

# Autoimmune Hepatitis

- Chronic hepatitis with immunologic abnormalities**
- Histologic features are similar to chronic viral hepatitis**
- Indolent or severe course**
- Dramatic response to immunosuppressive therapy**



## **Features:**

- 1-Female predominance (70%)**
- 2-Negative serology for viral Ags.**
- 3-↑serum Ig (>2.5 g/dl)**
- 4-High titers of autoantibodies (80% of cases)**
- 5-The presence of other autoimmune diseases as RA, thyroiditis, sjogern syndrome, UC in 60% of the cases**



## **The type of autoantibodies**

### **1-Antismooth muscle abs**

**anti actin**

**anti troponin**

**anti tropomyosin**

### **2-liver/kidney microsomal Abs**

**anti cytochrome P-450 components**

**anti UDP-glucuronosyl  
transferases**

### **3-Anti – soluble liver / pancreas antigen**



## **Outcome**

**Mild to severe chronic hepatitis**

**Full remission is unusual**

**Risk of cirrhosis is 5% which is the main cause of death**



# Nonalcoholic Fatty Liver Disease

## Types:

**1. Steatosis ( Fatty liver)**

**2. Steatohepatitis**

**hepatocyte destruction**

**parenchymal inflammation**

**progressive pericellular fibrosis**



## **Predisposing factors :**

**1-Type 2 DM**

**2-Obesity : body mass index**

**> 30 kg /m<sup>2</sup> in caucasians**

**> 25 kg /m<sup>2</sup> in Asians**

**3-Dyslipidemia ( ↑ TG, ↑ LDL, ↓ HDL)**



# Pathogenesis

## . **Metabolic syndrome**

- . Insulin resistance
- . Obesity
- . Dyslipidemia

## . **Mechanism of fatty accumulation**

1. Impaired oxidation of fatty acids
2. Increased synthesis & uptake of FFA
3. Decreased hepatic sec. of VLDL

- . ↑TNF , IL6 , chemokine → liver inflammation & damage



# Clinically

- NAFLD is the most common cause of incidental ↑ in transaminases
- Most pts. are asymptomatic
- Non-specific symptoms
  - Fatigue, malaise, RUQ discomfort
- Severe symptoms
- Liver Bx is required for dx.
- NAFLD m.b a significant contributor to cryptogenic cirrhosis





# Hemochromatosis

- .Excessive accumulation of body iron  
(liver & pancreas)**
- 1ry or 2ry (genetic or acquired )**



## **Causes of acquired hemosidrosis :**

1-multiple transfusions

2-ineffective erythropoiesis ( thalassemia )

3-increased iron intake (Bantu sidrosis )

4-chronic liver disease



## **-Features:**

1-Micronodular cirrhosis (all patients)

2-D.M ( 75 – 80%)

3-skin prigmentation 75-80%)

4-cardiomegaly , joints disease, testicular atrophy



**Symptoms appear 5<sup>th</sup> – 6<sup>th</sup> decades  
not before age 40**

**-M:F ratio 5 - 7: 1**

**-Genetic hemochromatosis ( 4 variants)**

**-The most common form is aut. recessive  
disease of adult onset caused by  
mutation in the HFE gene on chr.6**



# Pathogenesis

- 1ry defect in intestinal absorption of dietary iron.
- Total body iron 2-6gm in adults 0.5gm in liver mostly in hepatocytes
- In disease >50gm Fe accumulated → 1/3 in liver



- In hereditary hemochromatosis there is a defect in regulation of intestinal absorption of dietary iron leading to net iron accumulation of 0.5 – 1 gm/yr**
- The gene responsible is HFE gene located on chr.6 close to HLA gene complex**
- HFE gene regulates the level of hepcidin hormone synthesized in liver**
- Hepcidin → (-) Fe. absorption from intestine**
- HFE gene deletion causes iron overload**



## **-Two mutation can occur in HFE gene:**

1-Mutation at 845 nucleotide → tyrosine substitution for cystine at AA 282  
( C282 Y )

2-aspartate substitution for histidine at AA 63 ( H63D)

10% of pts. have other gene mutations



- Carrier rate for C282Y is 1/70
- Homozygosity is 1/200
- 80% of pts. are homozygous for (C282Y) mutation & have the highest incidence of iron accumulation
- 10% of pts. are either homozygous for H63D mutation or compound heterozygous for C282Y/H63D mutation





**Excessive Fe deposition → toxicity of the tissues :**

- 1. Lipid peroxidation**
- 2. Stimulation of collagen formation**
- 3. DNA damage**



## **Morphological changes:**

### **1-Deposition of hemosiderin in different organs**

Liver

Pancreas

Myocardium

Pituitary

Adrenal

Thyroid & parathyroid

Joints

Skin

### **2-Cirrhosis**

### **3-Pancreatic fibrosis**



- No inflammation
- Fibrosis
- Cirrhosis
- Synovitis
- Polyarthritits(pseudogout)
- Pigmentation of liver
- fibrosis of pancreas & myocardium
- Atrophy of testes



# Clinical presentation

M:F 5 – 7 :1     5 – 6 the decades

Hepatomegaly

Abdominal pain

Skin pigmentation

D.M

Cardiac dysfunction

Atypical arthritis

Hypogonadism

↑serum Fe ferritin

HCC 200x ↑in the risk



# Wilson Disease

- aut. Recessive disorder of Cu metabolism
- mutation in ATP7B gene on chr. 13 which encodes an ATPase metal ion transporter in Golgi region
- > 80 mutations
- Gene freq. 1:200
- Incidence is 1:30000



# Pathogenesis

Main source of Cu is from diet



Absorption of ingested Cu ( 2-5 mg/d)



Complex with albumin



Hepatocellular uptake



Incorporation with  $\alpha$ -2-globulin to form

**Ceruloplasmin**





Sec. into plasma  
(90 – 95% of plasma Cu)



Hepatic uptake of ceruloplasmin



Lysosomal degradation



Secretion of free Cu into bile



- In Wilson disease absorbed Cu. Fails to enter the circulation in the form of ceruloplasmin & the biliary excretion of Cu. is ↓
- Defective function of ATP-7B  
→ failure of Cu. excretion into bile & inhibits sec. of ceruloplasmin into the plasma  
→ Cu. accumulation in liver





**-↑Cu. Accumulation in the liver results in:-**

**1-Production of free radicals**

**2-binding to sulfhydryl groups of cellular proteins**

**3-displacement of other metals in hepatic metalloenzymes**



- By the age of 5yrs. Cu. Spills over to circulation causing hemolysis & involvement of other organs as brain & cornea also kidneys, bones joints & parathyroid glands**
- Urinary exc. Of cu. ↑**



# Morphology

## Liver

1-Fatty change

2-Acute hepatitis

3-chronic hepatitis

4-cirrhosis

5-massive hepatic necrosis

( rhodanine stain or orcein stain )



## **Brain:**

**Toxic injury to basal ganglia esp. the putamen causing atrophy & cavitation**



Eye:

**kayser- fleischer rings**

green – brown depositis of Cu. in  
descemet membrane in the  
limbus of the cornea

**(hepatolenticular  
degeneration)**



- **Clinically**

- Presentation > 6 yrs of age**

- Most common presentation is acute or chronic hepatitis**

- Neuropsychiatric presentation can occur**  
**behavioral changes**

- Frank psychosis**

- Parkinson disease- like syndrome**



- **DX**

- 1- ↓ in serum ceruloplasmin level
- 2- ↑ in urinary exc. Of Cu.
- 3- ↑ hepatic content of copper  
> 250 mg/gm dry wt.



# $\alpha$ -1-Antitrypsin Deficiency

- **Aut. Recessive disorder**
- **freq. 1:7000 in N. american white population**
- **$\alpha$ -1-antitrypsin is a protease inhibitor as elastase, cathepsinG , proteinase 3 which are released from neutrophils at the site of inflammation**
- **The gene pi. is located on chr. 14**
- **At least 75 forms of gene mutation are present**
- **The most common genotype is pi.MM present in 90% of individuals**
- **PiZZ genotype  $\rightarrow$   $\downarrow$  level of  $\alpha$ -1-antitrypsin in blood (only 10% of normal) are at high risk of developing clinical disease**





# Pathogenesis

- The mutant polypeptide (PiZ) is abnormally folded & polymerizes causing its retention in the ER of hepatocytes
- Although all individuals with Pizz genotype accumulate  $\alpha$ -1-AT-Z protein only 10% of them develop clinical liver disease . This is due to lages in ER protein degradation pathway

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- The accumulated  $\alpha$ -1-AT-Z is not toxic but the autophagocytic response stimulated within the hepatocytes appear to be the cause of liver injury by autophagocytosis of the mitochondria
- 8-10% of patients develop significant liver damage



# Morphology

-Intracytoplasmic globular inclusions in hepatocytes which are acidophilic in H&E. sections

-The inclusions are PAS-+ve & diastase resistant

-Neonatal hepatitis cholestasis & fibrosis

Chronic hepatitis

Cirrhosis

Fatty change

Mallory bodies

- Clinical features

-neonatal hepatitis with cholestatic jaundice appears in 10 – 20% of newborns with the disease

-Attacks of hepatitis in adolescence

-chronic hepatitis & cirrhosis

-HCC in 2- 3 % of Pizz adults ± cirrhosis



# **Reye's Syndrome**

**-Fatty change in liver & encephalopathy**

**-< 4 yr.**

**-3 – 5 d after viral illness**

**-↑liver & abn. LFT**

**Vomiting lethargy.**

**25% may go into coma**



# Pathogenesis

- Derangement of mitochondrial function along or in combination with viral infection & salicylate
- Microvesicular steatosis
- Brain edema
- Absent inflammation
- Sk. Muscles, heart, kidneys – fatty change



# **Budd – Chiari Syndrome**

- Thrombotic occlusion of the hepatic vein**
- Hepatomegaly**
- Wt.gain**
- Ascitis**
- Abd. Pain**



## **Causes:**

**1-PCV**

**2-Pregnancy**

**3-Postpartum**

**4-Oral contraceptive**

**5-PNH**

**7-Mechanical obstruction**

**8-Tumors as HCC**

**9-Idiopathic in 30% of the cases**

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- **Morphology**

- Swollen liver , red with tense capsule

- centrilobular congestion & necrosis

- Fibrosis

- Thrombi

- Clinically

- Mortality rate is high if not treated





# Primary sclerosing cholangitis

- Inflammation , obliterative fibrosis, & segmental dilation of the obstructed intra hepatic & extra hepatic bile ducts
  - In PSC, UC coexists in 70% of patients
  - in patients of UC, 4% develop PSC
  - 3-5 the decades
- M: F 2:1**

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- asymptomatic pts.
- persistent ↑ serum alkaline phosphatase.
- fatigue, pruritis, jaundice, wt loss, ascitis, bleeding, encephalopathy
  
- antimitochondrial Abs < 10% of cases
- **Antinuclear cytoplasmic Abs** in 80% of cases



# Morphology

- Concentric periductal onion-skin fibrosis & lymphocytic infiltrate
- Atrophy & obliteration of bile ducts
- Dilation of bile ducts inbetween areas of stricture
- Cholestasis & fibrosis
- Cirrhosis, cholangiocarcinoma ( 10 – 15%)

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## **Pathogenesis**

- Exposure to gut derived toxins
- Immune attack
- Ischemia of biliary tree



## **Secondary biliary cirrhosis**

-Prolonged obst. To extrahepatic biliary tree

### **-Causes:**

1-cholelithiasis

2-biliary atresia

3-malignancies

4-strictures



# Primary biliary Cirrhosis

- chronic, progressive & often fatal cholestatic liver disease
- Non-suppurative granulomatous destruction of medium-sized intrahepatic bile ducts, portal inflammation & scarring



- Age 20-80yrs ( peak 40-50yrs)**
- F>M**
- Insidious onset**
- Pruritis, jaundice**
- Cirrhosis over 2 or more decades**



- ↑ **Alkaline phosphatase & cholesterol**
- Hyperbilirubinemia = hepatic decompensation**
- Antimitochondrial Abs > 90%**
- Antimitochondrial pyruvate dehydrogenase**
- Associated conditions: sjogern synd. Scleroderma thyroiditis, RA, Raynauds phenomenon. MGN, celiac disease.**





- **Morphology**

- -interlobular bile ducts are absent or severely destructed (florid duct lesion)
- -intra epithelial inflammation
- -Granulomatous inflammation
- Bile ductular proliferation
- Cholestasis
- Necrosis of parenchyma
- Cirrhosis



# **Sinusoidal Obstruction Syndrome** **( Veno-occlusive disease)**

- Originally described in Jamaican drinkers of bush-tea containing pyrrolizidine alkaloids**
- This occurs in the first 20-30 days after bone marrow transplantation**
  - . Which is caused by:**
    - 1-Drugs as cyclophosphamide**
    - 2-Total body radiation**



- **Incidence**

- 20% in recipients of allogeneic marrow transplant

- **Clinical presentation**

- Mild – severe

- Death if does not resolve in 3 months



## **Mechanism**

- Toxic injury to sinusoidal endothelium  
→ emboli → blockage of bl. Flow
- Passage of blood into space of Disse  
→ ↑ stellate cells → fibrosis



# Peliosis Hepatis

**-sinusoidal dilatation**

**-Causes:**

**1-anabolic steroids**

**2-oral contraceptive**

**3-danazol**

**-Pathogenesis**

**Unknown**



- Asymptomatic
- Intra abdominal hemorrhage
- Liver failure
  
- reversible



# Liver tumors

- Benign
- Most common is cavernous hemangioma
- Usually <2cm
- Subcapsular
  
- Liver cell adenoma
- Young female
- Hx of oral contraceptive intake
- May rupture esp. during pregnancy causing severe intraperitoneal hemorrhage
- Rarely may contain HCC
- Misdx. Of HCC



# Liver Nodules

## **Focal noudular hyperplasia**

- **Well demarcated hyperplastic hepatocytes with central scar.**
- **Non-cirrhotic liver**
- **Not neoplasm but nodular regeneration**
- **Local vascular injury**
- **Females of reproductive age**
- **No risk of malignancy**
- **20% of cases have cavernous hemagnioma**





# Macroregenerative Nodules

- **Cirrhotic liver**
- **Larger than cirrhotic nodules**
- **No atypical features,**
- **Reticulin is intact**
- **No malignant potential**



# Dysplastic nodules

- Larger than 1 mm
- Cirrhotic liver
- Atypical features, pleomorphism and crowding
- High proliferative activity
- High or low dysplasia
- Precancerous (monoclonal, +ve gene mutations)
- Types:
  1. Small – cell dysplastic nodules
  2. Large – cell dysplastic nodules



# Hepatocellular carcinoma

- **5.4% of all cancers**
- **Incidence:**
  - <5/100000 population in N&S America**
    - N& central Europe**
    - Australia**
  - 15/100000 population in Mediterranean**
  - 36/100000 population in Korea, Taiwan**
    - mozambique, china**



- **Blacks > white**
- **M:F ratio**
  - 3:1 in low incidence areas. >60yr**
  - 8:1 in high incidence areas. 20-40yr**



# Predisposing Factors

- 1. Hepatitis carrier state**  
vertical transmission increases the risk  
**200X**  
cirrhosis may be absent  
young age group (20-40yr)
- 2. >85% of cases of HCC occur in countries with high rates of chronic HBV infection**



### **3-Cirrhosis**

**In western countries cirrhosis is present in 85-90% of cases**

**>60yr**

**HCV & alcoholism**

### **4. Aflatoxins**

**5. Hereditary tyrosinemia (in 40% of cases)**

**6. Hereditary hemochromatosis**



# Pathogenesis

1. Repeated cycles of cell death & regeneration  
HBC, HCV, gene mutations, Genomic instability
2. Viral integration  
HBV DNA intergration which leads to clonal expansion
3. HBV DNA intergration which leads to genomic instability not limited to integration site.



## 4. HBV

X-protein which leads to transactivation of viral & cellular promoters,

Activation of oncogenes,

Inhibition of apoptosis

5. Aflatoxins ( fungus *Aspergillus flavus*)  
mutation of p53

## 6. Cirrhosis

HCV

Alcohol

Hemochromatosis

Tyrosinemia (40% of pts. Develop HCC despite adequate dietary control





# Morphology

1. HCC
  2. CC
  3. Mixed
- Unifocal
  - Multifocal
  - Diffusely infiltrative



- Vascular invasion is common in all types.
- Well ---- Anaplastic
- **Fibrolamellar carcinoma**  
20-40 yr. M=F  
No relation to HBV or cirrhosis  
better prognosis  
single hard scirrhous tumor
- Cholangiocarcinoma are desmoplastic



## **metastasis**

Vascular – lungs, bones, adrenals, brain,  
in 50% of cholangiocarcinoma



- C/P  
abd. Pain, malaise, wt. loss  
increase  $\alpha$ -feto protein in 60 – 75% of pts.



- $\alpha$ -feto protein increases also with:
  - 1-yolk sac tumor
  - 2- cirrhosis,
  - 3-massive liver necrosis,
  - 4-chronic hepatitis,
  - 5-normal pregnancy,
  - 6-fetal distress or death
  - 7- fetal neural tube defect.



# Prognosis

- Death within 7 -10 months
- **Causes:**
  - 1-Cachexia
  - 2-GI bleeding
  - 3-Liver failure
  - 4-Tumor rupture and hemorrhage



**THE END**

