

URINARY INCONTINENCE IN DEMENTED WOMEN (DEMENTIA) .WHAT CAN WE DO ?

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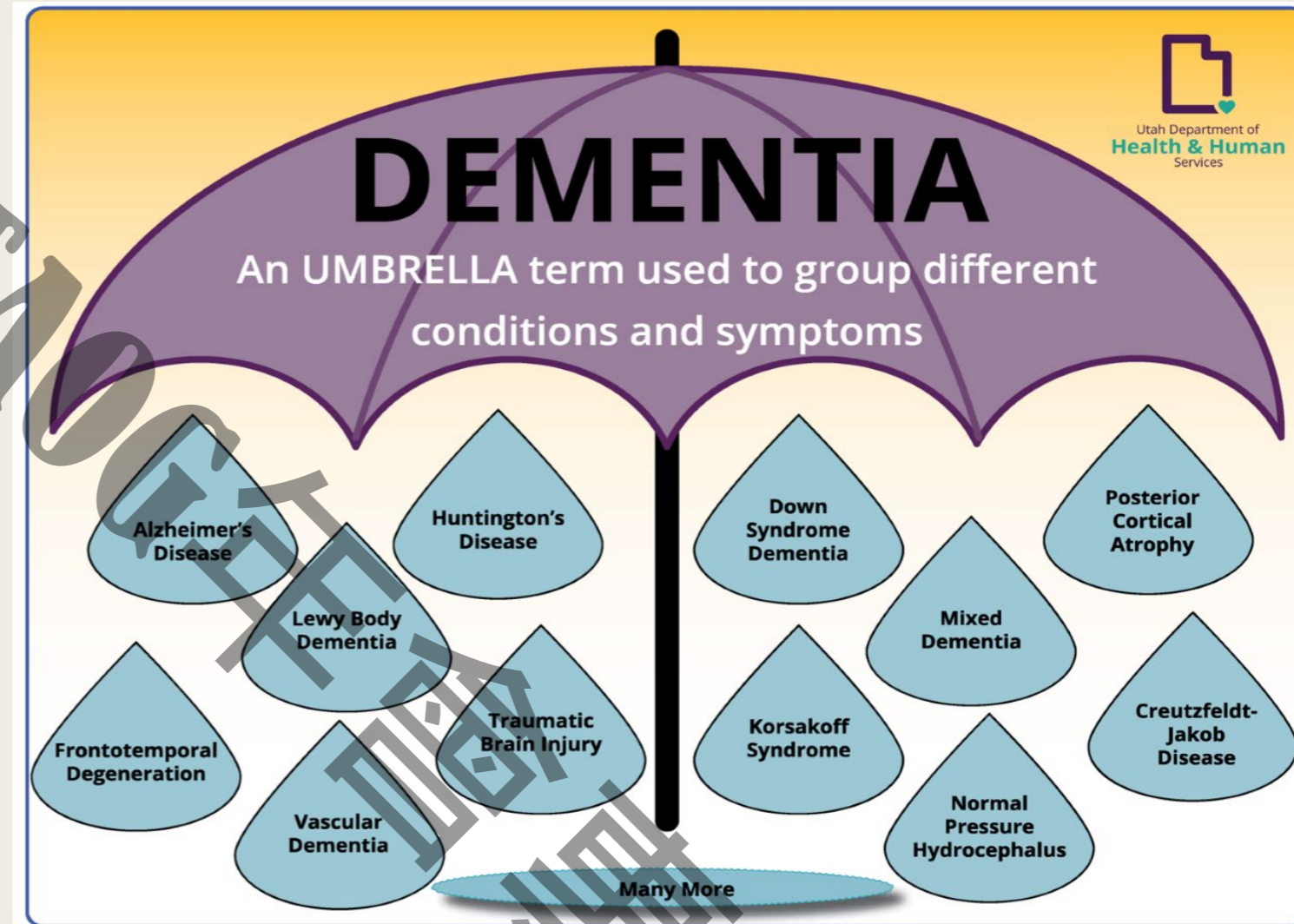
台灣婦女泌尿暨骨盆學會副秘書長

Contents

- ✓ What is dementia ?
- ✓ Prevalence rate of UI in dementia
- ✓ Etiology of UI in dementia
- ✓ Established urinary incontinence
- ✓ Evaluation
- ✓ Management

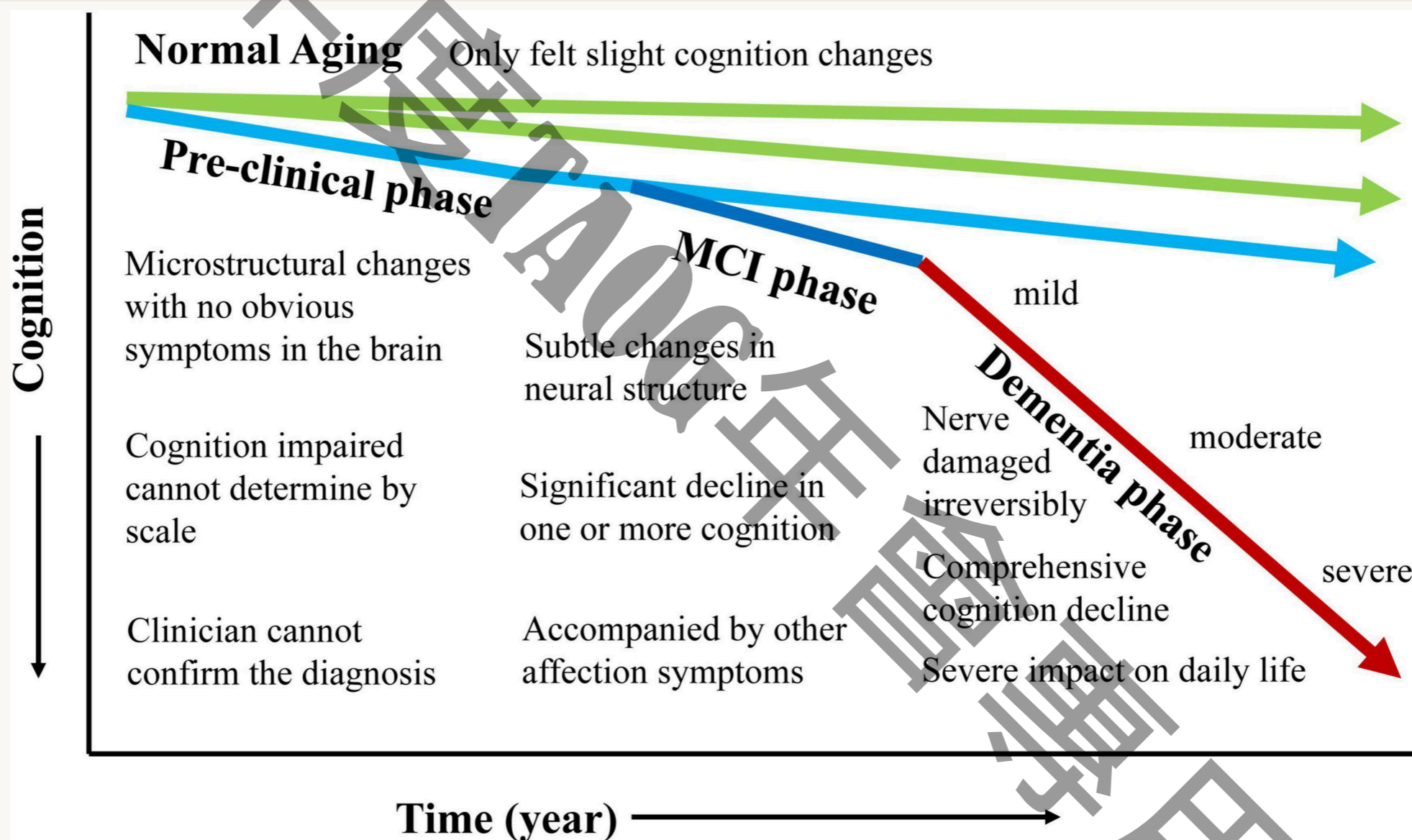
Nature of the Dementia

- Not one condition but more **an umbrella term** for a variety of conditions, mainly neurological, affect person's brain function (**thinking, behavior and feelings**) (Robinson, 2018)
- Central nervous system (CNS),
- Progressive, Irreversible



Cognitive Continuum

Mild cognitive impairment(MCI) (輕度知能障礙)



Diagnostic Criteria for Dementia

DSM-5: Dementia = Major neurocognitive disorders

- Evidence of significant cognitive decline from a previous level of performance in **one or more** cognitive domains:
 - Learning and memory (學習及記憶力)
 - Language(語言)
 - Executive ability (執行工作能力)
 - Complex attention (集中注意力)
 - Visual perception, praxis (視覺空間感知能力)
 - Social cognition (社交溝通能力)

- The cognitive deficits interfere with independence in everyday activities. (認知功能缺損必須影響到患者的日常生活)

Dementia course

□ 依照病程進展可分為輕度知能障礙(MCI)、輕度（初期）、中度（中期）、重度（晚期）

□ **輕度症狀：**

都很輕微，患者意識都很清楚，外表看起來跟一般正常人並沒有兩樣，最明顯的為記憶力衰退，特別是記不住日常、最近且立即的事物，其他像是語言、算術、空間感、時間概念、抽象思考、社交能力、判斷力等也會出現障礙，產生異常行為，過去熟悉的工作可能無法勝任，影響日常起居，伴隨這些行為的心態很可能變得疑心病重、被害妄想、憂鬱、焦慮、等精神疾病症狀

Dementia course

□ 中度症狀：

生活能力會繼續下降，本來應該認識的家人或朋友可能也會認不出來，可能分不清楚現在的季節，本來常走動、會認識的地方可能也會因為**搞不清楚方向而迷路**，煮飯、洗衣服或是上街買東西等活動更無法自行完成，**個人清潔衛生處理不好**，衣服穿不整齊等等

□ 重度症狀：

完全依賴別人照顧，記憶力嚴重喪失，幾乎不記得生命中重要的事情，分不清楚白天晚上，家裡的環境也不認識而常常走錯房間，離開家門就不知道回來的路，朋友或家人可能已經全都不認識，

□ 平均病程大約在 8-10 年



Mini-Mental Status Examination

施測日期： ____/____/____

教育程度： _____

錯誤 正確

- 0 1 (1)現在是民國幾年？
- 0 1 (2)現在是哪一月份？
- 0 1 (3)今天是幾號？
- 0 1 (4)今天星期幾？
- 0 1 (5)現在是什麼季節？

社區訪視：自家/他家

住院/門診

- 0 1 (6)這裡是哪一個縣、市？
- 0 1 (7)這裡是哪一個市鎮鄉區？
- 0 1 (8)這裡是哪一個村、里或俗名？
- 0 1 (9)這裡的門號、路名？
- 0 1 (10)這裡是幾樓？

(11)請重述三個名稱(按第一次重述結果計分，最多只能重複練習三次)

- 0 1 眼鏡
- 0 1 紅色
- 0 1 誠實

(12-a)(100減7，遞減5次)93____；86____；79____；72____；65____

(12-b)(倒著念)「家和萬事興」，依達正確之順序給分_____

- 0 1 (13)眼鏡 (三分鐘以後，說出剛才記下的三種名稱)
- 0 1 (14)紅色
- 0 1 (15)誠實
- 0 1 (16) (拿出手錶)這是什麼？_____
- 0 1 (17) (拿出鉛筆)這是什麼？_____
- 0 1 (18)「心安菜根香」《知足天地寬》(只能清晰的念一次)
- 0 1 (19) (請念一遍，並做做看)「請閉上眼睛」
- 0 1 (20)左手拿紙
- 0 1 雙手對折
- 0 1 置於大腿
- 0 1 (21)在紙上寫一句完整的句子
- 0 1 (18)這裡有一個圖形，請在同一張紙上照描一遍

總分為 _____ 分

施測者： _____

Mini-Mental Status Examination (簡易智能篩檢測驗)

共有11個題目，滿分30分。**全民健康保險**規定診斷為阿茲海默氏症病患藥品給付為**MMSE 10~26分**。

臨床失智評分量表 (CDR, Clinical Dementia Rating)

描述區分成六個向度:

1.定向感

2.記憶

3.判斷與問題解決

4.家庭功能/嗜好

5.公共事務的參與

6.基本日常活動

臨床失智評定量表

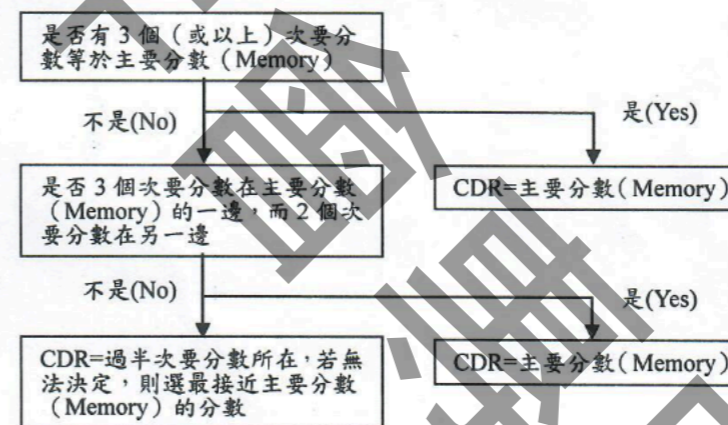
Clinical Dementia Rating (CDR) 評分日期: _____

	健康 0	疑似/輕微 0.5	輕度 1	中度 2	重度 3
Memory 記憶	• 無記憶喪失 • 偶爾遺忘	• 輕微的遺忘 • 回憶片段 • 良性的遺忘	• 對最近事物遺忘 • 影響日常生活	• 嚴重記憶喪失 • 只記得很熟的事物 • 無法記得新事物	• 嚴重記憶喪失 • 只有片段記憶
Orientation 定向力	• 人、時、地定位正常	• 除了對時間順序稍有困難外，其餘均正常	• 時間順序有問題 • 對人、地定位正常 • 有時會找不到路	• 對時、地定位經常有問題	• 只有人的定位正常
Judgment & Problem Solving 判斷及解決問題	• 日常問題包括財務及商業性的事務都能處理很好	• 處理問題時，在分析類似性和差異性時稍有困難	• 處理問題時，在分析類似性和差異性時有中度困難 • 社會價值的判斷力通常還能維持	• 處理問題時，在分析類似性和差異性時有嚴重障礙 • 社會價值的判斷力已受影響	• 無法做判斷或解決問題
Community Affairs 社區事務	• 和平常一樣能獨立處理有關工作、購物、業務、財務和社區活動	• 對上述活動有疑似或輕度障礙	• 雖參與上述活動但無法獨立，偶爾仍有正常表現	• 無法獨立勝任家庭外的事務，但外表看來正常	• 無法獨立勝任家庭外的事務，但外表看來即有病態
Home Functions 家居及嗜好	• 家庭生活、嗜好及知性興趣維持良好	• 對上述活動偶爾有障礙	• 較困難的家事已經不做 • 放棄複雜外務、嗜好和興趣	• 只有簡單的家事還能做 • 興趣很少，也很難維持	• 整天在自己房間
Personal Care 個人照料	• 有自我照顧的能力		• 需要時常的提醒	• 在穿衣、個人衛生及個人情緒，需要協助	• 個人衛生失禁，需要專人協助

Profound 深度 CDR 4	• 說話無法理解或不相關，無法理解或遵照簡單指示；偶爾認得配偶或照顧者 • 吃飯只會用手指頭，不太會用餐具，且須人幫忙	• 大小便經常失禁 • 大部份時間無法行動，在扶助下可走幾步，甚少外出；常有無目的的動作
Terminal 末期 CDR 5	• 說話無法理解或沒有反應；無法辨認家人 • 需人餵食，可能會有吞嚥困難而需使用鼻胃管餵食	• 大小便失禁 • 臥床、無法坐立、站立、肢體攣縮

註：只有記憶才是主要項目，其他都是次要項目。如於兩格中無法決定選那一格，請圈嚴重者

計分標準



CDR 總分= _____ 分

特殊案例

Memory=0	2個或以上次要分數大於0	CDR=0.5
Memory=0.5	3個或以上次要分數大於或等於1	CDR=1
Memory>0	過半次要分數等於0	CDR=0.5
	2個次要分數小於Memory；2個大於Memory；	CDR=Memory
	1個等於Memory	

評分人員: _____

Dementia population

- More than 35 million worldwide live with dementia, will expected to double by 2030. (**double every 20 years**) (Alzheimers Dement.2013)
- 2021 (WHO) Global status report on the public health response to dementia : more than 55 million worldwide

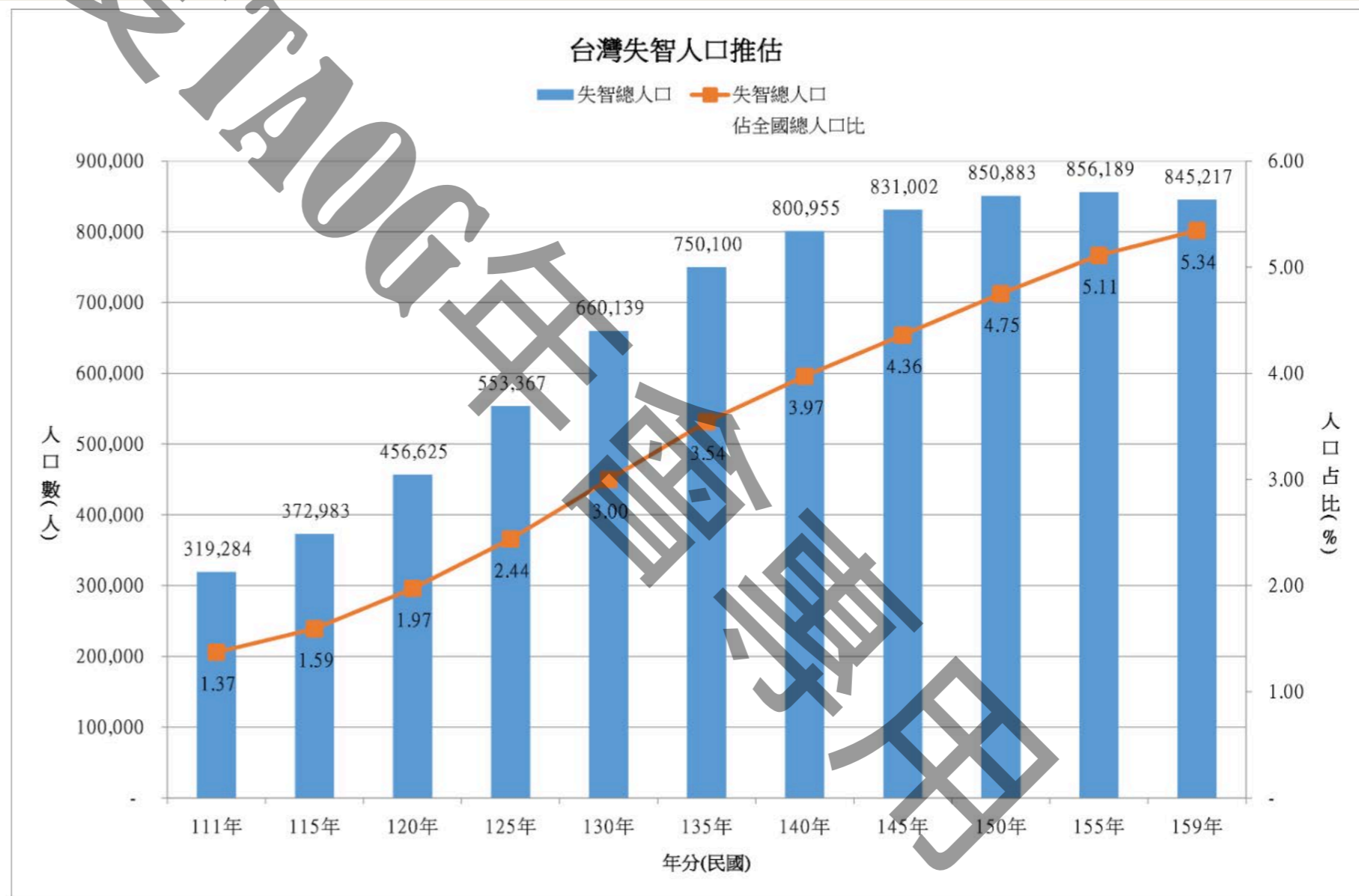
台灣失智人口現況

表一：五歲分年齡層失智症盛行率

年齡(歲)	65~69	70~74	75~79	80~84	85~89	≥90
失智症盛行率(%)	3.40	3.46	7.19	13.03	21.92	36.88

□ 民國110年12月底台灣失智人口共312,166人，佔全國總人口**1.34%**

□ **93.8%** 住在家裡



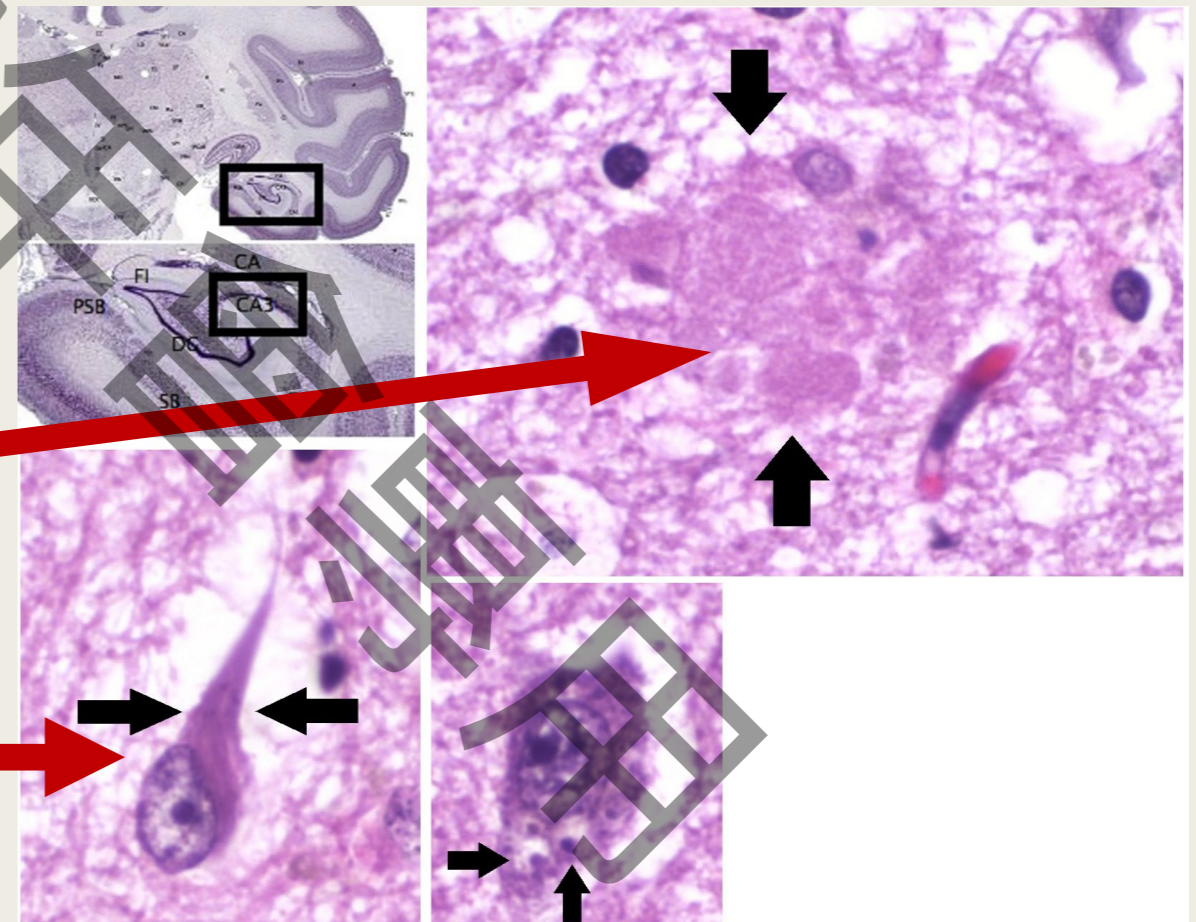
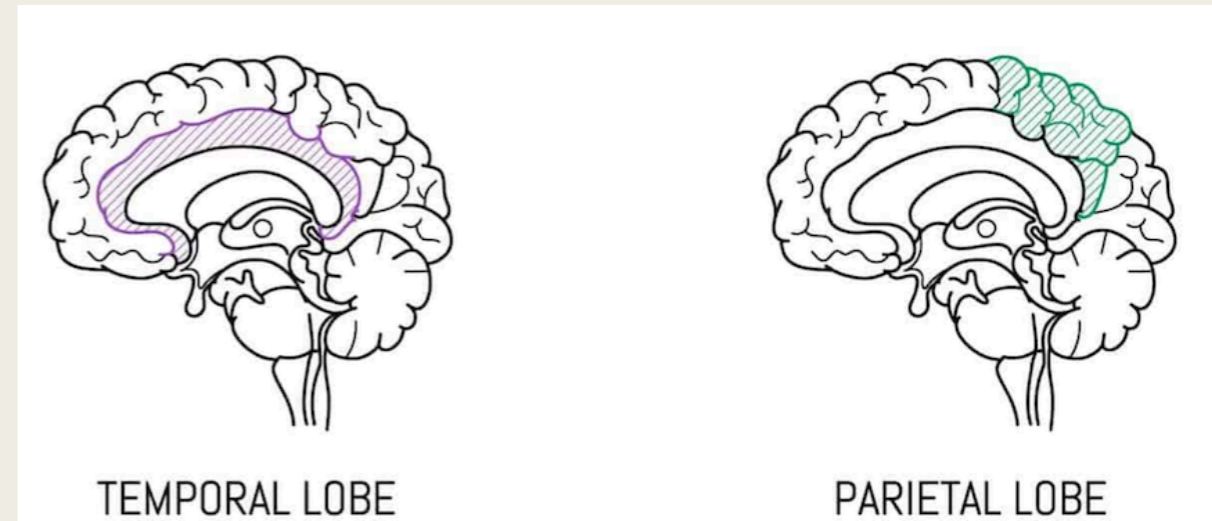
Prevalent Causes of Dementia

- Alzheimer's Disease (AD) : 65% - 85%
- Lewy body Dementia : 15% - 30%
- Frontotemporal Dementia : 5% - 10%
- Multi-infarct(Vascular) Dementia : 2% - 10%
- Other Dementia : 5% - 10%

Louis, Elan D., and Stephan A. Mayer. Merritt's neurology. Lippincott Williams & Wilkins, 2021.

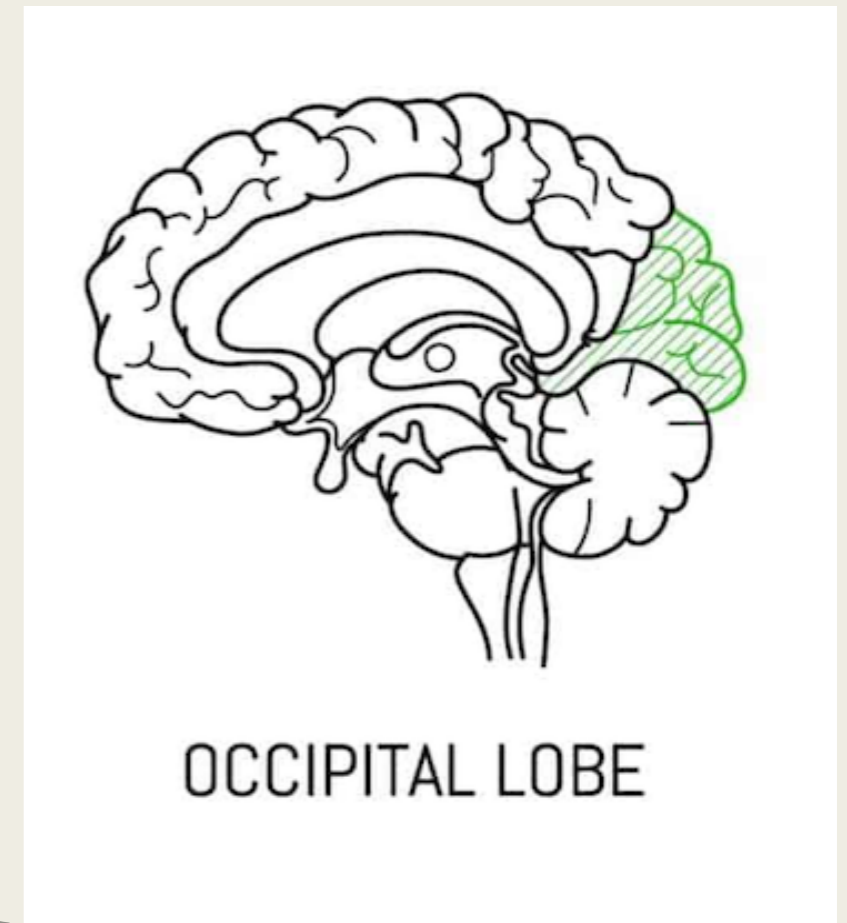
Alzheimer's Disease (AD)

- most common cause of dementia with 60% to 70% in Taiwan.(Acta Neurol Taiwan.2008)
- Over 65 yrs
- Lesion **Temporal(hippocampus)** and **parietal lobe**
 - a. Prominent **memory** and **language impairment**
 - b. Amyloid proteins in **amyloid plaques**
 - c. Phosphorylated **tau** proteins in neurofibrillary tangles(NFTs)



Lewy Body Dementia(LBD)

- Parkinson's disease dementia & Dementia with Lewy bodies
- Lesion : occipital lobes
- Over 70 yrs
- α -synuclein accumulation in brain: **Lewy body**

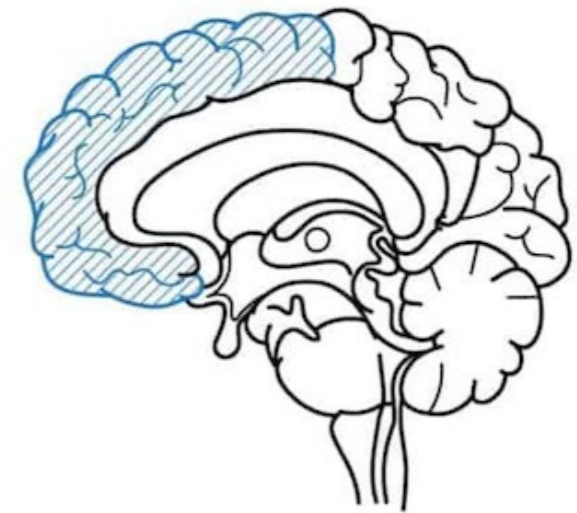


Lewy Body Dementia(LBD)

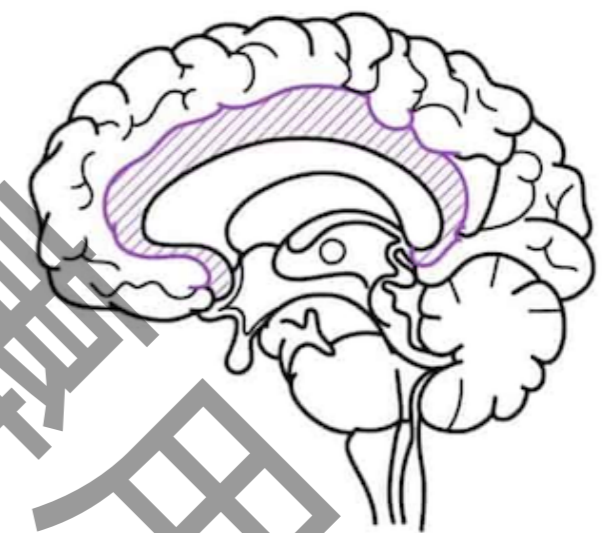
- Vivid visual hallucination(看到栩栩如生的人或是小動物
視幻覺)
- Fluctuating consciousness(意識反反覆覆,時而清醒時而
混亂)
- Parkinsonism (rigidity, bradykinesia, rest tremor)(身體僵
硬,遲緩,手抖,走路不穩)
- REM sleep behavior disorder (RBD)(大吼大叫和拳打腳
踢)
- **Autonomic dysfunction** : urinary incontinence, urinary
retention, nocturnal polyuria

Frontotemporal Dementia

- Lesion : **frontal & temporal lobes**
- Over 50 yrs
- Behavioral variant (行為異常, 人格改變)
 - Apathy , Behavior disinhibition , Compulsive behavior , Diet: hyperorality
 - Emotion: loss of empathy ,
- Primary progressive aphasia(語言障礙)
 - Impaired semantic knowledge & single word comprehension
 - Impaired language fluency and grammar



FRONTAL LOBE





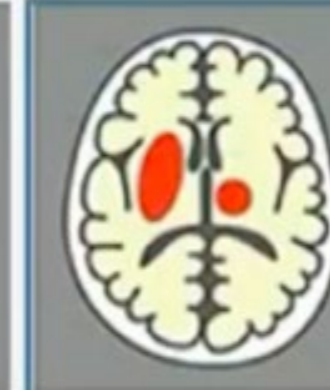



TEMPORAL LOBE

Multi-infarct(Vascular) Dementia

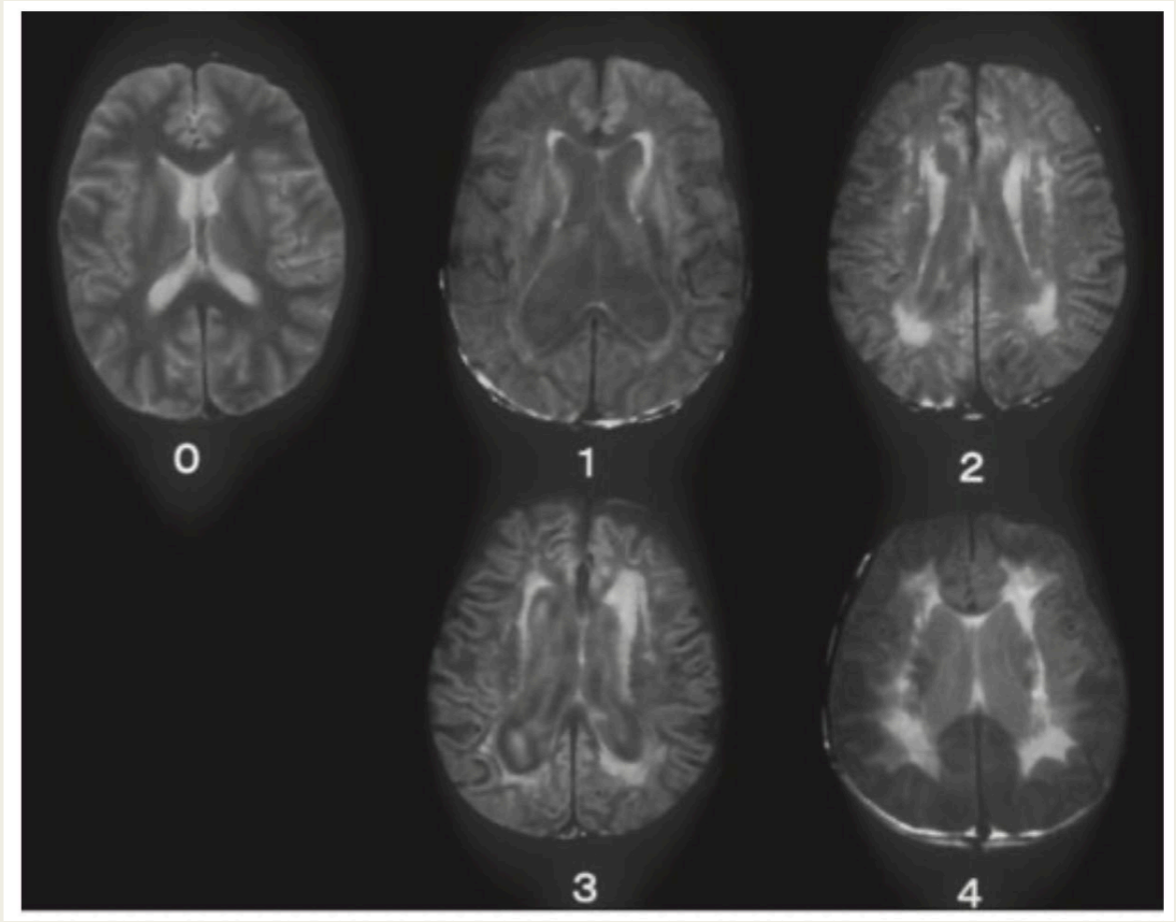
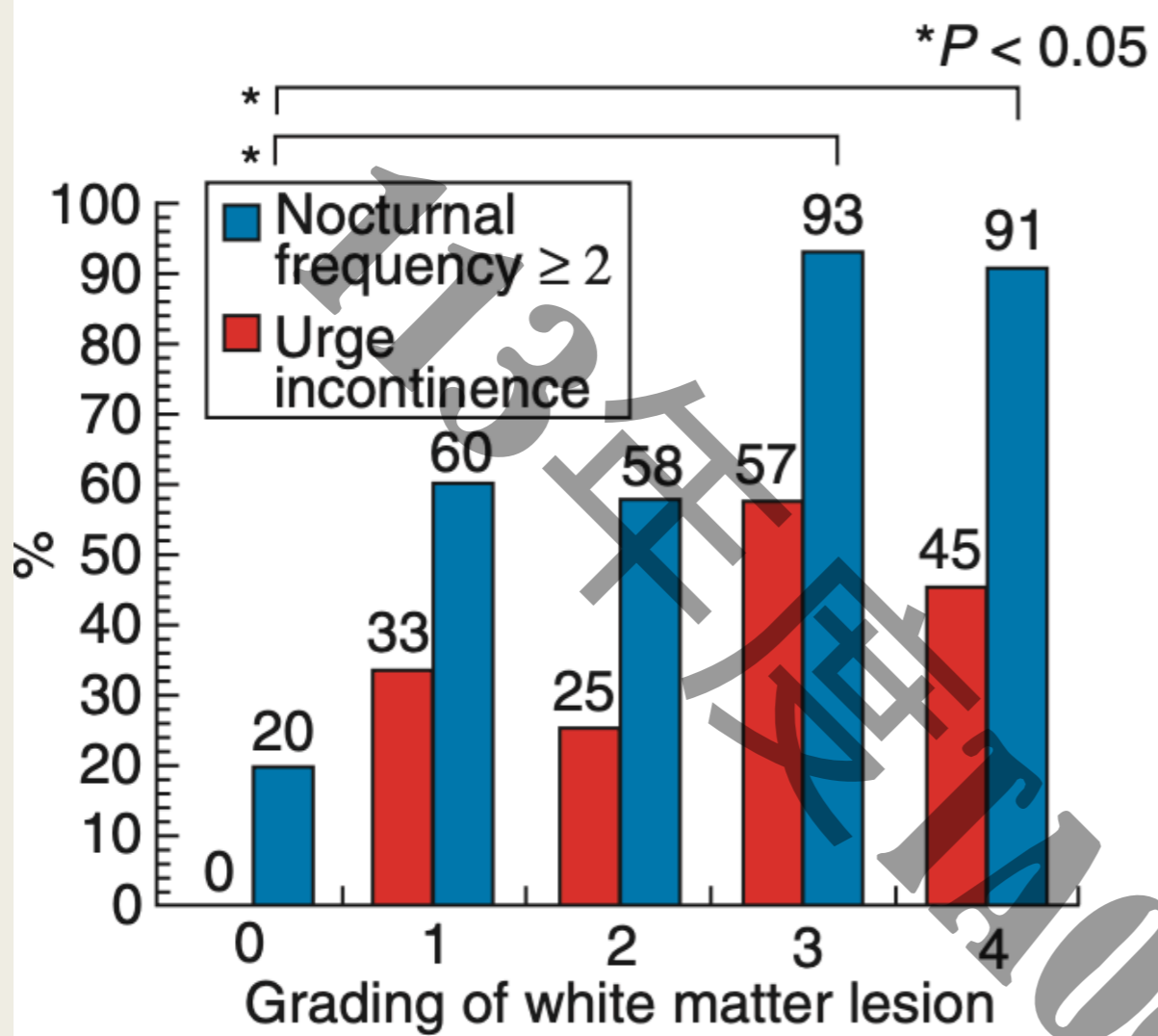
Ischemic or hypoxic brain damage

Different cerebrovascular pathologies associated with dementia

					
Large infarcts or cortical infarcts	Multiple small or lacunes	Strategic infarcts / lacunes	Hypoperfusive lesions, HS	Cerebral haemorrhages	CVD pathology with AD
LVD; atherosclerosis	SVD; micro-vascular changes	Embolic/ hypertensive disease	Cardiac arrest; MI	Different angiopathies	Stroke injury and ageing-related AD
Focal signs, stepwise progression	No or slight focal signs, insidious progression	Focal signs, stepwise progression	Absence of focal signs, insidious progression	Focal signs, stepwise progression	Absence of focal signs, insidious progression
MID or cortical VaD	SIVD	Strategic infarct dementia	VCI or VaD	VCI or dementia with CH	VaD with AD pathology

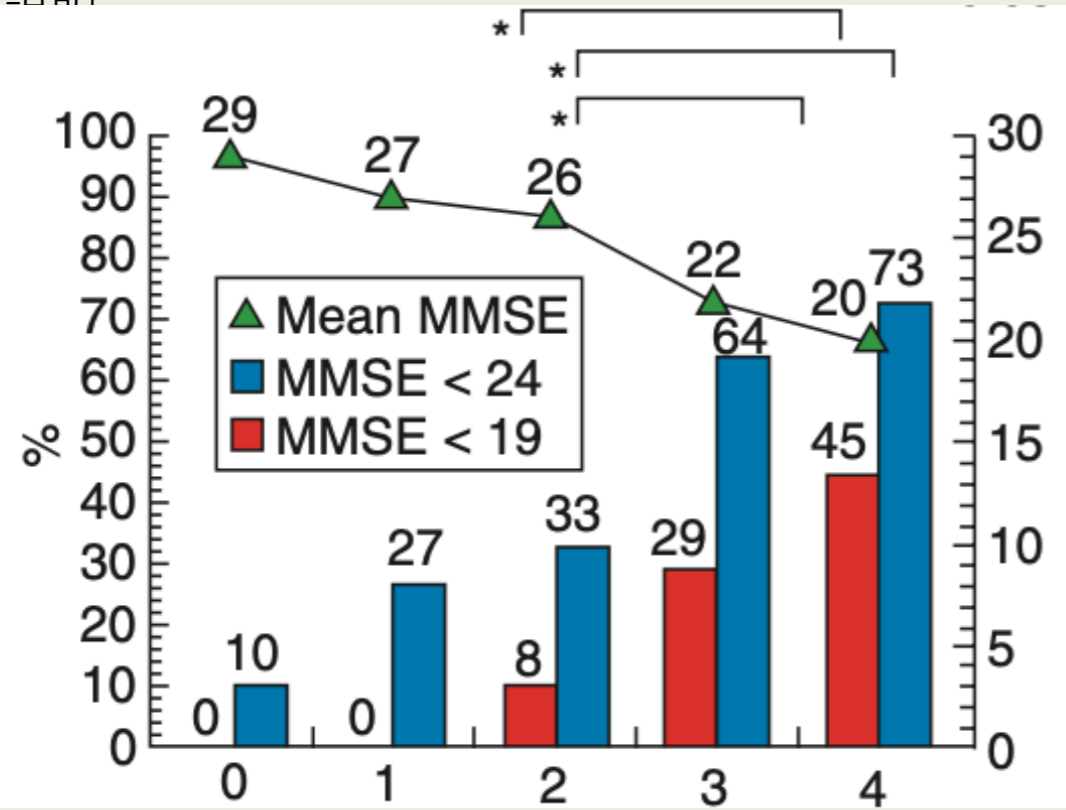
Multi-infarct(Vascular) Dementia

- **Second common causes** of dementia in Taiwan: often have **stroke** like episodes
- **Subcortical** dementia (AD, LBD, FTD are all cortical dementia)
- Most commonly affect site : frontal lobe & subcortical area (**center of micturition reflex**)
- Features : Slow processing speed, inattention, executive dysfunction, gait disturbance, **urgency, incontinence**, emotional disturbance



cerebral white-matter lesions and urinary dysfunction (Kotsoris et al.)

说明



- urinary disturbance more common than cognitive
- nocturnia frequency more common than incontinence
- urinary disturbance in 50%, preceded development of dementia by 5 years or more

Medical Treatment

Acetylcholinesterase inhibitors(AChEI, :膽鹼酶抑制劑)

mild to moderate degree patient

1. donepezil (Aricept® 愛憶欣膜衣錠)
2. rivastigmine (Exelon® 憶思能膠囊、Exelon® Patch 憶思能穿皮貼片)
3. galantamine (Reminyl® 利憶靈持續藥效膠囊) 。

enrich acetylcholine levels
M1 receptors in brain

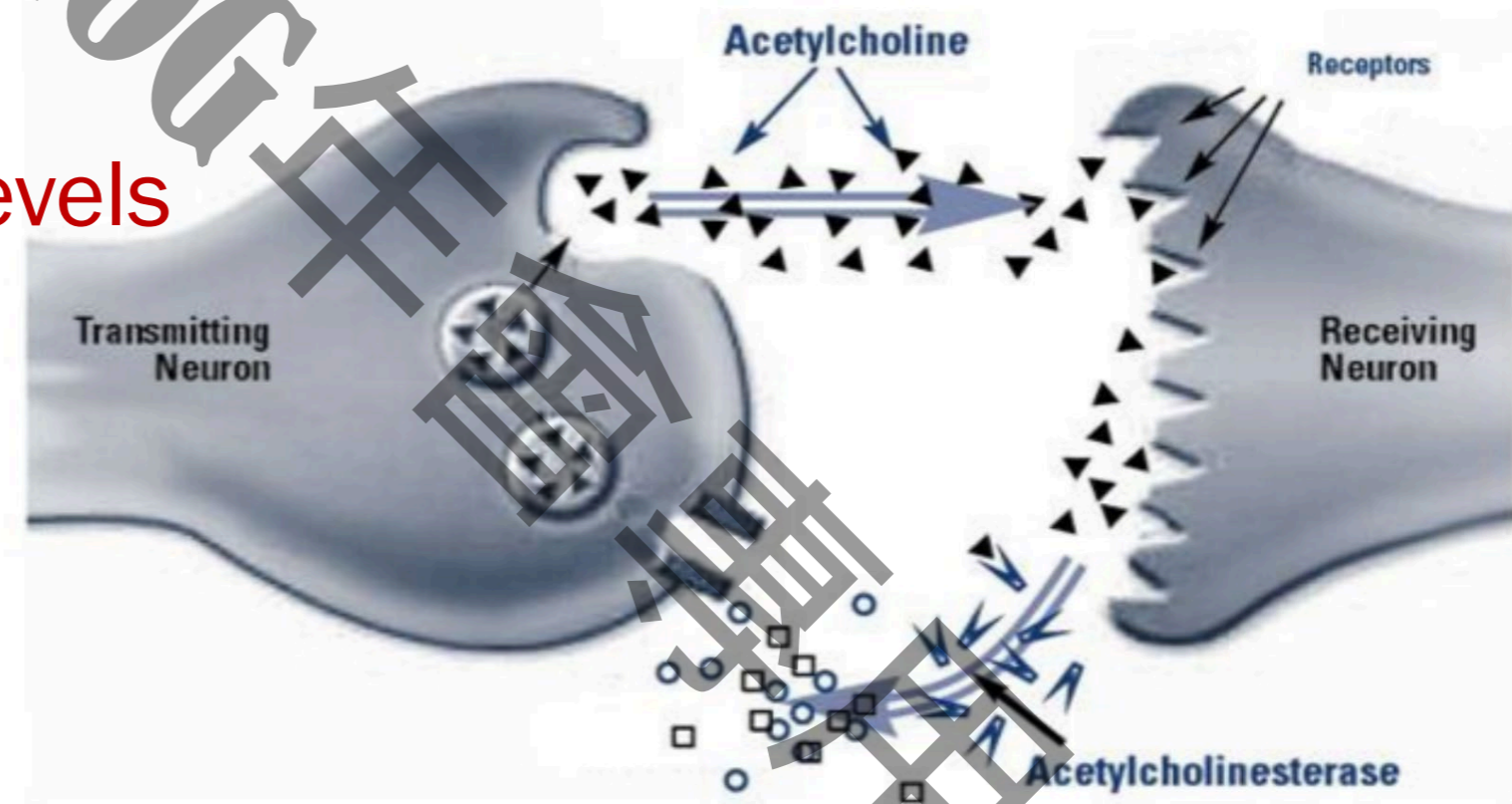


Fig. 1. After signalling, acetylcholine is released from receptors and broken down by acetylcholinesterase to be recycled in a continuous process.

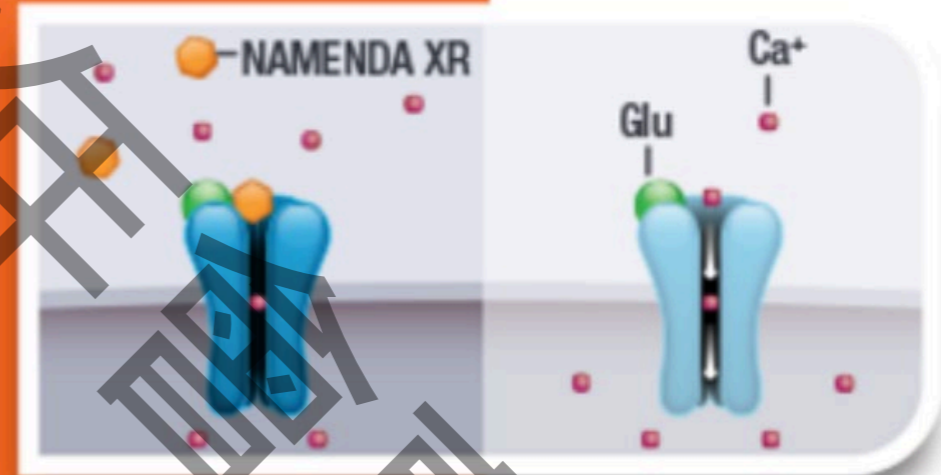
N-methyl-D-aspartate (NMDA) receptor antagonist

- Memantine(Witgen®)
- In moderate to severe degree patient
- Glutamate + NMDA receptor = cell death

NAMENDA XR = memantine

Glutamate Pathway

Sustained activation of NMDA* receptors may lead to excessive calcium influx, neuronal dysfunction, and cell death^{5,6}



NAMENDA XR

NAMENDA XR is believed to block sustained activation of NMDA receptors caused by abnormal glutamatergic activity^{1,5}

Prevalence rate of urinary incontinence in dementia

Low Urinary Tract Syndrome(LUTS) in dementia

□ The most frequent were **urgency** (64%), **frequency** (64%), and **incontinence** (57%). (Neurourol Urodyn 2008)

□ 65% incontinent subjects had fewer than three episodes per week

□ 11% had three to six episodes per week

□ 24% had incontinence once a day or more

(J Am Geriatr Soc 2009)

UI rates are higher in dementia than non-dementia

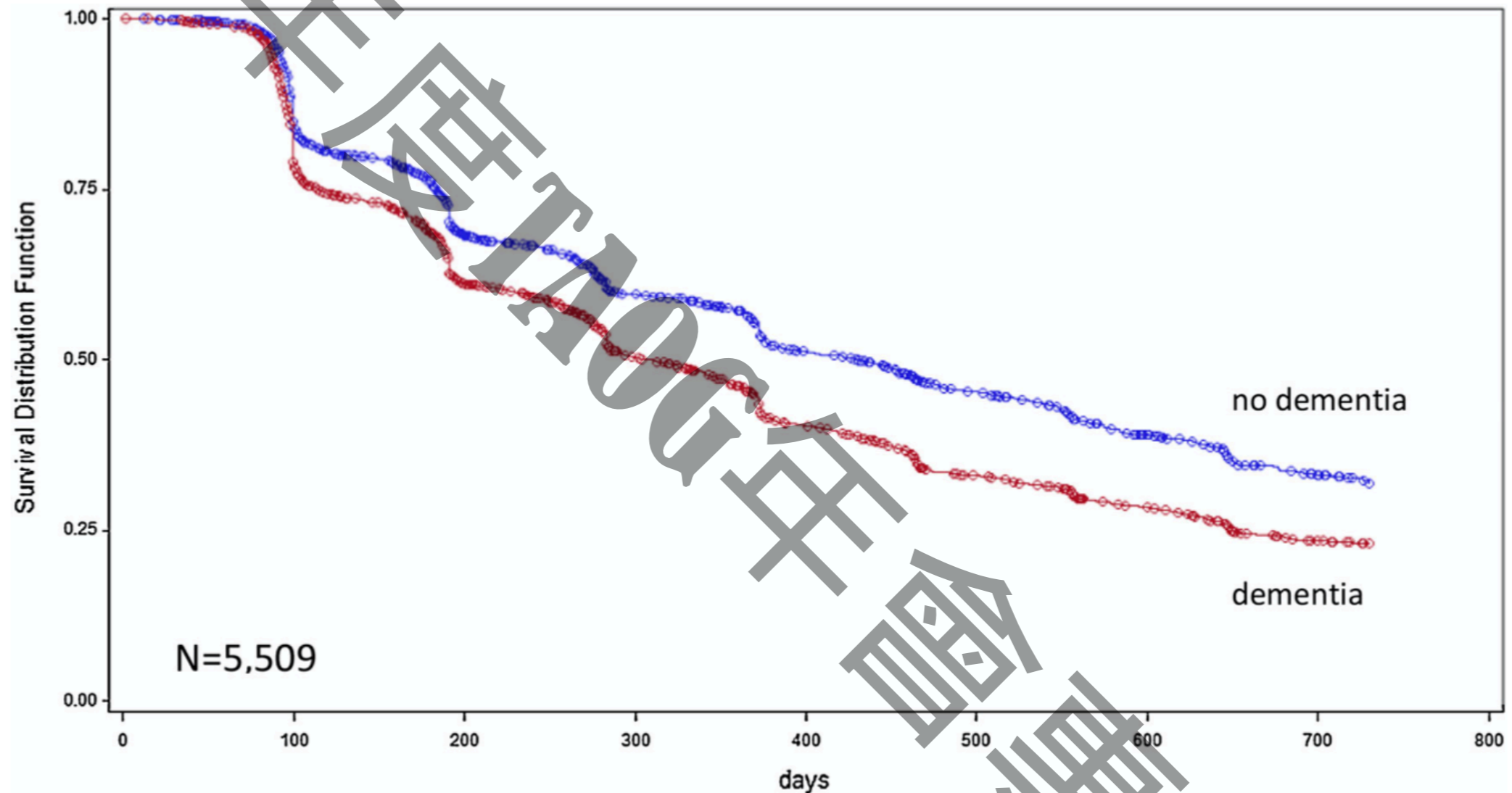


Fig. 1 Kaplan–Meier survival plot for loss of bladder continence following admission to a nursing home from Canadian Resident Assessment Instrument-Minimum Data Set (unpublished data)

Drugs Aging, 14 July 2015

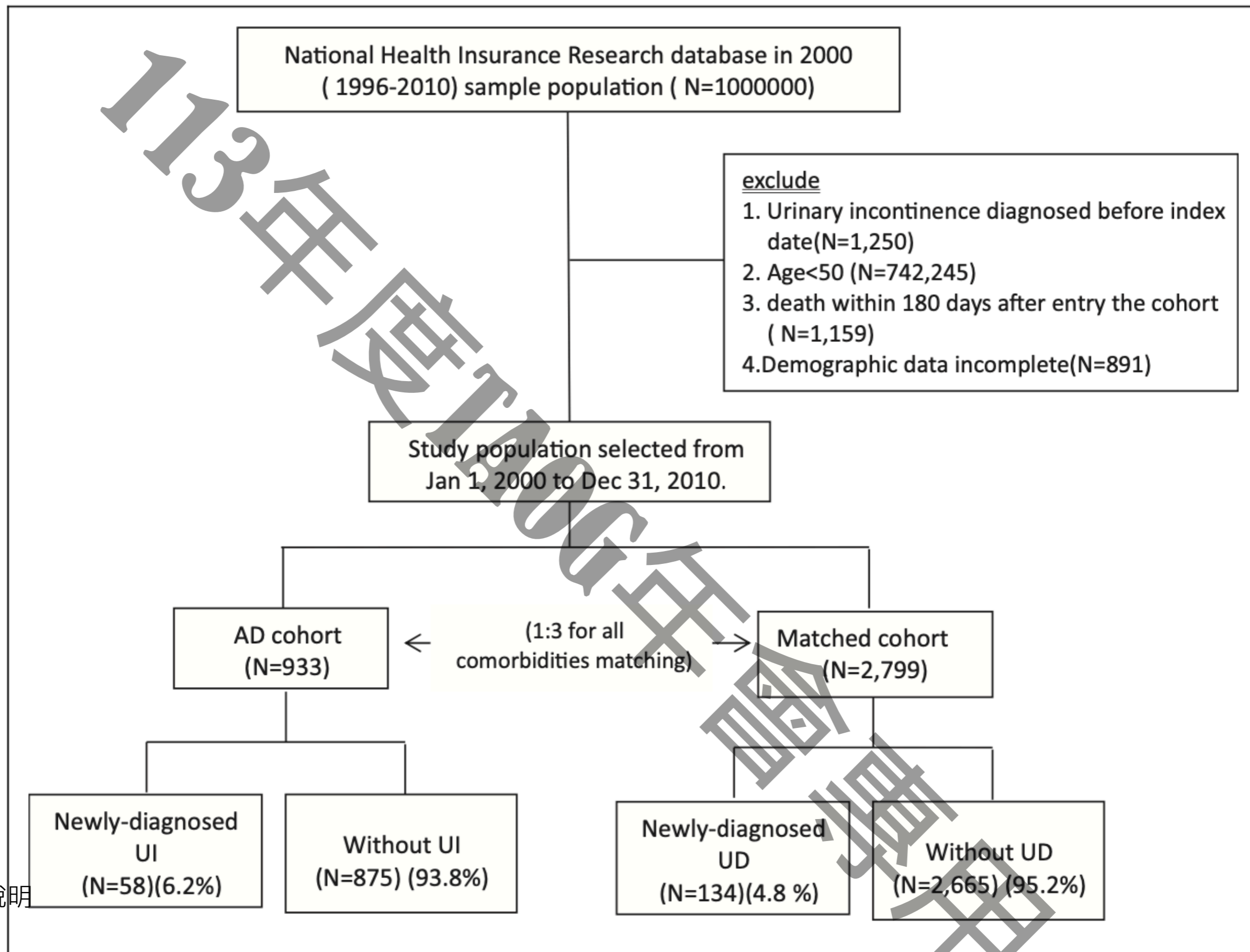
Prevalence rate of UI in dementia

- Varies from **11%** (outpatient clinics) to **93%** (institutional samples) (Neuro Urodyn.2017)
- UI prevalence in dementia patients is **74% in nursing homes** and **32% at home** (Hellström et al., 1994 Sweden)
- Dementia developing UI is greater when institutionalized compared to receiving home care (Orme et al., 2015)

Urinary Incontinence in Alzheimer's Disease: A Population-Based Cohort Study in Taiwan

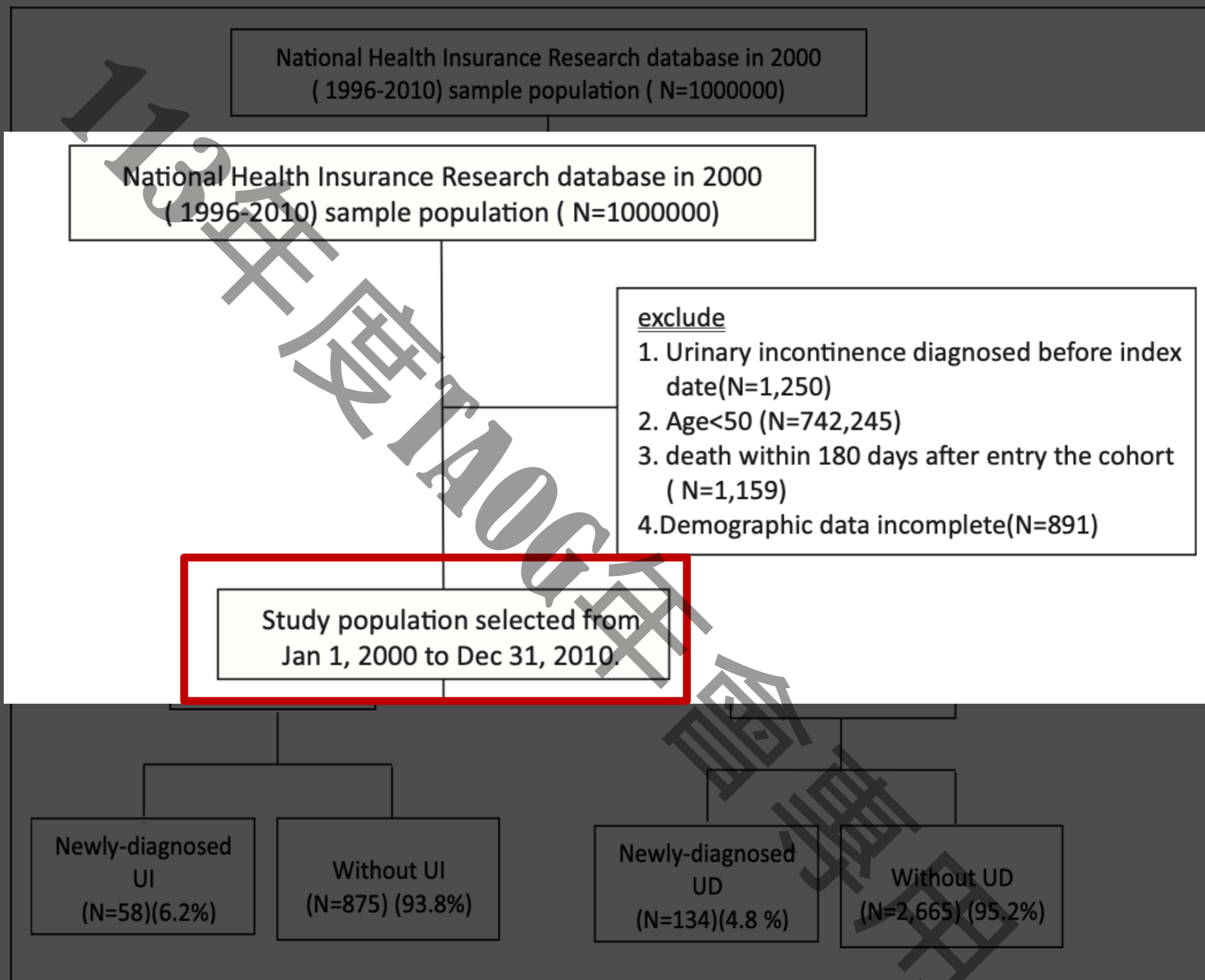
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American Journal of Alzheimer's Disease & Other
Dementias® 2017, Vol. 32(1) 51-55



説明

Flowchart of study selection.

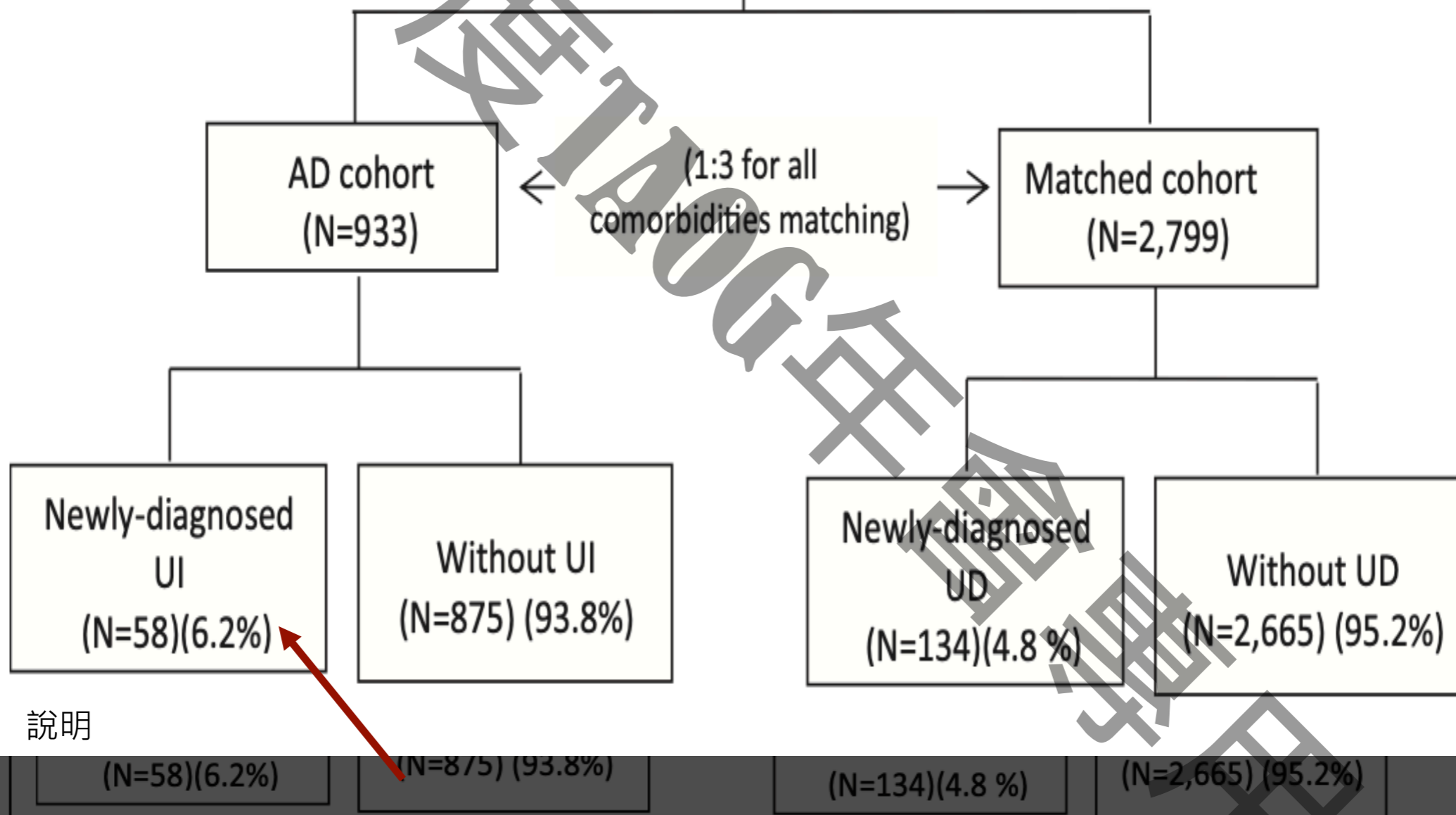


Flowchart of study selection.

National Health Insurance Research database in 2000
(1996-2010) sample population (N=1000000)

exclude

1. Urinary incontinence diagnosed before index date(N=1,250)
2. Age<50 (N=742,245)
3. death within 180 days after entry the cohort



Annual incidence of UI in AD are 6.2 %

Flowchart of study selection.

UI rates are higher in dementia than non-dementia

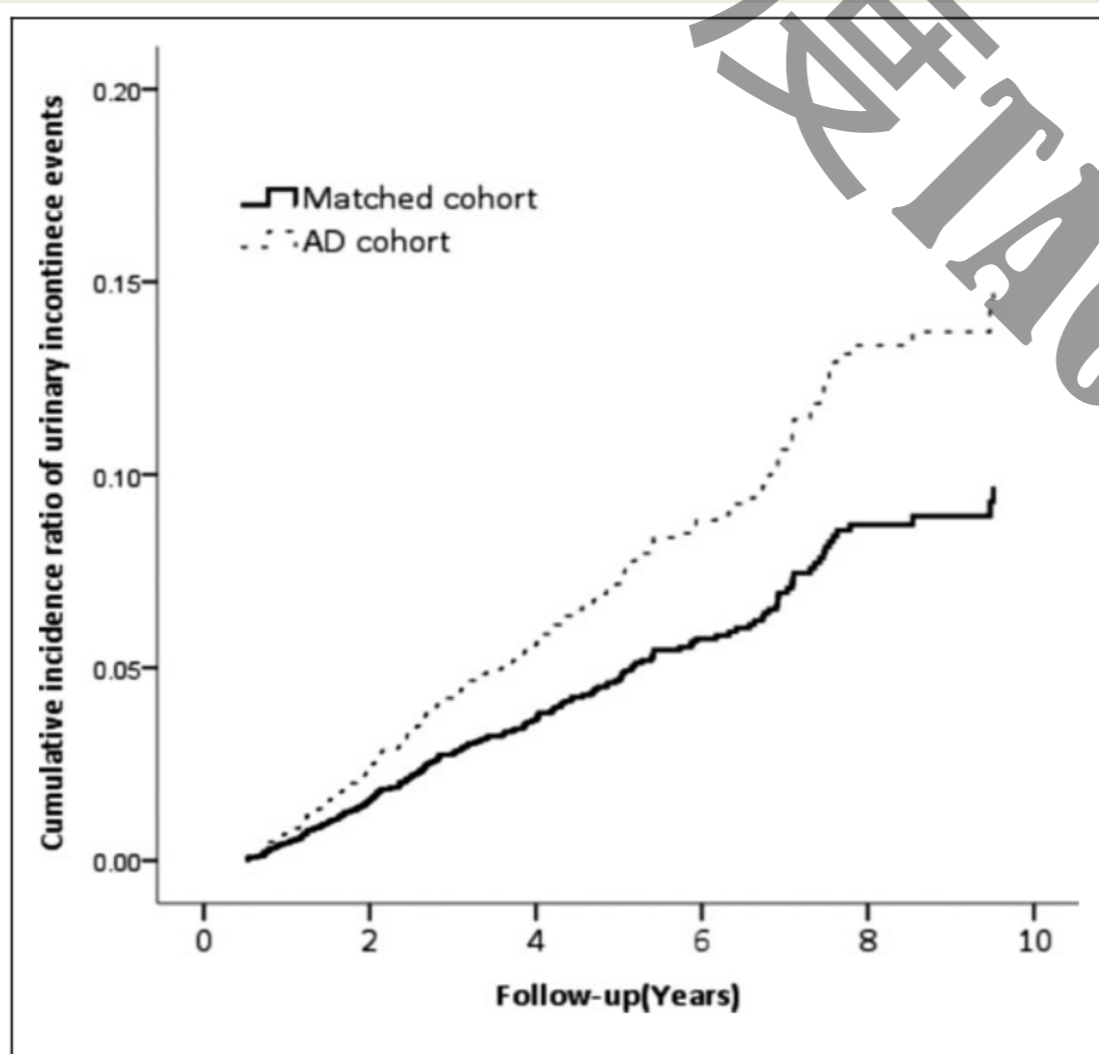


Figure 2. Cumulative incidence ratio curve of urge incontinence.

Table 2. The Risk of Urinary Incontinence Between AD Cohort and Matched Cohort.^{a,b}

	Number of Cases	Per 1000, Person Year	aHR	95% CI	P Value
Matched cohort	134	9.61	Ref	1.3-2.09	<.001
AD cohort	58	14.61	1.54		

Abbreviations: AD, Alzheimer's disease; aHR, adjusted hazard ratio; CI, confidence interval; Ref, reference.

^aN = 3732.

^bAdjusted for age, gender, diabetes, hypertension, chronic kidney disease, and urinary tract infection.

Prevalence rate of UI in AD- 4.2%

Table 3. Annual Incidence and Prevalence of Urinary Incontinence in Patients With AD.

Annual incidence of urinary incontinence in AD	
All patients with AD	6.2%
Rivastigmine	7.8%
Donepezil	5.8%
Galantamine	2.9%
Memantine	1.4%
Urinary incontinence prevalence in AD	
All patients with AD	4.2%
Rivastigmine	3.4%
Donepezil	4.8%
Galantamine	5.6%
Memantine	4.4%

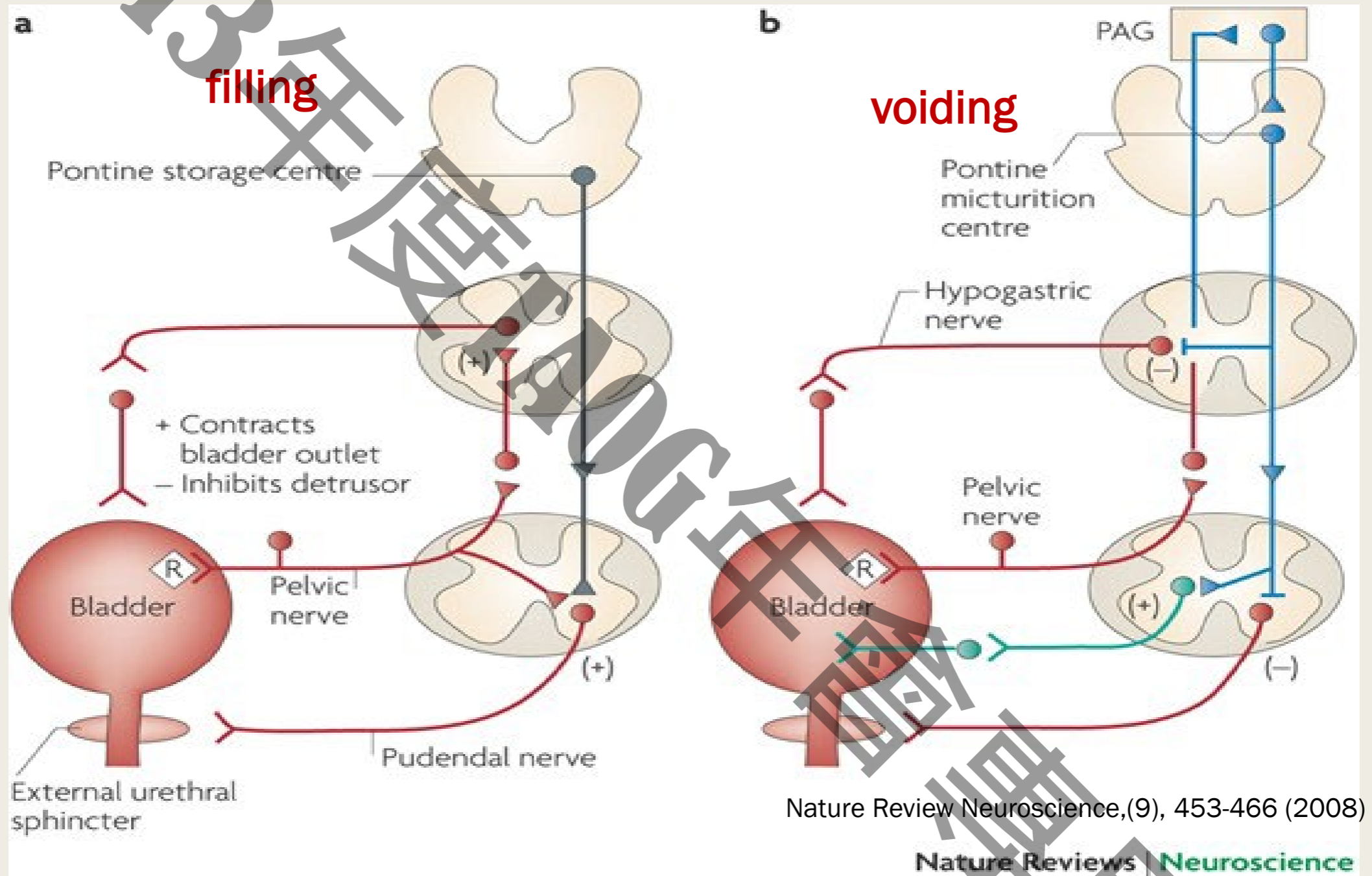
Abbreviation: AD, Alzheimer's disease.

Etiology of urinary incontinence in dementia

How to maintain continence

- Normal lower urinary tract with intact innervation for both filling and voiding phase
- Willingness to hold urine after **first sensation**, proper motivation to urinate in toilet
- **Cognitive ability** to know how to get to toilet
- How to adjust clothing and use toilet facility

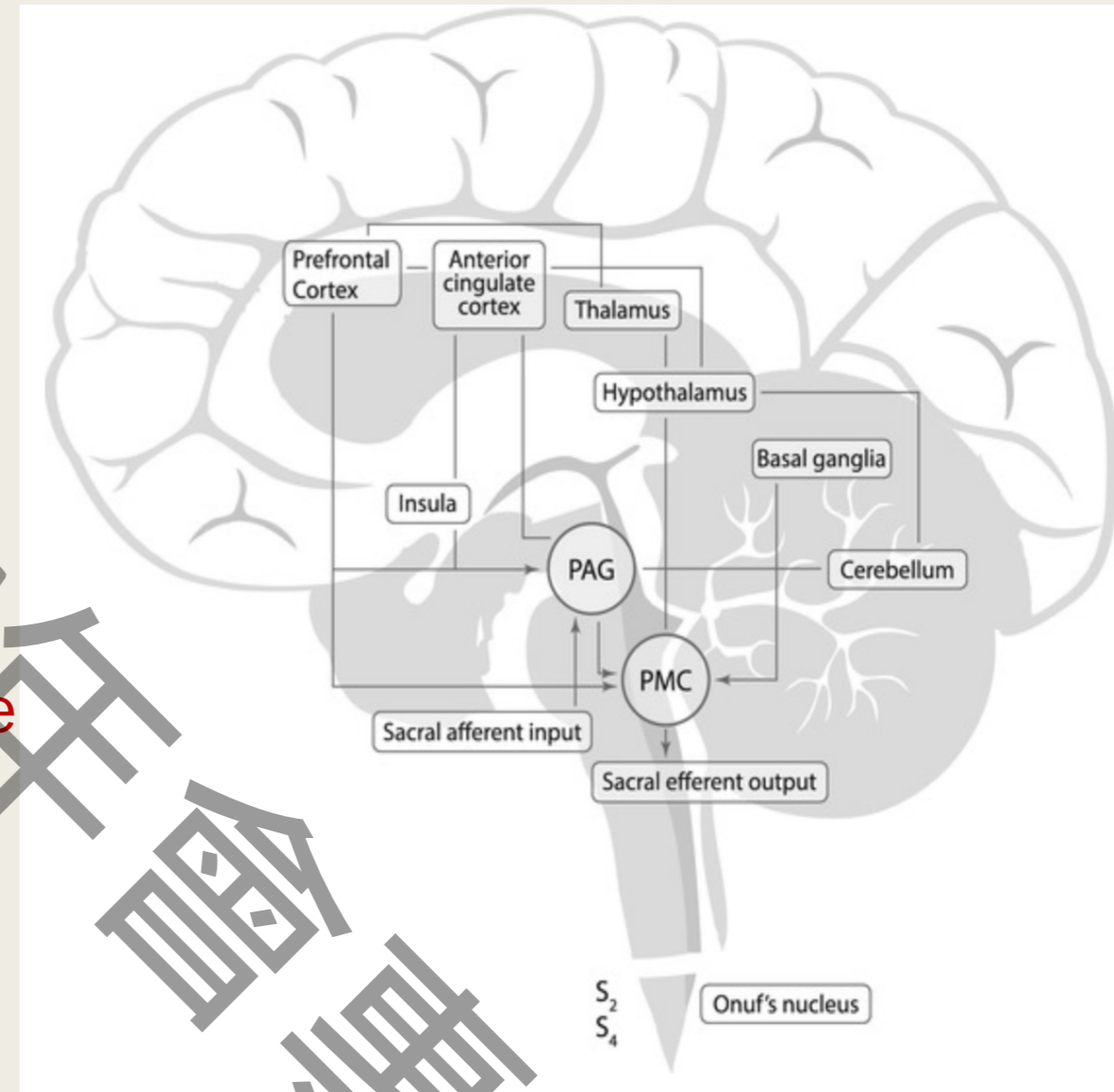
Neurophysiology of Micturition



Actions of autonomic and somatic nervous system during bladder storage and voiding

Central Nervous System Regulation

- **Cortical** (prefrontal cortex, insula, anterior cingulate cortex, cerebellum),
- **Subcortical** (basal ganglia, thalamus, hypothalamus)
- **Pontine Micturition Center**
- accomplishes major functions:
 - **Control voiding until the time and place are appropriate**



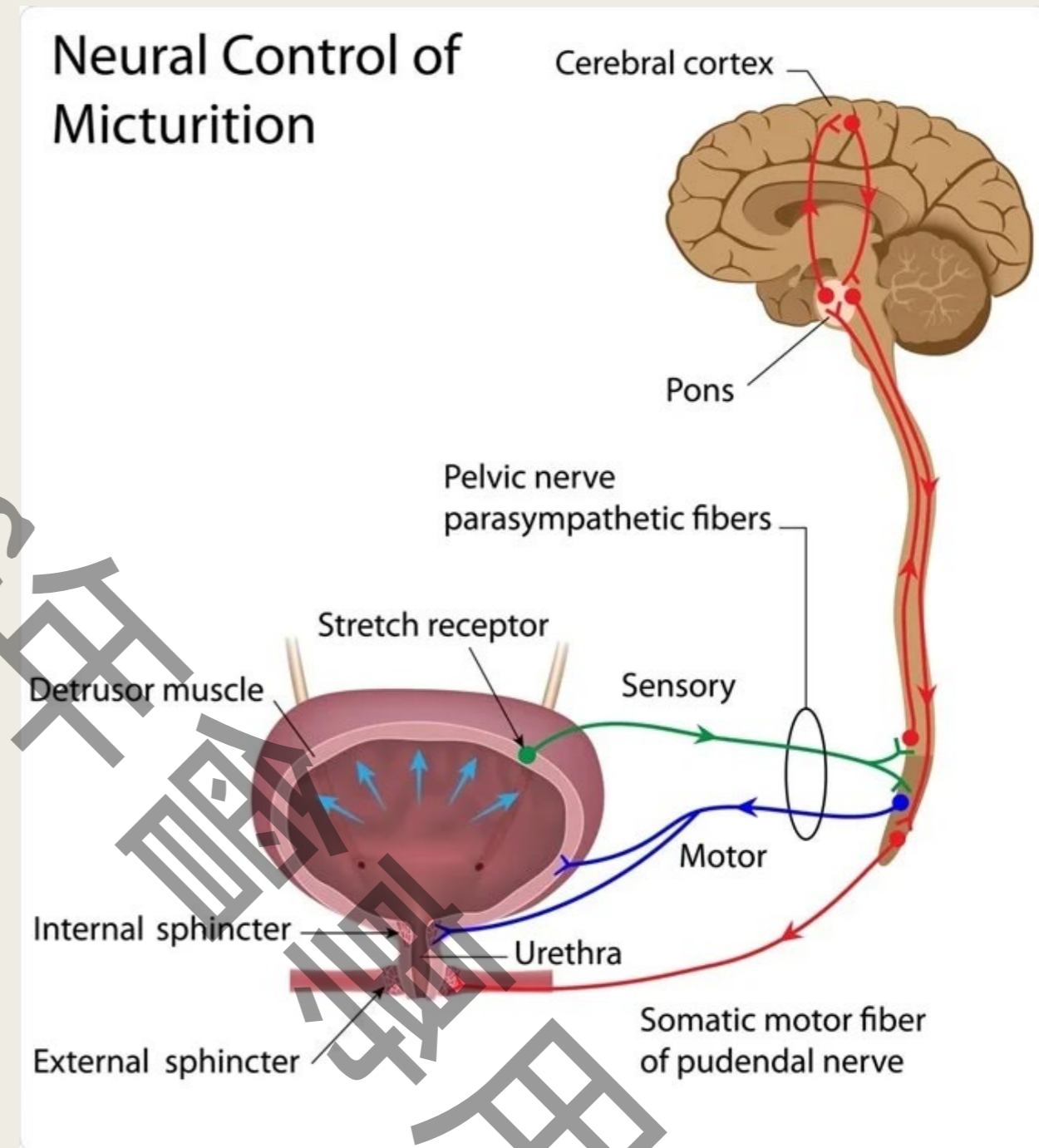
Etiology of UI in dementia

- Still not well clear now, but It is well known that there is a **dysregulation in brain-bladder communication.**
- Neurological pharmacotherapy
- Old age

Etiology of UI in dementia

□ Dementia itself

Cerebral dysfunction lead to **loss of brain's inhibitory of micturition reflex**, resulting involuntary detrusor contraction : **urgent incontinence**



Etiology of UI in dementia

- Dementia itself
- Cognitive dysfunction : **functional incontinence**
- AD : UI occurs at the **advance stage** of dementia.
- DLB & vascular dementia : UI might occurs in **early stage**
- Onset of UI was significantly earlier in LBD (3.2 years after dementia onset) than in Alzheimer's disease (6.5 years after dementia onset).

Etiology of UI in dementia

Neurological pharmacotherapy

- Acetylcholinesterase inhibitors (AChEI) :
 - a. Enrich acetylcholine levels act on bladder muscarinic receptors, cause **urgent incontinence**
 - b. 7% risk of precipitating UI, and current incontinence may be significantly worsened. (Arch Intern Med. 2005)

Effects of age on continence

- ❑ Decreases the bladder's capacity and elasticity to hold urine
- ❑ Less aware of the desire to void, may only become aware that their bladder needs emptying when it is **90% full**
- ❑ More residual urine
- ❑ In women, the **decrease in estrogen**, the urethra to become thin and less flexible, decreased closing pressures leading to stress incontinence

(Nazarko, 2015)

How dementia affect continence

Cognitive symptoms

- **Amnesia(健忘)** : the most prominent feature, forget, need to use toilet
- **Aphasia(失語)** : forget how to express their need to use toilet
- **Apraxia(失用)** : problems walking to and recognizing the toilet, poor dexterity and inability to manipulate their clothing, using household objects
- **Agnosia(失認)** : lose ability to recognize sensory information, difficulty in recognizing objects, people, place.

ASSESSMENT

Careful history taking and medication review

- Spouses, caregiver, and patient should be involved
- National Institute for Health and Care Excellence (NICE) guidelines (2018) : **even if a patient has dementia, their views about their own care must be considered.**
- Modified ways of communicating : **simplified language**(less than 10 words), visual aids or simplified text



Pattern of the incontinence ?

- Is it urinary or fecal incontinence, or both?
- Occur at certain times of the day ? Or at night only ?
- Occur if the patient is left alone for long periods ?
- **Active** : passing small amounts because they cannot reach the toilet on time ?
- **Passive** : passing full amounts and unaware of the need to void ?

(Payne, 2015)

Evaluation of lower urinary tract dysfunction

Methods	Details
Detailed history taking	Fluid intake Micturition habits Medications including anticholinergics
Questionnaires	International Prostate Symptom Score Overactive Bladder Symptom Score
Voiding diary	Time and volume of voiding Episodes of urinary incontinence and urgency
Physical examination	Abdomen, lumbar, pelvis and genitalia Bulbocavernosus reflex Anal reflex and anal sphincter tone
Urinalysis	Pyuria, bacteriuria, hematuria, glucosuria, ketonuria
PVR urine measurement	Ultrasonography (bladder scan) Catheterization

PVR: post-void residual.

Cause of Transient Urinary Incontinence (DIAPPERS)

- **D** - Delirium(譫妄) :

Common causes include stroke, infection, pain, fractures, medications, changes in environment, recent surgery.

- **I** – Symptomatic urinary infection.

- **A** – Atrophic vaginitis : local irritable

- **P** – Pharmacological :

Anticholinergics, diuretics, antidepressants, antipsychotics, sedatives, anti-Parkinson's treatment, etc.

Cause of Transient Urinary Incontinence

- **P** – Psychological : depression
- **E** – Excessive urine output :
Diabetes Insipidus, excess fluid intake, diuretics, alcohol and caffeinated drinks, heart failure.
- **R** – Restricted mobility :
due to restraint use, pain, lower limb arthritis, functional decline.
- **S** – Stool impaction

Full Urodynamic Studies(UDS)

- May be difficult to perform due to invasive and cannot cooperate
- Considered only if other treatment modalities failed and the results **have direct influence on treatment choices and outcome.**

(Si Ching LIM. Int Arch Urol Complic 2017)

- Limited study may be useful (eg. Uroflow, filling cystometry) – bladder compliance & detrusor activity

Established urinary
incontinence in
Dementia

Nature of incontinence in dementia ?

- Urge incontinence(detrusor over-activity)
- Stress incontinence
- Mixed type
- Overflow incontinence(detrusor underactivity)
- Function incontinence
- Nocturnal enuresis

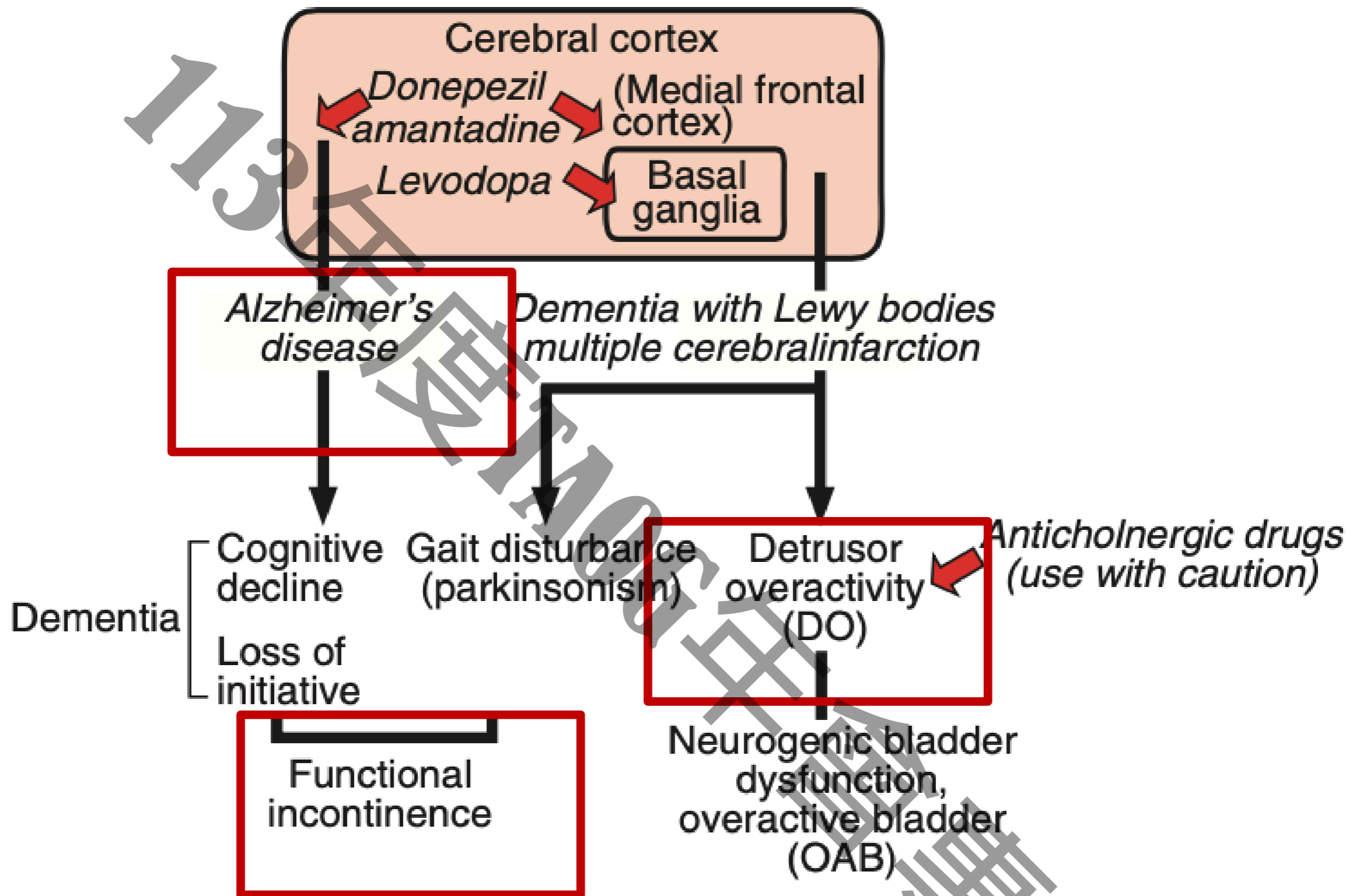


Fig. 4 Relationship between functional incontinence and neurogenic incontinence.

Nature of incontinence in dementia

- UDS in 46 dementia patients, found DO(detrusor overactivity) in 58 % of Alzheimer's and in 91% of vascular dementia .(Mori et al.1999)
- AD : the 2 most common types included **urgency incontinence** (44.3%) and **functional incontinence** (25.3%). (Asia-Pac Psych. 2015)

Original Article: Clinical Investigation

**Urinary incontinence in patients with Alzheimer’s disease:
Relationship between symptom status and urodynamic diagnoses**

Seong Ho Lee,¹ Sung Tae Cho,¹ Hae Ri Na,² Seok Bum Ko² and Moon Ho Park³

説明

Table 1 Type and severity of urinary incontinence on ICIQ-UI

	Men (n = 48)	Women (n = 96)	P-value
Age (years)	76.3 ± 8.8	79.8 ± 7.7	>0.05
Type of UI (%)			
Stress	4 (8.3)	24 (25)	
Urge	26 (54.2)	42 (43.8)	
Mixed	2 (4.2)	14 (14.6)	
Enuresis	11 (22.9)	11 (11.4)	
Unexplained	5 (10.4)	5 (5.2)	

Urodynamic study finding

Table 2 Urodynamic study findings

	Men (n = 48)	Women (n = 96)	P-value
Uroflowmetry			
Free Qmax (mL/s)	10.50 ± 3.22	11.61 ± 4.12	>0.05
PVR (mL)	58.50 ± 43.15	51.32 ± 37.15	>0.05
UDS parameters			
MCC (mL)	230.19 ± 72.51	214.19 ± 67.41	>0.05
PdetQmax (cmH ₂ O)	38.60 ± 11.48	32.35 ± 11.45	0.002
MUCP (cmH ₂ O)	52.65 ± 16.03	47.65 ± 15.25	>0.05
DO (%)	25 (52.1)	58 (60.4)	>0.05
DSD	0	0	

Values are presented as mean ± standard deviation.

LUTS in Dementia

diseases	LUT Symptoms	Urinary Incontinence (Storage Dysfunction)	PVR >100ml (Voiding Dysfunction) (Mostly Peripheral)	No. of Patients	Ref.	Detrusor Overactivity (Mostly Central)	Neurogenic Change Of Sphincter MUPs (Somatic Denervation) (Onuf Nucleus)	Abnormal MIBG Myocardial Scintigraphy (Noradrenergic Denervation)	No. of Patients	Ref.
MSA	100%	71%	70%	245	21	75%	83%	(0-10%)	245	21
DLB	91%	71%	8%	32	-	89%	47%	100%	32	-
PAF	100%	55%	55%	6	22	67%	3/4	(100%)	6	22
PD	53-70%	25-28%	0%	115	23	81%	5%	(90%)	21	24
AD	44%	33% (100% in totally dependent cases)	0%	24	25,27,28	40-78%	0%	(0-10%)	24	10,25,26

MSA: multiple system atrophy; DLB: dementia with Lewy bodies; PAF: pure autonomic failure; PD: Parkinson's disease; AD: alzheimer's disease; LUT: lower urinary tract; PVR: post-void residual; MUP: motor unit potential MIBG: metaiodobenzylguanidine; ref: references.

- Most LUTS are **storage dysfunction**,
- Detrusor overactivity** is the most common LUTS (DLB > AD).

Voiding symptoms

diseases	LUT Symptoms	Urinary Incontinence (Storage Dysfunction)	PVR >100ml (Voiding Dysfunction) (Mostly Peripheral)	No. of Patients	Ref.	Detrusor Overactivity (Mostly Central)	Neurogenic Change Of Sphincter MUPs (Somatic Denervation) (Onuf Nucleus)	Abnormal MIBG Myocardial Scintigraphy (Noradrenergic Denervation)	No. of Patients	Ref.
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- voiding dysfunction is less in AD but more on DLB
- 50% of DLB have chronic denervation from Onuf nucleus (urethral sphincter muscle), which lead to **stress urinary incontinence**.

Neurological lesion vs PVR vs UDS



Suprapontine lesion

- **History:** predominantly storage symptoms
- **Ultrasound:** insignificant PVR urine volume
- **Urodynamics:** detrusor overactivity



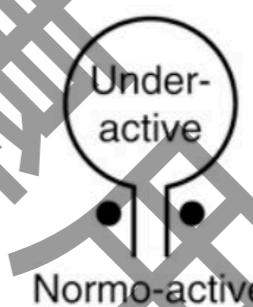
Spinal (infrapontine-suprasacral) lesion

- **History:** both storage and voiding symptoms
- **Ultrasound:** PVR urine volume usually raised
- **Urodynamics:** detrusor overactivity, detrusor-sphincter dyssynergia



Sacral-infrasacral lesion

- **History:** predominantly voiding symptoms
- **Ultrasound:** PVR urine volume raised
- **Urodynamics:** hypocontractile or acontractile detrusor



Daroff, R. "Bradley and Daroff's Neurology in Clinical Practice." (2022).

MANAGEMENT

- ✓ Lifestyle modifications
- ✓ Behavioral therapy
- ✓ Pharmacological treatment

Non-Pharmacological Management

❑ Bladder training

- ❑ May not be efficacious
- ❑ Delaying voiding may cause agitation and restlessness due to discomfort.

❑ Electrical stimulation

- ❑ Little data to support use.
- ❑ 20% increased in incontinence episodes.(J. Am. Geriatr. Soc. 1992)

Non-Pharmacological Management

Pelvic floor exercise with biofeedback

- Success determined by patient's motivation, dementia course.
- No protocol was properly assessed in dementia patients.

Lifestyle modifications

- ❑ Keep bladder diary
 - ❑ Timing and amount of voiding
 - ❑ Type of fluid ingested – **avoid dehydration**
 - ❑ Whether the patient was able to reach toilet on time.

- ❑ **Caffeine** is both a diuretic and a bladder irritant causing increase in bladder pressure and detrusor irritability. (Neuro. Urodyn. 2011)

Avoid Obesity

- Increased risk of UI, with a 20-70% increase in risk of daily incontinence for each 5-unit increase in BMI.
- Causing obstructive sleep apnea triggers atrial natriuretic peptide(**ANP**) production which causes diuresis contributing to **nocturia**

Behavioral therapy

- Not curative but safe and reversible
- Requires active participation of a motivated patient with support from caregivers.
- The caregivers may be frustrated with the elderly persons' inability to fully comply with the instructions given to them (Neuro. Urodyn. 2015)
- 80.7% was more effective at managing urge incontinence than placebo(39.4%) (Burgio et al 2006)

Prompted voiding(提示性解尿)

- Induced by caregiver
- Patient can void independently, caregiver provide assistance to toilet
- Ask the patient at regular time intervals (2 hours during the daytime and 4 hours at night)
- 觀察上廁所的徵兆：焦慮來回走動，拉衣服，褲子

Prompted voiding

- Checked every 1-2 h, 32% mean relative reduction in wet episodes (J. Aust. Geriatr. Soc. 1995)
- Even in severely demented patient who had difficulty voiding regularly, it is possible to gradually improve UI. (Eur Urol 2018)
- No evidence about whether these effects are sustained over a long period of prompted voiding, or persist after stopping prompted voiding.

(Cochrane Database of Systematic Reviews 2000,)

Timed voiding(定時解尿)

- Scheduled time : usually every 2 hours in day, or individualized schedule
- Reduced incidence of incontinence from 32% to 43% (Int. J. Geriatr. Psy. 2004)

Main Results of Studies on Behavioral Strategies for Dementia With UI

TABLE II. Main Results of Studies on Behavioral Strategies for Dementia Patients With Urinary Incontinence

References	Publication year	Study type	LE ^a	N	Most relevant results
Jirovec ³⁶	1991	Case series	4	N/R	Six weeks of scheduled toileting did not improve incontinence in a group of demented and dependent nursing home residents, although poor staff compliance with the toileting program contributed to the negative outcome.
Gitlin et al. ³⁷	1993	Prospective study	4	17	An occupational therapist delivered intervention in five visits over 3 months to family caregivers. The intervention focused on behavioral strategies. "Toileting schedule" was poorly accepted.
Adkins et al. ³⁸	1997	Case report	4	2	Prompted voiding can be implemented by family caregivers. Intervention reduced incontinence for both participants.
Jirovec et al. ³⁹	2001	Randomized controlled trial	2b	118	Individualized scheduled toileting was agreed with carer. The authors reported a decrease (unspecified amount) in incontinence at 6 months compared to baseline in 28 of 44 participants (64%) in the experimental group.
Engberg et al. ⁴⁰	2002	Randomized controlled study (cross-over design)	2b	19	Prompted voiding achieved 60% reduction in daytime incontinence episodes.
Lancioni et al. ⁴¹	2011	Case report	4	3	The use of the alarm system and caregivers' prompts was effective in helping the three patients reduce their large urinary accidents to zero or near zero levels.
Drennan et al. ⁴²	2012	Systematic review	4	3 ^b	There was insufficient evidence from any studies to recommend any strategies.

^aLevel of evidence.

^bThree studies included in the quantitative analysis.

Environmental settings

Enhanced visual cues

- Painting the toilet doors bright orange.
- Displaying large pictures of a lady sitting on a toilet



Enhanced mobility aids



Enhanced mobility aids

 **日常生活篇**

穿衣 選擇魔鬼氈和鬆緊帶等操作容易




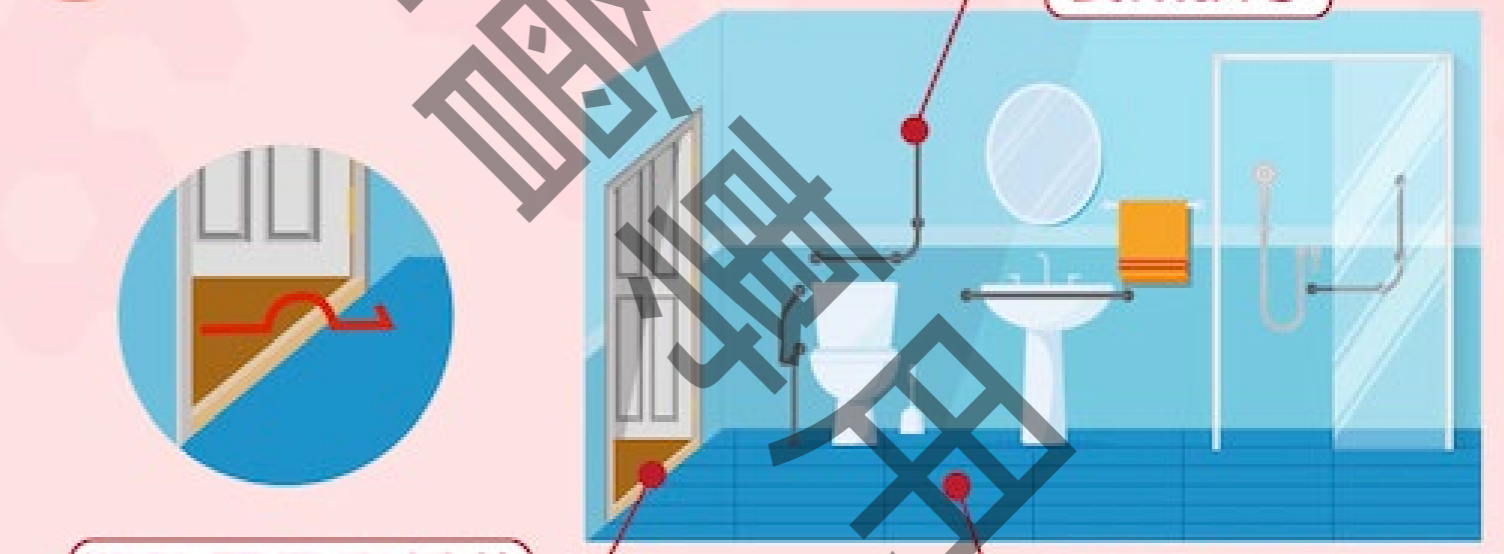
鈕扣

拉鍊

魔鬼氈

鬆緊帶

 **居家環境篇**



裝設扶手

消除門檻高低差

鋪設防滑墊/地磚

Pharmacological treatment

- Reduce the dose of AChEI inhibitors rather than adding anti-muscarinic (Gill et al., 2005)
- Alternative to AChEI inhibitors is memantine, an N-methyl- D-aspartate (NMDA) glutamate receptor antagonist

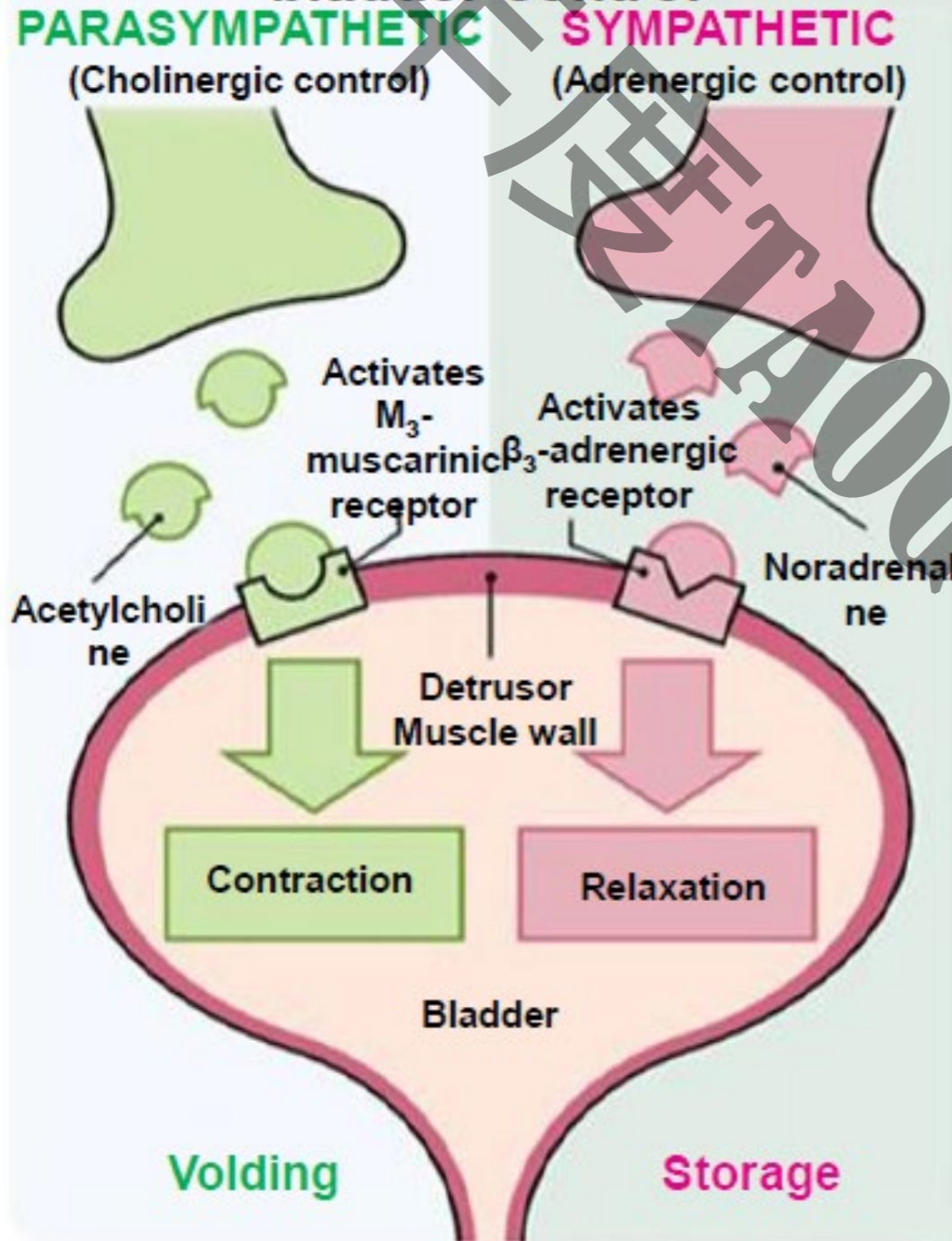
Pharmacological treatment

- Depends on whether the patient has **storage** (UI) or **voiding** (underactive bladder) problems
- Storage incontinence can be alleviated with **antimuscarinics** (anticholinergics) and, **beta-3 receptor agonist**, mirabegron used either alone or as a combination

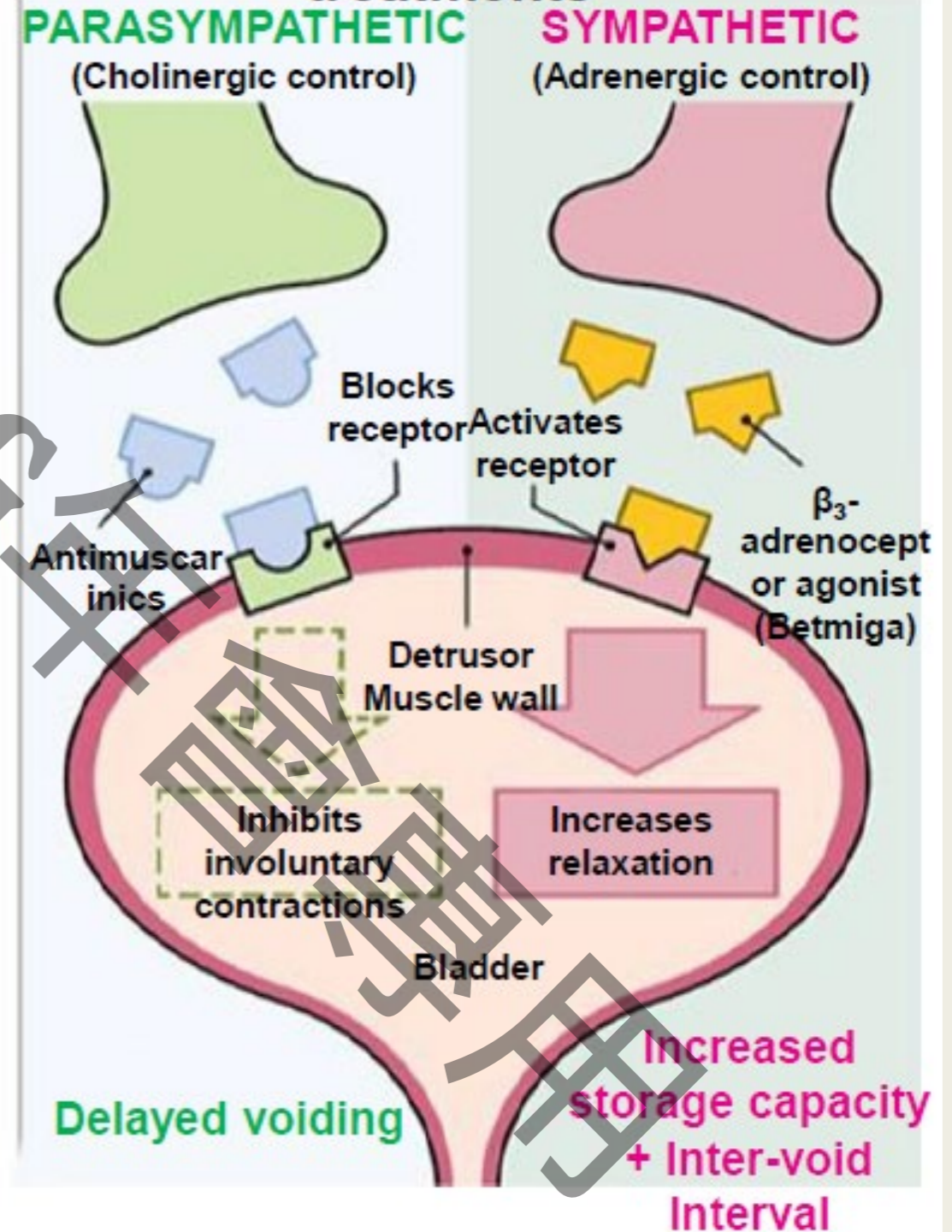
正常膀胱的神經控制

OAB的藥物治療

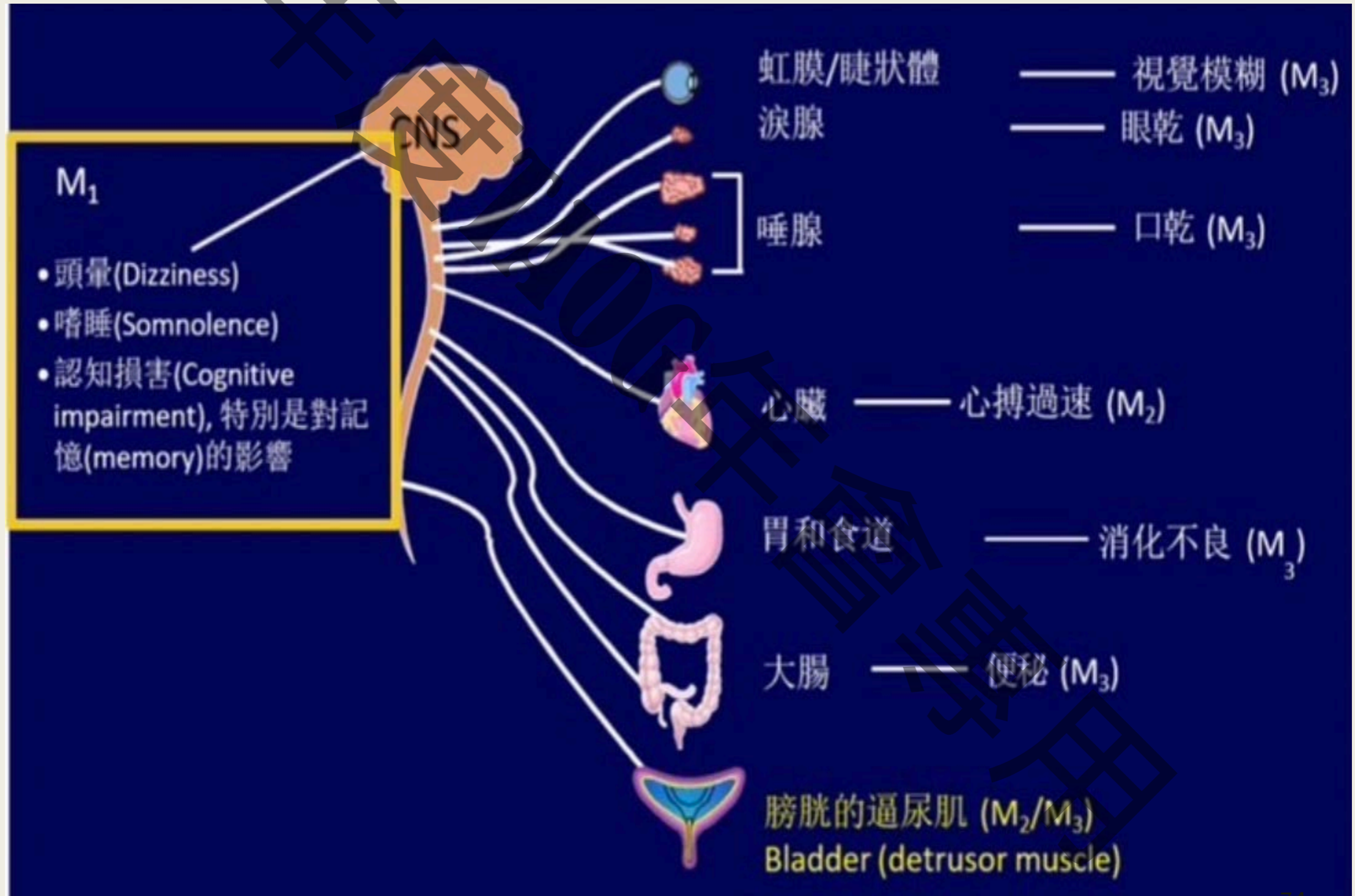
Nerve pathways in normal bladder control



Mode of action of OAB treatments



Adverse events of anticholinergics cognitive dysfunction & urinary retention

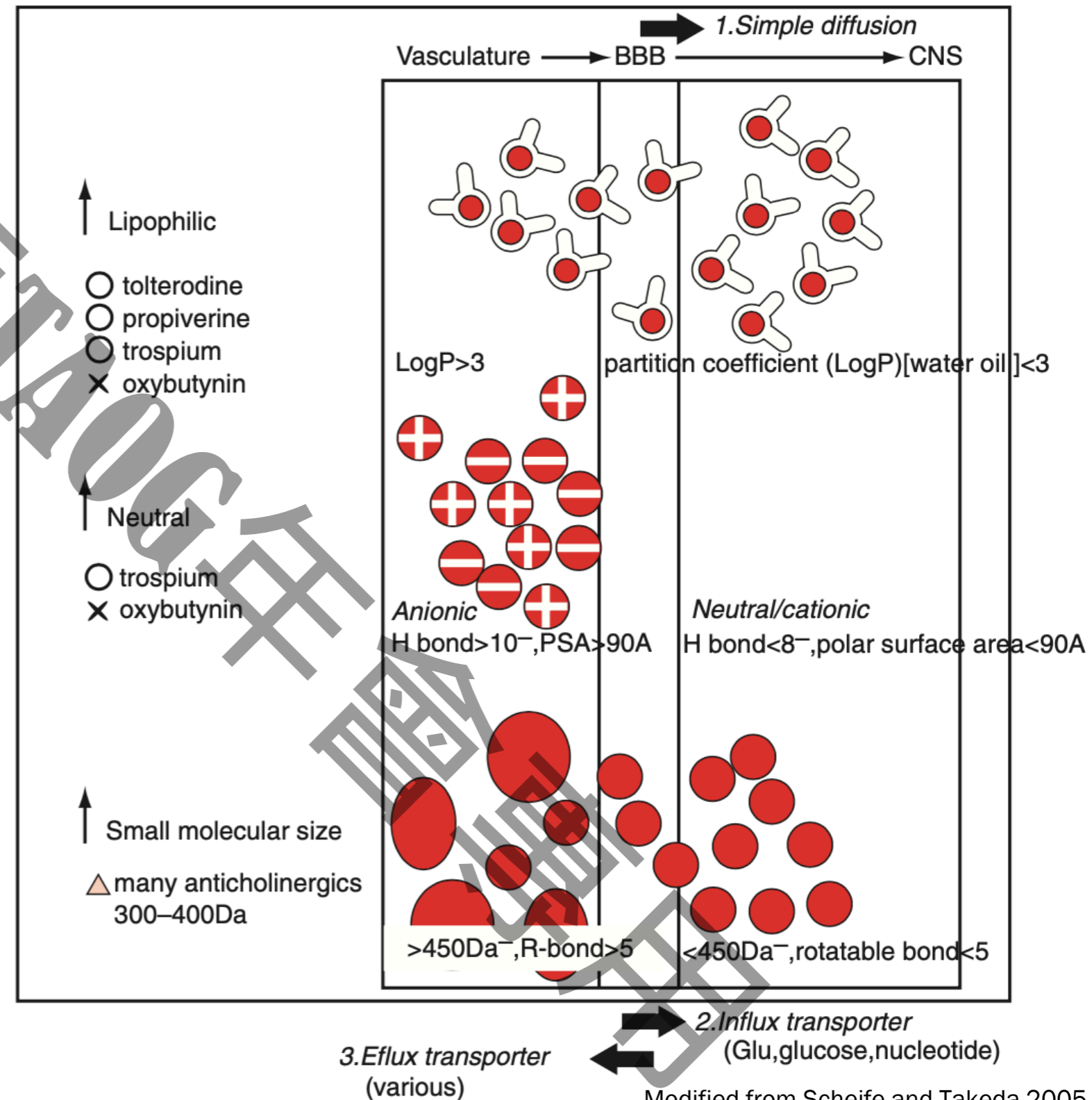


Medication Crossing Blood-Brain Barrier(BBB)

Central muscarinic receptor affinity : **M1-receptor** selectivity.

Easy penetration of BBB

- a. High lipid solubility
- b. Neutral charge or low degree ionization
- c. Small molecular size (< 450 Da)



Antimuscarinic drug

Table 1. Basic characteristics of the antimuscarinic drugs

	Molecular weight (kDa)	Ability to cross BBB	Selectivity
Darifenacin	507.5	Low	M3
Fesoterodine	527.6	Low	Non-selective
Oxybutynin	393.9	High	Non-selective
Propiverine	403.9*	Limited data	Non-selective
Solifenacin	480.5	Moderate	Predominantly M3
Tolterodine	475.6	Moderate	Non-selective
Trospium	427.9	Low	Non-selective

BBB: Blood-brain barrier, *Value expressed in g/mol

Acetylcholinesterase Inhibitors (AChEI) and anticholinergic agents in combination ?

- Opposite pharmacologic mechanism
- **Significant worsening** in MMSE after 2 years compared to those on AChEI alone. (Lu and Tune 2003)
- **50% faster rate of functional decline** in patients taking combination of AChEI and anticholinergic agents (**oxybutynin or tolterodine**) even though the ADAS-Cog scores were unchanged (Sink KM 2008)

Acetylcholinesterase Inhibitors (AChI) and anticholinergic agents in combination ?

- Case reports on **tolterodine** :
dramatic deterioration of cognition occurred, expressed by delusion and agitation and reversible on discontinuation
- AD with UI : AChI **galantamine** (up to 24 mg/day), in combination with **trospium** 50–60 mg/day for OAB
No change of cognitive function (Mini-Mental State Score) during 6-month follow-up (J Nutr Health Aging 2009)

AUGS Consensus Statement(2020) Association of Anticholinergic Medication Use and Cognition in Women With OAB

- ❑ Older than 70 years should be avoided
- ❑ When used in elderly, use those low potential to cross the blood-brain barrier
- ❑ The lowest effective dose should be prescribed,
- ❑ Alternative medication such as beta-3 agonists
- ❑ Decrease the dosage of other anticholinergic medications

Non-Antimuscarinic Agents

- Beta-3 agonist

1. Mirabegron (Betmiga, FDA 2012), 25 mg or 50 mg, extended-release, swallow whole
2. Vibegron (Gemtesa, FDA 2020), 75 mg, may be crushed

- The function of beta-3 receptors in the human CNS is unclear.

- Large observational studies of mirabegron use designed to capture cognitive adverse events are in progress.

Surgical Management of SUI

- Consider : postoperative complications and comorbidities
- High risk of developing postop delirium
- The more frail, disabled elderly with cognitive impairment have not been well studied.

(Update of AUA guideline 2020)

The role of continence aids

All attempts at keeping the person continent fail

The goals are to

- prevent skin irritation and breakdown
- reduce the risk of infections
- decrease falls
- ease the caregiving task

The role of continence aids

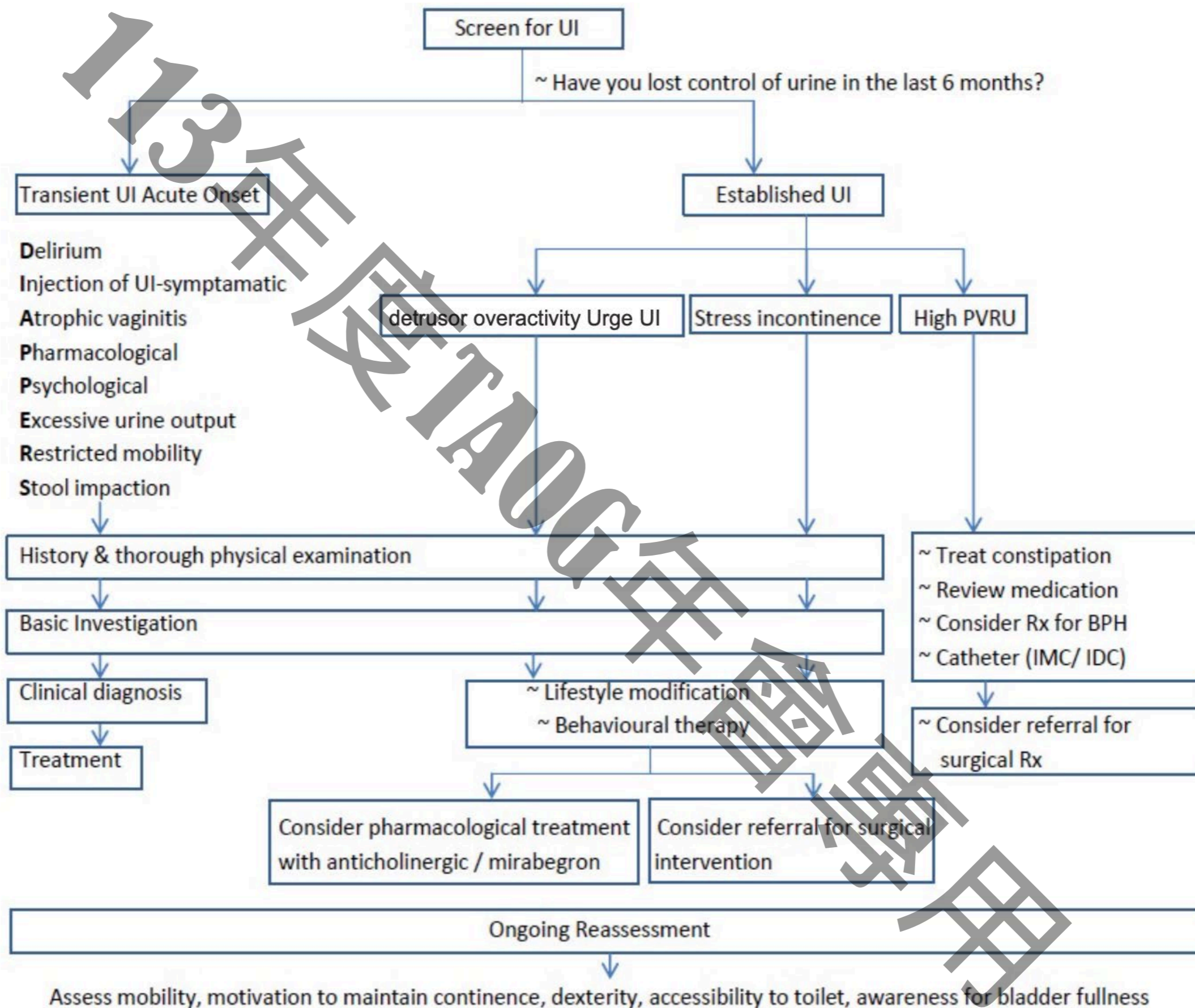
- Pull-up pads : often popular, because resemble underwear
- Using waterproof mattress covers or bed pads
- Clean intermittent catheterization (CIC) :
difficult to carry out because of uncooperativeness and agitation

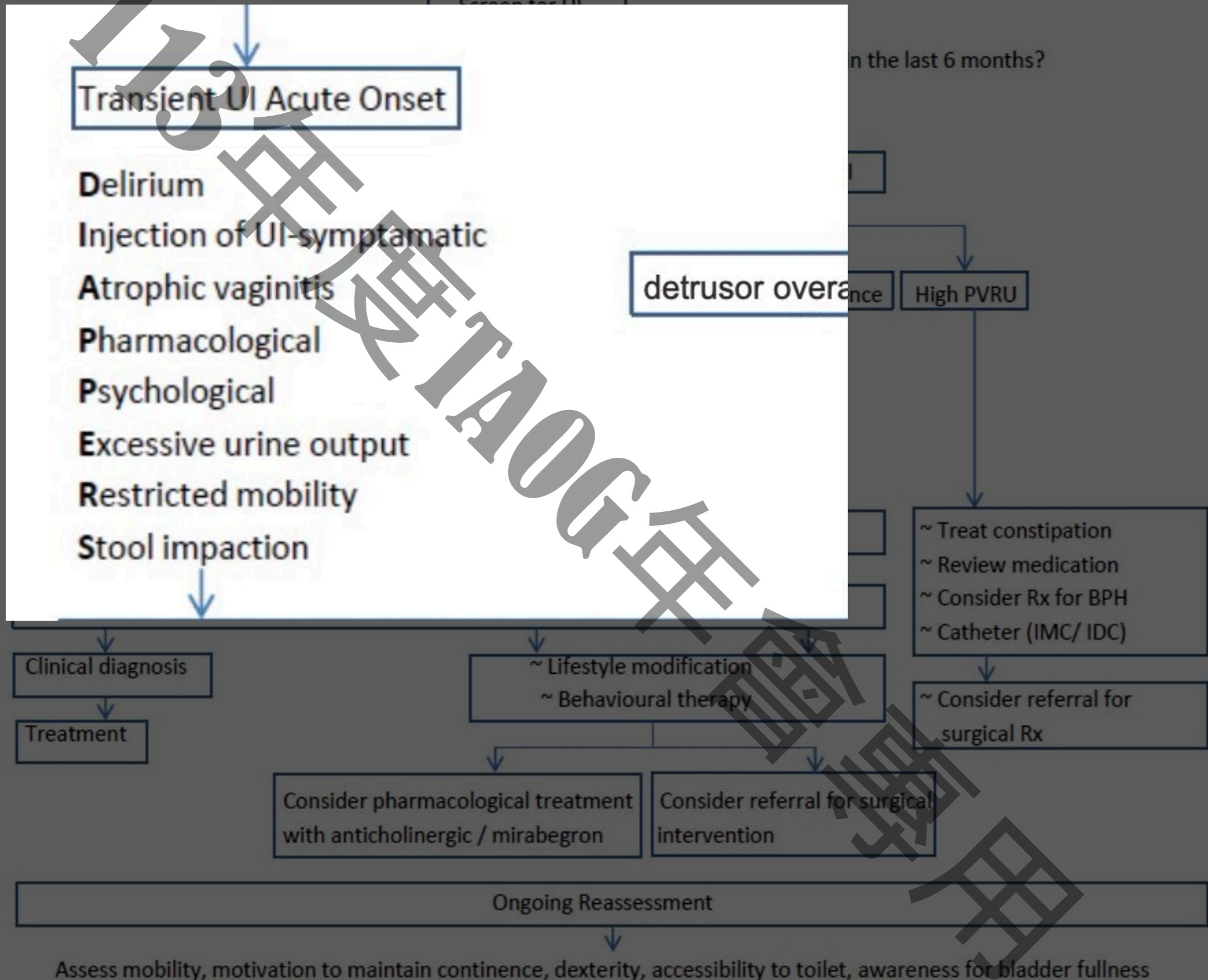
The role of continence aids

Indwelling catheterization

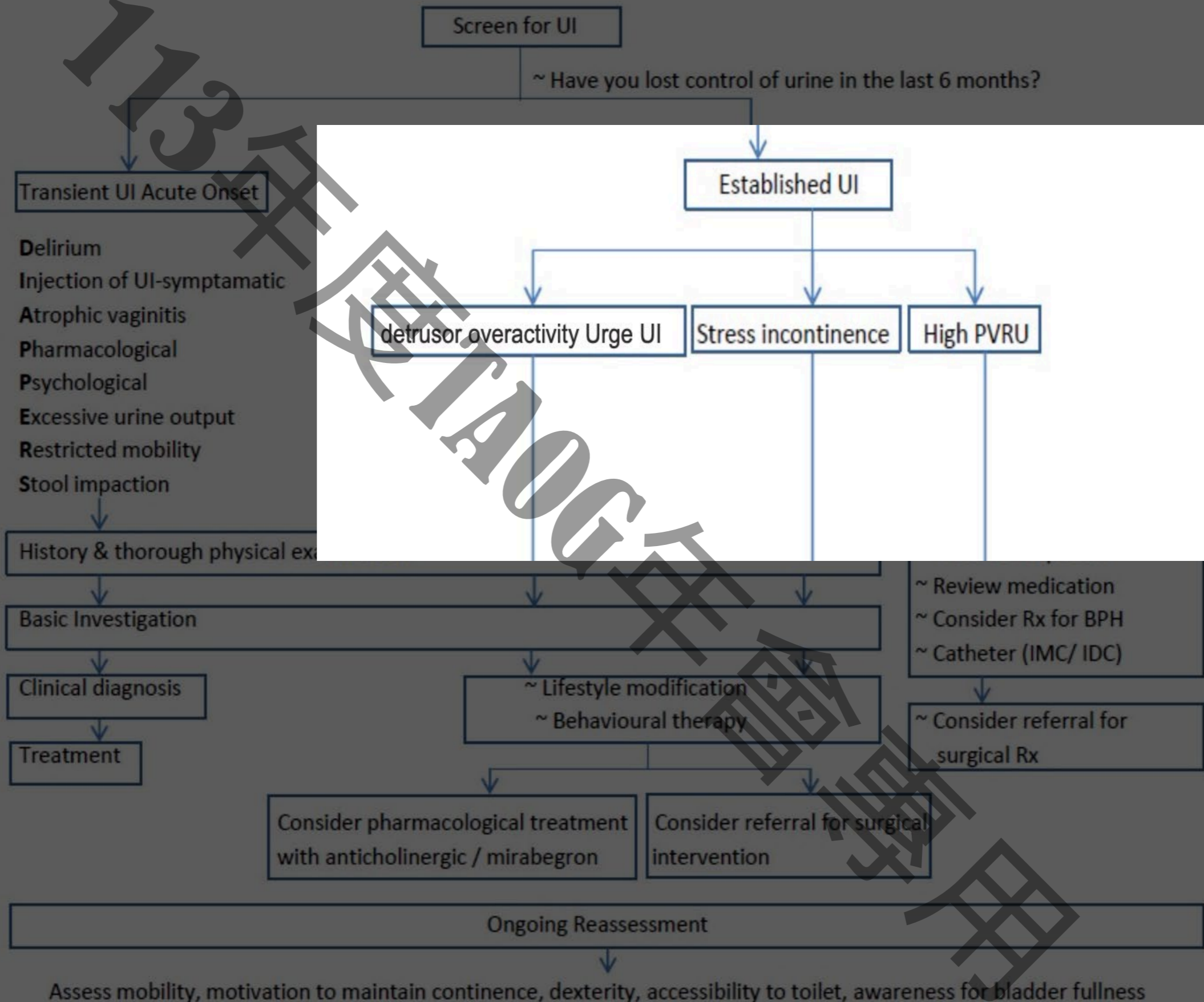
- ❑ Temporary relief of acute urinary retention
- ❑ For the healing of pressure sores
- ❑ Most severely demented
- ❑ Urine output monitoring is necessary

Managing the Elderly with UI and Dementia





Managing the Elderly with UI and Dementia



Managing the Elderly with UI and Dementia

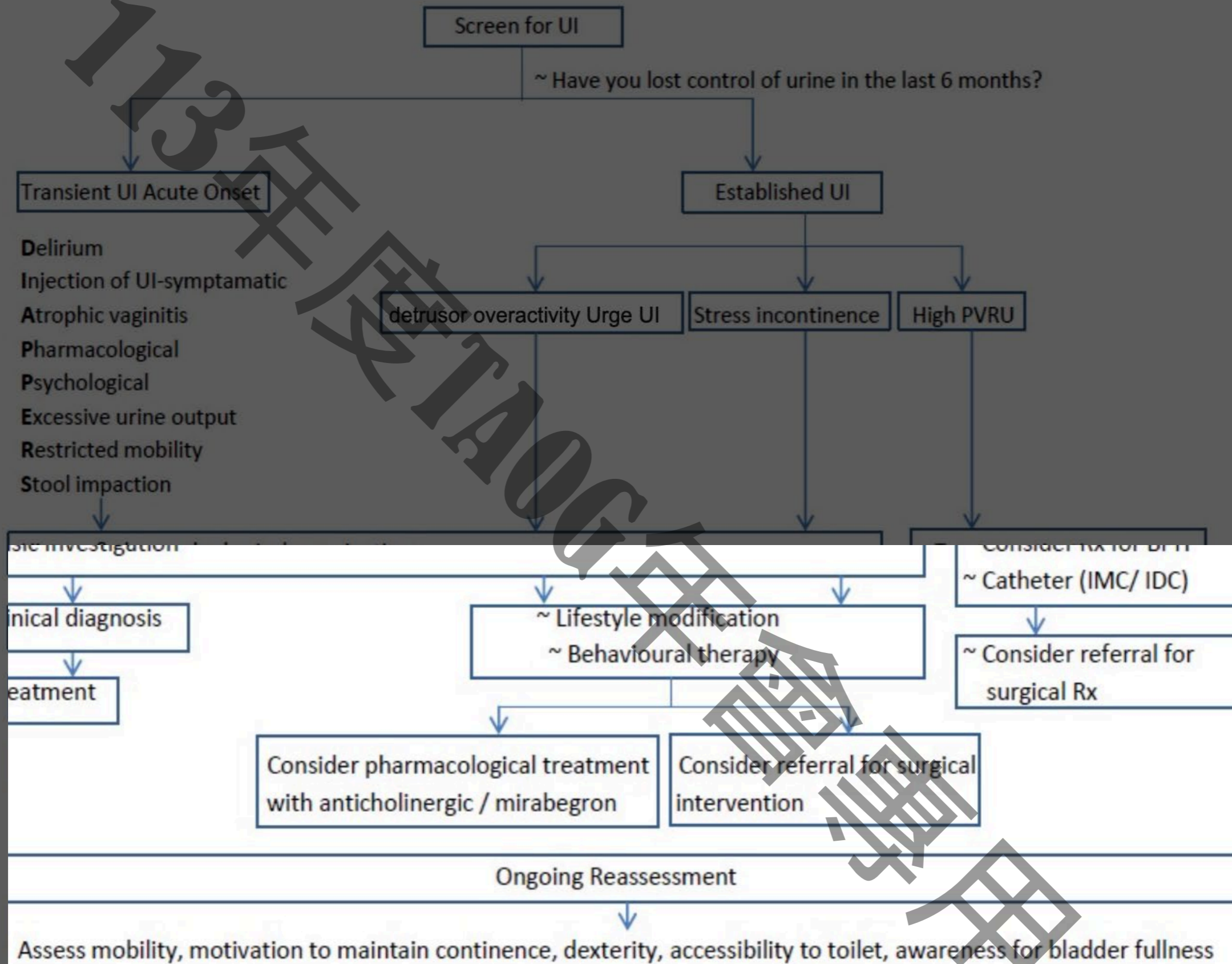


Figure 1: Summary of management of UI.

Figure 1: Summary of management of UI.

Summary of important points

- ✓ The causes of UI in dementia are often multifactorial and treatment options are limited
- ✓ Careful history taking , keep bladder diary, and measurement of PVR are necessary
- ✓ Much incontinence in dementia may be **functional**, but detrusor overactivity cause **urge incontinence** should be considered

Summary of important points

- ✓ First-line treatment is behavioral therapy, but more effective is the behavioral and pharmacological therapies.
- ✓ Pharmacological treatment : **anticholinergics** and **beta-3 adrenergic receptor agonist**. A careful risk-benefit analysis of medications is essential
- ✓ Two important predictors of incontinence : the severity of **cognitive impairment** and **the degree of immobility**.

Summary of important points

- The surgical options are often suboptimal and carries with it postop morbidity and mortality.
- Maintaining social dryness with quality of life as the main outcome should be the goal
- Close cooperation between neurologists and urogynecologist is needed

謝謝聆聽