

The NA level in the IBAT of the 28 °C rats was the same in the three groups (N, J, RN); the NA turnover rate was very slow and could not be measured. In the 5 °C rats the NA level was enhanced in the J and RN groups; however, the NA turnover rate was enhanced only in the RN group.

In the interscapular brown adipose tissue, the 5HT level was twice as high in the 5 °C rats than in the 28 °C rats. It was significantly enhanced in only the 5 °C J and RN rats.

It was concluded that, under the present experimental conditions, DIT was low in thermoneutral acclimated rats. Cold acclimation induced a large increase in DIT. In the brown fat it seemed that NA and 5HT may be involved in this phenomenon.

**Comparative study of daily energy expenditure measured by physical activity questionnaire (QAPSE) and physical fitness (VO<sub>2</sub>max) in the elderly.** M Bonnefoy<sup>1</sup>, T Kostka<sup>2</sup>, SE Berthouze<sup>3</sup>, JR Lacour<sup>4</sup> (<sup>1</sup> *Service de médecine gériatrique, Centre hospitalier Lyon-Sud, 69495 Pierre-Bénite;* <sup>2</sup> *Department of Preventive Medicine, Medical University, Lodz, Poland;* <sup>3</sup> *Département de rééducation et réadaptation fonctionnelles, GIP Exercice, faculté de médecine, université Jean-Monnet, Saint-Étienne;* <sup>4</sup> *Laboratoire de physiologie, GIP Exercice, faculté de médecine de Lyon-Sud, Lyon, France*)

The purpose of this study was to validate a physical activity questionnaire QAPSE (Questionnaire d'Activité Physique Saint-Etienne) in a homogeneous population of elderly subjects and to estimate its potential application in routine physical activity (PA) assessment in that age group. Sixty-five (31 men and 34 women) community dwelling, healthy people aged 65–84 years participated in the validation substudy in comparison with the VO<sub>2</sub>max measured by a max-

imal exercise test and anthropometric data. The reproducibility of the questionnaire was assessed by a test-retest design. The questionnaire was completed twice by 44 subjects after an interval of at least 6 weeks. Maximal oxygen consumption (VO<sub>2</sub>max) correlated positively with mean habitual daily energy expenditure (MHDEE) ( $r = 0.56$ ;  $P < 0.0001$ ), > 3METs (metabolic equivalent) DEE activity ( $r = 0.371$ ;  $P = 0.002$ ), leisure activity ( $r = 0.368$ ;  $p = 0.003$ ), sports activity ( $r = 0.461$ ;  $P < 0.0001$ ), basic daily activity ( $r = 0.325$ ;  $P = 0.008$ ) and moving DEE activity ( $r = 0.273$ ;  $P = 0.028$ ). MHDEE was positively correlated with body weight ( $r = 0.464$ ) and with fat free mass ( $r = 0.639$ ) and negatively correlated with percentage of body fat ( $r = -0.501$ ). MHDEE levels found in our study ( $9\,904 \pm 1\,083$  kJ for men and  $7\,950 \pm 732$  kJ for women) were in agreement with the values of total energy expenditure obtained in elderly people using other questionnaires as well as those measured by other methods: energy intake or doubly labelled water technique. Paired *t*-test based mean differences between the two administrations of the questionnaire completed at different times did not reach statistical significance for any of the studied QAPSE activity indices. Test-retest correlation coefficients ranged from 0.648 for the moving index to 0.967 for MHDEE with the correlation coefficient *P* values being  $< 0.0001$  for all the QAPSE activity indices. Our data showed a better correlation between the physical fitness and physical activity of the subjects than any of previous studies conducted in elderly people. The strong correlations obtained were a result, in our opinion, of the very precise measurement of all the daily physical activities of older persons. The reliability of the data appeared to be at least comparable with other questionnaires for elderly people concerning high intensity activities and are clearly better for low intensity activities.

We concluded that QAPSE had demonstrated excellent repeatability and good validity for physical fitness and anthropometric data in an elderly population. This questionnaire investigated important dimensions of elderly people's activity and provided a good estimation of usual DEE for that age group.

#### **Validation of impedancemetry measurements of body composition in the elderly.**

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Significant body composition changes occur with ageing that make it necessary to reappraise the relevant measurement techniques. The density of lean body mass (LBM) decreases with age. This generates biases in densitometric methods. The hydration of LBM varies little with age; therefore, total body water (TBW) is a good parameter for estimating body composition in the elderly. Estimates of TBW with impedancemetry has not been properly validated in the elderly, both for low (50 kHz) and high (> 500 kHz) current frequencies. In particular, the only published equations [Deurenberg (1990) *Am J Clin Nutr*] overestimate fat mass by about 7%. The aim of the present study was therefore to perform such a validation, the reference technique for measuring TBW being <sup>18</sup>O dilution.

TBW was measured by <sup>18</sup>O dilution in 40 healthy volunteers (19 women, 21 men), aged 67.7 ± 5.0 years (mean ± SD). <sup>18</sup>O dilution space was calculated from the plasma isotopic plateau achieved after the dose was given orally. Resistance (R), reactance (Xc) and impedance (Z) were measured at two frequencies (50 and 100 kHz)

with an Analycor3 impedancemeter (Eugenia, France).

TBW (<sup>18</sup>O dilution) was 34.78 ± 6.74 kg. At 50 kHz, R was 491.1 ± 71.5 Ω and Xc was 42.8 ± 6.6 Ω. At 100 kHz R was 478.6 ± 70.0 Ω and Xc was 32.7 ± 5.5 Ω.

Multiple regression models that minimize the standard error of the estimate (SEE) involved three variables: i) the ratio of height<sup>2</sup> over impedance (H<sup>2</sup>/Z, in cm<sup>2</sup>.Ω<sup>-1</sup>), ii) weight (W, in g), iii) gender (S) as a discrete variable (women = 0, men = 1).

Corresponding equations were:

at 50 kHz,

TBW (g) = 343.2 H<sup>2</sup>/Z + 0.175 W + 2 891.2 S + 1 925.3

r<sup>2</sup> = 0.951, SEE = 1 556.3

at 100 kHz,

TBW (g) = 339.9 H<sup>2</sup>/Z + 0.168 W + 2 638 S + 1 975.4

r<sup>2</sup> = 0.955, SEE = 1 490.0

In conclusion, specific equations were derived that describe TBW in the elderly from impedances at either 50 or 100 kHz. Precision (SEE) of TBW estimates with such models were 1 556 g (4.5%, 50 kHz) and 1 490 g (4.3%, 100 kHz).

#### **Evaluation of weight gain composition using DXA in preterm infants fed HM fortifier or two different preterm formulas.**

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Recently reproducibility, accuracy and precision of dual X-ray absorptiometry (DXA) measurements were determined in newborn piglets suggesting that bone mineral content and fat content could be easily evaluated in small subjects. Reference values were also determined at birth in preterm and term infants appropriate for gestational age (n = 107) with body weight ranging from 1 100 to 3 800 g. The aim of the present