

What Does Your Liver Do?

- Your liver is essential to your life. It is the largest solid internal organ in the body. It is about the size of a football and weighs about 3 to 3.5 pounds (1.36–1.59kg). It is located on your right side, just under your rib cage. ^{1,2,3}
- The liver performs many vital functions, including filtering toxins from your blood, managing blood clotting, making bile to digest fat, storing sugar for energy, turning extra glucose into glycogen, making protein for blood plasma, and helping with digestion. ^{1,2,3}

What Is Liver Disease?

There are many kinds of liver diseases and conditions, the most common are hepatitis viruses, nonalcoholic fatty liver disease (NAFLD), autoimmune diseases, genetic conditions, cancer, and others. Liver disease has many causes such as: ^{1,4,5}

- **Infections:** Viruses and parasites can infect the liver. The most common infections are hepatitis viruses. Liver-damaging viruses can be spread through contaminated food or water, unscreened blood transfusions, sexual contact, exposure to blood/body fluids, and other ways.
- **Immune system abnormalities:** Your immune system protects your body from germs and toxins. But that system can attack certain parts of your body (autoimmune), including your liver. Examples of autoimmune liver diseases include autoimmune hepatitis; primary biliary cholangitis; primary sclerosing cholangitis.
- **Genetics:** An abnormal gene inherited from one or both of your parents can cause liver damage. Genetic liver diseases include: nemochromatosis; Wilson's disease; alpha-1 antitrypsin deficiency.
- **Cancer and other growths:** Examples include liver cancer; bile duct cancer; liver adenoma.
- **Other causes of liver disease:** long-term alcohol use; fat accumulation in the liver (NAFLD; nonalcoholic fatty liver disease); obesity; some prescription or over-the-counter medications; some herbal compounds.

How Many People Have Liver Disease?

- **More than 100 million people in the U.S. have some form of liver disease.** 4.5 million U.S. adults (1.8%) have been diagnosed with liver disease. But it is estimated that **80-100 million adults in the U.S. have fatty liver disease** and many do not know they have it. ^{6,7}
- Left untreated, liver disease can lead to liver failure and liver cancer. ⁴
- In 2020, 51,642 adults in the U.S. died from liver disease (15.7 per 100,000 population). ⁶
- Chronic liver disease/cirrhosis was the 12th leading cause of death in the U.S in 2020. ⁸
- In 2019, chronic liver disease was the 8th leading cause of death for non-Hispanic African American/Black people aged 45–64 years old. ⁹
- A 2016 study compared **general liver disease/cirrhosis prevalence rates by racial/ethnic categories**, as follows: Japanese Americans (6.9%); Hispanic/Latino persons (6.7%); White persons (4.1%); African American/Black and Native Hawaiian persons (3.9%). ¹⁰
 - In that study, nonalcoholic fatty liver disease (NAFLD) was the most common cause of liver disease/cirrhosis among all groups. The most common causes of cirrhosis by ethnicity were: NAFLD in Japanese American, Native Hawaiian, and Hispanic/Latino persons; alcoholic liver disease (ALD) in White persons; and hepatitis C in African American/Black persons.

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- Cirrhosis is a long-term liver disease. Cirrhosis is scarring of the liver, when scar tissue replaces healthy tissue, causing damage and reducing the liver's functioning. Cirrhosis is most often caused by hepatitis and other viruses; long-term alcohol abuse; and nonalcoholic fatty liver disease (NAFLD).¹¹
- Risk factors for liver disease include heavy alcohol use; obesity; type 2 diabetes; tattoos or body piercings; injecting drugs using shared needles; had a blood transfusion before 1992; exposure to other people's blood and body fluids; unprotected sex; exposure to certain chemicals or toxins; and family history of liver disease.¹
- Cirrhosis increases the risk for stroke. Stroke incidence was 2.17% (95% CI, 1.99%-2.36%) per year in patients with cirrhosis and 1.11% (95% CI, 1.10%-1.11%) per year in patients without cirrhosis.¹²
- Rates of liver cirrhosis deaths have been consistently higher for Black/African American men and women than their White counterparts since the 1950's.¹³

Fatty Liver Disease

Nonalcoholic fatty liver disease (NAFLD)

- Fatty liver disease, also called nonalcoholic fatty liver disease (NAFLD) causes excess fat to build up in the liver. It is a "silent" disease with few or no symptoms. Causes are still being studied, but research points to genetics, digestive disorders, and diet.^{14,15,16}
 - **It is not caused by heavy alcohol use** (alcohol-associated liver disease). Risk factors include being overweight/obesity, type 2 diabetes/insulin resistance, high cholesterol/triglyceride levels, one or more traits of metabolic syndrome (traits and medical conditions linked to overweight/obesity), and older age.
 - **Nonalcoholic steatohepatitis (NASH)** is a form of NAFLD in which you have inflammation of the liver and liver damage, in addition to fat in your liver.
 - The two kinds of NAFLD are nonalcoholic fatty liver (NAFL) and nonalcoholic steatohepatitis (NASH). NAFLD may be renamed metabolic-associated fatty liver disease (MAFLD) when associated with metabolic syndrome.
- **NAFLD is one of the most common causes of liver disease in the U.S.** About 24% of U.S. adults are estimated to have it. Cleveland Clinic estimates that about 20-30% of adults in the U.S. have excess fat in their liver.^{17,15}
- In the U.S., NAFLD affects between 80 and 100 million individuals, among whom nearly 25% progress to NASH. Many do not know they have the disease. 11% of NASH patients will develop cirrhosis or liver failure.^{18,19,7,21,16}
- NAFLD is the most common cause of liver disease worldwide. The global prevalence of NAFLD is estimated as high as one billion.^{22,7}
- Research estimates that **NAFLD is present in up to 75% of overweight people and in more than 90% of people with severe obesity.**^{17,23,24}

Nonalcoholic steatohepatitis (NASH)

- Nonalcoholic steatohepatitis (NASH) is a dangerously progressive form of NAFLD in which patients have inflammation of the liver and liver damage, in addition to excess fat. About 1.5% to 6.5% of U.S. adults have NASH; one estimate states 9-15 million have NASH.^{25,17,16}
- NASH prevalence projected to increase by 63% between 2015 and 2030.^{26,27}
- NASH is expected to become the leading cause of liver transplantation in the United States between 2020-2025.^{26,28}

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- NASH may progress to hepatocellular cancer (HCC) and is also a leading cause of liver transplant.²⁹
- Partial breakdown of NAFLD/NASH prevalence by race by the NASH Education Program: NAFLD overall prevalence in the U.S. (2013 data): 34%; NAFLD prevalence by race/ethnicity (2011 data): Hispanic/Latino people: 58.3; White people: 44.6%; Black/African American people: 35.1%. NASH overall prevalence in the U.S. (2013 data): 12%; NASH prevalence by race/ethnicity (2011 data): Hispanic/Latino people: 19.4%; White people: 9.8%.^{26, 30, 31}

How Children are Affected by Nonalcoholic Fatty Liver Disease (NAFLD)

- NAFLD has become the most common form of childhood liver disease in the U.S., more than doubling over the past 20 years, partly because of the increase in childhood obesity. Studies estimate that 5% to 10% of children have NAFLD.^{32, 33, 34, 35, 36}

Hepatitis

What is hepatitis?

Hepatitis is inflammation of the liver. It can cause liver damage, affecting its vital functions. It is often caused by various forms of hepatitis viruses; the most common in the U.S. are hepatitis A, B, and C. People can also get inflammation of the liver from heavy alcohol use, toxins, some medications, and some medical conditions, such as diabetes and obesity. It is estimated that 115,900 new cases of Hepatitis A, B and C occur annually in the U.S.^{37, 40}

What is the difference between hepatitis A, B, C, D, and E?

- Hepatitis A, hepatitis B and hepatitis C are caused by three different viruses that cause liver damage. They are spread in different ways and can affect the liver differently. Hepatitis A is usually a short-term infection. Hepatitis B and hepatitis C can begin as short-term, but in some people, the virus stays in the body, causing chronic infection. There are vaccines to prevent hepatitis A and hepatitis B, but no vaccine for hepatitis C. Hepatitis D and E are not common in the U.S. but do occur.^{37, 40, 41}
- More than half of people with hepatitis do not know that they have it. They can be at risk for liver disease and cancer and can unknowingly transmit it to others. 67% of persons living with hepatitis B and 51% of persons with hepatitis C infections do not know they have the virus.⁴²

Hepatitis A (HAV; Hep A)

- Hepatitis A is a highly contagious, usually short-term, liver infection that can be spread person-to-person and through tainted food or drink. It is preventable by vaccine.^{43, 44, 40}

Hepatitis B (HBV; Hep B)

- Hepatitis B is a type of liver infection caused by the hepatitis B virus (HBV); it can be short-term but can progress to a life-long illness. Hepatitis B is spread with blood, semen, or other body fluids. It is the world's most common serious liver infection and is preventable through vaccines.^{45, 46, 40, 47}
- **Between 850,000 (CDC) and 2.4 million (The Hepatitis B Foundation) people** in the U.S. are living with chronic hepatitis B infection*.^{48, 46}
*According to the U.S. Department of Health and Human Services (HHS): "850,000 people in the U.S. are estimated to be living with hepatitis B. The actual number may be as high as 2.2 million or as low as 730,000."⁴²
- **At risk for hepatitis B:** Anyone can get hepatitis B, but high-risk people include: people who inject drugs or share needles, syringes, drug equipment (the most common risk factor for acute HBV infection, because of the opioid crisis); infants of infected mothers; sex partners of infected people, esp. men who have sex with men; people living with someone who has

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hepatitis B; healthcare and public-safety workers exposed to blood; hemodialysis patients; people who have gotten tattoos with infected needles. ^{49, 50}

- About 70% of adults with acute hepatitis B develop symptoms, which tend to appear an average of 90 days (1-4 months) after exposure to the virus. Symptoms include abdominal pain; dark urine; fever; joint pain; appetite loss; nausea/vomiting; fatigue/weakness; jaundice (yellowing of skin and whites of eyes). ^{51, 52}
- 67% of persons living with chronic hepatitis B infection do not know they have the virus and are not receiving the appropriate care and treatment. ^{42, 45}
- A person can spread the hepatitis B virus and not know it. ⁴⁹
- In 2019, more than half of acute hepatitis B cases reported to CDC were among persons 30–49 years old. ⁴⁰
- A one-time universal screening for hepatitis B could save 23,000 lives and nearly \$600 million in the U.S. ^{53, 54}
- The largest group affected by acute hepatitis B was Non-Hispanic White people (1.0 cases per 100,000). ⁴⁰
 - In 2016, Asian Americans and Pacific Islanders (AAPIs) represented about 5% of the U.S. population, but about half of all persons with **hepatitis B**. As a result, 1 in 12 AAPIs were living with hepatitis B. ^{42, 55}
- Asian Americans were almost eight times more likely to die from hepatitis B than non-Hispanic Whites, in 2018. ⁵⁵
- Hepatitis B and C can cause cirrhosis and liver cancer. ^{56, 57}

Hepatitis C (HCV; Hep C)

- Hepatitis C is a liver infection caused by the hepatitis C virus (HCV) and is spread through contact with blood from an infected person. Most people become infected by sharing needles or other equipment used to prepare and inject drugs; the opioid crisis has accelerated the spread of this virus. For some, hepatitis C is a short-term illness, but for more than half it becomes a long-term, chronic infection. Chronic hepatitis C can result in cirrhosis and liver cancer. ⁵⁸
- **There is no HCV vaccine, but treatments, called Direct Acting Antivirals (DAAs) can cure it.** ^{59, 60, 61}
- 2.4 million people are estimated to be living with hepatitis C in the United States. The actual number may be as high as 4.7 million or as low as 2.5 million*. ⁴²

*Prevalence/incidence numbers for HCV are estimated and vary because National Health and Nutrition Examination Surveys (NHANES), a primary source of data for CDC, do not sample certain populations, such as people who are incarcerated, homeless individuals, nursing home residents, persons on active military duty, and immigrants. The most recent estimate of HCV prevalence in the United States was generated from analysis of 2013 to 2016 NHANES survey data. ⁶²
- The CDC estimated that 2.4 million adults in America—approximately 1% of the adult population—were living with hepatitis C during 2013–2016. ^{63, 64}
- **At risk for HCV:** Current or former IV drug users, even those who injected only once many years ago; people with HIV; maintenance hemodialysis patients; patients with persistently abnormal alanine aminotransferase (ALT) levels; people with multiple sexual partners/men who have sex with men; organ transplant recipients esp. before July 1992 ; people who had transfusions including those who received clotting factor concentrates produced before 1987 or blood/blood components before July 1992; people who received blood from a donor positive for hepatitis C; healthcare, emergency medical, and public safety personnel exposed to HCV infected blood; children of mothers with HCV; people who received a piercing or tattoo in an unclean environment using unsterile equipment. ^{65, 40, 66}

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- **HCV symptoms** (once liver damage is advanced): bleeding or bruising easily; fatigue; loss of appetite; yellow skin and eyes (jaundice); dark urine; itchy skin; fluid buildup in the abdomen (ascites); swelling in legs; weight loss; confusion, drowsiness and slurred speech (hepatic encephalopathy); spiderlike blood vessels on skin (spider angiomas).⁶⁷
- 40%-51% of persons living with HCV have no symptoms and do not know they have it, so they are not receiving treatment to prevent disease progression and liver damage, including cirrhosis and liver cancer. They are also risk transmitting the virus to others.^{42,63}
- The highest rates of hepatitis C in the U.S. are among American Indian/Alaska Native peoples (3.6 cases per 100,000).⁴⁰
- The rate of new hepatitis C infections in 2018 was four times as high as 2010, according to CDC. 2018 also marked a decade of increases in new hepatitis C infections in people in their 20s and 30s, mostly because of injection drug use (IDU).^{42,59}
- Newly reported HCV infections by age (2018): Millennials (most adults in their 20s and 30s) 36.5%; Baby Boomers (most adults in their mid-50s to early 70s) 36.3%; and Generation X (adults in their late 30s to early 50s) 23.1%.⁴²
- “Baby Boomers” (born 1945 through 1965) were formerly the highest risk group for HCV. They are now being equaled in infection rates by Millennials (born 1981-1996). Gen Xers (born 1966-1980) are heavily affected as well.⁶⁸
- In 2019, an estimated **57,500* new Hepatitis C infections** occurred in the United States.⁴⁰

Hepatitis D (HDV; Hep D; “delta hepatitis”)

- Hepatitis D is **most common** in Eastern Europe, Southern Europe, the Mediterranean region, the Middle East, West and Central Africa, East Asia, and the Amazon Basin in South America. **HDV is uncommon in the United States**, where most cases occur among people who migrate or travel to the U.S. from countries with high HDV endemicity. The actual number of HDV cases in the U.S. is unknown.⁶⁹
- Hepatitis D virus (HDV) affects globally nearly 5% of people who have a chronic infection with hepatitis B virus (HBV).⁷⁰
- HDV has similar risk factors/groups and symptoms to hepatitis A, B ,C. It can be a long or short-term illness. However, HDV is not spread through food or water, sharing eating utensils, breastfeeding, hugging, kissing, hand holding, coughing, or sneezing.⁶⁹
- HDV can only infect people who are also infected by the hepatitis B virus (HBV); infection can occur simultaneously (co-infection) or after infection with hep B (super-infection). **HDV is a “disease amplifier.”** It causes HBV to progress more rapidly, causing cirrhosis and liver failure, making it more deadly.⁶⁹

Hepatitis E (HEV)

- Hepatitis E is a liver infection caused by the hepatitis E virus (HEV). HEV is found in the stool of HEV infected people. It is uncommon in the U.S. and developed countries. It is most common in developing countries with inadequate water supply and poor environmental sanitation; people often get HEV from drinking contaminated water. **People living in crowded camps or temporary housing, esp. refugees and displaced people, are at high risk.** Symptoms of HEV are like other forms of hepatitis; however, many people especially young children, can have no symptoms. Most people with healthy immune systems fully recover; there is no vaccine for HEV.⁷¹
- **For pregnant women, HEV can be a very serious illness**, with a mortality rate of 10%–30% in their third trimester. **HEV is also a serious health threat to people with preexisting chronic liver disease and organ transplant recipients** on immunosuppressive therapy.⁷¹

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Liver Cancer

- Liver cancer, also called hepatocellular carcinoma (HCC), is when tumor cells begin to grow out of control taking over the liver's functional, healthy cells. There are several kinds of liver cancer which are broken down into general categories: primary liver cancer which starts in the liver itself and includes hepatocellular carcinoma and bile duct cancer; secondary liver cancer which spread to the liver from somewhere else in the body; and benign liver tumors which may interfere with the liver's function but do not grow into nearby tissues or spread.⁷²
- The primary causes of liver cancer include hepatitis B virus (HBV) (the third leading cause of cancer deaths in the world), hepatitis C virus (HCV), alcohol consumption, nonalcoholic fatty liver disease (NAFLD), and other causes of liver disease that result in cirrhosis.⁷³
- Risk factors for liver cancer include cirrhosis from any cause (including hepatitis C, non-alcoholic fatty liver disease, alcohol induced fatty liver disease, hemochromatosis, primary biliary cirrhosis and others); chronic hepatitis B; non-alcoholic fatty liver disease with liver fibrosis (scarring); and diabetes, sometimes even in the absence of cirrhosis. In the presence of these chronic liver diseases certain factors are more commonly associated with risk of hepatocellular carcinoma, including male gender; certain racial/ethnic groups (see below); genetic history (hereditary hemochromatosis); HIV or AIDS; heavy alcohol and tobacco use; obesity; and type 2 diabetes. Rare risk factors for liver cancer include exposure to certain chemicals and substances (e.g., aflatoxins, vinyl chloride and thorium dioxide (thorotrast)); steroid use.^{74,75}
- **Estimated new cases of liver/bile duct cancer in 2021:** 42,230 (2.2% of all new cancer cases). Estimated liver/bile duct cancer deaths in 2021: 30,230 (5.0% of all cancer deaths that year).⁷⁶
- **Liver cancer is a leading cause of cancer deaths in the U.S. among all races, ethnicities, and genders.** It claims the lives of approximately 30,000 adults in the U.S. each year.^{76,77}
- **Liver cancer is the most rapidly growing cause of cancer deaths in the U.S.** Liver cancer death rates have more than doubled since 1980.^{78,79,80,81}
- Liver cancer is a major cause of cancer death among all U.S. males and in Mexican American men.⁸⁰
- Liver cancer incidence in the United States is higher among Black/African American people compared to Whites.⁸²
- Between 2000 and 2016, liver cancer death rates jumped 43% in the U.S., despite a steady decline of the overall cancer death rates during the same period. The higher rate was also accompanied by an increase in liver cancer incidence.^{83,84}
- **2018 rates of new liver/bile duct cancers by race/ethnicity**, per 100,000: Hispanic/Latino (13.3); Asian/Pacific Islander (10.9); American Indian/Alaska Native (9.9); Black/African American (9.8); White (7.8). By gender: male (12.6); female (4.6).⁸⁵
- In 2018, **Hispanic/Latino men had highest incidence rates of liver cancer** (19.4 per 100,000), followed by Asian/Pacific Islander (16.8); Black/African American (15.8); American Indian/Alaska Native (13.4); and White males (11.7). Among women, Hispanic/Latino women had the highest incidence rates of liver cancer (8.1 per 100,000 women), followed by Asian/Pacific Islander (6.1); American Indian/Alaska Native (6.9); Black/African American (5.2), and White women (4.3).⁸⁵
- A 2017 study found the following racial/ethnic disparity in liver cancer death rates: 5.5 per 100,000 in non-Hispanic whites vs. 11.9 per 100,000 in American Indians/Alaska Natives.⁷⁹
- **Chronic viral hepatitis is the leading "pathway" to liver cancer** in the U.S. and nonalcoholic fatty liver disease (NAFLD) is rapidly increasing as a common cause of liver cancer in the U.S. and worldwide.^{86,87}

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Pediatric Liver Disease

Biliary Atresia

- Approximately **15,000 children are hospitalized each year in the U.S. with pediatric liver diseases** or disorders (as of 2016). Due to the absence of symptoms, especially in early stages, these disorders continue to be under-recognized or diagnosed late. ⁸⁸
- **Biliary atresia (BA)** is a rare disease at birth causing damage, scarring and blockage of the bile ducts. It affects 1 in 8,000 to 1 in 18,000 live births worldwide. **About 10-20% of infants with biliary atresia have abnormalities in other organs, such as heart defects or issues with their spleen.** ^{89, 90, 91, 92, 93, 94}
- **Biliary atresia (BA) is mostly seen in full-term infants**, (not in premature babies). ^{95, 96} We don't know the etiology of BA. **There is emerging evidence that BA may start in utero and can be picked up at birth** (but this is not proven yet). ^{96, 97}
- We do not know what causes BA, but the diagnosis of BA is time-sensitive, ie., must occur as soon as possible. ^{96, 97}
- Treatment of BA is surgical, and outcomes are better if the diagnosis and surgery occurs early, before 40 days of life. ^{96, 98}
- New clinical trials for treatment of BA are ongoing. ⁹⁶

Children and Nonalcoholic Fatty Liver Disease (NAFLD)

- Fatty liver disease, also called nonalcoholic fatty liver disease (NAFLD) has become the most common form of childhood liver disease in the U.S., more than doubling over the past 20 years, partly because of the increase in childhood obesity. Studies estimate that 5% to 10% of children have NAFLD. ^{99, 33, 34, 35, 36}
- Prevalence of NAFLD in children by race/ethnicity: children of Hispanic/Latino ethnicity (11.8%); Asian children (10.2%); White children (8.6%); children of Black/African American race (estimate of 1.5%). ³⁵

Alcoholic Related Liver Disease (ALD)

- Alcohol Related liver disease (ALD) is a major cause of alcohol-related morbidity and mortality through cirrhosis, liver cancer, and acute and chronic liver failure. The amount of alcohol consumed placing an individual at risk is not known. A typical patient has consumed alcohol heavily for two or more decades, although sometimes abuse may be for less than 10 years. ^{100, 101}
- Alcohol Related Liver Disease (ALD) is a spectrum of conditions, ranging from reversible fatty liver to alcoholic hepatitis (AH), cirrhosis, and hepatocellular carcinoma (HCC). AH is a distinct syndrome caused by long- term alcohol use and has a poor prognosis. ¹⁰⁰

Rare Liver Diseases

There are many types of rare liver diseases. Some more common ones include: [Alagille Syndrome](#), [Acute Hepatic Porphyria](#), [Biliary Atresia](#), [Crigler-Najjar Syndrome](#), [Galactosemia](#), [Glycogen Storage Disease](#), [Lysosomal Acid Lipase Deficiency](#), [Primary Biliary Cholangitis](#), [Primary Sclerosing Cholangitis](#) and [Wilson Disease](#).

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Rare diseases are those which affect a small number of people compared to the general population. In the United States, a disease is considered rare if it affects fewer than 200,000 people in the U.S. at any given time. The European Liver Patients' Association (ELPA) estimates the incidence of rare liver diseases in all geographical areas at about 1 per 50,000 to 1 per 100,000 births, but the exact prevalence is unknown. ^{102, 103, 104, 105}

Wilson Disease

- About **one in 30,000-40,000** people have **Wilson disease** worldwide. About 2,000-3,000 cases have been diagnosed in the U.S. ^{106, 107, 108}
- Some people with Wilson Disease **may not develop signs or symptoms** of liver disease; a minority will develop acute liver failure. Some with Wilson disease only have symptoms if they develop chronic liver disease and complications from cirrhosis. ^{106, 107, 108}
- Liver disease is usually the first sign of Wilson disease in children and young adults. It is caused by a genetic disorder of copper build-up in the liver. Copper can also build up in the brain, pancreas, heart and other organs. Symptoms are often mistaken for other neurological, liver, or psychiatric conditions or diseases. If a patient presents with liver disease, the most common mistaken diagnosis is viral hepatitis. Nervous system or psychiatric problems are often the initial features in individuals diagnosed in adulthood and commonly occur in young adults with Wilson disease. ^{106, 109}
- Approximately one in 90 people may be carriers of the Wilson disease gene. ¹¹⁰

Alpha-1 Antitrypsin Deficiency

- **Alpha-1 Antitrypsin Deficiency (AATD, Alpha-1, inherited emphysema, genetic emphysema)** affects about **1 in 1,500 to 3,500** individuals with **European ancestry**. It affects the lungs (emphysema) and the liver (cirrhosis). Patients with at risk genes typically develop symptoms in adulthood. ^{111, 112, 113}
- AATD affects approximately 100,000 people in the U.S. ¹¹⁴
- Patients with at risk genes typically develop symptoms in adulthood. ¹¹⁵

Alagille Syndrome

- **Alagille Syndrome (ALGS)** is a rare genetic disorder that can affect multiple organ systems of the body including the liver, heart, skeleton, eyes and kidneys. It occurs in about **one of every 30,000-45,000** live births. The disorder affects both sexes equally and shows no geographical, racial, or ethnic preferences. **ALGS presents in infancy, as opposed to many of the other rare liver diseases.** ^{116, 117, 118}
- One of the major features of Alagille syndrome is liver damage caused by abnormalities in the bile ducts. ^{118, 119}

Primary sclerosing cholangitis (PSC)

- **Primary sclerosing cholangitis (PSC)** is a disease of the bile ducts. Approximately 70%–80% of patients with PSC have inflammatory bowel disease (IBD), ulcerative colitis or Crohn's disease, with the majority (80%) suffering from ulcerative colitis. ^{120, 121}
- **PSC affects males twice as often as females**, and most often occurs in middle-aged adults. The incidence and prevalence of the disorder is unknown, but one estimate places the incidence a 1 per 100,000 people in the U.S. and Europe. ¹²²
- **Despite being classified as a "rare" disease, PSC is the fifth leading cause of liver transplantation (LT) in the U.S.** Some studies indicate that PSC is on the rise. ^{122, 123}

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Primary biliary cholangitis (PBC)

- Primary biliary cholangitis (primary biliary cirrhosis) is a chronic disease that slowly destroys the bile ducts in your liver and can have no symptoms. ¹²⁴
- There are fewer than 200,000 PBC cases in the U.S. per year. **PBC mostly affects women and appears usually in middle age.** There is no cure, but treatment can help delay the condition's progression and manage complications. **A liver transplant may be required in severe cases.** ¹²⁵

Hereditary Hemochromatosis

- Hereditary hemochromatosis is a rare genetic disease that causes your **body to absorb too much iron** from your diet. The excess iron, stored in your organs, especially your liver, heart and pancreas, can lead to life-threatening conditions, such as liver disease, heart problems and diabetes. Doctors can treat hereditary hemochromatosis by periodically removing blood from your body (phlebotomy), as if you were donating blood, to reduce your iron levels to normal. ¹²⁶
- Hereditary hemochromatosis is the **most common autosomal recessive disorder in whites.** It has a **prevalence of 1 in 300 to 500 people** of northern European descent. ¹²⁷

Liver Transplantation

- A liver transplant is a surgery to replace a diseased or failed liver with a healthy liver to save someone's life. A whole liver can be transplanted, or just part of one. A healthy liver will mostly come from a deceased organ donor. A healthy living person who is a "match" can donate part of their liver. ^{128, 129}
- A liver transplant is a surgery to replace a diseased or failed liver with a healthy liver to save someone's life. There are currently 11,556 people on the liver transplant wait list. In 2021 there were 9,236 liver transplants. ¹³⁰
- There are more people who need a liver than the supply available. People continue to die while on the waiting list. ¹³¹
- The waiting time for a deceased donor liver transplant ranges from less than 30 days to more than 5 years. ¹³²

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