Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

Internal Medicine:

Gastroenterology and Hepatology

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Table of Contents:

Welcome to the Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) Program

We're glad you have chosen our program to help manage your liver disease. This folder is a resource to help you take an active role in your medical care and help you understand your liver disease and how it will impact your life. We have included information about treatment options for your liver disease, including recommendations on healthy eating and physical activity. We have also included other helpful resources for programs that you may be interested in.

In this folder, you will find:

- An overview of metabolic dysfunction-associated steatotic liver disease (MASLD), which used to be known as non-alcoholic fatty liver disease or NAFLD
- Healthy eating recommendations for patients with MASLD
- Physical activity recommendations for patients with MASLD
- Weight and physical activity tracking sheets
- Other resources and programs related to MASLD

About our team

Providing quality, patient-centered care is our number one goal. We are a team of doctors, advanced practice practitioners, registered nurses, and dietitians. We want to partner with you to make sure you receive the best care possible for your liver disease. We look forward to working with you.

Who do I call with questions?

If you need to contact your doctor, call the nurse who works with them or send a message through the Michigan Medicine Patient Portal (MyUofMHealth.org).

- Appointments and questions: call (734) 647-5944 or (888) 229-7408
- Afterhours and on weekends: call (734) 936-6267 and ask for the gastroenterology fellow on call
- To fax medical records: fax them to (734) 936-7392

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

What is MASLD?

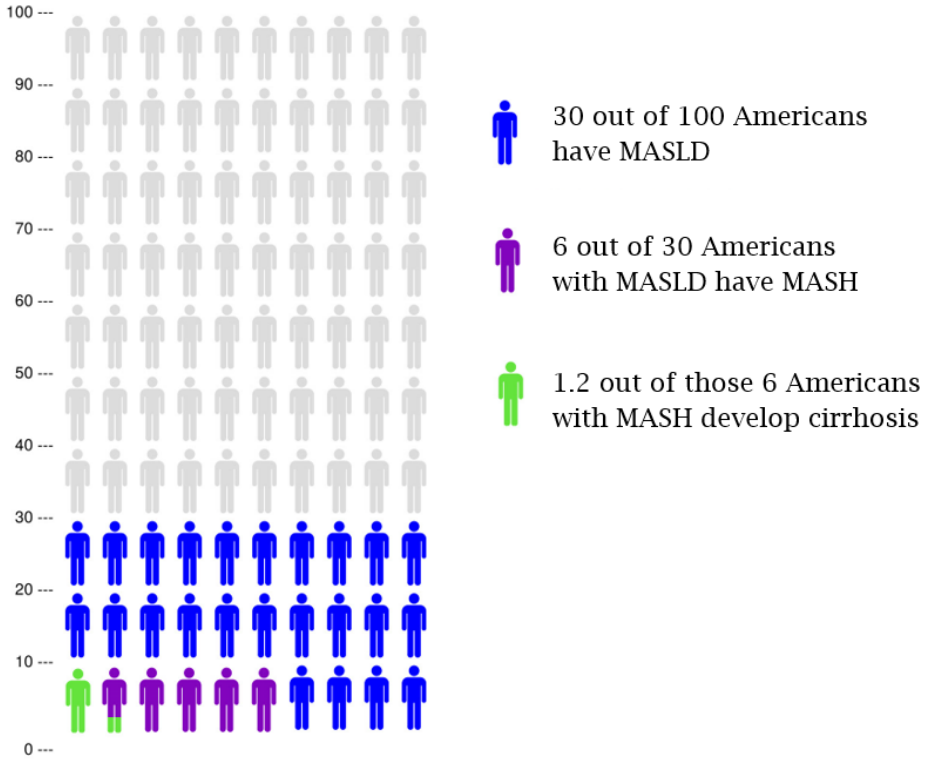
Metabolic dysfunction-associated steatotic liver disease (MASLD) is caused by a buildup of fat in the liver in people with **metabolic diseases** (like diabetes, obesity, high blood pressure, or high cholesterol) who don't drink too much alcohol. MASLD used to be called **non-alcoholic fatty liver disease, or NAFLD,** and you may still hear people call it NAFLD.

- People with MASLD 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 out. **Genetics** (the health traits passed on to you from your parents) can affect all of these things as well.
- Diets that contain high amounts of carbohydrates and sugars (including fructose and high fructose corn syrup) can also cause fat production in the liver cells.

Some people with MASLD have not just fat in the liver (called **steatosis**) but also both fat and inflammation (swelling) in the liver (called **steatohepatitis**). This condition is called **metabolic dysfunction-associated steatohepatitis (MASH),** and it is the more severe form of MASLD.

How common is MASLD and MASH?

- Up to 30 out of 100 people, or 30% of the US population, are estimated to have MASLD!
- MASLD is the most common liver disorder in the United States and most of the rest of the world. As conditions like obesity and diabetes are increasing, so is MASLD.
- MASLD is usually found on imaging tests like an ultrasound or a CAT scan. Under the microscope, the liver structures are normal, but the liver cells have accumulations of fat in them.
- About 20 out of 100 (20%) of people with MASLD are estimated to have MASH. MASH is a worsening (progressive) form of MASLD 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 MASH may develop severe scar tissue called **cirrhosis**.



Who is at risk for MASLD and MASH?

People with 1 or more features of metabolic syndrome are more at risk for MASLD. Also, because of similar lifestyles and genetics, people with a family history of MASLD may also be at higher risk of developing the disease.

Metabolic syndrome is defined as having 3 or more of the following features:

- Obesity (having a body mass index (BMI) greater than or equal to 30), particularly those with a large waistline or abdominal (belly) obesity
- Pre-diabetes or diabetes (People with MASLD and diabetes have a greater risk for MASH)
- Low HDL cholesterol (low levels of good cholesterol)
- High lipids (fat) called triglycerides
- High blood pressure

What are signs and symptoms of MASLD and MASH?

People with MASLD and MASH may have no symptoms or findings on a physical exam. Often, people will say they feel some discomfort in their right upper abdomen, or fatigue (tiredness). We often find MASLD when a person is having abdominal imaging tests done for other reasons.

How is MASLD diagnosed?

- Diagnosis (confirming that you have MASLD) is not always easy, because people usually have no symptoms and liver blood tests can be completely normal. Even if liver tests (such as ALT and AST) are elevated, liver tests alone cannot tell us how severe MASLD is.
- We usually diagnose MASLD when the testing for other causes of liver disease is negative and there is a certain type of fat deposit on your liver imaging tests (ultrasound, CAT scan, or MRI).
- In the past, taking a sample of the liver (called a **biopsy**) was the only way to figure out if a patient had MASLD or MASH. Doing a biopsy can

also help us see how much liver damage and fibrosis (scar tissue) there is. However, there are now newer, **noninvasive** (not requiring surgery or cutting tissue) ways to find if someone has MASH.

- Noninvasive tests, like FibroScan® (a special ultrasound for the liver), can also estimate (make a good guess about) the amount of fat and scar tissue in the liver. FibroScan® is less accurate for people with obesity, but it is a safe and simple test that can be repeated to track liver damage over time.

What are the health risks related to MASLD and MASH?

Health risks from MASLD

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

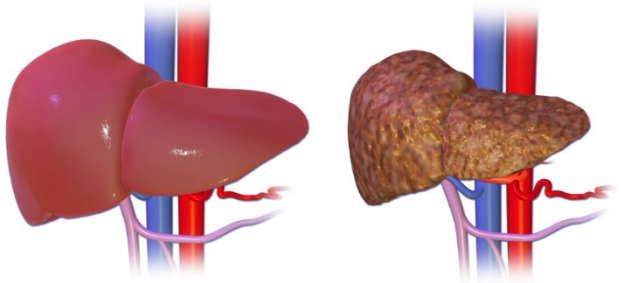
Health risks from MASH

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

What are health issues related to 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, and it can cause high pressure in those blood vessels (called **portal hypertension**). As normal liver cells are replaced with scar tissue, the

liver stops performing some of its important functions like making proteins.



Normal Liver Liver Cirrhosis

- Over time, patients with cirrhosis have increased risk for developing complications (health problems) related to their liver disease. Some of these complications are listed below.

Large blood vessels (varices) with possible internal bleeding

Because livers with cirrhosis 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. These 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 abdomen, 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 related to 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 bloodstream and go into the brain. This can cause changes in your behavior and

sleep, as well as confusion and sleepiness. These changes are called **hepatic encephalopathy.**

Liver cancer

Livers with large amounts of scar tissue or cirrhosis have an increased risk of developing liver cancer, called **hepatocellular carcinoma.**

How is MASLD and MASH treated?

Medical experts continue to actively research MASLD, but for now, there are no specific medications that can cure MASLD. However, studies have shown that both fat, inflammation, and scar tissue can leave your liver. This means that MASLD and MASH can be **reversible**. Some ways to reverse the effects of MASLD and MASH are below.

Making lifestyle changes, including diet and exercise

Reducing liver fat and inflammation is possible when people lose weight and change their lifestyle. This is the first recommended treatment for MASLD and MASH.

- Lifestyle changes include eating a healthy diet as well as increasing physical activity. The goal is that these changes will become a regular part of your daily routine for the rest of your life.
- Losing 10% of your total current body weight makes it more likely that you will reduce the amount of fat and inflammation in your liver. Weight loss must be slow (not losing more than 1-3 pounds per week), since fast weight loss can actually make your liver disease worse.

Taking medications

Sometimes we may ask people diagnosed with MASH to start taking vitamin E (in a particular type called alpha-tocopherol).

- Vitamin E is an antioxidant that experts think helps reduce liver inflammation.
- This medicine may be less helpful or less safe for people with diabetes or significant heart disease, so **do not start this medication without talking with your liver doctor first.**

Managing any other diseases

Improving your control of any other metabolic diseases you have, such as diabetes, high blood pressure and high cholesterol or lipids, can also you're your MASLD.

Avoiding alcohol

Heavy alcohol use can cause extra damage and fat buildup in the liver.

- Heavy alcohol use in women means having 7 or more drinks per week, or 4 or more drinks on the same day. In men, heavy alcohol use means having 14 or more drinks per week, or 5 or more drinks on the same day.
- People with MASLD should stop drinking alcohol entirely if possible. If you do not think you can completely stop drinking alcohol, it is important to reduce the amount of alcohol you drink to less than 7 drinks per week for women and less than 14 drinks per week for men.

What medications can I take safely with MASLD or MASH?

- People with cirrhosis must avoid pain medications called **non-steroidal anti-inflammatory drugs (NSAIDs)**. These include over-the-counter medications such as ibuprofen (Motrin® or Advil®) and naproxen (Aleve® or Naprosyn®), as well as some prescription medications. Ask your doctor if any of your medications are NSAIDs.
- It is safe to take acetaminophen (Tylenol®), at doses of 2000 milligrams or less a day.

    - This means that you should take no more than 6 regular strength pills, or no more than 4 extra strength pills, each day. You should not take more than 20 regular strength pills, or more than 15 extra strength pills, each week.
    - Some cold medications and prescription pain medications contain acetaminophen, so read the labels and make sure you don't take too much by mistake.
- Unless your doctor says otherwise, statin medications (such as Lipitor®, Crestor®, or Zocor®) are completely safe for people with early cirrhosis.

What vaccinations should I get?

- Those who are not immune to hepatitis A and B should get those vaccines. This will prevent significant liver damage if you are exposed to either of these viruses.
- We also recommend that you get the influenza vaccination (flu shot) every year.

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD): Related Programs and Resources

Note: These recommendations are for patients with **metabolic dysfunction-associated steatotic liver disease (MASLD)**, a condition which used to be called **non-alcoholic fatty liver disease (NAFLD)**.

Structured nutrition and exercise programs

Resource information	QR code
University of Michigan Metabolic Fitness Program: A 12- or 24-week lifestyle program through the UM Preventive Cardiology Program. www.umcvc.org/mfp	
University of Michigan Weight Management Program: A 3-month diet and physical activity program through the UM Metabolism, Endocrinology, & Diabetes Program. www.uofmhealth.org/conditions-treatments/endocrinology-diabetes-and-metabolism/adult-weight-management	
University of Michigan Gastroenterology and Hepatology Nutrition and Dietitian Referral: To talk with specialized dietitians who provide consults and recommendations for patients with MASLD, call **(844) 233-0433**.	---
University of Michigan MHealthy Programs: These are programs and resources for patients including exercise classes, recipes, and other educational resources. hr.umich.edu/benefits-wellness/health/mhealthy/patient-community/services-patients-community	

Resource information	QR code
Weight Watchers: This is a popular weight management program available through your community or online. www.weightwatchers.com/us	

Weight loss procedures

Resource information	QR code
University of Michigan Endoscopic Bariatric Therapy Program: This program provides endoscopic (procedures using a small scope that are less invasive than surgery) options for weight loss. www.uofmhealth.org/conditions-treatments/digestive-and-liver-health/endoscopic-bariatric-therapy-ebt	
University of Michigan Bariatric Surgery Group: This is a resource for surgical options for weight loss. www.uofmhealth.org/conditions-treatments/surgery/bariatric-surgery	

Free online calorie counter and exercise journals

Resource information	QR code
MyFitnessPal: This is a nutrition tracking app. www.MyFitnessPal.com	

Websites for healthy recipes

Resource information	QR code
Eating Well: www.EatingWell.com	
Physician Committee for Responsible Medicine (PCRM) recipes of the week: www.pcrm.org/health/diets/recipes	
Eat Right: www.eatright.org/food/planning-and-prep/recipes	

Current and future MASLD-related research studies

Resource information	QR code
University of Michigan Hepatology Website: www.med.umich.edu/hepatology/trials/NAFLD-NASH.html	

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD): Physical Activity Recommendations

Note: These recommendations are for patients with **metabolic dysfunction-associated steatotic liver disease (MASLD)**, a condition which used to be called **non-alcoholic fatty liver disease (NAFLD)**.

What is physical activity and fitness?

Physical activity is any kind of activity that gets your body moving.
The types of physical activity that can help you get fit and stay healthy include:

- **Aerobic or "cardio" activities:** These activities make your heart beat faster and make you breathe harder. Examples include brisk walking, riding a bike, swimming, or running. Aerobic activities make your heart and lungs stronger and build up your endurance (your ability to stay active for long periods of time).
- **Strength training activities:** These activities make your muscles work against, or "resist," something and focus on building stronger muscles and bones. Examples include lifting weights, doing push-ups, or using resistance bands.
- **Stretching activities:** These activities work on flexibility and the ability to move your joints and muscles through their full range of motion. Stretching helps you be more flexible and avoid injury (hurting yourself).

Fitness, or being "fit," means being able to do physical activity. It also means having the energy and strength to feel as good as possible. Getting even a little more fit can improve your health. You don't have to be an athlete to be fit. A brisk 30-minute walk every day can help you reach a good level of fitness. If this is hard for you, you can work toward a level of fitness that helps you feel better and have more energy.

What are the benefits of physical activity?

- Being physically active is one of the best things you can do to get fit and stay healthy. Studies have shown that increases in physical activity can help decrease the amount of fat in your liver, particularly in people who are able to lose 10% of their current body weight. Increasing your physical activity and improving your fitness is good for your heart, lungs, bones, muscles, and joints and helps improve your liver health.
- Physical fitness lowers your risk for falls, heart attack, diabetes, high blood pressure, and some cancers. If you already have one or more of these problems, getting more fit may help you control other health problems and make you feel better.
- Being more fit also can help you to sleep better, handle stress better, and keep your mind healthy.
- Increasing your physical activity, along with decreasing the number of calories you eat and drink, can help you reduce the amount of fat in your liver.

What are the key points about physical activity with MASLD?

- No single physical activity program has been proven to be more effective than another. Below are overall recommendations for increasing your physical activity level. It is most important to find activities that work for you and that you are able to do regularly.
- Even without losing a lot of weight, being more physically active has overall health benefits, including possibly decreasing the amount of fat in your liver.

How can I be more physically active?

Moderate physical activity (activities that cause your heart rate to increase) is safe for most people. It is always a good idea to talk to your primary care

doctor before becoming more active, especially if you haven't been very active or if you have health problems.

If you're ready to add more physical activity to your life, here are some tips to get you started:

- **Make physical activity part of your regular day.** Make a regular habit of using stairs, not elevators, and walking to do errands near your home.
- **Start walking.** Walking is a great fitness activity that most people can start doing. Make it a habit to take a daily walk with family members, friends, coworkers, or pets.
- **Find an activity partner.** This can make exercising more fun.
- **Find an activity that you enjoy** and stay with it. Then change it up and do other activities so you don't get bored.
- **Use interactive tools,** such as smart phone applications, pedometers, or activity trackers, to watch and record your physical activity level and find out how many calories you burn during exercise and daily activities.

How much physical activity do I need to do?

Experts recommend the goals below for physical activity duration (your goal could be one, or a combination, of these):

- Do some sort of **moderate aerobic activity,** like brisk walking, for at least 2½ hours each week. It is up to you how many days you want to exercise, but it is best to be active at least 3 days a week. Be active for at least 10 minutes at a time. For example, you could:
    - Take a 10-minute walk 3 times a day. Do this 5 days a week.
    - Take a 30-minute walk 3 days a week. On the other 4 days, take a 15-minute walk.
    - Take a 45-minute walk every other day.
- Do more **high intensity activities,** like running, for at least 1¼ hours a week. This activity makes you breathe harder and have a much faster

heartbeat than when you are resting. You can spread out these 75 minutes any way you want. It is better to be active at least 3 days a week for at least 10 minutes at a time. For example, you could:

- Run for 25 minutes, 3 times a week.
- Run for 15 minutes, 5 times a week.

Here's an easy way to tell if your exercise is moderate: you're at a moderate level of activity if you can talk but not sing during the activity. If you can't talk while you're doing the activity, you're working too hard.

What is a healthy weight?

A healthy weight is a weight that lowers your risk for health problems. For most people, **BMI** (**B**ody **M**ass **I**ndex) and waist size are good ways to tell if they are at a healthy weight. However, reaching a healthy weight isn't just about reaching a certain number. Talk with your doctor or dietitian about what weight range is best for you.

- Patients with MASLD who can lose 10% of their current body weight (through healthy eating and being physically active) have improvements in their liver health.

What are the health benefits of walking?

Walking is one of the easiest ways to get the exercise you need to stay healthy. Think of walking as an easy way to burn calories and stay fit while you go about your daily routine.

- Start with a short-term goal. For example, walk for 5 or 10 minutes every day, or increase your number of steps by 300-500 steps each day.
- After you've made walking a habit, set a longer-term goal. You may want to set a goal of walking briskly for at least 30 minutes a day or work up to 10,000 steps a day. You can try to do this 5 days a week or more.

- You can use a phone app or wear a pedometer to track your steps each day. The first time you use it, count how many steps you normally take in a day. Track your activity every day, and set a goal for increasing the number of steps each day. At first, try to add 300 to 500 steps to your day. Then work toward 2,000 more steps a day. A good long-term goal is to get to 10,000 steps a day.
- To stay motivated, find a walking partner, such as a family member, friend, or coworker. Daily dog walks are also a great way to keep up your walking routine.
- Try to add more walking into your everyday activities. Add steps in whenever you can. Examples include:
    - Taking the stairs instead of the elevator
    - Parking farther away in a parking lot so you have to walk farther to wherever you're going
    - Getting up and moving around at work once an hour
    - Walking to the grocery store, doctor appointments, work, school, or shopping whenever possible
    - Walking a lap around the grocery store before you start shopping
    - Walking during TV commercials

What are some safety tips for starting a walking program?

- Know the area that you will be walking in.
- Walk in a well-lighted, safe place.
- Carry a cell phone for emergencies.
- Wear comfortable shoes and socks that cushion your feet.
- Pay attention to the surface you are working on. Use sidewalks and paths.
- If you usually walk outside and the weather is bad, take comfortable shoes to the mall and walk around inside the mall.

- Drink lots of water before, during, and after you are active. This is very important when it's hot outside and when you do high intensity exercise. Take a water bottle with you when you walk.

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD): Recommendations for Healthy Eating

Note: These recommendations are for patients with **metabolic dysfunction-associated steatotic liver disease (MASLD)**, a condition which used to be called **non-alcoholic fatty liver disease (NAFLD)**.

A healthy diet includes eating many different foods, including fruits and vegetables, while limiting saturated fat, cholesterol, sugary foods, and sodium. Healthy food habits can help reduce extra body weight. Studies have shown that, for people with MASLD, reducing your body weight by 10% leads to significant decrease in the amount of fat and scarring in the liver. This can decrease your future risk of getting advanced liver disease.

You don't need to make huge changes to eat healthier, and you don't have to change your habits all at the same time. It's best to set small goals and change your habits a little bit at a time. Over time, small changes can make a big difference in your health.

What are the main recommendations for healthy eating with MASLD?

- You can reduce the amount of fat in your liver by **decreasing your total calorie intake (eating less)** and **increasing your physical activity (exercising more)**.
- There’s no single diet that is best for healthy eating. In this handout, we give you overall recommendations for healthier eating habits. Focus first on identifying a few areas you might be able to improve on (rather than trying to make all these changes at once).

- Reducing the amount of high fructose corn syrup and sugar you eat and drink may be a good place to start, depending on your current eating habits.
- Healthier eating has many overall health benefits, including decreasing the amount of fat in your liver.
- You can meet with a nutritionist or dietitian, and they will give you more specific information and personalized recommendations for healthy eating.

How can I get started on a healthy diet?

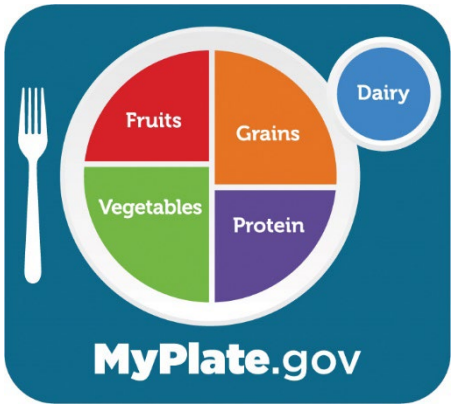
Watch your portion size

Did you know portion size and serving size are not the same thing? The National Institutes of Health (NIH) provides helpful definitions of each:

- **Portion size** is how much food you choose to eat at one time. You control your portion size whenever you eat.
- **Serving size** is the amount of food listed on a product's Nutrition Facts label. All of the nutritional values you see on the label are for the serving size the manufacturer suggests on the package. If you eat more than 1 serving (a bigger portion), you get more calories and nutrients. Being aware of the serving size can help you decide how much you want to eat of that food.

How to watch your portions:

- Use tools! Measuring cups and spoons let you measure out exact portions of food at meals until you can estimate (guess) the right amount of food to serve yourself.
- You can also use a visual approach (learn what a good portion size for you looks like) by dividing your plate into sections:



- Fill half of your plate with fruits and vegetables
- Fill one quarter of your plate with a grain (preferably a whole grain like brown rice or whole wheat pasta)
- Fill one quarter of your plate with a protein (like lean meats, beans, or tofu).
- If you can tolerate dairy products, eat or drink low-fat dairy foods as part of your meals or snacks, such as fat-free yogurt or skim milk.

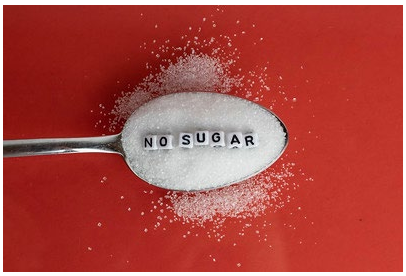
- To keep your energy level up and keep you from feeling hungry, avoid skipping meals (which usually leads to eating too much at the next meal). It is best to eat at regular times throughout the day (such as having 3 meals and 1- 2 healthy snacks during your day).
- Eat only the number of calories you need to stay at a healthy weight. If you need to lose weight, eat fewer calories than your body uses through exercise and other physical activity.
- Try keeping a food log or diary to see how many calories you are eating. The quality of calories is just as important as how many you eat. A dietitian can advise you on a good calorie goal. Focus on foods with good nutrients (fruits, vegetables, fish, foods high in fiber) instead of highly processed snack foods, sugar-sweetened drinks, refined (white) grains, refined sugar, fried foods, and foods that are high in saturated and trans fats.

Eat more fruits and vegetables

- Eat lots of different fruits and vegetables every day. Dark green, orange, red, or yellow fruits and vegetables are especially good for you. Examples include spinach, carrots, peaches, and berries.
- Try to eat at least 5 servings (1/2 cup) of fruits and vegetables every day.

- Keep fruits and vegetables around for snacks. Store them where you can see it so that you will be more likely to eat them.
- Cook dishes that have a lot of vegetables in them, such as stir-fries and soups.

Limit sugar and extra carbohydrates



- Limit or avoid drinks and foods with added sugar. These include candy, desserts, and soda pop.
- It's particularly important to limit how much high-fructose corn syrup you're eating and drinking to help with weight loss and healthy eating.
- Although 100% fruit juices may not contain added sugar, fruit juice gives your body a large amount of sugar to process at one time, and liquid calories are not as filling as whole foods. Choose a piece of fruit over juice. If you decide to drink juice, choose 100% juice, and limit the amount to 4 ounces per day.
- Limiting the total amount of carbohydrates (carbs) may help with MASLD.
- High carbohydrate foods include bread, cereal, rice, pasta, beans and starchy vegetables. Sweets (like desserts and pastries) tend to be high carbohydrate foods.

Significantly limit or completely avoid alcohol

For your liver health, we recommend completely avoiding alcohol. If you do not feel that you can completely avoid alcohol, it is very important not to drink in excess (**excess** is drinking more than 2 drinks a day for men and more than 1 drink a day for women). Too much alcohol can cause many different health problems, and it can add extra calories to your diet that may cause you to gain weight.

Limit saturated and trans fat

Diets high in saturated fat increase your bad cholesterol levels (LDL) and total cholesterol levels. Trans fats also raise your LDL cholesterol.

Try to avoid these foods that are high in saturated or trans fat:

Foods high in saturated fat:	Foods high in trans fat:
• Fatty cuts of meat (beef, lamb, pork) • Poultry (chicken or turkey) with skin • Whole and 2% milk • Butter • Cheese • Lard • Palm kernel oil • Palm oil • Coconut oil • Cocoa butter	• Baked goods (crackers, cookies, cakes, donuts) • Margarine sticks • Commercially-produced white breads • French fries and other fried foods • Processed foods that use partially hydrogenated oils (check the nutrition labels on products)

How to reduce saturated and trans fat:

- Use olive oil or canola oil when you cook.
- Use Smart Balance® or Earth Balance® spreads instead of butter or margarine.
- Bake, broil, grill, or steam foods instead of frying them.
- Choose lean meats such as chicken or turkey breast, fish, eggs, and lean cuts of beef and pork like tenderloin or sirloin. When buying ground beef or turkey, choose meats that are labeled at least 90% lean (10% or less fat). Ground turkey can contain dark meat and ski,n so it's important to look for 90% or more lean turkey or ground turkey breast.

- Drain off any extra fat after cooking meats.
- Cut off all fat you can see when you prepare meat, and remove skin from chicken and turkey.
- Avoid high-fat meats such as hot dogs, salami, bologna, and sausages.
- Eat more plant-based proteins such as beans, lentils, or soy. These have no saturated or trans fats. Soy products such as tofu, edamame, and tempeh may be especially good for you.
- Choose low-fat or fat-free milk and dairy products instead of whole-fat dairy, or try unsweetened almond, soy, or cashew milk.

Limit sodium

Almost all foods naturally contain sodium (salt). Salt that is added in during food preparation and food processing are the major sources of salt in our diet. Healthy adults only need 2400 milligrams (mg) of sodium per day, yet the average person eats around 6000-8000 mg sodium. Limit how much salt and sodium you eat to help lower your blood pressure and reduce water retention (how much water your body holds in).

Foods high in salt and sodium:
• Cured meats, sausages, and lunch meats • Canned vegetables, soups, beans, and fish • Soy sauce and miso • Commercially prepared main-course meals • Box dinners (including anything with seasoning packets) • Frozen meals • Cheeses (especially processed cheese) • Condiments and other dressings like mayonnaise, salad dressings, ketchup, and sauces (barbecue, steak, Worcestershire sauce)

How to reduce salt and sodium:

- Taste your food before salting it. Add only a little salt when you think you need it. With time, your taste buds will adjust to having less salt.
- Eat fewer snack items, fast foods, and other highly salted and processed foods.
- Check packaged food labels for the amount of sodium. Don't eat more than 2400 mg of sodium a day (or follow your doctor's instructions on sodium amounts).
- Choose low sodium types of canned goods (such as soups, vegetables, and beans).
- Use herbs and spices such as garlic, oregano, basil, onion, and pepper instead of salt.
- Use low sodium condiments whenever available, such as ketchup, mustard, and salad dressings.

Eat fish

Eat at least 2 servings of fish (about 1 pound of fish) every week. Certain kinds of fish, such as salmon and tuna, contain omega-3 fatty acids which may have health benefits.

Eat foods high in fiber

Foods with fiber, along with lean protein, helps you feel fuller longer and may allow you to eat less calories each day.

- Choose whole-grain products. Examples include oats, whole wheat bread, quinoa, and brown rice.
- Buy whole-grain breads and cereals instead of white bread or pastries.

- Fruits, vegetables, beans, nuts and seeds are all good sources of fiber. Add walnuts or chia seeds to oatmeal or have almonds with a piece of fruit for an afternoon snack.

What are other strategies for healthy eating?

- Keep more fruits, low-fat dairy products (low-fat milk and low-fat yogurt), vegetables, and whole-grain foods at home and at work. Focus on adding healthy food to your diet, rather than just taking unhealthy foods away.
- Buy a healthy recipe book and cook more meals at home. Chew gum when you cook so you won't be tempted to snack on the ingredients.
- Pack a healthy lunch and snacks for work. This lets you have more control over what you eat.
- Limit eating out as much as possible. When you do eat out, follow the suggestions above. You can also split your meal or pack half of it to take home for another meal.
- Put your snacks on a plate instead of eating from the package. This helps you control how much you eat.
- Don't skip or delay meals, and be sure to schedule your snacks. If you ignore your feelings of hunger, you may end up eating too much or choosing an unhealthy snack. If you often feel too hungry, it can cause you to focus a lot on food.
- Eat your meals with others when you can. Relax and enjoy your meals, and don't eat too fast. Try to make healthy eating a pleasure, not a chore.
- Drink water instead of sugary drinks (including high-sugar juice drinks). Sometimes your body might think it’s hungry when it’s just dehydration (not getting enough water). Try to drink at least 6-8 cups of water every day.
- Try to swap meatless main dishes for meat 2-3 times per week. For example, you can use dried beans, split peas, lentils, soy, and meat substitutes in place of meat in dishes.

- Use low-fat frozen yogurt, sorbets, etc. as a dessert in place of ice cream.
- Bake, broil, and steam foods instead of frying them.

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD): Sample Menu

Note: These recommendations are for patients with **metabolic dysfunction-associated steatotic liver disease (MASLD)**, a condition which used to be called **non-alcoholic fatty liver disease (NAFLD)**.

Breakfast

- ½ cup oatmeal, ½-1 cup fresh berries, and walnuts (made with skim or 2% milk or plant-based milk of choice)
- Greek yogurt layered with crunchy cereal, chia seeds, and blueberries for a breakfast parfait
- 2 eggs, 1 slice whole-grain toast, and ½-1 cup cantaloupe
- 2-egg omelet (or egg whites) with sautéed veggies (tomatoes, spinach, mushrooms, etc.) 1 ounce (oz) low-fat cheese, and roasted potatoes
- Hard-boiled egg slices with sliced vegetables (cucumber, tomatoes, bell peppers) in a whole-wheat pita
- Toasted whole-wheat bread topped with sliced avocado, cumin, and black pepper with ½ cup pineapple
- Whole-grain bagel or 2 slices of toast with nut butter, 100% fruit preservatives, hummus, or tahini
- Breakfast burrito (beans, vegetables, salsa, and avocado)
- 1 cup low-fat cottage cheese, sliced peach or other fruit, and 1 tablespoon (tbsp) nuts or seeds

Lunch and dinner
• Sandwich on whole-wheat bread, lean turkey, hard cheese, lettuce, tomato, mustard, and 1 cup (15-17) grapes and baked chips • Homemade lentil soup, whole-grain crackers, and ½ cup mandarin oranges • Tacos or burrito filled with beans, lettuce, tomato, salsa, guacamole, brown rice, and lean protein (chicken, ground turkey, tofu, or tempeh) • Large tossed salad with lean protein (chicken, tuna, or chickpeas), cucumber, tomato, shredded carrots, feta, and olive oil and balsamic vinegar or vinaigrette dressing, sunflower or pumpkin seeds, and an apple or orange • Lean turkey burger with lettuce, tomato, and mustard on a whole-grain bun with sweet potato fries • Stir-fry: firm tofu or lean chicken sautéed with bok choy, carrots, red bell pepper, broccoli bits, and onion, with ½ cup brown rice and low-sodium soy sauce • Grilled chicken, medium baked potato, Earth Balance® butter, 1 tbsp sour cream, and roasted carrots • Baked pork chop, ½ cup sweet potato, and spinach salad with olive oil and balsamic vinegar or vinaigrette dressing • Grilled scallops, quinoa with sautéed vegetables (peppers, broccoli bits, carrots, corn, garlic, onion) and 1 cup raspberries with whipped cream • Grilled kabobs with chicken, green bell pepper, tomato, mushrooms, onion, zucchini, and brown rice or quinoa • Whole-wheat pasta with tomato sauce and vegetables (mushrooms, tomatoes, eggplant, peppers, spinach) and parmesan cheese • Grilled salmon or white fish with lemon and herbs • Sushi: California roll, salmon avocado roll, or spring roll, etc. with low-sodium soy sauce and a side of edamame

Snacks
• 5-7 whole-grain crackers or pita with 1 oz low-fat cheese or ¼ cup hummus • Piece of fruit and a handful of nuts or 1-2 tbsp of natural nut butter • Edamame • Sliced bell peppers, carrots, cucumbers, and ¼ cup hummus • 3 cups air-popped popcorn tossed with 1 teaspoon coconut oil or Earth Balance® butter • Greek yogurt topped with 2 tbsp natural granola and strawberries • Half of a sandwich made with whole-grain bread • Baked apples with cinnamon

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD): Physical Activity Tracker

Note: These recommendations are for patients with **metabolic dysfunction-associated steatotic liver disease (MASLD)**, a condition which used to be called **non-alcoholic fatty liver disease (NAFLD)**.

Physical activity intensity guide:

- **Low intensity:** These activities do not change your heart rate. You can still have a normal conversation during the activity. Some examples include walking at a normal pace or stretching and resistance-based exercises.
- **Moderate intensity:** These activities cause your heart rate to increase. You can talk but not sing during the activity. Some examples include brisk walking, running at a moderate (medium) pace, or biking at a moderate pace.
- **High intensity:** These activities cause your heart rate to increase a lot. You can only speak 3–5 words at a time while breathing hard during the activity. Some examples include fast power-walking, running at a fast pace, swimming, or biking at a fast pace. It is important to only exercise at high intensity for shorter periods of time based on your fitness level. Talk with your primary care doctor before doing any high intensity physical activity.

Physical activity categories:

- **Cardio:** These activities make your heart beat faster and make you breathe harder. Examples include brisk walking, riding a bike, swimming, or running.

- **Strength:** These activities make your muscles work against, or "resist," something and focus on building stronger muscles and bones. Examples include lifting weights, doing push-ups, or using resistance bands.
- **Stretching:** These activities work on flexibility and the ability to move your joints and muscles through their full range of motion.

Physical activity duration guide:

Experts recommend the goals below for physical activity duration (your goal could be one, or a combination, of these):

- Do some sort of **moderate cardio activity,** like brisk walking, for at least 2½ hours each week. It is up to you how many days you want to exercise, but it is best to be active at least 3 days a week. Be active for at least 10 minutes at a time. For example, you could:
    - Take a 10-minute walk 3 times a day. Do this 5 days a week.
    - Take a 30-minute walk 3 days a week. On the other 4 days, take a 15-minute walk.
    - Take a 45-minute walk every other day.
- Do more **high intensity activities,** like running, for at least 1¼ hours a week. This activity makes you breathe harder and have a much faster heartbeat than when you are resting. You can spread out these 75 minutes any way you want. It is better to be active at least 3 days a week for at least 10 minutes at a time. For example, you could:
    - Run for 25 minutes, 3 times a week
    - Run for 15 minutes, 5 times a week

MASLD physical activity tracker

Use the tables below to track your physical activity each week.

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	
			□ Low □ Moderate □ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	

Week: ____/_____/_____ - ____/_____/_____
Goals:
_____
_____

Date	**Activity**	**Duration** (minutes)	**Intensity** (mark with an X)	**Notes**
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	
			☐ Low ☐ Moderate ☐ High	

UNIVERSITY OF MICHIGAN HEALTH
MICHIGAN MEDICINE

Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD): Weight Tracker

Note: These recommendations are for patients with **metabolic dysfunction-associated steatotic liver disease (MASLD)**, a condition which used to be called **non-alcoholic fatty liver disease (NAFLD)**.

Starting **weight** in pounds (lbs): _____

Starting **BMI**: _____

5% weight loss (lbs) (3-month goal):_____

10% target weight loss (lbs) (6-month goal): _____

Date (Goal is 1 entry per week)	**Weight (lbs)**	**BMI**	**Labs (if or when drawn)**
Week 1:			Hemoglobin A1c:_____ LDL: _____ HDL:_____ Triglycerides:_____
Week 2:			
Week 3:			
Week 4:			
Week 5:			
Week 6:			
Week 7:			
Week 8:			

Week 9:			
Week 10:			
Week 11:			
Week 12:			Hemoglobin A1c:_____ LDL: _____ HDL:_____ Triglycerides:_____
Week 13:			
Week 14:			
Week 15:			
Week 16:			
Week 17:			
Week 18:			
Week 19:			
Week 20:			
Week 21:			
Week 22:			
Week 23:			
Week 24:			Hemoglobin A1c:_____ LDL: _____ HDL:_____ Triglycerides:_____

Authors: Vincent Chen, MD, Monica Tincopa, MD
Edited by: Brittany Batell, MPH MSW, Karelyn Munro, BA