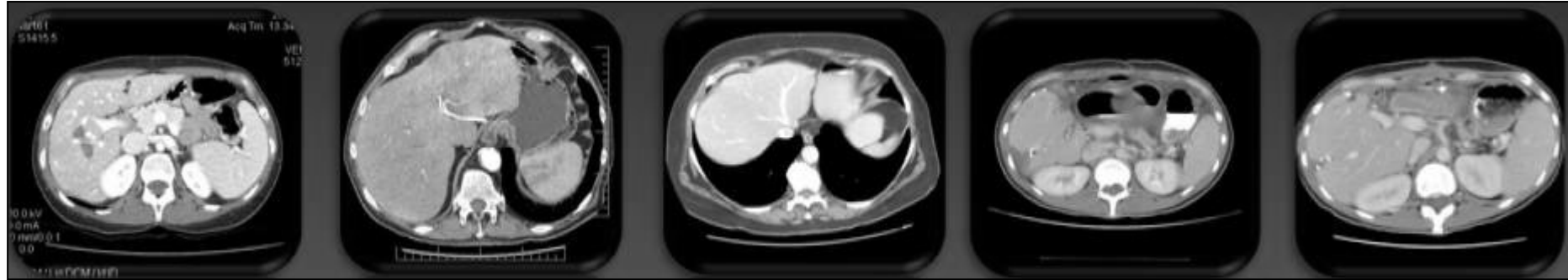


Liver masses: how to workup a liver mass and update on liver cancer



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BC Surgical Oncology Network, Oct 22 2016

CONFLICT OF INTEREST DECLARATION

I, **Alice Wei** declare that in the past 3 years:

I have been a member of an Advisory Board or equivalent with the following companies*:
Ethicon, Histosonic, Celgene, Sanofi, Takeda, Bayer

I have been a member of the following speakers' bureau: None

I have done speaking engagements for the following companies*: Sanofi, Celgene

I have received payment or funding from the following companies*

(includes gifts, grants, honoraria, and 'in kind' compensation): None

I have done consulting work for the following companies*: Cancer Care Ontario

I have held a patent for a product referred to in the program or that is marketed by a commercial organization: None

I or my family hold individual shares in the following companies*: None

I have participated in a clinical trial for the following companies*: None

MANAGING POTENTIAL BIAS

no commercial uses will be discussed

Learning Objectives

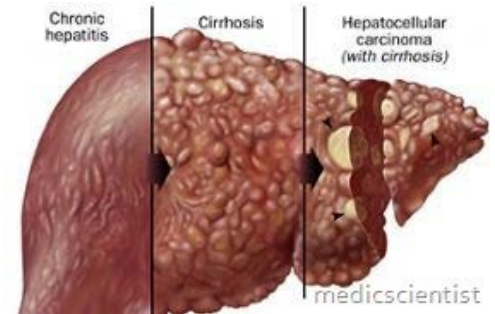
1. review approach for diagnosing liver masses
2. review management of benign lesions
3. review management of malignant tumors

Question: Which of the following statements are true?

1. Liver cysts should be resected if they grow rapidly?
2. Hepatic adenomas should only be resected if symptomatic
3. MRI should be used to assess all liver masses
4. Liver biopsy should be used to confirm diagnosis in all suspected liver cancers
5. Focal nodular hyperplasia can be confused with malignant liver tumours

Approach to liver lesions

- History & physical
 - Symptoms?
 - Pain weight loss/ fatigue/ jaundice
- Risk factors?
 - previous malignancy
 - risk factors for cirrhosis
 - EtoH, PSC etc
 - OCP, anabolic steroid use
- Routine blood tests → LFT, Bili, Alb, INR
 - add tumour markers if clinical suspicion
- Imaging is very important
 - Diagnostic → multimodality
 - Surveillance → single modality



Imaging modalities

- US → CT → MRI
- Special tests
 - contrast enhanced US
 - CT/PET
- Nuclear medicine scans
 - RBC scans/sulfur colloid scans
→ obsolete
- Biopsy
 - For indeterminate lesions

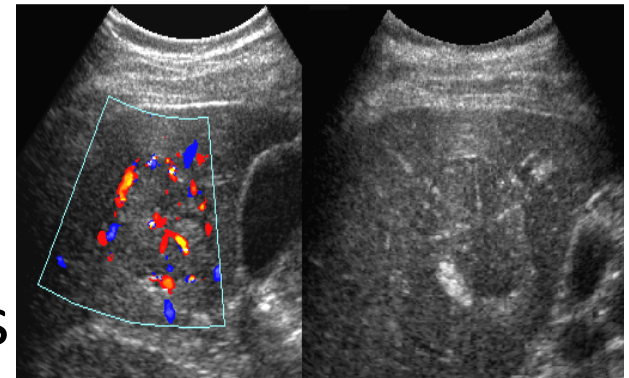


What to look for on imaging reports

- Important features
 - lesion consistency → was it there before
 - imaging characteristics → enhancement pattern
 - number/ location
 - evaluate non-tumour liver
- Get to know your radiologists
 - different sensitivity/ specificity thresholds
 - variety of area of interest/training
 - dictating styles differ
 - Modifiers used: suggestive, worrisome, cannot exclude...
- if dictation is not clear
 - call radiologist for clarification or advice

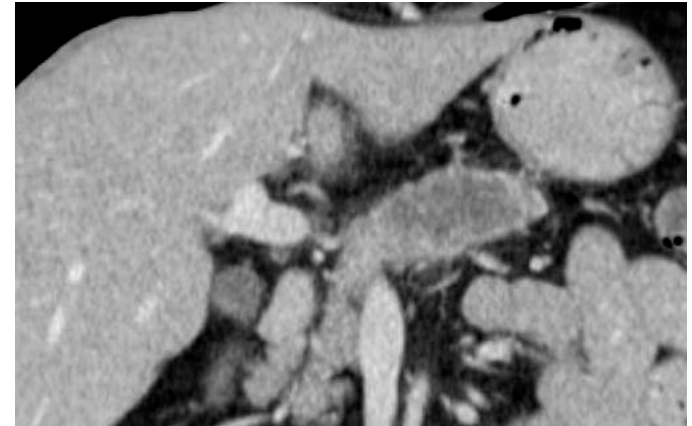
Ultrasound

- Useful for
 - Screening exam
 - assess for biliary obstruction
 - surveillance of established lesions
- Disadvantages
 - Additional tests required for confirmation
 - Quality is operator dependent
 - Limited visualization in fatty livers



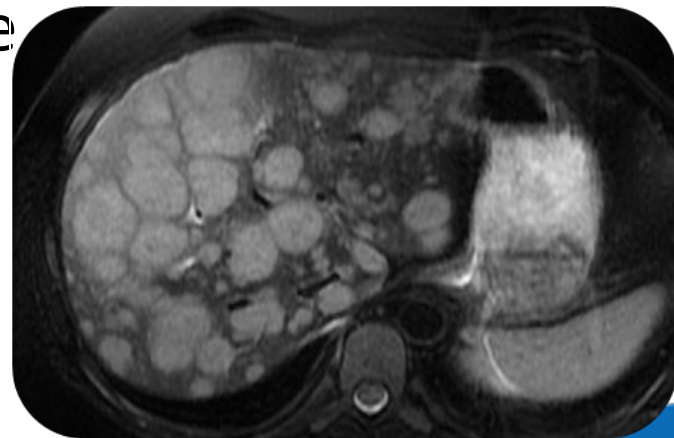
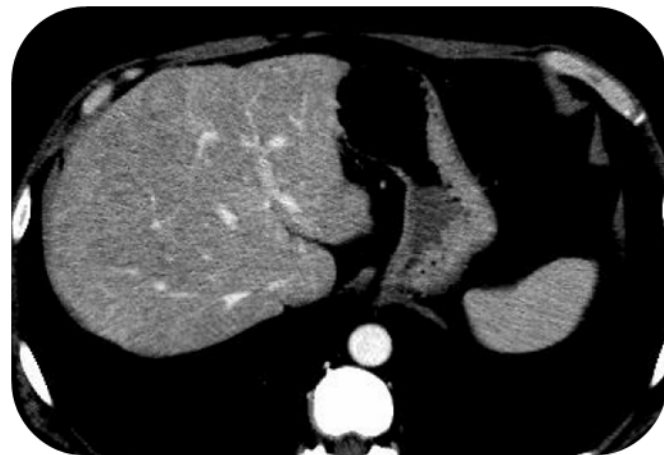
CT scan

- excellent size and anatomic resolution
- IV contrast required
 - Dye protocol depends on pathology
 - Dedicated liver protocol CT needed
- Contraindications:
 - impaired renal function
 - dye allergies
 - can be pre medicated
 - radiation exposure



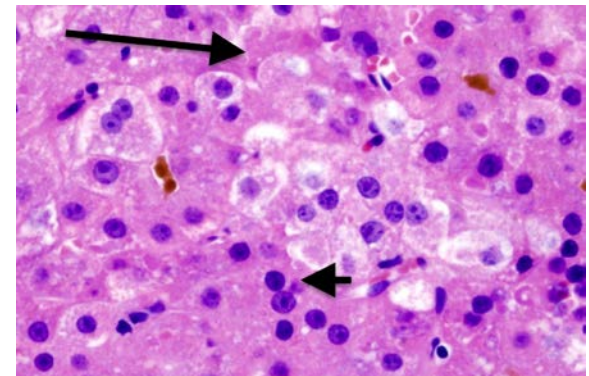
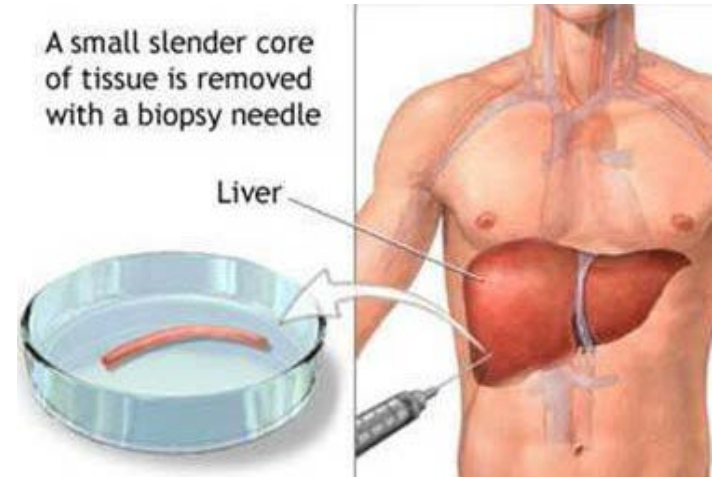
MRI scan

- Use MRI as confirmatory test
 - for 'doubtful' cases
 - No required for surveillance of known lesion
- helpful for 'indeterminate' lesions
 - Primovist and/or gadolinium dye
- superior for fatty livers
- MRCP to assess biliary system

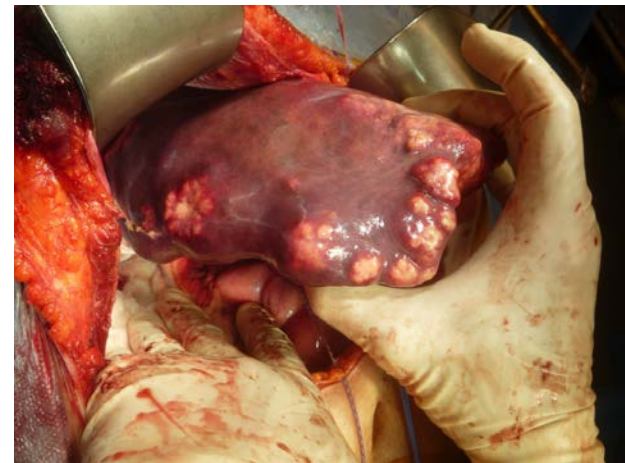
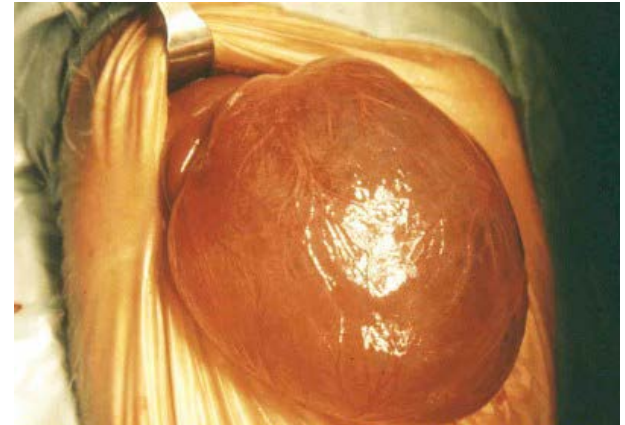
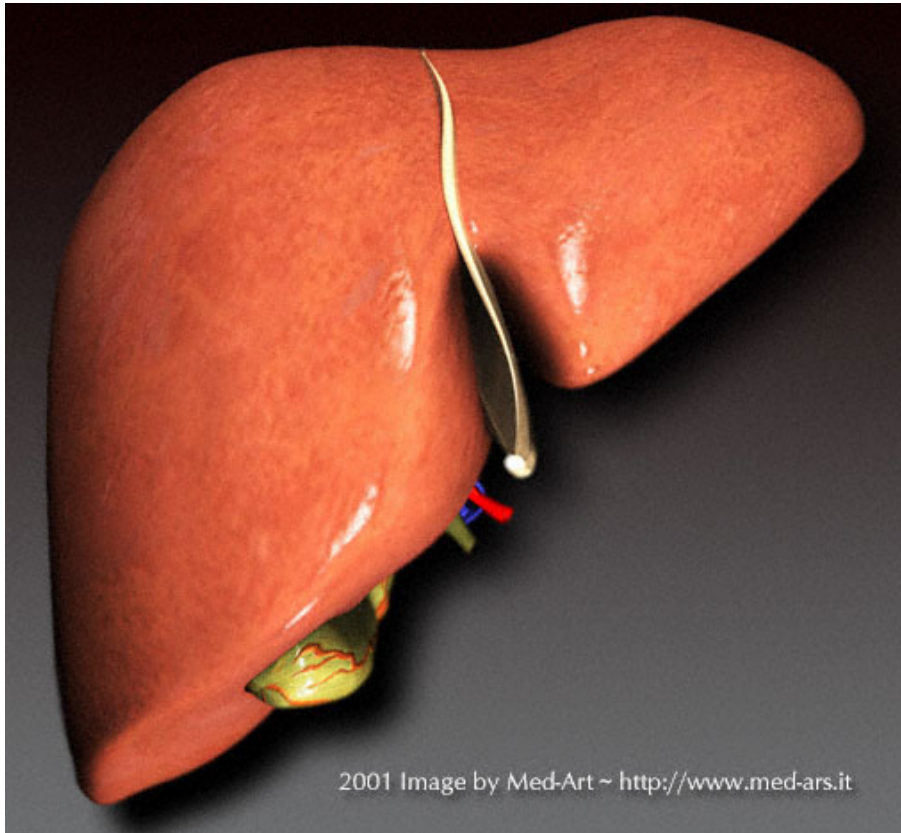


When to biopsy

- Biopsy selectively
- Indicated if tissue needed to guide Rx
 - to establish initial diagnosis of malignancy
 - Distinguish primary cancer site
 - Non-tumour liver if liver function an issue



Liver lesions



Liver cysts

- >90% asymptomatic
- >50% multiple
- Vast majority are benign
- If symptoms
 - Intra-cystic bleeding/mass effect
 - Consider drainage
- If ↑ growth or complexity consider MRI to characterize
- Polycystic liver disease
 - Assess for extra-hepatic disease



liver abscess

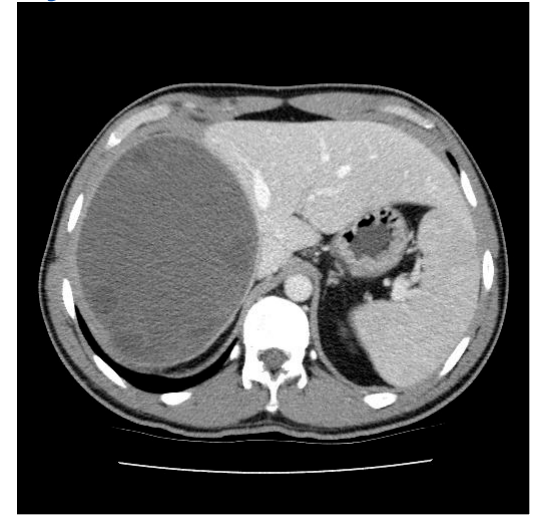


PLD

Complex liver cysts

- Often involuted simple cysts appear complex
- Infectious cysts
 - Hydatid cysts
 - Echinococcal cysts
 - Exposure to sheep/dogs
 - Fever and pain may be present
- Neoplastic cysts
 - biliary cystic neoplasms → rare
 - Cystic metastases occasionally

hydatid disease



neoplastic cyst



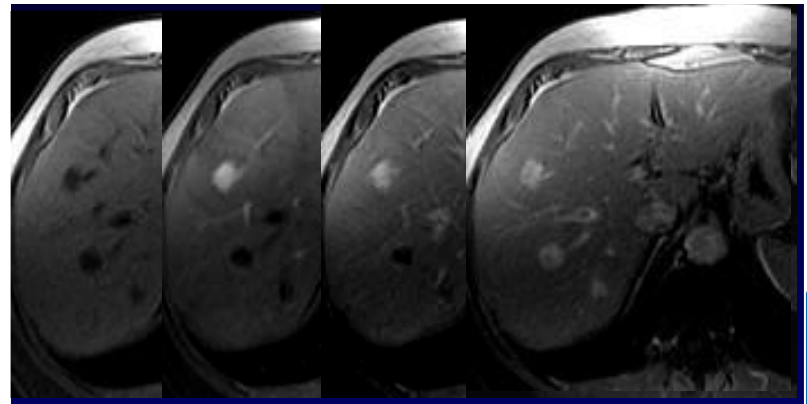
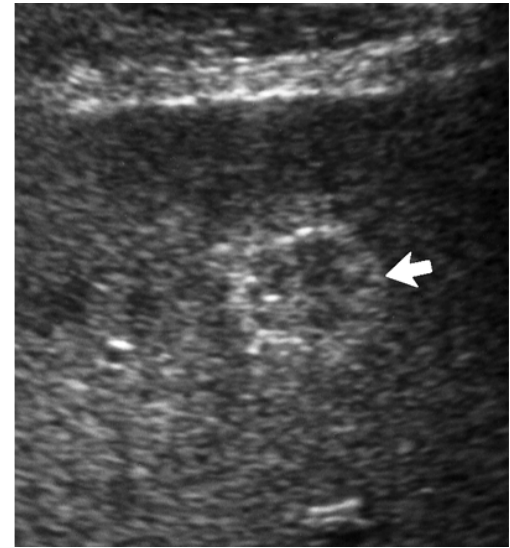
Solid benign lesion: Hemangioma

- most common liver neoplasm
- 20% population
- F:M 5:1
- always asymptomatic
- 20-30% multiple
- Typical features characteristics
 - sharply demarcated
 - peripheral nodular enhancement
 - centripetal filling



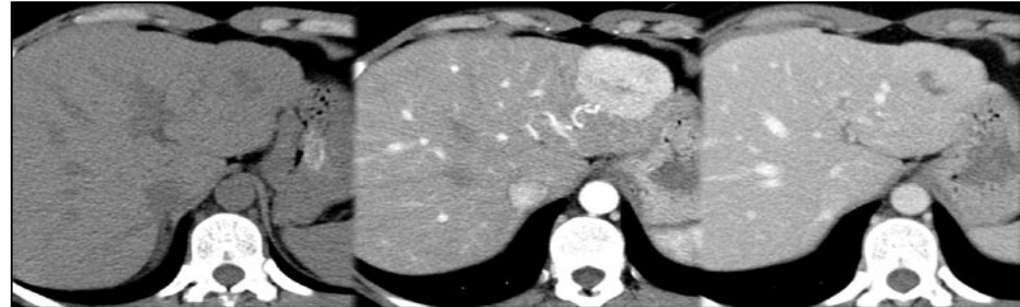
Hemangioma: Work up and treatment

- Ultrasound
 - diagnostic if healthy patient and no risk factors
- CT – liver contrast
 - often diagnostic
 - If classic features present → no F/U needed
- Beware of the atypical hemangioma
- MRI
 - accuracy 85-95%
 - confirmatory test for atypical lesions
- Rx: NO F/U required



Solid benign lesion: Focal Nodular Hyperplasia

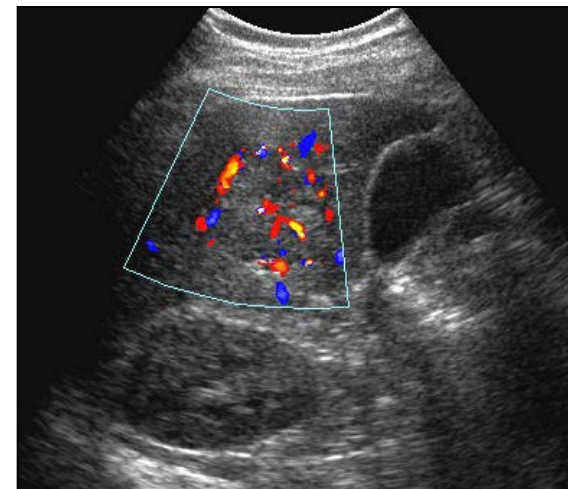
- benign, hyperplastic lesion
→ hamartoma?
- 3% population
- female: male 6:1
- FNH has
 - central stellate scar
 - tortuous feeding artery
 - homogenous arterial enhancement



Pre

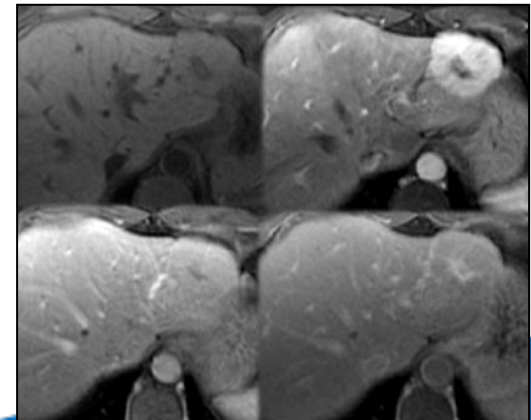
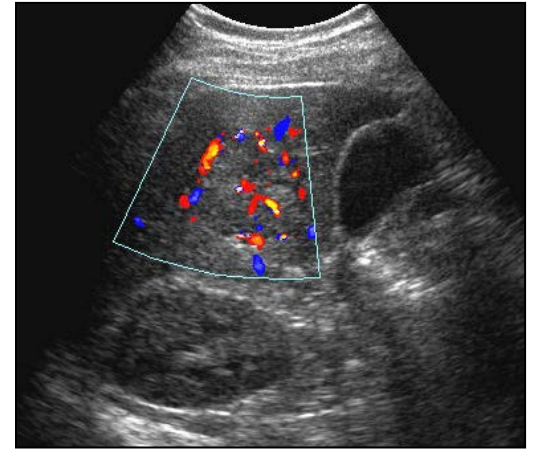
AP

PVP



Focal Nodular Hyperplasia

- FNH can be confused
 - adenoma
 - fibrolamellar HCC
 - Typical HCC
- US and CT are NOT diagnostic
- FNH must be confirmed with MRI
- MRI accuracy 70-90%
- sometimes biopsy needed



Solid benign lesion: Hepatic adenoma

- benign hepatocyte tumour
 - uncommon $1/10^6 - 4/10^5$
 - 44% have symptoms
 - 30% multiple
 - Premalignant (β -catenin mutation)
- associated with
 - OCP use / anabolic steroids
 - obesity
 - storage diseases (Glycogen Storage Types 1 And 3)
- **** potential for rupture and malignant transformation**
- MRI to characterize
- biopsy usually required



Solid benign lesion: Hepatic adenoma

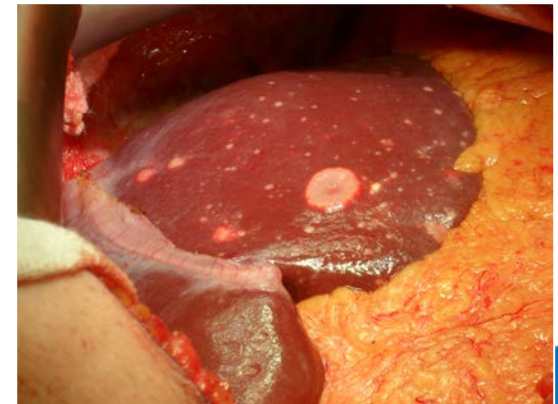
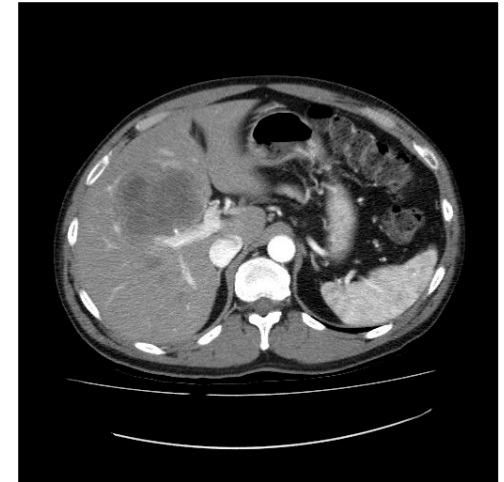


■ Treatment

- Stop exogenous hormones
- Refer for surgical resection
 - If bleeding → urgent embolization +/- surgery
- Expectant management an option for small adenomas¹
 - < 3 cm, no high risk features (beta-catenin mutated, inflammatory, undifferentiated subtype, hypervascular)
 - Surveillance → Imaging and AFP q6 mo X 2 yrs, then qyr
- Treatment for > 3cm
 - Ablation, RFA, resection

Solid malignant lesion: Metastases

- most common malignancy in liver
- often multiple
- appearance depends on primary
 - most hypoattenuated: adenocarcinoma
 - hypervascular: neuroendocrine, renal, melanoma, other
- workup depends on clinical setting
 - often biopsy NOT required for new lesions in recent cancer patient
- Treatment depends on primary cancer



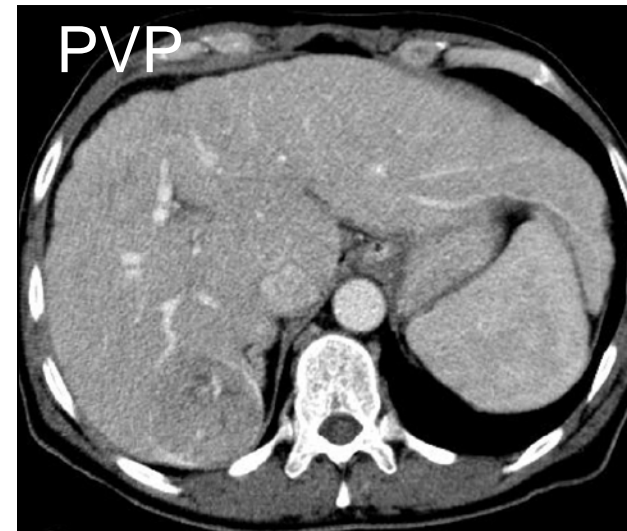
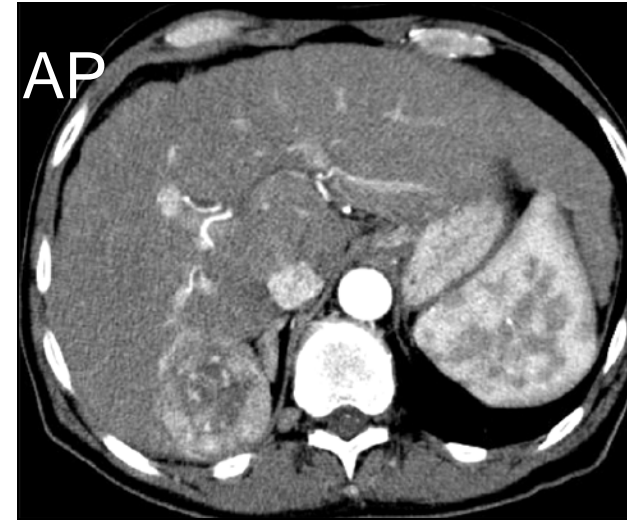
Solid malignant lesion: Hepatocellular carcinoma

- Increasing incidence due to
 - Hep C, fatty liver disease (NASH)
 - Improved screening for cirrhosis
- majority have liver disease
- hyperplastic → dysplastic → malignant
- difficult to differentiate between dysplastic nodule and HCC
- Usual variants have atypical imaging
 - HCC-cholangiocarcinoma variant
 - atypical imaging
 - Worse prognosis
 - Fibrolamellar HCC

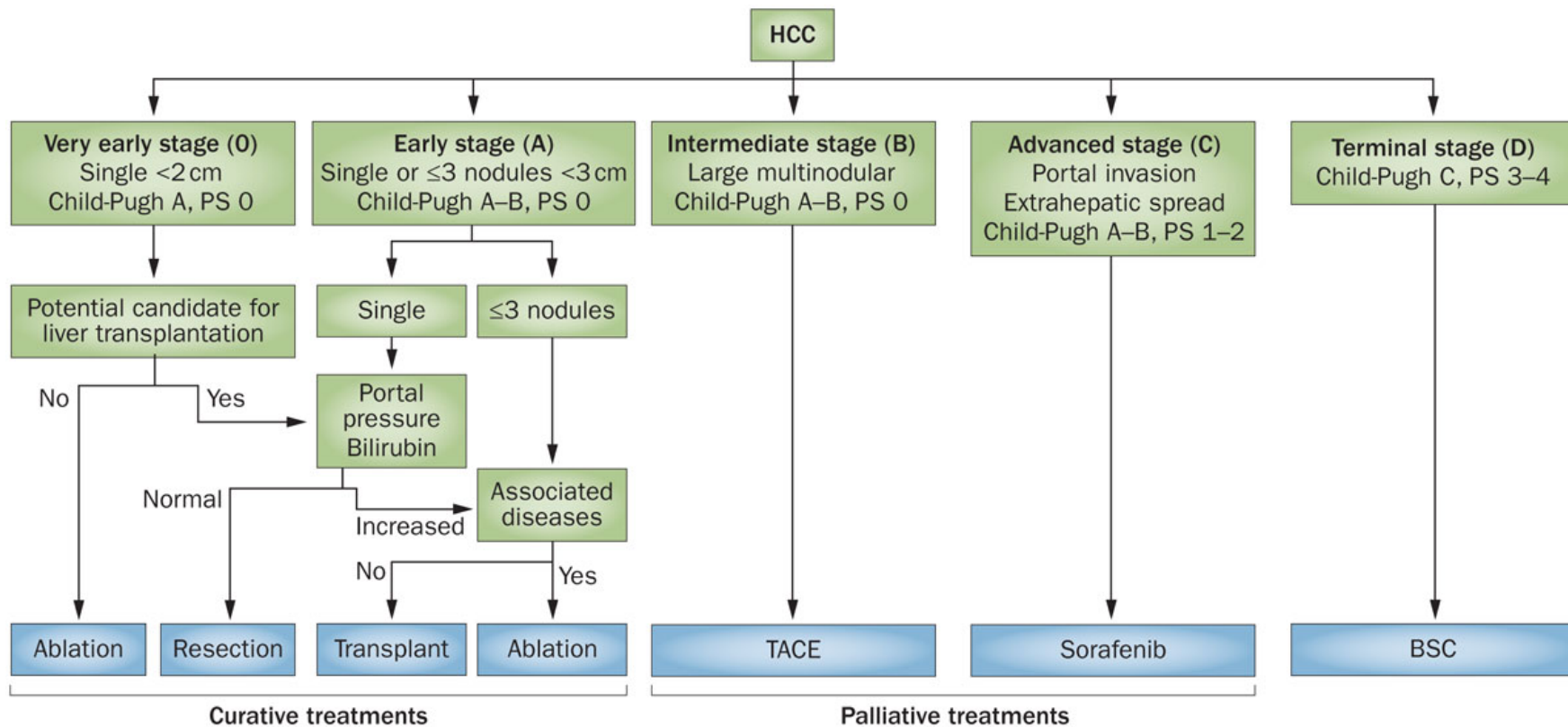


Hepatocellular carcinoma

- Imaging characteristics
 - Signs of cirrhosis
 - Arterial enhancement with venous 'washout'
 - Often multifocal
- Typical imaging + AFP are definitive
 - Biopsy often NOT required
- Rx: depends on liver function and tumour stage
 - Surgery only for Childs A, no portal hypertension

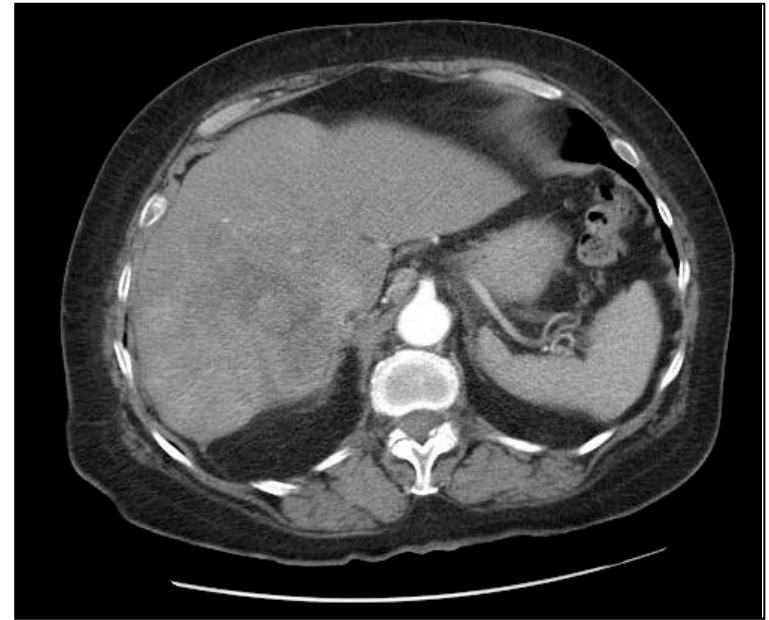


Management of HCC: BCLC algorithm¹



Solid malignant lesion: cholangiocarcinoma

- usually single hypoattenuated lesion
- Klatskin type if jaundice and biliary obstruction at bifurcation
- US/CT/MRI suggest adenoCA
- metastatic W/U usually required
 - CT chest, OGD/, colonoscopy, mammogram
- biopsy may be required
 - IHC → CK-7 + positive, CK 20-



Cholangiocarcinoma treatment

- Treat jaundice +/- cholangitis if present
- Surgical resection if resectable
- Role of adjuvant chemo +/- XRT
 - No good evidence
 - Gem/Cis considered for Stage III
 - XRT if positive margins
- Liver transplantation (Mayo protocol)
 - < 3cm localized klatskin tumour
 - Unresectable or liver disease

Radiologic features of common liver lesions

	US-US doppler, contrast ultrasound	Triphasic CT	MRI	PET SCAN	CT-angiography
Hemangioma (1-10 cm)	++ Hyperechoic Doppler: low flow, low index, absence of spectral broadening	+++ Peripheral puddles, fill in from periphery, enhancement on delayed scan	++++ Peripheral enhancement centripetal progression Hyperintense on T2, hypo intense on T1 SS > 95%, SP 95%	No uptake	+++ Cotton wool pooling of contrast, normal vessels without AV shunt, persistent enhancement Normal finding
Focal fatty liver	+ Hyper echoic, no mass effect, no vessel displacement	++ Sharp interface Low density (< 40 u)	+++	No uptake	
FNH (< 3 cm)	+ Homogenous iso, hypo, or hyper echoic, central hyper echoic area Central arterial signal Doppler: high flow, spectral broadening	++ Homogeneous enhance strongly with hepatic arterial phase Isodense with liver; Central low density scar	++++ Hyper vascular +Gd Isodense T1 Hyper intense scar T2 SS > 95%; SP > 95%	No uptake	+++ Hyper vascular 70% centrifugal supply
Adenoma (5-10 cm)	+ Heterogeneous Hyper echoic If haemorrhage: anechoic center In doppler: variable flow, spectral broadening	++ Homogenous > Heterogeneous, Peripheral feeders filling in from periphery	++ Capsule, Hyper intense in T1 (intra lesional fat)	No uptake uptake if degeneration to HCC	++ Hyper vascular Large peripheral Vessel Central scar if haemorrhage
HCC	+ Hypo or hyper echoic Doppler: hyper vascular Doppler: index and flow high, spectral broadening	+++ Hyper vascular, often irregular borders Heterogeneous > Homogeneous abnormal internal vessel Hallmark is venous washout SS 52%-54%	+++ Hyper vascular Poor different: Hypo intense T-1, Hyper intense T2 Well different: Hyper intense T-1, Iso intense T-2 SS 53%-78%	+ Increased uptake, but many HCCs show no uptake at PET	++++ Hyper vascular Av shunting Angiogenesis
Cholangiocarcinoma	Bile duct dilatation if major ducts are involved. Intra-hepatic CCC: no bile dilatation	Hypo dense lesion. Delayed enhancement	Hypo intense T1 Hyper intense T2 MRCP is useful	Uptake ++ SS 93%	Hypervascular
Metastasis	+ ¹ SS 40%-70% hypo to hyper echoic; doppler; low index and flow; presence of spectral broadening	+++ SS 49%-74 % complete ring enhancement	+++ SS 68%-90 % Low intensity T-1 High intensity T-2	+++++ SS 90%-100%	++++ SS 88%-95% hyper vascular



Treatment with liver surgery

- HPB sub-specialization
- Surgeons now better oncologists
 - collaboration with cancer centers
 - ↑ use of neo-adjuvant therapy
- advanced technical toolbox
 - high volume experience
 - vascular resections now routine
 - minimization of complication rates

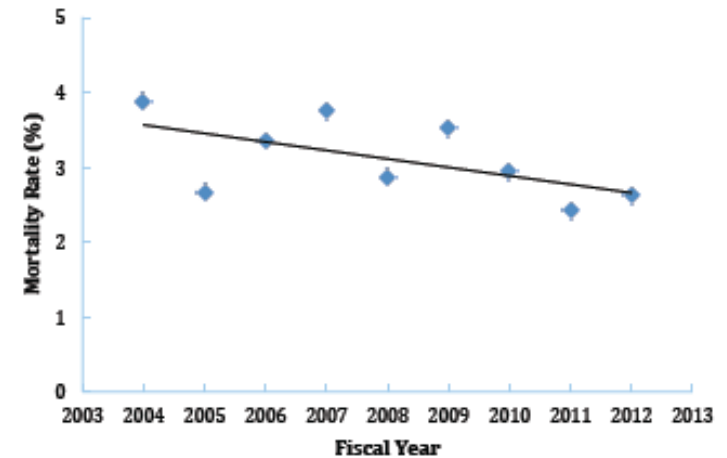


Figure 4.2.3g: Annual age-adjusted mortality rates for liver cancer surgeries (2004-12)

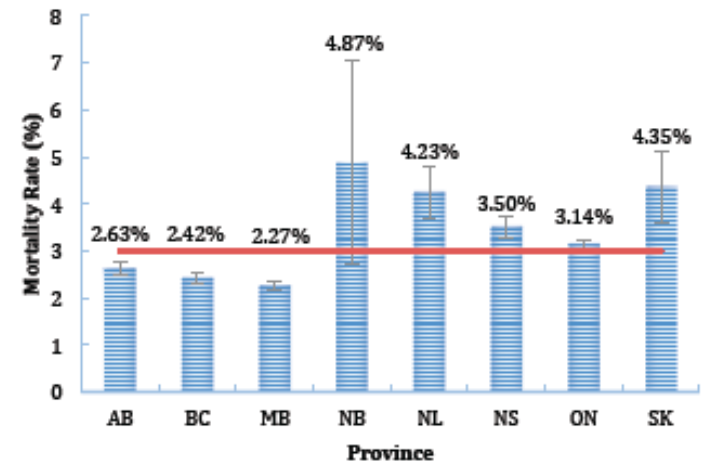
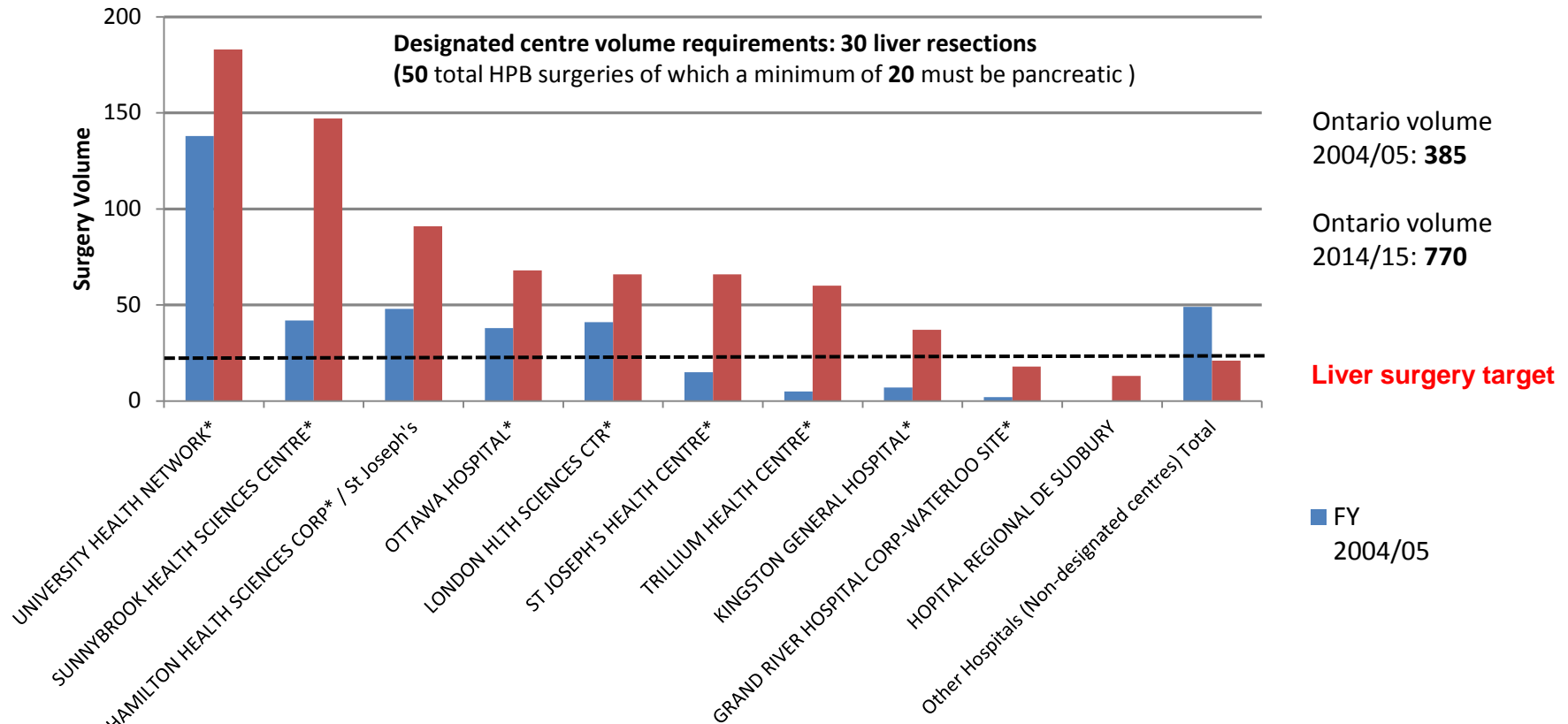


Figure 4.2.3h: Age-adjusted mortality rates for liver cancer surgeries (2004-12)

HPB surgery in Ontario

HPB Cancer Surgery Standards

Number of liver cancer surgeries by hospital corporation, fiscal years 2004/05 vs. 2014/15



Report date: July 2015

Data source: CSQI methodology, Discharge Abstract Database (CIHI) and National Ambulatory Care Reporting System (CIHI)

Prepared by: Cancer Care Ontario, Cancer Informatics

Notes:

* indicates designated centre

^ In 2010/11 St. Joseph's Healthcare Hamilton performed HPB surgery in partnership with Hamilton Health Sciences as a temporary measure until the standards could be fully implemented at one site. In 2011/12 HPB surgery has been consolidated

Conclusions

- Liver masses are commonly identified
- Imaging usually distinguishes between benign/malignant
- Selective biopsy for indeterminant lesions or when tissue is required for Rx
- Liver resection should be performed at an experienced centre



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Questions?



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