

**Injectable Diabetes Medications – Insulin\* and GLP Agents (back of page)**

J. Kirk 2022

<b>Meal time or Rapid-Acting Insulins or for Correction</b>					
<u>Insulin</u>	<u>Onset</u>	<u>Peak</u>	<u>Duration</u>	<u>Dosing</u>	<u>Manufactured - Units/ml &amp; Expiration Guidelines</u> <b>Protect from light.</b>
<b>Aspart (NovoLog®) U-100</b>	15 min	1-3 hrs.	3-5 hrs.	Pt specific	FlexPen® 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), 28 days once open keep at room temp
<b>Aspart (Fiasp®) U-100</b> <i>Ultra-Rapid</i>	16-20 min	1.5-2.2 hrs	5-7 hrs.	At 1 <sup>st</sup> bite of meal or within 20 min after starting meal	FlexPen® 3 ml Pen = 300 units, 10 ml vial, Expires 28 days once open keep at room temp. Glucose lowering effects to return to baseline when dosed at 0.1 U/kg
<b>Glulisine (Apidra®) U-100</b>	12-30 min	0.5-2 hrs.	~ 5 hrs.	Pt specific	SoloStar® Pen 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), Expires 28 days once open keep at room temp
<b>Lispro (Humalog Kwik Pen®) U-100, U-200, Lyumjev®</b> <b>Lispro (Admelog SoloStar®) – biosimilar - similar profile</b>	15-30 min 17 min	0.5–2.5 hrs. 120 -170 min	3-4 hrs. 4.6-7.3 hrs.	Lyumjev works within 13 min, take within 20 min of meal	Kwik® Pen U-100 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units) or 10 ml vial (1000 units), U-200 6 ml Pen (2 pens = 12 ml = 1200 units), SoloStar U-100 3 ml Pen = 300 units, 5 pens = 15 ml = 1500 units, Expires 28 days once open keep at room temp
<b>Short-acting insulin (meal), Protect from light and excessive heat</b>					
<b>Regular U-100</b>	0.5-1 hr.	2-4 hrs.	5-8 hrs.	30 min before meal	Humulin R®, Novolin R®, 10 ml vial (1000 units) 42 days once open keep at room temp, Humulin R® Kwik® Pen U-100 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units) Expires 10 days once opened at room temp
<b>Intermediate-acting insulin, Protect from light and excessive heat</b>					
<b>NPH U-100</b>	1-2 hrs.	2-8 hrs.	14-24 hrs. (up to 24 hrs esp. in CKD)	1-2x daily	Novolin N® 10 ml vials, Humulin N® vials & Kwik® Pen U-100 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), Expires 42 days vials & 14 days for pens once opened at room temp
<b>Long-acting insulin (basal) * Protect from light and excessive heat</b>					
<b>Determir (Levemir®) U-100</b>	1-3 hrs. at initiation	~9 hrs. (unsure)	7.6 - up to 24 hrs.	1-2x daily	FlexTouch® Pen 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), 42 days once open keep at room temp
<b>Glargine (Lantus®) U-100 (Toujeo®) U-300 concentrated (Toujeo® coupon cards on line) Biosimilar Basaglar® similar profile</b>	1-3 hrs. at initiation	no peak	24 hrs. (up to 36 hrs. especially with CKD)	Daily	SoloStar® & Basaglar® Pen 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), 28 days once opened at room temp Toujeo® Pen 4.5 ml Pen (3 pens = 13.5 ml = 1350 units), Expires 42 days once opened at room temp
<b>Degludec (Tresiba®)** U-100, U-200 concentrated (coupon cards on line)</b>	1-3 hrs. at initiation	no peak	Up to 42 hrs.	Daily	FlexTouch® Pen 3 ml = 300 units (5 pens = 15 ml = 1500 units) or U-200 Pen 3 ml = 600 units (3 pens = 9 ml = 1800 units), 56 days once opened at room temp
<b>Humulin R® - U-500 Kwik Pen (Concentrated Regular Insulin)</b>	30 - 45 minutes	~3-4 hrs.	~8-24 hrs.	2-3x daily	Kwik® Pen 3 ml = 1500 units (2 pens = 6 ml = 3000 units) Expires 28 days once open keep at room temp
<b>Combination Insulin Mixtures, Protect all insulin from light and excessive heat</b>					
<u>Insulin (2 insulin profiles acting)</u>	<u>Onset</u>	<u>Peak</u>	<u>Duration</u>	<u>Dosing</u>	<u>Manufactured Units/ml &amp; Expiration Guidelines</u>
<b>Humalog Mix® 75/25 (75% NPL, 25% lispro) U-100</b>	0.2-0.5 hrs.	1-4 hrs.	10-16 hrs.	2x daily	Kwik Pen® 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), Expires 10 days once open keep at room temp
<b>Humulin® Novolin® 70/30 mix (70% NPH, 30% Regular) U-100</b>	0.2-0.5 hrs.	1-4 hrs.	10-6 hrs.	2x daily	10 ml vial (1000 units) – use Relion® relabeled Novolin 70/30 at Walmart*, Expires 31 days once open keep at room temp
<b>Novolog Mix® 70/30 (70% protamine aspart) U-100</b>	0.2-0.5 hrs.	1-4 hrs.	12-24 hrs.	2x daily	FlexPen® 3 ml Pen (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units) 28 days Vials & 14 days Pen once open keep at room temp
<b>Humalog Mix® 75/25 (75% NPL, 25% lispro) U-100</b>	0.2-0.5 hrs.	1-4 hrs.	10-16 hrs.	2x daily	Kwik Pen® 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), Expires 14 days for Pens once opened at room temp
<b>Humalog Mix® 50/50 (50% NPL, 50% lispro)</b>	0.2-0.5 hrs.	0.8-6.5 hrs.	12-24 hrs.	1-2x daily	Kwik Pen Mix® 3 ml Pen = 300 units (5 pens = 15 ml = 1500 units), 10 ml vial (1000 units), Expires 10 days once opened keep at room temp

**Insulin naïve** – basal or split-mixed 0.1 to 0.2 units/kg and titrate up. \*Cost \$200-500 – no insurance. Check coupon card or Patient Assistance Programs. WalMart relabeled as Relion® (Novolin®) 70/30, NPH or Regular ~\$25/10 ml vial (1000 units) **or 5 Flex Pens** ~\$45/15 ml OTC status, box of #100 syringes, 5/16" pen needles (generic) cost ~\$20/box. **Inhaled Insulin** has a profile of rapid-acting insulin and available as Afrezza® Pulmonary Function Test needs assessment at baseline (do not use in COPD/Asthma or smoker)

**Glucagon-Like Peptide-1 (GLP-1) Receptor Agonist** – binds to GLP-1 receptor, ↑ intracellular cyclic AMP in beta cells, enhances glucose-dependent insulin secretion, suppresses glucagon secretion and slows gastric emptying. Use in Type 2 diabetes or in combination with insulin. Boxed warning for all except Byetta®: thyroid c-cell tumor in animal models; Pregnancy - avoid if nursing due to risk of fetal harm; hypoglycemia with concomitant use of insulin and sulfonylureas; pancreatitis; hypersensitivity reactions; monitor renal function, nausea, vomiting, diarrhea, or dehydration. Avoid use in patients with gastroparesis. Stored in refrigerator until use and then OK at room temperature for up to 30 days.

**Amylin agonist Pramlintide (Symlin®)** – 30 to 60 mcg before meals ↓ postprandial glucose by ↑ gastric emptying time, reduction of postprandial glucagon and reduction of caloric

Drug name	Dosing & Packaging Info	A1c & Weight	Administration & Storage, Comments	Adverse Drug Reactions
<b>Dulaglutide Trulicity®</b>	-dosing: start with 0.75 mg and can increase to 1.5 mg once <b>weekly</b> , 3 mg and 4.5 mg doses also approved -Separate doses by at least 3 days -29G needle on single-dose prefilled syringe dispose pen in sharps -Each pre-filled pen contains 0.75 or 1.5 mg/ml of dulaglutide, one package contains 4-single dose pens	A1c ~1.03%  weight loss: 1.5 mg – 6.6 lbs. 3.0 mg – 8.4 lbs. 4.5 mg – 10.1 lbs.	-Remove gray base cap and discard; turn ring to unlock; place firmly against skin; press green button, will hear a click; within 5 sec., will hear 2 <sup>nd</sup> click; medicine is now delivered; hold for 5-10 sec.; -Good at Room temp for up to 14 days, store in refrigerator, -No CrCl restrictions, including ESRD -Approved in CV risk reduction in established CVD	Nausea 0.75 mg 12-17.3%. Diarrhea 7.7-11.6%. 8.6%, vomiting 6.4-10.1%, injection site reaction 0.5%
<b>Exenatide Byetta®</b>	5 mcg SQ twice daily within 60 minutes before AM & PM meals. Can increase to 10 mcg after 1 month of therapy, 31 or 32G needle -Available 5 mcg/dose, 60 doses, 1.2 ml prefilled pen; 10 mcg/dose, 60 doses, 2.4 ml prefilled pen	5 mcg: A1c -0.48-0.6% 10 mcg: A1c -0.7% 6-6.5 lb. weight loss	-Room temp for up to 30 days -CrCl <30 mL/min, not recommended -Use caution in renal transplant patients -Caution listed for CrCl 30-50 mL/min	Vomiting 4-18%, nausea 8-44%, diarrhea 6-18%, injection site reaction 5.1%
<b>Exenatide LAR Bydureon® or Bydureon BCise®</b>	2 mg SQ once weekly -Separate doses by at least 3 days -23G, 7 mm custom needle -Each pre-filled pen contains 2 mg of exenatide/0.65 ml diluent, -One package has 4 single-dose pens	2 mg/week: A1c-0.88% 3.6 lb. weight loss	-Room temp for up to 28 days -CrCl <45 mL/min, not recommended -NC Medicaid preferred -Requires instruction on weekly devices	Vomiting 3.4%, nausea 8.2%, diarrhea 4%, injection site reaction 23.9%
<b>Liraglutide Victoza®</b>	0.6 mg once daily for one week initially. Dose to 1.2 or 1.8 mg daily if no nausea, 31 or 32G needle -Each pre-filled pen - 0.6 mg-1 pen (3 ml), 1.2 mg- 2 pens (6 ml), 1.8 mg- 3 pens (9 ml), 28 day expiration Protect from heat and sunlight	A1c -1.02% 5.4 lb. weight loss	-FDA approved for CV risk reduction: major adverse CV events MACE - CV death, nonfatal MI & stroke in patients with established CV disease -Once open store at room temp for up to 30 days -FDA approved for ages 10 years and older	Nausea 18%, 1.2 mg, 20%, vomiting 6-9%, diarrhea 10-12%, 1.8 mg, injection site reaction 2%
<b>Lixisenatide Adlyxin®</b>	10 mcg once daily for 14 days, then 20 mcg once daily thereafter. Give 1 hour prior to am or evening meal <i>Trials did not show superiority for CVD endpoints.</i>	A1c -0.48% 2 lb. weight loss	-Room temp for up to 14 days -CrCl <30 mL/min, not recommended, Caution CrCl 30-50 mL/min (cleared by endopetidases)	Nausea 25%, vomiting 10%, diarrhea 8%, injection site reaction 4%
<b>Semaglutide Ozempic®</b>	0.25 mg weekly x 4 weeks and can titrate to 0.5 mg weekly x 4 weeks and max dose is 1 mg weekly -Each pre-filled pen: 2 mg semaglutide/1.5 ml diluent, 32G needle, 3/16" 4 mm length, Protect from light	A1c – 1.43% 7.5lb. weight loss	-Once open store at room temp for up to 56 days -No restrictions for hepatic impairment or CrCl restrictions, including ESRD, weight loss average in SUSTAIN trials 7 to 13 lbs. depending on dose	Nausea (15.8-20%), vomiting (5-9.2%), diarrhea (8.8-8.9%), injection site reaction: 0.2%
<b>(2 drug profiles combined) Combination GLP-Insulin Mixtures, Protect all insulin from light and excessive heat</b>				
<b>Glargine + Lixisenatide Soliqua®</b>	15 units (contains 15 units of glargine and 5 mcg of lixisenatide). Inject daily within the hour prior to first meal of the day. Titrate by 2-4U qweek. Max dose is 60 units daily.	A1c -1.1% 3 lb. weight loss	100 units of insulin glargine per mL and 33 mcg of lixisenatide per mL, Dose Range – 15 to 60 once daily. Supplied as SoloStar® Pen 3 ml Pen = 300 units (5 pens = 15 ml). eGFR good to >15 ml/min	Hypoglycemia 8-18%, Ab development, diarrhea 7%, nausea 10%, vomiting 3%. HA 5%, nasopharyngitis 7%, hypoglycemia, dizziness, URI 6%, injection site rxn 2%
<b>Degludec + Liraglutide = Xultophy®</b>	10U daily for pts naïve to basal insulin/GLP-1(contains 0.36mg of Liraglutide). Start at 16U for pts currently on basal insulin/GLP-1. Increase by 2 units every 3 to 4 days. Max dose 50 units daily	DUAL Studies A1c: -1.5 -1.9% 5.9 lb. weight loss	Pre-filled pen – 3 mL (300 units Degludec & 10.8 mg Liraglutide 1.8 mg), Max dose 50 units daily	Hypoglycemia 14-37%, Ab development 2-11%, diarrhea 8%, ↑ serum lipase 7%, nausea 8%, injection site reaction 3%, nasopharyngitis 10%, HA 9%, URI 6%