

Sheet A: Parkinson's Disease

What is Parkinson's Disease?

- A progressive brain disease in which nerve cells that produce a chemical messenger called dopamine gradually die
- Dopamine is essential for smooth, coordinated movement; as levels fall, the brain loses its ability to control movement normally
- Named after Dr James Parkinson (1755 to 1824), who first described the condition in his 1817 essay 'An Essay on the Shaking Palsy'
- Etymology: the original term 'shaking palsy' (paralysis agitans in Latin) describes the tremor and motor features; the eponymous name replaced it in the 20th century
- Second most common neurodegenerative disease globally after Alzheimer's disease

Prevalence and Incidence

Global

- Approximately 11.67 million people living with Parkinson's disease globally (GBD 2023)
- Projected to reach 25.2 million by 2050, a 112% increase
- Fastest rising prevalence of all neurodegenerative diseases worldwide
- Incidence: approximately 13.9 per 100,000 people per year globally

UK

- Approximately 145,000 to 153,000 people in the UK (Parkinson's UK)
- Approximately 18,000 new diagnoses per year
- Average age of diagnosis is 60; 1 in 20 cases are diagnosed under 50 (young-onset Parkinson's disease)
- Men are 1.4 times more likely to be diagnosed than women

Wales

- Approximately 8,000 to 9,000 people in Wales are living with Parkinson's disease (Parkinson's UK estimate)
- Wales has above-average deprivation in many regions; lower socioeconomic status is associated with reduced access to specialist neurology services

Aetiology

- **Multifactorial:** the interaction of genetic susceptibility and environmental triggers
- **Genetic factors** (account for 5 to 10% of cases):
 - Several gene mutations have been identified that significantly increase risk, particularly in people who develop the disease before the age of 50
 - Having a close family member with Parkinson's disease roughly doubles the risk, though the majority of cases are not directly inherited
- **Environmental factors:**
 - Pesticide and herbicide exposure: people who work with agricultural chemicals have consistently higher rates of Parkinson's disease, and risk increases with greater exposure
 - Repeated or severe traumatic brain injury increases risk
 - Emerging evidence links gut microbiome changes to Parkinson's disease; digestive symptoms such as constipation often appear years before movement symptoms

- Interestingly, some population studies suggest that smoking and caffeine consumption are associated with lower rates of Parkinson's disease, though the reasons for this are not fully understood and neither is a recommended protective strategy

Pathology

- In Parkinson's disease, the nerve cells that produce dopamine in a region of the brain responsible for movement control progressively die
- As dopamine levels fall, the brain loses its ability to produce smooth, coordinated movement
- Symptoms do not appear until approximately 60 to 70% of these cells have already been lost, which is why there is often a long period with no obvious signs before diagnosis
- Over time the damage spreads beyond the movement areas of the brain, which is why cognitive and other non-motor symptoms develop at later stages

Signs and Symptoms

Four key motor symptoms (TRAP)

- **Tremor:** resting tremor, classically described as 'pill-rolling'; often the first symptom noticed
- **Rigidity:** resistance to passive movement ('cogwheel' or 'lead-pipe' rigidity)
- **Akinesia and bradykinesia:** slowness and reduced range of movement; reduced facial expression, so the face can appear flat or mask-like
- **Postural instability:** a later sign and a major cause of falls; not typically present at diagnosis

Non-motor symptoms (often precede motor symptoms by years)

- REM sleep behaviour disorder: acting out dreams during sleep
- Constipation, drooling, urinary urgency, and dizziness on standing; these occur because Parkinson's disease affects the nerves that control automatic body functions
- Anosmia: loss of smell, often one of the earliest signs
- Depression and anxiety: present in 40 to 50% of people with Parkinson's disease
- Cognitive impairment: mild cognitive impairment affects approximately 50%; dementia develops in the majority over time
- Speech and swallowing difficulties in advanced disease: the voice becomes very quiet and the speech slurred; difficulty swallowing becomes a serious complication at later stages

Risk Factors

Non-modifiable

- **Age:** risk increases sharply after 60; affects approximately 1 in 500 adults and 1 in 100 adults over 80
- **Sex:** men are 1.4 times more likely than women
- **Genetics:** certain gene mutations significantly increase risk, particularly for early-onset cases

Modifiable

- **Pesticide and herbicide exposure:** consistently elevated risk in agricultural and horticultural workers, with greater exposure linked to higher risk
- **Repeated head trauma:** relevant to contact sport athletes (connection to sports therapy practice)
- **Physical inactivity:** regular aerobic exercise appears protective against Parkinson's disease and slows progression in existing disease
- **Air pollution:** emerging evidence for particulate matter exposure as a risk factor

Quality of Life

Progressive disability leads to gradual loss of independence over years to decades

- **Falls and fractures:** postural instability makes falls a major risk; directly connects to the osteoporosis and sarcopenia content from Week 5
- **Communication difficulties:** the voice becomes very quiet and speech increasingly difficult to understand, which affects social interaction and confidence significantly
- **Mental health:** depression affects 40 to 50% of people; anxiety affects approximately 40%; dementia develops in the majority over the course of the disease
- **Employment:** many people leave work within 3 to 4 years of diagnosis due to motor and cognitive symptoms
- **Carer burden:** as the disease progresses, substantial unpaid care is required from family members

Exercise-based interventions have strong evidence for improving motor function, mood, cognition, and quality of life in Parkinson's disease; this is directly relevant to Exercise Science and Sports Therapy graduates

Sources

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