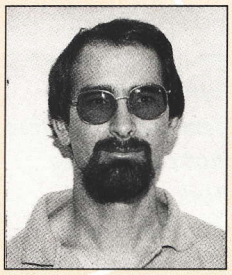

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DIAGNOSING DIABETES AND IMPAIRED GLUCOSE TOLERANCE

Dr Paul Rheeder (MMed) (Int), FCP (SA), MSc (Clinical Epidemiology) is a consultant in the Department of Internal Medicine at the University of Pretoria. He has a specific interest in diabetes and is involved in research in diabetes at Mamelodi Hospital in Pretoria. This community hospital reflects accurately the real-world situation of diabetes care for most of South Africa's citizens. The support systems are deficient (lost file, lost results etc.) and the work-load excessive.

Dr Rheeder's interest is in providing optimum care in sub-optimum conditions. He is a "hands-on" practical physician working daily with the real problems in the real world. He understands the circumstances that many GPs work in and offers his practical solutions to practical everyday care.

South Africa's diabetics need his approach and this series of articles will help many clinicians provide an improved service to their diabetics.

In this series of articles various experts share their understanding and management of medical problems with us. The emphasis is on practical approaches to the problem concerned and reconciliation of the Ivory Tower and the Coalface.

Diabetes causes considerable morbidity and mortality. There is also growing concern that undiagnosed diabetes or impaired glucose tolerance greatly enhances cardiovascular risk.

The young patient with sudden onset of symptoms or even coma, poses less of a diagnostic challenge than does detecting non-insulin-dependent diabetes mellitus as prevalent in the older, often asymptomatic subject.

Screening for diabetes mellitus: Who should be screened?

- Patients with classical symptoms of diabetes mellitus
- Obese patients
- Those with a strong family history
- Previous gestational diabetes
- Delivery of a baby of more than 4kg
- Pregnant women between the 24th and 28th week of gestation
- The patient with hypertension
- The patient with dyslipidemia
- Those with recurrent skin or genito-urinary infections
- The elderly (>65 years)[1]

Screening in the above context means the evaluation of venous plasma glucose. A raised capillary blood glucose result should preferably be followed by a venous plasma estimation. The fact that diabetes is present at least 4-7 years before clinical diagnosis in non-insulin-dependent diabetes mellitus makes vigilance in screening and diagnosis mandatory[2].

Diagnosis in the non-pregnant patient

Commonly, the World Health Organisation criteria[3] are used. If symptoms are present then one diagnostic blood value is sufficient for diagnosis. Without symptoms at least two separate diagnostic blood levels are needed. In practice, the random blood glucose cut-off points are the same as the two hour values following the oral glucose tolerance test (i.e. more than 11.1mmol/l for venous plasma or capillary blood).

The criteria for normal glucose tolerance, impaired glucose tolerance, and diabetes, are given in Table I.

Clinical evaluation at time of diagnosis

Deciding on whether or not insulin is needed is the first major decision. There are some clinical clues in this regard. The following favours insulin: age 30 years or younger; non-obese, rapid onset of symptoms (especially if associated with weight loss); ketonuria; island-cell antibody or anti Glutamic Acid Decarboxylase antibody positive. Traditionally, individuals with diabetic ketoacidosis have been regarded as needing insulin for long term management. However, black obese non-insulin-dependent diabetes mellitus subjects may present with diabetic ketoacidosis and may not need long term insulin[4].

The evaluation and management of the young, insulin-dependent diabetic will be covered in another article. In essence, the evaluation of the newly-diagnosed older diabetic focuses on three aspects:

1. Making sure that one is not dealing with secondary diabetes, e.g. following the use of steroids or as a result of chronic pancreatitis.
2. Determining the degree of complications already present. In non-insulin dependent diabetes mellitus subjects, 20% may have retinopathy at the time of diagnosis[2] with 5-10% of subjects having significant neuropathy or micro-albuminuria[5,6].
3. Determining the presence of other macrovascular risk factors such as smoking, hypertension and hyperlipidemia. Macroangiopathy accounts for more than 50% of deaths in this group[7].

A comprehensive history and examination should focus on the cardiovascular system, the eyes and the feet. Needless to say, the current symptomatology and the past med-

ical history are of great importance.

Special investigations that are needed include the following: Electro-cardiogram, fasting lipogram, serum creatinine and electrolytes, urine dipstix for albuminuria or, if available, a first morning urine specimen should be used to assess the albumin/creatinine ratio. If there is uncertainty about the type of diabetes then a fasting and glucagon-stimulated C-peptide may be helpful. Hba^{1}c may be useful in determining the degree of hyperglycaemia prior to diagnosis but this is not essential.

The subject with impaired glucose tolerance

The subject with a glucose value of uncertain significance (Table I) should ideally have an oral glucose tolerance test to exclude diabetes. The final diagnosis may be that of impaired glucose tolerance.

This is a dysglycaemic state that is intermediate between the normal state and the diabetic state. There are as many people of differing ages who have impaired glucose tolerance as there are people who have non-insulin-dependent diabetes mellitus (diagnosed and undiagnosed). In the USA, 35% of the population in the age group 65-74 years have asymptomatic hyperglycaemia[8].

The clinical relevance of impaired glucose tolerance is demonstrated by its sequelae, namely:

1. *The potential to develop non-insulin-dependent diabetes mellitus.* The rate of progression differs in different communities. Approximately 30% of subjects will develop non-insulin-dependent diabetes mellitus over a five year period and 30% will revert to normal glucose tolerance[9].
2. *The enhanced cardiovascular risk.* In a recent report on the Chicago Heart Association Detection Project[10] there was an increased risk of death associated with asymptomatic hyperglycaemia which persisted after adjustments for smoking, blood pressure, total cholesterol and basal metabolic index.

The Diabetes Prevention Program is a multicentre clinical trial aimed at preventing the development of diabetes mellitus in subjects at risk.

Management of impaired glucose tolerance

Weight loss and dietary modification are important. In Tanzania, simple dietary advice ("eat less") and exercise ("walk 30 minutes per day") in a Hindu sub-community of South Asians, resulted in only one out of 45 impaired glucose tolerance subjects developing non-insulin-dependent diabetes mellitus compared with one third of the control population[11].

Summary

1. Have a low threshold for screening subjects at risk for diabetes, using World Health Organisation criteria for diagnosis.
2. Clinical evaluation should be aimed at detecting complications already present and to determine macrovascular risk status.
3. Impaired glucose tolerance is clinically significant and should be managed by dietary and exercise therapy. ●

Table I. The World Health Organisation criteria for diagnosing diabetes and impaired glucose tolerance

Diagnosis	Venous plasma Glucose	Venous whole blood Glucose	Capillary blood Glucose
Normal glucose tolerance			
Fasting	<6,4 mmol/l	<5,6 mmol/l	<5,6 mmol/l
OGGT (2-HR)	<7,8 mmol/l	<6,7 mmol/l	<7,8 mmol/l
Impaired glucose tolerance			
Fasting	<7,8 mmol/l	<6,7 mmol/l	<6,7 mmol/l
OGGT (2-HR)	<7,8-11,1 mmol/l	<6,7-10 mmol/l	<7,8-11,1 mmol/
Diabetes mellitus			
Fasting	>7,8 mmol/l	>6,7 mmol/l	>6,7 mmol/l
OGGT (2-HR)	>11,1 mmol/l	>10 mmol/l	>11,1 mmol/l

OGGT= oral glucose tolerance test
(2-HR)= the two-hour blood glucose test

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