
بسم الله الرحمن الرحیم

# The effect of alcohol and smoking on health in patients with diabetes

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# Agenda

- Introduction
- Alcohol and risk of diabetes
- The effect of Alcohol in patients with diabetes
- Smoking and risk of diabetes
- Smoking in patients with diabetes

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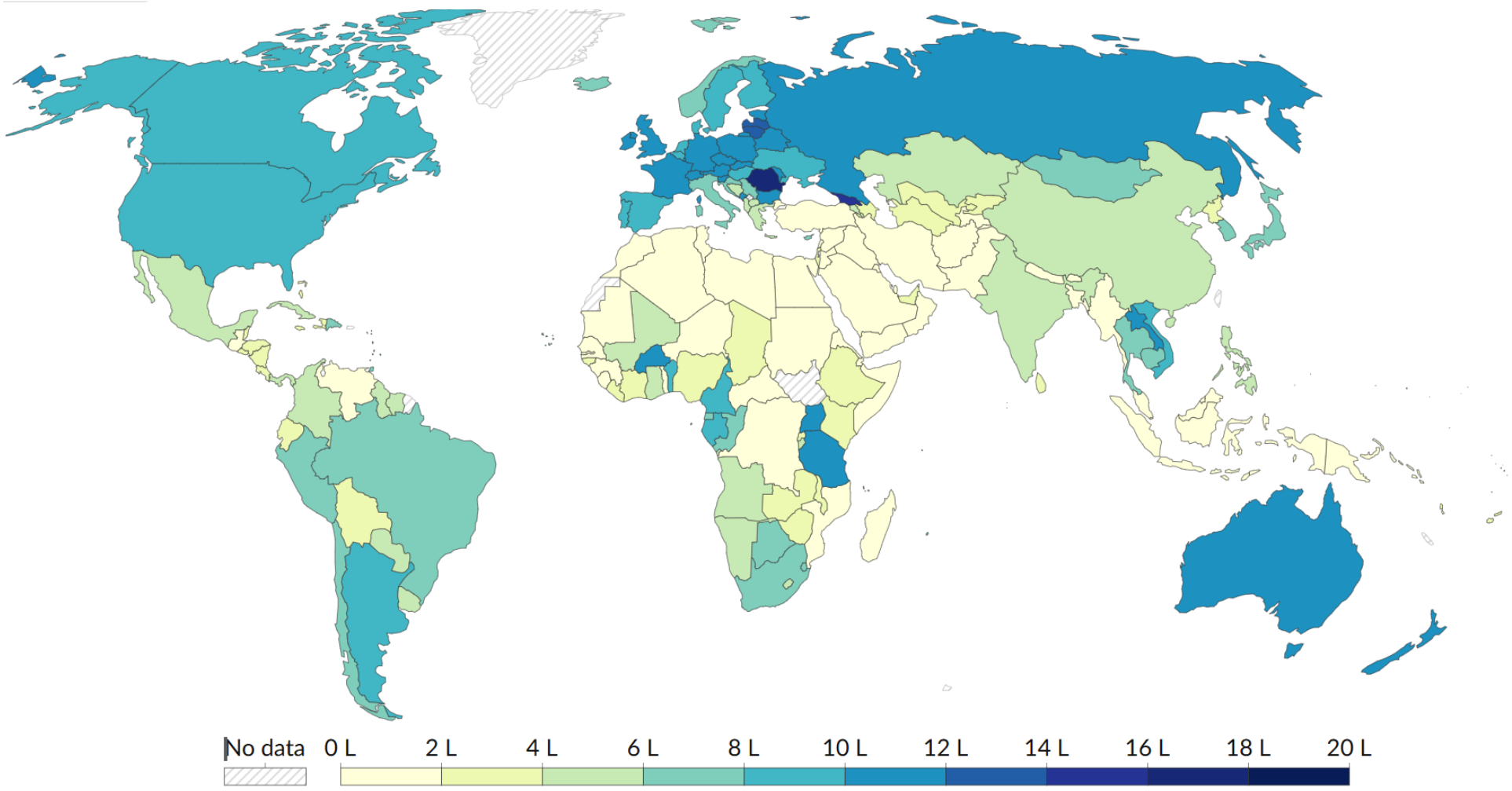
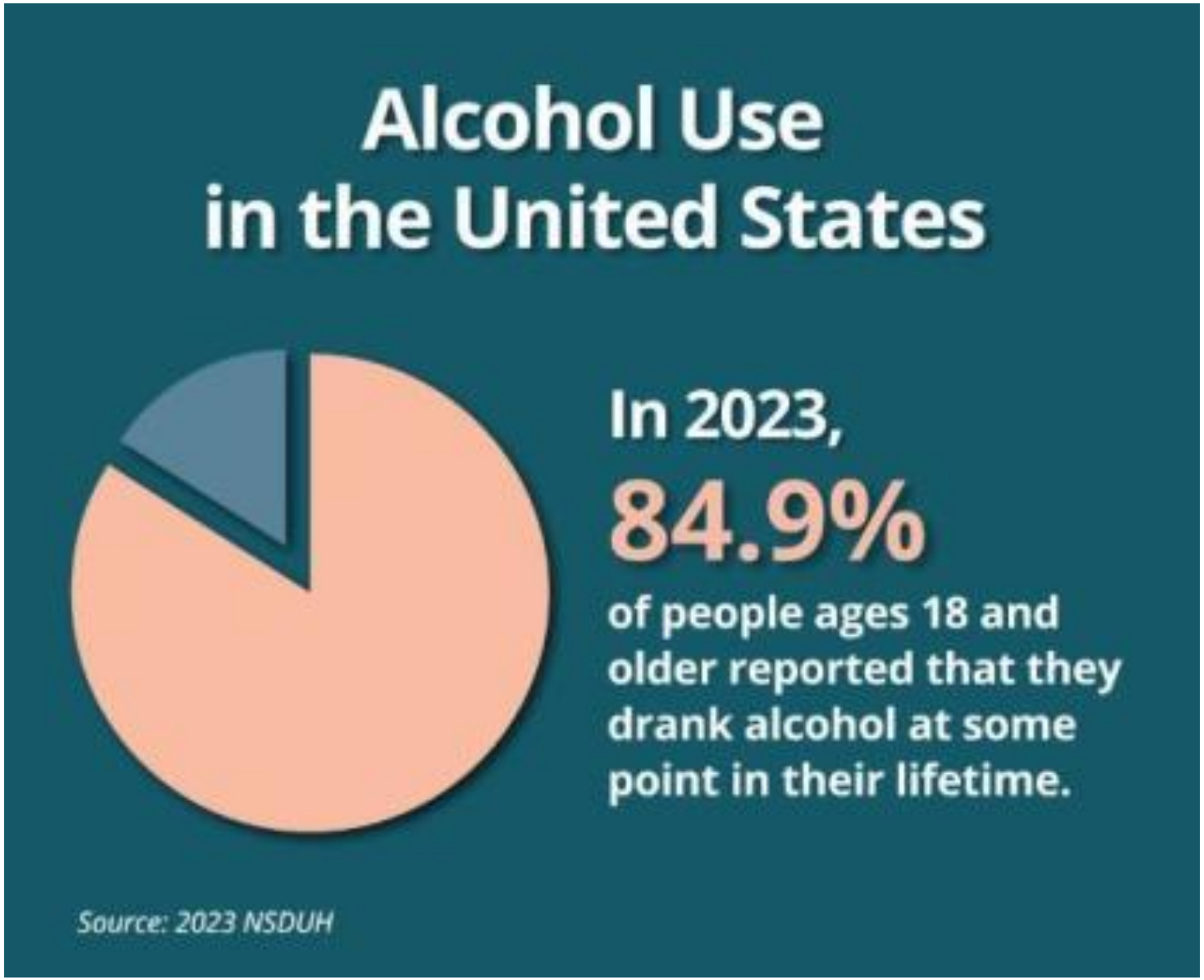
# Alcohol consumption per person, 2020




https://www.journal-of-hepatology.eu/article/S0168-8278(22)03061-6/fulltext




According to the 2023 National Survey on Drug Use and Health (NSDUH), 224.3 million people ages 18 and older reported that they drank alcohol at some point in their lifetime.

# Gluconeogenesis

80 percent of ingested alcohol is metabolized in the liver, leading to an increase in the NADH:NAD ratio (NAD is nicotinamide adenine dinucleotide and NADH is its reduced form).

This so-called “redox shift” results in inhibition of gluconeogenesis. After the consumption of 48 g of alcohol (approximately 4 glasses), hepatic gluconeogenesis has been shown to decrease by about 45%.

Gluconeogenesis is required to maintain glucose levels in the fasting state and inhibition of gluconeogenesis may result in hypoglycemia.

Am J Lifestyle Med. 2017 Jul 26;11(6):433–435

# Glycogenolysis

In a patient with normal glycogen stores, hepatic glucose output has been shown to reduce by 12% after ingestion of a moderate amount of alcohol. This rarely causes hypoglycemia.

However, if glycogen stores are depleted (in malnourished, alcoholics, and consuming very low carbohydrate diets or who are fasting), hepatic glucose production may be significantly impaired by alcohol ingestion and can lead to potentially life-threatening hypoglycemia, especially in patients with T1DM.

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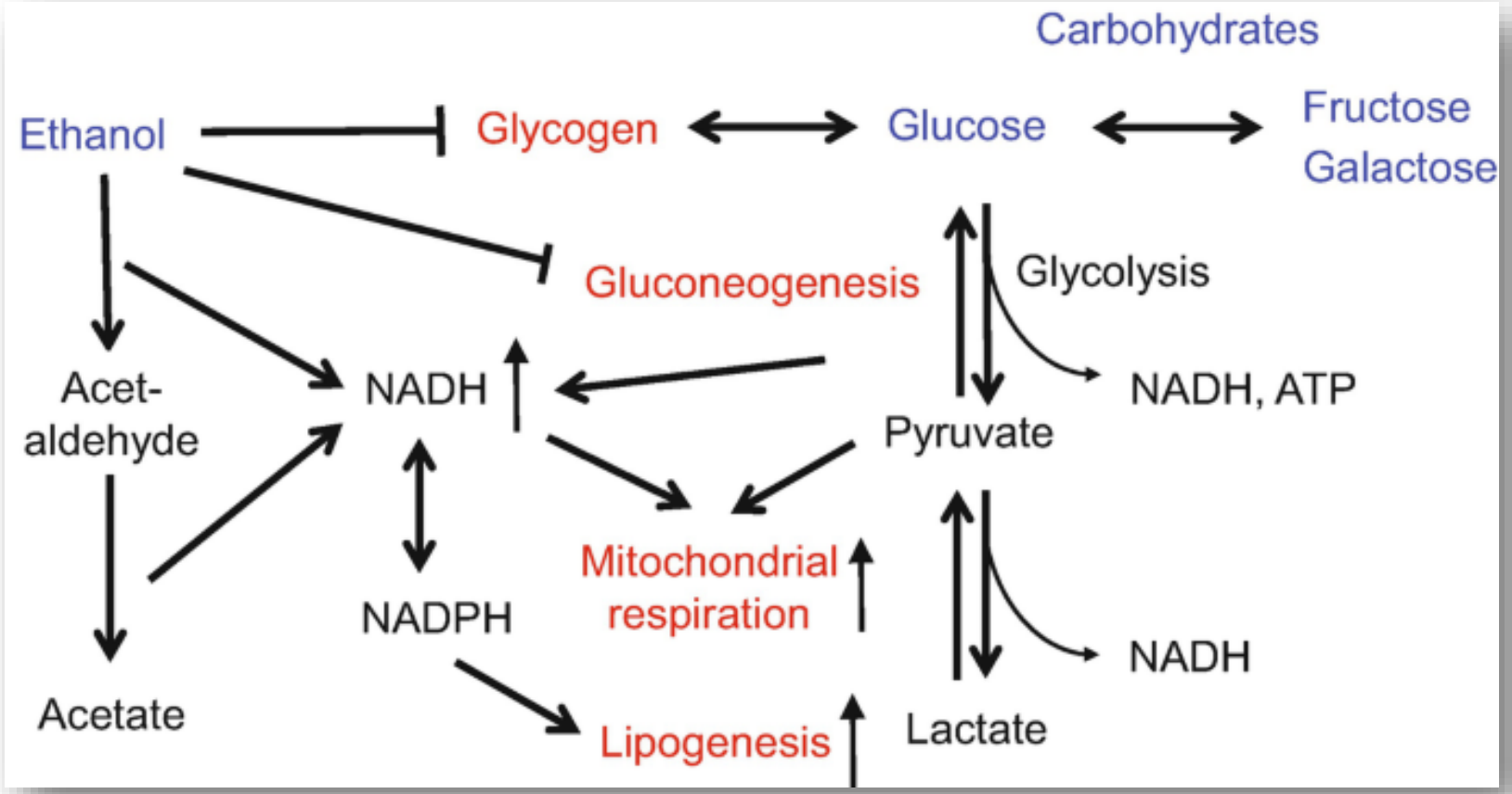
# Alcohol and glucose metabolism

- Alcohol decreases the secretion of both glucagon and insulin from the pancreas
- Inhibits both gluconeogenesis and glycogenolysis in liver




2015 Sep 29;5(4):2223–2246. doi: 10.3390/biom5042223

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# Myths vs. Facts

“Alcohol cures diabetes.”

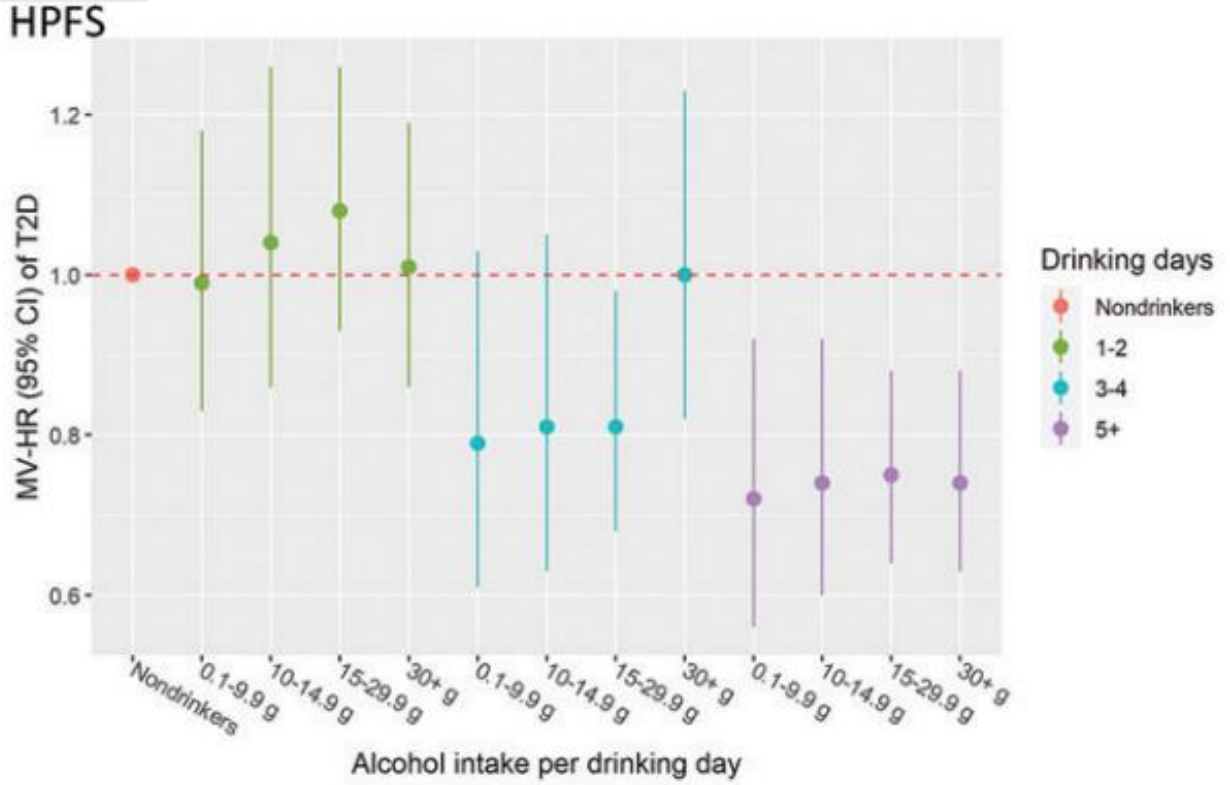
Diabetes Care®
American Diabetes Association®

# Alcohol Intake, Drinking Pattern, and Risk of Type 2 Diabetes in Three Prospective Cohorts of U.S. Women and Men

Xinyi Li, Jinhee Hur, Stephanie A. Smith-Warner, Mingyang Song, Liming Liang, Kenneth J. Mukamal, Eric B. Rimm, and Edward L. Giovannucci

# Moderate Alcohol Consumption (protective)

- Light to moderate alcohol consumption, especially regular light drinking, was associated with a lower risk of T2D among both men and women (15-30% reduced risk of T2D compared to abstainers).
- However, we do not suggest initiating alcohol consumption as a means of preventing diabetes due to effects on cancer, and mental health issues.



# Heavy Alcohol Consumption (Increased Risk)

Drinking ≥3 drinks/day is linked to a 20-40% higher risk of T2D.

Mechanisms

- Liver fat accumulation (alcoholic fatty liver disease → insulin resistance).
- Chronic pancreatitis → impaired insulin secretion.
- Weight gain (beer & cocktails are calorie-dense).
- Disrupted glucose metabolism (alcohol interferes with liver glucose production).

# Other Factors Influencing Risk

**Genetics**: Some people metabolize alcohol poorly, increasing diabetes risk.

**Gender**: Women metabolize alcohol slower, increasing their risk at lower intake levels.

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# Effects of Chronic Alcohol Consumption on Diabetes Control

- However, the relationship between alcohol and insulin sensitivity appears to be J-shaped, with increased insulin resistance in both abstainers and in heavy drinkers.

- Higher alcohol consumption has also been associated with worse glycemic control and poor diabetes self-care.

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# Hypoglycemia

**Alcohol inhibits liver glucose production**: The liver prioritizes metabolizing alcohol over releasing glucose, which can lead to hypoglycemia, especially in those taking **insulin or sulfonylureas**.

**Delayed hypoglycemia**: Hypoglycemia after drinking (even overnight), increasing the risk of severe hypoglycemia while sleeping (persists for up to 24 hours).

**Symptoms confusion**: Alcohol-induced drowsiness or dizziness can mimic hypoglycemia, making it harder to recognize a real hypoglycemia.

# Increased Risk of Hyperglycemia

**Chronic heavy drinking** can impair insulin sensitivity, worsening diabetes control.

**Liver damage (cirrhosis or fatty liver)** affects glucose metabolism, leading to fluctuation in blood sugar levels.

One week alcohol abstinence improved hepatic insulin sensitivity and FPG in non-obese Japanese men with mildly elevated FPG and drinking habits alcohol.

# Weight Management & Blood Sugar Control

**High-calorie content**: Alcohol is calorie-dense (7 kcal/g), contributing to weight gain, which worsens insulin resistance in type 2 diabetes.

**Mixed drinks & sugary additives**: Cocktails, beers, and sweet wines contain carbs that spike blood sugar initially, followed by a fall.

https://www.journal-of-hepatology.eu/article/S0168-8278(22)03061-6/fulltext

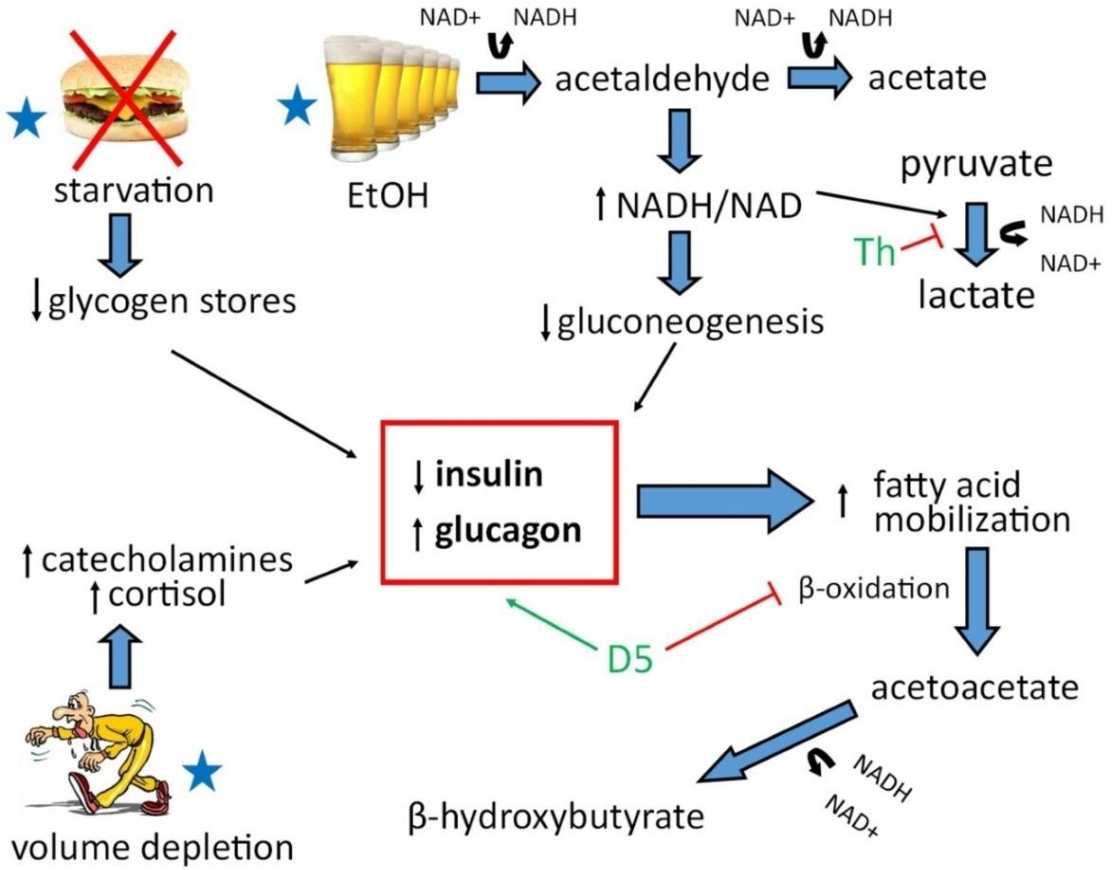
# Medication Interactions

**Metformin + alcohol** increases the risk of **lactic acidosis** (a rare but serious complication).

**Insulin & sulfonylureas (e.g., glipizide)** become more potent with alcohol, raising hypoglycemia risk.

# Dehydration & Ketone Buildup

- The registry classified participants as abstainers, low-risk drinkers (≤1 serving of alcohol per day for women and ≤2 servings per day for men) and at-risk drinkers (>1 serving per day for women and >2 servings per day for men).
- The rates of severe hypoglycemia were similar between low-risk and at-risk drinkers, but were significantly higher in those consuming alcohol than for those who abstain from alcohol. At-risk drinkers experienced DKA at a rate of 18.9 episodes per 100 patient years compared with just 6.4 episodes per 100 patient years for those abstaining from alcohol and 7.5 episodes per 100 patient years for those consuming moderate amounts of alcohol ($P < .001$).
- Increased risk of severe hypoglycemia and DKA in at-risk drinkers.



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Review article

# Smoking and diabetes

Alexia Rouland [a], Philippe Thuillier [b,*], Abdallah Al-Salameh [c,d], Farid Benzerouk [e,f], Thibault Bahougne [g,h], Blandine Tramunt [i,j], Ivan Berlin [k], Carole Clair [l], Daniel Thomas [m], Anne-Laurence Le Faou [n], Bruno Vergès [o,p], Vincent Durlach [q]

# Mechanisms involved in the association between smoking and diabetes

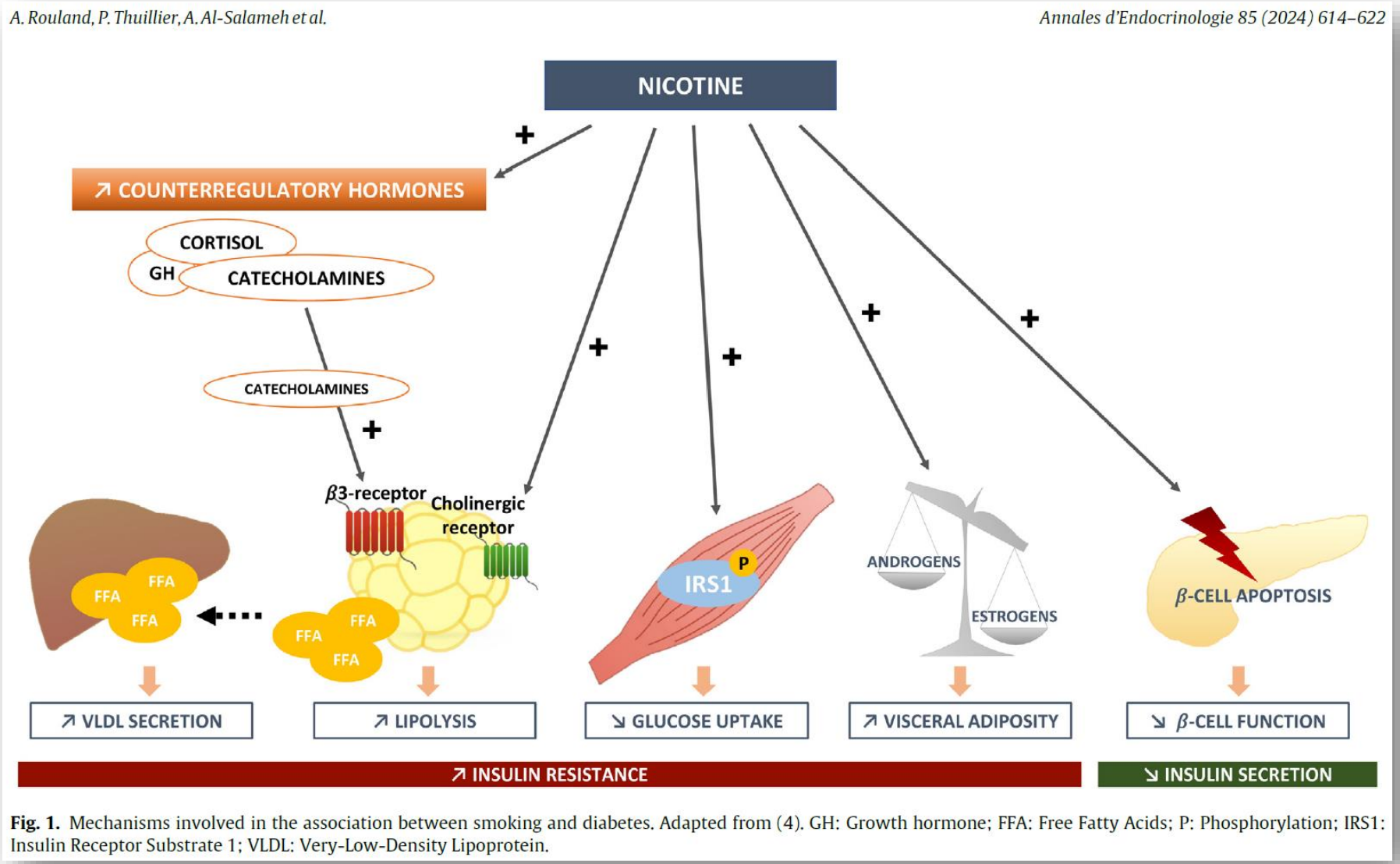


**Fig. 1.** Mechanisms involved in the association between smoking and diabetes. Adapted from (4). GH: Growth hormone; FFA: Free Fatty Acids; P: Phosphorylation; IRS1: Insulin Receptor Substrate 1; VLDL: Very-Low-Density Lipoprotein.

# Smoking increases the risk of diabetes

Smokers have a 30–40% higher risk of developing type 2 diabetes than non-smokers.

Heavy smokers (≥20 cigarettes/day) have an even greater risk (up to 50–60% higher).

The Nurses' Health Study also showed a dose-dependent relationship between passive smoking and risk of T2D in women included in the cohort (RR = 1.16, 95% CI: [1.00–1.35])

Quitting smoking improves insulin sensitivity and reduces diabetes risk over time.

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# Smoking worsens glycemic control

In type 2, active smoking is independently associated with deterioration in glycemic control, with increase in HbA1c (0.21% to 1.08%) in patients who smoke.

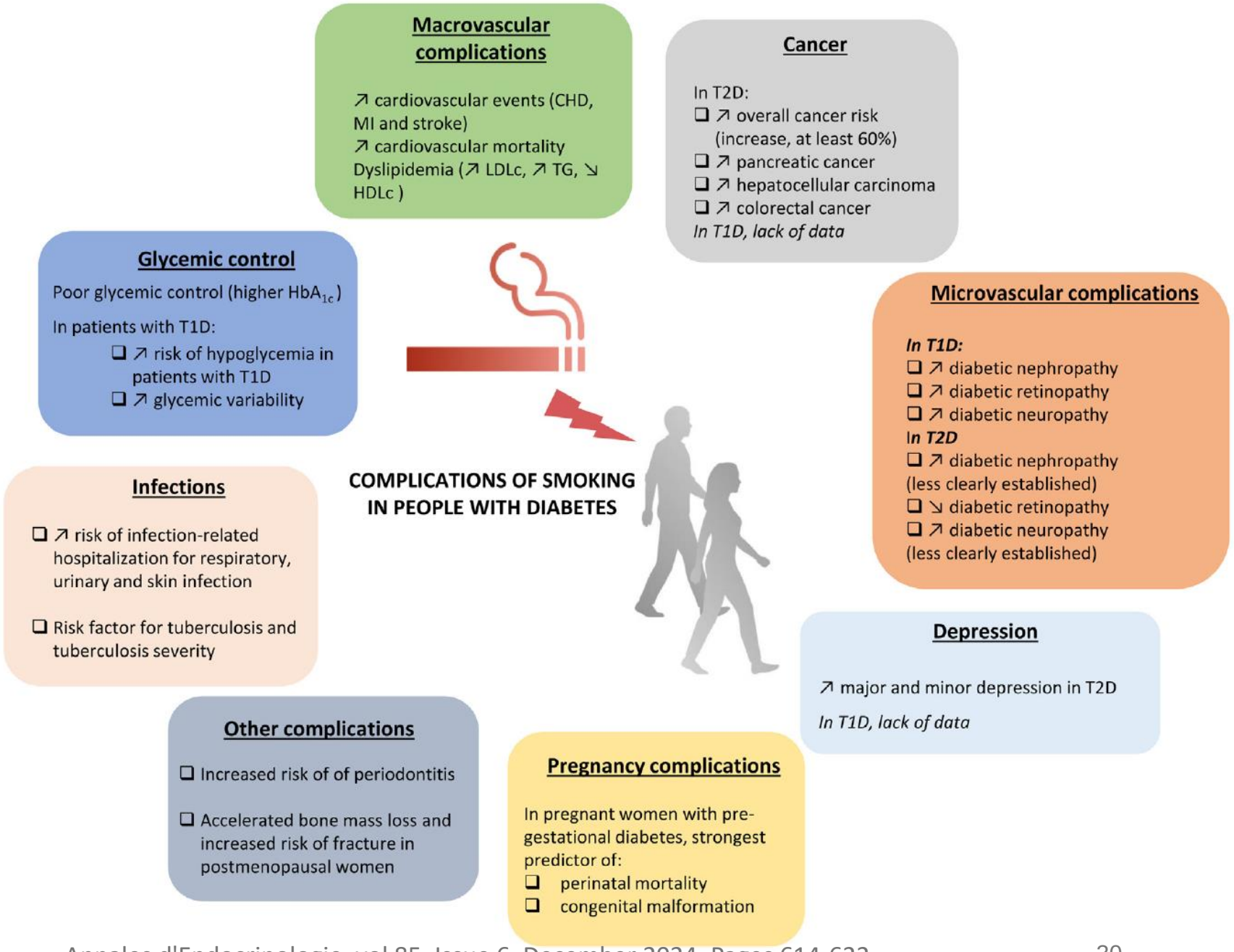
Smoking and diabetic imbalance in type 1 with increase in HbA1c ranging from 0.46% to 1.1%.

- Nicotine-mediated insulin resistance appears to be a primary factor.
- Another possible explanation could be delayed absorption of insulin by subcutaneous tissues due to smoking-related vasoconstriction: greater postprandial glycemic excursions.
- Negative lifestyle factors: unhealthy diet, or social factors (educational and economic status)

# Macroangiopathic complications of diabetes and smoking

| Event | Type 2 diabetes 3–21 studies [39] | Type 1 diabetes 1–5 studies [39] | Type 1 diabetes 2–4 studies [41] |
|---|---|---|---|
| Cardiovascular disease | 1.42 [1.32–1.52] | 2.26 [1.42–3.60] | |
| Cardiovascular death | 1.44 [1.24–1.68] | 1.91 [1.29–2.85] | |
| Coronary heart disease | 1.53 [1.43–1.65] | 1.33 [1.07–1.66] | 1.36 [1.07–1.72] |
| Stroke | 1.55 [1.41–1.70] | 1.39 [0.76–2.56] | Male: 2.13 [1.52–3.00]<br>Female: 1.27 [0.86–1.90] |
| Heart failure | 1.29 [0.95–1.75] | | |
| Obliterative arteriopathy of the lower limbs | 2.15 [1.63–2.85] | | |

# Complications of smoking in the diabetic population



# Take Home Messages

- Drinking ≥3 drinks/day is linked to a 20-40% higher risk of T2D.
- Alcohol is associated with hypoglycemia, severe hyperglycemia, ketoacidosis, weight gain and medical interaction in patients with DM.
- Smoking is a modifiable risk factor of DM.
- Active smoking has negative impact on glycemic control in both types of DM
- Smoking increases risk of all-cause mortality and worsens the chronic complications of diabetes.


Thank You!