

## **Impedance Cardiography:**

### **new algorithms relaunch an old technique**

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Since the Nineties, when new algorithms were used to analyse the impedance signal (1, 2), impedance cardiography (ICG) has become widely accepted, above all for clarifying the genesis of dyspnoea in emergency departments (ED) and in guiding the treatment of patients with chronic heart failure (CHF). Rapid and reliable information on cardiac output (CO), systemic vascular resistance (SVR), and the efficiency of the systolic and diastolic function can already be obtained non-invasively using echocardiography. However, echocardiography is not always readily available in the ED and it unquestionably involves high costs if used on an outpatient basis in cases of CHF in order to guide their treatment.

ICG can provide all of the above information non-invasively, without the need for specialised personnel and at low cost. Consequently, it can be proposed for use in the ED and for periodic check-ups of patients with CHF.

The author describes the results of a personal study that compares the CO values obtained with ICG and with thermodilution (TD) in critical patients admitted to intensive care for various reasons (3). The study demonstrates that the correlation between ICG and TD is very good in the medium and low outputs, whereas it deteriorates in high outputs. According to this study, CO measured with IGC must thus be viewed suspiciously in cases such as septic patients and liver transplant recipients, in whom high outputs are frequent.

The author then describes the use of ICG to diagnose dyspnoea in the ED, examining parameters that permit evaluation of the systolic function of the heart: Pre-Ejection Period (PE), Ejection Time (ET), PEP/ET, Acceleration Index (ACI) and estimated Ejection Fraction (EF). Diastolic function plays an extremely important role in the genesis of cardiogenic dyspnoea. ICG also makes it possible to keep an eye on diastolic function through continuous monitoring of isovolumic relaxation time (IVRT) and isotonic relaxation time (ITRT). The article also emphasises the fact that, other than echocardiography, ICG is the only non-invasive procedure that makes it possible to

study the beat-to-beat diastolic function. The article describes several clinical cases in which the use of ICG permitted more precise diagnosis and treatment.

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