

Hyperbaric gaseous cryotherapy: effects on skin temperature and systemic vasoconstriction.

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Source

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Abstract

OBJECTIVE:

To compare skin-surface cooling caused by the application of an ice bag (15min) and the projection of carbon dioxide microcrystals (2min) under high pressure (75 bar) and low temperature (-78 degrees C), a modality called hyperbaric gaseous cryotherapy.

DESIGN:

Randomized controlled trial with repeated measure.

SETTING:

Laboratory experiment.

PARTICIPANTS:

Twelve healthy male subjects (mean +/- standard deviation, 22.9+/-1.8y).

INTERVENTIONS:

Ice bag and hyperbaric gaseous cryotherapy were randomly applied on the skin of the nondominant hand.

MAIN OUTCOME MEASURE:

Skin temperature of the cooled (dorsal and palmar sides) and contralateral (dorsal side) hands were continuously measured with thermistor surface-contact probes before, during, and after (30min) cooling.

RESULTS:

Hyperbaric gaseous cryotherapy projection induced a large decrease ($P < .05$) of the dorsal skin temperature of the cooled hand (from 32.5 degrees +/-0.5 degrees C to 7.3 degrees +/-0.8 degrees C) and a significant decrease of the skin temperature of the palmar side and of the contralateral hand. The skin temperature of the dorsal side of the cooled hand was decreased with an ice bag (from 32.5 degrees +/-0.6 degrees C to 13.9 degrees +/-0.7 degrees C, $P < .05$). However, the lowest temperature was significantly higher than during hyperbaric gaseous cryotherapy, and no significant changes in the other skin temperatures were observed. Rewarming was equal after the 2 modalities, highlighting a more rapid increase of the skin temperature after hyperbaric gaseous cryotherapy.

CONCLUSIONS:

Hyperbaric gaseous cryotherapy projection decreased the skin temperature of the cooled and contralateral hand, suggesting a systemic skin vasoconstriction response. On the other hand, the vascular responses triggered by ice pack cooling appeared limited and localized to the cooled area.