



VISITE
DE L'IMAGERIE RADIO INTERVENTIONNELLE
(activité de cryoablation)

Avec des représentants de la Ligue contre le cancer, comité d'Ille-et-Vilaine

Jeudi 17 novembre à 16h

CHU de Rennes - Hôpital Pontchaillou -
Centre urgences réanimations - niveau-1





CRYOABLATION PERCUTANEE

Novembre 2022

Dr Marc-Antoine JEGONDAY
Dr Emmanuel QUEHEN

Imagerie Abdominale Diagnostique et Interventionnelle
Service de Radiologie et d'Imagerie Médicale
CHU Pontchaillou - Rennes

Destruction Tumorale Percutanée

Techniques mini-invasives de radiologie interventionnelle de suppression tumorale

> Début à la fin des années 90 par la RF

En complément des autres techniques chirurgicales, endoscopiques, endovasculaires, de radiothérapie, chez des patients sélectionnés en RCP

> Morbidité moindre

> Préservation de la fonction de l'organe

Tumeurs essentiellement malignes primitives ou secondaires

Foie > rein > poumon > MSK > parties molles > sein > indications rares

Guidage par imagerie (US, CT, RX, CBCT, fusion, ECUS, guidages avancés, robotique, ...)

Plusieurs modalités physiques de destruction :

Radiofréquence

Micro-ondes

Cryoablation

Autres : IRE, électro-chimio-thérapie, laser, injection intra tumorale, HIFU...

Destruction Tumorale Percutanée

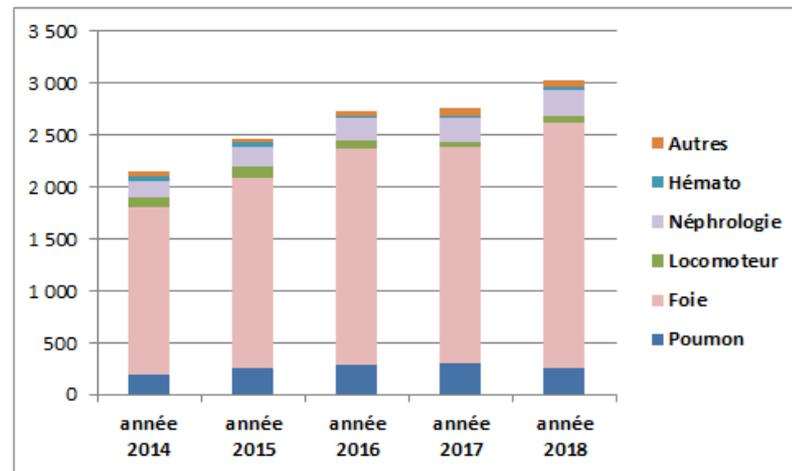
Techniques en plein essor en particulier depuis le début des années 2010

Elargissement de l'offre de soin en particulier en pathologie oncologique

Centres français référents : CHU Strasbourg (Pr Gangi), IGR (Pr De Baère), ...

Tous CHU - Nombre de séjours annuels avec activité de thermoablation, selon l'organe traité :

Organe traité	année 2014	année 2015	année 2016	année 2017	année 2018
Poumon	190	257	284	297	262
Foie	1 622	1 838	2 078	2 086	2 353
Locomoteur	88	98	84	51	60
Néphrologie	163	192	220	233	260
Hémato	38	45	22	22	27
Autres	55	40	37	69	71
Total tous CHU	2 157	2 470	2 725	2 758	3 033



DTP : Projet de pôle

Volonté forte du service d'imagerie médicale de développer en région Bretagne les techniques de radiologie interventionnelle et en particulier les DTP pour répondre à la demande de soin en oncologie (unicancer).

2015:
projet
de
pôle

Juillet 2018
: début
activité
CTRI

Fin 2019 :
nomination
d'un PH CTRI

2016 :
lancement
du projet
CTRI

Juillet 2019 :
finalisation
de
l'équipement
lourd

2020 ...
développement des
techniques :
cryoablation

Traitement de la
douleur en RI
Consolidation osseuse

Été 2018 : Scanner interventionnel

- 3^{ème} bloc opératoire de RI sur Pontchaillou
- Saturation des équipements d'imagerie diagnostique, réduction des délais
- **Unité de lieu et environnement de bloc**
 - Hygiène
 - Radioprotection
 - Equipe entraînée
 - Anesthésie
- **3 modalités de guidage en RI**
 - Scanner / Echographie / Radiographie
 - Techniques de guidage avancées
 - Potentialisation / précision
 - Protection thermique
 - Intégration fusion / ECUS en routine
 - Extension des indications RCP+++
- Perspectives de développement de nouvelles activités, guidage, sécurité, indications



Activité de DTP

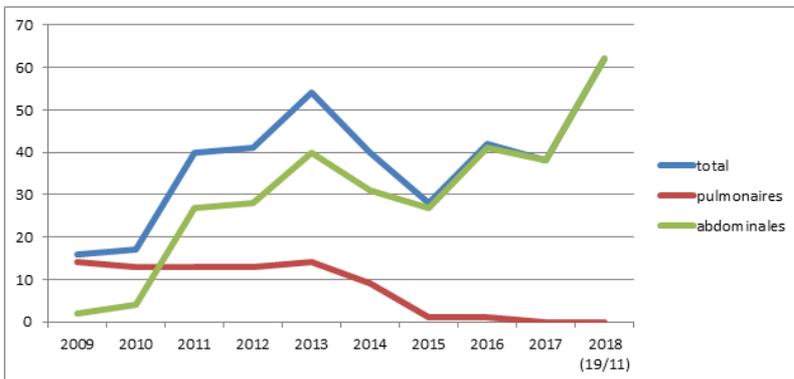


- Poursuite de la **montée en charge** de l'activité de **thermo-ablations** abdominales
 - RF
 - MWA
 - Cryoablation

- **Mini-invasif**
 - TTT curatif de patients non opérables
 - Morbidité / Tolérance
 - DMS
 - Préservation fonction organe



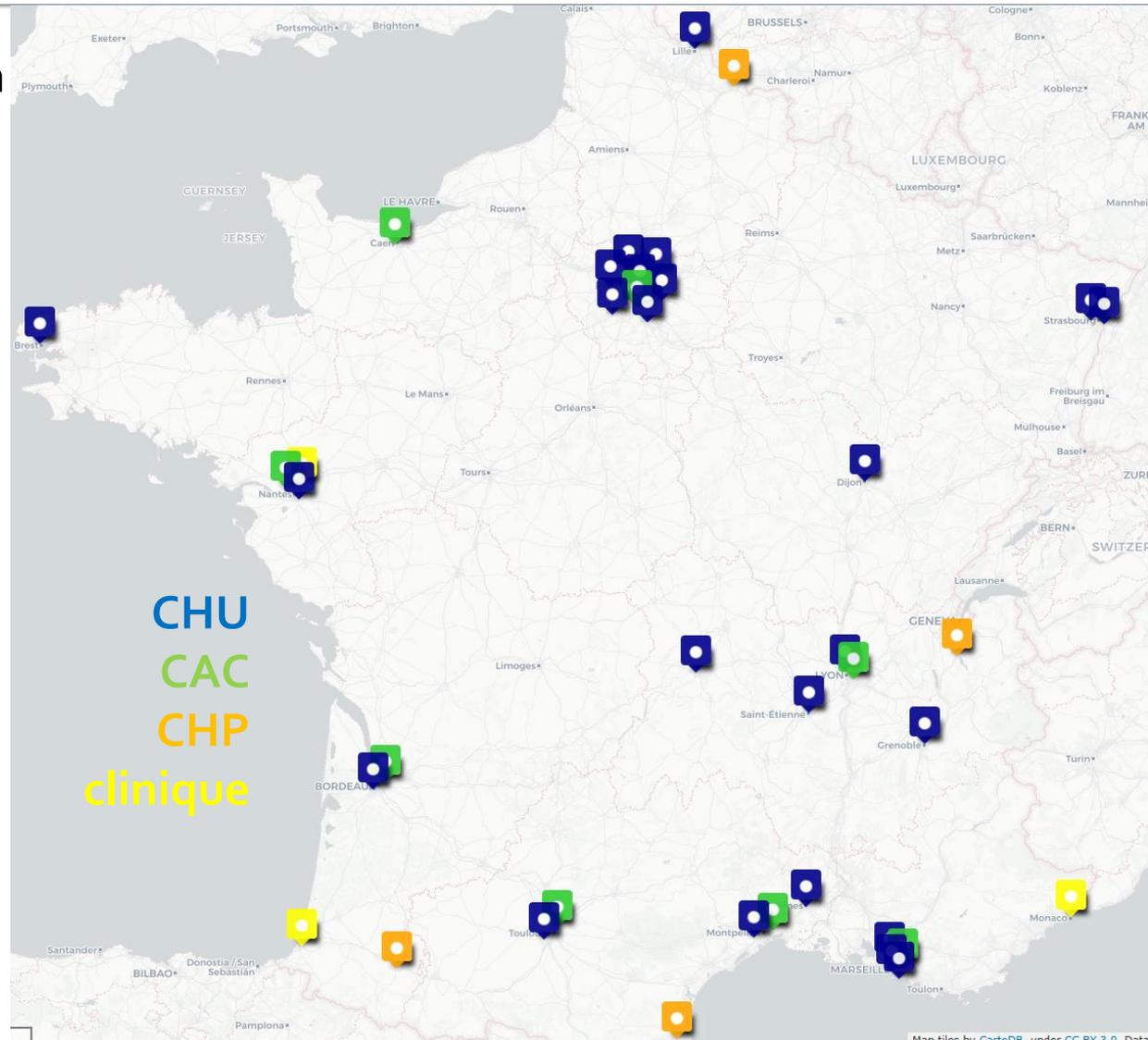
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 (19/11)
total	16	17	40	41	54	40	28	42	38	62
pulmonaires	14	13	13	13	14	9	1	1	0	0
abdominales	2	4	27	28	40	31	27	41	38	62



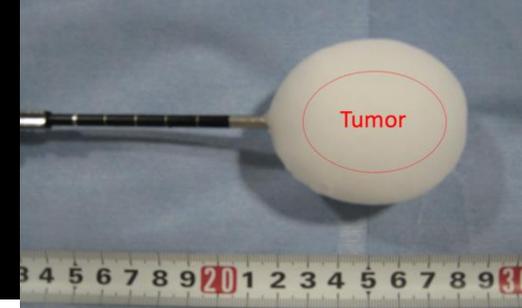
- **2019** : 96 patients
- **2020** : 87 patients (covid)
- **2021** : 88 patients (post covid – SBRT foie)
- **2022** : 77 patients (au 10/11)

Cryoablation percutanée (2021)

- DTP par le froid apparue fin des années 2000, présentant des spécificités la rendant singulière.
- 2012 PHRC national cryorein, inclusion de 10 patients au CHU de Rennes (Dr Rohou) sans pérennisation possible
- Depuis, développement progressif de la technique, des indications et des centres

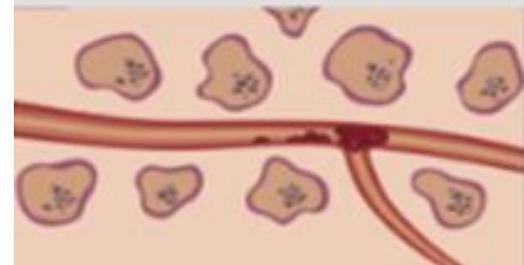
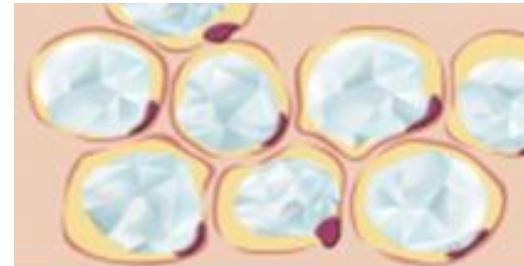


CRYOABLATION



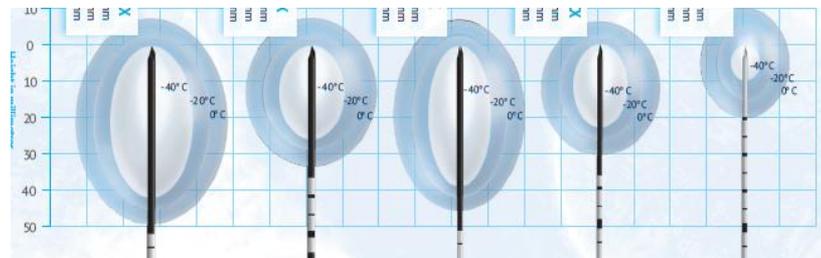
■ Destruction thermique par le froid

- Cycles congélation / décongélation
- Formation du glaçon
 - Décompression Argon
 - Effet Joule-Thomson
 - Cristallisation intra-cellulaire : déshydratation cellulaire, dénaturation protéique et altération membranaire + effet ischémique retardé (micro-thrombi)
- Réchauffement
 - Hélium
 - Résistance électrique
 - Modifications osmotiques, réaction inflammatoire et micro-hémorragique locale (potentialise le cycle suivant : cristallisation extra-cellulaire)
- → Rupture et apoptose cellulaire = **destruction tumorale** à -40°C



■ Application en RI

- Cryo-sondes
- Guidage en imagerie



MATERIEL



- **Environnement de travail**

- Cf scanner interventionnel
- IRM

- **Fournisseurs disponibles en France**

- BTG / Galil Medical (Distributeur FR : Boston)
- Endocare
- Icecure

- **Générateur**

- Modèle des autres centres : MAD
- Technologie évolutive



CONSOMMABLES

■ Cryo-sondes

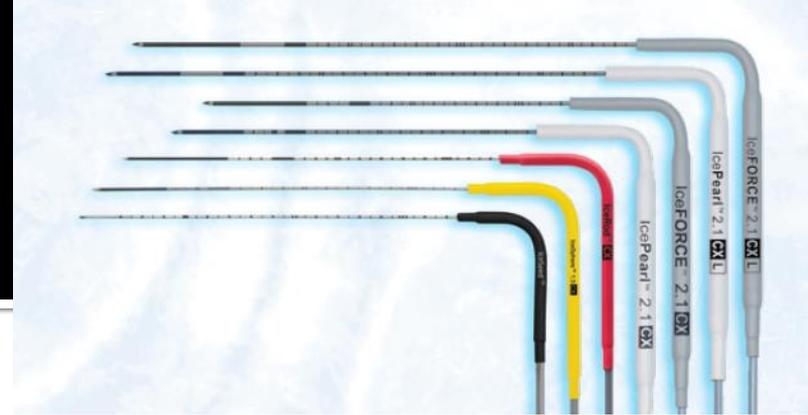
- Coût
- Usage unique
- Technologie rapidement évolutive
- Conditionnement similaire aux sondes de RF ou MW

■ Gaz

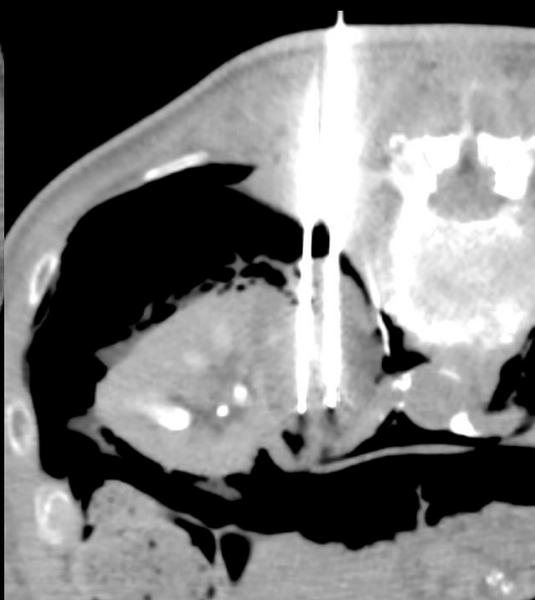
- Argon +++
- Hélium ou réchauffement électrique selon fournisseur
- Logistique
 - Fourniture non assurée par les fabricants
 - Encombrement
 - Bombonnes vs connectiques murales

■ Marquage CE

■ Liste hors GHS

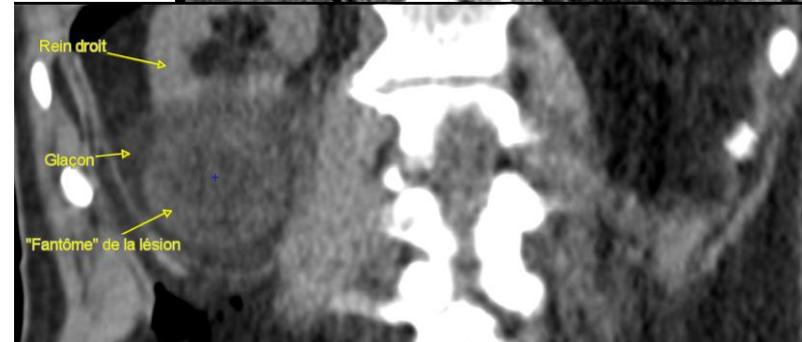
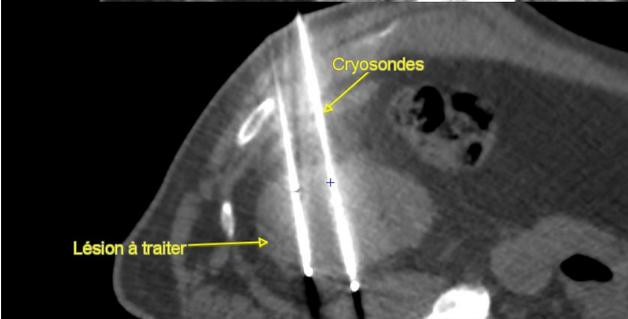


INTERVENTION



PROPRIETES TECHNIQUES

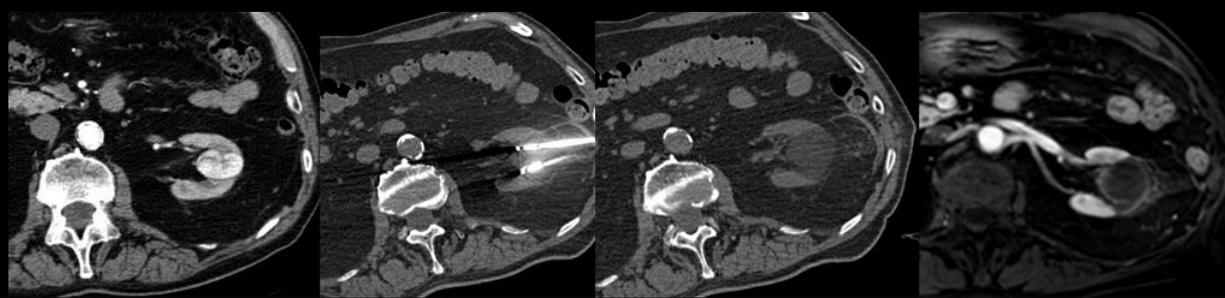
- **Iceball** : monitoring, précision
- **Préservation structures à risques**
 - Collagène : plèvre, voies urinaires
 - Iceball : structures neurologiques, tube digestif
- **Tolérance** :
 - Moins douloureux que RF ou MW
 - Possible sous sédation légère / AL
- **Volume d'ablation**
 - Effet de potentialisation entre les cryo-sondes



PROPRIETES TECHNIQUES

	CRYO	RFA
Contrôle zone d'ablation	+++	+
Volume d'ablation	+++	+
Risque plaie thermique	+	+++
Tolérance	++	-
Sédation	AG / AL	AG
Encombrement	+++	+
Durée procédure	Longue	Rapide
IRM compatible	+++	---
Organes	Rein, Poumon, Os, ...	<u>Foie</u> , Rein, Poumon, Os, ...

INDICATIONS RENALES



- Thermo-ablation : CI chir le plus souvent (biais de sélection)
 - Pas de RCT
 - T < 3-4 cm (mais pas que...)
 - Patients avec comorbidités++
 - Préservation F° rénale :
 - > IR, T. bilat, rein unique, prédispo génétique T. multiples, récidives post chir
- Rein : littérature la plus abondante sur la cryoablation
 - Equivalence / RF sur le contrôle local et survie (T1a)
 - Permet de traiter les lésions proches des voies urinaires (CI RF)
 - Ablation sous AL ou sédation consciente (patients à haut risque anesthésique)
 - Possibilité de TTT de tumeurs volumineuses (T1b, indication d'expert)
- Nombreuses études rétrospectives et méta-analyses
- Quelques études prospectives (non comparatives)
- Validé dans les recommandations nationales et internationales

Cardiovasc Intervent Radiol (2011) 34:573–578
DOI 10.1007/s00270-010-9934-7

CLINICAL INVESTIGATION

Prospective Analysis of the Safety and Efficacy of Percutaneous Cryoablation for pTINxMx Biopsy-Proven Renal Cell Carcinoma

Ronald Rodriguez · Ziga Cizman · Kelvin Hong ·
Alexandra Koliatsos · Christos Georgiades

Percutaneous Renal Cryoablation: Prospective Experience Treating 120 Consecutive Tumors

Xavier Buy¹
Hervé Lang²
Julien Garnon³
Erik Sauleau³
Catherine Roy⁴
Afshin Gangi¹

OBJECTIVE. The purpose of this study was to evaluate the safety and efficacy of percutaneous renal cryoablation.
SUBJECTS AND METHODS. A prospective nonrandomized evaluation of 120 renal tumors in 95 patients treated with percutaneous cryoablation because their condition did not allow surgery focused on tumor characteristics, complications, hospital course, treatment success based on MRI follow-up, and effect on renal function.
RESULTS. The mean follow-up period was 28 months (range, 6–63 months). The mean

THE JOURNAL
of UROLOGY
www.ajurajournals.org/journal/urology

AUA Guideline Articles

EAU
European Association of Urology

Review – Kidney Cancer

European Association of Urology Guidelines on Renal Cell Carcinoma: The 2022 Update

Börje Ljungberg^{a,*}, Laurence Albiges^{b,c}, Yasmin Abu-Ghanem^d, Jens Bedke^{d,e}, Umberto Capitanio^{f,g}, Saeed Dabestani^h, Sergio Fernández-Pelloⁱ, Rachel H. Giles^j, Fabian Hofmann^k, Milan Hora^l, Tobias Klatte^m, Teije Kuuskⁿ, Thomas B. Lam^{o,p}, Lorenzo Marconi^q, Thomas Powles^r, Rana Tahbaz^s, Alessandro Volpe^t, Axel Bex^{u,v,w}

Renal Mass and Localized Renal Cancer: Evaluation, Management, and Follow-Up: AUA Guideline: Part I

Steven C. Campbell^a, Peter E. Clark^b, Sam S. Chang^c, Jose A. Karam^d, Lesley Souter^e and Robert G. Uzzo^f

From the Cleveland Clinic (SCC), Cleveland, Ohio; Abram Health, Levine Cancer Institute (PE), Charlotte, North Carolina; Vanderbilt Ingram Cancer Center (SSC), Nashville, Tennessee; MD Anderson Cancer Center (LHG), Houston, Texas; Consultant Medical Oncologist (EJC), Ontario, Canada; Fox Chase Cancer Center (RGS), Philadelphia, Pennsylvania



HAS
HAUTE AUTORITÉ DE SANTÉ

INSTITUT
NATIONAL
DU CANCER

GUIDE - AFFECTION LONGUE DURÉE

Tumeur maligne, affection maligne du tissu lymphatique ou hématopoïétique
Cancer du rein de l'adulte

Jun 2010

BJUI
BJU International

Percutaneous cryoablation of renal tumours: outcomes from 171 tumours in 147 patients

David J. Breen, Timothy J. Bryant, Ausami Abbas, Beth Shepherd, Neil McGill*, Jane A. Anderson¹, Richard C. Lockyer¹, Matthew C. Hayes¹ and Steve L. George[†]

Department of Radiology, ^{*}Department of Anaesthesia, [†]Department of Urological Surgery, and [‡]Department of Public Health, University Hospitals of Southampton NHS Foundation Trust, Southampton, UK

Cardiovasc Intervent Radiol (2014) 37:1494–1499
DOI 10.1007/s00270-013-0831-8

CLINICAL INVESTIGATION

INTERVENTIONAL ONCOLOGY

Efficacy and Safety of Percutaneous Cryoablation for Stage 1A/B Renal Cell Carcinoma: Results of a Prospective, Single-Arm, 5-Year Study

Christos S. Georgiades · Ron Rodriguez

CRSE

Recommandations françaises du Comité de Cancérologie de l'AFU – Actualisation 2018–2020 : prise en charge du cancer du rein

French cCAFU guidelines – Update 2018–2020: Management of kidney cancer

K. Bensalah^{a,b}, L. Albiges^{a,c}, J.-C. Bernhard^{a,d}, P. Bigot^{a,e}, T. Bodin^{a,f}, R. Boissier^{a,g}, J.-M. Correas^{a,h}, P. Gimel^{a,i}, J.-F. Hetet^{a,j}, J.-A. Long^{a,k}, F.-X. Nouhaud^{a,l}, I. Ouzaid^{a,m}, N. Rioux-Leclercq^{a,n}, A. Méjean^{a,o}

Safety and Efficacy of Percutaneous Image-guided Cryoablation of Completely Endophytic Renal Masses

Catherine A. Murray, Brian T. Welch, Grant D. Schmit, John J. Schmitz, Adam J. Weisbrod, Matthew R. Callstrom, Tasha L. Welch, R. Houston Thompson, Anil N. Kurup, Stephen A. Boorjian, and Thomas D. Atwell

OBJECTIVE	To evaluate the safety, efficacy, and oncologic control of percutaneous image-guided cryoablation in the treatment of completely endophytic renal masses. Percutaneous image-guided cryoablation is a minimally invasive and effective treatment for small renal masses. Image-guided cryoablation is an attractive treatment for completely endophytic tumors given the challenge in visualization of such lesions during surgical extirpation.
MATERIALS AND METHODS	A retrospective study evaluating percutaneous cryoablation of completely endophytic renal masses with normal overlying renal cortex was performed. From January 2003 to December 2015, 200 endophytic renal masses (RENAL score 3 – endophytic/exophytic) were identified from an internal renal ablation database. After imaging review, 49 tumors with completely intact overlying renal cortex in 47 patients were included in the study. Outcomes, including complications and oncologic efficacy were evaluated according to standard nomenclature.
RESULTS	Patients comprised 37 men and 10 women (mean age 64.0 years) who underwent 48 cryoablation procedures to treat 49 renal masses. Mean tumor size was 2.5 ± 0.5 cm. Major complications occurred following 5 of the 48 (10%) procedures. Forty of 46 (87%) tumors with imaging follow-up were recurrence-free at a mean of 56 months. Five of six local recurrences were successfully retreated with cryoablation.
CONCLUSION	Percutaneous thermal ablation of completely endophytic renal masses is a relatively safe procedure associated with acceptable complication and local tumor control rates. Given the complexities associated with partial nephrectomy, percutaneous cryoablation may be considered an alternative treatment for these select patients. Long-term follow-up studies are necessary to determine the durable efficacy of this treatment. UROLOGY 00: 1–6, 2019. © 2019 Elsevier Inc.

Efficacy and Safety of Percutaneous Cryoablation for Stage 1A/B Renal Cell Carcinoma: Results of a Prospective, Single-Arm, 5-Year Study

Christos S. Georgiades · Ron Rodriguez

The Feasibility of Percutaneous Renal Cryoablation Under Local Anaesthesia

Eric de Kerviler · Constance de Margerie-Mellon · Alexandre Coffin ·
Guillaume Legrand · Matthieu Resche-Rigon · Guillaume Ploussard ·
Paul Meria · Pierre Mongiat-Artus · François Desgrandchamps · Cédric de Bazelaire

Received: 21 June 2014 / Accepted: 26 July 2014 / Published online: 18 September 2014
© Springer Science+Business Media New York and the Cardiovascular and Interventional Radiological Society of Europe (CIRSE) 2014

Abstract

Objectives The aim of this study was to evaluate the feasibility of cryoablation of renal tumours without sedation.

Materials and methods We prospectively evaluated 149 computed tomography-guided renal cryoablation procedures that were performed at our institution between 2009 and 2013. The patients received only 1 g of IV paracetamol prior to the procedure; intraprocedural, local anaesthesia was administered. We recorded the date and duration of the procedure, size and location of the tumour, number of cryoneedles used, need for dissection with saline or carbon dioxide and intraoperative degree of pain, which was scored using an established visual analogue pain score (VAS) (0–10). Multivariate analysis was used to identify

the associations between the recorded parameters and VAS.

Results An interventional radiologist and a technician could perform all procedures without the help of anaesthesiologists and with adequate analgesia. The pain level ranged from 0 to 8 (mean, 2.0). It did not correlate with the tumour size or with the number of cryoneedles. It was significantly greater when the ice ball involved renal cavities ($p = .0033$) and when carbon dioxide was used for dissection ($p < .0001$). Conversely, the team experience was positively correlated with lower pain levels ($p = .0381$).

Conclusion This study demonstrates that the cryoablation of renal tumours is feasible by interventional radiologists alone using a combination of IV paracetamol and local anaesthesia.

Comparison of Outcomes in Patients Undergoing Percutaneous Renal Cryoablation With Sedation vs General Anesthesia



CrossMark

Zhamshid Okhunov, Samuel Juncal, Michael Ordon, Arvin K. George, Achim Lusch, Michael del Junco, Michael Nguentat, Igor I. Lobko, Louis Kavoussi, and Jaime Landman

OBJECTIVE

To compare the efficacy and safety of local anesthesia with conscious sedation (LACS) with general anesthesia (GA) in patients undergoing percutaneous renal cryoablation (PRC) for renal cortical neoplasms.

METHODS

We performed a retrospective review of patients undergoing PRC between 2003 and 2013. Patient demographics, tumor characteristics, and perioperative and postoperative follow-up data were recorded and analyzed. We compared 3 principal outcomes across the GA and LACS groups: anesthesia-related outcomes, treatment failure, and complications.

RESULTS

A total of 235 patients with available data were included. Of these, 82 underwent PRC under GA and 153 patients under LACS. The 2 groups were similar with regard to age, gender, body mass index, American Society of Anesthesiologists score, tumor features, preoperative serum creatinine level, and hematocrit value. The GA and LACS groups had a similar percentage of patients with biopsy-proven renal cell carcinoma (68.5% and 64.2%, respectively; $P = .62$). The mean follow-up time for GA and LACS was 37 and 21 months, respectively ($P < .0001$). The mean procedure time for GA was significantly longer compared with LACS (133 vs 102 minutes; $P < .001$), and the mean hospital stay was shorter under LACS (1.08 vs 1.95 days; $P < .0001$). There was no difference in immediate failure (0% and 1.9%; $P = .051$) or recurrences (11% and 3.9%, respectively; $P = .051$) between GA and LACS groups. There was no difference in intraoperative and postoperative treatment-related complications between the 2 groups.

CONCLUSION

PRC for small renal masses under LACS is effective and safe. PRC with LACS has the advantage of decreased procedure time and a shorter hospital stay. UROLOGY 85: 130–134, 2015. © 2015 Elsevier Inc.

INDICATIONS OSSEUSES

Place de la RI dans la stratégie du traitement antalgique ?

Classification OMS (1986)

Création d'un niveau 4

= **Antalgie interventionnelle ?**

2000 : Rafael Miguel

- Douleurs mal contrôlées
- Effets secondaires insupportables du traitement

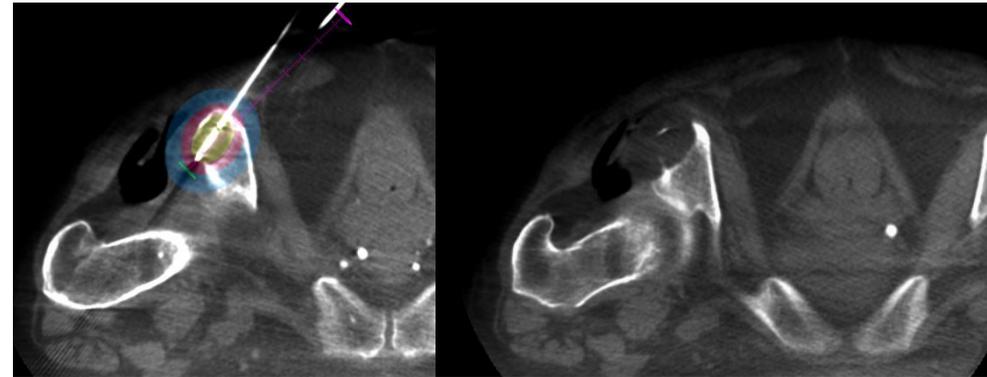


Radiologie interventionnelle antalgique = Palier 4 ?

Rafael Miguel. Interventional treatment of cancer pain: The fourth step in the WHO analgesic ladder? Cancer Control 7.2:149-156, 2000.

■ Algo-RI

- Douleur osseuse en **oncologie...**
- Association de techniques de RI...
- Guidage multimodal essentiel+++
- Evaluation **radio-clinique**
- PEC **pluri-disciplinaire...** « à la carte »
- Possibilité de **PEC ambulatoire**
- **Service rendu +++**



Remerciements C.Perret (CHU Nantes)

■ Mise en place de la filière

- Insuffisamment disponible dans la région
- Salle multimodale OK
- Equipe médicale « multi-organe »
- Réseau de correspondants (CHU-CAC)

■ Ablation

- RF++
- **Cryoablation** : lésions volumineuses ou à risque neurologique

Indications cimentoplastie métastases osseuses

- Antalgique +++
- Consolidation: résistance en compression

The complex block contains three images: a CT scan of a vertebral body fracture, a photograph of a hand holding a cement applicator, and a photograph of a hand holding a cement applicator.

Remerciements F.Deschamps (Gustave Roussy)

Original Article

Percutaneous Image-Guided Cryoablation of Painful Metastases Involving Bone

Multicenter Trial

Matthew R. Callstrom, MD, PhD
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 Matthew P. Goetz, MD
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 Timothy P. Maus, MD
 Gilbert Y. Wong, MD
 Kathy J. Brown, BS

Matthew R. Callstrom, MD PhD¹; Damian E. Dupuy, MD⁴; Stephen B. Solomon, MD⁵; Robert A. Beres, MD⁶; Peter J. Littrup, MD⁷; Kirkland W. Davis, MD⁸; Ricardo Paz-Fumagalli, MD⁹; Cheryl Hoffman, MD¹⁰; Thomas D. Atwell, MD¹; J. William Charboneau, MD¹; Grant D. Schmit, MD¹; Matthew P. Goetz, MD²; Joseph Rubin, MD²; Kathy J. Brown¹; Paul J. Novotny, MS³; and Jeff A. Sloan, PhD³

BACKGROUND: This study sought to describe the results of a single-arm multicenter clinical trial using image-guided percutaneous cryoablation for the palliation of painful metastatic tumors involving bone. **METHODS:** Over a 44-month period, 61 adult patients with 1 or 2 painful bone metastases with a score of 4 or more on a scale of 0 to 10 ($\geq 4/10$) worst pain in a 24-hour period who had failed or refused conventional treatment were treated with percutaneous image-guided cryoablation. Patient pain and quality of life was measured using the Brief Pain Inventory prior to treatment, 1 and 4 days after the procedure, weekly for 4 weeks, and every 2 weeks thereafter for a total of 6 months. Patient analgesic use was also recorded at these same follow-up intervals. Complications were monitored. Analysis of the primary endpoint was undertaken via paired comparison procedures. **RESULTS:** A total of 69 treated tumors ranged in size from 1 to 11 cm. Prior to cryoablation, the mean score for worst pain in a 24-hour period was 7.1/10 with a range of 4/10 to 10/10. At 1, 4, 8, and 24 weeks after treatment, the mean score for worst pain in a 24-hour period decreased to 5.1/10 ($P < .0001$), 4.0/10 ($P < .0001$), 3.6/10 ($P < .0001$), and 1.4/10 ($P < .0001$), respectively. One of 61 (2%) patients had a major complication with osteomyelitis at the site of ablation. **CONCLUSIONS:** Percutaneous cryoablation is a safe, effective, and durable method for palliation of pain due to metastatic disease involving bone. *Cancer* 2013;119:1033-41. © 2012 American Cancer Society.

KEYWORDS: palliation, image-guided, cryoablation, metastases, skeletal.

Vascular and Interventional Radiology • Original Research

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 Matthew R. Callstrom¹
 Timothy B. Curry²
 Jayawant N. Mandrekar¹
 Thomas D. Atwell¹
 Matthew P. Goetz³
 Joseph Rubin³

Palliation of Painful Metastatic Disease Involving Bone With Imaging-Guided Treatment: Comparison of Patients' Immediate Response to Radiofrequency Ablation and Cryoablation

- Bonne sélection des patients +++
- Service rendu : efficacité clinique rapide +++

¹From the Departments of Diagnostic Radiology (M.R.C., T.D.A., J.W.C., M.A.F., T.J.W., T.P.M., K.J.B.), Oncology (M.P.G., J.R.), Biostatistics (J.A.S., P.J.N.), and Anesthesi-

Purpose:	To prospectively determine the safety and effectiveness of percutaneous cryoablation for the reduction of pain, improvement in the activities of daily life, and reduction in the use of analgesic medications for patients with painful metastatic lesions involving bone.
Materials and Methods:	This study was compliant with HIPAA and was approved by the institutional review board. Written informed consent was obtained. During 18 months, 14 patients (eight men, six women; age range, 21–72 years; mean age, 54 years) with one or two painful metastatic lesions involving bone, with a score of 4 or greater out of 10 for worst pain in a 24-hour period, and who did not respond to or refused conventional radiation treatment or chemotherapy were treated with percutaneous cryoablation. Patient response was measured with the Brief Pain Inventory, and analgesic use was recorded before and after the procedure at days 1 and 4, weekly for 4 weeks, and then every other week for a total of 6 months. Complications were monitored. Analysis of the primary end points was undertaken with paired comparison procedures by using paired <i>t</i> tests across individual time points supplemented with repeated measures analysis of variance.
Results:	Treated lesions were 1–11 cm in diameter. Before cryoablation, the mean score for worst pain in a 24-hour period was 6.7 of 10; the score decreased to 3.8 ($P = .003$) 4 weeks after treatment. Mean pain interference with activities of daily living was 5.5 of 10 before treatment and decreased to 3.2 ($P = .004$) 4 weeks after treatment. All eight (100%) patients (exact 95% binomial confidence interval: 63%, 100%) for whom narcotics were prescribed prior to the procedure reported a reduction in these medications after cryoablation. No serious complications were observed.
Conclusion:	Percutaneous cryoablation is a safe and effective method for palliation of pain due to metastatic disease involving bone.

© RSNA, 2006

Musculoskeletal Imaging • Original Research

Kemal Tuncali¹
 Paul R. Morrison¹
 Carl S. Winalski¹
 John A. Carrino¹
 Sridhar Shankar^{1,2}
 John E. Ready³
 Eric vanSonnenberg⁴
 Stuart G. Silverman¹

MRI-Guided Percutaneous Cryotherapy for Soft-Tissue and Bone Metastases: Initial Experience

Multicenter Study of Metastatic Lung Tumors Targeted by Interventional Cryoablation Evaluation (SOLSTICE)

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INDICATIONS PLUS RARES

Poumon

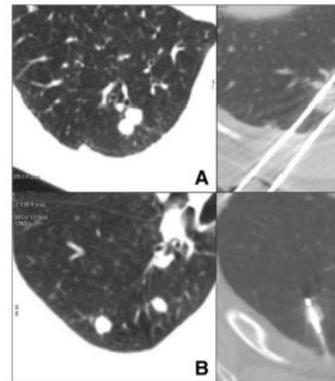
- Biopsie dans le même temps
- Une seule session
- Plusieurs lésions en une séance
- Traitement en zone irradiée

Parties molles

- Tumeurs desmoïdes
- Rares / Centres experts avec filière spécifique de PEC

Autres

- MAV, Sein, ...



ABSTRACT

Objective: To assess the safety and local recurrence-free survival in patients after cryoablation for treatment of pulmonary metastases.

Methods: This multicenter, prospective, single-arm, phase 2 study included 128 patients with 224 lung metastases treated with percutaneous cryoablation, with 12 and 24 months of follow-up. The patients were enrolled on the basis of the outlined key inclusion criteria, which include one to six metastases from extrapulmonary cancers with a maximal diameter of 3.5 cm. Time to progression of the index tumor(s), metastatic disease, and overall survival rates were estimated using the Kaplan–Meier method. Complications were captured for 30 days after the procedure, and changes in performance status and quality of life were also evaluated.

Results: Median size of metastases was 1.0 plus or minus 0.6 cm (0.2–4.5) with a median number of tumors of 1.0 plus or minus 1.2 cm (one to six). Local recurrence-free

response (local tumor efficacy) of the treated tumor was 172 of 202 (85.1%) at 12 months and 139 of 180 (77.2%) at 24 months after the initial treatment. After a second cryoablation treatment for recurrent tumor, secondary local recurrence-free response (local tumor efficacy) was 184 of 202 (91.1%) at 12 months and 152 of 180 (84.4%) at 24 months. Kaplan–Meier estimates of 12- and 24-month

overall survival rates were 97.6% (95% confidence interval: 92.6–99.2) and 86.6% (95% confidence interval: 78.7–91.7), respectively. Rate of pneumothorax that required pleural catheter placement was 26% (44/169). There were eight grade 3 complication events in 169 procedures (4.7%) and one (0.6%) grade 4 event.

Conclusion: Percutaneous cryoablation is a safe and effective treatment for pulmonary metastases.

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Percutaneous cryoablation for inoperable malignant lung tumors: Midterm results ☆

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Conclusion

La radiologie interventionnelle : des actes plus précis et moins invasifs pour les patients

La RI dont les DTP est en plein essor et reconnue dans le plan Unicancer comme une solution d'avenir.

La cryoablation percutanée possède des spécificités propres pour le traitement de patients sélectionnés en complément des autres techniques.

Elle est pénalisée par son cout et sa tarification inadaptée à l'échelle d'un établissement de santé.

Travail de fond des sociétés savantes de radiologie (SFR, FRI, SFICV...) pour la reconnaissance et la valorisation de ces actes.

Il apparait important de développer et de proposer cette expertise et ces techniques de recours sur notre territoire de santé.

La radiologie interventionnelle représente aujourd'hui un champ majeur d'innovation, au croisement de l'imagerie et de la chirurgie, de la technologie et de la science, et qui répond à une forte demande sociétale de proposer des traitements de plus en plus efficaces, mais aussi de moins en moins agressifs. L'étude «UNICANCER : Quelle prise en charge des cancers en 2020 » montre que le nombre de séjours pour des actes de radiologie interventionnelle pourra être multiplié par 4 dans les années à venir.

La radiologie interventionnelle comprend les procédures ayant pour but le diagnostic ou le traitement d'une affection, réalisées par un médecin radiologue, sous contrôle d'un moyen d'imagerie (fluoroscopie, échographie, scanner, IRM). **Dans les Centres de lutte contre le cancer, ces procédures permettent de réaliser des actes plus précis et moins agressifs pour les patients.**

Dans le contexte de la cancérologie, ces techniques peu invasives permettent d'accéder à une tumeur en profondeur en utilisant les voies naturelles (système urinaire, tube digestif...), le réseau vasculaire (artères ou veines) ou en choisissant un chemin court et sans risque au travers d'un organe (ex : voie transcutanée pour le foie ou les vertèbres).

Le champ d'application de la radiologie interventionnelle cancérologique est vaste. À titre d'exemples, il est possible ainsi, par le seul point d'entrée d'une aiguille, de détruire de petites tumeurs du foie ou des métastases du poumon, par un courant électrique (radiofréquence), par le froid (cryoablation) ou en les brûlant par des micro-ondes (thermoablation).

Le guidage de toutes ces interventions par l'imagerie confère une précision jusqu'ici inégalée aux gestes, y compris quand ils sont effectués en profondeur, et en particulier quand ils se déroulent dans des zones à risque élevé.

La radiologie interventionnelle en 2020 : un développement accru dû aux avancées technologiques

L'étude «UNICANCER : Quelle prise en charge des cancers en 2020 ? » montre **que la radiologie interventionnelle thérapeutique est amenée à croître fortement d'ici à 2020 du fait des avancées technologiques** telles que l'amélioration des techniques de guidage (image 3D, robotique permettant de calculer la meilleure trajectoire, cartographies des températures par IRM, ...); le développement des technologies non invasives (ultrasons...) et le perfectionnement des techniques de dépôt de médicaments permettant d'augmenter l'efficacité des doses injectées sans augmenter le risque pour le patient.

Les organes cibles sont les métastases osseuses, hépatiques et pulmonaires.

Les hypothèses 2020 retenues par nos experts sont :

- un nombre de séjours de radiologie interventionnelle multiplié par 4
- un traitement de 30 % des métastases hépatiques et pulmonaires, et de 50 % des métastases osseuses
- une ou deux interventions par an et par patient concerné
- un développement en substitution de la chirurgie, soit une diminution de 5 % des séjours chirurgicaux
- un tiers des séjours de radiologie interventionnelle sera effectué en ambulatoire
- ces prises en charge nécessiteront 2 à 3 consultations par un radiologue interventionnel par séjour, 1 à 2 actes de scanner ou IRM en imagerie classique diagnostic par patient pour le suivi post chirurgical

Cependant, **les hypothèses retenues sont pensées indépendamment de la tarification de ces activités. La radiologie interventionnelle ne présentera un développement thérapeutique important que sous réserve d'une tarification adaptée.**