Diabetes mellitus is a condition that imposes a tremendous health and societal burden worldwide, whether that burden is measured in terms of sickness, inability to function in daily life, use of health systems resources, costs or death. Given that insulin was discovered in 1922 and that optimism about finding a “cure” for a previously fatal disease rapidly followed, these facts are disturbing. But the great burden of diabetes is the present reality.

Nevertheless, there are many exciting and promising research developments which indicate that efforts in primary prevention (decrease disease development), secondary prevention (control abnormal metabolism), and tertiary prevention (limit damage from complications) will soon begin to reverse this burden, even in the face of an aging world population.

In the two major types of diabetes—insulin dependent and noninsulin dependent—genetic studies provide important lessons which may result in a reduction in the likelihood of developing diabetes. In insulin-dependent diabetes, genetically-based abnormalities in the body’s immune system may result in “self-destruction” of the insulin-producing beta cells in the pancreas, with subsequent high blood sugars. (The pancreas is the large elongated glandular organ, situated behind the stomach, that secretes insulin and pancreatic juice.) The possibility of controlling the immune system to prevent beta cell destruction prior to development of high blood sugar or clinical diabetes is being investigated. Studies to identify and then modify environmental factors which unmask these destructive genetic-based immunological tendencies are also under way, and could result in significant decreases in new cases.

For the more common noninsulin-dependent diabetes (NIDDM), studies have found evidence of early resistance to insulin in fat and muscle tissue, and compensatory elevations in circulating insulin, providing an environment that is then conducive to heart and vascular disease. Both of these occur well before a high blood sugar and typical clinical signs of diabetes appear. So the possibility of identifying such pre-diabetic individuals and improving the tissue insulin resistance (which may be due to genetic variations in the proteins that transport glucose into cells) could result in fewer cases of NIDDM and one of its major complications—heart and blood vessel disorders. A third type of diabetes, called malnutrition-related diabetes mellitus, is being carefully and thoroughly studied to identify causative factors.

In secondary prevention, that is, controlling the raised blood sugar, blood pressure and blood fats, several new developments are generating excitement and optimism. They include insulin and insulin-like products produced by genetic engineering; innovative methods to deliver insulin — perhaps by liposomes (small fat spheres) or insulin pumps; newer varieties and classes of oral glucose-lowering agents, for instance those which reduce glucose absorption from the intestine; drugs which block the effects or consequences of high blood sugar, e.g., “aminoquinidine” which blocks formation of glucose-protein complexes; and a wide variety of new, effective high blood pressure and lipid controlling pharmaceuticals, some of them with particularly beneficial properties in diabetic patients. All these developments are very important for the present and future control of metabolic abnormalities, thereby decreasing the likelihood of complications in diabetes.

New treatment
If complications develop, can this burden be reduced through tertiary prevention efforts? It is in this area that much can be done now while new studies are being completed. Laser-based photo-coagulation to prevent blindness from diabetic eye disease; simple and inexpensive foot care procedures to prevent amputations; prenatal and perinatal diabetes care to prevent adverse outcomes of pregnancy—these programmes have been developed and validated as very important treatment opportunities. The role of protein restriction and/or specific anti-high blood pressure medicines to preserve kidney function is at present under study. The results will have important implications for the management of patients with diabetes.

Cross-cutting all levels of prevention is the critical role of health education. Two particular aspects of this deserve mention. First, studies support the essential and positive role of the patient in his or her own care—the “activated” or “empowered” patient. Second, research is reminding us that changing behaviour is much more challenging and complex than simply providing knowledge. People’s beliefs, attitudes, home and work environment, social characteristics and norms are all essential features of any effective health education programme. Educational research will no doubt provide guidance and advice on how best to develop effective health education opportunities, using these essential elements.

In fact, research already provides hope for reducing further the worldwide burden of diabetes. Much has been learned and is now being applied. Much more information will soon be available to help us in our primary, secondary and tertiary prevention efforts.

A diabetic tests his level of blood glucose. Those who are well motivated and knowledgeable about the disease are best able to live a normal life.

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