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Ilex Increases Cutaneous Blood Flow by Augmenting Endothelium-Derived Hyperpolarizing Factors

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(No relationships reported)

Menthol containing topical analgesics are used for pain relief and as adjunctive cryotherapy. However, the effect of these topical agents on skin blood flow (SkBF) has not been fully elucidated.

PURPOSE: To determine the effects of a commercially available analgesic gel (BioFreeze®), and isolated ingredients menthol, and ilex paraguarensis on nitric oxide (NO) and endothelium-derived hyperpolarizing factor (EDHF)-mediated cutaneous vasodilation.

METHODS: Standardized reactive hyperemia (RH: 5 minute arterial occlusion) and local heating (LH: 42°C) protocols were performed on 10 healthy human subjects to investigate EDHF and NO-mediated vasodilation, respectively. Four gels were applied to separate sites on the ventral forearm: 1) placebo, 2) topical analgesic, 3) menthol, and 4) ilex. Local skin temperature at each site was controlled with a local heater. At the conclusion of each protocol maximal cutaneous vasodilation was elicited (43°C). Red blood cell flux was measured using laser speckle contrast imaging, normalized to cutaneous vascular conductance (CVC: flux/mean arterial pressure) and expressed as a percent of maximum CVC (%CVC_{max}).

RESULTS: %CVC_{max} during thermoneutral baseline was increased with the topical analgesic and ilex, but not menthol. The total hyperemic response (THR) was increased with the topical analgesic and ilex compared to both menthol and placebo gels. Only ilex was significantly different from placebo in response to LH.

Gel	Baseline (%CVC _{max})	THR (%CVC _{max} *sec)	LH (%CVC _{max})
Placebo	20 ± 2	5913 ± 792	74 ± 3
Topical Analgesic	58 ± 5*	18941 ± 3345*	78 ± 1
Menthol	20 ± 2	5242 ± 606	78 ± 3
Ilex	63 ± 7*	18760 ± 3021*	80 ± 2*

* indicates significantly different from placebo (p<0.05)

CONCLUSION: Menthol and placebo gels had no effect on SkBF, however commercially available analgesic gels containing ilex augmented SkBF during thermoneutral baseline and during RH. These data suggest that ilex augments SkBF largely through EDHF-dependent mechanisms.

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Racial Differences In Cardiac Response Following An Acute Bout Of Aerobic Exercise

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PURPOSE: To examine the cardiac responses following an acute bout of aerobic exercise in African Americans (AA) and Caucasians (CA).

METHODS: 24 young healthy CA (n=12, age: 25 ± 3 yr, VO2peak: 47.7 ± 2.7 ml/kg/min) and AA (n=12, age: 28 ± 2 yr, VO2peak: 41.9 ± 2.3 ml/kg/min) performed 45 min of moderate intensity aerobic exercise on a treadmill at 70% of heart rate reserve. Cardiac output (CO), end diastolic volume (EDV), end systolic volume (ESV), ejection fraction (EF) and stroke volume (SV) were measured by ultrasonography at rest (rest), 30 min (P30), and 60 min (P60) following exercise.

RESULTS: Table 1. Significant main effect of time (§ p<.05) and race († p<.05) and interaction (* p<.05) were found in SV and CO. Significant main effect of race and interaction were found in EF (p<.05). Significant main effect of time and interaction were found in EDV (p<.05).

CONCLUSIONS: These data suggest that AA and CA have differential cardiac responses following an acute bout of aerobic exercise. The changes in SV and CO were primarily attributed to changes in venous return and cardiac contractility. Future work is needed to verify the clinical significance of these cardiac responses.

Table 1. Cardiac responses to an acute bout of aerobic exercise

	CA			AA		
	rest	P30	P60	rest	P30	P60
EDV (ml) §*	128 ± 9	144 ± 10	126 ± 10	126 ± 8	125 ± 9	130 ± 9
ESV (ml)	58 ± 5	59 ± 6	57 ± 5	66 ± 4	67 ± 5	68 ± 5
SV (ml) §†*	70 ± 6	85 ± 6	69 ± 6	60 ± 5	58 ± 6	61 ± 6
CO (l/min) §†*	4.7 ± 0.5	6.1 ± 0.6	4.8 ± 0.4	3.7 ± 0.4	3.7 ± 0.6	3.8 ± 0.4
EF (%) †*	54.9 ± 1.9	59.1 ± 2.6	55.0 ± 2.0	47.4 ± 1.8	45.6 ± 2.4	47.0 ± 1.9