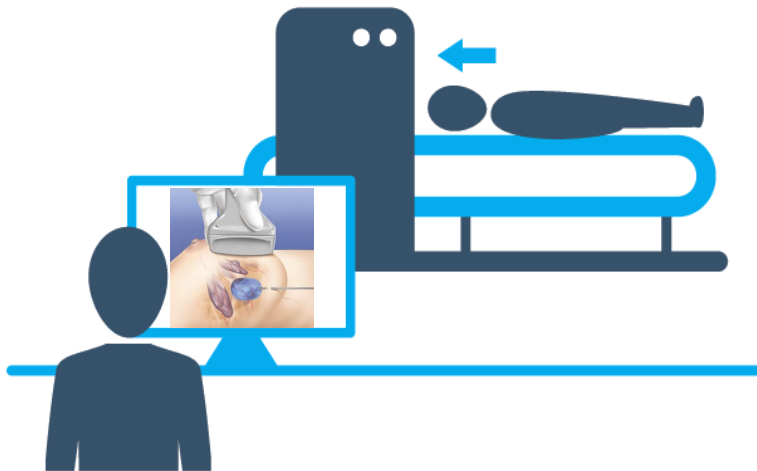


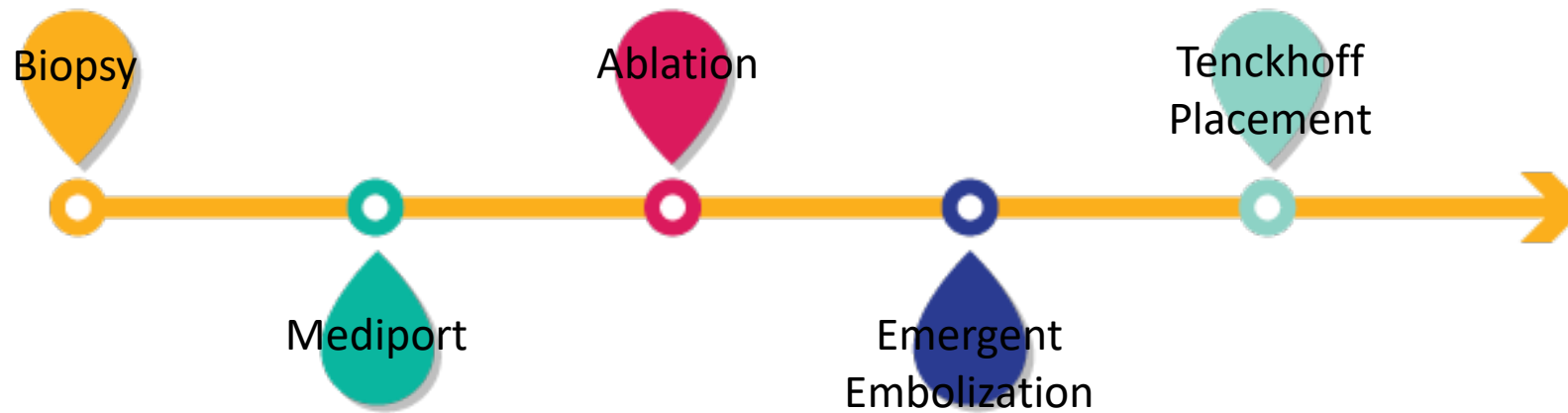
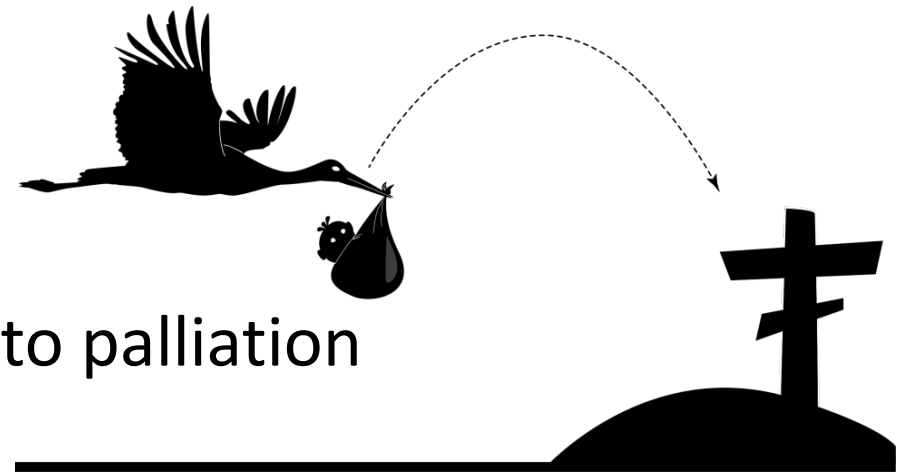
Advancements in Interventional Radiology

Amy Deipolyi, MD, PhD, FSIR
Director, Interventional Radiology
WVU/Charleston Area Medical Center



IR in cancer care

- Continuity of care for patients from diagnosis to palliation



Clinic consultation

- Prior to every IR procedure
- Establish longitudinal care



IR oncologic services

- Diagnosis
 - Biopsy
- Treatment
 - Venous access
 - Treatment of post-operative complications
 - **Locoregional therapy (ablation, embolization)**
- Palliation
 - Tunneled catheter placement (Tenckhoff, PleurX)
 - Treatment of cancer complications (hydronephrosis, biliary obstruction)
 - Pain intervention

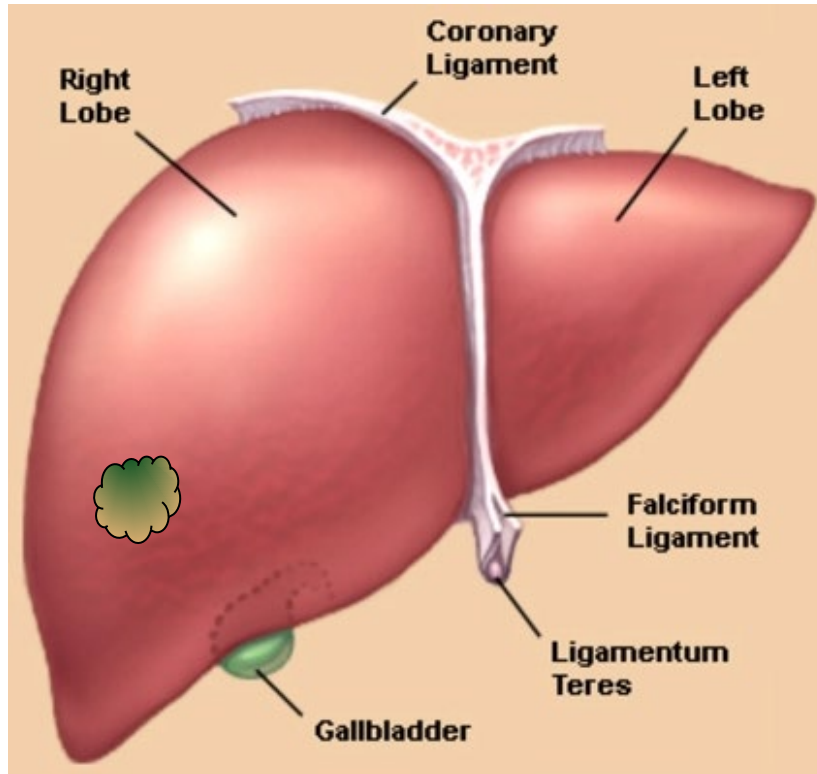
Rationale for local therapies

- Aggressive local treatment minimizes systemic effects
- Prolong current line of therapy / delay change in therapy
- Inability to tolerate other treatments
- Oligometastatic/oligoprogressive disease: different prognosis
- Immunogenic potential of local therapies



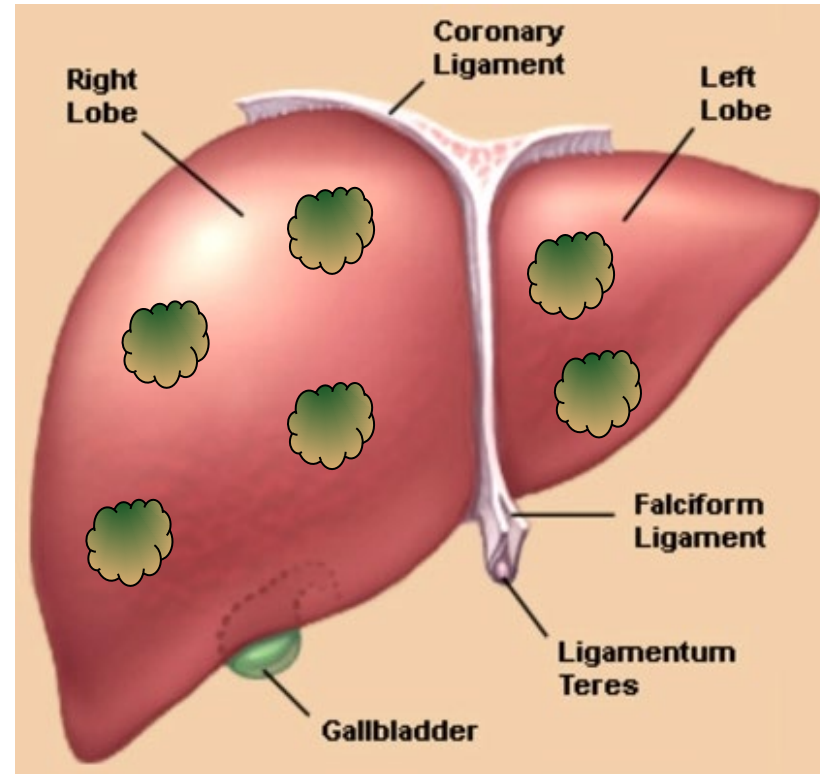
Locoregional therapies

Oligometastatic Disease



- Intent: Eradicate disease
- Primary modality: Ablation

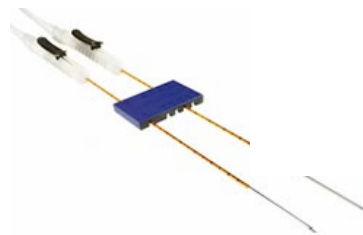
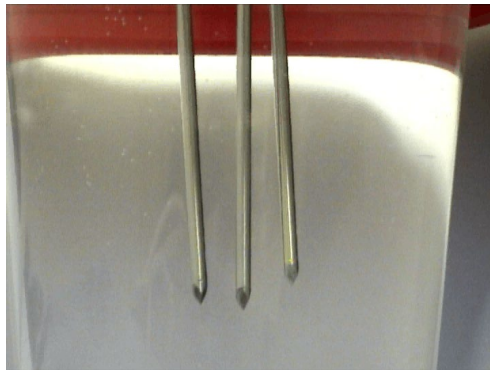
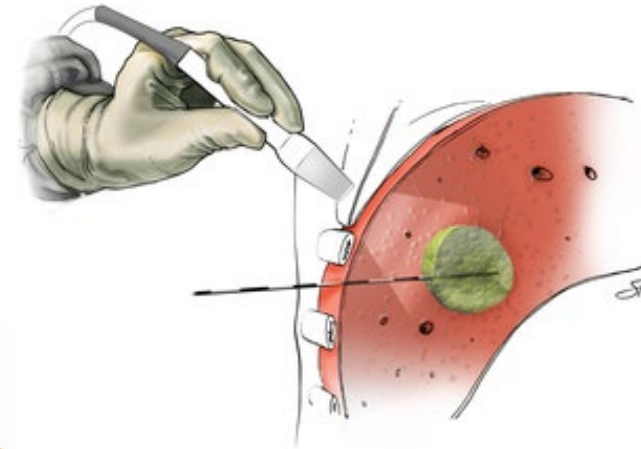
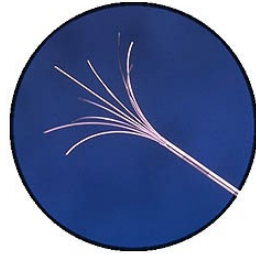
Multifocal Disease



- Intent: Control disease
- Primary modality: Embolization

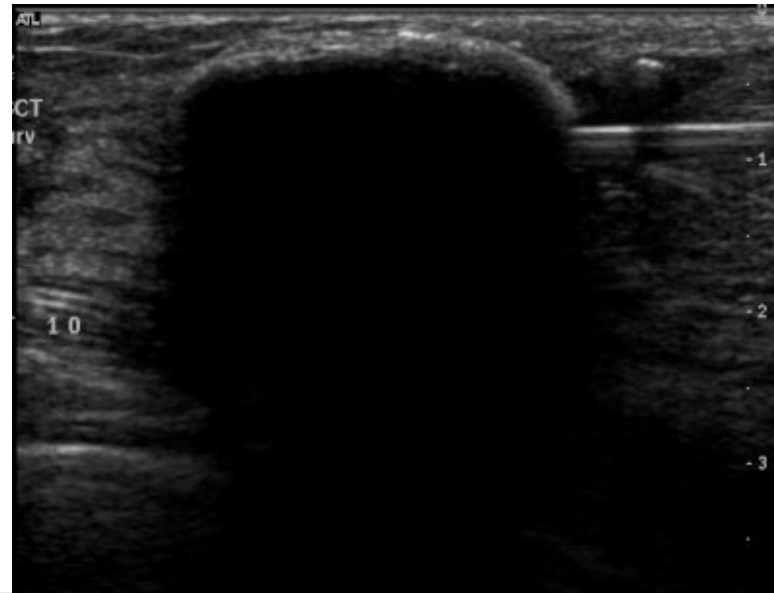
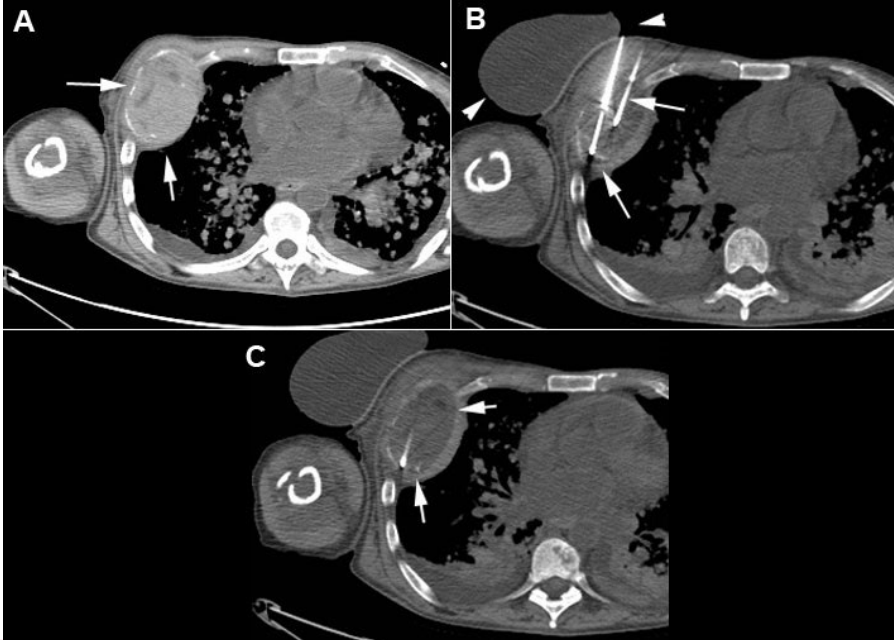
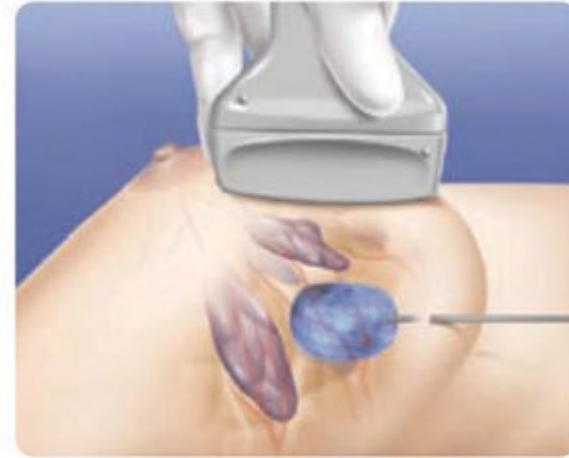
Ablation

- For 1—3 lesions, optimally < 3 cm
- Usually involves general anesthesia and possible overnight admission



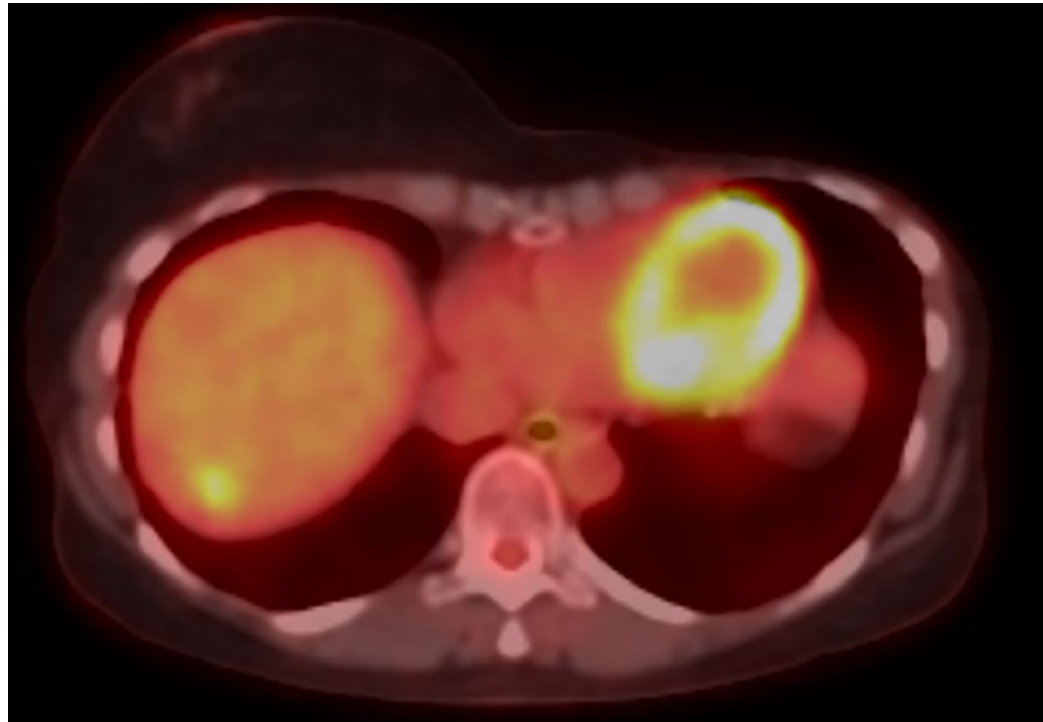
Ablation modalities

- Radiofrequency Ablation (RFA)
- Microwave Ablation (MWA)
- Cryoablation
- Laser Ablation
- High Intensity Focused Ultrasound (HIFU)
- Irreversible Electroporation (IRE, NanoKnife)



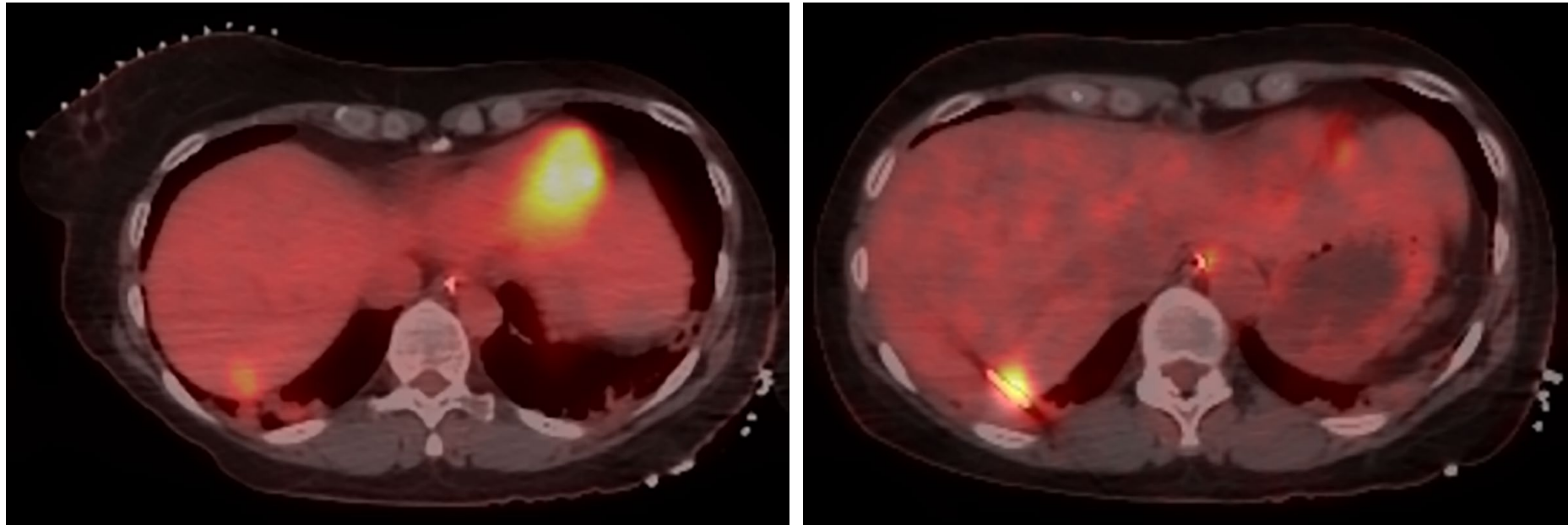
Example: Oligometastatic breast cancer

- 51-year-old F with ER+ PR+ HER2- BC, solitary site of metastasis



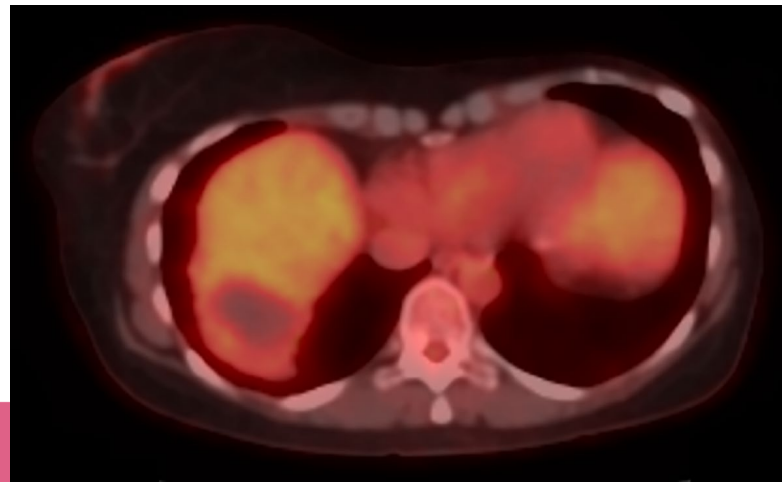
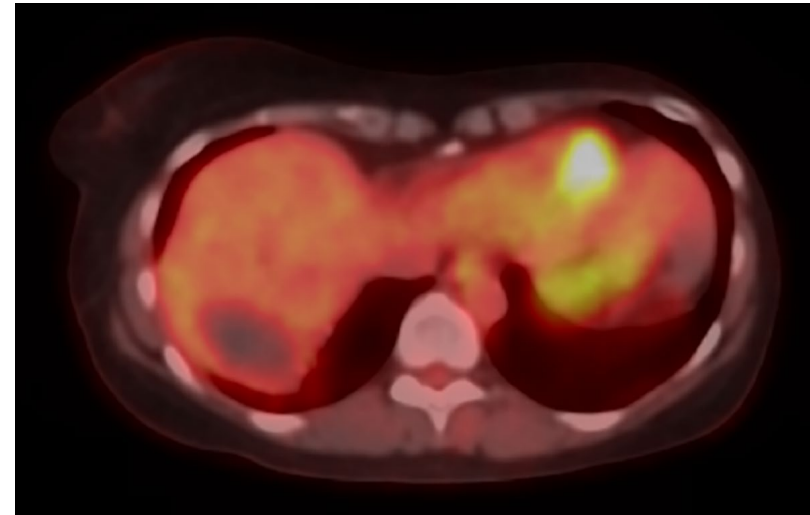
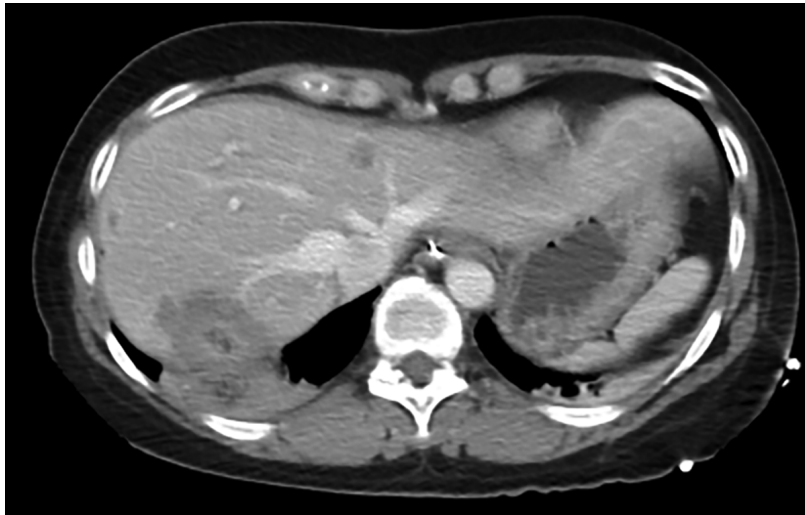
Example: Oligometastatic breast cancer

- 51-year-old F with ER+ PR+ HER2- BC, solitary site of metastasis



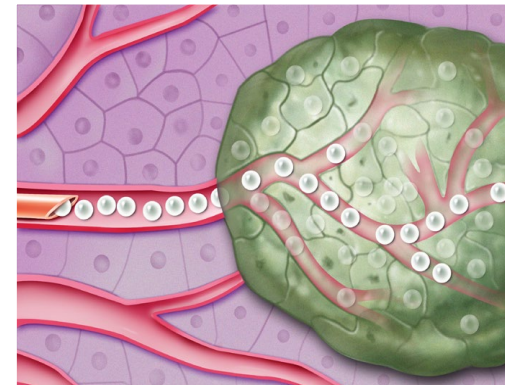
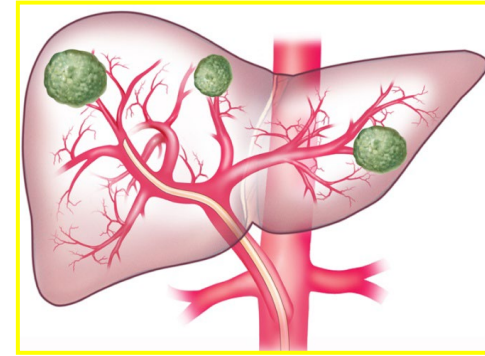
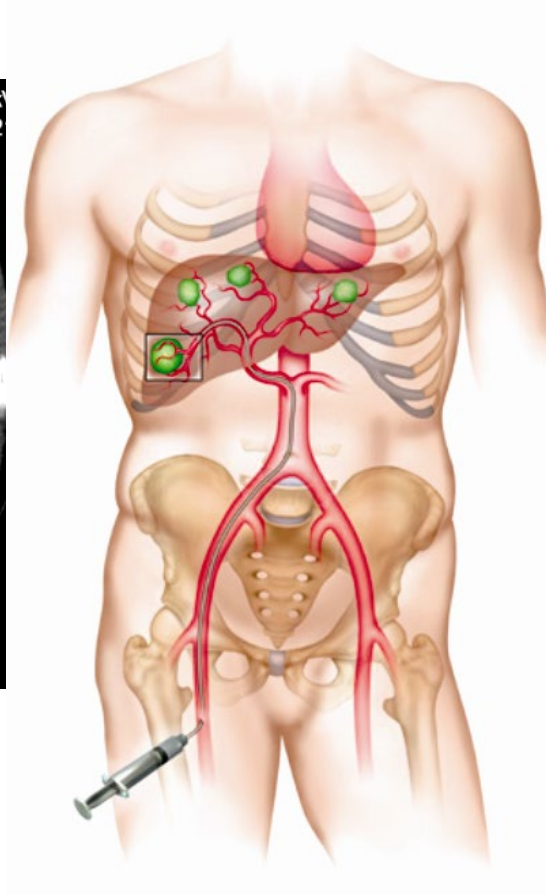
Example: Oligometastatic breast cancer

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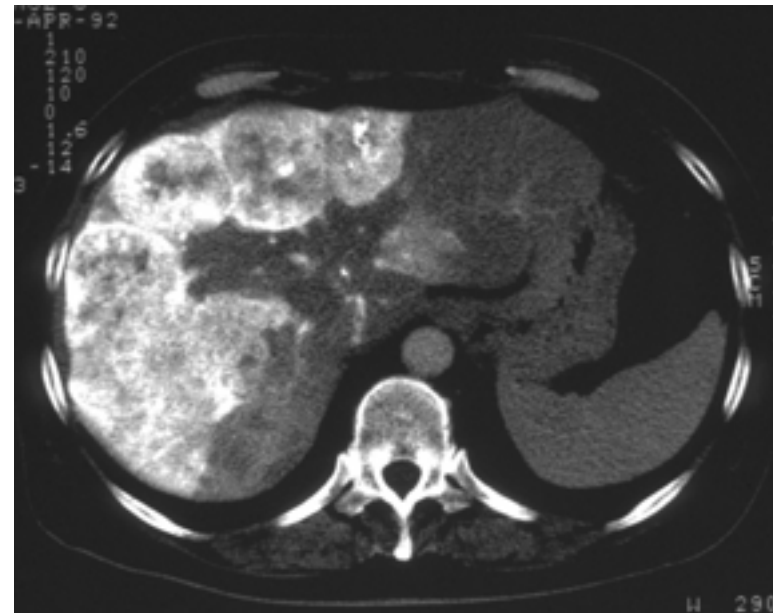
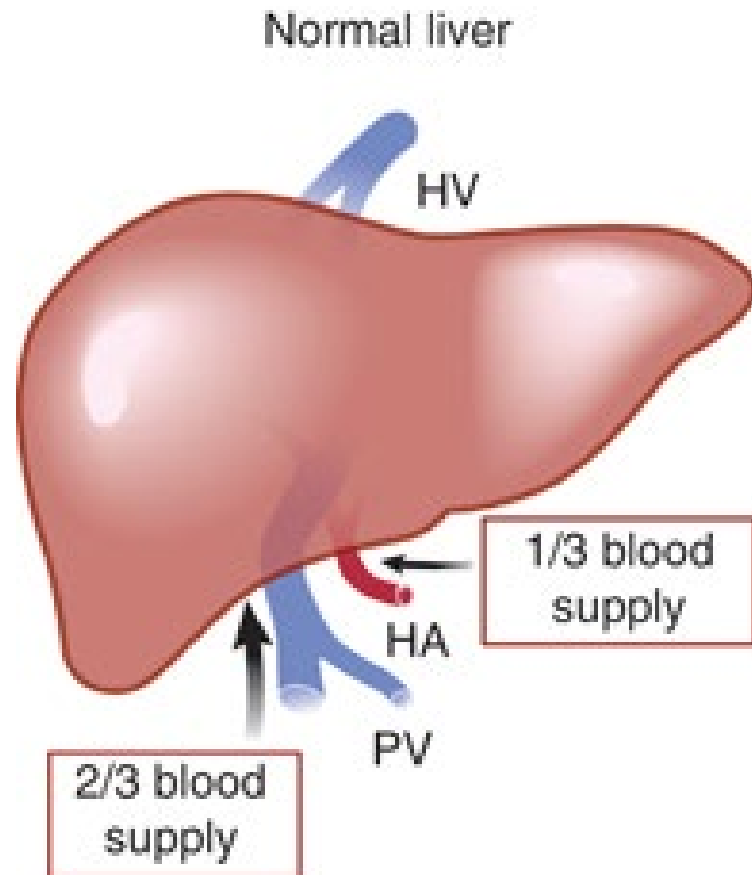
Hepatic arterial embolotherapy

- Liver-directed therapy for >3 lesions



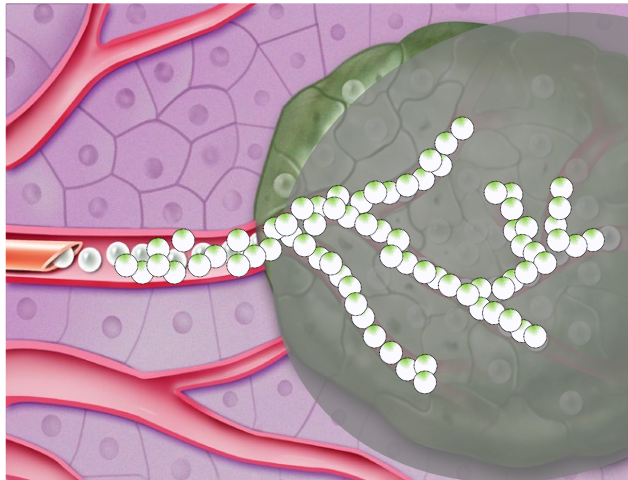
Rationale for hepatic arterial embolotherapy

- Cancer: hepatic arterial supply; normal liver portal venous supply

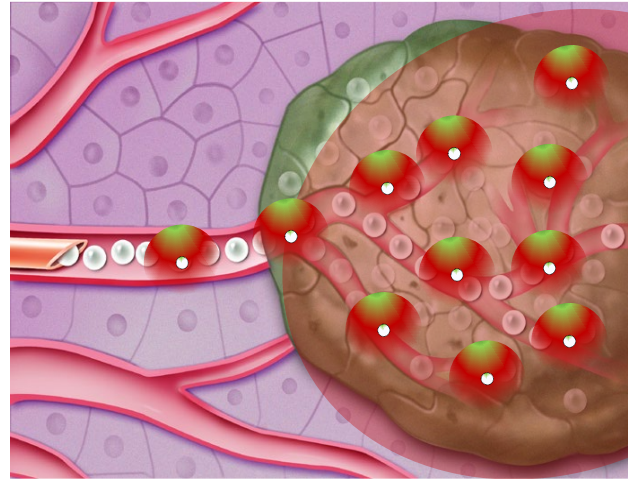


Types of embolotherapy

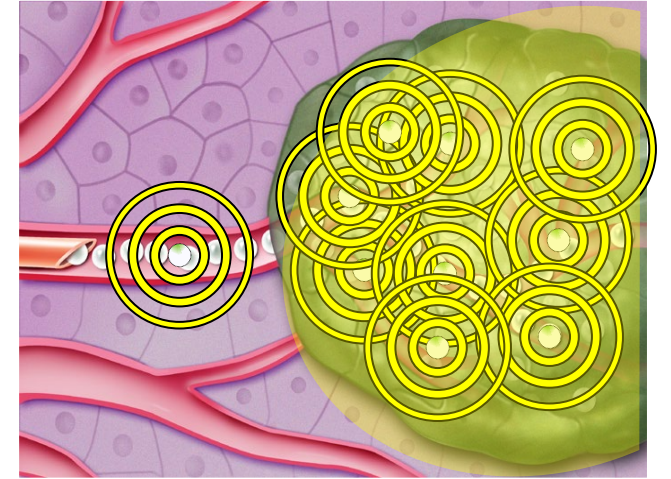
Ischemic cell death



Bland embolization

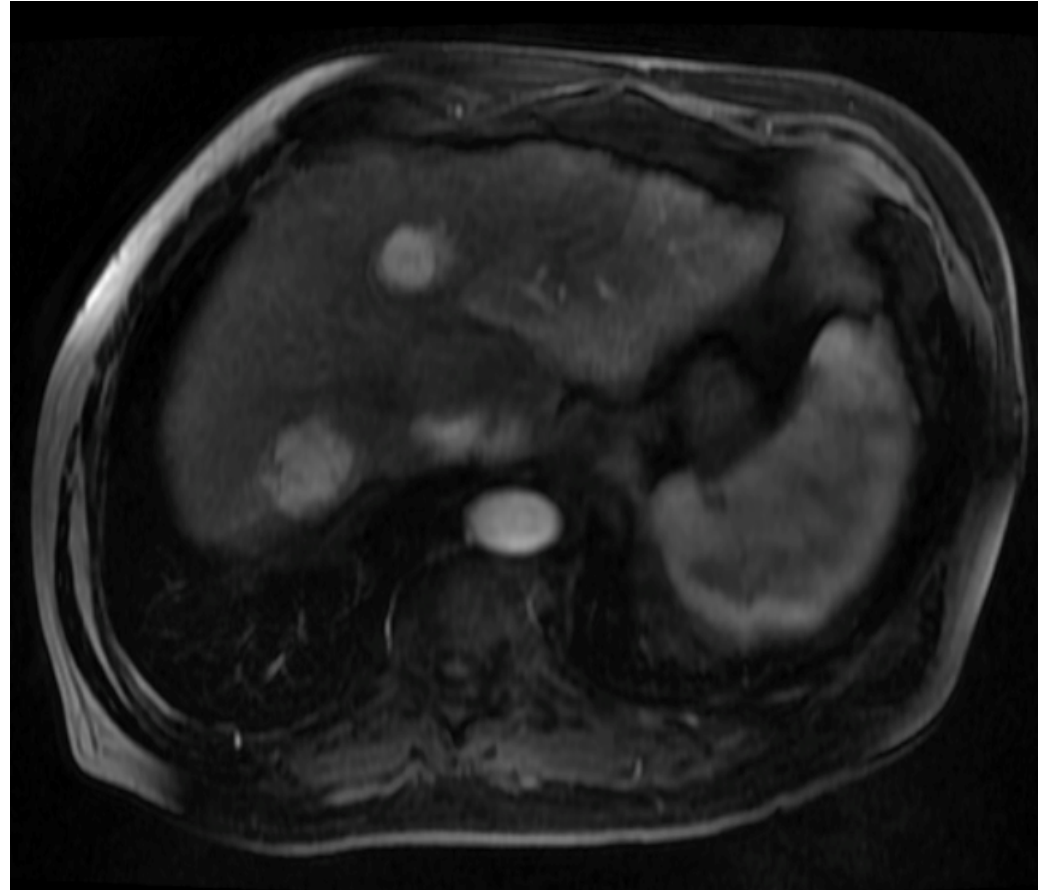


Drug-eluting bead
chemoembolization
(doxorubicin, irinotecan)

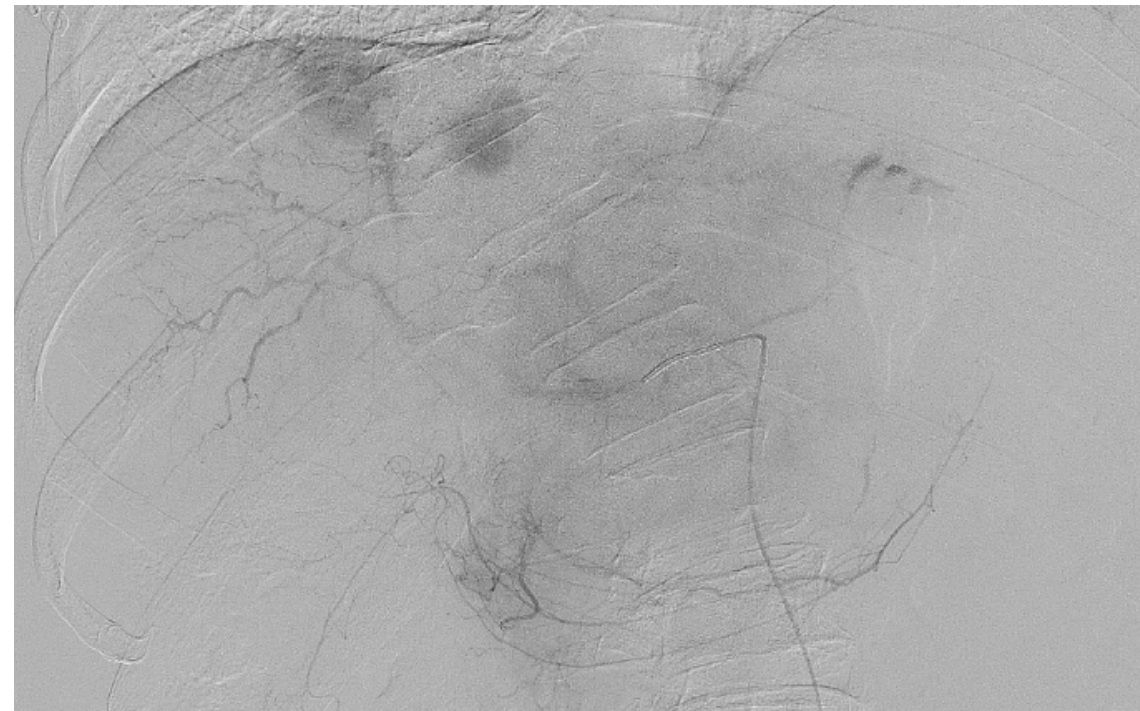


Radioembolization

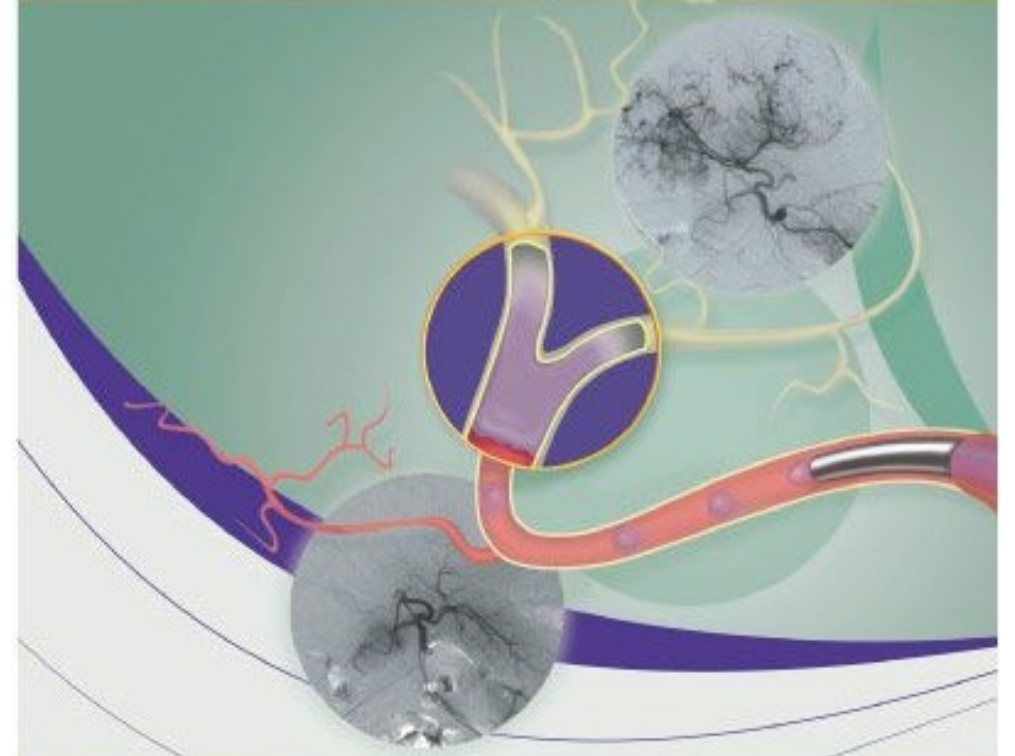
Example: Cirrhosis with HCC



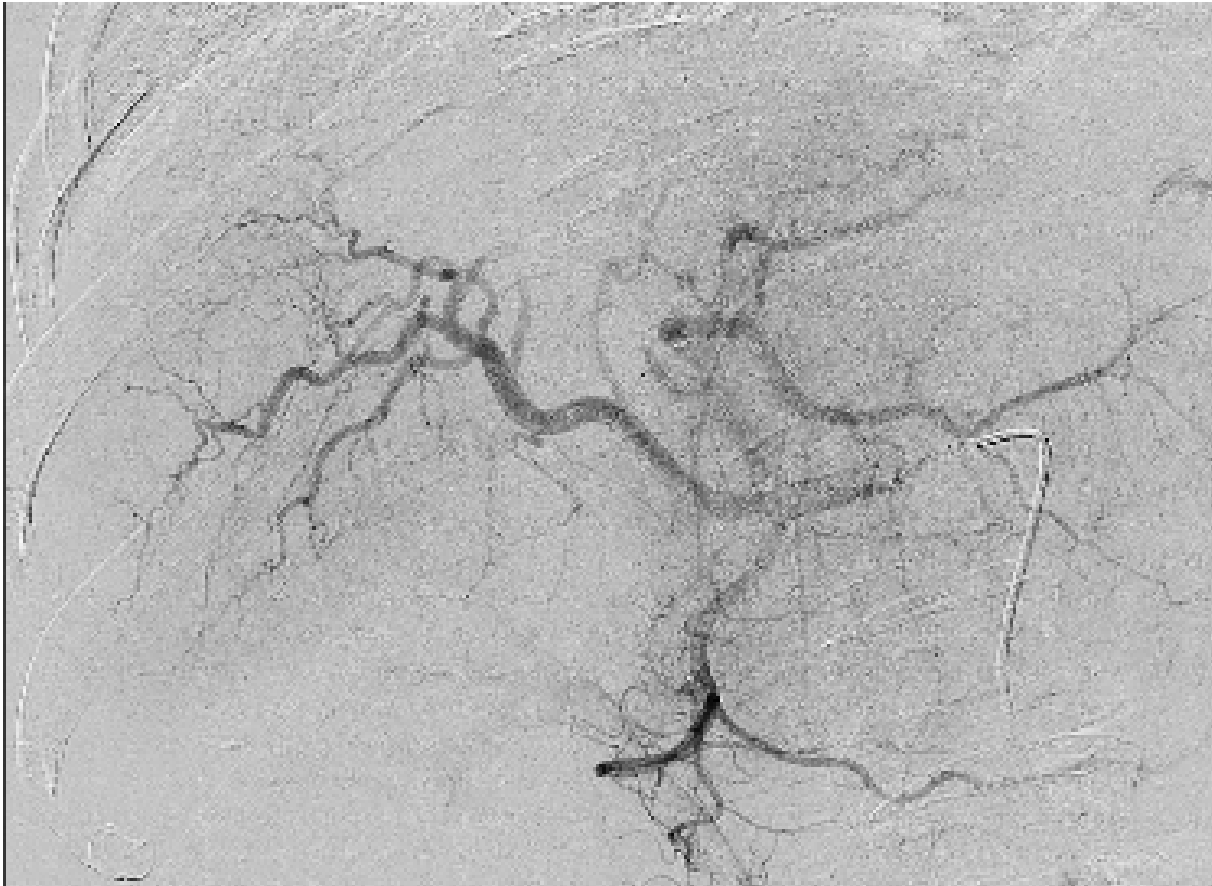
Example: Cirrhosis with HCC



Example: Cirrhosis with HCC

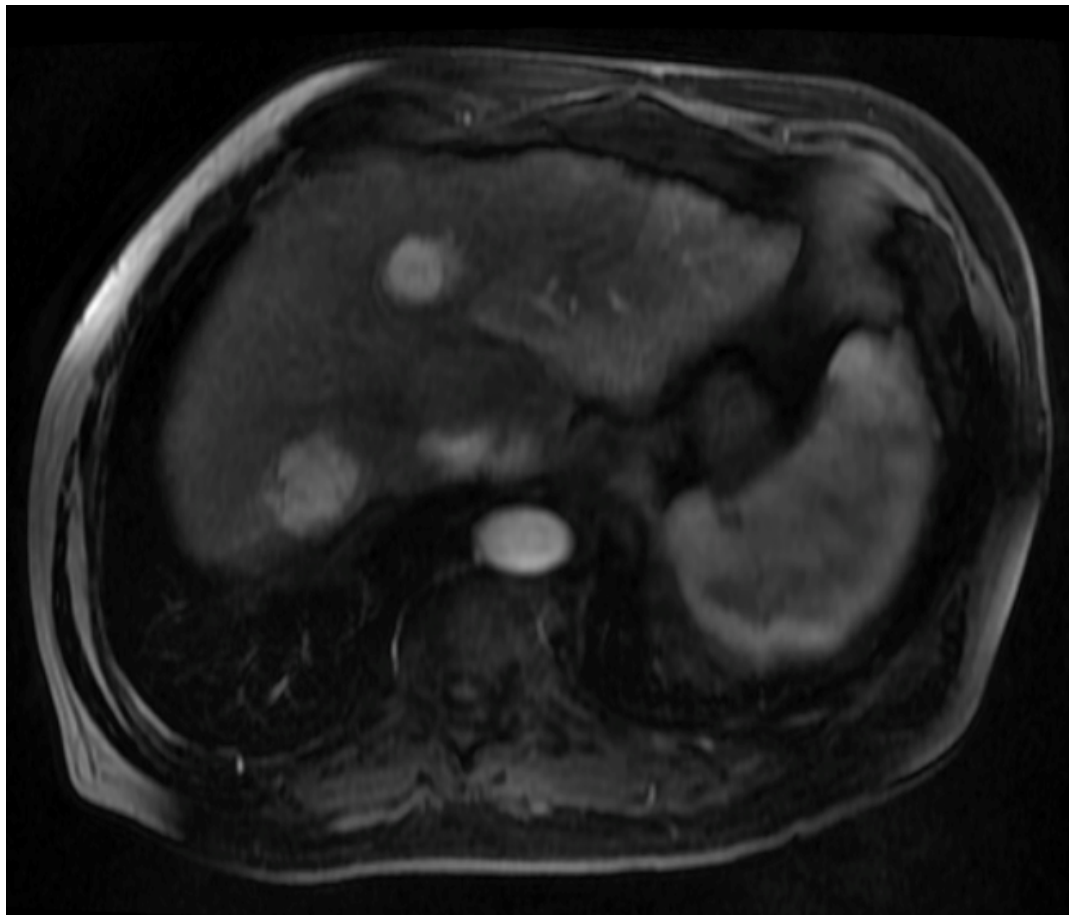


Example: Cirrhosis with HCC

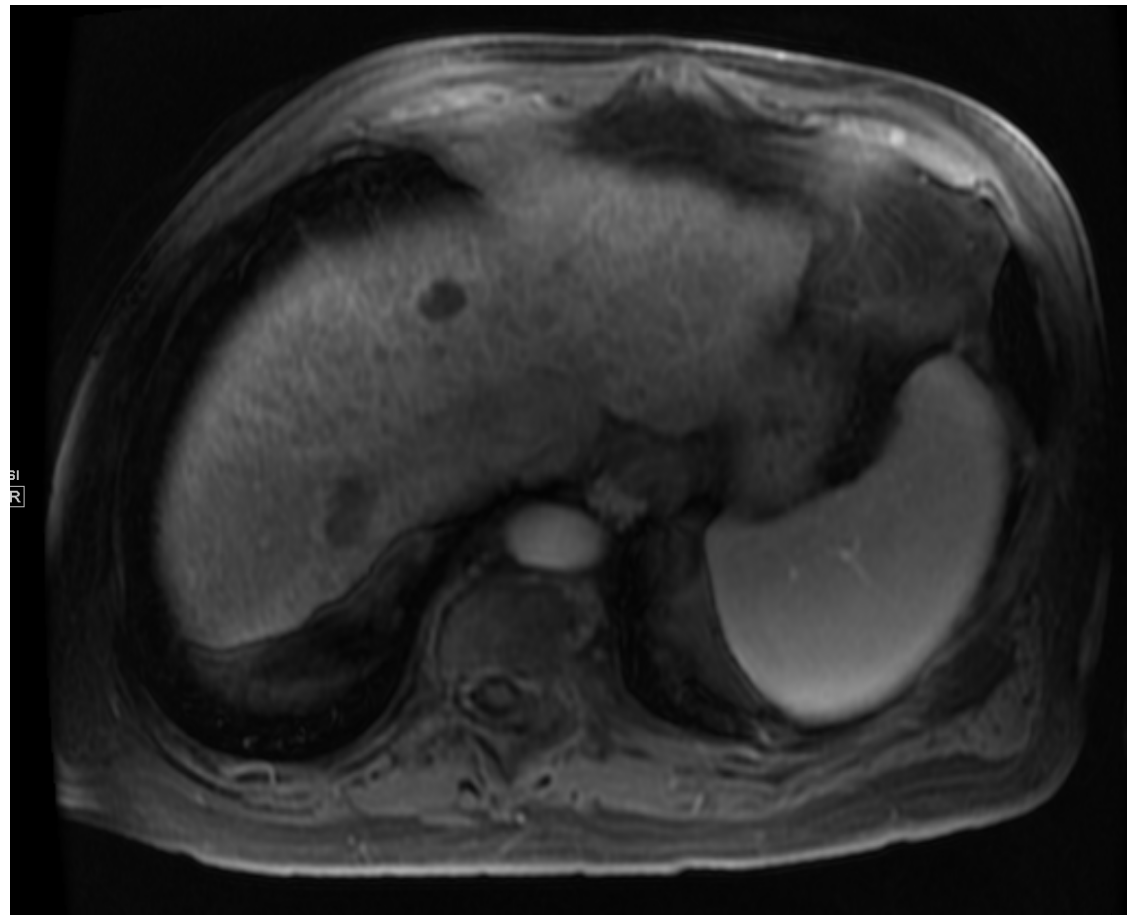


Example: Cirrhosis with HCC

Pre-Embolization



Post-Embolization

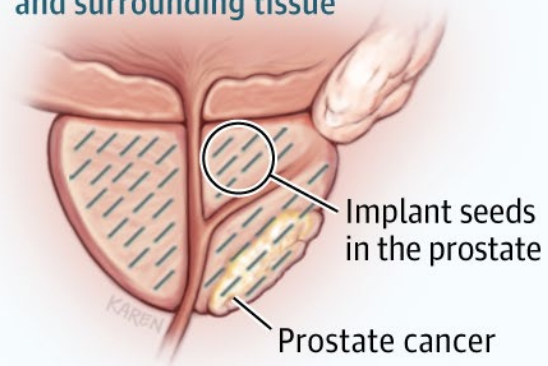


Radioembolization: Type of brachytherapy

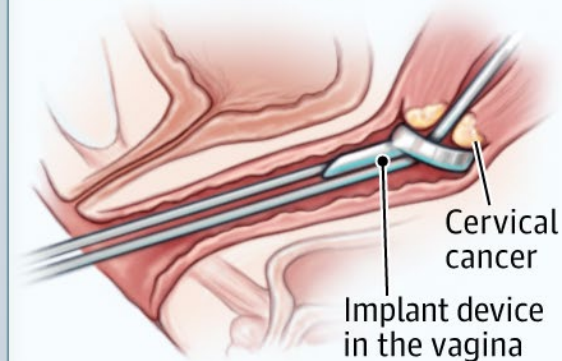
Brachytherapy is the internal delivery of radiation as cancer therapy.

Radioactive implants are placed very near or within a tumor and deliver high doses of radiation with less damage to other organs than external radiation.

Implant directly placed in tumor and surrounding tissue



Implant placed in body cavity



Brachytherapy may be permanent or temporary

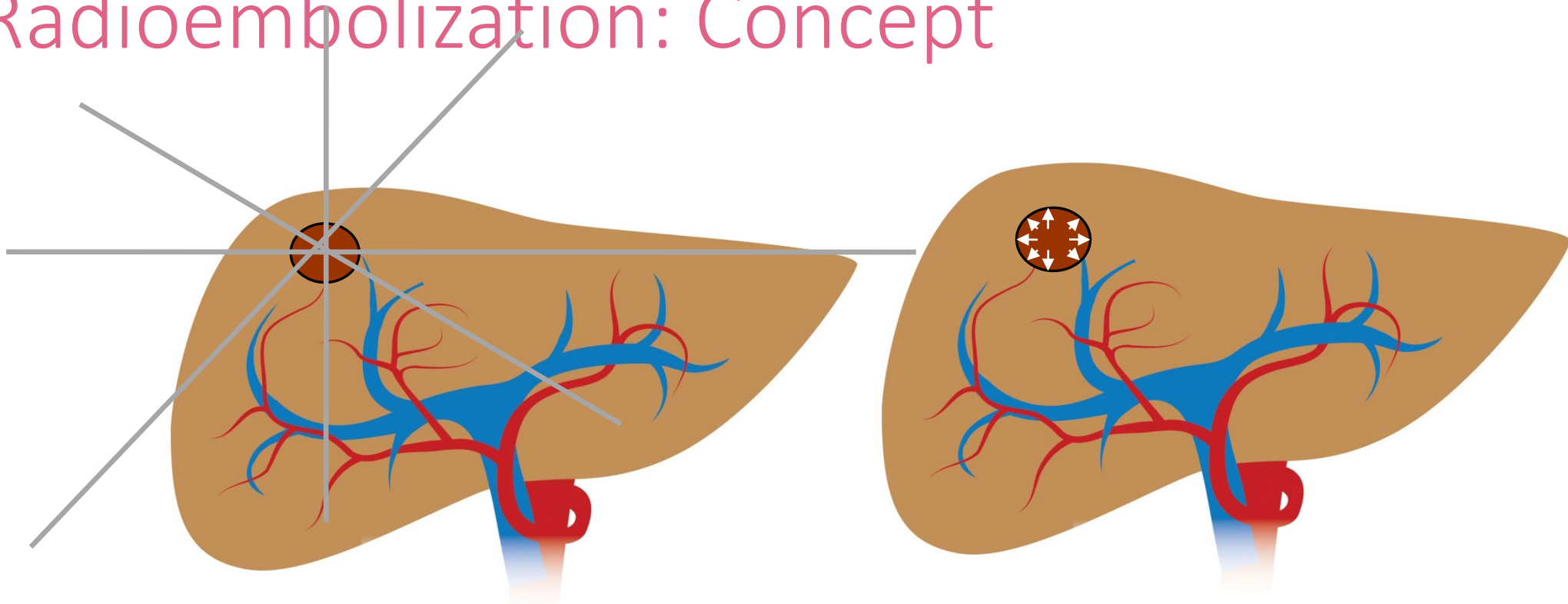
Permanent brachytherapy

- Permanent implant
- Single procedure
- Low dose of radiation

Temporary brachytherapy

- Temporary implant lasting minutes or days
- Single or multiple procedures
- Higher dose of radiation

Radioembolization: Concept



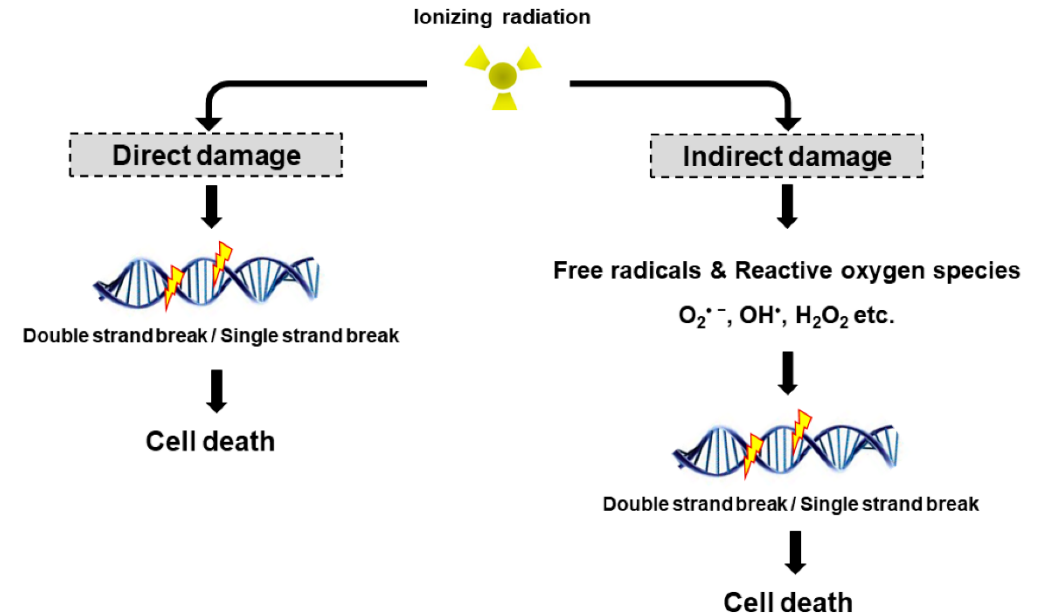
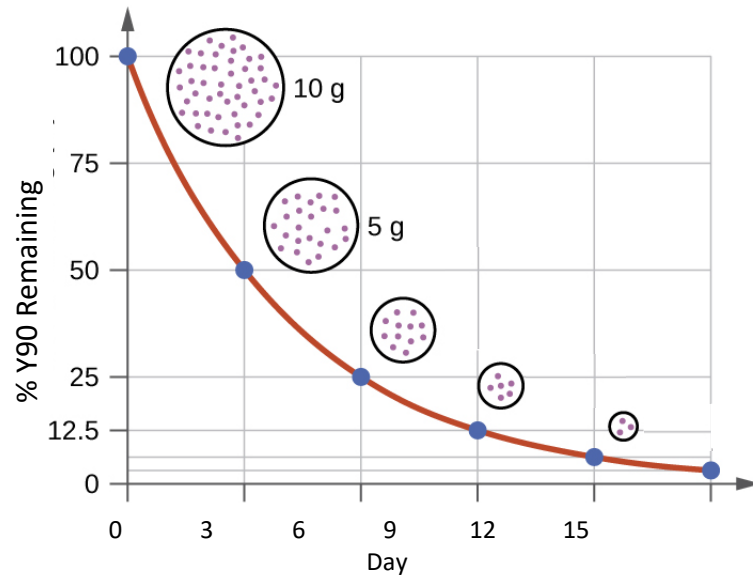
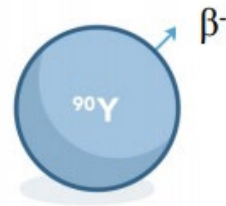
External radiation (~30 Gy)

Radioembolization (~300 Gy)

Yttrium-90 (Y90) = beta radiation emitter, only a few mm
Lethal doses delivered to tumors (120 Gy = tumoricidal)
Low dose to normal liver

Yttrium-90: “Infinite fractionation”

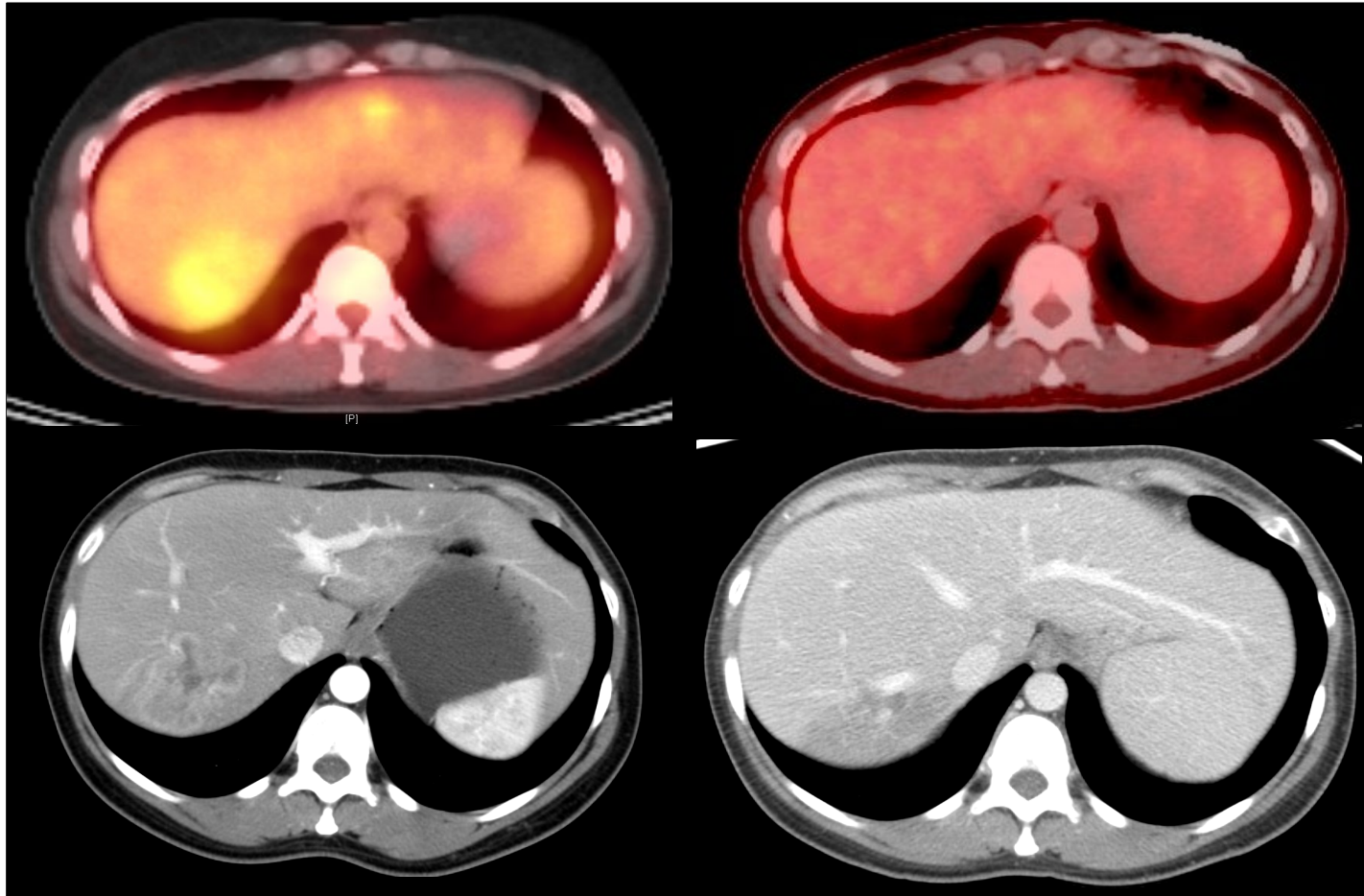
Yttrium-90 (Y90) = beta radiation emitter, only a few mm



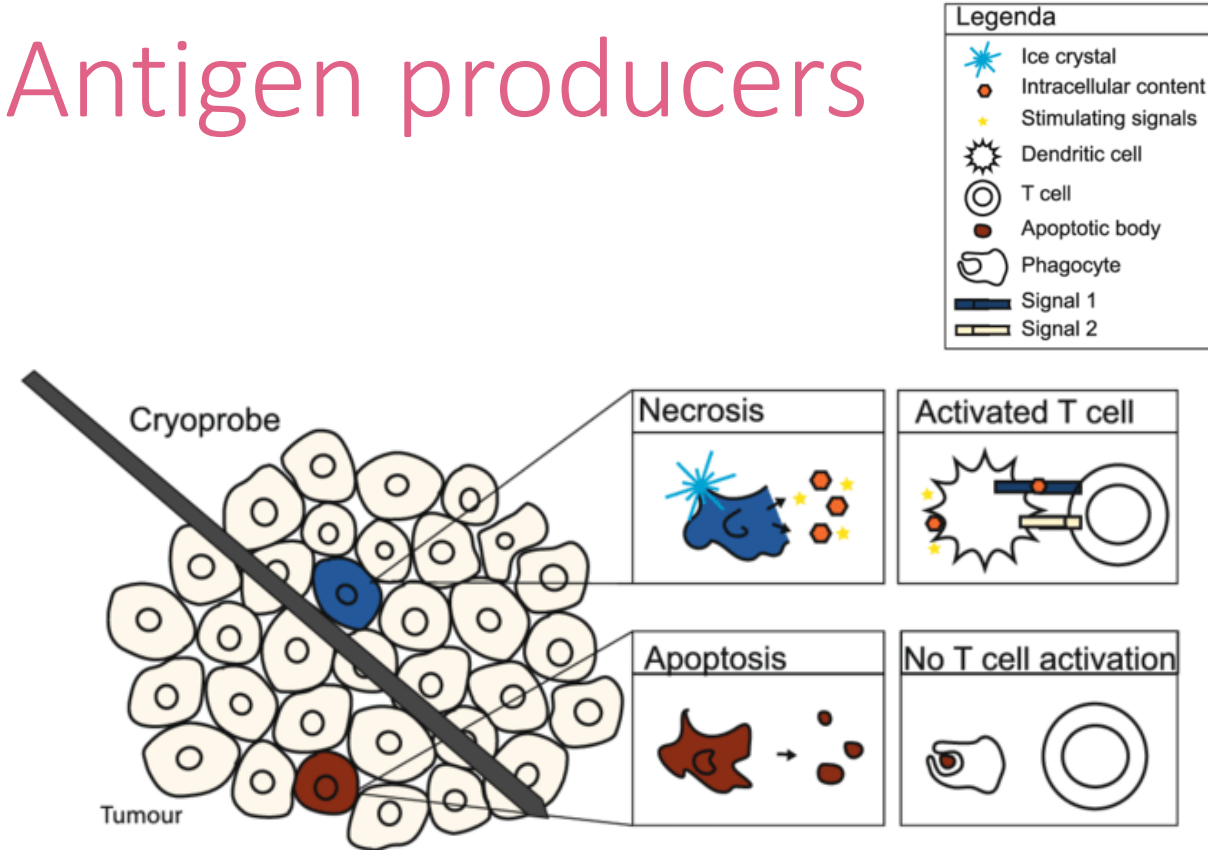
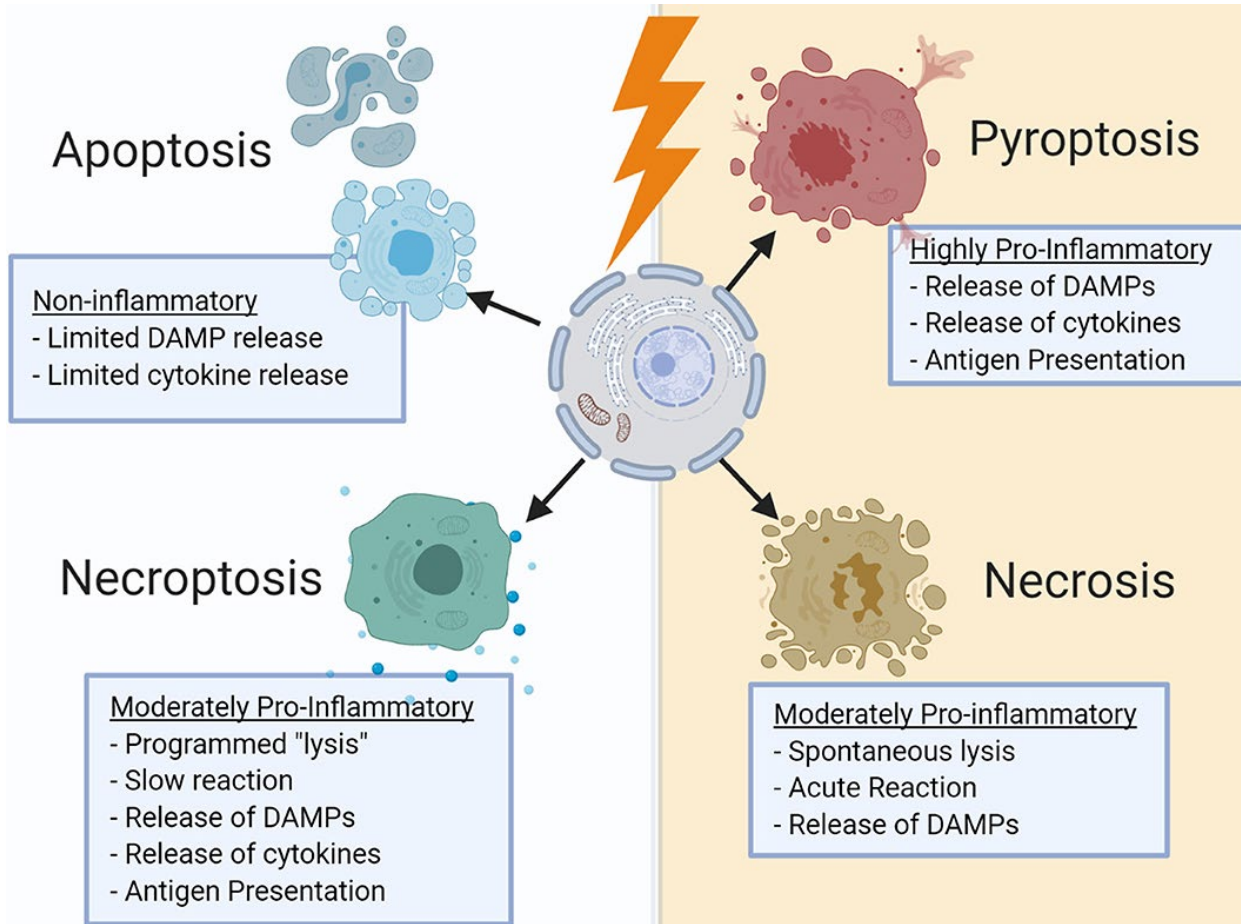
Example: Oligoprogressive colon cancer

Before

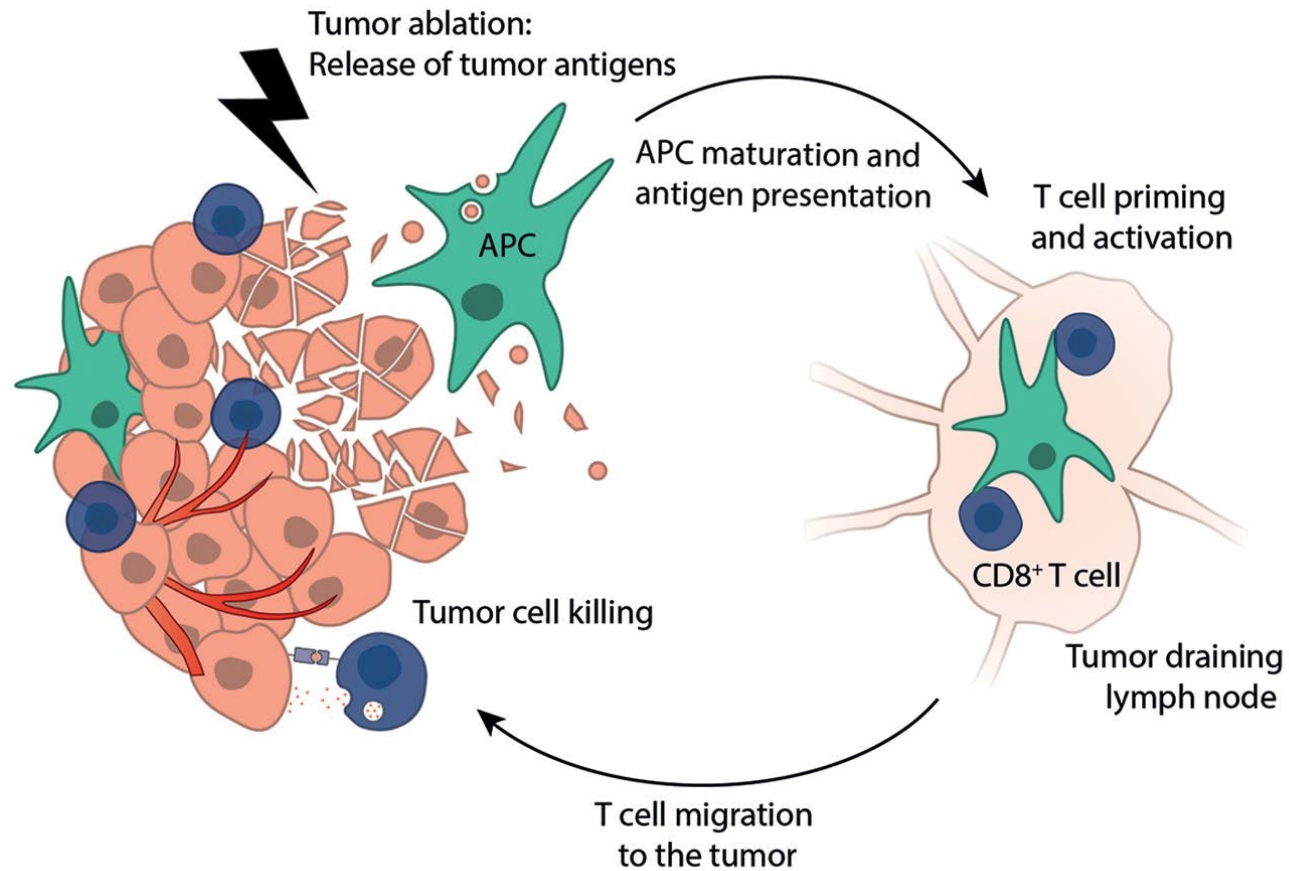
2 months after



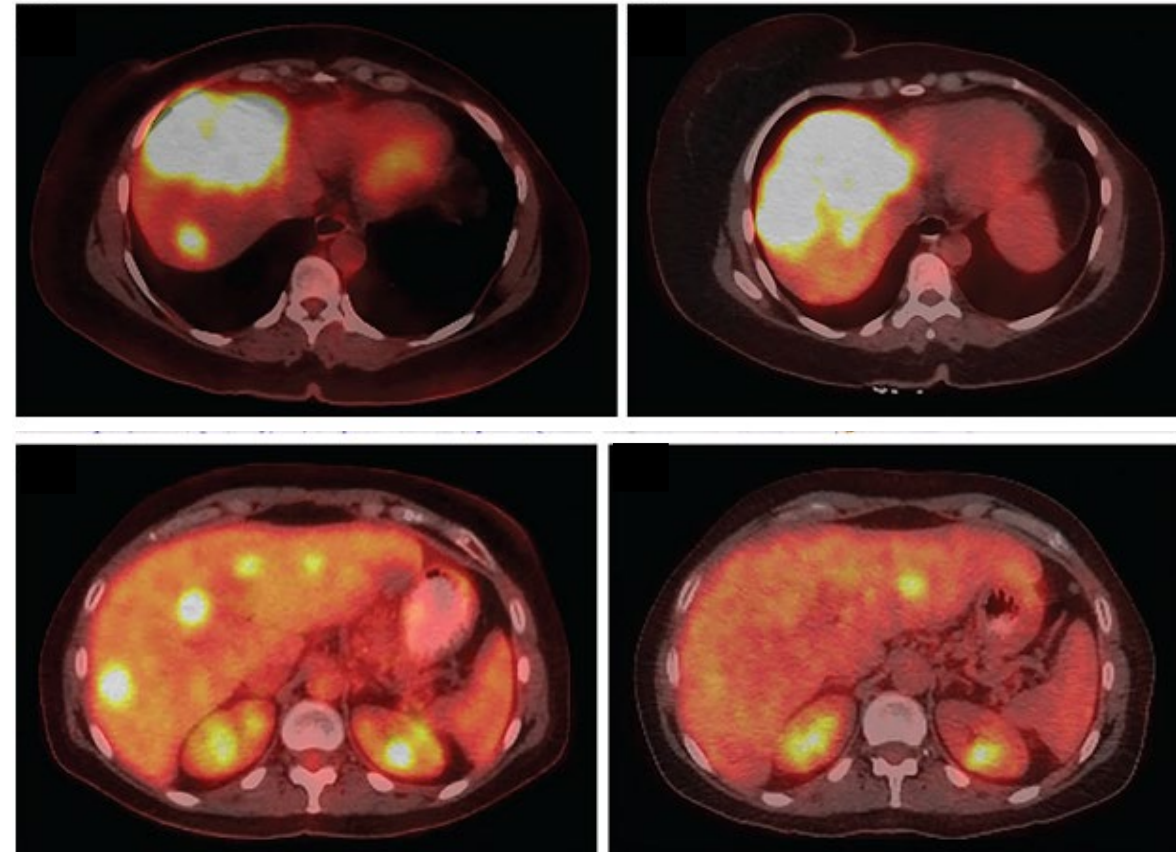
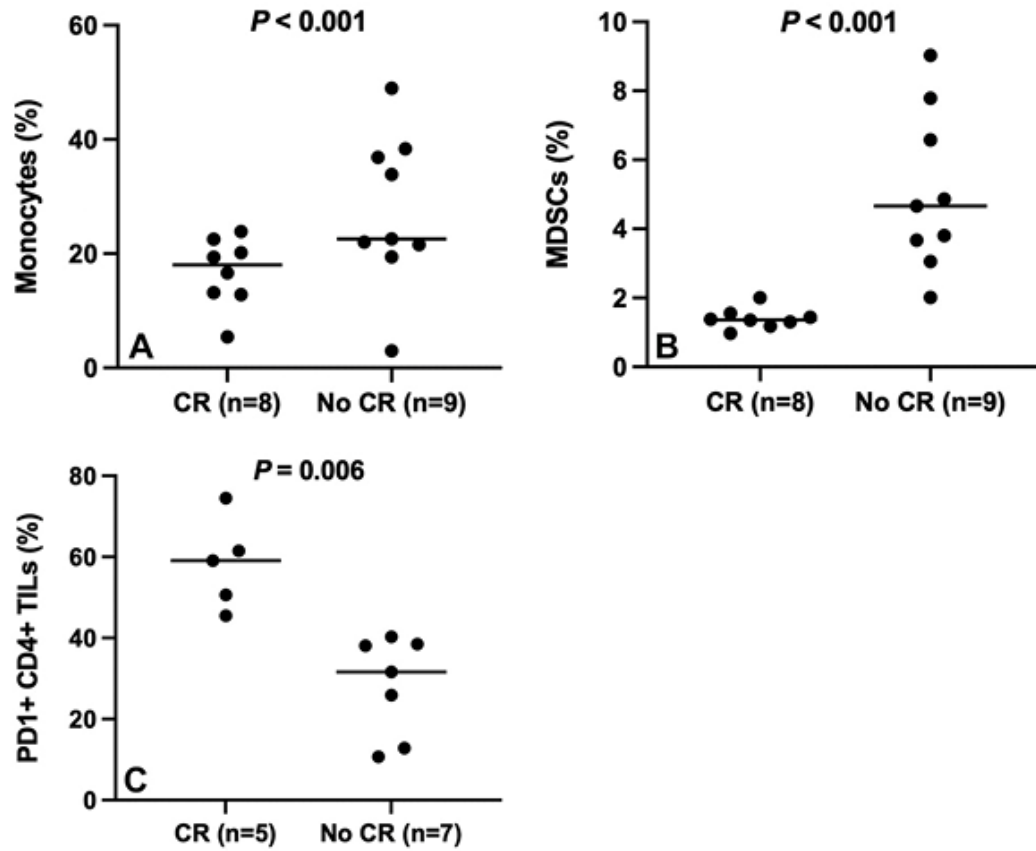
Locoregional therapies: Antigen producers



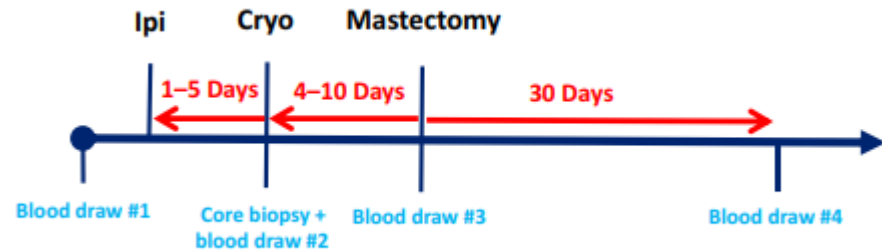
Local therapy can produce antigens driving anti-tumor immunity



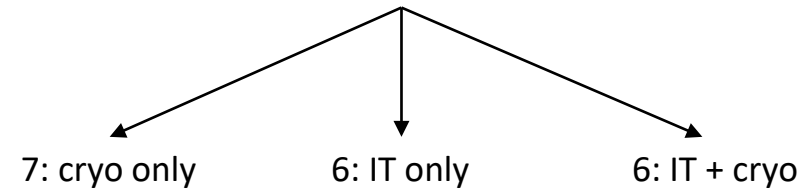
Radioembolization induces anti-tumor immunity



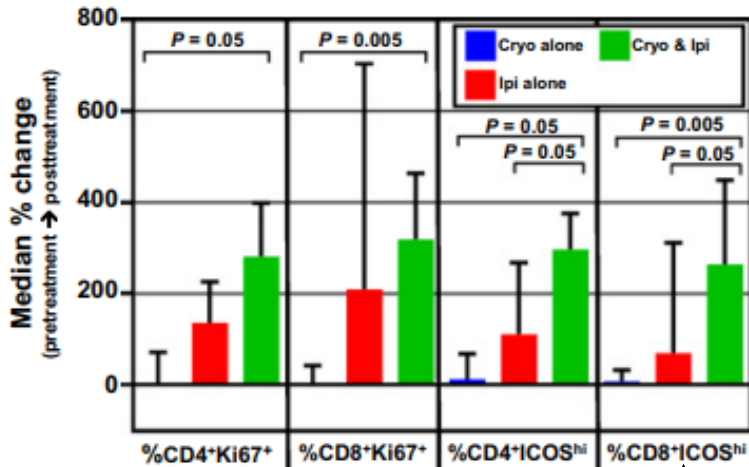
Immunogenic potential of breast cryoablation



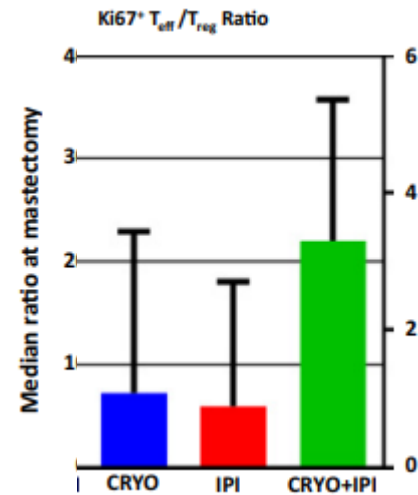
19 F with breast cancer planned for mastectomy



Peripheral immune cells



Activated T cells

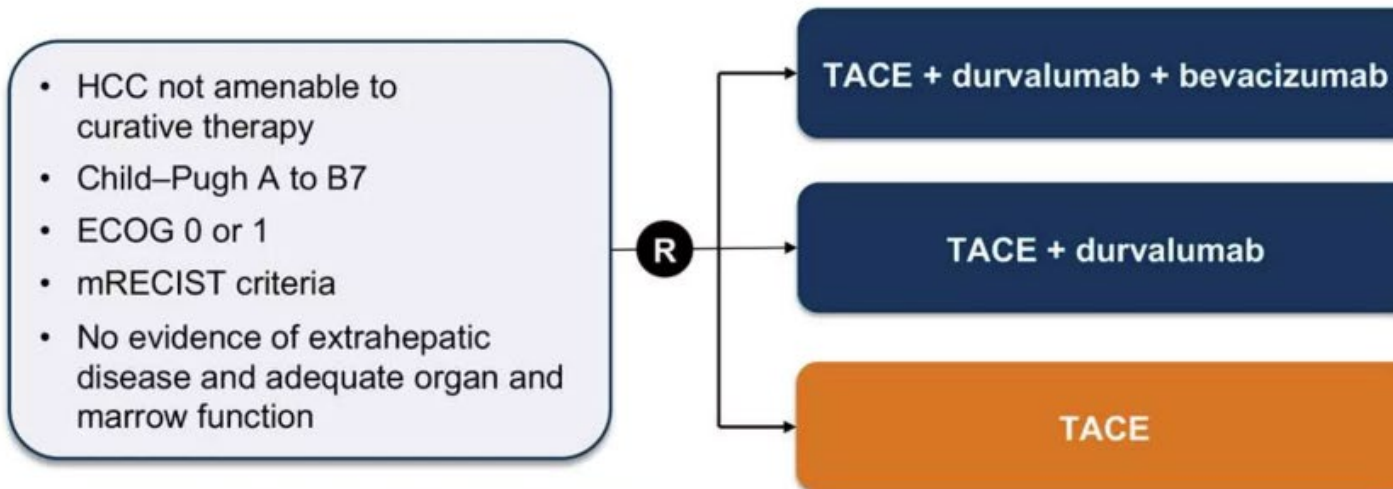


Tumor-infiltrating lymphocytes



EMERALD-1: TACE + IT

EMERALD-1: TACE in Combination With Durvalumab and Bevacizumab Therapy in Patients With Locoregional HCC¹

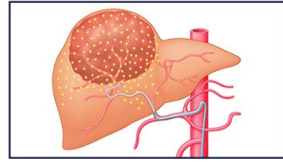


- **Primary endpoint:** PFS Arms B and C
- **Secondary endpoints:** PFS Arms A and C, OS, DOR, and time to symptom deterioration

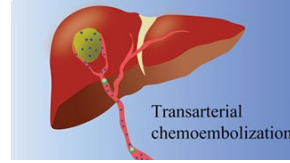
PFS:
TACE+D+B: 15 mo
TACE+D: 10 mo
TACE: 8 mo

1. <https://clinicaltrials.gov/ct2/show/NCT03778957>.

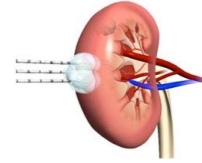
Summary



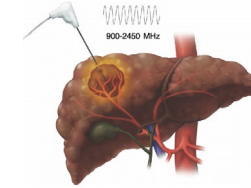
Radioembolization



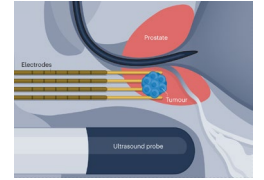
Chemoembolization



Cryoablation

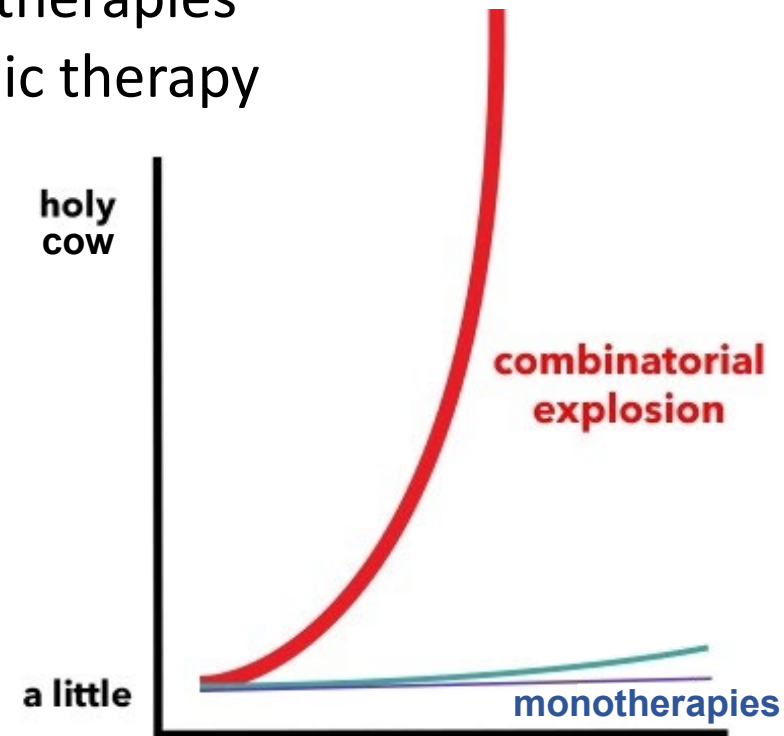


Microwave ablation



Nonthermal ablation

- Modern interventional radiology = interventional oncology
- Locoregional therapies – range from ablation to embolotherapies
- Local therapies administered in conjunction with systemic therapy
- Potential synergy with systemic therapy
- Immunogenic effects



Thank you!

