A novel passive method for the assessment of skin-electrode contact impedance in intraoperative neurophysiological monitoring systems

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Abstract-

Intraoperative Neurophysiological Monitoring is a set of monitoring techniques consisting of reading electrical activity generated by the nervous system structures during surgeries. In order to guarantee signal quality, contact impedance between the sensing electrodes and the patient’s skin needs to be as low as possible. Hence, monitoring this impedance while signals are measured is an important feature of current medical devices. The most commonly used technique involves injection of a known current and measurement of the voltage drop in the contact interface. This method poses several problems, such as power consumption (critical in battery-powered systems), frequency dependency and regulation issues, which are overcome by using a passive method. The fundamentals of the method proposed in this paper are based on the utilization of the variation suffered by the input amplifier (LNA) of the analog front-end of the acquisition system. Controlling the connection of the resistors and computing the root mean square of the LNA output voltage has been proved to be a useful tool to assess that the contact impedance is suitably low, allowing the user to know if the neural measurements obtained are valid.

Index Terms- passive, contact impedance, intraoperative, electrodes

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