RESISTENCIA A LA INSULINA Y DIABETES TIPO 2 EN LA INFANCIA Y LA ADOLESCENCIA

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Insulin resistance is a simple concept with complex ramifications. The notion that insulin action differs in different people and under different circumstances has been known for a considerable period of time. For example, it has long been recognized that young children with type 1 diabetes are "sensitiveó to small changes in insulin dosage, while obese adults with type 2 diabetes may require huge doses of insulin to establish metabolic control.

What is more recent is the finding that insulin action differs in a number of different and very common conditions and may in fact be a central contributor to the pathogenesis of some or all of these, including obesity, atherogenesis, type 2 diabetes, the metabolic syndrome, hypertension, hyperandrogenism, polycystic ovarian syndrome and perhaps some types of malignancy.

The increasing burden of obesity and its complications has increasingly focused the spotlight on insulin resistance in recent years. Yet most of this attention has been paid to adults and much less to the consequences and causes of insulin resistance in children and teens. This is despite the fact that many of the adult diseases associated with insulin resistance, such as obesity, type 2 diabetes, atherosclerosis, have their origins in childhood.

Furthermore, insulin resistance has long been documented in certain circumstances in children and teens with type 1 diabetes (e.g. at disease onset, with episodes of ketoacidosis or poor metabolic control), and is likely an adaptive response contributing to the growth spurt of puberty.

More recently, in utero contributions to programming of insulin resistance and its consequences have been brought to light, initially by Barker and his colleagues who have championed the field of 'fetal origins of adult disease.

Insulin resistance (IR) can be measured in many ways, the "gold standardó being the measurements derived from the euglycemic, hyperinsulinemic clamp technique, but there are others, including dynamic tests such as the frequently sampled IVGTT using the Bergman Minimal Model, or IR derived form the OGTT, and more static tests such as HOMA-IR and QUICKIE which are derived from measurement of fasting insulin and glucose concentrations.

Approaches are being developed, first in adults and more recently in teens as well, to modulate insulin resistance either by lifestyle change or through medications such as metformin in order to prevent progression to type 2 diabetes.

TYPE 2 DIABETES IN CHILDHOOD

There is no doubt that there is a steady increase in the numbers of youth being diagnosed with T2D worldwide. Most series of youth with T2DM report a female to male ratio varies of 1.3- 1.8 and a mean age of onset between 12 and 14 years of age with most patients in mid-to late puberty at diagnosis.

A positive family history can be elicited in the vast majority. Certain ethnic groups are over-represented in T2DM in youth, specifically, African American, Hispanic, First Nations and Asian. While the majority of our patients are asymptomatic at presentation, 20% have ketonuria and 8% DKA.

This is similar to that reported by other groups (as many as 25% in DKA and
up to 40% with ketones).

There is little information available on the prevalence of hypertension and hyperlipidemia in children with T2DM. Reported range for hypertriglyceridemia is from 4-32 % and 17-32% for elevated blood pressure, with even higher percentage in first nations group. Other features of insulin resistance syndrome are common at diagnosis: acanthosis nicrigans and menstrual abnormalities in females. Prevalence of features of metabolic syndrome are higher.

Diet and exercise are recommended as a first choice of therapy in those who are not ill at diagnosis, but successful only in few patients over time. If treatment goals are not met (HbA1c levels are above 7%) oral agent is indicated. Metfromin is the only one shown to be successful in an RCT in teens with T2D. If monotherapy is not successful over a reasonable period of time (3-6 months) other agent or insulin should be added.

Existence of complications at the time of diagnosis is not as clear in pediatrics.

According to ADA guidelines: (i) urinary albumin and lipid levels should be checked annually, (ii) dilated eye examination should be performed annually, (iii) screening for elevated blood pressure and

lipid abnormalities is indicated to detect microvascular disease. These examinations should begin at the time of the diagnosis.

The impact of early onset IR and T2D are only now beginning to be felt.

Major public health initiatives will be needed to reduce the burdens and long term complications of childhood obesity and its myriad consequences.

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