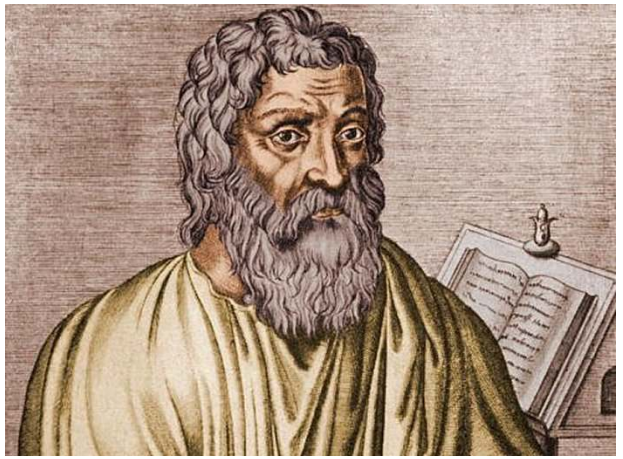
Cryotherapy for chronic pain

Christophe Perruchoud, MD
Morges - Switzerland

Pavia, IT, November 2017

History of cryotherapy

Hippocrates (460-377 BC) reported the use of ice, describing how **snow** was applied to wounds for pain relief.



Dominique-Jean Larrey, Napoleon's Surgeon General, noted in 1812 that half-frozen soldiers in the Moscow battle were able to **tolerate limb amputation** with little or no pain

Trescot A, Pain Physician, 2003

History of cryotherapy

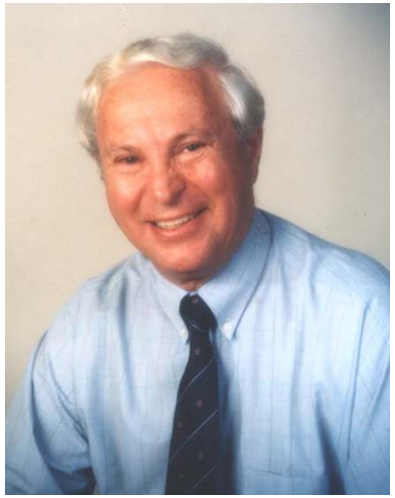
Arnott promoted the **application of cold** to relieve certain types of cancer and nerve pain, using mixtures of ice and salt at –20ºC

Richardson introduced ether spray in 1866 for topical anesthesia :“**to freeze**” became synonymous with “**to numb**”.

Trescot A, Pain Physician, 2003

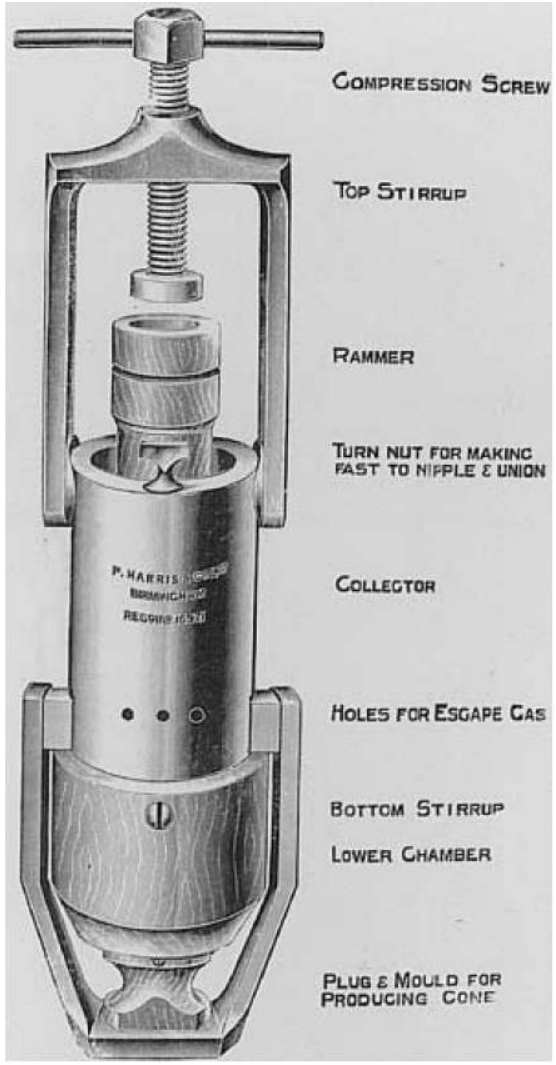
Modern cryoanalgesia

Cooper developed in 1961 a device using liquid nitrogen and insulated at the tip with temperature of **–190ºC** …



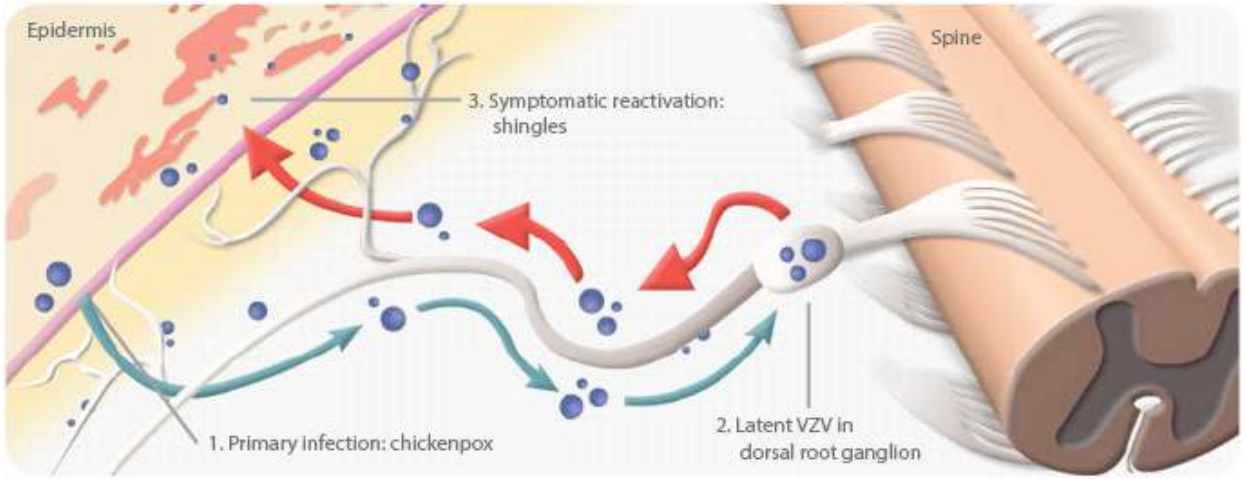
Amoils, an ophthalmic surgeon, developed a simpler hand held device in 1967, using carbon dioxide or nitrous oxide and could achieve temperatures of **–70ºC**.

Trescot A, Pain Physician, 2003

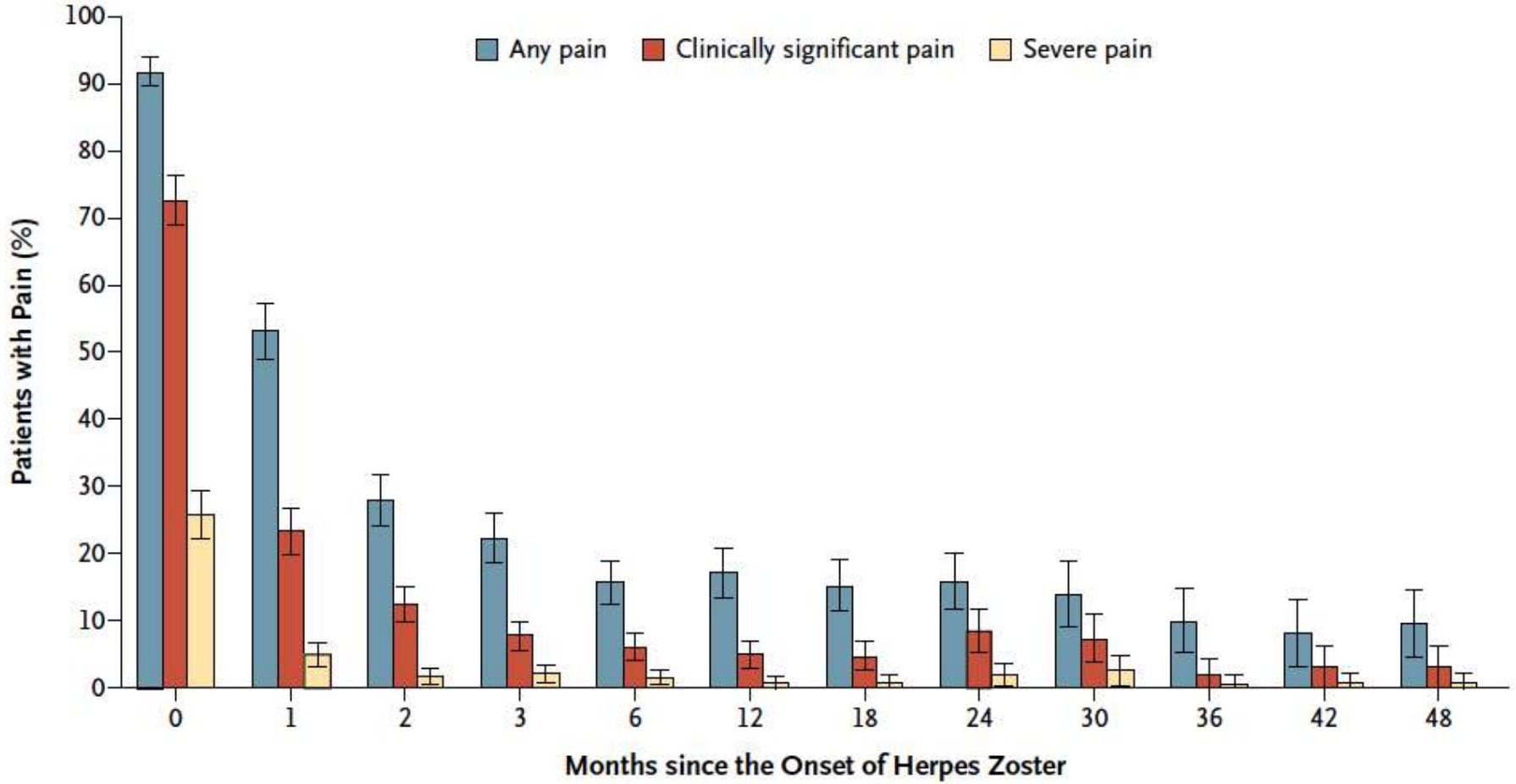


Hall-Edward's carbon dioxyde snow collector and compressor (1911)

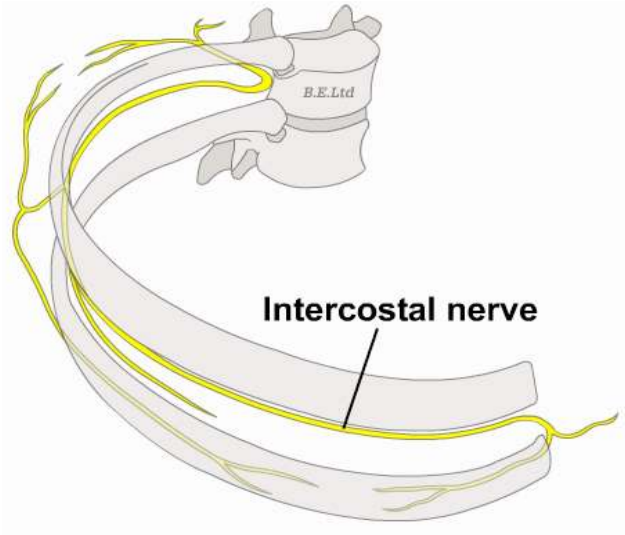
Postherpetic neuralgia



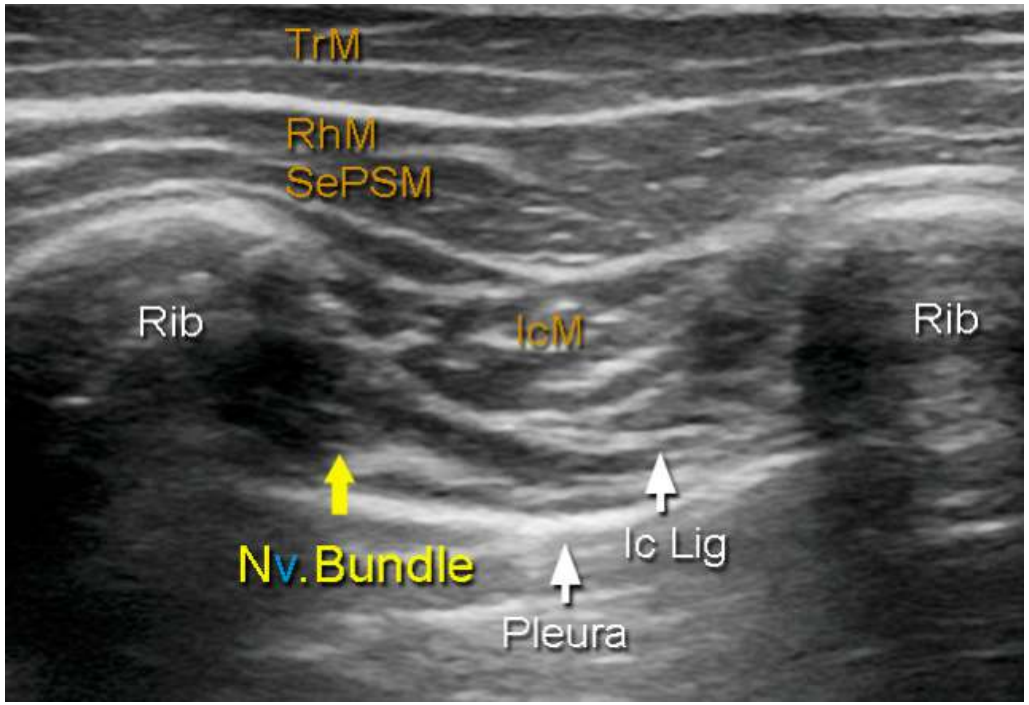
Postherpetic neuralgia



Intercostal nerves cryotherapy



Intercostal artery may be responsable for local heat sinks !!!
Cave : Pneumothorax



Images : www.nysora.com

Postherpetic neuralgia

- Green studied the effect of cryotherapy in 43 patients with PHN.
- At 3 months FU, 50 % of patients described a significative improvement of pain
- No patient developped a neuroma and pain relief lasted beyond the sensitive recuperation.

Green CR et al. Longterm follow-up of cryoanalgesia for chronic thoracic pain. Reg Anesth 1993

International Journal of Dermatology
2011

Pharmacology and therapeutics

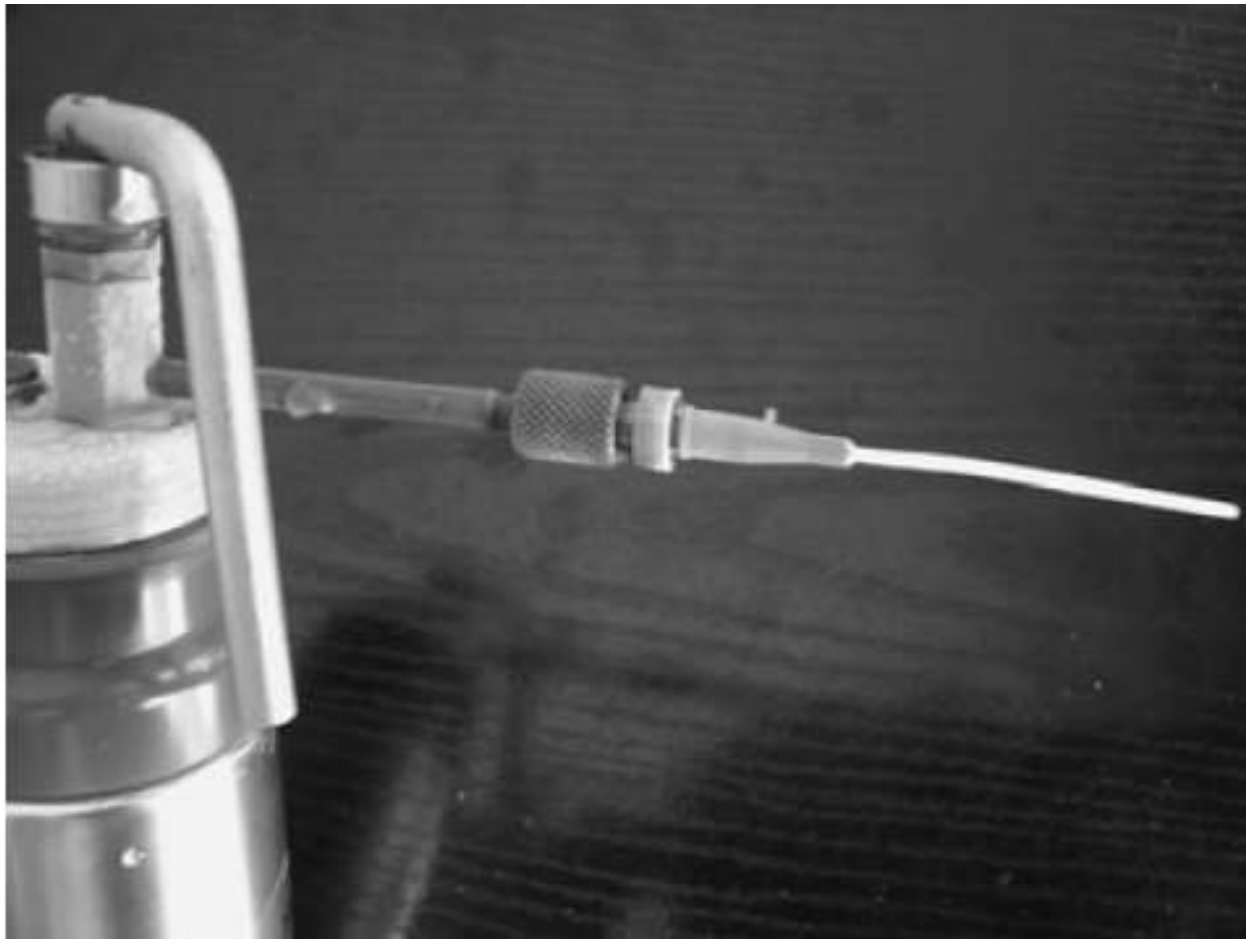
Cryoanalgesia for post-herpetic neuralgia: a new treatment

Liliana Calandria, MD

Abstract

The existent therapeutic options for post-herpetic neuralgia (PHN) are varied, albeit not sufficiently effective. The aim of this study was to try a new treatment modality for PHN. A spray of liquid nitrogen (LN) was used in 47 patients suffering from PHN as a stimulator of a mechanism not yet completely understood. The LN spray was carefully applied (so as not to freeze the skin surface) along the diseased sensory nerve dermatome, at weekly sessions lasting for 30 seconds each, with a mean of three applications per patient. The area corresponding to the dermatomes affected by the herpes zoster satisfactorily attenuated the herpetic neuralgia in all patients. Before the sixth treatment session, good or excellent improvement was obtained in 94% of the study patients. Pain was eliminated with one session in nine patients (19%), and with two sessions in eight patients (17%). We conclude that this non-freezing technique is absolutely safe and injury-free, and is very efficient in calming PHN.

Spray of liquid nitrogen



Patients and method

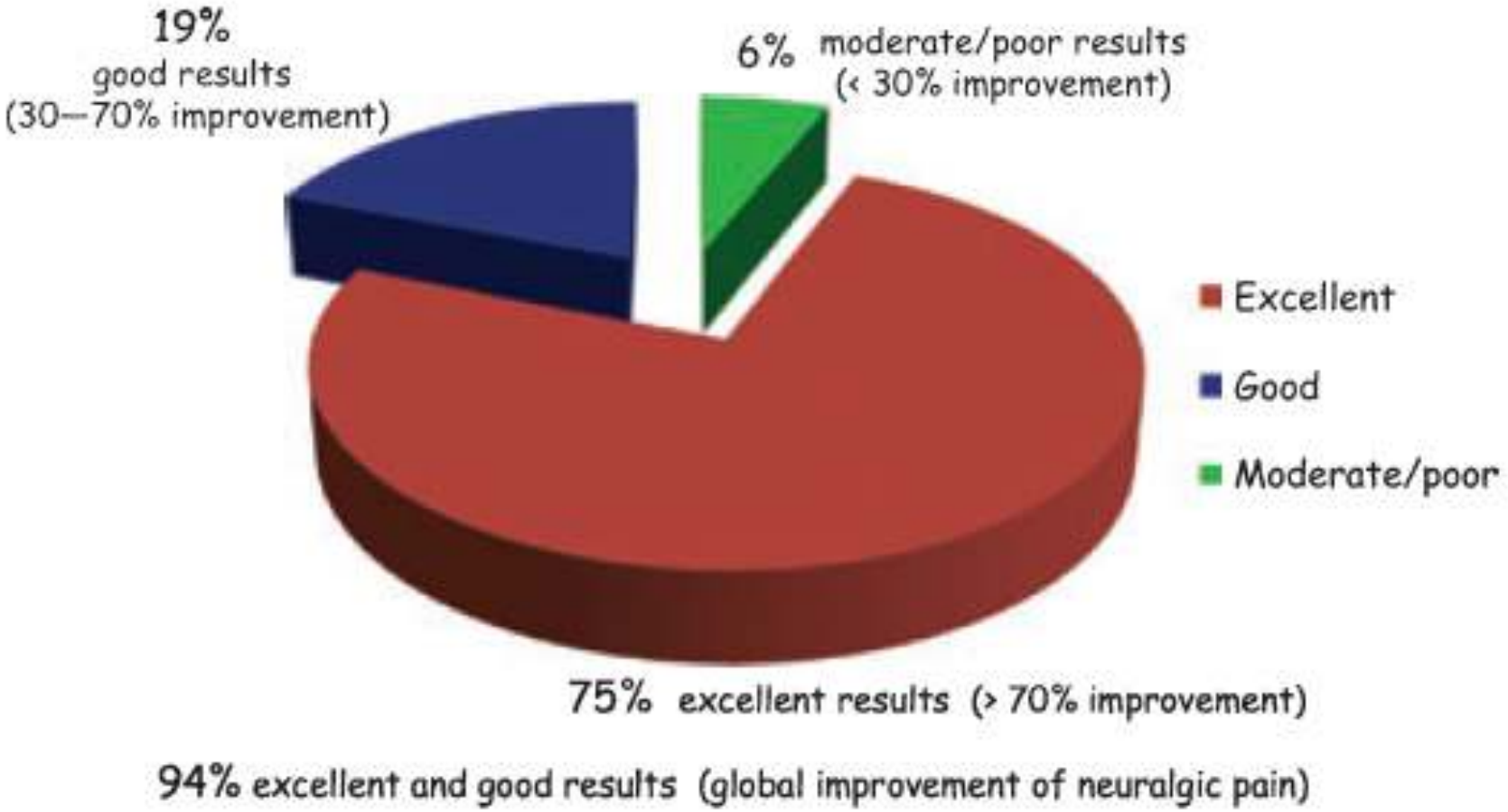
Location	Patients (n = 47)	%
Cephalic	13	27.7
Cephalic/cervical	3	6.4
Thoracic	24	51.0
Lumbar	2	4.3
Abdominal	4	8.5
Leg	1	2.1

Duration	Patients (n = 47)
1 week–1 month	19
2 months–1 year	15
>1 year	13

No. of sessions	Patients (n = 47)
1	9
2	8
3	5
4	7
5	4
6	5
7	2
8	1
10	1
12	1
14	2
20	2

Mean number of NFT sessions = 5.

Results


19%
good results
(30–70% improvement)
6% moderate/poor results
(< 30% improvement)
Excellent
Good
Moderate/poor
75% excellent results (> 70% improvement)
94% excellent and good results (global improvement of neuralgic pain)

Pilot study with the Cryo-T Duo in PHN patients

7 Patients

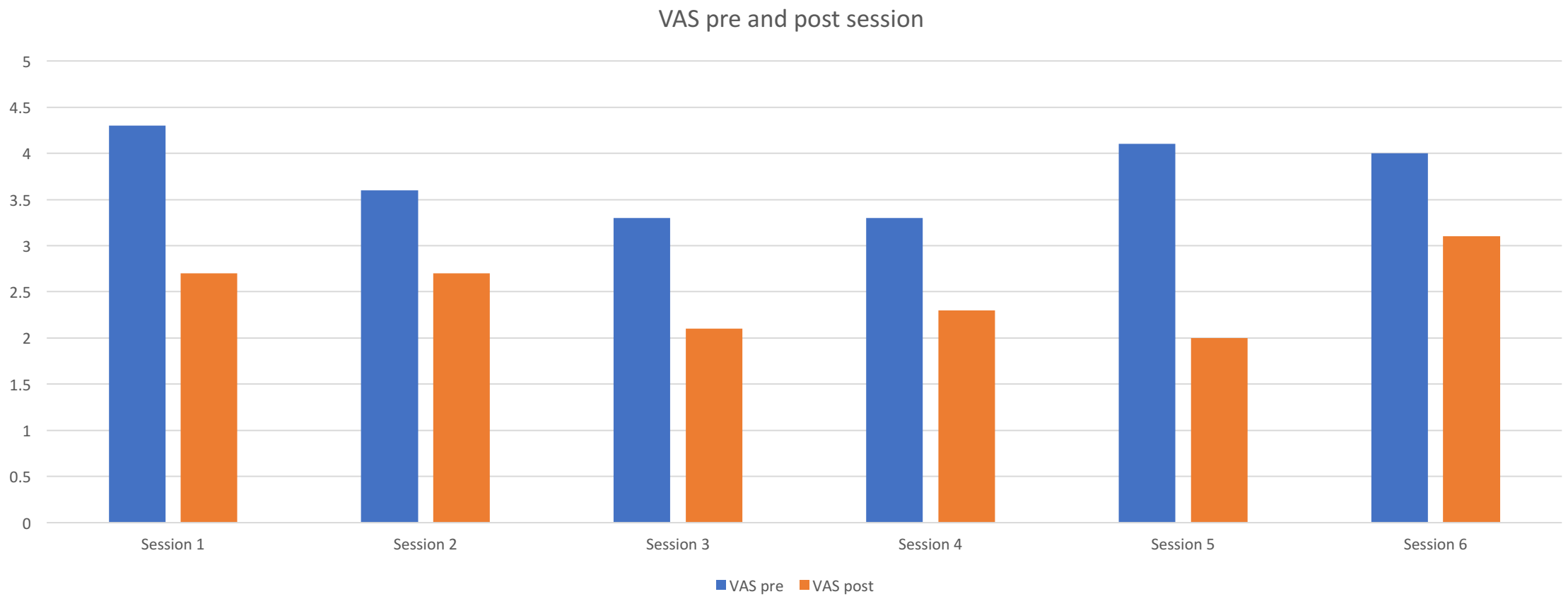
- 4 females, 3 males
- Mean age 67 y-old (45-80)
- Mean duration of PHN : 18.4 months (4-46)
- All patients treated with antiviral drug at acute phase
- Localisation: 4 thoracic
  2 cephalic
  1 lumbar
- Actual VAS : 4.3 ; VAS min : 2 ; VAS max: 6.9
- Allodynia (thermic and/or mecanic) : present in all but one

Protocol

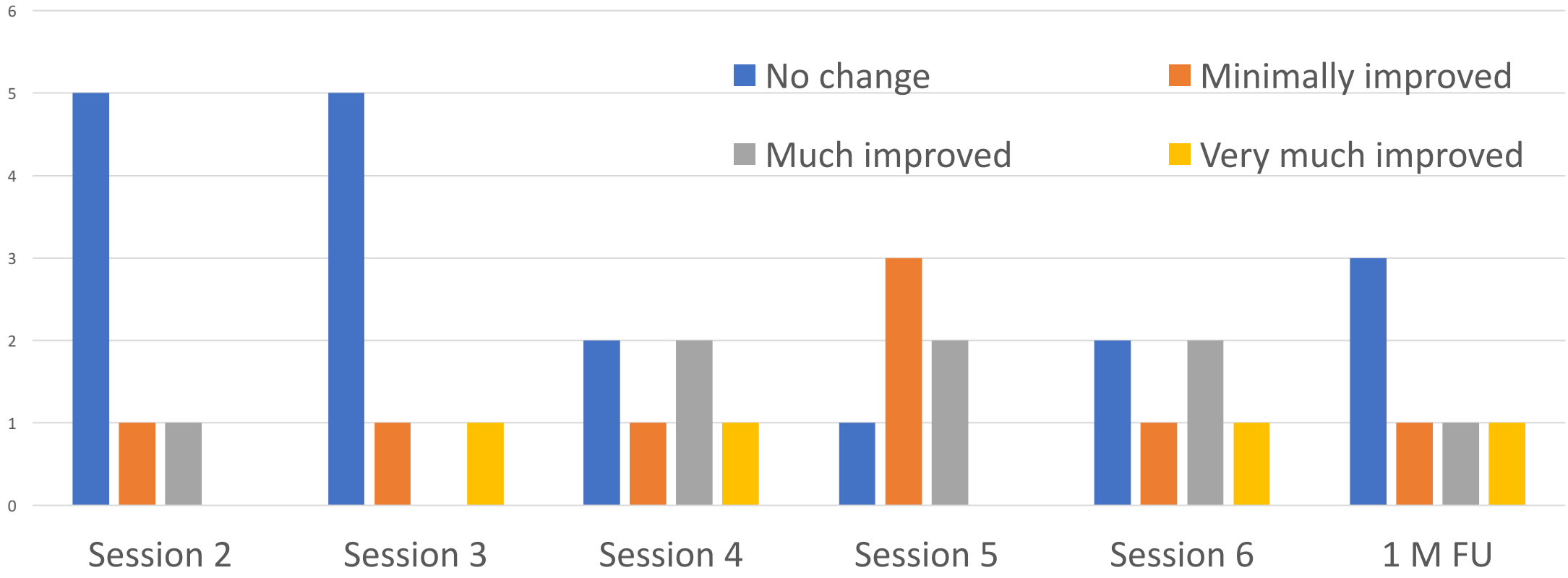
- 3 sessions per week during two consecutive weeks :
  - Average session duration: 4.8 minutes

Results

- 3 sessions per week during two consecutive weeks :
  - Average session duration: 4.8 minutes



Patient global impression of change

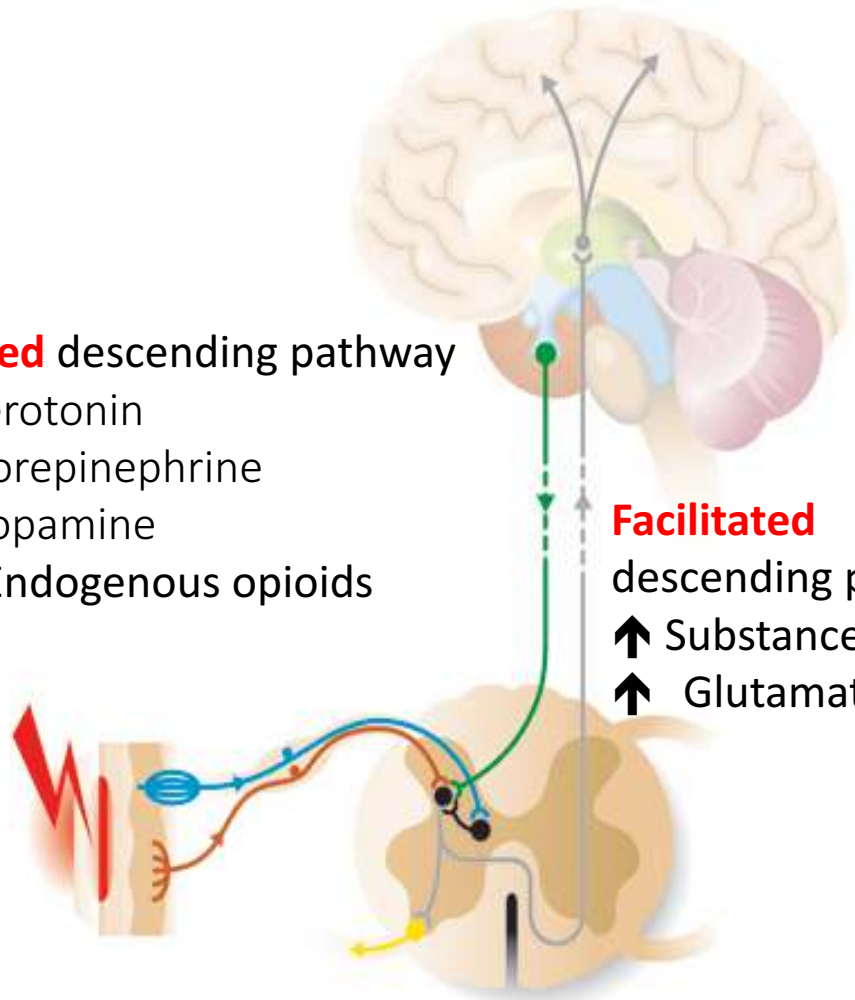


Non-invasive cryotheraphy for PHN

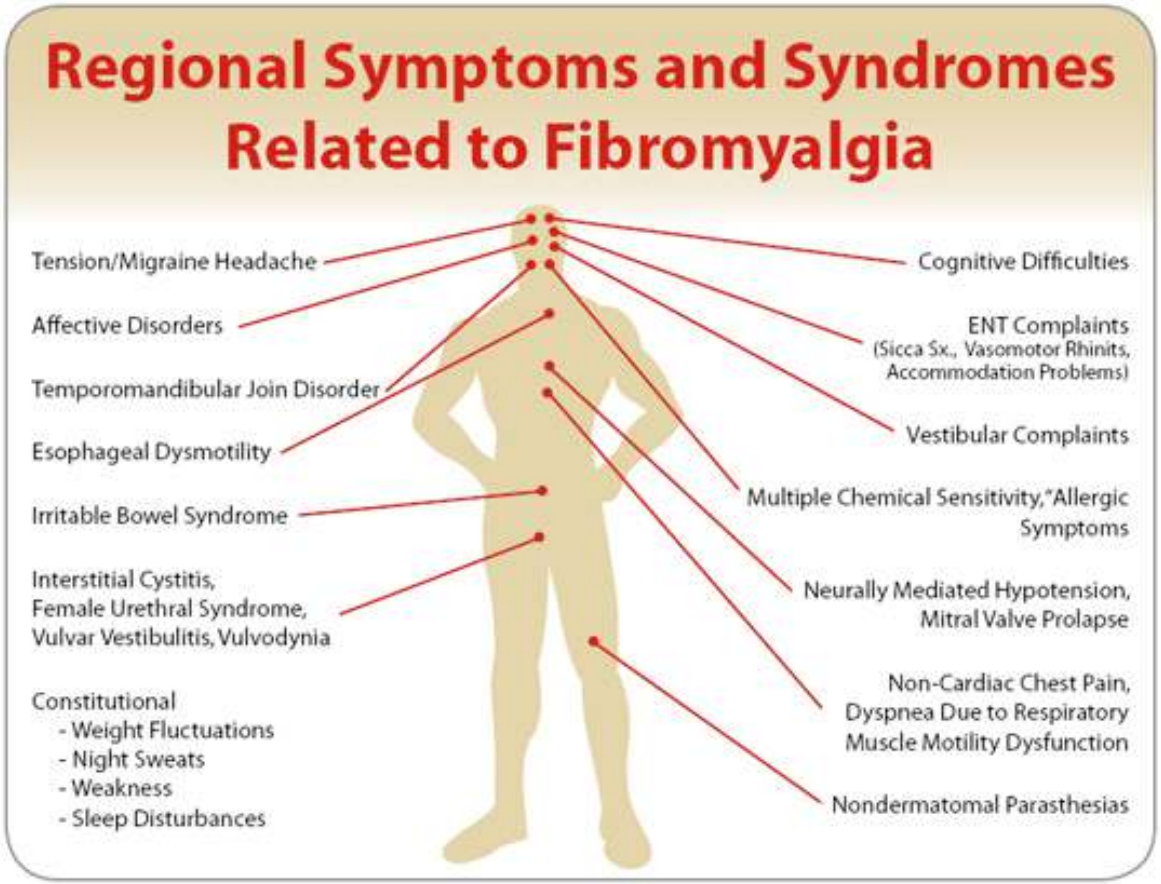
- Immediate (post session) pain relief
- Improvement after 4 sessions in 4/6 patients)
- Sustained effect at short term follow-up
- No complication, no side effects

Fibromyalgia

Inhibited descending pathway
- ↓ Serotonin
- ↓ Norepinephrine
- ↓ Dopamine
- ↑ Endogenous opioids



Facilitated descending pathway
- ↑ Substance P
- ↑ Glutamate



Programme pluridisciplinaire

L'EHC propose un programme complet à l'attention des patients souffrant de fibromyalgie, dans lequel interviennent de nombreux spécialistes: médecins-anesthésistes spécialisés dans le traitement des douleurs chroniques, physiothérapeutes, infirmières, diététiciennes et psychologues. Ce programme se déroule en ambulatoire sur une période de trois mois. Un suivi régulier à distance est également programmé.

Centre d'antalgie EHC - Morges

Programme de prise en charge de la fibromyalgie

Première consultation (individuelle) avec

- **Médecin spécialiste traitement de la douleur (antalgie)**
  - Anamnèse et examen clinique
  - Optimisation du traitement médicamenteux
  - Plannification du traitement et présentation du programme
- **Physiothérapeute**
  - Évaluation clinique
  - Elaboration du programme d'entrainement physique et de reconditionnement à l'effort

Séance **hebdomadaire** de physiothérapie (groupe de 6 à 8 personnes)

Suivi mensuel médecin spécialiste antalgie

Conseils personalisés de diététique (1-2 consultations)

Traitement personnalisé d'hypnose et auto-hypnose

Soutien psychologique Thérapie cognitivo-comportementale

rTMS

Bilan individuel en fin de programme

Suivi à intervalle régulier

+ Cryotherapy

Cryosauna (Whole body Cryotherapy)

- Pain relief
- Anti-inflammatory effect
- Diminution of muscular hypertonia
- Improvement of articular function
- Sensation of well-being
- Better sleep

Cryosauna (Whole body Cryotherapy)

Clin Rheumatol
DOI 10.1007/s10067-013-2280-9

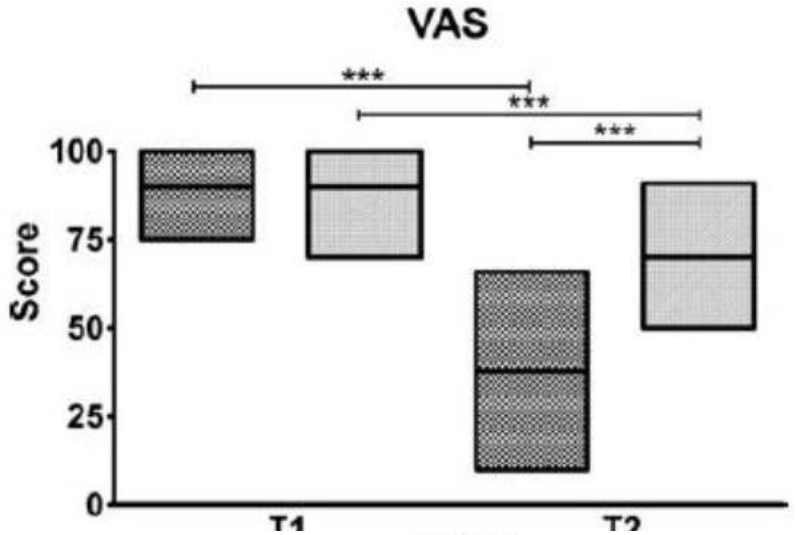
ORIGINAL ARTICLE

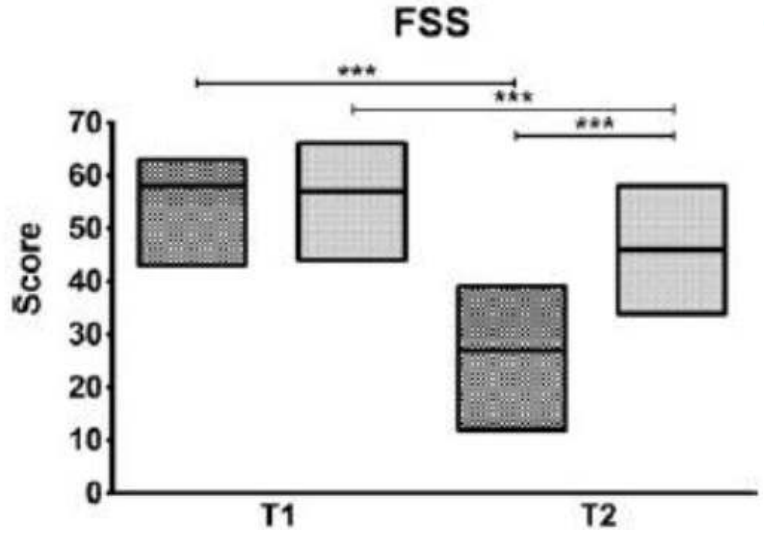
Effects of 15 consecutive cryotherapy sessions on the clinical output of fibromyalgic patients

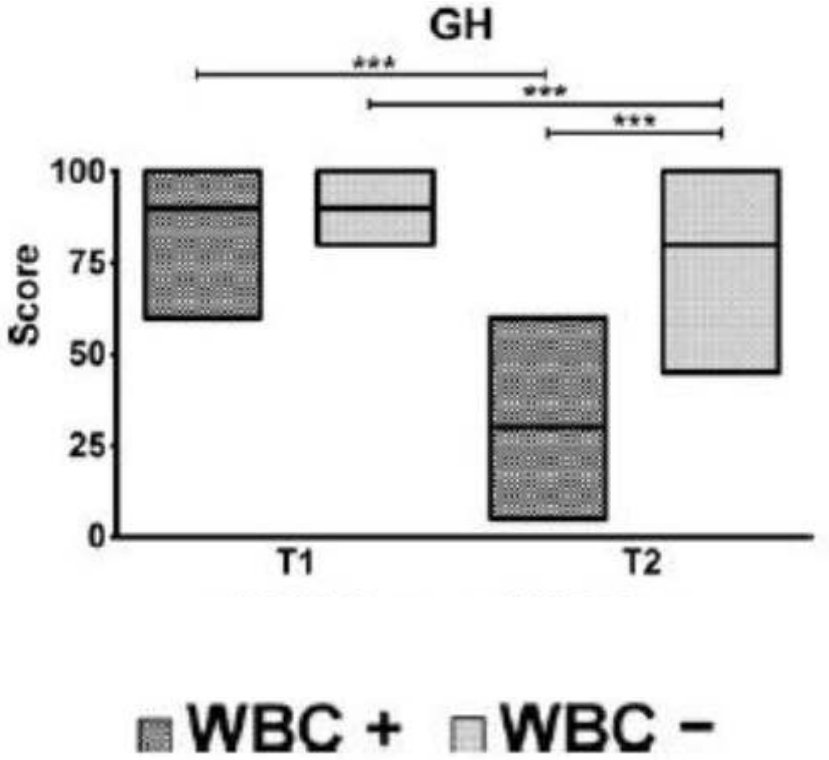
Lorenzo Bettoni · Felice Giulio Bonomi · Viviana Zani · Luigia Manisco · Annamaria Indelicato · Patrizia Lanteri · Giuseppe Banfi · Giovanni Lombardi

Received: 31 October 2012 / Revised: 26 March 2013 / Accepted: 19 April 2013

Cryosauna (Whole body Cryotherapy)



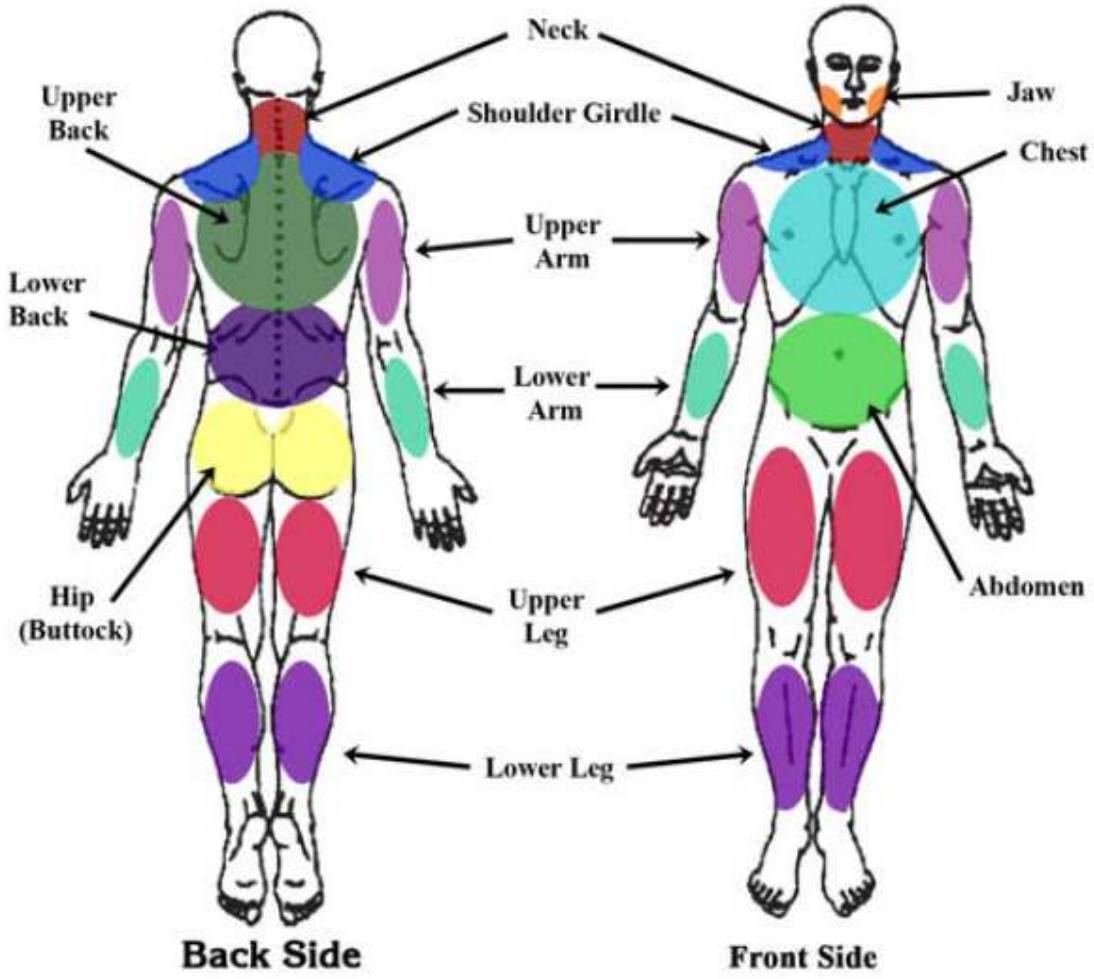




The New York Times

Death of Woman in Tank at a Nevada Cryotherapy Center Raises Questions About Safety

Use of the Cryo-T Duo in fibromyalgia and musculoskeletal pain



Non invasive cryotherapy in fibromyalgia

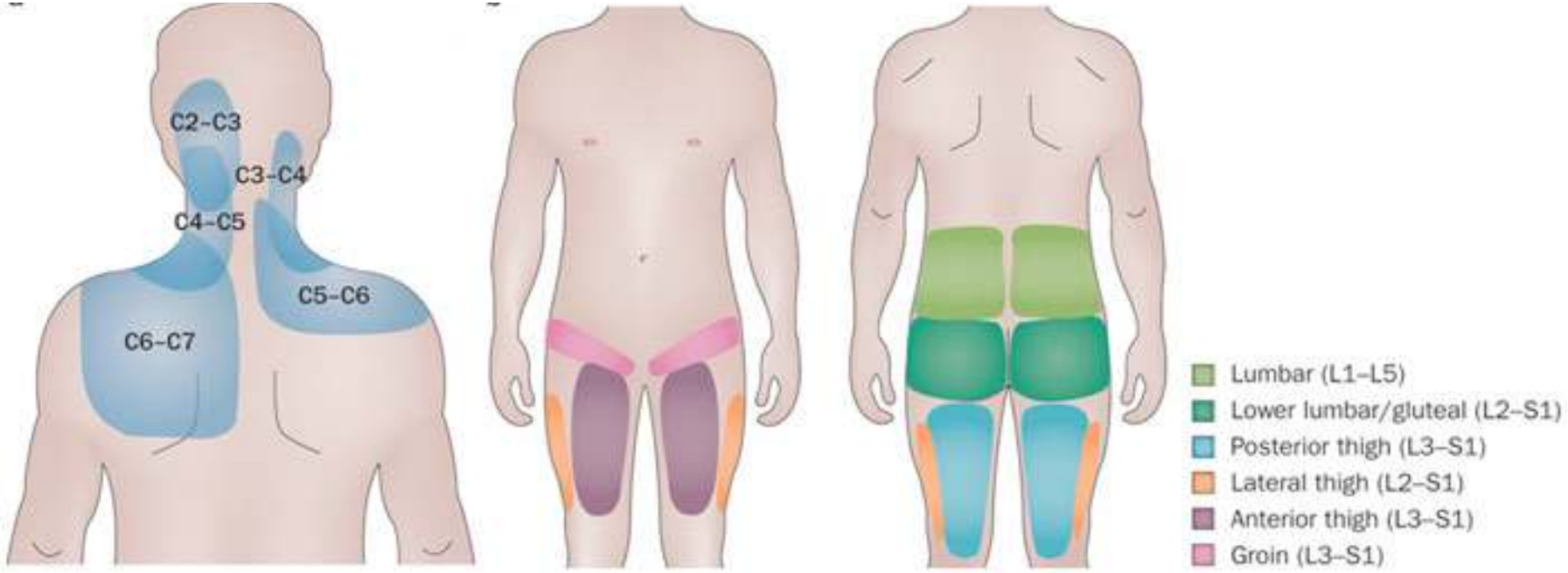
- Safe and well tolerated
- Alternative to the whole body cryosauna
- Treatment focused on worst areas of pain
- As a part of a multidisciplinary program
- Study needed …

Interventional cryotherapy

Peripheral nerves:

- trigeminal branches
- suprascapular n.
- Intercostal n.
- Ilio-inguinal n.
- Ilio-hypogastric n.
- Lateral cutaneous n.
- Medial branch nerves
- …

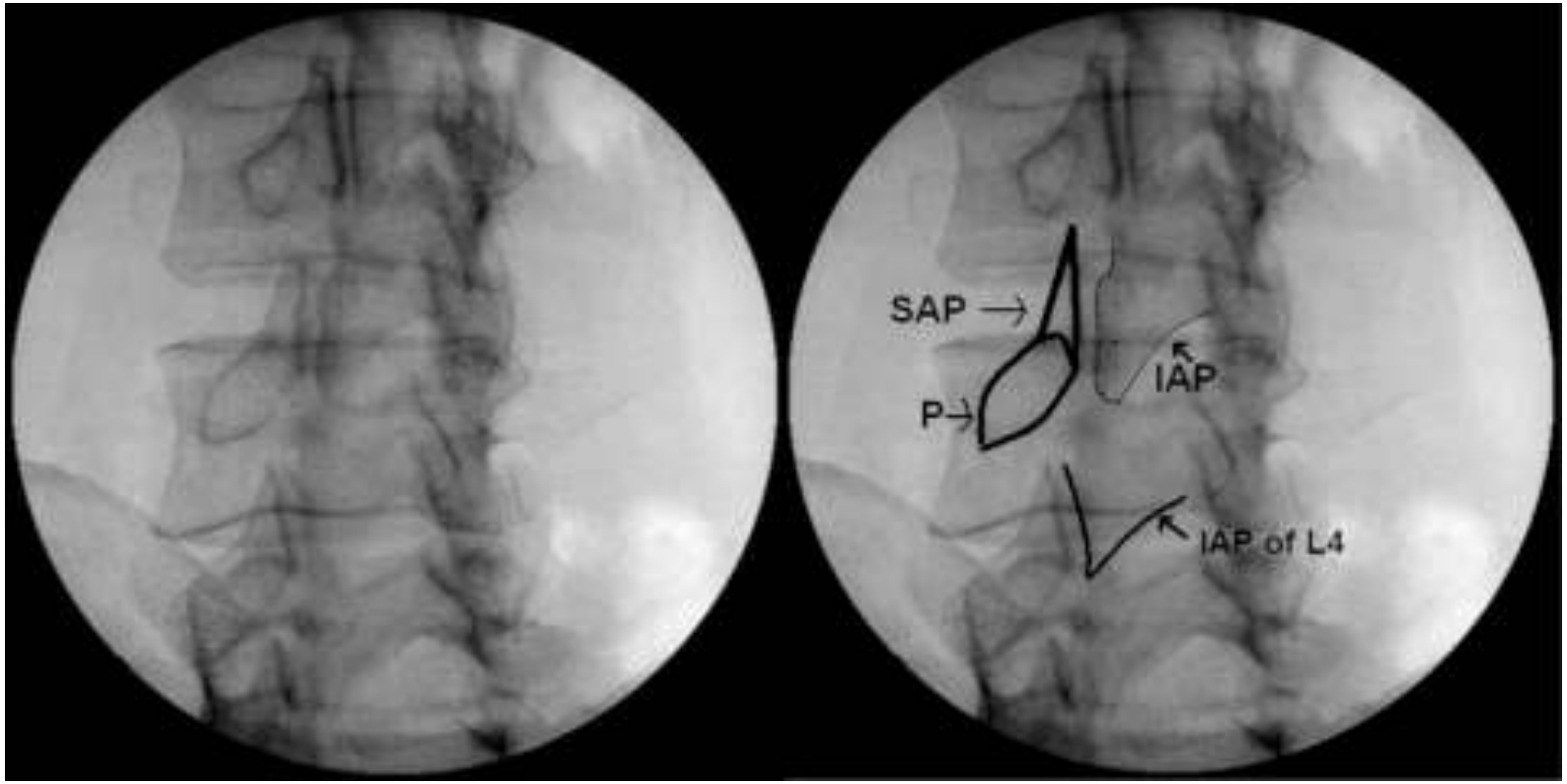
Low Back Pain & Facet Joint Syndrome



When diagnostic lumbar facet have given good but only temporary relief, one option for further treatment is **cryoneuroablation** or **radiofrequency** of the median dorsal rami

Low Back Pain & Facet Joint Syndrome

- Probe is placed at the junction of the transverse process and pedicle : the “Scottie dog’s eye”.




L5-S1 gauche
L4-L5 gauche
L3-L4 gauche

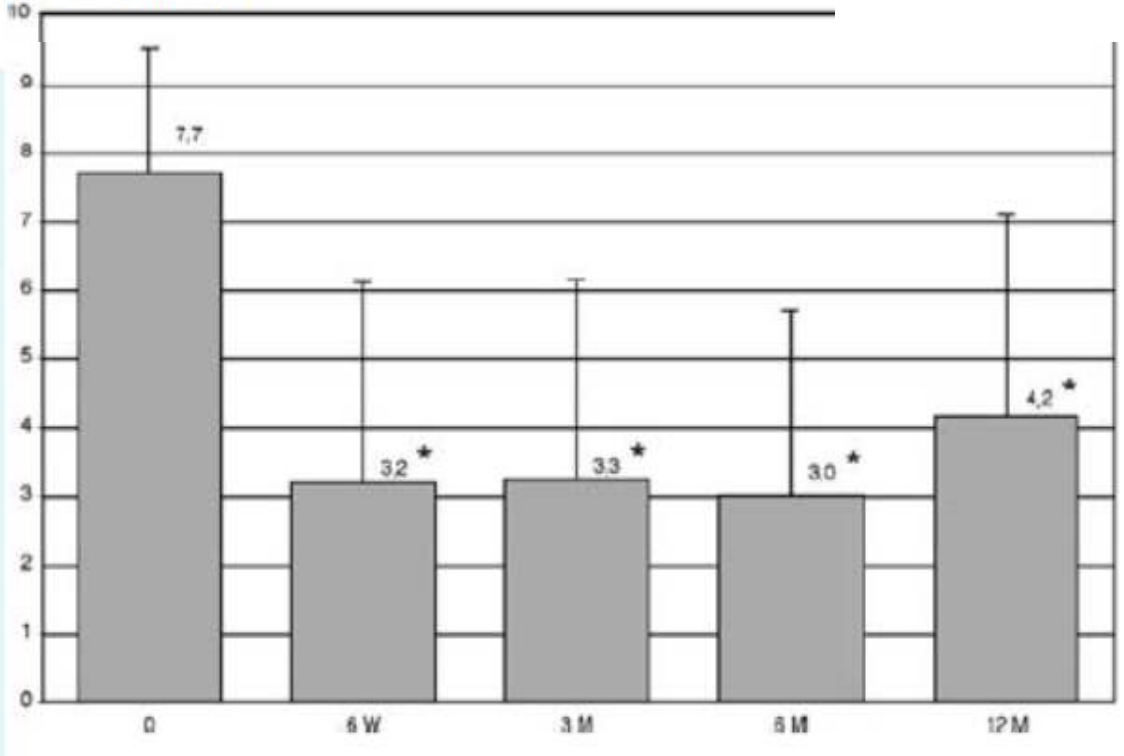
International Orthopaedics (SICOT) (2007) 31:525–530
DOI 10.1007/s00264-006-0208-6

ORIGINAL PAPER

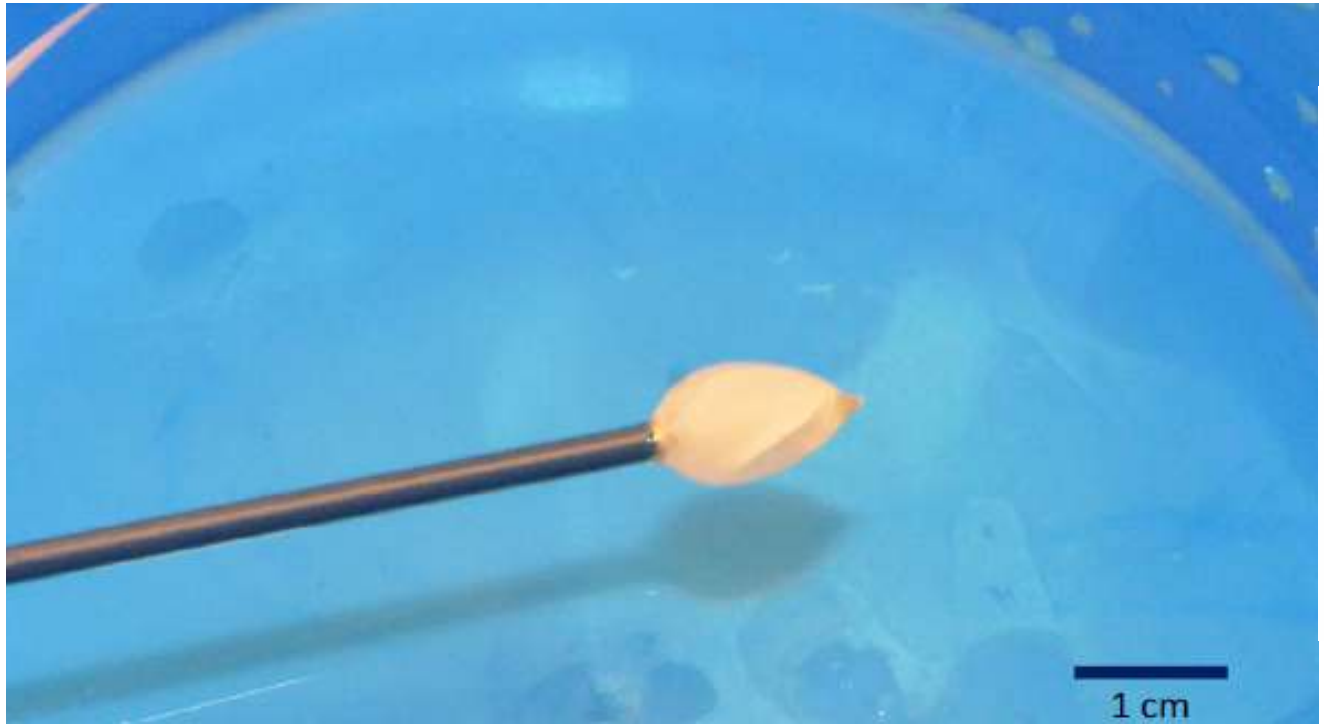
Percutaneous cryodenervation of lumbar facet joints: a prospective clinical trial

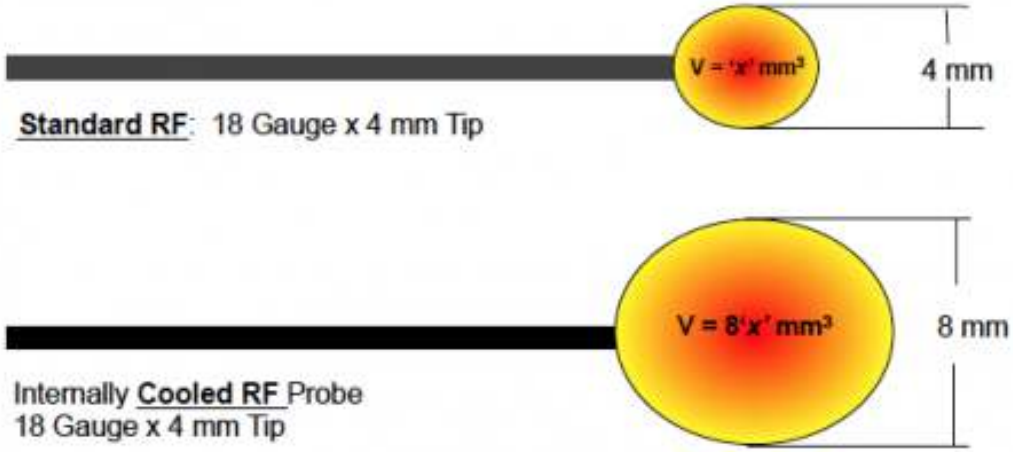
C. Birkenmaier · A. Veihelmann · H. Trouillier · J. Hausdorf · C. Devens · B. Wegener · V. Jansson · C. von Schulze Pellengahr

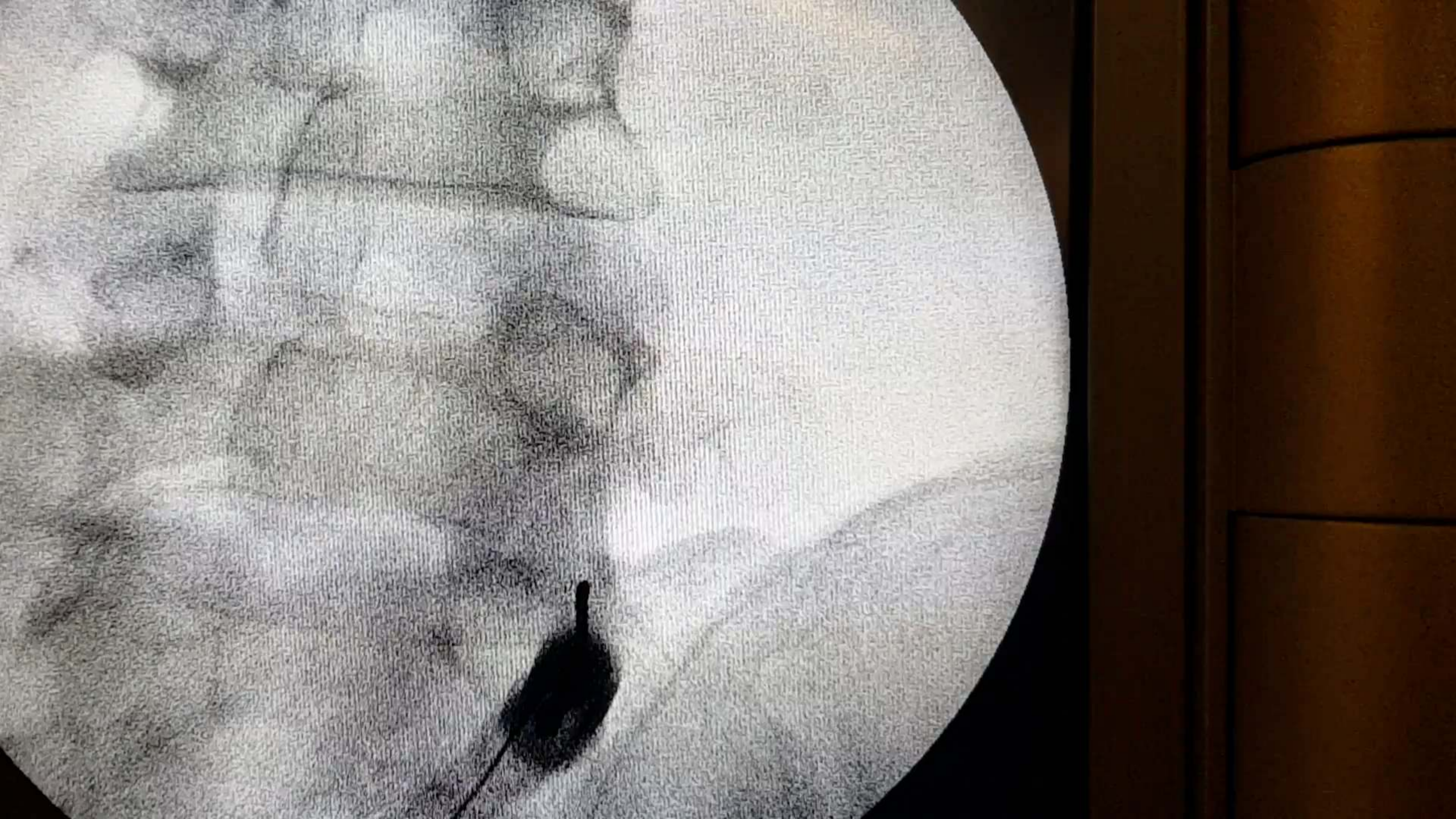
- 46 patients completed the study
- Follow-up 1 year



Cryo vs Radiofrequency







Conclusion

- Cryotherapy is an important tool in pain management
- Non-invasive cryotherapy is very well tolerated
- Interventional cryotherapy produces bigger lesions than conventional RF and possibly longer pain relief
- No neuroma formation