

Percutaneous Interventions in Oncology

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Percutaneous and Endovascular Treatment of Liver Tumors

- * The liver is the most common site of metastatic tumor deposits
- * Hepatic metastases are a major cause of morbidity and mortality in patients with GI tract cancer
- * For unresectable liver metastases or primary tumors, alternative local and regional ablative modalities have been developed in the last several years

Percutaneous Treatment of Liver Tumors

- * **Local Interstitial Therapy**
 - * Radiofrequency Ablation (RFA)
 - * Microwave Ablation (MWA)
 - * Irreversible Electroporation (IRE)
 - * Laser Induced Interstitial Therapy (LIIT)
 - * Cryotherapy
 - * High Intensity Focused Ultrasound (HIFU)
- * **Local and Regional Drug Administration**
 - * Alcohol injection
 - * Endotumoral chemotherapy
 - * Regional chemoembolization (TACE)
 - * Drug eluting beads (TACE)
 - * Percutaneous Hepatic Perfusion (PHP) with organ isolation
 - * Monoclonal antibody therapy
- * **Radioembolization w/ Microspheres (SIR spheres/Theraspheres)**

Change in Paradigms

* **New Paradigms**

- * “Cancer cure” has been changed for “Cancer control”
- * Radical therapies are being replaced for treatments that respect anatomical integrity and organ function
- * “Quality of life” is preferred over “Prolongation of (poor) life”

TACE = TransArterial ChemoEmbolization

- * Chemoembolization of liver tumors with ethiodol and chemotherapy drug (Mitomycin C & Doxorubicin) has been performed in Japan since 1977 for HCC
- * Not well known procedure in the Western countries until 1985
- * Radiology, Jan 1985 published 3 landmark papers on chemoembolization
- * Ohishi H, et al. Radiology 1985 described the technique with Lipiodol and Gelfoam

Pre Treatment



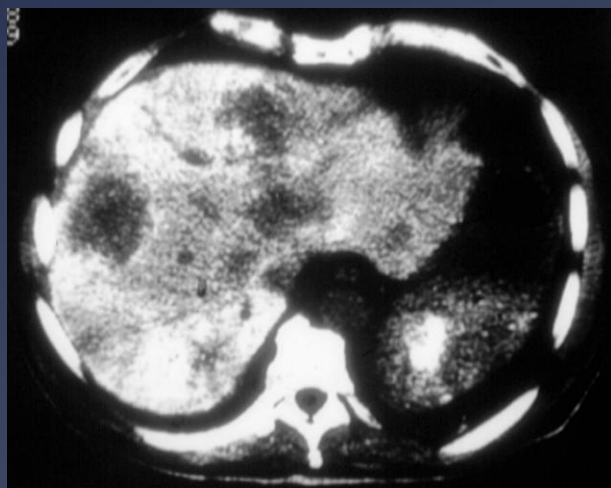
Post TACE Right lobe



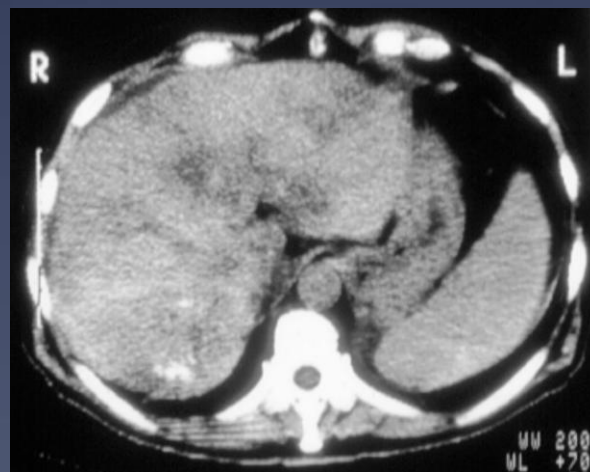
CT Follow up 1 mt



CT Follow up 6 mts



CT Follow up 12 mts



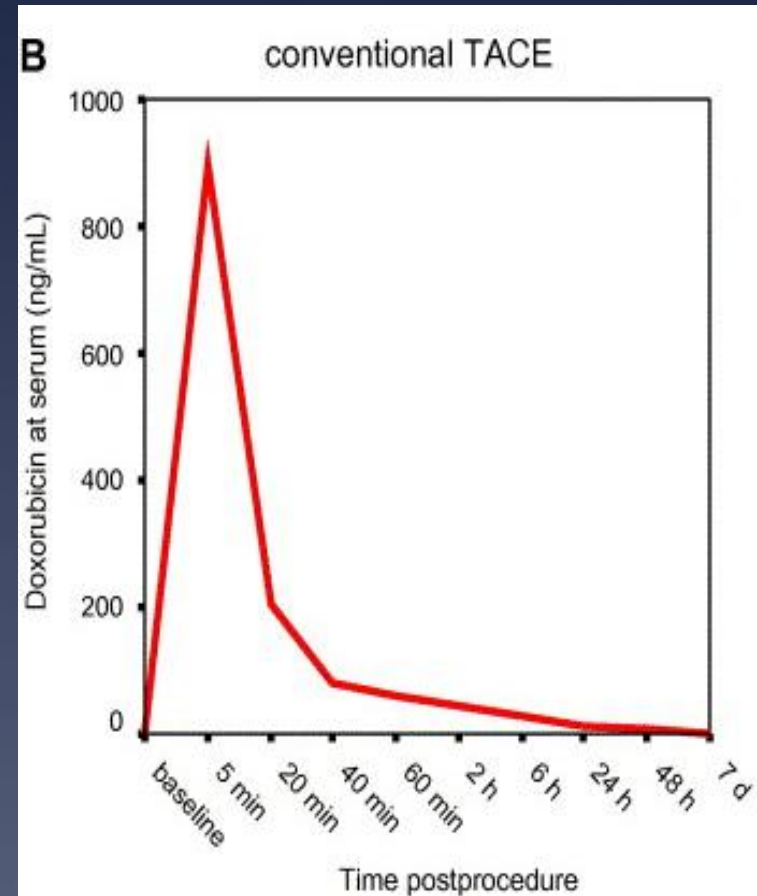
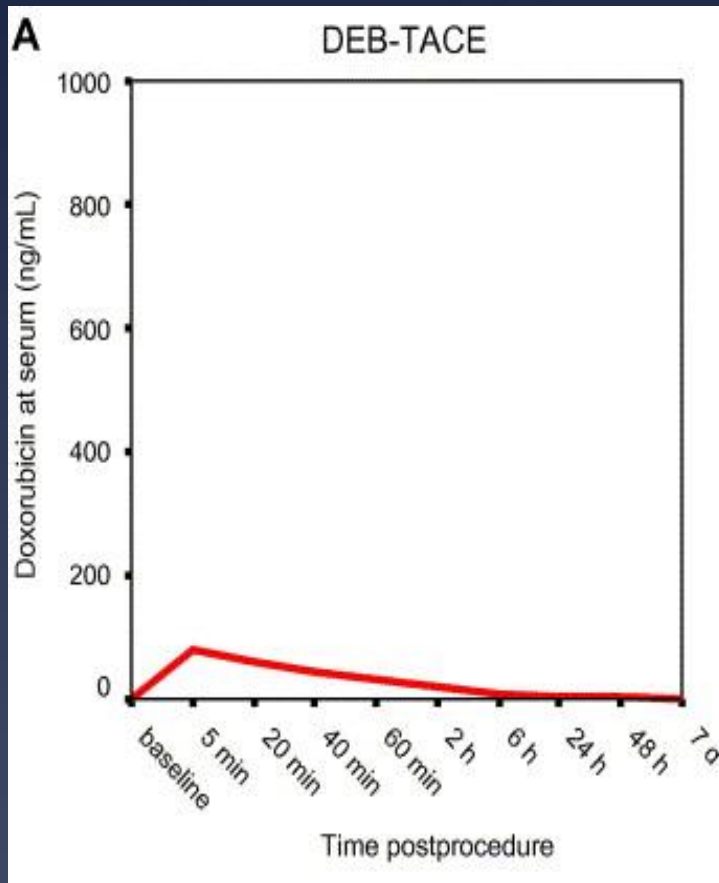
CT Follow up 18 mts



Colon CA metastatic: Failed chemotherapy, with severe pain
Treatment: 5 chemoembolizations with Ethiodol, Mitocycin C, PVA

DEB vs. conventional TACE

Pharmacokinetics: serum concentration over time



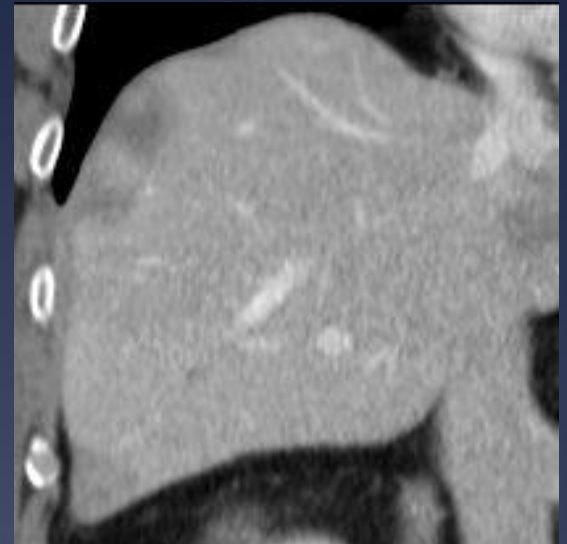
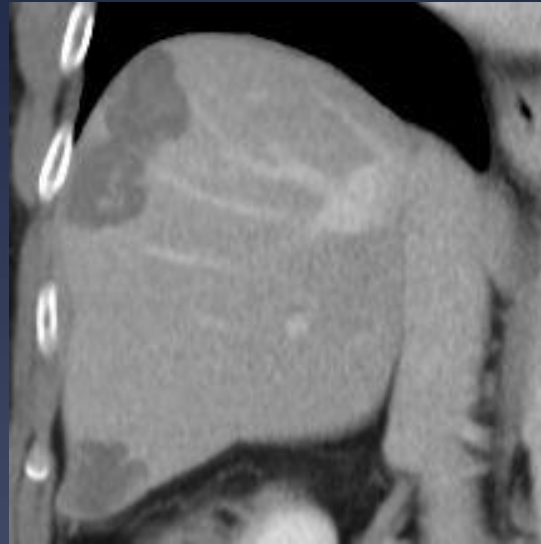
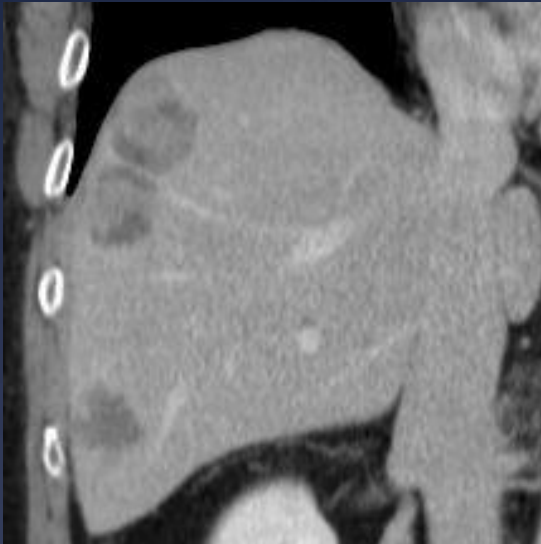
From Varela et al. Chemoembolization of hepatocellular carcinoma with drug eluting beads: Efficacy and doxorubicin pharmacokinetics. *J Hepatology* 46 (2007) 474-481

DEB Loaded with Irinotecan

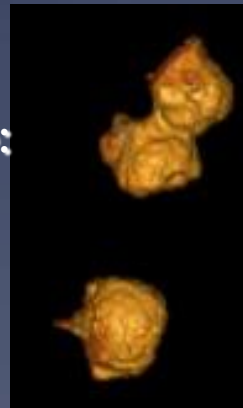
Pre

1 m FU

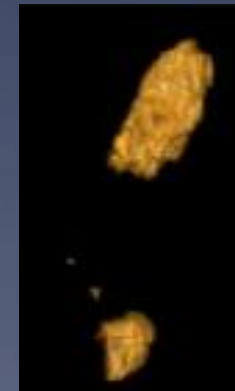
3 m FU



**Tumor volume:
42.9 cc**

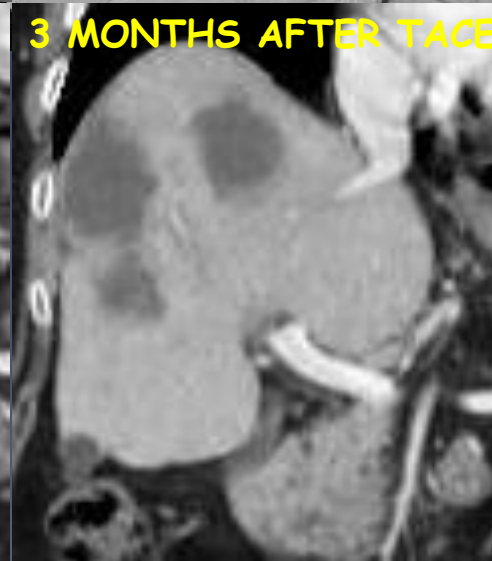
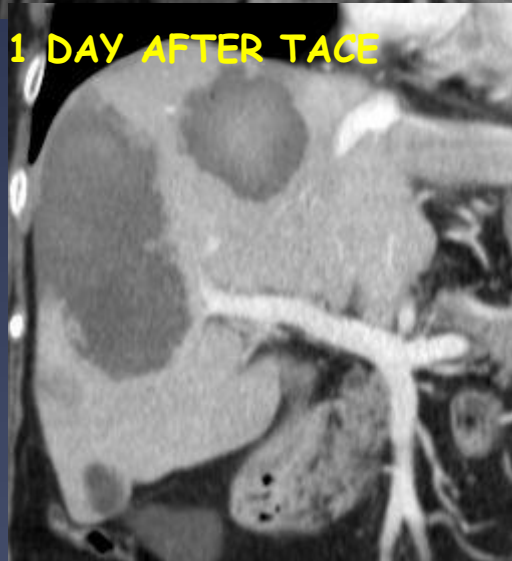
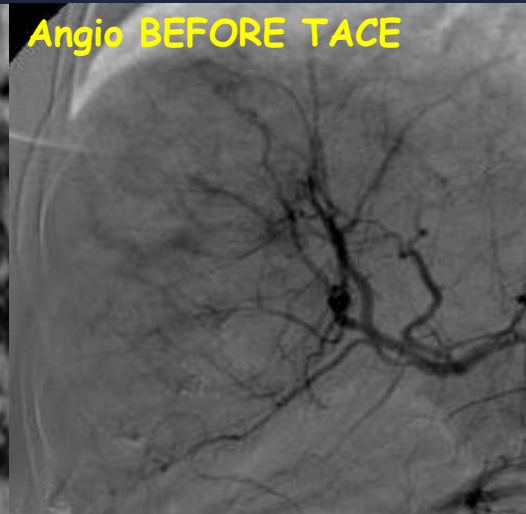
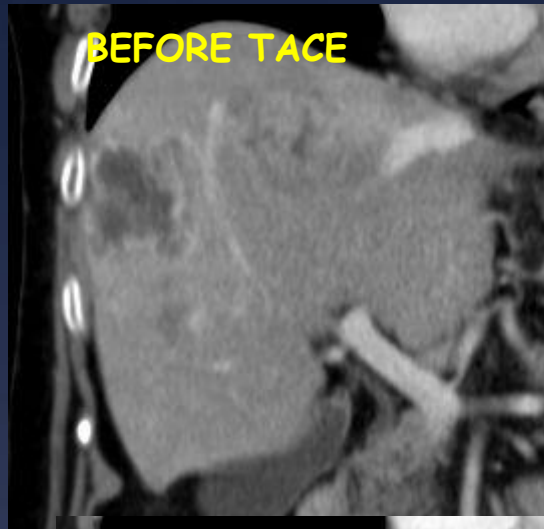


**Tumor volume:
57.8 cc**

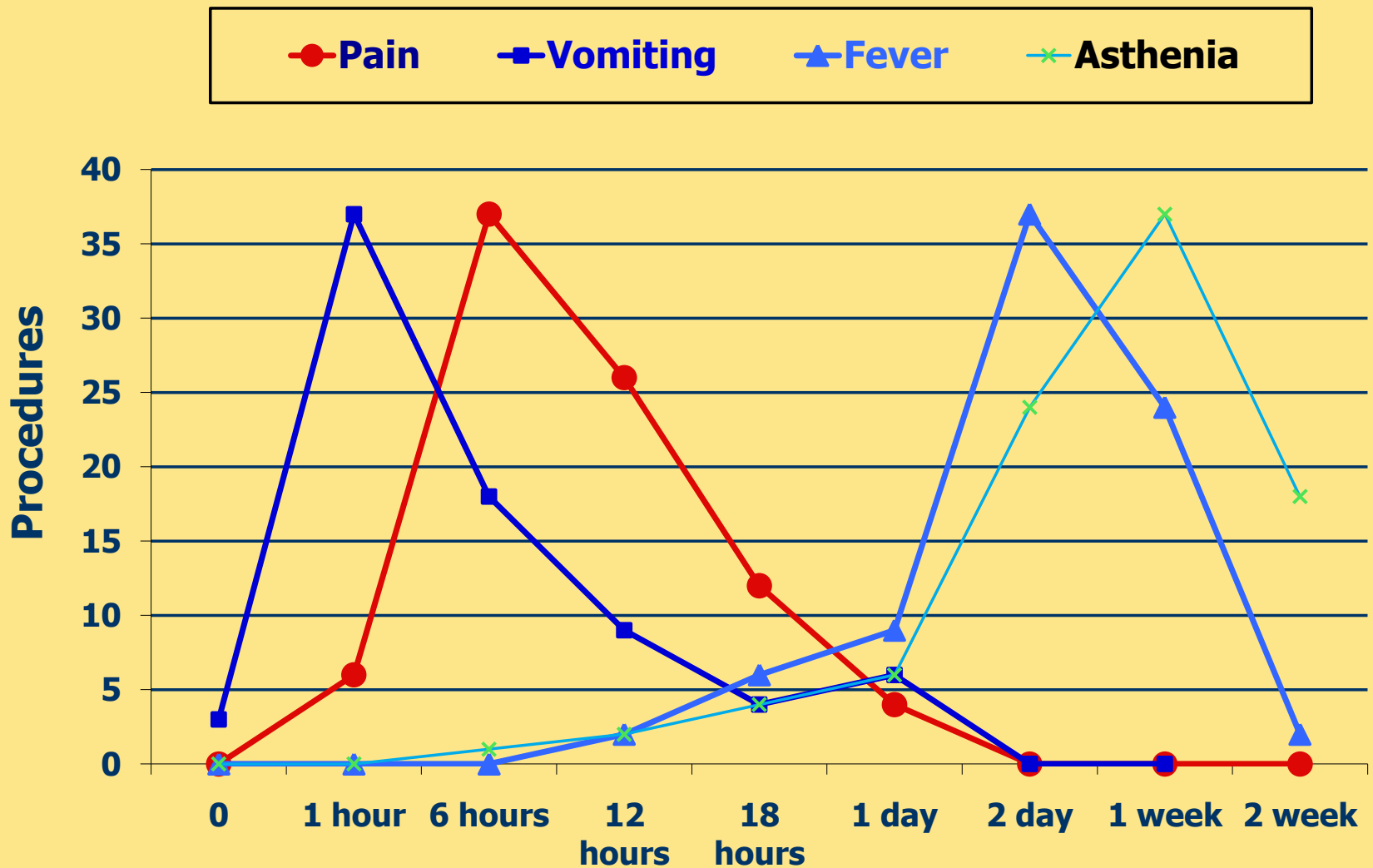


**Tumor volume:
14.5 cc (-66%)**

Colon CA metastatic to the liver

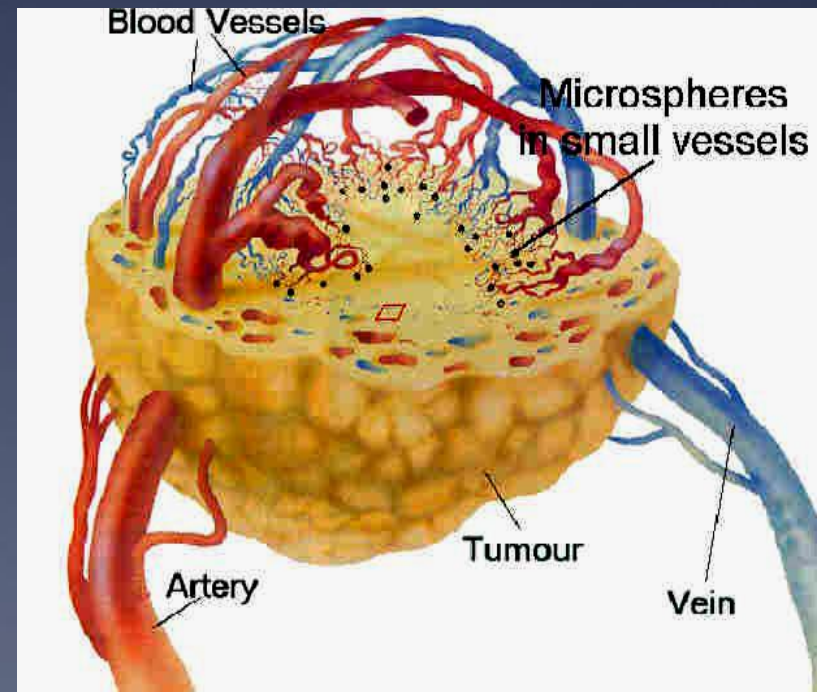
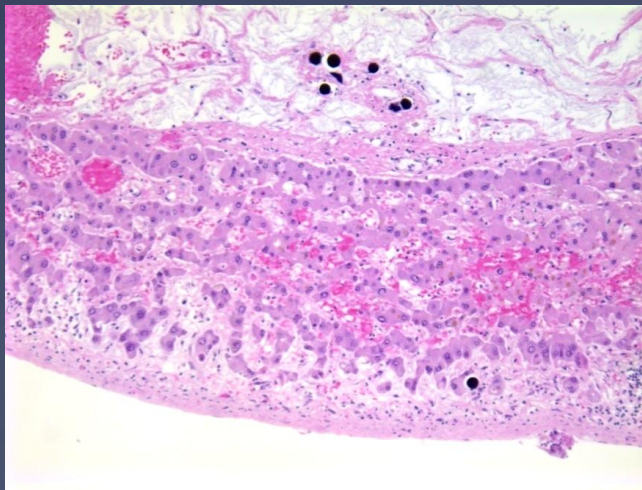


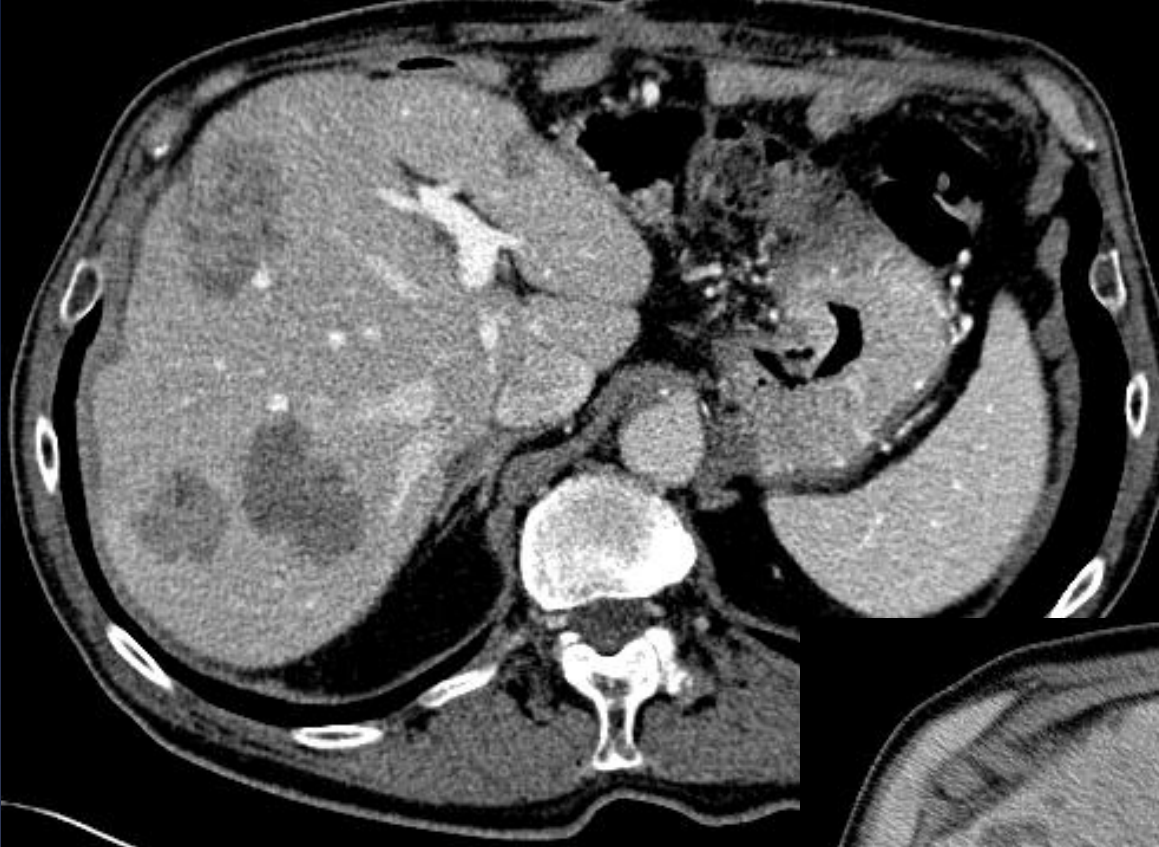
Time course of toxic events with DEB



Principles of Radioembolization

- * Experience with liver metastases is with resin microspheres
- * Why consider Y90?
 - * metastatic tumours are hyper but in general with some central necrosis, not really hypovascular
- * The action mechanism of Y90 is different from TACE
 - * Less reliance on vascularity as TACE
 - * Non-embolic as TACE
 - * Radiation embedded in microsphere offsets need for “hypervascularity”





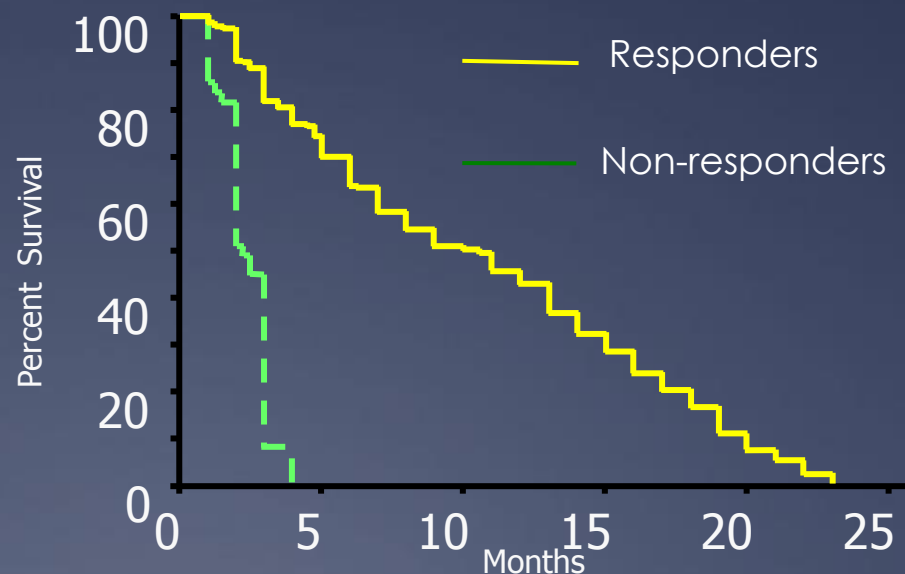
**Excellent
Response 6
months**

RESIN ⁹⁰Y-MICROSPHERE BRACHYTHERAPY FOR UNRESECTABLE COLORECTAL LIVER METASTASES: MODERN USA EXPERIENCE

- * 208 CRC patients
- * Pooled data from 7 institutions
- * Liver-dominant disease, refractory to oxaliplatin and irinotecan
- * Treated on a lobar or whole liver basis
- * Followed for laboratory/clinical toxicities (reported grade 2 and 3 toxicities)
- * Median follow-up 13 months (1-42 months)
- * Whole liver 25%, lobar 75%

RESIN ⁹⁰Y-MICROSPHERE BRACHYTHERAPY FOR UNRESECTABLE COLORECTAL LIVER METASTASES: MODERN USA EXPERIENCE

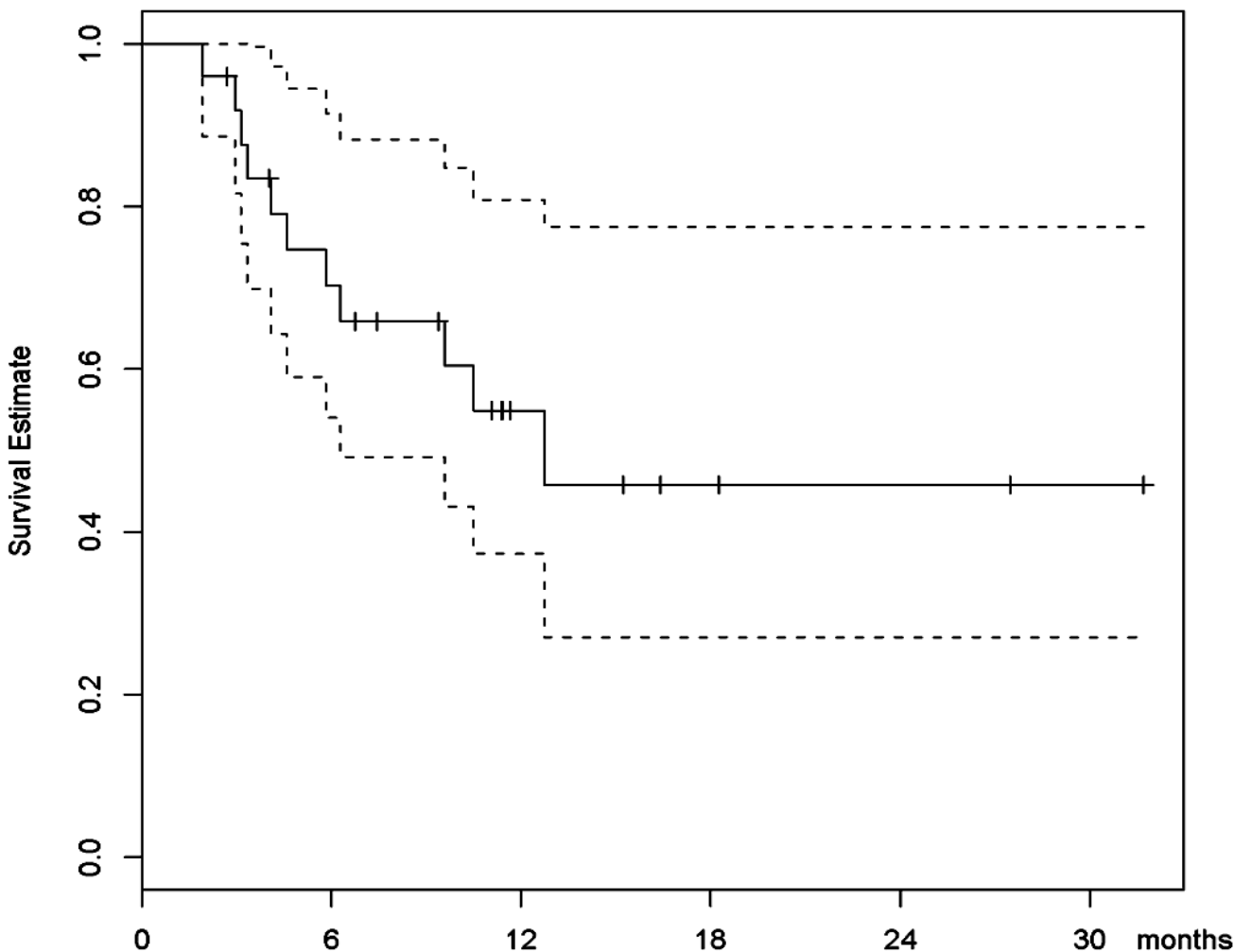
- * Fatigue, nausea and abdominal pain were most common
- * Grade 3 SAEs: 5% GI, 2% constitutional, 4 % liver function
- * Response rate: CT 35%, PET 91%, CEA 70%
- * Median survival 10.5 months in responders, 4.5 months in non-responders
- * **Conclusions:**
 - * Encouraging median survival in this heavily pre-treated group
 - * Acceptable toxicity
 - * Significant objective response rates
 - * Further investigation is warranted



**Kennedy et al Int J Radiat
Oncol Biol Phys 2006**

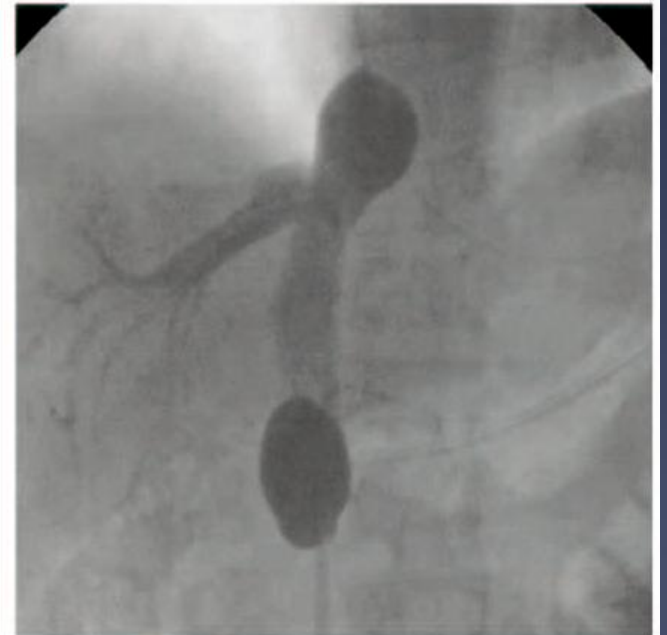
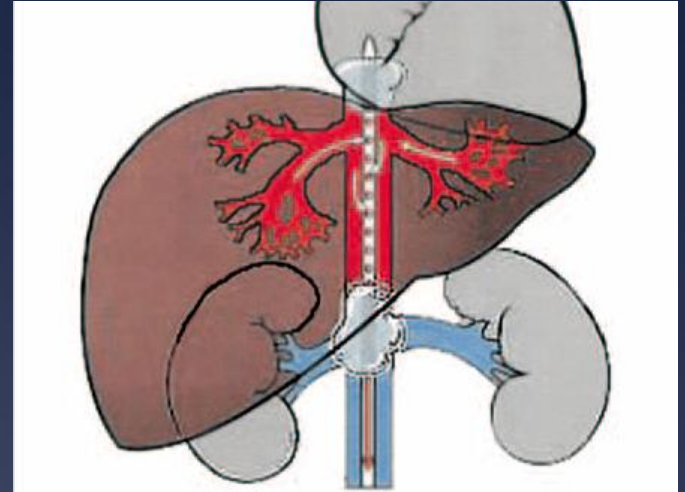
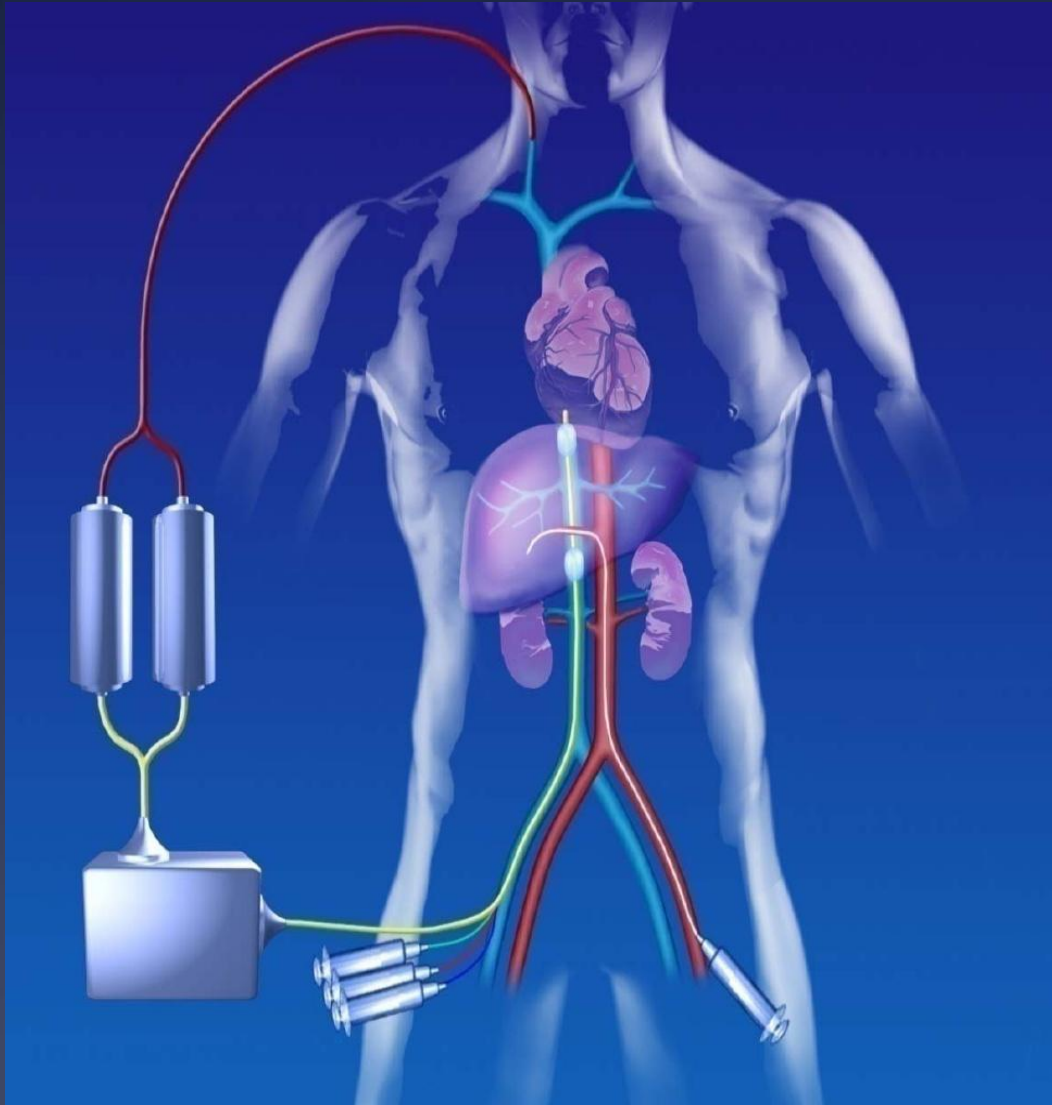
Y-90 Brachytherapy MUSC Experience

Overall Survival for non-HCC patients



Median OS = 12.7 m
K-M 1-y OS = 54.9%
K-M 2-y OS = 45.8%

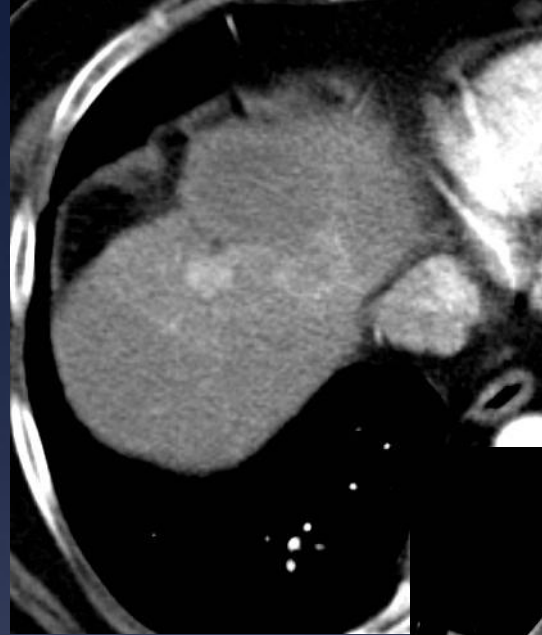
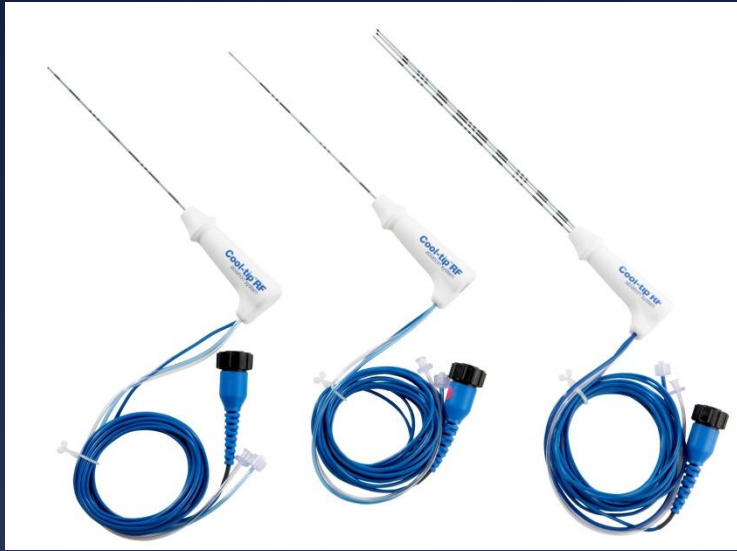
Percutaneous Hepatic Perfusion (PHP) Melphalan



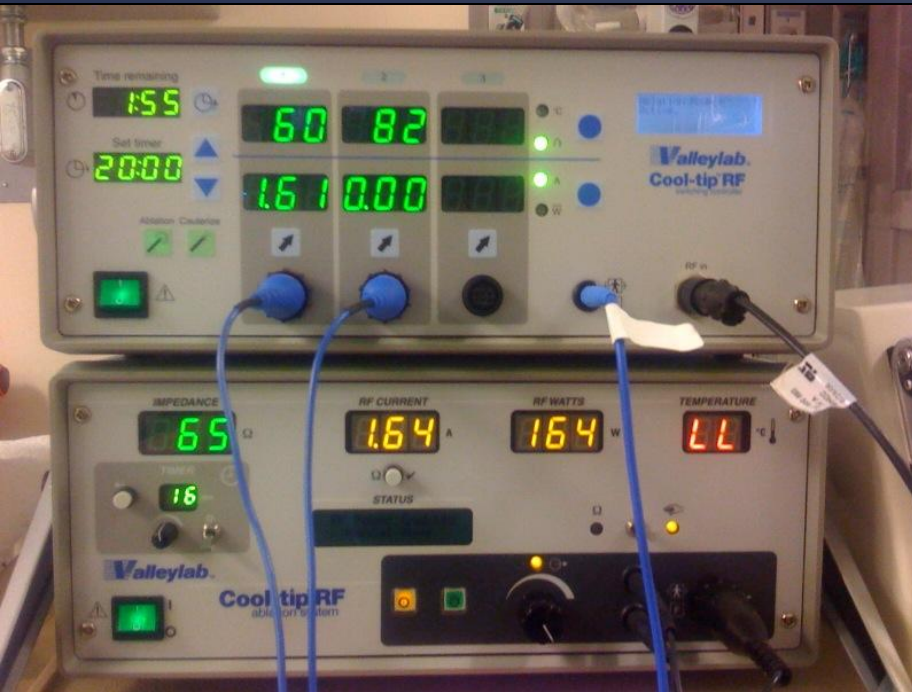
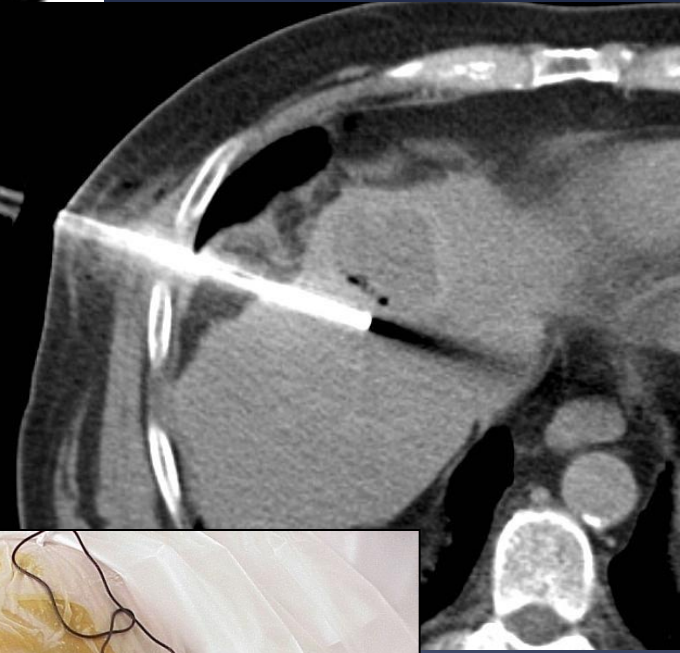
Ablation of Liver Tumors

Approach:

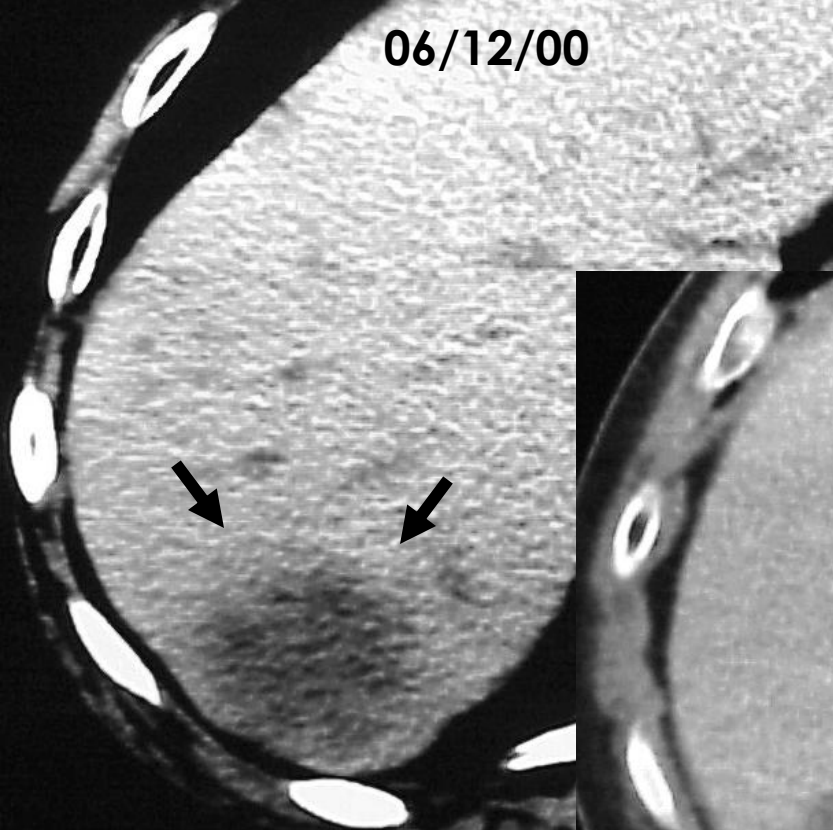
- * Percutaneous
 - * Imaging guidance
 - * Ultrasound
 - * CT/Fluoro CT
- * Intraoperatively
 - * Ultrasound
 - * Laparoscopic



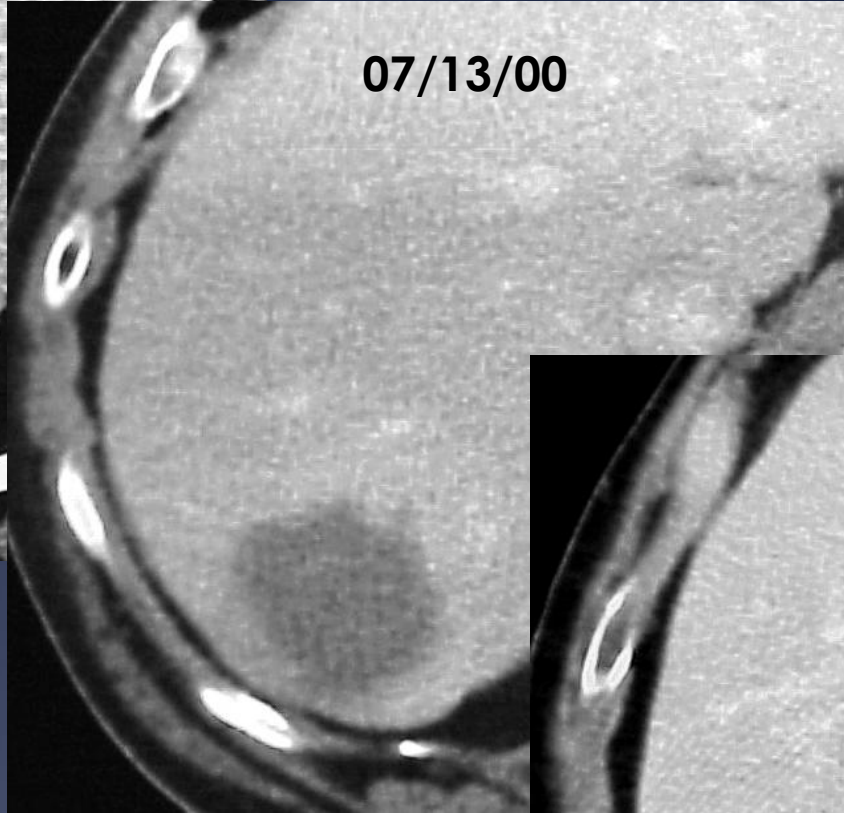
RFA



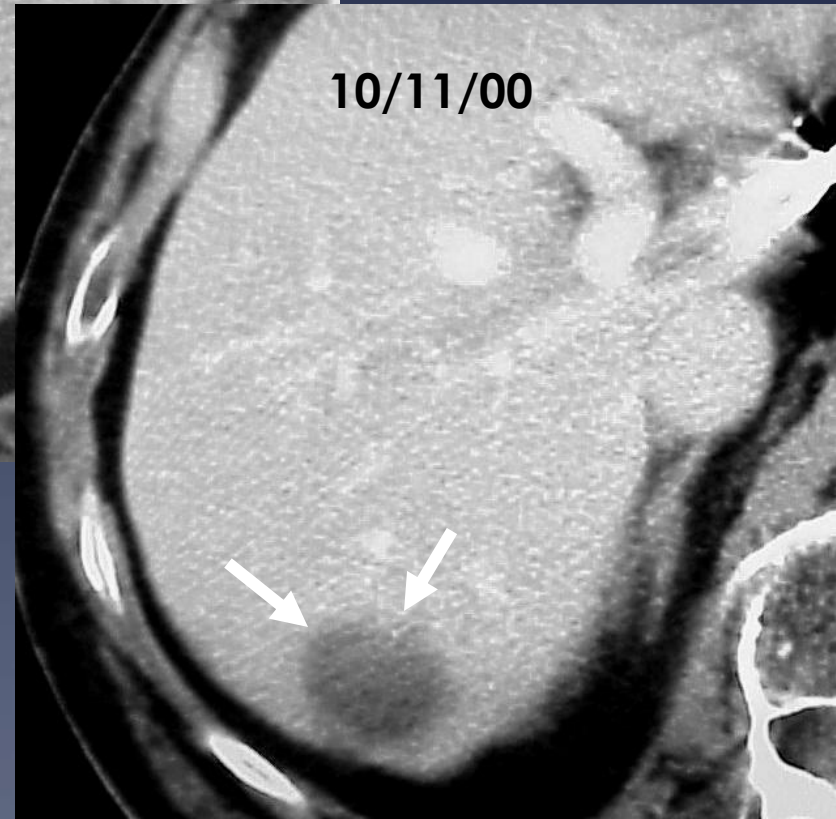
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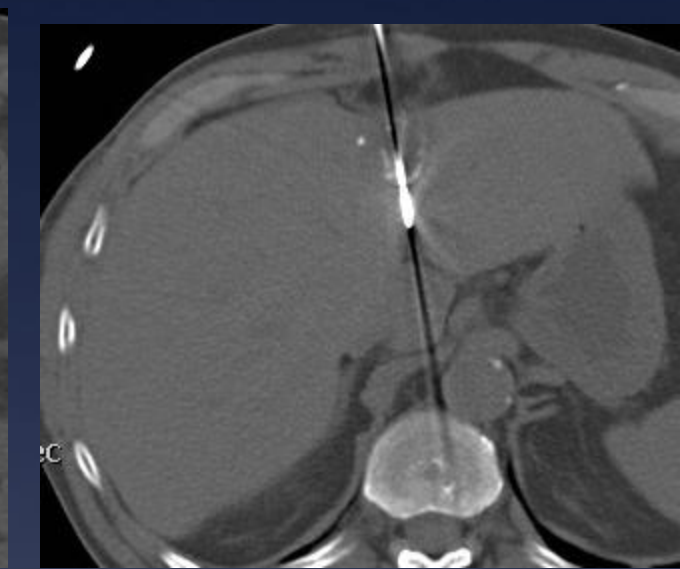
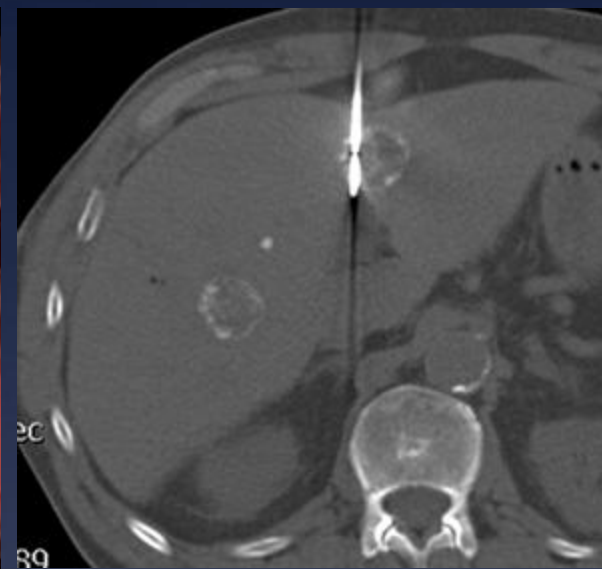
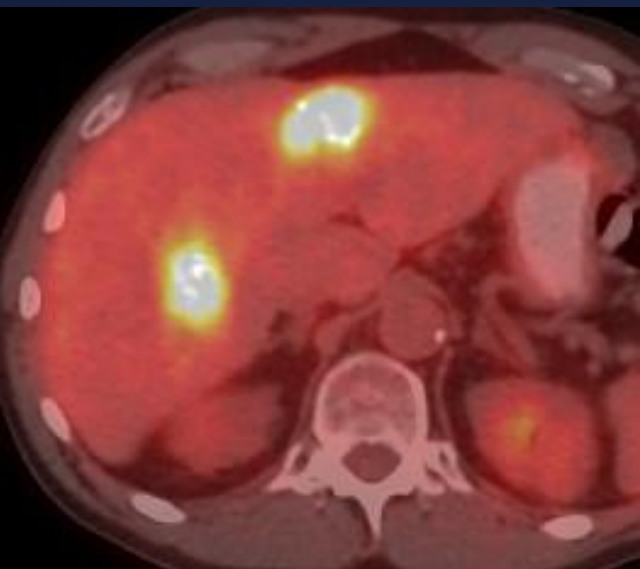
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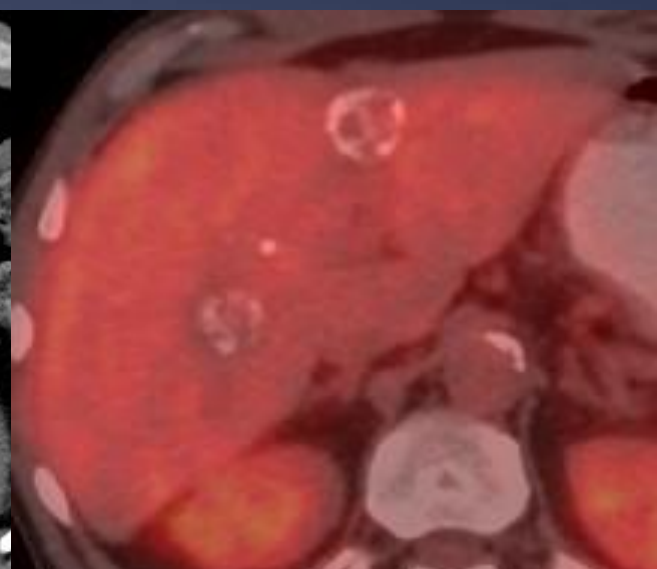
Colon Ca
Recurrence post resection

Microwave Ablation

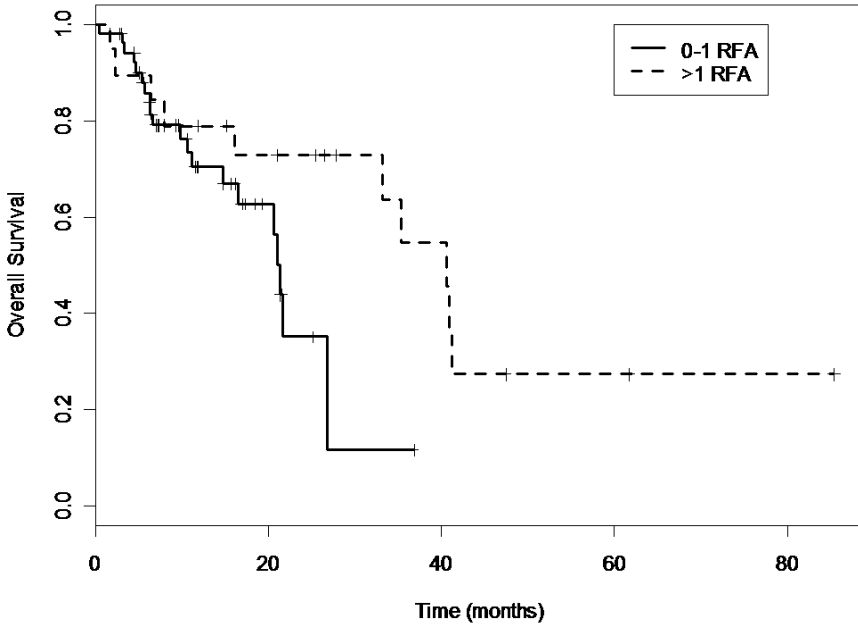




Calcified Colon Ca Metastases TACE and MWA



Overall Survival by # RFA (N=72 HCC)



Median Overall Survival:

RFA (0-1) = 21.3

(95% CI 16.6 – NA)

Median Overall Survival: RFA > 1 = 40.6

(95% CI 33.2 – NA)

p = 0.0341

*72 evaluable pts

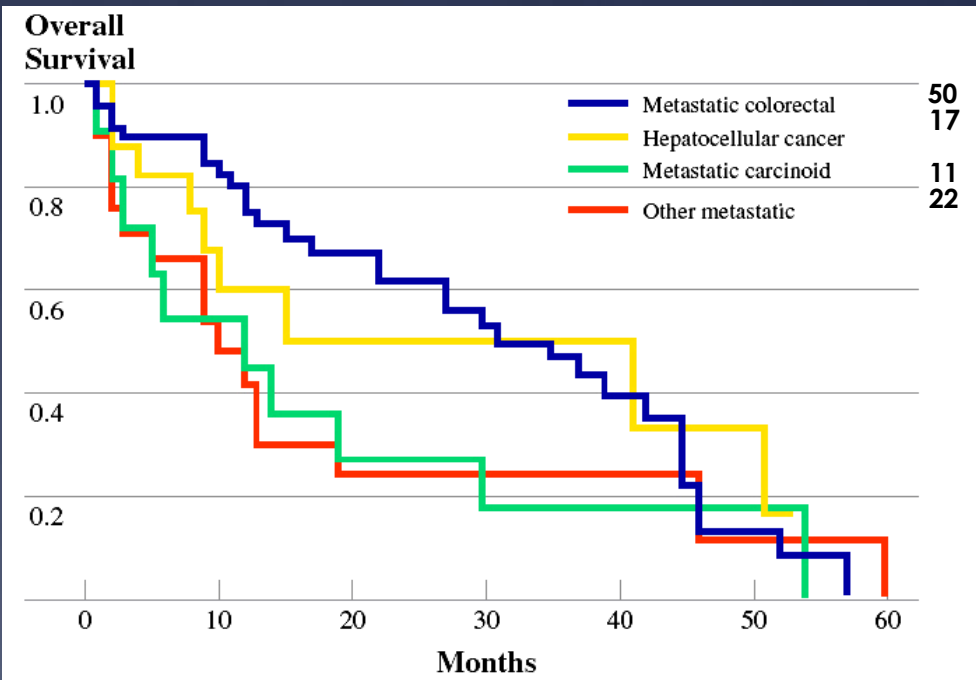


FIG. 1 Overall survival curve of patients treated with microwave ablation

