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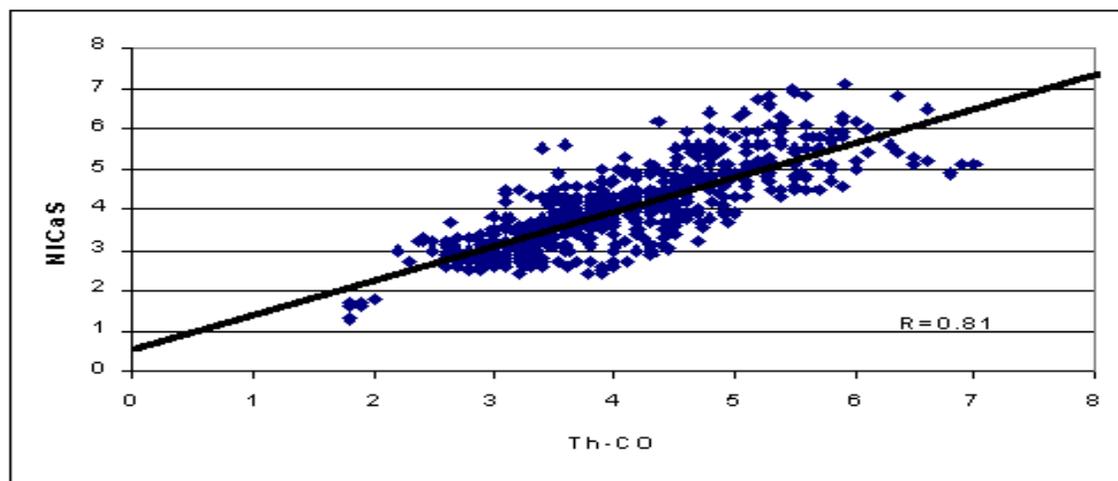
### **Whole-Body Electrical Bio-Impedance is accurate in Non Invasive Determination of Cardiac Output: A Thermodilution controlled, Prospective, Double Blind Evaluation.**

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**Background:** The NICaS<sup>TM</sup> is a novel non-invasive apparatus based on whole body electrical bio-impedance for simple non-invasive continuous CO determination.

**Patients and Methods:** Patients were recruited while randomized in a study evaluating the efficacy of Tezosentan (a ET-A/B endothelin antagonist) in patients admitted due to acute heart failure (CHF). Patients were randomized after having been hospitalized due to acute heart failure with dyspnea at rest, CI < 2.5 L/min/m<sup>2</sup> and PCWP ≥ 20 mmHg. *Study Protocol:* At baseline and during treatment with study drug at the pre-specified time points of 0.5, 1, 2, 3, 4 and 6 hours from randomization CO was determined by both thermodilution and the NICaS<sup>TM</sup> 2001 apparatus. At each time point CO was determined by thermodilution and NICaS<sup>TM</sup> 2001 apparatus by a two independent, blinded operators.

**Results:** Out of 130 patients enrolled, in 93 CO was measured simultaneously by both methods at all the pre-determined time points. The overall Correlation between the two methods was R=0.81 (Figure). Precision and bias were 0.01±0.6 L/min. There was a difference between the two methods in cardiac output readings. When Mean CI (of both methods) was < 2 L/min/M<sup>2</sup> CO readings were statistically significantly lower by NICaS while when CI was >3 L/min/M<sup>2</sup>, CO readings were statistically significantly higher by NICaS. We have calculated the cardiac power index (Cpi=CI\* mean arterial pressure), and found that low Cpi (indicating reduced myocardial contractile reserve) was related to higher recurrent CHF. However, Cpi based on NICaS CI measurement (NICaS Cpi) was a better predictor of recurrent CHF then thermodilution Cpi (Th Cpi), due to less accurate prediction in patients with high Cpi.



**Conclusions:** NICaS is a novel accurate non-invasive method for CO determination. The results of the present study suggest that NICaS might be more accurate than thermodilution for CO determination due to the tendency of thermodilution to under estimate CO when high and over estimate it when low.