

# Insulin for Toddlers With Difficult Diabetes

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**E**ffective control of blood glucose in toddlers with diabetes can be difficult for a variety of reasons. Unpredictable eating patterns with changes in the timing of meals and quantities eaten, as well as different levels of activity, are the major factors that impact on blood glucose levels at this age.

The Diabetes Control and Complications Trial showed the importance of good glycemic control in reducing complications of diabetes (1). Twice-daily insulin regimens with an intermediate-acting insulin such as isophane often result in unacceptable hypoglycemia in young children. We wish to describe two patients <3 years of age treated with a premeal short-acting analog insulin in conjunction with glargine insulin before bed.

The first patient was 15 months of age at the time of diagnosis. His initial HbA<sub>1c</sub> was 10.2%. He was started on isophane insulin (Insulatard) twice daily. His blood glucose control was erratic on this regimen, with blood glucose varying from 2.0 to 25 mmol/l (36 to 450 mg/dl.) and frequent hypoglycemic episodes.

He was then switched to Novomix 30

insulin, a 30% short-acting analog, in the morning, and his Insulatard was continued at a lower dose in the evenings. His glycemic control did not improve, and he continued to experience wide fluctuations in blood glucose levels.

Soon after this, his control became even more difficult as a result of variable eating patterns and he was started on Novorapid, a fast-acting insulin analog, three times a day immediately after his meals with glargine at bedtime. Soon after this change, his HbA<sub>1c</sub> fell from 10.2 to between 6.1 and 7.2% and there were fewer fluctuations in blood glucose and less hypoglycemic episodes.

The second patient was 18 months at the time of diagnosis. He was started on twice daily insulin, using isophane insulin (Insulatard) with a total dose of 0.5 units · kg<sup>-1</sup> · day<sup>-1</sup>. Blood glucose control proved very difficult; blood glucose ranged from 1.9 to 25 mmol/l (34 to 450 mg/dl) with no obvious patterns. He had numerous severe hypoglycemic episodes despite having no fast-acting insulin or requiring hospital admission. His HbA<sub>1c</sub> levels were between 8.3 and 9%. He was started on the same insulin regimen as the

first patient, without other changes, and his swings in blood glucose level settled dramatically with the disappearance of his hypoglycemic episodes and very high blood glucose levels. His HbA<sub>1c</sub> improved to levels between 7.5 and 8%.

Both of these families with toddlers had problems with rapid fluctuations in blood glucose levels on conventional insulin regimens. Because of hypoglycemic episodes, it was difficult to introduce much fast-acting insulin. Parents with small children often feel under pressure because of concerns about getting adequate carbohydrates in at mealtimes, and behavioral eating problems are common. The ability to give insulin after meals helps, as the timing of meals is much less critical. Also, there is the possibility for parental adjustment of the dose of fast-acting insulin analog on the basis of quantity of food eaten at each meal. Although this type of insulin regimen is widely used in older children and adults, there are virtually no descriptions of toddlers treated with glargine insulin.

## References

1. The Diabetes Control and Complications Trial Research Group: The effect of intensive treatment on the development and progression of long-term complications in insulin dependent diabetes mellitus. *N Engl J Med* 329:977–986, 1993

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Received and accepted for publication on 10 March 2004.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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