

**S. SETHU K. REDDY, MD**

Dr. Reddy is a staff physician in the Department of Endocrinology of the Cleveland Clinic, and is also an executive member of the clinical and scientific section of the Canadian Diabetes Association.

# Smoking and the complications of diabetes mellitus

**Young persons with diabetes are more likely to smoke than young persons without diabetes**

For people with diabetes mellitus, the risks of macrovascular and microvascular disease are substantial. Cigarette smoking can further increase these complications of diabetes and the morbidity and mortality associated with them. Yet, despite public strategies designed to curb tobacco consumption, many persons with diabetes continue to smoke.

The prevalence of smoking in the diabetic population is surprisingly similar to that in the general population. In fact, young persons with diabetes are *more* likely to smoke than are young persons without diabetes.

The National Health Interview Survey,<sup>1</sup> conducted in 1989, revealed that 36% of persons with diabetes aged 18 to 34 years smoked, compared with 27% of persons without diabetes in this age group. Self-reports (such as in this survey) probably underestimate how many people smoke. In a recent study of 99 persons with insulin-dependent diabetes mellitus (IDDM), only 31% admitted to smoking but 48% had elevated urinary cotinine levels—indicating they had been smoking.<sup>2</sup>

## ■ WHY DO PEOPLE WITH DIABETES SMOKE?

Persons with diabetes must monitor their blood glucose levels, control their weight, adhere to a diet, exercise regularly, and comply with medications—a difficult regimen for anyone to follow. For many patients, the act of smoking may, in a perverse way, constitute a way to feel a sense of control over at least one part of their lives. Because smoking suppresses appetite, patients with diabetes may view it as a weight-control method. Lack of social sup-

port may also predispose a diabetic patient to smoke.<sup>3</sup>

## ■ SMOKING INCREASES THE COMPLICATIONS OF DIABETES

### Macrovascular complications

Persons with diabetes have a greater risk of cardiovascular disease than do persons without diabetes. In women, diabetes reduces or negates the normal protection against cardiovascular disease afforded by estrogen.

Smoking increases the risk another twofold to fourfold and is a major risk factor for cardiovascular morbidity and mortality in persons with diabetes, according to population-based studies conducted primarily in cohorts with type II (non-insulin-dependent) diabetes mellitus. In the World Health Organization's Multinational Study of Vascular Disease in Diabetics,<sup>4</sup> among patients with type II diabetes the relative risk of myocardial infarction was 3.49 and the relative risk of new ischemic heart disease was 2.27 in smokers vs nonsmokers. A number of prospective studies also showed increased cardiovascular mortality in diabetic smokers.<sup>1,5,6</sup>

Only a few studies examined the effect of smoking on peripheral vascular disease, but two of them<sup>4,7</sup> confirmed that smoking is a significant risk factor for lower-extremity amputations and ulcers.

### Morbidity and mortality

In the Colorado IDDM Registry Follow-up Survey,<sup>8</sup> smokers with type I (insulin-dependent) diabetes had significantly more hospitalizations, days in the hospital, sick days, and





days in which activity was limited than did nonsmokers with type I diabetes. They also rated their health poorer.

In the Pittsburgh Study of IDDM subjects,<sup>6</sup> smoking was an independent predictor of all-cause mortality in women. In all participants, the mortality rate increased with the number of cigarettes smoked per day.

### Nephropathy

Smoking accelerates nephropathy in persons with diabetes.

In a prospective German study of 92 patients with type I diabetes,<sup>9</sup> progression of nephropathy occurred in 53% of smokers, compared with 11% of nonsmokers and 33% of ex-smokers. (Progression of nephropathy was defined as increases in proteinuria or serum creatinine or decreases in glomerular filtration rate.)

A Wisconsin study<sup>5</sup> examined smoking and the progression of proteinuria in 794 type II patients. Over 4 years of follow-up, the relative risk of developing gross proteinuria was 2.0 to 2.5 in heavy smokers compared with nonsmokers.

### Retinopathy

Tissue ischemia is thought responsible for the development of retinopathy in diabetic persons. The retina may respond to localized hypoxia (induced by smoking) by producing new blood vessels, which are prone to rupture and bleed, leading to vitreous hemorrhage, scarring, and blindness.

Although the data on smoking and the course of retinopathy are not conclusive, stud-

ies from England<sup>10</sup> and the United States<sup>11</sup> reveal that smoking increases both the incidence and the rate of progression of diabetic retinopathy.

## SMOKING AND THE PATHOGENESIS OF TYPE II DIABETES

Early epidemiologic evidence exists that smoking may be a risk factor for developing type II diabetes. Data from the Nurses' Health Study<sup>12</sup> suggest that current smokers have an increased risk of type II diabetes, with women who smoked more at greater risk. The relative risk of type II diabetes, adjusted for obesity and other risk factors, was 1.42 among women who smoked 25 or more cigarettes per day compared with nonsmokers. The Health Professionals' Study,<sup>13</sup> which included follow-up data from 41 810 men, showed that men who smoked more than 25 cigarettes per day had a relative risk of type II diabetes of 1.94 compared with nonsmokers.

## THE IMPORTANCE OF SMOKING CESSATION

Persons with diabetes have even more to gain from stopping smoking than do those without diabetes. Therefore, aggressive antismoking education needs to be implemented at the time of diagnosis.

Most smokers acquire the habit as teenagers, suggesting a need to fully educate patients in the pediatric clinic. More research on the design, implementation, and outcomes of smoking cessation programs in persons with diabetes mellitus needs to be conducted. ■

## REFERENCES

1. Ford ES, Malarcher AM, Herman WH, Aubert RE. Diabetes mellitus and cigarette smoking: Findings from the 1989 National Health Interview Survey. *Diabetes Care* 1994; 17:688-692.
2. Masson EA, MacFarlane IA, Priestly CJ, Wallymahmed ME, Flavell HJ. Failure to prevent nicotine addiction in young people with diabetes. *Arch Dis Child* 1992; 67:100-102.
3. Haire-Joshu D, Heady S, Thomas L, Schectman K, Fisher E. Beliefs about smoking and diabetes care. *Diabetes Educator* 1994; 20:410-415.
4. Morrish NJ, Stevens LK, Fuller JH, Jarrett RJ, Keen H. Risk factors for macrovascular disease in diabetes mellitus: The London follow-up to the WHO Multinational Study of Vascular Disease in Diabetics. *Diabetologia* 1991; 34:590-594.
5. Klein R, Moss SE, Klein BEK, DeMets DL. Relation of ocular and systemic factors to survival in diabetes. *Arch Intern Med* 1989; 149:266-272.
6. Moy CS, Laporte R, Dorman JS, et al. Insulin dependent diabetes mellitus mortality: The risk of cigarette smoking. *Circulation* 1990; 82:37-43.
7. Palumbo PJ, O'Fallon WM, Osmundson PJ, Zimmerman BR, Langworthy AL, Kazmer FJ. Progression of peripheral occlusive arterial disease in diabetes mellitus. What factors are predictive? *Arch Intern Med* 1991; 151:17-721.
8. Gay EC, Cai Y, Gale SM, et al. Smokers with IDDM experience excess morbidity: The Colorado IDDM Registry. *Diabetes Care* 1992; 15:947-952.
9. Sawicki PT, Didjurgeit U, Muhlhauser I, Bender R, Heinemann L, Berger M. Smoking is associated with progression of diabetic nephropathy. *Diabetes Care* 1994; 17:126-131.



10. Jarrett RJ. Duration of non-insulin-dependent diabetes and development of retinopathy: analysis of possible risk factors. *Diabetic Medicine* 1986; 3:261-263.
11. Moss SE, Klein R, Klein BE. Association of cigarette smoking with diabetic retinopathy. *Diabetes Care* 1991; 14:119-126.
12. Rimm EB, Manson JE, Stampfer MJ, et al. Cigarette smoking and the risk of diabetes in women. *Am J Public Health* 1993; 83:211-214.
13. Rimm EB, Chan J, Stampfer MJ, Colditz GA, Willett WC. Prospective study of cigarette smoking, alcohol use and the risk of diabetes in men. *Br Med J* 1995; 310: 555-559.

# Eradication of polio and guinea worm disease

**DONALD R. HOPKINS, MD**

Dr. Hopkins is senior consultant in the Global 2000 project at the Carter Presidential Center in Atlanta, Ga.

**P**oliomyelitis and guinea worm disease, two ancient scourges of mankind, will soon follow smallpox into extinction if World Health Organization campaigns underway are successful. (At this stage, any case or suspected case of either disease should be reported to appropriate public health authorities immediately.)

## ■ POLIOMYELITIS

Poliomyelitis, a viral infection, is spread mainly person-to-person. The incubation period is 1 to 2 weeks. Only about 1% of infected persons suffer symptoms, which are usually general (fever, headache, muscle spasms), and which sometimes are followed by flaccid paralysis of muscles in one or more limbs, throat, or chest. About 2% to 10% of persons with acute paralysis die. Since the 1950s, this disease has been entirely preventable by a series of three to four immunizations. There is no nonhuman reservoir of infection.

In 1988, the World Health Organization set the goal of eradicating polio by the year 2000. At that time, the disease still occurred worldwide, affecting more than 300 000 annually (about 30 000 cases were officially reported that year).

Using an aggressive strategy of routine immunizations, "national immunization days," localized "mopping up" immunizations in high-risk areas, and sensitive surveillance of cases, the number of cases reported was reduced to less than 7000 in 1995. No cases have occurred in the Americas since 1991, and eastern Asia is on the verge of eliminating the infection as well.

The main endemic foci remaining are in the Indian subcontinent and central Africa.

The two major obstacles to eradicating polio completely are civil wars in Sri Lanka, Russia (Chechnya), Sudan, and Afghanistan; and the need for an additional \$500 million over the next 5 years.

Apart from ending forever the fear of polio epidemics and the tragedy of vaccine-associated cases, eradicating polio will save the United States alone more than \$200 million each year in costs of polio immunizations. Similarly, the entire \$30 million which the United States invested in the smallpox eradication program over 10 years has been recouped every few months since 1971, when routine vaccinations against smallpox and other measures were ended.

## ■ DRACUNCULIASIS (GUINEA WORM DISEASE)

Dracunculiasis is a parasitic infection that is acquired by drinking contaminated water.

A guinea worm emerging from a foot, Nigeria, 1985.

