장기간 운동이 마우스 조직별 heme oxygenase-1 발현에 미치는 영향

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Abstract

Kim, S. Y. Effects of long-term treadmill exercise on heme oxygenase-1 expression in mouse tissues. *Exercise Science*. 19(1): 15-26, 2010. Heme oxygenase (HO)-1, involved in the heme degradation process, is upregulated by a wide array of stimuli and has antioxidant, anti-inflammatory and other cytoprotective functions. The aim of this study was to investigate the difference and effect of long-term exercise on HO-1 expression among mouse tissues. The study carried out on twenty-four ICR mice. All mice participated in this study which consisted of three groups [control group (CONT, n=8), low-intensity exercise group (LIE, n=8), high-intensity exercise group (HIE, n=8)]. Mice were euthanized after 16 weeks of training periods and tissues (skeletal muscle, colon, heart, lung, liver, and brain) were removed. As a result of analyzed difference of HO-1 expression among tissues, liver topped the list, followed by colon, lung, heart, skeletal muscle, and brain ($p<.001$). In case of skeletal muscle, colon, and liver, after training for 16 weeks, HO-1 expression in HIE and/or LIE dramatically increased in comparison with CONT ($p<.01$, $p<.001$). On the other hand, no significant differences in the heart, lung, and brain were found between all groups. Taken together, we conclude that level of HO-1 expression is different between mouse tissues and long-term regular exercise can enhance the levels of HO-1 expression in skeletal muscle, colon, and liver.

Key words : heme oxygenase-1, long-term exercise, mouse tissues

초 록

김시영. 마우스 조직별 heme oxygenase-1 발현 차이와 장기간 운동에 의한 조절 가능성. *운동과학*, 제19권 제1호. 15-26, 2010. Heme oxygenase-1 (HO-1)은 산화적인 자극을 포함한 다양한 외부 스트레스에 대한 조직세포의 적응 및 방어에 중요한 역할을 담당하는 항산화효소이다. 본 연구의 목적은 마우스의 다양한 조직에서 HO-1의 발현 차이는 물론 장기간의 운동에 의한 조절 가능성을 알아보는 데 있다. 연구에 사용된 24마리의 ICR계 마우스는 각각 8마리씩 세 그룹 [control group (CONT, n=8), low-intensity exercise group (LIE, n=8), high-intensity exercise group (HIE, n=8)]으로 나누어 졌으며, 16주간의 트레드밀 운동프로그램 후 골격근, 대장, 심장, 폐, 간 그리고 뇌를 분리하여 분석하였다. CONT에서 안정시 마우스 조직별 HO-1 발현량을 분석한 결과, 간 조직에서의 발현량이 가장 높았으며, 이어서 대장, 폐, 심장, 골격근 그리고 뇌 순으로 발현량의 유의한 차이가 나타났다. 16주간 트레이닝 후 비교그룹 (CONT)에 비해 트레이닝 그룹 (HIE, LIE)의 골격근, 대장 및 간에서 HO-1의 발현량이 유의하게 증가된 ($p<.01$, $p<.001$) 반면, 심장, 폐 그리고 뇌 조직에서는 그룹 간 발현차이가 나타나지 않았다. 이상의 결과를 바탕으로 결론을 내리면, 안정된 상태에서 마우스 조직에 따라 발현되는 HO-1 단백질량은 조직 사이에 유의한 차이가 있으며, 골격근, 대장 그리고 간 조직에서의 HO-1 발현량은 반복된 운동으로 증가시킬 수 있었다.

주요어 : heme oxygenase-1, 장기간 운동, 마우스 조직

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