

ABSTRACT

This thesis deals with the measurement of (resting) energy expenditure and oxidation of nutritional substrates in critically ill patients, according to variously given nutritional support. The comparison of nutritional substrate incomes followed recommendation of the ESPEN guidance.

Patients were examined by indirect calorimetry. This study included 9 critically ill patients on the ventilator, of which 1 patient was spontaneously breathing. (Resting) energy expenditure and oxidation of individual nutritional substrates were determined from the measured values. Firstly, the measurements were taken on fasting patients (without nutritional support). Secondly, a low caloric nutrition (1370 ± 296.7 kcal/day) and lastly, normocaloric nutrition (2169.802 ± 500.926 kcal/day) were given.

This study also demonstrated the inaccuracy of resting energy expenditure estimation using predictive equations (the Harris-Benedict equation specifically), compared to the measured (R)EE by indirect calorimetry. According to the results of the HB-equation, resting energy expenditure decreased with increasing nutritional support. However, indirect calorimetry values showed the opposite, namely the increase in (resting) energy expenditure with increasing nutritional support. A statistically significant difference was found in the difference REE (%) between fasting patients and patients receiving normocaloric nutritional support ($p = 0.032$).

Irrespective of the administered nutritional support (even in the fasted state), the patients most oxidized lipids, then proteins and the least carbohydrate oxidation occurred. Fasting patients oxidized lipids from about 44 %, ca. 33 % oxidized proteins, and ca. 23 % oxidized carbohydrates. In patients with low calories diet was lipid oxidation of up to 56 %, protein oxidation of 31 % and carbohydrate oxidation of less than 13 %. In patients receiving normocaloric nutrition, the difference between lipid and protein oxidations was not found. Lipid oxidation was about 49 %, protein oxidation was about 45 %. Carbohydrate oxidation was the lowest and it was about 6 %.

In patients with normocaloric nutrition, was oxidation of carbohydrates significantly lower than in fasting patients ($p = 0.006$). Protein oxidation was significantly higher in normocaloric nutrition than in patients with low calories nutrition ($p = 0.035$).

Keywords: nutritional support, indirect calorimetry, oxidation of nutritional substrates, critically ill patients, ICU.