5 minutes and recurs, drug administration is required. [usually midazolam -buccal, rectal or IV.]**
- **After the patient regains consciousness, he/she should be sent home to rest. Treatment should be postponed until the patient feels well again**

Use the acronym to indicate the challenges regarding epilepsy in oral health care (5 mins)

- **Access** - The ability of someone to physically access the dental service. This also concerns timing.

- **Communication** - What affects communicating with the person? Think about language, sensory impairments, speech difficulties, intellectual disabilities, neuro-diversity, dental fear that affect two-way communication. What do you need to communicate?

- **Consent** - Are there difficulties in making health care decision for the person? Who is in charged?

- **Education** - Are there specific oral health education, or preventive advice for the patient or the caregiver?

- **Surgery** - What other adjustments should we make in the dental setting? This involves for fillings, cleaning, extraction, chair positioning etc.

- **Spread** - Is there a cross-infectivity concern? Is the person instead at risk of infection?

- **Oral implications** - How does the condition manifest in the mouth? What can we expect to see? This involves elements of Oral Medicine specialty.

- **Related concerns** - What other related issues do we see with this condition. This involves effects of progression of disease, effects of medical treatment etc.

Access
- May require caregiver if ID or refractory epilepsy
- Variable risk of fall, refractory epilepsy
- if pt has seizure prior to appt, postpone appt
- avoid time of the day / period of time where person is prone to seizures

Consent
- rectal midazolam administered by OHT?
- consent issues for person with ID

Communication
- ask: what type, when, triggers
- anxiety can be a trigger for seizures, TLC
- remind to have light meal, medications and emergency meds
- post ictal - ask a responsible adult to escort home

Education
- teach family NOT to stuff anything into the mouth during seizure
- gingival hyperplasia - need v good OH, surgical removal if non-reducing

Surgery
- Dental emergency management of status epilepticus
- Avoid triggers - bright lights/noise/ anxiety
- ill-fitting small dentures / AEB not good - risk of aspiration
- sedation with benzodiazepines may benefit. Reversal of BZD - can induce seizure
- drug interaction (aspirin azoles, metronidazole with phenytoin, carbamazepine)
- bleeding risk with valproate

Spread
- Epilepsy is not contagious

Oral implications
- worn/ground teeth: grinding tonic phase, or if fall face-first
- gingival hyperplasia - phenytoin (folate?), carbamazepine, lamotrigine, valproate
- soft tissue trauma

Related conditions
- Intellectual disability
- Lennox-Gaustant syndrome
- Stroke, brain trauma, brain tumors

Multiple Sclerosis (MS)

- Definition.
- Epidemiology / Background.
- Aetiopathogenesis.
- Clinical presentation.
- Diagnosis / Types.
- Treatment / Prognosis.
- Oral findings / Side effects of medication.
- Provision of dental treatment (ACCESS).

MS AUSTRALIA RESEARCH ADVOCACY CURE

Multiple Sclerosis (MS)

MS is the most common acquired chronic neurological disease affecting young adults, often diagnosed between the ages of 20 to 40 and, in Australia, affects three times more women than men. As yet, there is no cure. There is no known single cause of MS, but many genetic and environmental factors have been shown to contribute to its development. In MS, the body's own immune system mistakenly attacks and damages the fatty material – called myelin – around the nerves. This results in a range of symptoms, but no two people experience MS in the same way.



62% of people with MS use a disease modifying therapy (DMT), a decrease of 2% since 2017



Nearly 3m people live with MS worldwide



More than 33K Australians live with MS



$2.5bn was the estimated cost of MS to the Australian community in 2021



Average age of diagnosis is between 20-40 years



3 out of 4 Australians diagnosed with MS are women



MS affects more young adults than any other acquired chronic neurological disease



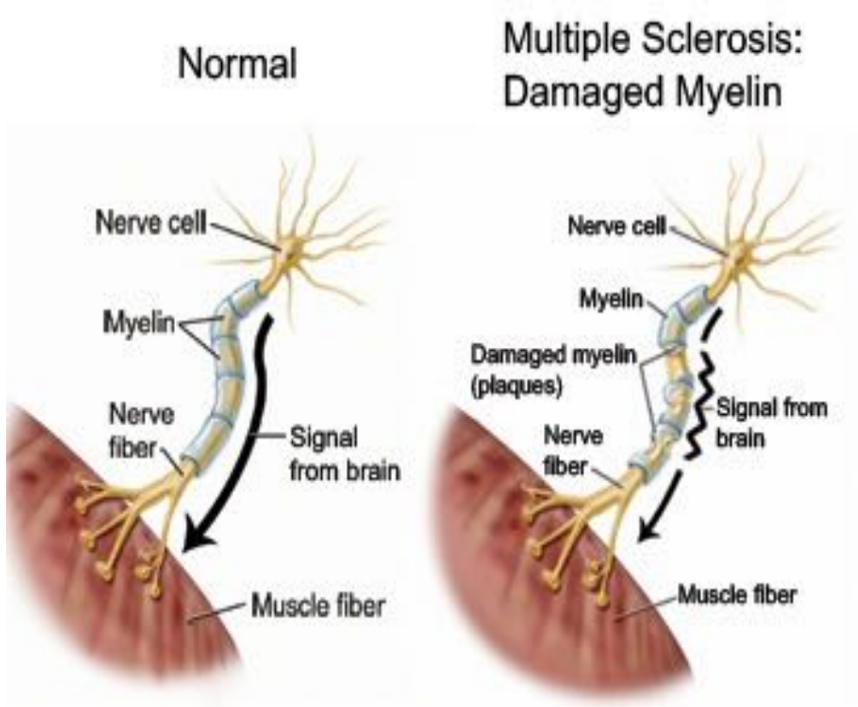
131 Australians living with MS per 100k people, up from 103 in 2017

MS AUSTRALIA

RESEARCH
ADVOCACY
CURE

Definition

- Chronic relapsing demyelinating CNS disease.
- Cause sensory, motor and psychological symptoms.
- Characterised by the formation of plaques throughout the CNS.



Psych 256: Cognitive Psychology SP15." Psych 256 Cognitive Psychology SP15. Web. 28 Oct. 2015.

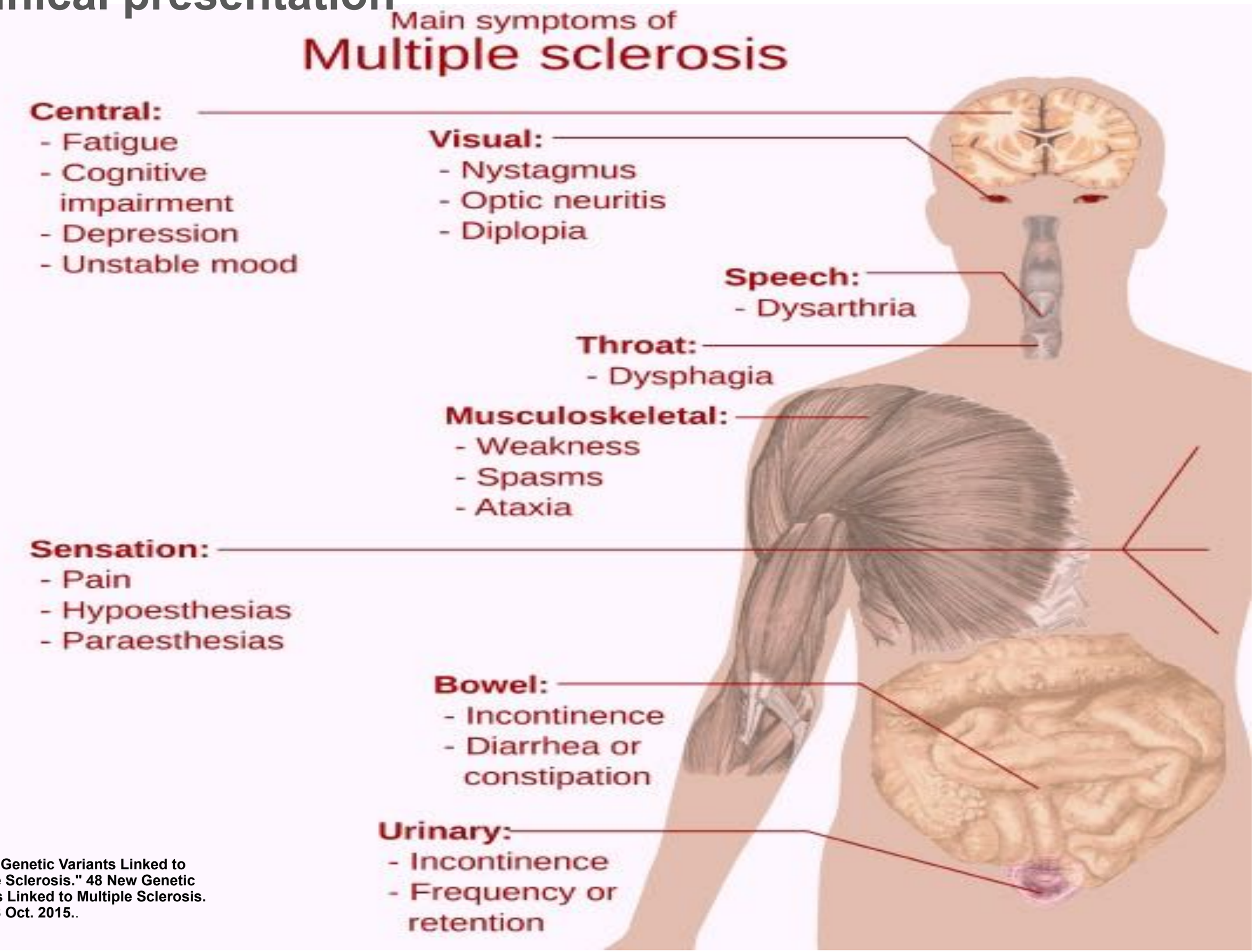
Background

- The two common symptoms are pain and spasticity (stiff and spasm).
- Disease progression: muscle spasm, immobility, disturbed sleep, pain and fatigue occur.

Aetiopathogenesis

- Unclear.
- Maybe familial predisposition.
- Maybe autoimmune in genetically susceptible individuals perhaps viral aetiology (HHV 6).
- Sunlight exposure appears to reduce risk

Clinical presentation



48 New Genetic Variants Linked to Multiple Sclerosis." 48 New Genetic Variants Linked to Multiple Sclerosis. Web. 28 Oct. 2015..

Diagnosis

- Clinical findings during acute attacks.
- MRI.
- Delayed visual evoked response potentials (VEPs).
- Lumbar puncture - CSF examination: shows increased IgG and slightly increased WBC.

Types

- Varies in severity and speed of evolution.
- Classified based on clinical course to:

1. Relapsing – remitting.
2. Primary progressive.
3. Secondary progressive.
4. Progressive relapsing.

Treatment

- Multidisciplinary team.
- No effective reliable treatment for MS.
- Disease modifying agents (DMAs) – beta interferons and glatiramer (Immunomodulator).
- Corticosteroids for acute episodes.
- Anti-inflammatory agents like natalzumab.
- SYMPTOMATIC MANAGEMENT - Muscle relaxant (Tizanidine).

Prognosis

- Most patient survive at least 20-30 years.
- After 25 years more than 75% of patients are still alive.
- Remission, complete, and partial are common.
- Fulminant MS (or malignant) occur occasionally and progress rapidly.

Oral findings

- No specific oral manifestation.
- But consider diagnosis in suspected clinical presentations, such as
  - young patient with bilateral trigeminal neuralgia
  - facial palsy but unlike Bell’s palsy (e.g. without retroaural pain)

Oral side effect of medication

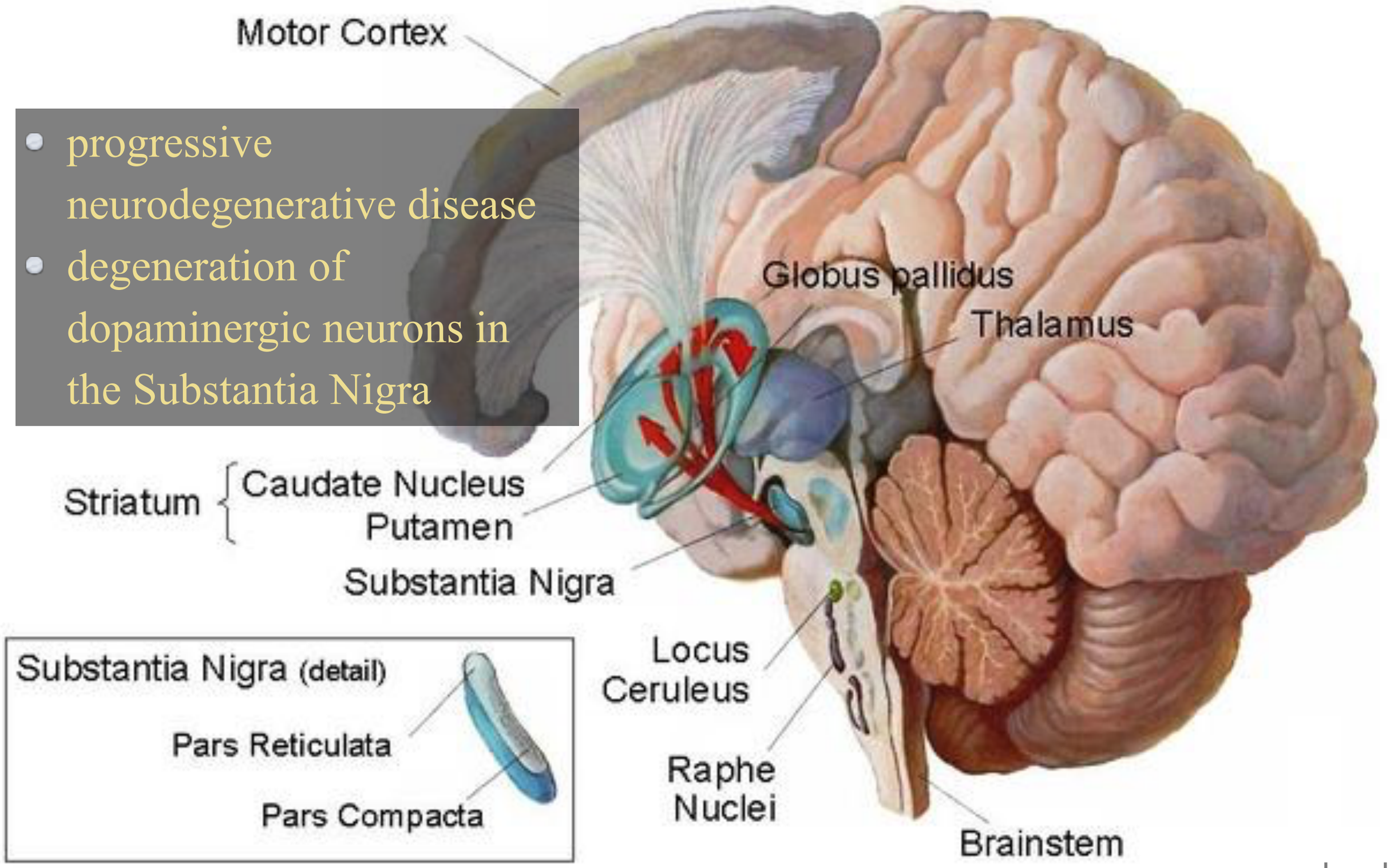
- Dry mouth due to:
  - Atropine used in treating the bladder dysfunction.
  - Tizanidine (muscle relaxant).
- Long-term steroid use
- Facial oedema caused by glatiramer (immunomodulator).

References

- MS Australia. https://www.msaustralia.org.au/what-is-multiple-sclerosis-ms/
- National Multiple Sclerosis Society. Web. 28 Oct. 2015.
- Psych 256: Cognitive Psychology SP15." Psych 256 Cognitive Psychology SP15. Web. 28 Oct. 2015.
- Scully, Crispian. *Scully's Medical Problems in Dentistry*. Elsevier Health Sciences, 2014.
- Scully, Crispian, Pedro Diz Dios, and Navdeep Kumar. *Special care in dentistry: Handbook of oral healthcare*. Elsevier Health Sciences, 2006.
- 48 New Genetic Variants Linked to Multiple Sclerosis." 48 New Genetic Variants Linked to Multiple Sclerosis. Web. 28 Oct. 2015.

Parkinson's Disease

- progressive neurodegenerative disease
- degeneration of dopaminergic neurons in the Substantia Nigra



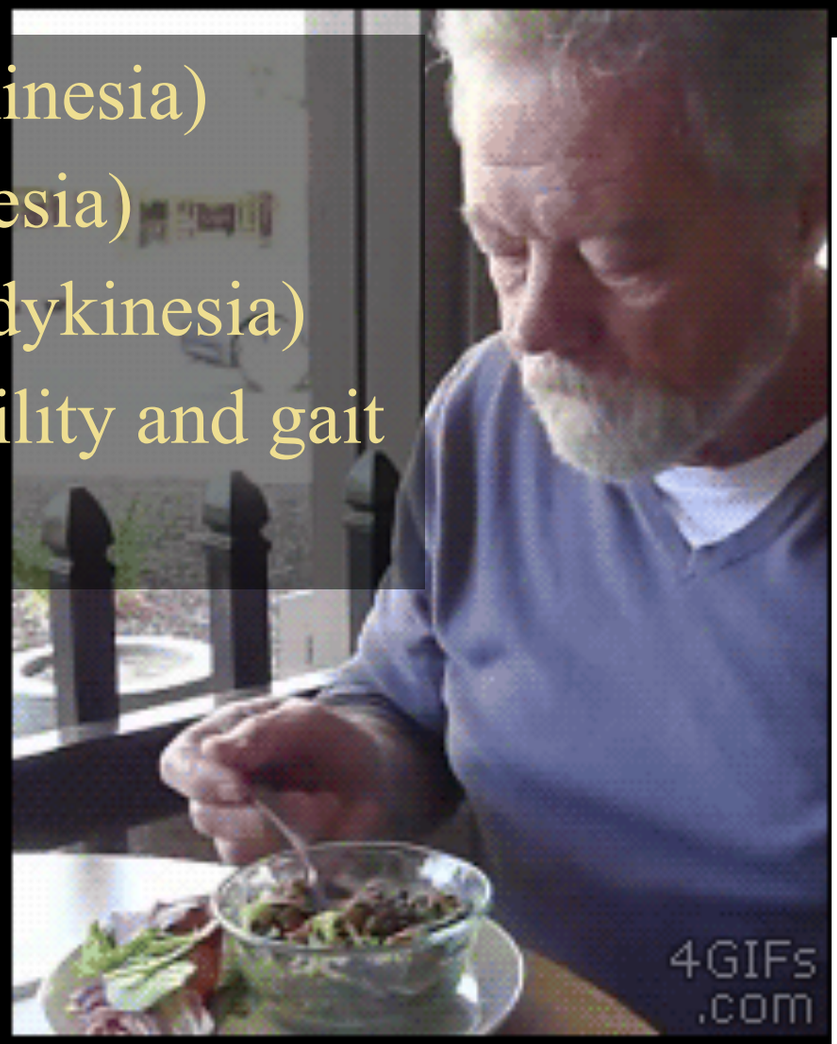
www.soc.ucsb.edu

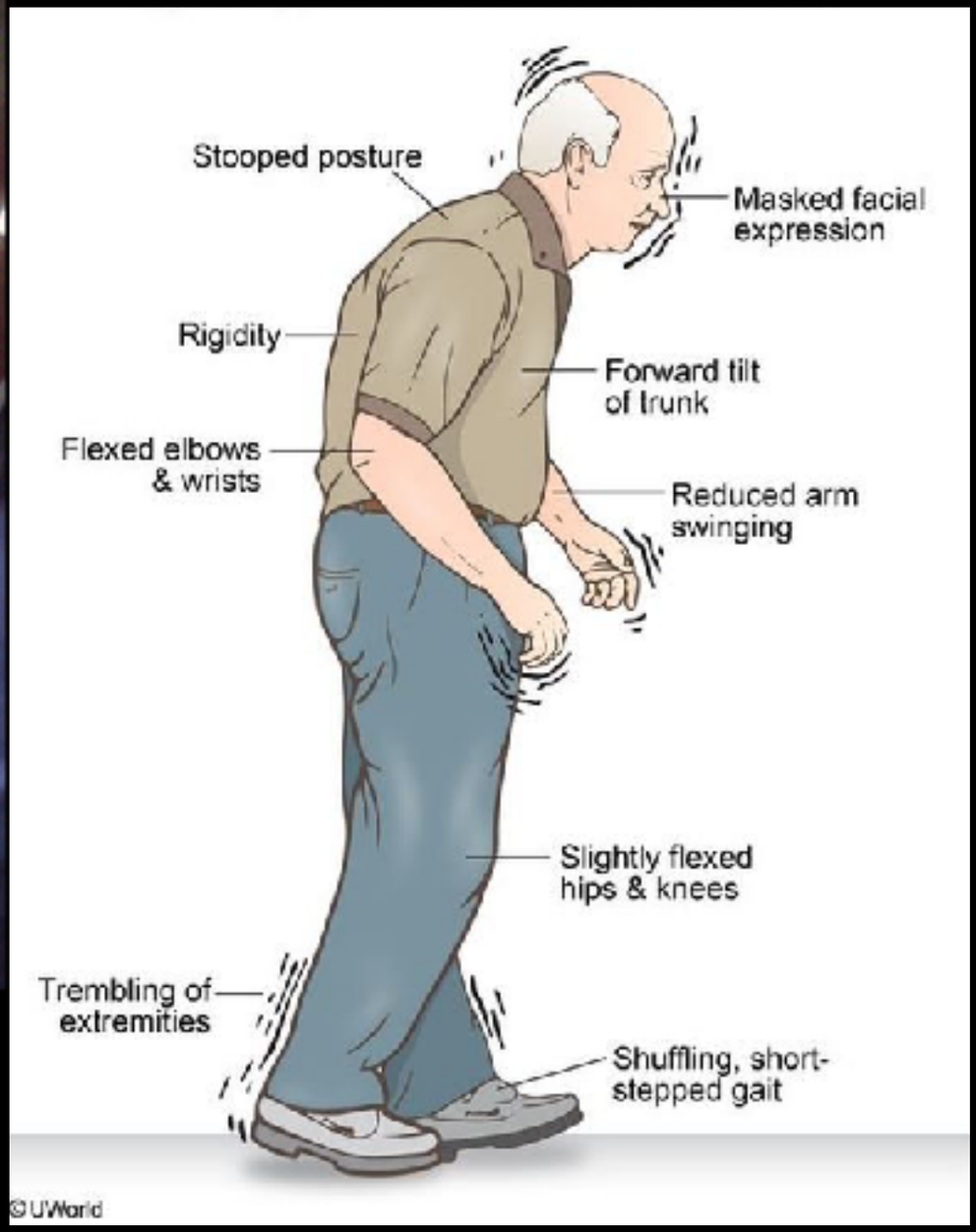
Parkinson's Disease

Classical Features

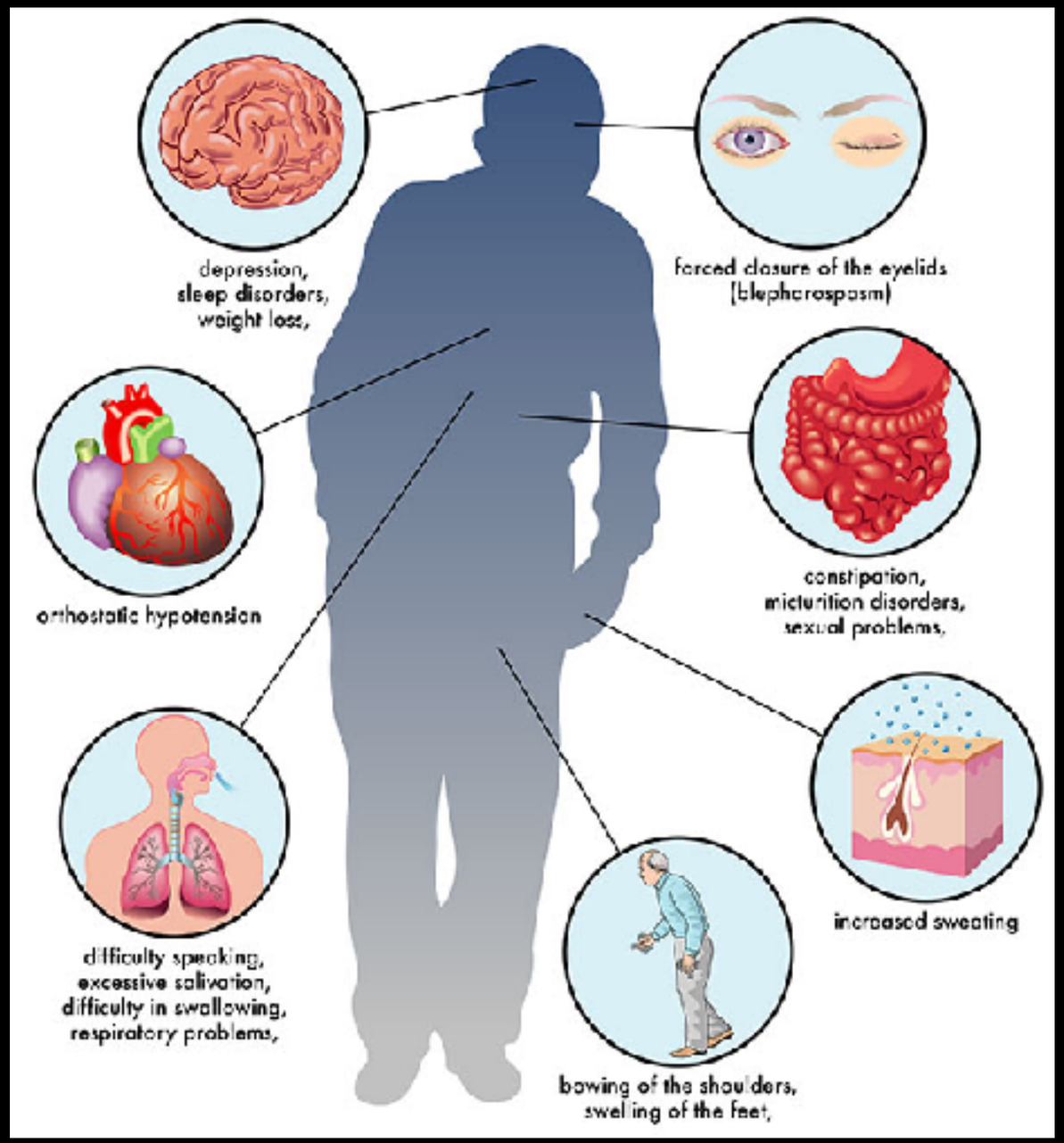
- Tremors (Dyskinesia)
- Rigidity (Akinesia)
- Slowness (Bradykinesia)
- Postural instability and gait disturbances

(Jankovic, 2007; Gallagher, 2013; Schneider & Obeso, 2015)





Parkinson's Disease



Non-motor symptoms

- Sensory disturbances
- Autonomic dysfunctions
- Neurological deficits
- Sleep disturbances

(Quinn et al., 1987; Jankovic, 2007; Gallagher, 2013; Schneider & Obeso, 2015)

Diagnosis

UK Parkinson's disease Society Brain Bank criteria:

Step 1. Diagnosis of Parkinson Syndrome

- Bradykinesia
- At least one of the following:
  - Muscular rigidity
  - 4-6 Hz rest tremor
  - Postural instability

Step 2. Exclusion of other similar diseases and mimicking signs

Step 3. Three or more supportive characteristics

Hughes et al., 1992

Diagnosis

Five stages of PD: Hoehn & Yahr Scale

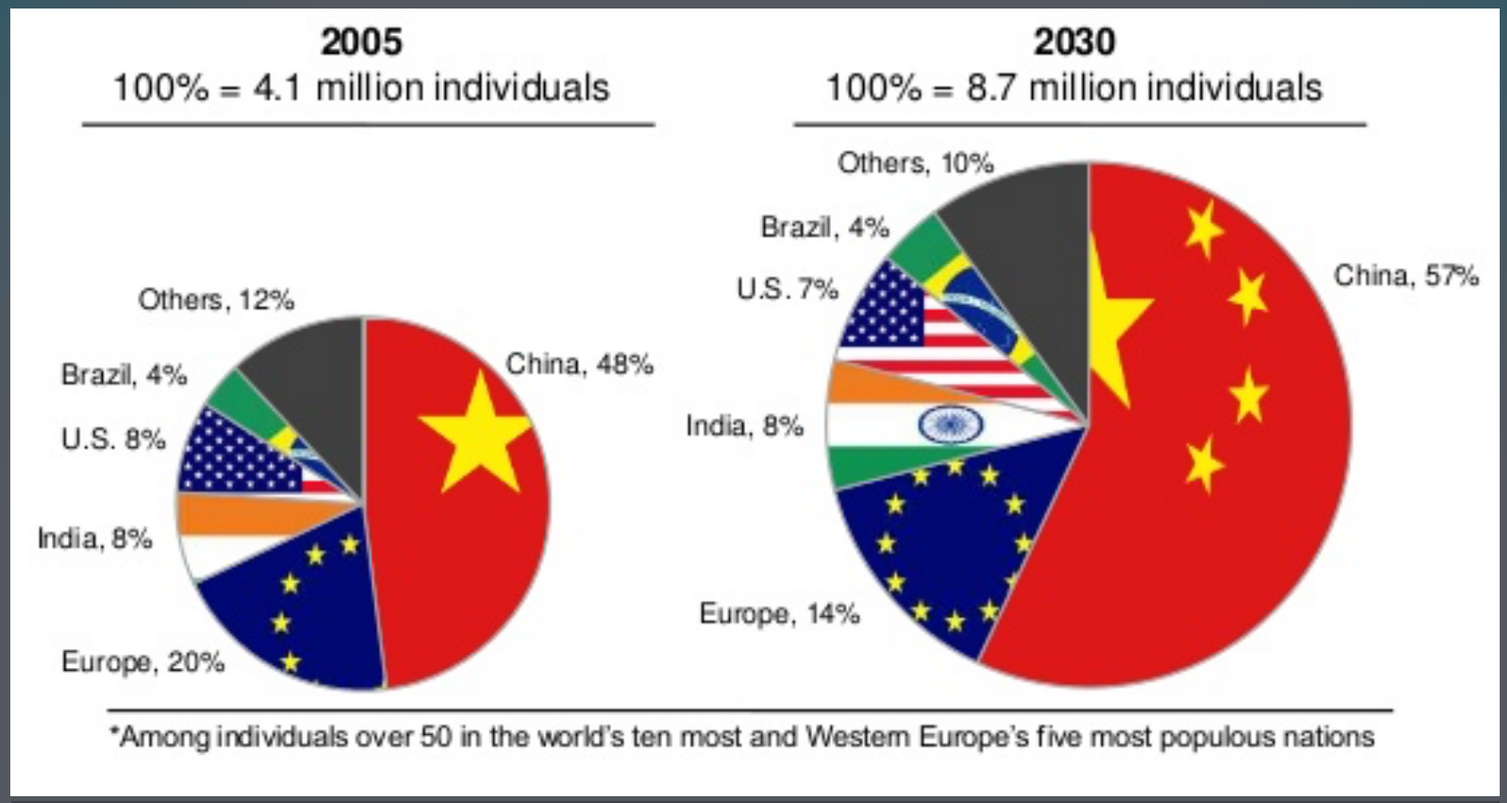
Stage	Symptoms
I (Mild – Early disease)	There is no to minimal functional impairment. Only one side of the body is affected.
II	Posture and balance are normal even though both sides of the body are affected.
III (Moderate)	Mild imbalance when standing or walking, both sides of the body are affected but the patient is independent.
IV (Severe – Advanced disease)	Imbalance when standing or walking is disabling, both sides of the body are affected and the patient requires assistance.
V	The patient is cachectic, restricted to bed or wheelchair and needs complete assistance for daily living activities.



Braak staging

Hoehn & Yahr; Braak et al., 2003; Hughes et al., 1992

Prevalence of Parkinson's Disease



Worldwide:

- Worldwide, 1 in every 3000
- 6.3 million worldwide (2016)
- 8.7-9.3 million worldwide by 2030
- 1 in 500 people in "W.E.I.R.D" countries

Ratio in genders:

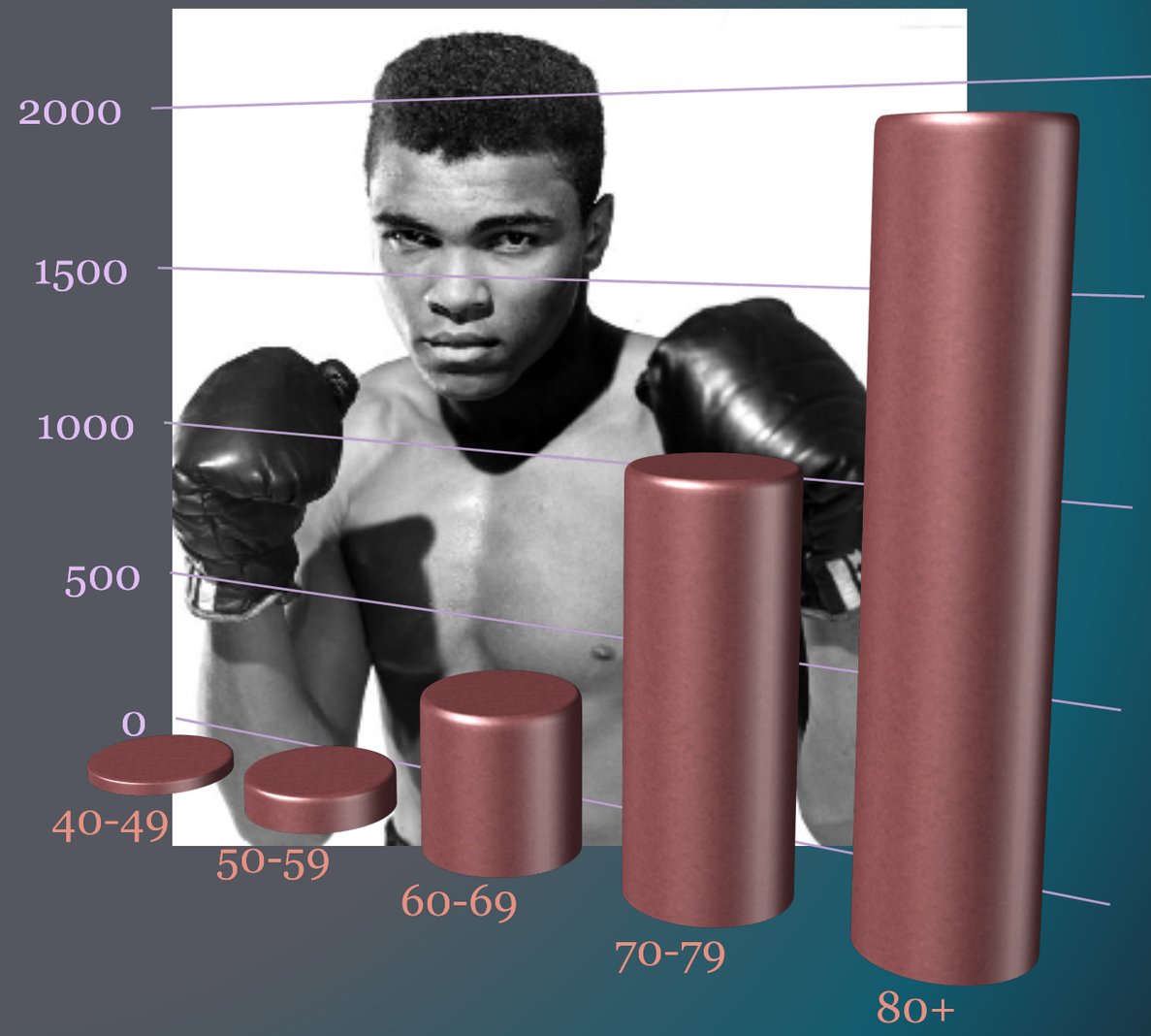
- Male to female ratio of 1.46

Dorsey et al., 2007; Parkinson's UK; Parkinson's Singapore; PSGP; Pringsheim et al., 2014; Taylor et al., 2007

Risk factors

- **Age**
- **Genetics** (OR: 4.19)
  - SNCA, LRRK2, PARK2, PINK, PARK etc.
- **Toxins exposure** (OR: 3.09)
  - Pesticides (paraquat, rotenone & maneb)
  - Herbicides, insecticides, metals etc.
- **Trauma to the head** (OR: 1.57)
  - Boxing, Muay Thai etc.

Age Prevalence of Parkinson's Disease



Irwin et al., 2012; Jenner et al., 2013; Jafari et al., 2013; Wang et al., 2011; Li et al., 2015; Hernán et al., 2002; Tan et al., 2008

Protective factors

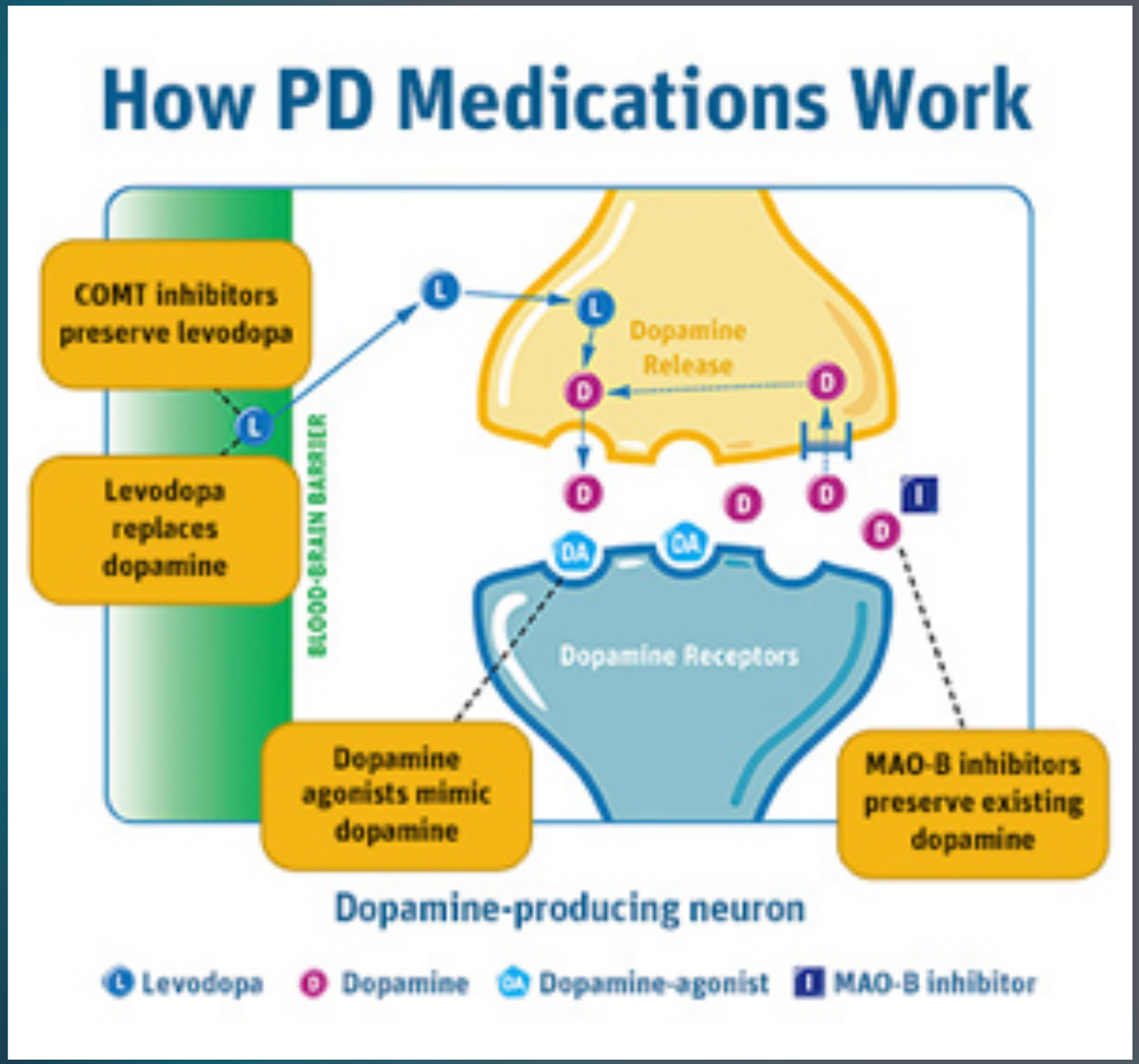
- Smoking (RR: 0.59)
- Coffee (RR: 0.69)
- Black tea (RR: 0.28)





Irwin et al., 2012; Jenner et al., 2013; Jafari et al., 2013; Wang et al., 2011; Li et al., 2015; Hernán et al., 2002; Tan et al., 2008; Barreto et al., 2015

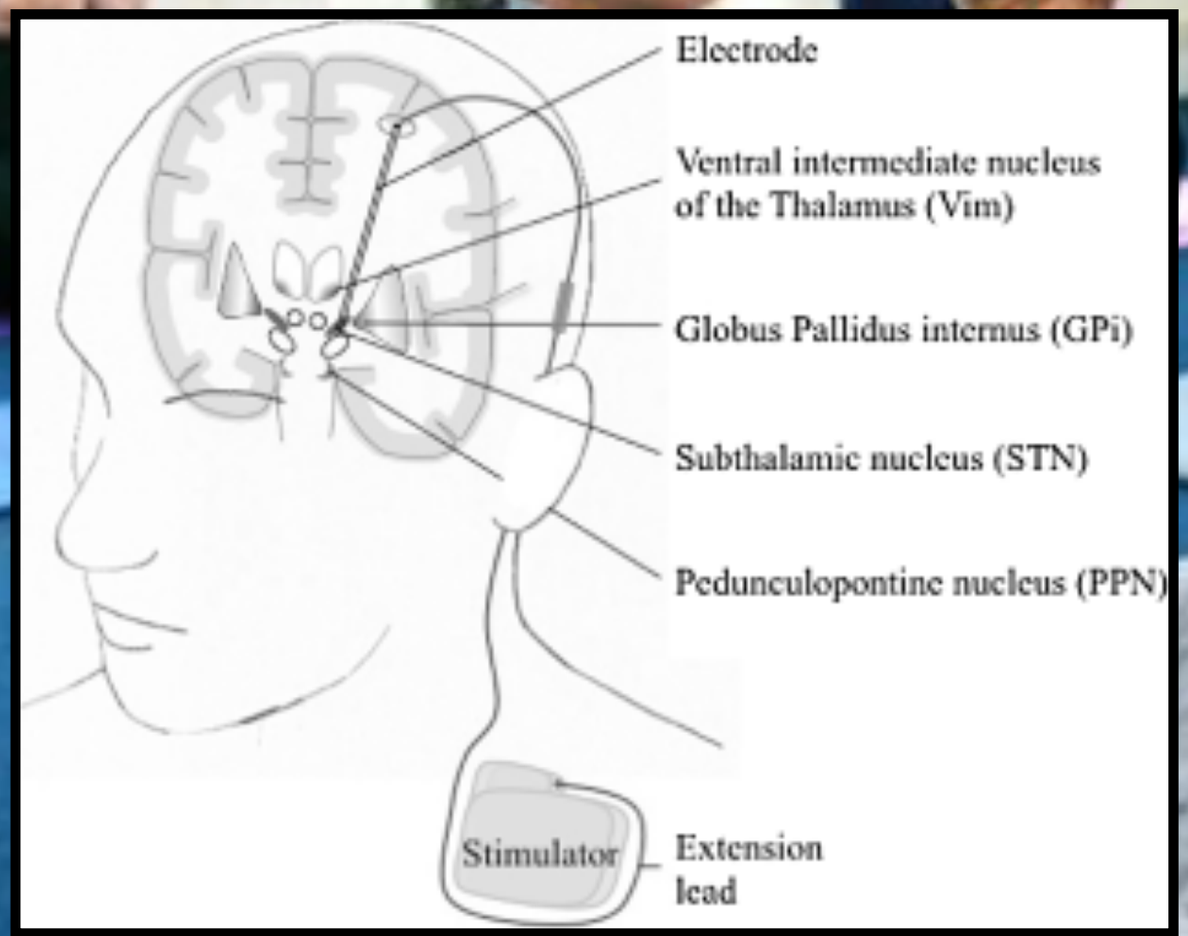
Pharmacological management



- Levodopa and combinations (duodopa, carbidopa)
- MAO-B inhibitor (selegiline, rasagline, safinamide)
- COMT inhibitors (entacapone, tolcapone)
- Dopamine agonist (pramipexole, ropinirole, apomorphine)
- Anticholinergics (trihexyphenidyl, benztropine)
- Others: propranolol, amantadine, clozapine, rivastigmine

http://www.azilect.com/AboutParkinsonsDisease/ParkinsonsTreatment

Surgical or Therapy



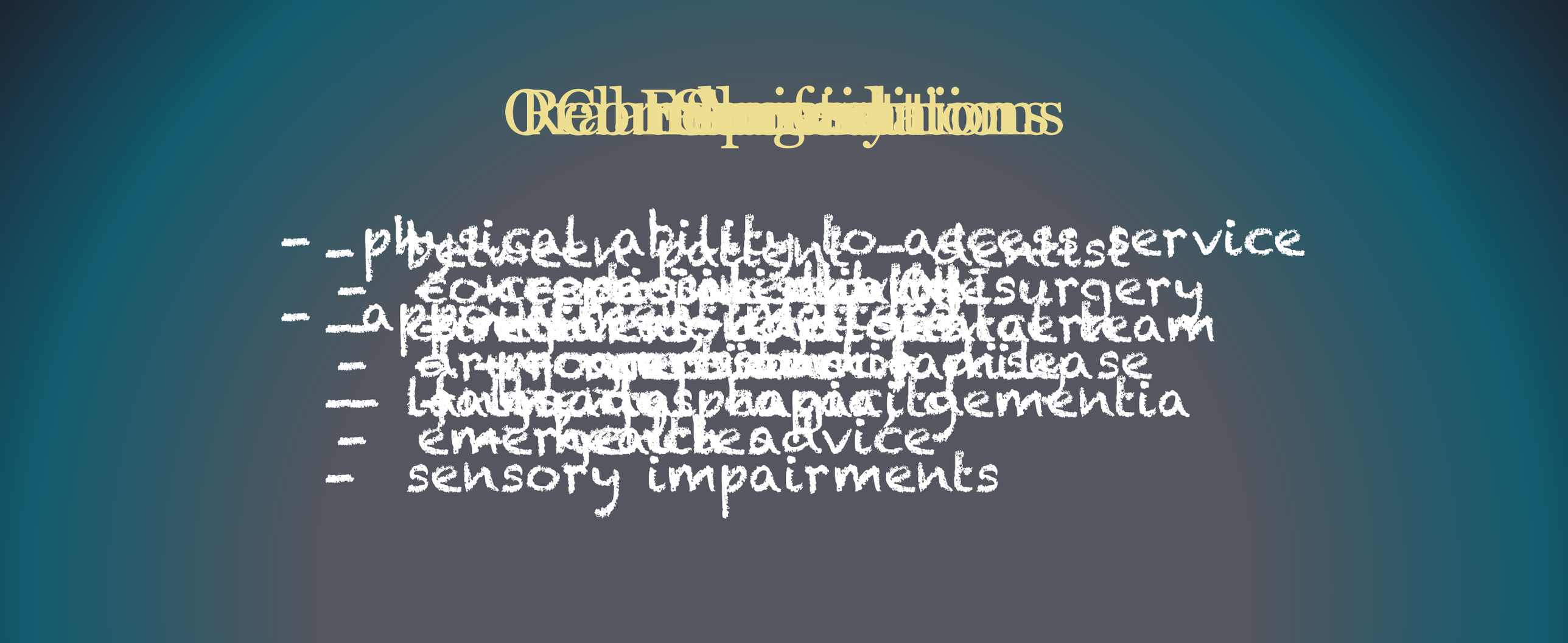
Supportive therapies:

- Physical and strength therapy
- Speech and Language Therapy
- Occupational Therapy

Surgical interventions:

- Deep brain stimulation
- Lesioning

(NICE [IPG19] 2003; Metman & Salvin, 2015; Poortvliet et al., 2015; Young et al., 1998; Dwarakanath et al., 2014; Tomlinson et al., 2013; Cruickshank et al., 2015; NICE [CG35], 2006; Smith et al., 2012)



Implications on Oral Health Care

Surgery

Surgery

- Pain and Anxiety Control
- General Anaesthesia Considerations
- Drug Reactions
- Dysphagia
- Deep Brain Stimulation



Outreach Tacloban

Surgery

Pain and Anxiety



Local anaesthesia

- generally safe
- recommendations to limit to 3 cartridges

Sedation

- Midazolam can be effective
- Nitrous Oxide good for tremors
- Tolerance can be induced
- Propofol and Ketamine concerns

(Nicholson et al., 2002; Burton, 2004; Shimohata et al., 2015; Chen & Wilkinson, 2012; Peretz et al., 2005; Gerlach et al., 2011; Golden et al., 1989)

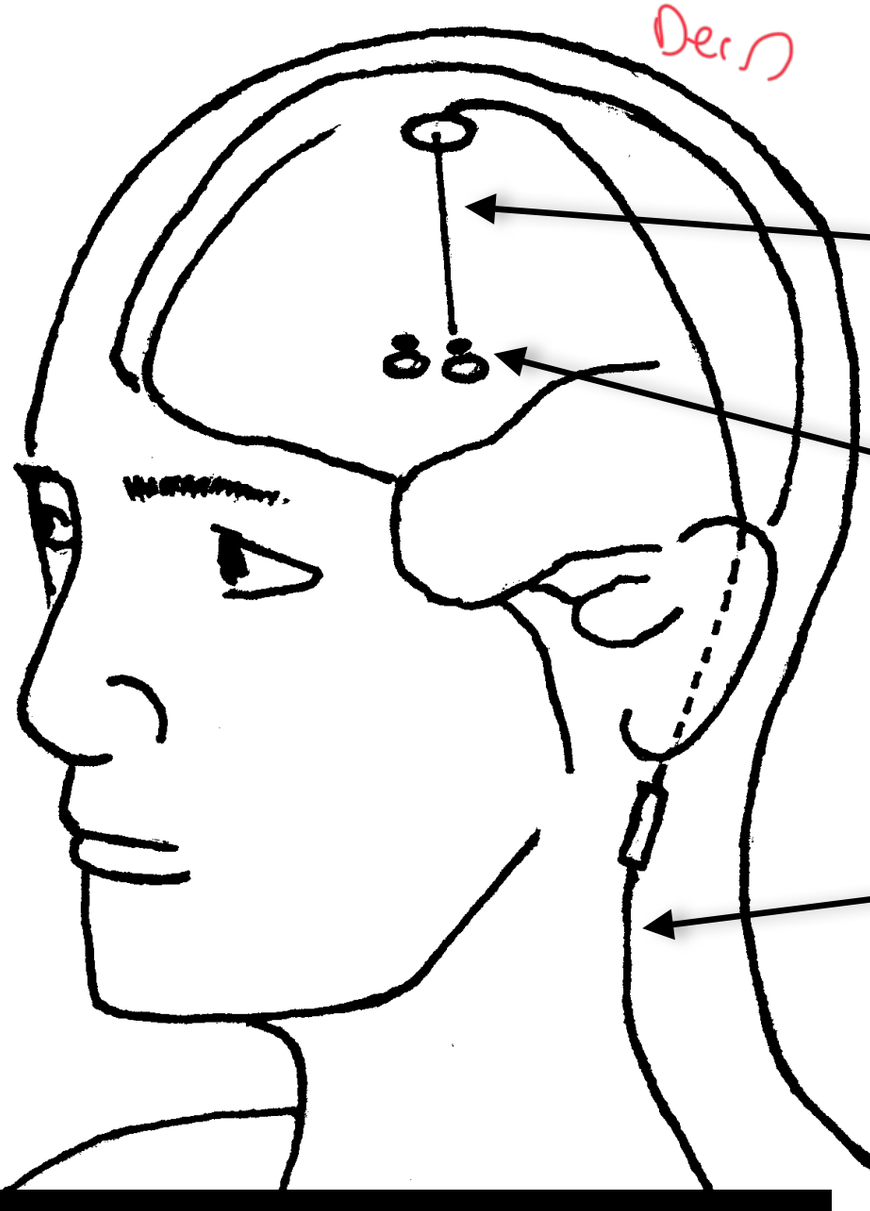
Surgery

Drug Prescription

Prescribing Drug	*Interacting Drug*	*Can cause*	*Management options*
Opioids	• *SSRI* • *Deep Brain Stimulation* • *MAO-B inhibitor (selegiline, rasagline, safinamide)*	*Hyperstimulation Serotonin syndrome*	*Avoid use of opioids. Consider NSAIDS or Paracetamol*
NSAIDS	• *β blockers (proponalol, atenolol)*	*Hypotensive effects of β blockers reduced*	*Use with caution.*
	• *SSRI (citalopram, fluoxetine, sertraline)*	*Risk of gastric bleeding*	*Use with caution.*
	• *COMT inhibitors (entacapone, tolcapone)*	*Hyperstimulation*	*Avoid use if possible. Paracetamol, otherwise consult doctor.*

(Starr, 1991; El-Okdi et al., 2014; Greenier et al., 2015; Shakoor et al., 2014; BNF, 2016; Dawoud et al., 2014)

Deep Brain stimulation



Electrode

Subthalamic nucleus (STN)

Extension lead

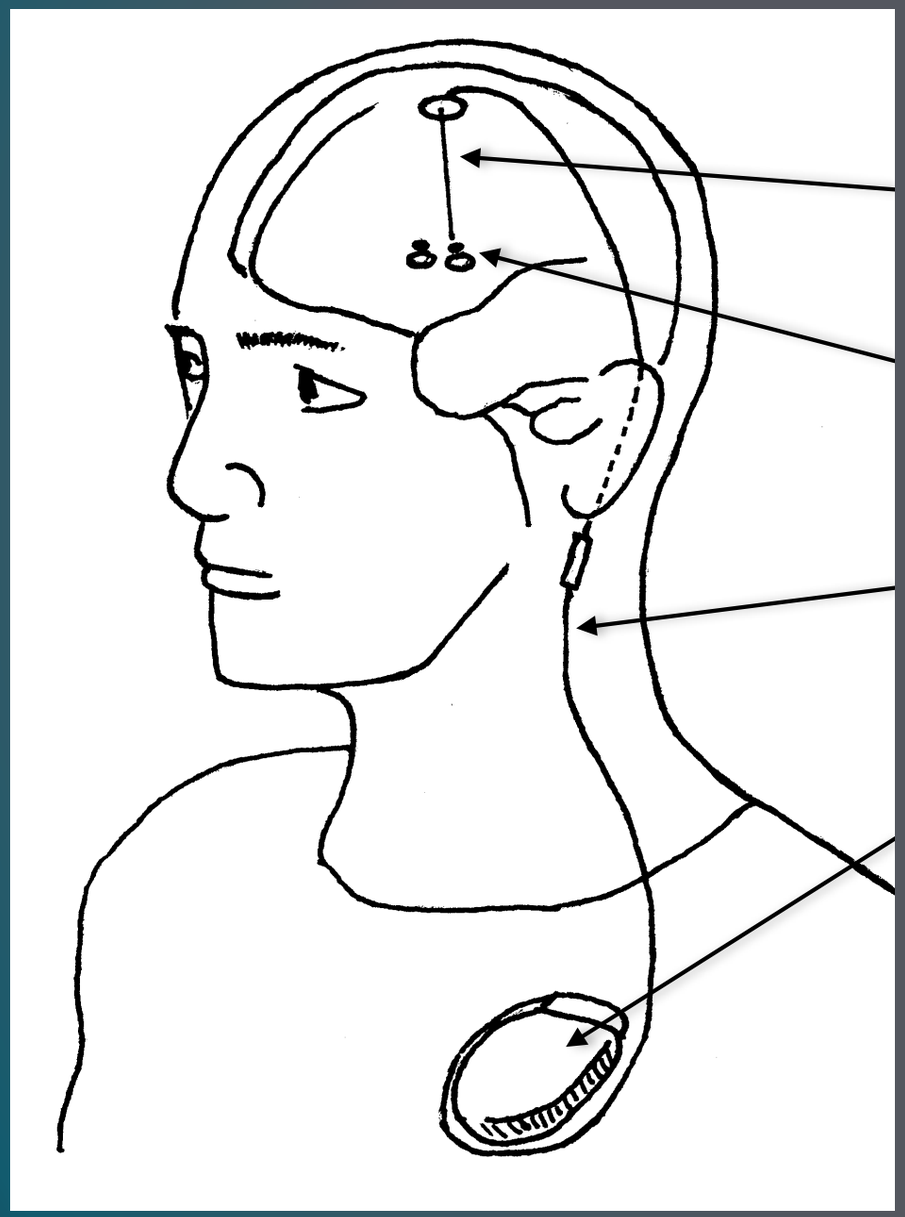
Neurostimulator

- ✓ tremors/dyskinesia
- ✓ mood
- ✓ impulse control
- ✓ cognition
- ✓ dysphagia

- – balancing
- – freezing of gait
- – non-motor symptoms

Mirza et al., 2017 Comparison GPI, STN; Figure from Lim, 2017

Dentistry DBS incidents



- 2001 - Death of a dental patient with DBS and diathermy use
- 2006 - Severe infection of DBS reported due endodontic cause
- 2008 - Diathermy use in head & neck region caused significant neural damage
- Some claims that majority of these incidents were not reported

Lim et al., 2017, Nutt et al., 2001; Sixel Döring et al., 2006, Roark et al., 2008

Definition

- Cerebral Palsy is an umbrella term encompassing a group of non-progressive neurological and physical disabilities
- caused by damage to a child's brain early in the course of development,
    - *in utero*, during birth or in the first few months of infancy.
- It is the most common congenital physical handicap

Aetiophysiology

- Brain damage is caused mainly by hypoxia, trauma, infection, or hyperbilirubinaemia.

- **Pre-natal risk:** pre-eclampsia, irradiation, a maternal age of less than 20 or over 35, various infections
- **Peri-natal risk**: trauma, breech birth, prematurity or post-maturity
- **Post-natal risk:** encephalitis, meningitis, kernicterus
- **Other risk factors:** haemorrhage and hypoxia, respiratory distress, cerebral ischemia, hypothermia or hypoglycaemia

Epidermiology

Cerebral palsy is the most common lifelong physical disability in the world, and people with cerebral palsy face significant barriers in everyday life.

Cerebral Palsy in Australia: Key Facts

ประมาณ 37,000

- **Prevalence**: It is estimated that around 37,000 people are living with cerebral palsy in Australia. Source:
- The cost of cerebral palsy in Australia is an estimated $5.17 billion annually (as at 2019)
- **Birth Rates**: Around 1 in 700 children in Australia are born with cerebral palsy.
- **Mobility**: 63% of people with CP can walk independently, while 26% use a wheelchair.
- **Geographic Diversity**: Around 30% of people with CP live in regional, rural, or remote areas, highlighting the need for equitable access to services.

- roughly 50% have some level of intellectual disabilities
- roughly 25-30% have epilepsy

Cerebral Palsy
AUSTRALIA

Types & Presentation

The features of the four types of cerebral palsy (CP)

Type of CP	%tage of all CP types	Site of damage	Features
Spastic	55%	Cortex	Increased muscle tone and contractions of affected limbs. Complete/partial loss of control of muscle movement. Difficulties with head support Difficulties with control and balance. Falls easily
Athetoid/ Dyskinetic	15% (or 20-25%)	Basal ganglia	Smooth writhing movements as muscle tone fluctuates from increased to decreased tone Constantly in motion High energy requirements Movements exaggerated if anxious or an effort is made to control them
Ataxic	10%	Cerebellum	Disordered short, jerky movements Difficulties with balance Difficulties with walking and sitting straight Requires time to execute changes in position Compromised co-ordination
Mixed	10-15%	Some or all of the above	Some or all of the above Tremor of all or part of the body Hypotonia of muscles Inability to stand Inability to raise the head

Table 1 from Lewis et al., 2008

Presentation

1. Musculo-Skeletal disorders
    - abnormal walking gait
    - poor movement in hands
    - arthritis, dislocations, contractures and deformities
2. Other impairments
    - Hearing, visual, speech
    - Epilepsy
    - Learning disabilities
    - Difficulty in swallowing (drooling)

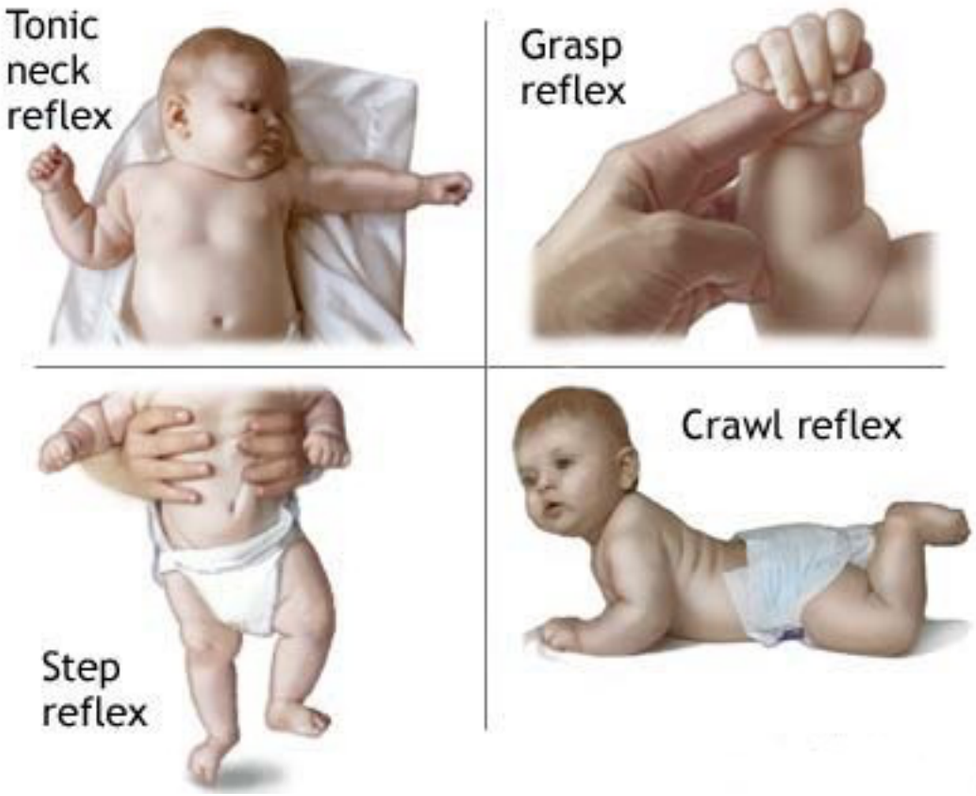
3. Secondary features
    - respiratory complications, angular chelitis from drooling
    - skin ulcers from pressure areas
    - digestive complications, reflux, constipation
    - bladder or kidney infections

Diagnosis

- Clinical signs:
    1. weakness in one or more limbs,
    2. abnormal gait with one foot or leg dragging,
    3. excessive drooling, difficulties in swallowing
    4. poor control over hand and arm movement

- Imaging to show changes in the brain

Diagnosis





images from www.abclawcenters.com

General Management

No cure

1. **Aids:** castings improve and maintain range of motion, wheelchair and aids improve independence
2. **Hip surveillance:** hip joint integrity
3. **Muscle spasticity:** botulin, diazepam, selective dorsal rhizotomy
4. **Bisphosphonates**
5. **Pressure care**
6. **Anti-epileptic medication**
7. **Constraint induced movement therapy**- Bimanual training, occupational therapy after botulin
8. **Fitness training**
9. **Bobath Therapy-x**

Provision of Dental Care

Issues faced includes:

- Bruxism, attrition, TMJ dislocations. sleep apnea
- Sialorrhea
- Xerostomia, mouth breathing
- Dysphagia
- High arch palate
- maxillary arch tapered, class II incisors

If p/t can't speak well doesn't mean intellectual disability

Provision of Dental Care

Issues faced includes (2):

- cooperation
- poor coordination:
    - poor lip seal;
    - oro-musculature dyskinesia,
    - tongue thrust and positioning,
    - abnormal bite reflex
    - lip trauma
    - Dysphagia
- communication difficulties





NEUROLOGICAL DISORDERS PRESENT WITH ABNORMAL MOVEMENT (DYSKINESIA)

- Tremors
- Chorea
- Tics
- Other involuntary movements

Huntington's Disease

- is an inherited degenerative neurological condition affecting the brain and central nervous system. It progressively impairs mental and physical abilities, eventually leading to the loss of critical functions such as walking, talking, eating and reasoning. Complications arising from HD ultimately resulting in death.
- Features
  - Uncontrollable dance-like movements (chorea). Rigidity subtypes are rare
  - changes behaviour, emotion, judgement, personality, hallucinations
- Causes:
  - Mostly autosomal dominant, sometimes sporadic
  - Mutation in Huntingtin gene, causing proteins to lodge in brain
- Prognosis: no cure, progress over 2 decades
- Epidemiology: 8-10 per 100,000 of European ancestry
- Treatment:
  - Supportive: exercise, healthy diet, psychosocial support
  - Palliative concepts of treatment
  - Medication to reduce symptoms (movement, mood etc.),

https://huntingtonsaustralia.au/about/
https://www.ninds.nih.gov/health-information/disorders/huntingtons-disease



CASE EXAMPLE

Medical History

- Huntingdon's Disease (Dx 2000)
  - ✦ Moderate Chorea
- Dysphagia (Severe)
  - ✦ declined PEG
  - ✦ Speech and Language Therapist, stabilised BMI

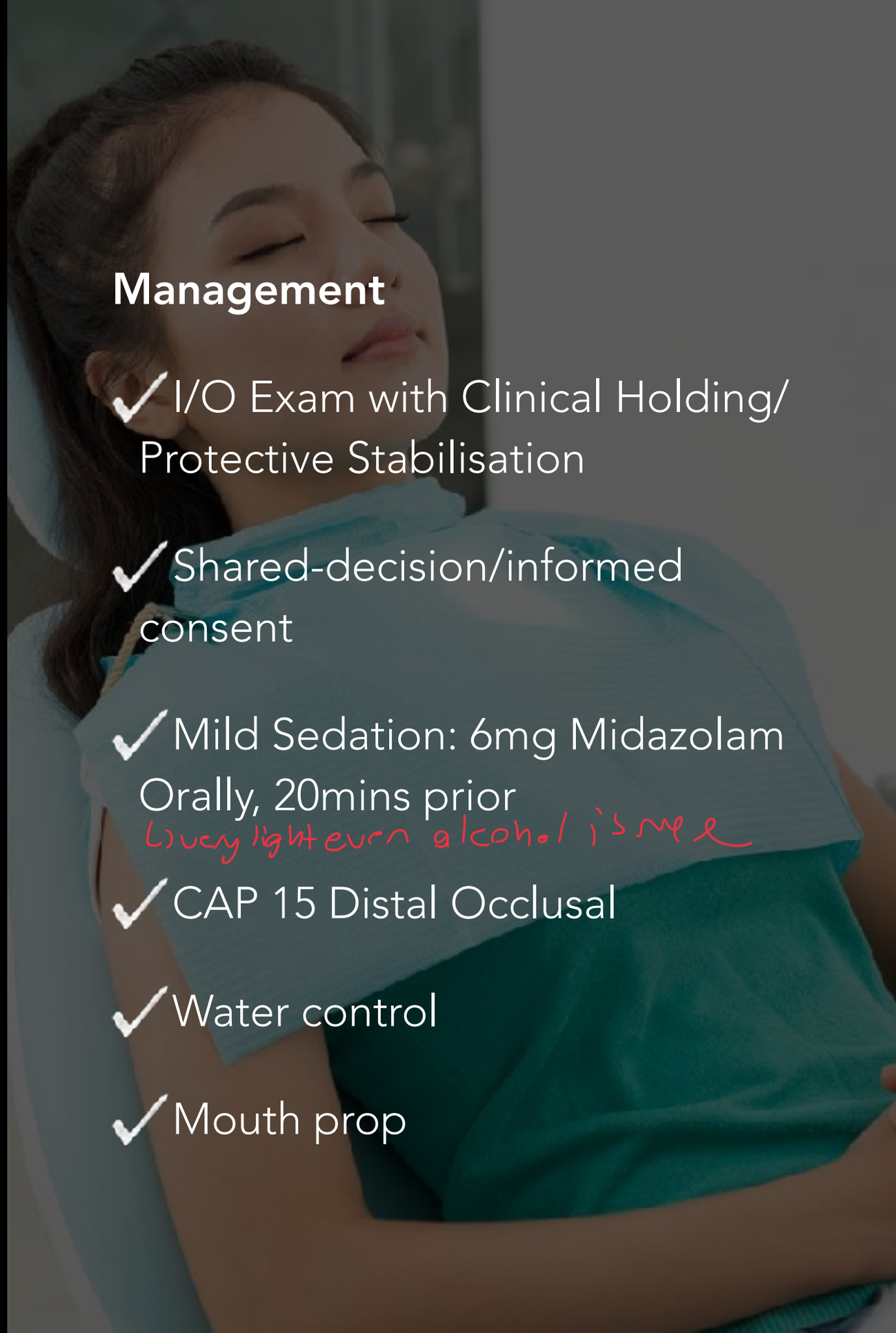
Social History

✦ used to work + housekeep
✦ Walking stick

Dental History

✦ Moderate caries risk
✦ Food pouching
✦ Self-brushing after meals

MEDS: Tetrabenazine, Citalopram (SSRI)



Management

✓ I/O Exam with Clinical Holding/ Protective Stabilisation

✓ Shared-decision/informed consent

✓ Mild Sedation: 6mg Midazolam Orally, 20mins prior
Lucy light even alcohol is me

✓ CAP 15 Distal Occlusal

✓ Water control

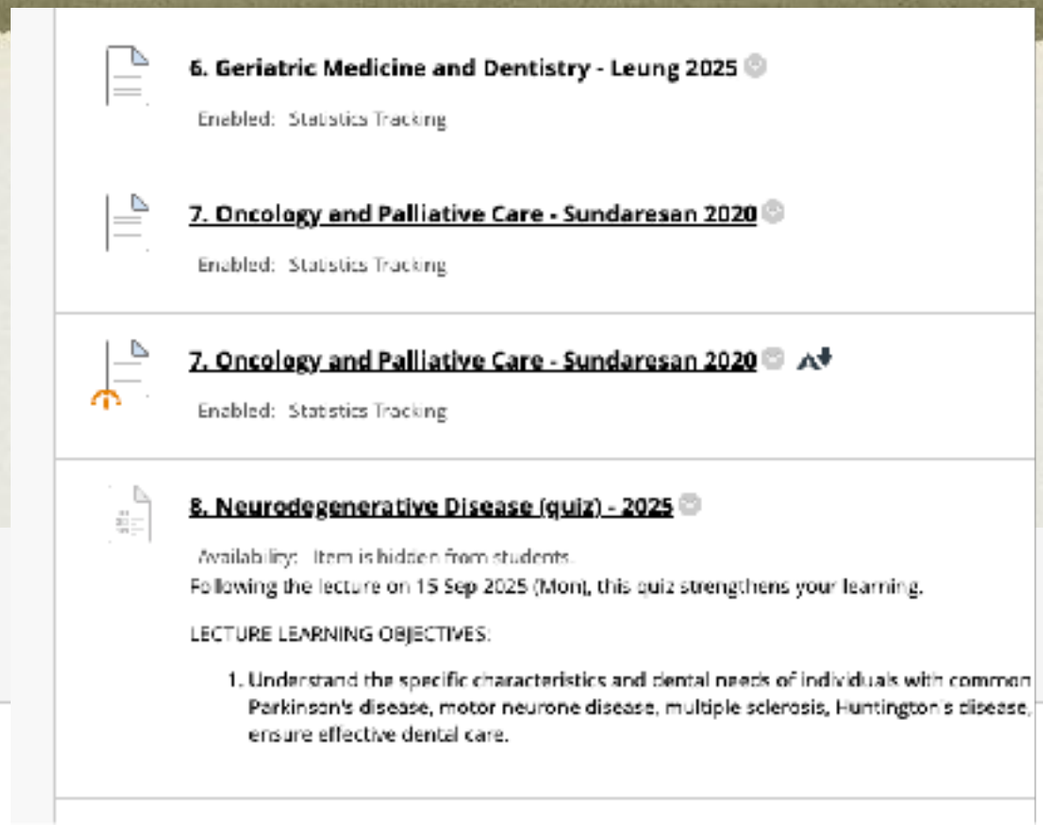
✓ Mouth prop

How to learn about conditions

	Spina Bifida	Motor Neurone Disease
Definition		
Epidemiology		
Clinical features		
Aetiopathogensis		
Diagnosis / Types		
Management / Prognosis		
Oral findings		
Emergencies		
ACCESS		

	Where to find basic info
Epilepsy	Slides
Cerebral palsy	Slides
Stroke	Dougall & Fiske 2008 https://www.nature.com/articles/sj.bdj.2008.891
Parkinson's disease	Slides
Motor neurone disease	Tay & Borromeo 2014 https://onlinelibrary.wiley.com/doi/10.1111/
Multiple sclerosis	Slides
Huntington's	Slides
Acquired brain injury	Kothari et al., 2020 https://www.tandfonline.com/doi/epdf/
Spina Bifida	Gary et al., 2012 https://onlinelibrary.wiley.com/doi/10.1111/

Things for you to do



Begin: 8. Neurodegenerative Disease (quiz) - 2025

INSTRUCTIONS

Description	Following the lecture on 15 Sep 2025 (Mon), this quiz strengthens your learning. Please allocate around **30 minutes** for this quiz. This is an individual quiz. LECTURE LEARNING OBJECTIVES: 1. Understand the specific characteristics and dental needs of individuals with common neurodegenerative diseases (e.g. epilepsy, Parkinson's disease, motor neurone disease, multiple sclerosis, Huntington's disease, spina bifida), including communication strategies and adaptations to ensure effective dental care.
Instructions	Please complete all questions in this assignment and submit them by **19 Sep 2025 (Friday) 1159pm**. This is an open book assignment, please utilise resources at your disposal. This is an individual assignment, not a group work. It trains your thinking process and would help in your assessment in this Unit. There is no time limit, but generally students take 15-30 minutes. Please submit by the deadline above. Thank you and enjoy learning!
Force Completion	This test can be saved and resumed later.
Due Date	This Test is due on 19 September 2025 11:59:00 PM AWST.

Click **Begin** to start: 8. Neurodegenerative Disease (quiz) - 2025. Click **Cancel** to go back.
You will be previewing this assessment and your results will not be recorded.

Module 5311 (Special Needs Dentistry)



Neurodegenerative disease

Thank you

guangxudavid.lim@uwa.edu.au

jeeyun.leung@uwa.edu.au **(unit coordinator)**

15 Sep 2025

2-4 PM (WA Time)

Online

Dr David Lim

Lecturer, Dental School, UWA

BDS (SG), MSc SCD (UCL), PG Dip Con Sed D (KCL), GC Geront (SUSS), Dip ACEdu (SUSS), FiADH, MFTD MFDS RCSEd

Acknowledgements to: Dr Daniel Sundaresan, AProf Mina Borromeo, Dr Matthew Lim, Dr Claudia Lopez Silva

UWA PERTH · AUSTRALIA