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Spirulina enhanced the skeletal muscle protein in growing rats

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■ **Abstract** *Background/Aim of the study* This study evaluates the effects of the blue green alga *spirulina* as the sole dietary source of protein on muscle protein in weaning rats. *Methods* Young (30 days) Wistar rats were fed, during 60 days, with 17% protein *spirulina* (S) and compared to rats fed 17% protein casein (C). We evaluated the muscle total protein and DNA contents and the in vitro protein synthesis and degradation rates as well the myosin protein expression. *Results* The groups presented similar body weight ($C = 427.3 \pm 8.6$; $S = 434.6 \pm 7.7$ g) and length ($C = 25.4 \pm 0.2$; $S = 25.6 \pm 0.2$ cm). Soleus muscle total protein ($C = 2.9 \pm 0.1$; $S = 2.7 \pm 0.1$ mg/100 mg) and

DNA ($C = 0.084 \pm 0.005$; $S = 0.074 \pm 0.005$ mg/100 mg) contents were also similar in both groups. Protein degradation ($C = 427.5 \pm 40.6$; $S = 476.7 \pm 50.5$ pmol/mg⁻¹ h⁻¹) did not differ between the groups but protein synthesis ($C = 17.5 \pm 1.0$; $S = 25.2 \pm 1.9$ pmol/mg⁻¹ h⁻¹) and myosin content (western blot analyses) were higher ($P < 0.05$, *t* test) in *spirulina* group. *Conclusions* Although the *spirulina* proved adequate protein quality to maintain body growth, the muscle protein synthesis rates were increased by the ingestion of the experimental diet in young rats.

■ **Key words** skeletal muscle – *spirulina* – protein

Introduction

The use of algae (seaweed) in human alimentation is ancient. In the East, in particular, such source of food material have been tried extensively, in the hope of correcting the widespread protein deficiency that characterizes the nutritional status of less favored populations [22, 41]. To this day, with the continuing low level of available protein food all over the world and increasingly urgent need for low-cost food of good nutritional value, the exploration of seaweed biomasses as food sources is a matter of generalized interest.

Spirulina is a helicoidal shaped blue green alga with length of 0.2–0.3 mm [8, 19]. *Spirulina*'s special merit as a food source is that it contains 65–70% protein on dry weight basis, which is higher than any other natural food and has all eight essential amino acids to men [26]. It normally grows in naturally alkaline lakes located in arid zones. Although the alkaline water from such lakes cannot be used for irrigation, it can be used for cultivation of *spirulina* [22, 41]. Since this alga has a rapid reproduction rate, dividing three times a day, a pond devoted totally to the growth of *spirulina* can produce 125 times as much protein as the same amount area devoted to