

How to Switch Between Insulin Products

Switching insulins should always be done with prescriber approval and close monitoring. Advise patients to closely monitor blood glucose levels after switching insulins. If switching between human insulin brands (e.g., *Humulin R* to *Novolin R*, *Humulin N* to *Novolin N*, or *Humulin R/N* or *Novolin R/N* to “store brand” *R/N*), keep the number of units each day the same. However, because these brands are not AB rated you may need to contact the prescriber for approval to switch between brands. See our *Comparison of Insulins* chart for meal timing, onset, peak, duration of action, and other information. Also see our algorithm *Initiation and Adjustment of Insulin Regimens for Type 2 Diabetes*.

Clinical Scenario	Recommendation/Comments
NPH to Long-acting	
NPH to insulin detemir (<i>Levemir</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.¹ • Some patients on basal-bolus insulin may require more <i>Levemir</i> than NPH.¹ • Give <i>Levemir</i> once daily, or divided twice daily if necessary for control.¹ • Do not mix <i>Levemir</i> with other insulins¹
NPH to insulin glargine (<i>Lantus</i>)	<ul style="list-style-type: none"> • NPH once daily: convert unit-per-unit and give once daily.² • NPH twice daily: reduce daily dose by 20% and give once daily² • Do not mix <i>Lantus</i> with other insulins.²
Long-acting to NPH	
Insulin detemir (<i>Levemir</i>) to NPH	<ul style="list-style-type: none"> • Convert unit-per-unit.³ • NPH at bedtime (for type 2 patients when combined with oral antidiabetes meds).¹⁶ OR • NPH twice daily (e.g., 50:50 or 2/3 in AM and 1/3 before dinner or at bedtime).³⁻⁵
Insulin glargine (<i>Lantus</i>) to NPH	<ul style="list-style-type: none"> • Convert unit-per-unit.³ • NPH at bedtime (for type 2 patients when combined with oral antidiabetes meds).¹⁶ OR • NPH twice daily (e.g., 50:50 or 2/3 in AM and 1/3 before dinner or at bedtime).³⁻⁵

More . . .

Clinical Scenario	Recommendation/Comments
Long-acting to long-acting	
Insulin detemir (<i>Levemir</i>) to insulin glargine (<i>Lantus</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{6,17} • Give once daily, or divided twice daily if necessary for control.¹⁵ • A lower daily dose may be needed.¹⁴ • Do not mix <i>Lantus</i> with other insulins.²
Insulin glargine (<i>Lantus</i>) to insulin detemir (<i>Levemir</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{1,6,17} • Give once daily, or divided twice daily if necessary for control.¹ • A higher daily dose may be needed, especially if divided twice daily.¹⁴ • Do not mix <i>Levemir</i> with other insulins.¹
Regular to rapid-acting	
Regular human insulin (<i>Humulin</i> , <i>Novolin</i>) to rapid-acting insulin analog (insulin aspart [<i>Novolog</i>], insulin glulisine [<i>Apidra</i>], insulin lispro [<i>Humalog</i>])	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,7,8,9} • Rapid-acting insulin analogs have a faster onset of action and a shorter duration of action than human regular insulin. Give rapid acting insulin analogs about 10 minutes before meals or with meals. See <i>Comparison of Insulins</i> for specifics of meal timing.¹⁰
Rapid-acting to regular	
Insulin aspart (<i>Novolog</i>), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog</i>) to regular human insulin (<i>Humulin</i> , <i>Novolin</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,7,8,9} • Rapid-acting insulin analogs have a faster onset of action and a shorter duration of action than human regular insulin. Give regular insulin about 30 minutes before meals. See <i>Comparison of Insulins</i> for specifics of meal timing.¹⁰
Rapid-acting to rapid-acting	
Insulin aspart (<i>Novolog</i>), insulin glulisine (<i>Apidra</i>) or insulin lispro (<i>Humalog</i>) to Insulin aspart (<i>Novolog</i>), insulin glulisine (<i>Apidra</i>) or insulin lispro (<i>Humalog</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,7,8,9,11} • Give rapid-acting insulin analogs about 10 minutes before meals or with meals. See <i>Comparison of Insulins</i> for specifics of meal timing.¹⁰

Clinical Scenario	Recommendation/Comments
<p>Premixed to premixed</p> <p>Premixed NPH/regular insulin (<i>Humulin 70/30</i>, <i>Novolin 70/30</i>) to Premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>], insulin aspart protamine/insulin aspart [<i>Novolog Mix70/30</i>])</p>	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,12,13} • Premixed insulin analogs have a faster onset of action but similar duration of action compared to human premixed insulin. Give insulin analogs about 10 minutes before meals or with meals. See <i>Comparison of Insulins</i> for specifics of meal timing.¹⁰
<p>Premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>], insulin aspart protamine/insulin aspart [<i>Novolog Mix70/30</i>]) to premixed NPH/regular insulin (<i>Humulin 70/30</i>, <i>Novolin 70/30</i>)</p>	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,12,13} • Premixed insulin analogs have a faster onset of action but similar duration of action compared to human premixed insulin. Give human premixed insulins (<i>Humulin 70/30</i>, <i>Novolin 70/30</i>) about 30 minutes before meals. See <i>Comparison of Insulins</i> for specifics of meal timing.¹⁰
<p>Premixed NPH/regular insulin (<i>Humulin 50/50</i>) to insulin lispro/insulin lispro protamine (<i>Humalog Mix 50/50</i>)</p>	<ul style="list-style-type: none"> • Convert unit-per-unit.¹ • Give <i>Humalog 50/50</i> about 10 minutes before meals or with meals. See <i>Comparison of Insulins</i> for specifics of meal timing.¹⁰ • <i>Humulin 50/50</i> insulin is being discontinued due to declining usage. <i>Humulin 50/50</i> insulin is expected to be unavailable as of April 2010 (see http://www.humalog.com/pdf/humulin-discontinued.pdf).

Users of this document are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and Internet links in this article were current as of the date of publication.

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Cite this Detail-Document as follows: *How to switch between insulin products. Pharmacist's Letter/Prescriber's Letter* 2009;25(10):251005.



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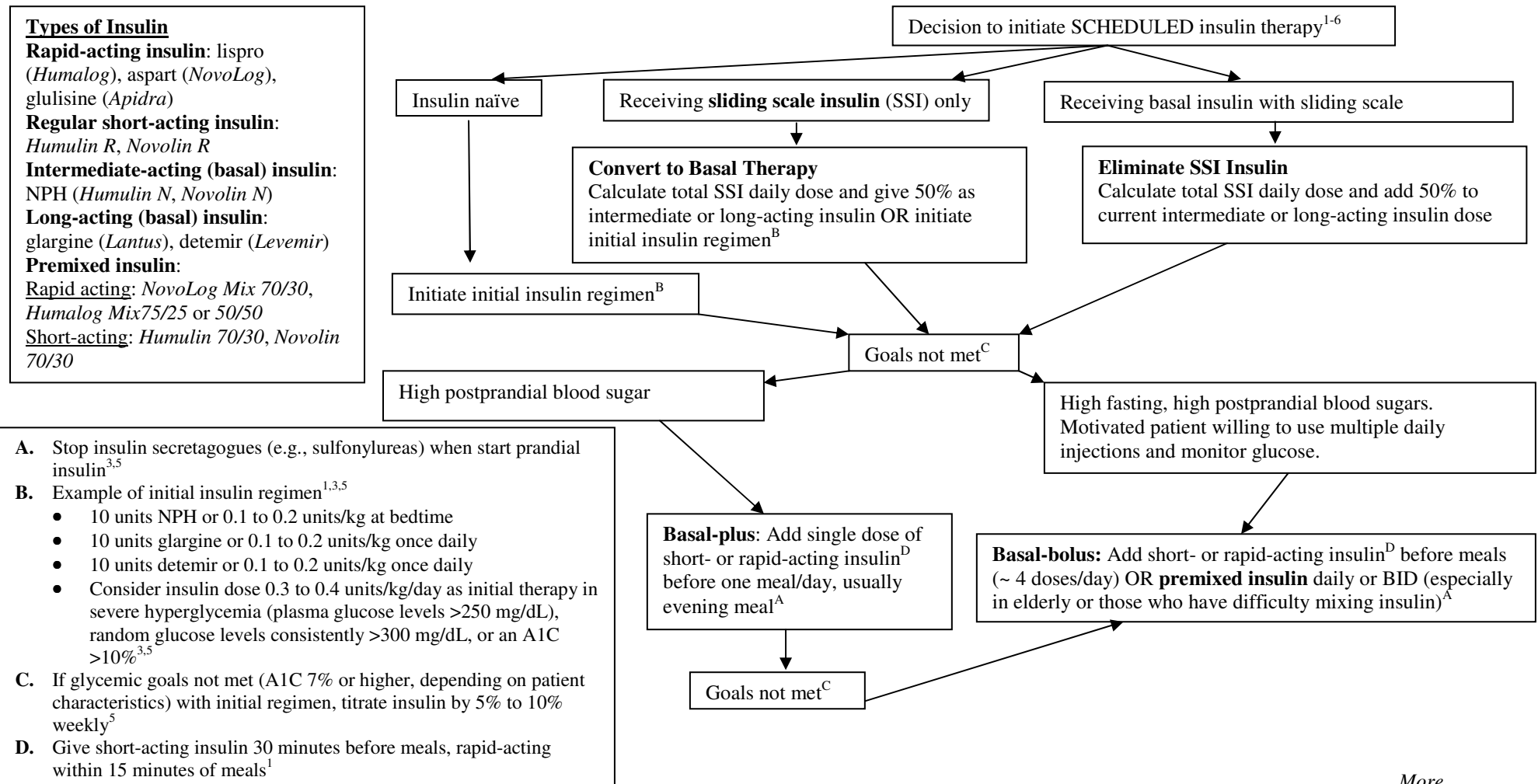
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Initiation and Adjustment of Insulin Regimens for Type 2 Diabetes

For guidance when to start insulin, please see our PL Algorithm, Stepwise Approach for Selecting Treatments for Type 2 diabetes.

Note: Insulin therapy should be individualized according to blood glucose values, A1C, diet, medications, lifestyle, etc. Sliding scale insulin as monotherapy should be avoided because it does not provide adequate glucose control and can lead to hypoglycemia.



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Cite this document as follows: *Initiation and Adjustment of Insulin Regimens for Type 2 Diabetes. Pharmacist's Letter/Prescriber's Letter. January 2014.*



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Comparison of Insulins and Injectable Diabetes Meds

-Information for the non-insulin injectables *Bydureon*, *Byetta*, *Symlyn*, and *Victoza* is located at the end of the chart-

Rapid-acting

(Information specific to U.S. products)

Brand (generic), Maker	<i>Humalog</i> (insulin lispro), Eli Lilly	<i>NovoLog</i> (insulin aspart), Novo Nordisk	<i>Apidra</i> (insulin glulisine), Sanofi-Aventis
Availability	Prescription only ¹		
Description	Human insulin analog (rDNA origin) ^{2,4,6}		
Onset ^c	15 to 30 minutes ³	10 to 20 minutes ⁵	25 minutes ³
Peak ^c	30 minutes to 2.5 hours ³	40 to 50 minutes ⁵	45 to 48 minutes ³
Duration ^c	3 to 6.5 hours ³	3 to 5 hours ⁵	4 to 5.3 hours ³
Administration	FDA-approved for SC injection and SC infusion. ^{2,4,6} <i>NovoLog</i> and <i>Apidra</i> approved for IV infusion in clinical settings. ^{4,6}		
Meal Timing	Give SC injection within 15 minutes before or immediately after meals. ²	Give SC injection 5 to 10 minutes before meals. ⁴	Give SC injection within 15 min. before or within 20 min. after starting a meal. ⁶
Formulations	100 units/mL. 10 mL vial, 3 mL vial, 3 mL cartridge, and <i>KwikPen</i>	100 units/mL. 10 mL vial, 3 mL <i>PenFill</i> cartridge, 3 mL disposable <i>FlexPen</i> , all latex-free ⁴	100 units/mL. 10 mL vial, 3 mL disposable <i>SoloStar</i> pen ⁶
Appearance	Clear, colorless ^{2,4,6}		
Compatibility ^d	<ul style="list-style-type: none"> • Can mix with NPH (<i>Humulin N</i>) for subcutaneous injection. Draw insulin lispro into syringe first.² • Mixture with <i>Humulin N</i> stable in prefilled syringes for 14 days refrigerated.²⁹ • Can mix <i>Humalog</i> with Lilly diluent to dilutions of 1:2 (U-50) or 1:10 (U-10). Diluted solutions stable for 28 days at 5° C (41°F) and 14 days at 30° C (86°F). Not for pen or pump.^{2,b} 	<ul style="list-style-type: none"> • Can mix with NPH. Draw aspart into syringe first and inject immediately after mixing.⁴ • Can mix with <i>Insulin Diluting Medium for NovoLog</i> to dilutions of 1:2 (U-50) or 1:10 (U-10). Diluted solutions stable for 28 days at <30°C (86°F).^{4,b} 	<ul style="list-style-type: none"> • Can mix with NPH. Draw insulin glulisine into syringe first and inject immediately.⁶
Stability of in-use products at room temp	Vial, cartridge, pens: 28 days ² External pump: 7 days (reservoir or 3 mL cartridge in <i>D-Tron</i> or <i>D-Tronplus</i>). 3 days (infusion set/insertion site). Discard pump insulin exposed to >37°C (98.6°F). ²	Vial, cartridge, pen: 28 days ⁴ External pump: 6 days (reservoir), 3 days (infusion set/insertion site). ⁴ Discard pump insulin exposed to >37°C (98.6°F). ⁴ Infusion bags: 24 hours ⁴	Vial, cartridge, pen: 28 days ⁶ External pump: 48 hours. Do not expose to >37°C (98.6°F). ⁶ Infusion bags: 48 hours ⁶
Cost ^a	\$130.00/10 mL vial, \$39.00/3 mL vial, \$241.52/5 of 3 mL cartridge \$251.00/5 of 3 mL <i>KwikPen</i>	\$132.40/10 mL vial \$245.95/5 of 3mL <i>PenFill</i> cartridge \$255.74/5 of 3 mL <i>FlexPen</i>	\$93.05/10 mL vial \$179.76/5 of 3 mL <i>SoloStar</i> pen

More . . .

Short-acting (i.e., Regular insulin)

Brand, Maker	Humulin R , Eli Lilly	Novolin R , Novo Nordisk
Availability	Non-prescription ¹ (500 units/mL <i>Humulin R</i> is prescription only) ¹⁰	
Description	Human insulin (rDNA origin) ^{7,8}	
Onset ^c	30 to 60 minutes ³ (30 minutes U-500) ⁴⁵	Around 30 minutes ⁷
Peak ^c	1 to 5 hours ³ (1 to 3 hours U-500) ⁴⁵	1.5 to 3.5 hours ⁷
Duration ^c	6 to 10 hours ³ (longer with U-500; up to 24 hours) ¹⁰	Around 8 hours ⁷
Administration	SC (U-100, U-500), IV infusion in clinical setting (U-100); ^{7,8,10} IM in clinical setting (off-label); ³ (500 unit/mL is SC only) ^{10,44} May precipitate in pump or adhere to tubing. ^{3,7}	
Meal timing	Most commonly recommended 30 minutes before meals. ¹¹	
Formulations	100 units/mL: 10 mL vial 500 units/mL: 20 mL vial	100 units/mL: 10 mL vial, latex-free ⁷
Appearance	Clear, colorless ^{7,8}	
Compatibility ^d	<ul style="list-style-type: none"> • Can mix with NPH. Draw regular insulin into syringe first.³ <i>Humulin R/N</i> mixtures stable in syringe at room temp for 28 days but consider possibility of microbial contamination; refrigeration recommended.^{3,43} • Diluent available for <i>Humulin R</i>^b 	
Stability of in-use products at room temperature	<ul style="list-style-type: none"> • Vial (U-100 or U-500): 31 days^{8,12} • Infusion bags: 48 hours⁸ 	<ul style="list-style-type: none"> • Vial: 42 days⁷ • Infusion bags: 24 hours⁷
Cost ^a	\$70.40/10 mL vial (U-100) \$597.75/20 mL vial (U-500)	\$70.83/10mL vial

Intermediate-acting (i.e., NPH)

Brand, Maker	Humulin N , Eli Lilly	Novolin N , Novo Nordisk
Availability	Non-prescription ¹	
Description	Human (rDNA) isophane suspension ^{13,14}	
Onset	1 to 2 hours ³	90 minutes ¹⁴
Peak	6 to 14 hours ³	4 to 12 hours ¹⁴
Duration	Up to 24 hours ¹³	Up to 24 hours ¹⁴
Administration	SC ³	
Formulations	100 units/mL. 10 mL vial, 3 mL disposable pen	100 units/mL. 10 mL vial, latex-free ¹⁴
Appearance	Cloudy ^{13,14}	
Compatibility ^d	<ul style="list-style-type: none"> • Can mix with aspart, glulisine, lispro, and regular insulins. See above for details. • Diluent available for <i>Humulin N</i>.^b 	
Stability of in-use products at room temperature	Vial: 31 days ¹² 3 mL pen: 14 days ¹²	Vial: 42 days ¹⁴
Cost ^a	\$70.40/10 mL vial \$223.18/5 of 3 mL pen	\$70.83/10 mL vial

Long-acting

Brand (generic), Maker	Lantus (insulin glargine) , Sanofi-Aventis	Levemir (insulin detemir) , Novo Nordisk
Availability	Prescription only ^{1,15}	
Description	Human insulin analog (rDNA origin) ^{15,16}	
Onset	1.1 hour ³	1.1 to 2 hours ³
Peak	No significant peak ¹⁵	No significant peak ¹⁶
Duration	10.8 to >24 hours (median 24 hours; sampling period 24 hours) ¹⁵	Mean 7.6 to >24 hours (dose-dependent; binds to albumin; sampling period 24 hours) ¹⁶
Administration	<ul style="list-style-type: none"> • SC once daily at same time each day¹⁵ • Convert 1:1 from once daily NPH, but reduce <i>Lantus</i> by 20% dose if converting from twice daily NPH¹⁵ • No need to shake before administration.¹⁵ • Pain at injection site reported more commonly than with NPH (2.7% vs 0.7%)¹⁵ 	<ul style="list-style-type: none"> • SC once or twice daily. Give once-daily dose with evening meal or at bedtime. If twice daily dosing needed, give evening dose with evening meal, at bedtime, or 12 hours after morning dose.¹⁶ • Convert 1:1 from another basal insulin.¹⁶ • <u>Type 2 diabetes</u>: Some patients may need higher doses of <i>Levemir</i> than NPH. Insulin-naïve patients with poor control on oral drugs: 0.1 to 0.2 units/kg (or 10 units) once daily in evening or divided twice daily.¹⁶
Meal timing	Not applicable	See “Administration” above.
Formulations	100 units/mL. 10 mL vial, 3 mL disposable <i>SoloStar</i> pen; does not contain latex but may have come into contact with latex during manufacturing process ⁹	100 units/mL. 10 mL vial, 3 mL disposable <i>FlexPen</i> , both latex-free ³⁷
Appearance	Clear, colorless ¹⁵	Clear, colorless ¹⁶
Compatibility ^d	<ul style="list-style-type: none"> • Do not mix with other insulins or dilute.¹⁵ Preliminary evidence shows mixing glargine with lispro or aspart did not adversely affect glycemic control.¹⁷⁻¹⁹ However, lispro peak is blunted.⁴⁷ The mixture is cloudy.^{17,19} • Has acidic pH (about 4)¹⁵ 	<ul style="list-style-type: none"> • Do not mix with other insulins or dilute.¹⁶ • Has neutral pH.¹⁶
Stability of in-use products at room temperature	10 mL vial: 28 days ¹⁵ <i>SoloStar</i> pen: 28 days ¹⁵	10 mL vial: 42 days ¹⁶ <i>FlexPen</i> : 42 days ¹⁶
Cost ^a	\$122.14/10 mL vial \$211.56/5 of 3 mL <i>SoloStar</i> pen	\$120.64/10 mL vial \$210.14/5 of 3 mL <i>FlexPen</i>

Ultra Long-acting

Brand (generic), Maker	Tresiba (insulin degludec) , Novo Nordisk	Ryzodeg (70% insulin degludec/30% insulin aspart) , Novo Nordisk
Availability	Investigational (FDA Advisory Committee meeting scheduled 11-8-12) ⁵³	Investigational (FDA Advisory Committee meeting scheduled 11-8-12) ⁵³
Description	Human insulin analog (rDNA origin) ⁵⁴	Human insulin analog (rDNA origin) ⁵⁴
Onset	30 to 90 minutes ⁵⁴	5 to 15 minutes ⁵⁴
Peak	None ⁵⁴	30 to 60 minutes ⁵⁴
Duration	Over 24 hours ⁵⁴	Over 24 hours ⁵⁴
Administration	SC ⁵⁵	SC ⁵⁵
Meal Timing	Once daily (any time of day), without regard to meals. ⁵⁵	Once daily with any meal. ⁵⁴
Formulations	Not available	Not available
Appearance	Clear ⁵⁵	Clear ⁵⁵
Compatibility	Not available	Not available
Stability of in-use products at room temperature	Not available	Not available
Cost	Not available	Not available

Insulin Mixtures

	70% insulin aspart protamine suspension, 30% insulin aspart solution	75% insulin lispro protamine suspension, 25% insulin lispro solution	50% insulin lispro protamine suspension, 50% insulin lispro solution	70% NPH, 30% Regular	
Brand, Maker	<i>NovoLog Mix 70/30</i> , Novo Nordisk	<i>Humalog Mix 75/25</i> , Eli Lilly	<i>Humalog Mix 50/50</i> , Eli Lilly	<i>Humulin 70/30</i> Eli Lilly	<i>Novolin 70/30</i> Novo Nordisk
Availability	Prescription only ¹			Non-prescription ¹	
Description	Human insulin analog (rDNA origin) solution and human insulin analog protamine suspension ^{20,22,24}			Human insulin (rDNA origin) solution and isophane suspension ^{23,25}	
Onset	10 to 20 minutes ³	15 to 30 minutes ³	15 to 30 minutes ³	Usually within 30 minutes ³	
Peak	1 to 4 hours ²⁰	1 to 6.5 hours (2.6 hours mean) ²²	0.8 to 4.8 hours (mean 2.3 hours) ²⁴	1.5 to 16 hours (mean 4.4 hours) ²²	2 to 12 hours (mean 4.2 hours) ^{20,25}
Duration	Up to 24 hours ²⁰	Similar to <i>Humulin 70/30</i> (up to 24 hours) ^{22,23}	22 hours or more ³	Up to 24 hours ^{23,25}	
Administration	SC only ^{20,22,23,24}				
Meal timing	Within 15 minutes before (or after starting [type 2]) a meal ²⁰	Within 15 minutes before a meal ²²	Within 15 minutes before a meal ²⁴	30 to 60 min. before a meal ^{22,46}	30 to 60 min. before a meal ^{22,46}
Formulations	100 units/mL. 10 mL vial, 3 mL disposable <i>FlexPen</i> , both latex-free ²⁰	100 units/mL. 10 mL vial and <i>KwikPen</i>	100 units/mL. 10 mL vial and <i>KwikPen</i>	100 units/mL. 10 mL vial, 3 mL pen (disposable)	100 units/mL. 10 mL vial, latex-free ²⁵
Appearance	Cloudy ^{20,22,24}				
Compatibility ^d	Do not mix with other insulins. ^{20,22,24,25}				
Stability of in-use products at room temperature	Vial: 28 days ²⁰ <i>FlexPen</i> : 14 days ²⁰	Vial: 28 days ²² Pens: 10 days ²²	Vial: 28 days ²⁴ Pens: 10 days ²⁴	Vial: 31 days ¹² Pen: 10 days ¹²	Vial: 42 days ²⁵
Cost ^a	\$132.40/10 mL vial \$255.74/5 of 3 mL <i>FlexPen</i>	\$130.00/10 mL vial \$251.00/5 of 3 mL <i>KwikPen</i>	\$130/10 mL vial \$251.00/5 of 3 mL <i>KwikPen</i>	\$70.40/ 10 mL vial \$223.18/5 of 3 mL pen	\$70.83/10 mL vial

Insulin Administration Devices

Device Manufacturer	Description	Dosage range and precision	Insulin used	Stability of in-use pens at room temp	Cost ^a	Comments
<i>Autopen Classic</i> AN3810 and AN3800 Owen Mumford www.owenmumford.com 800-421-6936	Reusable pen	AN3810: 1-21 units in 1-unit increments ^{28,41,52} AN3800: 2-42 units in 2-unit increments ^{28,41,52}	3 mL Eli Lilly cartridges (i.e., <i>Humalog</i>) ²⁸	<i>Humalog</i> : 28 days ²	\$30.72	Compatible with all major brands of pen needles. Automatic side injection button. ²⁸ Cannot correct “over-dialed” dose; must expel insulin and re-dial. ⁵²
<i>FlexPen</i> Novo Nordisk www.cornerstones4care.com 800-727-6500	Prefilled disposable pen	1-60 units in 1-unit increments ¹⁶	<i>Levemir</i> <i>NovoLog</i> <i>NovoLog Mix 70/30</i>	42 days ¹⁶ 28 days ⁴ 14 days ²⁰	\$210.14/5 \$255.74/5 \$255.74/5	Uses <i>NovoFine</i> , <i>NovoTwist</i> , or BD needles. ^{16,27,31} Can dial back to correct “over-dialed” dose. ¹⁶ Audible clicks (do not count clicks to set dose). ¹⁶ Large window. ²⁷ Resets to zero after shot. ¹⁶
<i>Humalog KwikPen</i> www.lillydiabetes.com 800-545-5979	Prefilled disposable pen	1-60 units in 1-unit increments ³⁹	<i>Humalog</i> <i>Humalog Mix 75/25</i> <i>Humalog Mix 50/50</i>	28 days ² 10 days ²² 10 days ²⁴	\$251.00/5 \$251.00/5 \$251.00/5	Compatible with BD pen needles. ^{31,39} Can correct dose without wasting insulin. ³⁹ Resets to zero after shot. ³⁹ Lightweight. ³⁵

Device Manufacturer	Description	Dosage range and precision	Insulin used	Stability of in-use pens at room temp	Cost ^a	Comments
<i>HumaPen Luxura HD</i> Eli Lilly www.lillydiabetes.com 800-545-5979	Reusable pen	1-30 units in ½-unit increments ³²	3 mL <i>Humalog</i> cartridges ³²	<i>Humalog</i> : 28 days ²	Free with coupon on web site (http://penvoucher.humalog.com/commbined.cfm)	For precise dosing ³² (e.g., for pediatrics). Can correct dose without wasting insulin. ³² Resets to zero after shot. ³³ Compatible with BD pen needles. ³³ Three year lifespan. ³³ Do not refrigerate pen. ³³ Audible clicks (but not recommended for unassisted use by the visually impaired). ⁵⁶
Lilly original prefilled pen www.lillydiabetes.com 800-545-5979	Prefilled disposable pen	1-60 units in 1-unit increments ³⁴	<i>Humulin N</i> <i>Humulin 70/30</i>	14 days ¹² 10 days ¹²	\$223.18/5 \$223.18/5	Can use with BD pen needles. ³¹ Magnifying dose window. ²⁶ Can dial back to correct “over- dialed” dose. ³⁴ Audible clicks, ²⁶ but not recommended for unassisted use by the visually impaired. ³⁴
<i>Novo Pen 3</i> Novo Nordisk www.novonordisk.com 800-727-6500	Reusable pen	2-70 units in 1-unit increments ⁴¹	3 mL <i>NovoLog</i> cartridges	28 days ⁴	\$24.53	Uses <i>NovoFine</i> or BD pen needles. ^{31,35} Can add <i>Penmate</i> attachment to make needle insertion easier. ³⁶

Device Manufacturer	Description	Dosage range and precision	Insulin used	Stability of in-use pens at room temp	Cost ^a	Comments
<i>Novo Pen Junior</i> Novo Nordisk www.cornerstones4care.com 800-727-6500	Reusable pen	1-35 units in ½ unit increments ⁴⁰	3 mL <i>NovoLog</i> cartridges	28 days ⁴	\$29.99	Uses <i>NovoFine</i> or BD pen needles. ^{31,40} Can add <i>Penmate</i> attachment to make needle insertion easier. ⁴⁰
<i>SoloStar</i> Sanofi-Aventis www.sanofi-aventis.us 800-981-2491	Prefilled disposable pen	1-80 units in 1-unit increments ⁴¹	<i>Apidra</i> <i>Lantus</i>	28 days ⁶ 28 days ¹⁵	\$179.76/5 \$211.56/5	Compatible with all pen needles from BD, Ypsomed, and Owen Mumford. ^{6,31,42} Can dial back to correct “over-dialed” dose. ⁶ Resets to zero after shot. ⁶

Misc. Non-Insulin Injectable Agents

Brand (generic), Maker	Therapeutic Class	Administration	Meal Timing	Formulation	Stability (in-use at room temp)	Cost ^a
<i>Bydureon</i> (exenatide, extended-release) ⁵¹ Amylin www.bydureon.com	Incretin mimetic (glucagon-like peptide-1 [GLP-1] receptor agonist)	Subcutaneous injection	Once weekly, any time of day, independent of meals	Each single-dose tray contains a vial containing 2 mg exenatide powder and a prefilled syringe providing 0.65 mL diluents.	4 weeks (single-dose tray). Reconstituted product should be injected immediately.	\$323.44/4 trays

Brand (generic), Maker	Therapeutic Class	Administration	Meal Timing	Formulation	Stability (in-use at room temp)	Cost ^a
<i>Byetta</i> (exenatide) ⁴⁸ Amylin www.byetta.com	Incretin mimetic (glucagon-like peptide-1 [GLP-1] receptor agonist)	Subcutaneous injection	Within 60 minutes before morning and evening meals, or the two main meals, at least 6 hours apart	5 mcg dose, 60 doses, 1.2 mL prefilled pen 10 mcg dose, 60 doses, 2.4 mL prefilled pen	30 days	\$315.25 (5 mcg, 1.2 mL pen) \$315.25 (10 mcg, 2.4 mL pen)
<i>Victoza</i> (liraglutide) ⁴⁹ Novo Nordisk www.victoza.com	Incretin mimetic (glucagon-like peptide-1 [GLP-1] receptor agonist)	Subcutaneous injection	Once daily, any time of day, independent of meals	6 mg/mL, 3 mL multi-dose pen	30 days	\$303.34/2 of 3 mL pen) \$455.01/3 of 3 mL pen
<i>Symlin</i> (pramlintide) ⁵⁰ Amylin www.symmlin.com	Synthetic amylin analog	Subcutaneous injection	Immediately before major meals (i.e., ≥250 kcal or ≥30 g carbohydrates)	<i>SymlinPen</i> 60 (1.5 mL; 1 mg/mL) <i>SymlinPen</i> 120 (2.7 mL; 1 mg/mL)	30 days	\$373.26/2 of <i>SymlinPen</i> 60 \$455.90/2 of <i>SymlinPen</i> 120

- Cost is Wholesale Average Cost (WAC).
- A diluent is available for *Humalog*, *Humulin R*, and *Humulin N*, (800-821-0528),²¹ and for *NovoLog* (800-727-6500).
- Based on subcutaneous administration.
- Novo Nordisk does not recommend storage of insulins in predrawn syringes.³⁸

Users of this PL Detail-Document are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and Internet links in this article were current as of the date of publication.

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Cite this document as follows: PL Detail-Document, Comparison of Insulins and Injectible Diabetes Meds. Pharmacist's Letter/Prescriber's Letter. November 2012.



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