The Phenotype of Pediatric Type 1 Diabetes Is Changing

By Kate Johnson
Montréal Review

COPENHAGEN — Type 1 diabetes, traditionally considered a disease of wasting, is now frequently diagnosed in children who are overweight, according to Dr. Ingrid M. Libman, assistant professor of pediatric endocrinology at the University of Pittsburgh.

“The problem now is that the lines are blurred between what we thought was clearly defined as type 1 and 2 diabetes,” Dr. Libman said in an interview. “The distinction can no longer be made based on phenotype.”

She presented at the annual meeting of the European Association for the Study of Diabetes showed that over 23 years of observation (1979-2002), the overall prevalence of obesity and type 2 diabetes in children with newly diagnosed insulin-treated diabetes (traditionally considered type 1 disease) has more than tripled—doubbling in African American children (from 30% to 62%) and quadrupling in white children (from 6% to 26%).

In some cases we now have no clear way of distinguishing what kind of diabetes someone has based on how they look,” she said, adding that acanthosis nigricans, traditionally associated with type 2 diabetes, is now commonly found in overweight patients with type 1 disease as well.

Subjects diagnosed in period I (1979-1989) and period II (1990-98) were tested for beta-cell autoimmunity. In those with autoimmunity, found in overweight patients with type 1 disease as well.

The problem now is that the lines are blurred between what we thought was clearly defined as type 1 and 2 diabetes.”

Parents can boost the caloric density of the diet or increase the child’s total intake by increasing the concentration of formula if appropriate, by adding energy boosters to meals, by using high-calorie foods, or by adding oral supplements.

Foods that can be used to increase energy intake include powdered skim milk, instant breakfast products, baby cereals, instant mashed potatoes, wheat germ, peanut butter, fruits canned in heavy syrup, vegetables frozen in cream or cheese sauces, or meats cooked in oil with breading or with added sauces or gravies.

Conspiration is a very common and troublesome problem for children with CP and it’s significantly mediated by muscle tone. Many parents don’t want to use medications, but it is warranted in many situations. To estimate if the fluid intake is adequate, the rule of thumb used is based on actual body weight following these guidelines:

- For the first 10 kg of the child’s weight, fluid intake should be 100 cc/kg.
- For the next 11-20 kg of the child’s weight, fluid intake should be 50 cc/kg.
- For the amount of weight exceeding 20 kg, fluid intake should be 25 cc/kg.

For example, 100% of the estimated fluid needs for a 32-kg child would equal approximately kg: specifically, (100 x 10 = 1000 cc) for the first 10 kg, plus (50 x 10 = 500 cc) for the next 10 kg, plus (25 x 12 = 300 cc) for the remaining 12 kg.

Bone mineral density is markedly reduced in nonambulatory children with CP placing them at increased risk for fractures and osteoporosis.

Therefore, the clinician should review the adequacy of micronutrients in the child’s diet, specifically calcium. Supplementing the diet to meet the dietary reference intake standard for calcium is essential, and may be required for other nutrients as well.

Tube feedings are a consideration for many children affected by CP, especially for those with the more involved forms. Tube feedings are considered when airway protection is necessary, but failure to thrive also should raise a red flag. During the first 3 years of a child’s life, adequate nutrition is critical for the expected growth in brain cells.

Parents are understandably fearful of tube feedings and often feel they have failed in nurturing their child. Pediatricians can help parents understand that tube feedings allow for assurance that the necessary nutrition is safely delivered. At the same time, parents and therapists can work on skill development necessary for eating.

Providing nutrition services and promoting healthy behaviors in children with CP are tasks best suited to an interdisciplinary team and can be carried out in a variety of health care, school, vocational, home, and community settings. It is the responsibility of the family, in concert with the health care team members, to promote nutrition care planning.

An international leader in the fields of research, treatment, and education for disorders and injuries of brain and spinal cord, Kennedy Krieger Institute provides a wide range of services to over 12,000 children each year with developmental concerns mild to severe. For more information, visit www.kennedykrieger.org.

The study may have had type 2 diabetes or type 1b—an insulin-dependent, nonautoimmune form of the disorder.

Dr. Libman said physicians might frequently face a new presentation of diabetes in which patients may actually have a confusing combination of characteristics.

“We are asking is that some kids may have characteristics of both type 1 and type 2 disease processes going on. If they are autoimmunepositive, they have type 1a diabetes; however, if they are also overweight and have acanthosis nigricans, you could argue that another insulin resistant condition. Although establishing a clear diagnosis may often seem essential to physicians, Dr. Libman said that in the end, it might not be.”

“If the child is really sick, does it matter if they have type 1 or 2? You will need to treat them with insulin. If they are overweight, not sick, and diagnosed randomly, you can likely control their blood sugars with lifestyle and metformin. If their antibodies come back positive, it doesn’t mean you should start insulin—but you may need to monitor them more carefully, and you may have a lower threshold for starting it.”

Overweight in children may not only make them more susceptible to developing type 2 disease, but in those who are genetically susceptible, it may also increase their risk or accelerate the development of type 1 disease—the concept of “double diabetes,” she said.

“Genetically, they have the genes to develop diabetes at some point (or not), but if they become overweight, they may have more chance. Weight makes the beta cell harder and may trigger an increased immune response—this is known as the ‘accelerator hypothesis,’” she said.

First-degree relatives of patients with type 1 diabetes have a greater risk of developing the disorder, making overweight particularly dangerous in this group, she commented.