Ketoacidosis, Antibodies Affect Insulin Reserve

BY KERRI WACHTER
Senior Writer

PHILADELPHIA — Positive pancreatic antibodies and the presence of diabetic ketoacidosis appear to affect how insulin reserve changes over time in children with type 2 diabetes, based on the results of a natural history study of 66 children.

By studying the natural history of type 2 diabetes in children, the researchers hope to identify predictors of changes in insulin secretion that could lead to new treatments aimed at delaying β-cell failure.

Hemoglobin A_{1c} and insulin dose differed between children who were nonacidotic and antibody negative at presentation, those who had diabetic ketoacidosis but were antibody negative at presentation, and those who were nonacidotic but antibody positive at presentation. HbA_{1c} and insulin dose changed significantly over time in a complex curvilinear manner, said Marcia Hernandez, a third-year medical student at the Philadelphia College of Osteopathic Medicine, who presented the results at the annual meeting of the Eastern Society for Pediatric Research.

Ms. Hernandez, Dr. Lorraine E. Levitt Katz, and their colleagues at the Children's Hospital of Philadelphia recruited 66 children (55% girls, mean age 14 years) with type 2 diabetes between 1998 and 2002. The children were presumptively diagnosed with type 2 diabetes based on clinical features—obesity (body mass index greater than 85% for age and gender), acanthosis nigricans, and a family history of type 2 diabetes. Children were treated with metformin and/or insulin.

The researchers measured HbA_{1c}, insulinlike growth factor–binding protein-1 (IGFBP-1), C-peptide, and the dose of exogenous insulin. Measurements were taken at diagnosis and at follow-up assessments every 3-6 months for 4 years.

In addition, pancreatic autoantibodies were measured at diagnosis. In accordance with the standard of care at the time, glutamic acid decarboxylase–65(Gad-65) antibodies were the only pancreatic antibodies measured at the time of diagnosis of diabetes, until 2001. After 2001, islet cell autoantigen 512 and insulin antibodies were measured in addition to Gad-65.

IGFBP-1 is secreted by the liver and circulates in the blood. Secretion is acutely inhibited by insulin. Higher fasting levels of IGFBP-1 have been found in individuals with type 1 diabetes, compared with those with type 2 diabetes. C-peptide reflects the amount of insulin produced by the body.

The children were divided into three groups: those who were nonacidotic and antibody negative at presentation (46), those who had diabetic ketoacidosis but were antibody negative at presentation (13), and those who were nonacidotic but antibody positive at presentation (7).

Those who presented with antibodies were younger at presentation. At baseline, HbA_{1c} was strongly correlated to C-peptide and insulin dose. Insulin dose was strongly correlated to IGFBP-1 and C-peptide.

All of the groups had elevated HbA_{1c} levels at baseline; those who had diabetic ketoacidosis but were antibody negative had the highest levels. HbA_{1c} in all groups reached the lowest levels between 6 months and 1 year, and then began steadily rising.

Group Characteristics

	Nonacidotic, antibody negative at presentation (n = 46)	Acidotic, antibody negative at presentation (n = 13)	Nonacidotic, antibody positive at presentation (n = 7)
% Male	41	54	57
% Black	80	100	43
% White	13	0	43
% Hispanic	2	0	0
Age at diagnosis	15 yr.	13 yr.	12 yr.
Body mass index	36 kg/m^2	33 kg/m^2	28 kg/m^2

Source: Ms. Hernandez

Teens With Bedroom TVs Have Poorer Diets, Are Less Active

BY NANCY WALSH
New York Bureau

Adolescents who had televisions in their bedrooms had less physical activity, poorer dietary habits, and worse school performance than did adolescents without bedroom televisions, investigators from the University of Minnesota School of Public Health, Minneapolis, reported.

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Girls with bedroom TVs spent less time in vigorous activity and ate fewer vegetables.

Daheia J. Barr-Anderson, Ph.D., and colleagues found that nearly two-thirds of adolescents aged 15-18 years had a television (TV) in their bedrooms, despite the fact that the American Academy of Pediatrics recommends against this.

A total of 781 ethnically and socioeconomically diverse teens participated in Project Eating Among Teens (EAT), answering questions about their TV viewing, dietary and exercise habits, and school performance.

Analysis of the data revealed that factors associated with the presence of a bedroom TV included gender, race/ethnicity, and socioeconomic status. The prevalence of a TV in the bedroom among boys was 68%, compared with 58% among girls, and was highest among black youths at 82%, and lowest among Asians at 39%.

Among those from households with highest socioeconomic status, the prevalence was 39%, compared with 61% among those from households with low socioeconomic status (Pediatrics 2008;121:718-24).

Girls with bedroom TVs spent less time in vigorous activity (4.2 hours/week vs. 5.2 hours/week, spent more time watching TV (20.7 hours/week vs. 15.2 hours/week), and had lower vegetable intake (1.7 servings/day vs. 2 servings/day) and higher sweetened beverage consumption (1.2 servings/day vs. 1 serving/day) than did girls without bedroom TVs. They also participated in fewer family meals (2.9/week vs. 3.7/week).

Boys with bedroom TVs spent more time overall watching TV (22.2 hours/week vs. 18.2 hours/week), had lower fruit intake (1.7 servings/day vs. 2.2 servings/day), and participated in fewer family meals than did those without TVs (2.9/week vs. 3.6/week). They also had lower grade point averages (2.6 compared to 2.9). These differences were all statistically significant.

The investigators suggested that "refraining from placing a TV in adolescents' bedrooms may be a first step in helping to decrease screen time and subsequent poor behaviors associated with increased TV watching."

HbA_{1c} Identifies Children's Diabetes, Impaired Glucose

BY KERRI WACHTER
Senior Writer

PHILADELPHIA — Testing for hemoglobin A_{1c} could be an effective means of screening children not only for type 2 diabetes but also for impaired glucose tolerance, according to the results of a study of 74 children.

"Type 2 diabetes was effectively excluded by hemoglobin A_{1c} [HbA_{1c}] below 6.0%," said Dr. Alisa Schiffman of Children's Hospital of Philadelphia. Using this cutoff, HbA_{1c} was 100% sensitive and 80% specific in identifying children with type 2 diabetes.

In its 2008 position statement on the standards of medical care in diabetes, the American Diabetes Association stated that the fasting plasma glucose test is the preferred means to diagnose diabetes in children and in nonpregnant adults. The use of the Hb A_{1C} level for the diagnosis of diabetes is not recommended at this time (Diabetes Care 2008;31:S12-54).

However, "oral glucose tolerance tests and fasting plasma glucose have logistical challenges in children" because of the overnight fasting requirement and multiple blood draws, Dr. Schiffman said at the annual meeting of the Eastern Society for Pediatric Research.

HbA_{1c} testing can be performed with just a finger stick at any time of day regardless of fasting status.

The researchers performed a retrospective chart review of 74 children (mean age 12 years) who were referred for the evaluation of type 2 diabetes. The children were assigned to one of three groups based on their fasting plasma glucose level and 2-hour plasma glucose level.

There was a significant trend for increasing HbA_{1c} along the continuum from normal glucose tolerance to type 2 diabetes. Mean HbA_{1c} was 5.4% for those with normal glucose tolerance, 6.1% for those with impaired glucose tolerance, and 6.8% for those with type 2 diabetes.

A threshold HbA_{1c} of 5.7% was 91% sensitive and 80% specific in identifying children with abnormal glucose tolerance.

"Hemoglobin A_{1c} can be used to screen for type 2 diabetes and even impaired glucose tolerance [in children]," said Dr. Schiffman.

Likewise, there was a significant trend for decreasing mean β-cell function along the continuum from normal glucose tolerance to impaired glucose tolerance to type 2 diabetes.

Children with normal glucose tolerance had a fasting plasma glucose level less than 100 mg/dL and a 2-hour plasma glucose less than 140 mg/dL. Children with impaired glucose tolerance had a fasting plasma glucose level between 100 mg/dL and 126 mg/dL and a 2-hour plasma glucose between 140 mg/dL and 200 mg/dL.

Children with type 2 diabetes had a fasting plasma glucose level of at least 126 mg/dL and a 2-hour plasma glucose greater than 200 mg/dL. In all, 51 children had normal glucose tolerance, 16 had impaired glucose tolerance, and 7 had type 2 diabetes.