


# Incidental Focal Liver Lesions

*"FLLs" and "Incidentalomas"*

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## Disclosure

- The speaker regrets he has no conflicts to declare.

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## Objectives

- To characterize the focal liver lesion with confidence as either needing no or only routine follow-up.
- To determine which ones needing further, more rigorous exploration (including biopsy).
- Recognizing the fact that excluding malignancy is paramount.
- Managing some of these focal liver lesions thru primary care practice.



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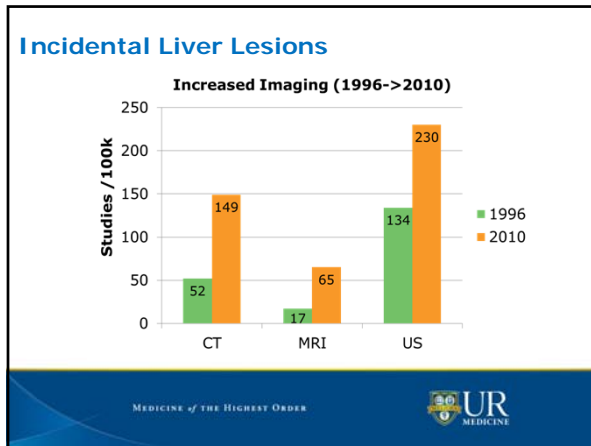
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### Final Diagnosis of Incidentally Identified Hepatic Lesions in Otherwise Well Patients

Lesion	Incidence(%)
<b>Benign</b>	
• Hemangioma	52
• FNH	11
• Adenoma	8
• Fatty infiltrate	8
• Other	4
Total	83
<b>Malignant</b>	
• HCC	6
• Metastasis	11
Total	17

FNH = focal nodular hyperplasia; HCC = hepatocellular carcinoma.  
 Little JM, Richardson A, Tah A. Hepatic dysplasia: a five-year experience. HPB Surg 1991;4:291-7.

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### Incidental Liver Lesions

- It is important to recognize that the range of diagnoses encountered will be related to the population under study.
- Benign conditions such as cholecystitis or renal colic are likely to have findings that mirror those of the general population.
- Malignant hepatic lesions will be greater in patients diagnosed with cancer, or disease screen for chronic liver disease.
- Thus, the radiographic finding and the clinical context must always be considered together to formulate an appropriate differential diagnosis.

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### Incidental Finding

52% non-cancer patients have benign liver lesion (autopsy)

*"Although most incidental findings prove to be benign, their discovery often leads to a cascade of testing that is costly, provokes anxiety, exposes patients to radiation unnecessarily, and may even cause morbidity"*

Washington K. In: Surgical pathology of the GI tract, liver, biliary tract and pancreas. 2nd ed. 2009; Casarella, WJ Radiology, 2002



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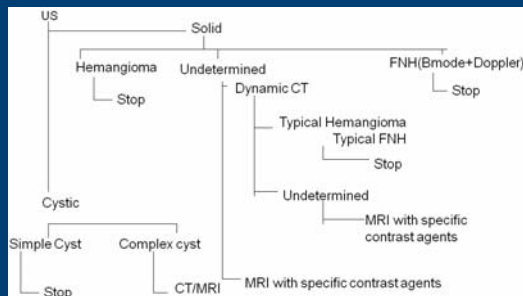
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### Simplified flow chart of imaging techniques used to study incidental liver lesions



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### Hepatic Cysts

- May be classified as:
  - Developmental
  - Infectious
  - Traumatic
  - Neoplastic
- Solitary or multiple
- Adjacent liver tissue is normal and free of fibrosis or inflammation
- 2-7% of the population
- Slightly more prevalent in women



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## Hepatic cysts

- Ultrasound is the best imaging method for characterizing these purely cystic liver lesions
- Well- defined homogenous cystic component
- Posterior acoustic enhancement
- Absence of a Doppler signal



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## Treatment of Hepatic Cysts

- Majority do not require treatment
- Monitor large cysts ( $\geq 4$  cm in diameter) periodically with U/S to assure that they remain stable
- Laparoscopic unroofing curative for simple cysts
- Enucleation for a cyst adenoma
- Formal hepatic resection for cystadenocarcinomas.

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## Hepatic Hemangioma

- Most common benign neoplasm of the liver (7% at autopsies)
- Second most common hepatic tumor, exceeded only by the metastases
- Affects all age groups
- Women > men, 1.5-5:1.
- Right lobe of the liver
- Few mm to > 20 cm
- Mesodermal in origin
- Histologically: Blood- filled cavernous vascular spaces of variable size and shape lined by single layer of flat endothelium
- They are usually stable, rarely increase or decrease in size

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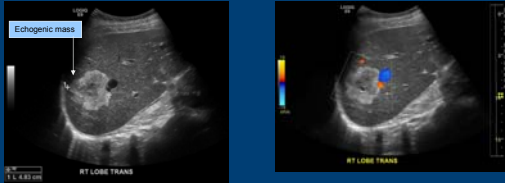
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## Hepatic Hemangioma

Characteristic U/S features:

1. Well- defined, homogenous, hyper echoic lesion
2. Posterior acoustic enhancement
3. No signal on color doppler



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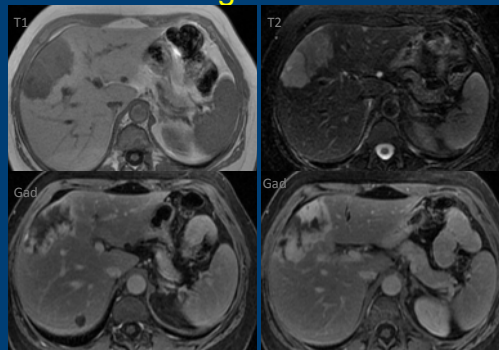
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## Hemangioma MRI



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Courtesy Dr. Shweta Bhatt

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## Treatment of Hepatic Hemangiomas

- Asymptomatic patients, particularly those with lesions < 1.5 cm, including those  $\leq 5$  cm, can be reassured and observed.
- Rapid growth of a Hemangioma has been reported, justifying close radiological follow up of patient with lesions >5 cm, particularly those in a sub capsular location.
- In the absence of symptoms, the risk of bleeding is too low to justify prophylactic resection.

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## Treatment of Hepatic Hemangiomas

- Patients who have pain or symptoms suggestive of extrinsic compression of adjacent structures should be considered for surgical intervention (liver resection, enucleation, hepatic artery ligation and liver transplantation).
- Non surgical techniques (hepatic artery embolization, radiotherapy and interferon alpha-2a) mainly in children.

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Guess?



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## Focal Fat vs. Fat Sparing



Focal fatty infiltration



Focal fatty sparing

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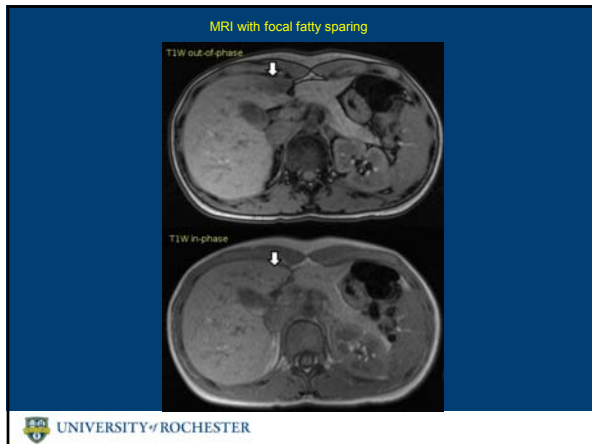
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### Focal Nodular Hyperplasia (FNH)

- A benign tumor like lesion containing a **highly vascularised central scar**.
- Predominantly in young females.
- The association with oral contraceptives/estrogens is not clearly established.
- No malignant potential and complications are also exceedingly rare.
- However, FNH shares some imaging features with other primary liver tumors including some of malignant origin (e.g. adenoma, hepato cellular carcinoma (HCC)), and thus a diagnosis of FNH must be unequivocal.

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### Focal Nodular Hyperplasia (FNH)

- An accurate diagnosis of FNH can be made from an ultrasound study showing:
  - homogenous, solid lesion of variable echogenicity
  - Absence of a peripheral hypo echoic rim (dark capsule)
  - Hyper echoic or hypo echoic central scar, displaying arterial vessels within the central scar on color coded Doppler
- When in doubt get a dynamic CT or MRI

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### Focal Nodular Hyperplasia - CT

NECT

CECT – arterial phase

Central scar

CECT-venous phase

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Courtesy Dr. Shweta Bhatt

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### Focal Nodular Hyperplasia - MRI

Hypo intense on T1

Hyper intense on contrast  
Central scar-hypo intense

Delayed scan  
Lesion-hypo intense  
Scar-hyper intense

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2000 by American Roentgen Ray Society

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### Focal Nodular Hyperplasia – Sample Case

36 yr old woman had scanning for abdominal pain

U/S: Hyper echic mass in right lobe of liver

Intense enhancement on CECT

Technetium sulfur colloid scan shows uniform uptake indicating that the FNH mass has Kupffer cells

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### Focal Nodular Hyperplasia – Sample Case

- If any of the features of FNH are lacking from CT or MRI images, a confident diagnosis is precluded and patients must undergo a more invasive diagnostic procedure, preferably a surgical biopsy.
- Image guided percutaneous biopsies can be inconclusive since it may not represent the overall histology of the tumor
- Surgical removal remains the treatment of choice in the case of an atypical diagnosis of FNH



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### Focal Nodular Hyperplasia – Treatment

- The natural history of FNH is one of stability and lack of complications
- Surgery for:
  - Rare, very symptomatic FNH
  - Highly suspicious lesion, which has eluded diagnosis by all other modalities



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### Hepatic Adenoma

- Benign tumor of hepatocellular origin
- Exceedingly rare compared with the previously described lesions
- Has a high propensity to bleed, rupture and may undergo malignant transformation.
- Can be difficult to distinguish from an extremely well differentiated hepato cellular carcinoma



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## Hepatic Adenoma

### Epidemiology:

- 3<sup>rd</sup> and 4<sup>th</sup> decade
- Female predominance- 2-6:1.
- Associated with use of oral contraceptives
  - Relative Risk (RR) of 2.5 after 3-5 yrs of use
  - RR 25-40 after 9 yrs of use
- Familial in maturity onset diabetes of the young and glycogen storage diseases, acromegaly ,androgen use
- Multiple in 20%, greater than 10 is adenomatosis

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## Hepatic Adenoma-Molecular Pathology

- Inflammatory- > 50%
  - T2 bright
  - + risk of HCC with  $\beta$ -catenin mutation (10%)
- Hepatocyte nuclear factor 1 $\alpha$ -inactivated, 35-40%
  - Diffuse fat
  - Very low risk of HCC
- $\beta$ -catenin-activated, 10%-15%, common in men
  - Absent fat, 45% risk HCC
- Unclassified-non-mutated 5-10%
  - No fat, no inflammation, no increased risk of HCC

Biblic-Sage P et al Dig Surg 2010; Laumonier H,et al. Hepatology 2008;Warther Z, Jain D. Pathology Research International 2011

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## Hepatic Adenoma

### Clinical features

- Usually asymptomatic
- May have abdominal pain or discomfort
- Propensity to rupture
  - Intra hepatic hemorrhage and pain
  - rarely hemoperitoneum and shock
- May decrease in size after withdrawal of oral contraceptives

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## Hepatic Adenoma



Giant hepatic adenoma

 UNIVERSITY of ROCHESTER Courtesy American Journal of Gastroenterology

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## Hepatic Adenoma

- Diagnosis is based upon clinical setting, a combination of imaging studies, and/or surgical resection
- A biopsy of aspirate is generally not recommended because of hepatic adenomas are associated with increased risk of bleeding and a needle biopsy is often non diagnostic
- A common dilemma is the differentiation of a hepatic adenoma from focal nodular hyperplasia

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## Hepatic Adenoma

- Ultrasonography: Nonspecific.
- Often large and in the right lobe of the liver
- Usually hyper echoic in relation to the surrounding liver parenchyma
- Given the tendency for these lesions to bleed, there is often a central hypo echoic region, which corresponds to hemorrhage
- Contrast enhanced ultrasound may improve accuracy compared with standard ultrasound

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### Metastatic Liver Lesions

- In Western countries, metastatic liver tumors are the most common malignant hepatic neoplasm
- In patient known to have extra hepatic malignancy, it is usually necessary to clarify if a hepatic lesion might be metastatic in origin, which typically requires a biopsy
- However, histologic confirmation is not always essential if reasonable certainty can be achieved with imaging studies or in settings in which there would be little benefit to the patient to establish a firm diagnosis

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### Metastatic Liver Lesions– Colon Cancer

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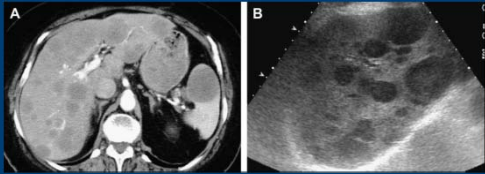
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### Metastatic Liver Lesions- Carcinoid



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Courtesy Dr. Shweta Bhatt

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### Metastatic Liver Lesions

- Resectable colo rectal cancer metastases are defined simply as tumors that can be resected completely, leaving an adequate liver remnant
- Most surgeons would require that there be no radiographic evidence of involvement of the hepatic artery, major bile ducts, main portal vein, or celiac/para aortic lymph nodes and adequate predicted functional hepatic reserve post resection.

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### Hepato Cellular Carcinoma (HCC)

- History of risk factors for chronic liver disease, viral hepatitis, metabolic liver diseases such as hereditary hemochromatosis, non alcoholic steatohepatitis and alcohol abuse
- Physical examination: Peripheral stigmata of cirrhosis or decompensated liver disease, which should raise suspicion for HCC
- The diagnosis can be difficult, and often requires the use of serum markers, one or more imaging modalities, and histologic confirmation

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## Hepato Cellular Carcinoma (HCC)

- It can be challenging to distinguish HCC from regenerative or even dysplastic nodules in patients with cirrhosis
- MRI is currently the modality of choice in such settings since distinctions can sometimes be made based upon the enhancement pattern and the presence of iron in regenerative nodules

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## Hepato Cellular Carcinoma (HCC)

- Serum AFP is normal in the majority of patients with fibro lamellar HCC and in up to 40% of HCC of patients.
- Biopsy is often not required for diagnosis
- A central scar (typical of focal nodular hyperplasia) can also be seen in patients with fibro lamellar HCC

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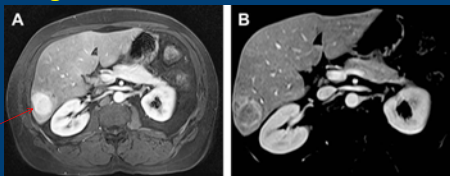
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## HCC Diagnosis



Early arterial phase and washout in the delayed venous phase of hepatic tumor. (A) arterial phase enhancement; (B) early washout; (C) delayed washout

Manuel Mendizabal, MD.  
K. Rajender Reddy, MD  
Med Clin N Am 93  
(2009) 885-900  
Kim T, Murakami T,  
Takahashi S, et al.  
Optimal phases of  
dynamic CT for detecting  
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carcinoma: evaluation of  
unenhanced and triple-  
phase images. *Abdom  
Imagng.* 1999;24:473-  
480.

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**HCC - Management**

Barcelona Clinic Liver Cancer Staging and Treatment Strategies

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Llovet JM, et al. Lancet 2003; 362: 1907-17

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**“Sub-centimeter” liver lesions?**

- With increased resolution of CT and MRI has come an increased detection of small nodules: 17% of patients with or without known previous malignancies may display small liver nodules ≤ 10 mm in diameter which are difficult or even impossible to characterize adequately
- The majority of these small lesions are benign, such as tiny liver cysts or hamartomas, but they can also be malignant

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**“Sub-centimeter” liver lesions?**

- Small nodules are generally invisible on most ultrasound examinations
- It is advisable to obtain a new control examination after about 3-4 months.
- Any intervening growth may justify the use of another diagnostic procedure, such as an image guided per cutaneous biopsy

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### Incidental Focal Liver lesions: Conclusions

- Incidental liver lesions on medical imaging are relatively common and the vast majority are benign.
- The choice of and need for further investigation when a focal liver lesion is identified depends on several patient factors and characteristics of the lesion on initial imaging.
- Ultrasound is used as a primary screening modality, but in several instances, CT or MRI act as the "problem-solving" technique.
- MRI is superior to CT for focal liver lesion characterization as a result of its high intrinsic contrast resolution and potential use of different types of contrast agents, both specific and non specific.
- Sub centimeter nodules continue to be a diagnostic dilemma demanding a close imaging examination, which depends largely on the clinical situation of the patient.
- Biopsy may be needed where imaging fails to characterize a lesion adequately.

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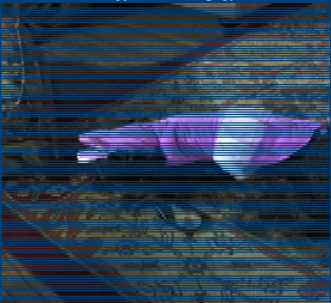
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## Thank You



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### References

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- Characteristics of common solid liver lesions and recommendations for diagnostic workup: *World J Gastroenterol* 2009 July 14; 15(26): 3217-3227.
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- UpToDate: 2012
- CT and MR Imaging Findings in Focal Nodular Hyperplasia of the Liver: Radiologic-Pathologic Correlation. *AJR*:175, September 2000

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