

Ultrasound Personalized Treatment Management, Monitoring and Psychoneurorehabilitation of Patients with Post-resuscitation Disease and Apallic Syndrome on an Evidence-based Basis



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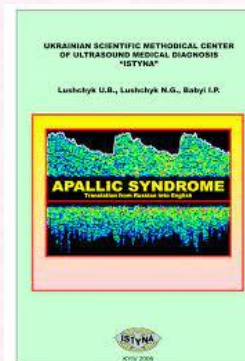
- **Apallic syndrome** or **vegetative condition** (now *Areaactive Vigilance Syndrome*)^[1] (other names are coma vigile or prolonged coma) is a special type of consciousness disorder. It is severe involvement of the cortex or subcortical structures while maintaining the function of the brainstem. This condition is usually irreversible (so-called persistent vegetative condition), but it can also be only transient^[2].

Phases of apallic state

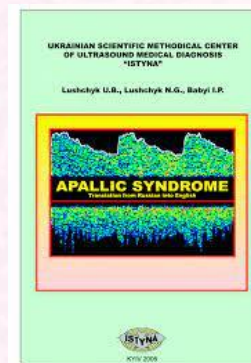
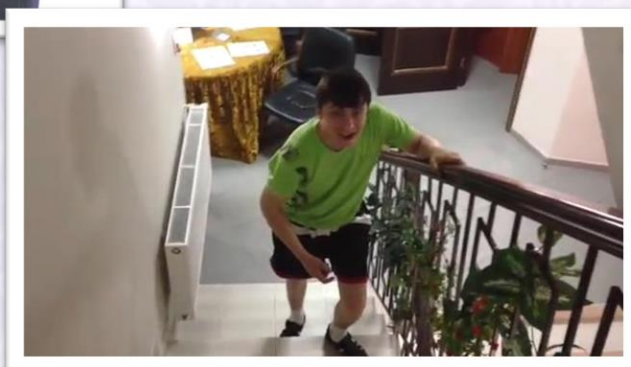
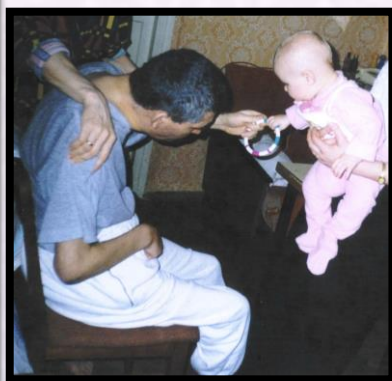
- **Persistent vegetative status** – if it lasts longer than **one** month,
- **Permanent vegetative condition** – if it lasts more than **twelve** months after **traumatic** brain injury or more than **three** months after **non-traumatic** brain injury.



1. LAUREYS, Steven, et al. *Unresponsive wakefulness syndrome: a new name for the vegetative state or apallic syndrome* [online]. ©2010. [cit. 2016-05-13]. <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2987895/>>.
2. AMBLER, Zdeněk. *Základy neurologie*. 6. edition. Praha : Galén, 2006. pp. 66-67. ISBN 80-7262-433-4.



Apply ultrasound methods to verify the state of organs and systems apallic syndrome patients to verify possible risks in the process from resuscitation to psychoneurorehabilitation

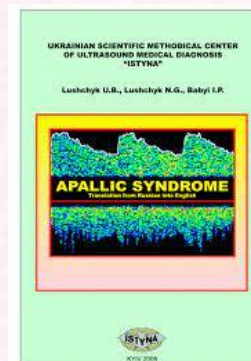


Ultrasound monitoring of structural and functional changes in organs and systems for the purpose of screening problem areas

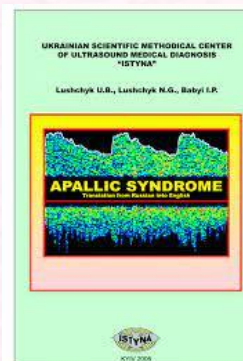


Results

- Multidisciplinary complex psychoneurorehabilitation has already become the norm for the recovery of acute patients after critical conditions. Our experience of working with such patients started since 1996, we have examined 1386 patients with post-resuscitation disease, 84% of them - patients with apallic syndrome.



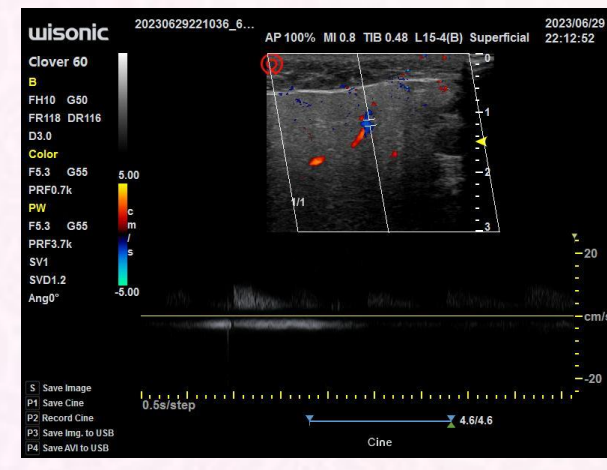
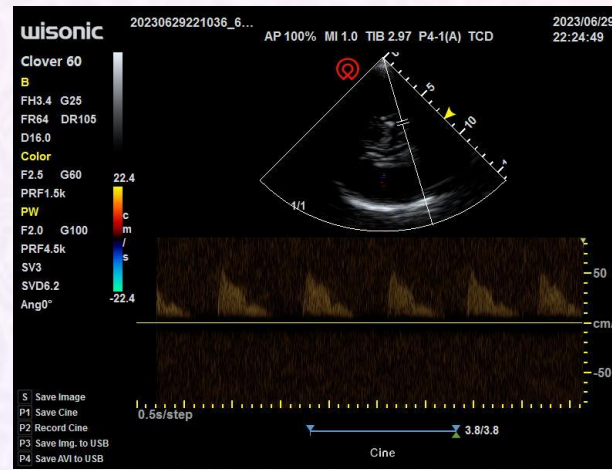
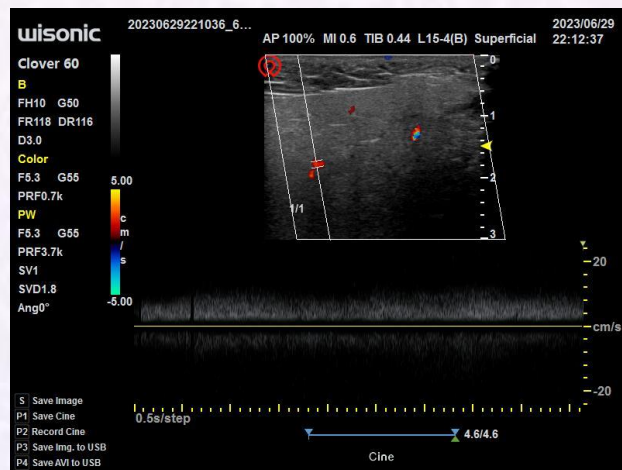
- Ultrasound techniques for verification and screening of problematic organs and systems today allow for a systematic approach to changes in the body and are an evidential basis not only at the diagnostic level, but also at the level of medical monitoring and auditing of changes in the body.



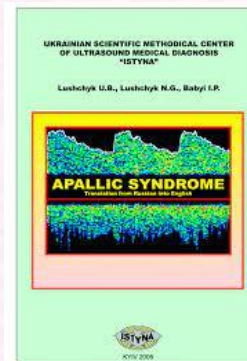
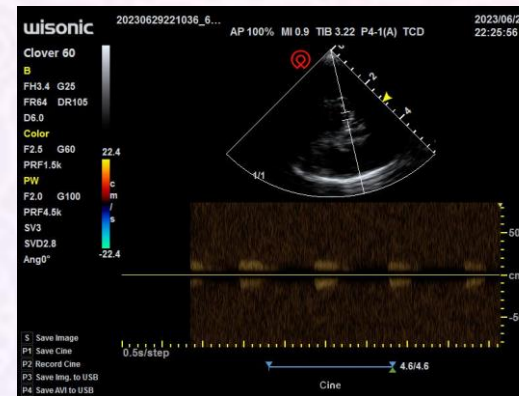
Results

Patient B., 2y. 10m.

Diagnosis: Apallic syndrome, level 2 by the Rancho Los Amigos scale. Postresuscitation disease with centralization of hemodynamics and minimal neurodynamics, background arterial hypotension.

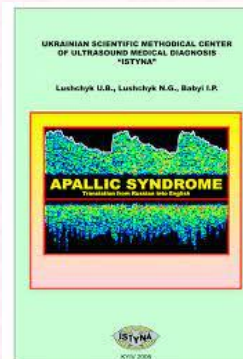
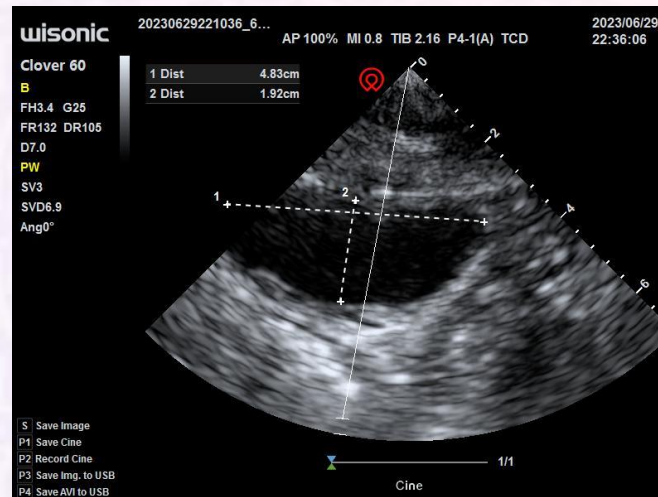
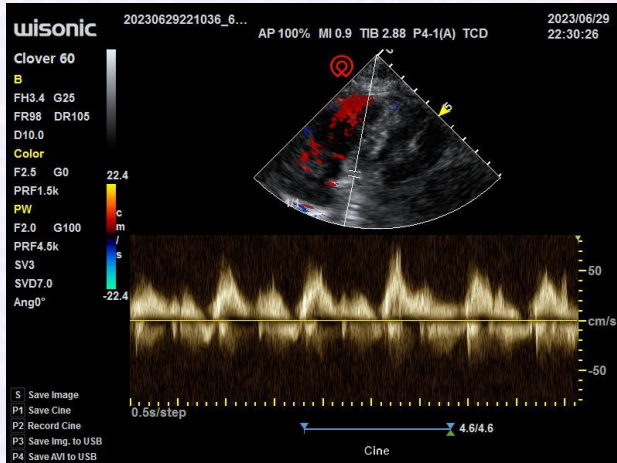
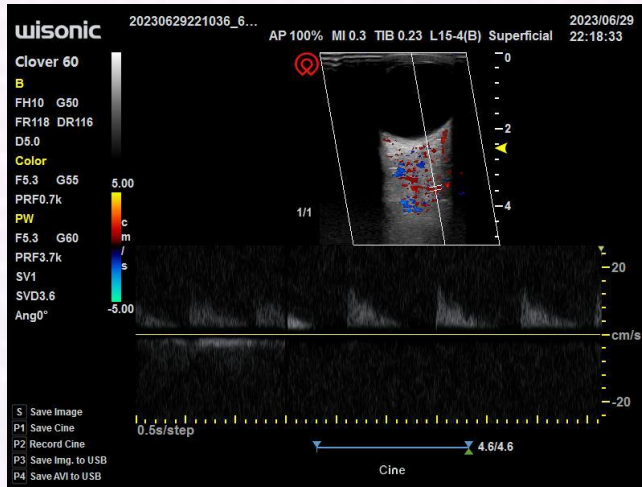


29/06/23. Patient B.



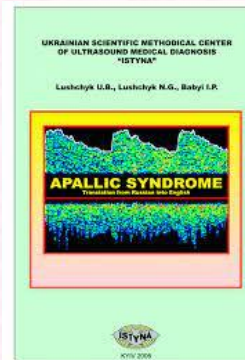
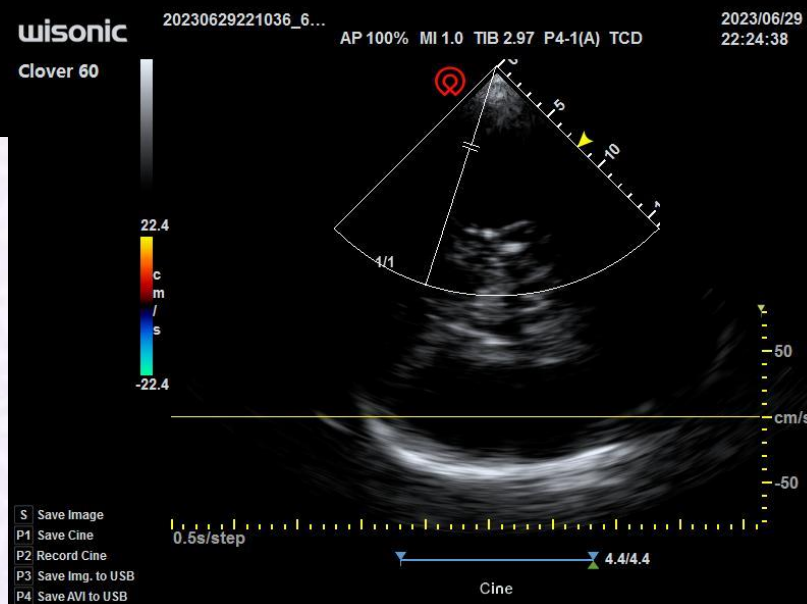
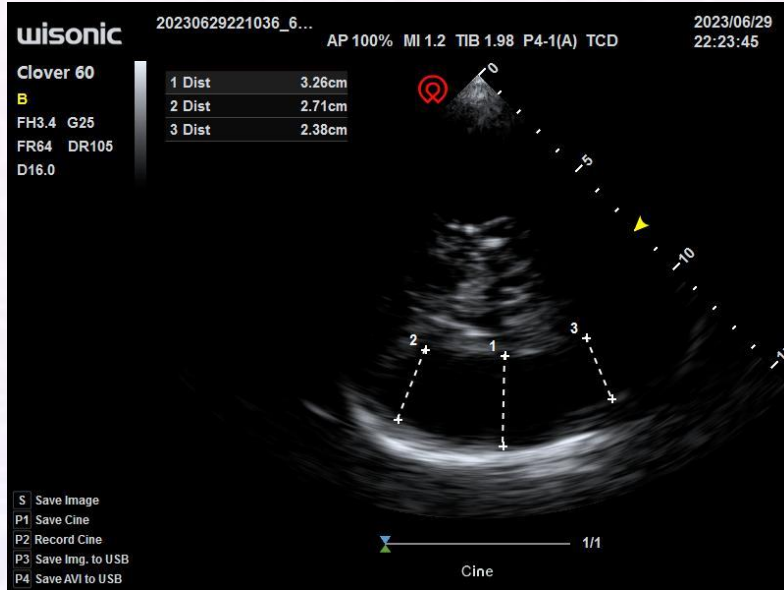
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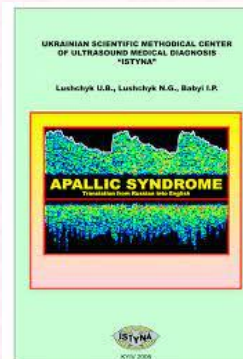
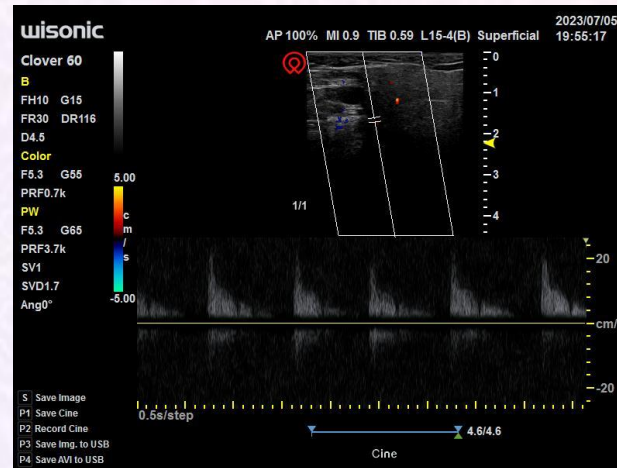
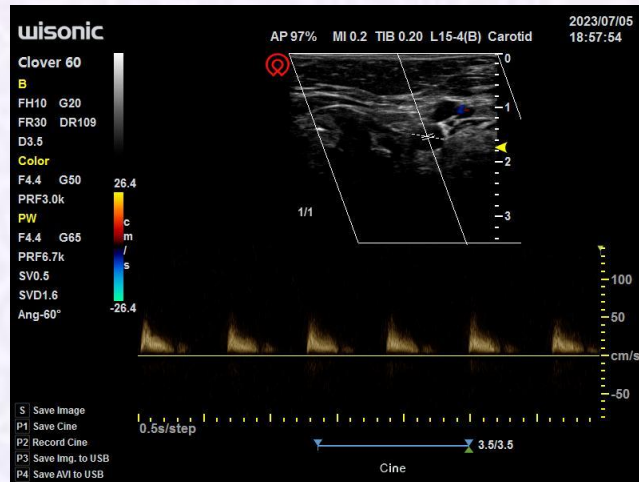
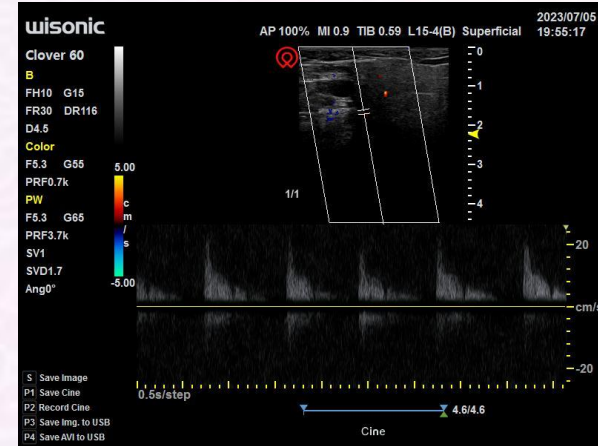
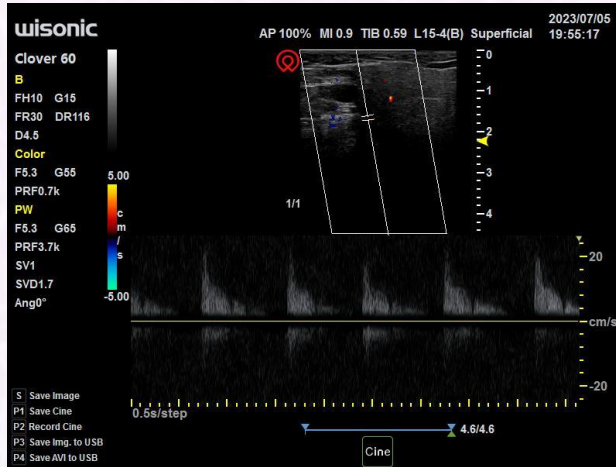
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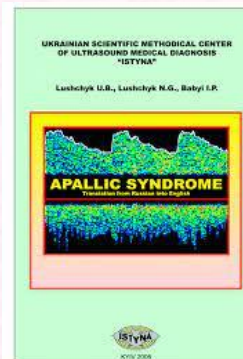
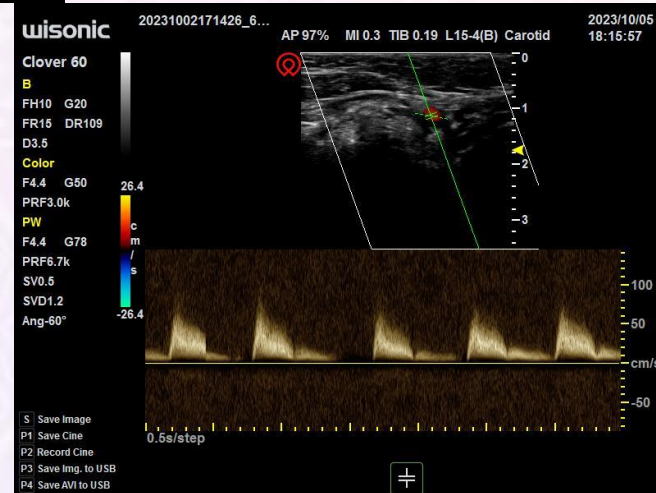
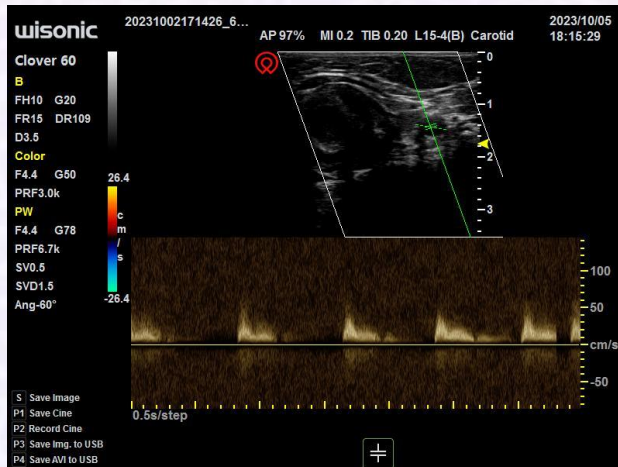
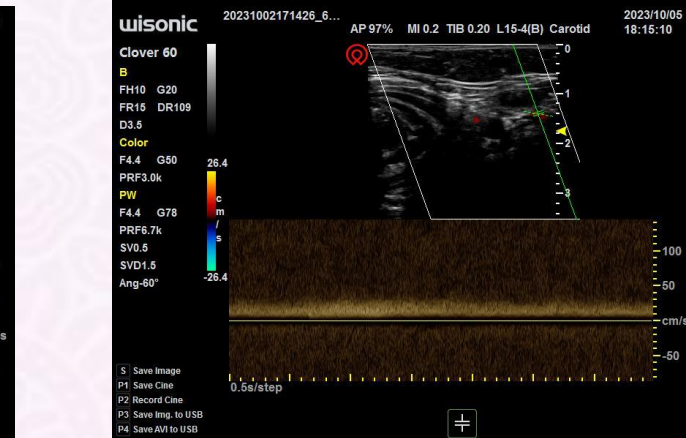
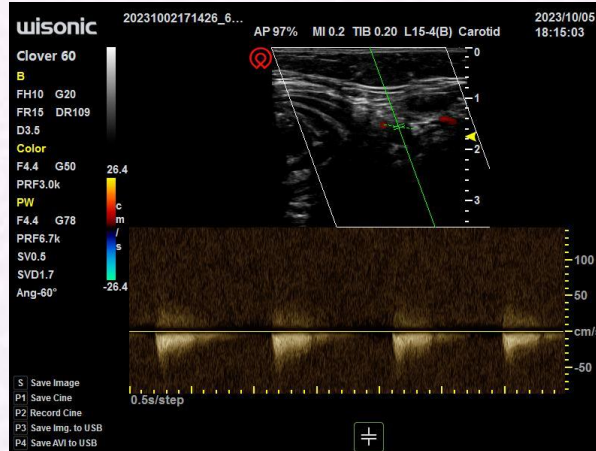


Results

Dynamics for a week of rehabilitation on 07/05/2023. Patient B.

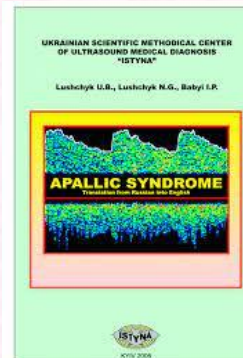
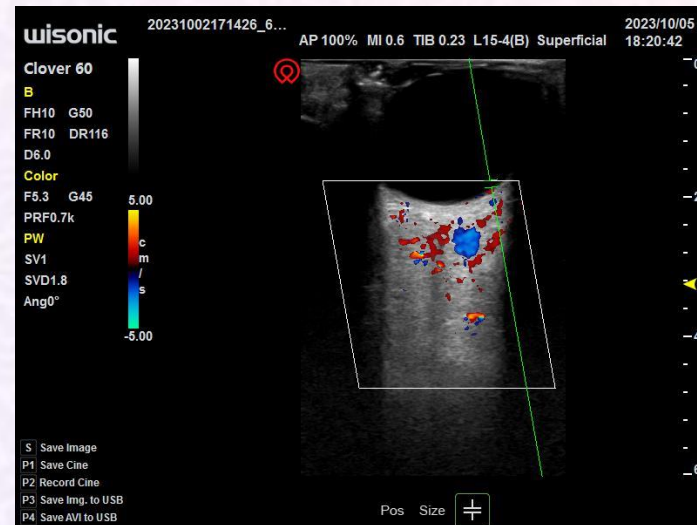
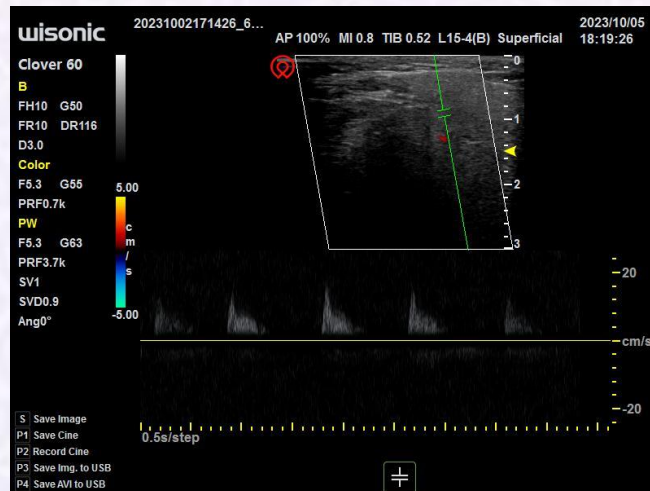
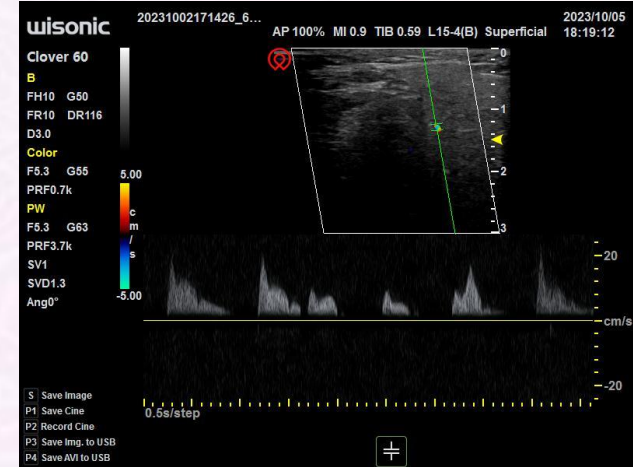
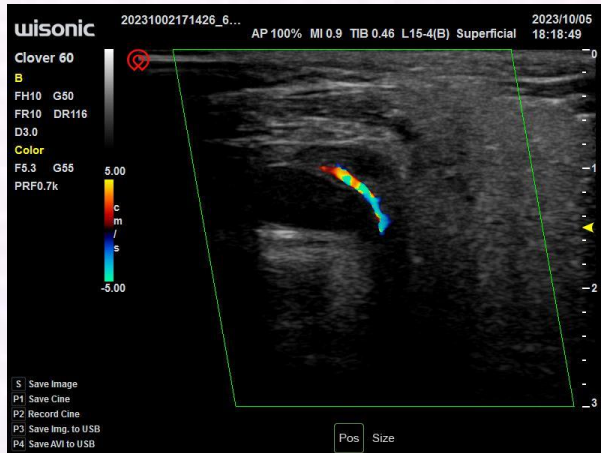


Dynamics for a week of rehabilitation on 05/10/2023. Patient B.



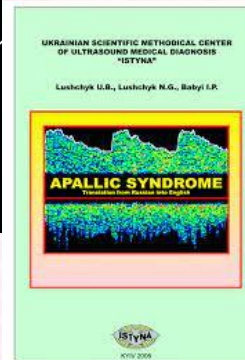
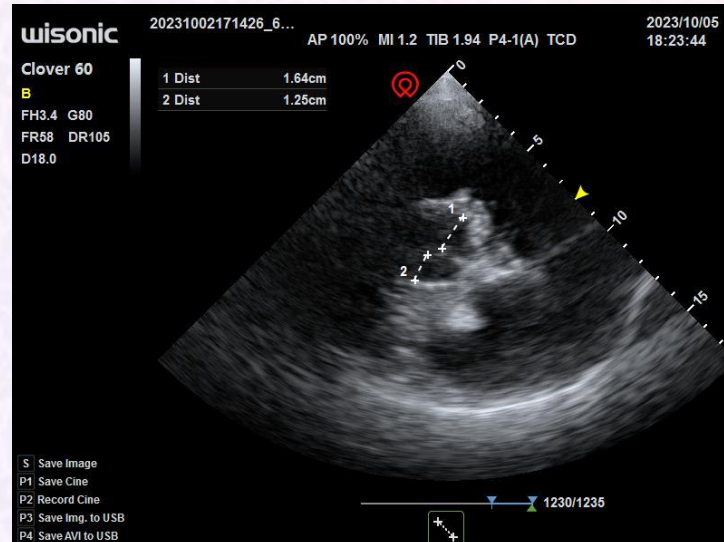
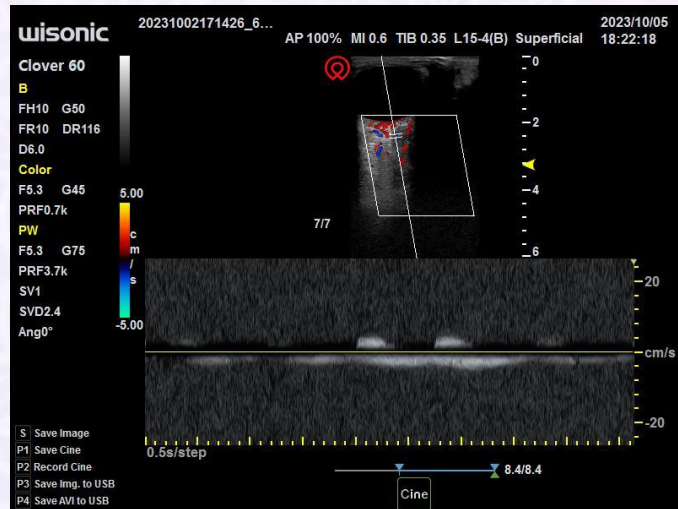
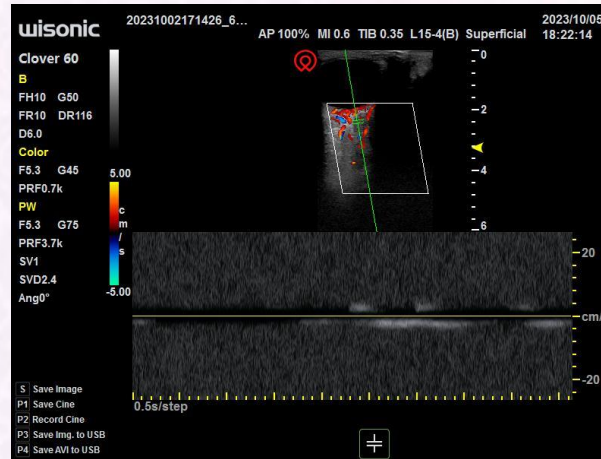
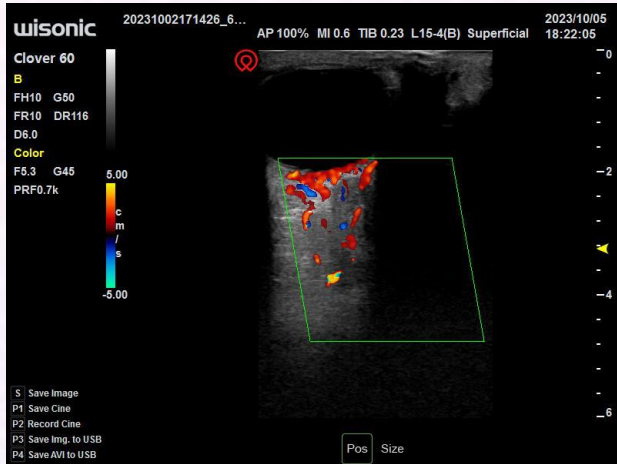
Results

Dynamics for a week of rehabilitation on 05/10/2023. Patient B.



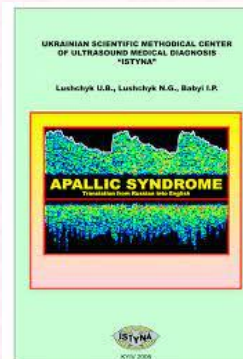
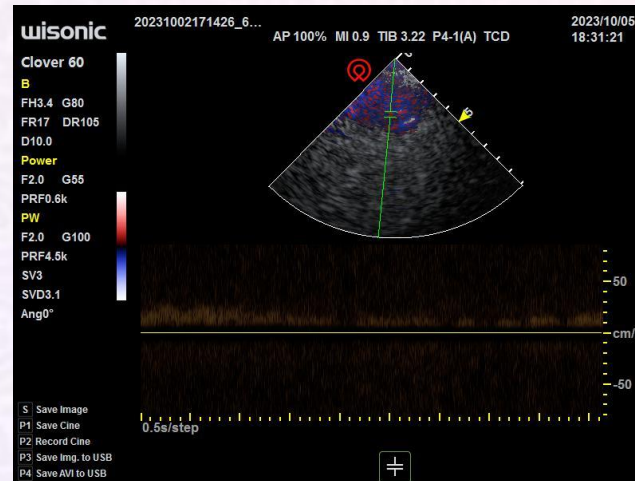
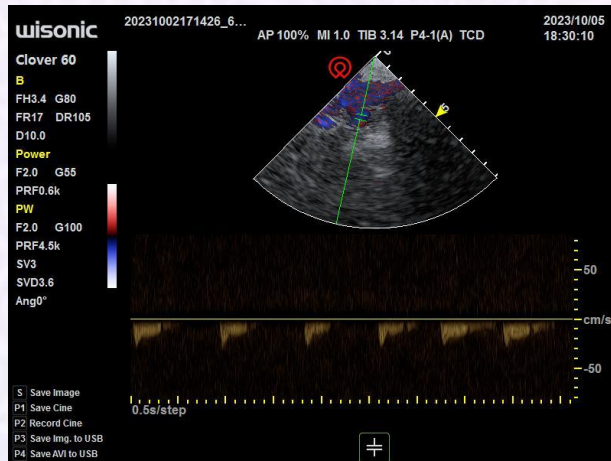
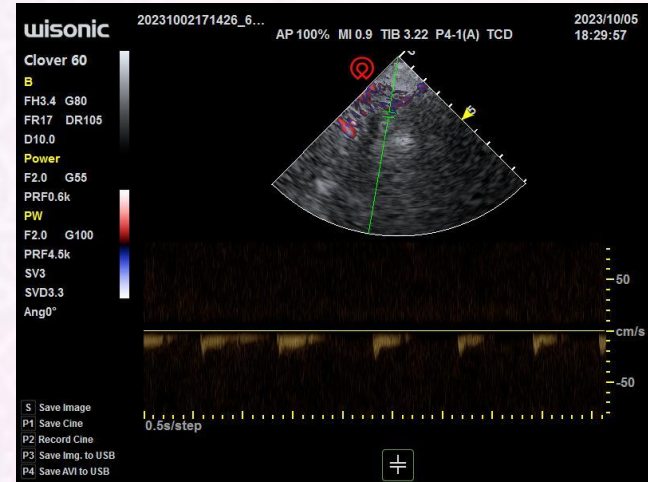
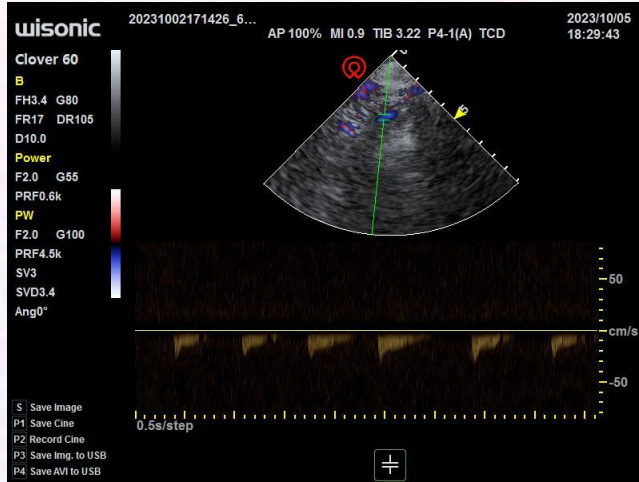
Results

Dynamics for a week of rehabilitation on 05/10/2023. Patient B.



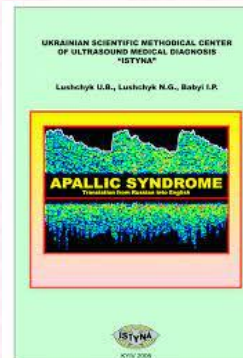
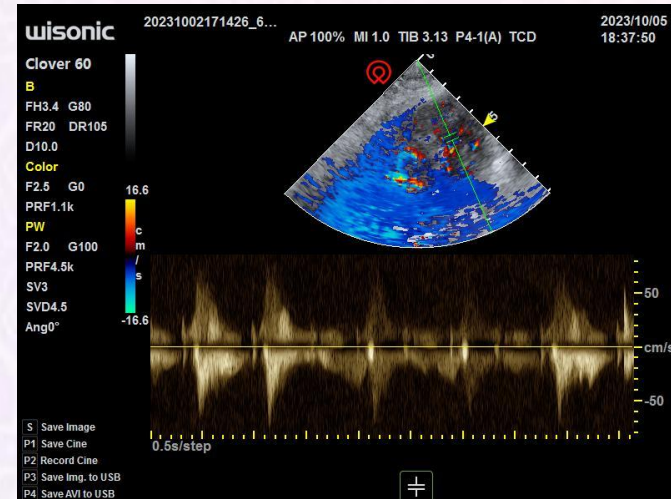
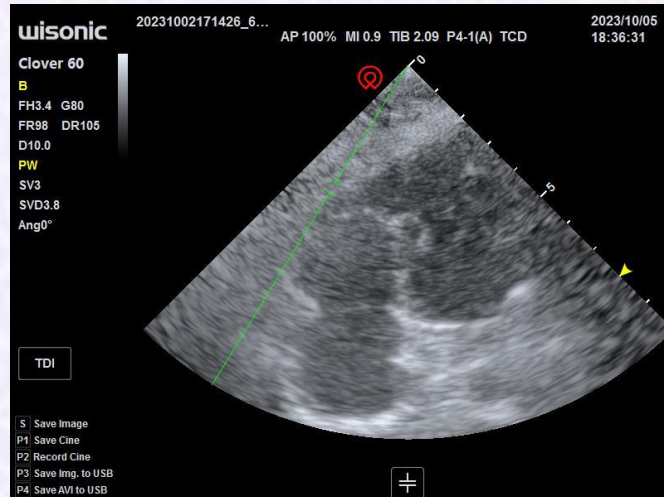
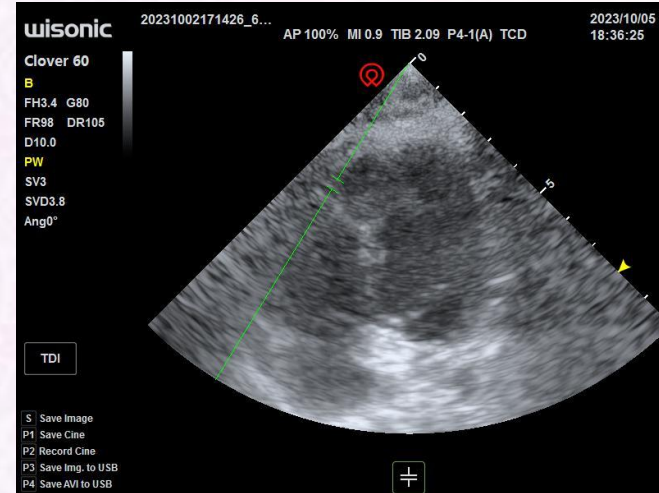
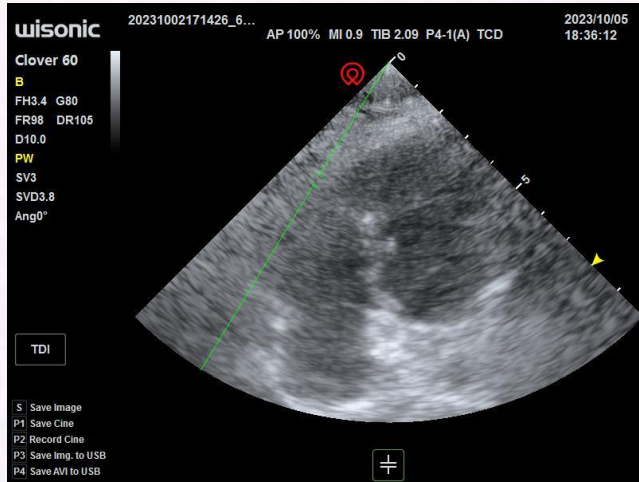
Results

Dynamics for a week of rehabilitation on 05/10/2023. Patient B.

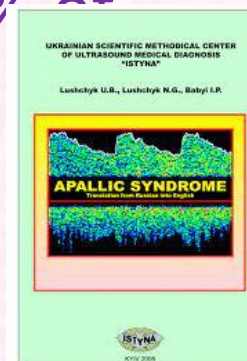


Results

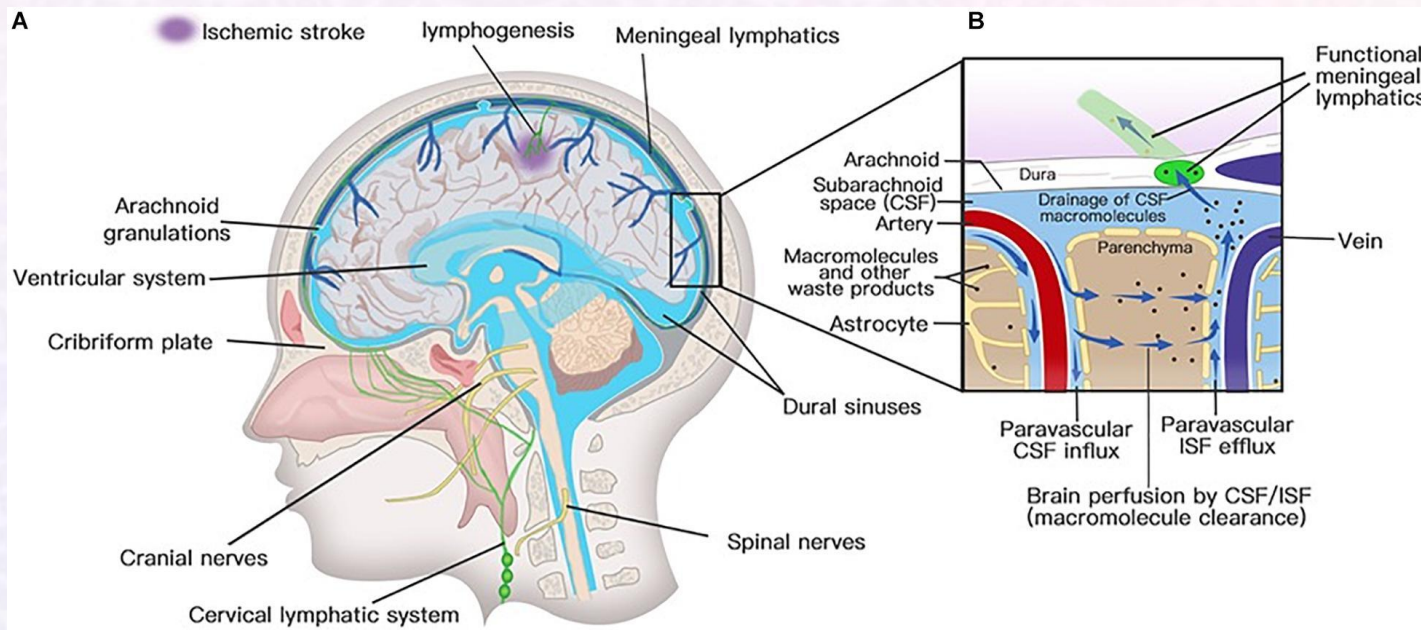
Dynamics for a week of rehabilitation on 05/10/2023. Patient B.



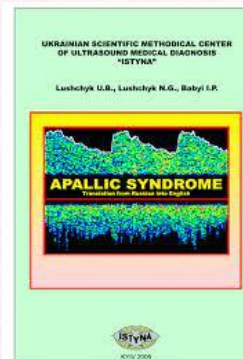
- For patients with apallic syndrome (vegetative state), the level of cerebral blood supply and the search for logical mechanisms for restarting the regional cerebral reservoir in order to restore the physiological level of blood supply are important.
- In most patients, the background level of cerebral blood supply was 5% (54%), 10-20% (20%), 20-40% (13%), 40-50% (13%), there was a shift in pathological arteriovenous balance in the direction of venous stasis according to the hypostatic type (83%) and hypertensive (27%), the deficit of blood supply in the main artery reached 50-80% (90% of patients with apallic syndrome),



- For patients with apallic syndrome (vegetative state), the level of the intracranial hydrohemodynamic conflict in anterior cranial fossa was at the level of subdecompensated in 100% of patients, in posterior cranial fossa - 85% of all patients.

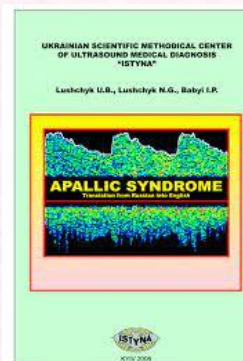


<https://www.frontiersin.org/articles/10.3389/fncel.2021.716825/full>

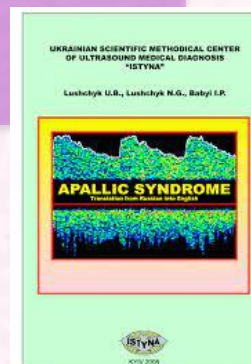


Results

- Intracranial neurosonography enables to assess the state of the ventricular system of the brain and monitor the hydrohemodynamic conflict.
- Echocardiography enables to objectify the ejection fraction and disorders of systemic hemodynamics after resuscitation measures.
- Ultrasound of the musculoskeletal system enables to detect hidden injuries, undiagnosed fractures in polytrauma and other problems.
- Ultrasound of the lungs is important to prevent pneumonia, which occurs spontaneously in this type of patient.



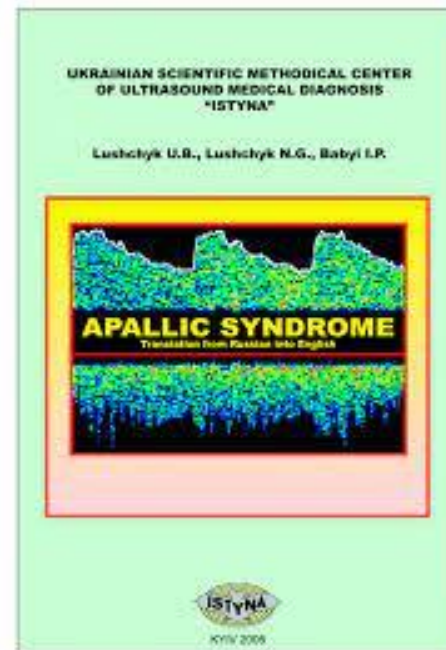
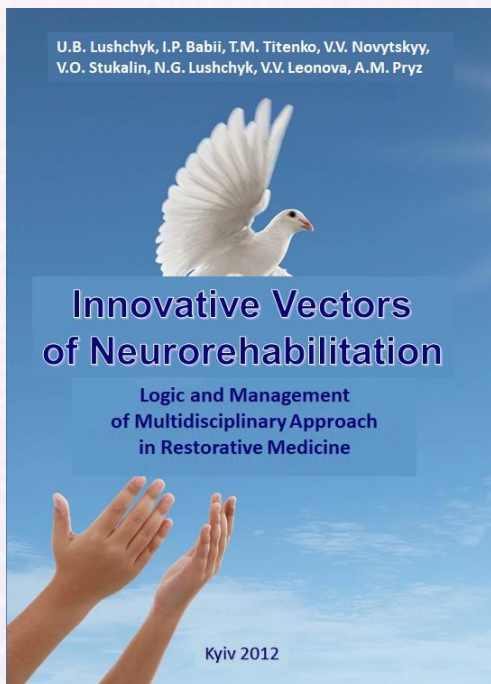
- Today, ultrasound analytical technologies enable to monitor the situation and carry out mathematical modeling of ultrasound parameters for the selection of both the optimal treatment tactics and for the audit of sanogenic changes in the patient's body.
- The effectiveness of such technologies makes it possible to reduce the duration of treatment and neurorehabilitation, since the treatment process is modulated mathematically, and the expected sanogenic transformations of the body are predictable thanks to optimal treatment management based on ultrasound evidence.





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