

# Insulin Action

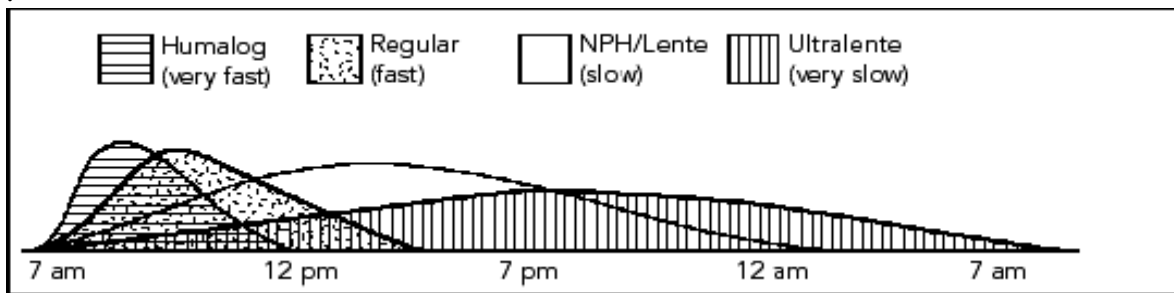
There are several types of insulin. They are classified by how long they act: very fast, fast, slow and very slow acting. Each type of insulin has a certain time period in which it works. In order to understand insulin action more completely, it is helpful to know the onset, peak and duration of the insulin you take.

Onset refers to when the insulin starts to work

Peak refers to when the insulin starts to work best

Duration refers to how long the insulin works

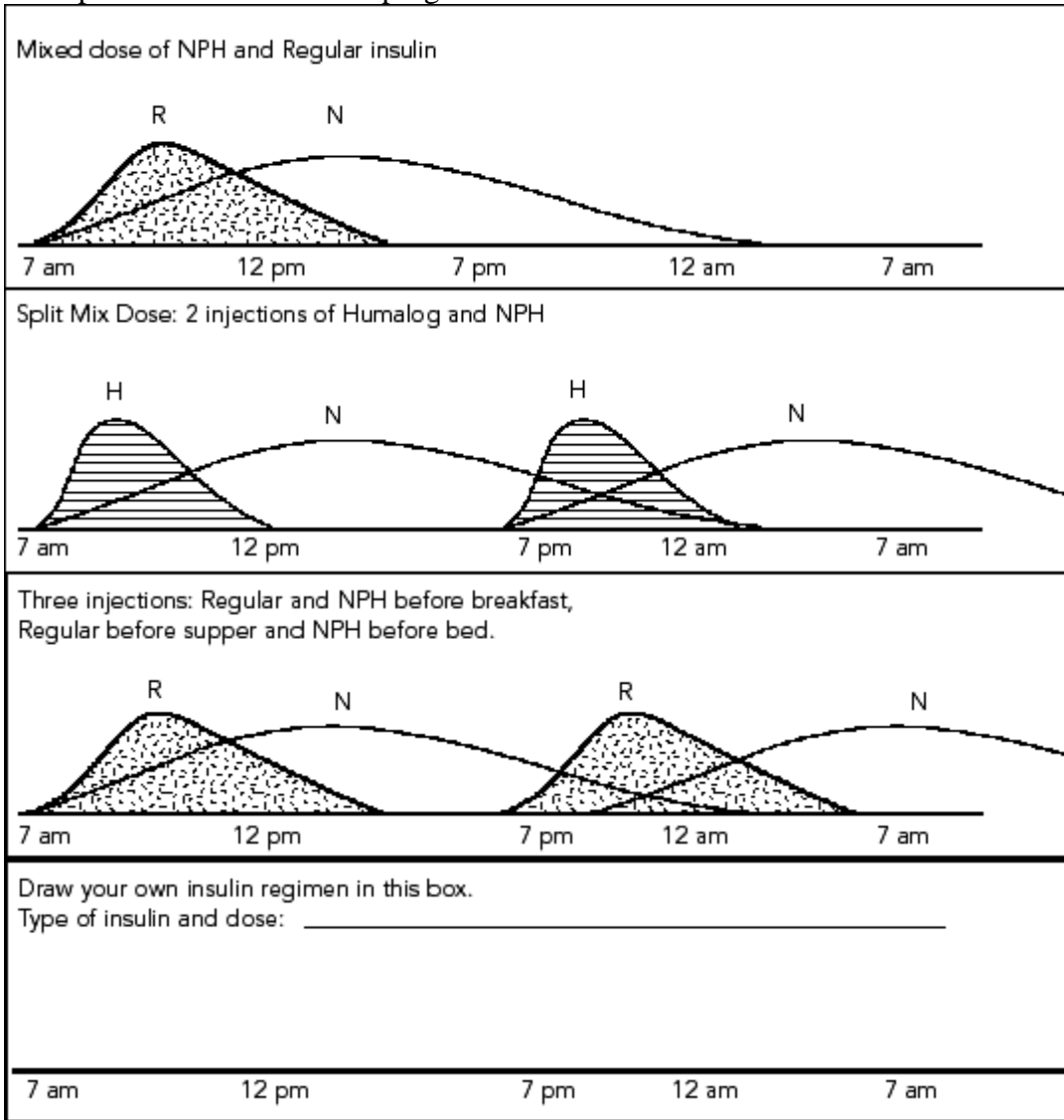
The pictures below show the examples of common insulin regimens with the action curves for different human insulins. **Lantus® is a very long acting insulin, with no peak over 24 hours. It is usually used in combination with diabetes pills or a fast acting insulin such as Humalog® or regular insulin.** The charts below describe the insulin action of the other types of insulin most commonly used in treating diabetes.



## Types of insulin

	Onset	Peak	Effective Duration
<b>Rapid-acting</b> Insulin aspart (Novolog) Insulin lispro (Humalog) Insulin glulisine (Apidra)	10 to 30 minutes	½ to 3 hours	3 to 5 hours
<b>Short-acting</b> Regular	30 – 60 minutes	1 to 5 hours	8 hours
<b>Intermediate-acting</b> NPH Lente	1 to 4 hours " "	4 to 12 hours 4 to 15 hours	14 to 26 hours 16 to 26 hours
<b>Long-acting, peaking</b> Ultralente	4 to 6 hours	8 to 30 hours	24 to 36 hours
<b>Long-acting, peakless</b> Insulin glargine (Lantus)	1 to 2 hours	Flat, basal-like	24 hours

Example of insulin treatment programs:



## Helpful Hints in the Use of Insulin

How is insulin stored?

Unopened bottles of insulin should be stored in the refrigerator and are good until the expiration date on the box and/or bottle. Bottles of insulin that you are using can be stored at room temperature (59-86 degrees Fahrenheit) for about 1 month (28 - 30 days). The strength of the insulin may be altered after that. Do not use insulin after it has been kept at room temperature for longer than a month. Insulin should never be frozen. Keep insulin bottle(s) away from direct sunlight or heat and in a cool, dry place. Avoid exposing the bottles to temperature extremes (less than 36 degrees Fahrenheit or more than 86 degrees Fahrenheit).

Has my insulin gone "bad"?

Don't use regular insulin or Humalog if it becomes cloudy in appearance and/or is expired. Don't use NPH or Lente insulin if it becomes clumped or crystallized, or if the bottle becomes frosted, or if it is expired.

What if my insulin needs to be changed?

Changes in type and/or source of species may result in the need for a change in dose. Any change of insulin should be made only under medical supervision.

What about mixing insulins?

Humalog and any slow-acting insulin (NPH, Lente, Ultralente) - inject within 5 minutes of mixing.

Regular and NPH – With diabetes educator, MD or home health approval may be stored in pre filled syringes for up to 21 days in refrigerator. Store with needle up and remember to roll or turn syringe side to side 20 times before administering.

Regular and Lente - inject within 5 minutes of mixing. It is best not to mix and store for later use. Regular and Ultralente - mix and inject within 5 minutes or inject the Regular and Ultralente in two different injections. Be consistent with your choice.

# INSULIN

Insulin	Effective Duration(hours)	Onset	Peak
<b>Rapid acting insulins:</b> <b>Insulin aspart (Novolog)</b> <b>Insulin lispro (Humalog)</b> <b>Insulin glulisine (Apidra)</b> Fast acting and short duration. Give immediately before the meal. Can be mixed with NPH, but must give immediately after mixing.	5 to 15 minutes.	1 to 1.5 hour	2-4 hours
<b>Regular (R)</b> Short Acting. Give 30 minutes prior to the meal.	.5. to 1 hour	2 to 3 hours	3 to 6 hours
<b>NPH (N)</b> intermediate acting	2 to 4 hours	4 to 10 hours	10 to 16 hours
<b>Lente (L)</b>	3 to 4 hours	4 to 12 hours	12 to 18 hours
<b>Ultralente (U)</b> Slow onset and long acting peaking is individual	6 to 10 hours	usually 6 to 16 hours (varies)	18 to 20 hours
<b>Insulin Glargine (Lantus)</b> A clear fast acting insulin that last 24 hours should not be mixed with other insulins.	1.1 hours	No Peak	24 hours
<b>Insulin Mixtures</b>			
<b>Humulin 70/30</b> (70% NPH and 30 % Regular) Should be given 30 min before meals	.5 to 1 hour for R and 2 to 4 hours for N	2 to 3 for R 4 to 6 for N	3 to 16 hours
<b>Humulin 50/50</b> (50% NPH and 50% Regular) Give 30 minutes before meals	“	“	“
<b>Humalog Mix 75/25.</b> (75% lispro protamine suspension and 25% Lispro) In Pen only. Give 15 min before a meal.	5 to 15 minutes	Humalog in 1 to 1.5 hours Lispro suspension 2- to 4 hours	1 to 18 hours

## Lantus ® (Glargine)

Many people with diabetes require insulin for better blood glucose control. The insulin recommended for you will be based upon your eating schedule and daily activities. Each person's insulin program will be different. Lantus, a new type of insulin, might be right for you. It is approved for use in adults and children with type 1 diabetes and for adults with type 2 diabetes. It is not approved for use by pregnant women.

### How does it work?

Lantus is considered a long acting insulin. This means it has a relatively constant action, with no peak over 24 hours. Because of this, Lantus may also be referred to as "basal" or "background" insulin. It is usually used in combination with diabetes pills or with fast acting insulin such as Humalog ® (Lispro) or regular insulin.

### What are the benefits of taking this insulin?

There may be less risk of hypoglycemia (low blood glucose.) In particular, you could expect less hypoglycemia at night, as compared to using NPH or Lente (intermediate acting insulins) twice a day.

### How do I take Lantus?

Lantus is injected like other insulins, into fat tissue under the skin, not into muscle. As with other insulins, you should rotate your site of injection. Lantus is given only at bedtime. It is clear in color and long acting. Caution should be used to avoid confusion with other clear, but short acting insulins.

### How much Lantus should I take?

Your healthcare team will recommend the correct dose for you. Adjustments in the dose will be based upon your blood glucose results. If you are already on one injection of intermediate-acting insulin, it will probably be a one-for-one unit exchange. If you are taking intermediate insulin twice a day, your dose of Lantus may be about 20% less than your current total dose of intermediate insulin.

### Are there any precautions?

The general precautions are listed below:

Lantus must not be diluted or mixed with any other insulin or solutions, because it may change the action of Lantus and the other insulins. You should inform your healthcare provider about any other medications you may be taking, since they may alter the way Lantus works in your body. Some patients in clinical studies stated the injection was slightly more uncomfortable as compared to other insulin, but it was not enough for them to stop using Lantus.

### How should I store Lantus?

Store unopened vials in the refrigerator. 10 ml vials can be kept at room temperature if kept out of direct light and if the temperature is less than 86 degrees F, for 28 days.