= Hepatitis C =

Hepatitis C is an infectious disease caused by the hepatitis C virus (HCV) that primarily affects the liver . During the initial infection people often have mild or no symptoms . Occasionally a fever , dark urine , abdominal pain , and yellow tinged skin occurs . The virus persists in the liver in about 75 % to 85 % of those initially infected . Early on chronic infection typically has no symptoms . Over many years however , it often leads to liver disease and occasionally cirrhosis . In some cases , those with cirrhosis will develop complications such as liver failure , liver cancer , or esophageal and gastric varices .

HCV is spread primarily by blood @-@ to @-@ blood contact associated with intravenous drug use , poorly sterilized medical equipment , needlestick injuries in healthcare , and transfusions . With blood screening the risk from a transfusion is less than one per two million . It may also be spread from an infected mother to her baby during birth . It is not spread by superficial contact . It is one of five known hepatitis viruses : A , B , C , D , and E. Diagnosis is by blood testing to look for either antibodies to the virus or its RNA . Testing is recommended in all people who are at risk .

There is no vaccine against hepatitis C. Prevention includes harm reduction efforts among people who use intravenous drugs and testing donated blood . Chronic infection can be cured about 90 % of the time with treatments that include the medications sofosbuvir or simeprevir . Previous to this a combination of peginterferon and ribavirin was used which had a cure rate around 50 % and greater side effects . Getting access to the newer treatments however can be expensive . Those who develop cirrhosis or liver cancer may require a liver transplant . Hepatitis C is the leading reason for liver transplantation , though the virus usually recurs after transplantation .

An estimated 130 ? 200 million people worldwide are infected with hepatitis C. In 2013 about 11 million new cases occurred . It occurs most commonly in Africa and Central and East Asia . About 343 @,@ 000 deaths due to liver cancer and 358 @,@ 000 deaths due to cirrhosis occurred in 2013 due to hepatitis C. The existence of hepatitis C ? originally identifiable only as a type of non @-@ A non @-@ B hepatitis ? was suggested in the 1970s and proven in 1989 . Hepatitis C infects only humans and chimpanzees .

= = Signs and symptoms = =

= = = Acute infection = = =

Hepatitis C infection causes acute symptoms in 15 % of cases . Symptoms are generally mild and vague , including a decreased appetite , fatigue , nausea , muscle or joint pains , and weight loss and rarely does acute liver failure result . Most cases of acute infection are not associated with jaundice . The infection resolves spontaneously in 10 ? 50 % of cases , which occurs more frequently in individuals who are young and female .

= = = Chronic infection = = =

About 80 % of those exposed to the virus develop a chronic infection . This is defined as the presence of detectable viral replication for at least six months . Most experience minimal or no symptoms during the initial few decades of the infection . Chronic hepatitis C can be associated with fatigue and mild cognitive problems . Chronic infection after several years may cause cirrhosis or liver cancer . The liver enzymes are normal in 7 ? 53 % . Late relapses after apparent cure have been reported , but these can be difficult to distinguish from reinfection .

Fatty changes to the liver occur in about half of those infected and are usually present before cirrhosis develops . Usually (80 % of the time) this change affects less than a third of the liver . Worldwide hepatitis C is the cause of 27 % of cirrhosis cases and 25 % of hepatocellular carcinoma . About 10 ? 30 % of those infected develop cirrhosis over 30 years . Cirrhosis is more common in those also infected with hepatitis B , schistosoma , or HIV , in alcoholics and in those of male gender

. In those with hepatitis C , excess alcohol increases the risk of developing cirrhosis 100 @-@ fold . Those who develop cirrhosis have a 20 @-@ fold greater risk of hepatocellular carcinoma . This transformation occurs at a rate of 1 ? 3 % per year . Being infected with hepatitis B in addition to hepatitis C increases this risk further .

Liver cirrhosis may lead to portal hypertension , ascites (accumulation of fluid in the abdomen) , easy bruising or bleeding , varices (enlarged veins , especially in the stomach and esophagus) , jaundice , and a syndrome of cognitive impairment known as hepatic encephalopathy . Ascites occurs at some stage in more than half of those who have a chronic infection .

= = = Extrahepatic complications = = =

The most common problem due to hepatitis C but not involving the liver is mixed cryoglobulinemia (usually the type II form) ? an inflammation of small and medium @-@ sized blood vessels . Hepatitis C is also associated with the autoimmune disorder Sjögren 's syndrome , a low platelet count , lichen planus , porphyria cutanea tarda , necrolytic acral erythema , insulin resistance , diabetes mellitus , diabetic nephropathy , autoimmune thyroiditis , and B @-@ cell lymphoproliferative disorders . 20 ? 30 % of people infected have rheumatoid factor ? a type of antibody . Possible associations include Hyde 's prurigo nodularis and membranoproliferative glomerulonephritis . Cardiomyopathy with associated abnormal heart rhythms has also been reported . A variety of central nervous system disorders has been reported . Chronic infection seems to be associated with an increased risk of pancreatic cancer .

= = = Occult infection = = =

Persons who have been infected with hepatitis C may appear to clear the virus but remain infected . The virus is not detectable with conventional testing but can be found with ultra @-@ sensitive tests . The original method of detection was by demonstrating the viral genome within liver biopsies , but newer methods include an antibody test for the virus ' core protein and the detection of the viral genome after first concentrating the viral particles by ultracentrifugation . A form of infection with persistently moderately elevated serum liver enzymes but without antibodies to hepatitis C has also been reported . This form is known as cryptogenic occult infection .

Several clinical pictures have been associated with this type of infection . It may be found in people with anti @-@ hepatitis @-@ C antibodies but with normal serum levels of liver enzymes ; in antibody @-@ negative people with ongoing elevated liver enzymes of unknown cause ; in healthy populations without evidence of liver disease ; and in groups at risk for HCV infection including those on hemodialysis or family members of people with occult HCV . The clinical relevance of this form of infection is under investigation . The consequences of occult infection appear to be less severe than with chronic infection but can vary from minimal to hepatocellular carcinoma .

The rate of occult infection in those apparently cured is controversial but appears to be low . 40 % of those with hepatitis but with both negative hepatitis C serology and the absence of detectable viral genome in the serum have hepatitis C virus in the liver on biopsy . How commonly this occurs in children is unknown .

= = Virology = =

The hepatitis C virus (HCV) is a small , enveloped , single @-@ stranded , positive @-@ sense RNA virus . It is a member of the Hepacivirus genus in the family Flaviviridae . There are seven major genotypes of HCV , which are known as genotypes one to seven . The genotypes are divided into several subtypes with the number of subtypes depending on the genotype . In the United States , about 70 % of cases are caused by genotype 1 , 20 % by genotype 2 and about 1 % by each of the other genotypes . Genotype 1 is also the most common in South America and Europe .

The half life of the virus particles in the serum is around 3 hours and may be as short as 45 minutes . In an infected person , about 1012 virus particles are produced each day . In addition to replicating

in the liver the virus can multiply in lymphocytes .

= = Transmission = =

The primary route of transmission in the developed world is intravenous drug use (IDU) , while in the developing world the main methods are blood transfusions and unsafe medical procedures . The cause of transmission remains unknown in 20 % of cases ; however , many of these are believed to be accounted for by IDU .

= = = Drug use = = =

Intravenous drug use (IDU) is a major risk factor for hepatitis C in many parts of the world . Of 77 countries reviewed , 25 (including the United States) were found to have prevalences of hepatitis C in the intravenous drug user population of between 60 % and 80 % . Twelve countries had rates greater than 80 % . It is believed that ten million intravenous drug users are infected with hepatitis C ; China (1 @.@ 6 million) , the United States (1 @.@ 5 million) , and Russia (1 @.@ 3 million) have the highest absolute totals . Occurrence of hepatitis C among prison inmates in the United States is 10 to 20 times that of the occurrence observed in the general population ; this has been attributed to high @-@ risk behavior in prisons such as IDU and tattooing with nonsterile equipment . Shared intranasal drug use may also be a risk factor .

= = = Healthcare exposure = = =

Blood transfusion , transfusion of blood products , or organ transplants without HCV screening carry significant risks of infection . The United States instituted universal screening in 1992 and Canada instituted universal screening in 1990 . This decreased the risk from one in 200 units to between one in 10 @,@ 000 to one in 10 @,@ 000 @,@ 000 per unit of blood . This low risk remains as there is a period of about 11 ? 70 days between the potential blood donor 's acquiring hepatitis C and the blood 's testing positive depending on the method . Some countries do not screen for hepatitis C due to the cost .

Those who have experienced a needle stick injury from someone who was HCV positive have about a 1 @.@ 8 % chance of subsequently contracting the disease themselves . The risk is greater if the needle in question is hollow and the puncture wound is deep . There is a risk from mucosal exposures to blood , but this risk is low , and there is no risk if blood exposure occurs on intact skin .

Hospital equipment has also been documented as a method of transmission of hepatitis C , including reuse of needles and syringes ; multiple @-@ use medication vials ; infusion bags ; and improperly sterilized surgical equipment , among others . Limitations in the implementation and enforcement of stringent standard precautions in public and private medical and dental facilities are known to be the primary cause of the spread of HCV in Egypt , the country with highest rate of infection in the world .

= = = Sexual intercourse = = =

Whether hepatitis C can be transmitted through sexual activity is controversial . While there is an association between high @-@ risk sexual activity and hepatitis C , and multiple sexual partners are a risk factor for hepatitis C , there is no conclusive evidence that hepatitis C can be transmitted by sexual activity , since people who report transmission with sex as their only risk factor may actually have used drugs but denied it . The majority of evidence supports there being no risk for heterosexual couples with only one sexual partner . Sexual practices that involve higher levels of trauma to the anogenital mucosa , such as anal penetrative sex , or that occur when there is a concurrent sexually transmitted infection , including HIV or genital ulceration , do present a risk . The United States Department of Veterans Affairs recommends condom use to prevent hepatitis C

transmission in those with multiple partners , but not those in relationships that involve only a single partner .

= = = Body modification = = =

Tattooing is associated with two to threefold increased risk of hepatitis C. This can be due to either improperly sterilized equipment or contamination of the dyes being used . Tattoos or piercings performed either before the mid @-@ 1980s , " underground , " or nonprofessionally are of particular concern , since sterile techniques in such settings may be lacking . The risk also appears to be greater for larger tattoos . It is estimated that nearly half of prison inmates share unsterilized tattooing equipment . It is rare for tattoos in a licensed facility to be directly associated with HCV infection .

= = = Shared personal items = = =

Personal @-@ care items such as razors , toothbrushes , and manicuring or pedicuring equipment can be contaminated with blood . Sharing such items can potentially lead to exposure to HCV . Appropriate caution should be taken regarding any medical condition that results in bleeding , such as cuts and sores . HCV is not spread through casual contact , such as hugging , kissing , or sharing eating or cooking utensils . Neither is it transmitted through food or water .

= = = Mother @-@ to @-@ child transmission = = =

Mother @-@ to @-@ child transmission of hepatitis C occurs in less than 10 % of pregnancies . There are no measures that alter this risk . It is not clear when transmission occurs during pregnancy , but it may occur both during gestation and at delivery . A long labor is associated with a greater risk of transmission . There is no evidence that breast @-@ feeding spreads HCV ; however , to be cautious , an infected mother is advised to avoid breastfeeding if her nipples are cracked and bleeding , or if her viral loads are high .

= = Diagnosis = =

There are a number of diagnostic tests for hepatitis C , including HCV antibody enzyme immunoassay or ELISA , recombinant immunoblot assay , and quantitative HCV RNA polymerase chain reaction (PCR) . HCV RNA can be detected by PCR typically one to two weeks after infection , while antibodies can take substantially longer to form and thus be detected .

Chronic hepatitis C is defined as infection with the hepatitis C virus persisting for more than six months based on the presence of its RNA . Chronic infections are typically asymptomatic during the first few decades , and thus are most commonly discovered following the investigation of elevated liver enzyme levels or during a routine screening of high @-@ risk individuals . Testing is not able to distinguish between acute and chronic infections . Diagnosis in the infant is difficult as maternal antibodies may persist for up to 18 months .

= = = Serology = = =

Hepatitis C testing typically begins with blood testing to detect the presence of antibodies to the HCV , using an enzyme immunoassay . If this test is positive , a confirmatory test is then performed to verify the immunoassay and to determine the viral load . A recombinant immunoblot assay is used to verify the immunoassay and the viral load is determined by an HCV RNA polymerase chain reaction . If there is no RNA and the immunoblot is positive , it means that the person tested had a previous infection but cleared it either with treatment or spontaneously ; if the immunoblot is negative , it means that the immunoassay was wrong . It takes about 6 ? 8 weeks following infection before the immunoassay will test positive . A number of tests are available as point of care testing

which means that results are available within 30 minutes .

Liver enzymes are variable during the initial part of the infection and on average begin to rise at seven weeks after infection . The elevation of liver enzymes does not closely follow disease severity .

= = = Biopsy = = =

Liver biopsies are used to determine the degree of liver damage present ; however , there are risks from the procedure . The typical changes seen are lymphocytes within the parenchyma , lymphoid follicles in portal triad , and changes to the bile ducts . There are a number of blood tests available that try to determine the degree of hepatic fibrosis and alleviate the need for biopsy .

= = = Screening = = =

It is believed that only 5 ? 50 % of those infected in the United States and Canada are aware of their status . Testing is recommended for those at high risk , which includes injection drug users , those who have received blood transfusions before 1992 , those who have been in jail , those on long term hemodialysis , and those with tattoos . Screening is also recommended in those with elevated liver enzymes , as this is frequently the only sign of chronic hepatitis . Routine screening is not currently recommended in the United States . In 2012 , the U.S. Centers for Disease Control and Prevention (CDC) added a recommendation for a single screening test for those born between 1945 and 1965 .

= = Prevention = =

As of 2016 , no approved vaccine protects against contracting hepatitis C. However , there are a number of vaccines under development and some have shown encouraging results .

A combination of harm reduction strategies , such as the provision of new needles and syringes and treatment of substance use , decreases the risk of hepatitis C in intravenous drug users by about 75 % . The screening of blood donors is important at a national level , as is adhering to universal precautions within healthcare facilities . In countries where there is an insufficient supply of sterile syringes , medications should be given orally rather than via injection (when possible) .

= = Treatment = =

HCV induces chronic infection in 50 ? 80 % of infected persons . Approximately 40 ? 80 % of these clear with treatment . In rare cases , infection can clear without treatment . Those with chronic hepatitis C are advised to avoid alcohol and medications toxic to the liver , and to be vaccinated for hepatitis A and hepatitis B. Ultrasound surveillance for hepatocellular carcinoma is recommended in those with accompanying cirrhosis .

= = = Medications = = =

Treatment with antiviral medication is recommended in all people with proven chronic hepatitis C who are not at high risk of dying from other causes . People with the highest complication risk should be treated first , with the risk of complications based on the degree of liver scarring . The initial recommended treatment depends on the type of hepatitis C virus with which a person is infected .

HCV genotype 1a : 12 weeks of ledipasvir and sofosbuvir OR 12 to 24 weeks of paritaprevir , ombitasvir , dasabuvir , and ribavirin

HCV genotype 1b : 12 weeks of ledipasvir and sofosbuvir OR 12 weeks of paritaprevir , ombitasvir , and dasabuvir

HCV genotype 2 : 12 to 16 weeks of sofosbuvir and ribavirin

HCV genotype 3 : 12 weeks of sofosbuvir , ribavirin , and pegylated interferon
HCV genotype 4 : 12 weeks of ledipasvir and sofosbuvir OR paritaprevir , ritonavir , ombitasvir , and ribavirin , OR 24 weeks of sofosbuvir and ribavirin
HCV genotype 5 or 6 : sofosbuvir and ledipasvir
Sofosbuvir with ribavirin and interferon appears to be around 90 % effective in those with genotype 1 , 4 , 5 , or 6 disease . Sofosbuvir with just ribavirin appears to be 70 to 95 % effective in type 2 and 3 disease but has a higher rate of adverse effects . Treatments that contain ledipasvir and sofosbuvir for genotype 1 has success rates of around 93 to 99 % but is very expensive . In genotype 6 infection , pegylated interferon and ribavirin is effective in 60 to 90 % of cases . There is some tentative data for simeprevir use in type 6 disease as well .
Prior to 2011 , treatments consisted of a combination of pegylated interferon alpha and ribavirin for a period of 24 or 48 weeks , depending on HCV genotype . This produces cure rates of between 70 and 80 % for genotype 2 and 3 , respectively , and 45 to 70 % for genotypes 1 and 4 . Adverse effects with these treatments were common , with half of people getting flu like symptoms and a third experiencing emotional problems . Treatment during the first six months is more effective than once hepatitis C has become chronic .

= = = Surgery = = =

Cirrhosis due to hepatitis C is a common reason for liver transplantation though the virus usually (80 ? 90 % of cases) recurs afterwards . Infection of the graft leads to 10 ? 30 % of people developing cirrhosis within five years . Treatment with pegylated interferon and ribavirin post transplant decreases the risk of recurrence to 70 % .

= = = Alternative medicine = = =

Several alternative therapies are claimed by their proponents to be helpful for hepatitis C including milk thistle , ginseng , and colloidal silver . However , no alternative therapy has been shown to improve outcomes in hepatitis C , and no evidence exists that alternative therapies have any effect on the virus at all .

= = Prognosis = =

The responses to treatment is measured by sustained viral response (SVR) , defined as the absence of detectable RNA of the hepatitis C virus in blood serum for at least 24 weeks after discontinuing the treatment , and rapid virological response (RVR) defined as undetectable levels achieved within four weeks of treatment . Successful treatment decreases the future risk of hepatocellular carcinoma by 75 % .
Prior to 2012 sustained response occurs in about 40 ? 50 % in people with HCV genotype 1 given 48 weeks of treatment . A sustained response is seen in 70 ? 80 % of people with HCV genotypes 2 and 3 with 24 weeks of treatment . A sustained response occurs about 65 % in those with genotype 4 after 48 weeks of treatment . The evidence for treatment in genotype 6 disease is sparse and what evidence there is supports 48 weeks of treatment at the same doses used for genotype 1 disease .

= = Epidemiology = =

It is estimated that 150 ? 200 million people , or ~ 3 % of the world 's population , are living with chronic hepatitis C. About 3 ? 4 million people are infected per year , and more than 350 @,@ 000 people die yearly from hepatitis C @-@ related diseases . During 2010 it is estimated that 16 @,@ 000 people died from acute infections while 196 @,@ 000 deaths occurred from liver cancer secondary to the infection . Rates have increased substantially in the 20th century due to a combination of intravenous drug abuse and reused but poorly sterilized medical equipment .
Rates are high (> 3 @.@ 5 % population infected) in Central and East Asia , North Africa and the

Middle East , they are intermediate (1 @.@ 5 % -3.5 %) in South and Southeast Asia , sub @-@ Saharan Africa , Andean , Central and Southern Latin America , Caribbean , Oceania , Australasia and Central , Eastern and Western Europe ; and they are low (< 1 @.@ 5 %) in Asia @-@ Pacific , Tropical Latin America and North America .

Among those chronically infected , the risk of cirrhosis after 20 years varies between studies but has been estimated at ~ 10 ? 15 % for men and ~ 1 ? 5 % for women . The reason for this difference is not known . Once cirrhosis is established , the rate of developing hepatocellular carcinoma is ~ 1 ? 4 % per year . Rates of new infections have decreased in the Western world since the 1990s due to improved screening of blood before transfusion .

In the United States , about 2 % of people have hepatitis C , with the number of new cases per year stabilized at 17 @,@ 000 since 2007 . The number of deaths from hepatitis C has increased to 15 @,@ 800 in 2008 and by 2007 had overtaken HIV / AIDS as a cause of death in the USA . This mortality rate is expected to increase , as those infected by transfusion before HCV testing become apparent . In Europe the percentage of people with chronic infections has been estimated to be between 0 @.@ 13 and 3 @.@ 26 % .

In England about 160 @,@ 000 people are chronically infected . Between 2006 and 2011 28 @,@ 000 about 3 % , received treatment .

The total number of people with this infection is higher in some countries in Africa and Asia . Countries with particularly high rates of infection include Egypt (22 %) , Pakistan (4 @.@ 8 %) and China (3 @.@ 2 %) . It is believed that the high prevalence in Egypt is linked to a now @-@ discontinued mass @-@ treatment campaign for schistosomiasis , using improperly sterilized glass syringes .

= = History = =

In the mid @-@ 1970s , Harvey J. Alter , Chief of the Infectious Disease Section in the Department of Transfusion Medicine at the National Institutes of Health , and his research team demonstrated how most post @-@ transfusion hepatitis cases were not due to hepatitis A or B viruses . Despite this discovery , international research efforts to identify the virus , initially called non @-@ A , non @-@ B hepatitis (NANBH) , failed for the next decade . In 1987 , Michael Houghton , Qui @-@ Lim Choo , and George Kuo at Chiron Corporation , collaborating with Dr. D.W. Bradley at the Centers for Disease Control and Prevention , used a novel molecular cloning approach to identify the unknown organism and develop a diagnostic test . In 1988 , Alter confirmed the virus by verifying its presence in a panel of NANBH specimens . In April 1989 , the discovery of HCV was published in two articles in the journal Science . The discovery led to significant improvements in diagnosis and improved antiviral treatment . In 2000 , Drs. Alter and Houghton were honored with the Lasker Award for Clinical Medical Research for " pioneering work leading to the discovery of the virus that causes hepatitis C and the development of screening methods that reduced the risk of blood transfusion @-@ associated hepatitis in the U.S. from 30 % in 1970 to virtually zero in 2000 . "

Chiron filed for several patents on the virus and its diagnosis . A competing patent application by the CDC was dropped in 1990 after Chiron paid $ 1 @.@ 9 million to the CDC and $ 337 @,@ 500 to Bradley . In 1994 , Bradley sued Chiron , seeking to invalidate the patent , have himself included as a coinventor , and receive damages and royalty income . He dropped the suit in 1998 after losing before an appeals court .

= = Society and culture = =

World Hepatitis Day , held on July 28 , is coordinated by the World Hepatitis Alliance . The economic costs of hepatitis C are significant both to the individual and to society . In the United States the average lifetime cost of the disease was estimated at 33 @,@ 407 USD in 2003 with the cost of a liver transplant as of 2011 costing approximately 200 @,@ 000 USD . In Canada the cost of a course of antiviral treatment is as high as 30 @,@ 000 CAD in 2003 , while the United States costs are between 9 @,@ 200 and 17 @,@ 600 in 1998 USD . In many areas of the world , people

are unable to afford treatment with antivirals as they either lack insurance coverage or the insurance they have will not pay for antivirals . In the English National Health Service treatment rates for hepatitis C are higher among wealthier groups per 2010 @-@ 2012 data . Spanish anaesthetist Juan Maeso infected 275 patients between 1988 and 1997 as he used the same needles to give both himself and the patients opioids . For this he was jailed .

= = Research = =

As of 2011 , there are about one hundred medications in development for hepatitis C. These include vaccines to treat hepatitis , immunomodulators , and cyclophilin inhibitors , among others . These potential new treatments have come about due to a better understanding of the hepatitis C virus .

The combination of sofosbuvir and velpatasvir in one trial (reported in 2015) resulted in cure rates of 99 % .

= = = Animal models = = =

One barrier to finding treatments for hepatitis C is the lack of a suitable animal model . Despite moderate success , current research highlights the need for pre @-@ clinical testing in mammalian systems such as mouse , particularly for the development of vaccines in poorer communities . Currently , chimpanzees remain the available living system to study , yet their use has ethical concerns and regulatory restrictions . While scientists have made use of human cell culture systems such as hepatocytes , questions have been raised about their accuracy in reflecting the body 's response to infection .

One aspect of hepatitis research is to reproduce infections in mammalian models . A strategy is to introduce liver tissues from humans into mice , a technique known as xenotransplantation . This is done by generating chimeric mice , and exposing the mice HCV infection . This engineering process is known to create humanized mice , and provide opportunities to study hepatitis C within the 3D architectural design of the liver and evaluating antiviral compounds . Alternatively , generating inbred mice with susceptibility to HCV would simplify the process of studying mouse models .

= = Special populations = =

= = = Children and pregnancy = = =

Compared with adults , infection in children is much less well understood . Worldwide the prevalence of hepatitis C virus infection in pregnant women and children has been estimated to 1 ? 8 % and 0 @.@ 05 ? 5 % respectively . The vertical transmission rate has been estimated to be 3 ? 5 % and there is a high rate of spontaneous clearance (25 ? 50 %) in the children . Higher rates have been reported for both vertical transmission (18 % , 6 ? 36 % and 41 %) . and prevalence in children (15 %) .

In developed countries transmission around the time of birth is now the leading cause of HCV infection . In the absence of virus in the mother 's blood transmission seems to be rare . Factors associated with an increased rate of infection include membrane rupture of longer than 6 hours before delivery and procedures exposing the infant to maternal blood . Cesarean sections are not recommended . Breastfeeding is considered safe if the nipples are not damaged . Infection around the time of birth in one child does not increase the risk in a subsequent pregnancy . All genotypes appear to have the same risk of transmission .

HCV infection is frequently found in children who have previously been presumed to have non @-@ A , non @-@ B hepatitis and cryptogenic liver disease . The presentation in childhood may be asymptomatic or with elevated liver function tests . While infection is commonly asymptomatic both cirrhosis with liver failure and hepatocellular carcinoma may occur in childhood .

= = = Immunosuppressed = = =

The rate of hepatitis C in immunosuppressed people is higher than the normal population . This is particularly true in those with human immunodeficiency virus infection , recipients of organ transplants and those with hypogammaglobulinemia . Infection in these people is associated with an unusually rapid progression to cirrhosis .