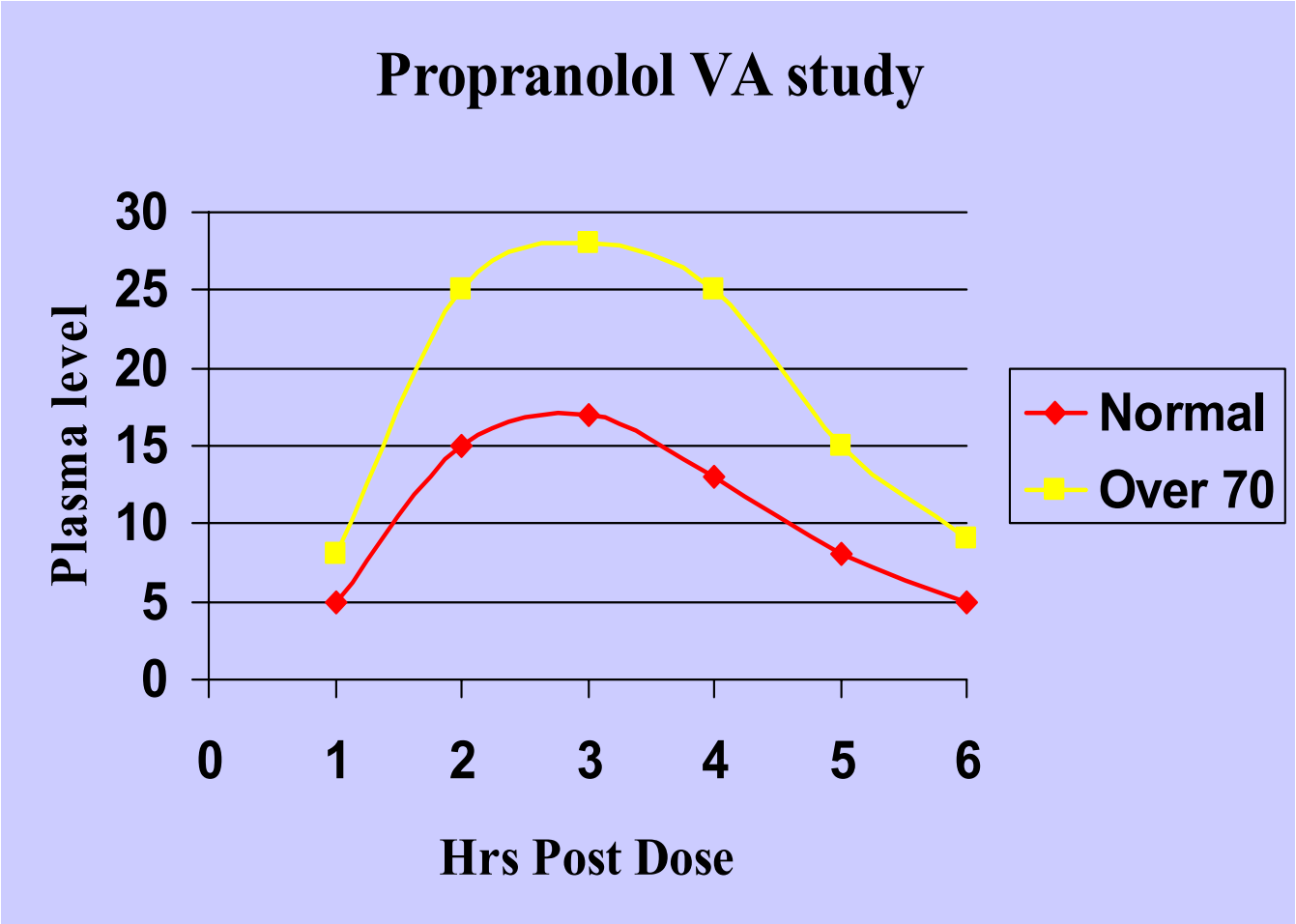
The role of medication in falls risk

Patrick A. Ball,
Foundation Professor of Rural Pharmacy,
Charles Sturt University,
Wagga Wagga

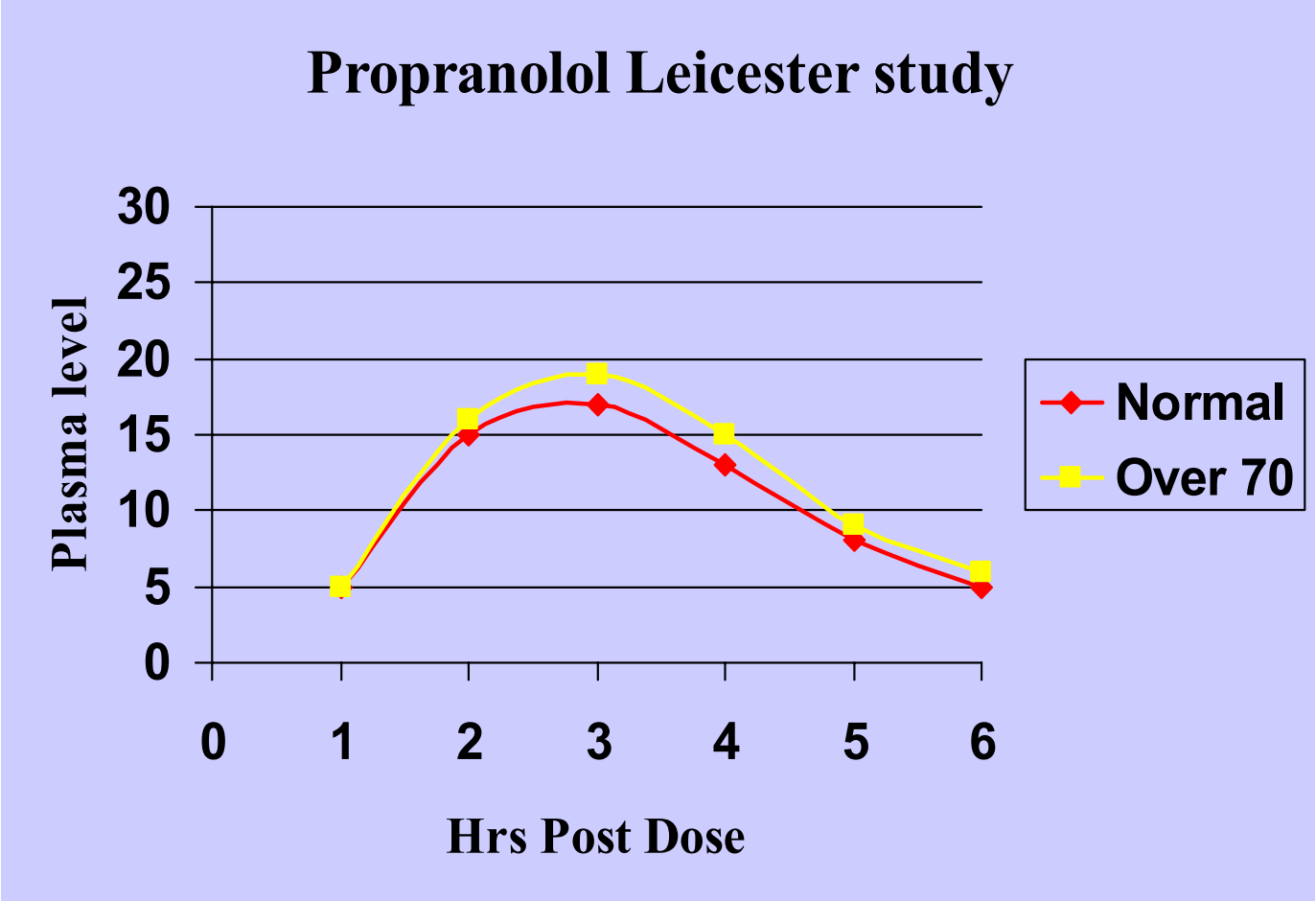
Lecture outline

- The aged are not created equal
- Insidious nature of onset of problems
- Changes in medication handling associated with aging
- The importance of frailty
- Multiple pathologies – multiple medications
- Importance of medication review / dose titration

Are all aged created equal ?



Are all aged created equal ?



Created equal ?

Frailty

Frailty is a syndrome resulting from a *multi-system reduction* in capacity to the extent that a number of physiological systems are close to the *threshold* of symptomatic clinical failure. As a consequence, the frail person is at *increased risk of disability and death* following *minor external stresses*

Medications in the elderly

- Multiple pathology
- Multiple medications
- ‘Polypharmacy’

“I demand a second opinion!”

Medication issues in the elderly

- Evidence-based therapy in an evidence free zone!
- Elderly not represented in trials
  - 3% of RCT include elderly
  - 1% of meta-analyses
- Most trials designed to show effect – under represent adverse effects

Evidence based guidelines

- Evidence from elderly?
- Boyd CM et al *JAMA.* 2005;294:716-724.
- Theoretical elderly patient with comorbidities
- Applied therapeutic guidelines
  - *"Most Clinical Practice Guidelines did not modify or discuss the applicability of their recommendations for older patients with multiple comorbidities. Most also did not comment on burden, short- and long-term goals, and the quality of the underlying scientific evidence, nor give guidance for incorporating patient preferences into treatment plans."*
  - *"If the relevant CPGs were followed, the hypothetical patient would be prescribed 12 medications (costing her $406 per month) and a complicated nonpharmacological regimen. Adverse interactions between drugs and diseases could result. "*

Available formulations

- Tablets and capsules designed for a ’70kg Man’
- Dosage generally assumes ‘normal’ GI, Hepatic and Renal function
- >65yr average 5.7 medications
- >80yr average 9.3 medications

www.bbc.co.uk

Ageing: Altered Pharmacokinetics

- Reduced gastric acid secretion
- Decreased gastrointestinal mobility
- Reduced surface area of absorption
- Reduced splanchnic blood flow
- Reduced liver size
- Reduced liver blood flow
- Reduced glomerular filtration
- Reduced renal tubular filtration

Problem

- Altered Hepatic/Renal function seldom predictable in advance
- Reluctance to over-investigate in elderly
- Real problem of anaemia of blood sampling
- Responding to symptoms

Accumulation

- Does NOT occur in everyone, or at any given stage
- Chronic dosing ± reduced clearance
- Often very slow (YEARS) to emerge
- Caution
  - Agents with long half life
  - Agents with active metabolites
- Choice of agent
  - SR formulation of short half life drug
  - Elimination pathway
  - Activity of metabolites

Reduced homeostatic reserve

- Orthostatic circulatory responses
  - α-receptor agents - postural drop
- Postural control
  - dopamine D_2 agents - sway - falls
- Thermoregulation
  - psychotropics - circulation
- Cognitive function
  - cholinergic & catecholamine agents

Sarcopenia

- ‘Sarcopenia is not a disease but rather refers specifically to the universal, involuntary decline in lean body mass that occurs with age, primarily due to the loss of skeletal muscle’

Rosenberg I, Am J Clin Nutr 1989;50:1231-1233

www.sarcopenia.com

Sarcopenia in humans

- Proposed biochemical mechanisms
  - Reduced mediating factors for activation of progenitor myoblasts (Crisona et al 1998)
  - Decreased muscle protein synthesis (Viner et al 1999, Nair 2000)
    - BUT Increased synthesis: Volpi et al JAMA 2002;286(10):1206-1212
  - Reactive oxygen species (Leeuwenburgh et al 1998, Richmonds et al 1999)
  - Altered enzyme activities
  - Altered nitrogen balance
  - Altered glucose metabolism (Johnson and Hammer 1993, Tsao et al 1996)
  - Role of mitochondria (Wanagat et al 2001)

Treatment/Prevention

- Proven:
  - Resistance training starting around 55yr

    Winnet et al, Preventive Medicine 2001;33:503-513
  - No proven pharmacological intervention

Dementia - definition

- 'The loss, usually progressive, of cognitive and intellectual functions, without impairement of perception or consciousness. Most commonly associated with structural brain disease.
  - Alzheimer's Disease
  - Multi-infarct dementia

Pharmacists definition

- ‘Drug induced until proven otherwise’
- Drug induced loss of cognitive function is classified as ‘Delirium’ but to onlookers / carers the difference is ‘academic.’

- A ‘clouded’ mind increases falls risk

Pharmacists definition

- ‘Drug induced until proven otherwise’
  - Anticholinergics
    - Tricyclics
    - Incontinence agents
  - Biochemical balance
  - Cerebral blood flow
  - H_2 antagonists
  - Steroids
  - Hypothyroidism

Issues

- Australia, America, New Zealand Quality in Healthcare Surveys
- ≅10% of hospital admissions ‘medication related’
- ≅10% of hospital admissions ‘falls’ related
- Unable to cross-correlate medication and falls

Medication Management

Address concordance (Compliance)

Never cease to ‘optimise’

Regular medication review

Dose titration according to response / adverse effects

Pursue non drug approaches to issues such as incontinence, sleep disorders etc.

Monitoring is cheaper than hospitalisation

Exclude hypothyroidism /B_{12} deficiency etc

Thank you

- Thank you for your attention
- Any questions?