

# Safety and Results of Bioelectrical Impedance Analysis in Patients with Cardiac Implantable Electronic Devices

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DOI: 10.21470/1678-9741-2019-0098

## Abstract

**Objective:** To analyze the dual interference between cardiac implantable electronic devices (CIEDs) and bioelectrical impedance analysis (BIA).

**Methods:** Forty-three individuals admitted for CIEDs implantation were submitted to a tetrapolar BIA with an alternating current at 800 microA and 50 kHz frequency before and after the devices' implantation. During BIA assessment, continuous telemetry was maintained between the device programmer and the CIEDs in order to look for evidence of possible electric interference in the intracavitary signal of the device.

**Results:** BIA in patients with CIEDs was safe and not associated with any device malfunction or electrical interference in the intracardiac electrogram of any electrode. After the implantation of the devices, there were significant reductions in BIA measurements

of resistance, reactance, and measurements adjusted for height resistance and reactance, reflecting an increase (+ 1 kg;  $P < 0.05$ ) in results of total body water and extracellular water in liter and, consequently, increases in fat-free mass (FFM) and extracellular mass in kg. Because of changes in the hydration status and FFM values, without changes in weight, fat mass was significantly lower (-1.2 kg;  $P < 0.05$ ).

**Conclusion:** BIA assessment in patients with CIEDs was safe and not associated with any device malfunction. The differences in BIA parameters might have occurred because of modifications on the patients' body composition, associated to their hydration status, and not to the CIEDs.

**Keywords:** Electric Impedance. Body Water. Electrophysiologic Techniques, Cardiac. Body Composition. Electricity. Electrodes. Telemetry.

## Abbreviations, acronyms & symbols

BIA	= Bioelectrical impedance analysis	ICD	= Implantable cardioverter defibrillator
BCM	= Body cell mass	ICW	= Intracellular water
BMI	= Body mass index	NYHA	= New York Heart Association
CIEDs	= Cardiac implantable electronic devices	PA	= Phase angle
CRT	= Cardiac resynchronization therapy	PM	= Pacemaker
CRT-D	= Cardiac resynchronization therapy defibrillator	R	= Resistance
DBP	= Diastolic blood pressure	RVI	= Right ventricle impedance
DM	= Diabetes mellitus	RVT	= Right ventricle threshold
ECM	= Extracellular mass	SAH	= Systemic arterial hypertension
ECW	= Extracellular water	SBP	= Systolic blood pressure
FFM	= Fat-free mass	SD	= Standard deviation
FM	= Fat mass	SPSS	= Statistical Package for the Social Sciences
H	= Height	TBW	= Total body water
HF	= Heart failure	Xc	= Reactance

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Article received on March 8<sup>th</sup>, 2019.

Article accepted on April 24<sup>th</sup>, 2019.