



# CRYOSURGERY FOR THE GP AND GP SKIN SPECIALIST

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CRYOSURGERY involves the use of local freezing for the controlled destruction of unwanted living tissue. Since the technique involved is simple, cryosurgery lends itself to its use in the treatment of skin lesions in general practice. However, it is important to have a clear understanding of the principles involved. Inappropriate treatment of even benign skin lesions can lead to unnecessary complications and complaints and poor selection and inadequate treatment of malignant tumours can result in poor results and serious problems for the patient. This article is confined to the management of benign and premalignant skin lesions.

## 1. The refrigerant

Table 1 Surface tissue temperatures attainable with various cryogenes	
Cryogen	Temperature (degree C)
Carbon dioxide snow	- 79
Nitrous oxide	- 75
Liquid nitrogen	- 20 (cotton-wool bud)
	- 180 (spray)
	- 196 (probe)

In the past various refrigerants have been used in clinical practice. Table 1 shows the types of cryogenes now available together with their surface temperature reductions. Whilst -20oC is adequate for the treatment of benign and more superficial skin lesions, subzero temperatures of -50oC are required for the treatment of malignant lesions. Clearly, liquid nitrogen with its boiling point of -196oC has the greatest "lethal" subzero temperature for tissue destruction and as it is now readily available and relatively cheap, it is the cryogen of choice in both primary and secondary care. In general practice a supply of liquid nitrogen can be organised from various sources.

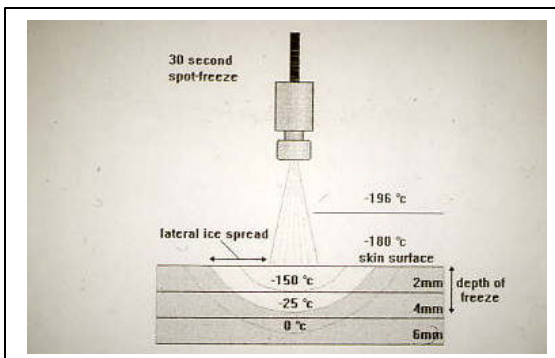
- Most cryosurgery suppliers, as part of their contract, also sell or rent out storage flasks of various sizes and provide a source of liquid nitrogen.

- The pharmacy department at the local District General Hospital will often be happy to supply liquid nitrogen. In this situation, it is often best to organise groups of patients into a regular clinic so that liquid nitrogen transportation can be arranged on, say, a monthly basis using a transit flask with a protective container.
- Whilst in general practice, the author had a 50-litre Dewar storage flask at the Health Centre which is topped up by BOC suppliers every 6 weeks.

## 2. Training and experience

Nurses should not treat skin lesions that have not been seen and diagnosed by a GP. No lesion should be treated by cryosurgery unless its diagnosis is certain or a pre-treatment biopsy has been undertaken. Most histopathologists find freeze biopsies unsatisfactory. It is essential that the operator is confident in treating benign lesions before extending his or her experience in the field of premalignant and malignant skin lesions.

## 3. The cryofreeze – spot freeze



During a cryofreeze, a white "icefield" is formed on the skin surface. Histologically, the cryofreeze causes ischaemia and necrosis by direct cellular damage and

Whilst the degree of tissue damage is partly related to the length of the freeze time employed, other factors play an important part. Different cells and tissues have their own sensitivity to cold and the vasculature of the underlying tissue also affects the speed and degree of cold damage.

### Relative sensitivities to low temperatures

Cell/tissue/organism	Sensitivity
Melanocytes	Sensitive to Cold injury (easily killed)
Basal cells	
Keratinocytes	
Bacteria	
Connective tissue	
Neural connective sheath	
Blood vessel endothelium	Insensitive to Cold injury
Viruses	

#### 4. Equipment and method



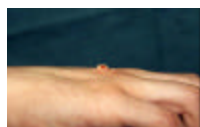
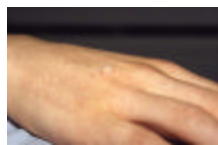
Using the cotton-wool bud technique, one can not achieve tissue temperatures lower than  $-20^{\circ}\text{C}$ . Hence the method is only suitable for treating thin, benign skin lesions or thin solar keratosis.



With the closed delivery system, of which there are several designs of hand-held cryosurgical units, one can achieve subzero temperatures of  $-40$  to  $-50^{\circ}\text{C}$  at sufficient depth to treat skin malignancies such as BBCs and even some SCCs (Fig 1).

When using the spray technique to treat skin lesions greater than 2cm in diameter or of an irregular outline, one can modify the 'spot-freeze' technique by applying the liquid nitrogen in a paint-spray or spiral fashion to produce an even freeze over the whole lesion.

Thicker lesions such as raised warts that contain much keratin are relatively resistant to cryosurgery. They are best paired down using a scalpel blade or emery board before the liquid



Best results are obtained by pairing away much of the keratin and then, using an auroscope earpiece of an aperture size to include the wart, spraying the liquid nitrogen down the ear-piece on to the wart until an ice-halo around the tip is produced. This technique ensures a good depth of localised freeze without freeze damage to the surrounding normal tissue.

Whether treating benign or malignant skin lesions, it is important to record freeze times, cycles and methods used. This ensures a correlation between freeze times, method and outcome and enables other clinicians following up the patient to choose or adapt further management accordingly.

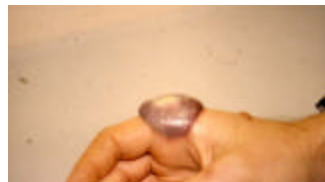
## 5. Lesions and suitability for cryosurgery

### a) Warts



Most warts can be treated at home using over-the-counter preparations such as Salatac (Salicylic acid 12%, lactic acid 4%) gel or Cuplex (Salicylic acid 11%, lactic acid 4%, copper acetate) gel.

If cryosurgery is considered appropriate, some common warts and plane flat warts can be treated by the liquid nitrogen cotton-wool bud technique or by the spot-freeze spray technique. Viruses are relatively insensitive to liquid nitrogen and it is the destruction of the wart tissue that produces the results. However, the liquid nitrogen also appears to stimulate an immune response to all existing warts, which enhances the cure as well as the resistance to further infection.



The initial treatment should not be more than one application or about a five-second spray as some patients can be very sensitive to liquid nitrogen.

Subsequent management can be decided from the outcome of the initial response. Best results are obtained by repeating treatment at 3-4 week intervals e.g. a monthly clinic, until the wart(s) have been completely cleared.



Periungual warts require shorter freezes if excessive pain or damage to the nail matrix is to be avoided. Warts over knuckle joints, nerves and tendons should be treated with care.

My preferred treatment for digitate warts, particularly on the face, is curettage under local anaesthetic using a small eye-spud curette and gently cauterising the base with a fine ball-point cautery.

As keratin is a good insulator of liquid nitrogen, larger warts should be pared down with a scalpel before treatment. Thick, raised, localised warts are more effectively treated using the auroscope earpiece described above.



The over zealous treatment of warts with cryosurgery can result in unsightly and unacceptable scarring. So an initial test dose of 5-10 seconds is a useful measure in deciding the sensitivity of the patient to liquid nitrogen and in gauging the subsequent length of spray to be applied.

#### **b) Seborrhoeic warts (keratosis)**



Seborrhoeic warts become increasingly common with age and they do not normally require treatment. The indications for treatment usually include persistent irritations, unsightliness (especially on the face) or worrying changes in pigmentation and occasional bleeding.



Thin lesions can readily be treated by a relatively short, single cryospray (4-8 seconds), confining the spray to no more than 1-2mm beyond the margin of the lesion.

However, for thicker keratosis or where there is any suspicion of malignancy, especially with the heavily pigmented lesions, curettage and cauterly under local anaesthetic is the correct treatment.

### c) Pyogenic granuloma



Post-traumatic (figure of AA patrol man with history of injury to hand) or wound granuloma respond very well to cryosurgery. They may require several single 20-30 second freezes. If there is any doubt about the diagnosis, however, a pre-freeze biopsy must be taken to exclude more serious pathology.

Whilst I feel that the correct treatment for a genuine ingrown toenail is partial wedge avulsion and ablation, liquid nitrogen cryosurgery can be very useful in reducing much of the inflammatory granulation tissue before definitive surgery and may even obviate the need for further treatment. The freezing, however, should be done in successive short single freezes a few weeks apart to avoid unnecessary pain and to shrink the tissue gradually.

### d) Naevi - Skin tags, fleshy naevi and vascular lesions

The simplest treatment for skin tags and pedunculated papilloma is snip and gentle cauterly or simple shave cauterly with or without local anaesthetic, depending on the patient and the size of the lesion.

Benign, raised "fleshy" naevi, which have usually been present for many years, can be treated by cryosurgery spray or probe.

However, excellent results with minimal complications are obtained by simply shaving the lesion with a straight-edged scalpel blade just above the surface of the skin and trimming the lesion with gentle cauterly under local anaesthetic. This also enables histology to be carried out if there is any doubt about the nature of the lesion.





In my opinion, spider naevi are best treated by "cold-point" cautery using a special hot pointed needle that can be obtained with most electrocautery units.

This technique coagulates and shuts down the main subcutaneous feeder vessel, resulting in involution of the unsightly tiny tributaries with no subsequent pigmentation changes, which can result if a liquid nitrogen cryoprobe is used on the total lesion.

Haemangioma can be effectively treated by cryosurgery using either a cryoprobe or by using a cryospray employing the auroscope earpiece technique described above. However, if there is doubt about the exact pathology, excision biopsy is required.

#### **e) Solar (actinic) keratosis**



Solar keratosis result from the effect of accumulative sun exposure and are most commonly found on sun-exposed areas on the face and ears of older patients and the scalp of balding men. Thin lesion can be readily treated by liquid

However, thicker lesions, which have exhibited various changes, are best treated by curettage and cautery under local anaesthetic and the tissue sent for histology. If a solar keratosis is confirmed, no further treatment is required. However, a significant proportion of such keratotic lesions will show early or definite features of a squamous cell carcinoma, which requires more definitive treatment.

## 6. Side effects and complications

With appropriate selection of patients, adequate equipment and training and proper techniques, liquid nitrogen cryosurgery can be an excellent and effective therapeutic modality for the treatment of some benign and pre-malignant skin lesions.

Even with "benign" regimes of liquid nitrogen cryosurgery, however, side effects and occasional complications need to be understood and explained. These include pain during the freeze and thaw phase and occasional tissue swelling and blister formation – see figure above. Hence even when treating warts a relatively short freeze should be used on the first occasion and both verbal and written explanation and advice should be given to the patient.

### **Advice Sheet following Cryosurgery for Warts or Verrucae**

Your wart(s) or verruca(e) have been treated with liquid nitrogen. This destroys the warts by freezing.

They may feel sore for a day or two and sometimes a blister develops under the wart. If a blister forms you should apply an Elastoplast or simple dry dressing until the wart comes off. If the blister is very large you should see the practice nurse or one of the doctors who will advise you if it should be released or opened. The treated wart usually peels off or comes off with the top of the blister in a week or two.

If the wart has not cleared in 3-4 weeks, please arrange to see the doctor or nurse again. More than one treatment may be required.

With longer freezes, local anaesthetic should be considered and care given to explain subsequent swelling in lax tissues such as near the eyelids or lips. Pigmentation changes occur to a varying degree following cryosurgery.



Cryosurgery should not be used for even short freezes in coloured individuals. This is well illustrated in the unsightly hypopigmentation resulting from treating this young man's labial warts with liquid nitrogen using the simple cotton wool bud technique

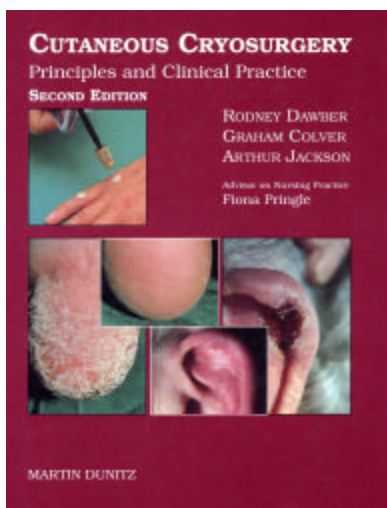
Following cryosurgery, post-inflammatory hyperpigmentation is not uncommon which later tends to fade. However, with longer cryofreeze regimes, subsequent hypopigmentation can occur resulting in a bad cosmetic outcome. Hence for patients with tanned or pigmented skin, if removal or treatment of a benign or malignant skin lesion is considered necessary, cryo surgery is best avoided.



68 year old lady at onset, at 2 weeks and 2 months with:-

1. Seborrhoeic keratosis of right temple treated by superficial curettage biopsy and gentle cautery
2. BCC of right cheek treated by double 20sec FTC using liquid nitrogen cryospray preceded by curettage biopsy two weeks earlier
3. Intradermal naevus of right upper lip treated by shave and cautery

## 7. Further reading



Further reading:

Dawber R, Colver G, Jackson A. Cutaneous Cryosurgery - Principles and Clinical Practice (2<sup>nd</sup> edition).

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