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Heart Awareness and the Laboratory

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Introduction

Obesity, insulin resistance and the metabolic syndrome make up a complex set of risk factors which significantly contribute to heart disease worldwide. The WHO considers obesity to be a global pandemic with more than 650 million adults considered to fall within this category worldwide[1].

The American Academy of Paediatrics considers childhood obesity as the paediatric pandemic of the millennium[2].

Obesity and its consequences

Although secondary causes of obesity exist, including hypothyroidism, hypercortisolism, polycystic ovarian syndrome and certain genetic conditions, the greatest majority of obesity is caused by high energy diets with physical inactivity. The consequences are demonstrated in figure 1.

Insulin resistance

Peripheral cells' resistance to the effects of insulin prompts the pancreas to produce more insulin.

As insulin is a growth factor, it has certain adverse effects, including increasing abdominal fat distribution, hypertension, increasing cholesterol levels, polycystic ovarian syndrome finally leading to type 2 diabetes.

The metabolic syndrome

These group of characteristics, which is not considered a single disease entity, places a patient at increased risk of cardiovascular complications and mortality. The criteria of the metabolic syndrome are captured in table 1.

BMI	Weight category
<18.5	Underweight
18.5 - 24.9	Healthy weight
25.0 - 29.9	Overweight
30.0 - 34.9	Obesity class I
35.0 - 39.9	Obesity class II
≥40	Obesity class III

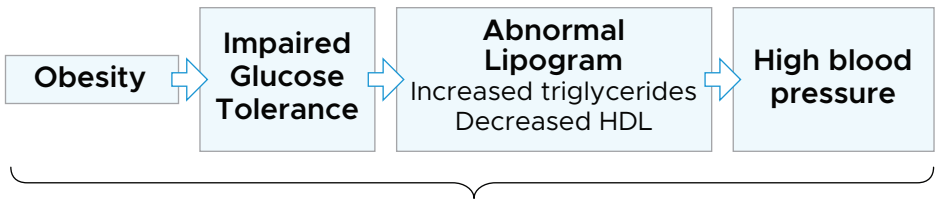

Figure 1. The progression from obesity to the metabolic syndrome and its consequences.

Increased risk of

1. Heart disease
2. Stroke
3. Type 2 diabetes
4. Gall stones
5. Osteoarthritis
6. Obstructive sleep apnoea
7. Infertility
8. Certain types of cancer

Table 1. Criteria for the metabolic syndrome according to the International Diabetes Federation 2006[3].

Central obesity defined as a waist circumference of ≥80cm in males* ≥94cm in females* PLUS any 2 of the following:	
Fasting triglycerides (TG)	≥1,7mmol/L or on treatment for elevated TG
HDL-cholesterol	<1,3mmol/L or on treatment for low HDL
Hypertension	≥130/85 or on treatment for hypertension
Fasting plasma glucose	≥5,6mmol/L or previously diagnosed with type 2 diabetes

* At present, European values are used in the South African setting.

The role of the laboratory

The initial onus remains on the clinician to identify their patients that are at risk of the metabolic syndrome and its consequences.

This is by identifying obese patients by determining the BMI as well as measurement of the blood pressure. If secondary or contributory causes of obesity is suspected, specific testing can be undertaken in this regard.

If no underlying medical causes are suspected, the laboratory can assist through performing a risk assessment specifically for the metabolic syndrome in the form of:

- Fasting plasma glucose or glucose tolerance test
- Fasting Lipogram (including total cholesterol, LDL, HDL and triglycerides)

Further testing which may be of value in these patients include:

- Uric acid
- Thyroid function (screening only warrants a TSH)
- Renal function

Conclusion

The metabolic syndrome is becoming an increasing portion of the patient population seen within the Westernized lifestyle. It is essential that early identification and risk factor evaluation is performed, to treat and manage patients prior to the onset of irreversible complications.

References

1. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
2. https://www.aap.org/en/patient-care/institute-for-healthy-childhood-weight/aap-policy-statements-on-obesity/
3. file:///C:/Users/adele/Downloads/IDF_Meta_-def_final.pdf

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