Pharmacology in the Elderly

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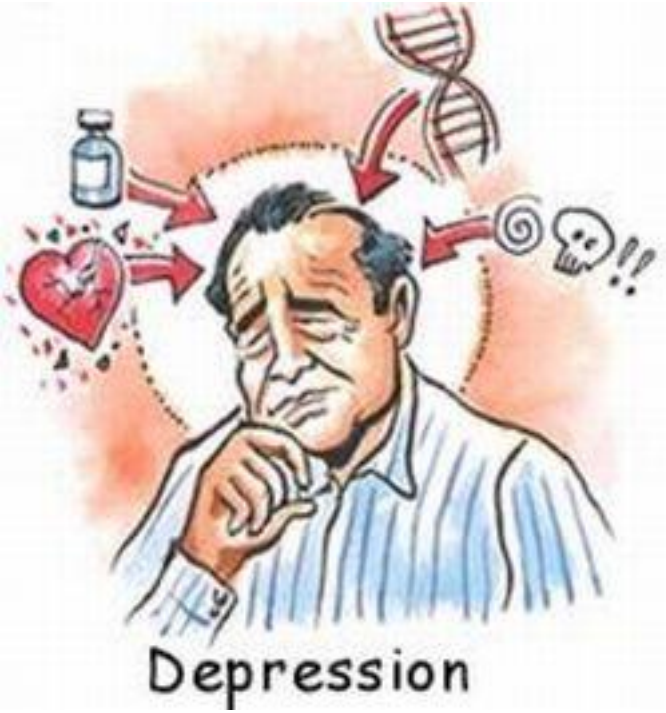
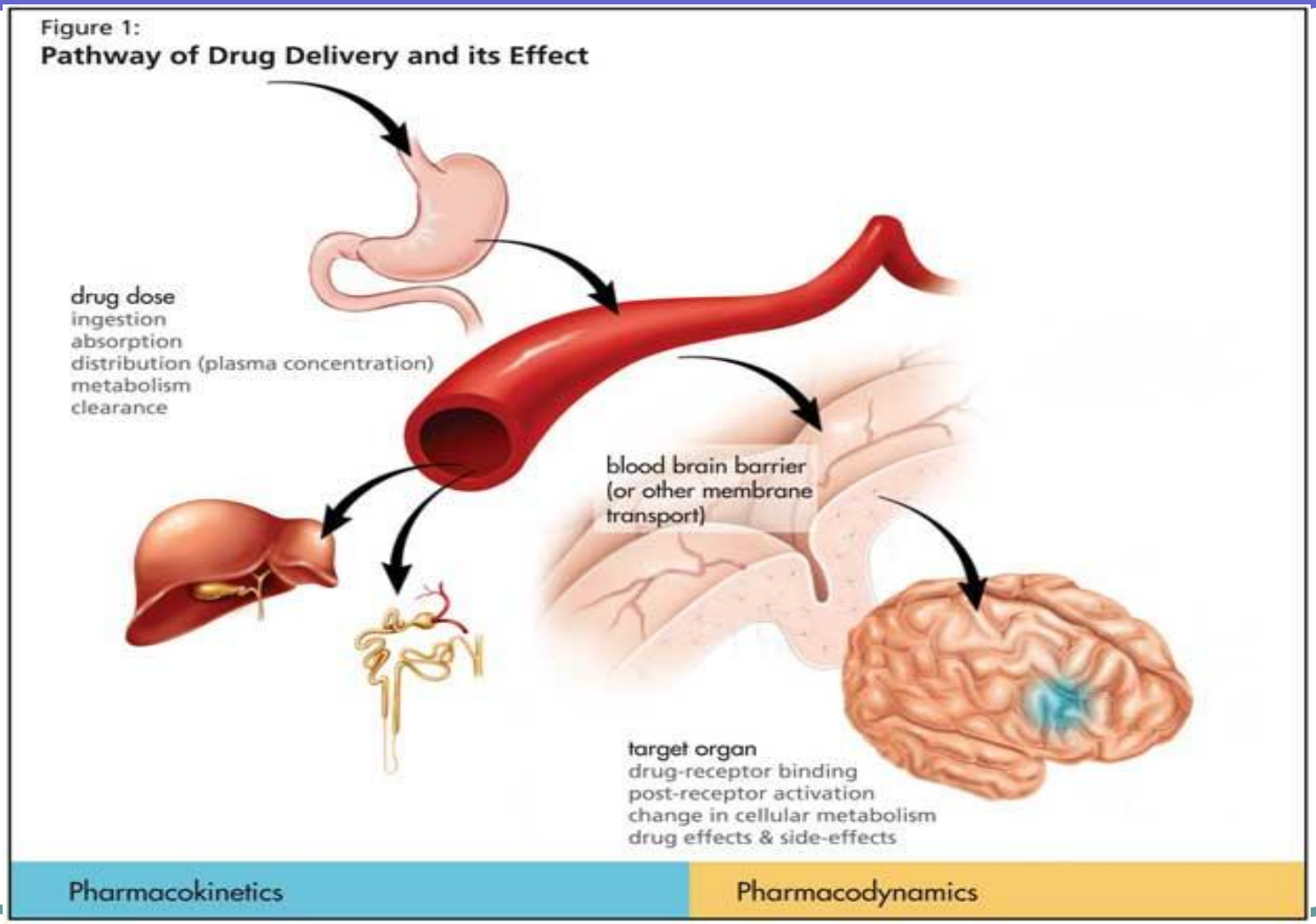
Age changes

Ageing causes a number of changes in drug absorption, distribution and elimination

This can occur as a consequence of living habits such as diet ,alcohol use, smoking, concomitant use of other drugs , liver enzyme changes and disease processes



Pharmacokinetics & Pharmacodynamics



Pharmacokinetics

Important factors;

- Increase in Gastric pH
- Reduction of gastrointestinal motility
- Reduction in blood flow
- Decrease absorption surface in the gastrointestinal tract

Pharmacokinetics

- Distribution is influenced by
  - Blood flow
  - Plasma protein binding
  - Physico-chemical properties of the drug itself
- Also influenced by lean and non-lean body mass
  - Adipose tissue increases
  - Total body water is reduced

Pharmacokinetics

- Liver blood flow decreases with age
- Genetic influences on liver enzymes
  - Cytochrome P450 enzymes
  - Fast metabolisers vs. Slow metabolisers
- Liver metabolism is also influenced by smoking, liver disease, alcohol nutritional status and influence of other drugs

Pharmacokinetics

- Aging causes reduced renal function
- 30-35% reduction in glomerular filtration and renal blood flow
- Drugs that are excreted through glomerular filtration such as lithium are potentially toxic in the elderly

Pharmacodynamics

- Some drugs can have varying effects in the elderly
- This occurs due to several reasons
  - Changes in the number of receptors
  - Changes in the binding affinity
  - Deficits in homeostatic mechanisms

Pharmacodynamics

- Changes in drug receptors/target organ responses - alter sensitivity to effect of drugs (> CNS effects of benzodiazepines).
- Impairment of secondary compensatory mechanisms - predispose to adverse effects (orthostatic hypotension with diuretics or TCAs).

- Need to be careful to try and achieve an efficacious pharmacological response with the lowest dosage
- Go LOW and go SLOW principle

Conventional Antipsychotics

- Increased risk of EPSE and tardive dyskinesia
- Increased cardiovascular risk – QTc interval

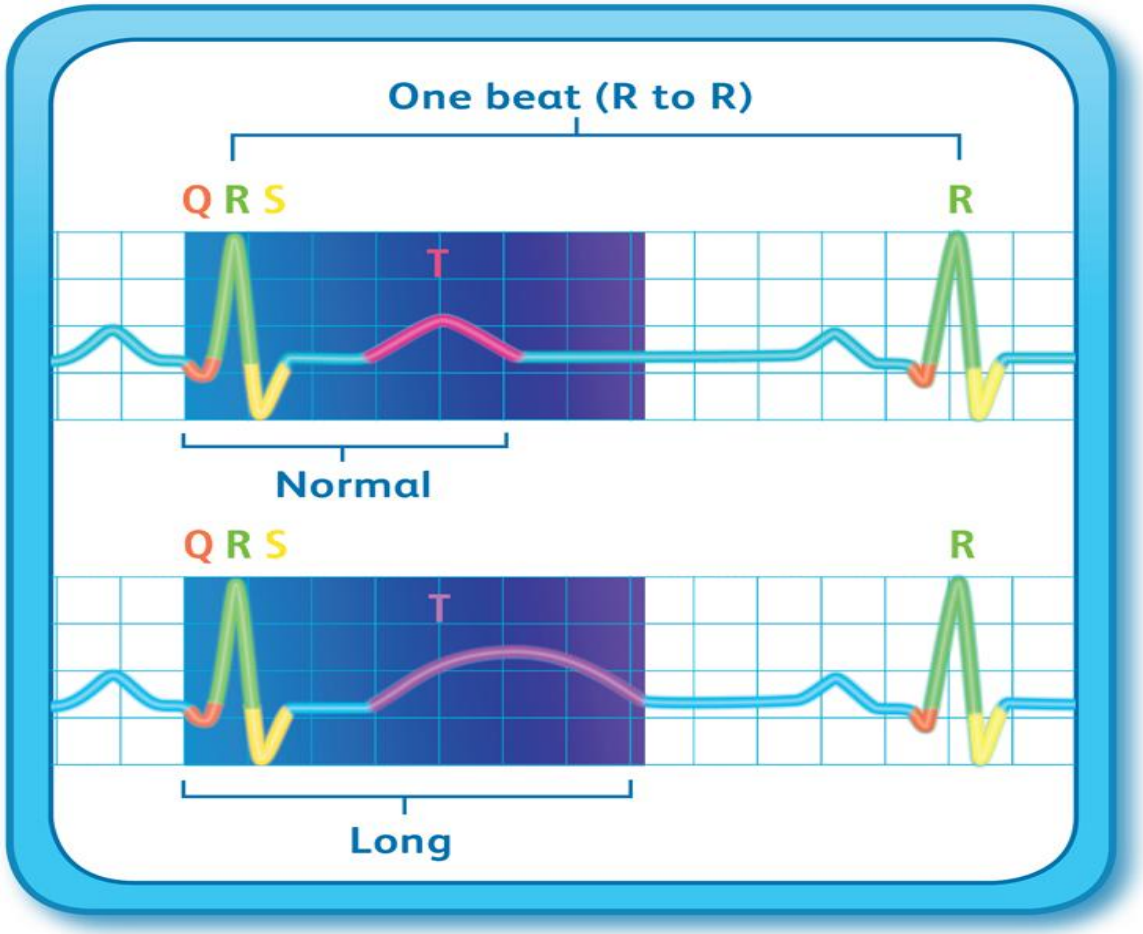


Illustration showing prolonged QT interval on an electrocardiogram (ECG)

Atypical Antipsychotics

- Generally lower risk for EPSE and cardiovascular issues
- Metabolic syndrome
- Orthostatic Hypotension

Antidepressant medication

- **Tricyclic antidepressants –** anticholinergic, sedative and cardiovascular effects
- Narrow therapeutic index
- Concomitant administration of inhibitors and inducers of liver enzymes
- Generally 2nd line treatment in the elderly

Antidepressant Medication

- **SSRI- Selective Serotonin Reuptake inhibitors**
- Wide therapeutic index
- Effected by metabolism in the liver
- Loss of therapeutic effect in the elderly
- Serotonin syndrome

Benzodiazepines

- Adverse events reported more frequently in the elderly
- Daytime drowsiness, dizziness and light headedness
- Also associated with memory problems, rebound insomnia and withdrawal
- Cumulative effects
- Falls – Hip fractures

Effect of adverse events

- Falls – sedation levels, hypotension
- Higher rates of morbidity – longer hospitalisation
- Delirium
- Mortality

Limitations in treating the Elderly

- Medical co-morbidities
- Less efficacy of certain medications
- Limited dosing flexability
- Prolonged illness

Non-compliance

- Unintentional - result confusion, forgetfulness
- Intentional - to minimise adverse effects or save money.

Minimising adverse effects

- Whenever possible, use non-pharmacological treatments
- Lowest feasible dose (often less than half usual adult dose)
- Smallest number of medications/simplest dose regimens
- Be familiar drug effects in elderly
- Simple verbal/written instructions for every medication
- Presenting symptoms may be a result of medications (not old age)
- Regular review chronic - may be possible to stop medications or reduce dose if renal function declines
- Make sure the carer understands treatment