

August 2019 ~ Resource #350802

How to Switch 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 N/R* or *Novolin N/R* to “store brand” *N/R*), keep the number of units each day the same. However, because these brands are not AB rated pharmacists may need to contact the prescriber before switching. See our chart, *Comparison of Insulins*, 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 may require more insulin detemir than NPH.¹ • Give insulin detemir once daily, or divide twice daily.¹ • Do not mix insulin detemir with other insulins.¹
NPH to insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>) NPH to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • NPH once daily: convert unit-per-unit to <i>Lantus</i>, <i>Semglee</i>, or <i>Toujeo</i> and give once daily.^{2,14,30} No specific information to guide NPH once daily to <i>Basaglar</i> switch. Consider conversion as for <i>Lantus</i>, given <i>Lantus/Basaglar</i> dose equivalency.¹² • NPH twice daily: reduce total daily dose by 20% and give <i>Lantus</i>, <i>Basaglar</i>, <i>Semglee</i>, or <i>Toujeo</i> once daily.^{2,12,14,30} • May take ≥5 days to see the max effect of the selected dose of <i>Toujeo</i>.¹⁴ Do not increase dose more often than every 3 to 4 days.¹⁶ • Do not mix insulin glargine with other insulins.^{2,12,14,30}
Long-acting to NPH	
Insulin detemir (<i>Levemir</i>) to NPH	<ul style="list-style-type: none"> • Convert unit-per-unit,³ or reduce dose by 20%.²⁷ • Give NPH twice daily (e.g., 50:50 or 2/3 in AM and 1/3 before dinner or at bedtime).^{3,4,26,27}
Insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>) to NPH Insulin glargine U-300 (<i>Toujeo</i>) to NPH	<ul style="list-style-type: none"> • Convert unit-per-unit from <i>Lantus</i>,³ or reduce dose by 20%.²⁷ • No specific information to guide <i>Basaglar</i> or <i>Semglee</i> to NPH switch. Consider conversion as for <i>Lantus</i>, given <i>Lantus/Basaglar/Semglee</i> dose equivalency.^{12,30} • Consider 20% dose reduction when switching from <i>Toujeo</i> to NPH to be conservative.²⁷ • Give NPH twice daily (e.g., 50:50 or 2/3 in AM and 1/3 before dinner or at bedtime).^{3,4,26,27}

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Clinical Scenario	Recommendation/Comments
Long-acting to long-acting	
Insulin glargine U-100 (<i>Lantus</i>) to/from insulin glargine U-100 (<i>Basaglar</i> , <i>Semglee</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{12,30}
Insulin detemir (<i>Levemir</i>) to insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>)	<ul style="list-style-type: none"> • Consider converting unit-per-unit to <i>Lantus</i>.^{3,5} A lower daily dose may be needed.⁷ • No specific information to guide <i>Levemir</i> to <i>Basaglar</i> or <i>Semglee</i> switch. Consider conversion as for <i>Lantus</i>, given <i>Lantus/Basaglar/Semglee</i> dose equivalency.^{12,30} • Give once daily.^{5,12,30} • Do not mix insulin glargine with other insulins.^{2,12,30}
Insulin detemir (<i>Levemir</i>) to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • <i>Levemir</i> once daily: convert unit-per-unit and give once daily.¹⁶ • <i>Levemir</i> twice daily: reduce total daily dose by 20% and give once daily.¹⁸ • May take ≥ 5 days to see the max effect of the selected dose of <i>Toujeo</i>.¹⁴ Do not increase dose more often than every 3 to 4 days.¹⁶ • Do not mix insulin glargine with other insulins.¹⁴
Insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>) to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • <i>Lantus</i> once daily: convert unit-per-unit and give once daily.¹⁶ • <i>Lantus</i> twice daily: convert unit-per-unit (or reduce by about 10% or less) and give once daily.²⁹ • For patients controlled on <i>Lantus</i>, expect that a higher daily dose (about 10% to 18%) of <i>Toujeo</i> will be needed to maintain control.¹⁷ • No specific information to guide <i>Basaglar</i> or <i>Semglee</i> to <i>Toujeo</i> switch. Consider conversion as for <i>Lantus</i>, given <i>Lantus/Basaglar/Semglee</i> dose equivalency.^{12,30} • May take ≥ 5 days to see the max effect of the selected dose of <i>Toujeo</i>.¹⁴ Do not increase dose more often than every 3 to 4 days.¹⁶ • Do not mix insulin glargine with other insulins.¹⁴
Insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>) to insulin detemir (<i>Levemir</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit from <i>Lantus</i>.^{1,5} • No specific information to guide <i>Basaglar</i> or <i>Semglee</i> to <i>Levemir</i> switch. Consider conversion as for <i>Lantus</i>, given <i>Lantus/Basaglar/Semglee</i> dose equivalency.^{12,30} • Give once daily, or divide twice daily.¹ • If divided twice daily, a higher daily dose may be needed.⁷ • Do not mix insulin detemir with other insulins.¹

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Clinical Scenario	Recommendation/Comments
Long-acting to long-acting, continued	
Insulin glargine U-300 (<i>Toujeo</i>) to insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>) or insulin detemir (<i>Levemir</i>)	<ul style="list-style-type: none"> • Reduce dose by about 20% when converting.^{2,12,27,30}
NPH or long-acting to ultra-long acting	
NPH, insulin detemir (<i>Levemir</i>), insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>), or insulin glargine U-300 (<i>Toujeo</i>) to insulin degludec (<i>Tresiba</i>)	<ul style="list-style-type: none"> • Convert total daily dose unit-per-unit and give once daily,¹⁹ or consider a 20% dose reduction.^{21,27} • Do not increase the dose more often than every 3 to 4 days.¹⁹ • No specific information to guide <i>Semglee</i> to <i>Tresiba</i> switch. Consider conversion as for other NPH/long-acting products, given <i>Semglee</i> dose equivalency to other insulin glargine 100 unit/mL products.³⁰
Ultra-long acting to NPH or long-acting	
Insulin degludec (<i>Tresiba</i>) to NPH, insulin detemir (<i>Levemir</i>), insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>), or insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • Reduce dose by 20%.^{27,30} • Give <i>Levemir</i>, <i>Lantus</i>, <i>Basaglar</i>, <i>Semglee</i>, or <i>Toujeo</i> once daily, or divide <i>Levemir</i> twice daily.^{1,2,12,14,30} • If converting from <i>Tresiba</i> >80 units/day, divide twice daily.²⁷ • Give NPH twice daily (e.g., 50:50 or 2/3 in AM and 1/3 before dinner or at bedtime).^{3,4,26,27}
Regular to rapid-acting	
Regular human insulin (<i>Humulin R</i> , <i>Novolin R</i>) to rapid-acting insulin analog (insulin aspart [<i>NovoLog</i> , <i>Fiasp</i>], insulin glulisine [<i>Apidra</i>], insulin lispro [<i>Humalog</i> , <i>Admelog</i> , <i>Lyumjev</i>])	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,8-10,20,22,31} • Rapid-acting insulin analogs have a faster onset of action and a shorter duration of action than human regular insulin. See <i>Comparison of Insulins</i> for specifics of meal timing.¹¹
Regular to inhaled insulin	
Regular human insulin (<i>Humulin R</i> , <i>Novolin R</i>) to mealtime insulin inhalation powder (<i>Afrezza</i>)	<ul style="list-style-type: none"> • Round each mealtime insulin dose up to the nearest 4 units, then convert unit-per-unit to the <i>Afrezza</i> dose (available in 4-unit and 8-unit cartridges).¹⁵

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Clinical Scenario	Recommendation/Comments
Rapid-acting to regular	
Insulin aspart (<i>NovoLog, Fiasp</i>), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog, Admelog, Lyumjev</i>) to regular human insulin (<i>Humulin R, Novolin R</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,8-10,20,22} • Rapid-acting insulin analogs have a faster onset of action and a shorter duration of action than human regular insulin. See <i>Comparison of Insulins</i> for specifics of meal timing.¹¹
Rapid-acting to rapid-acting	
Insulin aspart (<i>NovoLog, Fiasp</i>), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog, Admelog, Lyumjev</i>) to insulin aspart (<i>NovoLog, Fiasp</i>), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog, Admelog, Lyumjev</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.^{3,8-10,20,22,31} • See <i>Comparison of Insulins</i> for specifics of meal timing.¹¹
Rapid-acting to inhaled insulin	
Insulin aspart (<i>NovoLog, Fiasp</i>), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog, Admelog, Lyumjev</i>) to mealtime insulin inhalation powder (<i>Afrezza</i>)	<ul style="list-style-type: none"> • Round each mealtime insulin dose up to the nearest 4 units, then convert unit-per-unit to the <i>Afrezza</i> dose (available in 4-unit and 8-unit cartridges).¹⁵
Inhaled insulin to rapid-acting or regular	
Insulin inhalation powder (<i>Afrezza</i>) to insulin aspart (<i>NovoLog, Fiasp</i>), insulin glulisine (<i>Apidra</i>), insulin lispro (<i>Humalog, Admelog, Lyumjev</i>), regular human insulin (<i>Humulin R, Novolin R</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.¹⁵ • See <i>Comparison of Insulins</i> for specifics of meal timing.¹¹
Regular to long-acting or ultra-long acting	
Regular human insulin (<i>Humulin R, Novolin R</i>) to insulin glargine U-100 (<i>Lantus, Basaglar, Semglee</i>), insulin glargine U-300 (<i>Toujeo</i>), insulin detemir (<i>Levemir</i>), insulin degludec (<i>Tresiba</i>), or NPH	<ul style="list-style-type: none"> • Add up the total daily dose and start with 50% as intermediate, long-acting, or ultra-long acting insulin, or start an initial insulin regimen, as suggested in our algorithm, <i>Initiation and Adjustment of Insulin Regimens for Type 2 Diabetes</i>.⁶

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Clinical Scenario	Recommendation/Comments
NPH, long-acting, or ultra-long acting to premixed	
<p>NPH, insulin detemir (<i>Levemir</i>), insulin glargine U-100 (<i>Lantus</i>, <i>Basaglar</i>, <i>Semglee</i>), insulin glargine U-300 (<i>Toujeo</i>), or insulin degludec (<i>Tresiba</i>) to premixed NPH/regular insulin (<i>Humulin 70/30</i>, <i>Novolin 70/30</i>), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>], insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>])</p>	<ul style="list-style-type: none"> • Switch to premix twice daily. Give same total daily dose as basal but give 2/3 in the morning and 1/3 with dinner, or give half with breakfast and half with dinner.⁶ • No specific information for switching from <i>Toujeo</i> or <i>Tresiba</i>. Consider dose reduction. • No specific information to guide switch from <i>Semglee</i>. Consider conversion as for other NPH/long-acting products, given <i>Semglee</i> dose equivalency to other insulin glargine 100 unit/mL products.³⁰
Premixed to NPH	
<p>Premixed NPH/regular insulin (<i>Humulin 70/30</i>, <i>Novolin 70/30</i>), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>], or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to NPH</p>	<ul style="list-style-type: none"> • Add up the total units and give 70% to 75% as NPH,³ or reduce dose by 20%.²⁷ • Give NPH twice daily (e.g., 50:50 or 2/3 in AM and 1/3 before dinner or at bedtime).^{3,4,26,27} • Give 25% to 30% of each premix dose as prandial insulin (regular or rapid-acting analog) before the meal(s) before which the premix was usually taken.³
Premixed to long-acting	
<p>Premixed NPH/regular insulin (<i>Humulin 70/30</i>, <i>Novolin 70/30</i>), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>], or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to insulin glargine U-100 (<i>Lantus</i>, <i>Basaglar</i>, <i>Semglee</i>), insulin detemir (<i>Levemir</i>)</p>	<ul style="list-style-type: none"> • Add up the total units for each dose and give 70% to 75% as long-acting insulin U-100 (once daily or divided twice daily [insulin detemir]),^{1,3} or reduce dose by 20%.²⁷ • Give 25% to 30% of each premix dose as prandial insulin (regular or rapid-acting analog) before the meal(s) before which the premix was usually taken.³ • No specific information to guide switch to <i>Semglee</i>. Consider conversion as for other long-acting products, given <i>Semglee</i> dose equivalency to other insulin glargine 100 unit/mL products.³⁰

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Clinical Scenario	Recommendation/Comments
Premixed to long-acting, continued	
Premixed NPH/regular insulin (<i>Humulin 70/30, Novolin 70/30</i>), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>]), or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • If the premix is given once daily, convert to <i>Toujeo</i> once daily unit-per-unit based on the long-acting component of the premix insulin.²⁸ • If the premix is given twice daily, give 80% of the long-acting component as <i>Toujeo</i> once daily.²⁸ • Do not increase dose more often than every 3 to 4 days.¹⁶ • Add prandial insulin if desired.
Premixed to ultra-long acting	
Premixed NPH/regular insulin (<i>Humulin 70/30, Novolin 70/30</i>), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>]), or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to insulin degludec (<i>Tresiba</i>)	<ul style="list-style-type: none"> • No specific guidance is available. Consider switching unit-per-unit based on the long-acting component of the premix insulin.¹⁹ • Do not increase dose more often than every 3 to 4 days.¹⁹ • Add prandial insulin if desired.
Premixed to premixed	
Premixed NPH/regular insulin (<i>Humulin 70/30, 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 Mix 70/30</i>])	<ul style="list-style-type: none"> • Convert unit-per-unit,³ or reduce dose by 20%.²⁷ • Premix analogs have a faster onset but similar duration compared to human premixes.^{10,13} See <i>Comparison of Insulins</i> for specifics of meal timing.¹¹
Premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>]), insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to premixed NPH/regular insulin (<i>Humulin 70/30, Novolin 70/30</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit,³ or reduce dose by 20%.²⁷ • Premix analogs have a faster onset but similar duration compared to human premixes.^{10,13} See <i>Comparison of Insulins</i> for specifics of meal timing.¹¹

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Clinical Scenario	Recommendation/Comments
Premixed to inhaled insulin	
Premixed NPH/regular insulin (<i>Humulin 70/30</i> , <i>Novolin 70/30</i>), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i>], or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to mealtime insulin inhalation powder (<i>Afrezza</i>)	<ul style="list-style-type: none"> • Divide half the total daily insulin dose equally among the three meals of the day, and round each mealtime insulin dose up to the nearest 4 units, then convert unit-per-unit to the <i>Afrezza</i> dose (available in 4-unit and 8-unit cartridges).¹⁵ • Give the other half of the total daily insulin dose as basal insulin (e.g., NPH, insulin glargine, or insulin detemir).¹⁵
U-100 insulin to U-500 insulin	
All types of other U-100 insulins to <i>Humulin R U-500</i>	<ul style="list-style-type: none"> • Determine the total daily dose of U-500 used by adding the units of all types of other insulins given in one day (i.e., unit-per-unit conversion).²³ • Divide the total daily dose of U-500 into a two or three times a day regimen (given 30 minutes before meals) for most patients.²³ See our chart, <i>Tips to Improve Insulin Safety</i>, for suggested starting points based on total daily dose.
Long-acting or ultra-long acting to long-acting + GLP-1 agonist	
Insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>), insulin detemir (<i>Levemir</i>), insulin glargine U-300 (<i>Toujeo</i>), or insulin degludec (<i>Tresiba</i>) to insulin glargine U-100 + lixisenatide (<i>Soliqua 100/33</i>)	<ul style="list-style-type: none"> • Information not based on any specific long- or ultra-long acting insulin product. Conversions are simply for patients uncontrolled on basal insulin ≤ 60 units/day.²⁴ • Patients on basal insulin < 30 units/day, the recommended starting dose is 15 units insulin glargine/5 mcg lixisenatide once daily, given within one hour prior to the first meal of the day.²⁴ • Patients on basal insulin 30 units/day to 60 units/day, convert to 30 units insulin glargine/10 mcg lixisenatide once daily, within one hour prior to the first meal of the day.²⁴ • <i>Soliqua</i> has not been studied with prandial insulins.²⁴ • Do not mix <i>Soliqua</i> with other insulins.²⁴ • Titrate doses weekly by 2 to 4 units of insulin glargine (equals 0.66 mcg to 1.32 mcg of lixisenatide component).²⁴ • Maximum daily dose is 60 units insulin glargine/20 mcg lixisenatide.²⁴

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Clinical Scenario	Recommendation/Comments
Long-acting or ultra-long acting to ultra-long acting + GLP-1 agonist	
Insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i>), insulin detemir (<i>Levemir</i>), insulin glargine U-300 (<i>Toujeo</i>), or insulin degludec (<i>Tresiba</i>) to insulin degludec + liraglutide (<i>Xultophy</i>)	<ul style="list-style-type: none"> • Dosing recommendations are the same regardless of previous insulin dose.²⁵ • Start with 16 units insulin degludec/0.58 mg liraglutide given once daily.²⁵ • Do not mix <i>Xultophy</i> with other insulins.²⁵ • Titrate doses every three to four days, by 2 units insulin degludec (equals 0.072 mg liraglutide).²⁵ • Maximum daily dose is 50 units insulin degludec/1.8 mg liraglutide.²⁵

Users of this resource 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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