

# HIGH FRUCTOSE CORN SYRUP AND METABOLIC ALTERATIONS ASSOCIATED WITH ELEVATE FRUCTOSE CONSUMPTION

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## AIMS

- To examine fructose consumption.
- To identify functional characteristics of HFCS, its use in the food industry and consumption on foods with HFCS.
- To understand fructose metabolism and its connection to metabolic alterations.

## HIGH FRUCTOSE CORN SYRUP



HFCS is an alternative sweetener to sucrose [3].

Production [4]:

- Wet milling of corn to extract starch
- Hydrolysis of starch to produce dextrose
- Isomerization of dextrose to convert a portion into fructose
- Fractionation to enhance the fructose content

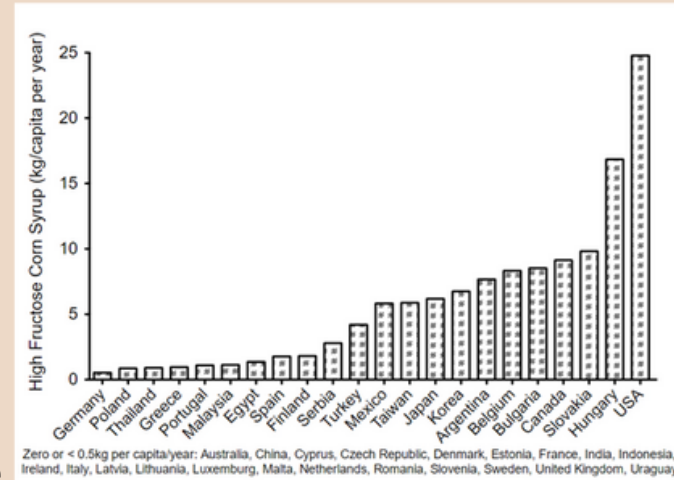
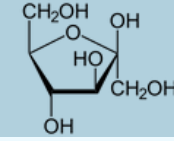



Figure 1: HFCS use by country [3]

	HFCS-42	HFCS-55	HFCS-90
Carbohydrates (%) <sup>a</sup>			
Fructose	42	55	90
Glucose	52	41	8
Oligosaccharides	6	4	2
Ash (%)	0.03	0.03	0.03
Moisture (%)	29	23	23
Dry solids (%)	71	77	77
pH	3.5	3.5	3.5
Viscosity (Pa.S)			
26.6 °C	0.15	0.70	0.57
32.2 °C	0.10	0.40	0.36
37.7 °C	0.70	0.25	0.22
Refractive index at 20 °C	1.464	1.4786	-
Density (kg/m <sup>3</sup> ) at 37.7 °C	1333.67	1373.21	1383.99
Colour (RBU) <sup>b</sup>	≤25	≤25	≤25
Physical form	Syrup	Syrup	Syrup
Flavour	Sweet, bland	Sweet, bland	Sweet, bland

## FRUCTOSE



Fructose is a monosaccharide present in fruits, vegetables and honey [1].  
Fructose + glucose → Sucrose [1].  
Glucose, fructose and sucrose are caloric sweeteners [2].



## FRUCTOSE METABOLISM

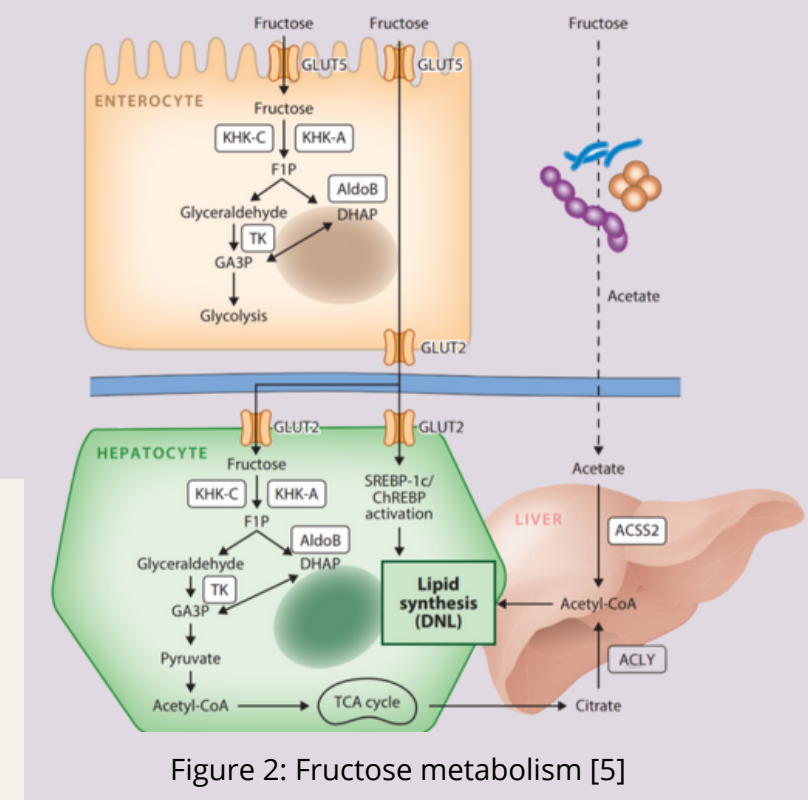


Figure 2: Fructose metabolism [5]

## METABOLIC ALTERATIONS

- De novo lipogenesis (DNL)
- Acid uric production
- Steatosis
- Inflammation
- Inhibition of hepatic fatty acid oxidation

- Non alcoholic fatty liver disease (NAFLD)
- Type 2 diabetes
- Obesity

[5]

## CONCLUSIONS

- Fructose has been part of the human diet for millennia, but its consumption surged since the 18th century with the introduction of HFCS.
- This increase is associated with health issues such as obesity, metabolic syndrome, and type 2 diabetes. The current trend of reducing sugars aims to prevent these diseases.
- HFCS is widely used in processed foods, standing out for its low cost and versatility, being more prevalent in the U.S than in Europe.
- The analysis reveals that fructose affects metabolic health, contributing to hepatic steatosis, inflammation, and oxidative stress.

## REFERENCES

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