

Chapter 8

Insulin: Types and Activity



WHY ARE INSULIN SHOTS NEEDED?

- Not enough insulin is made in the pancreas of a person with type 1 diabetes.
- Insulin can't be taken as a pill because it would be destroyed by stomach acid.
- People with type 2 diabetes who have ketones or very high blood sugars also usually take insulin shots, at least in the beginning.

THE THREE TYPES OF INSULIN ARE:

- 1 **“rapid-acting”** (Humalog, NovoLog, Apidra and Regular)
 - Humalog, NovoLog and Apidra are more rapid-acting than Regular; they peak earlier and do not last as long as Regular insulin.
 - Humalog, NovoLog, Apidra and Regular insulins are clear.
- 2 **“intermediate-acting”** (NPH, Lente®)
 - Most intermediate-acting insulins are cloudy and must be mixed to get the same dose with each shot.
 - The bottles should be turned gently up and down 20 times before drawing the insulin into the syringe.

- The NPH and Lente insulins peak during the day when food is being eaten.

- 3 **“long-acting”** (Lantus® [insulin glargine] and Levemir® [insulin detemir]; see table)

- These are the first true basal (flat-acting, no peak) insulins that last approximately 24 hours.
- They are clear insulins (don't confuse with rapid-acting insulins).
- Levemir must be drawn into the syringe alone (cannot be mixed with any other insulin).
- Best given in the bottom (buttocks, seat) to make sure the insulin is given into fat or into a pinch of fat.

**** Insulin must be stored so that it does not freeze or get over 90° F (3.2° C) because it will spoil.**

HOW AND WHEN IS INSULIN USED?

Most people take two or more shots of insulin each day.

RAPID-ACTING INSULIN USES:

- Rapid-acting insulins are used to stop the rise of the blood sugar after eating food.
- The rapid-acting insulin can be mixed with the intermediate-acting insulin to give before breakfast and dinner.
- If Humalog, NovoLog or Apidra is used, it should be taken 10-15 minutes before the meal (unless the blood sugar is below 80 mg/dl [4.5 mmol/L]).
- If Regular insulin is being used, the shot is usually taken 30 minutes before meals.
- For toddlers: Humalog, NovoLog or Apidra can be given after the meal. That way, the dose can be adjusted to fit the amount of food eaten.

- Some people also take a shot of rapid-acting insulin before lunch or the afternoon snack.
- Rapid-acting insulins are also used to “correct” a blood sugar level that is too high (see Correction Insulin Dose: Chapter 21).

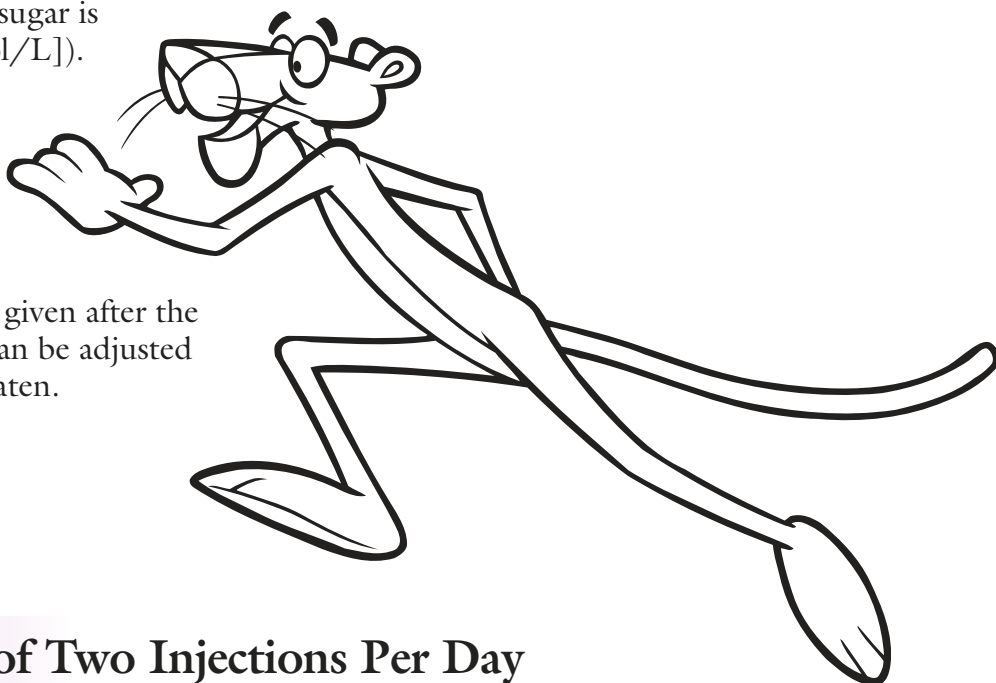
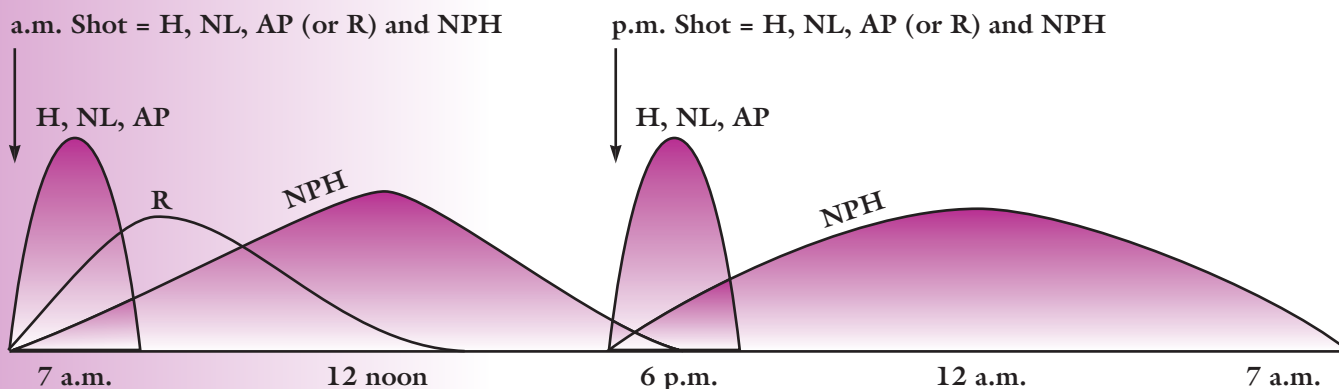


Figure 1: Example of Two Injections Per Day



Many people receive two injections per day. NPH may be used as the intermediate-acting insulin in the a.m. They can then take a rapid-acting insulin plus Lantus (see Figure 1-B) or NPH prior to dinner.

INTERMEDIATE-ACTING INSULIN USE:

- The intermediate-acting insulins (NPH and Lente) are longer-acting peak insulins. They are usually taken twice daily in a syringe with a rapid-acting insulin.
- Intermediate-acting insulins taken at dinner or bedtime have a peak during the night so that low blood sugars are more common compared to when a basal (long-acting) insulin is used.
- People who take three shots per day sometimes take their NPH at bedtime rather than at dinner to help it last through the night.



LONG-ACTING INSULIN USE:

• When using insulin glargine (Lantus) or insulin detemir (Levemir):

- the dose is usually taken alone without any other insulin in the syringe (ask your doctor). (Then Humalog, NovoLog or Apidra are taken before each meal.) See Figure 1.
- it is best to take the insulin in the buttocks (seat) or to give the insulin into a pinch of fat in the stomach (to make sure the insulin is going into the fat).
- the action is very flat and the chance for a bad low blood sugar, particularly during the night, is reduced.
- it works as a basal insulin, which prevents the liver from releasing sugar (and ketones) into the blood.

- NPH (an intermediate-acting insulin) is sometimes taken in the morning, particularly if a noon shot cannot be taken. It can be given in the same syringe with the rapid-acting insulin. See example in Figure 1.
- the dose is judged on the basis of the morning blood sugar no matter when the Lantus or Levemir shot is taken (a.m., lunch, dinner or bedtime; all times work - though one consistent time must be chosen). If the blood sugar is consistently above the desired range (Chapter 7) at breakfast, the dose is increased. If below the lower level, the dose is decreased.

Figure 2: Use of Lantus or Levemir Insulin

Two of the most common methods of using Lantus or Levemir insulin:

Figure 1-A. In the first example, Lantus or Levemir is used as the basal insulin (given in the a.m., or at dinner or at bedtime) and a rapid-acting insulin is taken prior to meals and snacks.

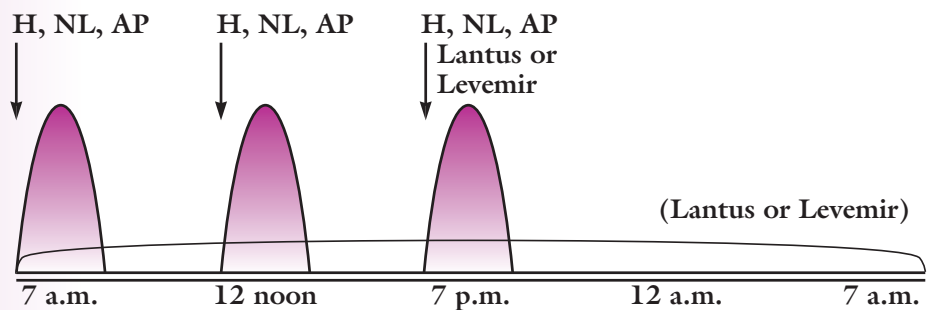


Figure 1-B. In this second example, NPH and a rapid-acting insulin are taken in one syringe in the a.m. A rapid-acting insulin is taken alone at dinner. Lantus or Levemir (alone in the syringe) is taken consistently either in the a.m., at dinner, or at bedtime.

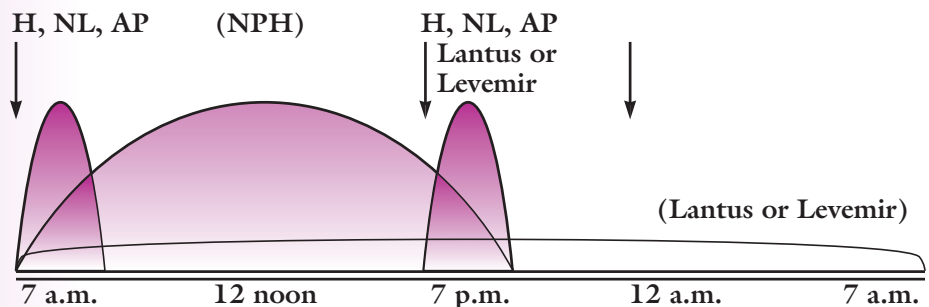
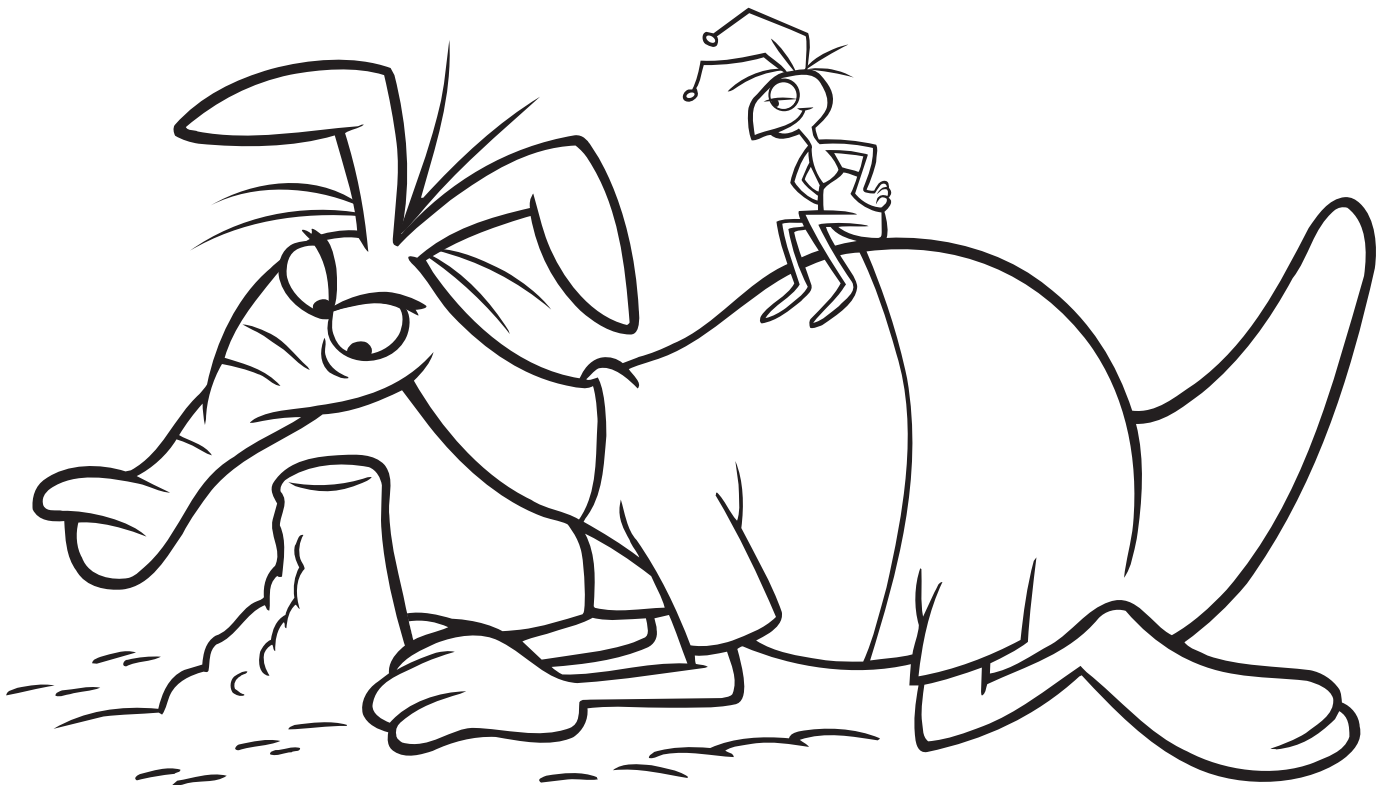
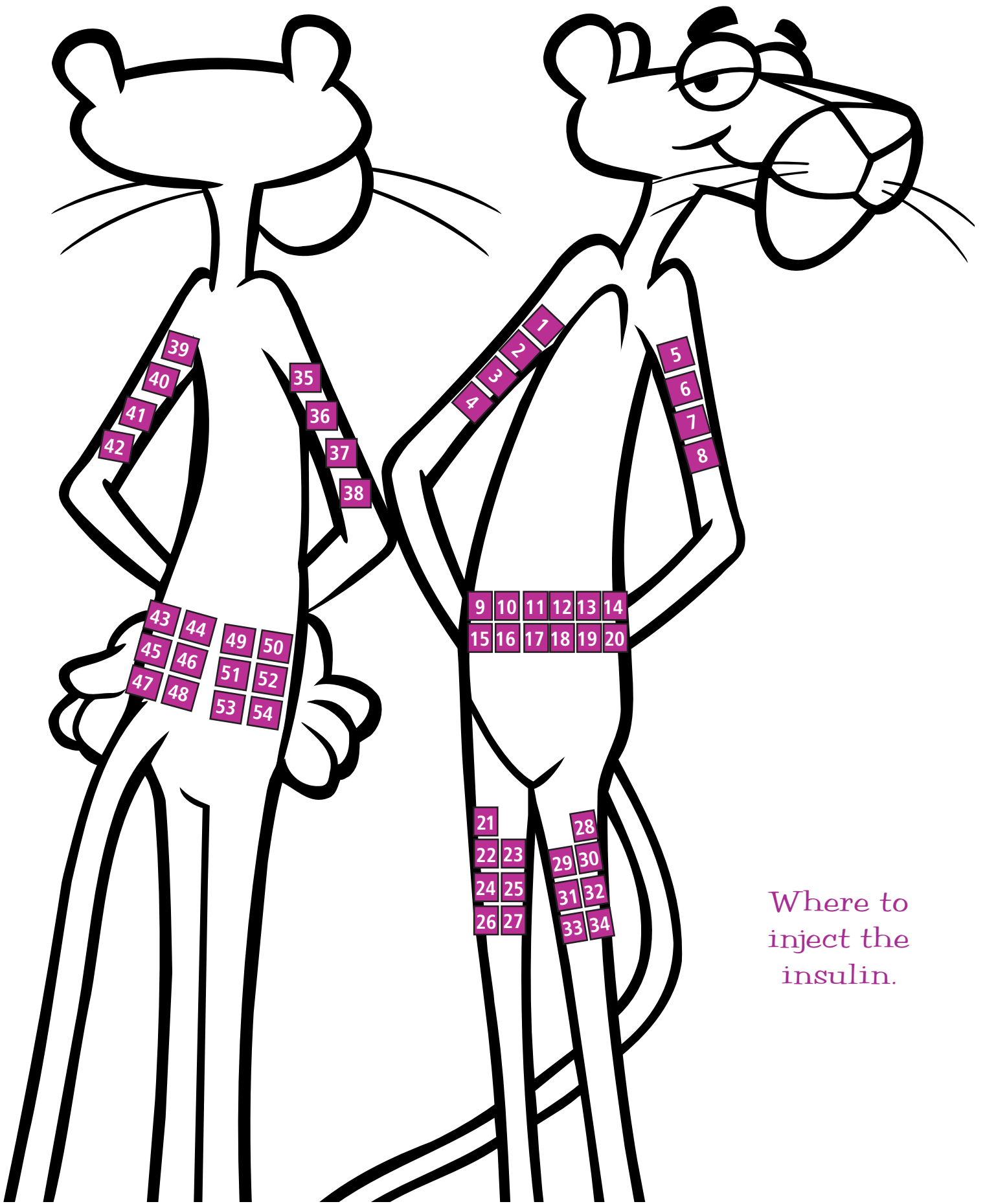


Table 1
Insulin Activities

| Type of Insulin | Begins Working | Main Effect | All Gone |
|---------------------------------|----------------|----------------------------------|-------------|
| RAPID-ACTING and REGULAR | | | |
| Humalog/NovoLog/Apidra | 10-15 minutes | 30-150 minutes | 5 hours |
| Regular | 30-60 minutes | 2-4 hours | 6-9 hours |
| INTERMEDIATE-ACTING | | | |
| NPH | 2-4 hours | 6-8 hours | 12-15 hours |
| LONG-ACTING | | | |
| Lantus (insulin glargine) | 1-2 hours | 2-24 hours | 24 hours |
| Levemir (insulin detemir) | 1-2 hours | 2-22 hours | 22-24 hours |
| PRE-MIXED INSULINS | | | |
| Lente | 1-2 hours | 6-12 hours | 15-24 hours |
| NPH/Regular (R) mix | 30-60 minutes | R = 2-4 hours NPH = 6-8 hours | 12-15 hours |





Where to
inject the
insulin.