

Comparison of bio-impedance spectroscopy and multi-frequency bio-impedance analysis for the assessment of extracellular and total body water in surgical patients.

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1. Measurements of extracellular and total body water provide useful information on the nutritional status of surgical patients and may be estimated from whole-body bio-impedance measurements at different frequencies.
2. Resistance and reactance were measured at 50 frequencies from 5kHz to 1MHz in 29 surgical patients (17 males, 12 females) with a wide range of extracellular to total body water ratios.
3. A fit to the spectrum of reactance versus resistance data gave predicted resistances at frequencies zero and infinity. Values of extracellular and total body water determined by this bio-impedance spectroscopy technique were regressed against values obtained from radioisotope dilution. The standard errors of the estimate were 1.8931 and 3.2591 respectively.
4. Resistance indices ($\text{height}^2/\text{resistance}$) at selected frequencies gave the highest correlations with extracellular and total body water at 5kHz and 200kHz respectively, and prediction equations derived from multiple stepwise regressions also showed these to be the optimum frequencies. The standard errors of the estimate for this multi-frequency bio-impedance analysis method were 1.9371 and 2.6061 for extracellular and total body water respectively.
5. To assess the ability of the two methods to measure changes in extracellular and total body water, reproducibility was assessed from repeat measurements 10 min apart in a subgroup of 15 patients. Bio-impedance spectroscopy gave mean coefficients of variation for extracellular and total body water of 0.9% and 3.0% respectively. For multi-frequency bio-impedance analysis the corresponding coefficients of variation were 0.9% and 0.6%.
6. It is concluded that a simple impedance analyser operating at only two frequencies compares favourably with the more complex spectroscopy technique for the determination of extracellular and total body water in surgical patients.