THE METABOLIC SYNDROME OF THE LIVER:
NON-ALCOHOLIC FATTY LIVER DISEASE (NAFLD)

RISK FACTORS FOR FATTY LIVER

Obesity
As much as 90% of obese individuals have some level of fatty liver

Simple carbohydrates
Over-consumption of simple carbohydrates, especially high-fructose corn syrup

Methylation defects
Methylation defects associated with high homocysteine and low levels of betaine and choline

WHAT IS “FATTY LIVER”?

Extra fat in liver cells
Asymptomatic accumulation of triglycerides and other fats in the liver cells

Fat content
When fat content exceeds 5% of liver volume = non-alcoholic fatty liver disease (NAFLD) or fatty liver

Metabolic syndrome
The liver manifestation of metabolic syndrome

Progression
Can remain benign or progress from fatty infiltration > inflammation > fibrosis (scarring) > cirrhosis > and even to hepatocellular carcinoma

Insulin resistance & diabetes
Up to 70% of type 2 diabetics have NAFLD

Inflammation
Inflammation measured by elevated C-reactive protein

Weight change
Rapid post-surgical weight loss

Lack of choline
Total parenteral nutrition if the nutritional formula lacks choline

The most common
Non-alcoholic fatty liver disease is the most common liver disease in the Western world.

It’s on the rise
According to the American Liver Foundation, 25% of Americans have fatty liver, and the incidence is on the rise – primarily because of a rise in obesity and associated lifestyle choices.

Who it affects
Fatty liver affects as much as 30-40% of adults and 5-10% of children and adolescents.
SOME NUTRITIONAL SUPPLEMENT SOLUTIONS

While a diet low in simple carbohydrates, particularly fructose or high-fructose corn syrup, is a great place to start, nutritional/botanical supplementation has been shown in numerous clinical studies to provide benefit.

MEDIBOLIC® | SF808
The cornerstone of our metabolic syndrome and weight management programs
- Provides nutrients and botanicals that have been shown to benefit fatty liver - cinnamon, resveratrol, green tea, partially hydrolyzed guar gum (PHGG), 5-MTHF, betaine, and others
- Enhances thermogenesis (fat burning), increases satiety, and supports weight loss
- Supports insulin sensitivity for improved blood sugar and HbA1c levels

WHAT'S THE EVIDENCE?
Here are a few examples of studies on ingredients in MediBolic.

Cinnamon
In a double-blind, placebo-controlled (DBPC) trial, 50 people with NAFLD were randomized to receive 1,500 mg cinnamon daily or placebo for 12 weeks. The cinnamon group had significant decreases in fasting blood sugar, insulin resistance, total cholesterol, triglycerides, liver enzymes (AST, ALT, GGT), and highly-sensitive C-reactive protein.¹

Resveratrol
In a DBPC trial, 60 NAFLD patients were randomized to 300 mg resveratrol or placebo twice daily for 12 weeks. Resveratrol significantly improved insulin sensitivity, LDL- and total-cholesterol, liver enzymes, blood glucose, and inflammatory biomarkers. Adiponectin was significantly increased.² In another DBPC trial, 50 NAFLD patients were supplemented with 500 mg resveratrol or placebo daily for 12 weeks. Significant improvements in liver enzymes, inflammatory markers, and hepatic steatosis grade were seen in the treatment group compared to the placebo group.³

Green Tea Phytosome
Obesity is a primary risk factor for NAFLD. In a study of obese individuals, 50 subjects taking 150 mg of green tea phytosome (GreenSelect® Phytosome) twice daily with a low-calorie diet for 90 days lost significantly more weight (14 kg vs. 5 kg) and had significantly decreased BMI compared to 50 individuals in a diet-only group.⁴ In another study, following a three-month diet and lifestyle intervention, 40 obese women were given either 150 mg green tea phytosome or placebo twice daily for another three months, which resulted in maintenance of weight loss in the green tea group but not the control group.⁵

Partially Hydrolyzed Guar Gum
In an animal study of nonalcoholic steatohepatitis (NASH; NAFLD with inflammation), PHGG reduced liver fat accumulation and inflammation, while increasing Lactobacilli and butyrate levels.⁶ In human studies PHGG reduces the glycemic index of the food with which it is consumed and helps modulate blood sugar and lipid levels.⁷

Methyl Donors: Betaine, Choline, Folate, and B12
Low levels of betaine are seen in NASH, and the more extensive the disease progression, the lower the betaine levels.⁸ In an animal model, supplementation with methyl donors – folate, B12, choline, and betaine – prevented high-fat and high-sucrose diet-induced liver triglyceride accumulation.⁹

ULTIMATE-E® | E143
Mixed tocopherols
- Studies show decreased liver enzymes in NAFLD patients
- Vitamin E supplementation can decrease liver fibrosis scores

WHAT'S THE EVIDENCE?
See vitamin E plus Siliphos studies below.

The American Association for Study of Liver Diseases guidelines recommend 800 IU vitamin E daily as first line therapy for non-diabetics with biopsy-proven NASH (they did not have studies in diabetics).¹⁰ In a study of NASH patients, 800 IU vitamin E as d-alpha tocopherol daily for one year resulted in significant improvement in liver histology and liver enzymes; the conventional medication pioglitazone did not.¹¹
SILIPHOS® | SF733
Milk thistle flavonoid (silybin) bound to phosphatidylcholine for enhanced delivery of the active ingredients to the liver
| Preserves mitochondrial function in animal model of fatty liver
| Anti-inflammatory and antioxidant effects provide liver support and protection of hepatocytes from damage by toxic insults
| Normal glutathione levels are maintained – glutathione is an important antioxidant for liver protection

WHAT’S THE EVIDENCE?

In an animal model of NASH induced by choline and methionine depletion, silybin-phospholipid complex (Siliphos) protected mitochondrial function in hepatocytes. Most of the studies on Siliphos for fatty liver have been in combination with vitamin E. In an animal model of NAFLD, Siliphos + vitamin E lowered liver fat infiltration, limited liver glutathione depletion, and protected mitochondrial function. In a pilot study, 85 patients with either NAFLD or NASH + hepatitis C (HCV) received 376 mg silybin + 776 mg of phosphatidylcholine (phytosome complex) and 360 mg vitamin E daily for one year; an untreated group served as control. Significant improvements in liver fat on ultrasound and decreased liver enzymes were seen in the NAFLD group, while improvements in fibrosis scores were seen in the NAFLD + HCV group. Both groups had significant improvements in hyperinsulinemia. Following the pilot study, 138 patients were randomized to receive placebo or 118 mg silybin + 388 mg phosphatidylcholine (phytosome complex) and 180 mg vitamin E daily for one year. Significant improvements in liver enzymes, insulin sensitivity, and liver histology were noted in the treatment group.

MERIVA 500-SF | SF813 / SF814 / SF814N
Curcumin bound to phospholipids for enhanced absorption
| Provides dual antioxidant and anti-inflammatory effects in the liver
| Clinical study of Meriva® in NAFLD patients found improvement in liver enzymes and fat accumulation (see below for details)
| Another study found Meriva lowered lipids and uric acid in NAFLD patients (see below for details)

WHAT’S THE EVIDENCE?

In a DBPC trial 100 patients with NAFLD were randomized to receive 500 mg curcumin phytosome (Meriva®) twice daily or placebo for eight weeks. Supplementation resulted in significant improvements in body mass index, waist circumference, liver fat accumulation on ultrasound, and liver enzymes. Liver enzymes were elevated in the control group. Analysis of the data from this same trial found significant improvements in total- and LDL-cholesterol, triglycerides, and uric acid in the Meriva group compared to placebo.

NIACEL-250® | SP643
Nicotinamide riboside (NR)
| Supports healthy metabolic function, including insulin sensitivity and benefit for fatty liver
| Promotes healthy aging through sirtuin activation
| Direct precursor to NAD, increasing the body’s ability to produce energy

WHAT’S THE EVIDENCE?

Liver NAD levels are decreased in an animal model of NAFLD. Nicotinamide riboside resulted in prevention and reversal of fatty liver by inducing sirtuin-dependent mitochondrial proteins. In another study, NR decreased inflammation in hepatocytes and improved factors associated with metabolic syndrome, including blood sugar, adiponectin, insulin resistance, liver cholesterol, and structural integrity of hepatocyte mitochondria.
NAFLD CAN BE A SILENT CONDITION

How many of your patients have fatty liver and don’t even know it?

REFERENCES

1. Askari F, Rashidkhani B, Hekmatdoost A. Cinnamon may have therapeutic benefits on lipid profile, liver enzymes, insulin resistance, and high-sensitivity C-reactive protein in nonalcoholic fatty liver disease patients. Nutr Res 2014;34(2):143-148.


