

Amblyopia; Beyond our clinical practice

Review of literature

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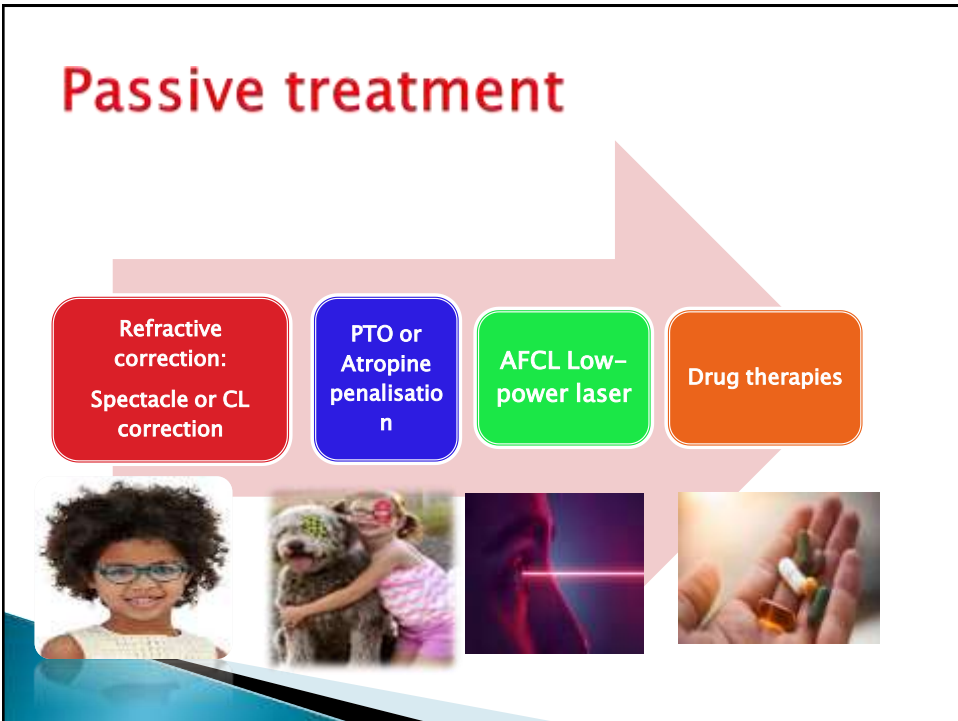
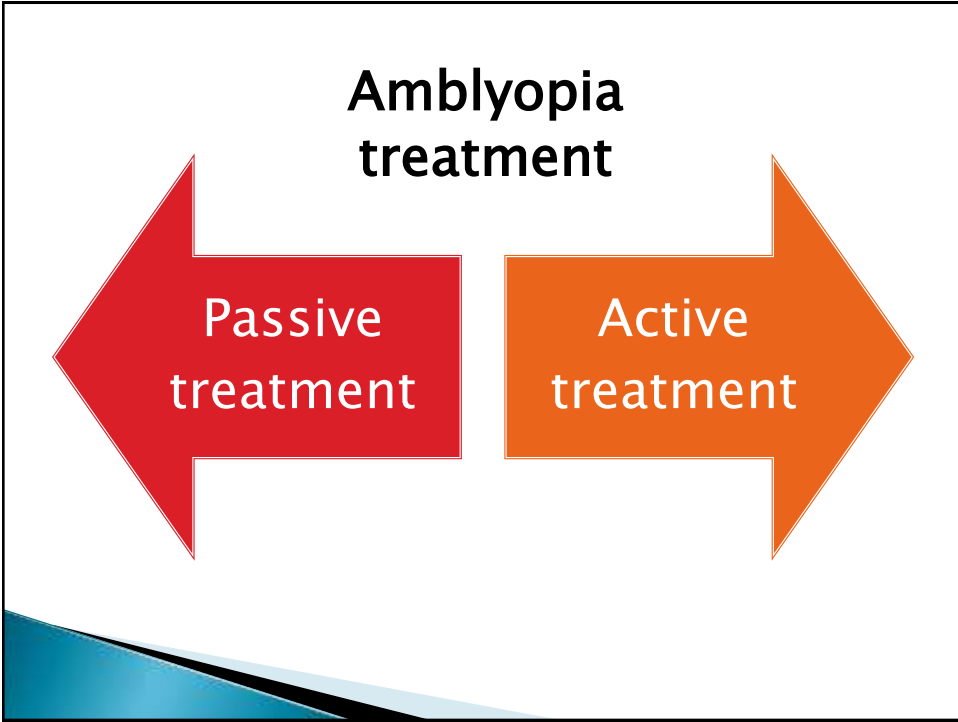
The motive of my review




Is there any other treatment than occlusion?



Is there a hope to treat my amblyopic eye at my age?



Automatic Frequency Conversion Laser (AFCLA)



Method


- The **macular area** was irradiated by AFCLA through the conjunctiva (**200 cm distance in frontal** of the eye ball) for 240 sec
- **10 daily treatment sessions** followed with 10–40 days consolidation therapy and FU at 3,6,12 and 24 months respectively
- **no PTO** and no additional medication
- Mean age was **46** years in one study and in another 4–14 years

Results

- VA improved in **90%** of the treated eyes , increasing by ≥ 3 *lines* and *M-VEP* amplitude with decreases latency.
- The treatment effect was **maintained for 6 months** in both strabismic and ametropic amblyopia.

*Zhisheng et al, 2019
Ivancic & Tomislav, 2012*

Drug therapies



Idea

- **Neurosensitize** the brain which allows for **REVERSAL** of some or all of the visual loss in the non-dominant eye.

Levodopa–Carbidopa

- age: **7–17**
- Reported: decrease level of DA in deprivation amblyopia

Citicoline

- from **9 to 37** age with a temporary vision improvement and no SE
- complex bimolecule involved in cellular metabolism
- Cholinergic and neuroprotective properties
- Was initially tried in Glaucoma

Kraus & Culican, 2018

Active treatment

Monocular

- Pleoptics (history !)
- Near activities

Binocular

- Perceptual learning
- Dichoptic training
- Other ideas



Monocular treatment Near activities

Paper-based

Computer-based

Completing Word puzzles

Videos

Dot to dot drawings

Computer games

Colouring in parts of pattern



Dot to dot drawings



Progressing from patterns of high to low visual angle

Colouring in parts of pattern



Choose one pattern to colour at a time on the page

Binocular treatment

Perceptual LEARNING

Eleanor Gibson (1963): Any relatively permanent and consistent change in the perception of a stimulus array following practice or experience with this array.

“Practice makes perfect”

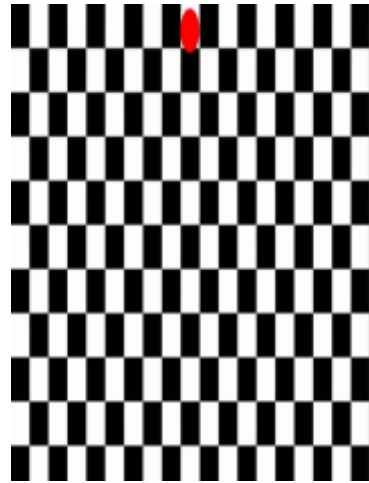
Clinical application

- ▶ Accurate refractive correction is essential.
- ▶ The use of a combination of different visual tasks.
- ▶ Stringent stopping rule
- ▶ *Practice under conditions where performance is severely impaired(eg: contrast detection or position acuity with stimuli near the cut-off spatial frequency)?*

Clinical application

Repeatedly practice a visual discrimination task.

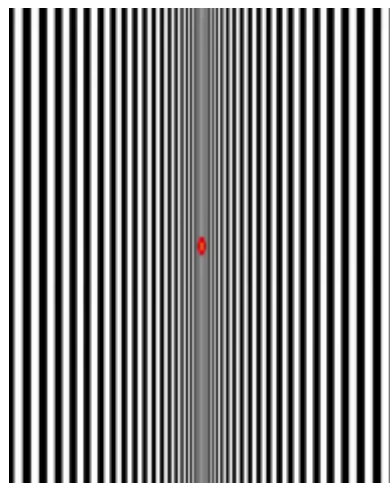
Ex:
Position discrimination in noise



Clinical application

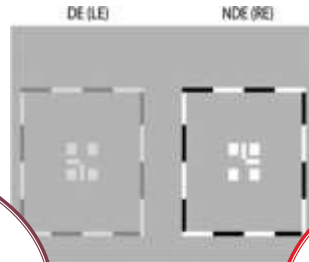
Letter identification in noise

Recommended period :2h/day , 5 days/ week for 9 months with significant improvement found in VA and CS



Dichoptic TRAINING

- ▶ PASSIVE form of binocular treatment
- ▶ Independent Stimuli to each eye



Lower contrast image to the fellow eye
fellow eye was initially set to a lower level 20–60%

higher contrast image to the amblyopic eye
contrast 100%;

Contrast re-balanced movies



As the patient's developing binocular function improves, the contrast difference between the two eyes reduced, potentially to a point where no difference is required.



Advantages

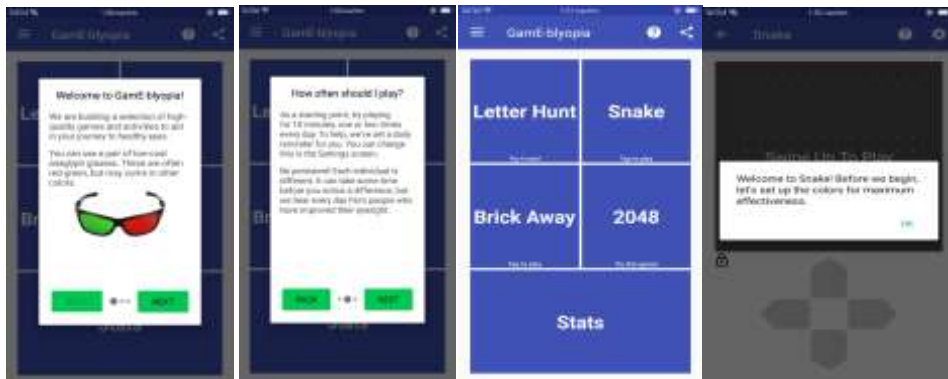
- ▶ From a clinic based, observed task to mobile, home-based use
- ▶ User friendly




Monocular fixation in a binocular field

Android apps

Let's start to practise it!





"I'm 58 and am starting to use my right eye for the first time in my life!"

"Thanks so much for the app! My career depends on it as I am an airline pilot!"

"My lazy eye improved a lot. I can now watch 3D movies. Thanks so much."

"Had me using both eyes in no time."

Interactive binocular treatment (I-BiT)

- ▶ Present separate images to each eye
- ▶ Dynamic visual scene
- ▶ Preferentially stimulating amblyopic eye



Ideas will never come to an end!

OUR ELECTRONIC SHUTTER EYEGLASSES

same try a USB cable

ON/OFF Frequency setting

SHUTTER TYPE SELECTION DEL

USB PLUG

LCD GLASSES




Treatment using grating stimuli
(Active stimulation therapy using CAM vision stimulator)



Syntonics phototherapy in the treatment of amblyopia




Software-based active treatments for amblyopia for use at home or in office



Exposure to dark



- ▶ Dark exposure promotes recovery from amblyopia
- ▶ 3 parameters:
- ▶ Age, minimum period of exposure, how absolute does the darkness have to be

Take home message

- ▶ Amblyopia is still an unresolved problem.
- ▶ The best modality of treatment is yet to be explored in future.
- ▶ The best line of treatment is patching which is the worst line of treatment!

sup, i'm awkward.



Thank you
for
listening 😊



References

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- ▶ Dennis M. Levi¹ and Roger W. Li². Perceptual Learning as a potential treatment for amblyopia: a mini-review, *Vision Res.* 2009 Oct; 49(21): 2535-2549.

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- ▶ Ivandic BT, Tomislav MD, Low-Level Laser Therapy improves visual acuity in adolescent and adult patients with amblyopia , Photomedicine and laser surgery, Vol. 30(3) , 167-171,2012
- ▶ Z Li, G Li , Xli et alTreatment of anisometropic amblyopia in children with Automatic frequency conversion laser , J Clin Exp Ophthalmol 10 ,2, 2019 (792)
- ▶ Birch EI, Leffler JN, Binocular amblyopia treatment with contrast-rebalanced movies , JAAPOS, issue 3 , june 2019, 160.e1-160.e5