

1. Drug dosage forms and routes of administration

2. Information about drugs

3. Drug legislation in CZ

What is a dosage form?

It is a final form, in which the drug is given to the patient.

Dosage Form

- Mixture of **substances with therapeutical effect** and **excipients**
 - Excipients: antioxidants, fillers, pigments (dyes), fragrances, ointment bases, solvents etc.
 - No pharmacological effect
 - Allergies (parabens), intolerance (lactose)
- **Shape** and **characteristics** of a medical preparation
- Adjusted to the **route of administration**
- Influence **pharmacokinetics** of a medical substance

Generations of dosage forms:

1st = classic dosage forms

2nd = controlled release

3rd = controlled biodistribution

Excipients of AERIUS tablets:

Core: calcium hydrogen phosphate dihydrate, microcrystalline cellulose, maize starch, talc.

Coating: lactose monohydrate, hypromellose, titanium dioxide, macrogol 400, indigotin, carnauba wax, white wax.

Classification of Dosage Forms

According to the consistency:

- solid
- semi-solid
- liquid
- gaseous

According to the usage:

- **for internal use** (*Ad usum internum*, e.g. *Peroralia*, *Parenteralia*)
- **for other use** (*Ad usum alium*, e.g. *Ocularia*, *Nasalia*, *Unguenta*).

Liquid Dosage Forms

a) For internal use:

1. (Per)oral liquids

- solutions, suspension, emulsion for *per os* administration
- tinctures, drops, syrups

2. Parenteral liquids

- injections
- infusions

b) For external use:

- eye drops, ocular waters, ear drops, nasal drops
- liquids for cutaneous use, for compresses
- liquids applied to the mucosa (douche – irrigation, gargle)

Semi-solid Dosage Forms

- Applied on the **skin** or **mucosa**
 - Local effect (dermatology)

- Systemic effect (TTS)



- Ointment (unguent)
- Creme
- Gel (jelly)
- Paste
- Transdermal patch
(TTS, *Emplastra*)

Solid Dosage Forms

Specific in shape:

- Tablet
- Suppository
- Vaginal pessary (suppository)
- Capsule
- Lozenge (pastilles)

Non-specific in shape:

- Dusting powder
- Herbal mixture
- Peroral powder:
 - Classic
 - Grained
 - Effervescent

Tablets and Capsules

Tablets:

- Uncoated
- Coated
- Gastro-resistant
- Effervescent
- Tablets dispersed in the mouth
- Chewable
- Sublingual
- etc.

Capsules:

- Hard
- Soft
- Gastro-resistant
- With modified release
- etc.

Gaseous Dosage Forms = Aerodispersions

Topical

- ear, nasal, oral, sublingual and cutaneous spray

Preparations for inhalation

- liquids (scattering of liquid drops)
- powders (particle size determines the place of absorption)

Foams

- cutaneous, rectal, vaginal foams

Making of an aerodispersion:

- Mechanically by a nebulizer (spray)
- By liquefied/compressed gas (pressure container)

How could a drug be administered?

↓ Routes of administration ↓

Systemic administration

= drug is **absorbed** into the **circulation** → it influences all the body

- enteral
- parenteral

Local (topical) administration

= drug is **NOT absorbed** into the circulation → it affects only the place of application

- skin, mucosa, e.g. conjunctiva
- GIT, but the drug is not absorbed from GIT

Systemic administration – enteral

(Per)oral (*per os*, p.o.)

Enteron (ancient greek) = intestine

- Onset of effect depends on phys-chem. properties of the medical substance and excipients
- Possibility of lower bioavailability: first-pass effect (liver)

Rectal (*per rectum*)

- Do not irritate stomach, do not cause nausea
- Lower bioavailability – lesser surface of rectum walls
- Sooner onset of effect – *plexus venosus rectalis* flows into *vena cava inferior* („bypass of the liver“)

„First pass“ effect

Systemic administration – parenteral

Para enteron (ancient greek) = out of the intestine

1. Non-injection (non-invasive)

a) oral

- Absorption by oral mucosa (e.g. sublingual)
- Lipophilic substances – quick absorption (2 mins), e.g. nitroglycerin

b) inhalation

- Gases, vapours nebo small particles
- Respiratory diseases (asthma, COPD...)

c) transdermal

- TTS = transdermal therapeutic system (controlled release)
- E.g. hormonal contraception patch, nicotine patch, analgesic patch

d) transnasal

- Good perfusion of nasal mucosa
- Substances could irritate it, or impair cilia function
- E.g. calcitonin, antimigraine drugs

e) vaginal – e.g. hormonal contraception ring

Systemic administration – parenteral

2. Injection (invasive)

- non-physiological

a) injection

- small volume of liquid
- i.v. administration – quick onset of effect
- i.m., s.c. – gradual absorption into circulation

b) infusion

- larger volume of liquid
- parenteral nutrition, minerals, glucose, ATBs, cytostatics etc.

Could this drug influence the effect of other drugs?



What is this tablet?

How frequently should I use it?

What is this drug used for?

How to store it?



What are possible adverse effects?

What is an appropriate dose?

Does it influence vigily?



Who must not use it?



Information about Drugs

PIL & SPC

- PIL = patient information leaflet = package leaflet **for patients**
- SPC = summary of product characteristics = information **for medical specialists** (physicians, pharmacists, nurses etc.)

EMA – European Medicine Agency (ema.europa.eu)

- Database of RMPs granted central authorisation by EC/EMA
- Reports concerning drugs' safety – **alerts**
- List of **newly authorized drugs**

SUKL – State Institute for Drug Control (sukl.eu)

- Database of RMP authorized in CZ
- Free access to all PILs and SPCs (in czech)

European Pharmacopoeia = european standard for the quality of drugs (**Czech Pharmacopoeia** = text from EP + czech specialities)

Computer databases of medical preparations

- **AISLP** (czech↔english, in most pharmacies and doctor's offices)

Pharmacopoeia

- Purpose: **to guarantee safe, effective and quality drugs**
- Information about medical substances, excipients, dosage forms
- Instructions for production, preparation, control, storage of drugs
- Used mostly in pharma industry

What could we found there?

- Analytical and instrumental **examination methods**
- **Materials** for drug containers and cases
- Instructions to ensure **sterility** of medical preparations
- Instructions concerning **radiopharmaceuticals, vaccines** etc.
- **Monographs** of specific substances
- Tables with usual **dosage of drugs** in adults, children, animals
- etc.

NO: mechanism of actions, adverse effects, pharmacokinetics, contraindications, pregnancy safety etc.!

Basic Drug Legislation in CZ

Act No. 378/2007 Coll., on pharmaceuticals

- Research
- Authorization of new drugs („registration“)
- Production, preparation and distribution
- Prescribing and dispense of medical preparations
- Destroying of unusable drugs
- Pharmacy duties
- **Pharmacovigilance** = drug safety service
- Controls and sanctions

Medical Prescription (Rx) in CZ

Validity:

- classic Rx: 14 days
- Rx for ATBs: 5 days
- Rx for local ATBs: 14 days
- Drugs of abuse and psychotropic substances (special Rx form): 14 days
- Rx for repeated use: 6 months, max. 1 year
- Rx from ED: day after the day of making up (= max. 48 h)

Legislation – Drugs of Abuse

Act No. 167/1998 Coll. on Dependency Producing Substances & Order of the Government 463/2013 Coll. regarding the lists of dependency producing substances

Specified narcotic and psychotropic drugs should be strictly monitored:

- Keeping files of accepting and dispensing
 - „Opiates Book“
- SUKL require this information
- Special Rx form – with oblique blue strip
- **Medical preparations and Rx forms should be stored in a safe or vault!**

Classification of narcotics

Group 1 → Rx with blue strip

- Highly addictive
- E.g. strong opioid analgesics
 - morphine
 - oxycodone
 - fentanyl etc.

Group 2

- Lower risk of addiction
- Classic Rx form
- E.g. codeine

Group 3 = „forbidden substances“

- No therapeutic use
- Misused
- Sometimes used in the research
- E.g. hashish, heroin etc..

Classification of psychotropic drugs

Group 1 = „forbidden substances“

- Hallucinogens, psychostimulants
- E.g. MDMA (exstasy)

Group 2 → Rx with blue strip

- Misused psychostimulants, addictive
 - E.g. methamphetamine and other amphetamins
- Therapeutically used: e.g. methylphenidate, buprenorphine

Group 3

- Barbiturates, risk of addiction, limited therapeutic use
- E.g. pentobarbital

Group 4

- Benzodiazepines, barbiturates and other potentially addictive drugs
- Classic Rx. form
- Hypnotics, sedatives, antiepileptics etc.
- E.g. diazepam, oxazepam, phenobarbital...

Precursors

= substances used in the production of addictive and psychotropic substances

- classic Rx (except pseudoephedrine)
- ephedrine – nasal drops in sinusitis
- pseudoephedrine – medical preparation for cold treatment
→ OTC with restriction
- ergotamine – antimigraine suppositories
- ergometrine – obstetrics