



SWISS  MADE

CRYOSUCCESS

LIQUIDFREEZING



The decisive step in  
the use of freezing  
technology

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# Skin-lesions, skin-changes, skin-diseases

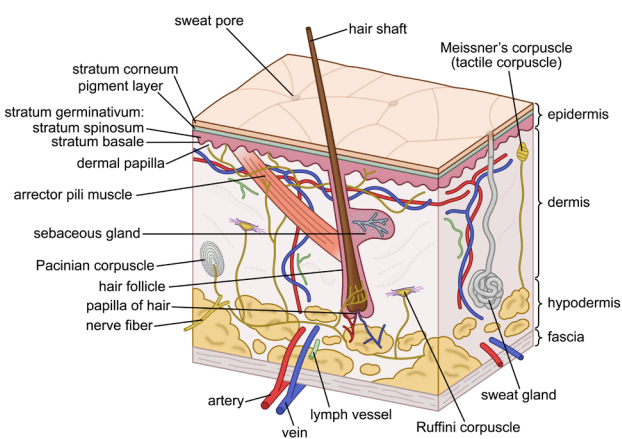
Skin changes can be observed on persons of all ages, and they have different reasons. We are generally born with a tender and sensitive skin. Big changes occur during puberty and again in an advanced age.

The aging of the skin is therefore one of the reasons for skin changes due to biological catabolism but also environmental influences, exposure to sunlight and others.

This process cannot be avoided but postponed with a good protection and care of the skin. However, not all persons are equipped with the same quality of skin and therefore there are big differences.

In addition to these natural alterations, we have to mention changes due to injuries like cuts, post-operative scars and burns and due to infections, hereditary disease and others.

Some of these skin changes can be treated in one kind or another leading to a better and nicer skin. The expectations and the results may differ a lot and it would be completely wrong to expect in principle a very high success rate. The success depends in particular on the type of the skin lesion, on the type of skin and last but not least on the applied method.



## Who treats what?

In principle, the treatment of skin lesions should be in any case under the control of a specialist.

In the first place there are the dermatologist, specialized in skin problems. However, there are minor and slighter lesions, which can be easily handled by other physicians like general practitioners, paediatricians, internists and so on.

There are also changes of the skin and the mucous membrane in the intimate area, which belong normally in the hands of gynaecologists or urologists.

Some of the most common skin lesions are warts. Vulgar warts, seborrheic warts, juvenile warts, genital warts and very often also plantar warts on feet. Because podiatrists are in charge of this part of the body, it makes sense that they make the treatment.

The law is different in almost every country and the rules who is allowed to treat. In any case of doubt or by unknown changes of the skin it is strictly recommended to consult a dermatologist. According to the situation, a pathological examination could also be mandatory.

## The way it mainly works

Patient ⇔ GP, or Gynaecologist or Urologist etc. ⇔ Dermatologist or Hospital

- Waste of time for the patient and a minimum of 2 visits
- Longer waiting time for the patient
- Higher costs for the patient or the insurance company

## Annual check-up at your office and immediate treatment

- You know the patient
- The patient feels good under your medical attendance
- No second visit to another location
- Follow up in your office
- Lower costs

# Warts

Many children but also adults have warts they would like to get rid of. Please refer to the summary of explanations below about the different types of warts.

## What are warts?

Warts are often harmless skin proliferations of the upper part of the derma and the mucous membrane, released by a viral infection of the so-called HPV (human papillomavirus) They are mainly skin coloured and are rugged to the touch, occasionally also discoloured, flat and soft. Its look depends on the location and the type.

## What kind of warts do we have?

There are several types of warts, for instance:

Vulgar-warts (*Verruca vulgaris*)



Flat-warts (*Verruca plana juvenilis*)



Seborrhoeic warts (senile warts)



Feet-warts (Mosaic and thorn-warts)



## Genital warts or fig-warts (Condyloma acuminatum)



Vulgar warts mainly grow around the nails, on fingers and on the back of the hand. They appear in the area of a pre-damaged skin.

Feet warts are usually found on the sole of the foot. When they appear in groups, they are called mosaic warts. By the constant pressure on the sole of the feet, they cannot grow outside and are pushed inside. As a result, partially very painful thorn warts are formed.

Flat warts are smaller and more flat than vulgar warts. They are softer and may appear in big numbers from 20 to 100. They appear in all locations, very often in the face of children but also in faces of men and on women legs, probably due to shaving.

Genital warts are often found on adults. Looking at their shape, they may have different forms, from small, soft and flat to big looking like a cauliflower. They appear in the area of the penis, the vagina, the portio, the anus, the end of the bowel but also on the mucous membrane of the mouth. In many cases, a relation with different cancer forms of the genital area has been proven.

## **How do I get warts?**

Warts are mainly transferred as a so-called smear infection. The time between the infection and the visibility can last a few months. In general, the risk of infection by vulgar warts is rather low. The risk for genital warts is much higher. Additional infections in the genital area or an immune weakness can multiply the risk of a contamination. Therefore, it makes sense to take precaution like safer sex in order to avoid those problems.

## **Some people get warts, others not. Why?**

Warts appear more often on skin areas, which are pre-damaged (eczemas, lacerations, erosions) or even injured. In addition, a certain kind of individual receptivity for warts can play a big role. As some individuals catch more often a cold there are some people easier catching warts. Beside normal hygienic and precautionary measures, the actual status of the immunological system is of great importance.

## **Should we treat warts?**

Looking at children and rarely at adults, warts can spontaneously disappear. The fact that warts are infectious and may attack new areas it definitely makes sense to treat them, particularly when they start to be painful.

Looking at genital warts an examination of the partner and a treatment is a must, because different types of HPV may create cancerous forms of the orifice of uterus and the uterus. In cases where relevant HPV-types were proven a long-term and close-meshed gynaecological control after a treatment is necessary.

## Pictures of treatment

The following pictures show the results on patient treatments. The first picture was taken prior to the treatment and the second picture after the treatment and a few days or weeks of recovering.

prior to the treatment



after the treatment





## There is more than just warts

The most common skin changes in practice, which can be treated successfully by Cryosuccess

Cold-surgery at a temperature of -89 °C

Extract of the indication index

<b>Indications</b>	<b>recommended application time in sec.</b>
Age pigments	1-2
Lentigo senile	2-3
Lentigo maligna	4-5
Acne	4-6
Juvenile warts	3-4
Keratosis actinica	5-7
Solar keratosis	4-5
Senile keratoma	7-8
Basiloma	8-9
Superficial spreading melanoma	3-4
Nevus pigmentosus	8
Mother's mark	8
Nevus flammeus	6
Nevocytic fibroma	8-10
Soft fibroma	4-5
Cavernous angioma	4-6
Capillary cavernous angioma	4-5
Hemangiolympangioma	6-8
Keloids	4-6
Verruca vulgaris	8-10
Plantar warts	15-20
Seborrheic warts	6-8
Molluscum contagiosum	3-5
Chronic erythematosus	3-5
Granuloma anulare	5-6
Prurigo nodular	4-6
Lichen ruber papelu	4-6
Condyloma	8-12
Spinocellular carcinoma	8-10
Sarcoma	8-10
Lid basiloma	6-10
Lid tumor	6-8
Labium carcinoma	2-5

These are only recommended application times. They depend on the thickness of the skin and other factors.

## Treatment possibilities

A big part of skin lesions, injuries and sicknesses can be treated. The success depends finally yet importantly from the chosen method.

According to the situation, different possibilities can be taken into consideration. In the past, normally the scalpel or a sharp spoon was used. Today more and more doctors are working with either an electrotome or a laser. These methods may absolutely achieve success but not without leaving scars, because the cells and the tissue are destroyed. In addition to this, they are often painful requiring a local anaesthesia and carrying a certain risk due to their heat, especially in case of cancerous changes.



**Scalpel**



**Sharp spoon**



**Electrocautery**



**Laser**

As an alternative, cryosurgery has been used for a long time. Anaesthesia is normally not necessary, cell structures are in general not destroyed, scars are seldom (depending on the type of skin) and the cold effect avoids a diffusiveness.

There are many different treatment possibilities for warts. Beside the mentioned methods we can talk about the application of acids and salves, the under injection and a combination of these different possibilities.

In principle, every method can be successful, but no method is guaranteed to achieve it, because a 100% success rate cannot be guaranteed.

# Advantages of cryosurgery

## What are the advantages of cryosurgery versus other treatment possibilities?

- No destruction of biological function or structures
- Excellent cosmetic effects
- Seldom scar formations
- Non-bleeding treatment
- No anaesthesia required
- Practically painless, therefore suitable for sensitive patients
- Most symptoms disappear after just one treatment

## Cryosurgery

So far in cryo-surgery there are actually two different systems used in hospitals, at dermatologists and in other offices. As a supplement, there are also disposable systems working with a gas mix.

### Nitrogen N<sub>2</sub>

Nitrogen has been used for decades in hospitals and dermatological offices. The high cold performance of -196° C is very efficient. To avoid unnecessary damages, the application time must be kept very short. It is important that everyone works out the right time, not only to avoid damages by long applications, but also to avoid that the time is too short, what would result in a repetition of the treatment. Only a short increase of time might be quite painful. Nitrogen has the characteristic to evaporate very quickly and the cost for one fill is rather high. In addition, in many countries, there is no nitrogen delivery at all and even in Europe, it is sometimes too expensive to deliver nitrogen into the countryside. The handling is not without risk. The small cans allow the use of different probes but are bulky and not very advantageous for a precise application.

## Can for nitrogen



## Small cans for nitrogen



## Nitrous oxide N<sub>2</sub>O

Nitrous oxide is also used for decades in doctors' offices. The cold performance is much lower and is at  $-89\text{ }^{\circ}\text{C}$ . All systems are equipped with a handgrip with exchangeable probes and a connection to the gas bottle. The fact that the probes are cooled down, the loss of cold comes up to almost 50 % what has a big influence of the effectiveness. Therefore, only a part of the desired treatments can be executed, and this is the reason why the system is almost not used any more.



Pistol for nitrous oxide



## Gas mix

For a few years, disposable systems based on a gas-mix have been available in the market and mainly used by general practitioners. The start up temperature is around  $-55\text{ }^{\circ}\text{C}$  and the probes are also cooled down. Therefore, the performance lies even below the nitrous oxide systems and even less treatments are possible.

## Gas mix



## Techniques to generate low working temperatures

Depending on the type of indication, in dermatological cryosurgery, mainly working temperatures between  $-70\text{ }^{\circ}\text{C}$  and  $-196\text{ }^{\circ}\text{C}$  are used. There are different techniques to generate cold, so for instance thermoelectric cooling, the release of high compressed gas like  $\text{CO}_2$  ( $-78,5\text{ }^{\circ}\text{C}$ ) and  $\text{N}_2\text{O}$  ( $-89\text{ }^{\circ}\text{C}$ ) and different liquid gas-mix. With the exception of  $\text{CO}_2$  and  $\text{N}_2\text{O}$  all cold performance are somehow in between approx.  $-30\text{ }^{\circ}\text{C}$  to approx.  $-55\text{ }^{\circ}\text{C}$ . Therefore, the operational area of these methods is strictly limited and not sufficient for a lot of applications, especially tumours but also other lesions. Now as before nitrogen reaches with  $-196\text{ }^{\circ}\text{C}$  still the highest performance but the liquid phase of  $\text{N}_2\text{O}$  with a constant temperature of  $-89\text{ }^{\circ}\text{C}$  should, in its effectiveness not be underestimated versus  $\text{N}_2$ .

## Technique in cryosurgery treatment by the liquid phase of the Cryosuccess-system

The Cryosuccess units work based on expansive cold, whereby liquid N<sub>2</sub>O (nitrous oxide) is brought through a micro capillary under a constant remaining temperature of -89 °C (184.4 K) directly onto the area to be treated. A freezing in a tissue depth of 3 mm, by a diameter of 10 mm, is reached after 12 seconds of application time (theoretical indication). This means, the destruction of the tissue was reached at -40° C, recognizable at the frozen skin area for 2-3 seconds. Patients feel a light tickle after the treatment close to the feeling of a mosquito bite. In the following days, usually a necrosis is built, peeling after 10 to 14 days. Normally the pigmentation comes back after a few weeks, but can take more time, depending on the type of skin.

As a rule, pain is normally not felt, but because some people are more sensitive to pain, a raised sensitivity can be observed especially when big lesions are removed.

## How is cryosurgery reacting in tissue?

The formation of extra- and intra cellular ice-crystals in treated tissue is of great importance because this creates cell destruction with secondary consequences. In freezing rapidly almost simultaneously extra- and intracellular ice-crystals are created, so called a homogenous nucleation, while slow freezing creates first only extra-cellular and only with a certain delay intracellular ice-crystals, so called a heterogeneous nucleation.

In this connection we talk about different phases, the physical, the vascular phase and the immunological.

The direct destruction of tissue and cells by ice-crystal formation as well as secondary structure changes in thawing during one or several successive freezing-thaw cycles, is terminated in thawing.

Irritations of the micro-circulation in the frozen area for up to 48 hours leads secondary to tissue anoxia and more destruction especially in the fringe.

Antigen characteristics in the physical phase of changed and released tissue particles could lead to secondary effects also outside of the treated area.

Furthermore, modified factors, different tissue sensitivity, typical secondary effects and contra indications are added.

Important are speed of the temperature decrease, lowest reached temperature, duration of freezing, volume of the frozen tissue and lapse of time of thawing. The most effective way is quick freezing, followed by slow thawing. Thereby, 99% of the cells per treatment are destroyed in vitro.

By cryosurgery, cells are destroyed, but as a rule in a selective way and therefore the connective tissue structures are preserved. This is highly important when comparing other methods. The risk of scar deformation is much lower. In addition, cells of different tissue are also different in cold sensitivity.

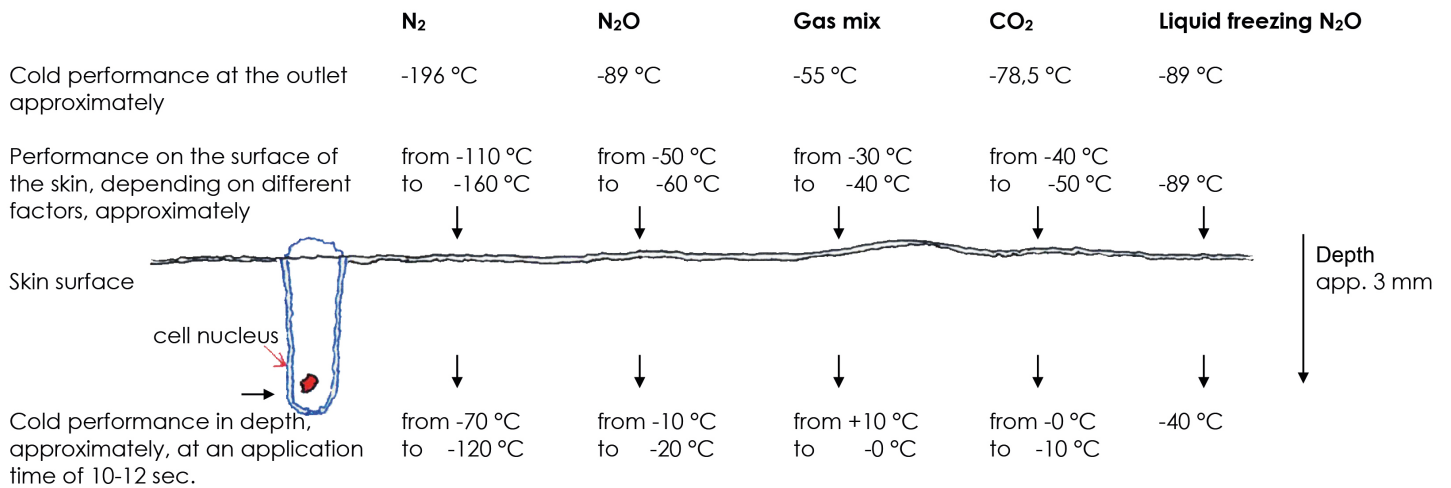
Looking at the submitted explanations, side effects could be a result of it. Especially in dark or high tanned skin, cryosurgery treated areas may be de-pigmented by a loss of cell-pigmentation. The re-pigmentation could last for years and as a result of sun-radiation, they could also show stronger pigmented fringes.

**Indications to the technique and the mechanism in the tissue are found in many published studies, abstracts and guidelines for cryosurgery. For detailed information contact the country specific medical association.**



# Cold performance of different systems and technologies looking at plantar warts as an example

(Theoretical calculation with possible deviations, because there are no precise data from producers beside Cryosuccess (Liquid freezing)

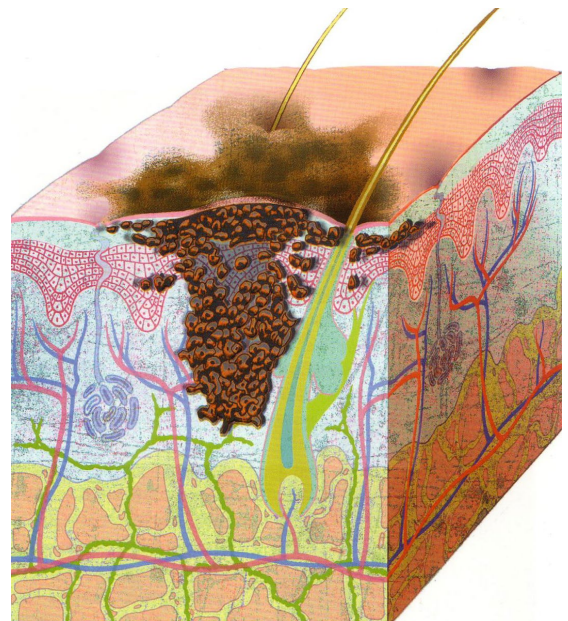
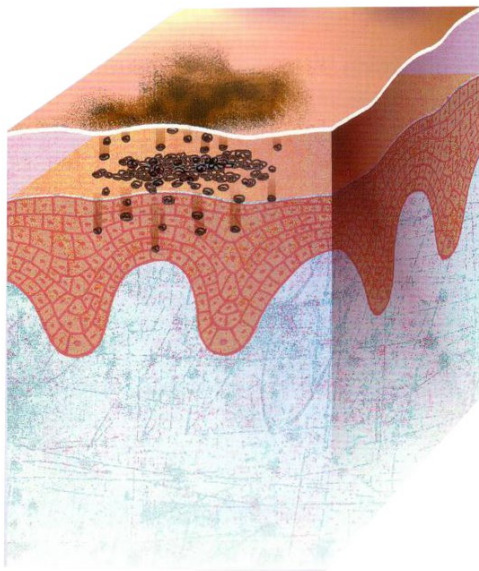
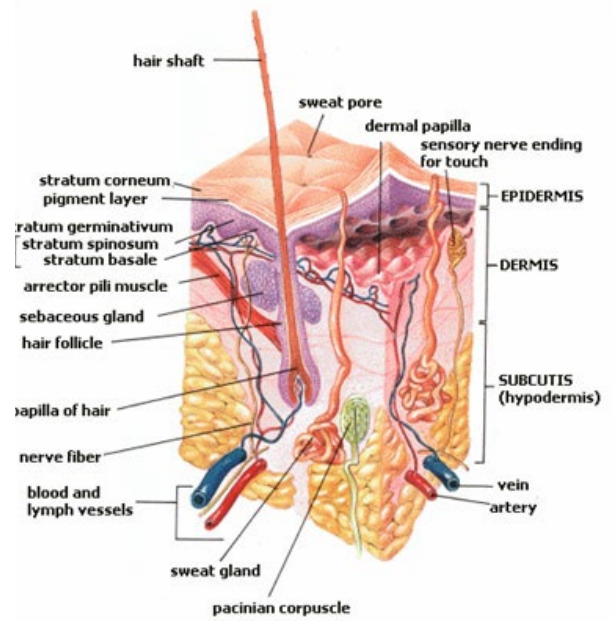
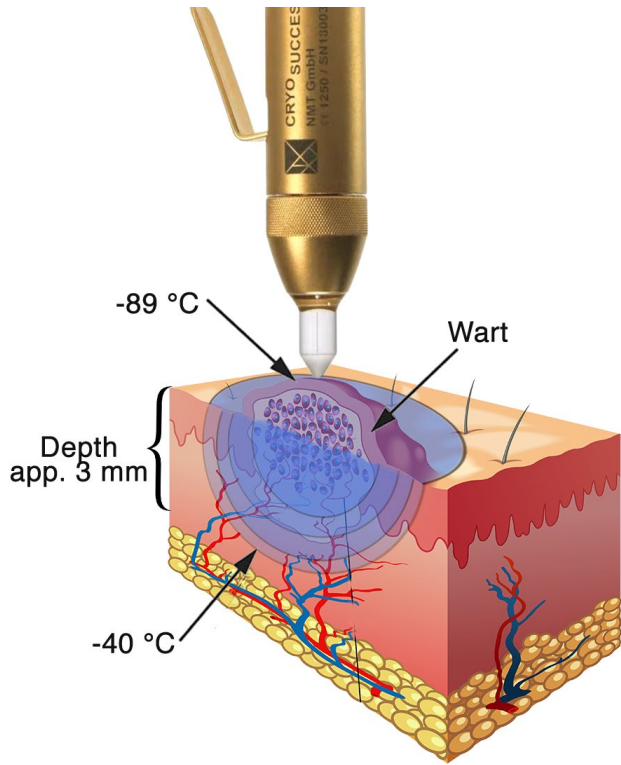


To reach a quick destruction of the cell nucleus, a temperature of approx. -40°C in the above-mentioned depth is mandatory.

This cold performance must run very quickly and should be reached within 10 to 12 seconds. The indicated approx. performances are linked to this application time. The application times can, of course, be increased. But with that, the risk of a complete destruction around the lesion in the upper parts is also raising. For all calculations, the fact that a smaller or bigger loss of cold (between the cold source and the surface of the skin), depending on the system and the technology, must be included.

Only with the liquid phase there is no loss. The cooling of the skin absorbs, by the presence of the body temperature, performance and this loss of performance is increasing in the depth. In a depth of 4-5 mm, a treatment outgoing from the skin surface, cannot be done. On this level an ice barrier is formed and a deeper penetration impossible. Considering that theoretical calculations are in the game, the practice clearly shows, that too low cold performance will never lead to a successful treatment.

# Skin



# The treatment

As for every treatment, a careful preparation is necessary. The following points are an important part of it:

- Anamnesis
- Clinical aspects
- Pathological examinations
- Enlightenment of the patient
- Choice of the procedure
- Precautions
- Indications
- Execution of the treatment
- After-treatment
- After-treatment check up

The preconditions for all treatments are a good knowledge of the user concerning the method, the organs, and sicknesses, to be aware of the possible success but also the risks.

# Cryosuccess

## Liquidfreezing - the good choice!

With the Liquidfreezing-system the engineers found the last issue in cryosurgery. Cryosuccess also works based on nitrous oxide with a temperature of  $-89^{\circ}\text{C}$ . The invention and the decisive step is „the liquidfreezing“ phase. We do not cool down the probes, like in all former systems. We transport the liquid gas to the top of the tip and from there onto the skin. Thereby, we have a constant temperature of  $-89^{\circ}\text{C}$ , which opens new treatment possibilities almost similar to nitrogen.

The important point in cryosurgery is to reach a cold performance in a certain time in a certain depth to assure that the necessary destructive power will be achieved. Only nitrogen and the “liquidfreezing“ of Cryosuccess can fulfil this requirement.

Cryosuccess has also other advantages.

- Recommended application times
- Handy like a pen
- Different tips for different applications
- Always ready for use
- Easy and almost painless treatment
- Good patient acceptance
- Moderate costs
- Easy to use

Studies to the different methods and to cryosurgery in general are found worldwide in a big number.

## Study references

### Concerning liquidfreezing please refer to

Hundeiker M.: Simplified Technology for Cryotherapy, tägl. prax 42, 311-314 (2001)

“Liquid Freezing“ in Aesthetic Dermatology M. Hundeiker

Cryosurgery in Office Dermatology. An Update M. Hundeiker, ID Bassukas

## The device

