Materials of Conferences

PROSPECTS OF APPLICATION OF NANOELECTRODE EQUIPMENT ON THE BASIS OF POROUS CERAMICS

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Preservation of nation's health where there's multifactor environment influence, worsening ecology, usage of new-generation medications and methods of treatment (nanotechnology, cell-technology) demands development of new approaches and safe methods of profound examination of human body, allowing examining repeatedly and during long time for dynamic monitoring.

It is known that biopotentials (constant, slow-changing, high frequent) reflect metabolic processes in cells, organs, tissues and organism systems of a human. Electric phenomena which are called biopotentials appear in the process of exchange between different biological structures.

Getting positive information about biopotentials depends first of all on the quality of medical electrodes [1].

Medical nanoelectrodes are most perspective for research of bioelectric activity of different organs and tissues. We developed the nanoelectrodes as part of the Russian Foundation for Basic Research project №08-08-99069 "Development of scientific basis of low-noise high-resistant nonpolarizable transition "electronic-ionic conduction" on the basis of porous ceramics" [2].

The main advantages of nanoelectrodes:

1. High stability of electrode potential — 0,001 uV/sec
2. Low resistance - ≤100 Ohm.
3. Almost do not polarize with currents ≤0,5 μмA.
4. Have low contact potentials in transition "electrode-electrolyte- skin" with and without current.
5. The variety of difference of electrode potentials is deciles of mV; internal noises within frequency range 0–1000Hz do not exceed tens of uV.

High metrological characteristics of the developed nanoelectrodes will allow measuring biopotentials, starting from direct current, with and without direct current influence aiming to research polarization properties of biological tissues.

At present time constructions of nanoelectrodes for heart, brain, muscles, eyes and skin examination, both for static and dynamic examinations, are developed.

Multifunctional equipment on the basis of application of medical nanoelectrodes with high resolving power and expanded frequency interval (0-10000) Hz for heart, brain, muscle, eyes and skin examination is being developed.

Application of medical nanoelectrodes will allow deepening knowledge about principles of different organs and tissues functioning, create fundamental basis of people's health preservation, prolonging active period of man's life and securing his professional longevity.

References

1. **State standard 25995-83. Electrodes for picking-up bioelectric potentials: General technical requirements and testing methods**. – USSR State Committee for Standards, 1984.
2. Avdeeva D.K., Vylegzhanin O.N., Grekhov I.S., Kazakov V.Y., Kim V.L., Klubovich I.A., Rybalka S.A., Sadovnikov Y.G., YukhinY.M. **Experimental results of electric activity of "electronic-ionic conduction" junction** // *European journal of natural history,* №2, 2009, ISSN 2073-4972, p.98

The work is presented for an International Science Conference "Nature management and protection of the environment", France (Paris), October 13-20, 2009. Received by the editorship on 23.09.2009.