항산화제 처리와 단기간의 지구성 운동이 골격근의 인슐린 유발 포도당 이동률에 미치는 영향

정수련

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Abstract

Jung, S.R. The effects of antioxidants treatment on training induced insulin-stimulated glucose transport activity in muscle. *Exercise Science*. 19(3): 311-320, 2010. The objectives of this study were to determine whether antioxidants treatment decrease training induced insulin-stimulated glucose transport activity and block GLUT4 biogenesis in muscle. 24 male Wistar rats were randomly assigned into 4 groups(Sedentary, Sedentary/Antioxidant, Exercise, Exercise/Antioxidant treat group). Antioxidants were given orally for a week, and for the control groups, same volume of vehicle was orally provided. After a week with or without antioxidants treatment, the two exercise-groups were trained by using 6h/day, 3-day-long swimming program. Swimming training increased GLUT4 protein concentration and insulin responsiveness by 76% and 123%, respectively, relative to sedentary groups($p<0.05$). However, antioxidants treatment did not change GLUT4 protein contents or the insulin stimulated-glucose transport activities on either exercise group or sedentary group. The COX IV protein concentration was significantly increased by 3d-swimming exercise, but antioxidants treatment did not change COX IV protein contents. We concluded that antioxidants treatment do not prevent endurance training induced increase in skeletal muscle insulin responsiveness.

Key words : antioxidant, endurance exercise, insulin responsiveness, GLUT4, COX IV

초 록

정수련. 항산화제 처리와 단기간의 지구성 운동이 골격근의 인슐린 유발 포도당 이동률에 미치는 영향. *운동과학* 제19권 제3호. 311-320, 2010. 최근, 기존의 연구결과와는 상반되게 항산화제 섭취가 신체활동에 의한 건강증진 효과를 저해시킨다는 연구 결과들이 보고되고 있다. 이에 본 연구는 항산화제 처리가 인슐린 반응성에 미치는 영향을 규명하기 위해 항산화제가 운동 유발 골격근의 인슐린 자극 포도당 이동률과 GLUT4 단백질의 생합성에 미치는 영향을 알아보았다. 8주령의 수컷 Wistar rat 24마리를 구입하여 4주간의 환경 적응 기간을 거친 후 각 6마리씩 4집단으로 무작위 배치하였다(sedentary; Sed, Antioxidant treat group; AO, Exercise group; Ex, Exercise+ Antioxidant treat group; Ex-AO). 항산화제 처리군은 1주일간 vitamin C와 vitamin E를, 나머지 집단은 vehicle를 경구 투여하였다. 1주일간의 항산화제 처리 후 운동 처리군은 3일간 수영을 실시하였다. 연구결과 3일간 수영은 비교군 보다 GLUT4단백질 양과 인슐린 반응성을 각각 76%, 123% 증가시켰고($p<0.05$), 미토콘드리아 생합성 표지 인자 중 하나인 COX IV 단백질 수준을 유의하게 증가시켰다($p<0.05$). 그러나 10일간의 항산화제 처리는 운동과 비운동 집단 모두에서 골격근의 GLUT4 단백질 양과 인슐린 유발 포도당 이동률에 영향을 미치지 않았고, COX IV 수준에도 영향을 미치지 않았다. 이러한 결과를 통해 항산화제 처리는 단기간의 운동유발 인슐린 반응성에 영향을 미치지 않는 것으로 생각한다.

주요어 : 항산화제, 지구성 운동, 인슐린 반응성, GLUT4, COX IV.

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