

## KEY MESSAGES

- There is some evidence suggesting that heavy use of Swedish snus is associated with metabolic syndrome, diabetes, or its precursor conditions. Other evidence suggests no associations with these conditions.
- Six epidemiology studies have examined the relationship between use of Swedish snus and diabetes or metabolic syndrome. Three studies found an association between these conditions among heavy snus users, but the three other studies found no association.
- Additional studies are needed to fully understand the relationship between use of snus and risk of developing diabetes and metabolic syndrome.

## QUESTIONS AND ANSWERS

### **Why have researchers studied the relationship between snus use and diabetes and metabolic syndrome?**

There is evidence that smokers are at increased risk of developing type 2 diabetes, as well as the conditions underlying type 2 diabetes, *i.e.*, insulin resistance and impaired glucose tolerance (Willi et al. 2007) and a related condition, metabolic syndrome (a cluster of risk factors including obesity, impaired glucose regulation, hypertension, and dyslipidemia). This finding has stimulated research into the relationship between snus use and these outcomes.

### **Is there evidence that snus use is associated with diabetes or metabolic syndrome?**

Yes, but the evidence is not conclusive, as some studies have found that use of snus is associated with these conditions, while other studies have not. An initial cross-sectional study (Persson et al. 2000) suggested that heavy snus users might be more likely to have type 2 diabetes than people who didn't use tobacco, and thus a hypothesis was raised. Five studies conducted since then have reached conflicting conclusions about the relationship between use of snus and development of diabetes.

A well-conducted cohort study concluded that use of snus was not associated with increased risk of diabetes (Eliasson et al. 2004). These investigators studied the effects of snus use on risk of type 2 diabetes, as well as its underlying conditions, among a large number of Swedish men. Snus users did not have increased risk of developing any of these conditions.

Persson and colleagues (2000) examined a large group of Swedish men and found that although the prevalence of type 2 diabetes was not increased among the entire group of current or former snuff users, men who were heavy users of snus (3 or more boxes per week) were more likely to have type 2 diabetes than men who had never used tobacco. Another cross-sectional study by Wandell et al. (2008) found no association between snuff use and metabolic syndrome or newly diagnosed diabetes. They evaluated current and former snuff use as well as dosage level among 1,859 men, aged 60 years, in Stockholm County, Sweden. Both of these studies were cross-sectional in nature, meaning that information on the exposure (snus use)

## SWEDISH SNUS AND DIABETES AND METABOLIC SYNDROME

---

and the outcome (diabetes) were collected at a single point in time. Cross-sectional studies have significant limitations, including the fact that, unlike cohort studies, they cannot determine whether the snus use preceded the diagnosis of diabetes.

Hilding and colleagues (2005) reported on an analytic study in which a large group of Swedish men were followed for more than 10 years. Snus users as a whole were not at increased risk of developing diabetes. However, risk increased as consumption increased, and men who consumed more than 5 boxes per week had significantly elevated risk of diabetes. This study has not been published in full form, so many details are not known.

Norberg and colleagues (2006) examined the relationship between snus use and metabolic syndrome. People who have metabolic syndrome are at increased risk of heart disease and type 2 diabetes. These authors reported in a follow-up study that heavy consumption of snus (more than 4 cans per week) were associated with increased risk of the metabolic syndrome.

In a study designed to observe a cohort for 10 years to examine the development of cardiovascular disease risk, Janzon and Hedblad (2009) compared snus users and non-snus users, presumably at baseline, on the prevalence of several demographic characteristics and cardiovascular disease risk factors, which included prevalence of type 2 diabetes. The prevalence of diabetes was not higher among the male or female snus users and the authors stated that there was no indication of a relationship between snus use and diabetes.

### **What conclusions have been reached by public health agencies about the association between snus use and diabetes and metabolic syndrome?**

The European Commission's Scientific Committee on Emerging and Newly Identified Health Risks concluded that snus use might be associated with diabetes, but current findings must be interpreted with caution because of study design limitations (SCENIHR 2008). The Commission's report was published before the latest study, by Janzon and Hedblad (2009) was available.

Type 2 diabetes is an important public health issue, so researchers will likely continue to investigate all kinds of lifestyle habits in an effort to understand ways to prevent the disease. Based on the findings noted above, future studies of snus use and type 2 diabetes should be careful to examine dose-response relationships.

## REFERENCES

Eliasson M, Asplund K, Nasic S, and Rodu B. 2004. Influence of smoking and snus on the prevalence and incidence of type 2 diabetes amongst men: The northern Sweden MONICA study. *J Int Med* 256:101-110.

Hilding A, Grill V, Efendic S, and Östenson C-G. 2005. High consumption of oral moist snuff ("snus") increases the risk of type 2 diabetes in a prospective study of middle-aged Swedish men. *Diabetologica* 48:A136.

## SWEDISH SNUS AND DIABETES AND METABOLIC SYNDROME

---

Janzon E and Hedblad B. 2009. Swedish snuff and incidence of cardiovascular disease. A population-based cohort study. *BMC Cardiovasc Disord* 9:21.

Norberg M, Stenlund H, Lindahl B, Boman K, and Weinehall L. 2006. Contribution of Swedish moist snuff to the metabolic syndrome: A wolf in sheep's clothing? *Scand J Public Health* 34:576-583.

Persson PG, Carlsson S, Svanstro L, Ostenson CG, Efendic S, Grill V. 2000. Cigarette smoking, oral moist snuff use and glucose intolerance. *J Intern Med* 248:103-110.

Scientific Committee on Emerging and Newly-Identified Health Risks (SCENIHR). 2008. Scientific opinion on the health effects of smokeless tobacco products. European Commission. Available at: [http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihr/docs/scenihr\\_o\\_013.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_013.pdf)

Wandell PE, Bolinder G, de Faire U, and Hellenius ML. 2008. Association between metabolic effects and tobacco use in 60-year-old Swedish men. *Eur J Epidemiol* 23:431-434.

Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J. 2007. Active smoking and the risk of type 2 diabetes: a systematic review and meta-analysis. *JAMA* 298:2654-2664.