Axonotmesis is one consequence of nerve injury and skeletal muscle inactivity occurs after these injuries. Different rehabilitation treatments have proven useful in accelerating sciatic nerve (SN) and soleus muscle (SM) regeneration. The aim of this study was analyze the effects of 4-week endurance and balance and coordination training programs on the morphology of the SN and SM fibers after crush injury of the SN. 23 male Wistar rats (3 months) were randomly divided in 4 groups: (1) sham-operated rats (Sham, n=5); (2) rats with sciatic crush (non-trained, NT, n=6); (3) rats with sciatic crush and endurance training (ET, n=6); and (4) rats with sciatic crush and balance and coordination training (BCT, n=6). For the surgical procedures, animals were anesthetized and the right SN was exposed and nerve crush injury was performed with 1 mm hemostatic forceps for 30 seconds. 48 hours after the surgery, the animals from the ET and BCT groups began specific training that lasted 4 weeks. 48 hours after the end of the training programs, the animals were anesthetized, transcardially perfused with saline solution, followed by Karnovsky solution. A short segment of the right SN 5mm distal to the crush injury site and small samples of the central part of the right SM were excised and fixed in the Karnovsky solution; postfixed OsO4, dehydrated in acetone, embedded in araldite. Sections (1µm) were stained with 1% toluidine blue. Images of the SM and the SN were captured, digitized and processed with Image Pro Plus Software 6.0. Dates were analyzed using one-way ANOVA followed by post hoc Tukey’s tests (p<0.05). In the SM, the percentages of the muscle tissue area of NT group were significantly lower and muscle connective tissue area was significantly greater than the other groups. The percentage of the muscle blood vessel area in the BCT group was significantly greater than that of the Sham and NT groups. In the SN, the percentages of the nerve tissue area of the Sham group were significantly greater and nerve connective tissue area was significantly lower than the other groups. The percentage of the nerve blood vessel area in the NT group was significantly lower than that in the Sham group and the nerve blood vessel area in the ET group was significantly larger than that in the NT group. These findings indicate that BCT and ET, when initiated in the early phase after SN injury, improve the morphological properties of the soleus muscle and sciatic nerve.

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Fig. 1: Digitized images. Soleus muscle (A-D). Sham(A), NT(B), ET(C), BCT(D). Bar=50 µm. Normal sciatic nerves, Sham (E), regenerating nerves, NT (F), regenerating nerves, ET (G), regenerating nerves BCT (H). Bar=20 µm. MF = muscle fiber; NF=myelinated nerve fiber; Sc=Schwann cell; *=endoneurial connective tissue; BV=blood vessel; Ld=lipid droplet.