

BIOELECTRICAL IMPEDANCE ANALYSIS OF PATIENTS WITH SCLERODERMA AS AN INDICATOR OF SEVERITY AND ACTIVITY OF THE DISEASE.

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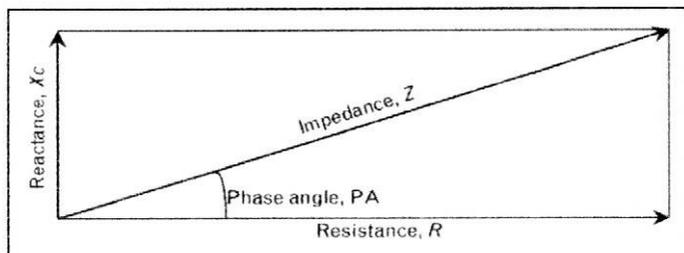
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Introduction – A lot of effort has been made in order to differentiate activity in scleroderma (passible of therapeutic intervention) from accumulated damage. This differentiation is very relevant when it comes to performing therapeutic interventions. (1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11).

The analysis of body composition through Bioelectrical Impedance Analysis (BIA), came up as a diagnostic method that allows us, through the flow of imperceptible electrical current, and numerous equations, to determine the composition of the body. Fat and bone tissue are poor conductors and have great resistance; lean tissue and hydroelectrolite solutions are the best conductors. Fibrous tissue and collagen would have an intermediate resistance, and although it isn't contemplated in BIA equipment, their progressive increase as occurs in scleroderma, might manifest in some way in the equipment measurements.

The relation between resistance (opposition to the flow of current) and reactance (capacity to absorb electric energy) determines the Phase Angle (PA), which has proven to have diagnostic and prognostic value in various diseases. It is considered one of the best indicators of cell membrane function and has been mentioned in numerous studies as a global indicator of health (12)(13)(14). The PA can also be interpreted as a nutritional indicator. (15).



Graphic representation of impedance and phase angle(16)

The idea that the PA is an indicator of health is supported in numerous studies. One of the first showed that the PA decreased in septic patients that died, whereas in survivors it increased. In patients that had recently received a liver or kidney transplant, BIA was useful to differentiate bad transplants from borderline or good transplants. Bad transplants showed a lower PA (16).

In patients infected with the HIV the PA figures were considered as the best predictor of life expectancy, even better than the CD4 recount and other clinical parameters. (17).

The evolution of the PA has been considered in cancer patients, a prognostic indicator. A direct association was found between PA and mortality in patients with lung, colorectal and pancreas cancer. (18)(19)(20) (21).

The range of normality of the PA varies according to gender, age and race. It is considered to be normal between 5 and 5.5°. It may range from 2 to 12°

This analysis generates interest in patients with scleroderma, as the progressive fibrosis of tissues that characterises it, should be reflected in the analysis.

Objectives – To describe seriated BIA and PA in 2 patients with diffuse Scleroderma.

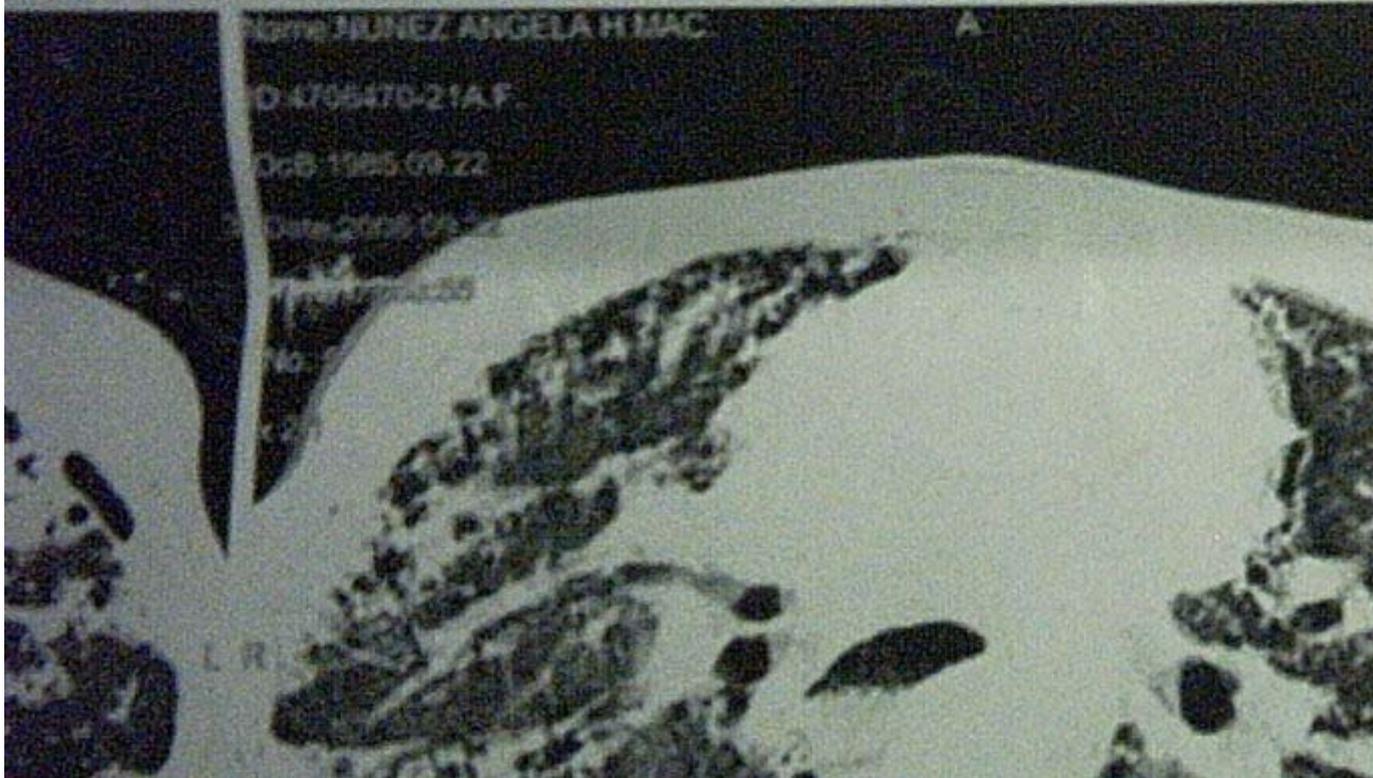
Patients and Method - Seriated BIA was carried out in 2 patients with severe diffuse Scleroderma for eight months. Both presented a Terminal Illness according to Medger's Severity Scale, one because of interstitial lung disease that required oxygen (AN), and the other because of a digestive compromise that required nutritional support, and finally, heart failure (AG). Both died. We took 5 and 3 measurements respectively. To perform the BIA we used BODYSTAT Quadscan 4000 & Multiscan 5000 equipment.





AG 32 years old





AN 21 years old

Results – Both patients showed a progressive increase of what the device interprets as body fat (poor conductive tissue), from 18.4% to 21.2% for the first patient and from 23.3% to 24.6% for the second, having registered weight loss in both.

Consequently, a progressive increase in the Resistance to the flow of current and a decrease in the Reactance (useful tissues) occurred, which lead to a dramatic fall in the Phase Angle, which varied in the first from 3.9 to 2 (days before death), and from 3.4 to 3.1 in the second (for this one, months before death).

Registry of data obtained by Bioimpedance Analysis in two patients with severe diffuse Sclerodermia

Patient	Date	Height	Weight	B	Fat %	Fat Kg	ECW %	Imp 50 Khz	R	Xc	AF
A. G.	15/10/06	1,57m	42,1 kg	1 ^a	22,3 n	9,4 b	29,9 a	690	687	41,35	3,4
30 a	23/03/07		42,1 kg	2 ^a	24,2 n	10,2 b	29,2 a	737	730	33,14	2,6
	03/05/07		41,4 kg	3 ^a	24,6 n	10,2 b	29,5 a	739	733	39,3	3,1
Demise	10/07										
A. N.	18/09/06	1,61m	36,4 kg	1 ^a	18,4 b	6,7 b	32,1 a	776	773	53,28	3,9
21a	3/10/06		34,6 kg	2 ^a	21,4 n	7,4 b	32,4 a	840			
	14/10/06		34,6 kg	3 ^a	22,3 n	7,7 b	32,4 a	859	855	43,81	2,9
	7/11/06		35,8kg	4 ^a	21,2 n	7,6 b	31,8 a	835	832	36,69	2,5
	5/03/07		33,6 kg	5 ^a	15,8 b	5,3 b	36 a	731	712	24,3	2
Demise	10/3/07										

n= normal b=bajo a= alto

Discussion – The figures found by BIA of poor conductive tissue increase, that the device interpreted as an increase of fatty mass (poor conductor), isn't the organism's behaviour against malnutrition. The patients were malnourished as shows their low body mass index and it worsened as time went on. In the first patient there was an increase of lung fibrosis and probably of other tissues as well, which lead to death in respiratory failure. In the second patient the increase of fibrous tissue was manifested ostensibly through a refractory restrictive heart failure that also lead to death.

The increase of Resistance, and the decrease of Reactance and Phase Angle can be correlated to the severity of the disease and they seem to be sensitive markers of its progression (activity markers). More studies are required to confirm this hypothesis.

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