

Ultrasound in Neuro-Ophthalmology: Atrophy of the Optic Nerve and Dysfunction of the Visual Analyzer (clinical and instrumental parallels for treatment of incurable conditions)



Authors:

Ulyana Lushchyk, Igor Babii, Viktor Novytskyy,
Nadiya Lushchyk, Ivanna Legka, Viktor Jr. Novytskyy,

Veritas Research Center (Kyiv, Ukraine)

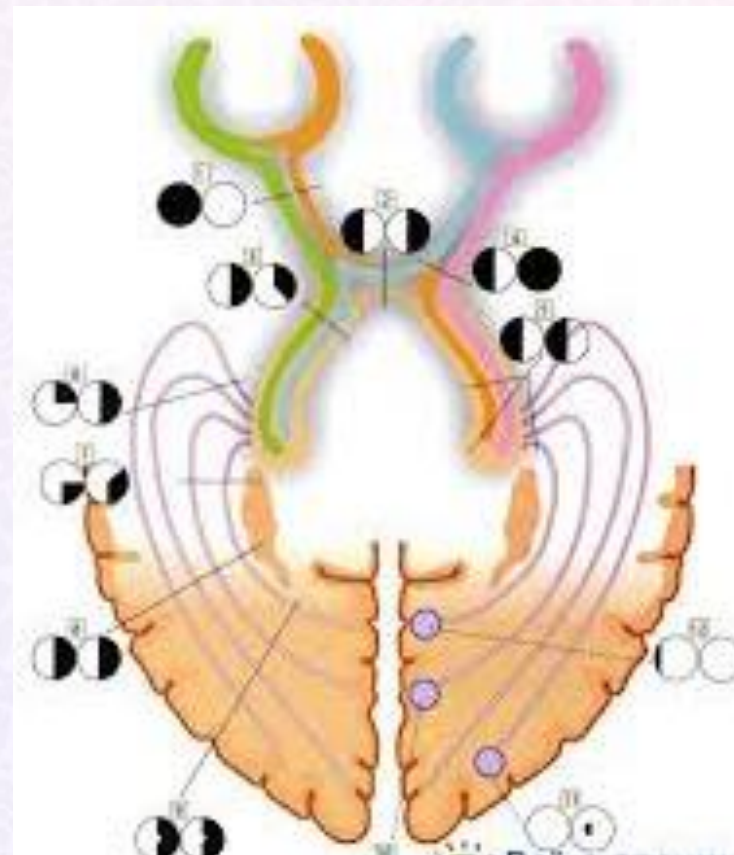
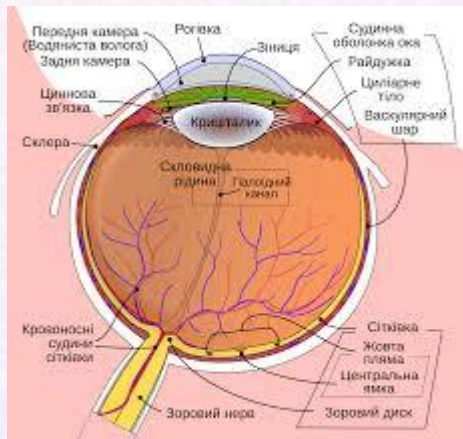
Veritas ITMED Center for Medical Technology Transfer (Kyiv, Ukraine)

Clinic of Vascular Innovations (Kyiv, Ukraine)

Ukrainian Medical Innovations Medical Center (Ternopil, Ukraine)



applied application of **ultrasound methodology in the analysis of visual analyser dysfunction** and mathematical modeling of optimal treatment tactics



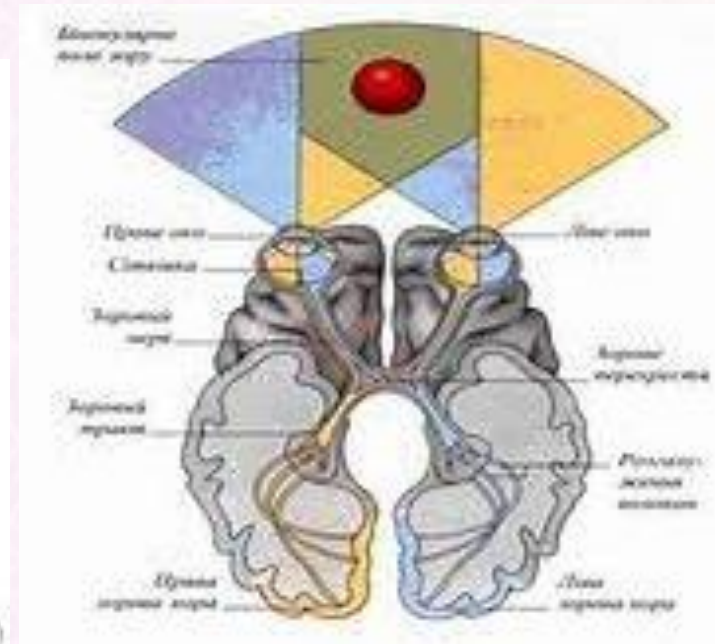
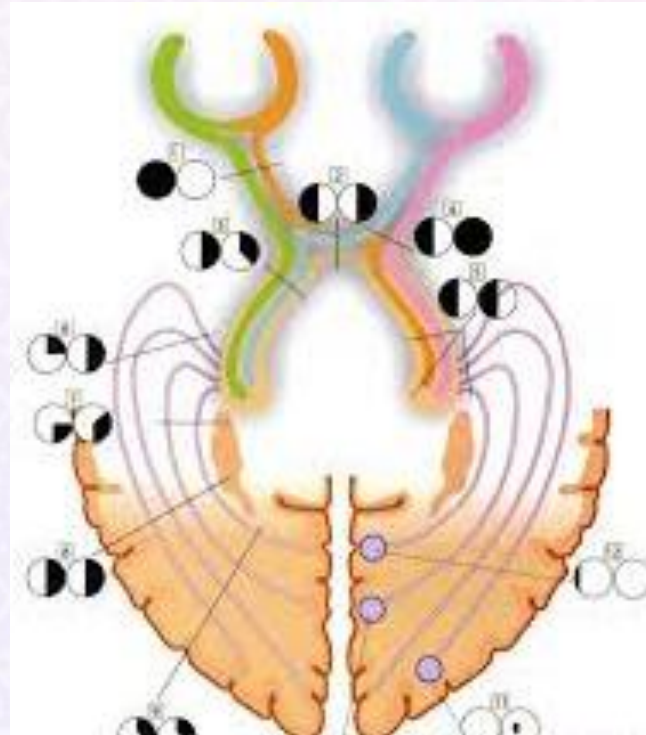
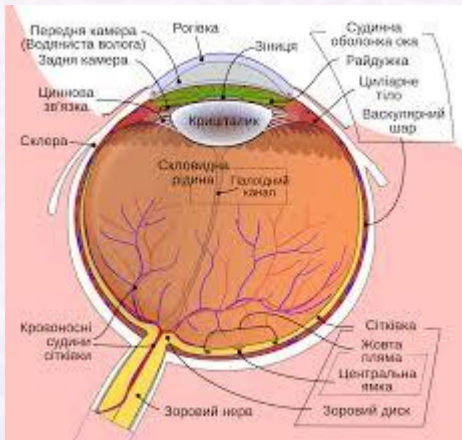
Graciolle bundle



Visual analyzer

The visual analyzer (organ of vision) is a component of the sensory system, an analyzer of the external environment, designed to reproduce images of the environment.

The organ of vision consists of the eyeball, the optic nerve and additional structures [1].

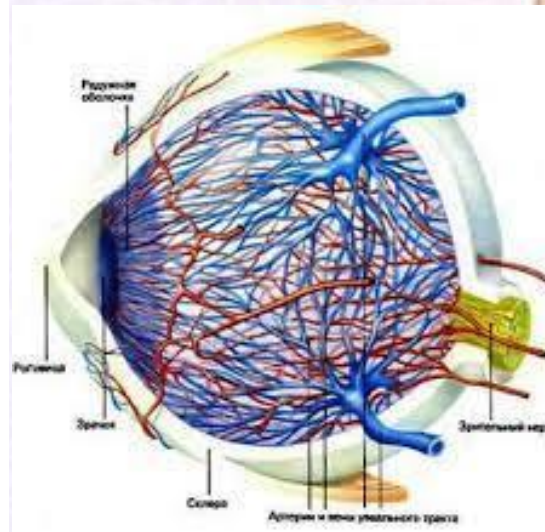
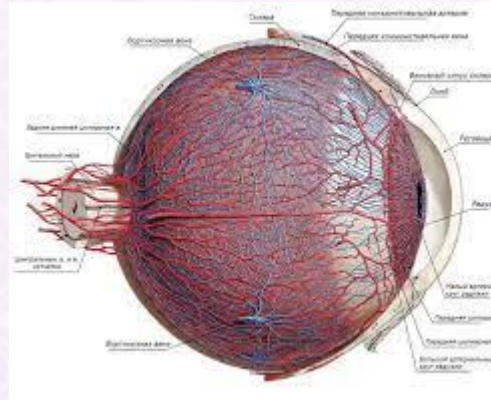
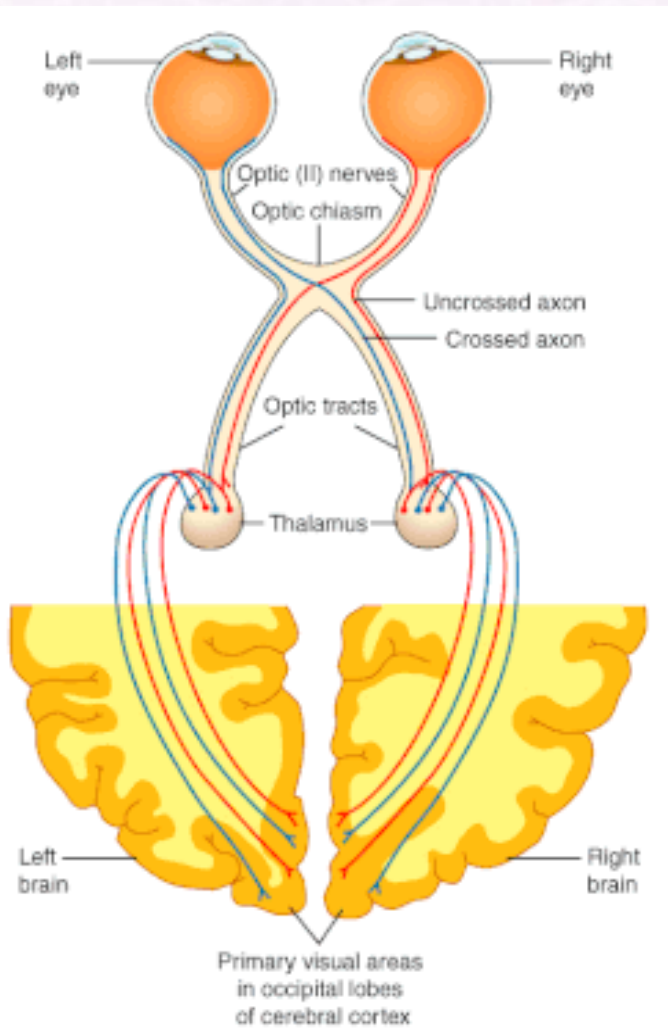


1. Wikipedia



Visual analyzer

The complex system of the visual analyzer from the eye to the occipital areas requires both the preservation of nerve integrity and adequate blood supply



Comprehensive ultrasound approach using scanning, colour and power Doppler, for visualizing the optic nerve, blood flow assessment indices of graphic Doppler both the optic nerve and the occipital lobes



During the last 10 years, we have diagnosed
visual analyser dysfunction

by the method of complex ultrasound in 346 patients

with a clinical picture of partial or complete atrophy of the optic
nerves of various genesis,

including 5 patients with post-resuscitation visual agnosia and partial
atrophy of the optic nerves,

1 - after removal of the brain tumor, 4 - after a toxic injury, 28 - after a
neuroinfection, 88 - diabetic angioneuropathy,

others - combination of several etiopathogenetic and hemodynamic
factors (stenosis of main arteries).



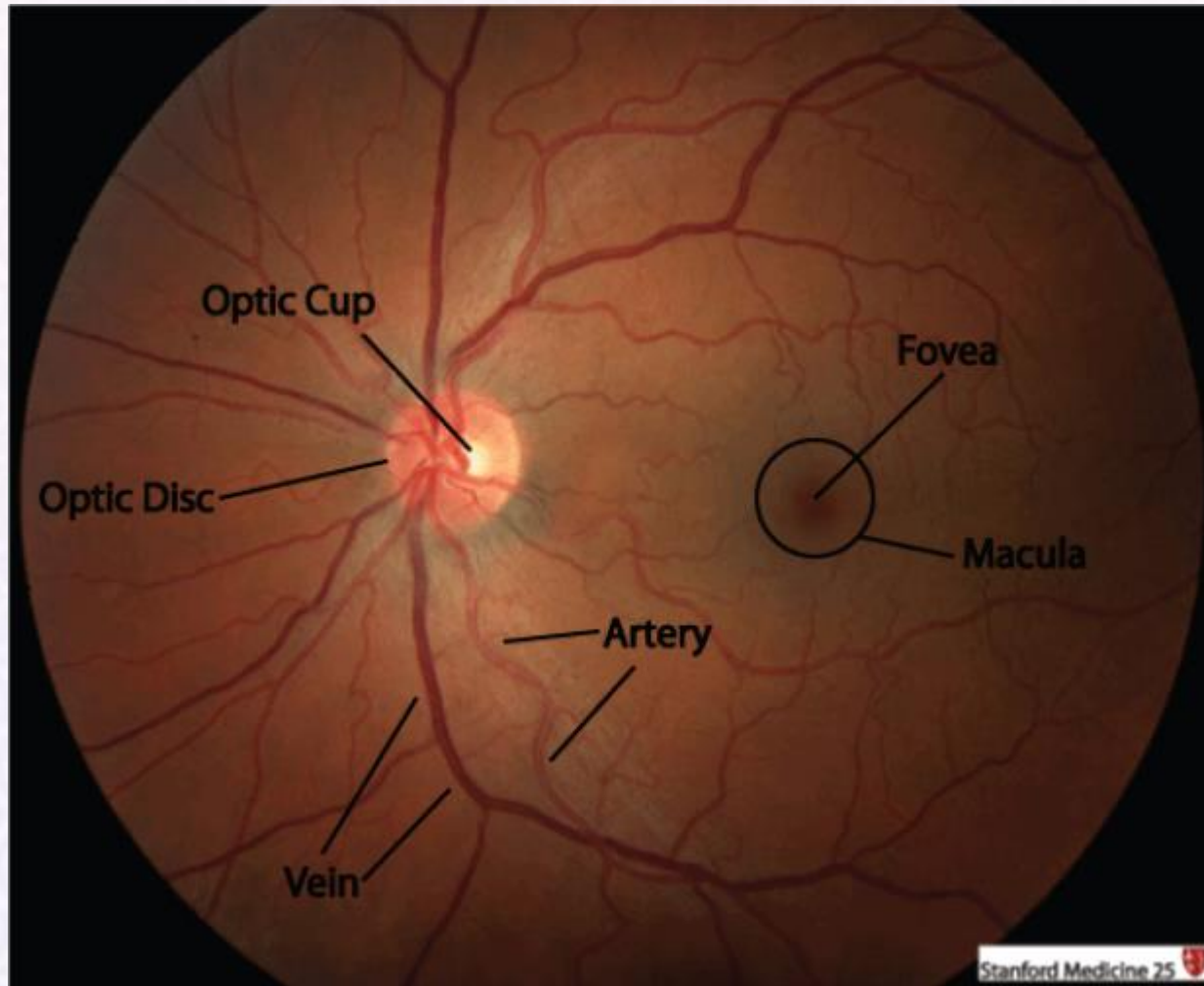
Results

Applying the complex ultrasound methods, we have detected

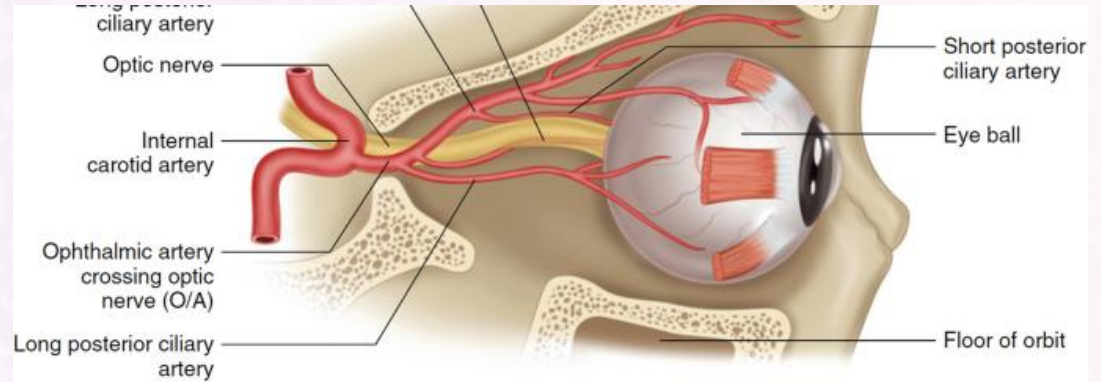
- the disorder of the ultrasound structure of the optic nerves in 87% of patients,
- intracranial hydrohemodynamic conflict in anterior cranial fossa in 96% of patients,
- in posterior cranial fossa in 54% of patients.
- Expressed hemodynamic deficiency in the projection of the arteries of the optic nerves in 78% of patients,
- in the projection of posterior cerebral artery - 60% of patients.



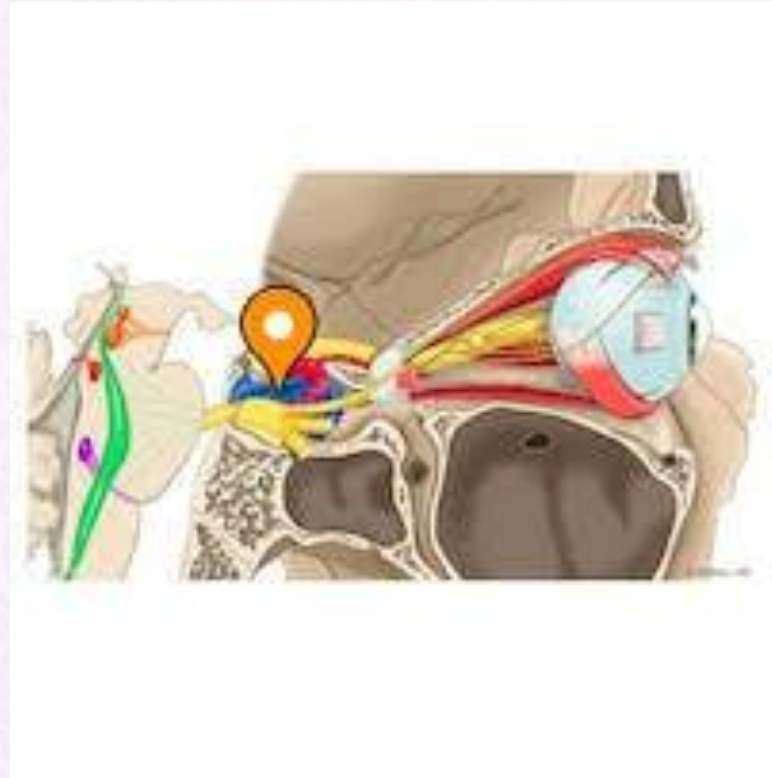
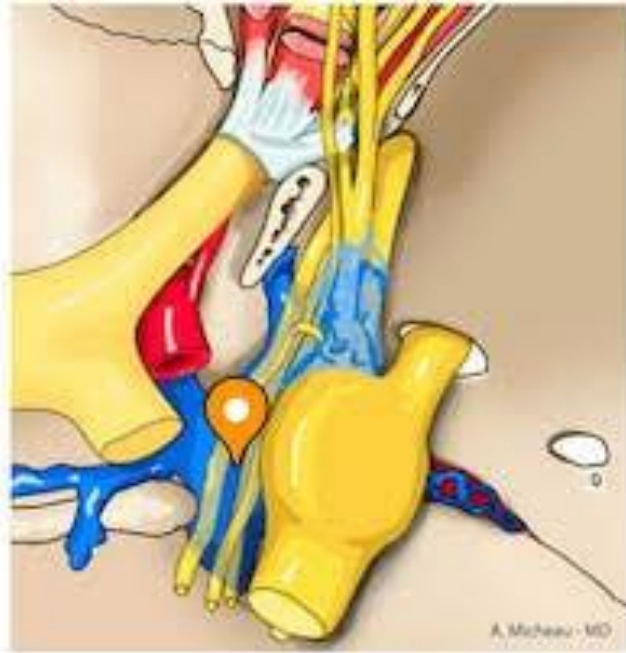
Visualization of the optic nerve



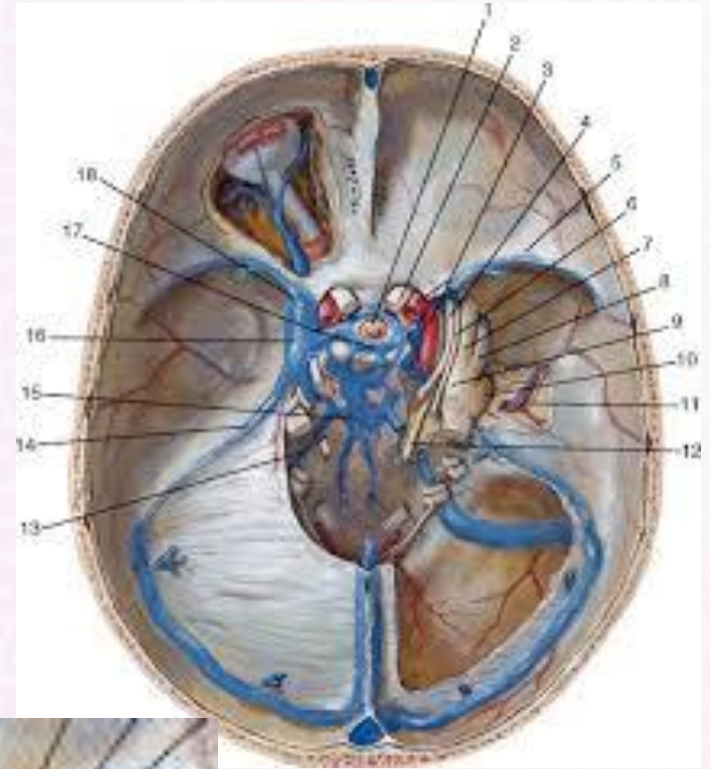
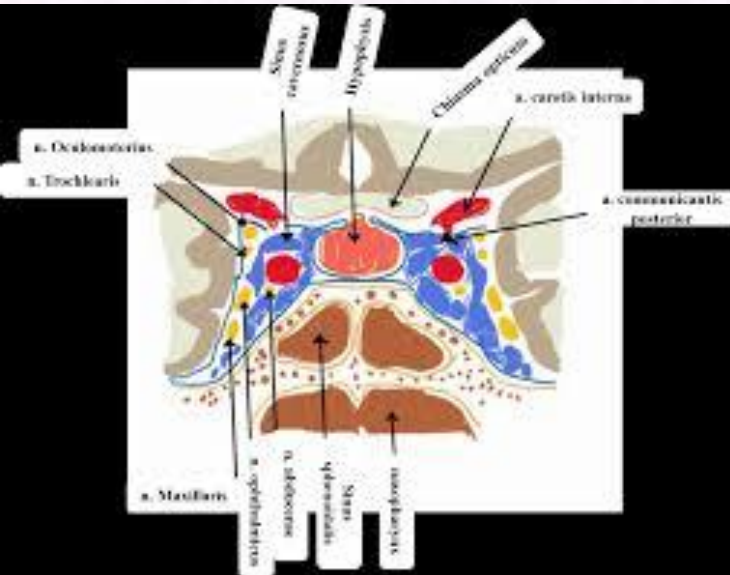
Blood supply of the eye and optic nerve



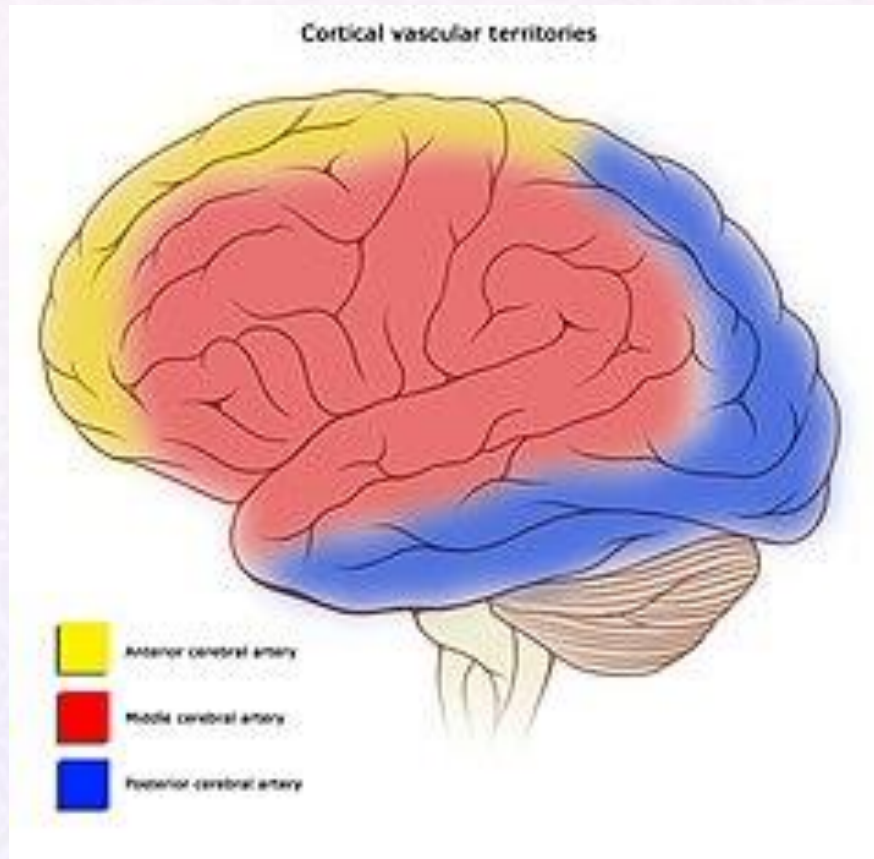
Assessment of the condition of the blood supply to the chiasm



Assessment of the condition of the blood supply to the cavernous sinus



Evaluation of the condition of the blood supply of the visual analyzer of the cortical zones of the occipital lobe



Results

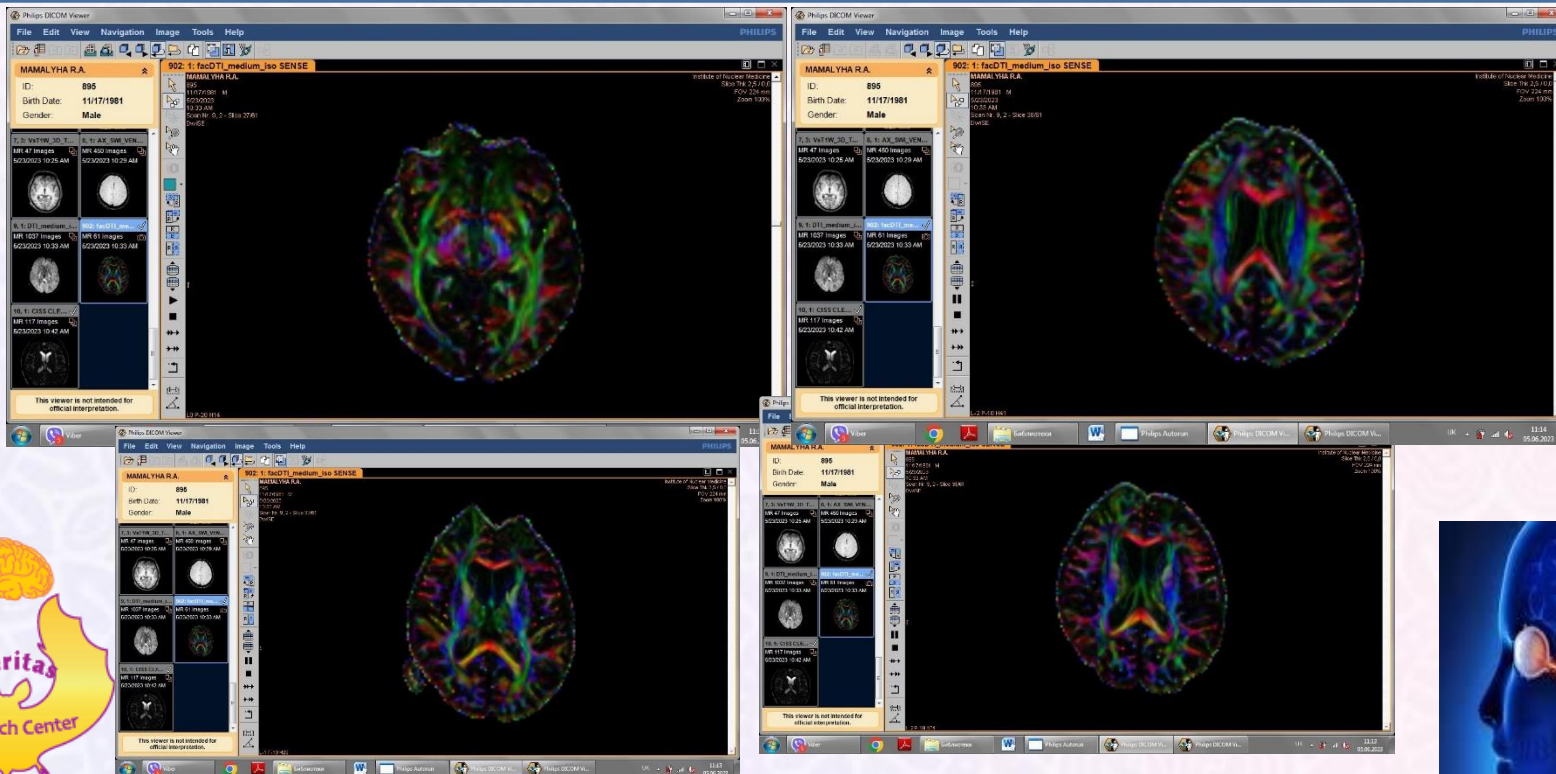
- 89 patients (26%) underwent long-term courses (six months to two years) of individual AngioNeuroCorrection and/or Therapy. The treatment regimen was monitored and modeled under the control of a complex ultrasound visual analyzer.
- Thanks to the math modeling of existing ultrasound patterns, it was possible to correct the ultrasound structure of the optic nerve, to restore blood supply in the arteries of the optic nerve and in the occipital lobes of the visual analyzer on the background of setting all hemodynamic parameters in the regional vascular reservoir of the brain.



Results

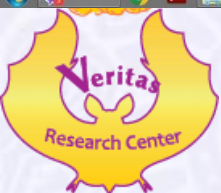
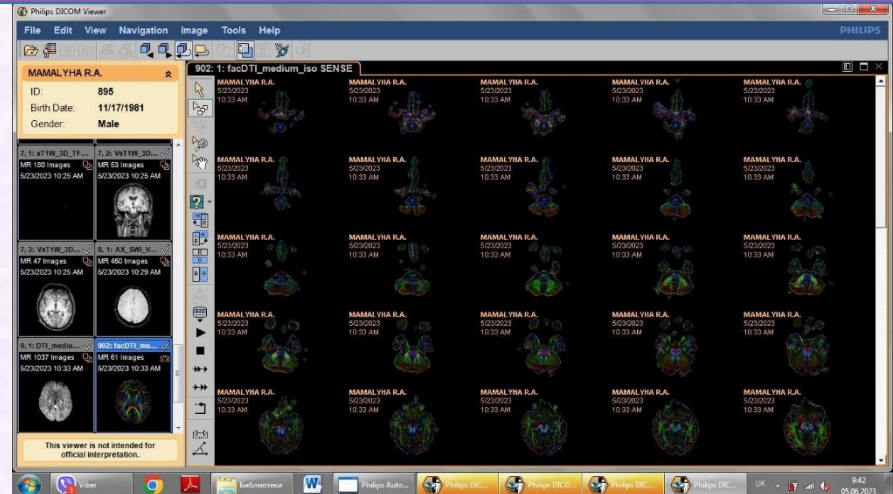
Patient R, m, 42 y.

Diagnosis: residual effects of an open traumatic brain injury with a bruise and contusion of the brain tissue of the frontal-temporal localization. 45 days of coma. Blindness for 3 years with full recovery of all other systems and cognitive-mental functions. During the year of Angiotherapy and Angiocorrection, it was succeeded to restore the perfusion of the optic nerve, partially the blood supply in the occipital regions of the brain. Perfusion MRI of the brain and visual analyzer.



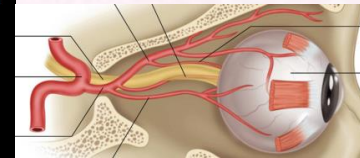
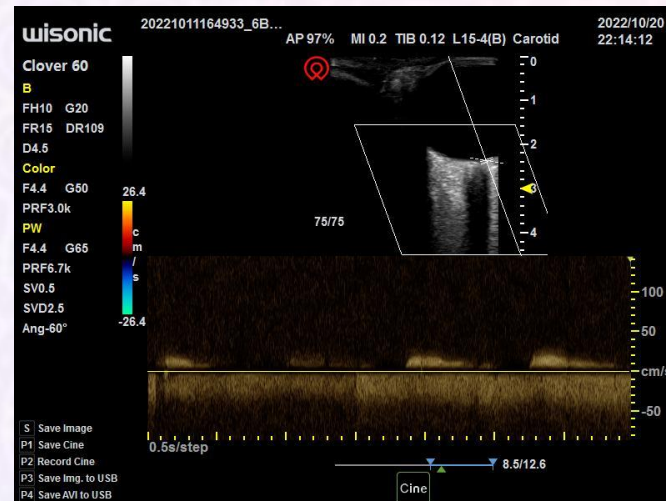
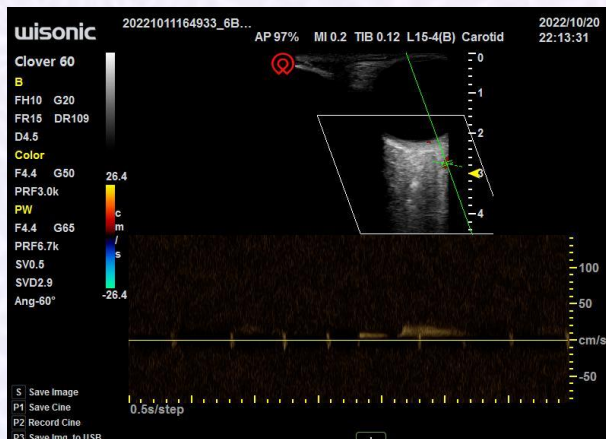
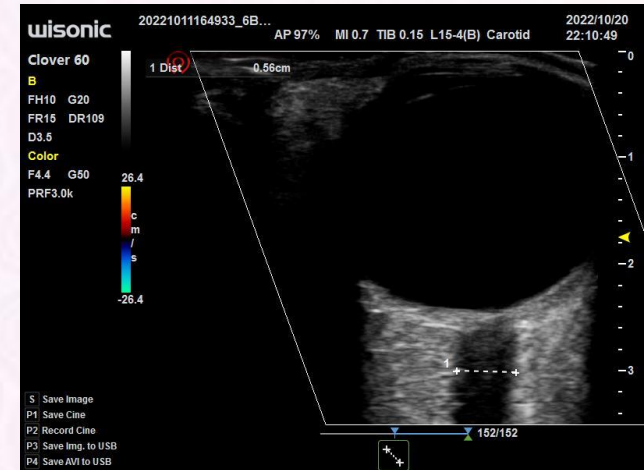
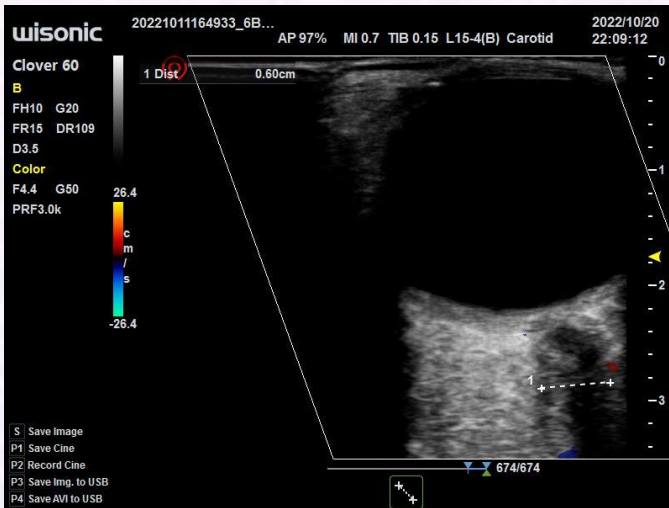
Results

CONCLUSION: post-traumatic cystic-gliotic changes in the basal parts of both frontal lobes and the right occipital lobe, currently, in comparison with the data of the previous MR study on 12.20.2021, the sizes have slightly increased due to the expansion of the gliosis zone. MR signs of post-traumatic atrophic changes of the optic nerves and chiasma, more to the right, the expression of which has not changed significantly compared to the data of the previous study. Analysis of MR tractography indicates partial damage to the fibers of the optical group on the right. The fibers of the optic group on the left are relatively preserved, currently, during the graphic reconstruction of the fibers, their density has increased, the FA coefficient has increased.



Results

Patient R, m, 42 y.
 Ultrasound dynamics of changes in blood supply to the optic nerve
 Start of treatment on 10/20/2022

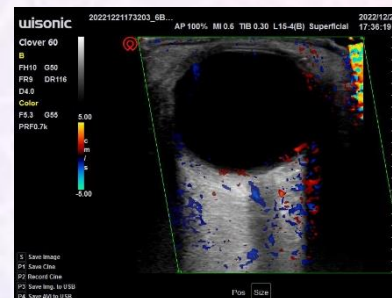
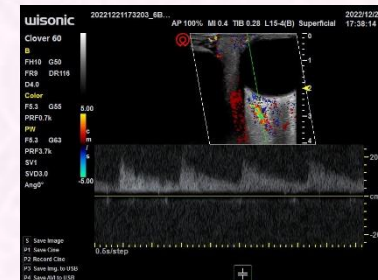
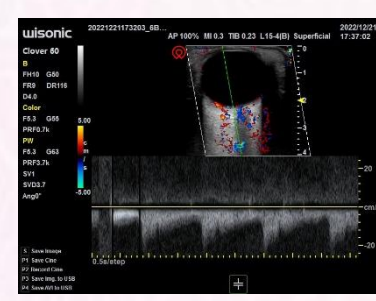
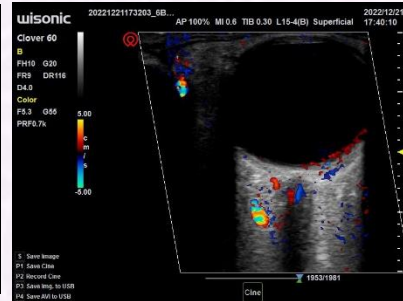
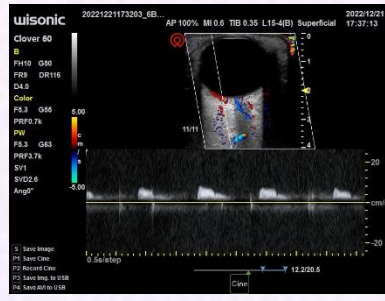
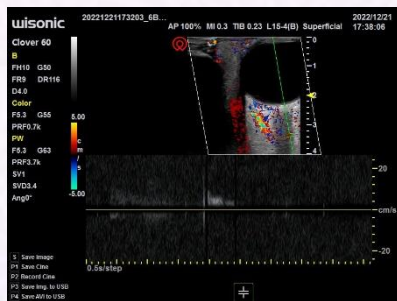


Results

Patient R, m, 42 y.

Ultrasound dynamics of changes in blood supply to the optic nerve

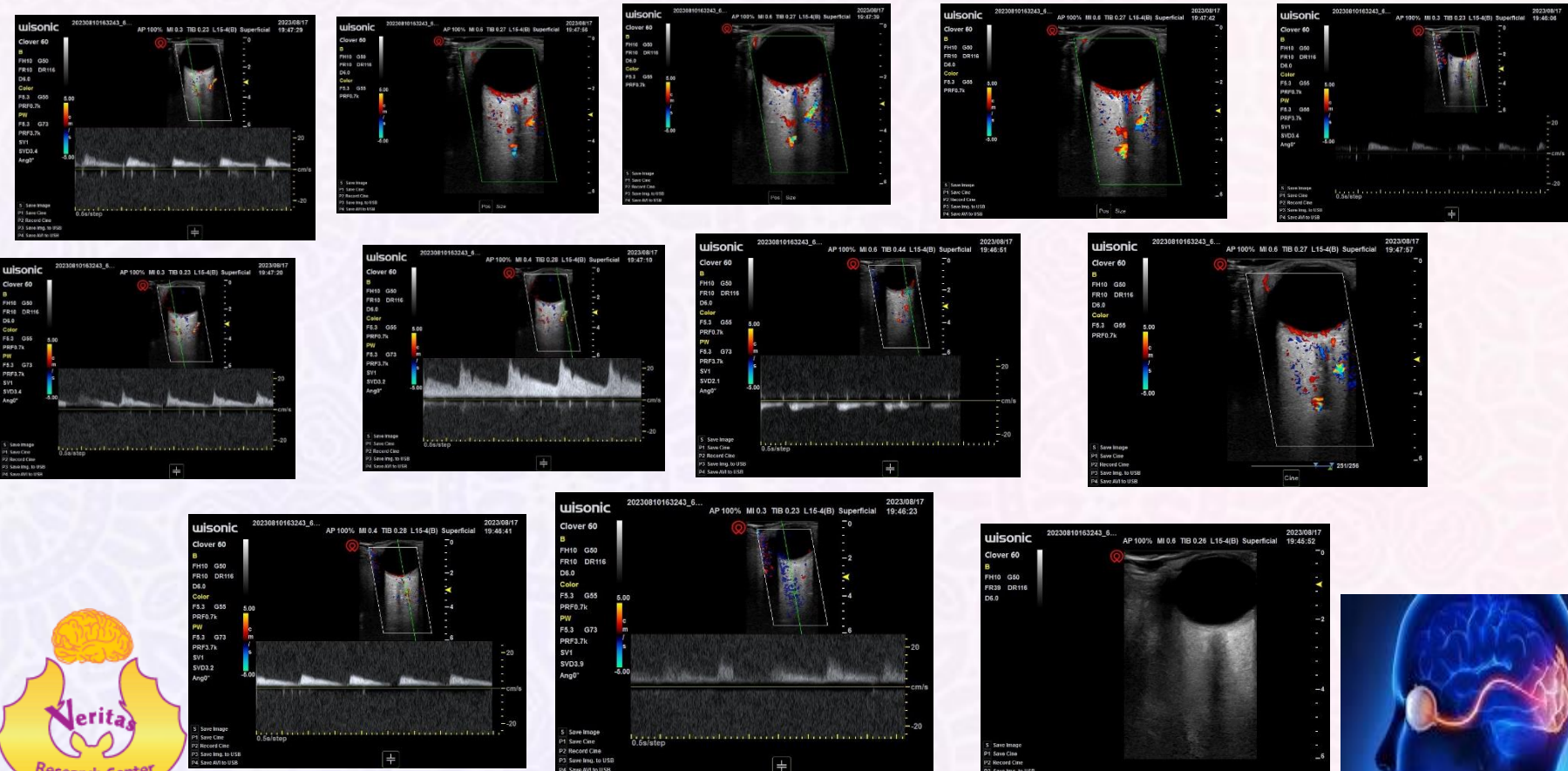
12/21/2022



Results

Patient R, m, 42 y.

Ultrasound dynamics of changes in blood supply to the optic nerve
08/2023



Results: changes during treatment

Optic atrophy



Patient P, 7 y.

Diagnosis: Congenital optic nerve atrophy. Practically blind from birth. Vision of small segments of the corner of the eye. Squint.

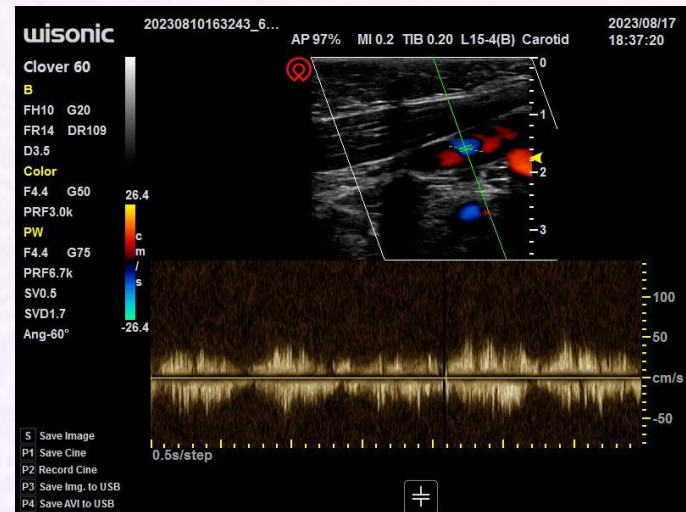
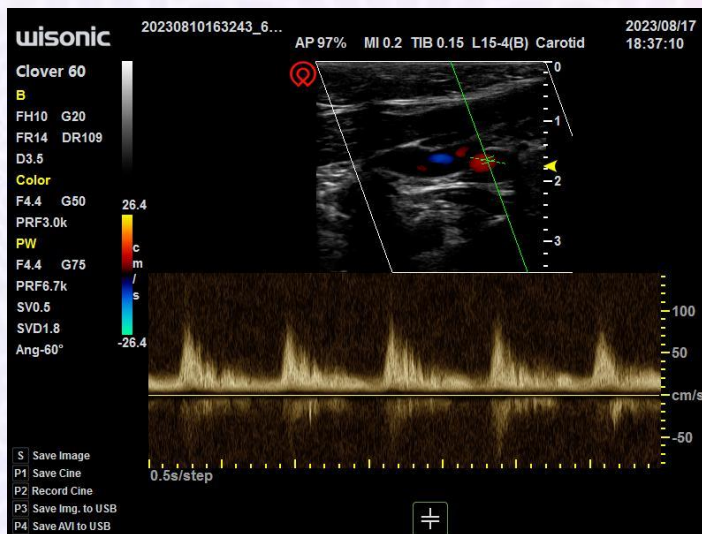
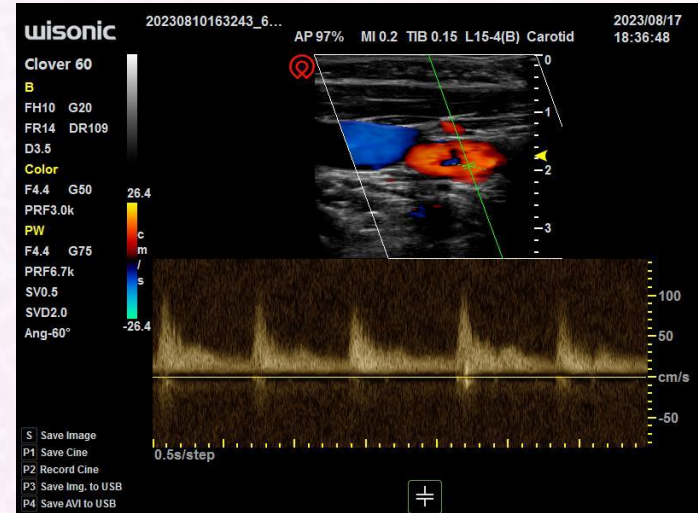
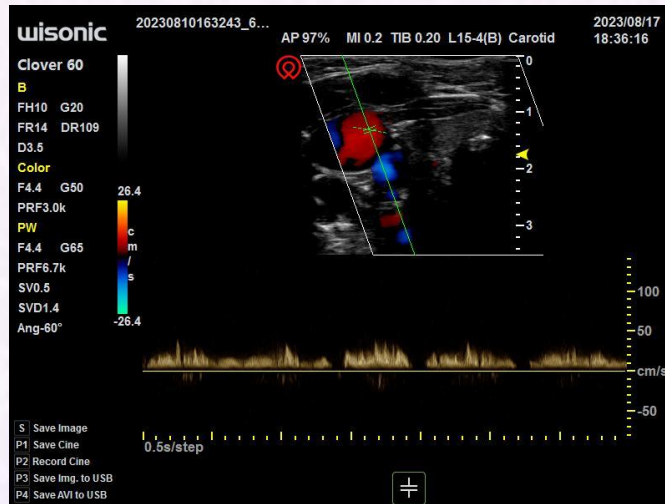
In the dynamics of the 2-month course of treatment, her vision improved - she began to distinguish the color of cars passing by. Counts white cars, does not pay attention to gray ones. Distinguishes the colors of objects. The dynamics is positive.



Results: changes during treatment

Optic atrophy

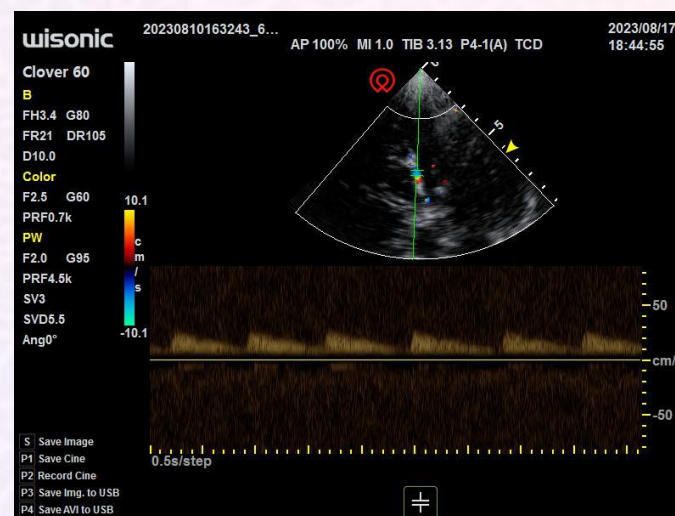
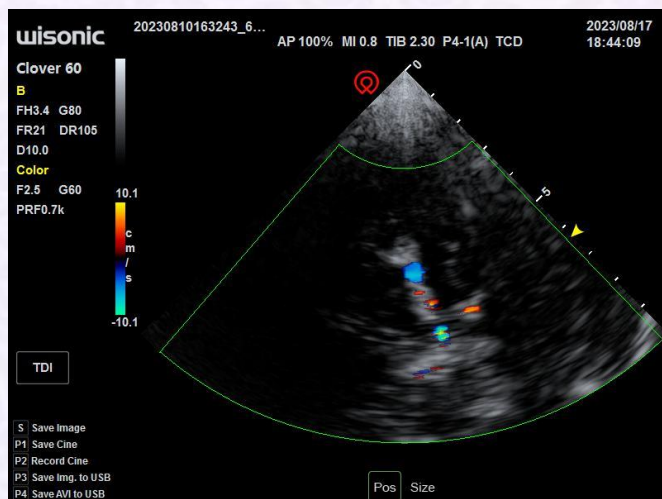
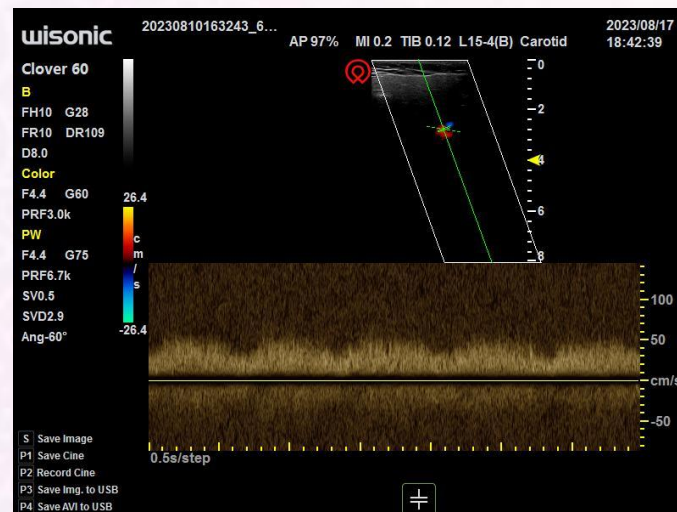
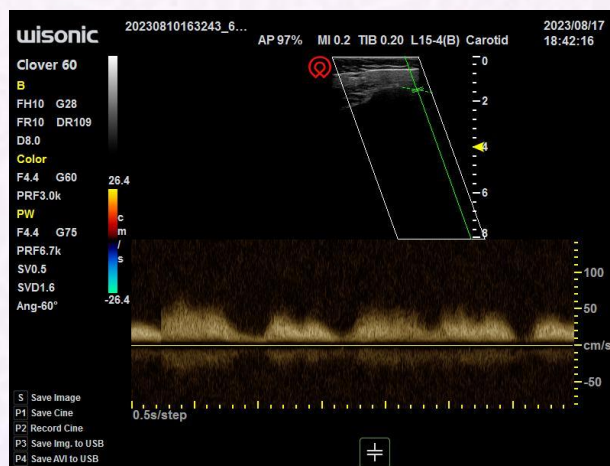
Check-up on 17/08/23.



Results: changes during treatment

Optic atrophy

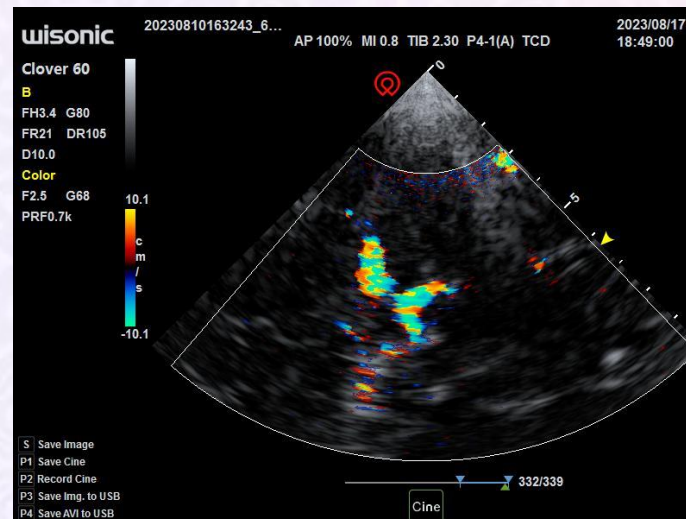
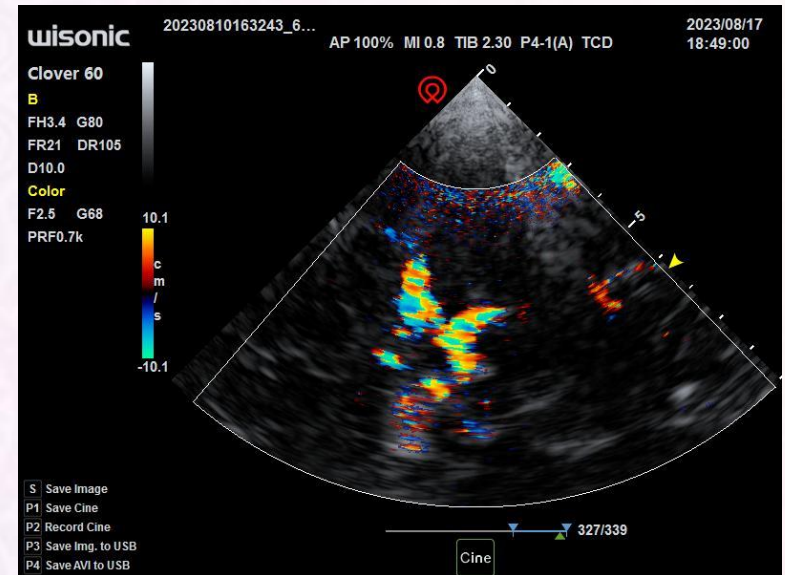
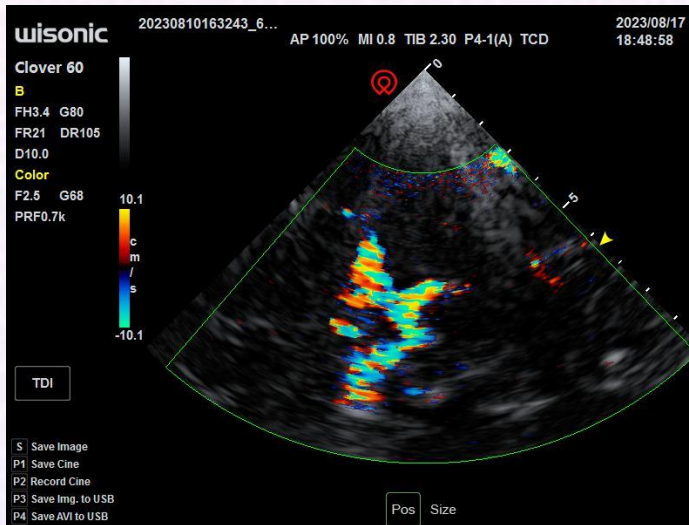
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Results: changes during treatment

Optic atrophy

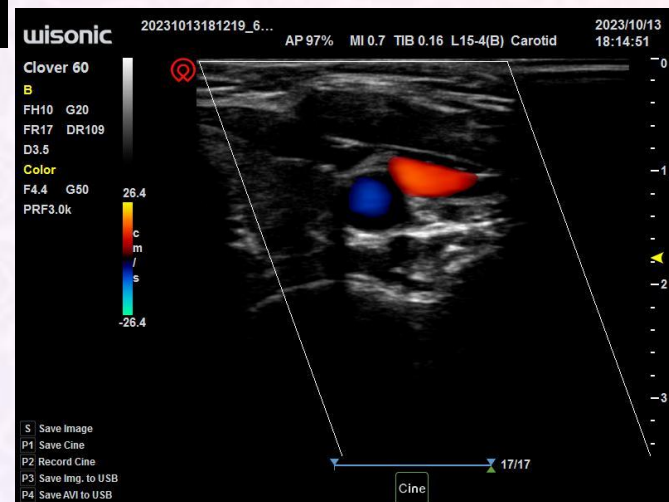
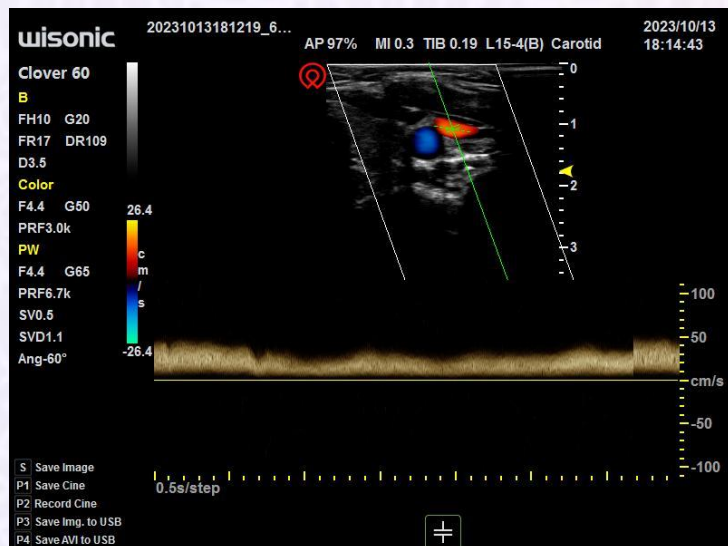
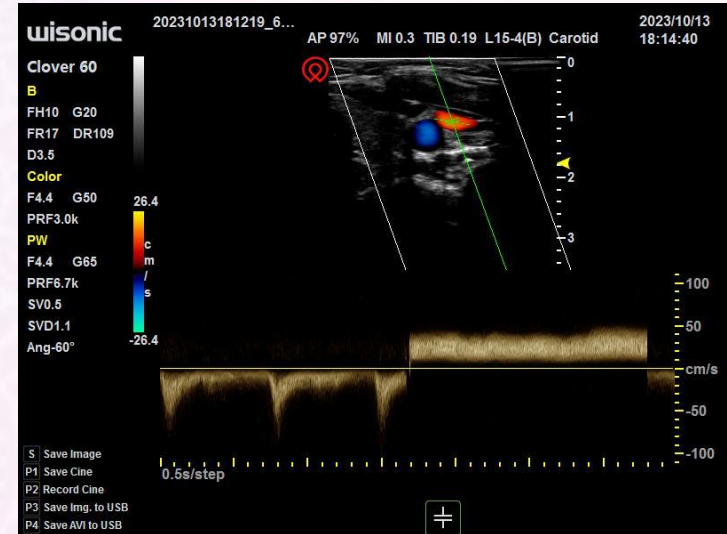
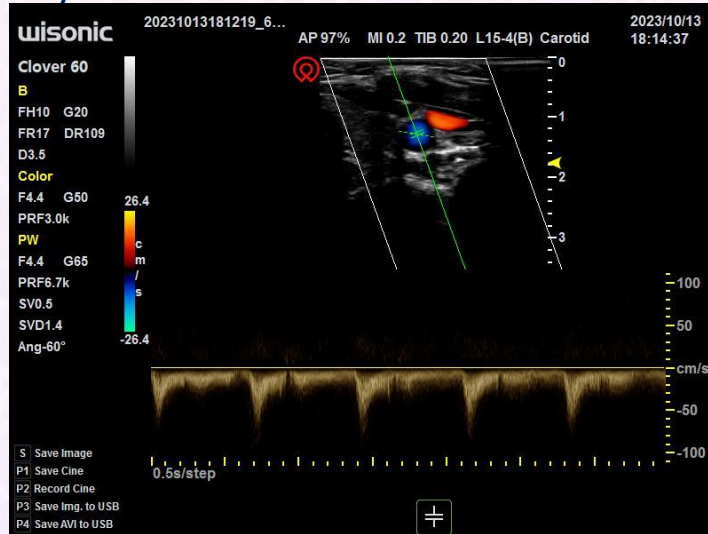
Check-up on 17/08/23



Results: changes during treatment

Optic atrophy

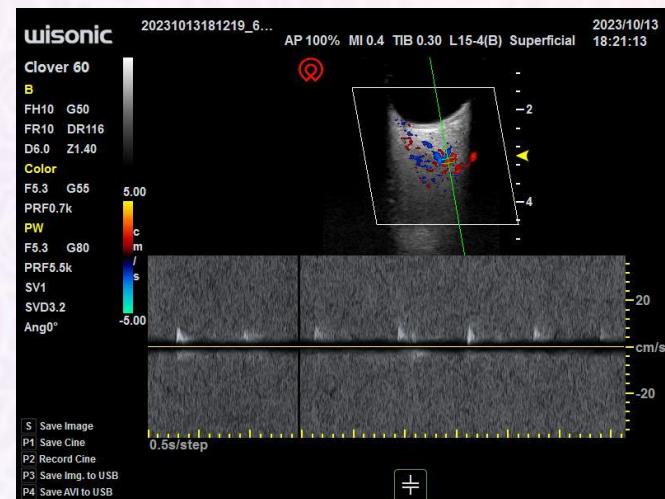
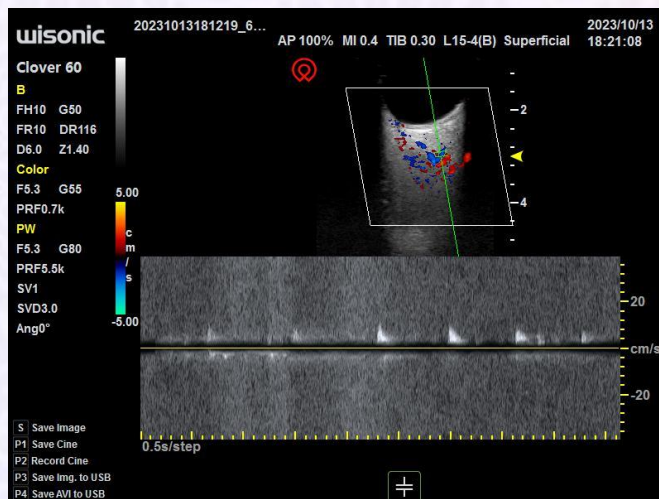
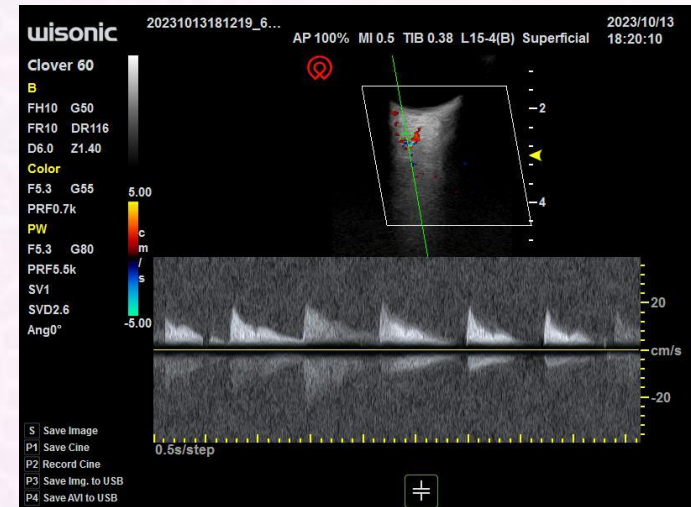
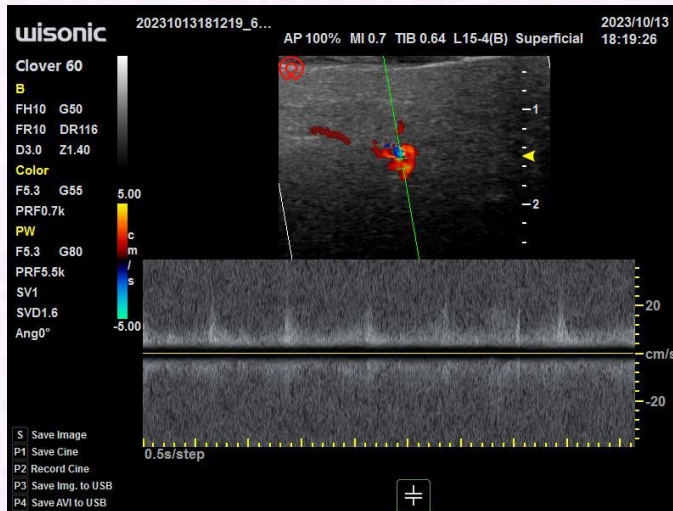
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Results: changes during treatment

Optic atrophy

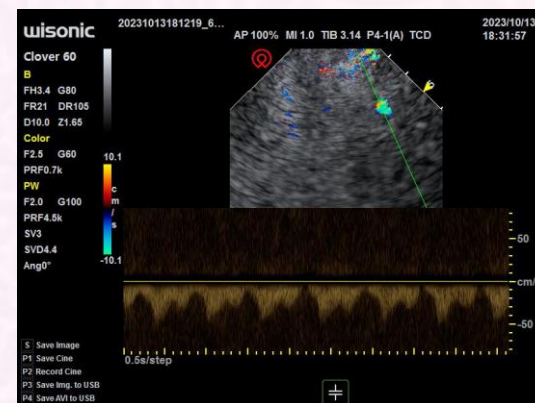
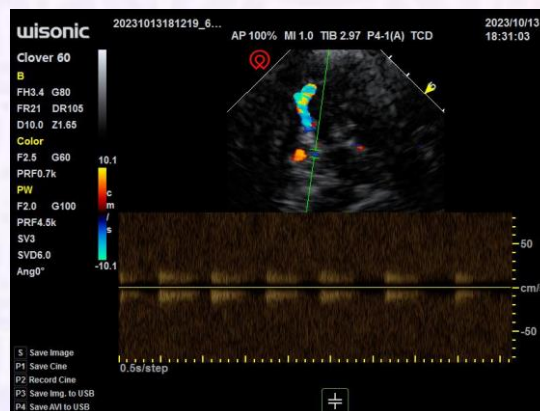
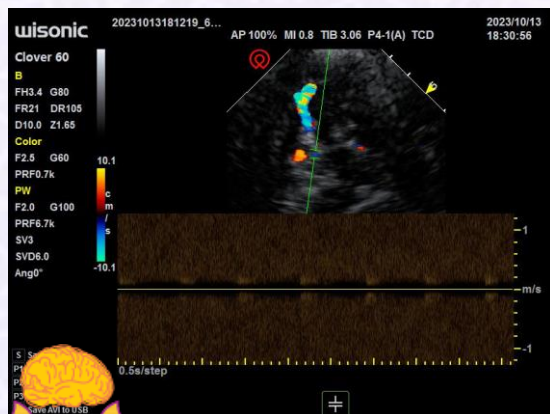
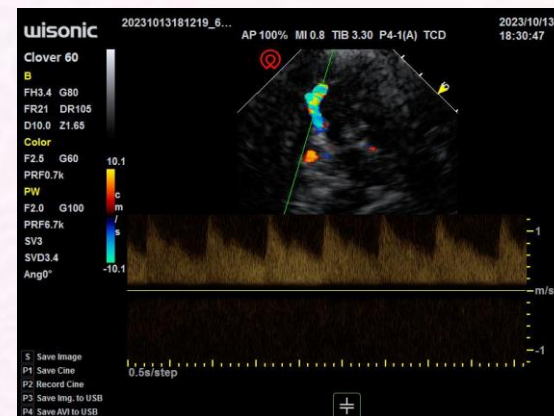
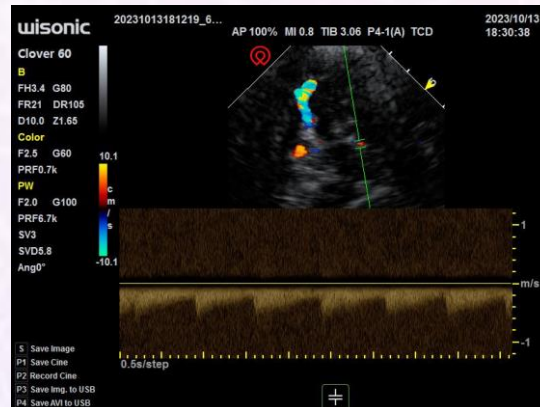
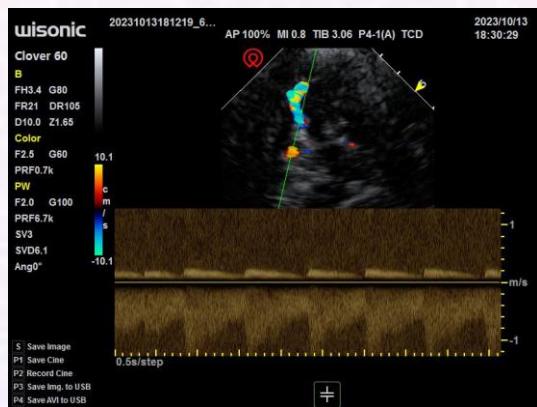
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Results: changes during treatment

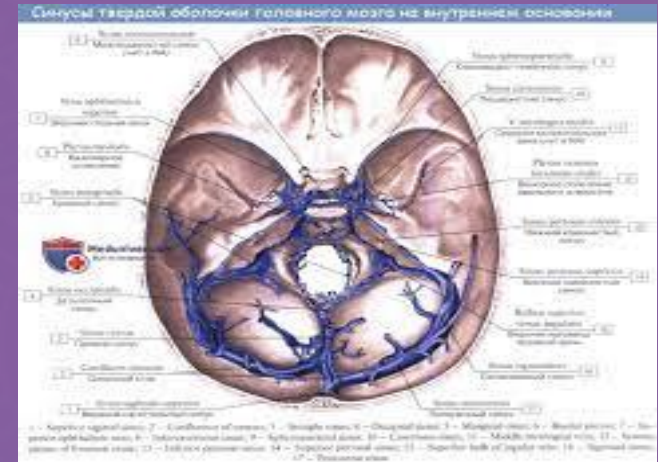
Optic atrophy

Check-up on 13/10/23. Hemodynamics in the process of reconstruction and in the initial stage of starting the blood supply in the projection of the PCA



Conclusions

- Ultrasound in neuro-ophthalmology opens up new possibilities in visualizing the nature of damage to the vascular-nerve bundle of the eye
- and enables modelling the situation in the indicative visual points of the visual analyser,



Conclusions

- monitoring pathological and sanogenic changes in hemodynamics and the ultrasound structure of nerve conductors,
- choosing the optimal treatment and psychoneurorehabilitation tactics for the purpose of restoration of physiological parameters of hemodynamics and neurodynamic.





**Sincerely grateful you
for your attention!**



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+38 (093) 135 61 87

(WhatsApp, Viber, Telegram)

Veritasangio@gmail.com

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