

Medical Writers' Circle

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a series of articles
written by medical
professionals about
the management
and treatment of
hepatitis C

Philip Rosenthal, MD

Professor of Pediatrics and
Surgery,
Medical Director, Pediatric
Liver Transplant Program,
Director, Pediatric Hepatology,
University of California, San
Francisco

Hepatitis C in Children Update 2006

As compared to adults, our knowledge of hepatitis C virus (HCV)

infection in children is limited. This is because there are many fewer children than adults infected with HCV and children are less likely to have symptoms from their HCV infection.

It is estimated that the seroprevalence (evidence of HCV antibody in the blood) of anti-HCV is 0.2% in children younger than 12 years of age, and 0.4% in those between 12-19 years of age. Based on these figures, it is estimated that approximately 240,000 children are exposed or infected with HCV in the United States. While the number of new HCV infections in adults is declining, new infections in children continue to occur as a result of maternal-

neonatal transmission. Prior to 1992, a sizeable number of children acquired HCV via blood and blood products. This group of adolescents has had HCV infection from 1-20 years. Vertical transmission, or infection transmitted from mother to newborn, accounts for another sizeable group of children with HCV infection. Horizontal transmission, either from adult to child in a household, or child-to-child at home or at school does not seem to be an important risk factor. Unfortunately, many children with HCV infection remain unidentified.

Acute HCV infection in children is rarely observed unless there are special circumstances such as a transfusion-associated outbreak. Fulminant hepatic failure from HCV has not been described in children. Most chronically infected

children with HCV are asymptomatic (without complaints) or have non-specific fatigue and/or abdominal pain. Most children with HCV infection have normal or mildly abnormal serum transaminase levels.

Natural history studies in children are few, and it is difficult to separate the effects of age and mode of acquisition. Further, depending upon the underlying disease that required a transfusion, the natural history of transfusion associated HCV infection may differ. In one study, children who were transfused at the time of surgery for congenital heart disease both cleared the infection or developed chronic hepatitis. Children with thalassemia and HCV infection may have more severe hepatic injury and less response to therapy, the result of secondary hemochromatosis (iron

storage in the liver). Children treated for leukemia prior to 1990 have a high rate of HCV infection, but in follow-up (13-27 years) did not appear to have significant liver disease. In another study of children with cancer, HCV infection was more

decade of life, in others the disease is more aggressive leading to cirrhosis and end-stage liver disease requiring transplantation. The factors responsible for these differences remain unknown.

possibly, this could be a statistical artifact due to small study size.

The results of the use of combination therapy in children are only recently beginning to be described. The use of interferon alfa-2b in combi-

Prevention remains the key for HCV education. Older children require education about high-risk behaviors. Tattooing and piercing might be associated with HCV acquisition especially if self-applied, as may sharing straws or implements for intranasal cocaine administration. Transmission of HCV infection in intravenous drug users is appreciated, as is sexual transmission.

Prevention of perinatal transmission should also be targeted. Universal testing of pregnant women for HCV infection is not recommended. Post-exposure immune globulin does not prevent infection. There are no medications available for decreasing maternal viral loads in pregnant women (both interferon and ribavirin are contraindicated during pregnancy).

In summary, HCV infection occurs in children and is frequently unrecognized. Compared to adults, the disease is frequently less severe or more prolonged. Children might have a better response rate to therapy, but this is based upon very small and uncontrolled studies. Education is important to prevent transmission of HCV

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significant with one child dying from liver disease and two children dying from hepatocellular carcinoma and 9% of cases developing cirrhosis (9-27 years after cancer diagnosis).

Whether maternal-neonatal transmission of HCV is different than transfusion acquired HCV is unclear. Initially, these children have elevated serum transaminase levels for a few years that subsequently become normal. If these children undergo a liver biopsy, there is evidence of chronic hepatitis. While in the majority of children with perinatal transmission of HCV there is mild liver disease in the first

There are no reports of treatment of acute HCV infection in children.

A review of the use of interferon as monotherapy in children demonstrates a sustained virologic response (SVR) of 33-45 percent. This is significantly better than the sustained virologic response rate for interferon monotherapy observed for adults. When the data is further scrutinized, the SVR for genotype 1 is 26% and 70% for other genotypes. The higher response rate observed in children might be the result of the earlier stage of the disease, higher relative interferon dosage, or lack of comorbid conditions. Or, very

nation with ribavirin was reported by Gonzalez-Peralta et al. and has led to FDA approval of this therapy for children. The combination therapy was well tolerated and the pharmacokinetics were similar to those in adults. The use of pegylated interferon therapy in children has not been published. Preliminary studies in children suggest safety and efficacy in a recently completed phase 1 trial. A randomized controlled trial of combination therapy of pegylated interferon with and without ribavirin is funded by the NIH (Peds-C Clinical Trial) and is currently in progress.

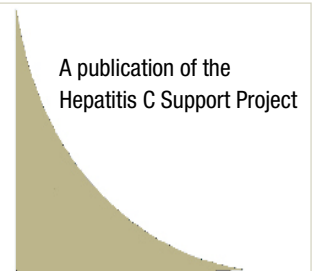


infection to adolescents and to newborns.



References

1. Rosenthal P. Chronic hepatitis C viral infection in childhood: to treat or not to treat with interferon – That is the question. *J. Pediatr. Gastroenterol. Nutr.* 1997; 24:363-4.
2. Rosenthal P. Centers for Disease Control and Prevention, “Hepatitis C: Diagnosis, Clinical Management, Prevention- Chronic HCV Infection in Children”, Live Satellite Videoconference/Public Health Training Network, 1998.
3. Jonas MM. Treatment of chronic hepatitis C in pediatric patients. In *Treatment of Chronic Hepatitis C*, Keefe EB, ed. *Clin. Liv. Dis.* 1999; 3:855-68.
4. Rosenthal P. Is our approach to treating chronic hepatitis C all wrong? *J. Pediatr. Gastroenterol. Nutr.* 2000; 31:100.
5. Jonas MM. Hepatitis C in children. In *Hepatitis C*, Liang TJ and Hoofnagle JH, eds. *Biomed Res Rep* 2000; San Diego, CA, Academic Press, p. 389-404.
6. Kelley DA, Bunn SK, Apelian D, et al. Safety, efficacy and pharmacokinetics of interferon alfa-2b plus ribavirin in children with chronic hepatitis C (abstract). *Hepatology* 2001; 34:342A.
7. Jacobson KR, Murray K, Zellos A, Schwarz KB. An analysis of published trials of interferon monotherapy in children with chronic hepatitis C. *J. Pediatr. Gastroenterol. Nutr.* 2002; 34:52-8.
8. Gonzalez-Peralta RP, Kelly DA, Haber B, et al. Interferon alfa-2b in combination with ribavirin for the treatment of chronic hepatitis C in children: efficacy, safety, and pharmacokinetics. *Hepatology* 2005; 42:1010-8.



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Hepatitis C Support Project

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The Mission of the Hepatitis C Support Project is to offer support to those who are affected by the hepatitis C Virus (HCV), hepatitis B Virus (HBV) and HCV coinfections.

Support is provided broadly, through information and education, as well as access to support groups. The Project seeks to serve the HCV community as well as the general public.

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