

This Week's Question

What is Insulin Detemir?

1. A new short acting insulin with no peak similar to Humalog
2. A new long acting insulin with no peak
3. An intermediate acting insulin similar to NPH
4. An inhaled insulin
5. A Oral insulin
6. A buccal insulin

Two long-acting insulin analogs have been developed for use as "basal" components of insulin treatment regimens: glargine and detemir. (Insulin glargine has US Food and Drug Administration [FDA] approval and is marketed under the trade name *Lantus*. Insulin detemir has received an "Approvable Letter" from the FDA indicating that the agency wants some final issues resolved before granting final approval.)

Insulin glargine has a lower isoelectric point than human insulin, leading to precipitation at the injection site. Insulin detemir has a fatty acid side chain that allows albumin binding, primarily resulting in association with tissue-bound albumin at the injection sites. Both of these analogs lead to prolongation of action. There also is evidence of greater reproducibility of effect compared with older insulin preparations, which is of particular benefit in decreasing the frequency of nocturnal hypoglycemia after administration at bedtime. Insulin glargine has received wide recognition as being of benefit in the treatment of both type 1 and type 2 diabetes, with duration of action approximating 24 hours in most persons. When comparing glargine, NPH, ultralente, and continuous subcutaneous insulin infusion (CSII), NPH shows an early peak of action; ultralente also has a peak, although broader; and CSII and glargine show flat and prolonged curves of insulin action.

It should be noted that the data for use of insulin glargine at bedtime rather than before dinner or at other points are not compelling. Furthermore, the mean durations of action of insulins detemir and glargine are 14 and 22 hours, respectively, so that administration twice daily is advisable for a substantial number of persons with type 1 diabetes given the latter agent. This may be particularly important in patients with type 1 diabetes treated with rapid-acting insulin analogs without regular insulin at dinner. With insulin detemir, administration twice daily is definitely required for persons with type 1 diabetes. The analog does show "peakless" action, and studies comparing NPH with insulin detemir in patients with type 1 diabetes show greater variability of fasting glucose and a 28% to 34% higher frequency of nocturnal hypoglycemia with NPH than with the analog.^[1,2]

A study presented at the 18th International Diabetes Federation Congress in Paris in August 2003 reported that among 54 persons with type 1 diabetes given NPH, detemir, or glargine insulin on 4 occasions with glucose infused to maintain euglycemia, the coefficient of variation of the glucose infusion was 46% to 68%, 23% to 27%, and 36% to 48%, respectively, suggesting that the degree of within-subject variability was least with detemir.^[3] In 505 persons with type 2 diabetes treated with insulin detemir vs NPH for 6 months, fasting glucose was similar at 175 vs 173 mg/dL, with lower within-persons variability of 23 mg/dL vs 25 mg/dL, and lesser weight gain of 0.9 vs 1.6 kg. However, A1C showed significantly greater decrease with NPH in this study (0.26% with detemir vs 0.36% with NPH).^[4]

Still uncertain is whether rapid-acting insulin analogs can be mixed with insulin detemir for coadministration. If possible, this might decrease the number of injections required in combination regimens from 5 (2 doses of detemir and 3 doses of insulin aspart or lispro) to 3 (2 doses of detemir mixed with insulin aspart or lispro before breakfast and dinner, and a third dose before lunch of the rapid-acting insulin alone).

References

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2. Vague P, Selam JL, Skeie S, et al. Insulin detemir is associated with more predictable glycemic control and reduced risk of hypoglycemia than NPH insulin in patients with type 1 diabetes on a basal-bolus regimen with premeal insulin aspart. *Diabetes Care*. 2003;26:590-596. [Abstract](#)
3. Heise T, Nosek L, Draeger E, Bilimann Ronn B, Kaptiza C, Heinemann L. Lower within-subject variability of insulin detemir compared to NPH insulin and insulin glargine in subjects with type 1 diabetes. Program and abstracts of the 18th International Diabetes Federation Congress; August 25-29, 2003; Paris, France. Abstract 12.
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