Image guided therapy for treatment of hepatocellular carcinoma

# Interventional radiology in the treatment of liver cancer patients

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FACULTÉ DE MÉDECINE



# TACE | 4D CT





#### Liver Radiofrequency Ablation



# RF ablation **local efficacy** :

local efficacy according to tumor size

2.5/3 cm

97.2 %

4/5 cm

- HCC complete necrosis
- 1999
   Smaller than 3 cm
   90%

   2000
   3.1 to 5 cm
   61%

   Greater than 5 cm
   23 %
  - 2cm or smaller

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Livraghi, Radiology 1999

Livraghi, Radiology, 2000

Livraghi T, Hepatology 2007

## RF ablation local efficacy : Microsatellites

Microsatellites at pathology 46/100



Tumor < 2.5 cm No satellites farther than 5 mm



# RF ablation local efficacy : Microsatellites

**Microsatellites at pathology 46/100** 



Tumor > 2.5 cm satellites farther than 5 mm

You treat what you see but not the satellites

















MWA









**Research Article** 



#### A randomized controlled trial of radiofrequency ablation and surgical resection in the treatment of small hepatocellular carcinoma

Kai Feng<sup>1,2,3,+</sup>, Jun Yan<sup>1,+</sup>, Xiaowu Li<sup>1</sup>, Feng Xia<sup>1</sup>, Kuansheng Ma<sup>1,\*</sup>, Shuguang Wang<sup>1</sup>, Ping Bie<sup>1</sup>, Jiahong Dong<sup>1</sup>



- 168 patients, 49% Child A
- Up to 2 HCC tumors  $\leq$  4 cm



# Long-term effectiveness of resection and radiofrequency ablation for single hepatocellular carcinoma $\leq$ 3 cm. Results of a multicenter Italian survey

729 consecutive single HCC <3 cm treated with surgey (n=302) or RFA (n=427)



Pompili M et al. J Hepatol 2013;59:89-97



# Long-term effectiveness of resection and radiofrequency ablation for single hepatocellular carcinoma $\leq$ 3 cm. Results of a multicenter Italian survey

#### 729 consecutive single HCC <3 cm treated with surgey (n=302) or RFA (n=427)

Variable	RES (n = 246)	RFA (n = 298)	p value	Efford
Age (yr)	67 (35-85)	68 (36-88)	0.188	
Men (%)	200 (81.3)	175 (58.7)	<0.001	( V <sup>2</sup>
Anti-HCV positive (%)	144 (58.5)	213 - ame	lan no	
HBsAg positive (%)	24 (9.8)	these		
Alcohol abuse (%)	31 (12.6)	mors (+.4)	ary	0.635
Mixed etiology of cirrhosis (%)	22 (8.0° 1 tu	38 (12	, CA	0.219
Other etiology of cirrhosis (%)	tients	······································	ion	1.528
Portal hypertension (%)	Le palling)	i dis i	5 001	0.515
Platelet count (x10 <sup>9</sup> /L)	the 138 (52-2	Mr. Jee	<0.001	0.914
Mild ascites (%)	21 0 11	ant	0.005	0.605
Encephalopathy (%)	c the	rne.	0.267	n.c.
Total bilirubin (mg/dl)	01	.10 (0.3-4.1)	<0.001	0.551
MELD score	ertiv	8 (6-18)	0.182	0.069
ALT (IU/L)	401	65 (14-222)	0.072	0.143
Creatinine (mg/dl)	0.40-1.71)	0.90 (0.10-5.16)	0.019	0.211
AFP (ng/ml)	9 (1-9000)	29 (2-2200)	<0.001	0.440
Tumor size The	2.5 (0.8-3.0)	2.3 (1.0-3.0)	0.153	0.052
HCC ≤2 cm (%)	99 (40.2)	109 (36.6)	0.381	0.086

Pompili M et al. J Hepatol 2013;59:89-97

# Resection vs RF ablation (randomized) :

#### • 180 HCC ≤ 5cm

### 30 and 60 days mortality Resection

RFA

1.1% and 1.1% 0%

Major complications Resection RFA

50 / 90 (cirrhosis alteration)

Hospital stay

Resection RFA

19.7 ± 5.6 9.18 ± 3.06

(Chen M, Ann Surg 2006)

#### Intra-arterial therapies

Patient not amenable to ablation or surgery

Tumor size Tumor number Technical issue Underlying liver function (for surgery)







Hypothetical distribution in healthy tissue – assuming no tumor, right lobe infusion



#### Hypervascular Tumor (3:1) – preferentially delivered to tumor





#### Emulison of chemotherapy and radio-opaque oil (Lipiodol)



Tight calibration & size distribution with uniform sphericity







Yttrium 90 or Holmium 166 loaded beads



















#### Baseline



#### 6 months



3 – 6 years post Y90



#### **Chemo-embolization in intermediate stage HCC**



(Kudo M Lancet Gastroenterol Hepatol 2018; 3: 37-46)



#### More advanced HCC : Sorafenib vs Radioembolization



#### The NEW ENGLAND JOURNAL OF MEDICINE ORIGINAL ARTICLE Atezolizumab plus Bevacizumab in Unresectable Hepatocellular Carcinoma

#### A Overall Survival







BCLC B+C

#### Take home messages

Primary liver cancer is mostly HCC

Underlying liver disease limits therapeutic options prognostic of the disease is mostly linked with local growth and not distant metastases

Image guided local therapies

- are able to selectively target part of the liver and thus limits toxicity
- have usually better tolerance than more agressive treatment (surgery)
- Possible when more agressive treatment cannot be provided
- have usually shorter hospital stay than surgery

- Are usualy delivered in a single session (radiofrequency), or in two or three session and patients have long break from treament, when compared to systemic therapies

- Can be combined with other local therapies or systemic therapies

# Thank you

Questions ?