

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Nutrition & Fatty Liver

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Fatty Liver

Non-alcoholic fatty liver disease

NAFLD

NAFLD

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- **NAFLD: accumulation of triglycerides in the hepatocytes**
- **Severity:**
 - Nonalcoholic Fatty Liver (NAFL): Steatosis (excessive fat accumulation)
 - Nonalcoholic steatohepatitis (NASH): steatosis and inflammation with hepatocyte injury (ballooning) with or without fibrosis.
 - ✦ NASH can progress to cirrhosis and hepatocellular carcinoma.

NORMAL LIVER



FATTY LIVER



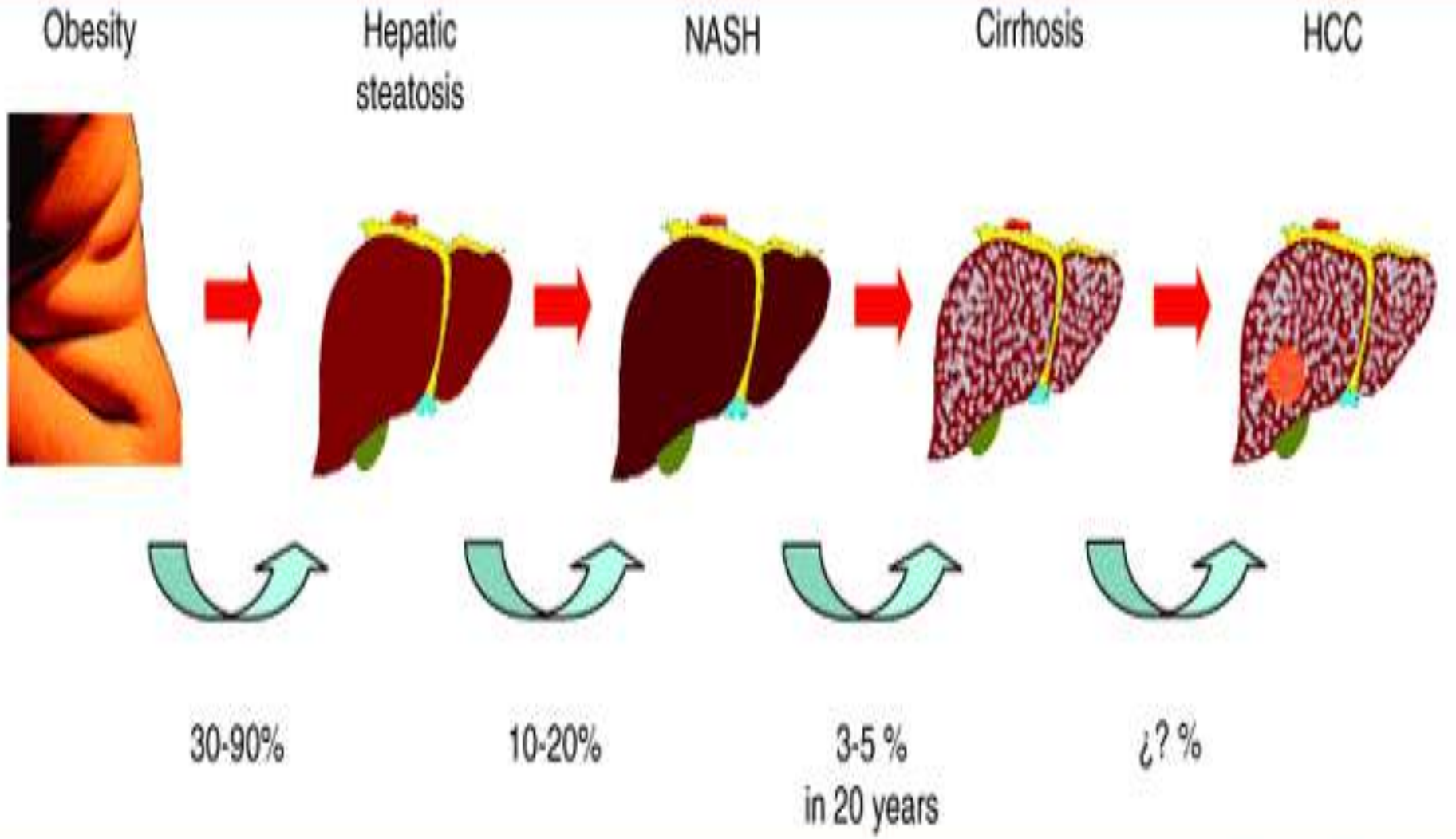
PROGRESSION OF
NAFLD



CIRRHOSIS



NASH



Risk Factors For Fatty Liver NAFLD

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- Obesity, particularly central obesity
- Type 2 diabetes mellitus,
- Dyslipidaemia
- Metabolic Syndrome
- Hypothyroidism, hypopituitarism, hypogonadism, sleep apnea, and polycystic ovary syndrome

NAFLD associations

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- NAFLD is associated with metabolic syndrome
- NAFLD has higher risk of all causes of mortality, largely because of the coexistence of the metabolic syndrome.
- Both BMI and visceral obesity are risk factors for NAFLD.

Prevalence OF NAFLD

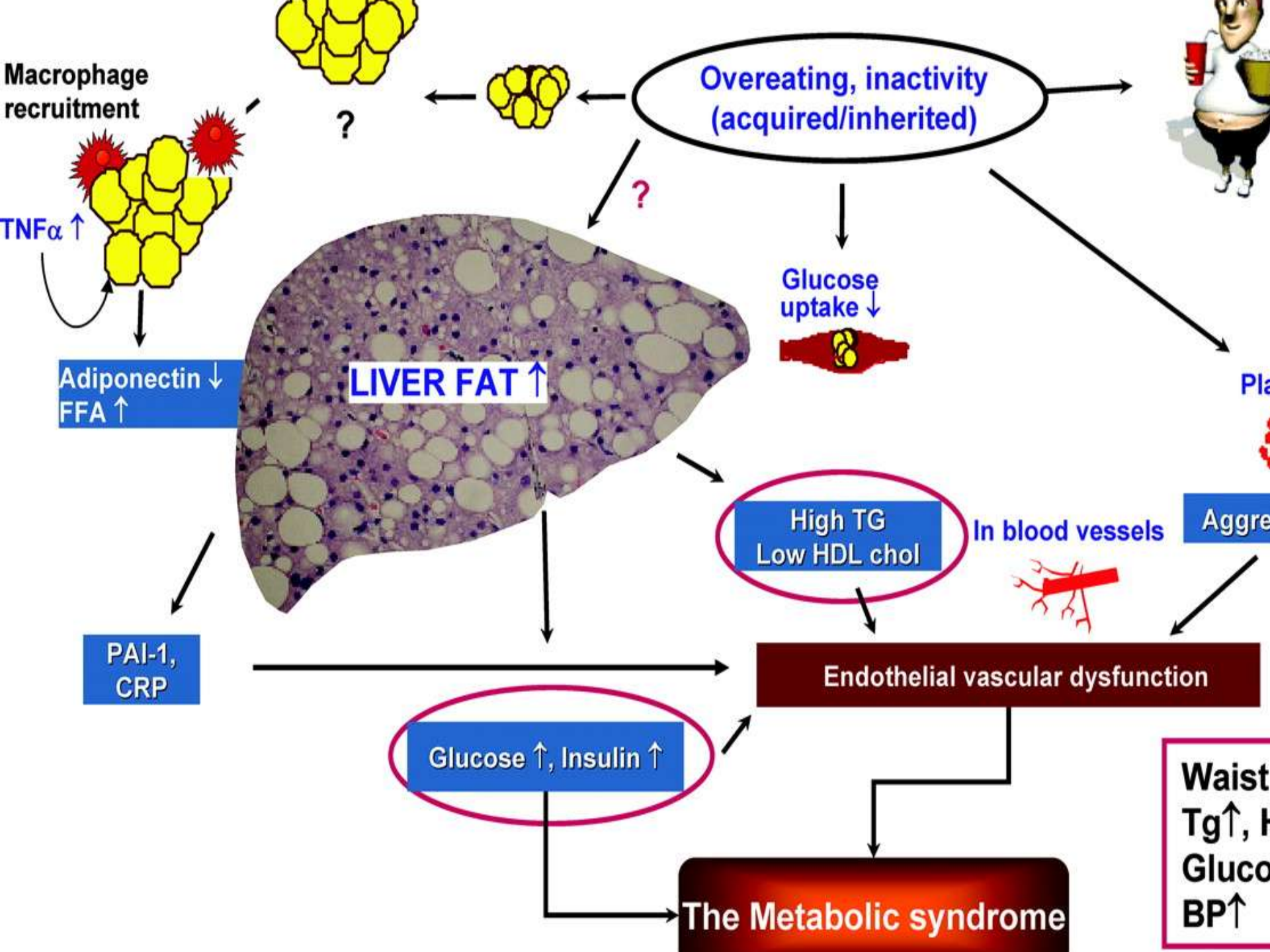
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- NAFLD: 6.3% to 33% (20% general population)
- NASH : 3 to 5%

NAFLD's
pathogenesis isn't
fully understood.

insulin resistance, oxidative stress, and

cytokine toxicity



Obesity

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- Central obesity (visceral adiposity) even if normal BMI

High fat intake

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- Increased ratio of omega-6 to omega-3 polyunsaturated fatty acids (PUFAs): decreases capacity to regulate liver lipid metabolism
- Increased intake of saturated fats
- Increased intake of trans fatty acids (oxidized oils)

High Carbohydrate Intake

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- high-carbohydrate diet increases fatty acid and triglyceride synthesis) AND liver inflammation.

Excess High-Fructose Corn Syrup Intake

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- Western dietary pattern and an increased intake of simple sugars, especially fructose.
- sugar-sweetened beverage consumption
- fructose may cause hepatotoxic damage
- fructose increases lipogenesis, and inflammation.
- Fructose induces insulin resistance and fasting and postprandial triglycerides

Inactivity

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- Decreased physical activity correlates with intrahepatic fat, decreased insulin sensitivity, and increased abdominal fat.

EVALUATION

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- **EXCLUDE** Common alternative causes of hepatic steatosis: alcohol consumption, hepatitis C, medications, Wilson's disease, parenteral nutrition and severe malnutrition
- **EXCLUDE** co-existing etiologies for chronic liver disease: hemochromatosis, autoimmune liver disease, chronic viral hepatitis, and Wilson's disease.

NASH should be
treated aggressively
to prevent progression
to cirrhosis

***DIETARY MANAGEMENT
IS THE MAIN
TREATMENT IN NAFLD***

Weight loss

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- Sustained (not rapid) weight loss
- 5% weight loss improves steatosis
- 10% weight loss improves steatohepatitis

Exercise

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- Exercise alone reduces hepatic steatosis but its ability to improve other aspects of liver histology remains unknown.
- **≥ 150 minutes/week at moderate intensity or ≥ 75 minutes/week at vigorous intensity**

Drugs

1. Vitamin E (a-tocopherol) 800 IU/day improves liver histology in non-diabetic adults with biopsy-proven NASH (first-line pharmacotherapy).
Risk: high-dose vitamin E is association with hemorrhagic stroke and all-cause mortality
2. Pioglitazone (not metformin) can treat biopsy-proven NASH. But long term safety and efficacy is not established.
3. Omega-3 fatty acids treat hypertriglyceridemia
4. Statin is not contraindicated to treat dyslipidemia

Dietary macronutrient composition

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- Dietary recommendations for heart health include:
- Low saturated fats (< 7%)
- Low trans fats (<1%)
- total fats to 25% to 35% of total calories.
- **high** MUFAs (Olive oil (73% MUFAs))
- **High in omega-3 PUFAs**
- **Low carbohydrate**
 - limit consumption of all added caloric sweeteners, including high-fructose corn syrup

Dietary compositions: **SUGARS**

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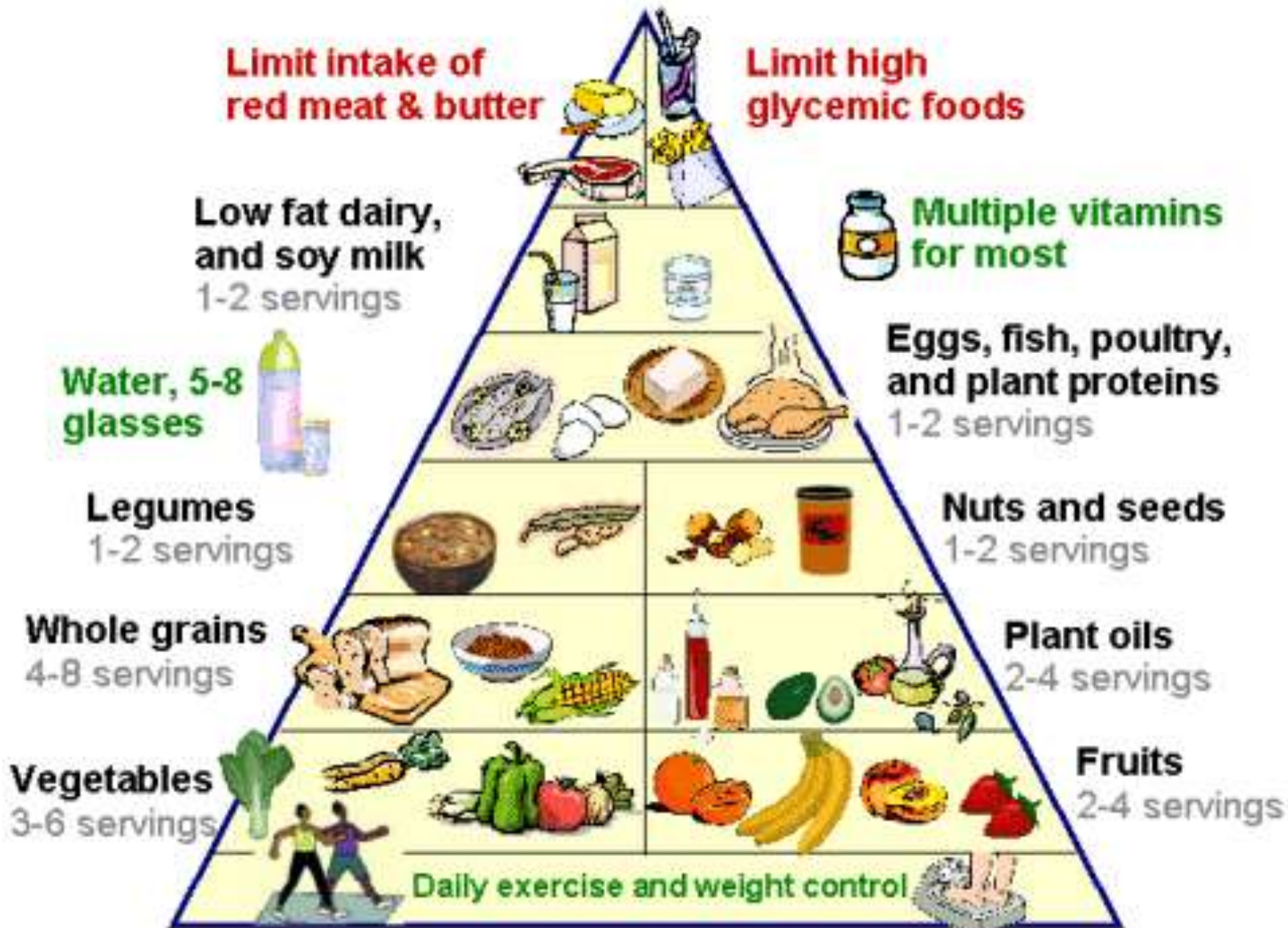
- The World Health Organization recommends that the daily intake of added sugars makes up no more than 10% of total energy.
- The American Heart Association recommends limiting the amount of added sugars to no more than one-half of daily calories:
 - **Women:** 100 kcal/day (6 tsp of sugar)
 - **Men:** 150 kcal/day (9 tsp of sugar).

Proposed Nutritional Guidelines for NAFLD/NASH

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Weight loss	10% of initial body weight over six months Maintenance of weight loss Bariatric surgery when individuals qualify
Calorie intake	1,200 to 1,500 daily <i>*Energy deficit of 500 kcal/day based on Mifflin-St Jeor formula</i>
Total fat	≤ 35% of total calories
Monounsaturated fatty acids	15% to 25% of total calories
Polyunsaturated fatty acids	5% to 10% of total calories Omega-3 fatty acids
Saturated fatty acids	7% to 10% of total calories
Carbohydrate	50% of total calories > 50% carbohydrate sources from whole grains Avoid high-fructose corn syrup Added sugars < 10% of total calories
Protein	15% of total calories Lean and vegetable protein
Antioxidants	None
Physical activity	≥ 150 minutes/week at moderate intensity or ≥ 75 minutes/week at vigorous intensity Cardiovascular exercise five times weekly Resistance training two or more times weekly Decrease time spent sedentary

- for 1600 calories diet :36-62 gm fats daily
- for 2000 calories diet : 44-78 gm fats daily
CONTAINING 11-13 GM SATURATED FAT
- for 2500 calories diet: 56-97 gm fats daily
- 1 TEASPOON= 4G SATURATED FAT



Omega-3 DHA & EPA



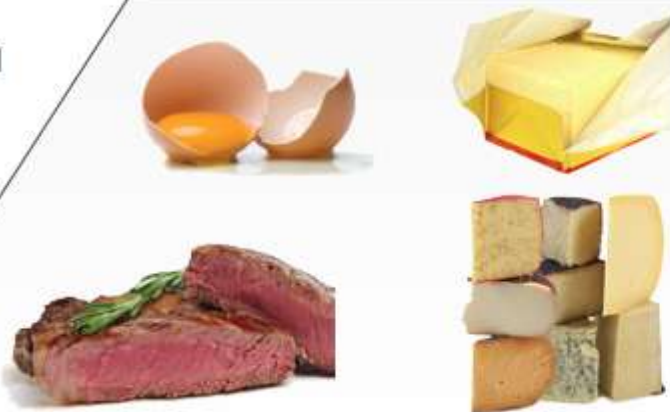
Omega-6 LA



Medium-chain triglycerides



Long-chain saturated



**Mo
unsat**



الدهون المشبعة

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- جميع مشتقات الالبان:
 - الجبن وخاصة جبن الماعز والروكفور و البرميزان
 - يفضل جبن الحالوم و الريكوتا و الشيدر نصف الدسمه
 - الحليب كامل الدسم
 - اللحوم الحمراء
- زيت النخيل و زيت جوز الهند
 - البيض
 - جلد الدجاج
 - المقلبات
- والمقلبات والمعجنات الترانس: مصنعه الدهون المهدرجه

ALTERNATIVES

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- الخضروات والفواكه
- الاسماك الزيتيه السلمون و الماكريل و الرنجه و التونه و السردين تحتوي علي اوميغا
- الدجاج والديك الرومي بدون جلد
- المشويات المسلوق و علي البخار

الدهون غير المشبعة

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- الزيوت النباتيه
- والكانولا وعباد الشمس و:زيت الزيتون واللفت والذره
- الاسماك الزيتيه
- السلمون والماكريل والرنجه الافوكادو

Any questions?

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THANK YOU