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Nutrient Drug Interactions
Effects of Nutrition on Pharmacokinetics and Pharmacodynamics of Drugs

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Drug Nutrient Interaction

A physico-chemical, physiological or pathophysiological process that alters disposition, function or toxicity of a food component or drug.
• Absorption
• Distribution
• Metabolism
• Elimination
Absorption

Physiological Changes

• Gut transit time
• Intraluminal pH
• Increased splanchnic blood flow
• Decreased portal blood flow
• Bile salt production
• Competing or interfering with active transport mechanisms
Absorption

Physico-chemical
• Interaction affecting drug and feed physical properties
• Chelation
  – Quinolones
  – Tetracyclines
• Binding to dietary substances
  – Protein
  – Fibre/pectin
  – Al & Mg salts
Distribution

- Malnutrition
  - Reduced plasma proteins
  - Increased total body water
  - Reduced fat stores
  - Reduced enzyme activity and substrate availability

- Obesity
Metabolism

• Enzyme induction
  - High protein/low carbohydrate diet

• Enzyme inhibition
  - Grapefruit juice
  - MAOI’s

• Bacterial breakdown
  - Fibre/Protein source

• Malnutrition
Folate

• Folic acid is involved in DNA synthesis

• Deficiency causes:
  - Megaloblastic anaemia
  - Diarrhoea

• Folate metabolism

Folic Acid \[\rightarrow\] Dihydrofolate \[\rightarrow\] Tetrahydrofolate

Dihydrofolate reductase (DHFR)
Folate Deficiency

- DHFR Inhibitors
  - Methotrexate
  - Trimetrexate
  - Pentamidine
  - Proguanil
  - Pyrimethamine
  - Trimethoprim
  - Triamterene

- Impaired Absorption or Utilisation
  - Alcohol
  - Metformin
  - Nitrofurantoin
  - O.C.P
  - Phenobarbitone
  - Phenytoin (Carl, 1992)
  - Primidone
  - Sulphasalazine (Pironi, 1988)
Thiamine (Vitamin B1)

• Deficiency causes Beri Beri
  – Lactic acidosis, cardiovascular, cerebral and peripheral neurological impairment

• Drugs associated with thiamine deficiency
  – Frusemide (Seligmann et al, 1991)
Pyridoxine

• Co-factor for the transaminases and for decarboxylation of amino acids
  - Isoniazid
  - Phenelzine
  - Penicillamine
  - Oral contraceptive pill
  - Hydralazine
  - Phenytoin
  - Theophylline (Delport et al, 1988)
Elimination

- Increased clearance of electrolytes
  - Diuretics
  - Cisplatin
  - Amphoteracin

- Decreased clearance of electrolytes
  - Potassium sparing diuretics
  - Demeclocycline
Summary

- Complex array of interactions
- Identification of high risk patients
- Prevention/minimisation of interaction
- Effective monitoring
References


