

# Drinking and Metabolic Disorders: Type II Diabetes Mellitus and Metabolic Syndrome

## The Issue in Brief

Evidence demonstrates a complex relationship between alcohol intake and metabolic disorders, notably Type II diabetes mellitus (DM) and the Metabolic Syndrome (MetS).

Diabetes mellitus risk is associated with alcohol consumption along a U- or J-shaped curve, much like cardiovascular disease (1). The mechanisms underlying the relationship between moderate drinking and DM are well understood.

The relationship between MetS and moderate alcohol consumption follows a similar J-shaped curve.

Heavier drinking patterns are related to an increase in risk for metabolic disorders.

The relationship between drinking and metabolic disorders is mediated by physiological and physical characteristics, such as body mass index (BMI), insulin production, genetic predisposition, diet, and cardiovascular health status.

MetS and DM are almost invariably observed in conjunction with a variety of other conditions and disorders.

ICAP's Health Briefings cover the effects of alcohol consumption on health. They offer an overview of the relationship between drinking patterns and health outcomes, compile the key literature, and provide the reader with an extensive bibliography that refers to original research on each topic. The Briefings attempt to present the balance of the available evidence. They have been peer reviewed by external experts and do not necessarily reflect the views of ICAP or its sponsoring companies.

## Relevant ICAP Publications:

Ellison, R. C. (Ed.). (2007, May). Health risks and benefits of moderate alcohol consumption: Proceedings of an international symposium. *Annals of Epidemiology*, 17(Suppl.), S1–S116. Available: <http://www.annalsof-epidemiology.org/issues>.

## What Is the Evidence?

**Evidence demonstrates a complex relationship between alcohol intake and metabolic disorders, notably Type II diabetes mellitus (DM) and the Metabolic Syndrome (MetS).**

This relationship is characterized by a U- or J-shaped curve:

- Moderate drinking patterns are generally associated with reduced risk (1).
- Heavy drinking patterns may be associated with increased risk.

### Drinking patterns and risk

**Diabetes mellitus risk is associated with alcohol consumption along a U- or J-shaped curve, much like cardiovascular disease (1).**

Moderate drinkers are at lower risk for DM than abstainers and heavier drinkers (1).

- This relationship has been observed in both men and women (2, 3) and holds true across cultures and ethnic groups (4, 5).
- The relationship between DM and moderate drinking seems particularly robust in older adults (6).

**The mechanisms underlying the relationship between moderate drinking and DM are well understood.**

- The effects of moderate drinking are mediated through increased insulin sensitivity (3).
- Alcohol consumption appears to improve insulin action without affecting insulin secretion (8), changing plasma glucose levels but not postprandial glucose (9).
- Moderate consumption also appears to reduce the risk of cardiovascular disease among DM patients (10).
- Atherosclerotic progression is decreased in moderate drinkers with DM (11, 12).

**The relationship between MetS and moderate alcohol consumption follows a similar J-shaped curve.**

- Research has described an inverse relationship between MetS and moderate drinking (13-15), particularly in conjunction with meals (16).
- Elevation of blood concentration of high-density lipoprotein (HDL) appears to be an important mechanism for the cardioprotective effects of alcohol, and this may be protective in the case of MetS as well (14).

**Heavier drinking patterns are related to an increase in risk for metabolic disorders.**

- Heavier drinking patterns are associated with increased risk for DM (17), for the MetS (18, 19), and for some related comorbidities, particularly hypertension (20).
- Women engaging in heavy drinking may experience more substantial increases in risk compared to men, particularly for hypertension (7, 21).
- Harmful drinking patterns may even interfere in medical compliance in DM patients (22).

### Confounders and comorbidities

**The relationship between drinking and metabolic disorders is mediated by physiological and physical characteristics, such as body mass index (BMI), insulin production, genetic predisposition, diet, and cardiovascular health status.**

- Body composition or type, indicated by BMI, plays an important role in the development and progression of DM (4, 7).
- The effects of alcohol on diabetes risk may also be confounded by a number of factors, such as gender, BMI, and age (23).

**MetS and DM are almost invariably observed in conjunction with a variety of other conditions and disorders.**

These include hypertension, cardiovascular diseases such as atherosclerosis, peripheral arterial disease and stroke, obesity or overweight, and poor nutritional status.

- Research demonstrates reduced cardiovascular mortality in DM and MetS patients associated with moderate alcohol intake (24).
- The cardioprotective benefits of moderate alcohol consumption may be especially important in metabolic disorder patients because of the prevalence of CVD within these populations (14).
- Alcohol decreases risk of atherosclerosis (12), which may be related to some beneficial outcomes in diabetic patients.
- Some researchers argue that, as alcohol intake increases, cardiovascular protection is offset by increased risk for hypertension (21).

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