Mainstreaming the metabolic syndrome: a definitive definition

This new definition should assist both researchers and clinicians

The metabolic syndrome — the clustering of abdominal obesity, dyslipidaemia, hyperglycaemia and hypertension — is a major public health challenge worldwide.[1,2] The metabolic syndrome is not benign; it is associated with a substantially elevated risk of type 2 diabetes (5-fold) and of cardiovascular disease (CVD) (2–3-fold),[1] and its increasing prevalence could possibly reverse the gains made through recent declining CVD mortality.

The metabolic syndrome is not a new condition. It was first described in the 1920s by Kylin, a Swedish physician, as the association of hypertension, hyperglycaemia and gout.[3] In the 1940s, attention was drawn to upper body adiposity (android or male-type obesity) as the obesity phenotype commonly associated with type 2 diabetes and CVD.[4]

This constellation of CVD risk factors has been given a number of names, including "deadly quartet", "syndrome X", and "insulin resistance syndrome",[1] but "metabolic syndrome" is likely to hold sway for the foreseeable future.

Just as the metabolic syndrome has borne a variety of different names, numerous definitions have also surfaced. The World Health Organization definition,[5] and two others, developed by the European Group for the Study of Insulin Resistance[6] and the National Cholesterol Education Program — Third Adult Treatment Panel (ATP III),[7] have been the main ones in use. Each of these agreed on the core components of obesity, hyperglycaemia, dyslipidaemia and hypertension. However, the definitions differ in the cut-points used for each component, and the way in which the components are combined, leading to considerable confusion.[1] The confusion has been particularly apparent in attempts to compare the burden in different populations, where the use of different definitions has seriously hampered the ability to make comparisons between and within communities.[1,2] The parameters for assessing obesity have been most problematic, with the current definitions failing to account for ethnic differences for cut-points in waist circumference and body mass index. It was also uncertain which of the definitions best predicted those at risk of CVD and diabetes, although from a clinical perspective, the ATP III definition was probably the most practical for alerting health care professionals to subjects at risk.[1,7]

Because of the confusion, the International Diabetes Federation (IDF) embarked on the process of developing consensus on a new global definition (Box).

The definition recognises the mounting evidence that visceral adiposity is common to each of the components of the metabolic syndrome. Thus, an excessive waist circumference (a good proxy measurement for visceral adiposity) is now a necessary requirement for the metabolic syndrome. Furthermore, as it is clear that the level of obesity at which the risk of other morbidities begins to rise varies between population groups,[1,10] ethnic-specific waist circumference cut-points have been incorporated into the definition, so that for South and South-East Asians, 90 cm and 80 cm are the cut-points for men and women, respectively. The cut-points for lipids and blood pressure are unchanged from those used by ATP III, and the glucose cut-point is the value most recently recommended as the upper limit of normal by the American Diabetes Association. As with many previous attempts to define diagnostic criteria for obesity, diabetes, hypertension, and dyslipidaemia, there is always the possibility that new research will force changes, including the possible incorporation of new components such as C-reactive protein and adiponectin.

The IDF consensus also includes recommendations for future research into components not currently included in the core definition of the metabolic syndrome. It further highlights strategies for treatment of the metabolic syndrome and its components.[8] It addresses both clinical and research needs and:

- provides a simple entry point for primary care physicians to diagnose the metabolic syndrome;
- provides an accessible diagnostic tool suitable for worldwide use, taking into account ethnic differences in waist circumference and associated type 2 diabetes and CVD risk; and
- establishes a comprehensive "platinum standard" list of additional criteria that should be included in epidemiological studies and other research into the metabolic syndrome.

Using this new definition, analysis of AusDiab indicates that 29.1% of Australian adults (aged 25 and over) have the metabolic syndrome, compared with 19.3% according to ATP III (P Z Z, J E S, unpublished data). Much recent discussion about the metabolic syndrome has appropriately raised questions about its definition, its clinical role, and even its existence.[1,11] At its heart, the syndrome represents the association between a range of factors that appear to be united both in terms of aetiology and consequences. The new IDF definition should provide researchers with a common platform for investigating the metabolic syndrome and its consequences. It should provide a useful practical tool that reminds health care professionals of

The 2005 International Diabetes Federation definition of the metabolic syndrome[8,9]

According to the International Diabetes Federation definition, for a person to be defined as having the metabolic syndrome, they must have:

- *Central obesity* (defined as waist circumference ⩾ 94 cm for Europid men and ⩾ 80 cm for Europid women, with ethnicity specific values for other groups*)

plus any two of the following four factors:

- *raised serum triglyceride level* (⩾ 1.7 mmol/L)
- *reduced serum HDL-cholesterol level* (< 1.03 mmol/L in males and < 1.29 mmol/L in females),

  (or specific treatment for these lipid abnormalities)
- *raised blood pressure* (systolic blood pressure ⩾ 130 mmHg or diastolic blood pressure ⩾ 85 mmHg), or treatment of previously diagnosed hypertension
- *impaired fasting glycaemia* (fasting plasma glucose [FPG] ⩾ 5.6 mmol/L), or previously diagnosed type 2 diabetes

* South Asian and South-East Asian men ⩾ 90 cm, women ⩾ 80 cm; Japanese men ⩾ 85 cm, women ⩾ 90 cm. ◆

the metabolic consequences of obesity, and identifies individuals at risk of CVD and type 2 diabetes who are likely to benefit from (lifestyle) interventions.

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