

# **Effects of drugs on chemical tests**

**Michaela Králíková, MD**  
**Department of Biochemistry**  
**Faculty of Medicine**  
**Masaryk University**

**Drugs may have specific effects on the plasma/serum or urine levels of many substances.**

- **These effects are more apparent when large doses of a drug are administered for a long time than when administration of a single dose occurs on an isolated occasion.**
- **Drugs can either interfere with the laboratory tests in vitro or in vivo.**



## **In vitro interferences**

- **color during spectrophotometric measurement**
- **chemical reaction with the analyte of interest or chemical substances used during analysis**
- **complexes formation**
- **Example: ascorbate or salicylate (reducing agents) and glucose in urine**

## **In vivo interferences**

- **arise from the therapeutic intent of drugs, their side effects, and patient condition and drug-response:**
- *interference with production, metabolism or elimination of the analyte* (enzyme activation, inhibition or competition, transport mechanisms competition etc.)
- *drug injuries to a certain organ / tissue → its function impairment*

# Interactions drug - diet

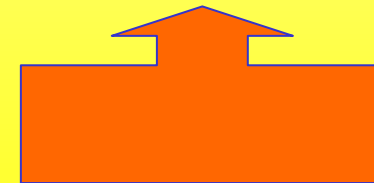
- **physiochemical** – reciprocal interference with absorption or solubility, charge change, chelate and other complexes formation
- Example: tetracyclin –  $\text{Ca}^{2+}$
- **physiological** - ↓ or ↑ of appetite, influence on peristalsis
- **patophysiological** - initiation of toxic effects of the drug by food

 **Follow up of drug intake:**

- **peroral antidiabetics**
- **contraceptives**
- **antihypertensive agents**
- **salicylate**
- **peroral anticoagulants**
- **antibiotics**
- **vitamines**
- **diuretics etc.**

# Examples of drug interferences

- ascorbate, salicylate, streptomycin  
↑ glc/U (non-specific reaction for reducing agents)
- ascorbate  
false positive gFOBT
- theophyllin  
determination of uric acid

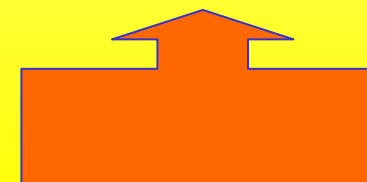


**in vitro interferences**

## Examples of drug interferences

- corticosteroids:
- ↑ synthesis of glycogen (liver)
- ↓ proteosynthesis → ↓ enzyme activities
- ↓ glucose tolerance → ↑ glc/S
- negative nitrogen balance (← ↑ protein catabolism)
- ↑ cleavage of TG → ↑ FA
- ↓ leucotriens synthesis (↓ arachidonic acid ← ↓ activity of phospholipase)
- ↑ resorption of  $\text{Na}^+$ ,  $\text{Cl}^-$  in renal tubules →  $\text{Na}^+$  and  $\text{Cl}^-$  retention → water retention
- ↑ renal secretion of  $\text{K}^+$ ,  $\text{H}^+$  → ↓  $\text{K}^+/\text{S}$ , alkalosis

in vivo interferences





## Examples of drug interferences

- *morfium*  
non-specific ↑ ALT, LD, AMS
- *contraceptives*  
↑ TG, chol
- *furosemid*  
↑ glc, AMS, ALP, ↓ Na

# **Therapeutic drug monitoring (TDM)**

**the measurement of drugs in body fluids as an aid to controlling dosage**

- **Is a benefit in assessing the therapeutic response or possible toxic side-effects.**
- **Is a benefit where there is a clear difference between the therapeutic and toxic effects and where serum levels correlate well with therapeutic and toxic effects.**
- **Examples: digoxin, theophylline, anticonvulsants (phenytoin, phenobarbitone, carbamazepine), lithium, aminoglycoside antibiotics**