BODY COMPOSITION AND ENERGY EXPENDITURE IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Göteborgs Universitet kommer att offentligen försvaras i Hörsal Arvid Carlsson, Akademicum, Sahlgrenska Akademin, Medicinaregatan 3, Göteborg

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av

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Avhandlingen baseras på följande delarbeten:

I. Slinde F, Grönberg AM, Engström CP, Rossander-Hulthén L, Larsson S.
   Body Composition by Bioelectrical Impedance Predicts Mortality in Chronic Obstructive Pulmonary Disease Patients. Submitted.

II. Slinde F, Rossander-Hulthén L.

III. Slinde F, Bark A, Jansson J, Rossander-Hulthén L.

IV. Slinde F, Ellegård L, Grönberg AM, Larsson S, Rossander-Hulthén L.

    Energy Expenditure in Underweight Chronic Obstructive Pulmonary Disease Patients before and during a Physiotherapy Program. Manuscript.
The prevalence of chronic obstructive pulmonary disease (COPD) is increasing in Sweden as well as worldwide. The main cause of the disease is cigarette smoking. Almost 50% of all COPD patients become underweight. The questions addressed in this thesis are:

(1) Does body composition measured by bioelectrical impedance predict mortality in patients with COPD?
(2) How large variation can be seen in humans’ body composition measured by bioelectrical impedance during 24 hours?
(3) How much energy do underweight patients with COPD expend when they are living their normal lives at home and during a physiotherapy program?

Methods used in this thesis were bioelectrical impedance analysis and dual-energy X-ray absorptiometry to assess body composition, doubly labelled water to measure total daily energy expenditure, indirect calorimetry to measure basal metabolic rate, and seven-day dietary registrations to measure energy intake.

This thesis shows that within a sample of COPD patients, who have been included in a one-year multidisciplinary rehabilitation program, those patients with a high proportion of fat-free mass – measured by bioelectrical impedance – lived longer than those with a low proportion of fat-free mass. This thesis also shows that standardization of the measurements of body composition by bioelectrical impedance is of importance. Measurements should be done in the fasting state after the subject has been in the supine position for ten minutes. Additionally, underweight COPD patients were found to have a large variation in energy expenditure. A variation in total daily energy expenditure from 1.2 to 1.8 times basal metabolic rate is reported. Some patients increased their total daily energy expenditure during two weeks of training with a physiotherapist, whilst others decreased their total daily energy expenditure. Energy intake of the patients cannot be used as a measure of their energy expenditure, since in most cases these two do not agree.

Conclusions: This thesis shows that bioelectrical impedance might be a prognostic tool in COPD, but the measurements need to be standardized. COPD patients at the same level of disease and body weight may have totally different levels of energy expenditure. The energy requirement of underweight COPD patients should therefore be assessed individually. New methods for assessing energy requirement/expenditure are needed to be developed for use in COPD patients. These methods need to be able to be used in the clinical setting, since the main conclusion is that calculation or prediction of energy requirements in COPD patients with current methods has limited value.