

# Pharmacotherapy in Elderly

Patients older than 65 years represent approximately 14% of the population in the Czech republic.<sup>[1]</sup> Aging brings with it quite a few changes, some of which have implications for treatment.



- **polymorbidity** - greater number of diseases requiring greater number of drugs
- **polypharmacy** - the use of large quantities of drugs (4 or more), incorrect combinations of drugs or prescription non indicated drugs
- **underprescription** - nonprescription drugs that have a demonstrable effect on the disease and survival (typically statins,  $\beta$ -blockers after AMI, cholinesterase inhibitors in Alzheimer's dementia, sufficient analgoterapie in cancer patients, antidepressants)
- decreased compliance - due to dementia or just due to excessive amounts of drugs

## Changes in Pharmacokinetics

### Absorption Decrease

There is pH increase in stomach, atrophy of villi and mucous in gut (decrease resorptive area), decrease in blood flow and motility in the GI tract. Overall, this leads to a slower onset of action of drugs administered orally. Muscle atrophy and reduced blood flow to the periphery is involved in the delayed onset of action of medications given intramuscularly.

### Distribution

There is physiological decrease of total body water, it can be enhanced by dehydration (typical for the elderly). Dehydration affects the drugs that are water-soluble. Their concentration in plasma is increased and toxic.

On the contrary, the concentration of drug fat-soluble increases due to higher total body fat (drugs are stored in adipose tissue) → benzodiazepines.

Malnutrition contributes to decrease in serum albumin - by increasing the plasma free fraction of drugs that bind to albumin → PAD, antidepressants, beta blockers.

### Decreased Metabolization and Excretion

- Due to the decrease in total liver weight and liver perfusion, reduced function of some enzymes (CYP, glucuronyltransferase → benzodiazepines).
- Decreased glomerular filtration, renal clearance, tubular secretion, renal hypoperfusion → aminoglycosides, lithium, digoxin, cimetidine, allopurinol, a contrast agent.

## Changes in Pharmacodynamics

- increased number of receptors or sensitivity to drugs (warfarin, heparin).<sup>[1]</sup>
- increased sensitivity to adverse effects of digoxin.<sup>[1]</sup>
- increased CNS sensitivity to benzodiazepines, morphine, which cause sedation, delirium, depression, or even at therapeutic doses.<sup>[1]</sup>
- numbness receptor beta - reduced effectiveness of  $\beta$ -blockers.<sup>[1]</sup>

## Adverse Effects and Drug Interactions

Side effects of drugs occur up to 20% of deaths in the elderly.

Typical side effects in the elderly are:

- orthostatic hypotension (syncope, falls)
- diarrhea, constipation
- sedation, delirium, confusion

Often drug interactions:

- warfarin + sulfonamides → displacement of drug from binding to binding protein → higher free fraction of warfarin and the risk of bleeding

## Unsuitable/less Suitable Drugs in the Elderly

- tricyclic antidepressants - anticholinergic effect
- antispasmodics - the risk of urinary retention, delirium

- barbiturates, benzodiazepines - the risk of sedation, addiction
- methyldopa - depression, sedation, bradycardia
- digoxin - possible high risk of adverse effects

### Medical drugs which need smaller doses (evidence based)<sup>[1]</sup>:

- atorvastatin (standard 10 mg/day, in elderly 5 mg/day)
- ibuprofen (standard 400-800 mg/3-4x day, in elderly 200 mg/3-4x day)
- metoprolol (standard 100 mg/day, in elderly 50 mg/day)
- omeprazole (standard 20 mg/day, in elderly 10 mg/day)
- and more ...

## Links

### Related Articles

- Special problems in the geriatric patients
- Principal Geriatric Syndromes
- Psychiatric Disorders in Geriatric Patients

### Sources

- WikiSkripta.eu. *Zvláštnosti farmakoterapie ve stáří* [online]. The last revision 2012-02-14, [cit. 2012-02-16]. <[http://www.wikiskripta.eu/index.php/Farmakoterapie\\_ve\\_stár%C3%AD](http://www.wikiskripta.eu/index.php/Farmakoterapie_ve_stár%C3%AD)>.
- ws:Zvláštnosti farmakoterapie ve stáří

### References

1. TOPINKOVÁ, Eva, et al. *Geriatric : Doporučený diagnostický a léčebný postup pro všeobecné praktické lékaře* [online] . 1. edition. 2007. Available from <[http://www.svl.cz/Files/nastenka/page\\_4766/Version1/Geriatric.pdf](http://www.svl.cz/Files/nastenka/page_4766/Version1/Geriatric.pdf)>. ISBN 80-86998-XX-X.