心血管疾患リスクに対する運動効果を予測できる血中バイオマーカーの探索

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Identification of Predictive Blood Biomarker for Exercise Effects on Cardiovascular Disease Risks

by

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ABSTRACT

Aging-induced deterioration of arterial stiffness is decreased by aerobic exercise training, and increased nitric oxide（NO）production is involved in this effect. Apelin promotes NO production via upregulation of endothelial NO synthase, resulting in improvement of arterial stiffness. However, the time-dependent effects of aerobic exercise training on circulating apelin levels remain unclear.

PURPOSE: This study aimed to determine whether the changes in circulating apelin levels by aerobic exercise training may be a novel predictive biomarker for the decrease

in arterial stiffness in middle-aged and older adults.

METHODS: Twenty Japanese healthy middle-aged and older subjects (66 ± 1 years) were randomly divided into two groups: exercise intervention and sedentary controls. Subjects in the training group completed 8-week of middle-intensity aerobic exercise training. We evaluated plasma apelin levels and brachial-ankle pulse wave velocity (baPWV), measured every 2 weeks for 8-week in the training group.

RESULTS: Plasma apelin levels were significantly increased after 4-week intervention (P<0.05). However, baPWV was gradually declined from baseline to 8-week and significantly decreased after 8-week intervention (P<0.05). Interestingly, the exercise training–induced increase in plasma apelin levels before and after 4-week exercise training was negatively correlated with the decrease in baPWV before and after 8-week exercise training (r=-0.700, P<0.05).

CONCLUSION: These results suggest that the plasma apelin levels were increased at the early stage of exercise training intervention and was associated with exercise training-induced alternation of arterial stiffness in middle-aged and older adults. Thus, plasma apelin levels may be a predictive biomarker of exercise training-induced improvement of arterial stiffness in middle-aged and older adults.

要　旨

中高齢者の有酸素性トレーニングによる動脈硬化度の低下には，血管拡張物質：apelinの分泌増加が影響することが報告されているが，有酸素性トレーニングによる血中apelin濃度の経時的な変化が動脈硬化度の低下効果に及ぼす影響は明らかでない．

【目的】本研究は，apelinが動脈硬化に対する運動効果を予測できる血中バイオマーカーになりうるか否か検討することを目的とした．

【方法】健常な中高齢男女20名を対象に，中等強度の自転車エルゴメータ運動を8週間実施するトレーニング群10名とコントロール群10名にランダムに分けた．トレーニング群は2週間ごとに，動脈硬化度の指標である上腕-足首間の脈波伝播速度（baPWV）および血中のapelin濃度を測定した．

【結果】血中apelin濃度は介入開始4週目から有意に増加したが，baPWVは介入開始8週目に有意に低下した．さらに，血中apelin濃度の介入開始から4週目の増加量とbaPWVの介入開始から8週目の低下量は，有意に負の相関関係を示した．

【結論】apelinは，有酸素性トレーニングによる動脈硬化度の低下を予測する血中バイオマーカーとなる可能性が示唆された．