

## Learning unit: Antiglucomatics and cycloplegics

### Impact of the learning unit

The aim is to provide students with a basic overview of antiglaucoma and mydriatic agents used in ophthalmology. During the course, students will learn about the mechanisms of action of the most common antiglaucoma agents, their therapeutic application and side effects. Special attention will be paid to the pharmaceutical forms of ophthalmic medicinal products and the most frequent combinations of antiglaucoma drugs used in ophthalmology. Antiglaucoma drugs prevent damage to the optic nerve by reducing intraocular pressure. Acute glaucoma attack requires urgent treatment. Mydriatics are used in ophthalmology for both diagnosis and therapy of ocular diseases, e.g. for prevention of synechiae in eye surgery. Anticholinergic drugs induce cycloplegia along with mydriasis.

### Important terms

antiglaucoma drugs reducing production of aqueous humour

- carbonic anhydrase inhibitors
  - brinzolamide (local administration)
  - dorzolamide (local administration)
  - acetazolamide (systemic - orally)
- beta adrenergic receptor blockers
  - timolol (*non-selective without ISA*)
  - betaxolol (*beta 1 selective without ISA*)
  - carteolol (*non-selective with ISA*)
- selective and non-selective sympathomimetics
  - alpha 2 adrenergic agonists
    - brimonidine
  - adrenaline (IPP eye drops, therapy of neovascular glaucoma)

antiglaucoma drugs increasing uveoscleral outflow

- direct parasympathomimetics (miotics)
  - pilocarpine
  - carbachol (*miosis during ocular surgery*)
- indirect parasympathomimetics (miotics)
  - physostigmine
    - miosis before intraocular surgery
    - (*earlier also therapy of open-angle glaucoma*)
- alpha 2 selective sympathomimetics
  - brimonidine
- prostaglandin F2 alpha analogues
  - latanoprost
  - travoprost
  -

hyperosmotic antiglaucoma drugs

- mannitol (i.v. in eye surgery)
- glycerol (p.o.)
  - (*not used in chronic therapy of glaucoma*)

## mydriatics

- anticholinergics (mydriatic and cycloplegic effects)
  - therapeutic mydriatic drugs (long term, prevention of synechiae)
    - atropine
    - hyoscine (scopolamine) (IPP)
  - diagnostic mydriatics (short term, examination of the fundus)
    - tropicamide
    - cyclopentolate
    - homatropine (IPP)
- sympathomimetics
  - tetrahydrozoline
  - phenylephrine

## Learning outcomes

Student knows basic pharmacological profile (mechanism of action, adverse effects, drug administration routes, other indications) of the particular groups of drugs used in the treatment of glaucoma.

Student knows basic pharmacological profile (mechanism of action, adverse effects, drug administration routes, other indications) of mydriatic agents.

Student explains the term cycloplegic agent.

## Recommended study materials

Rang & Dale's Pharmacology, 9<sup>th</sup> edition, 2020.

Study materials of the course aVLFA0721p, VLFA0721c, aVLFA0822p and aVLFA0822c.

Chapter 17.4 "Anti-glaucoma and miotic drugs" and 17.5 „Mydriatics and cycloplegics“ in the textbook "Pharmacology for students of bachelor's programmes at LF MU" (pp. 266-269), in IS aVLFA0822c.

## Exam questions

*Special pharmacology:* 64. Antiglaucomatics and cycloplegics

*Detail:* atropine, noradrenaline, oxymetazoline, pilocarpine