# Assessment of Resectability of HCC

**Ma. Vanessa H. de Villa, MD, PhD**

**Center for Liver Disease Management and Transplantation**

**The Medical City**

The Medical City Liver Center


SURVIVOR
TYPHOON
YOLANDA
PALO, LEYTE


AP PHOTO/AARON FAVILA

# Introduction

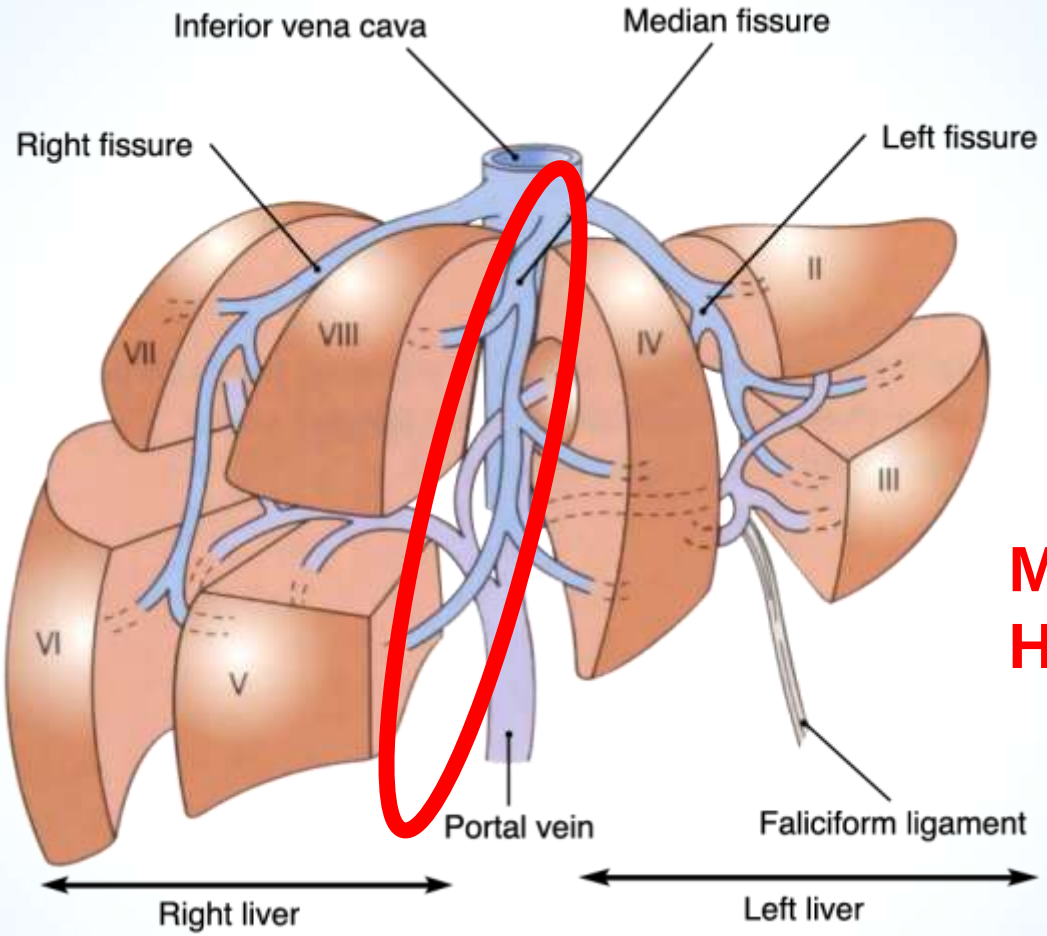
- Hepatocellular carcinoma (HCC) is very common in Asia
- Linked with high incidence of blood-borne viral Hepatitis and cirrhosis in Asia-Pacific
- Difficult to treat
- Usually detected in advanced stage
- Many treatment options now available

# Treatment Options for HCC

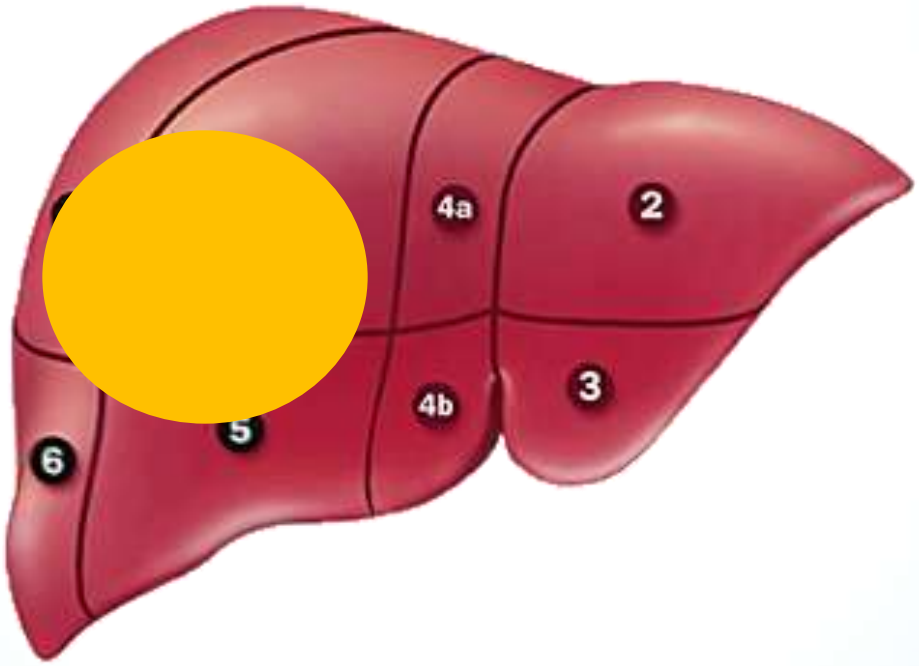
- Surgical
  - Liver resection
  - Liver transplantation
- Non-surgical
  - Local ablation
    - RFA, PEI, Microwave ablation, HIFU
  - Locoregional
    - TACE
    - DEB-TACE
    - SIRT
  - Systemic
    - Chemotx, molecular targeted, biological agents
  - Best palliative care

# Goals of Liver Resection

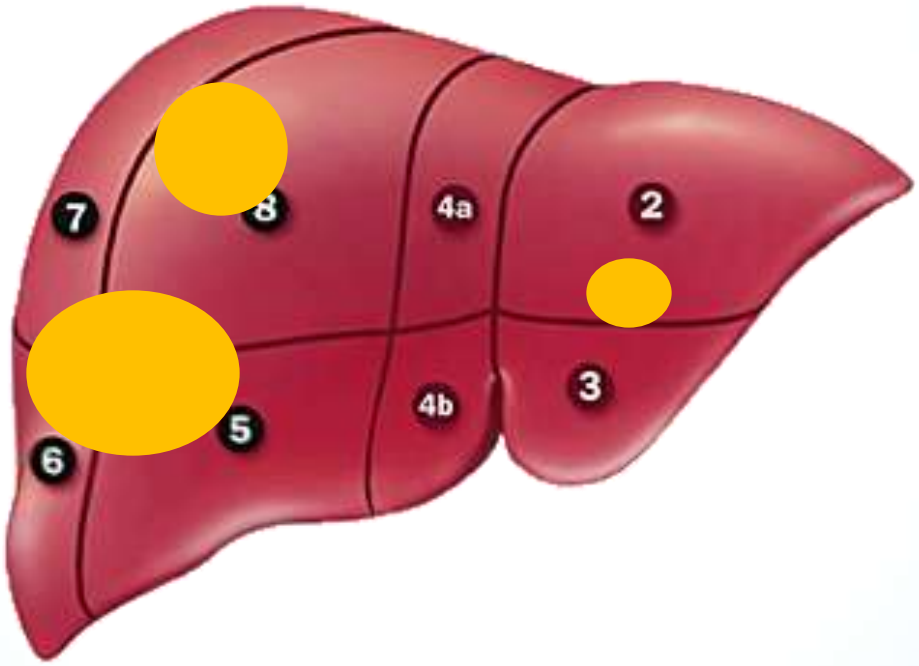
- To remove all the tumor
- To leave an adequate remnant liver
- Ensure patient recovery
  - Zero mortality
  - Low morbidity




**Middle Hepatic Vein**

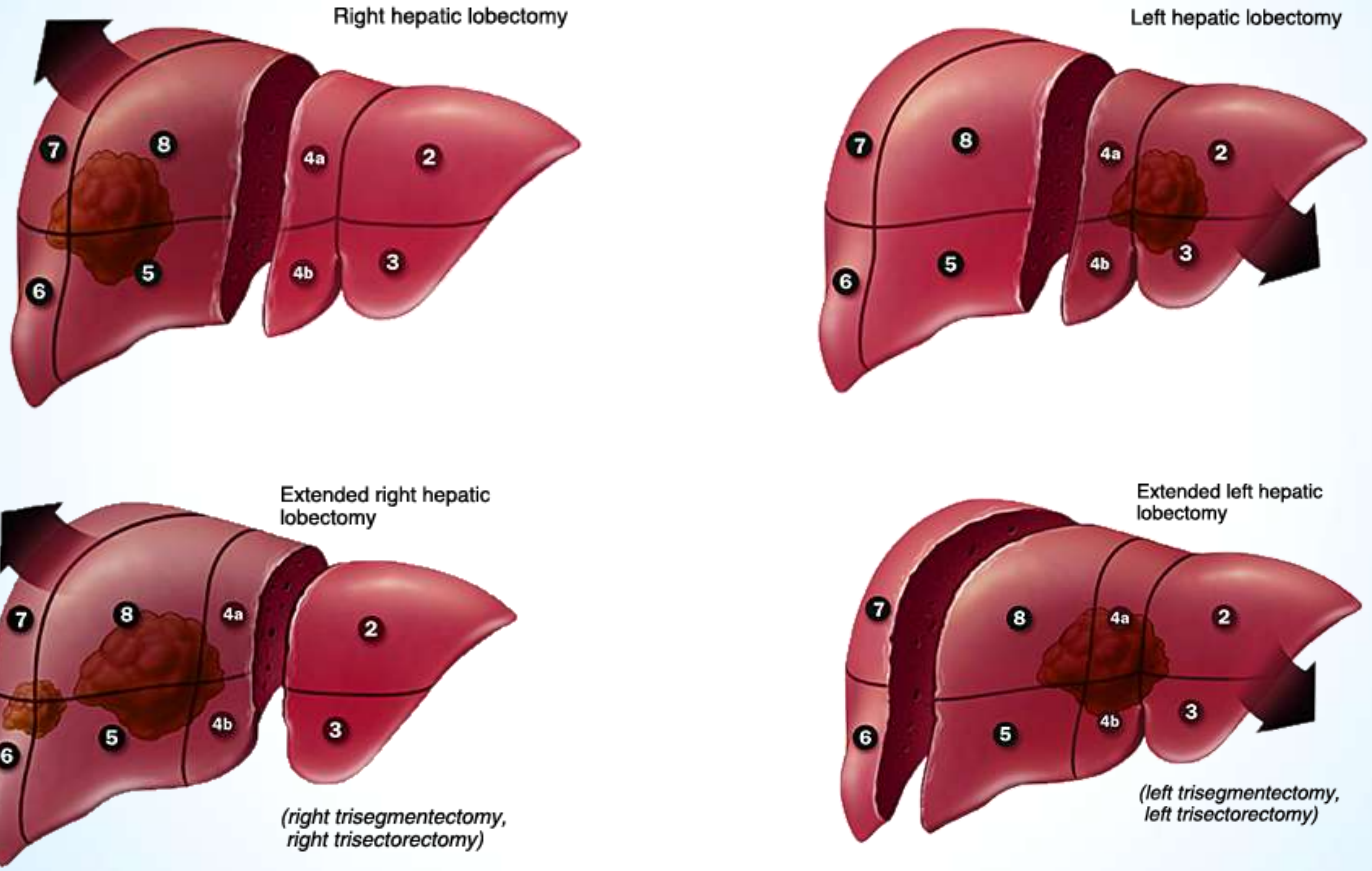



The Medical City Liver Center




The Medical City Liver Center

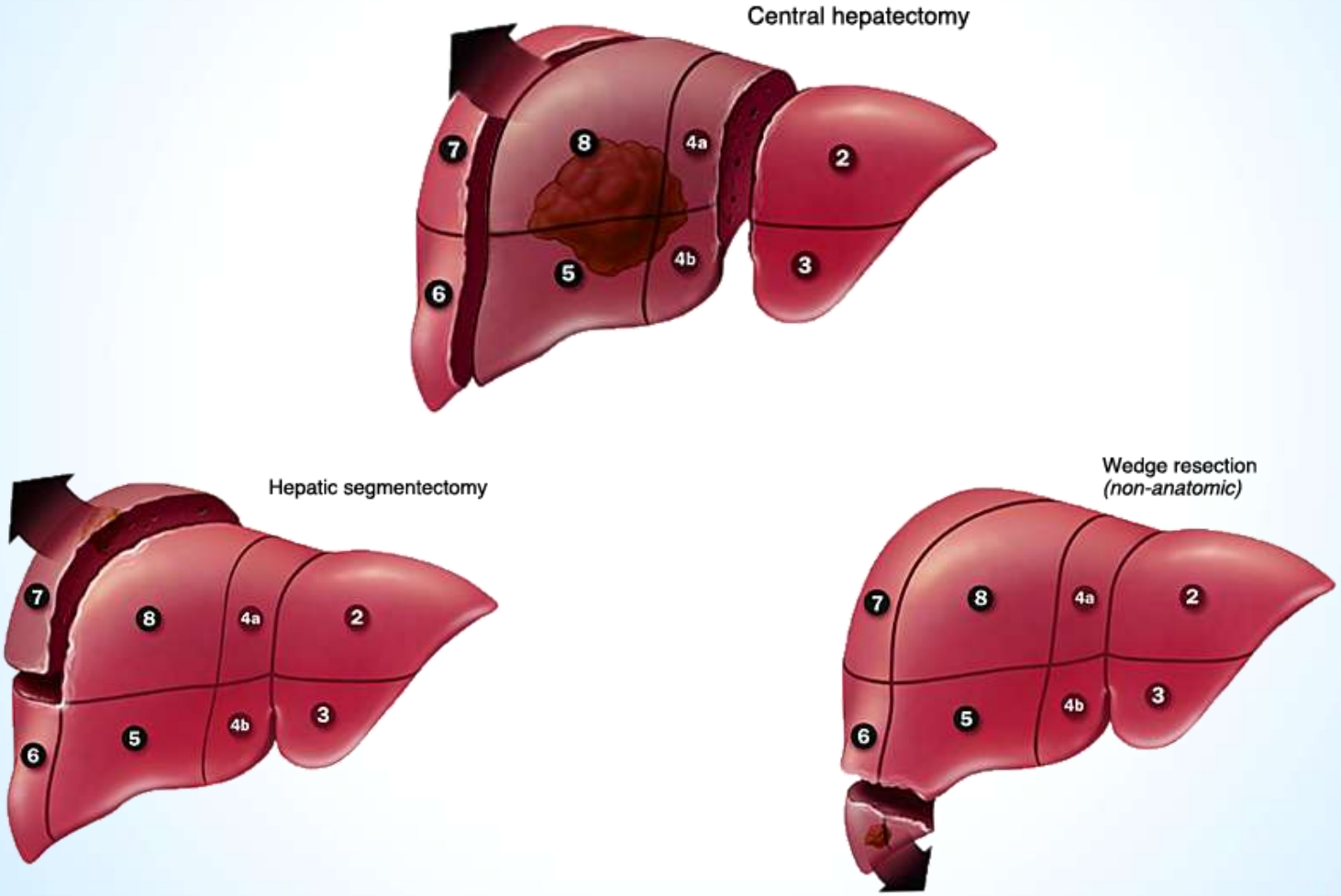
# Types of Liver Resection




Adapted from www.hopkinsmedicine.org/liver_tumor_center/treatments/surgery

The Medical City Liver Center

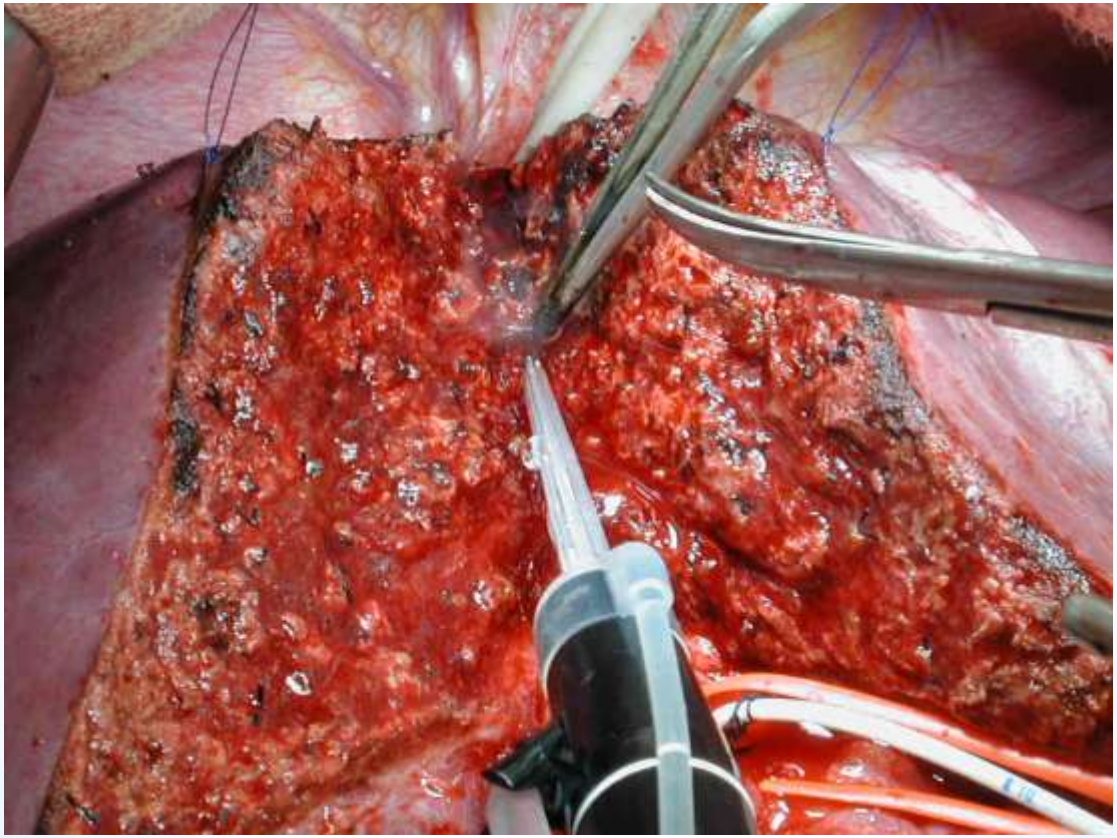
# Types of Liver Resection




Adapted from www.hopkinsmedicine.org/liver_tumor_center/treatments/surgery

The Medical City Liver Center

# TO CUT OR NOT TO CUT?



The Medical City Liver Center

# Parameters to Assess Resectability

- Tumor-related
- Liver-related (non-tumor portion)
- Patient-related

# Tumor-related Factors

- Size
- Number
- Distribution
  - Solitary vs. Multifocal
  - Unilobar vs. Bilobar
- Location
  - Right lobe, Left lobe, Central
  - Proximity to major blood vessels

# Preop Imaging

- Contrast triphasic CT scan or dynamic MRI
- Characterize tumor(s)
- Define anatomical relationships
- Assess non-tumor liver parenchyma
- Measure liver volumes (Future Liver Remnant)

# Liver-related Factors

- Size of the FLR (future liver remnant)
- Quality of liver parenchyma
  - Normal
  - Steatosis
  - Fibrosis
  - Cirrhosis

# Estimation of FLR Size

$$\frac{\text{CT / MR volumetry of FLR}}{\text{Estimated Standard Liver Volume}} = \%$$

**Table 1 Reported formulae for ESLV**

| Author | Report date | Formula | Material used (race, number) |
|---|---|---|---|
| Urata *et al*[7] | 1995 | ESLV = 706.2 × BSA + 2.4 | CT Volumetry (Japanese, 96) |
| Heinemann *et al*[8] | 1999 | ESLV = 1072.8 × BSA - 345.7 | Autopsy (Caucasian 1332) |
| Vauthey *et al*[9] | 2002 | LV = 18.51 × BW + 191.8 | CT volumetry (Western, 292) |
| Lee *et al*[10] | 2006 | ESLV = 691 × BSA + 95 | LDLT (Korea, 311) |
| Fan *et al*[11] | 2000 | ESLW = 218.32+BW × 12.29 + gender × 50.74 (M = 1, F = 0) | LDLT (Chinese, 159) |
| Chengdu[36] | 2009 | ESLV = 334.024 + 11.508 × BW | LDLT (Chinese, 115) |

ESLV: Estimated standard liver volume; BSA: Body surface area; BW: Body weight; CT: Computed tomography; LDLT: Living donor liver transplantation.

Shi ZR et al, World J Gastroenterol 2009

# Future Liver Remnant Size

- >30% of standard liver volume

  Fan et al, Arch Surg 2000

- 20-30% of liver volume in normal livers

  Guglielmi et al, Dig Surg 2012

# Assessment of Functional Reserve = quality of liver parenchyma

- Clinical and biochemical tests
  - Child-Turcotte-Pugh Score
  - MELD score
- Dynamic liver tests
  - Indocyanine green (ICG) test
  - Galactose elimination capacity
  - Lidocaine MEGX test
- Liver Stiffness Measurement
  - Fibroscan

# ICG test

- IV injection of indocyanine green
- Binds β lipoprotein and completely and exclusively removed by hepatocytes
- Eliminated unchanged in bile
- ICG retention rate at 15 mins measured
- Interpretation
  - <14% safe for major hepatectomy
  - 14-20% assess size of FLR and degree of cirrhosis
  - >20 not safe for major hepatectomy

Poon and Fan, Liver Transplantation 2004

The Medical City Liver Center

# Fibroscan

- Non-invasive measurement of liver stiffness
- Expressed in kilopascals (kPa)
- Useful tool in predicting post hepatectomy insufficiency

Kim SU et al, Hepatol Int 2008
Cescon et al, Ann Surg 2013
Wong JS et al, Ann Surg 2013
Fung J et al, PLoS ONE 2013

# Patient-related Factors

- Age
- Functional status
  - ECOG
  - Heart/Lung condition
- Co-morbidities

# Risk Factors for Postoperative Liver Failure

Older age (e.g. ≥ 70)
Cirrhosis
Fibrosis
Hepatitis
Intraoperative blood loss
Ischemia
Obstructive cholestasis
Preoperative chemotherapy
Steatosis

Clavien PA, New Engl J Med 2007


The Medical City Liver Center

# SUMMARY

- Assessment of resectability involves the analysis of factors related to the tumor, the liver and the patient
- Preop imaging is essential in the assessment of resectability
- It is important to aim to clear the liver of tumor while ensuring an adequate liver remnant
- Assessment by an experienced liver surgeon is essential

# Strategies to Improve Resectability

- Downstage the tumor
  - Neoadjuvant treatment
- Induce contralateral hypertrophy of FLR
  - TACE + PVE
  - SIRT
- Optimize patient conditions, if possible
  - Treat hepatitis
  - Reduce or eliminate steatosis, fibrosis

# Future Needs

- Learn to better use what is available in HCC treatment armamentarium to improve resectability
- Optimize combination treatment
- Better strategies to increase the future liver remnant size
- Improve regenerative capacity of the liver
  - Stem cells?
- Prevent recurrence


USAID
FROM THE AMERICAN PEOPLE


MEDECINS SANS

# Thank you


Typhoon Haiyan


CARGO
DEUTSCHES ROTES KREUZ