Drug Abuse & Toxicology

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Drug Abuse 藥物濫用 (DSM IV-TR)

One or more of the following:

- Recurrent use resulting in a failure to fulfill major role obligations at work, school, etc.;

  重覆使用物質並無法履行工作,學業或家庭中所擔當角色的責任
- Recurrent use in potentially hazardous situations;

  重覆在有危險的情況下使用
- Recurrent legal problems related to use;

  因使用物品而一再捲入法律糾紛
- Recurrent social or interpersonal problems

  持續或重覆出現社交或人際關係問題

With SUBSTANCE ABUSE the user has a choice: he/she uses in spite of illegal, unsafe consequences, or inappropriateness of the drinking/drugging experience

Diagnostic and Statistical Manual of Mental Disorders – 4th edition (DSM-IV-TR)

Drug Dependence (DSM IV-TR)

Three or more of the following in 1 year:

- Increased tolerance;
- Development of withdrawal;
- Taking larger amounts over longer period than intended;
- Unsuccessful efforts to cut down
- A great deal of time is spent in obtaining, using or recovering from the substance,
- Important social, occupational, or recreational activities are given up or reduced
- Continued use despite knowledge of consequences

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藥物依賴 (DSM IV-TR)

一年內出現以下三種或以上現象:

- 耐藥性;
- 脫癮;
- 使用的劑量比預期中大,使用時間亦比預期中長;
- 不斷想減少或控制使用物質但卻不成功 ;
- 花上大量時間獲取物質,使用物質或等待物質效用完結,
- 需要放棄或減少重要的社交,工作或娛樂活動
- 即使知道物質有可能引致或加劇身體上或精神上的傷害,仍然堅持使用

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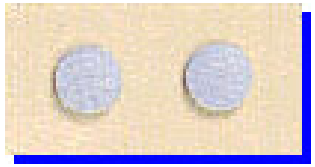
Drug Abuse in Clinical Practice

- Drug abuse is a significant problem in many parts of the world
- Apart from heroin abuse, “soft drugs” or “party drugs” poisoning also posed important medical threat
- The abuser may present for acute intoxication and its complication or chronically for medical, psychiatric and social problems
- A basic knowledge of the local common soft drugs is essential for appropriate management of such patients

Common Substance of Abuse

- Alcohol
- Heroins,
- Cocaine / Crack
- Ecstasy (MDMA)
- Ice (Methamphetamine)
- Ketamine
- Medications (Benzodiazepines, cough mixtures)

Narcotics Analgesic 麻醉鎮痛劑

物質	俗稱	醫藥用途
 Heroin/海洛英	白粉、粉 、灰、 四仔、 美金、港紙	沒有
 Methadone美沙酮  Physeptone菲仕通	蜜瓜汁 、老美 帆船仔、白色菲仕通	戒毒治療

Narcotic Analgesics 麻醉鎮痛劑

- **Heroin** is the morphine derivative most commonly abused
- Initial reactions are nausea 噁心 and vomiting
- Then causes a euphoric high
- Other symptoms and signs of use:
  - Drowsiness昏睡
  - Respiratory depression 壓抑呼吸
  - Pin-point Pupils
- Cause dependence 成癮

Nacrotics Withdrawal 斷癮症狀

- Watery eyes
- Runny nose
- Yawning
- Cramps, Diarrhea
- Loss of appetite
- Chills and sweating
- Irritability, tremors

- 流眼水
- 流鼻涕
- 打呵欠
- 痙攣
- 食慾不振
- 感到寒冷、出汗
- 煩躁、震顫

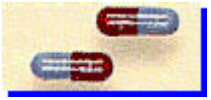
CNS Stimulants 興奮劑

- Used to increase alertness (增強警覺)
- Relieve fatigue (減輕疲勞)
- Abusive and addictively desired characteristics are euphoria (興奮), power, or relief from feeling of “down”

Clinical Effects of Stimulants

- Release of endogenous catecholamines (兒茶酚):
  - Psychomotor agitation (激動不安), tachycardia (心動過速), hypertension (高血壓), diaphoresis (冷汗), mydriasis (瞳孔放大), hyperthermia (過高熱)
- CNS toxicities
  - Seizures (癲癇), intracranial bleeding (顱內出血), TIA (短暫性缺血性發作), infarct (腦血管梗塞)
- CVS toxicities
  - Acute coronary syndrome (急性冠心病), hypertensive emergencies, arrhythmias (心律不齊), vasospasm (血管痙攣)
- Others:
  - Rhabdomyolysis (橫紋肌溶解) causing hyperkalaemia (高鉀血症)

Stimulants

物質	俗稱	醫藥用途	濫用後果
Amphetamines 安非他明   Methamphetamine甲基安非他明  Phentermine 二甲基苯乙基胺	Yaba, 麻古 Ice, 冰 大力丸	Appetite suppressant 減低食慾 stimulant 提神 treatment of narcolepsy 治療發作性渴睡症	Insomnia 失眠 Depression 抑鬱 Toxic psychosis 中毒性精神病 Loss of appetite 食慾不振 Heart and kidney failure 心臟和腎臟衰竭

Stimulants

物質	俗稱	醫藥用途	濫用後果
 MDMA (Ecstasy) 亞甲二氧基甲基安非他明	搖頭丸、狂喜、忘我、E仔	None	Dehydration 脫水 Exhaustion 筋疲力盡 Muscle breakdown 肌肉衰弱 Overheating 身體過熱 Convulsion 抽搐 Collapse 崩潰
 Cocaine 可卡因 Crack-cocaine	可卡因、可可精, C, coke, flake, snow, stardust Crack, 霹靂, 可樂	Local or topical anaesthetic 局部麻醉劑	Agitation 激動不安 Feelings of persecution被迫害感覺 Extra sensibility, especially to noise敏感度加強，特別對聲音 Mood swings 情緒波動 Affected memory影響記憶力 Damage nose tissue 破壞鼻腔組織 Impotence 性無能 Delirium 精神錯亂 Death 死亡

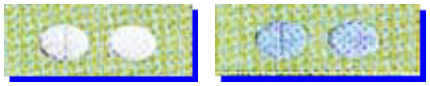
Complications of Stimulants

- Acute delirium (tweaking, 跳掣)
- Heat stroke (中暑)
- Rhabdomyolysis (横紋肌溶解)
- Symphathomimetic crises
  - Hypertension
  - Tachycardia
- Stroke (中風)
- Myocardial infarction (心肌梗塞)

CNS Depressants 鎮靜劑

- Used medicinally to relieve anxiety (焦慮), irritability , and tension.
- Small amounts cause calmness, relaxed muscle
- Larger amounts causes slurring of speech (說話含糊不清), impaired judgment, loss of motor coordination
- Very large dose cause respiratory depression ((呼吸機能低下), coma, death
- Complications include hypothemia (體溫過低), aspiration, complications of prolonged immobilization such as compressive neuropathies (壓力引起的外周神經炎)
- Tolerance develops very fast

Depressants

物質	俗稱
Benzodiazepines **苯二氮平類**	
Chlordiazepoxide (Librium, Librax) 氯二氮平(利眠寧) 	綠豆仔
Diazepam (Valium) 安定 	羅氏五號、羅氏十號
Flunitrazepma (Rohypnol) 氟硝西泮 (氟硝安定) 	十字架
Midazolam (Dromicum) 咪達唑侖 (速眠安) 	藍精靈
Nimetazepam (Erimin) 硝甲西泮 	五仔、黃飛鴻
Triazolam (Halcion) 三唑侖 (海樂神) 	白瓜子、藍精靈
Zopiclone (Imovane) 佐匹克隆 (憶夢返) 	白瓜子

CNS Depressants

物質	俗稱	濫用後果
Gamma Hydroxybutyric Acid (GHB) γ–羥丁酸	G、G水、液體狂喜、液體X、液體E、迷姦水	Drowsiness昏昏欲睡 Nausea 噁心 Visual disturbance 擾亂視覺 Unconsciousness 失去知覺 Seizures 抽搐 Respiratory depression 呼吸困難 Coma 昏迷

Benzodiazepines (苯二氮濮類)

- Clinical use: hypnotics 安眠藥, tranquillizers 鎮靜劑
- Effects of abuse:
  - Dependence 成癮
  - Drowsiness 昏睡
  - Dizziness 暈眩
  - Sedation 鎮靜神經
  - Depression 抑鬱
  - In-coordination 動作不協調
  - Ataxia 運動失調
  - Foetal abnormalities 胎兒不正常
  - Loss of memory 失憶
  - Impaired cognitive and neuromotor functioning 認知和神經訊息傳遞功能受損

Depressants: Withdrawal

- Anxiety
- Insomnia (失眠)
- Muscle tremors (肌肉顫抖)
- Loss of appetite
- Convulsions upon cessation of use
- Delirium (神智昏迷)
- Death

Ketamine 氯胺酮

- NMDA receptor antagonist
- Dissociative anaesthetic agent
- Used in paediatric, veterinary
- Adverse drug reactions:
  - Vomiting
  - Hypersalivation
  - Hypertension
- Very high dose: coma and respiratory failure

Ketamine 氯胺酮

- K仔、K、茄, “special K”, “vitamin K”, “Kit Kat”
- Most commonest used “soft drug” in recent few years
- White powder or pills which can be insufflated, ingested or rarely injected
- Common clinical features
  - CNS: altered mental state, slurred speech, anxiety, hallucinations (幻覺), distorted body images, nystagmus (眼球震顫), polyneuropathy (多發性神經炎)
  - CVS: palpitation, hypertension, tachycardia
  - Seizures or respiratory arrest may occur, death is rare
  - Psychomotor agitation makes patients at risk of self-injury, hyperthermia, muscle breakdown

Problems associated with Chronic Ketamine Use

- Chronic use results in neuropsychiatric features such as impaired long term memory, cognitive difficulties, etc

- “Street Ketamine” lower urinary tract destruction
  - Dysuria, frequency, painful haematuria, hydronephrosis, impaired renal function

- “Street ketamine” associated abdominal pain
  - Chronic epigastric or abdominal pain with no cause found
  - Up to 25% of chronic ketamine user

Hallucinogens 迷幻劑

物質	俗稱	醫藥用途
 Cannibis 大麻	草	沒有
 Cannibis resin 大麻樹脂	大麻精	沒有
 Lysergic acid diethyamide (LSD) 麥角酸二乙胺	黑芝麻、FING霸	沒有

Hallucinogens 迷幻劑

- Hallucinogens produce behavioral changes that are dramatic and of many dimensions
- Effects are rapidly changing feelings, sometimes violent and erratic behavior, hallucinations, illusions, paranoia (妄想症), etc.
- There are no documented withdrawal symptoms.
- Behavioral characteristics noted above fade with time.

Cannabis 大麻

- Can be commonly smoked and less commonly ingested in form of brewed tea or addictives in food
- Onset within minutes via inhalation, effects last for 1-3 hours
- Slow absorption after oral ingestion may result in delay of onset of symptoms (0.5-2 hours) and longer duration of effects up to 6 hours

Effects of Cannabis

- Euphoria followed by relaxation
- Sensory exaggeration
- Increased appetite
- Impaired judgement and memory
- Poor concentration
- Loss of coordination
- Urinary retention
- Dry mouth, tachycardia

Cannabis Chronic Use & Withdrawal

- Chronic users have increased risk of cardiovascular, respiratory and cognitive problems
- Chronic use can cause tolerance and dependence

- Withdrawal effects:
  - Insomnia
  - Hyperactivity
  - Decreased appetite

Other Psychotropic Agents

物質	俗稱	濫用後果
Cough Mixtures Codeine 可待因  Dextromethorphan 右甲嗎南 	高甸、止咳水、囉囉孿 DM丸 、黃豆仔、O仔	Dependence 成癮 Respiratory depression 壓抑呼吸 Toxic psychosis 中毒性精神病 Constipation 便秘 Loss of appetite 食慾不振 Dizziness 暈眩
Organic solvents 有機溶劑 	None	Impaired perception 知覺受損 Loss of coordination and judgment失去協調和判斷能力 Respiratory depression and brain damage 壓抑呼吸和腦部受損

Short and Long Term Problems of Addiction

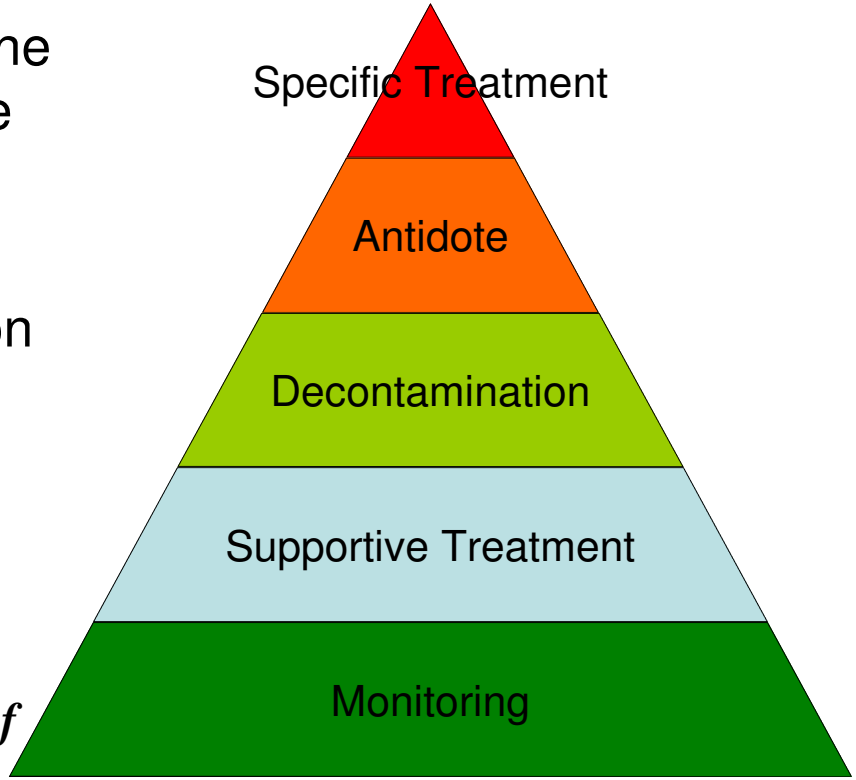
- Trauma
- Psychological/psychiatric Instability
- Intoxication
- Acute Withdrawal
- Drug Seeking
- Loss of employment
- Homelessness
- Legal Involvement and/or Avoidance
- Other medical conditions

Chronic Toxicity of Psychotropic Substances

- Poor memory
- Slowed response
- Problem with fine motor function
- Nasal symptoms
- Affective and psychotic symptoms

General Management of Acute Poisoning
Supportive care for most, specific care for some

- 80% require just observation while the body metabolises and eliminates the drugs/chemicals
- 15% need antidotes, measures to enhance the elimination of the poison or simply more time to regain full consciousness
- 10% need intensive supportive care
- Overall mortality <1%
- ***To identify promptly who are most at risk of developing complications and who may require specific treatment***



Management Approach to Acute Poisoning **Assessment, resuscitation, supportive care, specific treatment**

1. Make a rapid assessment of the patient.
2. Ensure that the airway, breathing and circulation are adequate.
3. Assess the conscious level (e.g. GCS).
4. Consider the need for measures to prevent absorption of the poison.
5. Consider whether an emergency drug analysis is necessary.
6. Consider whether an antidote is available, appropriate or necessary.
7. Consider whether it is possible or necessary to attempt to increase the elimination of the poison.

History: Toxin-related

- Which drug(s) were taken?
- When was it taken?
- How much was taken?
- How was it taken?
- Why was it taken?
- Was anything else taken? (Consider co-ingestion: other things which may be in this person's drug cabinet)
- Patients who overdose may be unreliable
- Gather info from family, friends, old medical records, drug bottles/bags, their occupational environment

History: Symptom-related

- What, if any, symptoms are present?
  - Obtain a specific list of symptoms
- How long after exposure did the symptoms begin?
  - In which order did the symptoms present?
- Are the symptoms and their progression the same in all involved patients?
- What underlying medical conditions or medications are coexisting?
- What prior therapy (self-initiated or otherwise) was instituted?

Physical Examination

- Vital Signs: *MUST* obtain a full set of vital signs (blood pressure, pulse rate, respiratory rate and temp), including blood glucose and pulse oximetry

- Certain toxins are associated with characteristic alterations in vital signs

- Vital signs are the key to your initial management of the patient....

Physical Examination & Clinical Evaluation

- A thorough physical examination with appropriate laboratory investigations can confirm the suspected diagnosis and detect the unexpected

- Repeated evaluations over time tract disease progression as well as the response to therapeutic interventions

- Important to rule out other differential diagnoses

Toxidrome (Toxicologic syndrome 毒物學綜合症)

- Grouping toxins together into recognizable syndromes
- Allows prompt recognition and the institution of appropriate therapy
- Examples:
- **Opioid (鴉片) toxidrome**
  - Respiratory depression, sedation, miosis (瞳孔縮小), bradycardia, reduced bowel motility
- **Sympathomimetic (擬交感神經藥) toxidrome** (e.g. cocaine, ephedrine)
  - Hypertension, tachycardia, psychomotor agitation (精神運動的不安), hyperthermia, diaphoresis (大量出汗), mydriasis (瞳孔放大)

Toxidromes

- **Anticholinergic (副交感神經阻滯藥) Toxidrome** (e.g. atropine, scopolamine, antihistamines)
  - Antagonism at the muscarinic cholinergic receptors
  - Tachycardia, hyperthermia, psychosis, dry flushed skin, mydriasis, urinary retention, ↓ bowel sound
  - ***Hot as a hare, Mad as a hatter, Dry as a bone, Blind as a bat, Full as a Flask***

Investigations

- All unconscious patients and those with features of severe toxicity should have measurement of:
  - blood glucose (H'stix)
  - electrolytes, urea, creatinine (RFT, calcium), LFT
  - Arterial or venous blood gas
  - paracetamol level
  - ECG, CXR
- Patients without clinical features suggestive of salicylate (水楊酸) poisoning (tinnitus, sweating, changed conscious level, tachypnoea, metabolic acidosis) do not require routine measurement of salicylate concentrations
- Bedside urine drug test kits are generally not helpful in managing acutely poisoned patients

Specific Toxicology Tests

- Paracetamol
- Salicylates
- Carboxyhemoglobin, methemoglobin
- Digoxin
- Ethanol
- Lithium
- Theophylline
- Iron
- Tricyclic antidepressants
- Plasma cholinesterase activity
- Methanol
- Cyanide

- To assess the severity of poisoning and guide management (e.g. use of antidote or enhanced elimination

Management

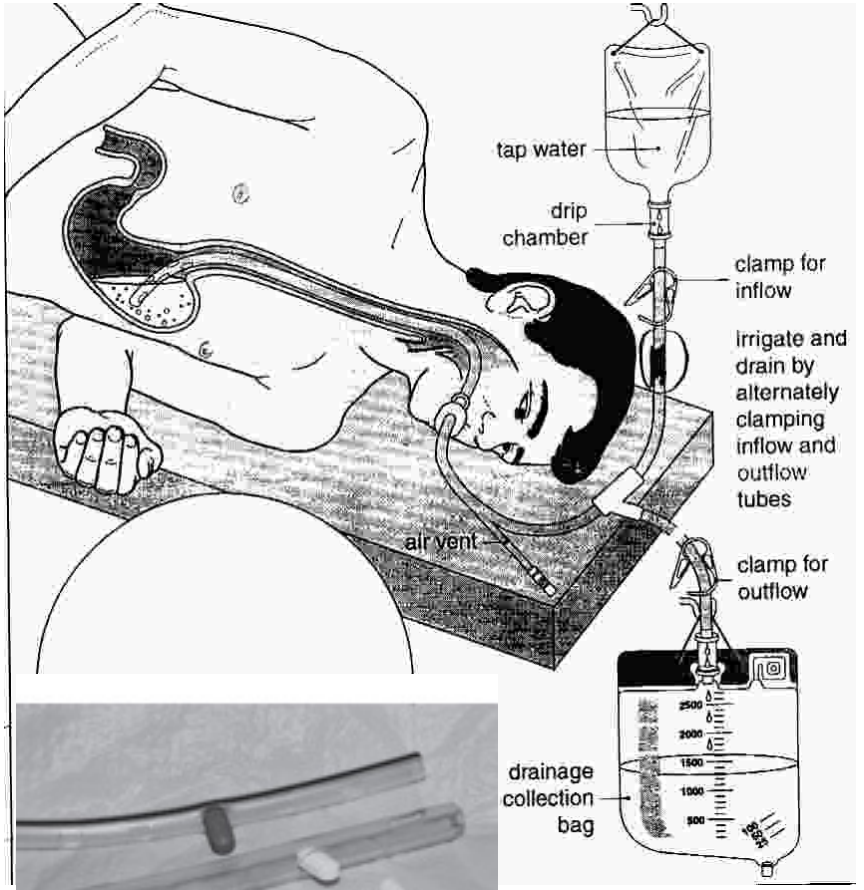
- Supportive
  - Correct hypoxia, hypotension, dehydration, hypo- hyperthermia, and acidosis
  - Control seizures

- Monitor
  - Blood pressure, pulse rate, ECG, Oxygenation, GCS

- General
  - ↓ Absorption
  - ↑ Elimination
  - Specific antidotes

Gut Decontamination 腸消除污染

- Gastric lavage (洗胃)
  - No role in routine GI decontamination of acutely poisoned patients
  - No evidence that gastric lavage improves patient outcome
  - Should only be considered in a patient presenting within one hour of ingestion of a potentially life-threatening overdose



Gut Decontamination (Reduce Absorption)

- Activated charcoal (活性炭)
  - Is a safe and probably effective agent used to decrease the amount of drug absorbed from the GI tract
  - Dose: 50g oral for patients who have ingested a potentially toxic overdose within the previous hour
  - Should be considered in large overdoses of toxic drugs where delayed GI absorption is possible (TCA, sustained release preparations)
  - Less effective in adsorbing metals (lithium 鋰, iron 鐵), alcohols (methanol 甲醇, ethylene glycol 乙二醇), or petroleum distillates 蒸餾油
  - Causes vomiting in 5% of patients

Gut Decontamination (Reduce Absorption)

- Whole bowel irrigation (全腸灌洗)
  - Administering polyethylene glycol (聚乙二醇, PEG 2 litre/hr in adults) orally until the resulting rectal effluent is clear
  - Reduces drug absorption by forcing the tablets through the GI tract
  - Used to treat
    - large ingestions of drugs not absorbed by activated charcoal (e.g. lithium, iron)
    - large ingestions of enteric coated or sustained release tablets
    - Patients who have ingested packages of illicit drugs (body packers)
  - Contraindications: obstructed bowel, ileus (腸梗阻), GI bleeding

Enhancing Elimination

- Multidose activated charcoal (MDAC)
  - Increases the elimination of drugs that undergo enterohepatic or enteroenteric circulation
  - Has proven efficacy in ingestions of
    - theophylline,
    - carbamazepine
    - phenobarbital
    - dapsone
    - phenytoin
  - Should be given to decrease ongoing absorption of drugs ingested (sustained release products, drugs that form concretions in GI tract, etc)

Enhanced Elimination

- Urinary alkalinisation
  - Effectively increase the elimination of salicylates, chlorpropamide, phenobarbital, etc
  - IV potassium supplementation

- Extracorporeal techniques (體外的方法)
  - Indicated in only a very limited subset of poisonings and only in patients with serious toxicity
  - Haemodialysis (血液透析): lithium, salicylates, theophylline, methanol, ethylene glycol
  - Charcoal haemoperfusion (活性炭血灌注): theophylline, carbamazepine, phenobarbitone

Antidotes (解毒劑) in acute poisoning

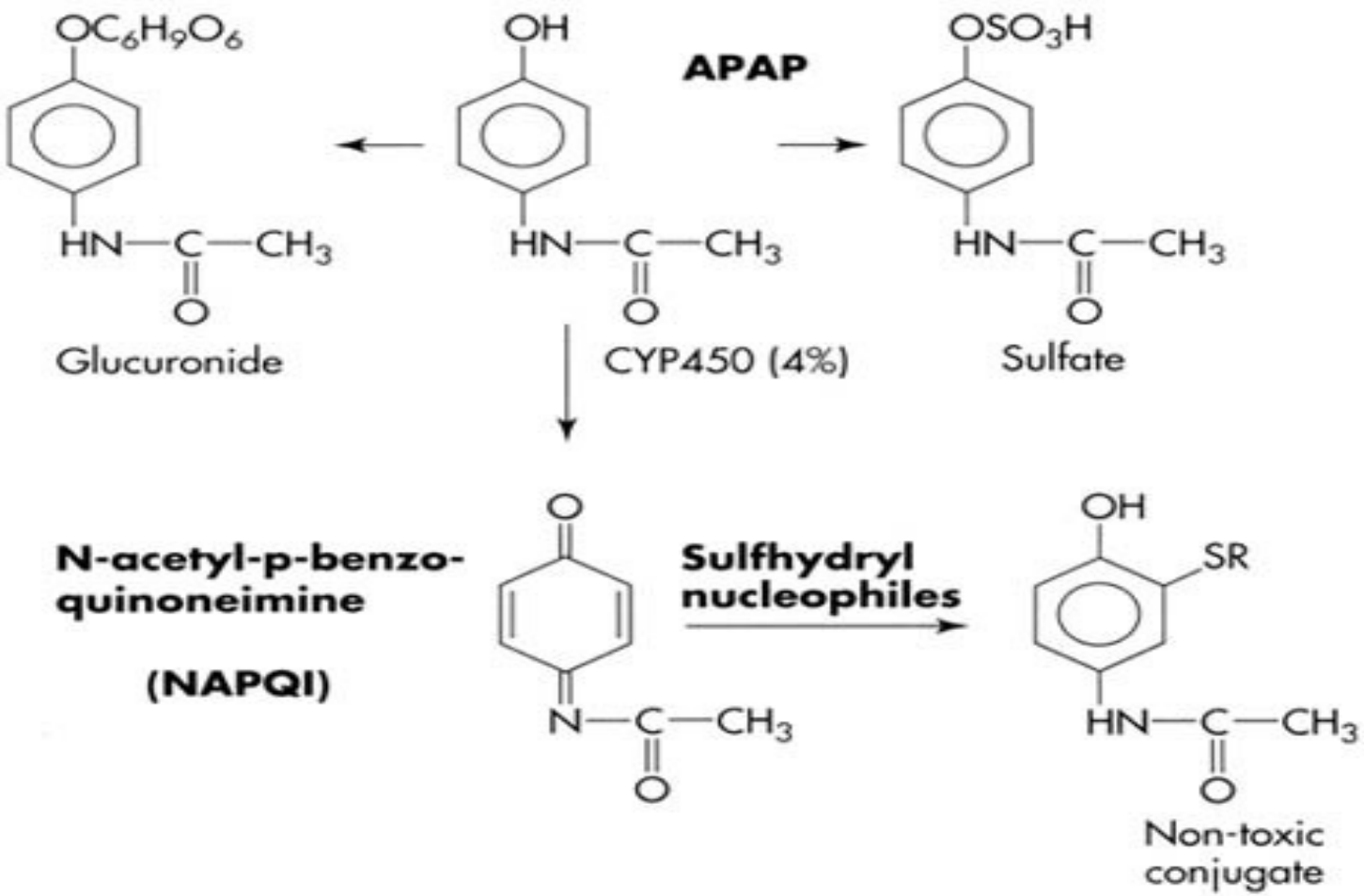
Is the antidote available or necessary?

- Naloxone - opiate poisoning
- N-acetylcysteine - paracetamol poisoning
- Flumazenil - benzodiazepine poisoning
- Atropine/pralidoxime - organophosphates
- Desferrioxamine - iron poisoning
- Ethanol - methanol poisoning
- Vitamin K1 - warfarin poisoning

Paracetamol (扑熱息痛) Overdose

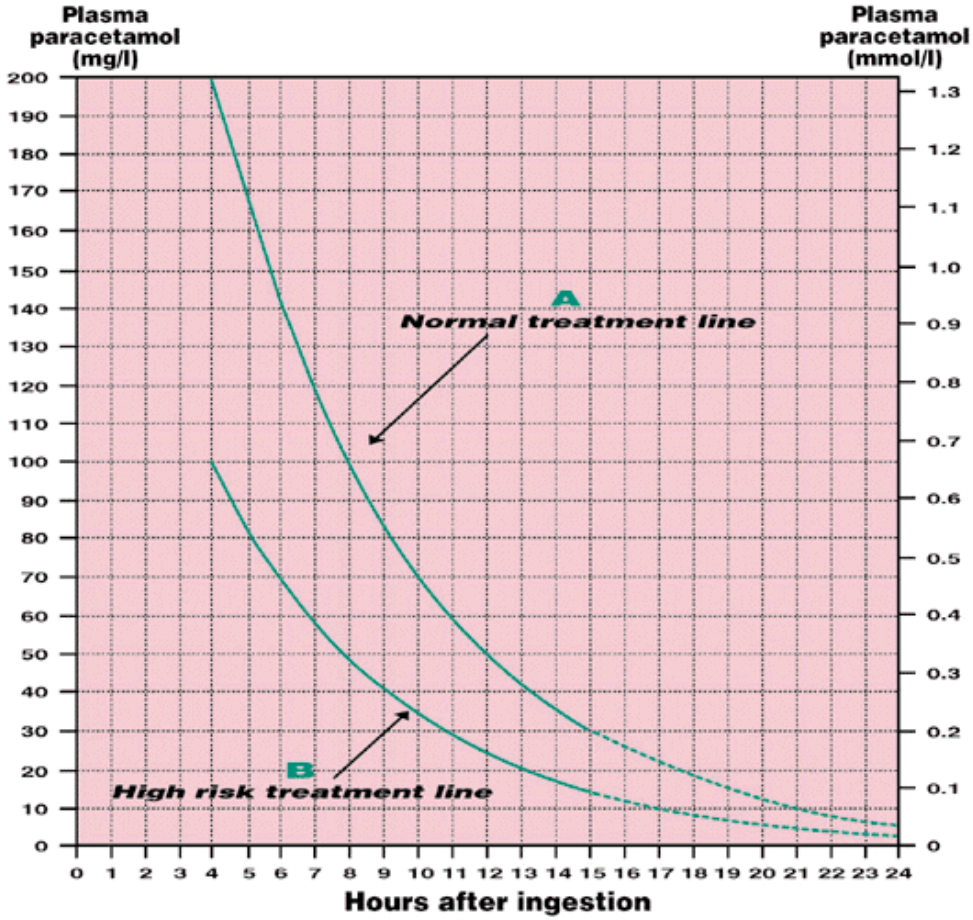
- Most common drug taken in overdose
- Few symptoms or early signs
- Hepatotoxic dose: ≧150mg/kg
- As little as 12g can be fatal
- Hepatic and renal toxin
  - Centrolobular necrosis
- More toxic if liver enzymes induced or reduced ability to conjugate toxin

Paracetamol Metabolism



Paracetamol Poisoning

- N-acetylcysteine (乙醯半胱氨酸, NAC) as antidote according to plasma level



Paracetamol Poisoning
IV NAC is remarkably effective if given within 8 hours

- Intravenous NAC to prevent liver and renal damage
  - Effective if given within 10 hours
  - May be ineffective after 15 hours
- IV NAC may cause anaphylactoid reactions
  - Especially if the loading dose is given over 15 min
  - Temporary withdrawal, restart at slower rate after IV antihistamine ±hydrocortisone
- Reasons for continuing morbidity in Hong Kong
  - Failure to give NAC appropriately and late presentations
- 'Subacute' poisoning in young children
  - Prolonged treatment with maximum daily dosage