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# Thought of the future of amblyopia treatment

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## Introduction

Amblyopia represents diminished vision during the critical periods in the first year of visual development due to abnormal visual pathways and stimulation.[1] The statistical 20/20 is the average visual acuity potential, so we can have little more or less vision acuity but still a normal vision**.** Parvo and magno retina cells[2] are damaged in amblyopic patients and shown low retina thickness in OCT[3,4] bad stereo-acuity and less contrast sensitivity[5–8] even in the good eye; when a patient loose an eye, the fellow eye improve very well his vision acuity. We can learn from others diseases Like Autism[9,10] to understand the patho-physiology[11] of the amblyopia where we have too much neuronal inter-connection that saturate the brain's functions and keep the patient unfocusing. In opposite there is less inter-neuronal connection especially in the occipital cortex in the amblyopia.

In regard of the multiple form of amblyopia (monocular, binocular or refractory cases) we have many treatments paths but often we Could be disappointed, so we must change our point of view about this disease by opening wide our way of thinking and horizon; by using more binocular activities[12,13] magnetic brain stimulation[14,15] cognitive methods like perceptual learning[16] darkness exposure[17] new medications drugs[18] and not just stay with the unique patching solution.[19] For such reasons a combination of all these solutions[20–23] seems to be the best guideline.

Countries who don't have enough economic facilities talks almost around full time or part time or even alternate patching with abnormal time patching that exceed 6hours source of great inconvenience for the patient. It's could be helpful in monocular amblyopia but useless in the bilateral and refractory patients cases. Studies[24–26] show that more time the eyes worked together combining information better and faster will be the visual acuity improvement with more stability in time and less relapse.[27] From 2002 thanks of the P.E.D.I.G[28–31] group study, amblyopia treatment could be done after age of 8 or 10 years[32] old then others study shows good results for patient over 17 years old and in adulthood in general.[33]

That means there is unlimited age to start an amblyopia treatment even after the fourth decade of life, the brain keep some cerebral plasticity[34–37] that allow him to improve the visual cortex interconnection and it's function with all cognitive brain section together for a better result in the amblyopia treatment. In the near future we can modulate the cerebral grey matter matrix extracellular matrix (ECM)[38,39] by using some enzyme and modulating drug such Chondroitin Sulfate Proteoglycans in order to have more neuronal connection and improve the Visual cortex activities.

In my own experience[40,41] I use split part time patching without exceeding 2hours a day but can be started from 20 mn a day in the case of deep unilateral amblyopia. The patching is unlocking the gabaergic[42,43] neuron in the chiasma to let the amblyopic eye signal goes to the occipital cortex because if there is a speed difference in the optic nerf in the both eyes more than 90 ms, the chiasma give the priority to the good eye so we can understand the better evolution of the part of the visual cortex of the non amblyopic eye; in the case of binocular amblyopia we don't use patching at all. Instead I use the polarized film technique[44] if the patient doesn't accept the traditional patching, then we can add 5 or 10mn of darkness exposure[45] to re-inializing the connection between the optic nerve and the visual cortex. If there is not enough improvement or it's take more time to get good result, we add gabapentin to save the magno and parvo retina cells and citicolin to improve the speed of the optic nerve.[46]

The further step in treatment is to use magnetic transcranial stimulation 30 minutes each month with growing power level and the result is seen after a cop of weeks. Assessing the binocular vision in each routine exam is very important specially if there is some binocular vision weakness, I recommend giving binocular exercise to the patient at home and doing synoptophore sessions then.

## Conclusion

In conclusion I can say that the future of amblyopia treatment is now beginning to removing the brakes of the brain plasticity[47] by using multiple solution in the same time, customizing the treatment for each patient to get better and faster result and changing the dogma in our minds of unsuccessful treatment in adulthood amblyopia to having effective and good result with limitless age of patients care.

## Acknowledgments

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## Conflicts of interest

The author declares that there are no any conflicts of interest.

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