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The cryobiology of cryosurgical injury

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Abstract

Cryosurgery, or tissue destruction by controlled freezing, has been investigated as a possible alternative to surgical intervention in the treatment of many diseases. This technique, which is under the larger category of thermal therapy, has its origins in the 1800s when advanced carcinomas of the breast and uterine cervix were treated with iced saline solutions. Since those early times, this technique has been used routinely to treat malignancies on the surface of the body (ie, dermatologic tumors) and has gained some acceptance as a clinical tool for the management of internal malignancies, including carcinoma of the prostate and kidney. The main advantages of the technique are the potential for less invasiveness and lower morbidity compared with surgical excision. The study of the destructive process of freezing is the focus of this article and is divided into 2 main areas: (1) understanding the mechanism by which freezing destroys tissue, and (2) understanding the thermal history that causes tissue destruction. The term "thermal history," as used in this article, will mean the time-temperature history experienced by the tissue during a thermal insult.



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