RUNNING WHEEL ACCESS REDUCES AND SLOWDOWN THE ELECTROMIOGRAPHIC RESPONSE IN C57BL/6. A PILOT STUDY

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INTRODUCTION

The effect of exercise on the axonal diameter of α-motoneurons has been poorly studied up to now. Only four old articles about this issue can be found at the literature, showing two of them an increase (Edds 1950; Samorajski & Rolsten 1957) and the other two a decrease (Andersson & Edstrom 1957; Roy, Gilliam, Taylor & Heusner 1983) in axonal diameter with exercise. Those contradictory results can be probably explained by the differences in species, intensities and types of exercises used.

We are generating a standardized animal model for studying the neural responses and adaptations to exercise in the future. According with ethical standards for animal use in scientific research, a pilot study, aimed to estimate the minimum number of animals needed to reach statistical significance, was designed. Here we present some preliminary results of this pilot study.

METHOD

Ten C57Bl/6 male mice were randomly assigned to a control group (CG; n=5) or an experimental group (EG; n=5). During 12 weeks CG animals lived in conventional boxes, while EG mice lived in boxes with 24 h. free access to a running wheel (RW), which movement was registered over 30s lapses with the VitalView software (Mini Mitter Co). Animals were kept in a light:darkness circadian rhythm of 12:12 hours, with water and food access ad libitum, in controlled atmospheric conditions. Before and after this period, the animals were weighed and evoked electromyography (EMG) by sciatic nerve stimulation was registered in the *tibialis anterioris*. The EMG was registered twice in each register, pre and postintervention,, and the mean value of the two measurements for each animal was used. The maximal EMG amplitude was considered as the maximal electromyographic response. The speed of the

response was analyzed in the faster EMG response, registering the time passed between 0.5 mV and 15 mV.

After the last EMG recording, animals were sacrificed and fixed in 4% paraphormaldehide, for future histological studies of sciatic nerve, lumbar spinal cord and *tibialis anterioris* muscle.

Data are expressed as mean ± standard deviation of the mean. Results were compared with the paired Student's t test, and differences were considered statistically significant when $p<0,05$ with a power over 80%.

RESULTS

As a pilot study with low number of subjects, the results of the study are generally not significant. However, the number of additional animals to be included to reach statistically significant differences can be estimated. Thus, tendencies are presented followed by the total number of animals estimated to have significant results.

Free access to RW showed a reduction in weight gain by EG animals respect to CG during de 12 weeks (16 animals will be necessary for significant results) (EG = 5.5 ± 1.739g; CG = 7.4 ± 2.069g).

Time necessary to increase from 0.5 to 15mV in the faster twitch EMG increased for the EG, indicating a slowdown process (13 animals will be necessary for significant results) (EGpre = 0.443 ± 0.0727ms; EGpost = 0.504 ± 0.0581ms)

Furthermore, maximal EMG response was significant slightly reduced in EG group (EGpre = 23.216 ± 0.193 mV; EGpost = 22.811 ± 0.0834 mV ; p = 0.002)

In contrast, no changes seem to be in Velocity or Maximal EMG in CG. Time in the faster twitch seem to be constant (CGpre = 0.5116 ± 0.0373ms ; CGpost = 0.489 ± 0.112ms).

Moreover, maximal response also seems to be constant (CGpre = 23.202 ± 0.221 mV; CGpost = 23.204 ± 0.294 mV).

DISCUSSION

The effect of free access to a RW for 12 weeks on the animal's weight, suggests that this could be an adequate experimental intervention to study the effects of voluntary physical activity in our model. Additionally, according with the relationship among the EMG and axonal diameter reported at previous studies (Anderson & Edstrom 1957; Roy et al. 1983), our preliminary data suggest a reduction of axonal diameter in response to exercise, that needs to be confirmed histologically at the future.

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