

# **Percutaneous Therapy Image-guided Therapy**

**Komgrit Tanisaro,MD**  
Associate Professor,  
Interventional Radiology,  
Bangkok Medical Center



# Practice Guideline by BCLC Proposal

**HCC**

PST 0, Child-Pugh A

**PST 0-2, Child-Pugh A-B**

PST >2, Child-Pugh C

Very early stage  
Single < 2cm

Early stage  
Single or 3 nodules < 3cm, PS 0

**Intermediate stage**  
**Multinodular, PS 0**

Advanced stage  
Portal invasion, N1, M1,  
PS 1-2

Terminal stage

Single

3 nodules ≤ 3cm

Portal pressure/bilirubin

Increased

Associated diseases

Normal

No

Yes

Portal invasion, N1, M1

No

Yes

Resection

Liver Transplantation  
(CLT/LDLT)

PEI/RF

Chemoembolization

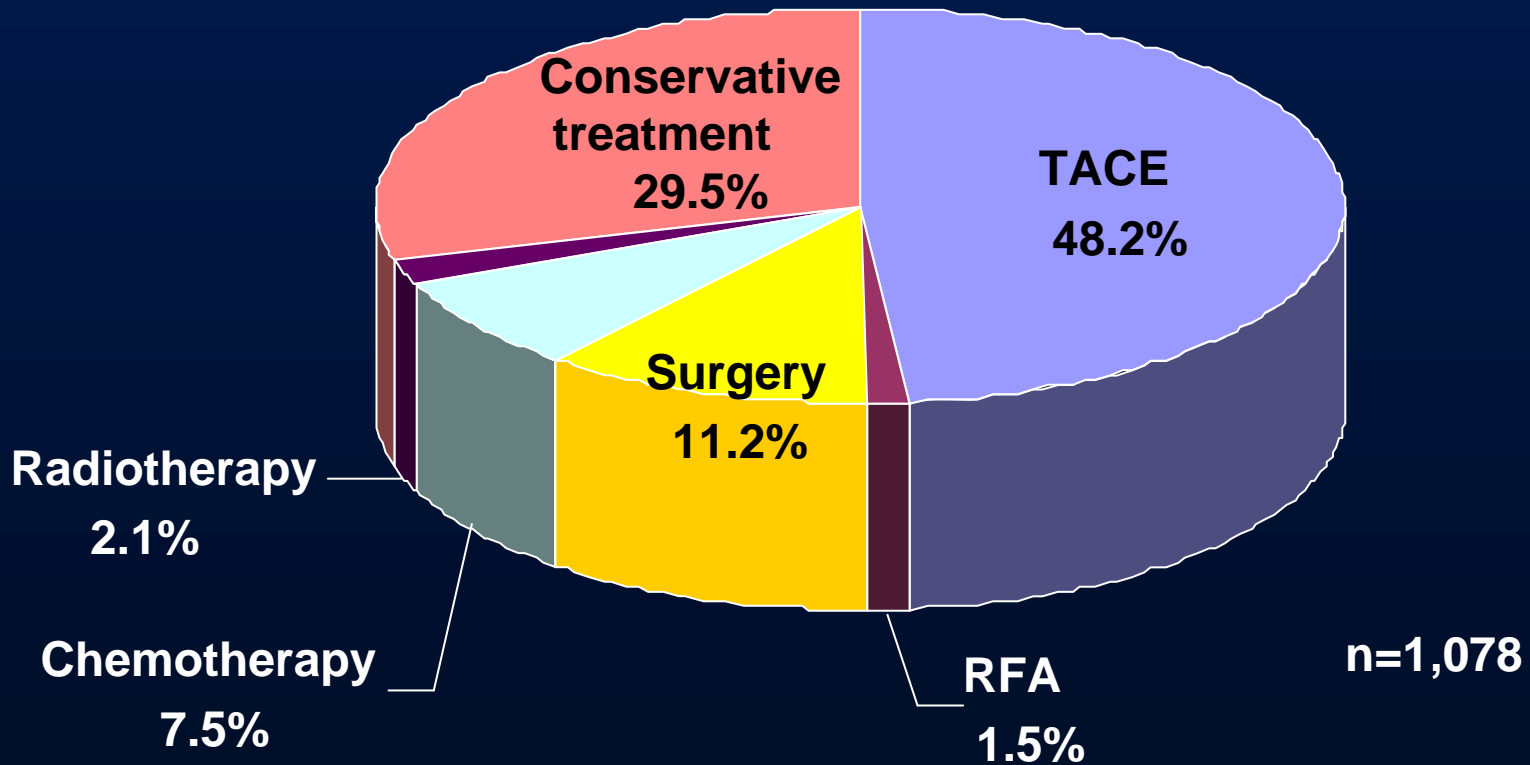
New Agents

Curative Treatments

Randomized controlled trials

Symptomatic

# Primary Treatment Modality Used



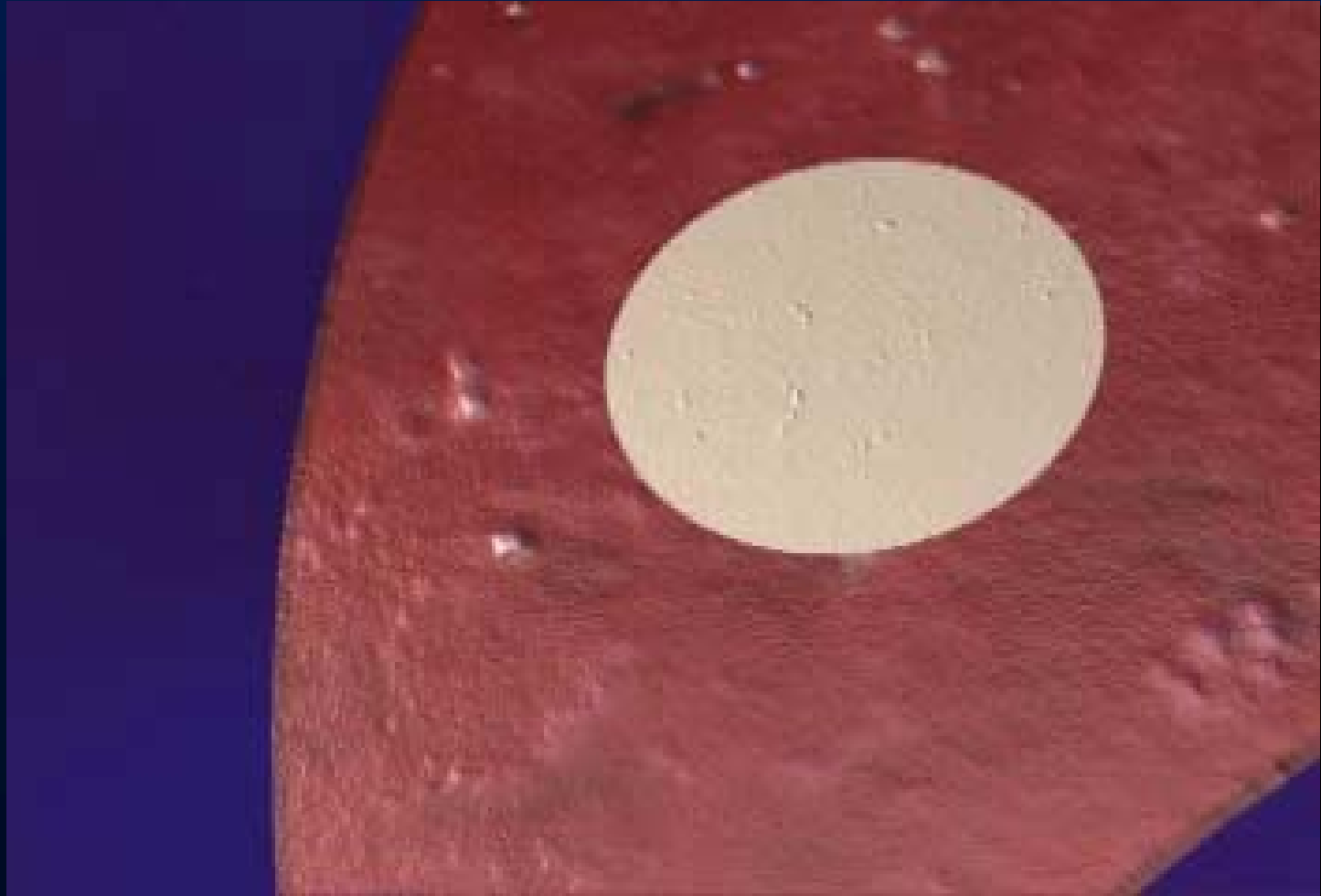
- **Chemoembolization = TACE, TOCE**
- **Percutaneous Ablation =  
Radiofrequency (RF), Ethanol (PEI)**

**RF,RFA**  
**Radiofrequency ablation**  
***“Not just Optional”***

**Komgrit Tanisaro,MD**  
Associate Professor,  
Interventional Radiology,  
Bangkok Medical Center



# Radiofrequency (RF) Ablation



# Generator RITA 1500X



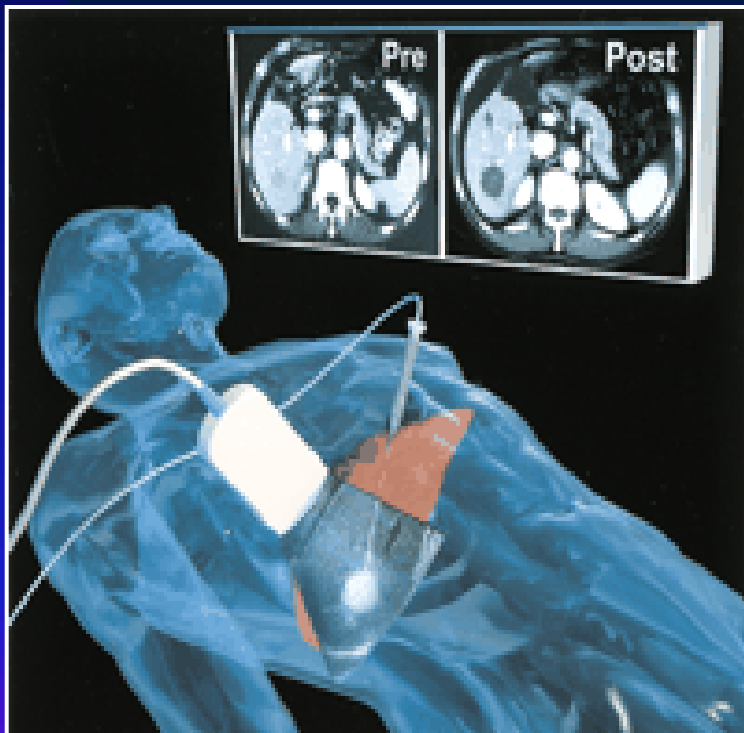
## Starburst Needle



NEEDLE (14 G)

# RADIOFREQUENCY ENERGY

Emission of RF Waves



Ionic agitation

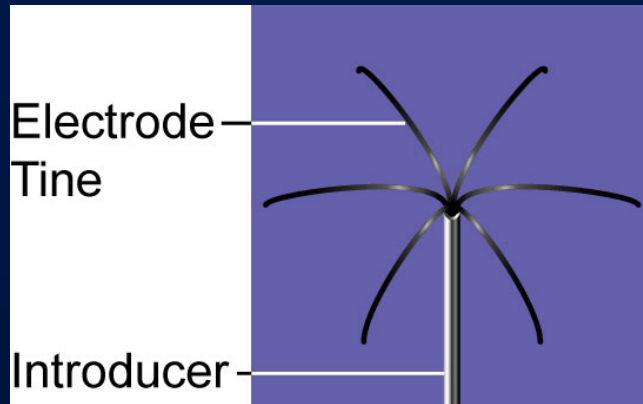


Tissue Heating

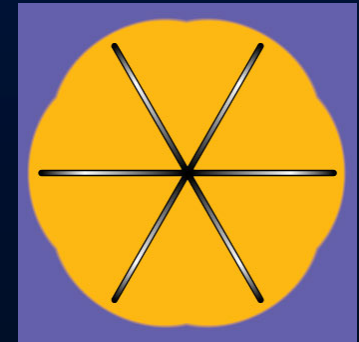
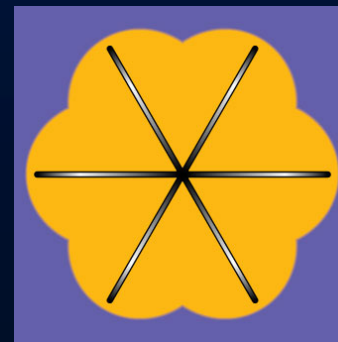
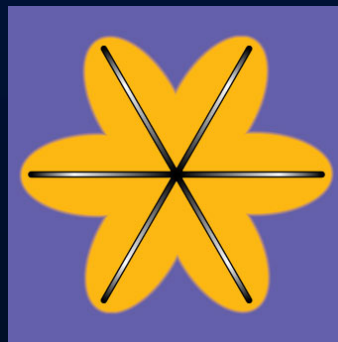
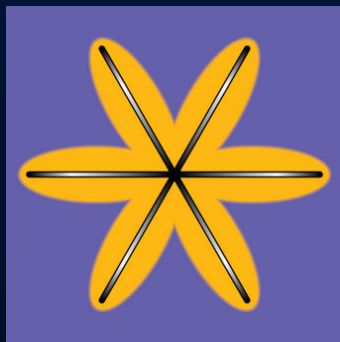
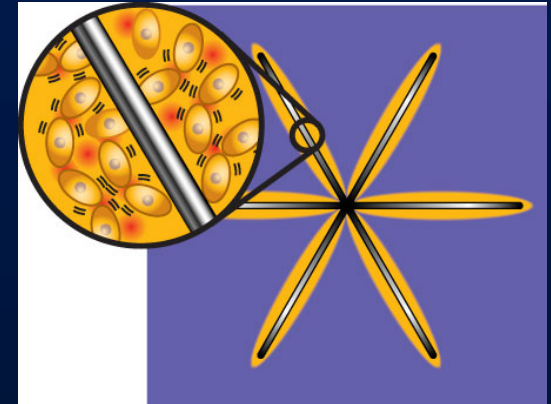


**COAGULATION NECROSIS**

# Stages of RF Ablation



Frictional  
Heating



Conductive Heating Over Time

11-09-2003



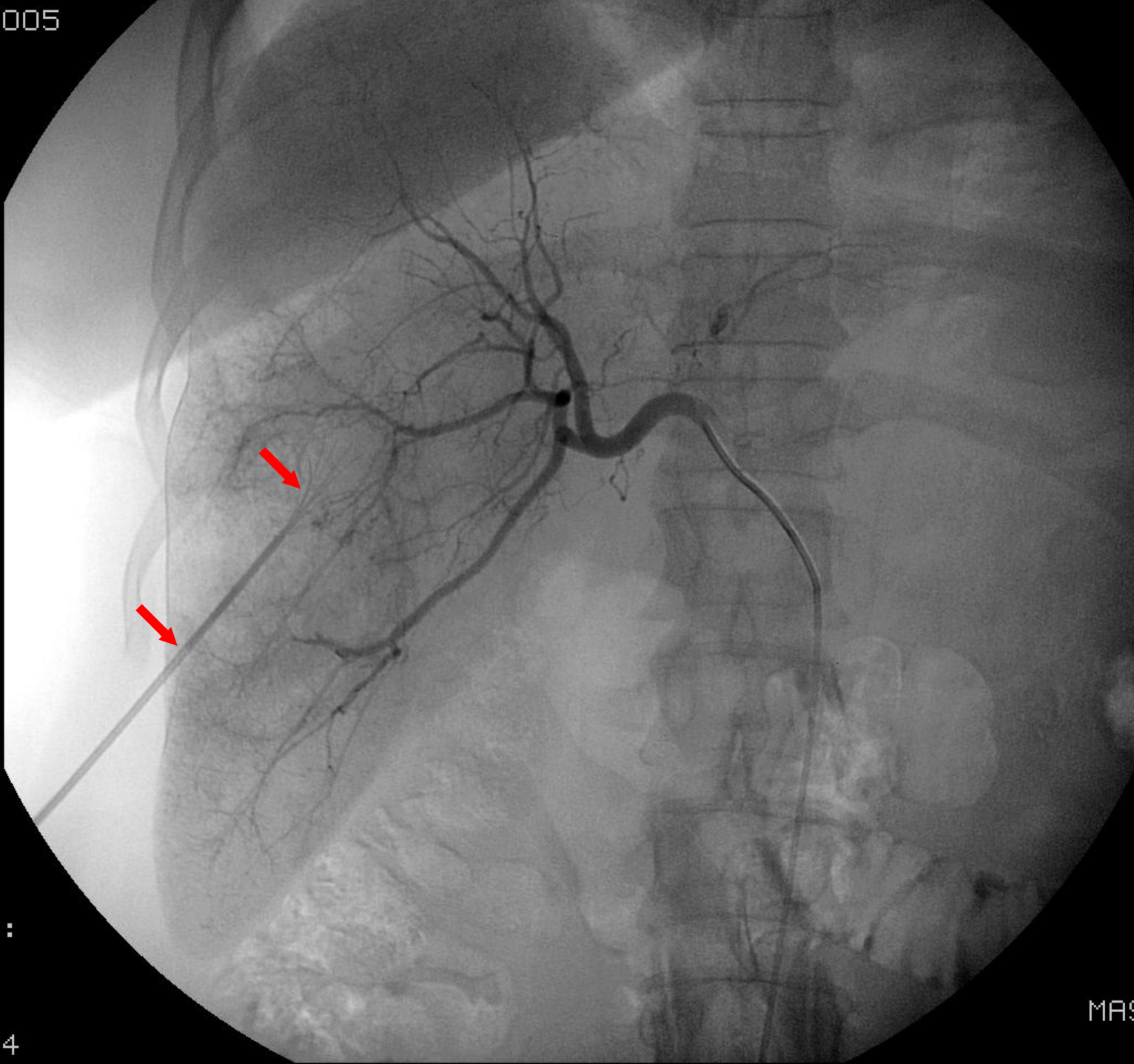
ROT  
1

ANG  
0

T-mask:  
0.40  
T-image:  
4.00  
T-run:  
13:48:24

RUN  
1  
26  
MASK IMAGE  
2 11

21-09-2005



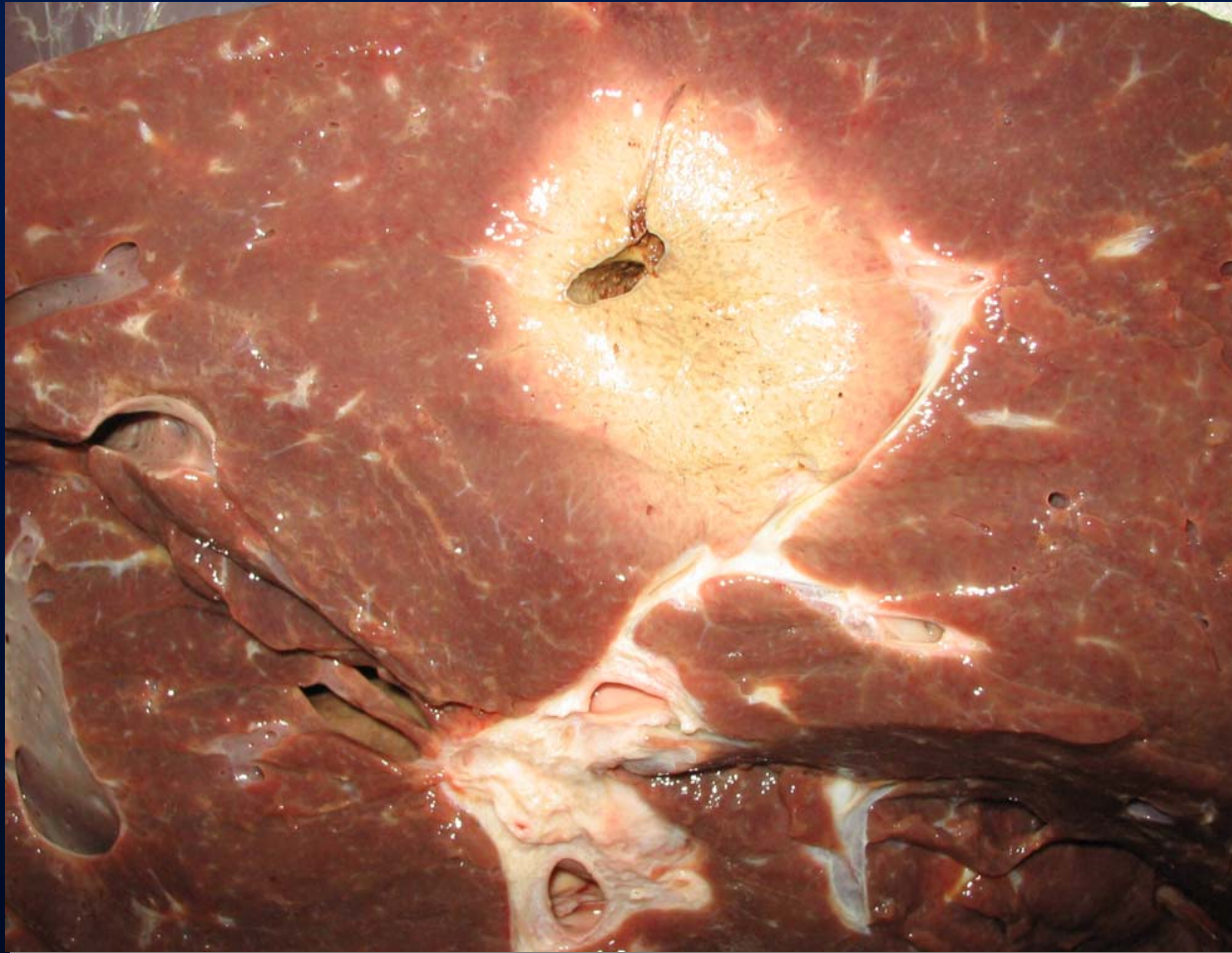
ROT  
1

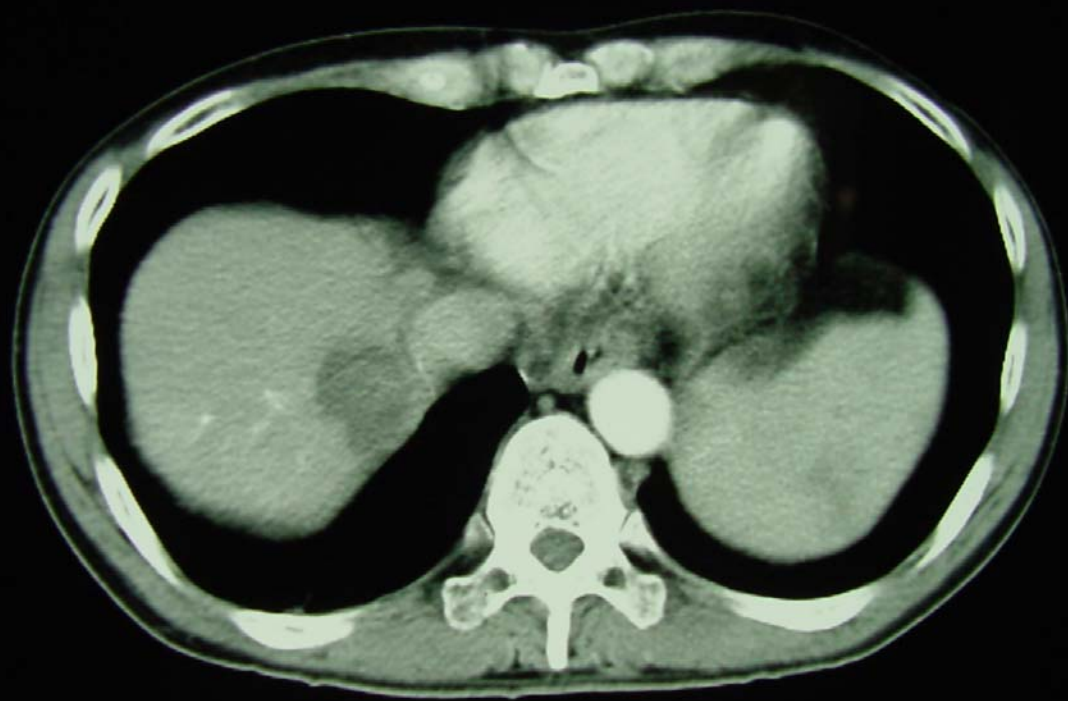
ANG  
0

T-mask:  
0.32  
T-image:  
4.48  
T-run:  
15:28:04

RUN  
2  
36  
MASK IMAGE  
2 15

# THERMAL LESION WITH 4 C.M. ABLATION IN COW'S LIVER

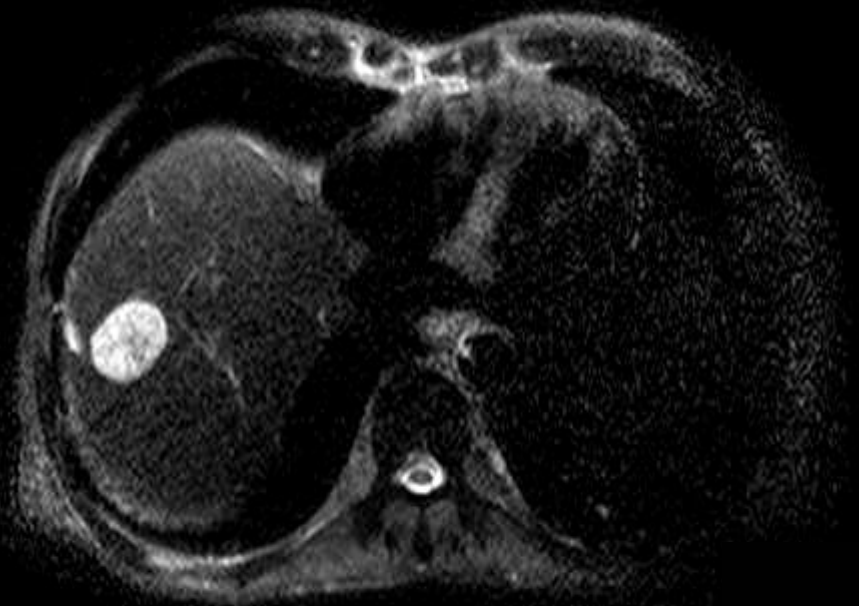




- Non-surgical
- No GA
- No incision, scar
- 1 night admission
- Repeatable
- Small HCC (less than 4 or 5 cm)
- Single or few nodules

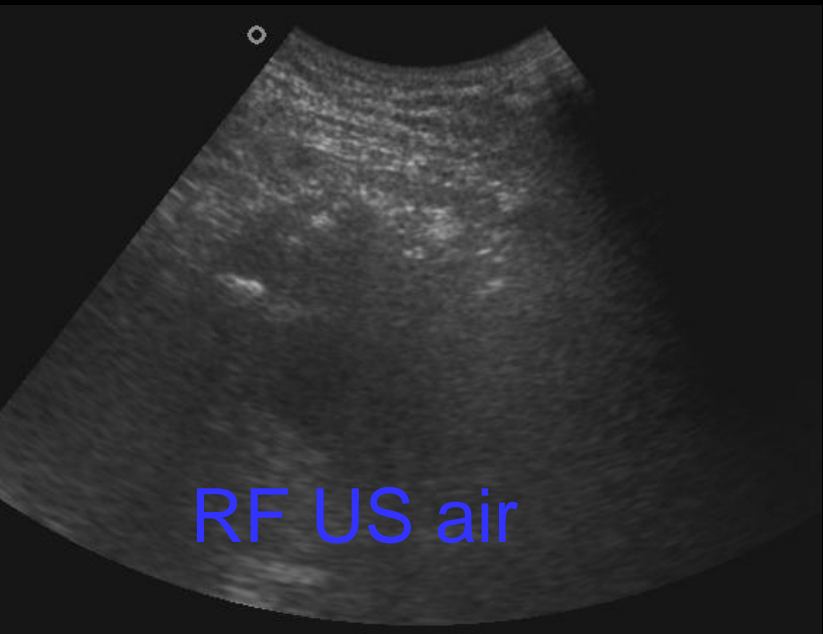
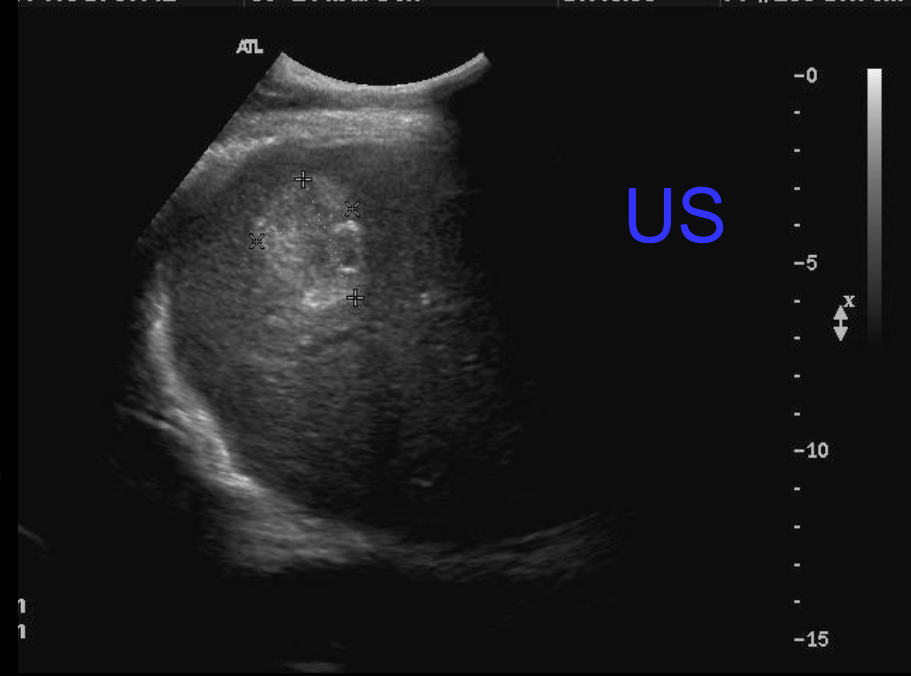


MRI

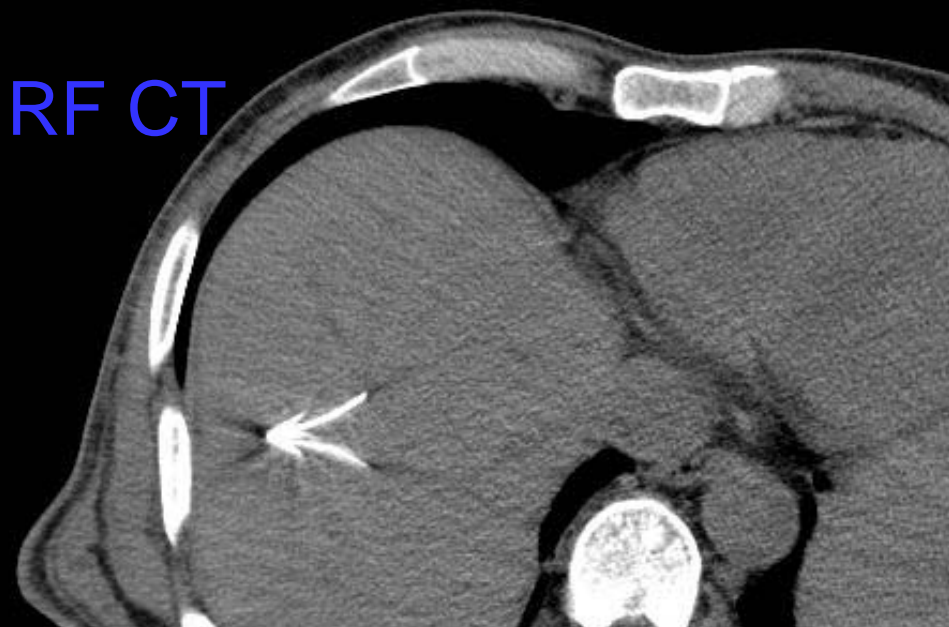


ATL

US



RF CT



**Br J Surg. 2005 Oct;92(10):1248-54.**

**Adverse effects of radiofrequency ablation of liver tumours in the Netherlands.**

- **A total of 19 major complications occurred after ten procedures, including biliary tract damage (seven patients), liver failure (four), hepatic abscess (three), peritoneal infection (two), intrahepatic haematoma (one), hepatic artery aneurysm (one) and pulmonary embolism (one). Twenty-four minor complications were related to concomitant partial hepatectomy or laparotomy. The overall complication rate was 20.3 per cent and the rate of complications related directly to RFA was **9.8 percent****

Treatment efficacy of radiofrequency ablation of 338 patients with hepatic malignant tumor and the relevant complications.

**World J Gastroenterol. 2005 Oct 28;11(40):6395-401.**

- **The major complication rate in this study was 2.5% (14 of 565 procedures), which consisted of 5 hemorrhages, 1 colon perforation, 5 injuries of adjacent structures, 2 bile leakages, and 1 skin burn.**

# RFA-needle tract seeding

- Cooled-tip needle
- 12 seeds/1314 cases/ 2542 nodules  
(0.9%)
- Risk factors= previous biopsy  
(Livraghi Br J Surg 2005;92(7):856)

# Tumor Seeding

1: [Liver Transpl.](#) 2007 Nov;13(11):1603-7.

Seeding risk following percutaneous approach to hepatocellular carcinoma.

[Perkins JD.](#)

Liver Transplantation Worldwide, University of Washington Medical Center, Seattle, WA.

microwave; 33 PEI; 26 RFA). RESULTS: In 41 papers specifying the total number of patients biopsied and/or treated, the median risk of seeding was 2.29% (range 0-11%) for biopsy group; 1.4% (1.15-1.85%) for PEI when used with biopsy and 0.61% (0-5.56%) for RFA without biopsy, 0.95% (0-12.5%) for RFA with biopsy and 0.72% (0-10%) for liver nodules (including non-HCC nodules) biopsied and ablated. CONCLUSION: Risk of seeding with HCC is substantial and appears greater with using diagnostic biopsy alone compared to therapeutic percutaneous procedures. This risk is particularly relevant for patients being considered for liver transplantation.

# **RFA vs Ethanol vs Other energy**

[Gut. 2006 Aug;55\(8\):1211-2.](#)

[Gut. 2006 Mar;55\(3\):435-6.](#)

Randomised controlled trial comparing percutaneous radiofrequency thermal ablation, percutaneous ethanol injection, and percutaneous acetic acid injection to treat hepatocellular carcinoma of 3 cm or less.

[Lin SM](#), [Lin CJ](#), [Lin CC](#), [Hsu CW](#), [Chen YC](#).

Liver Research Unit, Chang Gung Memorial Hospital, Chang Gung University, 199 Tung Hwa North Rd, Taipei, Taiwan.  
lsmpaicyto@cgmh.org.tw

**1:** [Radiology](#). 2003 Jul;228(1):235-40. Epub 2003 May 20.

Comment in:

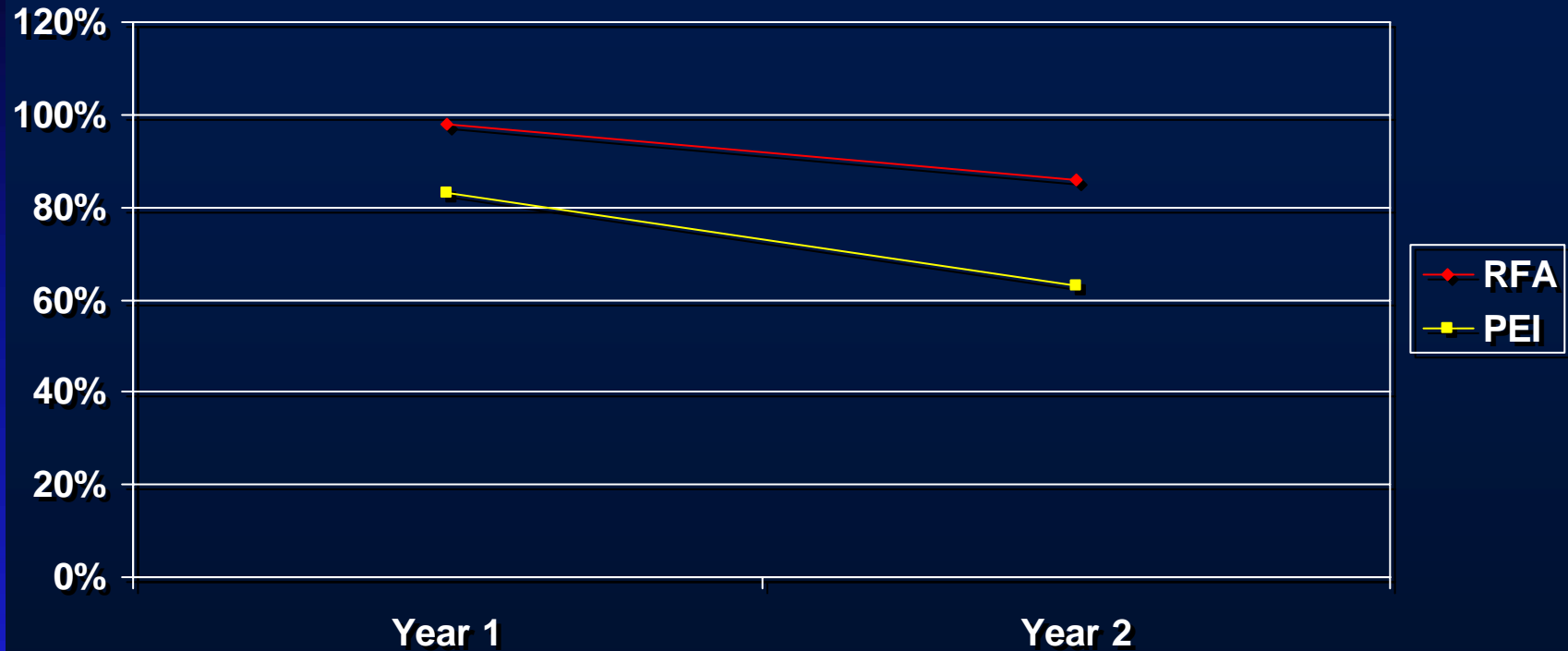
[Radiology](#). 2004 Mar;230(3):886; author reply 886-7.

Small hepatocellular carcinoma in cirrhosis: randomized comparison of radio-frequency thermal ablation versus percutaneous ethanol injection.

[Lencioni RA](#), [Allgaier HP](#), [Cioni D](#), [Olschewski M](#), [Deibert P](#), [Crocetti L](#), [Frings H](#), [Laubenberger J](#), [Zuber I](#), [Blum HE](#), [Bartolozzi C](#).

RFA outcome is better than  
ethanol, acetic, and microwave

# RFA vs PEI (alcohol injection)



Local recurrence-free Survival Rate (year)

P = 0.002

Lencioni et al, Radiology , July 2003

1: [Hepatogastroenterology](#). 2006 Sep-Oct;53(71):651-4.

**Thermal ablation therapy for hepatocellular carcinoma: comparison between radiofrequency ablation and percutaneous microwave coagulation therapy.**

**[Ohmoto K](#), [Yoshioka N](#), [Tomiyama Y](#), [Shibata N](#), [Kawase T](#), [Yoshida K](#), [Kuboki M](#), [Yamamoto S](#).**

Division of Hepatology, Department of Medicine, Kawasaki Medical School, Okayama, Japan. ohmotok@med.kawasaki-m.ac.jp

**BACKGROUND/AIMS:** To evaluate the initial therapeutic effect and safety of radiofrequency ablation (RFA) and percutaneous microwave coagulation therapy (PMCT) for the treatment of small hepatocellular carcinomas (HCCs). **METHODOLOGY:** Forty-eight patients with HCC were treated by RFA and 70 patients with HCC were treated by PMCT. These procedures were repeated until complete tumor necrosis was confirmed by contrast CT scanning. The therapeutic and adverse effects were compared between the two procedures. **RESULTS:** 1) The number of treatment sessions was significantly lower in RFA patients, and the necrotic area was significantly larger. 2) The local recurrence rate was significantly lower after RFA than after PMCT, while the ectopic recurrence rate showed no significant difference between the two procedures. 3) The survival rate was significantly higher after RFA compared with PMCT. 4) The incidence of pain and fever after treatment was significantly higher in PMCT patients. Occurrence of bile duct injury, pleural effusion and ascites were also significantly more common in PMCT patients. **CONCLUSIONS:** RFA is more useful for the treatment of small HCCs compared with PMCT because it is minimally invasive and achieves a low local recurrence rate, a high survival rate, and extensive necrosis after only a few treatment sessions.

# Outcome; Long-term study-Japan

- Tateishi Cancer 2005;103(6):1201
- 1000 RFA in 2140 HCC in 664 patients
- Major complication 4%, 1.9%/session
- Minor complication 1.7%, 0.8%/session
- Survival (1-5Y)= 95,86,78,67,38%

# Long-term study- US

Significant long-term survival after radiofrequency ablation of unresectable hepatocellular carcinoma in patients with cirrhosis.

Ann Surg Oncol. 2005; 12(8):616-28 (ISSN: 1068-9265)

Raut CP; Izzo F; Marra P; Ellis LM; Vauthey JN; Cremona F; Vallone P; Mastro A; Fornage BD; Curley SA  
Department of Surgical Oncology, The University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Boulevard, Unit 444, Houston, Texas, 77030-4009, USA.

Medscape Newsletters

[Sign Up To Receive Medscape Best Evidence](#)

Key journal articles ranked for newsworthiness and clinical relevance in each specialty, linked to Medline abstracts.

- MD Anderson 194 patients
- 3.3 cm
- Survival 1,3,5 Y= 84.5, 68.1, 55.4%
- Local recurrence 4.6%
- Complication 12%



# RFA vs Surgery

- Samsung, Korea
- Non RCT, 55 vs 99 patients
- Similar in rate of metastasis, survival, recurrence free
- Slightly higher local recurrence  
(J Clin Gastroenterol 2005;39(3):247)



**Dr. Lencioni and Dr. Laura Crocetti, from the University of Pisa, conducted a case-control study comparing the two treatment modalities in patients with small uninodular hepatocellular carcinomas (HCC) and well-compensated liver cirrhosis. They presented their findings Friday at the Society of Interventional Radiology's annual meeting in Toronto.**

- **38 patients underwent hepatic resection and 124 underwent RF ablation. The tumors were no larger than 5 cm in diameter.**

**In the surgical resection group, overall survival rates were 89% at 1 year and 65% at 3 years. Corresponding rates were 97% and 72% in the RF ablation group.**

- **The 1-, 2-, 3-, and 4-year overall survival rates for the PLAT group and the surgical resection group were 94.4%, 79.8%, 68.6%, 65.9% and 93.3%, 82.3%, 73.4%, 64.0%, respectively. The corresponding disease-free survival rates for the 2 groups were 90.8%, 68.6%, 59.8%, 48.2% and 86.6%, 76.8%, 69.0%, 51.6%, respectively. There were no significant difference between the 2 groups in the overall survival and disease-free survival rates. Also, there was no significant difference in the overall and disease-free survival rates between the 2 groups by analyzing tumors smaller than 3 cm, and between 3.1 and 5 cm, respectively**
- **Major complications happened significantly more often after surgical resection than PLAT (50 of 90 versus 3 of 71,  $P < 0.05$ ). Significant postoperative morbidity included liver failure (n = 2), gastrointestinal bleeding (n = 2), moderate/severe ascites (n = 27), and persistent jaundice for more than 30 days after surgery (n = 19).**

Comparison of survival rates after bland arterial embolization and ablation versus surgical resection for treating solitary hepatocellular carcinoma up to 7 cm.

[Maluccio M](#), [Covey AM](#), [Gandhi R](#), [Gonen M](#), [Getrajdman GI](#), [Brody LA](#), [Fong Y](#), [Jarnagin W](#), [D'Angelica M](#), [Blumgart L](#), [DeMatteo R](#), [Brown KT](#).

Department of Surgery, Memorial Sloan-Kettering Cancer Center, New York, New York 10021, USA.

**PURPOSE:** The vast majority of hepatocellular carcinomas (HCC) occur in patients with underlying liver dysfunction, making surgical resection available to only a subset of patients with adequate hepatic reserve. This study analyzes the authors' results with bland arterial embolization combined with radiofrequency ablation (RFA) or percutaneous ethanol injection (PEIT) compared with surgical resection for the treatment of solitary HCC up to 7 cm in size. **MATERIALS AND METHODS:** A retrospective review of all patients undergoing either surgical resection or bland embolization combined with local ablation for solitary HCC between January 1996 and August 2002 was performed. Progression-free survival rate and overall survival rate were calculated by the Kaplan-Meier method. **RESULTS:** There were 40 patients who underwent surgical resection and 33 patients who underwent embolization and ablation. Age, gender, and size of the treated lesion were not significantly different between the groups. The embolization/ablation group had more patients classified as Okuda stage II ( $P < .001$ ). The surgical group had a longer median recurrence-free survival rate (53.1 vs 25.1 months). With a median follow-up of 23 months, the 1-, 3- and 5-year actuarial overall survival rates were 97%, 77%, and 56% for the embolization/ablation group and 81%, 70%, and 58% for the surgical group, respectively. There was no statistical difference in overall survival rates ( $P = .20$ ). **CONCLUSIONS:** Bland arterial embolization in combination with ablation is effective in treating solitary HCC lesions up to 7 cm and achieves similar overall survival rates to surgical resection in selected patients.

**Compare Embolization and RFA to  
Surgery in medium-sized HCC**

# Combined Modalities

- TACE followed by RFA
- RFA followed by TACE
- Ethanol and RFA
- RFA followed by Surgery



## Hepatocellular carcinoma treated with radiofrequency ablation with or without ethanol injection: a prospective randomized trial.

[Zhang YJ](#), [Liang HH](#), [Chen MS](#), [Guo RP](#), [Li JQ](#), [Zheng Y](#), [Zhang YQ](#), [Lau WY](#).

Department of Hepatobiliary  
China.

PURPOSE: To prospectively evaluate whether use of combined radiofrequency ablation (RFA) and percutaneous ethanol injection (PEI) results in better survival compared with use of RFA alone in patients with hepatocellular carcinoma. MATERIALS AND METHODS: This study was local ethical committee approved; all patients gave written informed consent. One hundred thirty-three patients were randomly assigned to undergo RFA-PEI (n = 66; 57 men, nine women; mean age, 53.3 years; age range, 32-73 years) or RFA alone (n = 67; 58 men, nine women; mean age, 52.2 years; age range, 33-74 years). Patients with viable tumors at computed tomography (CT) 4 weeks after treatment received additional treatment. Overall survival rates were calculated and 3-year survival rates were compared with life-table and Mantel-Haenszel analyses, respectively. Survival curves were constructed and compared by using Kaplan-Meier and log-rank tests, respectively. The relative prognostic significance of variables in predicting overall survival and the time to tumor recurrence or metastasis were assessed with multivariate Cox proportional hazards regression and logistic regression analyses, respectively. RESULTS: One-, 2-, 3-, 4-, and 5-year overall survival rates were 95.4%, 89.2%, 75.8%, 63.3%, and 49.3%, respectively, with RFA-PEI and 89.6%, 68.7%, 58.4%, 50.3%, and 35.9%, respectively, with RFA alone. The survival curve for the RFA-PEI group was significantly better than that for the RFA-only group (P = .04). The survival curve for the RFA-PEI group was better than that for the RFA-only group with 3.1-5.0-cm tumors (P = .03) but not for those with 3.0 cm or smaller (P = .44) or 5.1-7.0-cm (P = .70) tumors. Overall tumor recurrence was lower with RFA-PEI (23 patients) than with RFA alone (33 patients, nonsignificant difference). Local recurrence was significantly lower with RFA-PEI (four patients) than with RFA alone (14 patients, P = .012). Tumor diameter proved to be the only significant prognostic factor for overall recurrence and intrahepatic recurrence. Treatment type and tumor size were significant prognostic factors for local recurrence. CONCLUSION: RFA-PEI facilitated better local tumor control and long-term survival compared with RFA alone.

Rd East, Guangzhou 51006

1: [World J Gastroenterol](#). 2005 Mar 14;11(10):1426-32.

Comparison between combination therapy of percutaneous ethanol injection and radiofrequency ablation and radiofrequency ablation alone for patients with hepatocellular carcinoma.

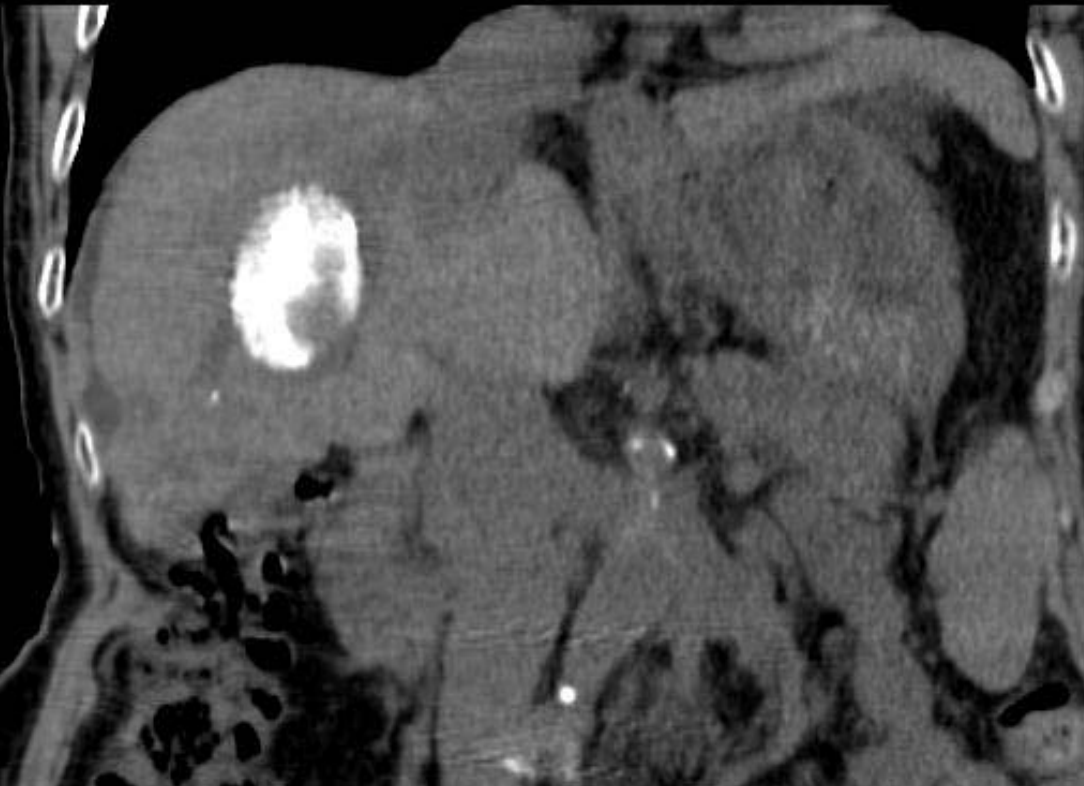
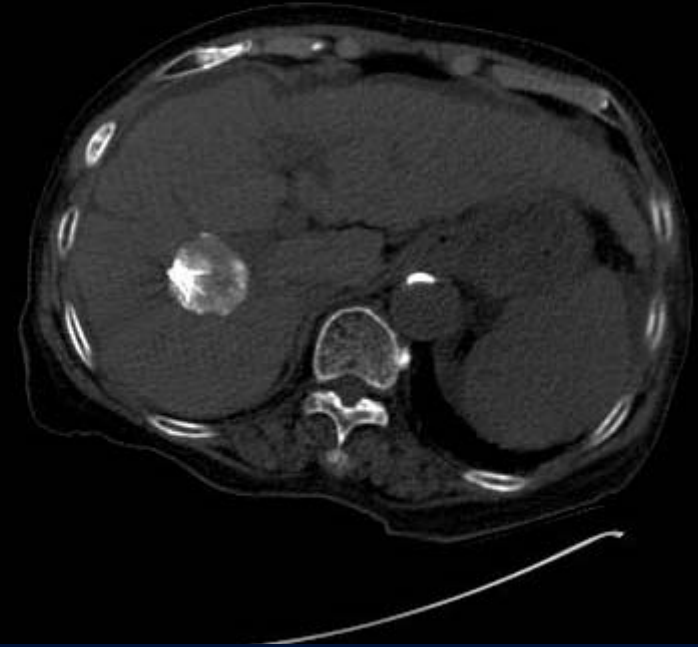
[Kurokohchi K](#), [Watanabe S](#), [Masaki T](#), [Hosomi N](#), [Miyauchi Y](#), [Himoto T](#), [Kimura Y](#), [Nakai S](#), [Deguchi A](#), [Yoneyama H](#), [Yoshida S](#), [Kuriyama S](#).

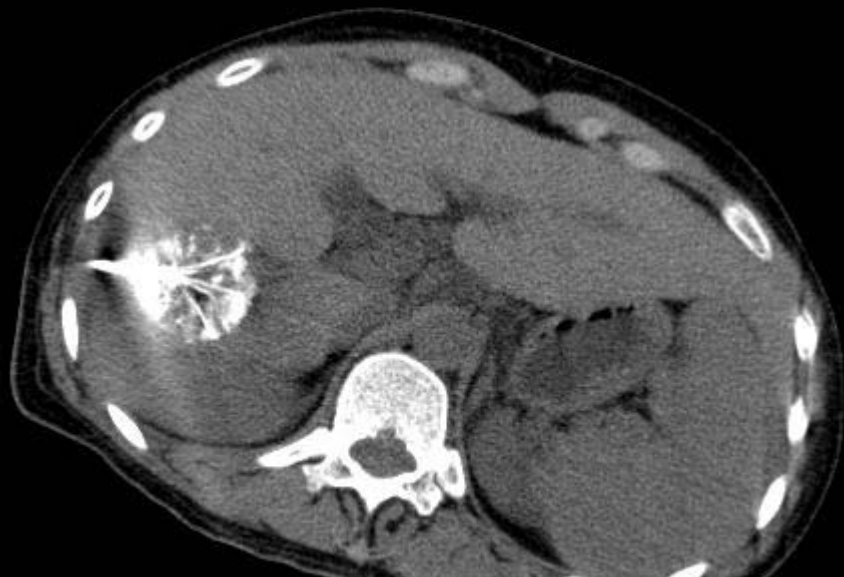
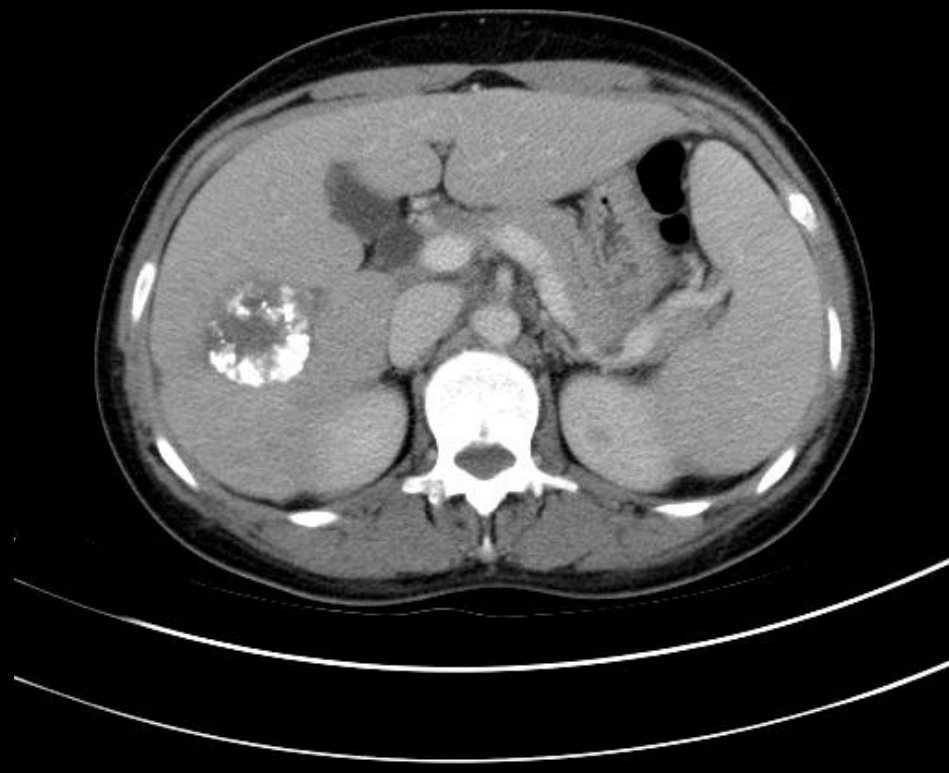
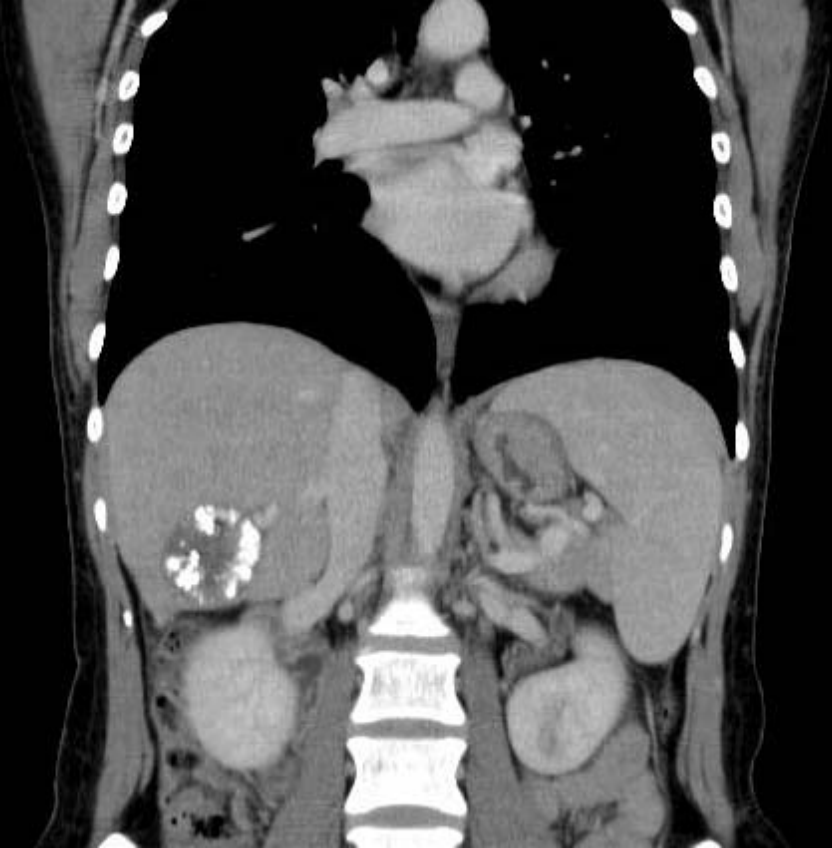
Third Department of Internal Medicine, Kagawa University School of Medicine, 1750-1 Ikenobe, Miki-cho, Kita-gun, Kagawa 761-0793, Japan.

Pre RFA with alcohol injection  
Better in Survival  
Size?

**TOCE**  
**followed by RF**  
**3 wks**

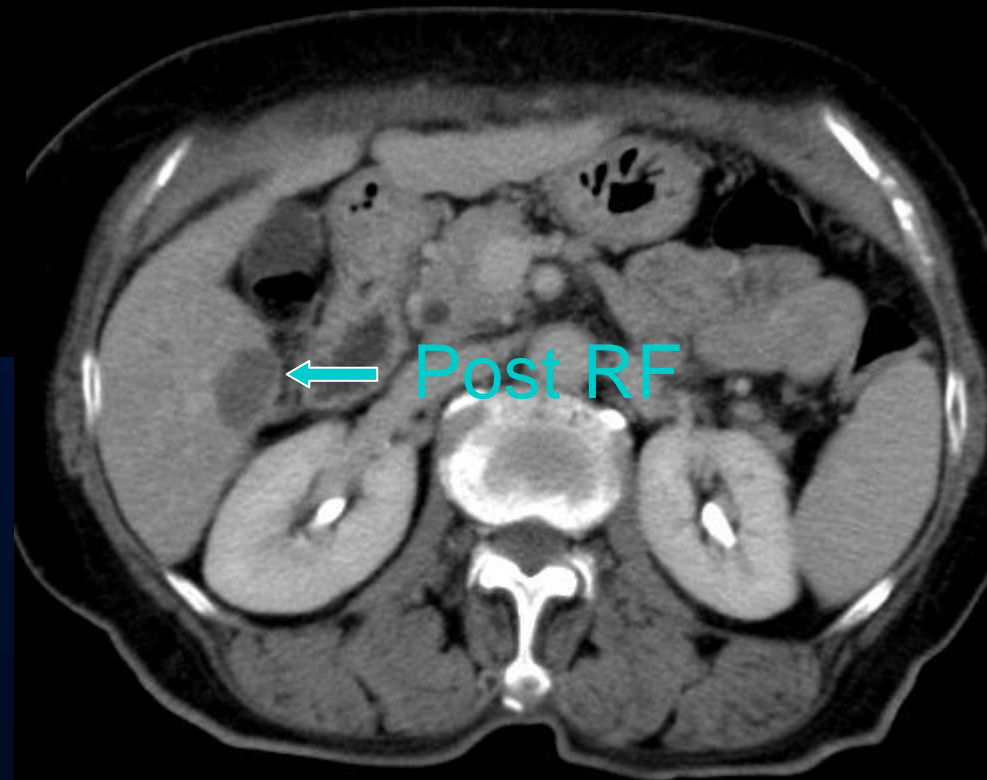
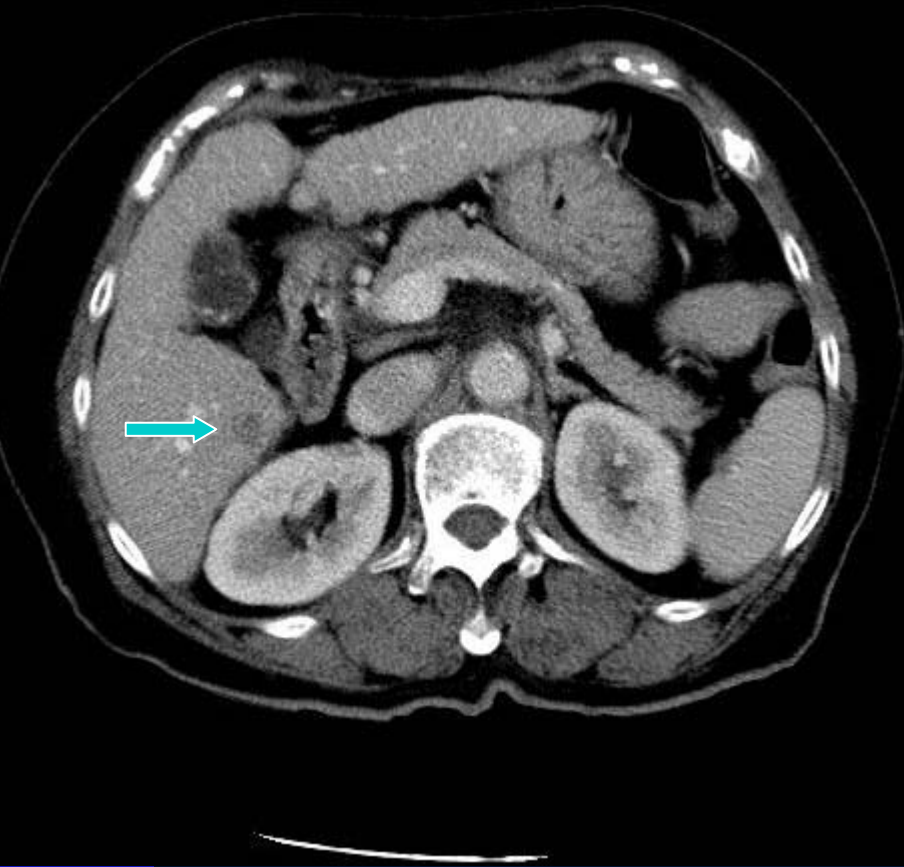
■ **Combined**





**RF for 9 M.post  
TOCE recurrence**

# Small HCC



Brilliance 16P  
Ex: 4581  
Se: 107642  
Im: 89  
DFOV 548.0 mm

A

Wattanosoth Hospital

IT,MR.

06/05/06

512

R

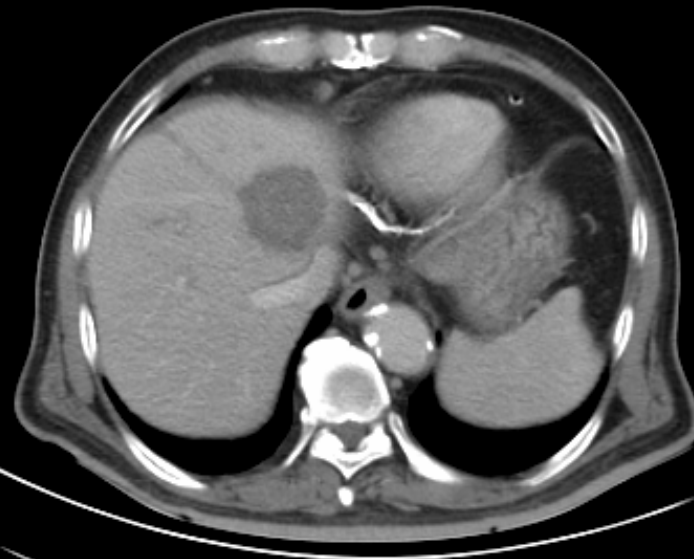
L

kV 120.0  
mA: 450  
5.0 mm  
Tilt: 0.0 degrees

11:05:50  
W=403,L=56

10mm/div

P



Ex: 1.2.840.113704.1

Se: 607

Im: 1

MR.

06/05/06

388 rows, 1090 cols

RIGHT LEFT

FOOT 250-262

258-270

266-278

274-286

282-294

290-302

298-310

306-318

314-326

322-334

330-342

338-350

FID1  
5000

[REDACTED]  
BANGKOK HOSPITAL

0179016856  
C5-2 Abd/Gen

13 Nov 05  
17:28:07

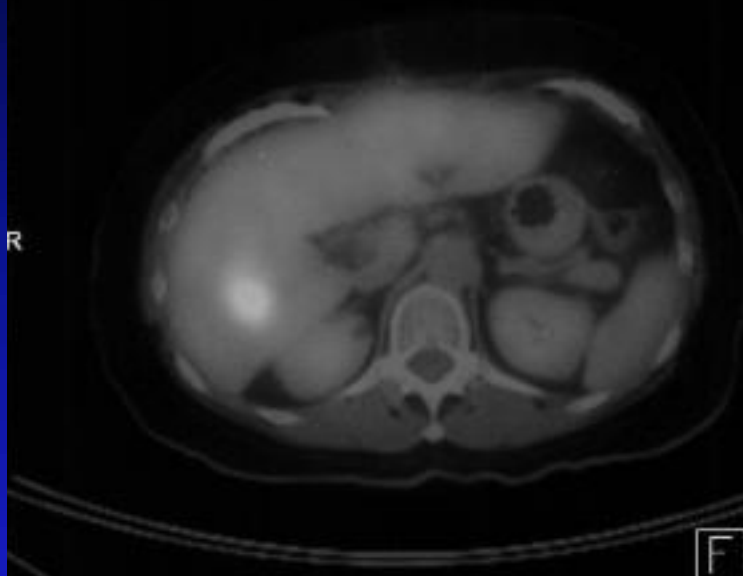
TIs 0.3 MI 1.3  
Fr #234 14.1cm

Map 3  
170dB/C 3  
Persist Off  
2D Opt:HSCT  
Fr Rate:Surv  
SonoCT®



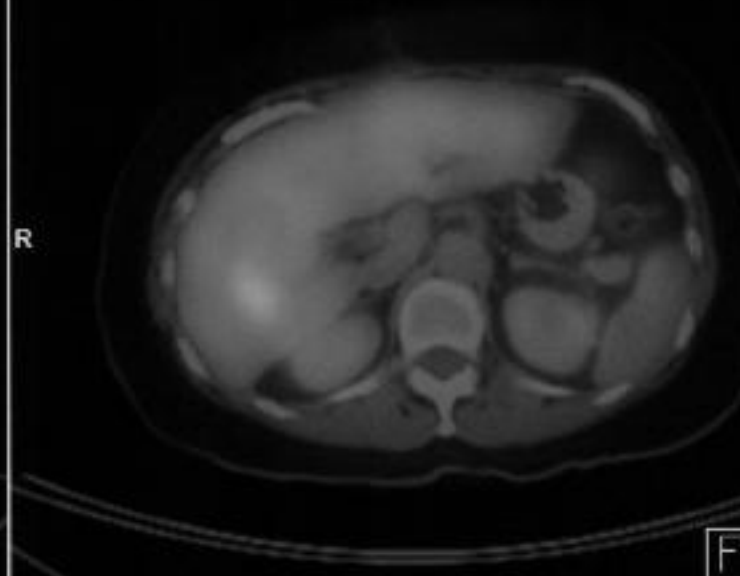
*Post Hepatectomy Recurrence*

3/1 17/2005  
11/17/2005  
1:39:08 PM  
I No. 12  
FUSED MPR THICK



F-18 FDG Fusion Images

3/1 17/2005  
11/17/2005  
1:39:08 PM  
I No. 13  
FUSED MPR THICK



F-18 FDG Fusion Images

Nov 2005



1: [AJR Am J Roentgenol.](#) 2006 May;186(5 Suppl):S275-83.

Radiofrequency ablation of recurrent hepatocellular carcinoma after hepatectomy: therapeutic efficacy on early- and late-phase recurrence.

[Yang W](#), [Chen MH](#), [Yin SS](#), [Yan K](#), [Gao W](#), [Wang YB](#), [Huo L](#), [Zhang XP](#), [Xing BC](#).

Department of Ultrasound, Peking University School of Oncology, 52 Fu-cheng Rd., Hai-dian District, Beijing 100036, People's Republic of China.

1: [Ann Surg.](#) 2006 Aug;244(2):265-73.

Implication of frequent local ablation therapy for intrahepatic recurrence in prolonged survival of patients with hepatocellular carcinoma undergoing hepatic resection: an analysis of 610 patients over 16 years old.

[Taura K](#), [Ikai I](#), [Hatano E](#), [Fujii H](#), [Uyama N](#), [Shimahara Y](#).

Department of Gastroenterological Surgery, Kyoto University Graduate School of Medicine, Kyoto, Japan. ko-taura@air.linkclub.or.jp

## RFA in recurrence post Hepatectomy

# Intervention before Liver transplantation?

1: [Am J Transplant.](#) 2007 Aug;7(8):1875-81. Epub 2007 May 26.

Treatment of HCC in patients awaiting liver transplantation.

[Schwartz M](#), [Roayaie S](#), [Uva P](#).

Mount Sinai Medical Center, Surgery/Transplant, New York, NY, USA. [myron.schwartz@mountsinai.org](mailto:myron.schwartz@mountsinai.org)

Liver transplantation (LT) is the treatment of choice for many patients with unresectable hepatocellular carcinoma (HCC), but long waiting time due to the shortage of donor organs can result in tumor progression and drop-out from LT candidacy. Furthermore, even in candidates meeting the restrictive Milan criteria there is risk of HCC recurrence; this risk rises significantly when patients with more advanced HCC are included. In an effort to address these issues, treatment of HCC in patients awaiting LT has become widespread practice. In this review the various modalities employed in the pre-LT setting are presented, and the evidence for benefit with regard to (1) improvement of post-LT survival, (2) down-staging of advanced HCC to within Milan criteria and (3) preventing waiting list drop-out is considered. Chemoembolization, radiofrequency ablation and ethanol injection all have well-documented antitumor activity; however, there is no high level evidence that waiting list HCC treatment with these modalities is effective in achieving any of the three above-mentioned aims. Nevertheless, particularly in the United States, where continued waiting list priority depends on maintaining HCC within Milan criteria, use of nonsurgical HCC treatment will likely continue in an effort to forestall tumor progression and waiting list drop-out.

1: [Liver Transpl.](#) 2007 Feb;13(2):272-9.

Comment in:

[Nat Clin Pract Gastroenterol Hepatol.](#) 2007 Oct;4(10):540-1.

Response to preoperative chemoembolization correlates with outcome after liver transplantation in patients with hepatocellular carcinoma.

[Millonig G](#), [Graziadei IW](#), [Freund MC](#), [Jaschke W](#), [Stadlmann S](#), [Ladurner R](#), [Margreiter R](#), [Vogel W](#).

Divisions of Gastroenterology and Hepatology, Medical University of Innsbruck, Austria.

had far better 1-, 2-, and 5-year survival rates (100, 93.2, and 85.7%, and 93.8, 83.6, and 66.2%, respectively) compared with those with no response or with tumor progression (82.4, 50.7, and 19.3%). Posttransplant survival analysis showed a marked survival benefit according to transarterial chemoembolization response: patients with complete or partial response had 1-, 2-, and 5-year survival rates of 89.1, 85.1, and 85.1%, and 88.6, 77.4, and 63.9%, respectively, compared with 68.6, 51.4, and 51.4% for patients whose disease did not respond to therapy. Subgroup analysis, however, showed that these benefits were only seen in patients whose disease met the Milan criteria, but not in disease exceeding the Milan criteria but fitting the

## Controversy

## TOCE before Liver transplantation

## Good responding TOCE leads to good outcome OLT

## Drop-out cases

# Chemoembolization



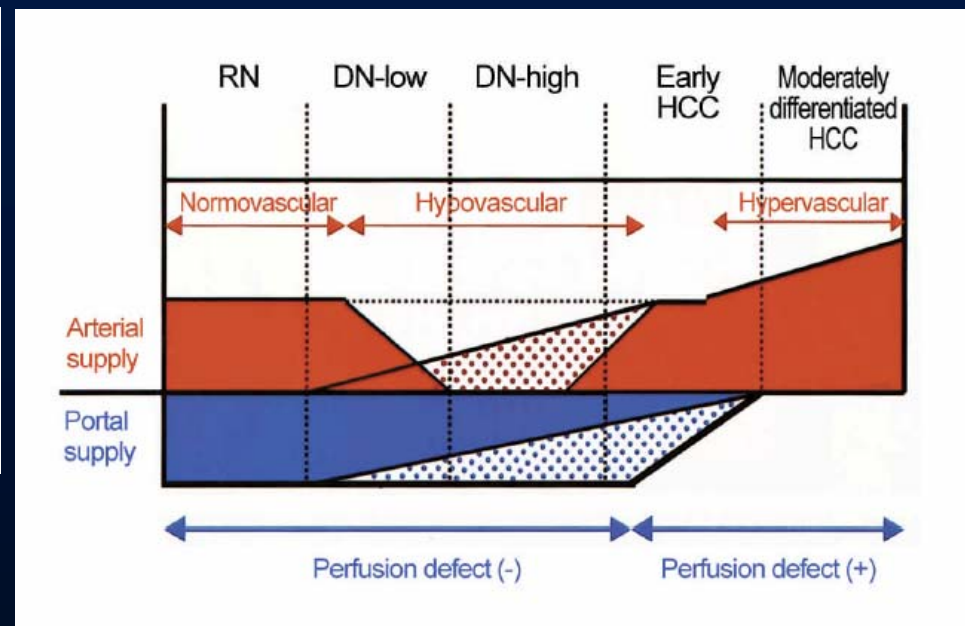
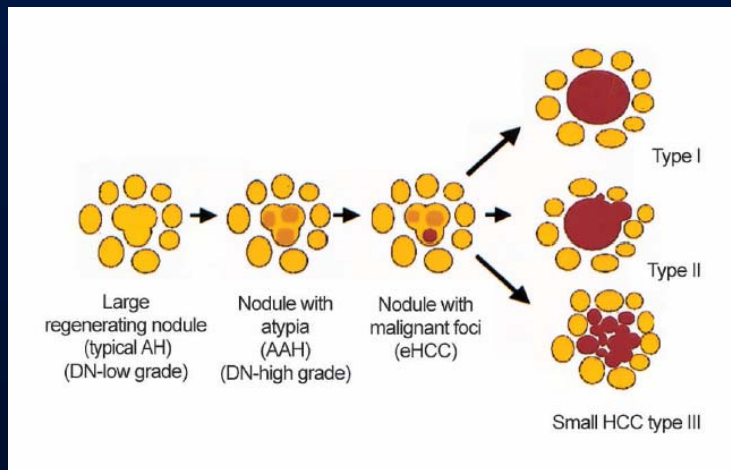
- **Komgrit Tanisaro,MD**  
Associate Professor,  
Interventional Radiology,  
Bangkok Medical Center

## ■ **Principle of TACE** **(transarterial chemoembolization)**

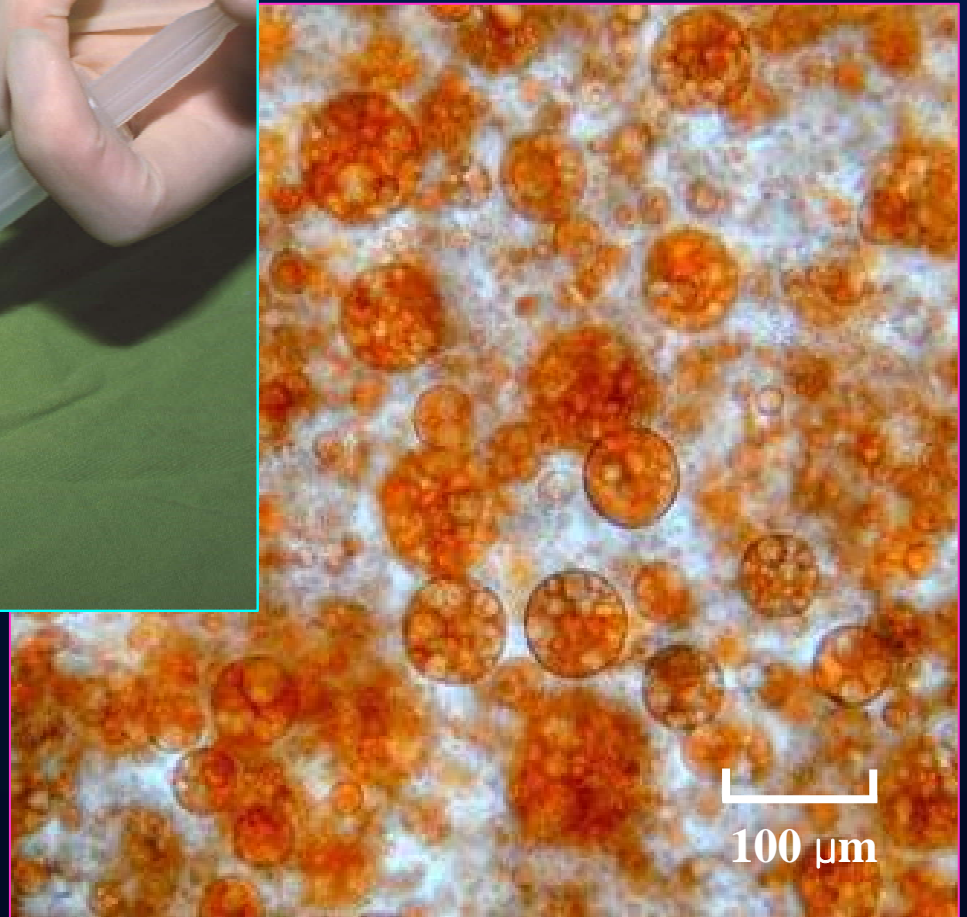
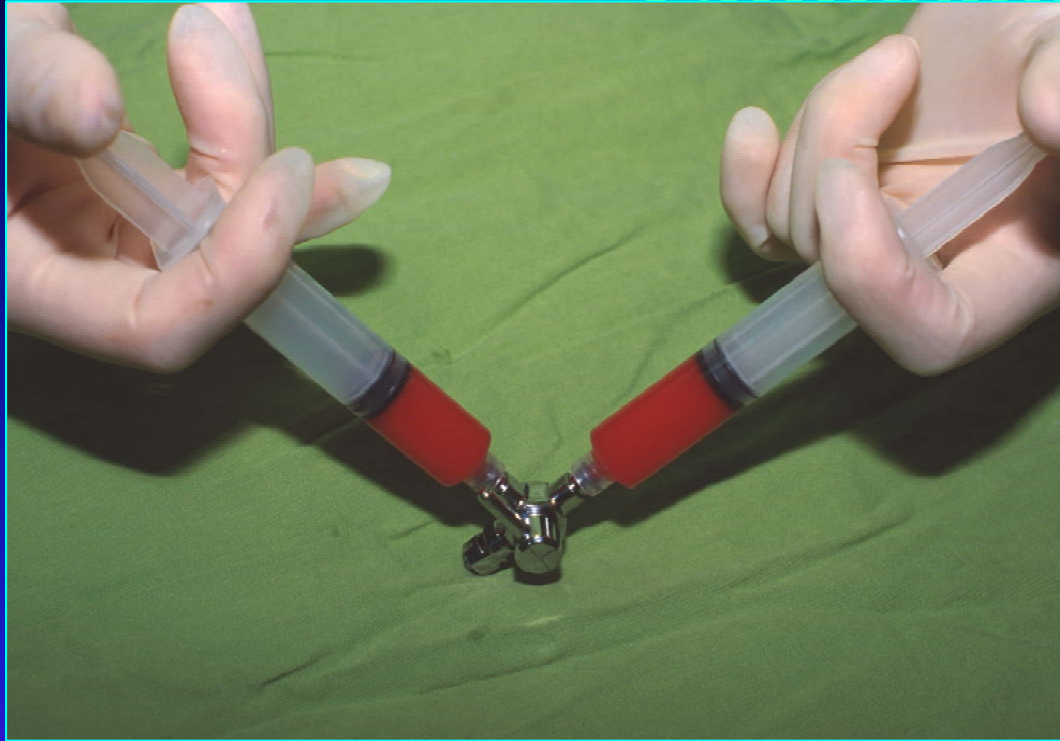
- ❖ **Dual blood supply of the liver**
- ❖ **Lipiodol + chemoembolization**
- ❖ **Superselective angiography technique**

# Blood Supply of HCC

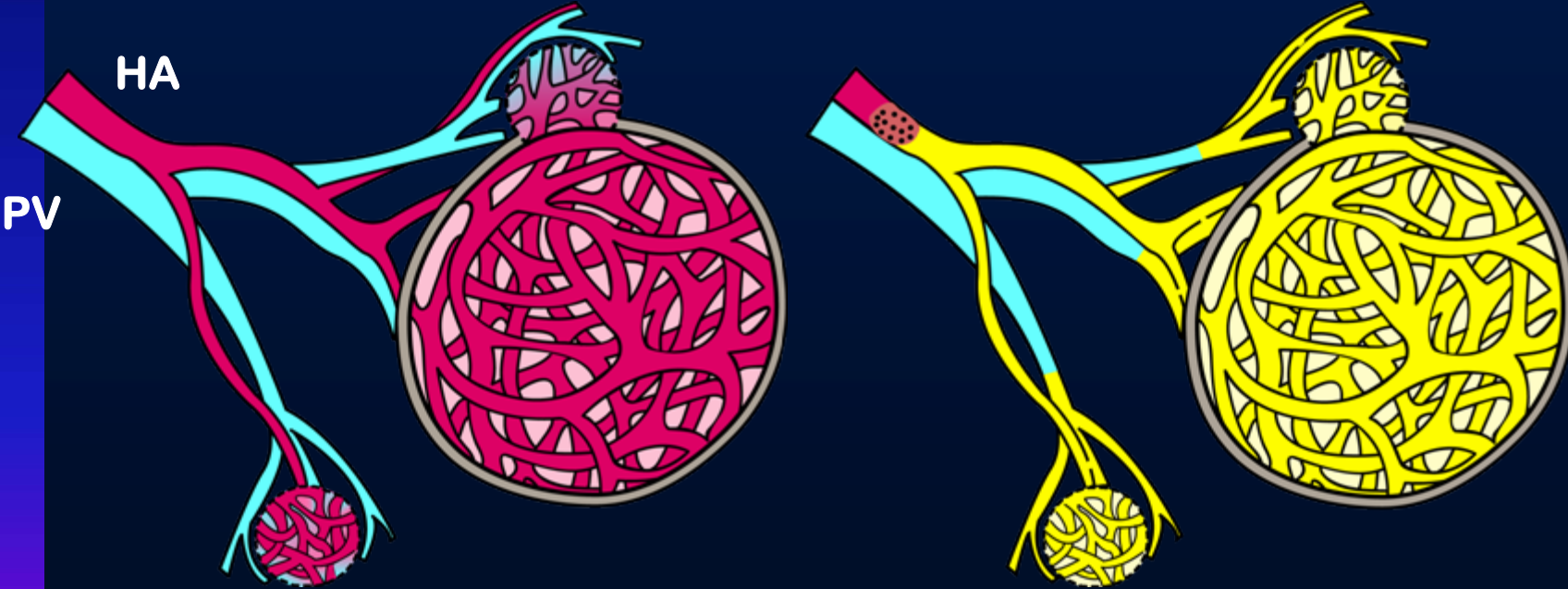
## ■ Developmental stage



# Lipiodol/Anticancer Drug Emulsion



# Lipiodol Chemoembolization





*2 weeks later*

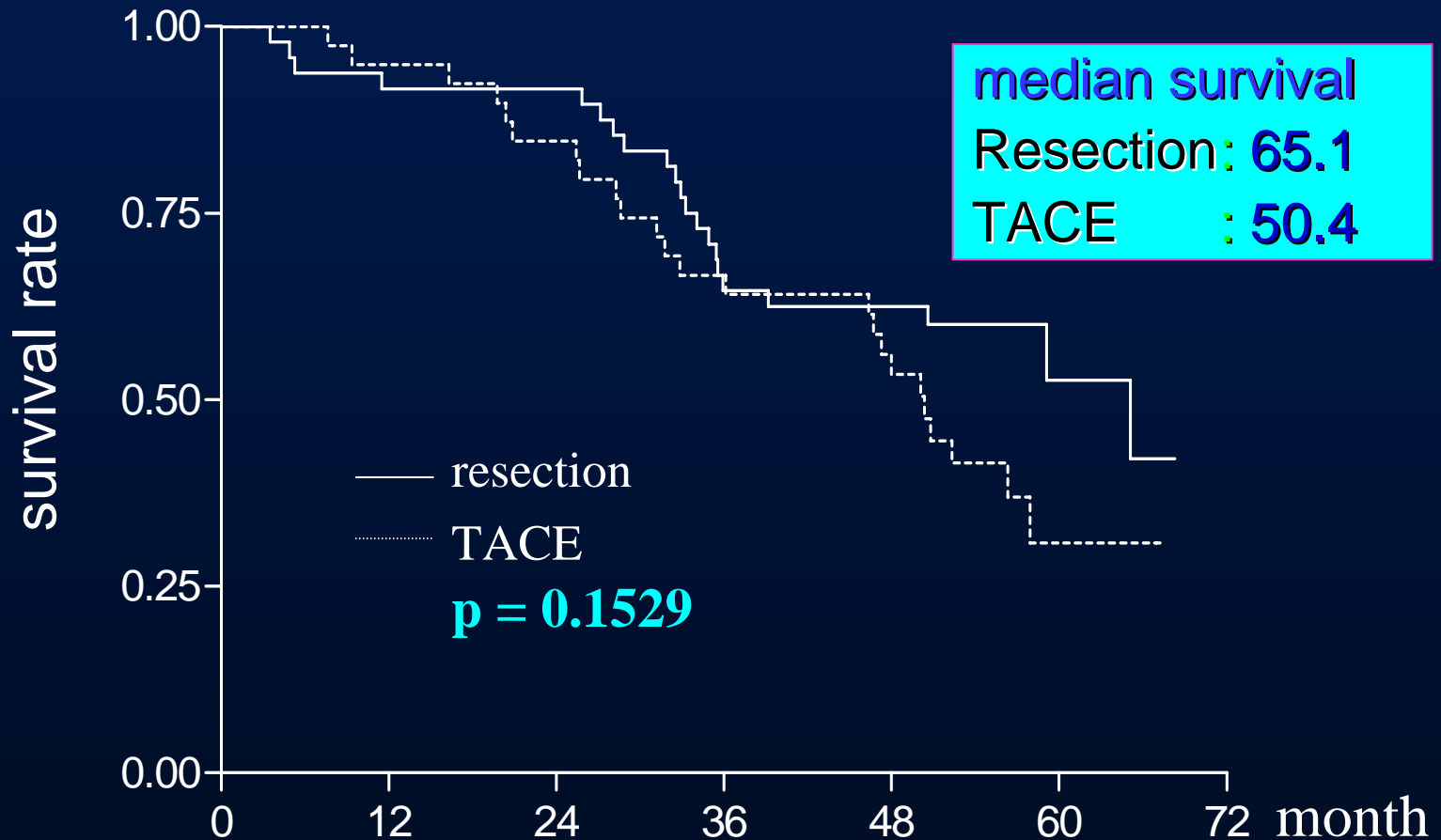
# Segmental TACE: Therapeutic Effects

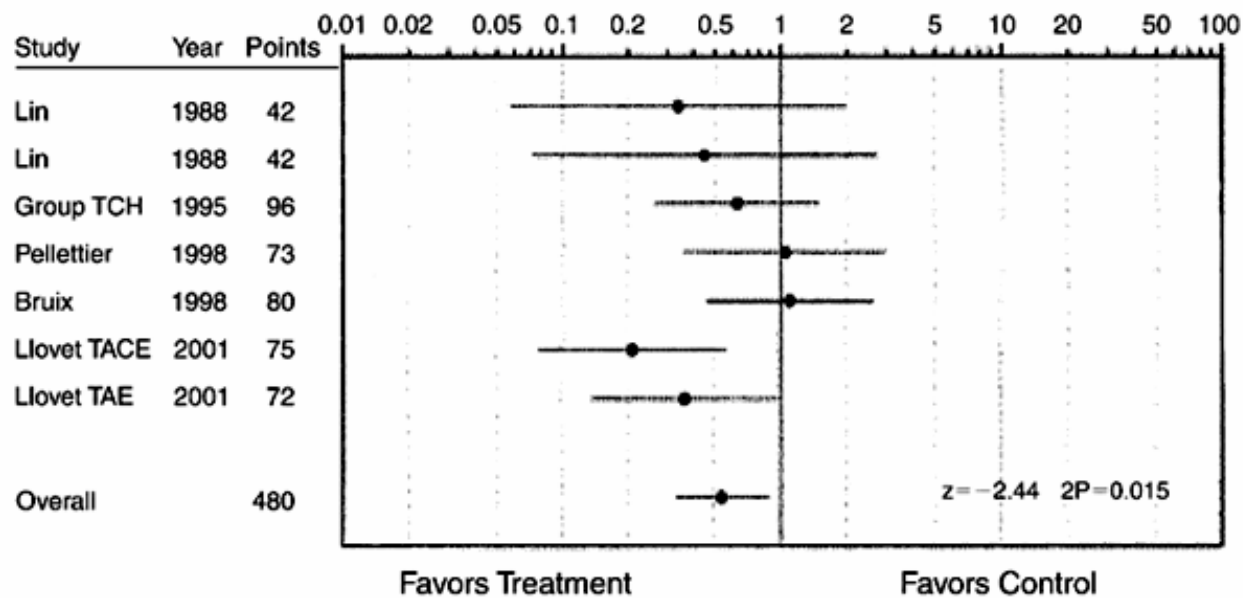
- **Long-term survival rates**
  - ❖ 1 yr (100%), 3 yr (73%), 5yr (53%)
- **Local recurrence rates**
  - ❖ 1 yr (18%), 5yr (33%)

*Matsui O, et al. Radiology 1993*

# Survival Rate after Resection and TACE

## UICC T1, 2 and Compact Uptake





# Randomized Controlled Trials

- **Barcelona Clinic Liver Cancer Group (Llovet et al.)**
  - ❖ **Lancet 2002; 359:1734-1739**
  - ❖ **Untreated HCC not suitable for curative treatment (SN, <5cm; MN, x3, <3cm)**
  - ❖ **Dx criteria: Bx, two imaging studies & AFP**
  - ❖ **Exclusion criteria**
    - ☞ **Child C, old age >75, active GI bleeding, encephalopathy, refractory ascites, angioinvasion(incl. segmental), extrahepatic spread, portosystemic shunt, hepatofugal blood flow, renal failure, endstage tumoral disease**
  - ❖ **903 pts registered → 112 randomized**
    - ☞ **37 arterial embolization (gelatin sponge)**
    - ☞ **40 chemoembolization (lipiodol+doxorubicin, followed by embolization)**
    - ☞ **35 control treatment**
  - ❖ **Primary endpoint: survival, secondary endpoint: treatment response**
  - ❖ **Study population**
    - ☞ **Mostly HCV: 95/112**
    - ☞ **SN 30; MN 80; DH 2**
    - ☞ **Ascites 26; abdominal pain 13; constitutional syndrome 6**
    - ☞ **PT: >70%, bilirubin <29.1 mmol/L, albumin >3.3g/dL**
    - ☞ **Main tumor size < 6cm, bilobar disease 55**
    - ☞ **Child A 79, Child B 33**
    - ☞ **Okuda stage I 73, stage II 39**

# Randomized Controlled Trials

## ■ Barcelona Clinic Liver Cancer Group (Llovet et al.)

❖ Lancet 2002; 359:1734-1739

### ❖ Results

#### ☞ Survival (1, 2, 3 year)

• Embolization	: 75%	50%	29%
• Chemoembolization	: 82%	63%	29%
• Control	: 63%	27%	17%

#### ☞ Treatment response (at 6 month)

• Responders (n=30)	: 96%	77%	47%
• Non-responders	: 65%	41%	

#### ☞ Portal vein invasion during follow-up

• Chemoembolization	: 17%
• Control	: 58%

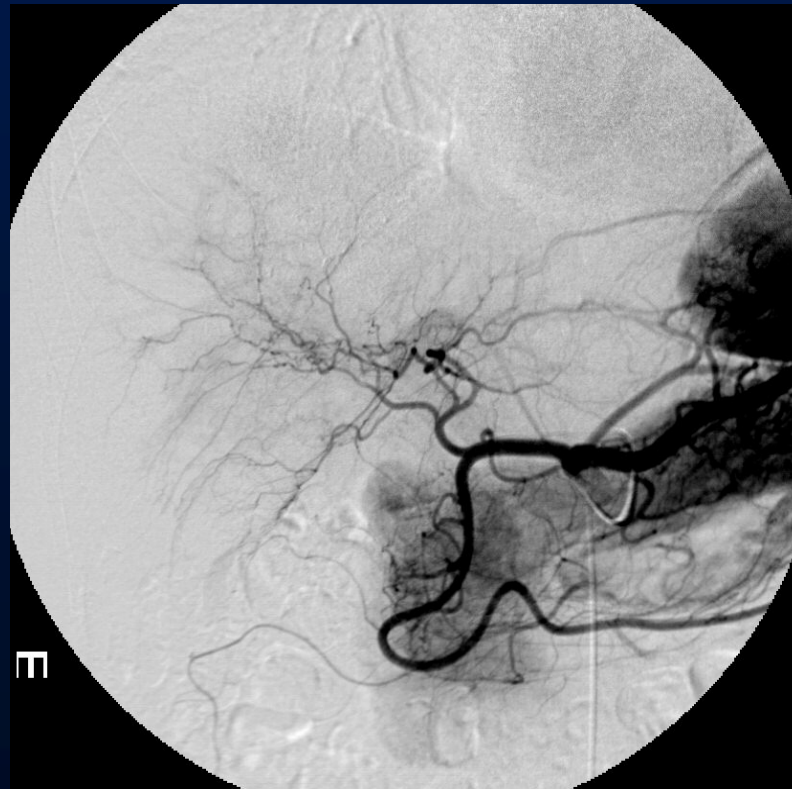
☞ No differences in hepatic insufficiency, extrahepatic spread

# 42/M: HBsAg(+), AFP 189,000, Child A



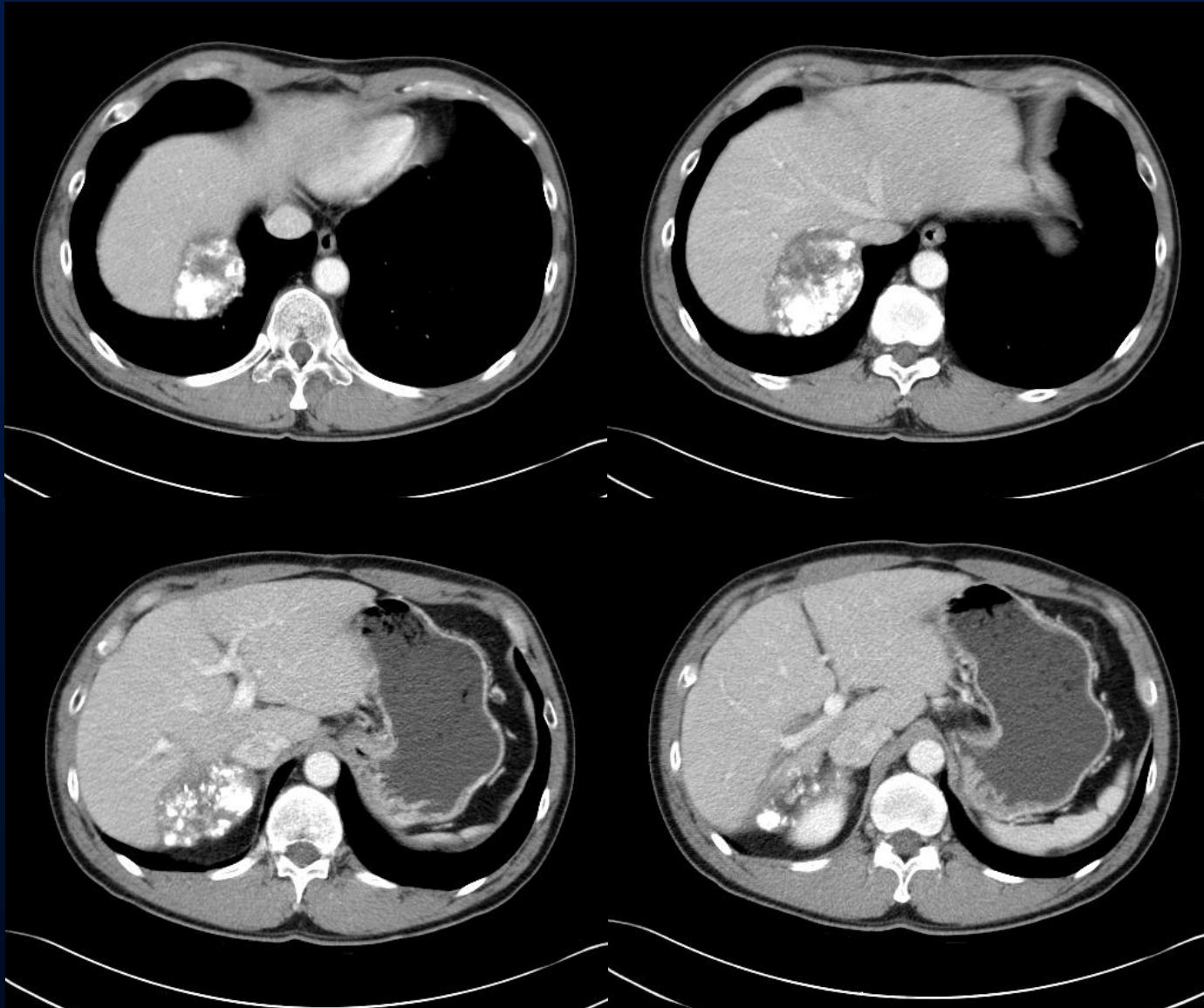
**42/M: AFP 189,000 → 319**

**03-12-05**



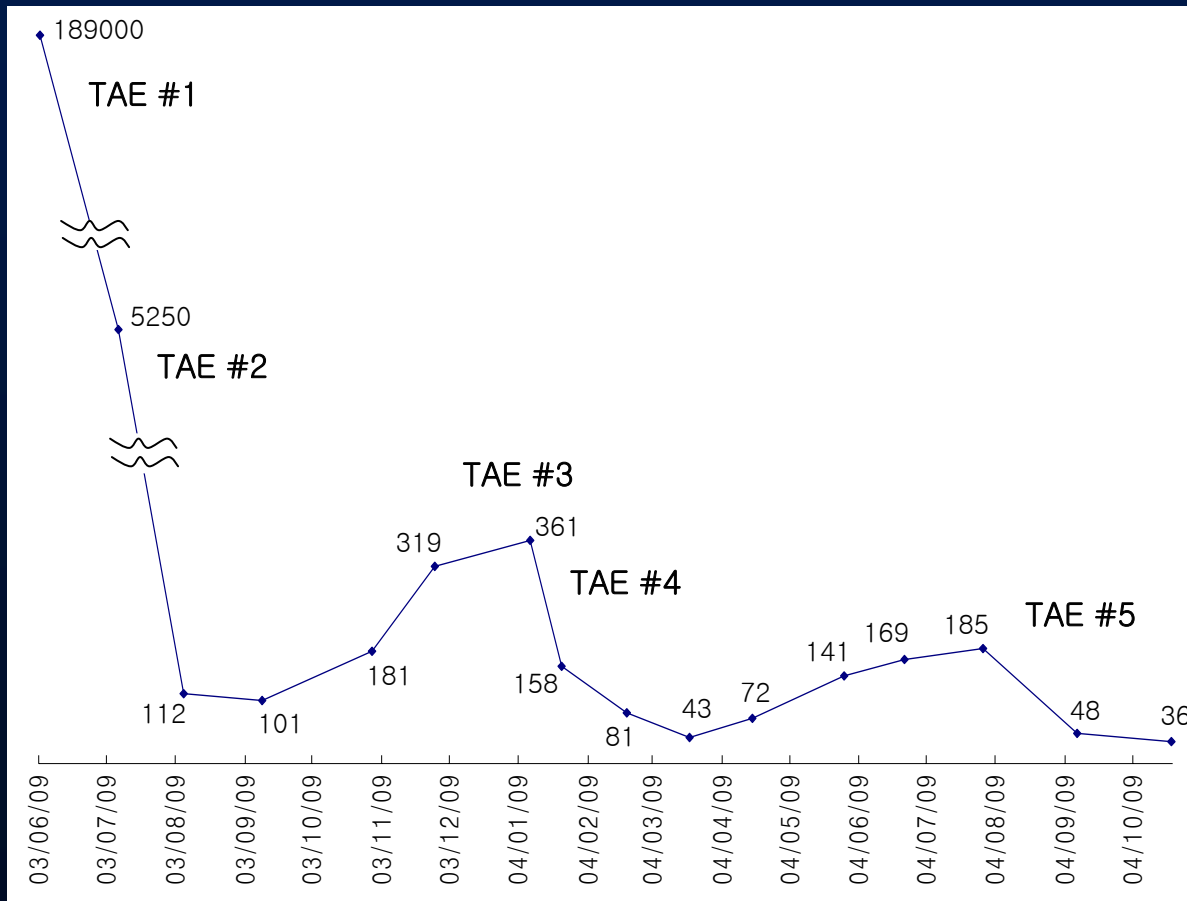
# 42/M: AFP 26

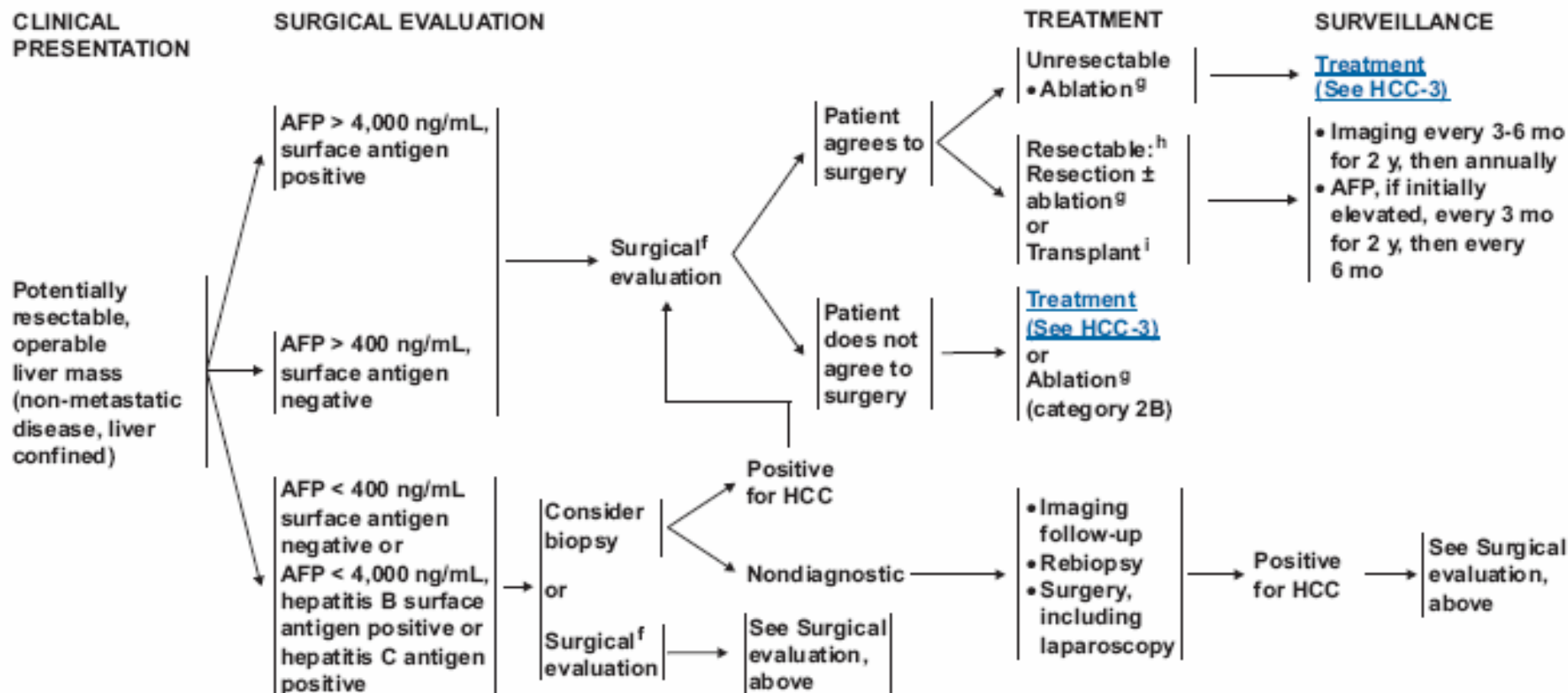
05-08-16



**TACE#5**  
(2y2m f/u)

# 42/M: AFP 189,000 → 26





<sup>f</sup>Discussion of surgical treatment with patient and determination of whether patient is amenable to surgery.

<sup>g</sup>Ablation or embolization options: radiofrequency, alcohol, cryotherapy, microwave or embolization (chemoembolization, radioembolization, bland embolization).

<sup>h</sup>Consider interferon or other antiviral therapy for selected low risk hepatitis C patients with completely resected tumors and good performance status.

<sup>i</sup>Criteria for transplantation (UNOS criteria):

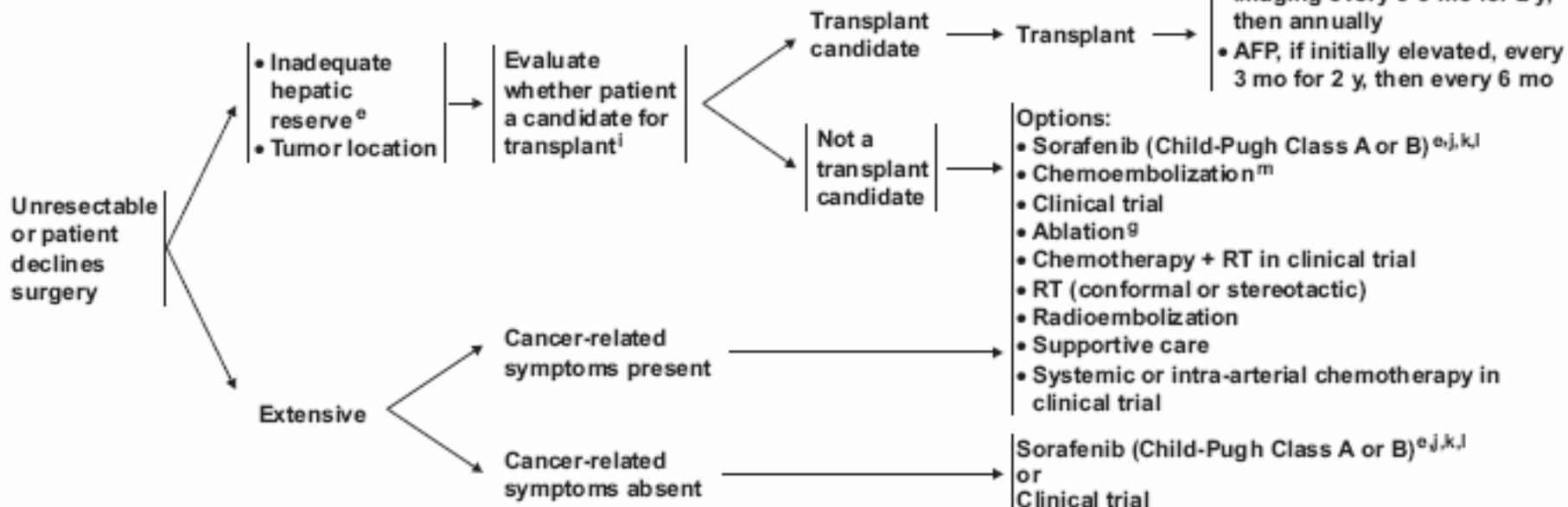
- Patient is not a liver resection candidate
- Patient has a tumor ≤ 5 cm in diameter or 2-3 tumors ≤ 3 cm each
- No macrovascular involvement
- No extrahepatic spread of tumor to surrounding lymph nodes, lungs, abdominal organs, or bone

Mazzaferro V, Regalia E, Doci R, et al. Liver transplantation for the treatment of small hepatocellular carcinomas in patients with cirrhosis. *N Engl J Med* 1996;334(11):693-700.

Note: All recommendations are category 2A unless otherwise indicated.

Clinical Trials: NCCN believes that the best management of a cancer patient is in a clinical trial. Participation in clinical trials is especially encouraged.

For relapse, see initial  
[Workup \(HCC-1\)](#)

CLINICAL  
PRESENTATION

<sup>e</sup>See [Child-Pugh Score \(HCC-A\)](#).

<sup>g</sup>Ablation or embolization options: radiofrequency, alcohol, cryotherapy, microwave or embolization (chemoembolization, radioembolization, bland embolization).

<sup>i</sup>Criteria for transplantation (UNOS criteria):

- Patient is not a liver resection candidate
- Patient has a tumor ≤ 5 cm in diameter or 2-3 tumors ≤ 3 cm each
- No macrovascular involvement
- No extrahepatic spread of tumor to surrounding lymph nodes, lungs, abdominal organs, or bone

Mazzaferro V, Regalia E, Doci R, et al. Liver transplantation for the treatment of small hepatocellular carcinomas in patients with cirrhosis. *N Engl J Med* 1996;334(11):693-700.

<sup>j</sup>The impact of sorafenib on patients potentially eligible for transplant is unknown. Data are inadequate to define dosing for patients with abnormal liver function (Child-Pugh Class B or C).

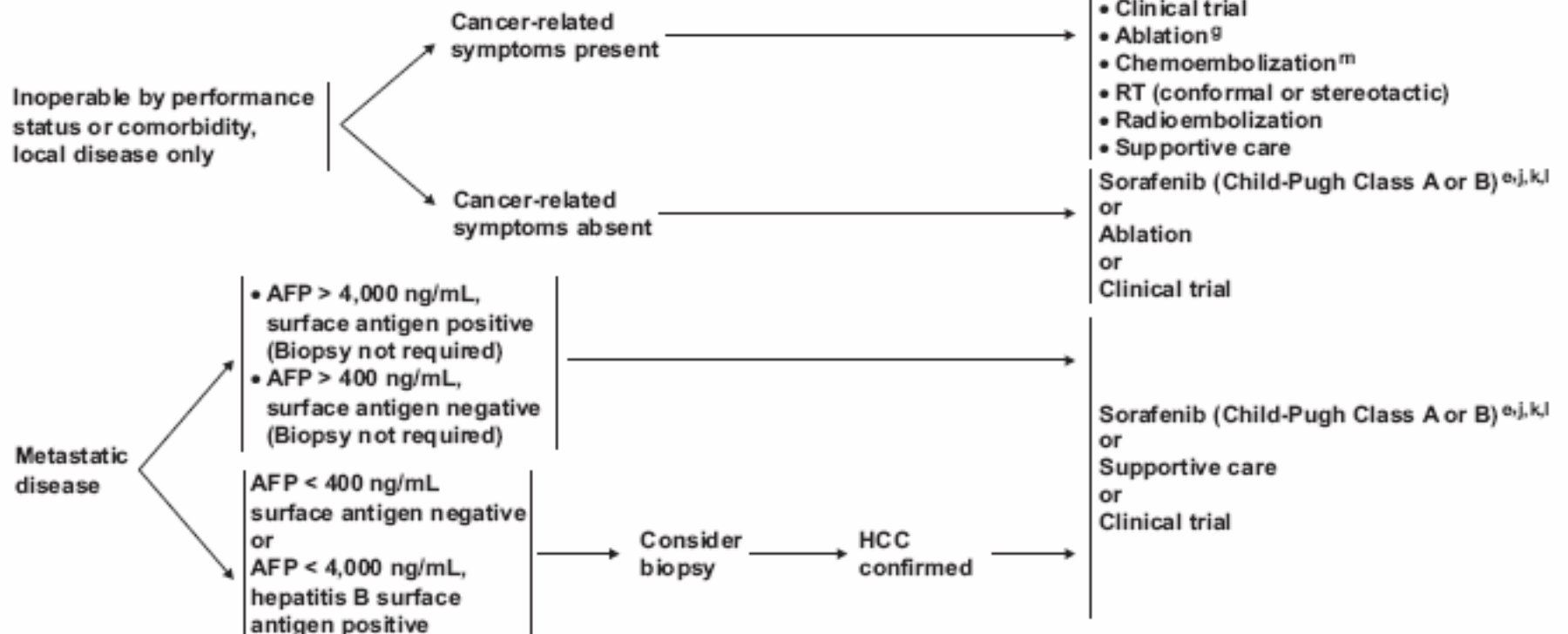
<sup>k</sup>For selected patients, a randomized clinical trial has demonstrated survival benefits. (Llovet J, Ricci S, Mazzaferro V, et al. Sorafenib improves survival in advanced Hepatocellular Carcinoma (HCC): Results of a Phase III randomized placebo-controlled trial (SHARP trial). 2007 ASCO Annual Meeting Proceedings Part 1. *J Clin Oncol* 2007, Vol 25, No. 18S (June 20 Supplement), 2007: LBA1)

<sup>l</sup>Caution: There are limited safety data available for Child-Pugh Class B patients. Use with extreme caution in patients with elevated bilirubin levels. (Miller AA, Murry K, Owzar DR, et al. Pharmacokinetic (PK) phase I study of sorafenib (S) for solid tumors and hematologic malignancies with hepatic or renal dysfunction (HD or RD): CALGB 6031 2007 ASCO Annual Meeting Proceedings Part 1. *J Clin Oncol* 2007, Vol 25, No 18S (June 20 Supplement), 2007: 3538)

<sup>m</sup>Contraindicated in cases of main portal thrombosis or Child-Pugh Class C.

Note: All recommendations are category 2A unless otherwise indicated.

Clinical Trials: NCCN believes that the best management of any cancer patient is in a clinical trial. Participation in clinical trials is especially encouraged.

CLINICAL  
PRESENTATION

<sup>e</sup> See [Child-Pugh Score \(HCC-A\)](#).

<sup>g</sup> Ablation or embolization options: radiofrequency, alcohol, cryotherapy, microwave or embolization (chemoembolization, radioembolization, bland embolization)

<sup>l</sup> The impact of sorafenib on patients potentially eligible for transplant is unknown. Data are inadequate to define dosing for patients with abnormal liver function (Child-Pugh Class B or C).

<sup>k</sup> For selected patients, a randomized clinical trial has demonstrated survival benefits. (Llovet J, Ricci S, Mazzaferro V, et al. Sorafenib improves survival in advanced Hepatocellular Carcinoma (HCC): Results of a Phase III randomized placebo-controlled trial (SHARP trial). 2007 ASCO Annual Meeting Proceedings Part 1. J Clin Onc 2007, Vol 25, No. 18S (June 20 Supplement), 2007: LBA1.

<sup>l</sup> Caution: There are limited safety data available for Child-Pugh Class B patients. Use with extreme caution in patients with elevated bilirubin levels. (Miller AA, Murry K, Owzar DR, et al. Pharmacokinetic (PK) phase I study of sorafenib (S) for solid tumors and hematologic malignancies with hepatic or renal dysfunction (HD or RD): CALGB 6031 2007 ASCO Annual Meeting Proceedings Part 1. J Clin Onc 2007, Vol 25, No 18S (June 20 Supplement), 2007: 3538)

<sup>m</sup> Contraindicated in cases of main portal thrombosis or Child-Pugh Class C.

Note: All recommendations are category 2A unless otherwise indicated.

Clinical Trials: NCCN believes that the best management of a cancer patient is in a clinical trial. Participation in clinical trials is especially encouraged.

Go o o o o o o o o o o o o g l e ▶

หน้า ผลการค้นหาค้นหา: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [ถัดไป](#)

HCC sorafenib

ค้นหา

NCBI PubMed A service of the U.S. National Library of Medicine and the National Institutes of Health  
www.pubmed.gov

All Databases PubMed Nucleotide Protein Genome Structure OMIM PMC Journals

Search PubMed for HCC sorafenib   [Save Search](#)

Display Summary Show 20 Sort By Send to

All: 6 Review: 2

Items 1 - 6 of 6

About Entrez  
Text Version  
Entrez PubMed  
Overview

# Practice Guideline by BCLC Proposal

**HCC**

PST 0, Child-Pugh A

**PST 0-2, Child-Pugh A-B**

PST>2, Child-Pugh C

Very early stage  
Single < 2cm

Early stage  
Single or 3 nodules < 3cm, PS 0

**Intermediate stage**  
**Multinodular, PS 0**

Advanced stage  
Portal invasion, N1, M1,  
PS 1-2

Terminal stage

Single

3 nodules ≤ 3cm

Portal pressure/bilirubin

Increased

Associated diseases

Normal

No

Yes

Portal invasion, N1, M1

No

Yes

Resection

Liver Transplantation  
(CLT/LDLT)

PEI/RF

Chemoembolization

New Agents

Curative Treatments

Randomized controlled trials

Symptomatic

