



Management of Insomnia and the use of hypnotic medications

Management of insomnia & the use of hypnotics

Lecture outline

1. Sleep physiology
 - Sleep cycle & important of REM sleep
2. Insomnia
 - Prevalence in Hong Kong
 - Classification of insomnia
3. Management of insomnia
 - Behavioral therapy
 - Pharmacotherapy
4. Sleep self assessment form



ARCHITECTURAL ORGANISATION OF SLEEP

- **NORMAL SLEEP IS DIVIDED INTO FIVE STAGES: STAGES 1, 2, 3, 4 (NON-REM SLEEP) AND REM SLEEP:**



- light sleep = stages 1 and 2

- deep sleep (real slow sleep) = stages 3 and 4

- paradoxical sleep = REM sleep

non-REM sleep

- **THESE STAGES PROGRESS IN A CYCLE FROM STAGE 1 TO REM SLEEP**
- **THERE ARE USUALLY 4 – 5 CYCLES DURING THE NIGHT**
- **A COMPLETE SLEEP CYCLE TAKES 90 TO 110 MINUTES ON AVERAGE**



STAGES 1 AND 2

■ STAGE 1 OR LIGHT SLEEP (A FEW MINUTES, ABOUT 5% OF TOTAL AMOUNT OF SLEEP):



- we drift in and out of sleep
- eyes move very slowly
- muscle activity slows (sudden muscle contractions called hypnic myoclonia)

➔ we can be awakened easily

■ STAGE 2 (ABOUT 50% OF TOTAL AMOUNT OF SLEEP):



- brain activity slows
- eye movements stop
- bodily temperature lows
- breathing becomes very regular



DEEP SLEEP AND PARADOXICAL SLEEP

■ STAGES 3 AND 4 (DEEP SLEEP) = THE MOST RESTORATIVE SLEEP



- no eye movement
- no muscle activity
- arterial pressure and cardiac frequency continue to slow
- ➔ it is very difficult to wake someone, and if he/she is awakened, he/she does not adjust immediately and often feels groggy and disoriented for several minutes after he/she wakes up

■ PARADOXICAL SLEEP (REM SLEEP) = CEREBRAL CONSOLIDATION OF DAY'S EXPERIENCE



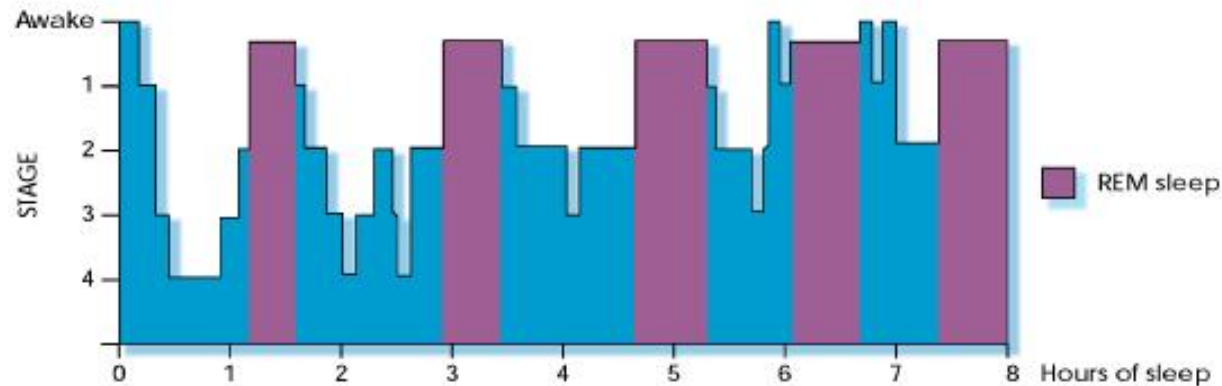
- breathing becomes more rapid, irregular, and shallow
- eyes jerk rapidly in various directions and limb muscles become temporarily paralysed
- heart rate increases, blood pressure rises, and males develop erections
- ➔ if someone is awakened, he/she often describes bizarre and illogical tales: dreams



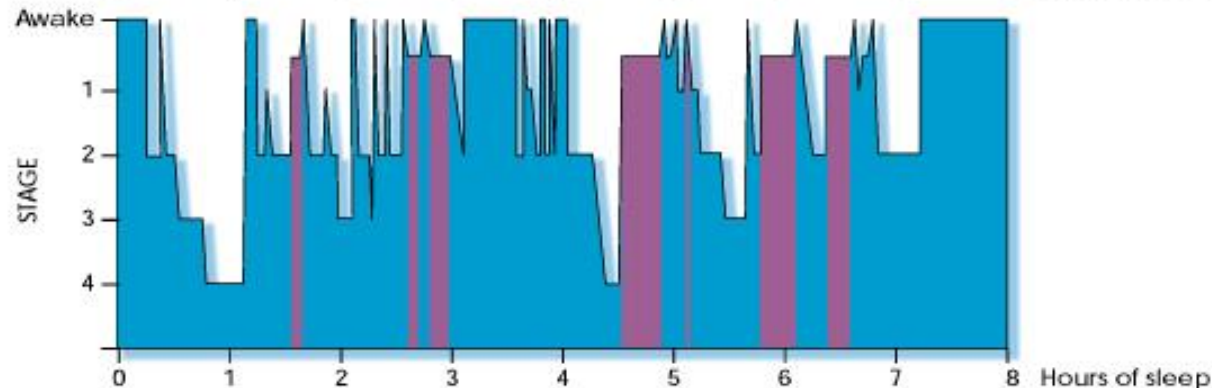
SEQUENCES OF STATES AND STAGES OF SLEEP:

■ COMPARISON OF NORMAL AND INSOMNIAC SUBJECTS

Normal
subjects



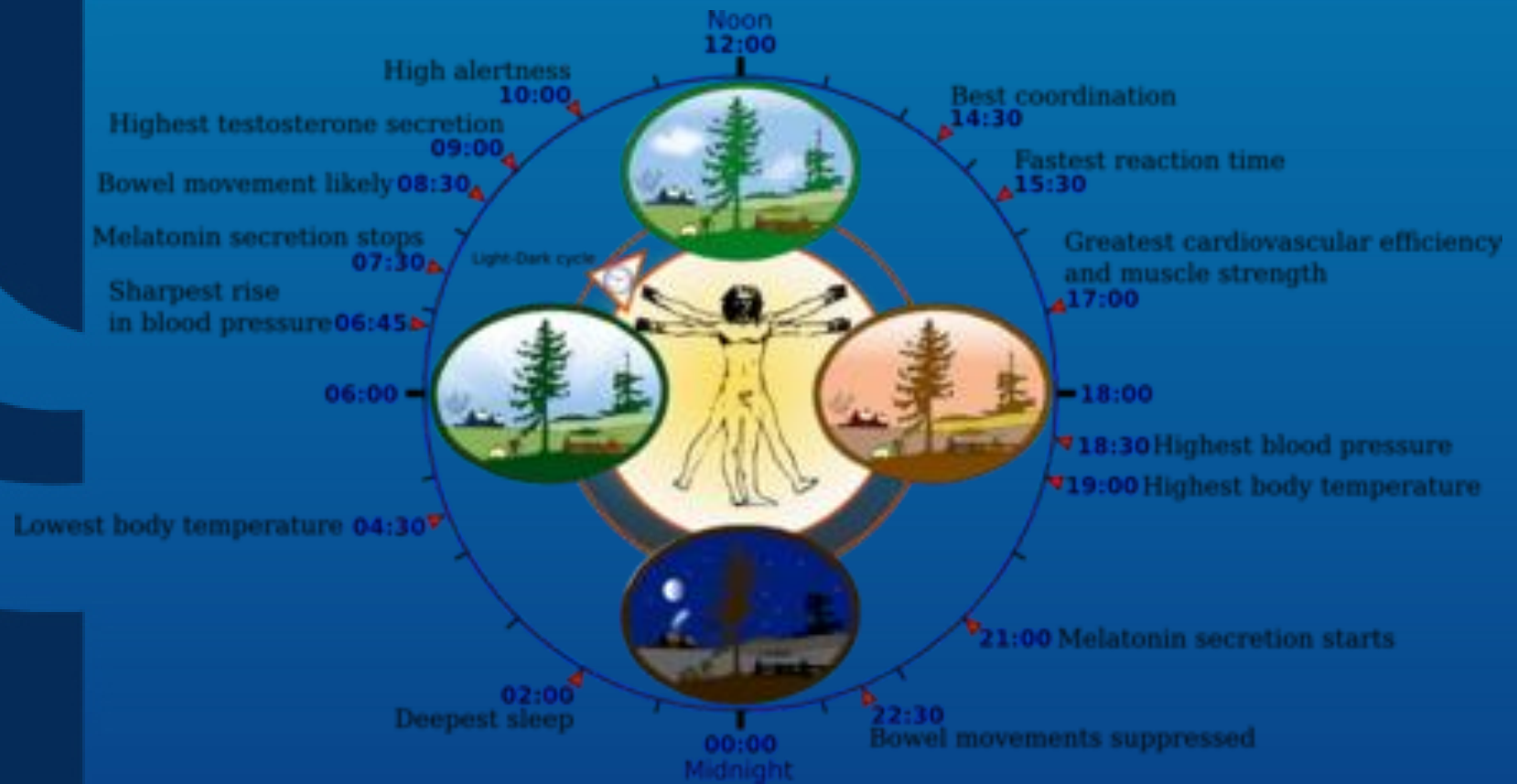
Insomniac
subjects



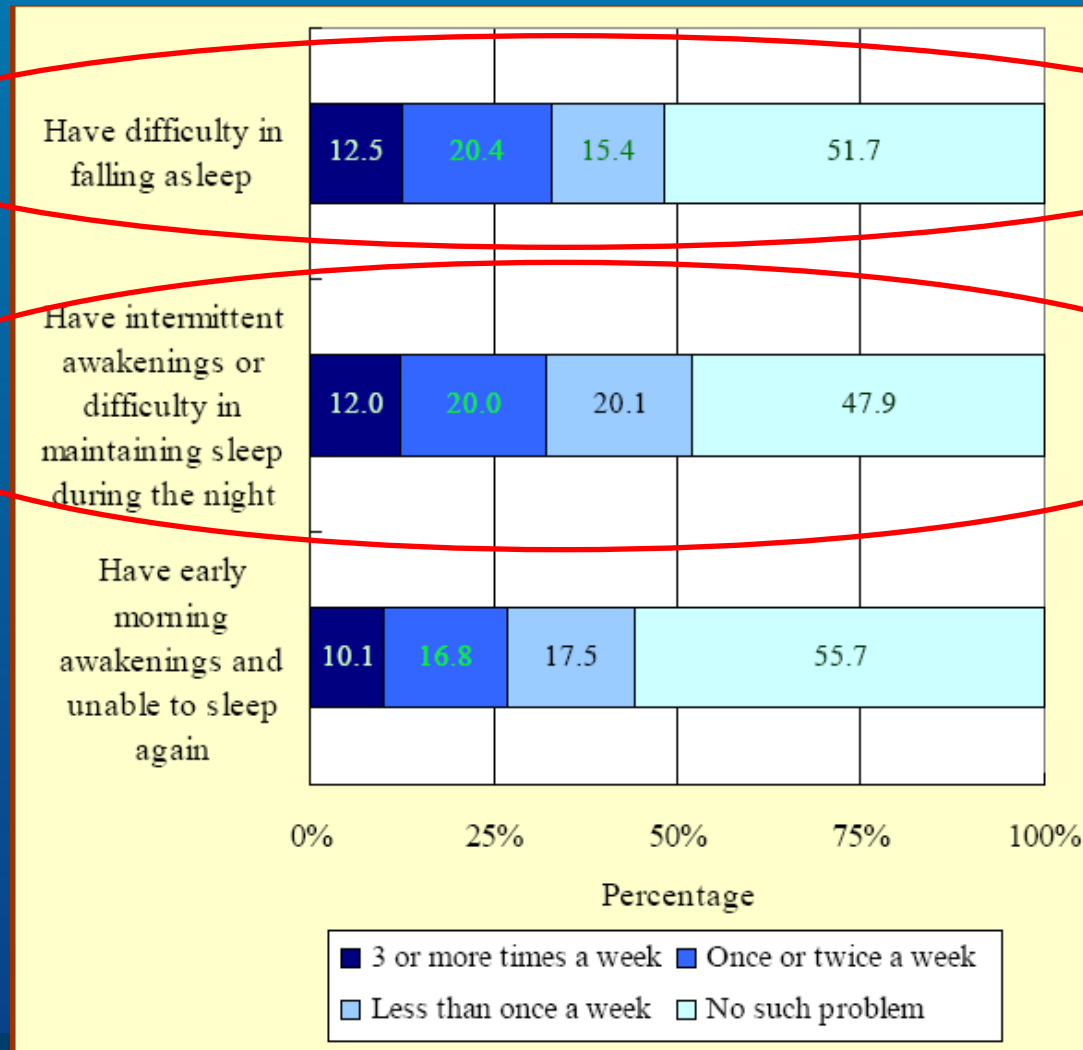
Why is REM Sleep important?

- It is believed that brain restoration takes place through protein synthesis during REM sleep
- REM sleep may be involved in restoring worn-out/depleted neurotransmitter systems
- Essential for maintaining memory, creativity, emotional balance, sexuality and mood
- Dream which takes place in REM sleep is thought to help integrate recent & remote information into new patterns

Biological clock



Distribution of insomnia in Hong Kong



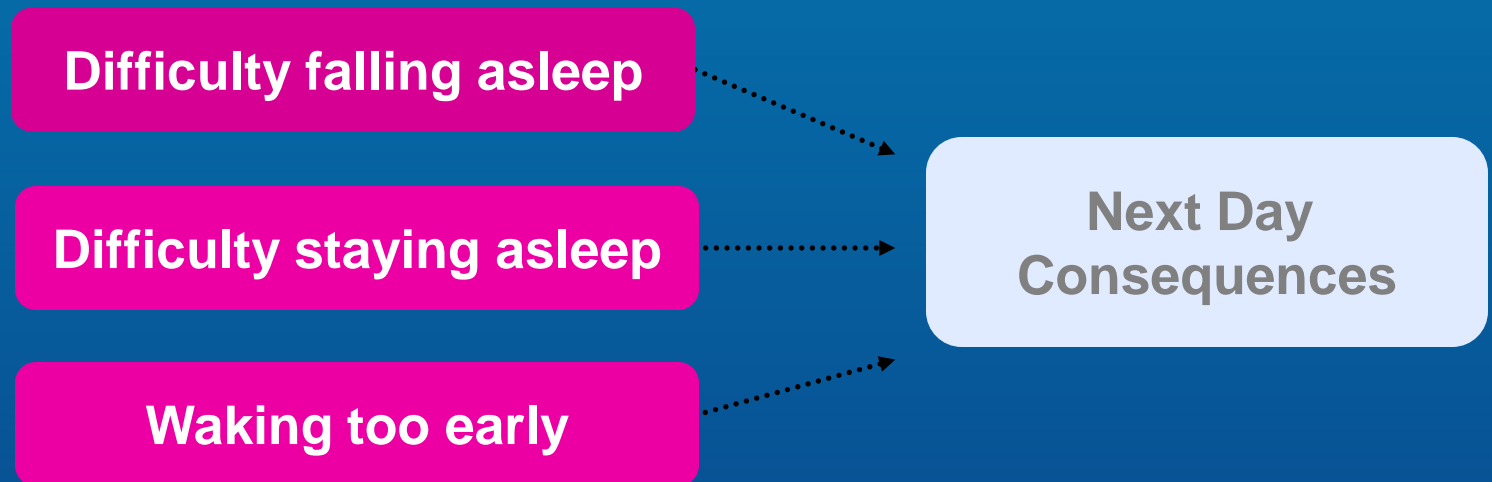
High risk group in Hong Kong

Characteristic	Rate*	Characteristic	Rate*
Sex		Type of living quarter	
Male	16.7	Public rental flats	22.5
Female	24.6	Subsidized sale flats	17.5
Age group		Private housing	21.2
18-24	17.7	Smoking status	
25-34	18.0	Never smoker	20.2
35-44	19.7	Quitter	21.6
45-54	22.8	Current smoker (smoking at least one cigarette per day)	23.8
55-64	26.9	Alcohol consumption	
Marital status		Never or seldom drinker (no drinking in the past month)	20.6
Never married	17.7	Occasional drinker (drinking in the last month but less than 4 days a week)	20.1
Married with children	21.1	Frequent drinker (drinking at least 4 days a week)	24.5
Married without children	27.2	Level of leisure-time exercise	
Divorced/Separated/Widowed	30.9	Less than once a week	21.6
Education level		Once a week or more	20.3
Not completed secondary or below	26.4	Weight status	
Completed secondary/Matriculation	21.5	Obese (BMI 25.0 or above)	22.2
Tertiary or above	15.8	Overweight (BMI 23.0 to less than or equal to 25.0)	19.3
Occupation		Normal (BMI 18.5 to less than 23.0)	19.9
Managerial/Professional worker	15.5	Underweight (BMI less than 18.5)	22.0
Clerk	21.1	General health status	
Service worker	19.0	Good or excellent	12.4
Blue collar worker	19.8	Fair	24.5
Non-working persons (included unemployed persons, home-makers, full-time students and retirees)	25.8	Poor	50.3

Note: * Rate per 100 people in the respective group.

Source: Behavioural Risk Factor Survey, April 2008.

Insomnia: Definition and classification



Adapted from Buysse. 2005. ¹

1. Buysse D. Definition, diagnosis, classification and etiology of chronic insomnia. In: National Institutes of Health. NIH State-of-the-Science Conference on Manifestations and Management of Chronic Insomnia in Adults; 2005 June 13-15. Bethesda, USA. Bethesda, MD: National Institutes of Health, 2005.

Type of Insomnia

- Transient Insomnia
- Acute Insomnia
- Chronic Insomnia

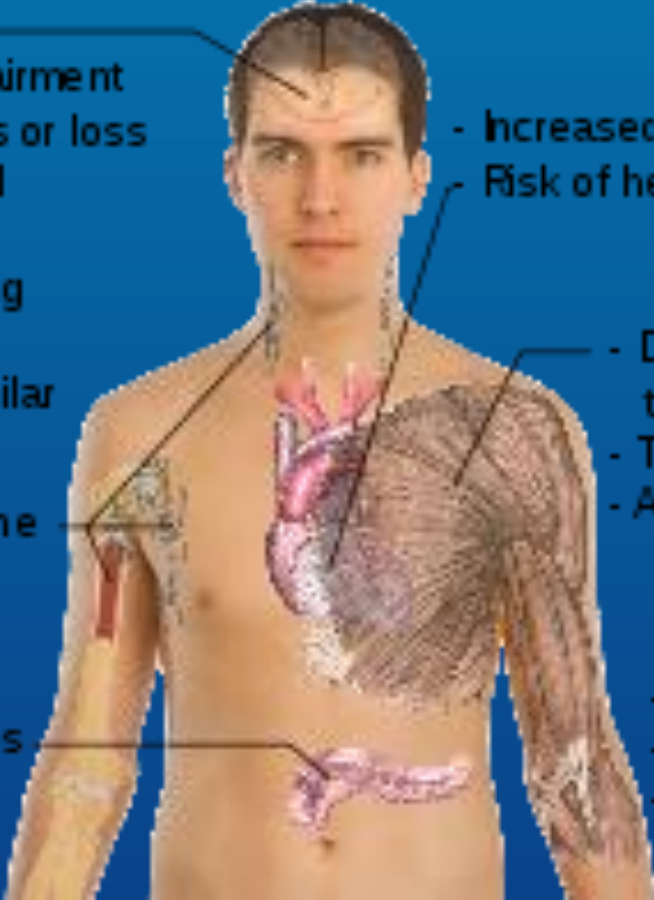
- Onset Insomnia
- Middle Insomnia
- Late Insomnia

Causes

- Psychoactive drugs
- Fluoroquinolone antibiotic drugs
- Restless Legs Syndrome
- Pain
- Hormone
- Life problems
- Mental disorder
- Disturbances of the circadian rhythm
- Neurological disorders
- Medical conditions
- Abuse of over-the-counter drug
- Poor sleep hygiene
- Parasomnia
- Rare genetic conditions
- Physical exercise

Effect of sleep deprivation

Effects of Sleep deprivation

- 
- The diagram shows a human torso with internal organs highlighted. Lines connect specific organs to lists of effects: the brain to irritability and cognitive issues; the heart to heart rate variability and disease risk; the lungs to decreased reaction time and tremors; the immune system to impaired immunity; and the pancreas to the risk of Type 2 diabetes.
- Irritability
 - Cognitive impairment
 - Memory lapses or loss
 - Impaired moral judgement
 - Severe yawning
 - Hallucinations
 - Symptoms similar to ADHD
 - Impaired immune system
 - Risk of diabetes Type 2
 - Increased heart rate variability
 - Risk of heart disease
 - Decreased reaction time and accuracy
 - Tremors
 - Aches
- Other:
- Growth suppression
 - Risk of obesity
 - Decreased temperature

Complication

Complications of **Insomnia**

Psychological

- Lower performance
- Slowed reaction time
- Risk of depression
- Risk of anxiety disorder

Other:

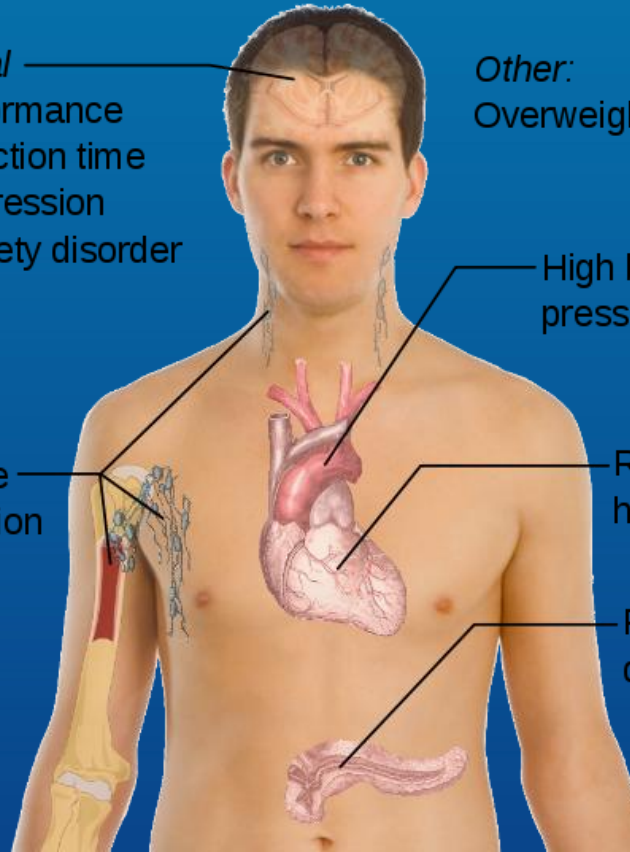
Overweight or obesity

High blood pressure

Risk of heart disease

Risk of diabetes

Poor immune system function



Behavioral Therapy

- Set a bedtime routine for yourself
 - Go to bed and get up at the same time every day
 - Read or watch TV before bedtime
 - Take a hot bath before going to bed
 - Avoid heavy eating late in the evening, but light bedtime snack may help
- Make sure your bedroom is quiet, peaceful and comfortable
 - Do not turn your bedroom into an office
 - Make sure your mattress is comfortable
 - Sound proof bedroom
- Avoid daytime naps during the day
- Avoid stimulants / alcohol
- Exercise regularly but not 3 hours before sleep
- Try deal with worries before sleep

Pharmacotherapy

Types of Hypnotics

- Antihistamines
- Barbiturates
- Benzodiazepines (nitrazepam, midazolam,....)
- Non-benzodiazepines (or sometimes called the “Z” drugs) (Zolpidem, zopiclone)
- Sedative anti-depressants (amitriptyline, doxepin, mirtazapine, trazodone,...)
- Chloral hydrate

Benzodiazepines (BZD)

- Short acting BZD ($T_{1/2}$ varies from 5-12 hours)
 - Temazepam (abuse potential)
 - Lorazepam
 - Lormetazepam
- Longer acting BZD ($T_{1/2}$ varies from 1-2 days)
 - Nitrazepam
 - Flurazepam
 - Flunitrazepam (addictive potential)

Benzodiazepines as Hypnotics

- Prolongs the total duration of sleep;
 - But it disturbs normal sleep architecture; reduces sleep latency;
- Hangover: it impairs daytime performance, memory disturbances and psychomotor activity e.g. driving
- Dependence
- Tolerances / Withdrawal symptoms (risk of Rebound insomnia)
- Pronounced respiratory depression may occur in combination with alcohol, antidote is flumazenil
- Commonest prescribed hypnotics but far from an ideal hypnotic
- Possibility of drug induced somnambulism / automatism at sleep

Non-BZD hypnotics (z drugs)

Zolpidem

- GABA-A receptor α -1 selective
- Onset 30 to 60 minutes, lasts for 3 to 4 hours
- Short term use

Zopiclone

- Pharmacologic binding spectrum that resembles classic BDZ but structurally different
- Onset in 1 hour, lasts for 6 to 8 hours
- Bitter taste, 40 % of patients experience it, genetically determined

Zalepon

- GABA-A receptor α -1 selective
- shortest acting of all 3 z drugs, half-life = 1.5 hour, no psychomotor impairment if taken 5 hours before driving, has no hangover effect

Insomnia self assessment form

自我評估問卷 SELF-REPORT QUESTIONNAIRE

我有失眠嗎？

請選出最能形容你在過去四星期的睡眠情況

	從 未	少 有	間 中	經 常	極 多
1. 我難於入睡	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. 我需要超過一個小時才能入睡	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. 我每晚醒來多過三次	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 如晚上醒來後，我需要很長的時間才可再入睡	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 我早上會太早醒來	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. 我常為能否安然入睡而擔憂	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. 我要依靠酒精幫助入睡	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. 當我躺下時常感腳部不能安靜，或有抽動的感覺	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. 我早上難以起床	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. 我睡醒時仍常感疲累	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. 有時一覺醒來，也好像沒有睡過一樣	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. 儘管我有充足時間躺在床上休息，但我仍然覺得睡眠不足	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. 我的睡眠導致我一整天都感到疲倦	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

備註：如你在以上的答案選擇合共有兩次或以上「經常」或「極多」的情況，你可能需要找家庭醫生商討你的睡眠狀況。