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EVALUATION OF TISSUE EFFECTS AFTER CONTINUOUS VERSUS SHORTER MULTIPLE INTERMITTENT CRYOGEN SPRAY COOLING EXPOSURE

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Background and Objectives: A previous RAFT tissue culture study indicated that continuous cryogen spray cooling spurts of 80 milliseconds or less are unlikely to cause cryo-injury. In this study, the epidermal and dermal effects of a continuous spurt versus shorter multiple intermittent spurts with the same total cryogen-delivery time are compared in the RAFT model.

Study Design/Materials and Methods: RAFT tissue culture specimens were constructed using human fibroblasts and rat-tail collagen for the dermal layer and human melanocytes and keratinocytes for the epidermal layer. Specimens were exposed to cryogen using the GentleLASE[®] nozzle (Candela Corporation, Wayland, MA). Four different spurt sequences, each spraying a total of 40 milliseconds of cryogen-delivery time, were evaluated (spurt duration is in bold and delay time between spurts is underlined): 40 milliseconds continuous spurt; **20-10-20** milliseconds; **10-10-10-10-10-10-10** milliseconds; and **5-10-5-10-5-10-5-10-5-10-5-10-5-10-5**. Biopsies were taken immediately and days 3 and 7 post-exposure.

Results: Minimal epidermal change was noted with the 40 milliseconds continuous spurt. Progressively more epidermal change was noted as the total 40 milliseconds cryogen-delivery time was divided into shorter multiple intermittent spurts. No dermal change was noted in any of the specimens.

Conclusions: Dividing the total cryogen delivery-time into shorter multiple intermittent spurts increases the risk of cryo-injury as opposed to a single continuous 40 milliseconds spurt.