Automatic fat correction in NutriPlus – how it works, what it does

The lean body mass (or fat-free mass) of a human being, with its water content, consists predominantly of muscle-cell and organ-cell mass, the interstice, plus the connective tissue and the bones. The size of the lean body mass is primarily governed by genetic factors, and changes only slowly as a trend curve in adults, e. g. thanks to exercise or long-term overnutrition/malnutrition.

Calculating the body fat with BIA

Electric current is propagated inside the human body only in aqueous liquids. This is why in BIA measurements first the total body water is determined, and from this the lean body mass with its water content is then calculated. The body's fat mass is thus obtained (indirectly) from the weight differential between lean body mass and body weight. Example: 70 kg body weight – 50 kg lean body mass = 20 kg body fat Consequently, all physiological or non-physiological fluctuations in body water or the electrolyte balance will directly entail changes in the amount of body fat calculated in BIA measurements.

Physiological fluctuations in total body water

Environmental factors like air pressure, temperature or altitude may lead to considerable fluctuations in total body water. Hormonal cycles, many diseases or the ingestion of medicines will also affect the water balance and the water distribution.

Inhomogeneity of the water distribution

Many diseases, even minor ones, will influence the distribution of the total body water. Often, the lower extremities are affected, e. g. in the case of varicosis or after thromboses. There are also generalised water distribution disorders, e. g. in the case of lymphatic oedemas or cardiac insufficiency. Deposition of water is particularly conspicuous and visible at the extremities. Physiological fluctuations in the total body water are also perceived predominantly at the extremities, e. g. "thickened" fingers with rising temperatures or swollen ankles after long-distance flights. These fluctuations exert a major influence in the BIA measurements.

Dietetic fluctuations in total body water

This effect is particularly marked in the first few days after beginning a weightreducing diet. Before a diet, the body's fat content is mostly underestimated somewhat, due to water being stored outside the cells. At the beginning of a diet, significant quantities of body water are excreted, which entails water and electrolyte shifts that change the body's electrical conductivity. This dietetically induced reduction in the total body water means that the calculation will overestimate the quantity of body fat.

The BIA analysis will then frequently fail to show an adequate reduction in body fat, despite the reduced body weight involved. In extreme cases, the body fat will even be calculated as higher in the second progress measurement, despite a weight loss by the patient.

How the fat correction feature functions

NutriPlus compensates for these shifts in water and conductivity by means of the automatic fat correction feature. The parameter is designated as "Fat corr." in the printout. Note that all the fat values calculated up to this juncture are calibrated with the individual mean resistance of the patient concerned. This curve smoothing ensures that extreme fat values are cropped and changes in the fat mass reduced to a physiological measure.

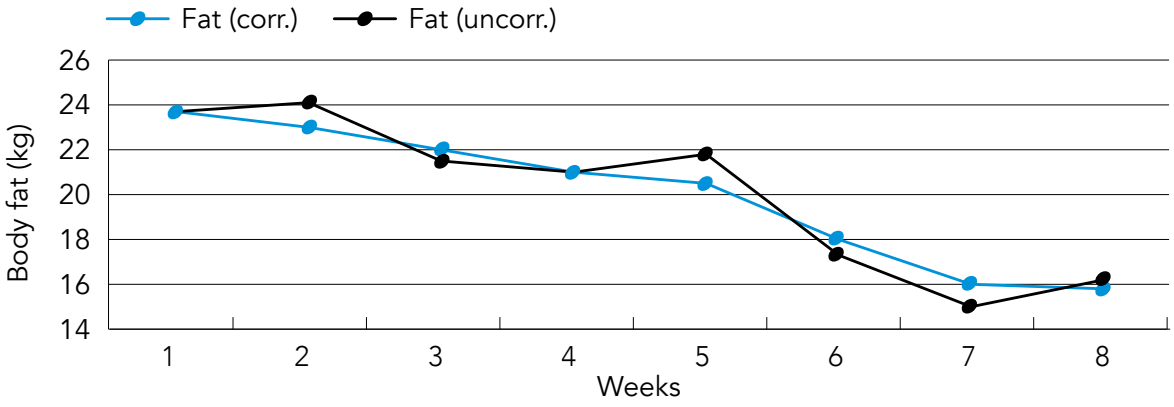
In parallel to the corrected body fat, however, in NutriPlus the fat value originally computed is also listed in each case, as "Fat uncorr.". This means that users

Continuous updating

The automatic fat correction feature always utilises all the measurements, so as to define the patient's individual correction factor with the requisite precision. Thus at every new measurement all the old values will also be checked, and adapted if necessary. As a consequence of this retrospective correction, more recent reports may show changes in the old fat values – an intentional, triedand- tested effect.

Example – Body fat as a diet proceeds

Figure 1: Example of a comparison between corrected and uncorrected fat during the course of a weight-reducing diet.



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