Bioimpedance-Based System for Cancer Diagnosis: Current Advances and Future Perspectives

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Bioimpedance-based systems have emerged as promising tools for cancer diagnosis, offering non-invasive and real-time measurements of tissue properties. This tutorial provides an overview of the principles underlying bioimpedance-based cancer diagnosis and highlights recent advances in this field. The electrical impedance of tissues is influenced by factors such as cellular density, structure, and vascularization, which are often altered in cancerous tissues. By measuring the impedance of tissues using low-level electrical currents, bioimpedance-based systems can potentially differentiate between healthy and cancerous tissues. This tutorial discusses the challenges associated with developing accurate and reliable bioimpedance-based cancer diagnosis systems, including the need to distinguish between cancerous and non-cancerous abnormalities and standardize measurement techniques. Furthermore, it emphasizes the importance of clinical validation studies to assess the effectiveness of bioimpedance-based systems in various cancer types and stages. Overall, bioimpedance-based systems hold promise for improving cancer diagnosis by offering non-invasive, cost-effective, and real-time measurements. However, further research and development are necessary to optimize the accuracy and reliability of these systems for clinical use.