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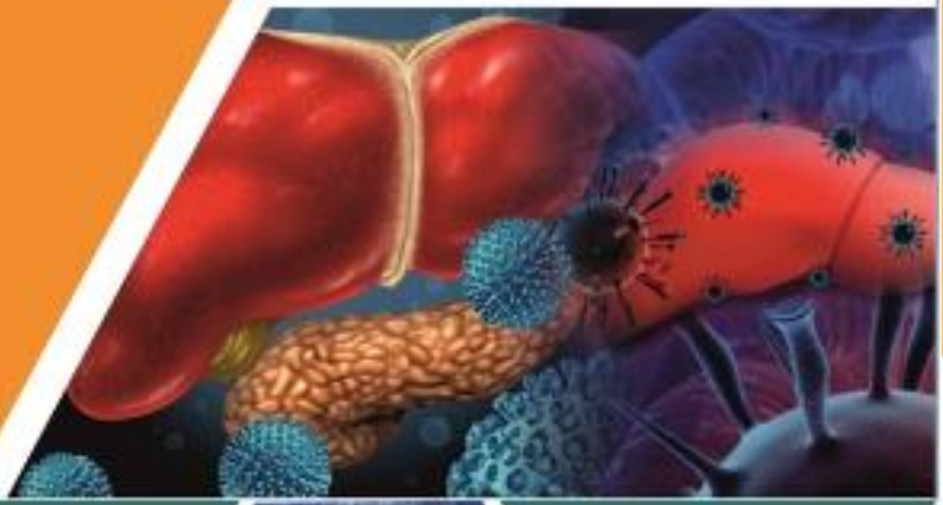
PROJECT PRAKASH

Programmed Approach to Knowledge and Sensitization on Hepatitis

HEPATITIS INDUCTION PROGRAM

FOR DOCTORS



DIAGNOSIS & MANAGEMENT OF VIRAL HEPATITIS A & E

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DIAGNOSIS & MANAGEMENT OF HEPATITIS A & E

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Scheme of Discussion

- Historical Perspective
- Virology
- Epidemiology
- Clinical Features- Special Scenarios
- Diagnosis
- Treatment
- Vaccination

- AVH as an infectious disease as early as 8th century AD.
- Multiple Outbreaks reported during the 18th and 19th centuries.
- By mid-20th century- Empirically, Divided into infectious hepatitis- Hepatitis A and serum hepatitis- Hepatitis B

In 1970's- HAV and HBV Finally Discovered

- Others labelled as non-A, non-B post-transfusion hepatitis agent.

Schmid R. *J. Gastroenterol. Hepatol. 2001;* **16: 718–22.**
Cockayne EA. *Q. J. Med. 1912;* **6: 1.**
McCallum FO. *Br. Med. Bull. 1972;* **28: 105–8.**

India- Home to Discovery

- November 1955
- Post Flooding of Yamuna- Contamination of water supplies.

Wahi PN, Arora MM. Epidemic hepatitis. *N. Engl. J. Med. 1953;* **248: 451–4.**

- 29 000 persons (2.3% of popn) icteric illness.
- Young adults- Highest disease rate.
- Mostly self-limited course, except pregnant women (High CFR)

Vishwanathan R. *Indian J. Med. Res. 1957;* ***45 (Suppl.*** 1): 1–29.
Vishwanathan R, Sidhu AS. *Indian J. Med. Res. 1957;* ***45 (Suppl.): 49–58.***

The Man Who Did It….

- Ist suspected by Dr MS Khuroo in 1980
- Outbreak of AVH in Kashmir- 275 cases b/w Nov 1978- Apr 1979.
- 11–40 years old
- Common water source.
- 12 (4.4%) – FHF and 10 deaths
- No HAV/HBV Markers
- Ist suspicion of enterically transmitted organism

The Discovery…Finally

- Mikhail Balayan, A Russian Virologist
- *Inoculated himself (Immune to* HAV) PO with extract of fecal matter from 9 patients with epidemic non-A, non-B hepatitis
- Developed AVH.
- Stool- 27- to 30-nm spherical VLPs
- Aggregation with convalescent sera from patients with enteric non-A, non-B hepatitis only.
- Seroconversion against VLPs, but no detectable HBsAg or boosting of anti-HAV antibodies.

Balayan MS et al. *Intervirology 1983;* ***20: 23–31.***
Bradley DW, Krawczynski K et al. *Proc. Natl. Acad. Sci. U S A 1987;* ***84: 6277–81.***
Arankalle VA et al. *Lancet 1988;* ***1: 550–4.***

The Genomic Inauguration..

- 1990- N*ucleic acid clone* from bile obtained from experimentally-infected animal.
- Later, molecular cloning and sequencing of the entire genome of virus isolates from Asia and Mexico.

Reyes GR et al *Science 1990;* ***247: 1335–9.***
Tam AW et al *Virology 1991;* ***185: 120–31.***
Huang CC et al *Virology 1992;* ***191: 550–8.***

Hepatitis Virus named Hepatitis E after A →B→ C → D

Causes "e"pidemics and "e"ndemic disease

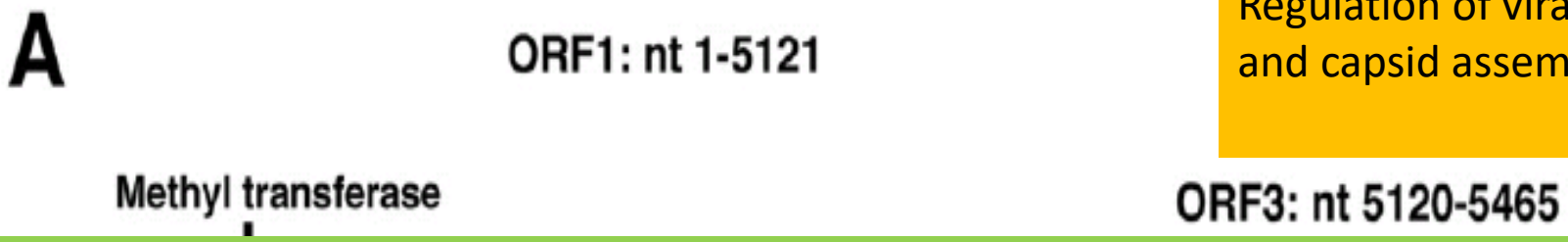
THE VIRUS ITSELF
Taxonomy, Morphology & Genome

Taxonomy and Structure

- Only member of genus Hepevirus in the family Hepeviridae.
- Two species- Mammalian and Avian
- Small nonenveloped icosahedral virus with a diameter of 27–34 nm.
- Genome- Polyadenylated ss +ve-sense RNA of about 7.2 kb with a short noncoding region at both the 5′ and 3′ ends.

Largest- ORF 1- Nonstructural proteins- Methyl transferase, protease, helicase, and RNA dependent RNA polymerase .

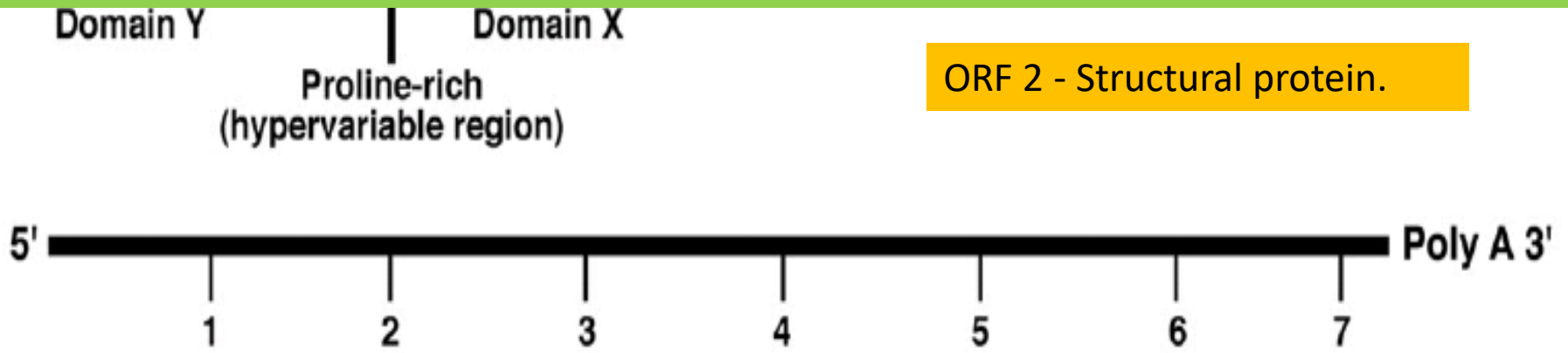
Smallest, ORF 3- Phospoprotein- Viral evasion of immune system, Regulation of viral replication and capsid assembly.



ORF- 2- Encodes Viral Capsid

Contains important epitopes- Induces neutralising Abs

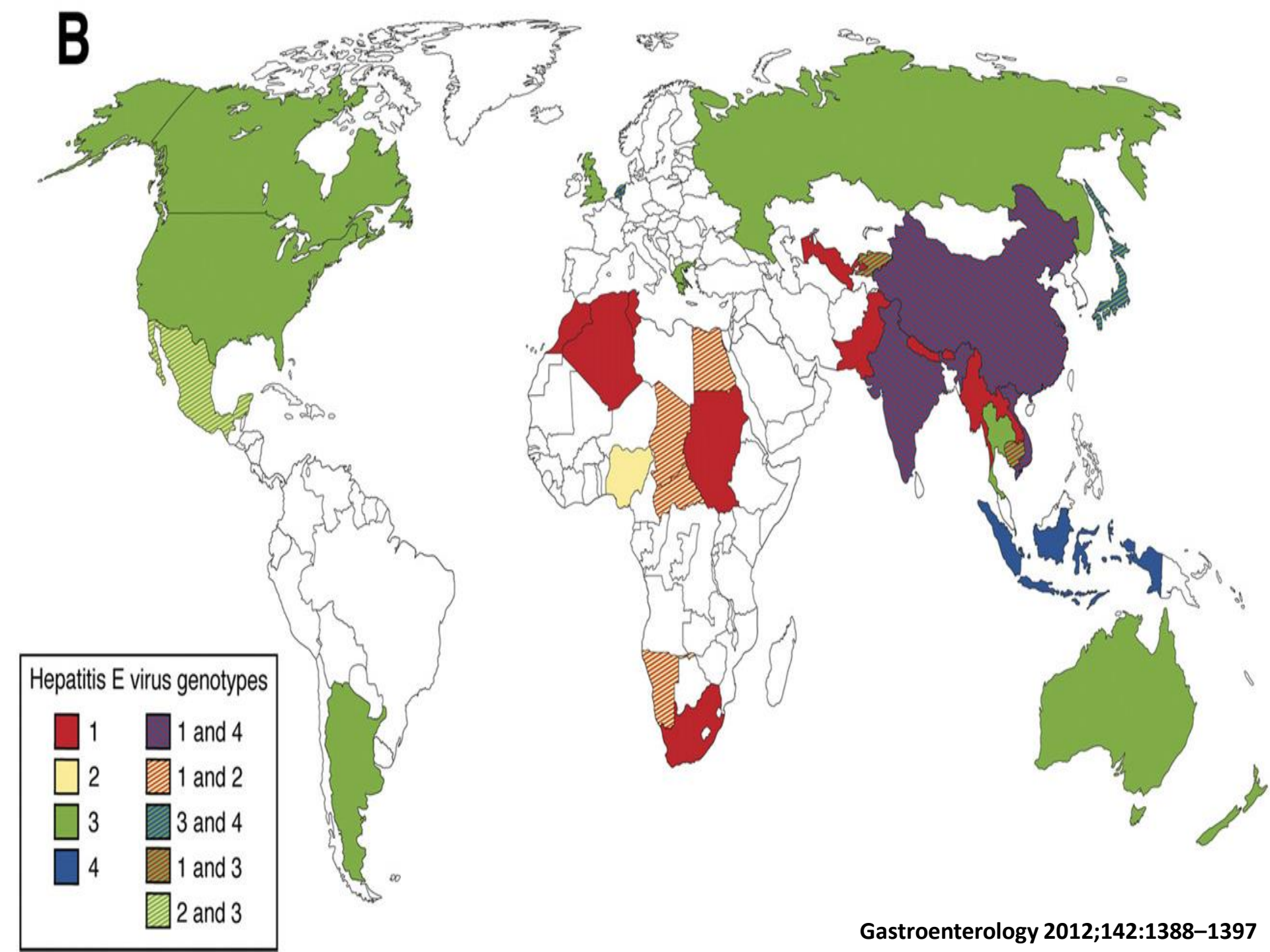
Prime genomic area selected for vaccine development



ORF 2 - Structural protein.

Geopgraphical Distribution

Genotype	Geographical Area
1	Asia and Africa
2	Mexico, Western Africa (Nigeria and Chad).
3	United States , Europe (United Kingdom, France, Netherlands, Spain, Austria, Greece, Italy), Japan, Australia, New Zealand, Korea and Argentina.
4	China, Taiwan, Japan and Vietnam.



Gastroenterology 2012;142:1388–1397

EPIDEMIOLOGY

Routes of Transmission

- Most common route- Contaminated drinking water.
- Other routes-

1. Food-borne Transmission
2. Transfusion Of Infected Blood Products, And
3. Vertical (Materno-fetal) Transmission

Endemic Areas

- Most related to consumption of fecally-contaminated drinking water
- Several hundred to thousands
- Unimodal outbreaks (Few weeks), to prolonged, multi-peaked epidemics (Over a year)
- Frequently follow heavy rainfall and floods
- Also sometimes in Hot, Dry Summer

- Urban areas with leaking water supply
- SAR among household contacts of patients only 0.7% to 2.2%
- Apparently no person to person transmission

Aggarwal R et al *Indian J. Gastroenterol. 1992;* ***11: 109–12.***

Somani SK, Aggarwal R et al *J. Viral Hepat. 2003;* ***10: 446–9.***

2007- >10,196 persons and 160 deaths.
Symptomatic attack rate- Lowest for children <2 years of age (6.9%) and highest for pregnant women (80.7%)
Overall symptomatic attack rate- 25.1%
CFR among jaundice cases of 1.5%.
Highest Mortality in children <2 years of age (12/92, 13%) and in pregnant women (13/189, 6.9%).

Teshale EH et al. *Hepatitis E epidemic,* Uganda. *Emerg. Infect. Dis. 2010;* ***16: 126–9.***

- Disease rates- Highest among young adults.
- Lower disease rates in children- Due to a higher proportion of asymptomatic infections in them, than to lower frequency of infection.
- M > F- Greater risk of consuming contaminated water.

c.f Hepatitis A
Highest Attack rates amongst Children < 5 years
SAR 50- 75 % among housesold contacts

Pregnancy and Hepatitis E

- Higher proportion of Hep E in pregnant women with AVH (37-60%)
- Higher incidence of FHF in HEV-AVH
- A/w poor maternal and fetal outcomes.

Pregnancy and Hepatitis E

- Prospective field study- Epidemic of non-A non-B hepatitis
- 3 Groups-

1. Pregnant women,
2. Nonpregnant women of child bearing age
3. Men (15 to 45 years old).

Khuroo MS et al. **Incidence and severity of viral hepatitis in pregnancy.** Am J Med. 1981 Feb;70(2):252-5.

Parameter	Pregnant Women n= 208	Non-Pregnant Women n = 3350	Men n = 3822
AVH	36 (17.3 percent)	71 (2.1 percent)	107 (2.8 percent)
FHF	8 (22.2 percent)	0	3 (2.8 %)

✓AVH- T1 8.8 % , T2 19.4 % and T3 18.6 %

✓Incidence in all three trimesters was higher, when compared to that in nonpregnant women.

✓High Incidence of FHF- Observed exclusively in the last trimester.

✓Nonfulminant viral hepatitis did not influence the course of pregnancy or fetal well-being

The Indian Journal of Pediatrics
January 2003, Volume 70, Issue 1, pp 37-39

Mother-to-child transmission of hepatitis E virus infection

Dr. Sarman Singh, Alok Mohanty, Y. K. Joshi, Deepika Deka, Sujit Mohanty, S. K. Panda

Year 1997-98, 60 pregnant women with AVH
6 cord blood samples- IgG/IgM antibodies against hepatotropic viral agents and HEV RNA

Results : 22 (37%) +ve for IgM anti-HEV antibodies, 10% with HBV
Most (72%) of the HEV infected patients in T3
3 (50%) cord samples positive for HEV RNA.
14/22 (63.6%) HEV infected mothers had FHF, All died

Conclusion : The mortality rate in HEV infected mothers was 100%. Mother to child transmission of hepatitis E virus infection was established in 50%

But is it really so?

Bhatia V, Singhal A, Panda SK, Acharya SK.

A 20-year single-center experience with acute liver failure during pregnancy: is the prognosis really worse?

Hepatology. 2008 Nov;48(5):1577-85

- ✓1015 consecutive ALF patients in the reproductive age group
- ✓January 1986 to December 2006

Parameter	Pregnant Women n = 249 (42.2 %)	Non-Pregnant Women n = 341	Men n = 425
% of HEV related ALF	59.4% p < 0.001	30.4 %	23.1 %
Mortality	53.8% p = 0.572	57.2 %	57.9 %

CONCLUSION

- Mortality of pregnant patients with ALF similar to that of nonpregnant women and men
- Independent of the cause or trimester.
- Pregnancy per se- Not a poor prognostic factor for a patient with ALF

Variable	HEV-Infected Women (n = 132), n/n (%)	Non–HEV-Infected Women (n = 88), n/n (%)	Relative Risk (95% CI)	P Value
Fetal outcomes†				
Preterm delivery	95/105 (90)	61/81 (75)	1.2 (1.0–1.4)	0.005
Poor fetal outcome	83/105 (79)	41/81 (51)	1.6 (1.2–2.0)	<0.001
Second trimester	33/33 (100)	14/15 (93)	-	0.68
Third trimester	50/72 (69)	27/66 (41)	1.7 (1.2–2.4)	0.001
Spontaneous abortions	8/105 (8)	4/81 (3)	1.5 (0.5–4.9)	0.68
Stillbirths	57/105 (54)	25/81 (1)	1.8 (1.2–2.5)	0.026
Neonatal deaths	18/105 (17)	12/81 (15)	1.2 (0.6–2.3)	1.00
Live births (in hospital)	22/105 (21)	40/81 (49)	0.4 (0.3–0.6)	<0.001
Second trimester	0/33 (0)	1/15 (7)	-	0.68
Third trimester	22/72 (31)	39/66 (59)	0.5 (0.3–0.8)	0.001

Patra S et al Ann Intern Med 2007;147:28-33

Hepatitis E- India

- Reported in 7.2–28.7 % of AVH (Pediatrics)
- Multiple infections in 4.5–23%.
- HAV + HEV infection in 68- 87. 5%
- Overall prevalence in AVH-

1. India 25-50 %
2. Nepal 50 %
3. Pakistan 5.4 – 77 %
4. China 20 – 35 %
5. Taiwan 3.9 – 50 %

Malathi S et al. *J. Trop. Pediatr. 1998; 44: 275–8.*
Poddar U et al. *J. Trop. Pediatr. 2002;* 48: 210–13.
Kumar A, Yachha S K JGH 21 (2006) 1533–1537

STUDY	No	A	B	E	A+B	A+E	A+B +E	Non AtoE
Delhi V.Singh 1992	54	59.25	3.7	-	3.7	-	-	NANB 33.33
Indore Jaiswal 1992-98	167	46.1	15.0	7.2	-	-	-	31.1 HepC (0.5%)
Chennai Malathi 1995 – 96	127	38.6	13.4	15.7	7.1	13.4	0.8	11
Chandigarh Poddar 1997-2002	172	64.5	16.3	7.6	-	7	-	3.5
SGPGI JGH 2006	122	81.2	14	28.7	-	-	-	-

STUDY	No	A	B	E	A+B	A+E	A+B +E	Non AtoE
PGIMER 2011, Adults	685	17.5	7.3	38.6	-	-	-	NANB 34 %
SMS IJMR, 2012	736 14-70 Yrs < 10 Yrs = 4	4.9	-	49.7	-	-	-	32
KGMC LKO 2012	267 (Peds 143) AVH + FHF	26.9 (27.3)	16.10 (9.8)	17.9 (6.9)	2.2	8.6	-	39.7

Diagnostic Microbiology and Infectious Disease. Vol 71, 2, 2011, 110-117
Indian J Med Res. 2012 September; 136(3): 477–482.
Jain P et al Indian Journal of Medical Microbiology 2013 31(3) 261-65

Prevalence of Hepatitis E in FHF

Condition	Country	N	Age range (Years)	Calendar period	Prevalence %	Method
Fulminant hepatitis	Bangladesh[87]	22	18–60	1995–1996	63.6	IgM
	India[159]	95	5–75	1992–1996	41	IgM
	Pregnant women	31	NA	1992–1996	94	IgM
	India[77]					
	Pregnant women	44	18–35	1992–1999	75	IgM
	women	17	18–35	1992–1999	12	IgM
	Taiwan[160]	32	Adults	1982–1992	25	IgG
					3.1	IgM

CLINICAL FEATURES

Endemic Countries

- As self-limiting, acute icteric hepatitis, indistinguishable from other hepatotropic viruses.
- Lasts a few weeks- Improves spontaneously.
- IP- 2 to 8 weeks (Mean 40 days)
- Prodrome – flulike myalgia, arthralgia, weakness, and vomiting.
- Later - Jaundice, itching, uncolored stools, and darkened urine.

- Rarely have prolonged cholestasis- Good outcome
- Rarely as FHF, esp pregnant women.
- High incidence of asymptomatic or inapparent HEV infection
- CFR- 0.5% to 4% (Hospital Based)
- Population surveys- 0.07% to 0.6%.

Naik SR et al. *Bull. World Health Organ. 1992;* ***70: 597–604.***
Zhuang H et al. *Amsterdam: Excerpta Medica,* 1991; 277–85.

HEV and ACLF

- HEV superinfection on CLD- Superimposed acute liver injury and acute on chronic liver disease.
- Higher risk of a poor outcome.

Hepatitis E virus is responsible for decompensation of chronic liver disease in an endemic region.

Kumar A, Aggarwal R, Naik SR, Saraswat V, Ghoshal UC, Naik S.
SGPGI, LKO.Indian J Gastroenterol. 2004 Mar-Apr;23(2):59-62.

n = 32 decompesated CLD patients ---- >14 (44%) IgM anti-HEV
IgM HEV +ve in only 3 of 48 (6%) patients with compensated CLD
11 /14 had prodrome.
2/14 died, 12 survived, as compared to 9 of 18 patients without evidence of recent HEV infection ($p<0.01$).

CONCLUSION:
HEV infection is a frequent cause of decompensation in patients with liver cirrhosis in HEV-endemic regions.

CHRONIC HEPATITIS E

- Defined by persisting HEV RNA in serum or stools for 6 months or more, in immunosuppressed patients

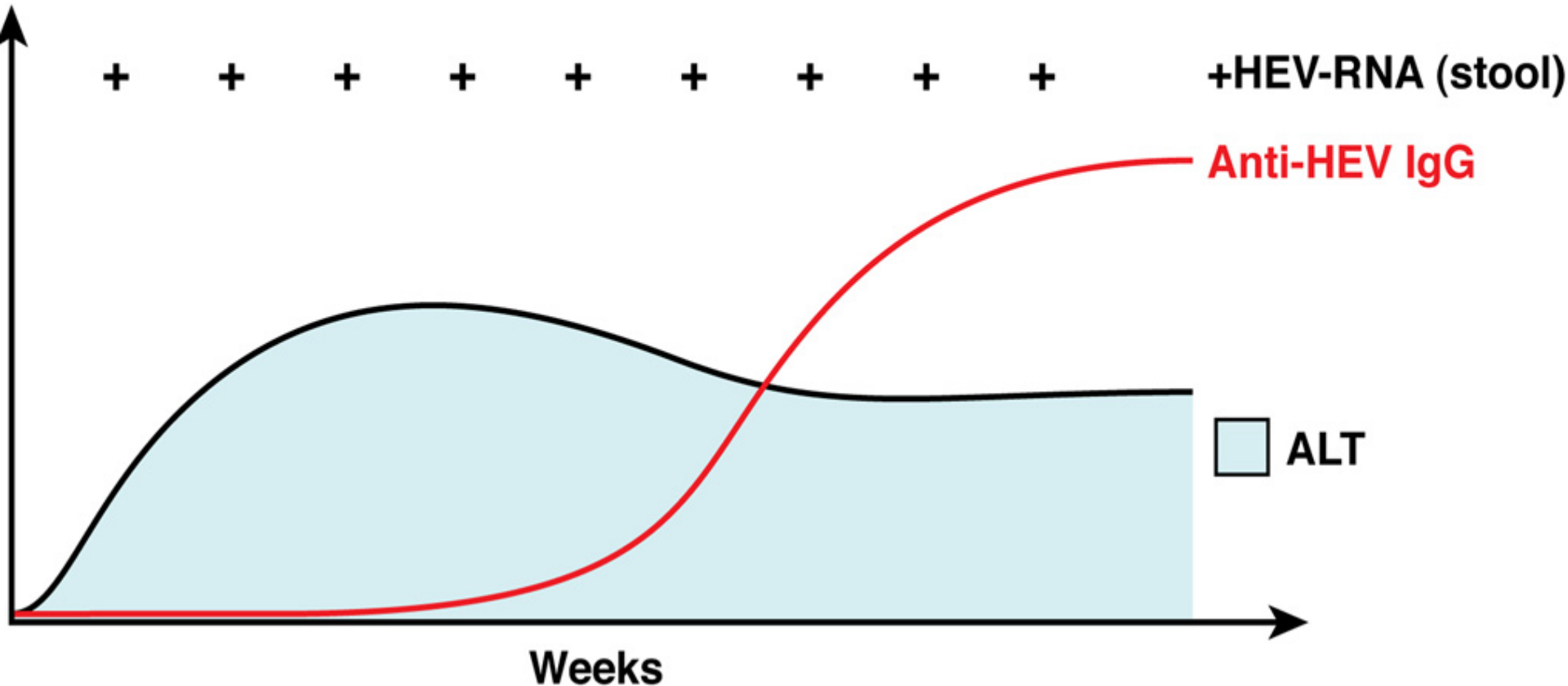
- Described in LT and KT recipients in Europe since 2008.
- Also in heart transplants ,patients receiving chemotherapy, hematological conditions and with HIV infection.

- All recipients of SOT with increased liver enzymes should be tested for HEV RNA (Not Ab), unless there are other obvious causes of hepatitis.

Pischke S et al. J Hepatol 2011;54(Suppl 1):495.
de Man RA et al. Hepatology 2011;54(Suppl 1):360A.

- All cases among immunosuppressed persons
- Only genotype 3 virus.
- No cases of CHE with Genotype 1 HEV, the predominant disease-causing strain worldwide, or among otherwise healthy persons yet been reported.

Chronic hepatitis E



DIAGNOSIS

- Diagnosed either:

1. Directly by detecting its nucleic acids or
2. Indirectly by detecting an immune response in the host.

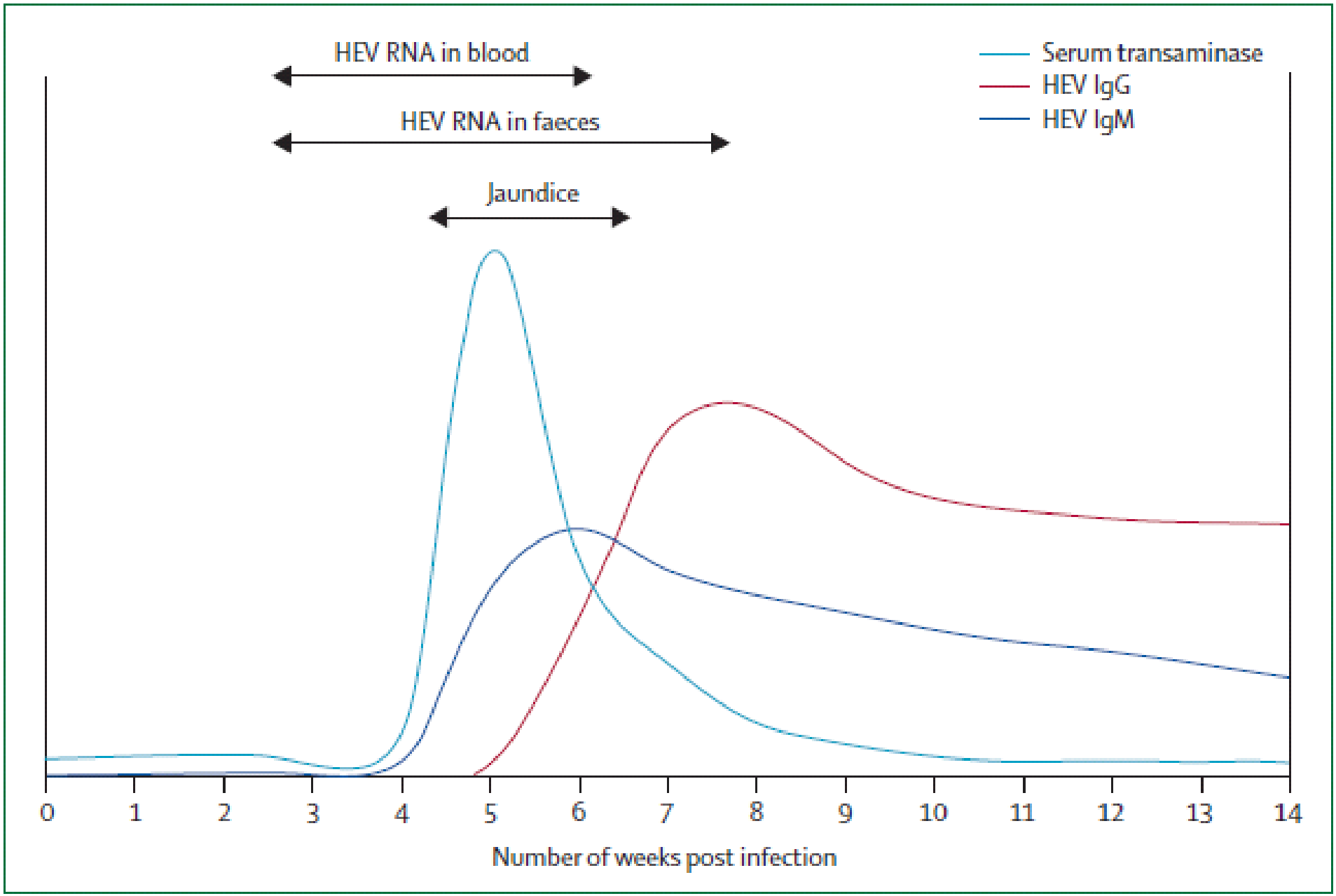


Figure 1: **Schematic representation of HEV infection, showing virus detection at different sites and serological response**

Short communication

Differential diagnosis of hepatitis E virus, cytomegalovirus and Epstein-Barr virus infection in patients with suspected hepatitis E

M. Fogeda, F. de Ory, A. Avellón, J.M. Echevarría*

Service of Diagnostic Microbiology, National Centre of Microbiology, Instituto de Salud Carlos III, Majadahonda, Madrid, Spain

- *Acute infection by CMV or EBV may cause false reactivity for* anti-HEV IgM- Polyclonal B-cell stimulation.

- *Can cause* diagnostic mistakes and should be investigated in patients positive for anti-HEV IgM and negative for HEV RNA.

Journal of Clinical Virology 45 (2009) 259–261

Molecular techniques

- Detection of HEV RNA- Reverse Transcriptase Polymerase chain reaction (RT-PCR)-based assays in samples
- Variability in the accuracy between different laboratories.
- In AVH-E, peak viraemia occurs during the I.P and early phase.
- Viral RNA detected just before the onset of clinical symptoms in both blood and stool samples.
- HEV RNA undetectable in blood about 3 weeks after the onset of symptoms.

- Shed in stool for 5 weeks after onset.
- Window of detectable RNA is therefore narrow.
- Only tests recommended for use in immunosuppressed patients with CHE.

TREATMENT

Anti Viral Measures

- Usually self-limiting- Does not need treatment.
- Use of pegylated interferon, ribavirin or both in chronic HEV infection due to associated risk of progressive liver injury
- May lead to cirrhosis after < 3 years of infection
- Mostly case reports or small case series.

Gerolami R et al. N Engl J Med **2008; 358:859–860.**
Haagsma EB et al. Liver Transpl **2008; 14(4):** 547–553.
Kamar N et al Am J Transplant **2008; 8(8):1744–1748.**

Treatment of severe acute hepatitis E by ribavirin

René Gerolami , Patrick Borentain, , Ferdaous Raissouni, , Anne Motte, , Caroline Solas , Philippe Colson

J Clin Virol 2011;52:60–62.

- Severe acute HEV in a immunocompetent pt.
- 61 year old, Geno 3
- Prothrombin index 38%, Bil 550µmol/L and ALT still increasing, reaching 4565IU/L, No HE
- Ribavirin (1200mg/day) x 21 Days
- LFTs rapid improvement- ALT normalized, bilirubinemia 138µmol/L, and HEV RNA undetectable in the serum.

VACCINATION

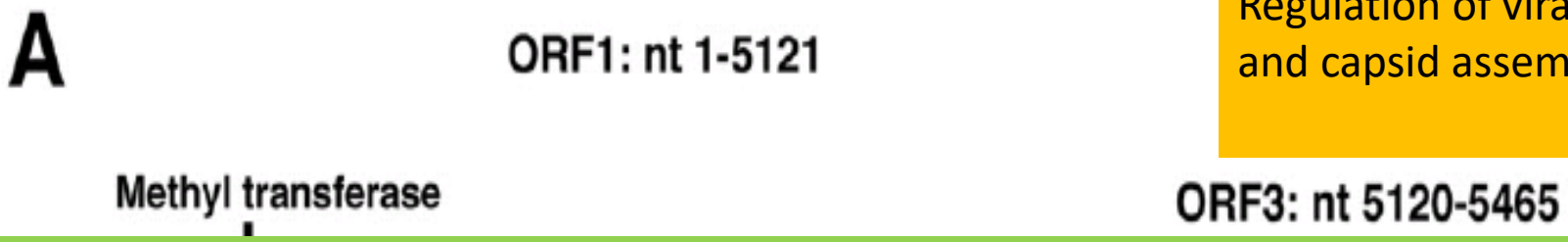
Basis

- Recovery results in protective immunity— neutralizing antibodies HEV genotypes 1–4.
- HEVspecific CD4 and CD8 T-cell responses + in recovered patients
- Immunodominant regions within ORFs 2 and 3 induce T-cell responses.
- Immunity against HEV- Lifelong— Reinfection is asymptomatic

Zhou YH et al Vaccine 2005;23:3157–3165.
Husain MM et al. J Viral Hepat 2011;18:e603–e608.
Aggarwal R et al. J Viral Hepat 2007;14:283–292.

Largest- ORF 1- Nonstructural proteins- Methyl transferase, protease, helicase, and RNA dependent RNA polymerase .

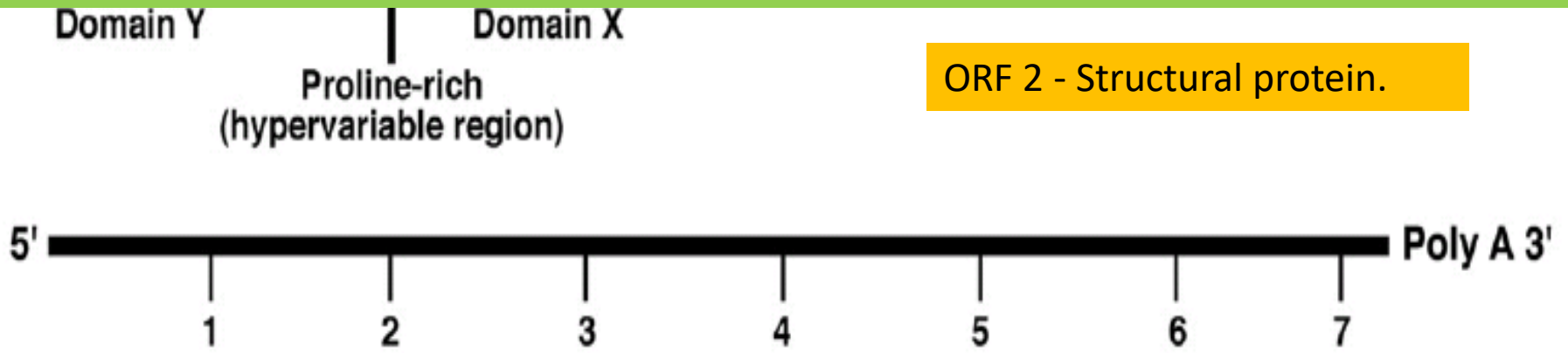
Smallest, ORF 3- Phospoprotein- Viral evasion of immune system, Regulation of viral replication and capsid assembly.



ORF- 2- Encodes Viral Capsid

Contains important epitopes- Induces neutralising Abs

Prime genomic area selected for vaccine development



ORF 2 - Structural protein.

Vaccine 1

- Recombinant vaccine- GSK and Walter Reed Army Institute
- Purified polypeptide from *Spodoptera frugiperda cells infected with a recom*binant baculovirus containing a truncated HEV genomic sequence encoding the capsid antigen (56 kDa protein encoded by ORF2 of HEV1)

Shrestha MP et al. N Engl J Med 2007;356:895– 903

- Successful in Phase II study
- 2000 Nepalese soldiers, with a 96% efficacy after administration of 3 doses(0, 1 and 6).
- After 3 vaccine doses, hepatitis E in 69 subjects (66/69 in placebo group).
- No further development

Vaccine 2

- A Phase III study of 100,000 Chinese adults
- Recombinant HEV vaccine (HEV 239- 26 KDa protein encoded by ORF2 of HEV1)-30 g purified HEV antigen adsorbed to 0.8 mg aluminum hydroxide
- 94%–100% efficacy, Safe in pregnant women.
- Protects against infection with HEV genotypes 1 and 4 But ?? 3
- Approved in China in December 2011.

Wu T et al. Hepatology 2011 Dec 13
Wedemeyer H et al. Nat Rev Gastroenterol Hepatol 2011;8:8–10.

CONCLUSION

- ✓ Only Genotype 1 in India (Humans)
- ✓ Mostly waterborne- Zoonotic spread in Developed world.
- ✓ Hepatitis E constitutes 7.2–28.7 % of AVH in India
- ✓ Higher proportion in pregnant women with AVH (37-60%).
- ✓ Benign Course, Low SAR
- ✓ Mortality- 0.5% to 4% (Hospital Based), Population surveys- 0.07% to 0.6%.

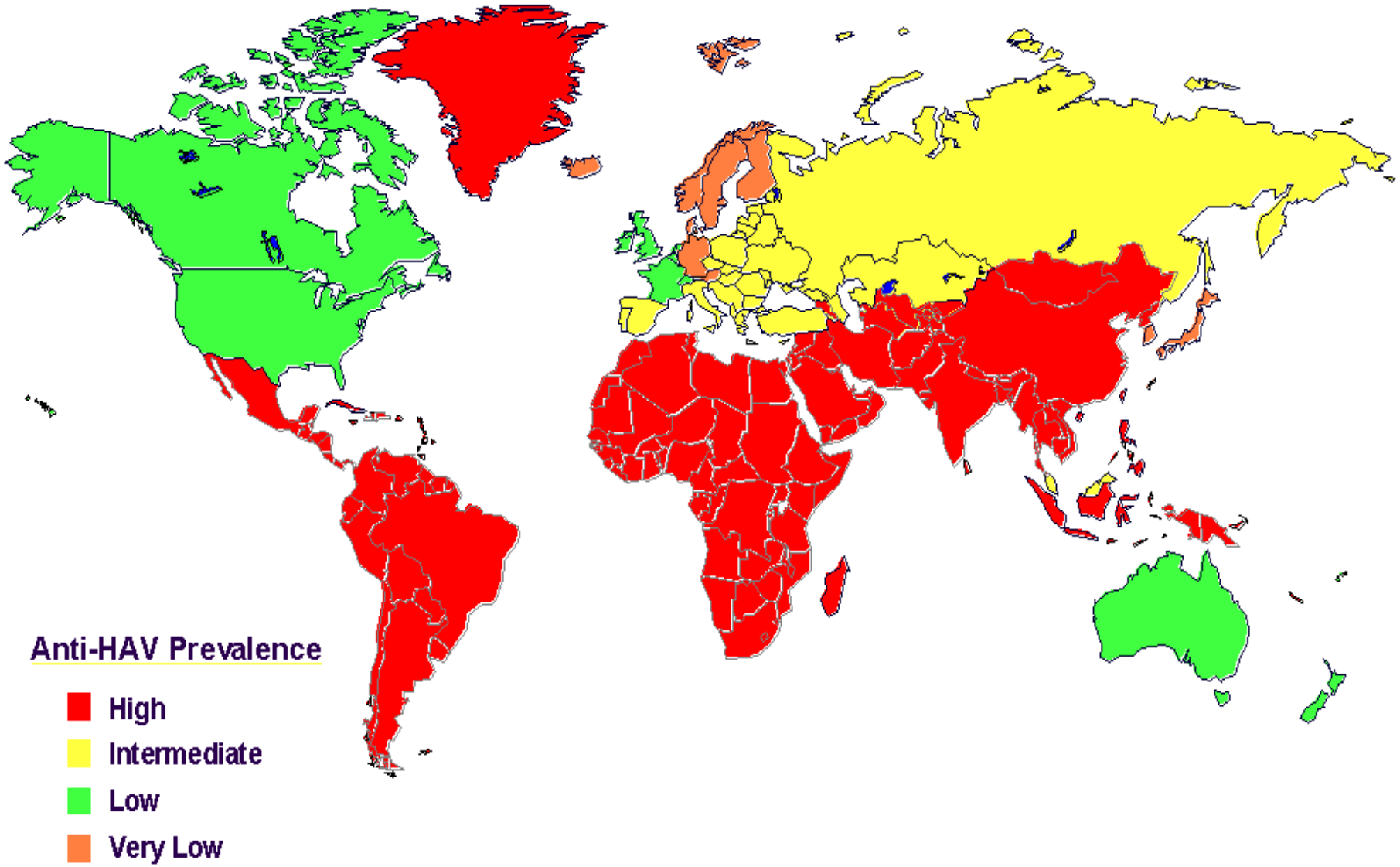
- ✓ Symptomatic HEV infections m.c b/w 15 to 40 years.
- ✓ Children mostly asymptomatic
- ✓ Seroprevalence- Begins to rise in late adolescence and peaks between the 2nd and 3rd decade of life.
- ✓ India – 25- 50% Seroprevalence
- ✓ Most Common cause of ACLF.

- ✓ Only supportive management needed
- ✓ Severe cases may need RBV therapy
- ✓ CHE seen in immunosuppressed patients- Only Geno 3- May Lead to Cirrhosis.
- ✓ RBV and Peg IFN for CHE Rx
- ✓ Vaccination- Not licensed for general use.

Hepatitis A Virus Transmission

- Close personal contact
  (e.g., household contact, sex contact, child day care centers)
- Contaminated food, water
  (e.g., infected food handlers, raw shellfish)
- Blood exposure (rare)
  (e.g., injecting drug use, transfusion)

Geographic Distribution of HAV Infection



Global Patterns of Hepatitis A Virus Transmission

Endemicity	Disease Rate	Peak Age of Infection	Transmission Patterns
High	Low to High	Early childhood	Person to person; outbreaks uncommon
Moderate	High	Late childhood/ young adults	Person to person; food and waterborne outbreaks
Low	Low	Young adults	Person to person; food and waterborne outbreaks
Very low	Very low	Adults	Travelers; outbreaks uncommon

Hepatitis A - Clinical Features

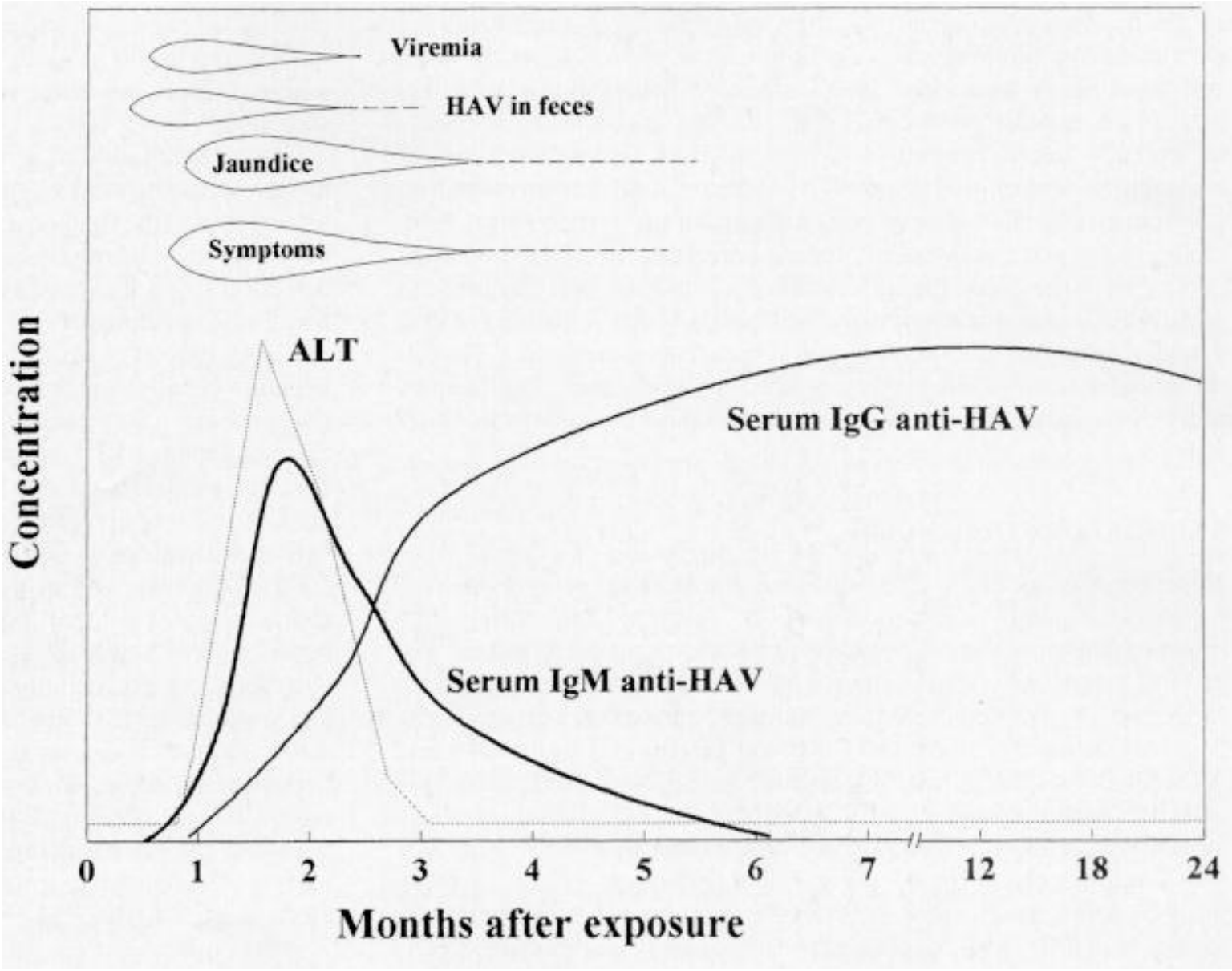
Incubation period:	Average 30 days Range 15-50 days
Jaundice by age group:	<6 yrs, <10% 6-14 yrs, 40%-50% >14 yrs, 70%-80%
Complications:	Fulminant hepatitis Cholestatic hepatitis Relapsing hepatitis
Chronic sequelae:	None

Clinical features

- Onset: usually abrupt
- Duration
  - Mild lasting 1-2 weeks
  - Severe lasting months
  - Rarely fatal
- Children usually asymptomatic
  - 5-10% jaundiced
  - 1-2 week duration
- Adults are usually symptomatic
  - Jaundiced
  - Nausea, vomiting, & fever are common.
- Greatest infectivity
  - 2 wks before jaundice appears
- Fecal viral shedding
  - Greatest during late incubation and prodrome
  - Diminishes rapidly after jaundice occurs

Relapsing hepatitis A

- Recurrent hepatitis secondary to primary infection
- The severity of symptoms and biochemical abnormalities during second phase tend to be the same as observed during the initial illness except for a tendency to greater cholestasis
- The rate of hepatitis A relapse varies in different case series from 1.5% to 11.9%


Viremia
HAV in feces
Jaundice
Symptoms
ALT
Serum IgG anti-HAV
Serum IgM anti-HAV
Concentration
0
1
2
3
4
5
6
7
12
18
24
Months after exposure

Laboratory Diagnosis

- Acute infection is diagnosed by the detection of HAV-IgM in serum by EIA.
- Past Infection i.e. immunity is determined by the detection of HAV-IgG by EIA.
- Cell culture – difficult and take up to 4 weeks, not routinely performed
- Direct Detection – EM, RT-PCR of faeces. Can detect illness earlier than serology but rarely performed.

Hepatitis A

Treatment

- There is no treatment

Prognosis

- HAV is usually a benign course in young, healthy people and is associated with a low mortality
- Older adults, immunosuppresed patients and those with chronic liver disease have greater morbidity and mortality
- Mortality 0.1-2%

Hepatitis A

Prevention

- Immune globulin (IG)
  - Available since 1940
  - Immunoglobins administered low dose provides protection for 1-2 months
- Inactivated HAV vaccine
  - Available since 1992

Hepatitis A

Prevention

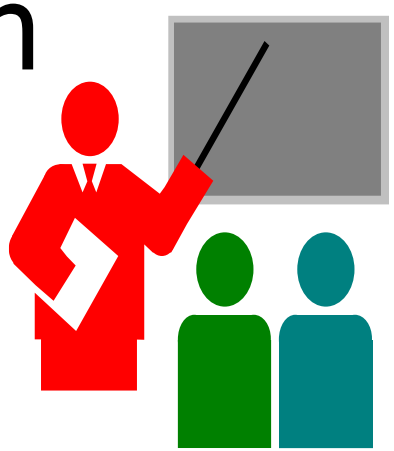
- Pre exposure prophylaxis
  - Indications for HAV vaccination:
    - People planning to travel to endemic areas
      - The risk for hepatitis A exists even for travelers to urban areas, those who stay in luxury hotels, and those who report that they have good hygiene and that they are careful about what they drink and eat
    - Men who have sex with men
    - Illicit drug users
    - People with chronic liver disease
    - Recipients of clotting factor concentrates

ilbs

Recommended Hepatitis A Virus Vaccine Dosages and Schedules for Adults

Vaccine	Dosage	Dosing and Route
Hepatitis A Vaccines		
Havrix	1440 EL.U.	2-Dose Schedule: 1 ml given IM at 0 and 6-12 months
Vaqta	50 U	2-Dose Schedule: 1 ml given IM at 0 and 6-18 months
Combined Hepatitis A and B Vaccines		
Twinrix	HAV: 720 EL.U *plus* HBsAg: 20 mcg	Standard 3-Dose Schedule: 1 ml given IM at 0, 1, and 6 months *or* Accelerated 4-Dose Schedule: 1 ml given IM on days 0, 7, and 21-30, followed by a booster dose at month 12

Hepatitis A: Prevention



- Immunization
- Sanitation & Education
  - Safe food, water and ice
  - Good personal hygiene
- Standard Immune globulin prophylaxis (IG)
  - 80 - 90% effective if given within two weeks of exposure
  - Immunization 2 weeks prior eliminates need
  - Indications:
    - Close personal contacts
    - Day Care center outbreaks
    - Fellow food handlers
    - Restaurant patrons if deficiencies in hygiene or if handler prepared unheated food

Hepatitis A and Food Workers

- High potential for outbreaks
- Verify Diagnosis
- Evaluate food related duties, types of food & preparation methods
  - Some food related work low-risk
  - Wearing gloves reduces risk
  - Fellow food handlers are more at risk than diners

Thank you!