

運動後に行うアイシングの長期的な適用の影響について

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Long-term Effects of the Regular Post-exercise Muscle Cooling

by

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ABSTRACT

Cold application (cryotherapy) is an established component in the treatment by rest, ice, compression, elevation (RICE) for acute sports injuries with decreasing local inflammatory reactions. This treatment has been also employed with identical therapeutic benefits to exercise-induced damage following vigorous exercise among athletes. Recently, cold application has been regularly used with even less muscular damage for facilitation of recovery from physical and mental fatigue and as a preventive against the muscular injury following exercise. Ten male subjects participated in resistance training comprising five sets of 8-wrist curl exercises at a workload of 8-repetition maximum, three times a week for six-weeks. Half of the subjects immersed their experimental forearm in cold water ($10 \pm 1^\circ\text{C}$) for 20 minutes after the end of the wrist curl exercises (the cold group), while the

remaining five served as controls (the control group). Ultrasonography-evaluated thickness of forearm flexor muscles and circumference of the experimental extremity significantly ($p<0.05$) increased after the training period in both groups. However, degree of these increases was significantly ($p<0.05$) less in the cold group as compared with that in the control group. Diameter of ultrasonography-evaluated brachial artery failed to increase in the cold group despite a significant increase ($p<0.05$) of that in the control group after training. Maximal strength and muscular endurance with rhythmic handgrips tended to increase in both groups after the training period, while each increase was less in the cold group as compared with that in the control group. It is considered that training-induced molecular and humoral adjustments, including muscle hyperthermia, are physiological, transient, and essential for training effects (myofiber regeneration, muscle hypertrophy and improved blood supply). Cooling generally might attenuate these temperature-dependent processes. This seems disadvantageous for training, in contrast to the beneficial combination of rest, ice, compression and elevation (RICE) in the treatment of macroscopic musculo-tendinous damage.

要 旨

10名の被験者に、8RMの運動強度で8回のリストカール運動を5セット行う筋力トレーニングを週3回、6週間行わせた。毎回トレーニング終了後に運動側上肢を $10 \pm 1^\circ\text{C}$ の冷水に20分間浸した被験者5名を冷却群、残りを対照群としてトレーニング効果を比較した。両群で形態的变化やパフォーマンスの向上が認められたが、冷却群では筋厚、前腕最大周径囲および上腕動脈血管径の増加が有意 ($P<0.05$) に小さく、最大筋力および筋持久力の増加も小さい傾向にあった。これらは、筋力トレーニングの効果を引き起こす要因として、機械的刺激とあわせて組織の温度上昇やそれに伴う諸変化が関与する可能性を示唆した。RICE処置として損傷部位を冷却することが有益であることは明確であるが、傷害の予防や疲労回復のために損傷がない組織を冷却することには、RICE処置の冷却と同様の意義のほかに、トレーニング効

果が減衰する可能性を考慮する必要があると推察された。