

營養與老化 (00070115)

Nutrition and Aging

Drugs and Nutritional Considerations in the Elderly



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Learning Objectives

- **Most Common Therapeutic Drugs**
- **Age-Related Changes in Drug Metabolism**
- **Drug Effects on Nutrition**

References

- **Geriatric Nutrition: The Health Professional's Handbook (2006, 3rd ed)
Chernoff, R, Jones and Bartlett
Publishers, Inc.**
- **Nutrition in Aging (1997, 3rd ed)
Schlenker, ED, McGraw-Hill Higher
Education**

Most Common Therapeutic Drugs

- 1978~1979

antihypertensives

analgesic - antipyretics

antirheumatics

cathartics

- 1987~1988

antihypertensives

analgesic - antipyretics

anticoagulants

antirheumatics



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Age-Related Changes in Drug Metabolism

- ↑↑ intolerance with ↑↑ age
- changes in pharmacokinetics and pharmacodynamics
pharmacokinetics (藥物代謝動力學)
how the body absorbs, distributes, metabolizes
and excretes a drug and its metabolites

drug absorption

poorly dissolve (↓ HCl), delay drug
absorption (splanchnic blood flow ↓ 40~50%)
↓ amount of drug that enters the systemic
circulation (↓ absorptive surface)

Age-Related Changes in Drug Metabolism

drug disposition

H₂O-soluble drugs may not be adequately distributed (20 yr→40 yr body H₂O ↓ 10~15%)

prolong or ↑ effect of lipid-soluble drugs
(body fat ↑ 18~35% in M, ↑ 33~48% in F)

↑ unbound or free drug available for pharmacologic action (↓ plasma albumin)

↓ drug metabolism → ↑ toxicity

prolong drugs in the body (liver wt ↓ 35%)

↓ drug excretion → ↑ toxicity

↓ the rate of drug elimination by kidney

Age-Related Changes in Drug Metabolism

- pharmacodynamics (藥物效應動力學；藥效學)
the effect of drugs on a target organ
a change in receptor no., function, or sensitivity
 - ↑ receptor sensitivity $\Rightarrow$ high incidence of toxic drug reactions
 - ↓ receptor sensitivity $\Rightarrow$ ↓ therapeutic response to a drug

Drug Effects on Nutrition

- interfere with nutritional status through the effects on food intake, nutrient absorption, metabolism, and excretion
- food intake
 - antineoplastic drugs → anorexia, nausea, vomiting
 - cardiac glycosides → anorexia, nausea
 - antihypertensive drugs (hydralazine, diazoxide) → nausea, vomiting, diarrhea, ↓ appetite
 - psychotropic medications for the treatments of anxiety and depression → ↑ appetite (hyperphagic)
 - tolbutamide (oral diabetic agent) → ↑ appetite

Drug Effects on Nutrition

- drugs and nutrient absorption (esp. micronutrients)
 - laxatives → loss of Ca & K
 - antacids → thiamin deficiency (↓ HCl)
 - lipid-lowering drugs (cholestyramine) →
 - ↓ absorption of fat-soluble vitamins
 - ↓ vitamin B₁₂ uptake (binds to intrinsic factor)
 - antiinfective drugs (tetracyclin) →
 - loss of Ca & Mg (form insoluble precipitates)
 - ↓ intestinal vitamin K synthesis

Drug Effects on Nutrition

antiinflammatory drugs (colchicine for antigout) →

↓ absorption of B₁₂, carotene, fats, cholesterol,
lactose (↓ lactase), Na, K

clofibrate (lipid-lowering drug), neomycin

(antibiotics) → ↓ carbohydrate absorption

cimetidine (H₂-receptor antagonist for ulcer) →

vitamin B₁₂ deficiency (↓ HCl)

Drug Effects on Nutrition

- **drugs and nutrient metabolism**
anticoagulant (warfarin) → vitamin K antagonist
methotrexate (antineoplastic agent) → folic acid antagonist
anticonvulsant (phenytoin) → interfere with folate absorption
isoniazid (treat tuberculosis) → interfere with hydroxylation of vitamin D
→ secondary impairment of Ca absorption

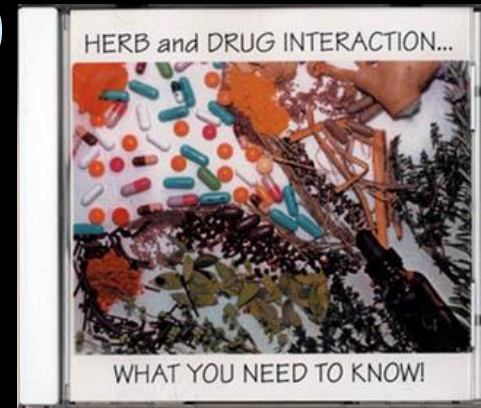
Drug Effects on Nutrition

- drugs and nutrient excretion

aspirin → ↑ plasma clearance of folic acid by competing for its binding site

penicillamine (antiinflammatory drug for rheumatoid arthritis) → ↑ urinary Zn & Cu excretion (chelates with Zn & Cu)

diuretics → ↓ reabsorption of Na
hyperexcretion of K, Mg, Zn



Summary

- **Age-Related Changes in Drug Metabolism**
 - ↑↑ intolerance with ↑↑ age
- **drugs and nutrient metabolism**
 - Anticoagulant
 - Isoniazid
 - aspirin