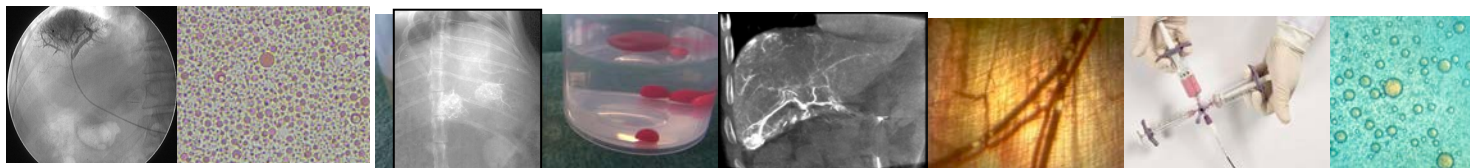


# Conventional Chemoembolization

## My Top Technical Pearls



Thierry de Baere

Gustave Roussy - Villejuif - France



# Disclosures

Consultant: Terumo, Boston Scientific, Guerbet, Eisai, AstraZeneca

Grants/Research Support: Terumo

Speakers' Bureau: Terumo, Guerbet

*Brand names are included in this presentation for participant clarification purposes only.*

*No product promotion should be inferred.*

# 1 – Use CBCT: 3D Images / Image Analysis / Guidance

## **Computed Analysis of Three-Dimensional Cone-Beam Computed Tomography Angiography for Determination of Tumor-Feeding Vessels During Chemoembolization of Liver Tumor: A Pilot Study**

**Frederic Deschamps • Stephen B. Solomon •  
Raymond H. Thornton • Pramod Rao •  
Antoine Hakime • Viseth Kuoach • Thierry de Baere**

<b>83 subsegmental feeders in 25 liver tumors</b>	<b>2D</b>	<b>3D</b>	<b>Automatic vessel analysis</b>
<b>Sensitivity</b>	64%	73%	<b>93%</b> <sup>(1, 2)</sup>
<b>Duration</b>	94 s	187 s	<b>135 s</b> <sup>(2)</sup>
<b>Agreement between users</b>	54%	62%	<b>82%</b> <sup>(1, 2)</sup>

<sup>(1)</sup>  $p < 0.05$  compare with 2D data, <sup>(2)</sup>  $p < 0.05$  compared with 3D data

# 1 – Use CBCT: 3D Images / Image Analysis / Guidance

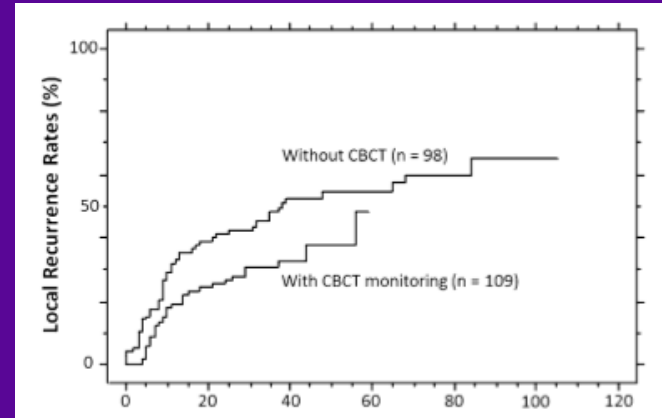
## Comparison of Local Control in Transcatheter Arterial Chemoembolization of Hepatocellular Carcinoma $\leq 6$ cm With or Without Intraprocedural Monitoring of the Embolized Area Using Cone-Beam Computed Tomography

207 HCCs  $\leq 6$  cm superselective TACE: DSA in 98 tumors & CBCT in 109 tumors

1-, 2-, and 3-year local recurrence rates

DSA : 33.3%, 41.3%, 48%

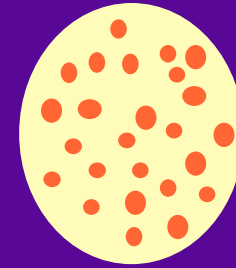
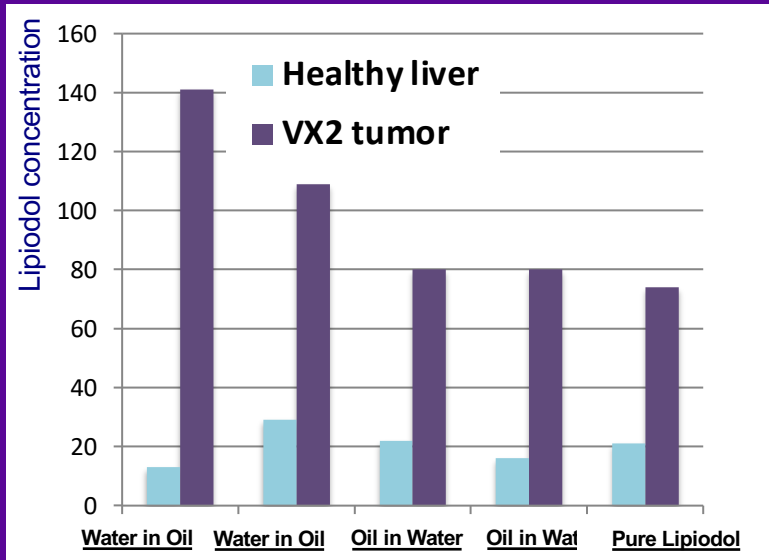
CBCT : 22.3 %, 26.8 %, 30.6 %



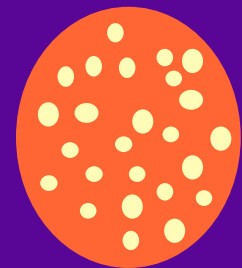
Safety margins in 65.3% of DSA vs. 87.2% of CBCT

Safety margin: Lipiodol uptake 5 mm wide around HCC < 25 mm, 10 mm wide around HCC > 25 mm

## 2 – Water in Oil Emulsion / Drug in Lipiodol

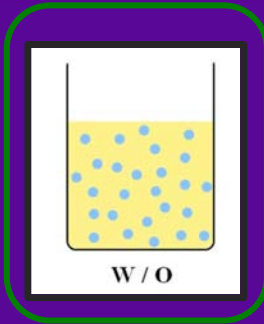


**Water in Oil**  
**Doxo. in Lipiodol**

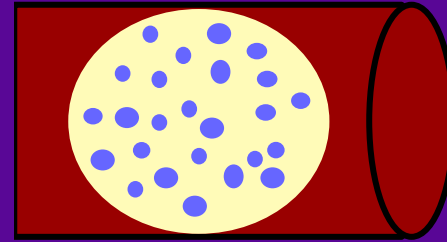
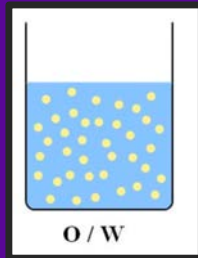


**Oil in Water**  
**Lipiodol in Doxo.**

## 2 – Water in Oil Emulsion / Drug in Lipiodol

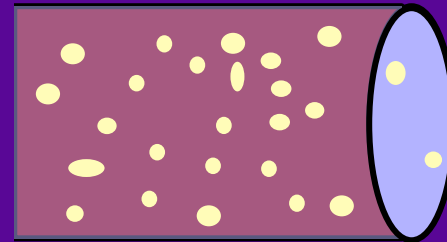


Lipiodol® + methylene blue  
W/O = water in oil  
O/W: oil in water



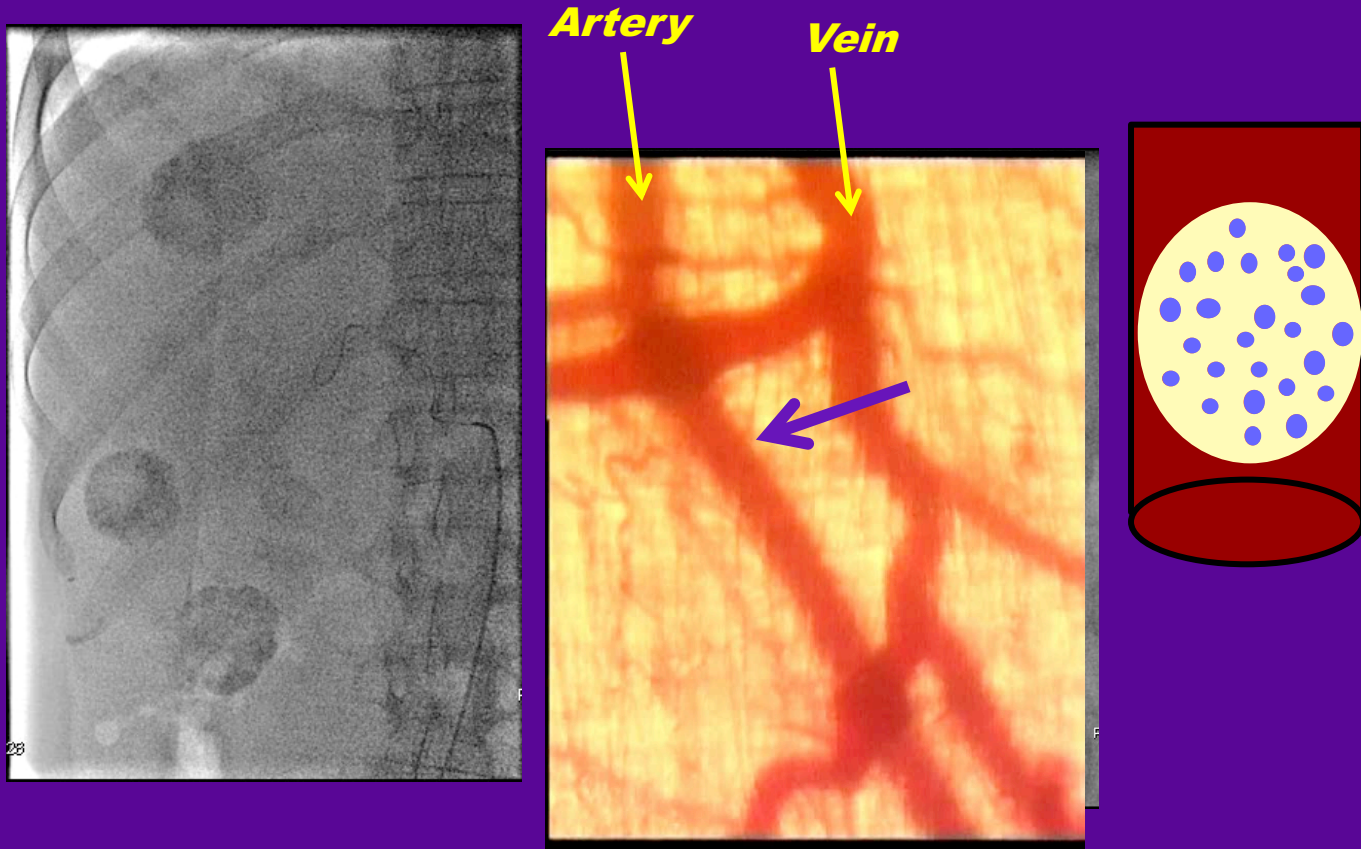
Lipiodol as a drug carrier

Drug diluted in blood



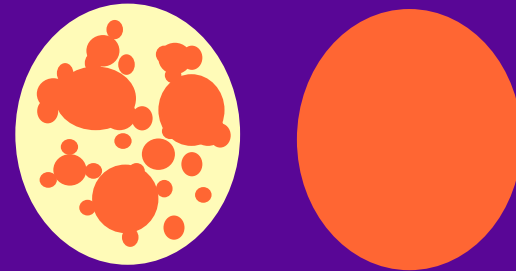
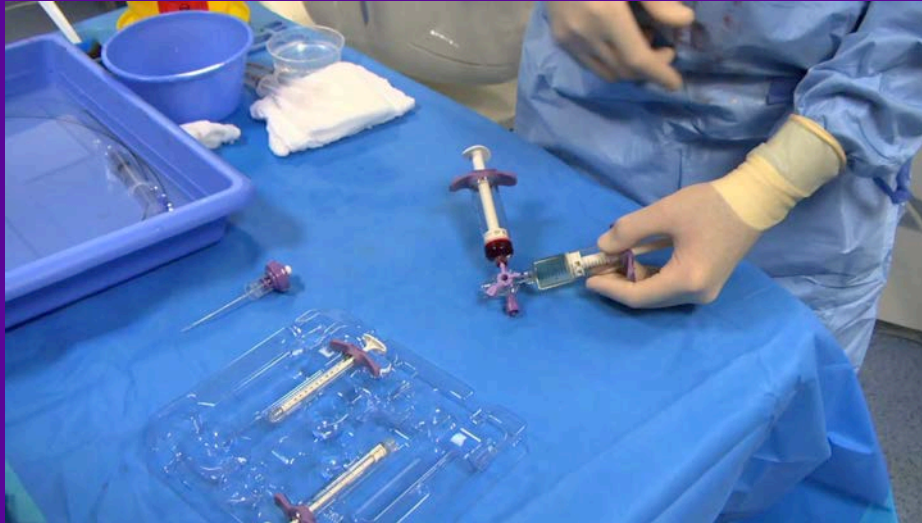
Yellow Lipiodol  
Blue Drug

## 2 – Water in Oil Emulsion / Drug in Lipiodol



## 2 – Water in Oil Emulsion / Drug in Lipiodol

Favor a drug in oil emulsion with a 3-way stopcock method:  
Lower volume of drug versus Lipiodol  
Push Drug toward Lipiodol  
Dilution of drug in contrast medium increases stability





## 2 – Water in Oil Emulsion / Drug in Lipiodol

Cardiovasc Intervent Radiol (2017) 40:1927–1932  
DOI 10.1007/s00270-017-1763-5



### LABORATORY INVESTIGATION

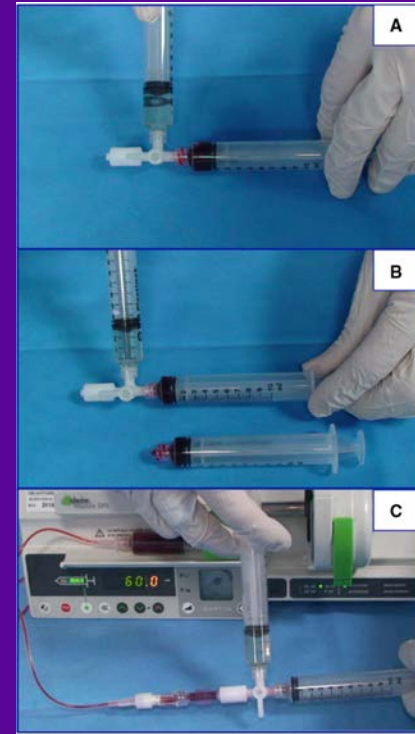
#### Parameters for Stable Water-in-Oil Lipiodol Emulsion for Liver Trans-Arterial Chemo-Eembolization

F. Deschamps<sup>1,2</sup> · L. Moine<sup>3,4</sup> · T. Isoardo<sup>3</sup> · L. Tselikas<sup>1,4</sup> · A. Paci<sup>2,4</sup> ·  
L. M. Mir<sup>2,4</sup> · N. Huang<sup>3</sup> · E. Fattal<sup>3,4</sup> · T. de Baère<sup>1,4</sup>

Injection of doxorubicin (diluted in saline) in Lipiodol :

- Bolus
- Incremental: 2 consecutive aliquots
- Continuous injection over 3 minutes

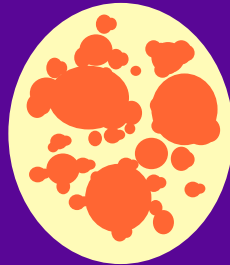
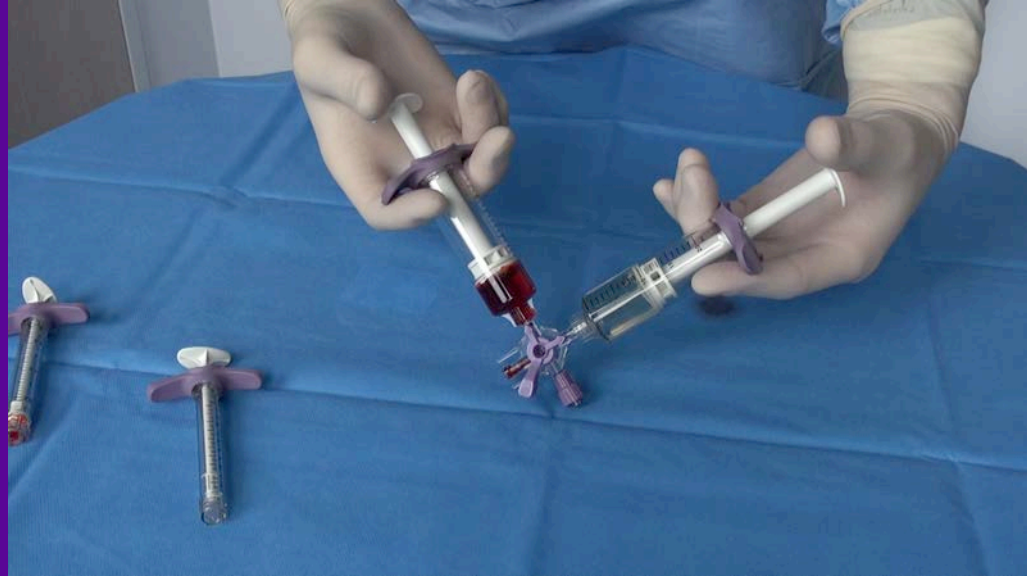
Incorporation method	Percentage of water-in-oil emulsion	Stability of water-in-oil emulsion
Bolus ( $n = 16$ )	6.25% ( $n = 1$ )	
Incremental ( $n = 16$ )	93.7% ( $n = 15$ )	$p < 0.0001^a$ 96 ± 101 min $p = 0.018$
Continuous ( $n = 16$ )	100% ( $n = 16$ )	$p < 0.0001^b$ 326 ± 309 min



## 2 – Water in Oil Emulsion / Drug in Lipiodol

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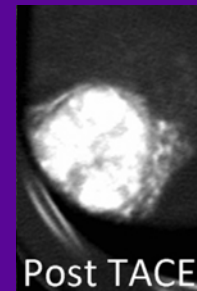
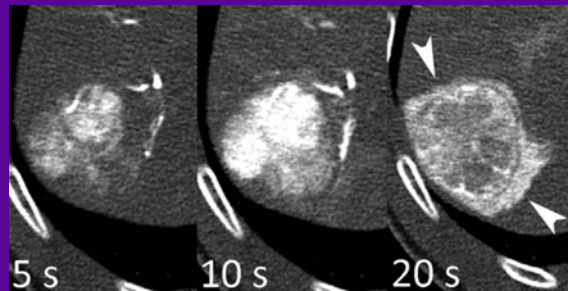
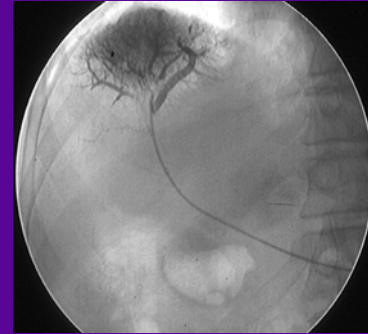
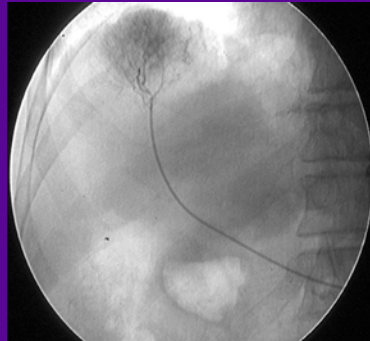
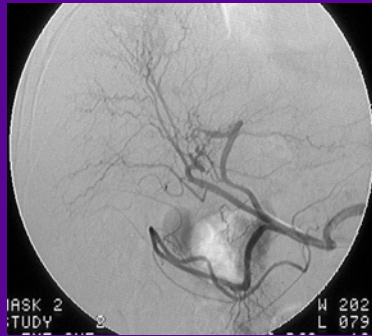
Incremental



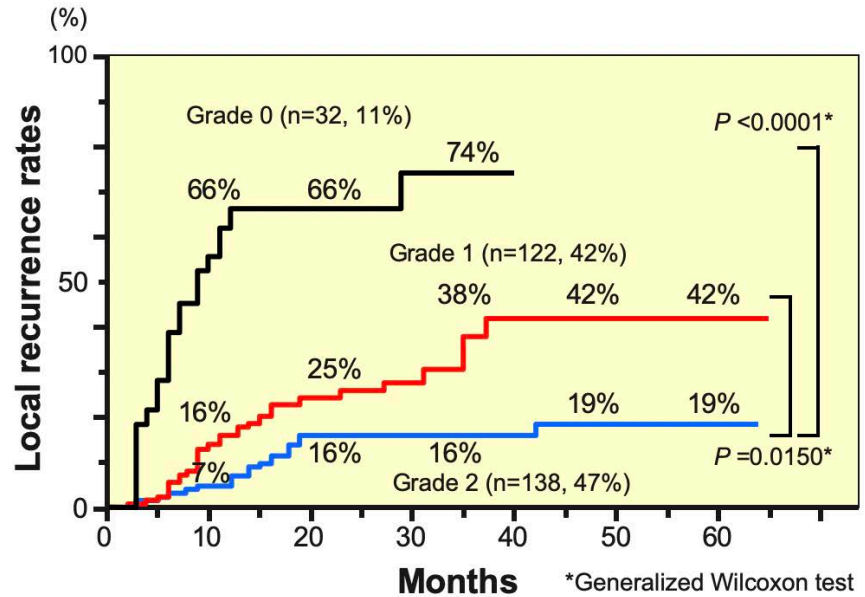
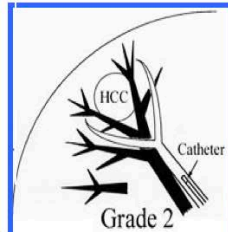
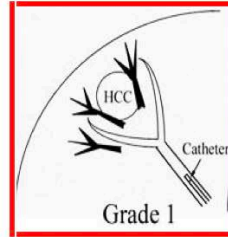
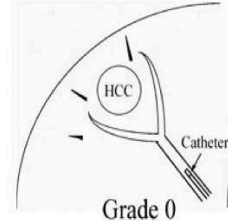
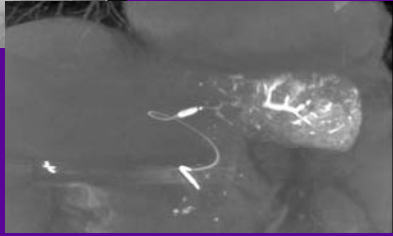
### 3 – Lipiodol Opacification of the Portal Vein

*In hypervascular HCC, Lipiodol injected into the hepatic artery is initially retained in the tumor sinusoids, and then flows into the portal veins through:*

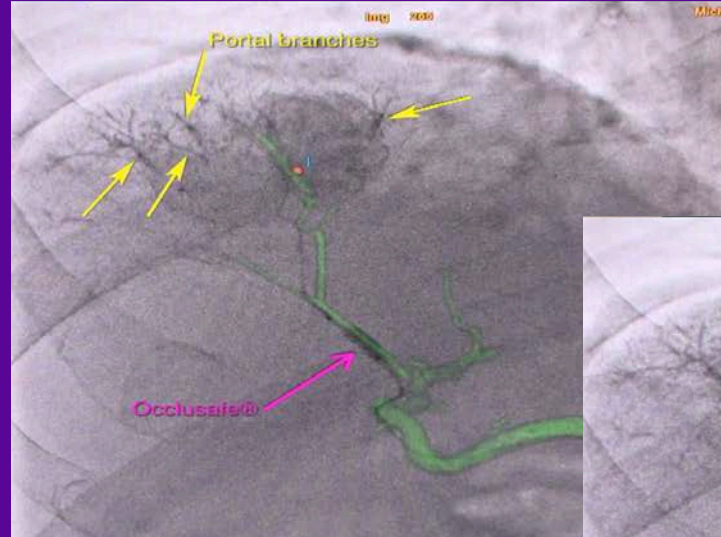
- *the drainage route from HCC*
- *the peribiliary plexus*



### 3 – Lipiodol Opacification of the Portal Vein



### 3 – Lipiodol Opacification of the Portal Vein



The **endpoint** for the Lipiodol drug emulsion :

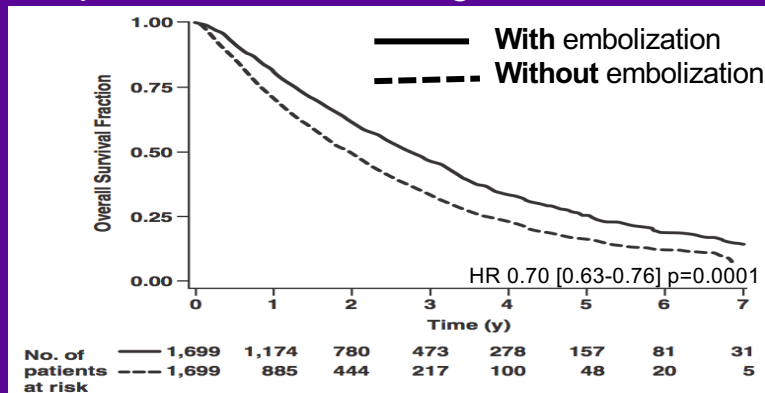
- stasis in very peripheral tumor-feeding arteries
- appearance of Lipiodol in portal vein branches near the tumor

## 4 – Always Particle Embolized

Prospective observational cohort study over 8 years: 11,030 patients with HCC

8,507 TACE

2,523 Lipiodol + anticancer agent



### The endpoint for Gelfoam embolization

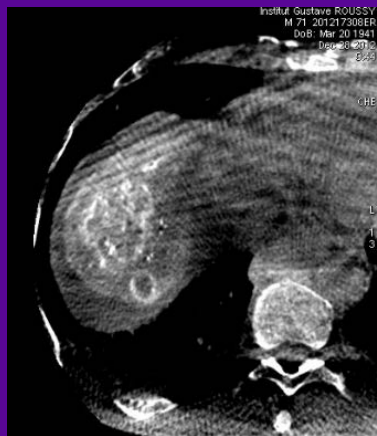
- complete stasis up to the catheter tip when placed superselectively
- “tree-in-the winter” appearance when TACE is less selective  
(lobar or major segments)

## 5 – Use CBCT: Immediate Evaluation $\pm$ Lipiodol-Guided Thermal Ablation

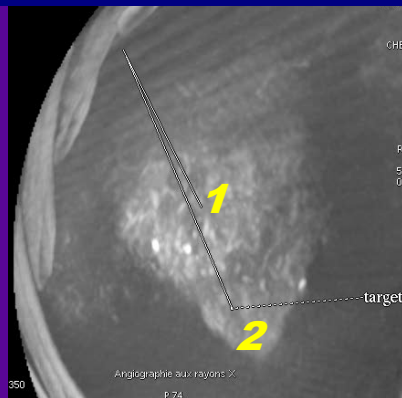
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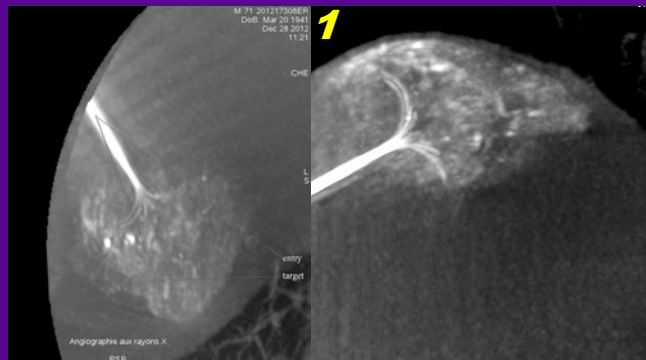
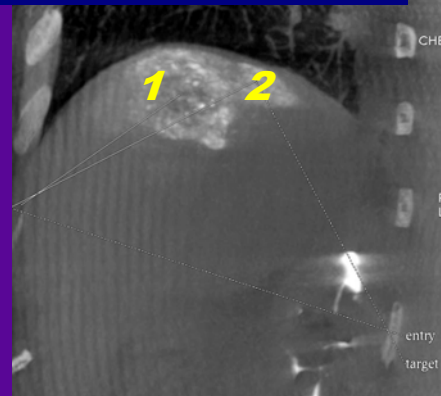
# 5 – Use CBCT: Immediate Evaluation $\pm$ Lipiodol-Guided Thermal Ablation



**CBCT after chemolipiodol  
needle tract definition**



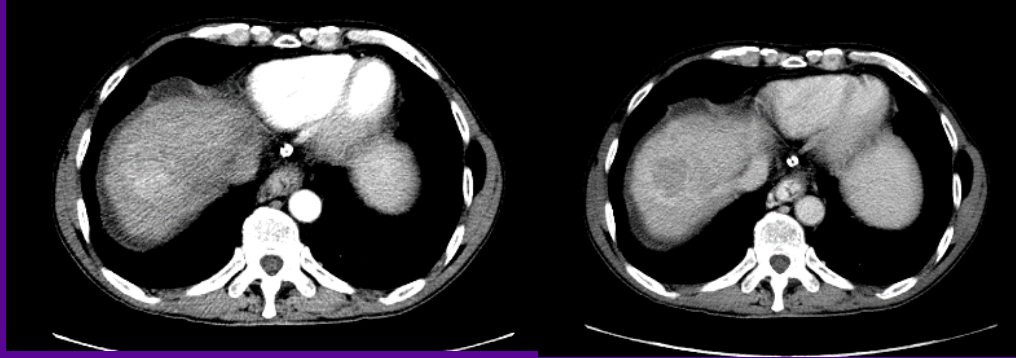
**CBCT after chemolipiodol  
needle tract definition**



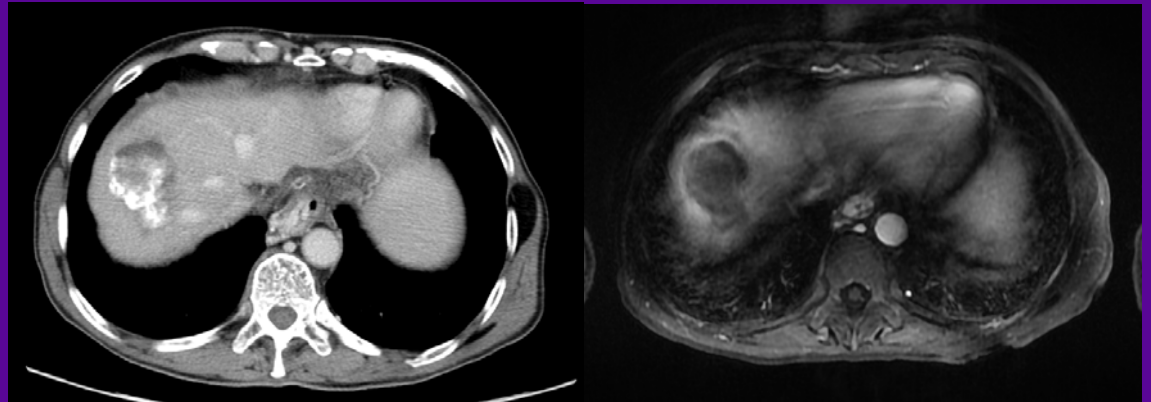


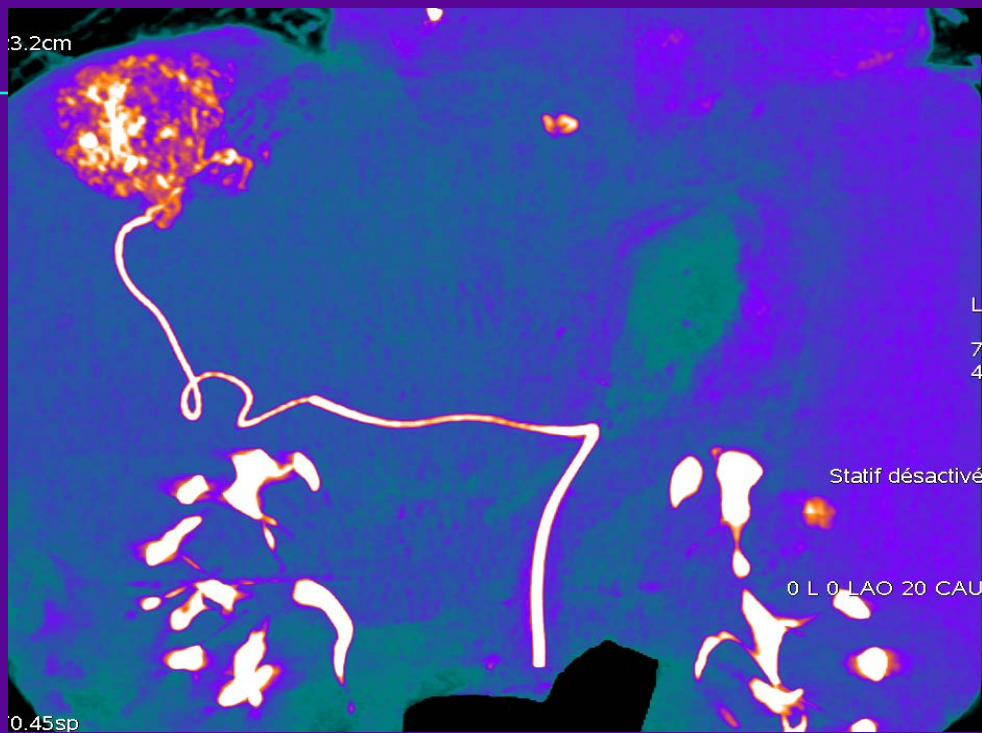
## 5 – Use CBCT: Immediate Evaluation $\pm$ Lipiodol-Guided Thermal Ablation

Baseline



Follow-up pots TACE + RFA





# Thank you

