Ultra-Long Acting Basal Insulins

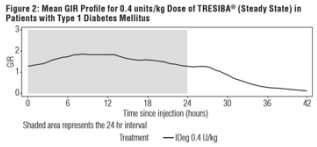
Insulin Degludec
100 units/mL
200 units/mL

Insulin Glargine
300 units/mL

Insulin Degludec (Tresiba®)

Onset: ~1 hour
Duration: > 40 hours
T ½: 25 hours (independent of dose)

Figure 2: Mean GIR Profile for 0.4 units/kg Dose of TRESIBA® (Steady State) in Patients with Type 1 Diabetes Mellitus



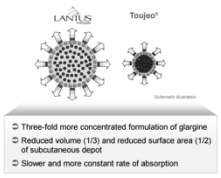
Insulin Degludec (Tresiba®)

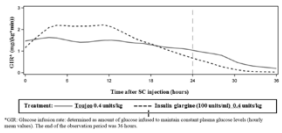
How Supplied	Concentration	Volume	Total Available Units in Presentation	Max Dose per Injection	Dose Increment
U-100 vial	100 units/mL	10 mL	1,000 units	Dependent on syringe	Dependent on syringe
U-100 FlexTouch	100 units/mL	3 mL	300 units	80 units	1 unit
U-200 FlexTouch	200 units/mL	3 mL	600 units	160 units	2 units*

*Note: Tresiba U-200 can only be dosed in 2 unit increments

Insulin Glargine (Toujeo®)

Onset: 4 hours
Duration: > 40 hours
T ½: ~19 hours





Insulin Glargine (Toujeo®)

How Supplied	Concentration	Volume	Total Available Units in Presentation	Max Dose per Injection	Dose Increment
U-300 SoloStar	300 units/mL	1.5 mL	450 units	80 units	1 unit
U-300 Max Solostar	300 units/mL	3 mL	900 units	160 units	2 units

*Note: Toujeo Max Solostar can only be dosed in 2 unit increments

Clinical Considerations

Advantages

- Once-daily dosing
- Lower risk of nocturnal hypoglycemia
- Flatter insulin action curve provides more consistent glucose lowering effect
- Flexible dosing interval between 8 to 40 hours (insulin degludec)

Disadvantages

- 2-unit dose increment with insulin glargine U-300 Max Solostar pen and degludec U-200 FlexPen
- Max dose per injection for glargine U-300 Solostar pen is 80 units
- Unit-per-unit, glargine U-300 has less glucose-lowering effect than glargine U-100

Patient Case 3

DH is a 32 year-old female with type 1 diabetes on MDI who will be coming in next week for pump and CGM start

Her current diabetes regimen includes:
- Insulin degludec 38 units qPM
- Insulin aspart 1:8 ICR; 1:25 ISF with target BG 120 mg/dL

How would you recommend transitioning from her ultra-long acting basal insulin to the pump

Patient Case 3

A. Day -2 and -1: 50% degludec
   Day 1: stop degludec, start pump at 50% temp basal
   Day 2: 80% basal dose

B. Week prior: transition to qAM degludec
   Day -1: last dose degludec in AM
   Day 1: start pump at 80% basal dose

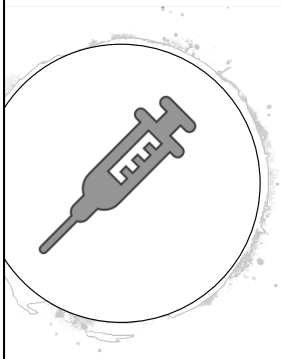
C. Day -1: last dose degludec in PM
   Day 1: start pump at 0% temp basal for remainder of insulin active time

Concentrated Insulins

Useful for patients with insulin resistance
- $\geq$ 2 units/kg/day or total doses > 200 units/day
- 3 units/kg/day in pediatric patients

Insulin resistance may occur in:
- Obesity
- Stress conditions: infection, steroid use
- Acquired form of lipodystrophy
- Pregnancy
- Insulin receptor defects
- Insulin receptor auto-antibodies

Why use concentrated insulin in patients with insulin resistance?



Limitations of Injection Volumes

- Tolerability
- Pen and syringe limit
- Large subcutaneous injections may impeded absorption

Concentrated Insulins

Insulin Degludec
200 units/mL

Insulin Regular
500 units/mL

Insulin Glargine
300 units/mL

Insulin Lispro
200 units/mL

Insulin Regular U-500 (Humulin R U-500®)

Onset: 0.25 to 0.5 hours

Duration: 13 to 24 hours

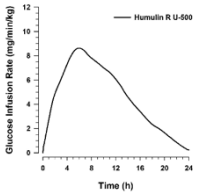


Figure 1: Mean Insulin Activity Versus Time Profiles After Subcutaneous Injection of a 100 U Dose of HUMULIN R U-500 in Healthy Obese Subjects

5 times the concentration of Insulin Regular U-100

Used to cover both basal and prandial insulin needs

Delayed absorption with peak, profile is similar to that of NPH

Insulin Regular U-500 (Humulin R U-500®)

HOW TO PRESCRIBE

****If patient is using a vial and syringe, clearly note what type of syringes they are using****

If patient uses a U-100 syringe	If patient uses a tuberculin syringe	If patient uses a U-500 syringe	If patients uses the U-500 pen
If your patient is taking 80 units of U-500 insulin 3 times daily before meals…			
Divide the dose (in this case 80) by 5 Ex. The patient should draw up to the 16-unit line on a U-100 syringe **Sig:** Use a U-100 syringe to draw up and inject 16 units under the skin TID AC	**Divide the dose (in this case 80) by 500** Ex. The patient should draw up to 0.16-mL line on a tuberculin syringe **Sig:** Use a tuberculin syringe to draw up and inject 0.16 mL under the skin TID AC	**Order as 1:1, no conversion required** Ex. The patient should draw up to the 80-unit line on a U-500 syringe **Sig:** Use a U-500 syringe to draw up and inject 80 units under the skin TID AC	**Order as 1:1, no conversion required** Ex. The patient should dial up to 80 units on the U-500 pen **Sig:** Inject 80 units under the skin TID AC
In each of the above scenarios, the patient would receive 80 units of U-500 insulin			

Patient Case 4

KH is a 58 year-old male with history of type 1 diabetes mellitus on insulin pump with insulin aspart U-100. His insulin requirements exceed 200 units per day and his prescriber requests your help in transitioning to use of insulin regular U-500 via pump. What do you recommend?

Basal

Maximum Basal Rate	6.00 U/hr

Basal 1 (active)

24-Hour Total	114.100 U

Time	U/hr
0:00	3.85
6:00	4.90
11:00	5.20
18:30	5.00

Day Off

24-Hour Total	–

Time	U/hr
–	–

Workday

24-Hour Total	–

Time	U/hr
–	–

Bolus

Bolus Wizard	On
Units	g, mg/dL
Active Insulin Time (h:mm)	4:00
Maximum Bolus	25.0 U

Easy Bolus	Off
Bolus Increment	0.1 U
Bolus Speed	Quick
Dual/Square	Off/Off

Carbohydrate Ratio (g/U)

Time	Ratio
0:00	9.0
5:30	1.5
20:00	4.0

Insulin Sensitivity (mg/dL per U)

Time	Sensitivity
0:00	30
5:00	20
22:00	25

Blood Glucose Target (mg/dL)

Time	Low	High
0:00	100	140
6:00	90	120
22:00	100	140

Using Insulin Regular U-500 in Insulin Pumps

Higher basal rates during the day; lower at night

Long insulin active time

Do not bolus more frequently then 4-6 hours to limit insulin stacking

Check your calculations!

Insulin Aspart (Fiasp®)

Formulation of insulin aspart with addition of vitamin B3 (niacinamide) and L-Arginine to increase the speed of absorption and for stability

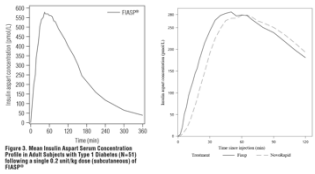


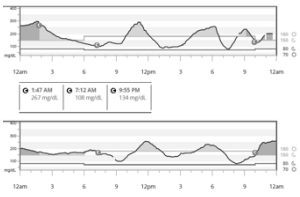
Figure 3. Mean Insulin Aspart Serum Concentration Profile in Adult Subjects with Type 1 Diabetes (N=51) following a single 0.2 unit/kg dose (subcutaneous) of FIASP®

Inject at the start of a meal or within 20 minutes after starting a meal

Patient Case 5

CT is a 47 year-old female with history of gastroparesis and type 1 diabetes mellitus. She is currently on CGM and insulin pump therapy with insulin lispro.

She is having a hard time with post-prandial glucose variability because she does not always know how much she will be able to eat. She wonders if switching to fast insulin aspart in her pump would be a good option for her. What do you recommend?



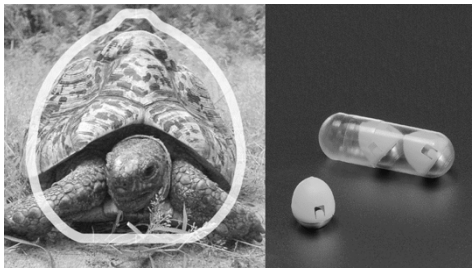
Patient Case 2

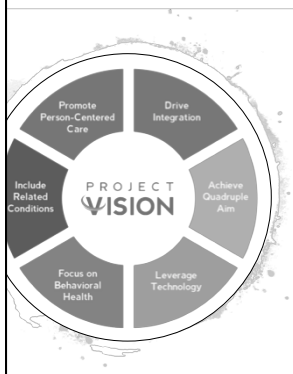
A. Fast insulin aspart is not FDA approved for use in insulin pumps

B. Fast insulin aspart would allow CT the flexibility to bolus after she eats preventing post-prandial glucose excursions

C. Fast insulin aspart has a faster peak and shorter duration of action compared to insulin lispro, which could lead to late post-prandial hyperglycemia in a patient with gastroparesis

Emerging Therapies: Oral Insulin





AADE Project Vision

A multi-year initiative to position diabetes educators for success within a dynamically changing environment, elevating your role as integrators for clinical management, education, prevention and support

AADE's PROJECT VISION seeks to

- Improve outcomes with holistic, patient-centered care
- Bridge the gap between the clinical and self-management aspects of care
- Make the most of the skills that you already have while growing those diabetes specialists of the future should develop
- Elevate your role as an expert at the clinical and behavioral aspects of diabetes care
- Claim your expertise in the cardiometabolic space
- Demonstrate how diabetes education programs are *savings* centers and not *cost* centers