

### Serum Aminotransferases Levels Exceeding 500 IU/L

- Acute viral hepatitis
- Drug or toxic liver injury
- Ischemic hepatitis
- Severe C.A.H.
- CBD stone
- Budd Chiari and V.O.D.
- Acute Fatty Liver of Pregnancy and HELLP
- Wilson's disease



### Serum Aminotransferases

- AST : ALT greater than 2
- Both less than 300 IU/L

Characteristic of alcoholic liver disease



### Serum Aminotransferases Normal or Minimal Elevations Despite Advanced Liver Disease

- Chronic HCV
- Idiopathic genetic hemochromatosis
- NAFLD



### Serum Aminotransferases

AST and ALT elevated

Comprehensive blood  
work-up unrevealing

Liver biopsy normal

Suspect \_\_\_\_\_!



### A Quiz !

- |   |   |
|---|---|
| 1. 42 year old "social drinker"<br>with hepatomegaly                        | A. AST = 2700 IU/L<br>ALT = 3874 IU/L     |
| 2. 48 year old alcoholic with a<br>recent history of headaches              | B. AST = 88 IU/L<br>ALT = 41 IU/L         |
| 3. 26 year old with WPW syndrome<br>and a prolonged bout of<br>palpitations | C. AST = 19,420 IU/L<br>ALT = 16,748 IU/L |



### Celiac Sprue Can Cause Chronic "Unexplained" ALT Elevations

- 140 consecutive patients with a comprehensive negative serologic work-up studied.
- 13 patients (9.3%) had positive antigliadin and antiendomysial antibody tests. Duodenal biopsies consistent with sprue.
- Liver biopsies revealed non-specific changes.
- ALT and AST usually normalize on a gluten free diet.

Bardella MT, et al. Hepatology 1999; 29, 65



## Four Causes of “Unexplained” ALT (SGPT) Elevations

1. Muscle Disease/Injury (CPK)
2. Celiac Sprue (TTG antibody)
3. Adrenal Insufficiency (Cortisol)
4. Thyroid Dysfunction (TSH)

MCAT



## Serum Alkaline Phosphatase Sources

1. Liver
2. Bone
3. Small intestine
4. Placenta
5. Other, e.g., Regan isoenzyme



## What does cholestasis mean?



## Serum Alkaline Phosphatase

- Patients with cholestasis have increased levels
- Level not helpful in distinguishing intrahepatic from extrahepatic cholestasis
- Rarely patients with hypernephroma and Hodgkin's have elevated levels in absence of liver involvement
- Patients with Wilson's disease often have normal or below normal values



## Rare cause of elevated Alkaline Phosphatase

Cholestasis may be seen rarely in patients with hypernephroma as part of a paraneoplastic syndrome.

This is referred to as nephrogenic hepatic dysfunction syndrome or Stauffer's syndrome.

The cause is unknown but may relate to secretion of IL-6.



## Rare Causes of Jaundice in Adults

1. Hypernephroma
2. Hodgkin's (paraneoplastic phenomenon)
3. Amyloid
4. Hemobilia
5. Hepatic Artery Aneurysms
6. Bile Duct TB
7. Bile Duct Lymphoma
8. BRIC Syndrome



## Serum Bilirubin

- Indirect, direct, delta
- “Isolated” hyperbilirubinemia
- Prognostic indicator

Alcoholic hepatitis  
Halothane hepatitis  
PBC



## When Is Jaundice An Emergency?

1. Severe unconjugated hyperbilirubinemia in the newborn.
2. When patient has fulminant hepatic failure.
3. When patient has cholangitis.
4. When patient has massive hemolysis.



## Alcoholic Hepatitis

Discriminant Function Value  
Prothrombin time - Control x 4.6

plus

Serum bilirubin (in mg/dl)  
Value > 32, mortality 50% !



## Causes of low serum Albumin

1. Malnutrition
2. Liver disease
3. Nephrotic syndrome
4. Protein losing enteropathy



## Serum Globulins

- |                  |  |
|------------------|--|
| 1. Increased IgG | A. A young woman with abnormal LFT's and arthralgias                         |
| 2. Increased IgA | B. A 42 year old salesman with hepatomegaly, spider nevi and AST of 112 IU/L |
| 3. Increased IgM | C. A 57 year old white woman with hypothyroidism and pruritis                |



## Increased Serum Globulins Answers

- |                  |                           |
|------------------|---------------------------|
| 1. Increased IgG | Autoimmune Hepatitis      |
| 2. Increased IgA | Alcoholic Liver Disease   |
| 3. Increased IgM | Primary Biliary Cirrhosis |



## **Serum Ferritin Elevated**

1. Idiopathic genetic hemochromatosis
2. Hepatocellular necrosis
3. Hodgkin's
4. Leukemia
5. Hyperthyroidism
6. Uremia
7. Rheumatoid arthritis



## **Cirrhosis is Very Unlikely in a Patient with Hemochromatosis If:**

1. Patient <40 years old
2. No Hepatomegaly
3. Ferritin <1000
4. Normal AST and ALT



## **Remember**

- Serum ferritin may be normal in pre-cirrhotic hemochromatosis.
- A patient with a ferritin in excess of 10,000 may turn out not to have hemochromatosis.



## **Liver Ultrasound**

**Hepatic lesions**

**Ascites**

**Gallstones**

**Jaundice**



## **Gallstones: Ultrasound**



## **Computed Tomography**

**Hepatic lesions**

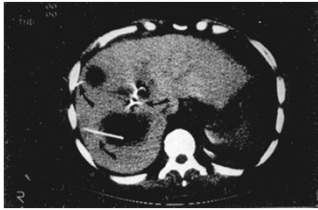
**Jaundice**

**Budd-Chiari syndrome**

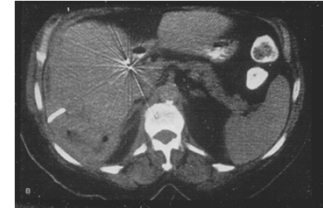
**Iron overload**



## Utility of CT: Liver Abscess

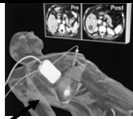
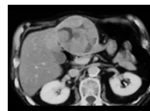


## Utility of CT: Liver Abscess

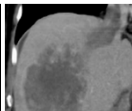
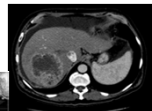


## The Roles of Imaging

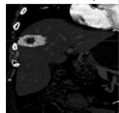
• Detect



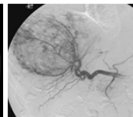
• Diagnose



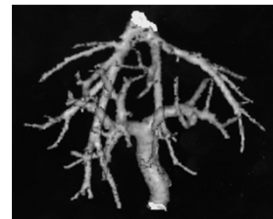
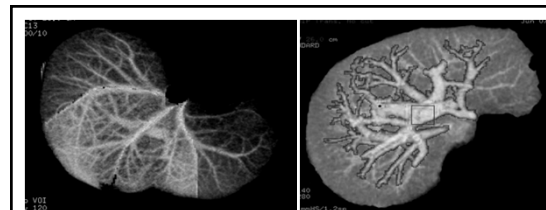
• Stage



• Plan treatment



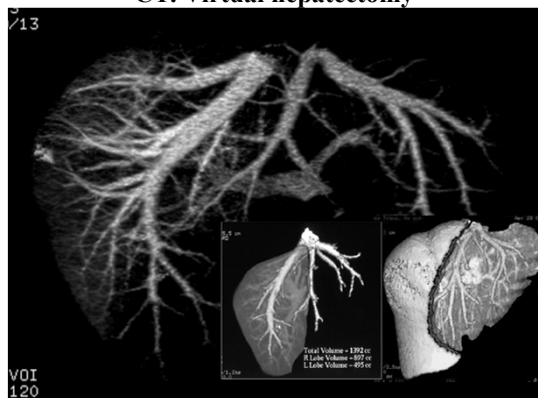
• Treat



Contemporary CT  
scanning helps plan  
surgical approach

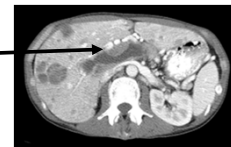


## CT: Virtual hepatectomy

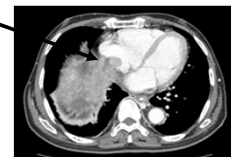


## “Ominous” imaging features

• Tumor thrombus



• Caval extension

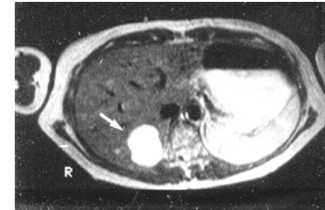


## **Magnetic Resonance Imaging (MRI)**

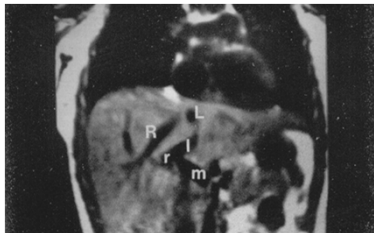
- Hepatic metastases
- Vascular lesions, e.g., hemangioma
- Hepatic and portal vein
- Iron overload



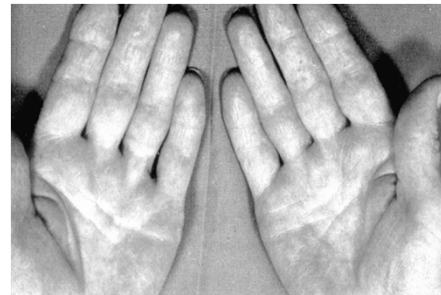
## **MRI: Hepatic Hemangioma**



## **MRI: Clarity of Vascular Structures**



## **Stigmata of Chronic Liver Disease**



## **Stigmata of Chronic Liver Disease**



## **A Medical Limerick !**

**An older Miss Muffett  
Decided to rough it  
And lived upon Whiskey and Gin  
Red hands and a spider  
Developed outside her  
Such are the wages of sin**

*Dr. Bean*



Continued ...

But in spite of the teacher, physician  
and preacher,  
She could not be made to believe  
Icteric, anemic and hyperlipemic  
She developed the syndrome of Zieve !



## Rupture of Umbilical Hernia



## Alius Tementi Aqualiculo Mortem Parturit

That one, with his swollen belly,  
is pregnant with his own death.

St. Jerome, c. 347 - 419 C.E.



## 34 year old woman

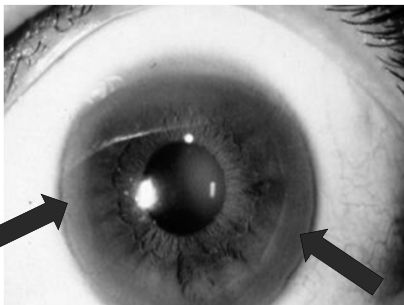
<u>DATE</u>	<u>Serum Alk Phos</u>
• 1/13/99	19 (normal 40-118 IU/L)
• 2/24/00	18
• 4/13/00	168
• 6/29/00	262
• 2/1/01	16

Each lab value is...

**WHAT'S THE DIAGNOSIS ?**



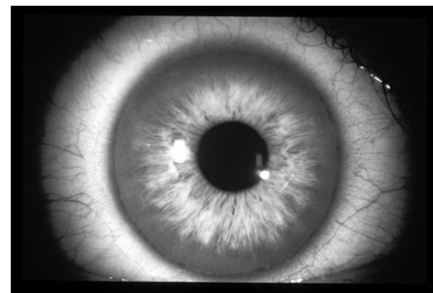
## Eye Findings in Wilson's Disease



K-F Ring



## Sunflower Cataract in Wilson's Disease



## Is Liver Biopsy the Gold Standard?

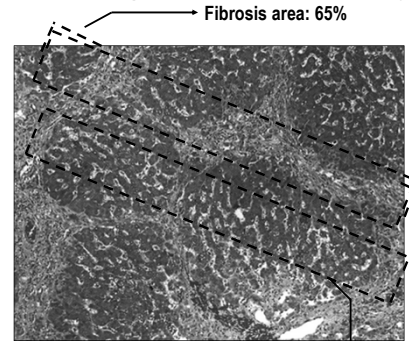
Liver biopsy has been considered to be the Gold Test.

However, it is invasive, subject to sampling and on rare occasions there can be serious complications.

Is there a non-invasive alternative to evaluating the degree of hepatic fibrosis?



## Sampling error of liver biopsy



Fibrosis area: 15%

Fibrosis area: 65%

Courtesy of M. Pinzani, Florence



## Fibrotest (fibrosure)

Alpha 2 macroglobulin, haptoglobin, gammaglobulin, GGT, total bilirubin, apolipoprotein A1

The severity of disease was correctly identified in 46% of patients.

Am J Gastroenterol 2006

**Fibrosure. I am not so sure!**



## Fibroscan

Examination time < 5 minutes

Median value of 10 successful acquisitions

Sampling error

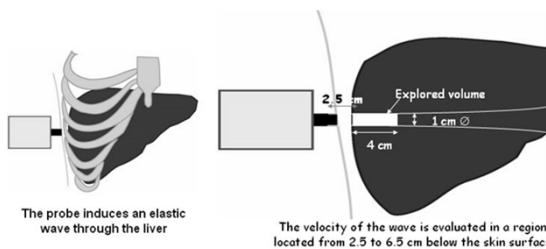
- Biopsy – 1/50,000
- Fibroscan – 1/500

Courtesy of N. Afdhal, MD



## Hepatic Elastography

- Fibroscan is a rapid and non-invasive measure of hepatic stiffness
- Hepatic stiffness correlates with fibrosis



The probe induces an elastic wave through the liver

The velocity of the wave is evaluated in a region located from 2.5 to 6.5 cm below the skin surface

**Sampled volume: 1: 500**



Courtesy N. Afdhal, MD

## Sampling

- Liver biopsy samples only 1/50,000<sup>th</sup> of whole liver.
- Fibroscan samples 1/500<sup>th</sup> of whole liver.





## Advantage of Fibroscan

- Liver transient elastography obviates the need for inaccurate and invasive liver biopsies
- The actual stiffness score can provide us with an accurate glimpse of staging cirrhosis on a continuum



## Emerging Scenario

