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FUTURE OF INTERVENTIONAL RADIOLOGY EXPERT PANEL
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Métastases hépatiques des tumeurs neuroendocrines :

SIRT et ses perspectives

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Conflits d’intérêt

Consultant :

- Boston scientific
- Terumo
- Merit Medical

Centre utilisateur exclusif de Therasphere®

Remerciements

Oncologie digestive Cochin : Pr Coriat, Dr Pellat

Médecine nucléaire : Pr Cottereau – Dr Dechmi – Dr Monssarat

Contexte et rationnel

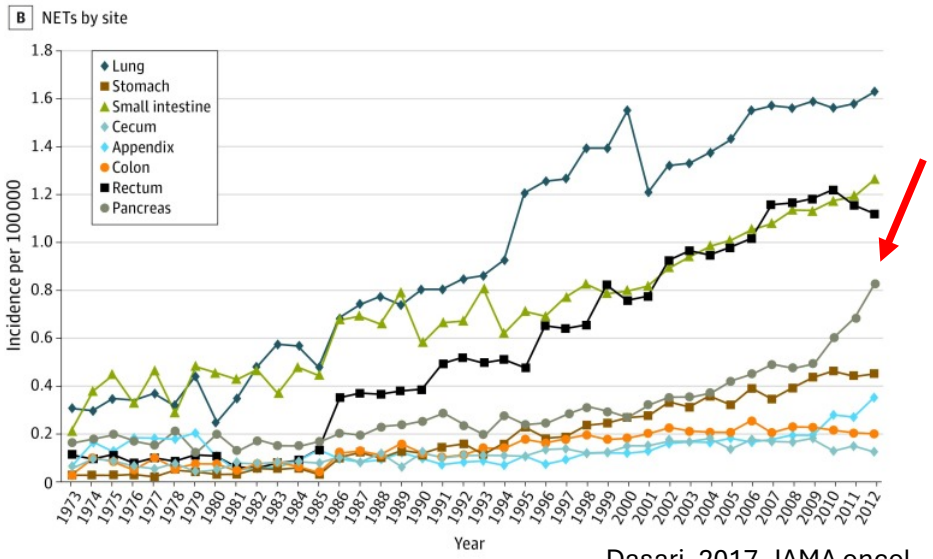
Les néoplasies neuroendocrines : généralités

Origine : <u>Digestive (2/3)</u>

Intestin grêle	1,45/100 000/an
Pancréas – Appendice	0,95/100 000/an
Estomac – rectum	0,45/100 000/an
Œsophage - foie – Voies biliaires	Exceptionnelles

<u>Autre</u>

Paragangliome, pulmonaire, sein, prostate, primitif inconnu



Dasari, 2017, JAMA oncol

Présentation hétérogène :

Symptômes et stade au diagnostique
Prédisposition héréditaire
Sécrétion fonctionnelle (20% des pTNE – plus pour le grêle) et récepteurs à la somatostatine

Pronostic variable :

Différenciation histologique (TNE / CNE)
Ki67 et grade *(>3% ; 3-20%, ≥20%)*
Stade tumoral
Organe d'origine

<u>Survie globale à 5 ans :</u>

Pancréatiques : 25 à 75%
Iléales : 55% à 70%
CNE : 5 à 40%

White *et al.* Lancet Regional Health – 2022
Bierley *et al.* Oxford 2017
Hofland *et al.* J of endocrinology - 2023,

Les néoplasies neuroendocrines : particularités

Rare et hétérogène : peu d'essais randomisés – beaucoup d'accords d'experts

➔ RCP RENATEN-ENDOCAN – Réseau TENpath

➔ Inclusion dans des essais +++

Survie longue : objectifs thérapeutiques personnalisés :

Guérison

Augmentation de la survie

Contrôle local

Contrôle des symptômes

Amélioration / maintien de la qualité de vie…

De Mestier et al. Thésaurus National de Cancérologie Digestive, 2023

Bilan préthérapeutique

Radiologie :

Scanner : Abdomino-pelvien injecté 30 et 70s

Thoracique

IRM : Abdominale – Foie (±Hépatospécifique)

Pelvienne : TNE rectales

Cérébrale et rachidienne : si symptômes ou surveillance si connue

Endoscopie digestive :

EOGD – iléocoloscopie : diagnostic, biopsies, complications

Echoendoscopie : biopsies – résecabilité – Si imagerie normale

Imagerie nucléaire :

PET au ^{68}Ga-DOTATOC : bilan de toute NNE métastatique (^{177}Lu-DOTATATE)

PET au ^{18}FDG : Pronostic indépendant des TNE, préthérapeutique des CNE

PET au ^{18}F-DOPA : meilleur sensibilité que DOTATOC pour grêle : lésion introuvable, bilan exhaustif

Essai clinique en cours *BRD 11/5-K : TEP 68Ga-DOTANOC*

ETT :

Bilan des complications

Primitif

Résécabilité

Extension

Complication

De Mestier et al. Thésaurus National de Cancérologie Digestive, 2023

Synthèse et traitement

Décision thérapeutique complexe basée sur tous les éléments cités

<u>Du syndrome sécrétant</u>

Antisécrétant

Symptomatique

<u>Du primitif</u>

Non métastatique

Résection endoscopique

Chirurgie ± Curage

Métastatique

Exérèse du primitif

<u>Des métastases</u>

Indication :

Progression

Symptomes/ sécrétion non contrôlée

Envahissement hépatique >50%

Place de la SIRT

Synthèse et traitement

Tumeurs neuroendocrines bien différencies pancréatiques sporadiques

Tumeurs localisées

Tumeur<2 cm asymptomatique

Surveillance

Tumeur>2 cm ou symptomatique

Chirurgie
Cholécystectomie

Pas de traitement adjuvant

Tumeurs avancées

Métastases résécables

Chirurgie
+/-Chimiothérapie néoadjuvante
+/- Autres traitements locorégionaux

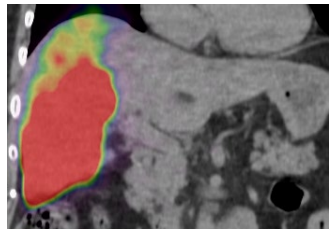
Métastases non résécables

Première ligne :
-Surveillance
-Analogues de la somatostatine
-Chimiothérapie (*grade 3*)

Au delà de la première ligne:
- Analogues de la somatostatine
- Chimiothérapie +/-bevacizumab
- Evérolimus, sunitinib, cabozantinib
- Radiothérapie interne vectorisée
-Thérapies locorégionales si pas de contre-indication

Traitement concomitant d'un syndrome fonctionnel

Inclusion dans un essai clinique à privilégier autant que possible



Dr Pellat, Pr Coriat

Pourquoi un traitement « ciblé » des métastases hépatiques?

Pronostic

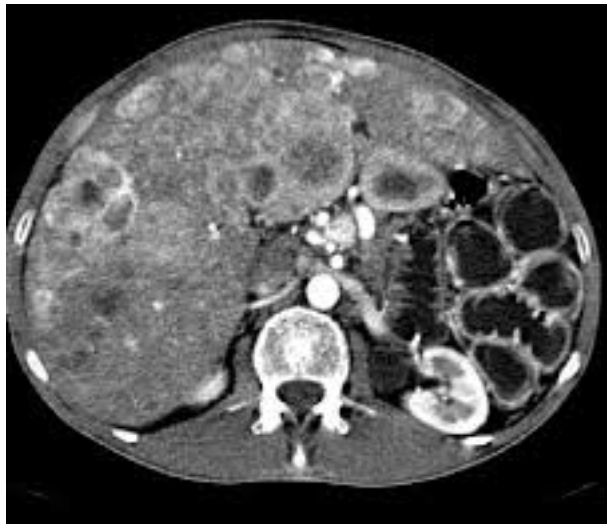
si invasion hépatique majeure

Dénutrition

Complications cardiaques

Compression osseuse

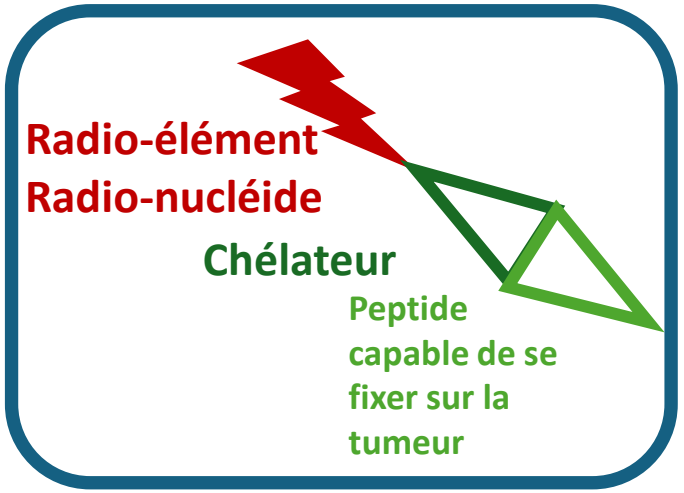
Insuffisance hépatocellulaire



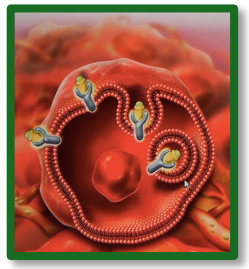
Jusqu’à 25% COD tout patients confondus*

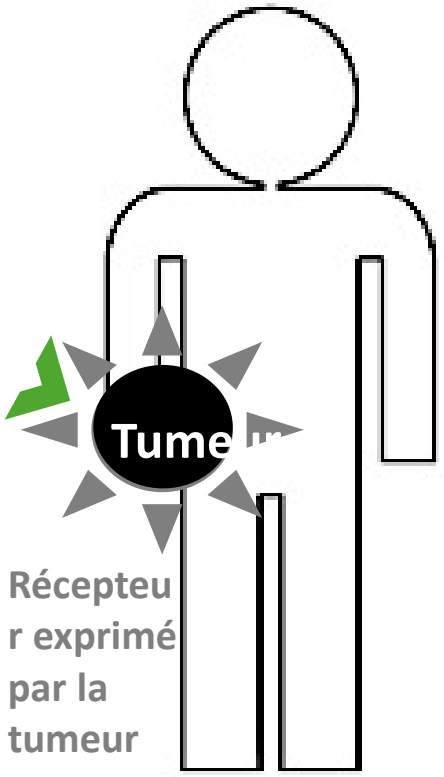
Anas M. Saad et al. J Clin Oncol (2020)
Beringer et al. ESMO 2021

Radiothérapie interne vectorisée (RIV)



TRAITEMENT anti-cancéreux





Radiothérapie métabolique par Lu^{177} et TNE bien différenciées

combinaison d'une molécule vectrice dirigée spécifiquement sur une cible, avec un isotope radioactif

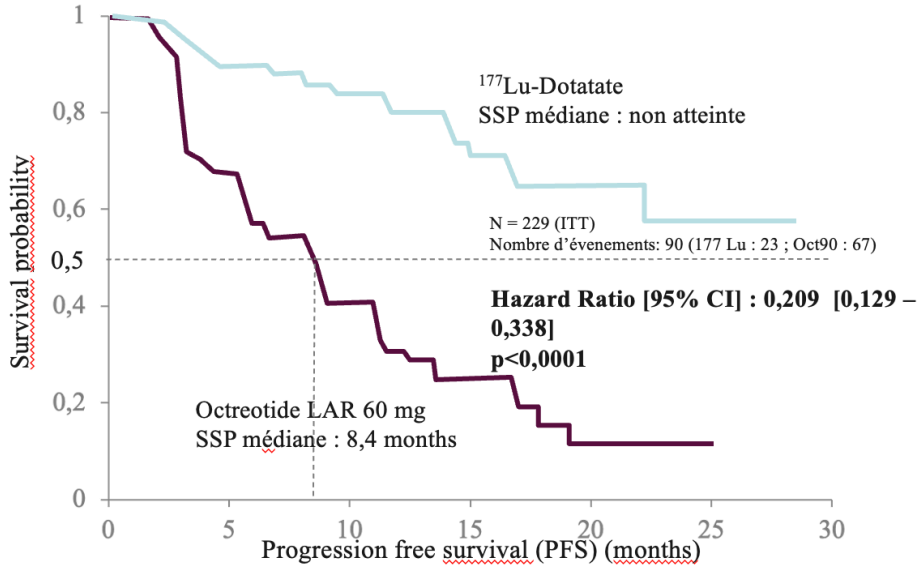
- Ciblage des récepteurs SST
- Vecteur : agoniste en routine clinique du sous-type 2 des récepteurs à la somatostatine
- Isotope : Lutetium 177

Radiothérapie interne vectorisée (RIV)

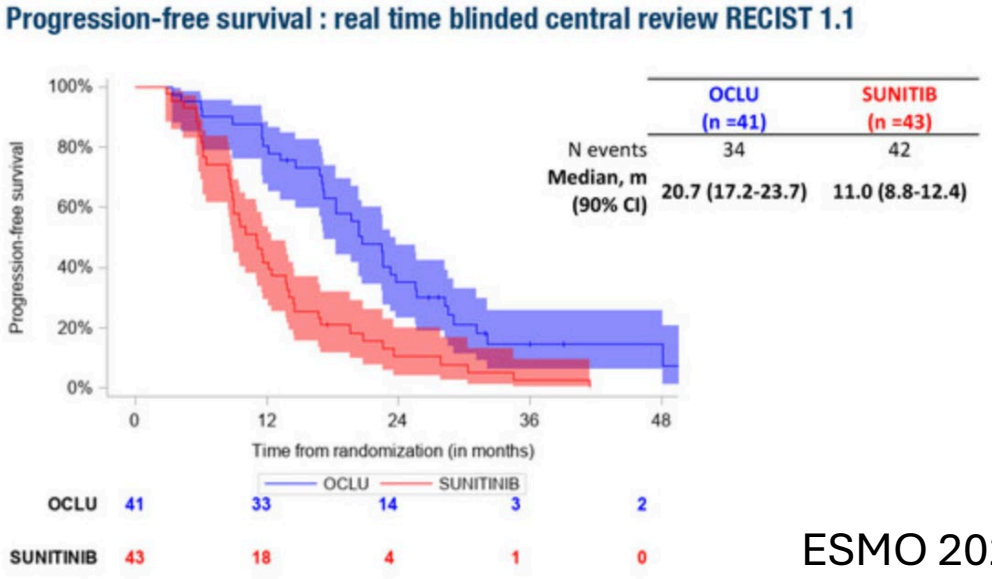
NETTER 1 : 1ère étude randomisée sur la RIV phase 3 / preuve d'efficacité - TNE du grêle G1 G2

Conforté par **Netter 2** pour les G2 et G3

Strosberg J. et al. –NEJM 2017



Occlurandom : Phase II : étude de phase 2, randomisée comparant l'efficacité et la tolérance de la RIV versus sunitinib - TNE pancréatiques



ESMO 2022

Radiothérapie interne vectorisée (RIV) : remboursement

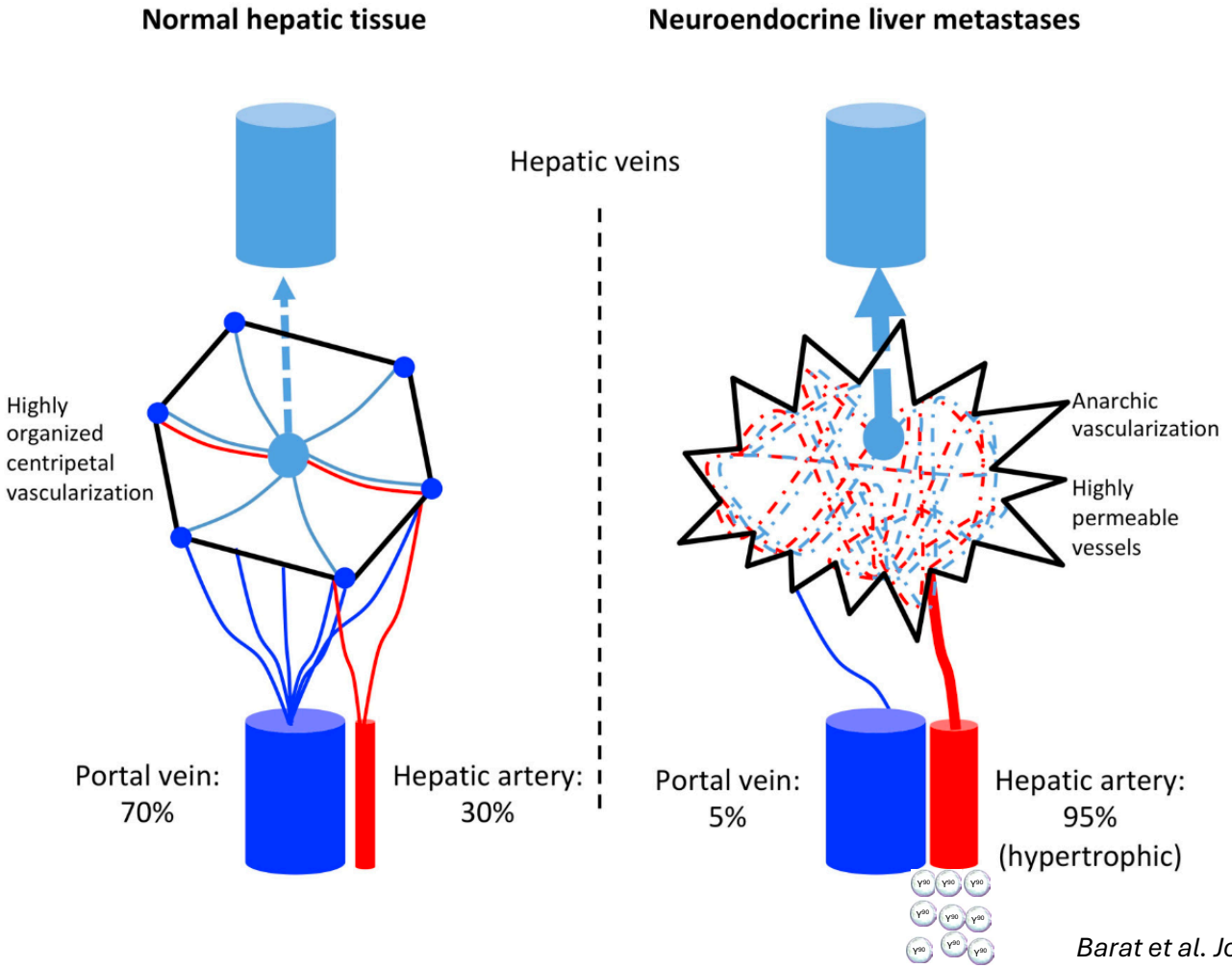
Remboursement : TNE du grêle uniquement
- 2ème ligne, après progression de la maladie avec octréotide.
- 1ère ligne si tumeurs d'emblée progressives ou avec une masse tumorale hépatique importante (> 50 %).

Doses compassionnelles :

•Phéochromocytome/paragangliome (PPGL) métastatique ou localement avancé inopérable
•TNE **bronchique**, métastatique ou localement avancée inopérable, progressive ou de sécrétante non contrôlée
•TNE **thymique**, métastatique ou localement avancée inopérable, progressive ou de forme sécrétante non contrôlée et exprimant les récepteurs de la somatostatine sur l'imagerie TEP des récepteurs de la somatostatine, en relation avec les résultats de la TEP au FDG et sur proposition de la RCP nationale Renaten.
•TNE y compris une TNE de **primitif inconnu**, NE correspondant **PAS à l'indication** de l'AMM
•Méningiome de tous grades, exprimant les récepteurs de la somatostatine de type 2

HAS 2022/ANSM 2025

La radio-embolisation : rationnel



Barat et al. Jcm 2020

Risque de shunt veineux :
- Poumon +++
- Digestif
- Autre

➔ Irradiation non cible

Recrutement artériel anarchique
- Hépatique multiple
- Extra-hépatique
  - Digestif
  - Diaphragmatique
  - …

➔ Irradiation foie « sain »

SIRT et TNE : Devices disponibles

Y90

Billes de verre

Résine

Ho 166

Terumo Announces Perma tion of Holmium Platform SIRT Product Range Due to Ope kity

Published on: May 7, 2025

Cas clinique

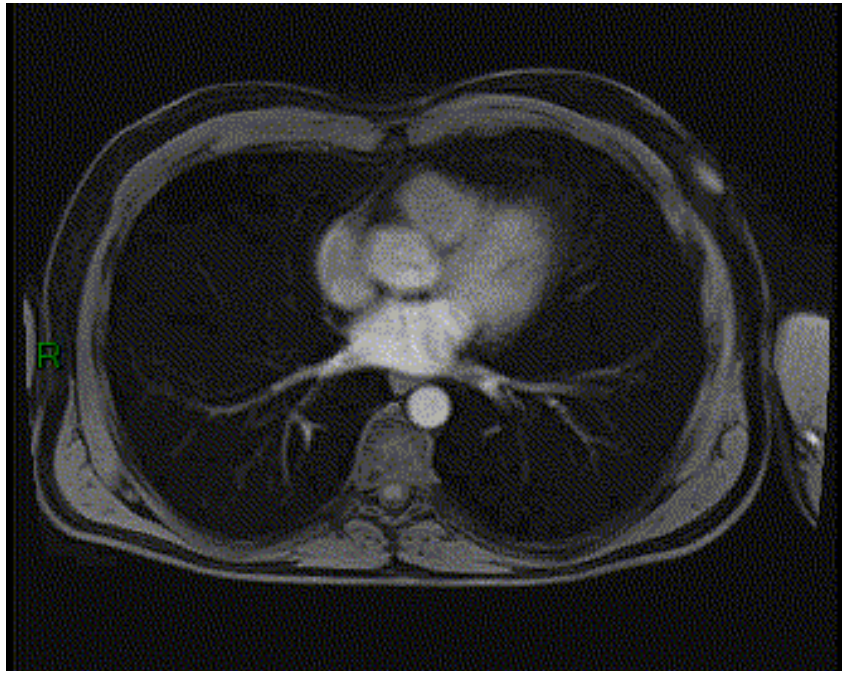
Cas clinique

Homme 53 ans

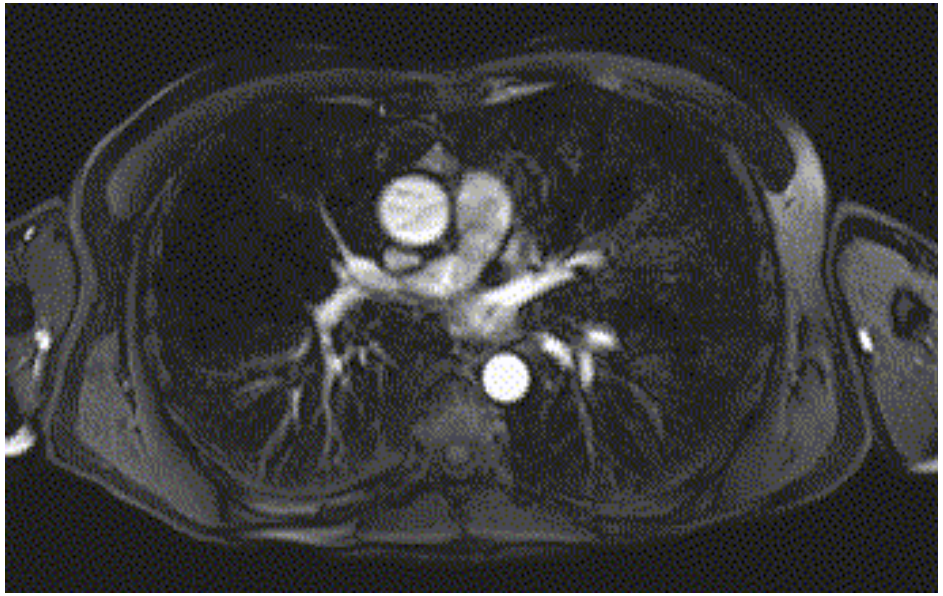
TNE du grêle (duodénale) de grade II (ki-67 : 14%)
DPC en 2015.
Métatases hépatiques en 2019 : Xeloda – Temodal
Progression en 2021 : Everolimus puis Sutent

2023 : Progression isolée et douloureuse d'une lésion du VI

2022



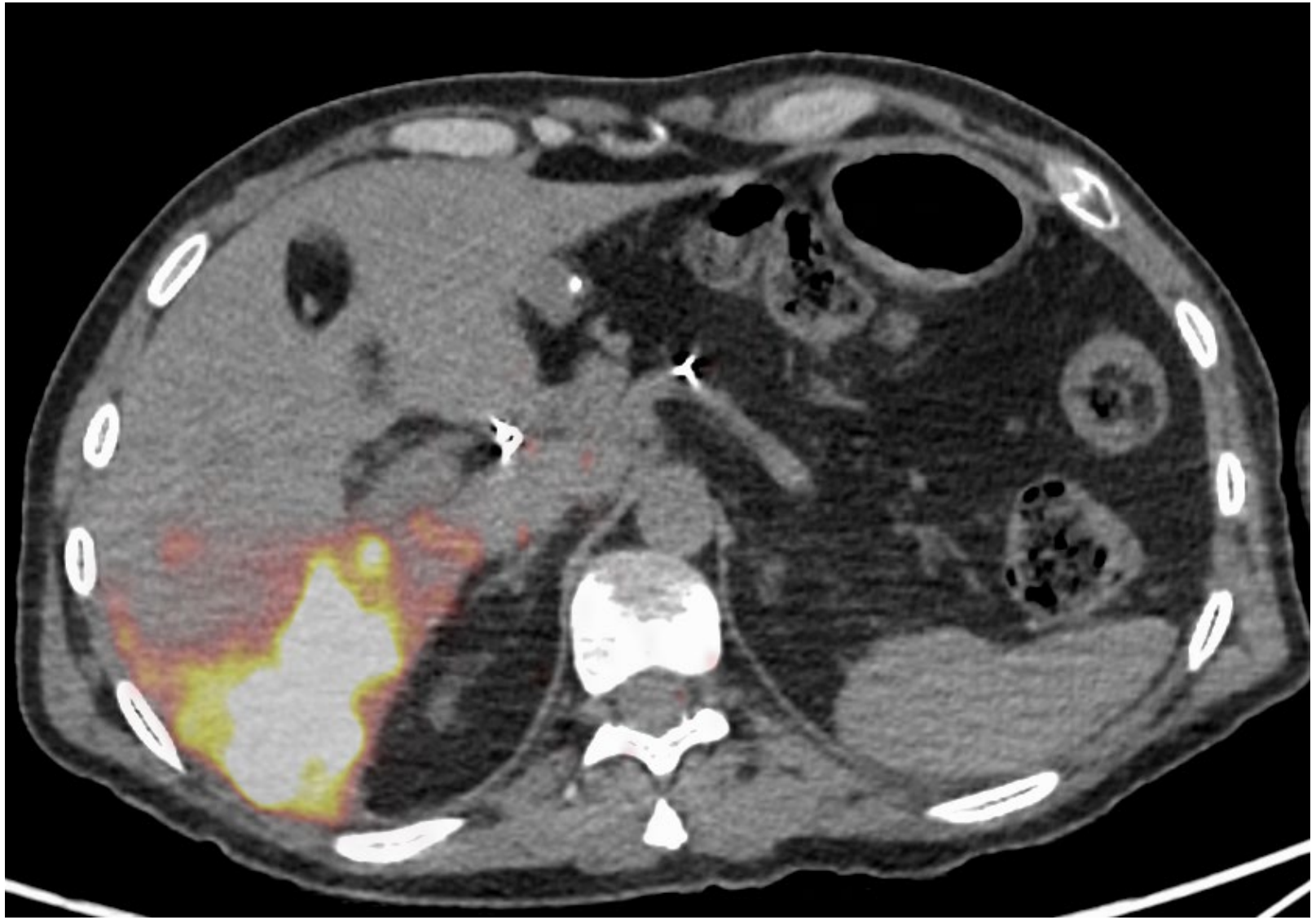
2023



Cas clinique

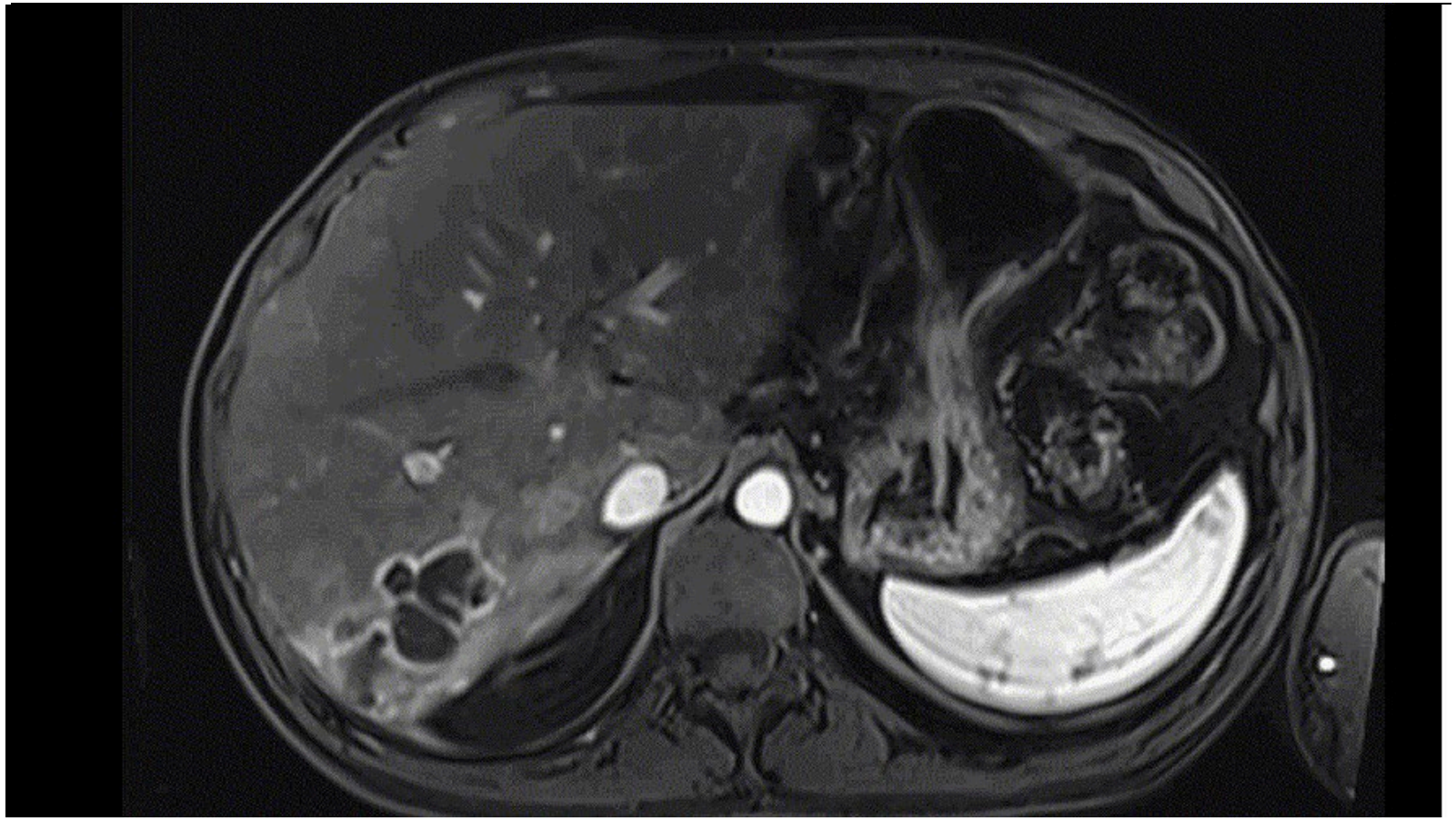
Traitement : segment VI

335 Gy à la tumeur



Cas clinique

IRM 3 mois

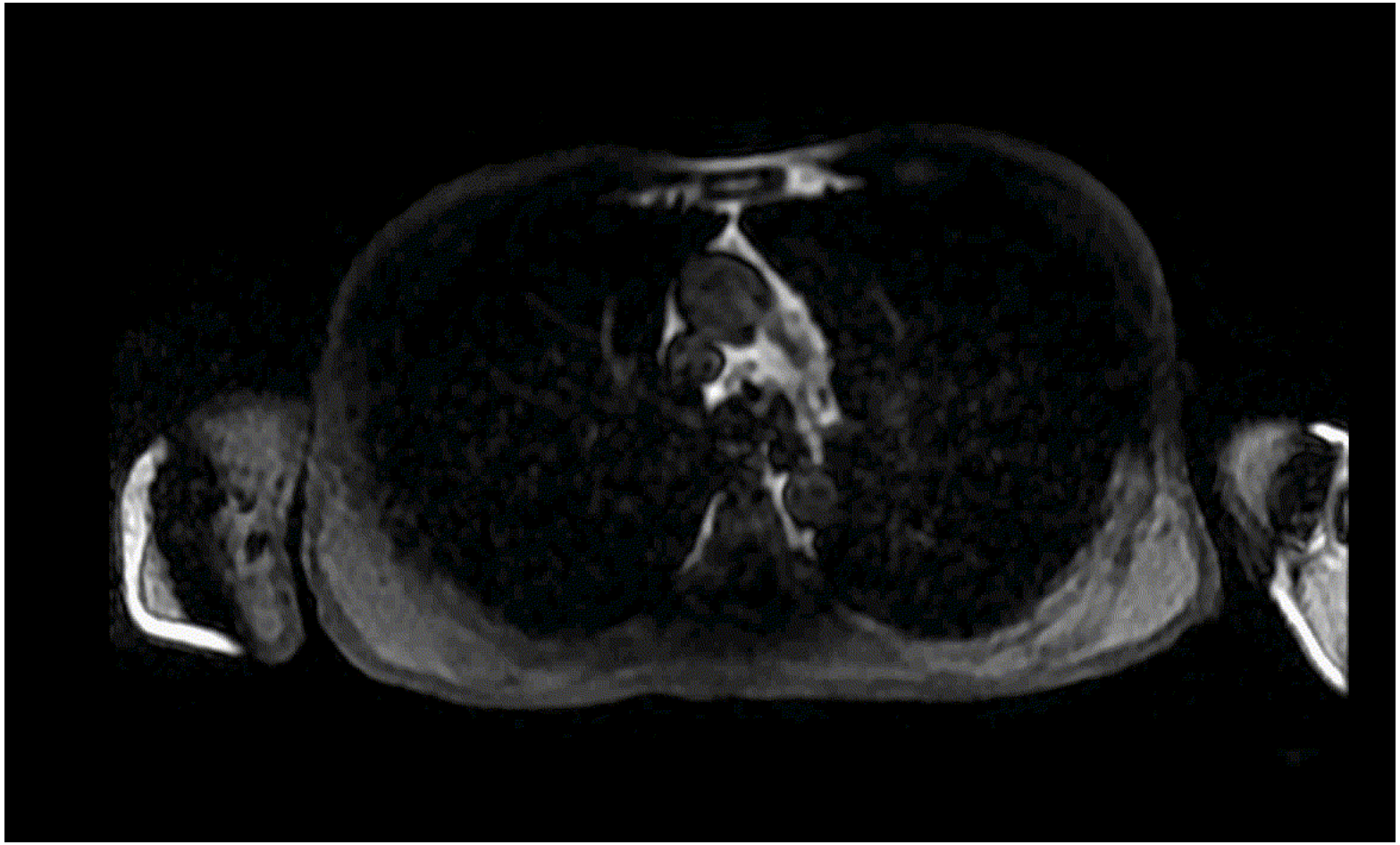


Cas clinique

Progression des lésions non traitées :

Carbozantinib 60mg/j

IRM à 1 an : nécrose segmentaire

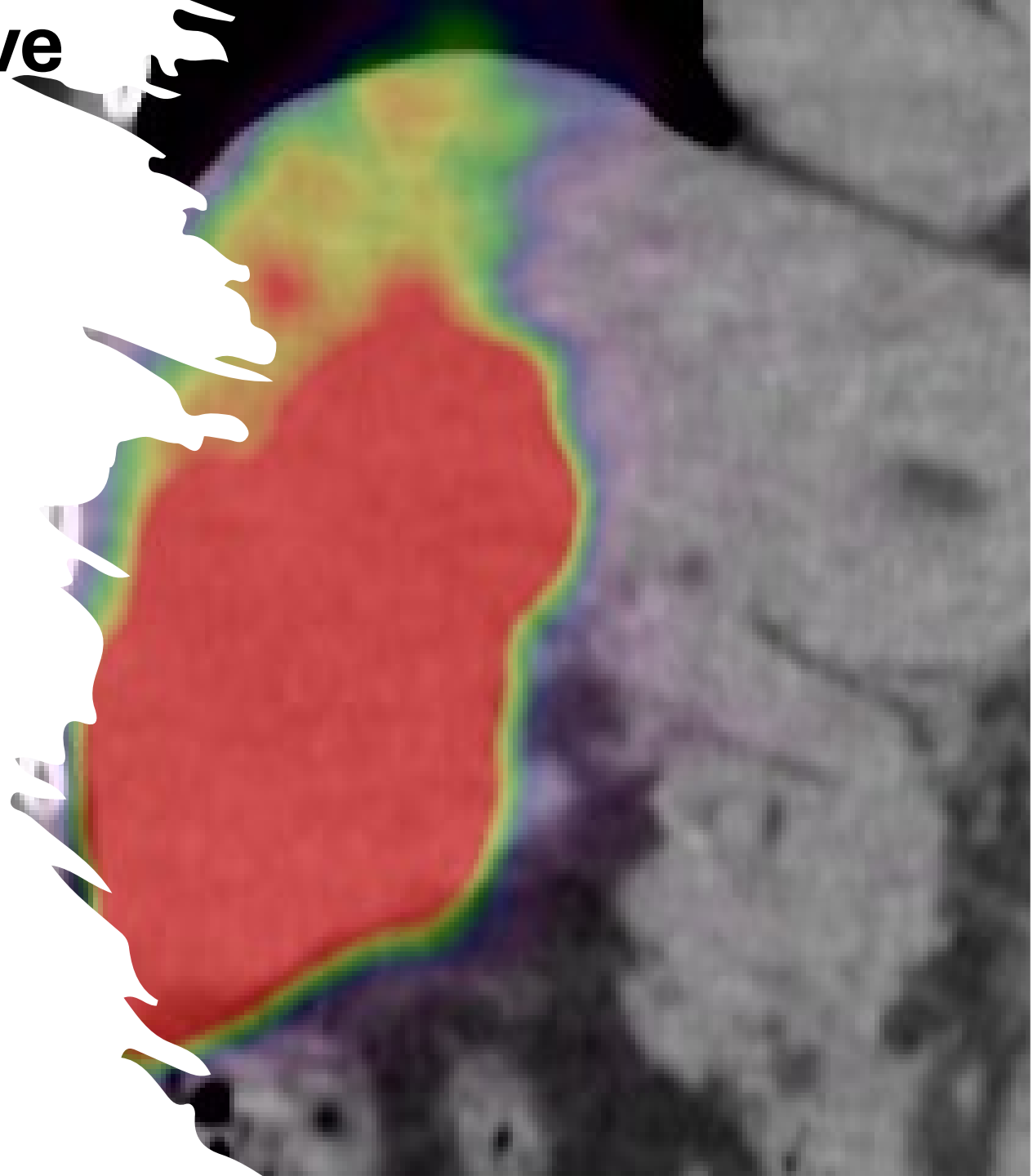


Connaissances actuelles

SIRT et TNE : niveau de preuve

Difficultés : Pathologie rare
Peu d'évènements « décès »

Conséquences :
Peu de patients inclus
Rétrospectif
Critère de substitution « DFS »

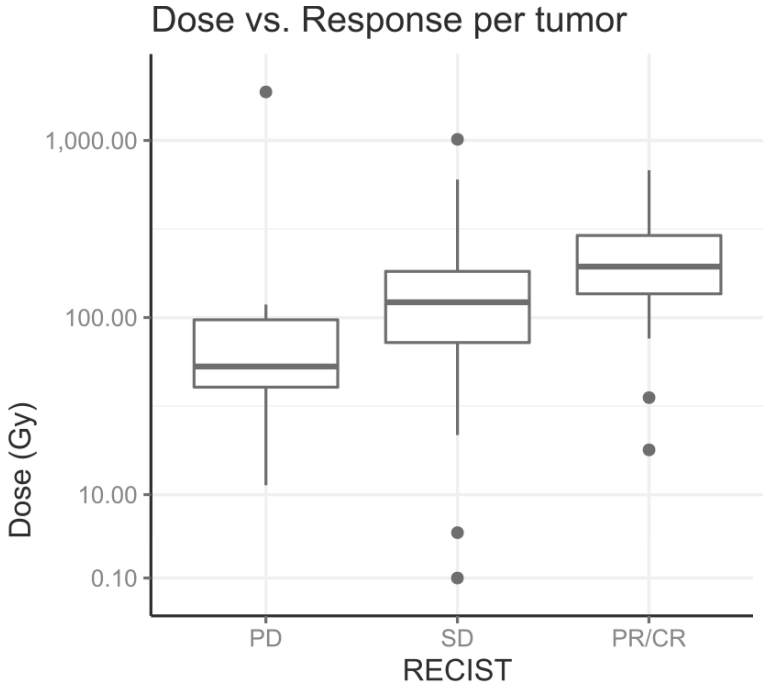


SIRT et TNE : niveau de preuve – « Glass »

Ebbers et al. EJNMMI 2021

Rétrospectif, monocentrique
128 TNE (toute origine) – 26 patients – 31 SIRT
CJP : réponse RECIST 1.1

>150 (voir 170) Gy pour Réponse



Watanabe et al. J Nucl Med 2024

Rétrospectif 99 patients

➔ Même trend

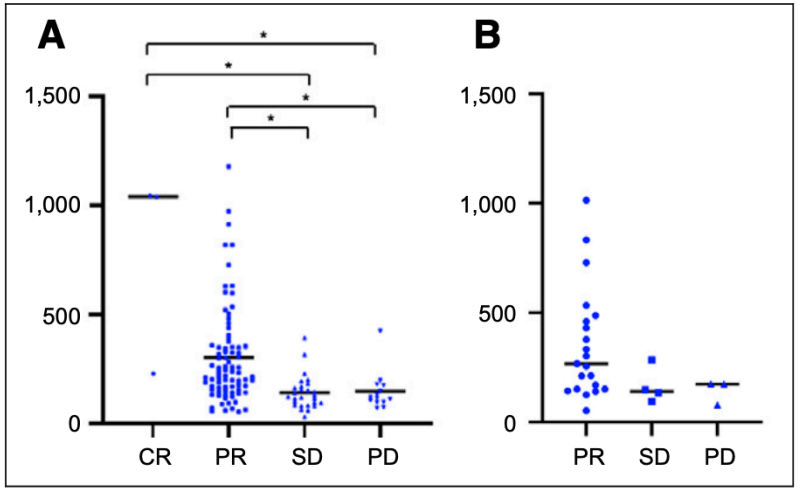


FIGURE 2. Lesion-based (A) and patient-based (B) comparisons of MAD

SIRT et TNE : niveau de preuve – « Glass »

Egger et al. 2020

Rétrospectif, 2 centres 2000 - 2018
248 patients (TNE toute origine)
- 197 TACE
- vs 51 SIRT

Évaluation :
- Morbidité
- Réponse Recist
- Résultats à long terme

Table 2. Periprocedural Outcomes after Transarterial Chemoembolization vs Transarterial Radioembolization among Patients with Neuroendocrine Liver Metastases

Outcome	TARE (n = 51)	TACE (n = 197)	p Value
Length of stay, d, median (IQR)	0 (0, 0)	1 (1, 1)	<0.0001
Any complication, n (%)	7 (13.7)	44 (22.6)	0.17
Major complication, n (%)	3 (5.9)	18 (9.2)	0.58
30-d mortality, n (%)	1 (2.0)	6 (3.1)	1.0
90-d mortality, n (%)	5 (9.8)	10 (5.2)	0.21
Laboratory, median (IQR)			
Bilirubin change, mg/dL	0 (-0.3, +0.1)	+0.4 (+0.1, +0.8)	<0.0001
Platelet change, $10^3/\mu L$	-29 (-78, +19)	-42 (-82, -4)	0.31
INR change	+0.1 (-0.1, +0.3)	+0.2 (+0.1, +0.3)	0.07
Creatinine change, mg/dL	-0.1 (-0.2, 0)	+0.1 (0, +0.2)	<0.0001
% chromogranin change	-16 (-64, +49)	-43 (-77, -4)	0.07
Radiographic			
% change in size, median (IQR)	-9 (0, -27)	-19 (-6, -34)	0.051
RECIST response, n (%)			0.0002
Complete response	2 (4.4)	5 (3.6)	
Partial response	9 (19.6)	37 (26.6)	
Stable disease	27 (58.7)	92 (66.2)	
Progressive disease	8 (17.4)	5 (3.6)	

INR, international normalized ratio; IQR, interquartile range; RECIST, response evaluation criteria in solid tumors; TACE, transarterial chemoembolization; TARE, transarterial radioembolization.

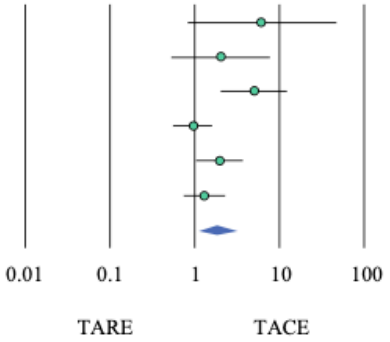
Pas de différence

TNE : SIRT versus TACE

Ngo et al. An Surg Oncol 2021

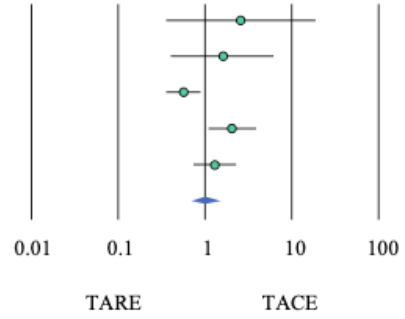
(a) Median overall survival

Study name	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value
1 Ozkan, 2013	6.088	0.797	46.501	1.741	0.082
2 Engelman, 2014	2.060	0.532	7.971	1.047	0.295
3 Singla, 2016	5.137	2.089	12.636	3.564	0.000
4 Chen, 2017	0.980	0.564	1.702	-0.072	0.943
5 Minh, 2017	1.993	1.062	3.741	2.148	0.032
6 Egger, 2020	1.344	0.769	2.352	1.037	0.300
	1.915	1.140	3.218	2.455	0.014



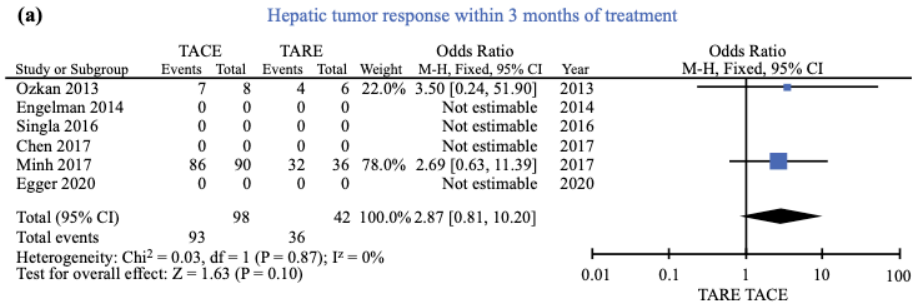
(b) Median hepatic progression-free survival

Study name	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value
1 Ozkan, 2013	2.592	0.368	18.259	0.956	0.339
2 Engelman, 2014	1.575	0.410	6.049	0.662	0.508
3 Chen, 2017	0.570	0.370	0.879	-2.543	0.011
5 Minh, 2017	2.010	1.071	3.773	2.174	0.030
6 Egger, 2020	1.292	0.739	2.259	0.897	0.370
	1.007	0.753	1.347	0.049	0.961



Elf et al. (W J surg 2018) Sirt versus Bland embolisation : même tendance

(a) Hepatic tumor response within 3 months of treatment



(b) Hepatic tumor response more than 3 months after treatment

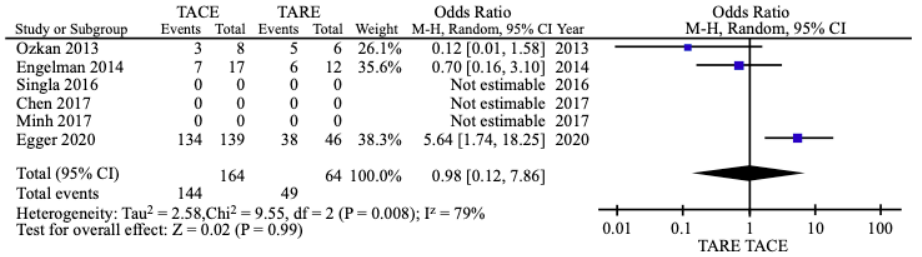
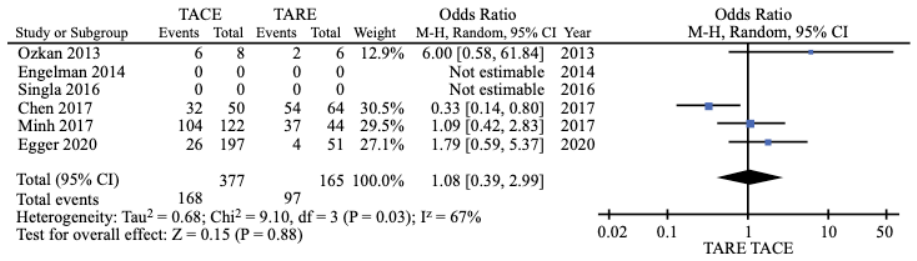
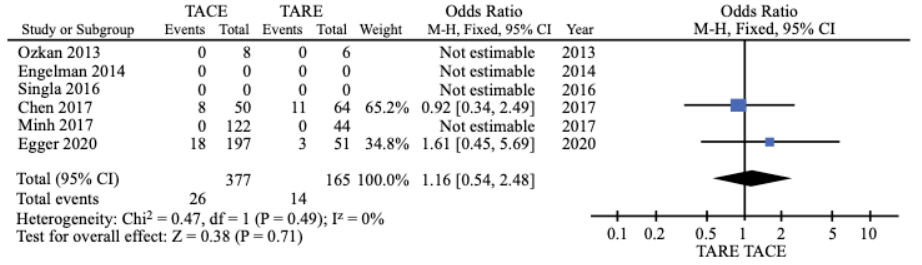


FIG. 4 Meta-analysis of hepatic tumor response. **a** Within 3 months of treatment. **b** More than 3 months after treatment

(a) Minor adverse events



(b) Major adverse events



SIRT et TNE : niveau de preuve – « Resin »

Braat et al. CVIR 2019 :

International multicentrique
Rétrospectif
Objectif :
CJP → Efficacité (Recist 1.1)
CJS → Toxicité et OS

TNE toute origine et grade avec MH
244 patients sur 8 centres

Réponse complète (RC) : 8 %.
Réponse partielle (RP) : 35 %
Stabilisation de la maladie (SM) : 48 %

Survie globale médiane (SGm) :
G1 : 3,7 ans
G2 : 2,7 ans
G3 : 0,7

Complications spécifiques à la SIRT : < 4 %.

Symptômes : 44 % amélioration et 34 % résolution.

Les facteurs pronostiques significatifs de survie :
Grade de la TNE/l'indice Ki67,
Charge tumorale (≥ 75 %),
Atteinte extrahépatique
Réponse Recist 1.1.

Braat et al. CVIR 2020 : SIRT après RIV 5% de complication

SIRT et TNE : niveau de preuve – « Resin »

Wong et al. Resin registry Cancer 2022

170 patients suivi >2 ans

Survie globale 33 mois
Survie sans progression : 25 mois
Toxicité > grade 3 : 7,6%

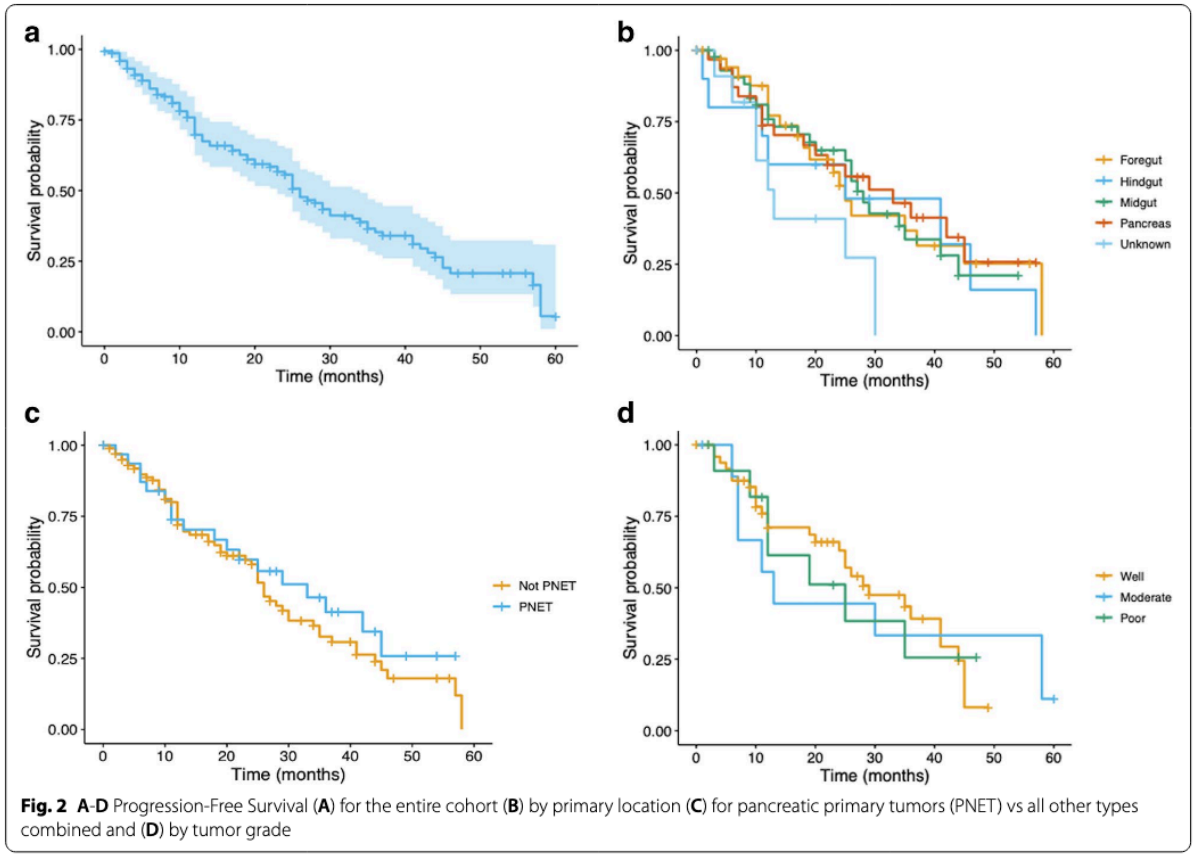


Fig. 2 **A**-**D** Progression-Free Survival (**A**) for the entire cohort (**B**) by primary location (**C**) for pancreatic primary tumors (PNET) vs all other types combined and (**D**) by tumor grade

Pas de différence significative
OS ni PFS selon l'origine de la TNE

SIRT et TNE : niveau de preuve – « Resin »

Schaarschmidt et al. J Nucl Med 2022

Multicentrique, rétrospective, descriptive

Comparaison originale :
128 patients SIRT de **sauvetage**
102 SIRT en **seconde ligne**
TNE toute origine et tout grade

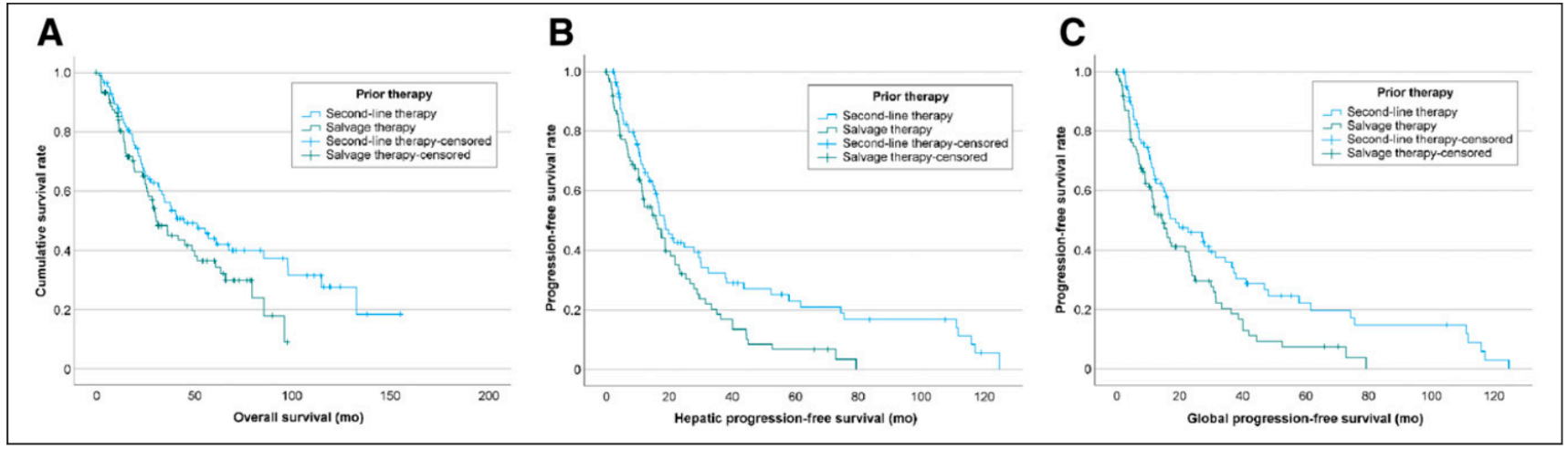


FIGURE 4. Kaplan–Meier survival curves investigating influence of extent of prior therapy (second-line therapy: prior surgery for primary tumor or metastases and somatostatin analog treatment before ^{90}Y RE vs. salvage therapy) on OS (A), hepatic PFS (B), and global PFS (C).

➔ Meilleur en 2è ligne

SIRT et TNE : Dosimétrie

« Recommandations » dosimétriques

4. Long-term hepatic fibrosis may have a more negative impact than with other tumour types [50]
5. The preference for bland embolization, chemoembolization, or radioembolization remains a subject of scientific debate [10, 50, 58, 59]. Radioembolization typically has better short-term tolerability and durations of response [56]

Euro

Clinical and dosimetric considerations for yttrium-90 glass microspheres radioembolization of intrahepatic cholangiocarcinoma, metastatic colorectal carcinoma, and metastatic neuroendocrine carcinoma: recommendations from an international multidisciplinary working group

Marnix Lam[1,2] · Riad Salem[3] · Beau Toskich[4] · S. Cheenu Kappadath[5] · Carlo Chiesa[6] · Kirk Fowers[7] · Paul Haste[8] · Joseph M. Herman[9] · Edward Kim[10] · Thomas Leung[11] · Siddharth A. Padia[12] · Bruno Sangro[13] · Daniel Y. Sze[14] · Etienne Garin[15]

Table 2 mNET radioembolization recommendations

Treatment Intent	1. In eligible patients, radiation segmentectomy or radiation lobectomy are recommended [10, 57] 2. Palliation (i.e., symptom and tumour control) and/or consolidation complementary to systemic treatment is the intent for advanced disease 3. Most patients are treated with palliative intent due to late stage, multifocal disease with large tumour load [50]. Liver function should be preserved to prevent hepatotoxicity that precludes subsequent treatment (locoregional or systemic therapies) 4. Long-term hepatic fibrosis may have a more negative impact than with other tumour types [50] 5. The preference for bland embolization, chemoembolization, or radioembolization remains a subject of scientific debate [10, 50, 58, 59]. Radioembolization typically has better short-term tolerability and
Dose Calculation and Dosimetry Considerations	1. For radiation segmentectomy/lobectomy, it is recommended to use HCC, mCRC, iCCA guidance as a reference due to limited mNET data 2. MCD is preferred over SCD to evaluate TAD and NTAD [11, 62]. Data on specific dose thresholds is limited to a single institution case series and should be further investigated. Routine clinical use can not be recommended at this time 3. SCD reference average absorbed dose to the perfused volume is 120 Gy. The perfused volume may be the whole liver or a fraction thereof, which has proven to be safe and effective [50, 52]. TAD and NTAD may vary considerably between patients. Caution in case of poor targeting ([^{99m}Tc]TcMAA SPECT/CT) and/or low tumour burden (< 10%), which could lead to low efficacy and/or high toxicity, respectively 4. MCD NTAD prediction is typically more accurate than TAD, especially for (multiple) small and/or infiltrative tumours. In case of multiple smaller tumours, segmentation may be challenging, and instead can use a count-based isocontour thresholding technique on [^{99m}Tc]TcMAA SPECT/CT 5. Optimal tumour response and OS are attained when the TAD is ≥ 200 Gy with a minimum TAD ≥ 150 Gy (i.e., survival benefit threshold). Early studies showed a median whole liver NTAD of 54 Gy (range 11–128 Gy) with safe maximum administration ≤ 106 Gy [11]. A maximum NTAD of 75 Gy for single-session whole liver treatment is recommended to ensure safety. Proportionally higher NTAD is acceptable for smaller treatment fractions 6. Timing of radioembolization and extent of prior liver treatments should be considered. Evidence of long-term radioembolization effects is sparse and current studies lack clinical and dosimetric parameters [50] 7. In lower grade disease, emphasis is on safety (NTAD); in higher grade disease, emphasis is on efficacy (TAD)
Treatment Delivery	1. The interval between sequential lobar treatments ranges from 3–6 months. Interval progression in the untreated lobe is uncommon (except for grade 3/NEC); longer intervals may decrease the risk of liver decompensation. In cases of palliation, a shorter interval may be preferred 2. Bilobar disease can be treated using single-session bilobar or staged sequential lobar treatment. In general, staged sequential lobar treatment is preferred in low-grade NET to avoid potential long-term toxicity. In case of staged sequential lobar treatment, the lobe with more extensive disease should be treated first. For highly aggressive (i.e., grade 3/NEC) bilobar disease in a patient with preserved liver function and with [^{99m}Tc]TcMAA tumour targeting (i.e., high TAD; low NTAD), single-session bilobar treatment (i.e., two unilobar injections) should be based on MCD
Outcome Assessment and Follow-up	1. Contrast-enhanced MRI or CT should be performed every 3–6 months following treatment 2. Late responses are common and may take up to 4–9 months [63] 3. In the palliative intent setting, caution is warranted with an overly aggressive retreatment approach in patients with SD or PR. Retreatment (radioembolization, embolization, or systemic therapy) should be considered only in the setting of PD
Strength of Recommendation	B
Degree of Consensus	Strong

SIRT et TNE : Dosimétrie

« Recommandations » dosimétriques

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Patient Selection	1. All grade disease is acceptable, including neuroendocrine carcinoma (NEC) 2. Acceptable intrahepatic (maximum 50–70%; no maximum in case of palliation and preserved liver function) and extrahepatic disease burden (no defined maximum, as long as prognosis is defined by

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European Journal of Nuclear Medicine and Molecular Imaging

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Pretreatment Imaging	1. Multiple phase contrast-enhanced MRI or CT is recommended within 4–8 weeks of treatment. Depending on tumour grade, a longer interval is acceptable 2. Somatostatin receptor imaging may be performed for staging in somatostatin receptor positive grade 1–2 NET ([^{18}F]FDG-PET/CT in grade 3/NEC)
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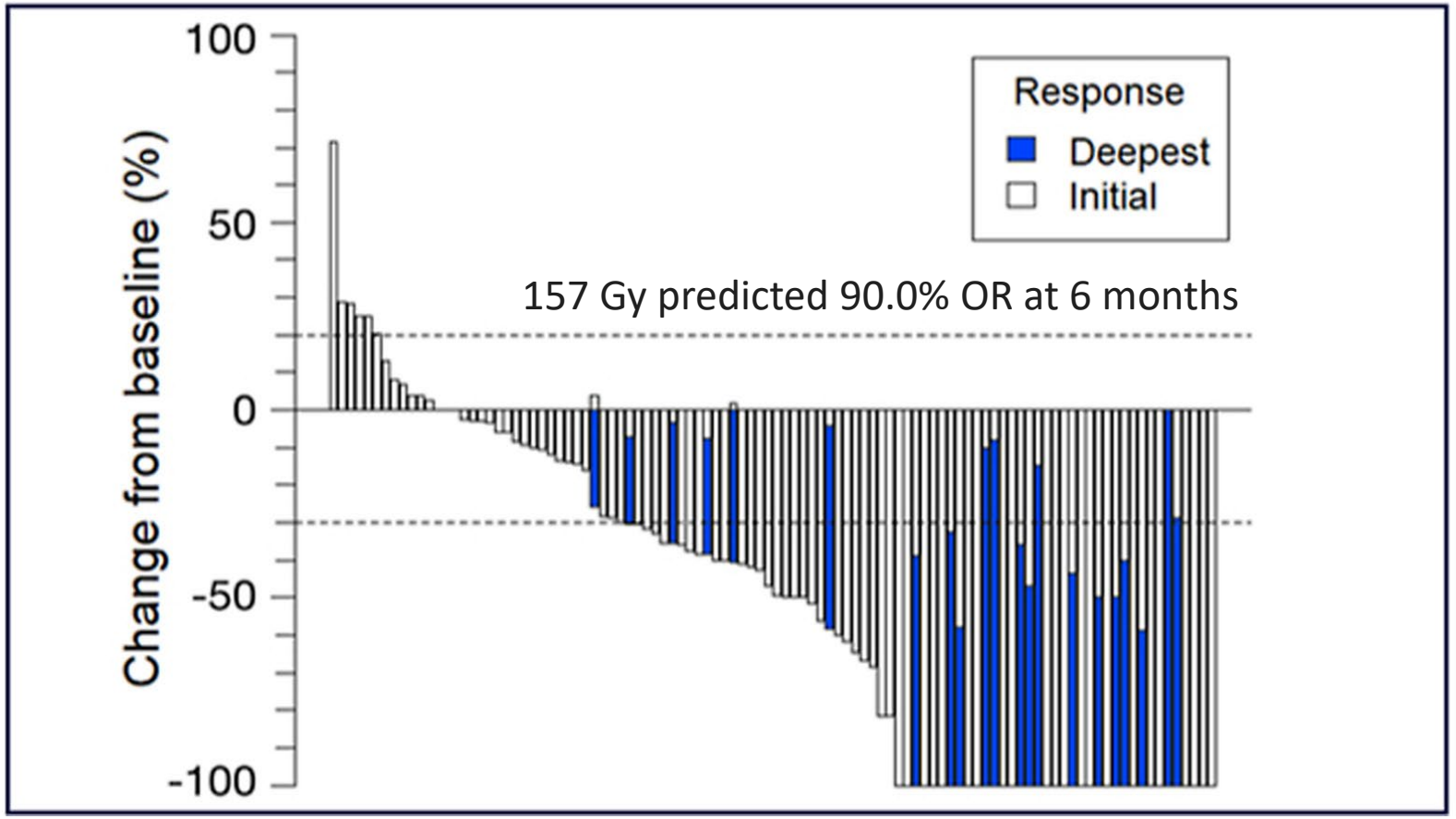
SIRT et TNE : Dosimétrie

Dosimetrie :
Doyle 2024 (JVIR)

Tumeurs >120Gy → Réponse objective

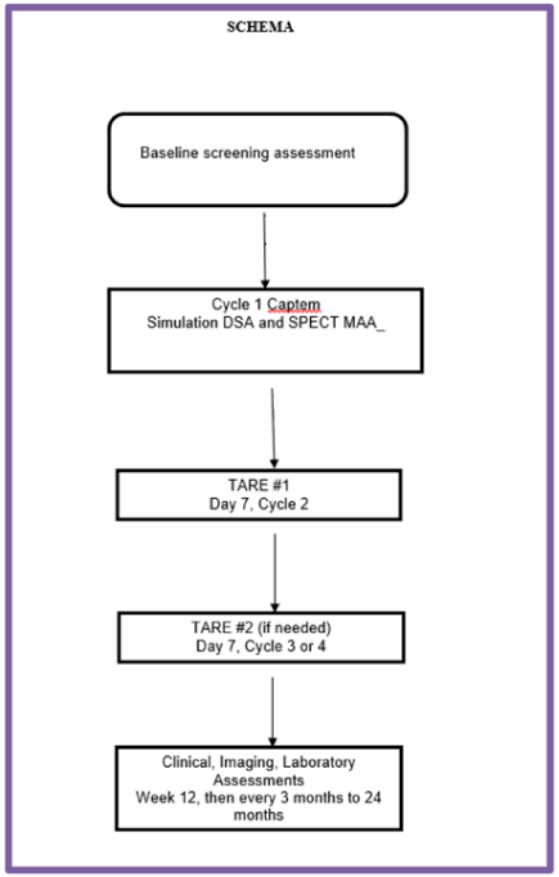
Rétrospective monocentrique – 35 patients 56 tumeurs

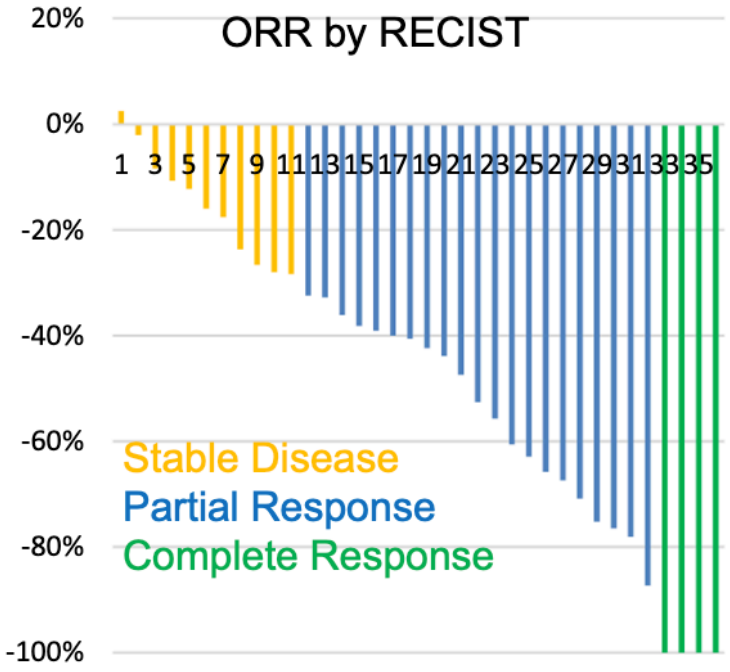


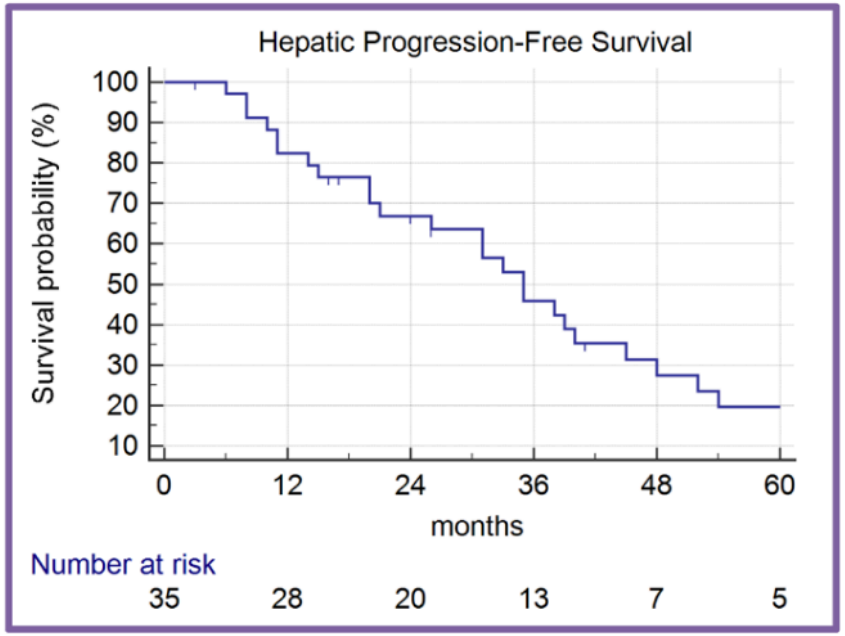
Avenir et perspectives?

SIRT et TNE : combinaison thérapeutique

Soulen et al. CVIR 2023 : SIRT + Capecitabine-Temozolomide pour TNE Grade 2
Monocentrique – rétrospective, 37 patients





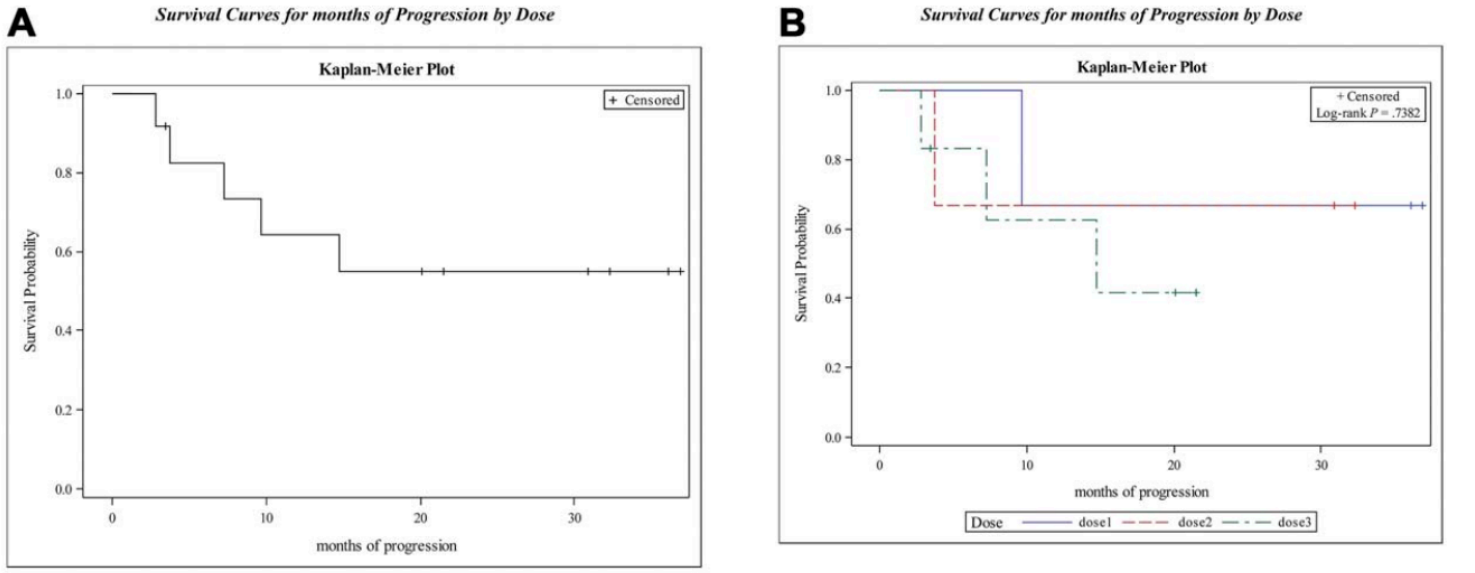


The combination of radiosensitizing chemotherapy with CapTem and ^{90}Y-TARE provided durable control of G2 NET liver metastases for substantially longer than expectations for embolotherapy or chemotherapy alone.

SIRT et TNE : combinaison thérapeutique

Kim et al. Cancer 2018

Phase 1b Pasireotide, Everolimus et SIRT – 13 patients



No. of Subjects	Event	Censored	Median Survival (95% CI)	12-mo Survival	24-mo Survival	36-mo Survival
12	5 (42%)	7 (58%)	NA (3.8, NA)	64.2% (30.2%, 84.8%)	55.0% (23.2%, 78.3%)	55.0% (23.2%, 78.3%)

Dose	No. of Subjects	Event	Censored	Median Survival (95% CI)	12-mo Survival	24-mo Survival	36-mo Survival
dose1	3	1 (33%)	2 (67%)	NA (9.6, NA)	66.7% (5.4%, 94.5%)	66.7% (5.4%, 94.5%)	66.7% (5.4%, 94.5%)
dose2	3	1 (33%)	2 (67%)	NA (3.8, NA)	66.7% (5.4%, 94.5%)	66.7% (5.4%, 94.5%)	NA (NA, NA)
dose3	6	3 (50%)	3 (50%)	14.7 (2.8, NA)	62.5% (14.2%, 89.3%)	NA (NA, NA)	NA (NA, NA)

Figure 2. (A) Kaplan-Meier curve for progression-free survival showing a median of 18.6 months (95% CI, 7.3 months to not reached). The progression-free survival rates were 61.5% at 1 year, 46.2% at 2 years, 38.5% at 3 years, and 28.8% at 4 years of follow-up. (B) Kaplan-Meier curve for overall survival showing a median of 46.3 months (95% CI, 18 months to not reached). The overall survival rates were 92.3% at 1 year, 69.2% at 2 years, 61.5% at 3 years, and 38.5% at 4 years of follow-up. CI indicates confidence interval; NA, not available.

Dose recommandée 10mg/j

Pas de suite…

SIRT et TNE : niveau de preuve – A suivre

ArTisaN trial – Sharma et al. BMC 2022
efficacité de la SIRT dans le traitement des (NEL) métastatiques hépatiques inopérables.

Phase 2 – Ouvert - Prospectif
24 patients
CJP : réponse Recist 1.1

En cours

CapTemY90 for Grade 2/3 NET Liver Metastases (CapTemY90)

Phase 2 - Prospectif
70 patients attendus
4 centres

Critères de jugement : PFS/OS

SIRT et TNE : Actualité

été 2025

Sirtex reçoit une approbation de marquage CE élargi pour ses microsphères en résine SIR-Spheres® Y-90 USA - Français

À propos de SIR-Spheres® en Europe
Les microsphères de résine SIR-Spheres® Y-90 sont indiquées pour le traitement :

- du carcinome hépatocellulaire (CHC) non résécable, ou
- des tumeurs hépatiques métastatiques non résécables d'un cancer colorectal primaire…
- du cholangiocarcinome intrahépatique non résécable, ou
- **des métastases hépatiques de tumeurs neuroendocrines (mNET**), ou
- d'autres métastases hépatiques

SIRT et TNE : Conclusion

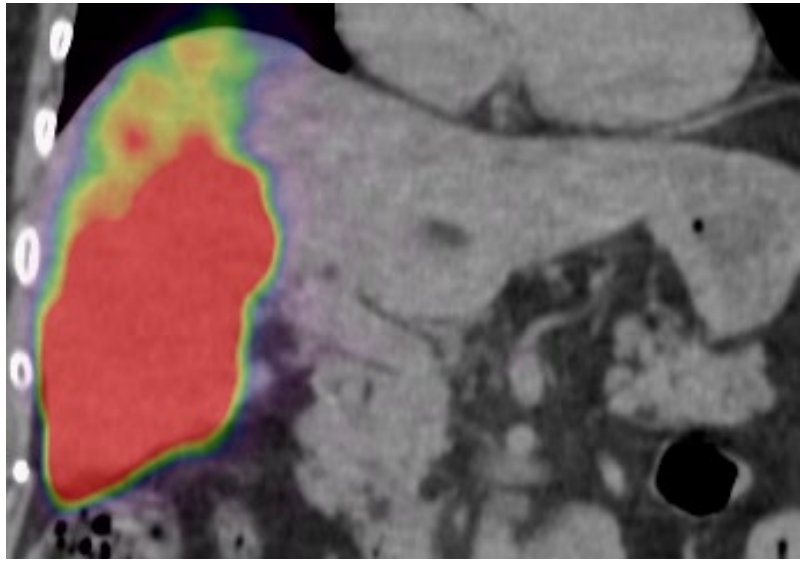
Outil de l’arsenal thérapeutique

Spécificité du type tumoral – faible niveau de preuve

→ Dosimétrie

→ Association thérapeutique

→ Tôt dans l’évolution



PATIENT SELECTION: NORTHWESTERN

- DISEASE BURDEN
  - Large, bulky tumors
  - Bilobar multi-focal disease
  - Infiltrative disease
  - Hypovascular Tumors
- CLINICAL INDICATORS
  - Significant carcinoid symptoms
  - Compromised performance status
- SPECIAL CONSIDERATRIONS
  - Failed other embolic therapy
  - Biliary tree compromised

R Salem, CIRSE 2025

F.IR.E25
FUTURE OF INTERVENTIONAL RADIOLOGY EXPERT PANEL
NOVEMBER
20 & 21
2025
Villa Gaby - Marseille
FRANCE
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Métastases hépatiques des tumeurs neuroendocrines :

SIRT et ses perspectives

Maxime Barat

Service de radiologie A (Pr Revel), Hôpital Cochin, Paris

AP-HP. Centre Université de Paris

Université Paris Cité