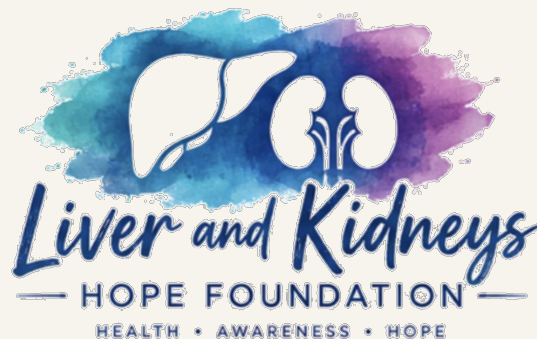




PATIENT & COMMUNITY EDUCATION SERIES

Understanding MASH

Metabolic dysfunction-Associated Steatohepatitis — a plain-language, comprehensive guide to the active, inflamed form of fatty liver disease: what it is, how it's staged, and how it's treated.

Formerly known as Non-Alcoholic Steatohepatitis (NASH)

Health Education Series · EDU-LIV

A publication of The Liver and Kidneys Hope Foundation · a Nevada 501(c)(3) nonprofit

First Edition

Important: This guide is provided for general educational purposes only. The Liver and Kidneys Hope Foundation is a nonprofit focused on liver-health education, community support, and outreach — it is **not a medical provider** and does not offer diagnosis, treatment, or medical advice. Nothing here should replace a conversation with a qualified, licensed healthcare professional who knows your history.

CONTENTS

What's Inside

This guide is a companion to our MASLD guide, but zooms in specifically on MASH — the more active, injury-causing form of fatty liver disease. It moves from biology through diagnosis, staging, treatment, and daily life.

1	The Liver & the Idea of "Steatohepatitis"	>
2	What Is MASH? From Steatosis to Active Injury	>
3	Inside the Liver: Inflammation, Ballooning & Injury	>
4	Fibrosis Staging: The Number That Matters Most	>
5	How Common Is MASH? Who Is Affected	>
6	What Drives MASH: Causes & Risk Factors	>
7	MASH and the Rest of the Body	>
8	Signs & Symptoms: Often Silent Until It Isn't	>
9	Diagnosing MASH: Blood Tests, Scores & Imaging	>
10	The Liver Biopsy: Still the Reference Standard	>
11	Related Terms: MASLD, MetALD, ALD & Cirrhosis	>
12	Possible Complications	>
13	Treatment & Management: The Big Picture	>
14	Medications for MASH: Approved & Emerging	>
15	Eating for a Healthier Liver	>
16	Movement & Exercise	>
17	Weight, Habits & Lasting Change	>
18	Alcohol, Medications & Supplements	>
19	Monitoring Over Time & Your Care Team	>
20	Special Situations	>

21 Living Well, Prevention & Myths vs. Facts >

★ Questions, Glossary, Resources & Disclaimer >

HOW TO USE THIS GUIDE

Colored boxes flag the essentials throughout: **Key Point**, **Did You Know?**, and **Talk With Your Clinician**. If you haven't yet, our companion guide "*Understanding MASLD*" covers the broader fatty-liver spectrum this guide zooms in from.

SECTION 1 The Liver & the Idea of "Steatohepatitis"

To understand MASH, it helps to break down the word itself — because each part describes a distinct event happening inside the liver.

Your liver is the body's largest solid internal organ, sitting under the right rib cage, and it performs hundreds of jobs: processing nutrients, making bile, managing fats, filtering toxins, producing clotting proteins, and storing vitamins. It has very few pain-sensing nerves and a large reserve capacity, which is precisely why serious injury can build for years without causing symptoms.

Breaking down the word "steatohepatitis"

- **Steato-** refers to fat (steatosis = fat accumulation).
- **-hepatitis** means inflammation of the liver.

Put together, **steatohepatitis** describes a liver that is not just storing extra fat, but is actively inflamed and being injured by it. This is the key distinction between simple fatty liver and MASH, and it is why MASH is treated as a more urgent conversation than fat alone.

DID YOU KNOW?

The liver can regenerate after injury — but that capacity is not unlimited. Long-standing inflammation, of the kind seen in MASH, can outpace the liver's ability to repair itself, leading to permanent scar tissue. This is the central concern this guide is built around.

KEY POINT

Fat in the liver is common and often harmless on its own. **MASH is what happens when that fat provokes ongoing inflammation and cell injury** — the stage where the disease gains the potential to cause lasting damage.

SECTION 2

What Is MASH? From Steatosis to Active Injury

MASH is the inflammatory, injury-causing form of fatty liver disease driven by metabolic dysfunction. It sits partway along a spectrum, and it is the point on that spectrum where real risk begins to build.

MASH stands for **Metabolic dysfunction-Associated Steatohepatitis**. It is one branch of the broader spectrum of **Steatotic Liver Disease (SLD)**, a naming system updated in 2023 by a large international panel of liver specialists. Under this system:

Term	What it means
SLD	Steatotic Liver Disease — the umbrella term for any fatty liver, whatever the cause.
MASLD	Fatty liver plus at least one cardiometabolic risk factor, with little or no alcohol involvement. Covers the full spectrum, including simple fat with no injury.
MASH	The subset of MASLD where inflammation and liver-cell injury (not just fat) are present. The focus of this guide.
MetALD	MASLD in a person who also drinks a moderate-to-higher amount of alcohol.
ALD	Alcohol-associated liver disease, where alcohol is the predominant cause.

Why the name changed from NASH

MASH replaces the older term **NASH** (Non-Alcoholic Steatohepatitis). The rename, agreed in 2023, moved the field away from a name defined by what the disease was *not* ("non-alcoholic") and toward what actually drives it — metabolic dysfunction — while also retiring language some patients found stigmatizing.

MASH is a diagnosis based on tissue, not just blood tests

Unlike a simple fatty liver, which can often be suspected from blood work and imaging, a definitive MASH diagnosis technically requires seeing three things together under a microscope, on a liver biopsy:

1. **Steatosis** — fat within liver cells.
2. **Inflammation** — immune cells present, responding to injury.
3. **Hepatocyte ballooning** — swollen, damaged liver cells, described further in Section 3.

In everyday practice, most people are identified as "likely MASH" using blood scores and imaging, with biopsy reserved for situations where confirmation changes the plan (see Sections 9–10).

KEY POINT

Not everyone with a fatty liver has MASH. MASH is a specific, more active subset — and it is the one most strongly linked to the risk of scarring, cirrhosis, and liver-related complications down the road.

SECTION 3

Inside the Liver: Inflammation, Ballooning & Injury

This section looks a little closer at what a pathologist actually sees down a microscope when examining a MASH liver — because understanding these features explains why MASH behaves differently from simple fat alone.

Steatosis: the starting point

Fat droplets accumulate inside liver cells (hepatocytes). On its own, this is called simple steatosis and usually causes no ongoing injury. In MASH, this same fat becomes the backdrop against which inflammation and cell injury occur.

Lobular inflammation

Clusters of immune cells appear scattered through the liver tissue, responding to stressed or dying cells. This inflammation is thought to be triggered by a combination of fat toxicity, oxidative stress, and signals from the gut and immune system — an active, ongoing process rather than a passive state.

Hepatocyte ballooning

Some liver cells become swollen and rounded, losing their normal structure — a change pathologists call "ballooning degeneration." Ballooned cells are a hallmark of cell injury and are one of the three features required for a formal MASH diagnosis. Their presence signals that fat has moved from being stored quietly to actively damaging the cell.

Why this combination matters

It is the *combination* of ongoing inflammation and cell injury — not fat by itself — that triggers the liver's wound-healing response: laying down collagen, or scar tissue, in a process called fibrosis (Section 4). Repeated over years, this is how MASH can progress toward cirrhosis.

DID YOU KNOW?

Pathologists often score MASH biopsies using a system called the **NAFLD/MASLD Activity Score (NAS)**, which grades steatosis, inflammation, and ballooning separately, then looks at fibrosis as its own, separate measurement. This separation exists precisely because activity and scarring don't always move together — a liver can be highly inflamed with modest scarring, or vice versa.

KEY POINT

MASH is fundamentally a disease of **ongoing injury**. That framing explains both why it is taken seriously and why calming the inflammation — through metabolic improvement or medication — can allow the liver real room to recover.

SECTION 4

Fibrosis Staging: The Number That Matters Most

If you remember one number from a MASH conversation, make it the fibrosis stage. Across large studies, it is the single strongest predictor of long-term liver outcomes — more predictive than the amount of fat or even the amount of inflammation.

Fibrosis is scar tissue, and it builds in a fairly predictable pattern as MASH progresses, described using an F0–F4 scale:

Stage	Pattern of scarring	What it generally means
F0	No fibrosis.	No scarring detected.
F1	Mild, localized scarring around small vessels (perisinusoidal or periportal).	Early stage; often not felt at all.
F2	Scarring extends and begins to link small areas together.	Referred to as "significant fibrosis" — a common threshold for closer monitoring or treatment discussions.
F3	Bridging fibrosis — scar tissue connects across larger areas of the liver.	"Advanced fibrosis" — the stage where medication and specialist care become especially important.
F4	Cirrhosis — scarring has reshaped the liver's architecture.	Covered in depth in Section 11.

KEY POINT — ACTIVITY VS. SCARRING

Two different things are being measured in MASH care: **disease activity** (how much inflammation and injury is happening right now) and **fibrosis stage** (how much permanent scarring has accumulated over time). Activity can improve relatively quickly with treatment; fibrosis changes more slowly, but importantly, **can also improve**, especially at earlier stages.

"F2 or higher" — a phrase you may hear often

Because F2 and F3 fibrosis carry a meaningfully higher risk of eventually progressing to cirrhosis, many treatment guidelines and clinical trials use "**significant fibrosis (F2+)**" as a threshold for more active treatment, including the newer MASH-specific medications discussed in Section 14.

DID YOU KNOW?

Fibrosis stage can now often be **estimated without a biopsy**, using blood-based scores and imaging techniques such as elastography — tools covered in detail in Section 9. This has transformed how MASH is monitored over time.

SECTION 5 How Common Is MASH? Who Is Affected

MASLD as a whole affects roughly one in three adults worldwide — but MASH, its more active subset, is naturally less common, while still affecting a very substantial number of people.

Estimates vary by population and study method, but researchers generally believe MASH affects somewhere in the range of **5-8% of the adult population** globally, with figures trending higher in some countries alongside rising rates of obesity and type 2 diabetes. Put another way: of the large group of people with a fatty liver (MASLD), a meaningful minority have progressed to the more active MASH stage.

Groups with higher rates of MASH specifically

- **People with type 2 diabetes.** This group has substantially higher rates of MASH, and of more advanced fibrosis within MASH, than the general population.
- **People with obesity,** particularly with fat concentrated around the abdomen.
- **People with metabolic syndrome** — the cluster of elevated blood sugar, blood pressure, triglycerides, and low HDL cholesterol.
- **Certain genetic backgrounds,** including variants in genes such as *PNPLA3*, which raise the risk not just of fat accumulation but of progression to MASH and fibrosis.

DID YOU KNOW?

MASH-related cirrhosis has become one of the **fastest-growing reasons** people need a liver transplant in many countries, even as other causes of liver disease, such as hepatitis C, have become far more treatable.

KEY POINT

A MASH diagnosis is common enough that you are far from alone — but it is specific enough that it usually warrants closer attention and monitoring than a simple fatty liver finding.

SECTION 6 What Drives MASH: Causes & Risk Factors

MASH shares its root causes with MASLD more broadly, but tends to appear where metabolic strain is more pronounced, more prolonged, or compounded by genetic susceptibility.

Insulin resistance: the central engine

In insulin resistance, cells respond poorly to insulin, prompting the body to produce more of it. This drives the liver to take in and manufacture more fat than it can safely store, while promoting the kind of low-grade, chronic inflammation that characterizes MASH. Insulin resistance is the thread connecting MASH to obesity, type 2 diabetes, and cardiovascular disease.

The cardiometabolic risk factors

The same five factors used to diagnose MASLD apply here — a person needs at least one, alongside a fatty liver, to fall on this spectrum:

Risk factor	Typical adult threshold clinicians use*
Excess weight / central adiposity	BMI at or above 25 (23 for many Asian populations), or an enlarged waist measurement.
Higher blood sugar	Fasting glucose at or above 100 mg/dL, elevated HbA1c, type 2 diabetes, or treatment for it.
Higher blood pressure	At or above 130/85 mmHg, or blood-pressure medication.
Higher triglycerides	At or above 150 mg/dL, or lipid-lowering treatment.
Lower HDL ("good") cholesterol	Below about 40 mg/dL (men) or 50 mg/dL (women), or on treatment.

*Approximate; adjusted for age, ethnicity, and clinical context by a clinician.

What tips someone from MASLD toward MASH

- **Genetics.** Variants such as *PNPLA3* and *TM6SF2* increase susceptibility to inflammation and fibrosis, not just fat storage — helping explain why some people with modest risk factors still develop MASH.
- **Duration and severity of metabolic strain.** Longer-standing, poorly controlled insulin resistance and diabetes raise the odds of progressing from simple fat to active inflammation.
- **Diet patterns** high in added sugars (especially fructose), refined carbohydrates, and ultra-processed foods, which promote fat production and worsen insulin resistance.
- **Low physical activity** and prolonged sitting.
- **Obstructive sleep apnea**, through its effects on oxygen levels and metabolism overnight.
- **Gut microbiome factors**, an active area of ongoing research into what drives liver inflammation specifically.

DID YOU KNOW? — "LEAN" MASH

As with MASLD more broadly, a meaningful minority of people with MASH have a normal body weight. In these cases, genetics and where the body stores fat play an outsized role — a reminder that body weight alone should never be used to rule MASH in or out.

SECTION 7 MASH and the Rest of the Body

MASH rarely exists in isolation. For most people diagnosed with it, the greatest overall health threat is not the liver — it's the heart.

Because MASH shares its metabolic roots with cardiovascular disease, type 2 diabetes, and chronic kidney disease, it is best understood as one visible expression of body-wide metabolic dysfunction, rather than an isolated liver problem.

Cardiovascular disease: the leading cause of death

Cardiovascular disease — not liver disease — is the most common cause of death in people with MASH. This is one of the most important facts in this entire guide: managing blood pressure, cholesterol, and blood sugar is not a side issue in MASH care, it is central to it.

KEY POINT

A treatment plan for MASH that ignores heart-disease risk is an incomplete plan. The steps that help the liver — weight management, activity, blood sugar control — are the same steps that protect the heart.

Other closely linked conditions

- **Type 2 diabetes.** The two conditions reinforce one another, and diabetes raises the risk of more advanced fibrosis within MASH.
- **Chronic kidney disease,** which shares metabolic risk factors with MASH.
- **Certain cancers,** including a modestly elevated risk of some cancers beyond liver cancer, likely via shared metabolic pathways.
- **Obstructive sleep apnea** and **PCOS,** both of which share metabolic roots with MASH.

DID YOU KNOW?

Because of these connections, a MASH diagnosis often prompts a broader check-up — cardiovascular risk calculation, kidney function tests, and diabetes screening. That reflects thorough, joined-up care, not an escalation of concern.

SECTION 8

Signs & Symptoms: Often Silent Until It Isn't

Despite the active inflammation happening inside the liver, most people with MASH feel completely normal — which is exactly why it is so often found by accident.

In earlier stages, MASH typically causes **no noticeable symptoms**. When symptoms do occur, they are usually mild and easy to attribute to other things:

- **Fatigue** or reduced energy.
- A dull ache or sense of fullness in the **upper right abdomen**.
- Difficulty concentrating, sometimes described as "brain fog."

These symptoms are non-specific and unreliable as a way to detect MASH — testing is what actually reveals it.

Signs suggesting more advanced disease

These can emerge once fibrosis becomes significant, and are worth discussing with a clinician promptly:

- Yellowing of the skin or eyes (jaundice).

- Swelling of the abdomen, legs, or ankles.
- Easy bruising or bleeding.
- Persistent itching.
- Confusion or unusual drowsiness.
- Vomiting blood or passing black, tarry stools.

SEEK MEDICAL CARE PROMPTLY

Vomiting blood, black tarry stools, sudden confusion, or a swollen, painful abdomen can signal a serious complication and warrant prompt medical attention. This guide cannot assess urgency — a clinician can.

KEY POINT

Feeling well is not evidence that the liver is well. With MASH specifically, active inflammation can be occurring — and fibrosis slowly accumulating — while symptoms remain completely absent.

SECTION 9

Diagnosing MASH: Blood Tests, Scores & Imaging

Because MASH is technically a tissue diagnosis, most day-to-day care focuses on estimating the *likelihood* of MASH and, above all, the stage of fibrosis — using tools that don't require a biopsy.

Step 1 — Blood tests

- **Liver enzymes** (ALT, AST, GGT). These may be mildly elevated in MASH, but a substantial number of people with confirmed MASH — even with fibrosis — have *normal* enzyme levels, so normal results do not rule it out.
- **Tests excluding other causes**, such as viral hepatitis, autoimmune liver disease, iron overload, and thyroid dysfunction.
- **Metabolic tests**, including fasting glucose or HbA1c, a full lipid panel, and liver function markers such as albumin, bilirubin, and platelet count.

Step 2 — Estimating fibrosis risk with calculated scores

- **FIB-4 index**. Calculated from age, AST, ALT, and platelet count, this widely used score sorts people into low, indeterminate, or higher likelihood of advanced fibrosis, guiding who needs further testing or a specialist referral.
- **NAFLD Fibrosis Score (NFS)** and other blood-based panels may also be used, sometimes incorporating direct fibrosis markers for added precision.

Step 3 — Imaging

Test	What it shows
Ultrasound	Detects moderate-to-large amounts of liver fat; a common first step but less precise for scarring.
Transient elastography (FibroScan / VCTE)	A quick, painless bedside scan estimating liver stiffness — a stand-in for fibrosis — and fat content (via CAP score).
MRI-based tests (MRI-PDFF, MR elastography)	Highly accurate measurement of both fat and stiffness; often used in specialist or research settings.

DID YOU KNOW?

A typical pathway looks like this: routine bloodwork or imaging hints at a fatty liver → a FIB-4 score is calculated → if it suggests risk, an elastography scan follows → and if uncertainty remains, a hepatologist may consider a biopsy. Most people are monitored this way without ever needing one.

TALK WITH YOUR CLINICIAN

Worth asking directly: "What is my FIB-4 score?" "Does my imaging suggest any fibrosis?" and "Based on these results, do you think this looks like MASH, and what's the next step?"

SECTION 10

The Liver Biopsy: Still the Reference Standard

Non-invasive tests have transformed MASH care, but a biopsy remains the most detailed way to confirm the diagnosis and precisely stage the disease. Understanding what it involves can ease any anxiety about the idea.

What a biopsy involves

A thin needle is used, usually through the skin (percutaneous), guided by imaging, to remove a small sample of liver tissue — typically under local anesthesia, sometimes with light sedation. The tissue sample is examined under a microscope by a pathologist, who looks specifically for the three MASH hallmarks described in Section 3 (steatosis, inflammation, and ballooning) and grades the stage of fibrosis.

When a biopsy is typically considered

- When non-invasive tests give an unclear or conflicting picture.
- When another liver condition needs to be ruled out alongside MASH.
- When precise staging would change the treatment plan — for example, confirming eligibility for a MASH-specific medication (Section 14).
- In some clinical trials, which often require biopsy-confirmed MASH for enrollment.

What to expect and typical risks

Most people go home the same day, with some soreness at the biopsy site. Serious complications, such as significant bleeding, are uncommon but are discussed by the physician performing the procedure as part of informed consent. As with any medical procedure, your own care team is the right source for guidance specific to you.

DID YOU KNOW?

Because a biopsy only samples a small piece of the liver, and because reading it involves some human judgment, results can occasionally vary between samples or observers ("sampling variability"). This is one reason non-invasive tests, tracked over time, add real value alongside biopsy.

TALK WITH YOUR CLINICIAN

If a biopsy is recommended, it's reasonable to ask what specifically the result would change about your treatment plan — understanding the "why" often makes the decision easier.

SECTION 11

Related Terms: MASLD, MetALD, ALD & Cirrhosis

MASH sits inside a family of related terms, and understanding where it fits — and where it can lead — helps make sense of conversations with your care team.

MASH's place in the SLD spectrum

Recall from Section 2: MASLD is the umbrella term for fatty liver linked to metabolic risk factors, and MASH is the more active subset within it, marked by inflammation and cell injury rather than fat alone. Not everyone with MASLD has MASH, but everyone with MASH also meets the criteria for MASLD.

When alcohol is also part of the picture: MetALD

Some people have both metabolic risk factors and a moderate-to-higher alcohol intake. This combination is classified as **MetALD** rather than pure MASLD/MASH, because both factors likely contribute to liver injury, and addressing only one may not be enough. Being candid with your clinician about alcohol use helps ensure accurate classification and advice.

Cirrhosis: the end stage of the fibrosis pathway

When MASH-related fibrosis progresses to its most advanced stage (F4), it is called **MASH cirrhosis**. At this point, scar tissue has reshaped the liver's structure. Early ("compensated") cirrhosis can still be symptom-free; as it advances ("decompensated"), it can cause fluid buildup in the abdomen (ascites), swollen veins prone to bleeding (varices), confusion (hepatic encephalopathy), and jaundice. Cirrhosis also raises the risk of liver cancer, which is why regular surveillance is recommended for anyone with it.

KEY POINT

These categories describe a person's current situation, not a fixed fate. Someone can move between them — for instance, as alcohol intake or metabolic health changes — and treatment adjusts accordingly.

TALK WITH YOUR CLINICIAN — HONESTLY

Being open about alcohol use, even if it feels uncomfortable, leads to a more accurate picture and better tailored advice. There's no judgment in an honest conversation — only better care.

SECTION 12 Possible Complications

Because MASH involves active injury, understanding what can happen if it progresses unchecked helps explain why monitoring and, where appropriate, treatment matter — while keeping in mind that many people with MASH never reach these more serious stages.

Liver-related complications

- **Progressive fibrosis**, potentially advancing from F1/F2 toward F3 and eventually cirrhosis (F4) over years, particularly without changes to the underlying metabolic drivers.
- **Cirrhosis-related complications**, including ascites, variceal bleeding, hepatic encephalopathy, and jaundice, once cirrhosis is reached.
- **Liver cancer (hepatocellular carcinoma)**, whose risk rises substantially once cirrhosis is present, prompting regular surveillance imaging.

Complications beyond the liver

- **Cardiovascular disease** — as noted in Section 7, the leading cause of death in people with MASH.
- **Worsening type 2 diabetes control.**
- **Chronic kidney disease.**

DID YOU KNOW?

For people with MASH cirrhosis, clinicians commonly recommend vaccination against hepatitis A and B and regular liver-cancer surveillance, typically an ultrasound every six months — simple, protective steps that make a meaningful difference.

KEY POINT — KEEPING PERSPECTIVE

A MASH diagnosis does not mean these outcomes are likely for you specifically. It means they are worth actively preventing — and the tools to do so are often within reach, especially the earlier action is taken.

SECTION 13

Treatment & Management: The Big Picture

MASH care has changed meaningfully in recent years. Lifestyle change remains the essential foundation for everyone, and for the first time, there are medications designed specifically to treat the disease itself.

Layer 1 — The foundation: metabolic health

For nearly everyone with MASH, improving metabolic health is the cornerstone of treatment — it is not a fallback option, but the most powerful, evidence-backed intervention available, capable of reducing inflammation and, in many people, improving fibrosis. Weight change, where appropriate, shows a dose-related benefit:

Approximate body-weight reduction	Typical liver benefit reported in studies
Around 3–5%	Meaningful reduction in liver fat.
Around 7–10%	Reduction in inflammation; resolution of MASH in many people.
10% or more (sustained)	Best chance of improving fibrosis.

Figures are general research averages; individual results vary, and weight loss is not the only lever available.

Layer 2 — Treating conditions that travel alongside MASH

- **Blood sugar management.** Some diabetes medications carry added liver and cardiovascular benefits, discussed further in Section 14.
- **Cholesterol management.** Statins are generally considered **safe** in MASH and are important for lowering cardiovascular risk; a fatty or inflamed liver is not, by itself, a reason to avoid them.
- **Blood pressure control,** protecting the heart, kidneys, and blood vessels.

Layer 3 — Medications aimed at MASH itself

This is the fastest-changing part of the field, covered in full in Section 14 — including the first medication specifically approved for MASH with fibrosis.

Layer 4 — Procedures and advanced care

- **Metabolic (bariatric) surgery,** which can produce substantial, durable improvements in eligible people with significant obesity.
- **Liver transplantation,** a life-saving option for carefully selected people with end-stage MASH cirrhosis.

A WORD OF CAUTION

The right treatment plan depends on individual factors — stage of disease, other conditions, and personal circumstances. **This guide cannot recommend specific drugs or doses.** Please make these decisions with a qualified clinician, and be cautious of unregulated "liver detox" products (see Section 18).

KEY POINT

Medication is a genuine, welcome addition to MASH care — but it works best *alongside* the metabolic foundation, not as a replacement for it.

SECTION 14

Medications for MASH: Approved & Emerging

This is one of the most active areas in all of liver medicine right now. This section describes the landscape in general, educational terms — not as a recommendation for any individual.

A milestone: the first MASH-specific approval

In **2024**, a medication became the first therapy specifically approved in the United States for adults with MASH and **moderate-to-advanced liver scarring (fibrosis stages F2-F3)**, to be used **alongside diet and exercise**. It works by acting on a thyroid hormone receptor in the liver, helping to reduce liver fat and inflammation. Its arrival marked a genuine turning point: for the first time, clinicians have a medicine designed and approved for the disease itself, rather than only for the metabolic conditions that accompany it.

Medications developed for other conditions, with liver benefits

- **GLP-1 receptor agonists** (a class of medications originally developed for type 2 diabetes and weight management). In clinical studies, several have shown improvements in liver fat, inflammation, and, in some trials, fibrosis — making them particularly relevant for people with MASH who also have diabetes or significant excess weight.
- **Dual and triple hormone-receptor agonists**, a newer class in active development, combining effects on multiple metabolic hormone pathways at once; several are in late-stage clinical trials for MASH specifically.
- **Pioglitazone**, an older diabetes medication sometimes considered for selected patients with MASH, with its own set of benefits and cautions a specialist will weigh.
- **Vitamin E**, which some specialists consider for certain patients without diabetes, though it is not appropriate for everyone and carries its own considerations at higher doses.

What's still being studied

Because MASH research is moving quickly, additional medications targeting different steps of the disease process — from fat metabolism to inflammation to fibrosis itself — are in clinical trials. Guidelines and approved options are likely to keep expanding in the coming years.

DID YOU KNOW?

Because MASH treatment is evolving so quickly, this section will age faster than most others in this guide. Always ask your clinician what the *current* options are — and consider that clinical trials may also be an option worth discussing, particularly for more advanced fibrosis.

NOT A SUBSTITUTE FOR INDIVIDUALIZED CARE

Eligibility for any MASH medication depends on fibrosis stage, other health conditions, and individual risk factors. **This section is general education, not a recommendation.** Only a qualified clinician, with your full history and current test results, can determine what's appropriate for you.

SECTION 15 Eating for a Healthier Liver

No single food treats or causes MASH. What matters is the overall pattern of eating, sustained over months and years — and a liver-friendly diet turns out to be simply a heart-friendly, everyday-healthy one.

The most studied pattern: Mediterranean-style eating

- Plenty of **vegetables, fruits, legumes, and whole grains.**
- **Healthy fats** — olive oil, nuts, and seeds — in place of butter and processed fats.
- **Fish and seafood** a couple of times a week, with poultry in moderation.
- Less **red and processed meat**, fewer sweets, and fewer sugary drinks.

What to cut back on

Cut back on...	Why it matters for MASH specifically
Sugar-sweetened drinks & added sugars	Fructose in particular drives fat production in the liver and worsens insulin resistance — a key contributor to the inflammation seen in MASH.
Ultra-processed foods	Often high in sugar, refined starch, and unhealthy fat — easy to over-eat and metabolically taxing.
Refined carbohydrates	Spike blood sugar and feed ongoing fat production.
Excess saturated fat	Found in fatty processed meats and many fried, packaged foods.

A few evidence-informed extras

- **Coffee.** Regular coffee consumption (with limited added sugar) has been linked in observational studies to lower rates of liver fibrosis — a liver-friendly habit, though not a treatment.
- **Fiber**, from vegetables, fruit, beans, and whole grains, supporting steadier blood sugar and gut health.
- **Gradual, sustainable change** over extreme restriction — very rapid weight loss can sometimes stress the liver rather than help it.

TALK WITH A PROFESSIONAL

A registered dietitian can tailor these principles to your taste, culture, budget, and any other conditions such as diabetes. Ask your clinician whether a referral is available.

NOTE

This section describes general dietary patterns for education only, not a personalized nutrition prescription. If you have diabetes, kidney disease, or another condition, seek individualized advice before making significant changes.

SECTION 16 Movement & Exercise

Exercise helps the liver in a distinctive way: it can reduce liver fat and inflammation even when the number on the scale barely moves. For MASH specifically, that matters.

Why activity works

Physical activity improves how the body uses insulin, burns fat that would otherwise accumulate in the liver, and reduces the low-grade inflammation associated with MASH. Studies show liver-fat benefits from exercise **independent of weight loss** — encouraging for anyone who has found the scale a frustrating measure of progress.

A practical target

- **Aerobic activity:** working toward roughly 150 minutes per week of moderate activity (brisk walking, cycling, swimming) — for example, about 30 minutes on most days, building up gradually.
- **Strength / resistance training** two or more days a week, to build muscle and improve how the body handles sugar.
- **Less sitting.** Breaking up long stretches of sitting with short movement breaks helps too.

KEY POINT

The best exercise is the one you'll actually keep doing. Consistency matters more than intensity — walking counts, gardening counts, dancing counts.

BEFORE YOU START

If you have heart disease, are new to exercise, or have other health concerns, check with your clinician about what type and intensity is safe to begin with.

SECTION 17 Weight, Habits & Lasting Change

Knowing what helps is rarely the hardest part — sustaining it, in a busy life, usually is. This section is about making change realistic and kind to yourself.

Set goals you can actually keep

- **Small and specific beats big and vague.** "A 15-minute walk after lunch on weekdays" is easier to start and sustain than "get fit."

- **Aim for direction, not perfection.** Even modest, sustained improvement in weight, activity, and diet meaningfully benefits an inflamed liver.
- **Anchor new habits to existing ones** — tie a walk to your morning coffee, or stretching to a favorite show.

Handle setbacks gently

Lapses are a normal part of any long journey, not a sign of failure. What matters most is returning to your routine, not never slipping. Self-compassion tends to make lasting change easier, not harder.

Build support around you

- **Enlist people** — a friend, family member, or community group makes change more durable and enjoyable.
- **Use your care team** — dietitians, diabetes educators, and counselors can all help.
- **Track what motivates you** — energy, sleep, and lab numbers, not only the scale.

DID YOU KNOW?

The Liver and Kidneys Hope Foundation's community programs exist partly for this reason · change is easier, and more enjoyable, when you're not doing it alone.

A NOTE ON SAFETY

Extreme diets, crash weight loss, and unregulated "fat-burner" products can be counter-productive or even harmful to an already inflamed liver. Sustainable, moderate change — guided by professionals — is safer and works better over time.

SECTION 18 Alcohol, Medications & Supplements

Your liver processes nearly everything you consume — and in MASH, where inflammation is already present, a few mindful choices here matter more than usual.

Alcohol

Because a MASH liver is already inflamed and under strain, alcohol adds a second source of injury. Many clinicians advise people with MASH to **minimize or avoid alcohol entirely**, particularly once significant fibrosis is present. Drinking alongside MASLD risk factors can also shift a person's classification toward MetALD, described in Section 11. Your own clinician can advise what's appropriate for your specific stage of disease.

Everyday medications

- **Acetaminophen (paracetamol)** is generally acceptable in normal doses for many people, but total daily amount matters more with liver disease present — ask your clinician what's safe for you, and watch for it hidden in combination cold-and-flu products.
- Tell every prescriber and pharmacist that you have MASH, so they can check new medicines are appropriate.

- Don't stop prescribed medicines (such as statins) on your own out of worry about the liver — many are beneficial and safe. Raise concerns with your clinician first.

"LIVER DETOX" AND HERBAL PRODUCTS — BE CAREFUL

Products marketed to "cleanse" or "detox" the liver are not proven to help MASH, and some supplements and herbal remedies have caused liver injury outright. High-dose herbal extracts and weight-loss supplements are of particular concern. **Check with a clinician or pharmacist before taking any supplement** — an inflamed liver has less reserve to absorb an additional insult.

Vaccinations and other protections

People with chronic liver conditions are often advised to stay current on vaccinations, including hepatitis A and B, to avoid additional liver insults. Your clinician can advise what's right for you.

TALK WITH YOUR CLINICIAN OR PHARMACIST

Bring a full list of everything you take — prescriptions, over-the-counter medicines, vitamins, and supplements — to your appointments. It's one of the simplest ways to protect your liver.

SECTION 19 Monitoring Over Time & Your Care Team

MASH is a long-term condition that is monitored over time, not resolved in a single visit. Because inflammation and fibrosis can both shift, ongoing tracking is central to good care.

What monitoring usually involves

- **Periodic blood tests**, tracking liver enzymes, metabolic markers, and fibrosis scores such as FIB-4.
- **Repeat elastography or imaging** at intervals your clinician judges appropriate, to watch for change in fibrosis stage in either direction.
- **Attention to the whole metabolic picture** — blood pressure, cholesterol, blood sugar, and weight — since these drive both liver and cardiovascular risk.
- **For those on a MASH-specific medication**, follow-up to assess response and tolerability.
- **For those with cirrhosis**, additional surveillance, including regular liver-cancer screening.

Who might be on your team

Primary care provider

Hepatologist / gastroenterologist

Registered dietitian

Diabetes / endocrine specialist

Cardiologist

Nurse educator

Pharmacist

Mental-health professional

Community & peer support

Given the more active nature of MASH, involvement of a hepatologist is common, particularly once fibrosis reaches F2 or higher, or when a MASH-specific medication is being considered.

KEY POINT — YOU ARE THE CONSTANT

Clinicians and tests change, but you're present at every appointment. Keeping your own records — lab results, fibrosis scores, medications, and questions — makes your care smoother and more effective.

MAKE THE MOST OF APPOINTMENTS

Write your top two or three questions beforehand. Ask for your actual numbers and what they mean. Ask what the plan is until your next visit, and what would be a reason to check in sooner.

SECTION 20 Special Situations

MASH looks a little different across different groups. A few situations deserve their own note.

Children and teenagers

With rising childhood obesity, MASH is increasingly identified in younger people. Care centers on the whole family — supportive, shared changes to eating and activity rather than singling out a child. Because young people have many years of liver health ahead of them, early attention is especially valuable, and pediatric specialists guide diagnosis and any treatment.

"Lean" MASH

A meaningful minority of people with MASH have a normal body weight. Their disease is more often shaped by genetics and by where the body stores fat, and it still deserves the same careful evaluation of fibrosis stage. A normal weight should never be a reason to dismiss a MASH finding.

People with type 2 diabetes

Because rates of MASH and advanced fibrosis are substantially higher in people with type 2 diabetes, many guidelines recommend actively screening this group with tools like FIB-4. Some diabetes medications also carry added liver benefit, which a clinician can factor into an overall plan.

Pregnancy

MASH can be associated with certain pregnancy complications, and some medications used for metabolic health or MASH itself are not suitable during pregnancy. Anyone pregnant or planning a pregnancy should discuss their liver health with their care team so the plan can be adjusted safely.

Older adults

In older age, MASH often sits alongside several other conditions and medications. Care emphasizes balancing benefits and risks, protecting heart health, and maintaining strength, mobility, and quality of life.

TALK WITH YOUR CLINICIAN

If any of these situations apply to you or a family member, mention it directly — it may change what testing, monitoring, or treatment makes sense.

SECTION 21 Living Well, Prevention & Myths vs. Facts

A MASH diagnosis touches more than the liver — and it's just as important to know what's actually true about the condition as it is to know how to manage it day to day.

Living well: mind, mood & community

It's common to feel worried or frustrated after a MASH diagnosis, especially given the more serious tone the word "hepatitis" can carry. These feelings are understandable — and worth tending, since stress and low mood can make healthy routines harder to sustain. Talking with trusted people, protecting sleep, managing stress in ways that work for you, and leaning on community or peer support all genuinely help. MASH is a medical condition with strong biological and genetic roots — not a character flaw — and you deserve care and information delivered with respect.

IF YOU ARE STRUGGLING

If you are experiencing persistent low mood, hopelessness, or thoughts of harming yourself, please reach out to a healthcare professional or a local crisis line. Support is available, and you don't have to manage those feelings alone.

Prevention — and preventing progression

- **Aim for a healthy weight**, with particular attention to waist size.
- **Eat mostly whole foods** in a Mediterranean-style pattern, minimizing sugary drinks and ultra-processed foods.
- **Move regularly**, combining aerobic activity with some strength work.
- **Keep metabolic numbers in range** — blood sugar, blood pressure, cholesterol.
- **Be moderate with alcohol, or avoid it** — especially relevant given MASH's active inflammation.
- **Don't smoke**, and prioritize sleep, including treatment for sleep apnea if present.

Myths vs. facts

Myth	Fact
"MASH only happens to heavy drinkers."	MASH is driven by metabolic dysfunction and can occur in people who drink little or no alcohol.
"If I feel fine, my liver must be fine."	MASH is usually silent. Active inflammation and fibrosis can build while a person feels completely well.
"A fatty liver and MASH are the same thing."	MASH is a specific, more active subset of fatty liver disease, marked by inflammation and cell injury — not fat alone.
"Normal liver enzymes mean I don't have MASH."	Liver enzymes can be normal even with confirmed MASH and fibrosis, which is why other tests are used.
"There's nothing to do but wait and see."	Metabolic improvement can reduce inflammation and even improve fibrosis, and there are now medications approved specifically for MASH.
"A detox supplement will treat my MASH."	No supplement is proven to treat MASH, and some have caused liver injury. Everyday habits — not products — do the real work.
"MASH is only a liver problem."	It's closely tied to heart disease, diabetes, and kidney health — and heart disease is the most common cause of death in people with MASH.

KEY POINT

If you remember one thing from this page: MASH is active, usually silent, closely tied to overall metabolic health — and, especially at earlier fibrosis stages, genuinely responsive to treatment.

CLOSING

Questions, Glossary, Resources & Disclaimer

Questions you might ask your doctor

- Do my results suggest MASH specifically, or an earlier stage of fatty liver?
- What is my FIB-4 score, and does it suggest any fibrosis?
- Do I need imaging, such as a FibroScan, or a referral to a liver specialist?
- Am I a candidate for any of the newer MASH-specific medications?
- What are my numbers for blood sugar, blood pressure, and cholesterol, and are they in range?
- Should I be vaccinated against hepatitis A or B?
- How and when will we re-check my liver? What would be a reason to contact you sooner?
- What is my overall cardiovascular risk, and how do we lower it?

Glossary

Term	Plain-language meaning
ALT / AST	Liver enzymes measured in blood; may be normal even in confirmed MASH.
Ballooning	Swollen, injured liver cells seen on biopsy — one of the three hallmarks of MASH.
Cirrhosis	Advanced, permanent liver scarring (fibrosis stage F4).
Elastography (FibroScan/VCTE)	A painless scan measuring liver stiffness as a stand-in for fibrosis.
Fibrosis	Scar tissue in the liver, graded F0 (none) to F4 (cirrhosis).
FIB-4	A score from age and routine blood tests estimating the likelihood of advanced fibrosis.
Hepatologist	A doctor who specializes in the liver.
Insulin resistance	Reduced cellular response to insulin; the central driver of MASH.
MASH	Metabolic dysfunction-Associated Steatohepatitis — active, inflamed fatty liver disease (formerly NASH).
MASLD	Metabolic dysfunction-Associated Steatotic Liver Disease — the broader spectrum MASH belongs to (formerly NAFLD).
MetALD	MASLD in a person who also drinks moderate-to-higher amounts of alcohol.
Steatosis	Fat accumulation — here, inside liver cells.

About The Liver and Kidneys Hope Foundation

The Liver and Kidneys Hope Foundation (TLHF) is a Nevada-based 501(c)(3) nonprofit dedicated to liver-health education, community support, and outreach. Through educational materials like this guide, community programming, our chapter network, volunteer efforts, and fundraising initiatives, we work to raise awareness of liver conditions and support the people affected by them. The Foundation is not a medical provider and does not deliver clinical care.

A NOTE ON SOURCES AND CURRENCY

This guide reflects widely accepted, general medical understanding of MASH intended for patient education. It does not cite individual studies, and the science — especially around new medications — continues to advance quickly. For the most current, individualized information, your healthcare professional is the best resource. If anything here appears to conflict with advice from your care team, follow your care team.

Full disclaimer

PLEASE READ

This publication is provided by The Liver and Kidneys Hope Foundation for **general educational purposes only**. It is **not medical advice** and is not a substitute for professional diagnosis, treatment, or the judgment of a qualified, licensed healthcare provider who knows your personal history. The Liver and Kidneys Hope Foundation is **not a medical provider** and does not practice medicine, provide clinical services, or establish a provider-patient relationship through this material.

Do not use this guide to diagnose or treat a health problem or disease, and do not disregard or delay seeking professional medical advice because of something you have read here. Medications, doses, thresholds, and figures mentioned are general and illustrative; they must not be acted upon without individualized professional guidance. If you think you may have a medical emergency, contact your local emergency services immediately.

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The Liver and Kidneys Hope Foundation · Health Education Series (EDU·LIV) · "Understanding MASH," First Edition
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