
INVESTIGATING THE CHARACTERISTICS OF COAXIAL NEEDLE ELECTRODES FOR VENIPUNCTURE CONTROL BY ELECTRO-IMPEDANCE METHOD

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Abstract

The study tested coaxial needle electrodes to select the optimal design of the electrode system. We developed models of inhomogeneous media simulating a blood vessel and surrounding soft tissues, as well as models of coaxial needle electrodes. Moreover, we did an experiment to evaluate the influence of the geometric parameters of needle electrodes on their characteristics. Finally, we carried out a model study of needle electrodes in various versions for the evaluation of their characteristics

Keywords

Bioimpedance, puncture, needle electrode, coaxial needle, electrode system

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References

- [1] Grimnes S., Martinsen O.G. Bioimpedance and bioelectricity basics. Oxford, Academic Press, 2008. 488 p.
- [2] Kudashov I.A., Shchukin S.I., Belaya O.V., Perov S.Yu., Petrov V.I. The features of the controlling venipuncture electrical impedance method. *Biomeditsinskaya radioelektronika* [Biomedical Radioelectronics], 2015, no. 7, pp. 15–19 (in Russ.).
- [3] Trebbels D., Fellhauer F., Jugl M., Haimerl G., Min M., Zengerle R. Online Tissue Discrimination for Transcutaneous Needle Guidance Applications Using Broadband Impedance Spectroscopy. *IEEE Transactions on Biomedical Engineering*, 2012, vol. 59, iss. 2, article no. 6072257, pp. 494–503.
- [4] Kudashov I.A. Biotekhnicheskaya sistema kontrolya venepunktzii na osnove izmereniy elektricheskogo impedansa. Diss. kand. tekhn. nauk [Biotechnical control system of venipuncture, on the basis of measurements of electrical impedance. Cand. tech. sci. diss.], Moscow, Bauman MSTU Publ., 2016. 125 p. (in Russ.).
- [5] Shchukin C.I. Osnovy vzaimodeystviya fizicheskikh poley s bioob"ektami [Bases of interaction of physical fields with biological objects]. Moscow, Bauman MSTU Publ., 2002. 66 p. (in Russ.).
- [6] Dielectric Properties of Body Tissues. Niremf: website.
URL: <http://niremf.ifac.cnr.it/tissprop/htmlclie/htmlclie.php> (accessed 06.06.2016).

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