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Comparison of Insulins

(Information specific to U.S. products)

This chart compares insulins in regard to duration, usual frequency, and cost. It also provides information on route of administration, stability of in-use products at room temperature, and place in therapy. Other available charts pertaining to insulin and injectable diabetes meds include *Initiation and Adjustment of Insulin Regimens for Type 2 Diabetes*, *How to Switch Insulin Products*, *Insulin Analogs vs Human Insulin*, and *Comparison of GLP-1 Agonists*.

--Information in chart is from U.S. product information (see footnote "a") unless otherwise specified.--

Insulin, Mfr	**Duration**	**Usual Frequency**	**Formulations/Cost[b]**	**Stability, in-use, room temp**
Rapid-acting: prandial human insulin analogs (rDNA origin). Onset 10 to 30 minutes (*Fiasp* faster).[2] For **type 1 diabetes**, recommended at each meal (three or more injections daily) with one or two injections of basal insulin.[4] For **type 2 diabetes**, once daily at largest meal plus basal insulin, or basal-bolus regimen (i.e., two or three times daily with meals plus basal insulin).[3] All are given via subcutaneous injection. *Humalog* 100 unit/mL, *NovoLog*, *Apidra*, and *Admelog* can be given subcutaneously via insulin pump. *Fiasp*, *Humalog* 100 unit/mL, *Apidra*, *NovoLog*, and *Admelog* can be given by intravenous infusion. All are clear and colorless.				
Admelog (insulin lispro), Sanofi-Aventis	3 to 5 hours[2]	Two to four times daily. Inject within 15 min before or immediately after a meal.	$233.50/10 mL vial $90.17/3 mL *SoloStar* pen $450.84/5 of 3 mL *SoloStar* pen	Vial, pen: 28 days Pump reservoir: 7 days IV infusion: 4 hours (0.1 to 1 unit/mL in NS)
Humalog (insulin lispro), Eli Lilly	3 to 5 hours[2]	One to three (or more) times daily.[3,4] Inject within 15 min before or immediately after a meal.	$274.70/10 mL vial $82.41/3 mL vial $510.45/5 of 3 mL cartridge ($102.09 each) $530.40/5 of 3 mL 100 unit/mL *KwikPen* or *KwikPen Junior* ($106.08 each) $424.32/2 of 3 mL *KwikPen* **200 unit/mL**	Vial, cartridge, pen: 28 days Pump reservoir (*Humalog* 100 unit/mL): 7 days IV infusion: 48 hours (0.1 to 1 unit/mL in NS)
NovoLog (insulin aspart), Novo Nordisk	3 to 5 hours[5]	One to three (or more) times daily.[3,4] Inject within 5 to 10 min before a meal.	$275.58/10 mL vial $511.88/5 of 3 mL *Penfill* cartridge $532.22/5 of 3 mL *FlexPen*	Vial, cartridge, pen: 28 days Pump reservoir: 6 days IV infusion: 24 hours (0.05 to 1 unit/mL in NS, others). Diluted 1:1 (U-50) or 1:9 (U-10) with *Insulin Diluting Medium for NovoLog*: 28 days

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Insulin, **Mfr**	**Duration**	**Usual Frequency**	**Formulations/Cost**[b]	**Stability, in-use, room temp**
Rapid-acting, continued				
Apidra (insulin glulisine), Sanofi-Aventis	5.3 hours (average)[2]	One to three (or more) times daily.[3,4] Inject within 15 min before a meal, or within 20 min after the start of the meal.	$255.11/10 mL vial $492.83/5 of 3 mL *SoloStar* pen	Vial, pen: 28 days Pump reservoir: 48 hours IV infusion: 48 hours (0.05 to 1 unit/mL in NS)
Fiasp (insulin aspart), Novo Nordisk Formulated with niacinamide for faster absorption.[7]	3 to 5 hours[2]	One to three (or more) times daily.[3,4] Inject at the start of the meal, or within 20 min after the start of the meal.	$275.58/10 mL vial $532.22/5 of 3 mL *FlexTouch* pen	Vial, pen: 28 days IV infusion: 24 hours (0.5 to 1 unit/mL in NS or D5W)
Short-acting (regular): regular human insulin of rDNA origin. Available OTC (100 unit/mL only). Onset about 30 minutes (<15 min for the 500 unit/mL concentration). Longer time to onset and longer duration than rapid-acting analogues. Regardless, lag time between regular insulin administration and meals may not be necessary for all patients with **type 2 diabetes**.[1] For **type 1 diabetes**, non-preferred alternative to rapid-acting insulin at each meal (three or more injections daily) with one or two injections of basal insulin.[4] For **type 2 diabetes**, once daily at largest meal plus basal insulin, or basal-bolus regimen (i.e., two or three times daily with meals plus basal insulin).[3] Can be given via subcutaneous injection, or intravenous infusion (100 unit/mL concentration only). Clear and colorless.				
Humulin R **100 units/mL**, Eli Lilly	About 4 to 12 hours	One to three (or more) times daily.[3,4] Inject about 30 min before the meal.	$148.70/10 mL vial $44.61/3 mL vial	Vial: 31 days IV infusion: 48 hours (0.1 to 1 unit/mL in NS)
Humulin R **500 units/mL**, Eli Lilly	Mean 21 hours	Two or three times daily before a meal. Inject about 30 min before the meal.	$1,487/20 mL vial $287.10/3 mL *KwikPen* $574.20/2 of 3 mL *KwikPen*	Vial: 40 days Pen: 28 days
Novolin R, Novo Nordisk	8 hours	One to three (or more) times daily.[3,4] Inject about 30 min before the meal.	$137.70/10 mL vial	Vial: 42 days IV infusion: 24 hours (0.05 to 1 unit/mL in NS, D5W, D10 with KCl 40 mEq/L)

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Insulin, Mfr	Duration	Usual Frequency	Formulations/Cost[b]	Stability, in-use, room temp
Intermediate-acting (NPH): human insulin (rDNA origin) isophane suspension. Available OTC. For **type 1 diabetes**, may be used as the basal component of basal-prandial regimens (analogs preferred).[4] An initial insulin option in **type 2 diabetes**, often as an add-on to oral agents.[3] As **type 2 diabetes** progresses, may be used with mealtime rapid- or short-acting insulin with the largest meal.[3] Onset 90 min.[2] Administered via subcutaneous injection. Appears cloudy.				
Novolin N, Novo Nordisk	Up to 24 hours[2]	Once or twice daily.[6]	$137.70/10 ml vial	Vial: 42 days
Humulin N, Eli Lilly	Up to 24 hours[2]	Once or twice daily.[6]	$148.70/10 mL vial $44.61/3 mL vial $471.30/5 of 3 mL *KwikPen*	Vial: 31 days Pen: 14 days
Long-acting: human insulin analogue (rDNA origin). For type 1 diabetes, preferred as the basal component of basal-prandial regimens.[4] An initial insulin option in type 2 diabetes, often as an add-on to oral agents.[3] As type 2 diabetes progresses, may be used with mealtime rapid- or short-acting insulin with the largest meal.[3] Administered via subcutaneous injection. Appears clear and colorless.				
Basaglar (insulin glargine), Eli Lilly	About 24 hours	Once daily at the same time each day.	$316.85/5 of 3 mL *KwikPen* $63.37/3 mL *KwikPen*	Pen: 28 days
Lantus (insulin glargine), Sanofi-Aventis	Median 24 hours (range 10.8 to >24 hours; sampling period 24 hours)	Once daily at the same time each day.	$255.97/10 mL vial $383.94/5 of 3 mL *SoloStar* pen $76.79/3 mL *SoloStar* pen	Vial, pen: 28 days
Levemir (insulin detemir), Novo Nordisk	7.6 to 24 hours (sampling period 24 hours)(dose-dependent; binds to albumin)	Twice daily, or once-daily with the evening meal or at bedtime.	$269/10 mL vial $403.50/5 of 3 *FlexTouch* pen	Vial, pen: 42 days
Toujeo (insulin glargine), Sanofi-Aventis **(300 units/mL)**	>24 hours[8]	Once daily at the same time each day. First injection may provide insufficient coverage; may take at least 5 days to see maximum effect.	$124.11/1.5 mL *SoloStar* pen $372.34/3 of 1.5 mL *SoloStar* $620.57/5 of 1.5 mL *SoloStar* $248.23/3 mL *Max SoloStar* pen $496.46/2 of 3 mL *Max SoloStar* pens	Pen: 56 days

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Insulin, Mfr	Duration	Usual Frequency	Formulations/Cost[b]	Stability, in-use, room temp
Ultra Long-acting: human insulin analogue (rDNA origin). Administered via subcutaneous injection. Consider for patients with severe or nocturnal hypoglycemia on another basal analogue, or with hypoglycemia risk factors,[9-11] or adherence problems. Appears clear and colorless.				
Tresiba (insulin degludec), Novo Nordisk	At least 42 hours	Once daily at any time of day.	$461.60/5 of 3 mL **100 units/mL** *FlexTouch* pen $553.92/3 of 3 mL **200 unit/mL** *FlexTouch* pen	Pen: 56 days
Insulin Mixes: human insulin analogue (rDNA origin) solution and protamine-crystallized human insulin analogue suspension (*NovoLog Mix 70/30*, *Humalog Mix 75/25*, *Humalog Mix 50/50*). Others are human insulin (rDNA origin) solution and human insulin isophane suspension. *Humulin 70/30* and *Novolin 70/30* available OTC. Generally not appropriate for type 1 diabetes due to lack of dose flexibiltiy.[6] Consider for elderly patients with type 2 diabetes due to ease of use.[6] Typically started after failure of basal insulin plus non-insulin.[3] Given before breakfast and supper, or before breakfast, lunch, and supper.[3] Administered via subcutaneous injection. Appears cloudy.				
NovoLog Mix 70/30 (70% insulin aspart protamine suspension/30% insulin aspart solution), Novo Nordisk	Up to 24 hours	Typically given pre-breakfast and pre-supper, or pre-breakfast, lunch, and supper.[3] Give within 15 minutes before the meal, or after starting to eat.	$285.83/10 mL vial $532.22/5 of 3 mL *Flexpen*	Vial: 28 days Pen: 14 days
Humalog Mix 75/25 (75% insulin lispro protamine suspension/25% insulin lispro solution), Eli Lilly	See *Humulin 70/30*	Typically given pre-breakfast and pre-supper, or pre-breakfast, lunch, and supper.[3] Give within 15 minutes before the meal.	$284.70/10 mL vial	Vial: 28 days
Humalog Mix 50/50 (50% insulin lispro protamine suspension, 50% insulin lispro solution), Eli Lilly	>22 hours	Typically given pre-breakfast and pre-supper, or pre-breakfast, lunch, and supper.[3] Give within 15 minutes before the meal.	$284.70/10 mL vial	Vial: 28 days

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Insulin, **Mfr**	**Duration**	**Usual Frequency**	**Formulations/Cost**[b]	**Stability, in-use, room temp**
Insulin Mixes, continued				
Humulin 70/30 (70% NPH/30% regular), Eli Lilly	Mean about 23 hours (range: 18 to 24 hours)	Typically given pre-breakfast and pre-supper, or pre-breakfast, lunch, and supper.[3] Give about 30 to 45 minutes before the meal.	$148.70/10 mL vial $44.61/3 mL vial $471.30/5 of 3 mL *KwikPen* $94.26/3 mL *KwikPen*	Vial: 31 days Pen: 10 days
Novolin 70/30 (70% NPH, 30% regular), Novo Nordisk	Up to 24 hours	Typically given pre-breakfast and pre-supper, or pre-breakfast, lunch, and supper.[3] Give within 30 to 60 minutes before the meal.[2]	$137.70/10 mL vial	Vial: 42 days

a. **Product information used in creation of this chart**: *Humalog* (August 2017), *NovoLog* (March 2017), *Apidra* (February 2015), *Fiasp* (October 2017), *Humulin R* 100 units/mL (June 2015), *Humulin R* 500 units/mL (October 2016), *Novolin R* (January 2016), *Humulin N* (July 2017), *Basaglar* (July 2016), *Lantus* (April 2016), *Levemir* (February 2015), *Toujeo* (March 2019), *Tresiba* (December 2016), *NovoLog Mix 70/30* (May 2017), *Humalog Mix 75/25* (February 2015), *Humalog Mix 5050* (February 2015), *Humulin 70/30* (July 2017), *Novolin 70/30* (January 2016), *Admelog* (December 2017).

b. Wholesale acquisition cost. Medication pricing by Elsevier, accessed October 2017.

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