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Authors
Kao, BS
Kelly, KM
Aguilar, G
et al.

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A COMPARISON OF COLD AIR AND SAPPHIRE

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EVALUATION OF TISSUE EFFECTS AFTER CRYOGEN SPRAY COOLING EXPOSURE

Bunsho Kao,[1,2] Kristen M. Kelly,[1] Guillermo Aguilar,[1] Ronald J. Barr,[1] and J. Stuart Nelson[1]

[1] *University of California, Irvine, California*

[2] *Showa University, Tokyo, Japan*

Background and Objective: To better characterize the epidermal and dermal effects of Cryogen Spray Cooling (CSC), we exposed RAFT (human tissue skin model) specimens to CSC spurts of varying duration and then performed serial histologic evaluations over a period of 1 week.

Study Design/Materials and Methods: RAFT model specimens were exposed to CSC spurt durations of 10, 20, 40, 80, 100, 200 and 500 ms. Biopsies were taken immediately after CSC exposure and at 3 and 7 days post-exposure. Hematoxylin and Eosin (H&E) sections were prepared for evaluation of potential epidermal and dermal injury. Additional sections were stained with Ki-67 and Melan-A to identify and confirm keratinocyte and melanocyte viability, respectively.

Results: Minimal, transient epidermal changes were noted in specimens exposed to CSC spurt durations up to 100 ms. Keratinocytes and melanocytes remained viable and continued to proliferate normally in these specimens. At 1week, all epidermal changes were resolved and normal RAFT histology was observed. CSC spurt durations of 200 ms or longer resulted in partial thickness epidermal necrosis at 3 and 7 days. No dermal changes were noted in any of the specimens.

Conclusion: CSC spurt durations of up to 100 ms induce minimal if any epidermal damage or melanocyte injury. When used correctly, CSC does not impose a risk of cold-induced injury.