Non-alcoholic fatty liver disease (NAFLD)

WHAT IS NAFLD?27
- Non-alcoholic fatty liver disease.
- Presence of hepatic fat in people who do not consume excessive alcohol.
- Most common reason for mildly abnormal liver test results.

SUBCLASSIFICATIONS:
- NAFL (non-alcoholic fatty liver)
  - Fat in liver >5% by weight
  - Hepatomegaly
  - Minimal inflammation
  - Minimal cell death
- NASH (non-alcoholic steatohepatitis)
  - Excessive hepatic fat accumulation
  - Some scarring may be present
  - Inflammatory state
  - Increased cell death
- Cirrhosis
  - Significant scarring
  - Advanced liver damage
  - Compromised structure and function

PROGRESSION OF NAFLD13

NORMAL

LEAST SEVERE

Obesity
- Insulin resistance
- High fatty acids
- High cholesterol

NAFL

10-25% NAFL develops into NASH

Oxidative stress
- Mitochondrial dysfunction
- Gut-derived endotoxins
- Inflammatory cytokines

NASH

=20% NASH progresses to cirrhosis over 20-30 years

Unsuccessful or no treatment

CIRRHOSIS

MOST SEVERE

irreversible

WHAT HAPPENS INSIDE THE LIVER?14

LIPOGENESIS

LIPOTOXICITY

FIBROSIS

LIPOGENESIS

FREE FATTY ACIDS

SUGAR: SUROSE FRUCTOSE

HEPATOCYTE

ENDOPLASMIC RETICULUM STRESS

INFLAMMATION

LIQUID PRODUCTION

Lysosomal permeability

Mitochondrial dysfunction

Reactive oxidant species

HEPATOCYTE DEATH

IMMUNE CELL ACTIVATION

CAUSES
Although the exact cause of NAFLD remains unknown, growing evidence suggests excessive consumption of sugars, sucrose and fructose may act as a major contributor in the development and severity of NAFLD.

Risk factors include:23
- Obesity
- High cholesterol
- High triglycerides
- Type 2 diabetes
- Insulin resistance
- Hepatic iron
- Metabolic syndrome
- Polycystic ovary syndrome
- Hypothyroidism
- Hypertension
- Antioxidant deficiencies
- Bacterial translocation from gut to liver

SYMPTOMS7,8
Usually ASYMPTOMATIC. However, symptoms may include:
- Fatigue
- Weight gain
- Pain in upper right abdomen

DIAGNOSTIC CRITERIA
A definitive diagnosis of NAFLD depends on three factors:
1. Evidence of fatty infiltration (imaging or biopsy).
2. Exclusion of significant alcohol consumption.
3. Exclusion of other causes of hepatic steatosis (e.g. medications, surgery, metabolic disorders).

EVIDENCE-BASED SOLUTIONS15

Milk thistle
Silybum marianum
- Hepatoprotective
- Stabilises cell and lysosomal membranes
- Antioxidant, chelates iron, accelerates regeneration of hepatocytes, anti-inflammatory, anti-fibrotic

Coffee
Coffea arabica
- Hepatoprotective, antioxidant, anti-inflammatory, anti-fibrotic, improves insulin sensitivity

Zinc
- Antioxidant, anti-inflammatory, anti-fibrotic, deficiency linked to insulin resistance, involved in cell proliferation, maintains cell membrane integrity

Vitamin E
Alpha-tocopherol
- Antioxidant, anti-inflammatory, anti-fibrotic

Gamma-tocotrienol
- Regulates fatty acid metabolism, reduces endoplasmic reticulum stress, antioxidant, anti-inflammatory