

# Insulin

Drug Type	Pharmacokinetics	Uses
<b>1.Ultra-short acting insulin</b>  <b>Insulin lispro</b> <b>insulin aspart</b>	<b>Monomeric</b> analogue to insulin. <b>Clear</b> solutions at neutral pH. Fast onset of action (5-15 min). Short duration of action (3-5 h). Reach peak level 30-90 min after injection. S.C. (5 -15 min before meal).	To control post-prandial hyperglycemia & emergency <b>ketoacidosis</b> . Before each meal. <b>I.V.</b> in emergency.
<b>2.Short acting insulin (regular insulin)</b>	Soluble crystalline zinc insulin (stability –shelf half life). <b>Clear</b> solutions at neutral pH. Forms <b>hexamers</b> . Onset of action 30-45 min (S.C.). Peak 2-4 h. Duration 6-8 h.	<b>I.V.</b> in emergency situations. Management of <b>ketoacidosis</b> . After surgery. During acute infection Like sepsis. 2-3 times/day. Control postprandial hyperglycemia & ketoacidosis. ✓ <b>Pregnancy</b> .
<b>3.Intermediate acting insulin</b>	<b>A)Isophane</b> (NPH) insulin (Humulin N, Novolin N): A Neutral Protamine Hagedorn insulin in phosphate buffer. <b>Turbid</b> suspension at neutral pH. Given S.C. only <b>not I.V.</b> Onset of action 1-2 h. Peak serum level 5-7 h. Duration of action 13-18 h. <hr/> <b>B)Lente insulin</b> (Humulin L, Novolin L), Mixture of: 30% semilente insulin (amorphous precipitate of insulin with zinc in acetate buffer). 70% ultralente insulin (poorly soluble crystal of zinc insulin). <b>Turbid</b> suspension at neutral pH. Given S.C. <b>not I.V.</b> Delayed onset of action (1-3 h). Peak serum level 4-8 h. Duration of action 13-20 h.	<b>Lente &amp; NPH</b> insulins are equivalent in activity. <b>Cannot</b> be used in ketoacidosis or emergency
<b>4. Long acting insulin</b> <b>Insulin glargine (lantus)</b>	Slow onset of action 2 h. <b>Clear</b> solution BUT forms precipitate ( <b>hexamer</b> ) at injection site. Absorbed less rapidly than NPH & Lente insulin. Given S.C. <b>not I.V.</b> Long acting insulins <b>Insulin glargine (lantus)</b> . Maximum effect after 4-5 h. Prolonged duration of action (24 h). Produce broad plasma concentration <b>plateau</b> (low continuous insulin level). <b>Once daily</b> .	

## Complications:

**Hypoglycemia**, In: Overdose of insulin, Excessive (unusual) physical exercise, missed meal.  
Hypersensitivity reactions.  
Lipodystrophy at injection site.  
Weight gain (due to anabolic effects of insulin).  
Insulin resistance.  
Hypokalemia.