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Body composition, muscle function, and energy expenditure in patients with liver cirrhosis: a comprehensive study^{1,2,3}

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Background: Data describing the nutritional status of patients with liver cirrhosis of diverse origin, as assessed by direct body-composition methods, are limited.

Objective: We sought to provide a comprehensive assessment of nutritional status and metabolic activity in patients with liver cirrhosis by using the most accurate direct methods available.

Design: Two hundred sixty-eight patients (179 M, 89 F; $\bar{x} \pm \text{SEM}$ age: 50.1 \pm 0.6 y) with liver cirrhosis underwent measurements of total body protein by neutron activation analysis, of total body fat and bone mineral by dual-energy X-ray absorptiometry, of resting energy expenditure by indirect calorimetry, of grip strength by dynamometry, and of respiratory muscle strength by using a pressure transducer. Dietary intakes of energy and protein were assessed and indexed to resting energy expenditure and energy intake, respectively.

Results: Significant protein depletion, seen in 51% of patients, was significantly ($P < 0.0001$) more prevalent in men (63%) than in women (28%). This sex difference occurred irrespective of disease severity or origin. The prevalence of protein depletion increased significantly ($P < 0.0001$) with disease severity. Protein depletion was associated with decreased muscle function but not with lower energy and protein intake. Energy intake was significantly ($P = 0.002$) higher in men than in women, whereas protein intakes did not differ significantly ($P = 0.12$). Hypermetabolism, seen in 15% of patients, was not associated with sex, origin or severity of disease, protein depletion, ascites, or presence of tumor.

Conclusions: Poor nutritional status with protein depletion and reduced muscle function was a common finding, particularly in men, and was not related to the presence of hypermetabolism or reduced energy and protein intakes. The greater conservation of protein stores in women than in men warrants further investigation.

Key Words: Liver disease • nutritional status • protein depletion • energy expenditure • body composition • neutron activation • dual-energy X-ray absorptiometry • muscle function • dietary intake

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