Stabilogram

Premise

An oscillation is the periodic variation, usually over time, of an amount such as, for example, the position of a pendulum at rest that is hit. The term vibration is sometimes used as a synonym for oscillation. Physicists and electronics use the term vibration to mean a non-harmonic oscillation. Oscillations occur not only in physical systems, but also in biological and social ones.
The period is a physical quantity relative to the waves (for example of motions and field) defined as the time interval corresponding to the wavelength. It is generally indicated with T and is measured in the international system in seconds (s). It represents the time in which the wave completes a complete oscillation and returns to the initial condition. The definition of speed can be used to link wavelength and period to the wave propagation speed. The period is the inverse magnitude of the frequency $T = 1 / f$. The wavelength of a periodic wave is the distance between two crests or between two bellies of its waveform, it is commonly indicated by the Greek letter lambda λ.

In physics, the frequency of a phenomenon represents a trend consisting of events that repeat identical or almost identical over time, is given by the number of events that are repeated in a given unit of time; moreover, angular velocity is part of the general concept of velocity (variation of a quantity), in this case it expresses the variation of an angle over time. One way to calculate such a frequency is to set a time interval, to count the number of occurrences of the event that repeats in that time interval and then to divide the result of this count by the amplitude of the time interval. . Alternatively, you can measure the time interval between the initial instants of two successive events (the period) and then calculate the frequency as the inverse quantity of this duration $f = 1 / T$.

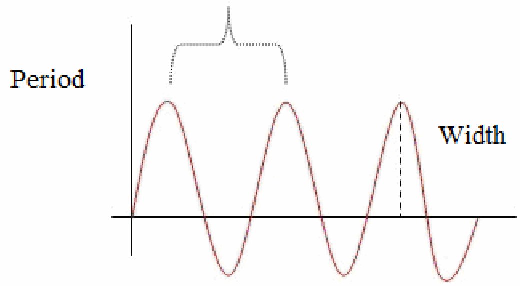

Fig.1

In posturography, the oscillations that are recorded by the various applications come from continuous changes in direction in space according to the sagittal and frontal axes, but they are non-harmonic, irregular oscillations, which depend on being posture as a complex non-linear system. The collected posturographic signal must be treated in the frequency domain according to Prieto's analysis through 95% or 50% confidence intervals. The graphic differences are well highlighted in fig. 2 compared to figure 1.

Fig.2 Stabilogram: note the irregularity, the fragmentation of the graph, due to the non-harmonic oscillation

The stabilogram is the graph of the postural oscillations that can be recorded in the sagittal (antero-posterior, AP, Y axis) and frontal (medium-lateral, ML, X) planes with respect to the time or duration of the examination.
It must be analyzed for its location, trend and appearance.
The following characteristics are to be considered:

Departure and arrival index or I P / A: at which altitude it leaves and at what altitude it arrives. Must be equal (=) to 0 or less (<) to -2-3 or higher (>) by + 2 + 3 mm at most v. Fig. 3
The trend of the oscillation line which must be as similar as possible to an isoelectric, and not similar to sinusoidal see fig. 4
Its morphology must not show excessive jagging or too many spikes over 5 mm v. fig.5

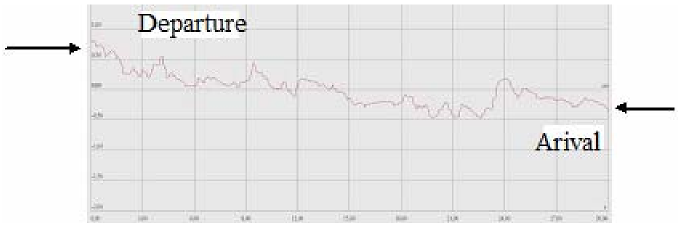

Fig.3

Fig. 4 Stabilogram trend: sinusoidal-like (black arrow) Red line: isoelectric

Fig. 5 Stabilogram aspect: spike

Normal and pathological stabilogram

Under conditions of static equilibrium, the stabilographic signal of the sagittal-frontal oscillations graphically determines a slightly jagged oscillation line which can be defined as isoelectric-like. Its pattern must resemble a sinusoidal-like line see fig. 6

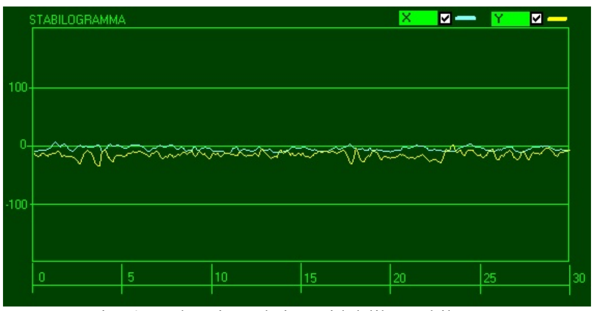

Fig. 6 Isoelectric and sinusoidal-like stabilogram

The start-finish index must be equal to zero, or lower than -2-3 or higher than + 2 + 3 mm at most.
The oscillation amplitude from the baseline must be equal and not greater both in the anteroposterior and in the mid-lateral to 11 millimeters.
According to Gagey, the oscillations of the human body in an upright position take place on the sagittal-frontal plane such as an inverted pendulum and according to a cone of about 2 °, within an area that is normally only 1 cm2 as an extension. This oscillation surface would be controlled by the so-called fine postural system.
It follows that all the oscillations that occur over an area of 1 cm2 are beyond the normal range, therefore to be considered pathological. The oscillation area expressed by the subject must then be compared with the appropriate tables that report the values of normality and pathology.
Of course, like all parameters, it must always be contextualized and put in relation to all the other indicators detected.
Recall that 1 cm2 corresponds to 100 square millimeters therefore from a quick calculation, if we have 12 mm in sagittal width and 10 in frontal, we will have that 12x10 = 120 mm2, the square centimeter of Gagey is exceeded.