

# Electroencephalograph-analyzer EEGA-21/26 “Encephalan-131-03”

Reliable tool of a classic encephalography in combination with innovative approach to functional diagnostics provides new capabilities and efficiency of carrying out studies

Simultaneous examination of EEG and brain blood circulation saves staff's time (for modifications 08 and 10)



Correlation between electric brain activity dysfunction and brain blood circulation can be reliably detected by unique means of synchronously carried out EEG and PSG studies



modification

08

19 EEG  
6 REG  
1 ECG

2 in 1



modification

10

21 EEG  
6 REG  
4 Poly  
1 ECG



modification

11

21 EEG  
4 Poly  
1 ECG

Compressed cardiocyclic presentation of dynamics of recorded physiological parameters demonstrates the correlation between various systems of an organism



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Taganrog

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## Software main functional capabilities

### Software “Encephalan–EEGA” and software “REG–studies”

provide effective visual analysis and various types of quantitative analysis of electric brain activity and brain blood circulation for valid neurophysiological diagnostics.

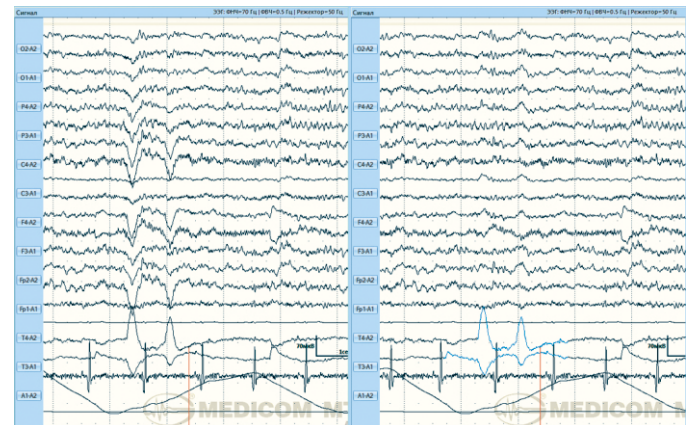
#### ● “Professional” variant (for modification 08)

**Routine EEG studies** with phono-photostimulation and results analysis with various methods of quantitative analysis with topographic mapping. EEG recalculation in different montages, automatic search and suppression of ECG artifacts. **Split mode** (window splitting function) increases the visual analysis capabilities.

**Frequency-time analysis of EEG signals** (coherence function, autocorrelation analysis, cross-correlation analysis) for linear or topic form of presentation in graphs, topographic maps and tables, and in the form of pseudo-3D graphic of frequency-time analysis results in all derivations.

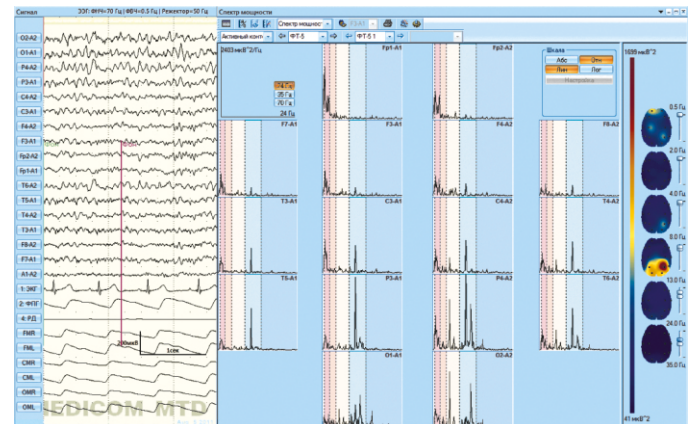
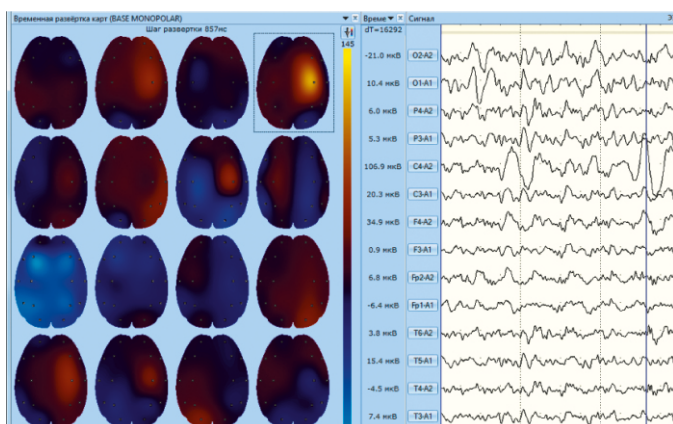
**Software uses updated ergonomic interface “Ribbon”,** in which menu elements and buttons are grouped in tabs for their functional purpose. This allows decreasing number of buttons which are simultaneously displayed on screen, and making easier the process of study carrying out.

**Topographic 2D and 3D mapping** of the results of EEG spectral analysis, automatic search of epileptiform activity and non-stationary EEG fragments.



**EEG description** is formed automatically and can be edited by a doctor. Automatic forming of EEG description with disorder evaluation by **E.A. Zhirmunskaya classification**.

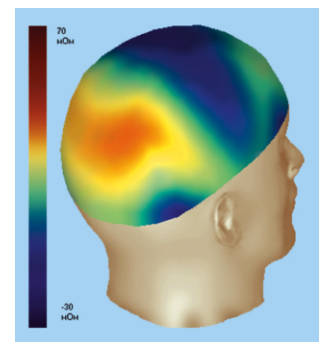
**Editor for forming doctor's conclusion by EEG and REG studies** with templates (glossary), saving results in the database, preparation of printing documents.



#### ● Brain impedance plethysmography – rheoencephalographic studies (REG)

Forming automatic conclusion with description of characteristics of pulse blood filling, peripheral resistance and elastic-tonic vessels characteristics. Amplitude mapping of rheoencephalographic signals, topographic mapping of main quantitative indices of brain blood circulation (rheo-graphic index, peripheral vascular resistance index, etc.), and two-component analysis with detection of arterial and venous components of rheoencephalographic signals.

**Analysis of synchronously recorded EEG and REG** and evaluation of interconnection between electric brain activity and brain blood circulation.



#### ● “Elite” variant (for modification 10 and 11)

Supplemented with functions for carrying out EEG studies using modern means of electrophysiological data processing, including automatic artifacts suppression (ECG, EMG, EOG).

Visual EEG analysis, extra-slow brain activity and other physiological signals by polygraphic channels.

Statistical analysis and processing, data export into ASCII, EDF/UDF, MatLab formats, various service options.

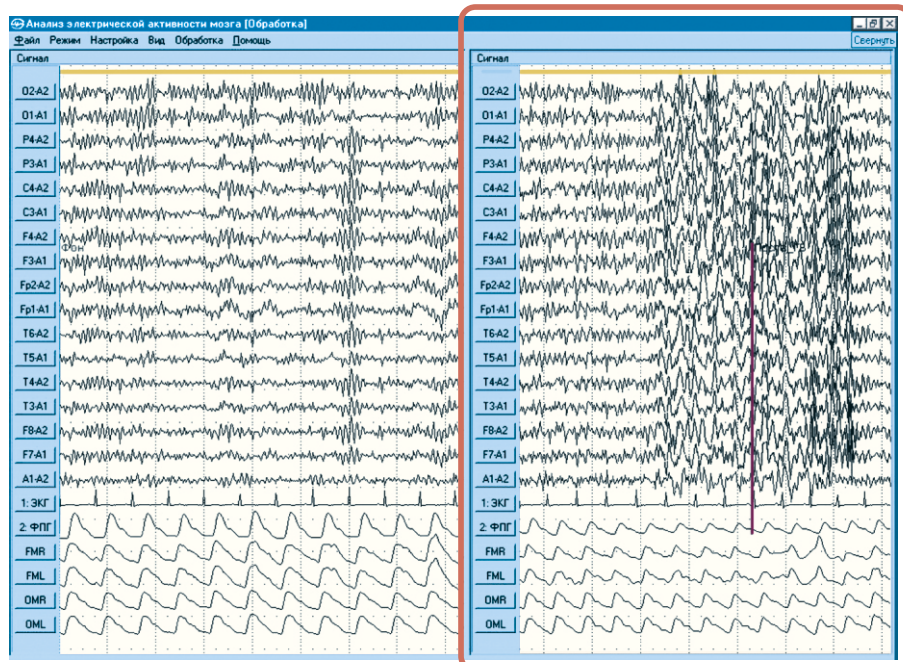


# Sample of simultaneous EEG and REG record with synchronous interrelation analysis

## Change of native physiological parameters in response to provoking actions (hyperventilation).

The left window contains initial background state, the right one – 3rd hyperventilation minute. At hyperventilation, the following can be observed: evident worsening of EEG and REG signals, namely, decrease of brain vessels pulse volume and occurrence of paroxysmal bursts of slow-wave activity on EEG.

Effective supplement to analysis of brain circulation and brain electric activity interconnection is a tool of mutual synchronization of native signals and trends of dynamics of calculated parameters change in response to trigger action – highlighted with colour in the pictures.



## Additional software “Encephalan-CA” for analysis of signals by polygraphic channels combined with EEG signals (to modification 10 with “elite” Software variant).

Software is meant for data analysis and trends visualization, which display cardio-cyclic dynamics (averaging from cycle to cycle) of different calculated parameters for cardiovascular, vegetative and central nervous systems in one time scale and provides an option of visual evaluation of their interconnection at synchronous record of 16 EEG derivations, 16 super slow brain activity derivations, 6 REG derivations and signals by 4 polygraphic channels from the list: ECG, EOG, EMG, respiration effort, photoplethysmogram and temperature.

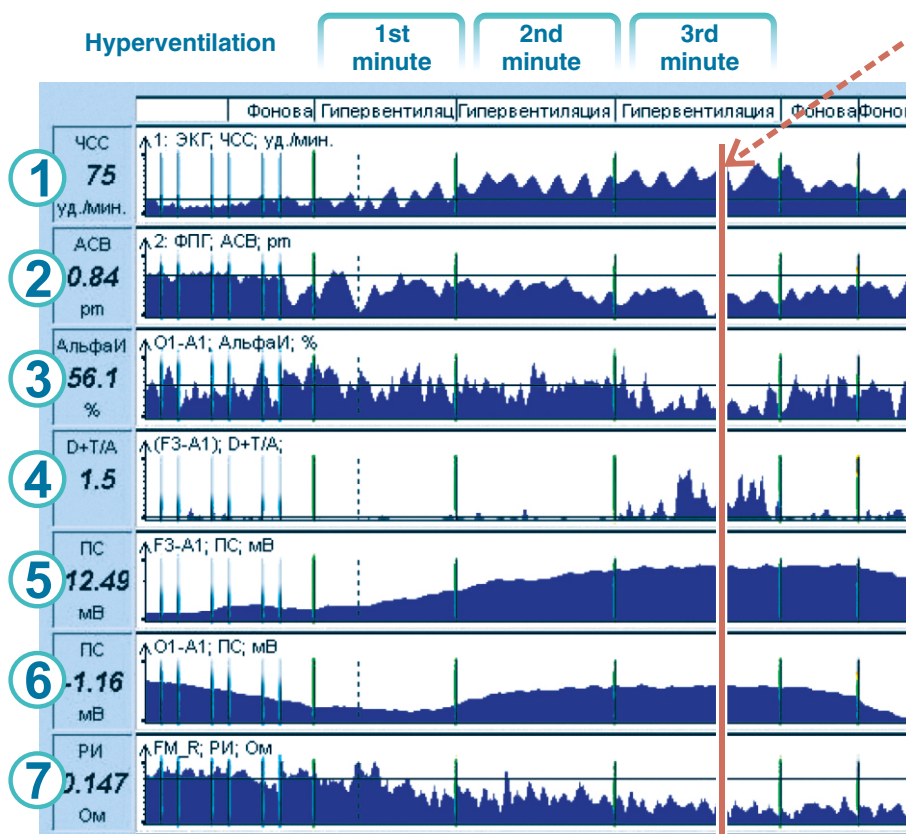
Software provides evaluation of physiological changes in response to provoking actions in order to detect weak and compensatory elements in organism's systems and ensures carrying out statistical and spectral analysis, building hypnograms and scattergrams, which display distribution of selected quantitative parameters over set study fragments, and generates automatic protocol with formalized description and table data with initial state and significant changes connected with functional tests carrying out.

## Analysis of trends, which display cardio-cyclic dynamics of parameters change, provides:

- Consideration of possible effect of vascular factor in epilepsy;
- Diagnostics of cerebrovascular disorders during functional tests for hyperventilation;
- Diagnostics of syncopal states.

## Change of physiological parameters on trends of cardio-cyclic dynamics in response to provoking actions (hyperventilation).

In 30 seconds after hyperventilation's (HV) start, the rheographic index REG (7) is significantly decreased, in 3 minutes of HV there are changes on EEG – sharp increase of slow-wave activity (5, 6) with paroxysmal manifestations (4) and sharp decrease of alpha-activity level (3).



## Additional functional capabilities

- **EEG/PSG Videomonitoring kit and software “Encephalan-Video”** for completely synchronized continuous digital record of electroencephalogram, audio- and video information, events marks, and for their analysis and archiving for differential epilepsy diagnostics.

- **EP-studies “Encephalan-EP”** – studies of long-latency visual and auditory evoked potentials, somatosensory, MMN, CNV, P300, and visual EP for chess pattern.

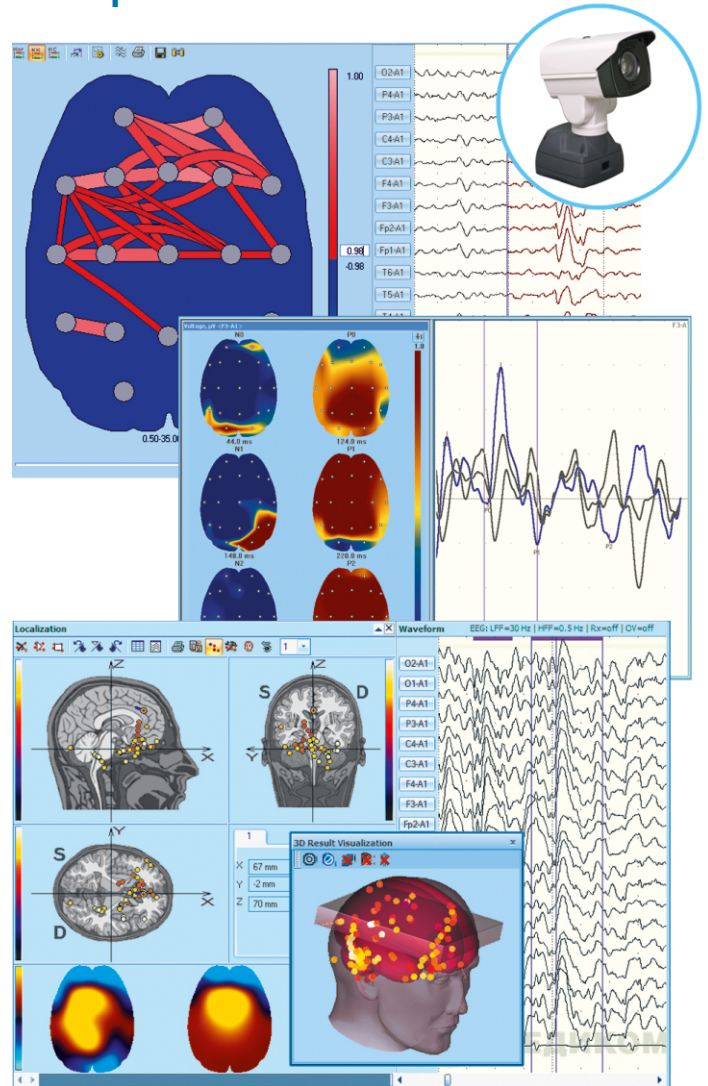
- **Software “Encephalan-AVS” for EEG and EP studies with audio-visual stimulation** uses different scenarios of cognitive stimulation. There is an option of sub-sensory (unconscious) stimuli presentation with marking and response control.

- **3D localization of electric activity sources “Encephalan-3D”** provides display of nominal source of electric activity on three projections of brain cut in the form of spatial dipole cloud, which allows localizing focus of EEG epileptiform activity or EP components source.

- **Analysis of super slow brain activity synchronously with EEG recording “Encephalan-SSA”**. Trends of super slow potentials dynamics and topographic maps of instant values and reactive changes of DC-potentials' level to functional tests carried out allow evaluating indirectly the cerebral energy exchange and metabolic changes dynamics.

- **Analysis of functional brain asymmetry “Encephalan-FBA”** provides visualization of intercentral connections map basing on the calculation of mutual functions (cross-correlation, cross-spectrum, coherence function) in order to diagnose inter- and intracentral interaction during different types of action.

- **Heart rate variability analysis “HRV”** for evaluation of ANS and neurohumoral regulation of a patient in initial (background) state and considering autonomic response to provoking actions. Provides the evaluation of adequacy of physical and psycho-emotional stresses, and drugs effect and treatment efficiency control.



## Electroencephalographs' basic specifications

- **Number of recorded parameters:**

**modification 08:** 19 EEG, 6 REG, 1 ECG;

**modification 10:** 21 EEG, 6 REG, 4 Poly, 1 ECG;

**modification 11:** 21 EEG, 4 Poly, 1 ECG.

- **Sensitivity:**

0,1–200  $\mu\text{V}/\text{mm}$  (21 stages) for EEG and EP;

0,02–5  $\text{mV}/\text{mm}$  (8 stages) for super-slow potentials;

5–500  $\mu\Omega/\text{mm}$  (7 stages) for volume REG

(for modifications 08 and 10);

0,1–10  $\Omega/\text{mm}$  (7 stages) for differential REG

(for modifications 08 and 10);

0,1–200  $\mu\text{V}/\text{mm}$  (13 stages) for polygraphic channels  
(for modifications 10 and 11).

- **22-bit AD converter, ADSP processor.**

- **Low-pass filter (LPF):** 5–70 Hz;

- **High-pass filter (HPF):** 0,016–16 Hz;

- **Ultra-low noise level:** 0,9  $\mu\text{V}$ ;

- **Common-mode rejection ratio:** > 125 dB;

- **Rejection filter:** 50–60 Hz;

- **Integrated calibration:** square (1 Hz) or harmonical (5 Hz) signal 5–4000  $\mu\text{V}$ ;

- **Photo- and phonostimulation control;**

- **PC communications:** USB

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v28-03-2022