Bifocal HCC on cirrhosis:
How we manage it

O. Seror

Interventional Radiology Unit, APHP, Bondy/Bobigny, France

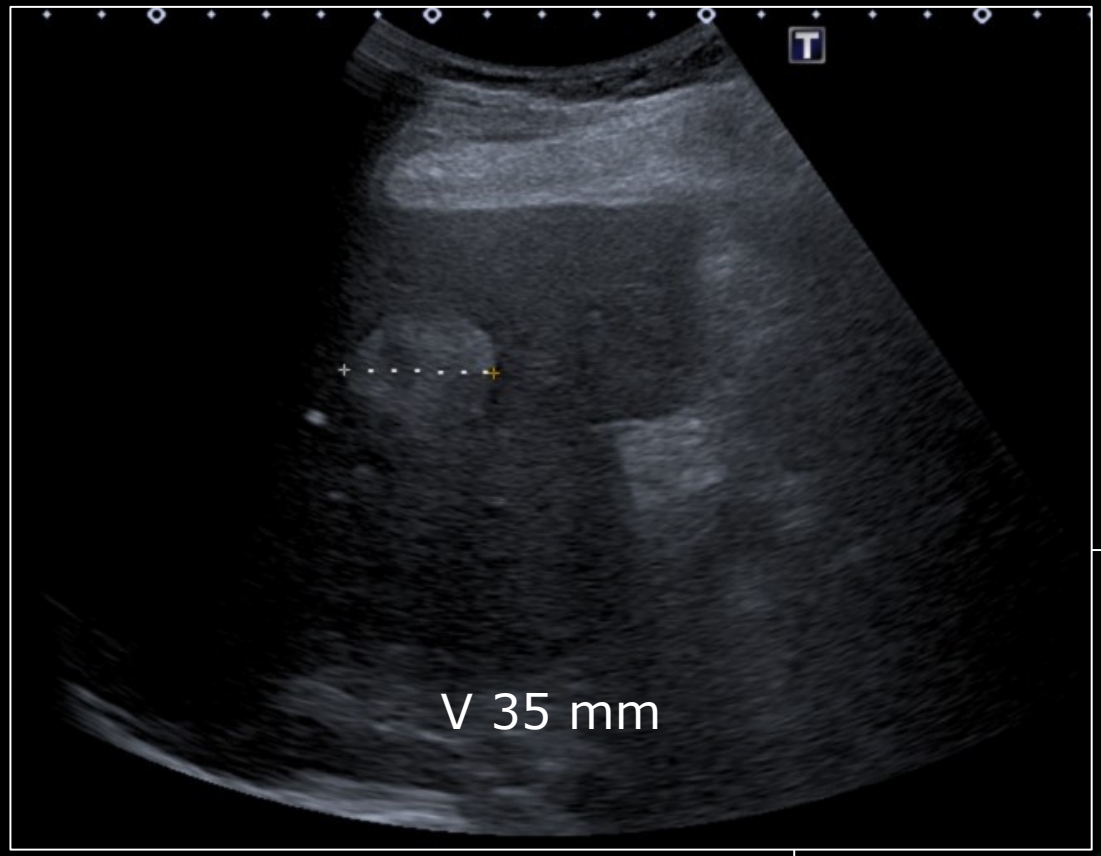
Hôpitaux Universitaires
Avicenne
Jean-Verdier
René-Muret
Paris-Seine Saint-Denis

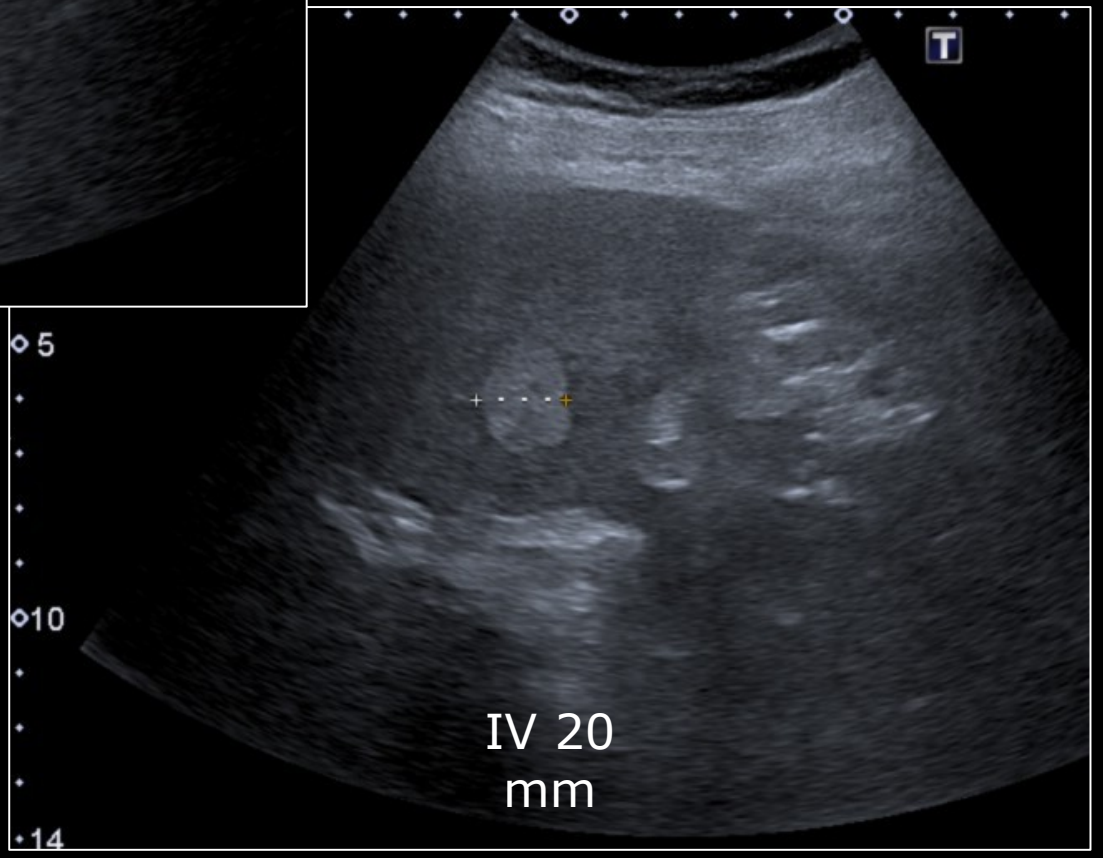
- ✓ Man 76 years old

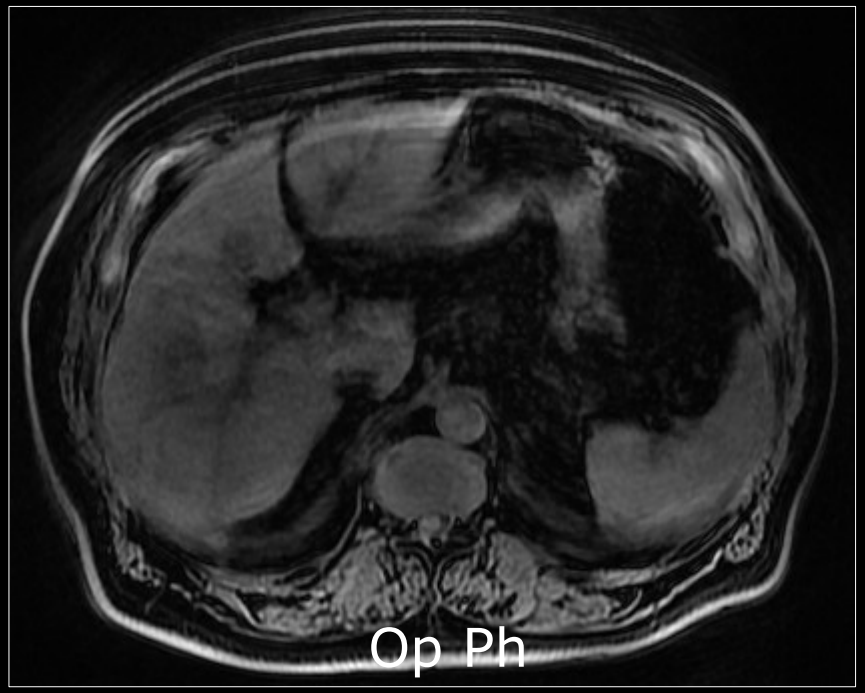
- ✓ Cirrhosis related to alcohol abuse
  - ❖ Prothrombin time : 72%
  - ❖ Albumin : 40 g/L
  - ❖ Bilirubin : 22 µmol/L
  - ❖ Plt : 203 10^3/mL

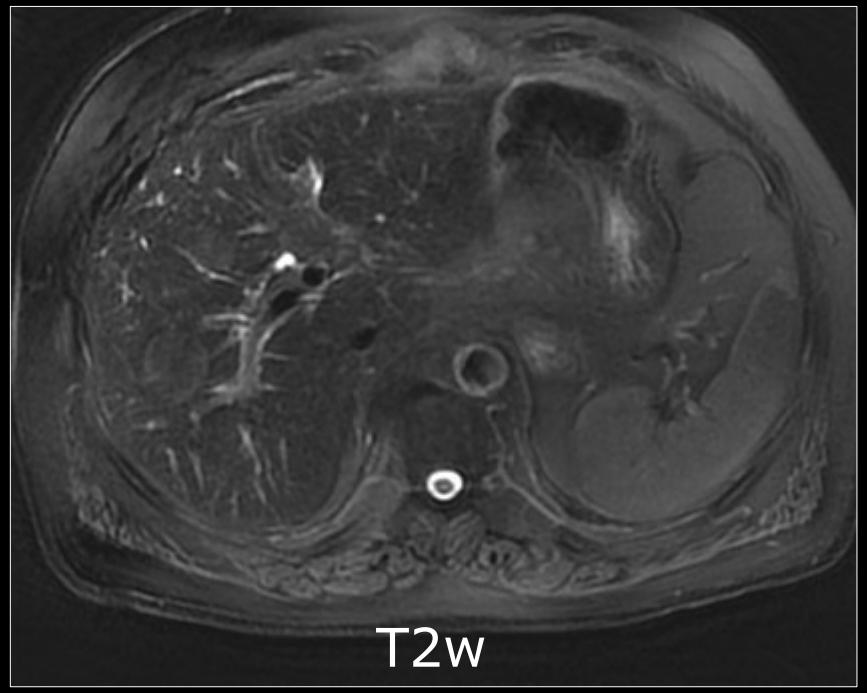
- ✓ Two nodules < 5 cm (IV & V) showing typical fatty HCC pattern

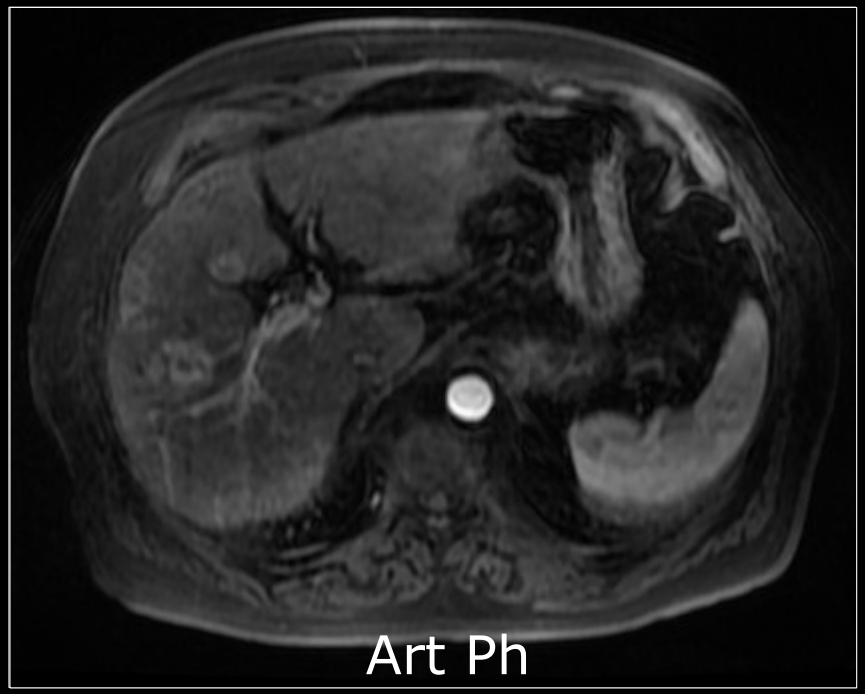
⇒ Child Pugh A + HCC within Milan
⇒ BCLC A => 2 HCCs

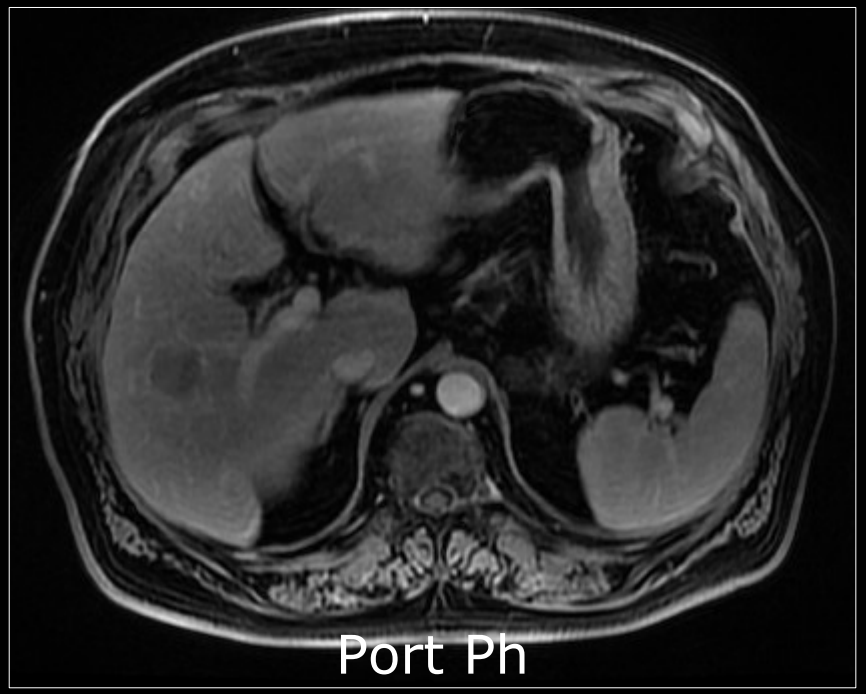

V 35 mm


5
10
14
IV 20
mm


Op Ph


T2w


Art Ph

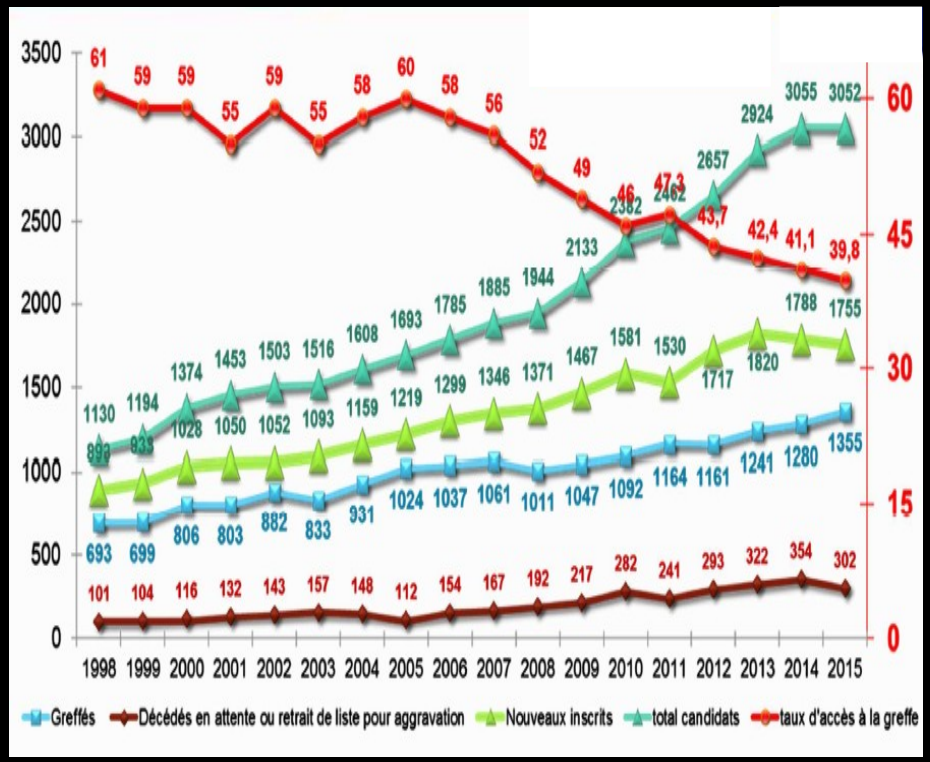

Port Ph

Which treatment?

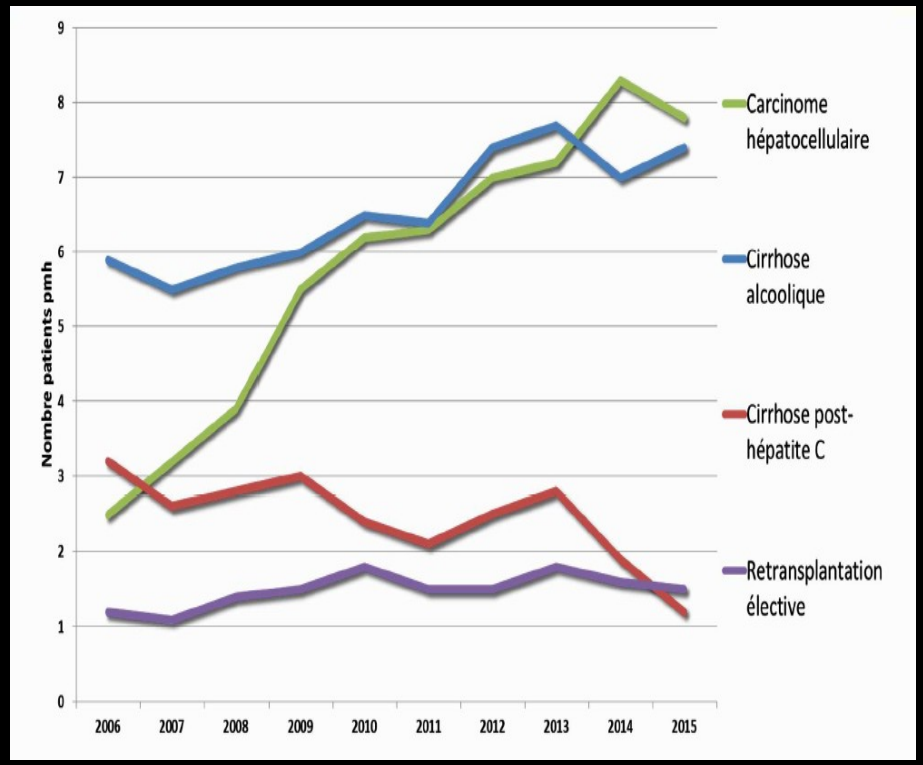
1. Transplantation
2. Resection
3. Ablation
4. TACE
5. Other

Transplantation not realy possible in first line

2.3 Patients / graft



LT indications

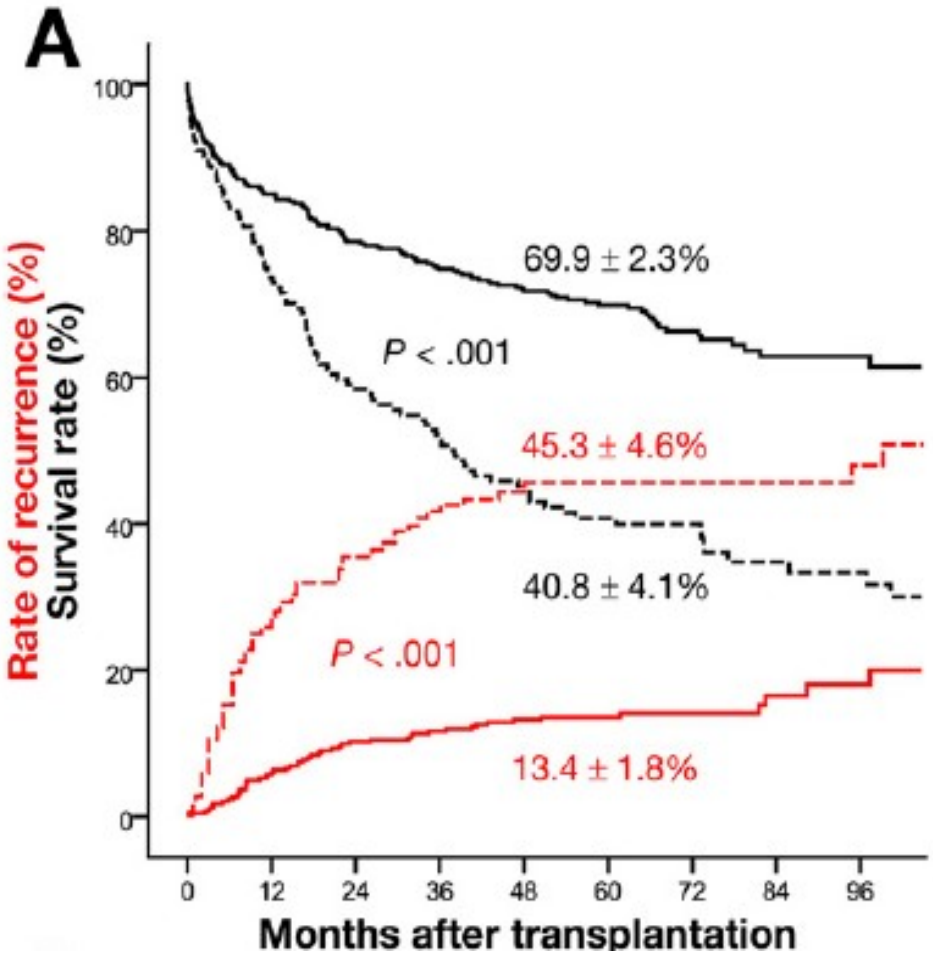


Mean time to LT for HCC in France : 12.2 months

Scoring for liver graph allocation : MELD & Risk of post LT recurrence

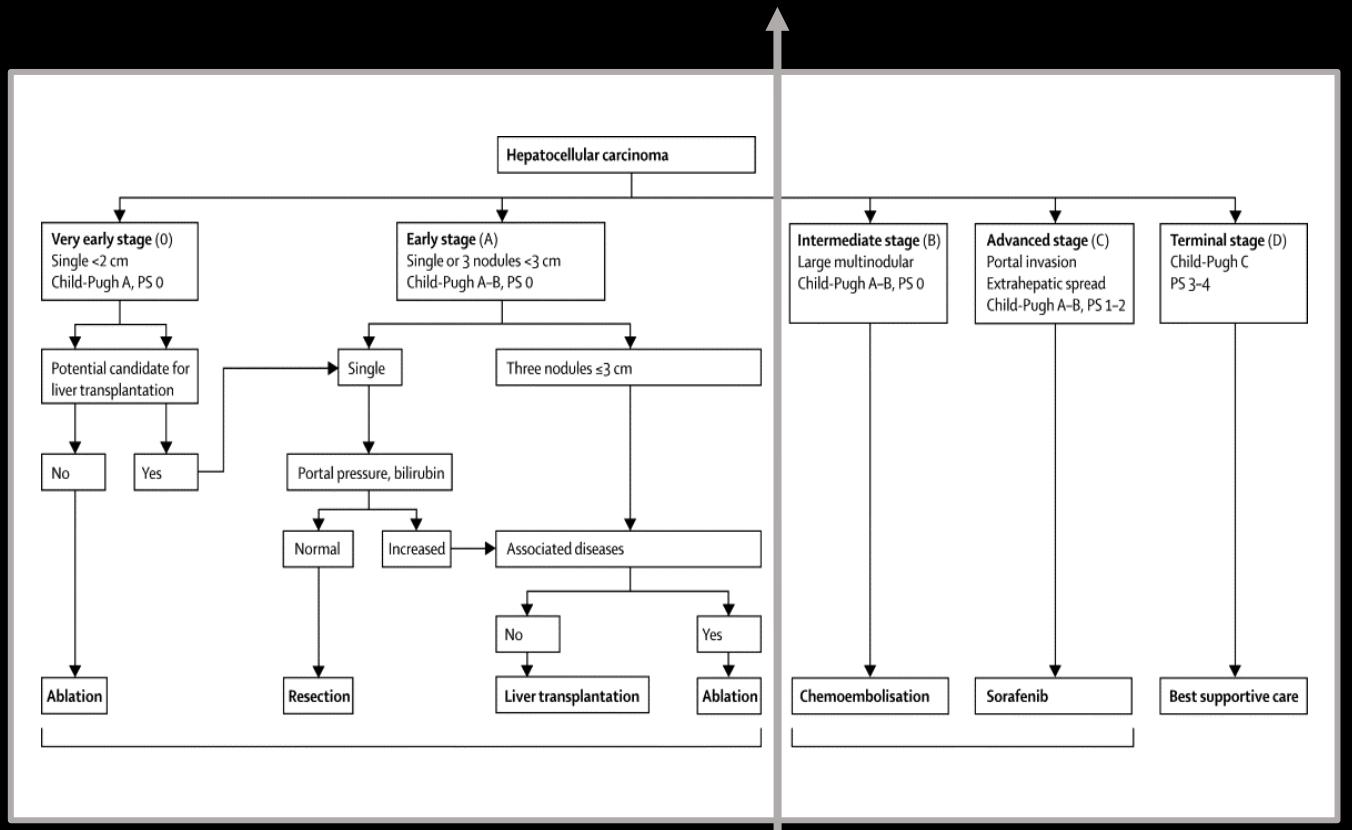
Score $_{AFP}$	**Pts**
Diameter (cm)	
≤3	**0**
3-6	**1**
>6	**4**
Number of nodules	
1-3	**0**
≥4	**2**
AFP (µg/L)	
≤100	**0**
100-1000	**2**
>1000	**3**

Duvoux C et al. Gastroenterology 2012



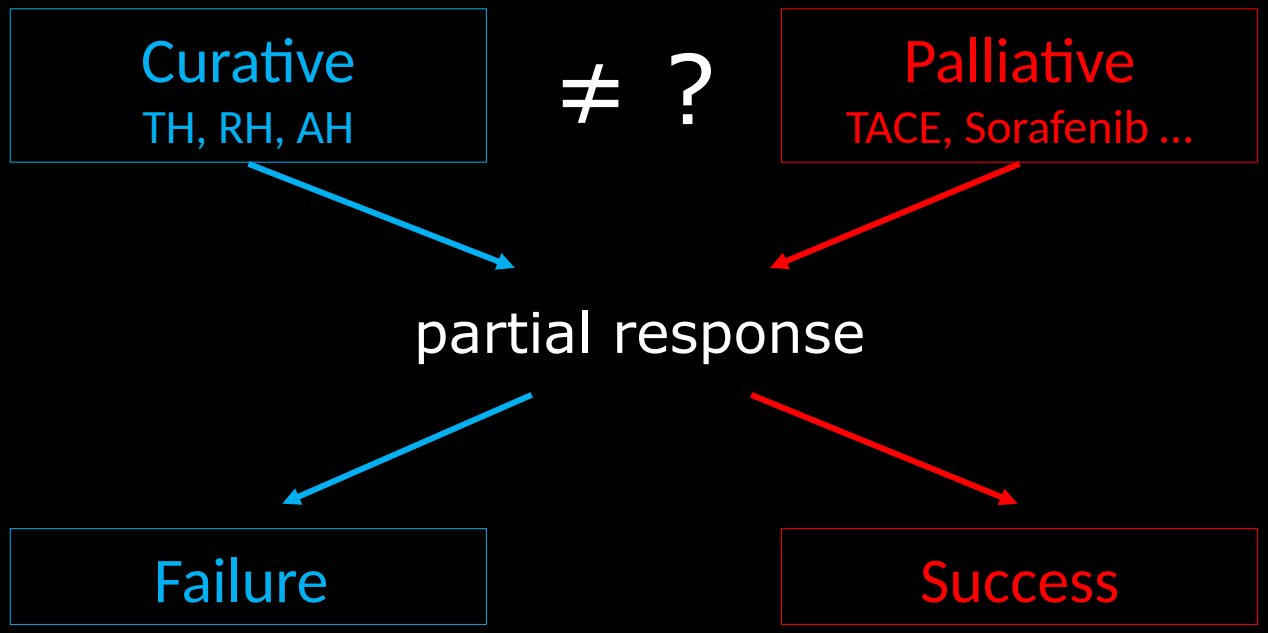
Risk of recurrence post-LT

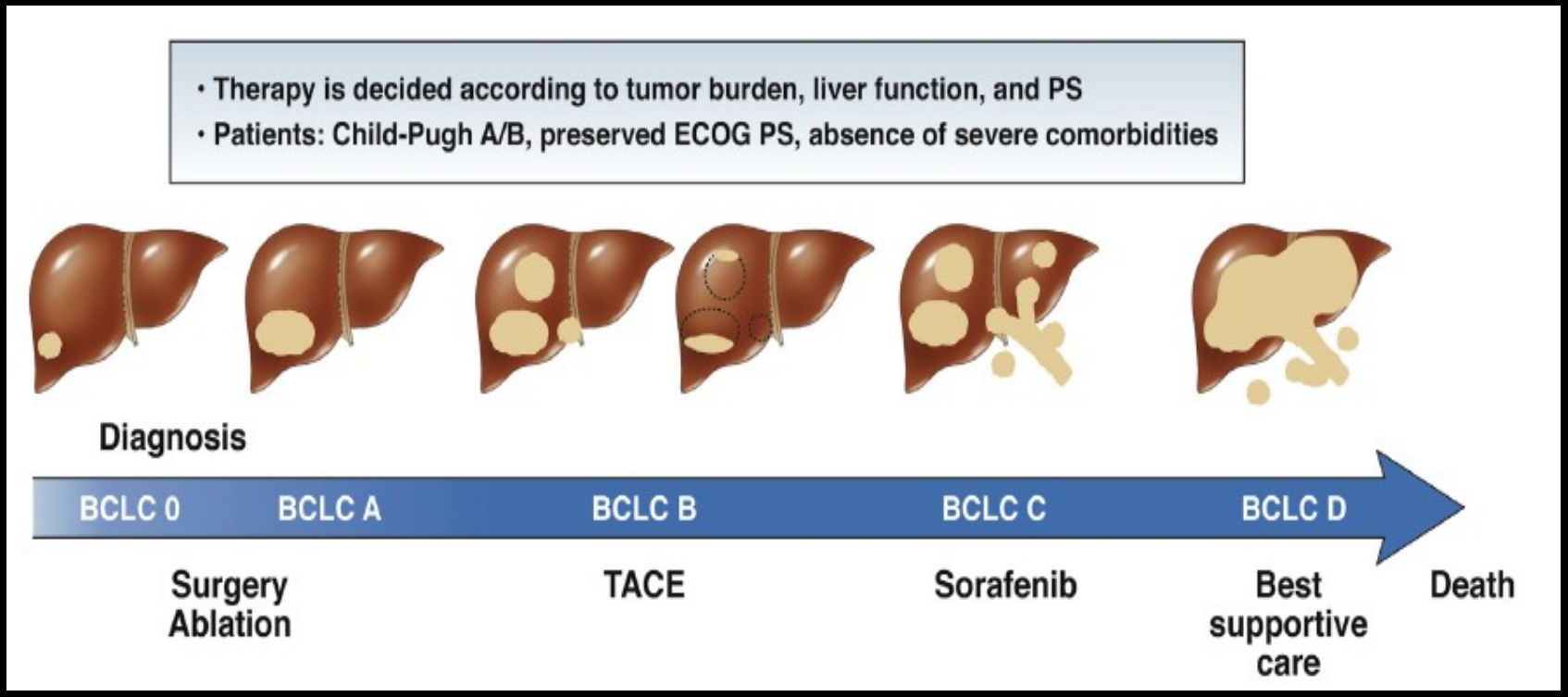
— ≤ 2 : low ---> 2 : high



BCLC (AASLD/EASLD)

Complete response : the hoped-for goal of any treatment for HCC





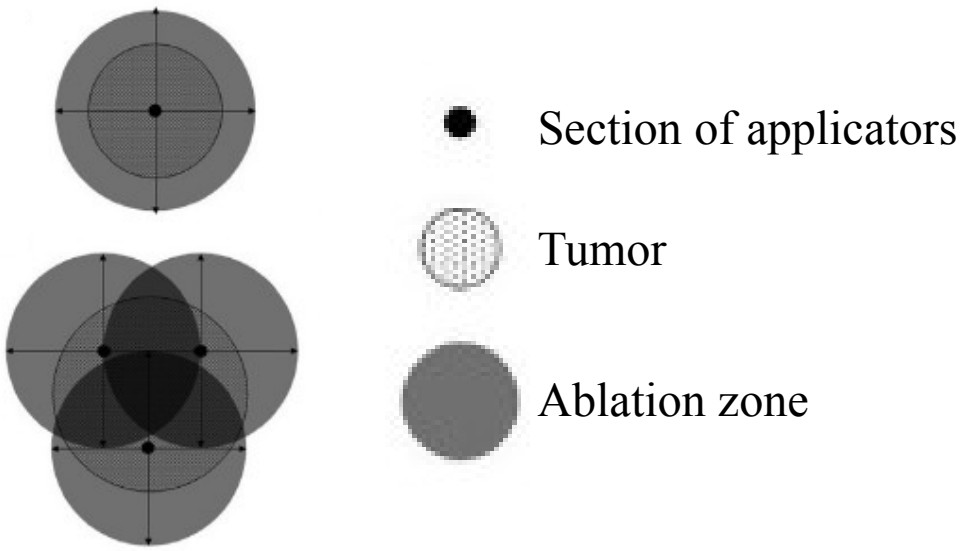
Technical/Technology

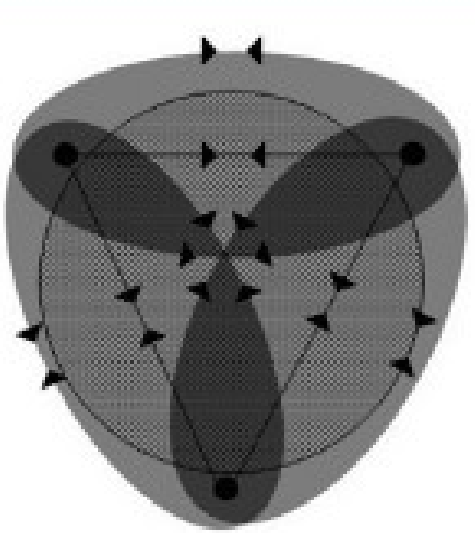
Pharmalogical/Targeting

Increase the rate of resort to first line curative intent

Increase OS in palliative strategy

Two main strategies for spatial energy deposition





Centrifugal energy radiating devices (1 or X applicators)

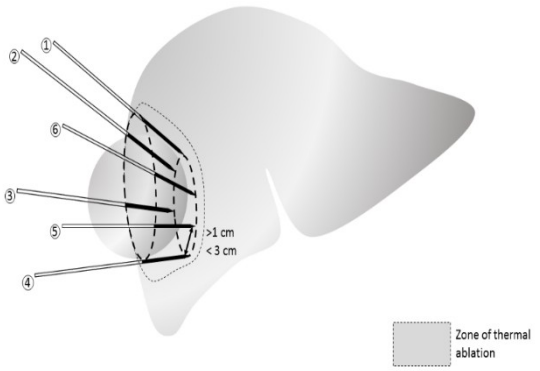
- (Multi) Monopolar RFA
- MWA
- Cryotherapy
- Laser

Centripetal energy deposition devices (2 applicators at least)

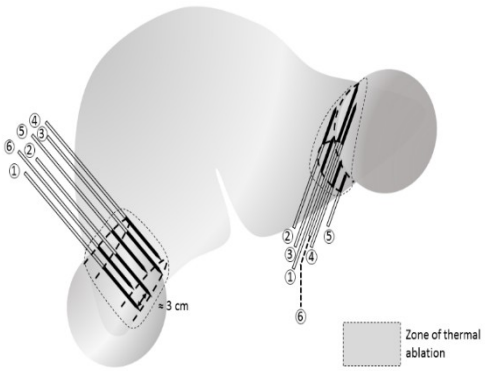
- (Multi) Bipolar RFA
- IRE

Centripetal energy deposition => extratumourous (no touch) ablations

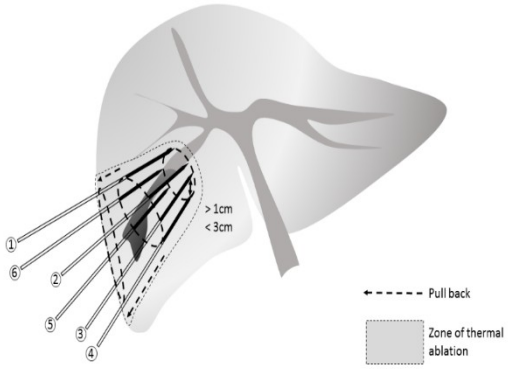
RF mbp no-touch retro-nodular convergente

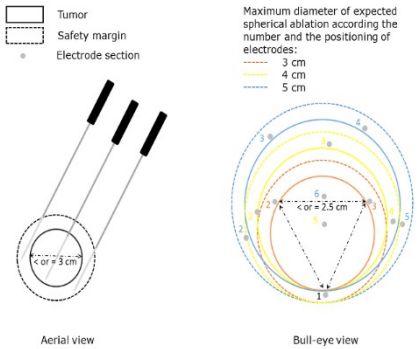


RF mbp no-touch cutting technique



RF mbp segmental (wedged)





Irréversible electroporation

RFA mbp no touch pour les CHC dans Milan (3)

Research Article

EASL JOURNAL OF HEPATOLOGY

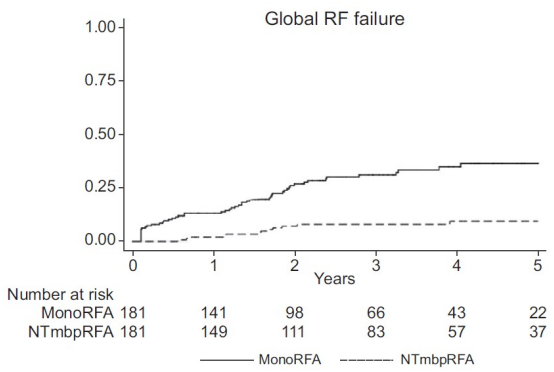
http://dx.doi.org/10.1016/j.jhep.2016.07.010

Comparison of no-touch multi-bipolar *vs.* monopolar radiofrequency ablation for small HCC

Arnaud Hocquelet[1,2,*], Christophe Aubé[3,4], Agnès Rode[5], Victoire Cartier[3], Olivier Sutter[6,7], Anne Frederique Manichon[5], Jérome Boursier[4,8], Gisèle N'kontchou[9], Philippe Merle[10], Jean-Frédéric Blanc[11], Hervé Trillaud[1,2], Olivier Seror[6,7,12]

Table 1. Baseline characteristics of patients treated either by monopolar or no-touch multi-bipolar radiofrequency ablation.

	MonoRFA n = 181 (%)	NTmbpRFA n = 181 (%)	*p* value
Age in years (SD)	64 (10)	65 (9)	0.110
Male	149 (82.3)	144 (79.5)	0.503
Cirrhosis aetiologies			0.196
Non-viral hepatitis	103 (57)	98 (54)	
Viral Hepatitis	66 (36)	61 (34)	
Mixed	12 (7)	22 (12)	
Child-Pugh A	156 (86.1)	156 (86.1)	1
Platelet count ≤100 G/L	72 (40)	72 (40)	1
Alpha fetoprotein serum level (categorized)			1
<10 ng/ml	122 (67.4)	122 (67.4)	
10-100 ng/ml	52 (28.7)	52 (28.7)	
>100 ng/ml	7 (3.9)	7 (3.9)	
Mean tumour size in mm (SD)	24 (8)	25 (8)	0.279
≤30 mm	149 (82.3)	149 (82.3)	
>30 mm	32 (17.7)	32 (17.7)	1
Multiple tumours	36 (19.9)	36 (19.9)	1
Subcapsular tumour	22 (12.1)	22 (12.1)	1
Tumour near large vessel	24 (13.2)	24 (13.2)	1



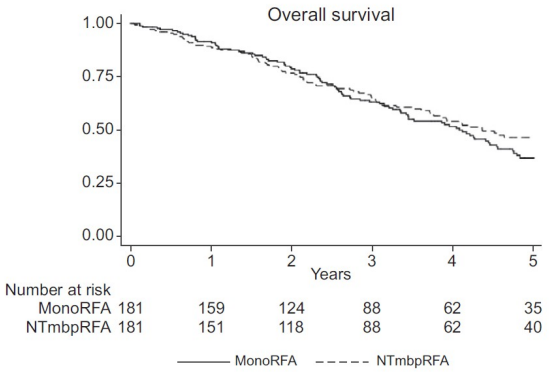


Table 2. Global radiofrequency ablation (RFA) failure, primary RFA failure and local tumour progression according to tumour size and RFA technique.

	<20 mm n (%)			20-30 mm n (%)			31-40 mm n (%)			>40 mm n (%)		
RF	MonoRFA n = 47	NTmbpRFA n = 39	*p* value	MonoRFA n = 102	NTmbpRFA n = 110	*p* value	MonoRFA n = 25	NTmbpRFA n = 24	*p* value	MonoRFA n = 7	NTmbpRFA n = 8	*p* value
Primary RFA failure	0	0	n.a.	6 (5.9)	0	0.011	3 (12)	0	0.235	1 (14)	0	0.467
LTP*	10 (21)	1 (2.6)	0.019	19 (20)	9 (8.4)	0.024	8 (36)	2 (8)	0.032	5 (83)	1 (12.5)	0.026
Global RFA failure	10 (21)	1 (2.5)	0.01	25 (25)	9 (8.2)	0.001	11 (44)	2 (8.3)	0.008	6 (86)	1 (12.5)	0.01

Inconspicuous target with US

Contents lists available at ScienceDirect

European Journal of Radiology

journal homepage: www.elsevier.com/locate/ejrad

Outcomes of patients with hepatocellular carcinoma referred for percutaneous radiofrequency ablation at a tertiary center: Analysis focused on the feasibility with the use of ultrasonography guidance

Ji-Eun Kim, Young-sun Kim*, Hyunchul Rhim, Hyo K. Lim, Min Woo Le
Sung Wook Shin, Sung Ki Cho

European Journal of Radiology 79 (2011) e80–e84

Analysis of risk factors for tumor invisibility on ultrasonography.

26.5 %

Risk factors	Number of tumors		*P*-value	Risk ratio (95% CI)
	Visible (n = 100)			
Body mass index			0.106	0.862 (0.720–1.032)
<25 kg/m^2	54	24		
≥25 kg/m^2	46	12		
Child-Pugh score			0.243	0.673 (0.346–1.309)
5	64	22		
6	24	12		
7	10	2		
8	2	0		
Macronodular cirrhosis			0.006*	4.117 (1.516–1.181)
Absent	53	15		
Present	47	21		
Tumor size	1.9 ± 0.8 cm	1.4 ± 0.6 cm	0.000*	0.823 (0.750–0.903)
Tumor location			0.063	0.379 (0.137–1.054)
High location	28	12		
Other	72	24		

Often associated with challenging location

World Journal of Gastroenterology

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ISSN 1007-9327 (print) ISSN 2219-2840 (online)

ORIGINAL ARTICLE

Retrospective Cohort Study

Radiofrequency ablation of hepatocellular carcinoma in difficult locations: Strategies and long-term outcomes

Wei Yang, Kun Yan, Gong-Xiong Wu, Wei Wu, Ying Fu, Jung-Chieh Lee, Zhong-Yi Zhang, Song Wang, Min-Hua Chen

Table 1 Comparison of baseline characteristics of 382 hepatocellular carcinoma patients in the difficult group and 88 hepatocellular carcinoma patients in the control group *n* (%)

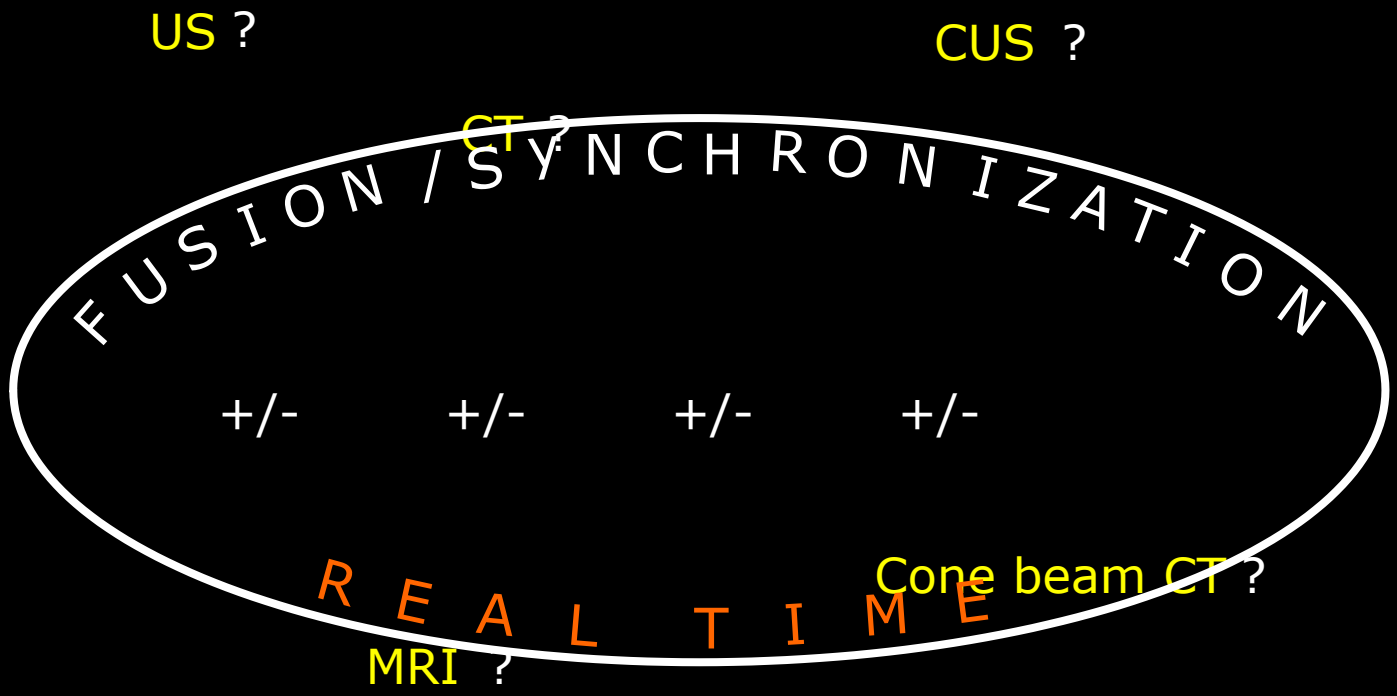
Characteristic	Difficult group (*n* = 382)	Control group (*n* = 88)	*P* value
Sex			
Male	331 (86.6)	74 (84.1)	0.531
Female	51 (13.4)	14 (15.9)	
Age (yr)	55.3 ± 10.1	57.4 ± 11.8	0.652
Liver cirrhosis	369 (96.6)	84 (95.5)	0.605
Child-Pugh class			
Class A	235 (61.5)	62 (70.5)	0.117
Class B	147 (38.5)	26 (29.5)	
Maximum diameter	3.4 ± 1.2	3.1 ± 1.1	0.071
> 3 cm	204 (53.4)	43 (48.9)	
> 5 cm	40 (10.5)	5 (5.7)	
Tumor number	1.4 ± 0.6	1.3 ± 0.9	0.128
Elevated AFP	172 (45.0)	38 (43.2)	0.754
Previous TACE	95 (24.9)	18 (20.5)	0.382
Previous hepatectomy	58 (15.2)	11 (12.5)	0.521

Table 2 Outcome of radiofrequency ablation in the difficult and control groups *n* (%)

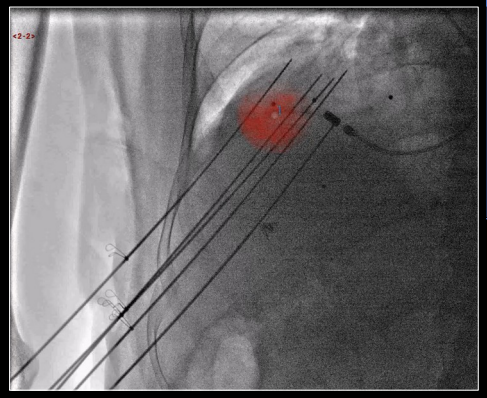
Group	Number of patients	Number of tumors	Tumor diameter (cm)	Early necrosis	Local progression
Control	88	170	3.1 ± 1.1	166 (97.6)	12 (7.1)[1]
Difficult	382	473	3.4 ± 1.2	446 (94.3)	60 (12.7)[1]
Near large vessels or bile ducts	87	95	3.5 ± 1.5	89 (93.7)	10 (10.5)
Near peripheral structures	232	291	3.4 ± 1.2	274 (94.2)	42 (14.4)[1]
Under liver capsule	63	87	3.1 ± 1.4	83 (95.4)	8 (9.2)
Total	470	643	3.3 ± 1.3	612 (95.2)	72 (11.2)

[1]Local progression rate in the difficult group was significantly higher than that in the control group (12.7% *vs* 7.1%, $P = 0.046$). Local progression rate in the subgroup of tumors near peripheral structures was significantly higher than that in the control group (14.4% *vs* 7.1%, $P = 0.018$).

Which imaging modality for guidance ?



Two complementary real time imaging modalities



+ Cross sectional Imaging
  - ➢ Select entry point
  - ➢ Check target hit
+ Real time imaging
+ Patient access
+ Volume Imaging
  - ➢ Adjust angulation
  - ➢ Adjust deep

Our goal:

make amenable a maximum HCC patients to ahead curative managements

Our tools:

- Advanced ablative techniques (technologies)
- Advanced imaging guidance

=> 2 leading strategies 1/ Real time
2/ Fusion

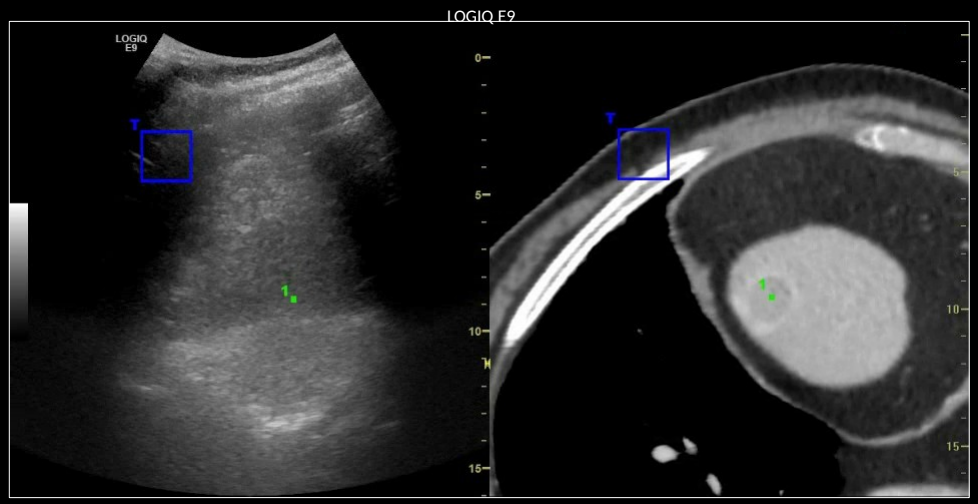
For our patient : US fusion with pretherapeutic CT/MRI and general anesthesia: the standard set up for ablation in our institution

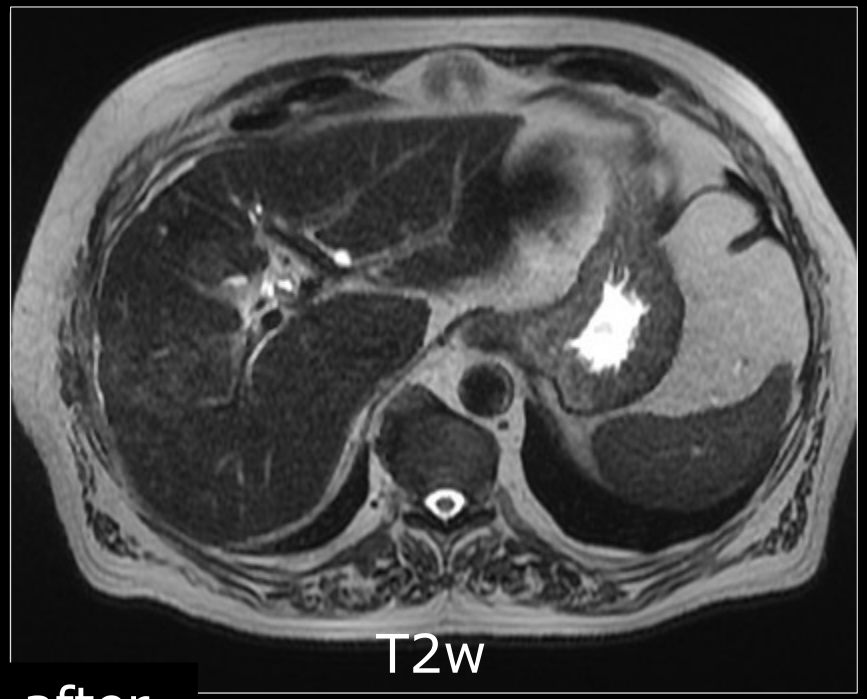
Large skin preparation for :

=> Free hand technique
=> In & Out plan US scan guidance

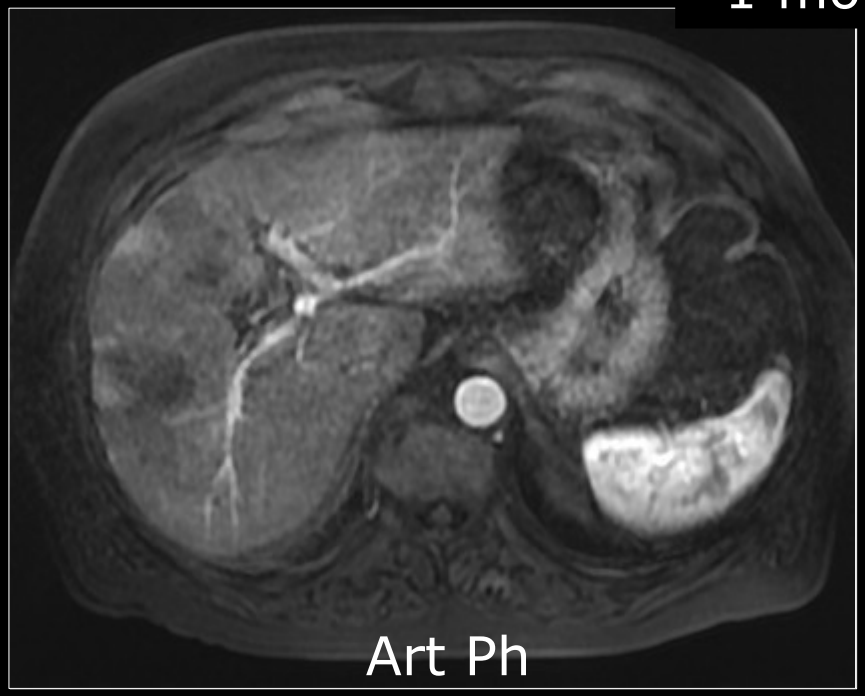
Fusion for ALL ablation and for ALL patients :

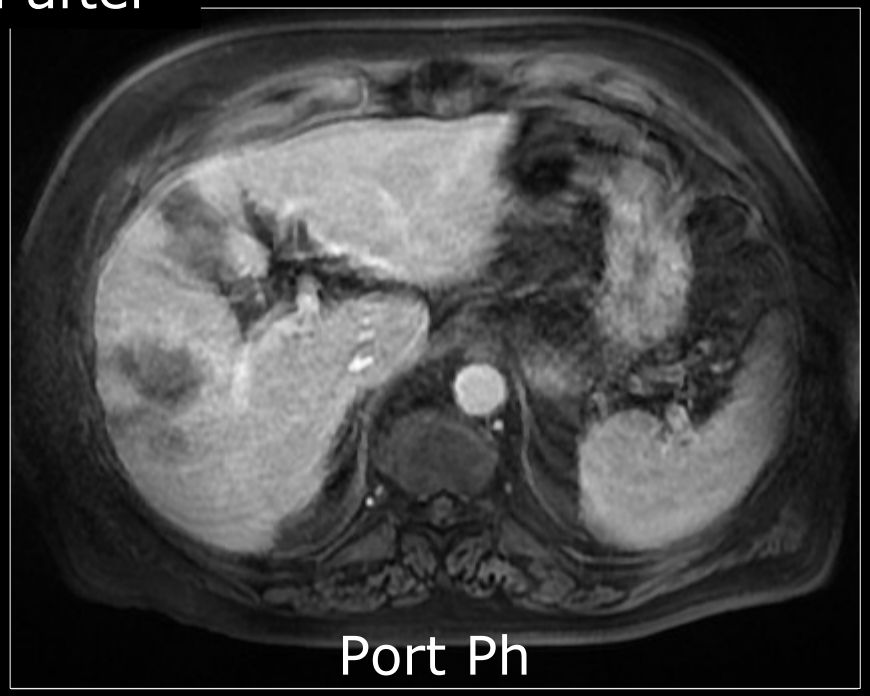
=> Active patient tracker for ALL
=> Manual 3 extra-target points coregistration
=> GPS marks on tumor(s) for adjustement



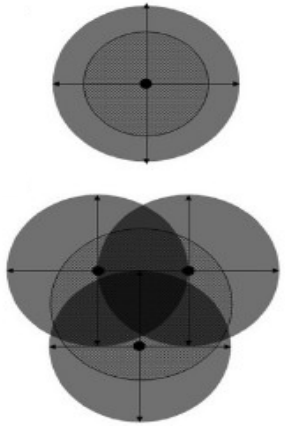


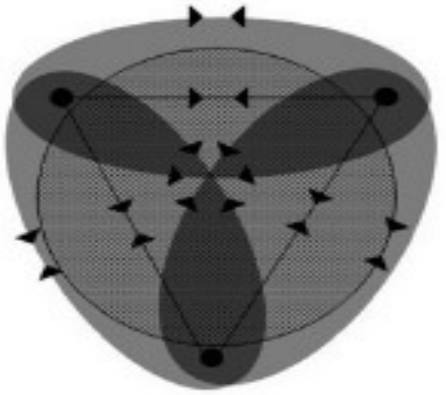
1 month after





- ≈ 270 percutaneous





Centrifugal energy radiating devices (1 or X applicators)

- (Multi) Monopolar RFA
- MWA
- Cryotherapy
- Laser

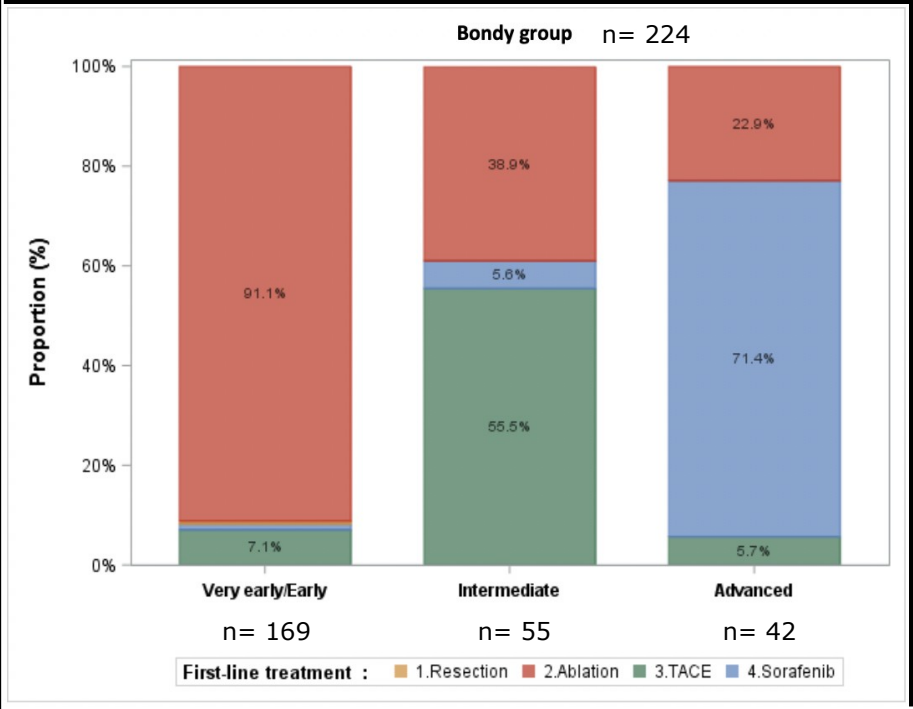
} 10%

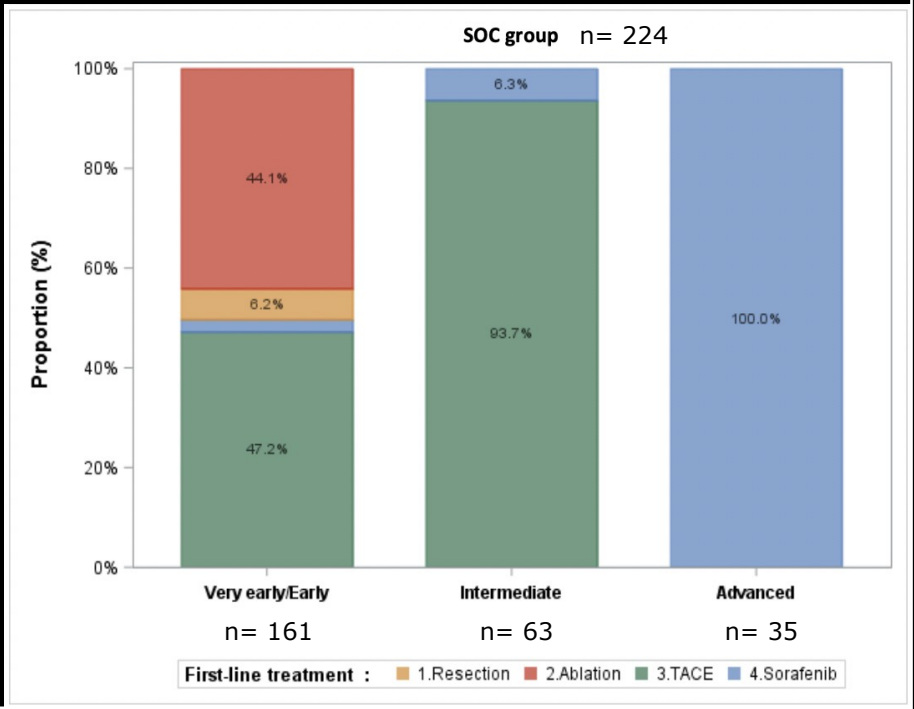
Centripetal energy deposition devices (2 applicators at least)

- (Multi) Bipolar RFA 60%
- IRE 30%

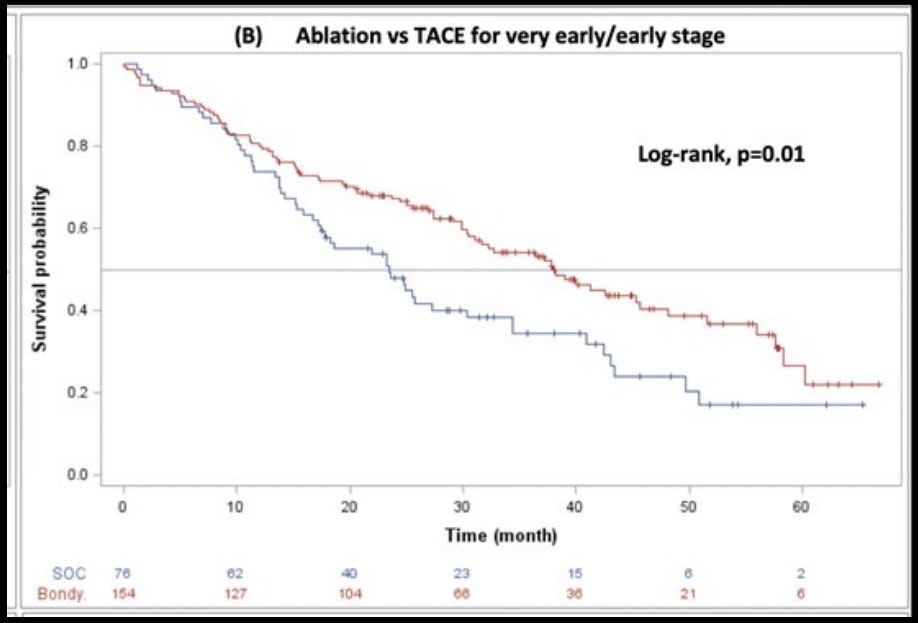
Ablation: the best chance of first line curative treatment in HCC patients with cirrhosis

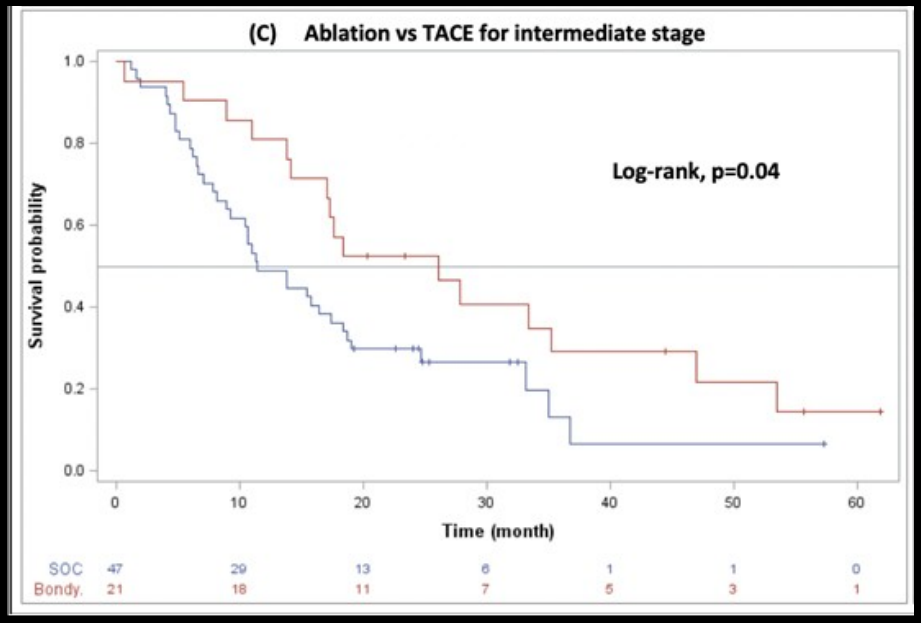
First line treatments according BCLC class
Bondy group (HUPSSD) *vs* Control group (2 other expert centers of AP-HP)
from 2012 to 2016





First line ablation versus first line TACE improves survival in comparable HCC patients





Take-home messages

- ✓ Overcoming many technical common contre-indications to percutaneous approaches, the use of advanced ablation technologies allows to treat in first line curative attempt most of early stages of HCC

- ✓ Effectiveness of any strategies consisting to delayed curative options (ablation, resection and transplantation) by using first line preparative or palliative treatments should be assessed in intention to treat analysis.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