Insulin Therapy in Patients with T2DM

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Agenda

- Indication of starting Insulin
- Normal Insulin secretion
- Choosing appropriate insulin
- Types of insulin
- Titrating of different kind of insulin

Indication

Significant weight loss

Severe hyperglycemia (250–300 mg/dL)

HbA1C >10 %

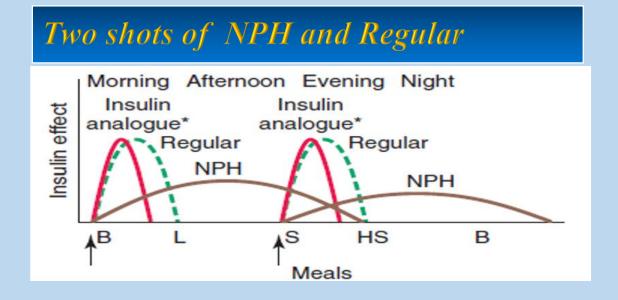
Symptoms of hyperglycemia

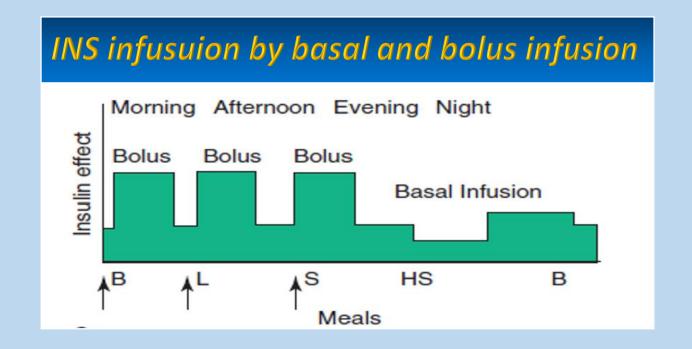
Diagnosis of T1DM is a possibility

Underlying renal or hepatic disease that precludes oral agents

Hospitalized or acutely ill patient

Multiple component INS regimen Morning Afternoon Evening Night Insulin Insulin Insulin anaanaana-Insulin effect logue* logue* logue* Long-acting Insulin^ **₄HS** В Meals





Choosing Insulin Patient centered approach

Age

Duration of diabetes

History of sever hypoglycemia

Patient-specific psycho-socioeconomic context

Types of Insulin

Types of Insulin

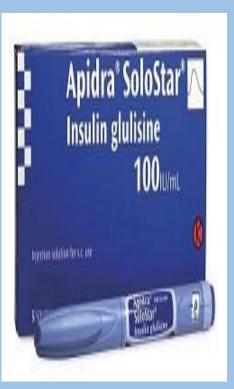


Rapid acting insulin

Aspart (Novorapid)



Glulisine (Apidra)



Lispro (Humalog)



Aspart (Rapidsulin)



Rapid-acting Analouge

Onset of action: 5-15 min after injection

Peak: 1 hour

Duration of action: 4 hour

Administration: 0-15min before meals or just after meal

Short acting insulin

Insulin Regular



Insulin Regular

Onset of action: 30 min after injection

Peak: 2-4 hours

Duration of action: 6-8 h or longer at high doses

Intravenously: immediately effective, half life of 10 min

Administration: 15-30min before or just after meals

Intermediate-acting Insulin

Neutral Protamine Hagedorn insulin(*NPH*)



Insulin NPH



Onset of action: 1 to 2 hours

Peak: usually at 4 to 8 hours

Duration of action: 12 to 16 hours

Administration: once or twice daily

Long acting insulin

Glargine

Lantus (U100)



Toujeo (U300)



Abasaglar(U100)



Long acting insulin

Detemir (Levemir)

Glargine (Basalin) Glargine (Glaine)







Insulin Glargine (U100)

Onset of action: 60-120 min

Peak: No pronounced peak

Duration of action: 24 hours

Once daily, before breakfast or at bedtime

Insulin Detemir (Levemir)

Onset of action: 60-120 min

Time to peak(hours): 6-10 h

Duration(hours):16-24 h

Twice daily, before breakfast and dinner or at bedtime

Once daily dosing is sufficient for at least 40% of patients

Concentrated INS

In patients with INS resistance who require large doses of INS

Higher doses of basal INS administration per volume usedabout 65-100 U/day or higher

Longer and flatter profiles of action than detemir and glargine

Lower risk of hypoglycemia than with glargine

Insulin Toujeo (U300)

Onset of action(min): 60-120 min

Time to peak(hours): No peak

Duration(hours):up to 72 h

Administration: once daily

Premixed Insulin

Lansulin 70/30



Novomix 30



Humalog25/75



Premixed Insulin

Single-peak action at about 4 to 6 hours after each injection

Reduced flexibility of dosing

More hypoglycemia compared to basal insulin

Premixed Insulin

appropriate for certain patients who eat regularly

No need for self mixing

Minimizing dosing error

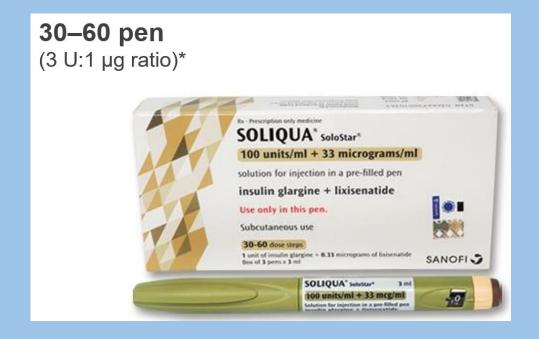
Less injections (attractive alternative to basal bolus)

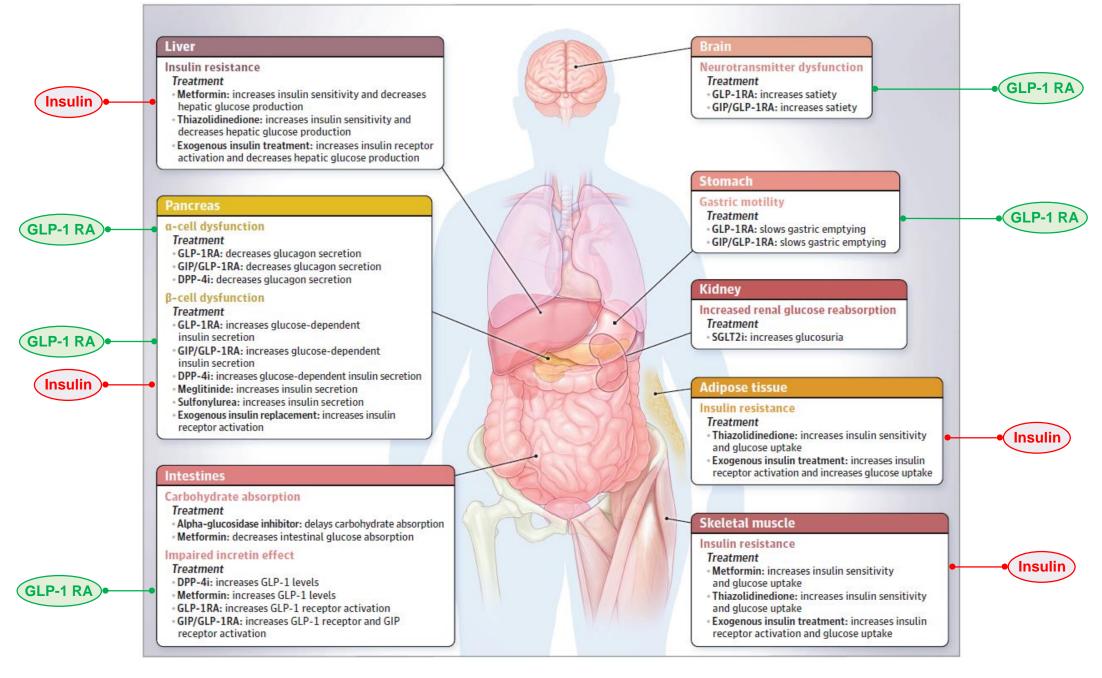
Disadvantages: inability to titrate the shorter- from the longer-acting component

Fixed -dose ratio Insulin

Ins Glargine/Lixisenatide (Soliqua)

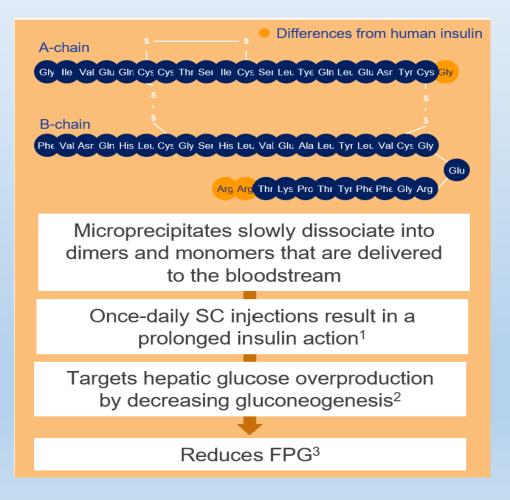




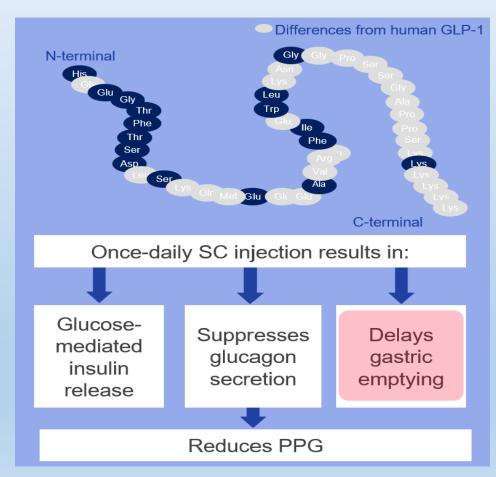


Ins Glargine/Lixisenatide (Soliqua)

Insulin glargine 100 Units/mL



Lixisenatide (GLP-1 RA)



Available in two pens, providing different dosing options.

10-40 prefilled pen contains per mL

100 units insulin glargine and 50 mcg lixisenatide

30-60 prefilled pen contains per mL

100 units insulin glargine and 33 mcg lixisenatide

Soliqua:10-40 pen

1 unit contains 1 unit of insulin glargine and 0.5 mcg lixisenatide

Allows daily doses between 10 and 40 units of Soliqua(10 to 40 units of insulin glargine in combination with 5 to 20 mcg lixisenatide).

Soliqua :30-60 pen

1 unit contains 1 unit of insulin glargine and 0.33 mcg lixisenatide

Allows daily doses between 30 and 60 units of Soliqua (30 to 60 units insulin glargine/10 to 20 mcg lixisenatide)

Should be administered SQ once a day within 1 hour prior to any meal

If a dose of Soliqua is missed, it should be injected within the hour prior to the next meal

Oral contraceptives should be taken 1 hour before or 11 hours after taking lixisenatide-containing products

Acetaminophene and antibiotics are among other drugs that are affected by this action of lixisenatide.

Hypoglycemia

Improved insulin sensitivity (e.g. by removal of stress factors)

unaccustomed, increased or prolonged physical activity

intercurrent illness (e.g. vomiting, diarrhoea)

inadequate food intake or missed meal

alcohol consumption

Starting dose of Soliqua

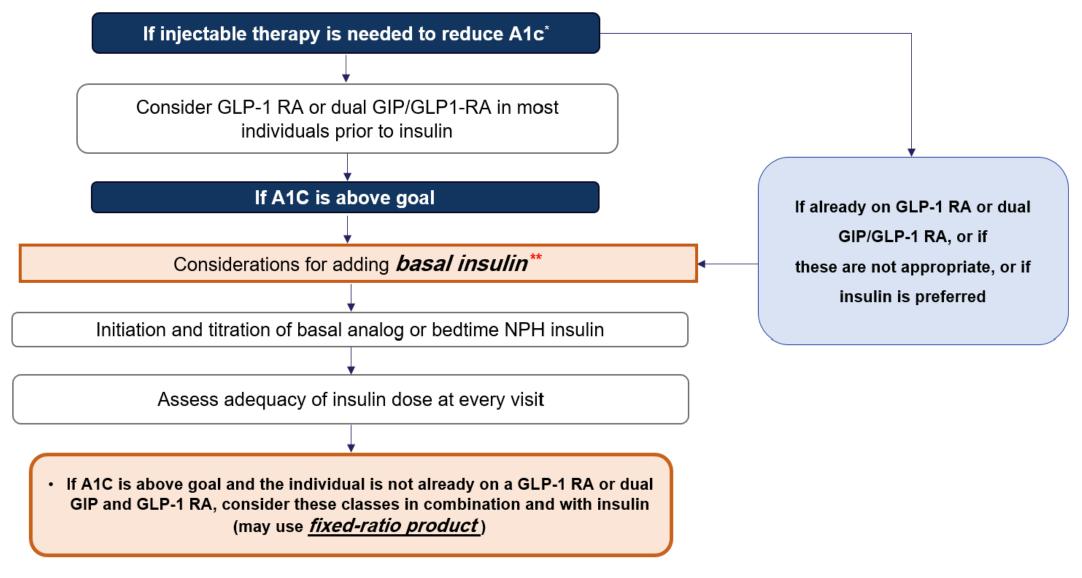
Previous treatment									
		Insulin naïve patients (Oral anti-diabetic treatment or GLP-1 receptor	Insuli n glargin e (U100) **	Insulin glargine (U100)** ≥20 to <30 Units	Insulin glargine (U100)** ≥30 to ≤60 Units Units				
		agonist)	<20 Units						
Starting dose	Soliqua® (10,40) non	10 Units		20 Units (20 Units/10)					
and Pen	(10-40) pen	(10 Units/5 mcg)*		(20 Units/10 mcg)*					
	Soliqua®				30 Units				
	- (30 60) pen				(30 Units/10 mcg) *				

If a different basal insulin was taken:

For twice daily basal insulin or Toujeo, the total daily dose should be reduced by 20% to choose the Soliqua starting dose.

For any other basal insulin the same rule as for insulin glargine (U100) should be applied

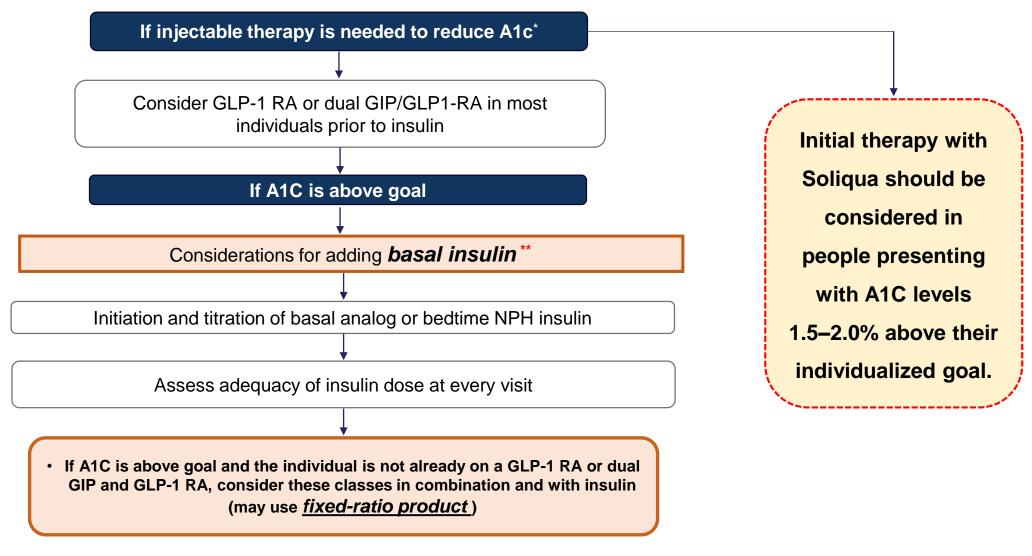
Status of Fixed-Ratio GLP1-Insulin Basal Combination in ADA 2025 Guideline



^{*}Consider insulin as the first injectable if symptoms of hyperglycemia are present, when A1C or blood glucose levels are very high (i.e., A1C >10% or blood glucose ≥300 mg/dL), or when a diagnosis of type 1 diabetes is a possibility.

ADA 2025 IR-SA-SLQ-25-10-138

^{**}For people on GLP1-RA and Basal insulin combination, consider use of a fixed ratio combination product (IDegLira or iGlarLixi)



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Insulin Ryzodeg 70-30

Onset of action(min): 15 min

Time to peak(hours):30 min - 2 ½ hours

Duration(hours): > 42 hours

Administration: once or twice daily with the main meal

Insulin Degludec/Aspart (Ryzodeg 70-30)



Insulin Ryzdec 70-30

A soluble insulin consisting of insulin degludec and aspart administered in one injection.

1 mL contains 100 U Ryzodeg (70% soluble insulin degludec and 30% soluble insulin aspart)

One pre-filled pen or cartridge contains 3 mL, equivalent to 300 U of insulin degludec/insulin aspart

Insulin Ryzdeg 70-30

It last for about 5 days and is more consistantly released into the blood stream

It can vary from 10 units to 400 units daily.

Minimizing dosing error

Less injections (attractive alternative to basal bolus)

Insulin Ryzdeg70-30

Starting 10 units once or twice per day immediately prior to main meal

Titration should be performed at **least weekly** until FBS are at the medically recommended target

Switching from regimen includes once/ twice-daily basal insulin, start at the same unit dose

Switching from multiple daily injections, start Ryzodeg once daily with the nain meal at the same unit dose as the basal insulin; continue bolus insulin at the same dose for meals NOT covered by Ryzodeg

In those on premixed insulins a simple swap at the same dose is appropriate

Basal Insulin

Metformin, GLP1 RA, DPP4 inhibitors, SGLT2 inhibitors can be continued when INS is added

long-acting INS dose >1 U/kg/day of should be considered for combination therapy with metformin or TZD

Addition of a TZD to a INS may necessitate a reduction in the INS dose to avoid hypoglycemia

INS plus TZD promotes weight gain and is associated with peripheral edema

Basal Insulin

A single dose of basal INS is initiated in the evening or before bedtime

Starting dose: 0.2-0.4 U/kg/day

Basal INS be adjusted every 3-4 days

10% increments by SMBG results, until FBS target is achieved

Bolus Insulin

Add 1 rapid-acting INS before largest meal

4 unit, 0.1 u/kg or 10% of basal INS

Increase dose by 1-2 unit or 10-15% once or twice weekly until SMBG target reached

For hypoglycemia, decrease corresponding dose by 2-4 unit or 10-20%

IF A1C not controlled, advance to basal-bolus

Add ≥ 2 rapid-acting INS before meal

4 unit, 0.1 u/kg or 10% of basal INS

Increase dose by 1-2 unit or 10-15% once or twice weekly

For hypoglycemia, decrease corresponding dose by 2-4 unit Or 10-20%

Insulin Type	Onset	Peak Time	Duration	Method
Rapid acting	15 minutes	1 hour	2 to 4 hours	Usually taken right before a meal. Often used with longer-acting insulin.
Rapid-acting inhaled	10 to 15 minutes	30 minutes	3 hours	Usually taken right before a meal. Often used with injectable long-acting insulin.
Regular/short acting	30 minutes	2 to 3 hours	3 to 6 hours	Usually taken 30 to 60 minutes before a meal.
Intermediate acting	2 to 4 hours	4 to 12 hours	12 to 18 hours	Covers insulin needs for half a day or overnight. Often used with rapid- or short-acting insulin.
Long acting	2 hours	Does not peak	Up to 24 hours	Covers insulin needs for about a full day. Often used, when needed, with rapid- or short-acting insulin.
Ultra-long acting	6 hours	Does not peak	36 hours or longer	Provides steady insulin for long periods.
Premixed	5 to 60 minutes	Peaks vary	10 to 16 hours	Combines intermediate- and short-acting insulin. Usually taken 10 to 30 minutes before breakfast and dinner.

Thank you!