長時間に及ぶ激しい運動が酸化低比重リポ蛋白（酸化LDL）生成を促進する可能性について

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The Effect of Prolonged Exercise on the Formation of Oxidized LDL and Total Antioxidant Capacity in Serum

by

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ABSTRACT

The purpose of this study was to clarify the effect of a single bout of prolonged exercise on the formation of oxidized LDL in plasma and on the total antioxidant capacity of serum.

Thirty-five male triathletes (36.7±8.8yr.), who participated in the '97 Ironman Japan in Lake Biwa (180.2km bike, 42.2km run, average race time: 9hrs 40min), were examined. Blood samples were taken before, immediately after and one day after the race to determine the level of oxidized LDL in plasma (ox-LDL), the antioxidant levels (vitamin C, α-tocopherol) in serum, and the lag time for the initiation of conjugated diene formation in serum (used as an index of total antioxidant capacity of serum).

Ox-LDL in plasma showed a significant increase immediately after and one day after the race.

Lag time for the formation of conjugated diene in serum was significantly prolonged immediately after the race. Also, lag time was positively correlated with serum vitamin C level immediately after the race. The change in plasma ox-LDL level was negatively correlated to the change in total antioxidant capacity in serum immediately after the race.

We conclude that the production of ox-LDL in plasma increased after the prolonged exercise. However, the total antioxidant capacity of serum was enhanced after the prolonged exercise in accordance with the increase of antioxidants. It may be the case when the total antioxidant capacity is sufficiently enhanced, the oxidation of LDL after prolonged exercise can be prevented.

要　旨

本研究では，長時間に及ぶ激しい運動の動脈硬化に対する影響を明らかにするために，血清中の酸化LDL濃度の変化，血清の総合的抗酸化能力の変化，抗酸化ビタミンの動態をトライアスロン競技をモデルとして検討した．その結果，過酸化障害の一つである酸化LDLは競技前に比して競技直後に有意な増加を示し，競技1日後にさらに上昇したが，基準値の範囲内であった．一方，血清に酸化剤添加後，酸化が急速に進むまでの時間（lag time）を総合的抗酸化能力の指標として検討したところ，lag timeは競技前と比べて競技直後に有意な延長を示し，その際のlag timeは血清中ビタミンC濃度と有意な相関を示した．

さらに競技直後の血漿中酸化LDL濃度の変化と血清の総合的抗酸化能力の変化との間には負の相関傾向が認められた．しかし，競技翌日には両者の間に有意な相関は認められなかった．

以上より，長時間激運動時に，酸化LDLの増加が認められたが，抗酸化能力の十分な増強により酸化LDLの生成増加を抑制し得る可能性が示唆された．