New clinical standard guidelines for stabilometry parameters:

differences by gender and age.

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INTRODUCTION

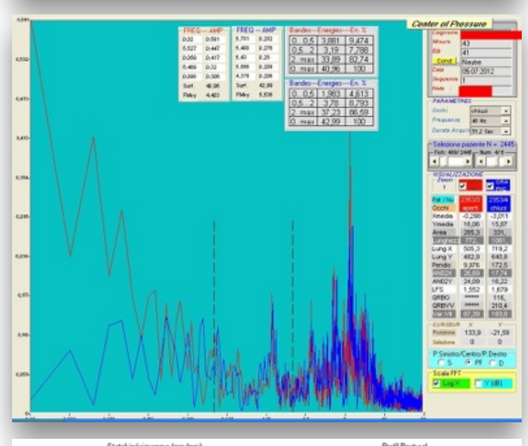
Stabilometry is an electronic system device that measures and studies the movements of a person in a standing position, to lead it back to stability (anti-fall). In 1985, the Association Française de Posturologie - AFP published the rules for some postural parameters obtained from a standardized platform (Normes 85-AFP, 1986). Whereas before, with the rules AFP 85, the detection of the postural parameters was performed in the laboratory, inside a cabin, isolating the person from the surrounding environment, starting from our work, the measurements are performed in a clinical setting rather than in a research lab, in a cohort of patients, rather than in volunteers, and conducted in an open environment (open field), always following the same criteria (normal brightness, absence of visual or auditory stimuli, positioning of the feet at 30 degrees, on a new platform that allows the 40 Hz registration, with feet apart, and separated forefoot from the heel, in static mode, open/closed eyes, during 51.2 sec). In this study all postural parameters were recorded in enrolled subjects divided by gender and and age in order to get new clinical guidelines for all stabilometric parameters and then very significant values of statistacal normality . Postural parameters allow us to diagnose the causes of postural imbalance. All stabilometric measurements were carried out by the same M.D. in static condition ,in the same clinical environmental conditions, observing criteria of inclusion and exclusion, in 3972 subjects aged from 5 to 87, both with open and closed eyes using the Cyber Sabots equipment (standardized platform with separated feet and detections for forefoot and rearfoot with a sampling frequency of 40 Hz). The results were subjected to independent statistical analysis at ILEPS University, to have objectivity and methodological rigor , grouping subjects by gender and age.

THE AIM

New standard rules of measurement in stabilometry. Sensitivity and specificity by age and sex.

METHODS AND MATERIALS

The subjects have been measured by the same operator in a transparent box, not to be under stress. 3972 subjects were selected and measured with open eyes and 2737 subjects were selected and measured with closed eyes, aged between 5 and 87 years; they have been measured in static balance for 51,2 sec. Particularly 2251 females and 1721 males, with a mean age of 34,2 years + 17,9 years. Each subject was looking straight ahead at a optical target approximately 2 meters away (at least twice the distance of the center of body mass from the ground). The recordings are made with open and closed eyes. This big and long work has been conducted for a new normalization of the measurement system. For each parameter a statistical analysis was conducted to calculate statistical error (risk of 1 species) and the stardard deviation that allowed us to improve the sample. On the sample we calculated the risk of second species, the average and the other indexes.



RESULTS

Starting from the analysis of variance with 1 factor (age) we tried in all the recordings all postural stabilometric parameters. In this study we present only some information that is valid both for open and closed eyes in almost all the parameters except ANO2 X, the frequency of Z, the inclination and the Romberg that are not statistically correlated with age.

CONCLUSIONS

We found a clear evolution of postural stabilometric parameters such as the area and length (historical and classic parameters) and the change of variation velocity (which can not be changed with the voluntary control and therefore it is statistically more reliable), with an improvement of the control according to the age, that tends to stabilize at about 30 – 40 years.

This demonstrates that the evolution of nervous system supervising postural control does not end with adolescence nor it is stable and unchanging but it continues its evolution with a regression of parameter values that recurs towards the 60-70 years. Young females stabilize at about 30 years earlier than males who delay up to about 40 years. Tonic postural system of males is less stable than the females' with regard of some components. Perhaps the subsequent regression of the females could be correlated with menopause. Another interesting result is the load distribution between forefoot and heel, which is here presented for the first time because until now the measurement systems that used the force platform with a single detection surface did not allow such distinction. Thus a different strategy of gender and regression according to age emerges: on average females have a higher load on the heels which is clinically accompanied by an anterior scapular plane; in the progression of life the load tends forward until an anterior load in the third stage of life. On avarage males have a higher load on the forefoot that is clinicaly accompanied by a lower lumbar lordosis and a scapular plane that is aligned before and then it tends to kiphosis; the load gradually recedes until it becomes posterior in the third stage of life, accompanying with a loss of lumbar lordosis, a progression of kyphosis and posterior scapular plane .

Bibliography

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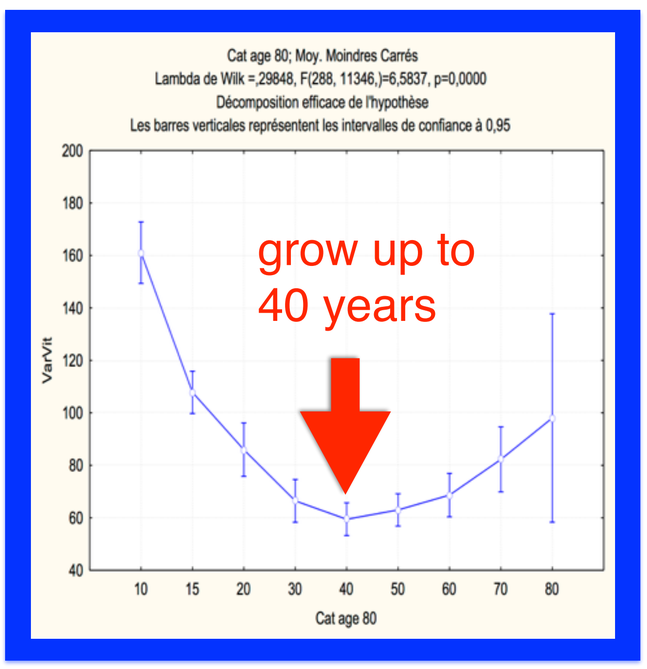
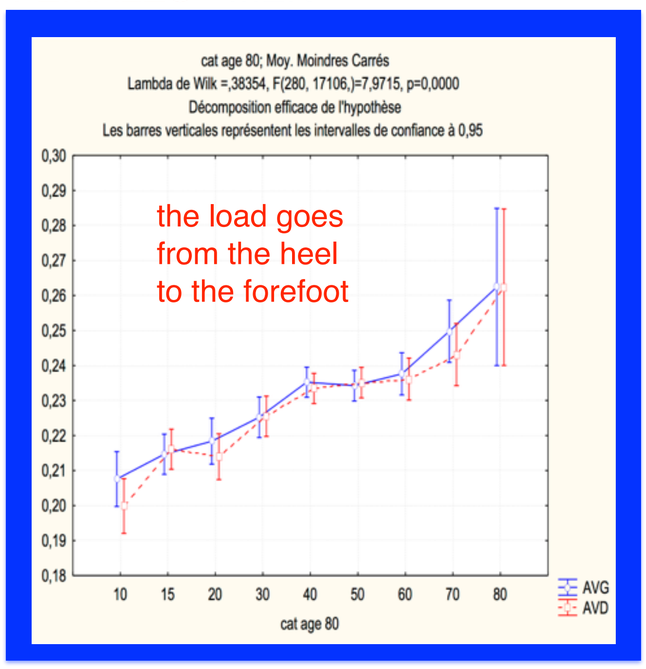
2) Rossato M., Bourgeois P., Ouaknine M. (2013). Stabilometry Standard Guidelines 2011-2013 during Clinical Practice. Marrapese Editore, Roma.

area - FEMALES

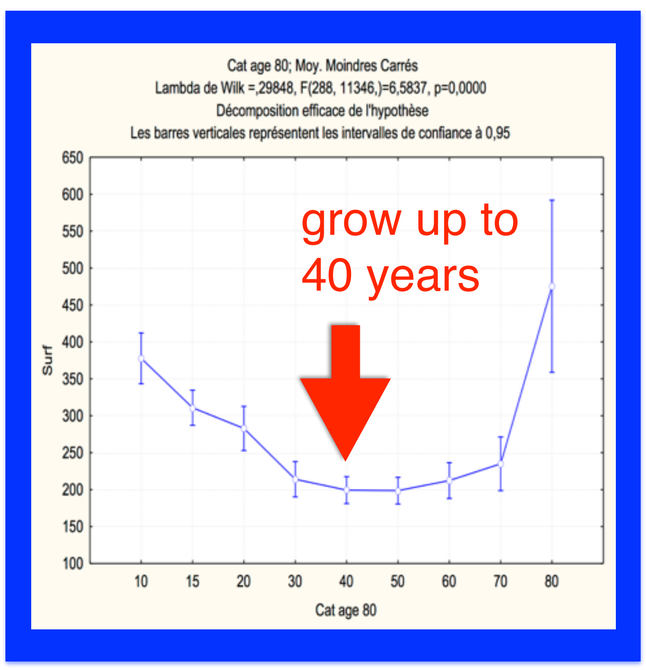
variation velocity - FEMALES



forefoot load distribution
FEMALES - MEN



area - MEN



variation velocity - MEN

hell load distribution
MEN - FEMALES