Abreu D.S. Bioimpedance and chronoamperometry as an adjunct to prostate-specific antigen screening for prostate cancer. Cancer Management and Research 2011:3 109–116

http://www.ncbi.nlm.nih.gov/pubmed/21629833

Abstract

Background:
Bioimpedance is an electrical property of living tissue that has been shown to be a safe technique when used in a number of biomedical applications. The aim of this research was to assess the utility of bioimpedance measurement as a rapid, cost-effective, and non invasive adjunct to digital rectal examination and PSA in differentiating tumor from normal prostatic tissue.

Methods:
Three hundred men were examined for signs and symptoms of prostate disorders. 147 patients with a digital rectal examination indicating a positive result underwent a prostate-specific antigen (PSA) test. A biopsy was advised for 103 of the men, of whom 50 completed the study. Before undergoing biopsy, an examination with the EIS (electro interstitial scan) system using bioimpedance and chronoamperometry was performed. In reference to the biopsy results (negative or positive), a statistical analysis of the EIS data and PSA was conducted using receiver operating characteristic curves to determine the specificity and sensitivity of each test.

Results:
The PSA test had a sensitivity of 73.9% and specificity of 51.9% using a cutoff value > 4 and a sensitivity of 52.2% and specificity of 81.5% using a cutoff value ≥ 5.7 and $P = 0.03$. The delta of the electrical conductivity (DE) of the left foot-right foot pathway had a sensitivity of 62.5% and specificity of 85.2%, with a cutoff value ≤ -5 and $P = 0.0001$. Algorithms comprising the delta of electrical conductivity and PSA showed a sensitivity of 91.5% and a specificity of 59.3%, with a cutoff value ≤ -10.52 and $P = 0.0003$.

Conclusion:
The EIS system had a very good specificity of 85.2%. However, the sensitivity of 62.5% would be a problem. Using a PSA reference > 4.1 ng/mL, the adjunctive use of bioimpedance and chronoamperometry provided by EIS technology could raise the sensitivity from 73.9% to 91.5% and the specificity from 51.9% to 59.3% in prostate cancer screening.