Normal signal transduction pathways of rat habitual endurance exercise at different intensities

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Objective A signal transduction pathway is always signal-specific, but it becomes special in exercise physiology, especially for habitual exercise training. In this paper, the normal signal transduction pathways (NPs) of habitual endurance exercise of Sprague-Dawly (SD) rats at different intensities were studied in terms of self-similar algorithm .

Methods 1. SD rats were randomly divided into a control group with no exercise (Cont), a low-intensity exercise group (LI) at 15 m/min for 60 min, a medium-intensity exercise group (MI) at 25 m/min for 40 min, and a high-intensity exercise group (HI) 35 m/min for 30 min. The the treadmill exercise began at 10 m/min for 10 min. The speed and time increased by 5 m/min and by 5 min respectively after every two days until the intensity was OK for LI, MI and HI groups. All rats in the exercise groups were trained for eight weeks. The muscle was collected two hours after the last training. The 20 parameters, the expression of PGC-1α, PI3K, AMPK, p38MAPK, SIRT1, IGF-1, Akt, mTOR, TFAM, NRF1 and NRF2 and the level of T, CS, SDH, β-HAD, MDH, HK, PK, LDH and HSL, were assessed. 2. The 20 dimension data sets were integratedly analyzed with self-similar algorithm.

Results 1. The first-order self-similarity held for the 20 dimension data sets between MI and HI groups. 2. There was one biomarker, PGC-1α, between Cont and LI groups with respect to HI group which parameters were used to be dimensionless for Cont and LI groups. 3. There were two biomarkers, PGC-1α and PI3K, between LI and MI or HI groups with respect cont group.

Conclusions The NP of LI group may be PGC-1α pathway, and the NPs of MI or HI group may be PGC-1α and PI3K pathways.