Managing a middle-aged woman with prediabetes

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This section is about the immediate management and investigation of an acute or subacute presentation in general practice. It is inspired by, but is not based on, a real patient situation.

Annie is a 57-year-old woman who came to Australia 25 years ago from China. She recently moved to your area and needs a GP. She is married to an Australian of British background and has one child, aged 20 years. She was recently told that her brother, who was diagnosed with diabetes last year, already has eye damage and Annie is concerned about her risk of developing diabetes. She has felt more tired recently and wonders whether this is a symptom.

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In this consultation, what questions would you ask Annie in light of her concerns?

Answer: Has she had any tests for diabetes in the recent past? When were her last blood tests, does she have any records from her old practice? Has anyone else in her family had diabetes? Is she taking any medications? Does she smoke or drink alcohol? Has she had any medical problems? Does she have any allergies? Does she work? What exercise does she do and how often? Did she have gestational diabetes when she was pregnant (or, as she might not have been tested, was her baby considered large, i.e. over 4.0 kg)? Did she have hypertension during pregnancy (this is considered a cardiovascular risk factor and also a risk for hypertension later in life)? Does she understand low cholesterol diets and does she follow one? Has she heard of low glycaemic index diets?

Annie had blood tests carried out through a well-known pathologist three months ago, before she moved. She does not know the results but they tested for 'everything' and she had to fast overnight. Her parents have passed away in China, one in an accident aged 68 years and the other from liver cancer aged 75 years. To her knowledge, no one has had diabetes except her older brother aged 59 years. Annie has no other medical problems, has never smoked, doesn't drink, is taking no medications and has no allergies. Annie doesn't exercise a lot during the week as she works long hours in a clerical role but she tries to walk for a couple of hours daily on the weekend. She says she has gained weight steadily since menopause and you observe she has abdominal fat deposition and appears mildly to moderately overweight. Her daughter was not a large baby and the pregnancy and delivery were normal.

You are conscious of the cost of repeating investigations so you request the pathology laboratory to fax you Annie's recent results. While you are waiting for these, what do you do?

Answer: You should measure Annie's blood pressure and weight, listen to her heart and chest, examine her abdomen, and ask about routine tests such as Pap smears and mammograms.

Annie weighs 64 kg and is 158 cm tall making her body mass index (BMI) 25.6 kg/m^2. However, she looks more overweight for her stature than the BMI suggests, an example of this measurement being an underestimate of central obesity in certain racial groups. Her blood pressure is 120/75 mmHg and other findings from the examination are normal.

You receive the fax with Annie's previous results, which show the following: fasting blood glucose level 6.2 mmol/L (normal under 6.0 mmol/L); normal electrolyte, urea and creatinine levels, liver function and full blood count; thyroid-stimulating hormone 2.6 IU/L (normal range 0.5 to 3.5 IU/L); hepatitis B surface antibody and antigen negative; hepatitis C antibody negative; vitamin D level 45 nmol/L (suggested normal range over 60 nmol/L); fasting cholesterol level 5.6 mmol/L (suggested normal range under 5.5 mmol/L); triglyceride level 2.6 mmol/L (suggested normal range under 1.9 mmol/L); HDL level 1.3 mmol/L (suggested normal range over 1.0 mmol/L); LDL level 3.6 mmol/L (suggested normal range under 3.5 mmol/L). What do the results tell you?

Answer: Annie has a blood glucose level that is slightly raised but this does not justify a diagnosis of diabetes. People who have a fasting blood glucose level above 5.5 mmol/L but below 7.0 mmol/L need to have a two-hour glucose tolerance test to exclude diabetes or prediabetes, particularly if they have other risk factors such as a family history or being overweight.[1] Annie has the national average cholesterol level but a mildly raised triglyceride level. Her triglycerides and cholesterol levels can be lowered with weight loss and, if needed, medication. She should take vitamin D supplements 2000 IU/day

with food because her vitamin D level in summer is low and she needs to be vaccinated against hepatitis B as she has no immunity to it (you discuss these issues with her in more detail). The other results are all normal.

You arrange a two-hour glucose tolerance test for Annie (including the diet she must follow for three days before the test) and give her information about low cholesterol diets.

She returns a few days later for the results, which are as follow:

- ***baseline fasting glucose level: 6.5 mmol/L (impaired fasting glucose range: 6.1 to 6.9 mmol/L)***
- ***two-hour postprandial blood glucose level: 7.9 mmol/L (impaired glucose tolerance range: 7.8 to 11.0 mmol/L).***

What do the results show and what is their significance to Annie's future risk of diabetes?
Answer: Annie has impaired fasting glucose and impaired glucose tolerance but does not have diabetes. Commonly her condition is called 'prediabetes'. Annie is also at increased risk of diabetes because she is Asian (especially so for south-east Asian people and Pacific Islanders).

A patient such as Annie who has both impaired fasting glucose and impaired glucose tolerance is at even greater risk of developing diabetes than if she has either abnormality alone. She will need annual two-hour glucose tolerance tests unless a diagnosis of diabetes is confirmed.

Annie asks how she can reduce her risk of developing diabetes. What do you tell her?
Answer: *Annie should exercise as much as she can (given her working hours) because this reduces blood glucose levels and weight and improves cardiovascular health. She should build up her exercise tolerance over a few weeks to ideally one hour a day of moderate to vigorous activity that raises the heart rate. This does not have to be done all at once; she might be able to exercise in her lunch break or walk to work and it helps to exercise with others. She needs education about total kilojoule intake, carbohydrate intake and low glycaemic index carbohydrates. She may be able to teach herself using library books and recommended websites (such as www.diabetesaustralia.com, www.heartfoundation.org.au and www.glycemicindex.com), but she may find it easier to consult a dietitian. Reduction of portion size and kilojoule intake is a good starting point. Anecdotally, many Asian patients find it particularly useful to consult a dietitian from their own culture if they cook mainly Asian food. The chronic diseases management plan and allied health referral is not an option at this stage for Annie as she does not have diabetes or any qualifying medical conditions.*

Metformin is a medication that has been available for decades and is used routinely in patients with diabetes. However, its use in prediabetes is off label and not funded by the PBS. This is despite much research about its benefits in prediabetes and the now widespread use of metformin for this indication if dietary and lifestyle measures for six to 12 months do not improve the patient's BMI and fasting blood glucose levels.[2] Metformin is especially used in patients such as Annie with abdominal obesity, hypertriglyceridaemia and prediabetes.

High-dose fish oil supplementation (600 IU/day with food) should be considered to reduce triglyceride levels as part of her lifestyle changes. It is not necessary to treat the hypertriglyceridaemia with medication at present.

It should be emphasised to Annie that prediabetes can be significantly improved or even reversed for years with lifestyle measures, although she still requires long-term follow up as she is likely eventually to develop diabetes.

Annie asks if her other organs need to be monitored as her brother already has complications from his diabetes. What do you suggest?
Answer: You reassure Annie that her full blood count and thyroid, liver and kidney function are all normal. Annie should see an optometrist and have a complete eye examination, including dilation of the fundi. This is recommended for all adults over 40 years of age periodically, but any abnormality found is unlikely to be due to her prediabetes. This is suggested as a routine baseline investigation because, generally, complications of diabetes take several years to develop.

Annie does not have high blood pressure, severe cholesterol problems or cardiac symptoms and has no family history of heart disease; therefore, investigation of her heart or review by a cardiologist is not indicated at present. Although dyslipidaemia and hypertension often coexist with prediabetes conditions, this is not the case in about 20% of people with prediabetes. This patient's main problem is glucose intolerance, placing her at increased risk of developing diabetes.

Nerve damage in the feet (and sometimes elsewhere) is more usually a complication of diabetes and is not routinely tested for in people with prediabetes. Painful neuropathy can occur even in patients with prediabetes, but is usually clinically apparent. Annie needs podiatry review only if she has problems managing her toenails or if she has other foot problems. She needs to keep well hydrated, especially in hot weather, as this will avoid her increased risk of dehydration.

People with prediabetes do not need regular blood glucose level monitoring, capillary blood testing or measurements of serum insulin level. A raised serum insulin level can be related to insulin resistance, but insulin results can be quite variable. The metabolic syndrome is clinically and biochemically obvious in other ways in patients with prediabetes and this test usually adds nothing to the management. Patients with prediabetes do not need C-peptide measurements. It is not necessary to measure the HbA_{1c} (usually between 5.7 and 6.4% in people with prediabetes) as this adds nothing to the management. The most important elements of care are the lifestyle changes discussed (including blood pressure and lipid control as required, to minimise risk of cardiovascular events) and ensuring Annie understands and is able to institute them.

Outcome: Annie plans to make an intensive effort to reduce her weight and to exercise more vigorously and more often, along with family members. She returns two weeks later for her first hepatitis B vaccination and tells you she has already seen a dietitian. She says she has reduced the amount of rice she eats, but she doesn't like eating long-grain rice (such as basmati), which is a low-glycaemic index substitute for short-grain white rice. She has attempted to reduce her daily glycaemic load and to spread carbohydrate intake across the day. Annie seems to be optimistic about her health and is coping well and not showing any signs of depression over her brother's situation or her own prognosis. She has yet to return for six-monthly follow up of her blood glucose and lipid levels. **ET**

References

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2. Twigg SM, Kamp MC, Davis TM, Neylon EK, Flack JR. Prediabetes: a position statement from the Australian Diabetes Society and Australian Diabetes Educators Association. Med J Aust 2007; 186: 461-465.