

Preliminary results for use of Illness Marker in heart failure patients.

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Introduction

- Heart failure is characterized by fluid disturbances. Changes in volume in the clinical practice are evaluated with fluid balance and weight measurements, but these do not reflect compartmental changes.
- Integrity of the cells can be characterized by the ratio of **measured** impedance values at 200 kHz and 5 kHz → **Illness Marker** (IM)
- Tracking IM over time → can be used as **fluid distribution indicator**
- Multifrequency bioimpedance analysis may provide insight into the compartmental changes
- Multifrequency bioimpedance can be used in altered fluid distribution
- AIMS**: to describe the body composition of heart failure patients
to explore the potential clinical role of IM in heart failure

Methods

- Randomly selected in-patients, who gave informed consent
- Body weight and height measured
- Heart echocardiography done by experts
- Bioimpedance measurements done with Bodystat Quadscan 4000

Characteristics of patient population

	Whole population (n=35)	NYHA I.-II. (n=21)	NYHA III.-IV. (n=14)	significance
Age (years)	63.8±12.1	65.0±8.5	63.2 ±14.3	NS
Weight (kg)	87.1±20.1	94.7±18.4	82.0 ±20.6	p<0.07
BMI	30.2±5.1	32.8±3.7	28.0±5.3	p<0.01
Fat (kg) [%]	29.3±10.6 [33.6±10.1]	37.0±4.4 [40.0±6.5]	24.1±10.4 [29.3±9.9]	p<0.0001 p<0.001
TBW (%)	51.7±7.9	46.1±3.9	56.1±7.3	p<0.0001
ECW (%)	23.4±3.4	20.7±0.9	25.1 ±3.3	p<0.0001
ICW (%)	27.7±2.9	26.1±2.4	28.8 ±2.7	p<0.006
ECW/ICW	0.84±0.09	0.80±0.06	0.87±0.09	p<0.01
3rd space volume (l)	0.5±1.9	-0.63±0.99	1.37±1.96	p=0.0003
IM	0.839±0.04	0.813±0.03	0.857±0.03	p=0.001
BMR (kcal/kg)	20.1±2.8	18.2±1.0	21.4±2.9	p=0.0002

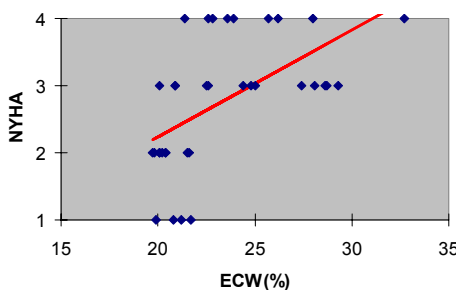
Abbreviations

TBW: total body water; ECW: extra-cellular water; ICW: intra-cellular water; BMI: body mass index; BMR: basal metabolic rate; NYHA: New York Heart Association scale

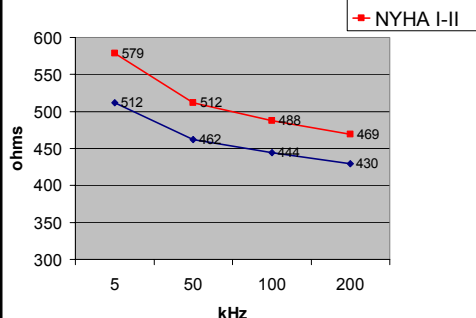
Results

- 35 patients were studied. Gender distribution: 57.1% men, 42.9% women, no significant difference according to functional status.
- Presence of **Diabetes mellitus: 31.4%**, hypertension 57.1%. **No significant difference** according to functional status (NYHA).
- Mean systolic function (EF) of the heart: 37%±13%
- Strong, significant correlation (**r=0.51**; p=0.002) between **ECW/ICW and IM**. Strong, significant correlation (r=0.56; p=0.0005) between ECW and heart functional status. Strong, significant correlation (r=0.56; p<0.001) between ICW and functional status.
- Alterations in ECW and ICW** compared to the normal values correlate **strongly, negatively with functional status** (r=0.55; p<0.005 and r=0.53; p<0.001, respectively)
- Strong and significant correlation (r=0.59; p<0.001) between BMR and heart functional status.
- Significant difference (p=0.02) in the difference between 5 and 200 kHz impedances between the NYHA I-II and NYHA III-IV functional classes.
- Significant correlation (r=0.49; p=0.003) between 3rd space volume and heart functional status.

Correlation between ECW and heart functional status (r=0.56; p=0.0005)



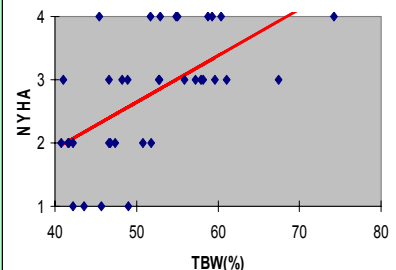
Impedance data according to functional status



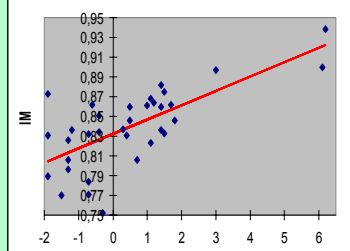
Conclusions

- Patient population is obese.
- Bioimpedance measurements can distinguish between high fat content of the body and/or fluid overload.
- Significant differences are present according to the functional status in body water spaces and Illness Marker.
- There is a trend in the measured impedance data towards lower values in more severe cases. The significant difference detected in the difference between the measured impedance values reflects the clinical situation.
- Illness Marker** and BIA **can be used to track changes** occurring during the course of the disease.
- The correlations between the body water spaces and IM and functional class show the **potential clinical role** of IM.

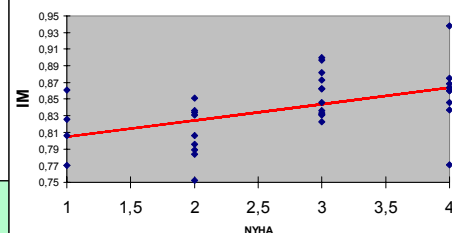
Correlation between TBW and heart functional status (r=0.60; p=0.0001)



Correlation between 3rd space volume and IM (r=0.70; p<0.0001)



Correlation between the heart functional status and IM (r=0.48; p=0.004)



Key reference

- Castillo Martínez L et al. Bioelectrical impedance and strength measurements in patients with heart failure: comparison with functional class. Nutrition 2007; 23(5):412-8.

Acknowledgements

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