What is NAFLD?

Nonalcoholic fatty liver disease (NAFLD) is caused by a buildup of fat in the liver in people with little or no alcohol use. The exact cause of NAFLD is unknown, but it is usually related to other medical issues like diabetes, obesity, and high cholesterol.

People with NAFLD generally have high levels of the hormone insulin but they are resistant to some of the actions of insulin (insulin resistance). This imbalance is likely to cause fat buildup in the liver. Fat buildup in the liver can also come from diet, increased fat production in the liver, or decreased ability of the liver to clear the fat. Genetics can affect all of these processes. Diets that contain high amounts of carbohydrates and sugars (including fructose and high fructose corn syrup) can also stimulate fat production in the liver cells.

There are two types of NAFLD:
1. **Nonalcoholic fatty liver (NAFLD):** fat builds up in the liver without inflammation or damage to the liver cells. Fat buildup without inflammation (swelling due to irritation) is called *steatosis*.
2. **Nonalcoholic steatohepatitis (NASH)** is when there is inflammation and liver cell injury with the buildup of fat.

**Nonalcoholic Fatty Liver Disease (NAFLD):**
Up to 30 out of 100 (30%) of the US population, or about 80 million Americans, are estimated to have NAFLD! This rate is even higher in certain populations, such as Hispanics, Asians and Indians. NAFLD is the most common liver disorder in the United States and the rest of the developed world. As issues like obesity and diabetes are increasing in frequency, so is NAFLD. NAFLD is usually
found on imaging tests like ultrasound or CAT scans. Under the microscope, the liver structures are normal, but the liver cells have accumulations of fat in them.

**Nonalcoholic Steatohepatitis (NASH):**

About 20 out of 100 (20%) of people with NAFLD, or about 15 million Americans, are estimated to have NASH. NASH is a worsening (progressive) form of NAFLD where the inflammation causes liver damage. This damage consists of cell death and scar tissue (also called fibrosis). Fibrosis can get worse over time and about 20 out of 100 (20%) of people with NASH may develop severe scar tissue called cirrhosis.

30 out of 100 Americans have NAFLD

6 out of 30 people with NAFLD have NASH

1.2 out of those 6 people with NASH develop cirrhosis
Who is at risk for NAFLD/NASH?
People with NAFLD tend to also have one or more features of metabolic syndrome, but not always. Additionally, because of similar lifestyles and genetics, people with a family history of NAFLD may also be at higher risk of developing the disease.

Metabolic syndrome:
Defined as having 3 or more of the following features:
- Obesity: Body Mass Index (BMI) greater than or equal to 30. Particularly those with a large waistline or abdominal (belly) obesity, also known as being “apple shaped”.
- Pre diabetes or diabetes*
- Low HDL cholesterol (low levels of good cholesterol)
- High lipids (fat) called triglycerides
- High blood pressure
* People with NAFLD and diabetes have greater risk of NASH.

What are signs and symptoms of NAFLD/NASH?
People with NAFLD/NASH typically have no symptoms or specific findings on a physical exam. Occasionally, people will report vague discomfort in their right upper abdomen or fatigue. Fatty liver is often found when a person is having abdominal imaging tests done for other reasons.

How is NAFLD Diagnosed?
Diagnosis is not always simple because people usually have no symptoms and liver tests can be completely normal. Even if they are elevated, liver tests alone cannot tell us how severe NAFLD is. Diagnosis is typically made when testing for other causes of liver disease is negative and there is a certain type of fat deposit on liver imaging tests (like ultrasound, CAT scan or MRI).
Taking a sample of the liver (called a biopsy) is the only way to accurately differentiate between NAFLD and NASH. Biopsy can also determine the extent of the damage and measure the degree of fibrosis (scar tissue). Noninvasive tests, like Fibroscan (a special ultrasound for the liver), can also estimate the amount of fat and scar tissue in the liver. Fibroscan is less accurate in severely obese persons, but it is a safe and simple test that can be repeated periodically to track liver damage over time.

**What are the Risks Associated with NAFLD/NASH?**

**NAFLD:**
The risk of developing advanced liver disease, like cirrhosis, is low. However, patients with NAFLD are at increased risk of having or developing serious medical conditions like heart disease, including heart attacks and high blood pressure, as well as diabetes. In fact, heart disease is the number one cause of death in patients with NAFLD.

**NASH:**
People with NASH also have an increased risk of having or developing heart disease, including heart attacks and high blood pressure. About 20% of people with NASH may develop severe scarring of the liver called cirrhosis.

**Cirrhosis:**
When something causes injury to the liver, liver cells are killed and scar tissue forms (fibrosis). When the entire liver is scarred, the liver becomes stiff and shrunken. This is called cirrhosis. Cirrhosis changes the way blood can flow through the vessels in the liver.

![Normal Liver](Normal_Liver.png) ![Liver Cirrhosis](Liver_Cirrhosis.png)
and can cause high pressure in those blood vessels (portal hypertension). As normal liver cells are replaced with scar tissue, the liver stops performing some of its important functions like making proteins. Over time, patients with cirrhosis have increased risk of developing complications related to their liver disease.

Potential complications include:

- **Large Blood Vessels (varices) with possible internal bleeding:**
  Because cirrhotic livers are very stiff, pressure can build up in the blood vessels that feed the liver. This pressure makes the blood vessels around the liver grow larger than normal. Large vessels are called varices. Large varices that form around the esophagus (food tube) and stomach can burst and bleed into the gastrointestinal tract.

- **Fluid accumulation in the abdomen (ascites) and legs:**
  High pressure in the veins of the liver also causes fluid to leak into the abdominal cavity, which is called ascites. The feet and legs can get swollen too. This can become very uncomfortable and make eating and breathing difficult. The most dangerous problem associated with ascites is infection, which can be life threatening.

- **Confusion (hepatic encephalopathy):**
  When the liver is unable to clear away toxic substances they can build up in the blood stream and go into the brain. This can cause changes in behavior and sleep pattern as well as confusion and sleepiness. These changes are called hepatic encephalopathy.

- **Liver Cancer:**
  Livers with significant amounts of scar tissue or cirrhosis have an increased risk of developing liver cancer, called hepatocellular carcinoma.
How is NAFLD/NASH Treated?
Active research is ongoing, but for now there are no specific medications that can cure NAFLD. However, studies have shown that both fat, inflammation and scar tissue can leave your liver. This means that NAFLD and NASH can be reversible.

Lifestyle modification:
Reducing liver fat and inflammation is possible when people lose weight and modify their lifestyle. This is the first line treatment for NAFLD/NASH.
- Lifestyle modification includes adopting a healthy diet as well as increasing physical activity. The goal is that these changes will become a permanent part of a daily routine and will be sustained for a lifetime.

- Losing 10% of your total current body weight increases the likelihood that the amount of liver fat and inflammation will improve. Weight loss must be gradual (a goal of 1-3 pounds per week) since rapid weight loss can actually worsen liver disease.

Medications:
Vitamin E:
People diagnosed with NASH through liver biopsy will sometimes be asked to start Vitamin E (alpha-Tocopherol).
- Vitamin E is an antioxidant that is thought to help reduce liver inflammation.
- This medicine may be less beneficial or less safe in people with diabetes or significant heart disease so do not start this medication without first talking with your liver doctor.
Managing other diseases:
Improving control of other metabolic diseases such as diabetes, high blood pressure and high cholesterol/lipids can also help NAFLD.

Avoiding alcohol:
Moderate or heavy alcohol use can cause additional damage and fat accumulation in the liver in people with NAFLD. Therefore, people with NAFLD should avoid alcohol entirely if possible. If you do not think you can completely stop drinking alcohol, it is important to minimize alcohol intake (less than 2 drinks per day for men and 1 drink per day for women).

Medication safety in NAFLD/NASH
People with cirrhosis must avoid pain medications called Non-Steroidal Anti-Inflammatories (NSAIDS). These include over-the-counter medications such as ibuprofen (Motrin®, Advil®), naproxen (Aleve® or Naprosyn®), as well as some prescription medications. Ask your doctor if any of your medications are NSAIDS.

- **It is safe to use Tylenol® (acetaminophen) at doses of 2,000 milligrams per day or less** (no more than 6 regular strength or no more than 4 extra strength tablets each day and no more than 20 regular strength or no more than 15 extra strength tablets each week). Some cold medicines and prescription pain medicines contain acetaminophen, so read the labels and make sure you don’t take too much by mistake.

- Unless your doctor says otherwise, statin medications are completely safe in people with early cirrhosis
**Vaccinations:**

Those who are not immune to hepatitis A and B should undergo a vaccination series at 0, 1, and 6 months. This will prevent significant liver damage if you are exposed to either of these viruses.

The yearly influenza vaccination (flu shot) is also recommended.