Akies obuolio judesiai vyksta trimis ašimis:

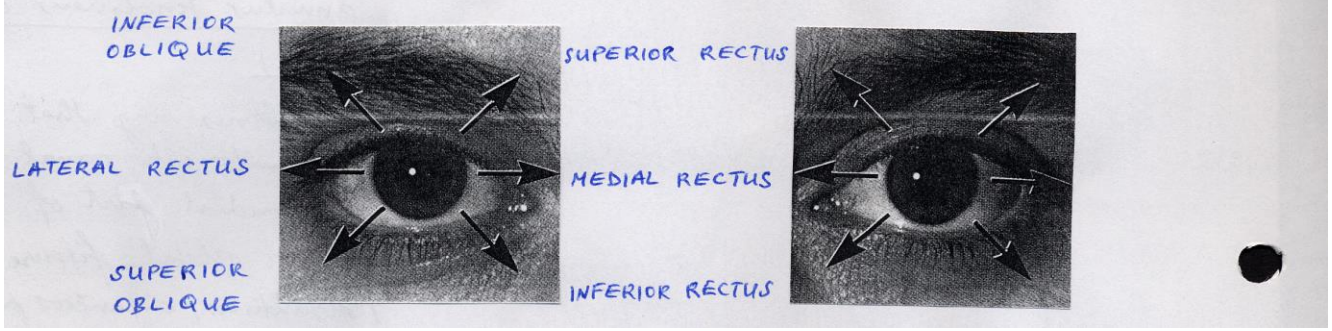
TRANSVERSE axis – elevation / depression

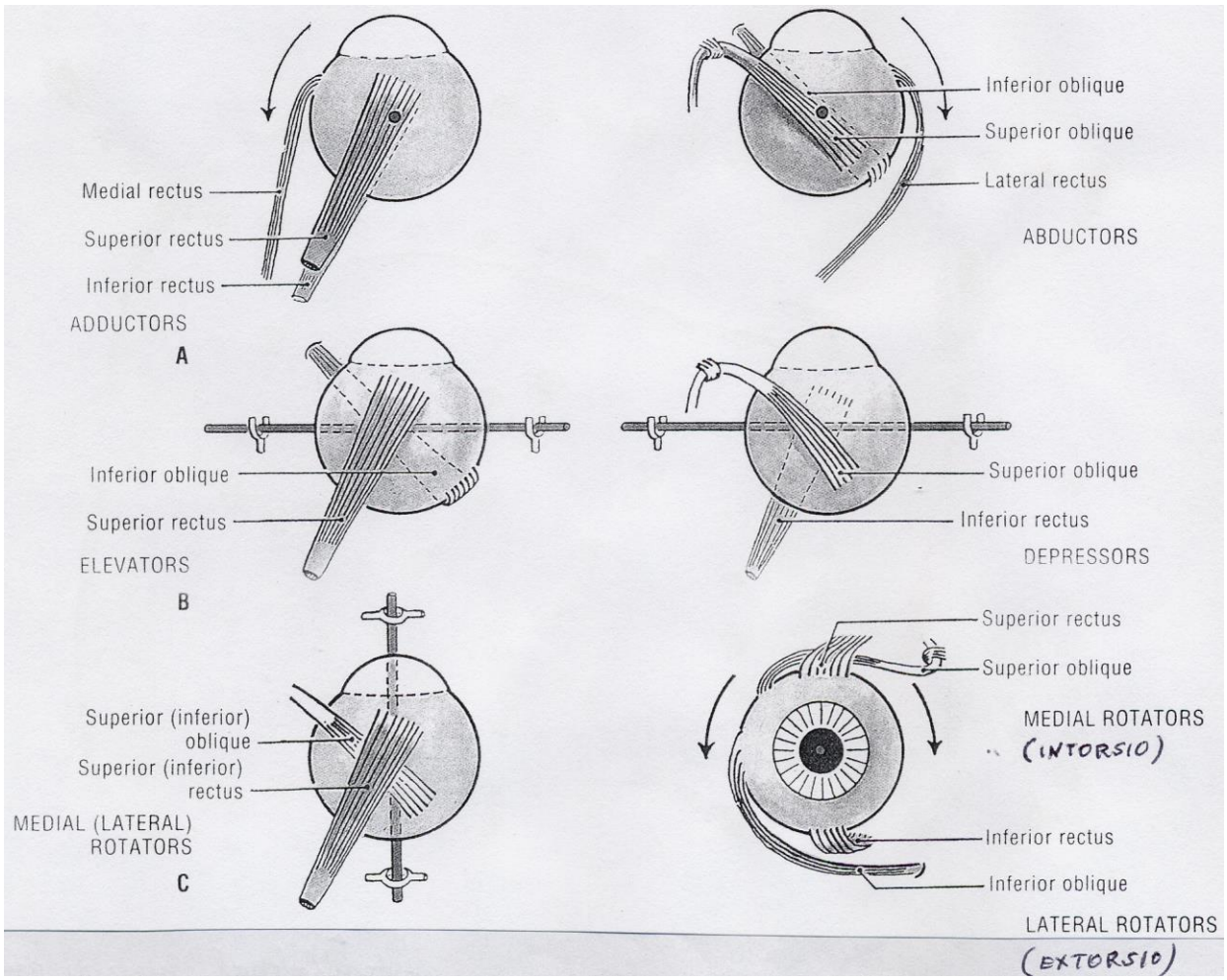
VERTICAL axis – abduction / adduction

AP axis – intorsion (s. medial rotation of upper portion)
extorsion (s. lateral rotation of upper portion)

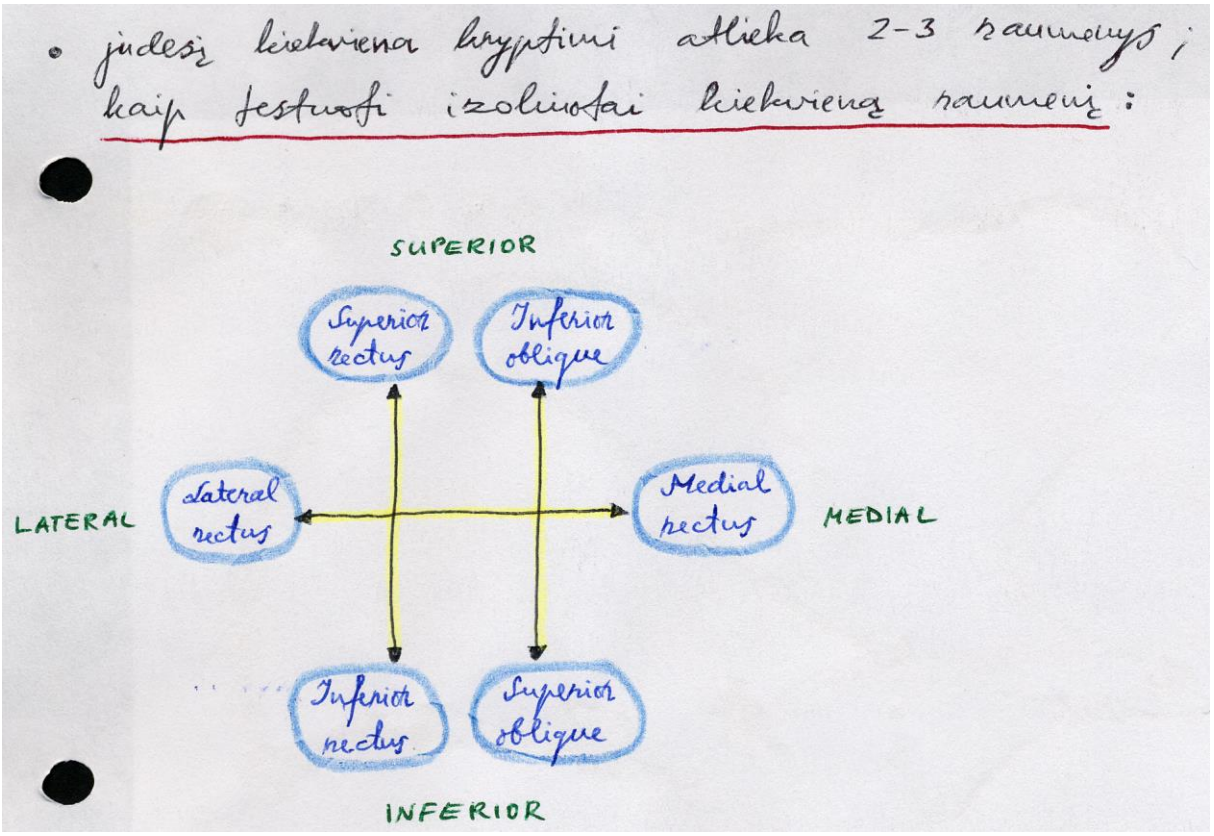
} t.y. pagal 12val. meridianų judesio kryptį

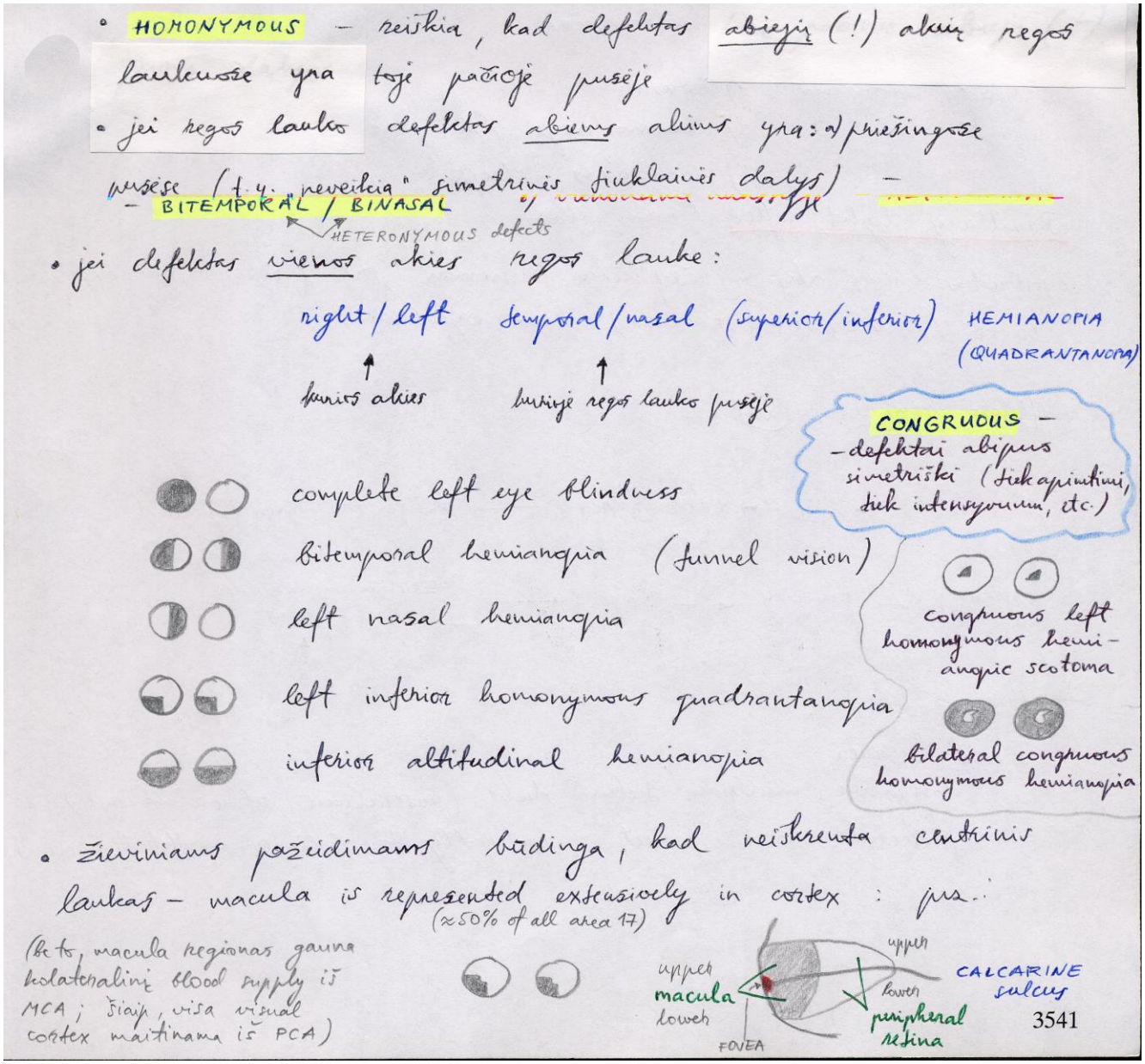
TORSION = CYCLODUCTION e.g. extorsion = excycloduction
intorsion = incycloduction





- judesį kiekvieną kryptimi atlieka 2-3 raumenys, kaip teisingai izoliuotai kiekvieną raumenį:





- *dvejinimasis didžiausias žiūrint pakenkto raumens veikimo kryptimi*: CN4 - į vidų ir žemyn (m. obliquus superior), CN6 - į išorę, CN3 - likusiomis kryptimis;
- ***papilledema*** does not develop up to age 3 years (because open sutures & fontanelles accommodate ICP↑).
- **retrochiasmal (optic tract ÷ primary visual cortex)** - visual field defects (without acuity abnormalities
- color vision deficit is more sensitive indicator of **optic nerve** injury than loss of visual acuity!

LEGAL BLINDNESS:

a) acuity in better eye < 20/400
b) acuity in better eye > 20/400 with substantial visual field loss (widest vision diameter ≤ 10°).

AMBLYOPIA - decrease of vision for which ***no cause can be found*** by PHYSICAL eye examination.

CATARACT

acuity < 20/200 - **mature** cataract.
acuity > 20/200 - **immature** cataract.
can still read at 20/20 but lens opacity confirmed by slit lamp - **incipient** cataract.
eye with intraocular lens (IOL) is called PSEUDOPHAKIC

COLOR BLINDNESS

suffix "**-anomaly**" = color weakness.
suffix "**-anopia**" = color blindness.

prefixes "**prot-**", "**deuter-**", "**trit-**" = defects of red, green, blue cone systems.

PAPILLITIS

- ***engorged pulsating veins*** (vs. **PAPILLEDEMA** - ***engorged nonpulsating retinal veins***)

RETINITIS PIGMENTOSA

- *several distinct* ***DYSTROPHIES*** *of* ***photoreceptors*** *&* ***pigment epithelium***

NEURORETINITIS

– inflammation of **OPTIC NERVE HEAD** + **POSTERIOR POLE OF RETINA** → prominent **macular star** (lipid exudate in macula).

AGE-RELATED MACULAR DEGENERATION

- RETINAL PIGMENT EPITHELIUM degeneration / atrophy in **macular region**; H: daily **multivitamins** (esp. vit. E and zinc) and **LUTEIN**

complication - choroidal *neovascularization* (conversion to "WET" form) – manifests by *metamorphopsia* (self-monitored with Amsler grid) – dgn by *fluorescein angiography*:

A. Neovascularization **outside fovea** → **laser photocoagulation**

B. **Subfoveal** neovascularization:

1. Selective vascular endothelial growth factor (VEGF) antagonists (injected intravitreally) – FDA approved: **PEGAPTANIB**, **RANIBIZUMAB**, **BEVACIZUMAB**.
2. **Photodynamic Therapy (PDT)** (FDA approved): IV photosensitizing dye [**VERTEPORFIN** (Visudyne®)] → nondestructive (cold) laser to activate dye within choroidal neovascularization.

GLAUCOMA

I. **Miotics** (used less commonly today; very effective in emergencies) - increase aqueous outflow via traditional pathway:

direct-acting (topical cholinergics) - **PILOCARPINE**, **CARBACHOL**

indirect-acting (topical cholinesterase inhibitors):

a) ***reversible*** – **PHYSOSTIGMINE**, **NEOSTIGMINE**

b) ***irreversible*** (increased risk of retinal detachment) – **DEMECARIUM**, **ECHOTHIOPHATE**, **ISOFLUROPHATE**

II. **Carbonic anhydrase inhibitors** – **ACETAZOLAMIDE** (oral, i/v), **DICHLORPHENAMIDE** (oral), **METHAZOLAMIDE** (oral), **ETHOXZOLAMIDE** (oral), **DORZOLAMIDE** (topical), **BRINZOLAMIDE** (topical).

III. **Adrenergic agonists** (topical):

a) **nonselective** (rarely used, cause mydriasis - contraindicated in angle-closure) – **EPINEPHRINE**, **DIPIVEFRIN**

b) **α_2-selective** – **APRACLONIDINE**, **BRIMONIDINE**; do not cause mydriasis (mediated by α_1).

- decrease aqueous production, increase uveoscleral aqueous outflow.

IV. **β-Blockers** (topical) – **TIMOLOL**, **BETAXOLOL**, **LEVOBUNOLOL**, **CARTEOLOL**, **METIPRANOLOL**

- decrease aqueous production.

V. **Prostaglandin analogs** (topical) - **LATANOPROST**, **BIMATOPROST**, **TRAVOPROST**, **UNOPROSTONE**.

- increase uveoscleral aqueous outflow.

VI. **Osmotic diuretics** – **GLYCERIN** (oral), **MANNITOL** (i/v), **ISOSORBIDE** (oral).

UVEITIS

- floaters & decreased vision;
in anterior uveitis – pain, photophobia, miosis (vs. in glaucoma – mydriasis), perilimbal injection (CILIARY FLUSH)
Rx: **cycloplegics** + **steroids**

DRUGS

Drugs that may precipitate GLAUCOMA:

1) mydriatics
2) steroids
3) anticholinergics

STEROIDS contraindicated:

1) herpetic corneal pathology
2) glaucoma

MYDRIATICS

- **short acting**:
  2.5% **PHENYLEPHRINE**
  0.5-1% **TROPICAMIDE** (lasts 3 hours)
- **longer action / wider dilation** - 10% **PHENYLEPHRINE**, 1% **CYCLOPENTOLATE** (lasts 24 hours).

MIOTICS

PILOCARPINE 1-4%

CYCLOPLEGICS

CYCLOPENTOLATE 1% (lasts 24 hours)
ATROPINE 1% (lasts 7 days)
HOMATROPINE 5%