

How to Switch Insulin Products

(last modified July 2024)

Switching insulins should always be done with prescriber approval and close monitoring. Advise patients to closely monitor blood glucose levels after switching insulins. Pharmacists may need to contact the prescriber before switching, depending on state/provincial regulations. Our FAQ, *Facts About Biosimilars*, addresses questions that may arise about interchangeability. See our chart, *Comparison of Insulins (US) (Canada)*, for meal timing, onset, peak, duration of action, and other information.

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.⁵ Some patients may require more insulin detemir than NPH.⁵ Give insulin detemir once daily, or divide twice daily.^{1,10} Do not mix insulin detemir with other insulins.^{1,10}
NPH to insulin glargine U-100 (<i>Lantus, Basaglar, Semglee, Rezvoglar [US]</i>) NPH to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> NPH once daily: convert unit-per-unit to U-100 insulin glargine and give once daily.⁵ NPH twice daily: reduce total daily dose by 20% and give insulin glargine once daily.⁵ It may take ≥ 5 days to see the maximum effect of the selected dose of <i>Toujeo</i>.^{13,14} Do not increase the <i>Toujeo</i> dose more often than every 3 to 4 days.^{13,14} Do not mix insulin glargine with other insulins.^{12-14,18,23,30,32,33,35}
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, Basaglar, Semglee, Rezvoglar [US]</i>) to NPH Insulin glargine U-300 (<i>Toujeo</i>) to NPH	<ul style="list-style-type: none"> Insulin glargine U-100: convert unit-per-unit,³ or reduce dose by 20%.²⁷ <i>Toujeo</i>: 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}

Clinical Scenario	Recommendation/Comments
Long-acting to long-acting	
Insulin glargine U-100 (<i>Lantus</i>) to/from insulin glargine U-100 (<i>Basaglar, Semglee, Rezvoglar</i> [US])	<ul style="list-style-type: none"> • Convert unit-per-unit.⁵
Insulin detemir (<i>Levemir</i>) to insulin glargine U-100 (<i>Lantus, Basaglar, Semglee, Rezvoglar</i> [US])	<ul style="list-style-type: none"> • Consider converting unit-per-unit.⁵ A lower daily dose may be needed.⁷ • Give once daily.^{5,18,30,35} • Do not mix insulin glargine with other insulins.^{12,18,23,30,32,33,35}
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 <i>Toujeo</i> once daily.^{13,14} • <i>Levemir</i> twice daily: reduce total daily dose by 20% and give <i>Toujeo</i> once daily.^{13,14} • It may take ≥ 5 days to see the maximum effect of the selected dose of <i>Toujeo</i>.^{13,14} Do not increase the <i>Toujeo</i> dose more often than every 3 to 4 days.^{13,14} • Do not mix insulin glargine with other insulins.^{13,14}
Insulin glargine U-100 (<i>Lantus, Basaglar, Semglee, Rezvoglar</i> [US]) to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit and give once daily.^{13,14,28} • Expect that a higher daily dose (about 10% to 18%) of <i>Toujeo</i> will be needed to maintain control.¹⁷ • It may take ≥ 5 days to see the maximum effect of the selected dose of <i>Toujeo</i>.^{13,14} Do not increase the <i>Toujeo</i> dose more often than every 3 to 4 days.^{13,14} • Do not mix insulin glargine with other insulins.^{13,14}
Insulin glargine U-100 (<i>Lantus, Basaglar, Semglee, Rezvoglar</i> [US]) to insulin detemir (<i>Levemir</i>)	<ul style="list-style-type: none"> • Convert unit-per-unit.⁵ • Give insulin detemir once daily, or divide twice daily.^{1,10} If divided twice daily, a higher daily insulin detemir dose may be needed.⁷ • Do not mix insulin detemir with other insulins.^{1,10}

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> , <i>Rezvoglar</i> [US]) or insulin detemir (<i>Levemir</i>)	<ul style="list-style-type: none"> • Reduce dose by 20%.⁵
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> , <i>Rezvoglar</i> [US]), or insulin glargine U-300 (<i>Toujeo</i>) to insulin degludec (<i>Tresiba</i>) or insulin icodec (<i>Awikli</i> [Canada])	<ul style="list-style-type: none"> • If switching to <i>Tresiba</i>, convert total daily dose unit-per-unit and give once daily, or reduce dose by 20% (for patients with type 1 diabetes [Canada], twice-daily basal insulin [Canada], or pediatrics [US]) and give once daily.^{19,34} • Do not increase the <i>Tresiba</i> dose more often than every 3 to 4 days.¹⁹ • If switching to <i>Awikli</i> (Canada), multiply total daily dose by seven (rounded to the nearest 10 units) and give once weekly. Titrate subsequent doses based on metabolic need, blood glucose levels, and glycemic goals.³⁷ <ul style="list-style-type: none"> ○ For first dose only, an additional 50% of the <i>Awikli</i> dose can given, depending on glycemic control and hypoglycemia history.
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> , <i>Rezvoglar</i> [US]), or insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none"> • Reduce dose by 20%.²⁷ • Give once daily, or divide <i>Levemir</i> twice daily.⁵ <ul style="list-style-type: none"> ○ If converting from <i>Tresiba</i> >80 units/day, divide U-100 insulin 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> [US], <i>Novolin R</i> [US], <i>Novolin ge Toronto</i> [Canada], <i>Myxredlin</i> [Canada], <i>Hypurin Regular</i> [Canada]) to rapid-acting insulin analog (insulin aspart [<i>NovoLog</i> (US), <i>NovoRapid</i> (Canada), <i>Trurapi</i> (Canada), <i>Fiasp</i> , <i>Kirsty</i> (Canada)], 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.^{3,20-22,29,31,36} • Rapid-acting insulin analogs have a faster onset of action and a shorter duration of action than human regular insulin.³ See <i>Comparison of Insulins</i> (US) (Canada) for specifics of meal timing.

Clinical Scenario	Recommendation/Comments
Regular to inhaled insulin	
Regular human insulin (<i>Humulin R</i> [US], <i>Novolin R</i> [US]) to mealtime insulin inhalation powder (<i>Afrezza</i> [US])	<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
Rapid-acting to regular	
Insulin aspart (<i>NovoLog</i> [US], <i>NovoRapid</i> [Canada], <i>Trurapi</i> [Canada], <i>Fiasp</i> , <i>Kirsty</i> [Canada]), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog</i> , <i>Admelog</i> , <i>Lyumjev</i>) to regular human insulin (<i>Humulin R</i> [US], <i>Novolin R</i> [US], <i>Novolin ge Toronto</i> [Canada], <i>Myxredlin</i> [Canada], <i>Hypurin Regular</i> [Canada])	<ul style="list-style-type: none"> Convert unit-per-unit.^{3,20-22,29,31,36} Rapid-acting insulin analogs have a faster onset of action and a shorter duration of action than human regular insulin.³ See <i>Comparison of Insulins</i> (US) (Canada) for specifics of meal timing.
Rapid-acting to rapid-acting	
Insulin aspart (<i>NovoLog</i> [US], <i>NovoRapid</i> [Canada], <i>Trurapi</i> [Canada], <i>Fiasp</i> , <i>Kirsty</i> [Canada]), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog</i> , <i>Admelog</i> , <i>Lyumjev</i>) to insulin aspart (<i>NovoLog</i> [US], <i>NovoRapid</i> [Canada], <i>Trurapi</i> [Canada], <i>Fiasp</i> , <i>Kirsty</i> [Canada]), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog</i> , <i>Admelog</i> , <i>Lyumjev</i>)	<ul style="list-style-type: none"> Convert unit-per-unit.^{3,16,20-22,29,31,36} See <i>Comparison of Insulins</i> (US) (Canada) for specifics of meal timing.
Rapid-acting to inhaled insulin	
Insulin aspart (<i>NovoLog</i> , <i>Fiasp</i>), insulin glulisine (<i>Apidra</i>), or insulin lispro (<i>Humalog</i> , <i>Admelog</i> , <i>Lyumjev</i>) to mealtime insulin inhalation powder (<i>Afrezza</i> [US])	<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> [US]) to insulin aspart (<i>NovoLog</i> , <i>Fiasp</i>), insulin glulisine (<i>Apidra</i>), insulin lispro (<i>Humalog</i> , <i>Admelog</i> , <i>Lyumjev</i>), regular human insulin (<i>Humulin R</i> , <i>Novolin R</i>)	<ul style="list-style-type: none"> Convert unit-per-unit.¹⁵ See <i>Comparison of Insulins</i> (US) (Canada) for specifics of meal timing.

Clinical Scenario	Recommendation/Comments
Regular to long-acting or ultra-long acting	
Regular human insulin (<i>Humulin R</i> [US], <i>Novolin R</i> [US], <i>Novolin ge Toronto</i> [Canada], <i>Myxredlin</i> [Canada], <i>Hypurin Regular</i> [Canada]) to insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i> , <i>Rezvoglar</i> [US]), 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"> • Calculate the average of the daily insulin requirement over the past five to seven days. Start with 70% to 75% as basal insulin.¹¹ • Cover meals with oral antidiabetics or mealtime insulin.¹¹
NPH, long-acting, or ultra-long acting to premixed	
NPH, insulin detemir (<i>Levemir</i>), insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i> , <i>Rezvoglar</i> [US]), insulin glargine U-300 (<i>Toujeo</i>), insulin degludec (<i>Tresiba</i>), or insulin (<i>Awigli</i> [Canada]) to premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin 70/30</i> [US], <i>Novolin ge 30/70</i> [Canada], <i>Novolin ge 40/60</i> [Canada], <i>Novolin ge 50/50</i> [Canada]), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada), <i>Humalog Mix 50/50</i> (US), <i>Humalog Mix 50</i> Canada]), insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i> (US), <i>NovoMix 30</i> (Canada)])	<ul style="list-style-type: none"> • Give same total daily dose,⁶ or reduce dose by 20%.²⁷ Give half with breakfast and half with dinner.⁶ • No specific information for switching from <i>Toujeo</i> or <i>Tresiba</i>. Consider 20% dose reduction.²⁷ • No specific information available for switching from <i>Awigli</i>.
Premixed to NPH	
Premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin 70/30</i> [US], <i>Novolin ge 30/70</i> [Canada]), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada)], or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to NPH	<ul style="list-style-type: none"> • Add up the total units and give 70% to 75% as NPH.³ • 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 • 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}
Premixed to long-acting	
Premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Novolin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin ge 30/70</i> [Canada]), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada)], or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i> (US), <i>NovoMix 30</i> (Canada)]) to insulin glargine U-100 (<i>Lantus</i> , <i>Basaglar</i> , <i>Semglee</i> , <i>Rezvoglar</i> [US]), or insulin detemir (<i>Levemir</i>)	<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]).^{1,3,10} • 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

Clinical Scenario	Recommendation/Comments
Premixed to long-acting, continued	
Premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin 70/30</i> [US], <i>Novolin ge 30/70</i> [Canada], <i>Novolin ge 40/60</i> [Canada], <i>Novolin ge 50/50</i> [Canada]), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada), <i>Humalog Mix 50/50</i> (US), <i>Humalog Mix 50</i> (Canada)], insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i> (US), <i>NovoMix 30</i> (Canada)]) to insulin glargine U-300 (<i>Toujeo</i>)	<ul style="list-style-type: none">• No specific guidance is available. Consider:<ul style="list-style-type: none">○ converting to <i>Toujeo</i> once daily unit-per-unit based on the long-acting component of the premix insulin, if the premix insulin is given once daily.⁵○ giving 80% of the long-acting component as <i>Toujeo</i> once daily, if the premix insulin is given twice daily.⁵○ adding prandial insulin, if desired.• Do not increase the <i>Toujeo</i> dose more often than every 3 to 4 days.¹⁴
Premixed to ultra-long acting	
Premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin 70/30</i> [US], <i>Novolin ge 30/70</i> [Canada], <i>Novolin ge 40/60</i> [Canada], <i>Novolin ge 50/50</i> [Canada]), premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada), <i>Humalog Mix 50/50</i> (US), <i>Humalog Mix 50</i> (Canada)], insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i> (US), <i>NovoMix 30</i> (Canada)]) to insulin degludec (<i>Tresiba</i>) or insulin icodec (<i>Awiqli</i>)	<ul style="list-style-type: none">• No specific guidance is available. Consider switching based on the long-acting component of the premix insulin, unit-per-unit⁵ or with a 20% reduction in dose,²⁷ then add prandial insulin if desired.• Do not increase the <i>Tresiba</i> dose more often than every 3 to 4 days.¹⁹
Premixed to premixed	
Premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin 70/30</i> [US], <i>Novolin ge 30/70</i> [Canada], <i>Novolin ge 40/60</i> [Canada], <i>Novolin ge 50/50</i> [Canada]) to premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada), <i>Humalog Mix 50/50</i> (US), <i>Humalog Mix 50</i> (Canada)], insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i> (US), <i>NovoMix 30</i> (Canada)])	<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.³ See <i>Comparison of Insulins</i> (US) (Canada) for specifics of meal timing.

Clinical Scenario	Recommendation/Comments
Premixed to premixed, continued	
Premixed protamine/rapid-acting analog (insulin lispro protamine/insulin lispro [<i>Humalog Mix 75/25</i> (US), <i>Humalog Mix 25</i> (Canada), <i>Humalog Mix 50/50</i> (US), <i>Humalog Mix 50</i> (Canada)], insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i> (US), <i>NovoMix 30</i> (Canada)]) to premixed NPH/regular insulin (<i>Humulin 70/30</i> [US], <i>Humulin 30/70</i> [Canada], <i>Novolin 70/30</i> [US], <i>Novolin ge 30/70</i> [Canada], <i>Novolin ge 40/60</i> [Canada], <i>Novolin ge 50/50</i> [Canada])	<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.³ See <i>Comparison of Insulins</i> (US) (Canada) for specifics of meal timing.
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> , <i>Humalog Mix 50/50</i>], or insulin aspart protamine/insulin aspart [<i>NovoLog Mix 70/30</i>]) to mealtime insulin inhalation powder (<i>Afrezza</i> [US])	<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 U-100 insulin to <i>Humulin R U-500</i> (US) or <i>Entuzity</i> (Canada)	<ul style="list-style-type: none"> • U-500 insulin is only for patients needing >200 units of insulin daily.^{2,8} See our checklist, <i>Tips to Improve Insulin Safety</i>, for special considerations with U-500 insulin. • Determine the total daily dose from all insulin sources combined.^{2,8} Round down to the nearest 5 units.⁸ • If A1c is $\leq 8\%$, reduce the dose by 20%.^{2,8} • Divide the dose two or three times daily, given 30 minutes before a meal.^{2,8} Recommended dosing ratios are 60:40 (for breakfast/dinner dosing) or 40:30:30 (for breakfast/lunch/dinner dosing).^{2,8} Other ratios may be appropriate. • It is recommended that daily doses of ≥ 300 to 750 units be divided three times daily.⁹ For doses >750 units, divide four times daily (with meals and at bedtime), with the bedtime dose being smaller than the mealtime doses.⁹ • For a titration algorithm, see https://www.humulin.com/hcp/dosing-titration#insulin-activity.

Clinical Scenario	Recommendation/Comments
Long-acting or ultra-long acting to long-acting + GLP-1 agonist	
Insulin glargine U-100 (<i>Lantus, Basaglar, Semglee, Rezvoglar</i> [US]), 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> [US])	<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 For 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 For patients on basal insulin 30 units/day to 60 units/day, convert to 30 units insulin glargine/10 mcg lixisenatide once daily, given 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
Long-acting or ultra-long acting to ultra-long acting + GLP-1 agonist	
Insulin glargine U-100 (<i>Lantus, Basaglar, Semglee, Rezvoglar</i> [US]), 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> [US])	<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 weekly or 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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