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內文：

I. Abstract

1. The prevalence of Parkinson's disease (PD) is expected to double over the next 20 years
2. This progressive disease has several implications relating to oral health.
3. This article reviews the epidemiology, pathophysiology, and characteristics of PD, as well as the treatments and oral health considerations to enable dental hygienists to undertake patient management and provide optimal care.

II. Introduction

1. A common neurodegenerative disorder
2. Be characterized by limitations in both motor and non-motor skills as well as in neuropsychiatric symptoms
3. Key oral health factors will be explored and recommendations to maintain optimal oral health while coping with PD
4. Current research regarding the potential therapeutic benefits of pulp stem cells to assist with diseases of the central nervous system will also be briefly explored.

III. Epidemiology

1. 1st: Alzheimer's disease ,2nd: Parkinson's disease
2. Worldwide prevalence: 4~6 million, and is expected about 8.7 ~9.3 million by 2030
3. Not correlate with ethnicity, but higher in men
4. Mean age of onset is around 57 years; very few diagnoses are reported <40 or> 85, drastic increase in number after age 60
5. Most cases reported before age 50 are linked to genetics, whereas later onset is more often associated with environment

Age	+
Genetics	+
Environmental:	
Smoking	-
Pesticides	+
Dairy product consumption	+
Metals	L
Hormonal influence	L
NSAID usage	L
Vascular diseases	L
Diabetes	L
Magnetic field exposure	L
Chemical exposures	L

+ , positive correlation; - , negative correlation; L, likely positive correlation.
References: 4, 8.

IV. Characteristics

1. Symptoms of PD develop gradually and are highly varied
2. Impairments of both motor and non-motor skills are common
3. Both of these characteristics change the centre of gravity ,balance and coordination, which may lead to falls and injuries

Resting tremor

1. The most common and apparent sign of PD
2. Express in one's hands ,arms, legs, jaw, tongue, forehead, or eyelids
3. The initiation of resting tremors is often unilateral presenting in one or two fingers while at rest

Bradykinesia 動作遲緩

1. Muscular rigidity or stiffness in body movement
2. Often accompanied by hypokinesia(運動能力低下) and akinesia(無法運

動)

Akinesia

1. Lack of facial expression (mask-like face)
2. Open mouth
3. Limited blinking of the eyes
4. Dysphagia(吞嚥困難) sialorrhea(唾液分泌過多)
5. Speech ability
6. Thermoregulation issues (autonomic dysfunction)

Postural instability

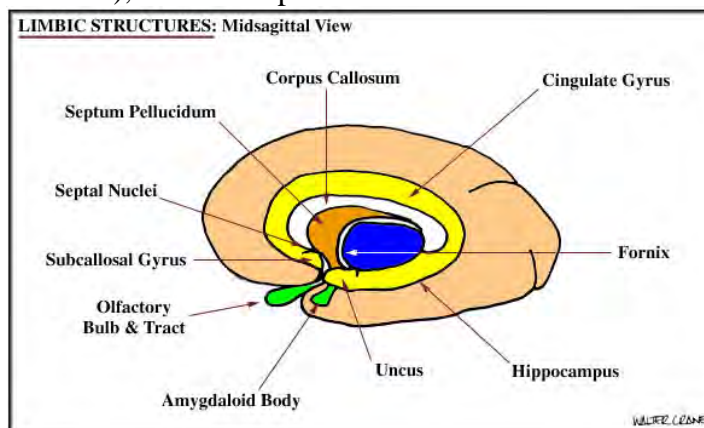
Postural instability may set in resulting in a festinated gait and a forward flexion of the upper body

Non-motor symptoms

Constipation, hypotension, fainting, cramps(痙攣), muscle aches and pains, olfactory dysfunction, sexual dysfunction, urinary/bladder dysfunction, visual dysfunction and various sleep disorders
Anxiety, depression, confusion, psychosis, memory loss, apathy(無情感), cognitive dysfunction and hallucinations

V. Pathophysiology

1. A complicated disease of the central nervous system
2. Associated with the loss of dopaminergic neurons, but the definitive cause of PD has not been determined
3. Dopamine serves the role of an inhibitory neurotransmitter and acetylcholine, which is dopamine's counterpart, acts as the excitatory neurotransmitter
4. Dopaminergic neurons send messages to the corpus striatum(motor function), which is a part of the midbrain and the forebrain (emotions)



5. The disease present until 60–80% of the neurons are lost or destroyed

VI. Treatments

1. Currently there are no available treatments or therapies to stop the development and/or progression of PD
2. Pharmacological interventions are designed to stimulate parts of the brain where dopamine functions and maximize the amount of dopamine that reaches the brain-- Levodopa
3. In some individuals the drug has diminished effectiveness over time

Table 2. Parkinson's disease medications and oral implications

Generic name	Xerostomia	Bruxism	Dry throat	Gingivitis	Tongue oedema	Abnormal taste	Glossitis	Orthostatic hypotension
Amantadine	X							X
Benzotropine	X							
Biperiden	X							
Bromocriptine								X
Cabergoline	X							X
Levodopa	X	X						X
Levodopa and Carbidopa	X	X				X	X	X
Levodopa and Entacapone	X	X				X	X	X
Pergolide	X							X
Pramipexole								X
Procyclidine	X							
Rasagiline	X							
Ropinirole	X			X	X		X	X
Selegiline		X				X		X
Trihexyphenidyl	X		X					

- Two surgical procedures are available: ablation procedure/ implantation of a pacemaker-like device
- Pulp stem cells yield several neuroprotective and neurotrophic factors, high levels of colony formation and proliferative abilities, as well as self-renewal qualities, making them highly desirable as a PD therapy and/ or treatment

VII. Oral health considerations

- Patients are more prone to oral disease owing to the many physical and mental changes associated with the disease.
- Individuals with PD have more periodontal involvement and multiple caires
- Prevention is a key component for maintaining oral health
- Patients may not tolerate long amounts of chair time

Motor impairment

Attrition, orofacial pain, discomfort of the temporomandibular joint, cracked teeth, and biting of the tongue, cheeks and / or lips

Xerostomia

- Approximately 55% of patients with PD have xerostomia owing to medications
- Impact oral health, speech, mouth ulceration, poor denture retention
- Treatment: sipping water frequently, utilizing sugar-free hard candies, and requently chewing sugarfree, xylitol-containing gum, salivary substitutes or pharmaceuticals ((Salagen/ Evoxac)
- Discomfort in the mouth may also contribute to a lack of oral hygiene self-care

Burning mouth syndrome

- Most likely associated with levodopa medication, or deficiencies in vitamins or minerals and hormonal imbalances
- The most common sites for burning mouth syndrome include the tongue, hard palate, lips and the alveolar ridge of edentulous individuals

Dysphagia/ Sialorrhea

- Impact health :weight loss, stress and fear while eating, challenges with taking medications
- => acid reflux (erosion)
=> sialorrhea (thick and rope like saliva)-> angular cheilosis

Nutrition

- Frequent meal and snacks

Dental caries
Root caries
Periodontal disease
Attrition
Orofacial pain
TMJ discomfort
Cracked teeth
Erosion
Biting of tongue, lips or cheeks
Xerostomia
Mouth ulcers
Burning mouth
Denture retention issues
Dysphagia
Sialorrhea

2. High in sugar, soft and sticky snack making plaque removal more challenging which increase the risk of caries and periodontal disease

Oral self-care

1. Physical and mental difficulty
2. Use powered toothbrushes or manual toothbrush head (Surround)
3. Chlorhexidine or antimicrobial oral rinses fluoridated products



VIII. Patient management strategies

1. Appointment: 60–90 min after their medications have been taken
2. A stress-free, short, mid-morning appointment
3. Communication can present a challenge
 - > use of questions that are closed-ended, only requiring a yes or no response
 - > Allowing adequate time for the patient to answer the questions
 - > Always keep the patient a part of the conversation
4. Patient position: dysphagia (a semi-reclined position should be utilized (45°)
5. Having an assistant
6. Cradling of the patient’s head during treatment
7. Patients with PD should not be left alone at any point throughout the dental visit
8. Recall every 3~4months

IX. Conclusion

1. Parkinson’s disease is a progressive central nervous system disorder characterized by tremors, rigidity and impaired motor function.
2. Oral involvement is significant and affects the oral health status of the patient
3. Dentist(Dental hygienists) must be cognizant of the oral signs and symptoms as well as treatment and oral self-care modifications that are necessary to ensure optimal dental hygiene care is rendered in a safe, comfortable and efficient manner

題號	題目
1	Which one is incorrect about xerostomia? (A) Is difficult to treat because the causes are vary (B) Many medicine have been reported xerostomia as a side effect (C) Xerostomia is not a common problem especially in older adult (D) Continuous sips of water make patient feel better
答案(C)	出處：Oral and maxillofacial pathology, 3 rd edition, p465
題號	題目
2	Which one is correct about burning mouth syndrome? (A) Four to seven times more likely in men (B) Vit. B deficiency is one of the factors associate with burning mouth syndrome (C) There is decreasing prevalence with advancing age (D) Mucosal changes are always visible
答案(B)	出處：Oral and maxillofacial pathology, 3 rd edition, p873