UNIVERSITY OF PRETORIA STEVE BIKO ACADEMIC HOSPITAL SOUTH AFRICA

TRANSEARTERIAL CHEMO-EMBOLIZATION FOR HEPATIC METASTASES FROM NEURO-ENDOCINE NEOPLASIA AND HEPATOMA



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### INTRODUCTION



Hepatic chemoembolization is a way of superselective embolization of a liver **primary carcinoma (HCC)** or a **metastatic lesion** 





### **PRIMARY LESIONS OF THE LIVER**

Hepatocellular carcinoma (HCC) is the most common primary tumor worldwide, as its incidence is rising



### **RISK FACTORS**



Most HCC are associated with cirrhosis. The risk of HCC appears to be related to the degree of activity of cirrhosis. The risk is higher in developing countries







The risk is <u>high</u> in patients with macronodular cirrhosis secondary to hemochromatosis and <u>lower</u> in patients with alcoholic micronodular cirrhosis

Surgery offers the best prospects of cure, but the resectibility of HCC is low



## HEPATOCELLULAR CARCINOMA (HCC)

PRIMARY LIVER malignancy---5<sup>th</sup> MOST COMMON CANCER. The survival of patients with <u>non-ablatable</u> hepatocellular carcinoma is still poor. However, transarterial embolization(TAE) or transarterial chemoembolization(TACE) have been shown to improve survival



## HCC



At very early stages, HCC is not highly vascular and receives its blood supply from both portal vein and the hepatic artery, however when the neoplasm grows to a more advanced stage ,the blood supply is mostly dependent on the hepatic artery. This specific hepatic profile has provided the basis for the development of arterial obstruction as an effective therapy







It may also enable the preferential deposition inside tumors, of any device carrying therapeutic agents, such as:

- Drugs
- Gene therapy vectors or
- Radioisotopes



## METASTASES



Depending on the primary site 30-40% of the patients who die of liver cancer, have liver metastases at autopsy. The most common cause of death from <u>colorectal</u> cancer is liver metastases .Some success has been achieved in resection of liver metastasis with limited-staged disease

<u>Treatment</u> using systemic chemotherapy and radiation therapy is relatively ineffective

The response to 5-Flourouracil, the most common single agent used in the treatment of hepatic colorectal metastases, is only 20%





1.Trans (catheter) arterial chemo embolization (TACE)





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5.Microwave ablation





Trans (catheter) arterial chemo embolization (TACE)
 Trans (catheter) arterial embolization (TAE)
 Ethanol ablation, or percutaneous ethanol injection (PEI)
 Radiofrequency ablation (RFA)
 Microwave ablation
 Other therapies have been introduced recently



### TACE



Arterial chemoembolization of liver and transarterial chemotherapy are similar procedures that are used for the treatment of liver cancer

In both procedures, chemotherapy is injected into the hepatic artery that supplies the liver tumor

The difference between the two procedures is that in chemoembolization, additional material is injected to block (embolize) the small branches of the hepatic artery





## WHY IS THE CHEMOTHERAPY INJECTED INTO THE HEPATIC ARTERY?

As already mentioned Normal liver gets its blood supply from two sources: the portal vein (about 70%) and hepatic artery (30%)

HCC gets its blood supply exclusively from the hepatic artery

This fact forms the basis of TACE and TAE



## PROCEDURE



Performed by an interventional radiologist in radiology department-angio theatre.

The radiologist must work closely with an <u>oncologist</u> who determines the amount of chemotherapeutic agent that the person receives at each session as some patients may undergo repeat sessions at 6-12 week intervals



## PROCEDURE



A femoral or a brachial artery approach can be used

Cobra-2, multipurpose or a head hunter catheter can be employed to super select the hepatic artery

A pig tail injector run can be performed in a lateral view to visualize the origin of coeliac trunk















#### FEMORAL ARTERY APPROACH







#### BRACHIAL ARTERY APPROACH



## TACE AND TAE



Both techniques take advantage of the fact that cancer (HCC) is a very vascular tumor and gets its blood supply almost exclusively from hepatic artery







## Closing a Vessel. EMBOLIZATION



#### **Our Products**



#### Fibered Coils, Platinum or Inconel, spiral, straight, Tornado and Nester.

MR Compatible: This term indicates that the device, when used in the MR environment, is MR safe and has been demonstrated to neither significantly affect the quality of the diagnostic information nor have its operations affected by the MR device.



### TACE



Tace has an advantage of exposing the tumor to high concentrations of chemotherapy and confining the agents locally since they are not carried away by bloodstream

At the same time, this technique deprived the tumor of its blood supply, which can result in the damage or death of the tumor cells



## TACE/TAE



The type and frequency of complications of TACE and intra arterial chemotherapy are similar

The potential disadvantage of TACE is that blocking the feeding vessels to the tumor may make future attempts of intra-arterial infusion impossible

Moreover , so far, there are no head to head studies directly comparing the effectiveness of intra-arterial infusion versus chemo-embolization



## **HOSPITAL STAY**



Patient generally stays in the hospital overnight for observation

The punctured groin is gently compressed with a compression bandage

Close observation in the ward for puncture site bleed for 24 hrs



## COMPLICATIONS



Generally the LFTs get worse during 1<sup>st</sup> 2-3 days post procedure. This worsening is actually due to the death of tumor (and some non-tumor) cells

Abdominal pain

Low grade fever

Vomiting





### CHEMOTHERAPEUTICS DOXO RUBICIN

DAUNORUBICIN

ETHANOL

METHOTREXATEL

**5-FLUOROURACIL** 

MITOMYCIN



## CHEMOTHERAPEUTICS



DAUNOBLASTIN (Also called DAUNORUBICIN) Each vial contains 20mg - Daunorubicin is an antineoplastic anthracycline antibiotic(I/V indication in leukaemia) Dose 1mg/kg (response dependant) 60-120mg can be given I/V 40-80mg intrahepatic, can be repeated in 6-8weeks, determined by CT finding



## CHEMOTHERAPEUTICS



DOXOBUBICIN Each vial contains 2mg/ml of DOXORUBICIN Hydrochloride in a sterile solution Cytotoxic effect is exercised by interaction with DNA (and

with cell membranes)

Indication : acute leukaemia

Soft tissue and bone sarcoma

Breast, ovarian carcinoma

Lymphomas

DOSE I/V 60-75mg/m<sup>2</sup>

Intrahepatic artery about 50 mg



## CHEMOTHERAPEUTICS



5-FLUOROURACIL Dose 500-800mg intra hepatic infusion



## 2008 (Mrs G) 1







## 2008 (Mrs G) 2


























































R1

















#### 2009 (Mr AB H) - LATEST





## 2009 (Mr AB H) - LATEST







#### 2009 (Mr AB H) - LATEST 81.38MIN 3021.2mGY



EL LILL



# 2009 (Mr AB H) - LATEST







#### 2009 (Mr AB H) - LATEST

RT PRE CHEMO



















































































































#### 2009 (Mr J) 1






### 2009 (Mr J) 2









# 2009 (Mr J) 3





# 2009 (Mr N J)

OST EMBOLISATION



















































Warning: Not for diagnostic use

#### MR P





Warning: Not for diagnostic use

#### MR P













### OUTCOME RESULTS



So what's next?



### **NEW WAY FORWARD**



**YTTRIUM-90** Radioembolization effective for HCC, neuroendocrine liver metastases and other liver metastases

# **PERCUTANEOUS HEPATIC PERFUSION** Improves survival in patients with hepatic metastases

HEPATIC LIPASE GENE VARIANT Plays a role in age related macular degeneration





#### RADIOEMBOLIZATION

90

External beam radiation has been excluded from the therapeutic armamentarium for liver tumors because of the low tolerance that the liver shows to radiation



<sup>90</sup>Y



#### Tumor response rates can reach more than 60%

Radioembolization (RE) is a new therapy where millions of minuscules of radioactive implants are injected into the common hepatic artery or its branches



<sup>90</sup> Y



# Liver radioembolization, also called selective internal radiation therapy (SIRT)







Two devices are available that have in common the radioisotope that provides the source of radiation (Y90) and the approximate size of sphere

(25-40µm)

The material of the sphere could be glass or resin







# <sup>90</sup> Y HAS MARKED ANTI-TUMOR ACTIVITY



64% pts show decrease in tumor vascularity after a single treatment

Only vascular lesions are targeted by microspheres







#### RE Can be a valuable treatment for patients with tumors invading the portal vein, provided they have good liver functions







Radiation induced liver disease typically occurs 4-8 weeks after the end of radiation plan Patients may develop:

- Fatigue
- Weight gain
- Ascites
- Elevation of transaminases, substantial rise in alkaline phosphatase and no increase in bilirubin







- Requires a single treatment session
- Usually no side efects after discharge





- Typically delivered as a series of sequential treatments,
- May produce significant side effects:
  -Post-embolization syndrome (pain,nausea and fever), cholecystitis, acute renal failure decline in LFTS



### SUMMARY



Historically, hepatic chemo-embolization has proven to be very effective method of treatment for hepatocellular carcinoma and later extended to treat liver metastases as well

Moving forward radioembolization seems to be a better alternative of TACE/TAE .....?



# THANK YOU



Thank you for attending this presentation, I hope it was informative and enjoyable!

