

The New Age of Insulin:

Exploring the Latest Trends in Insulin Therapy

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Disclosure

Conflicts of Interest and Financial Relationships Disclosures:

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- Advanced Practitioner Advisory Board and Speaker's Bureau:
 - Sanofi, Novo Nordisk.

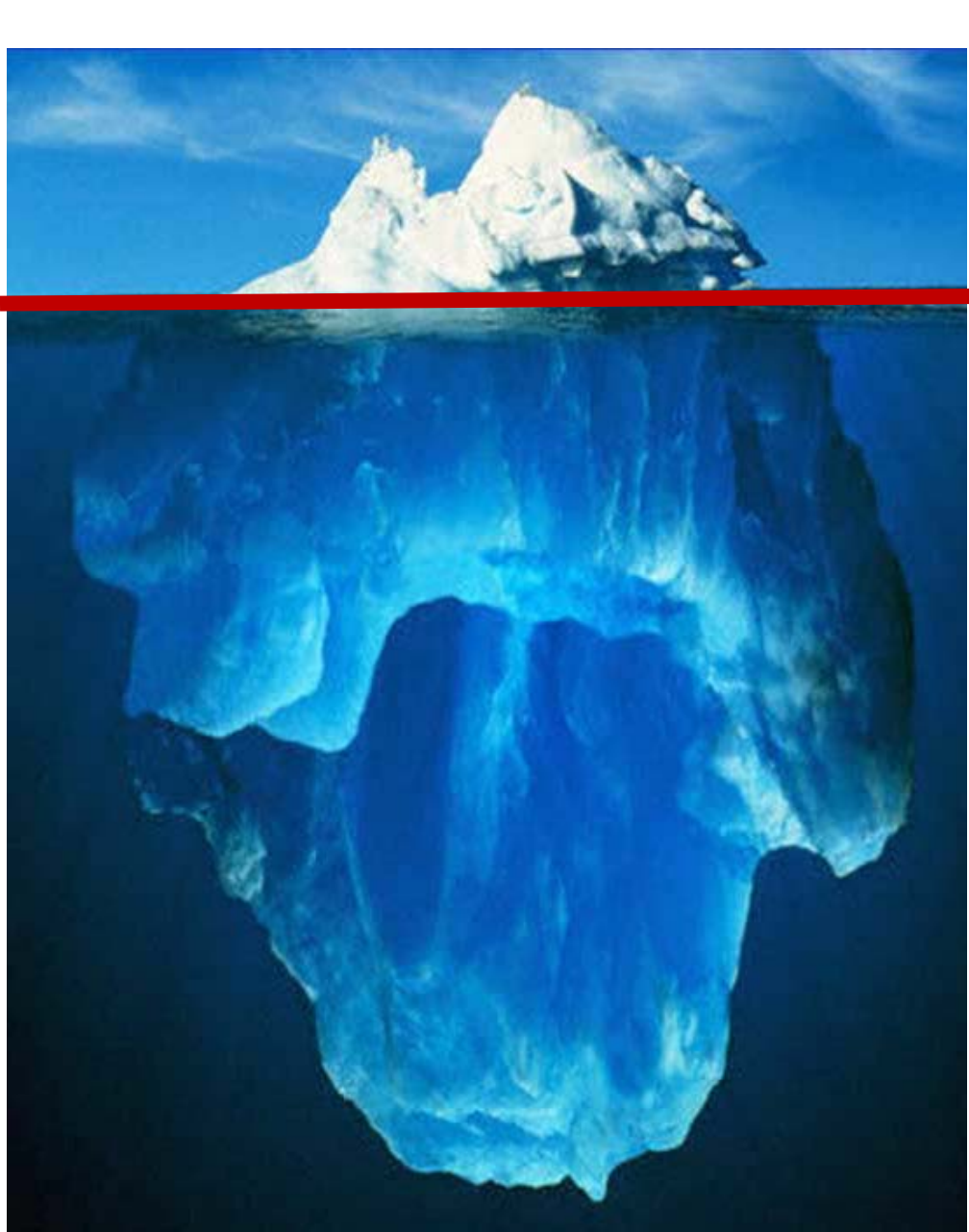
Objectives

At the conclusion of this knowledge-based educational activity, participants will be able to:

1. Discuss the current trends in the pathophysiology and progressive nature of diabetes.
2. Describe implications for the use of different insulin products in the diabetes management and care plan.
3. Compare the pharmacokinetic and pharmacodynamic parameters of insulin formulations and delivery methods.



Every **6 seconds** a person
dies from diabetes (**5.0 million
deaths**)

An iceberg floating in the ocean. The tip of the iceberg, which is visible above the water, is relatively small and jagged. The much larger, submerged part of the iceberg is hidden below the water line. A horizontal red line is drawn across the image, separating the visible tip from the hidden base. This visual metaphor represents the disparity between diagnosed diabetes and undiagnosed prediabetes.

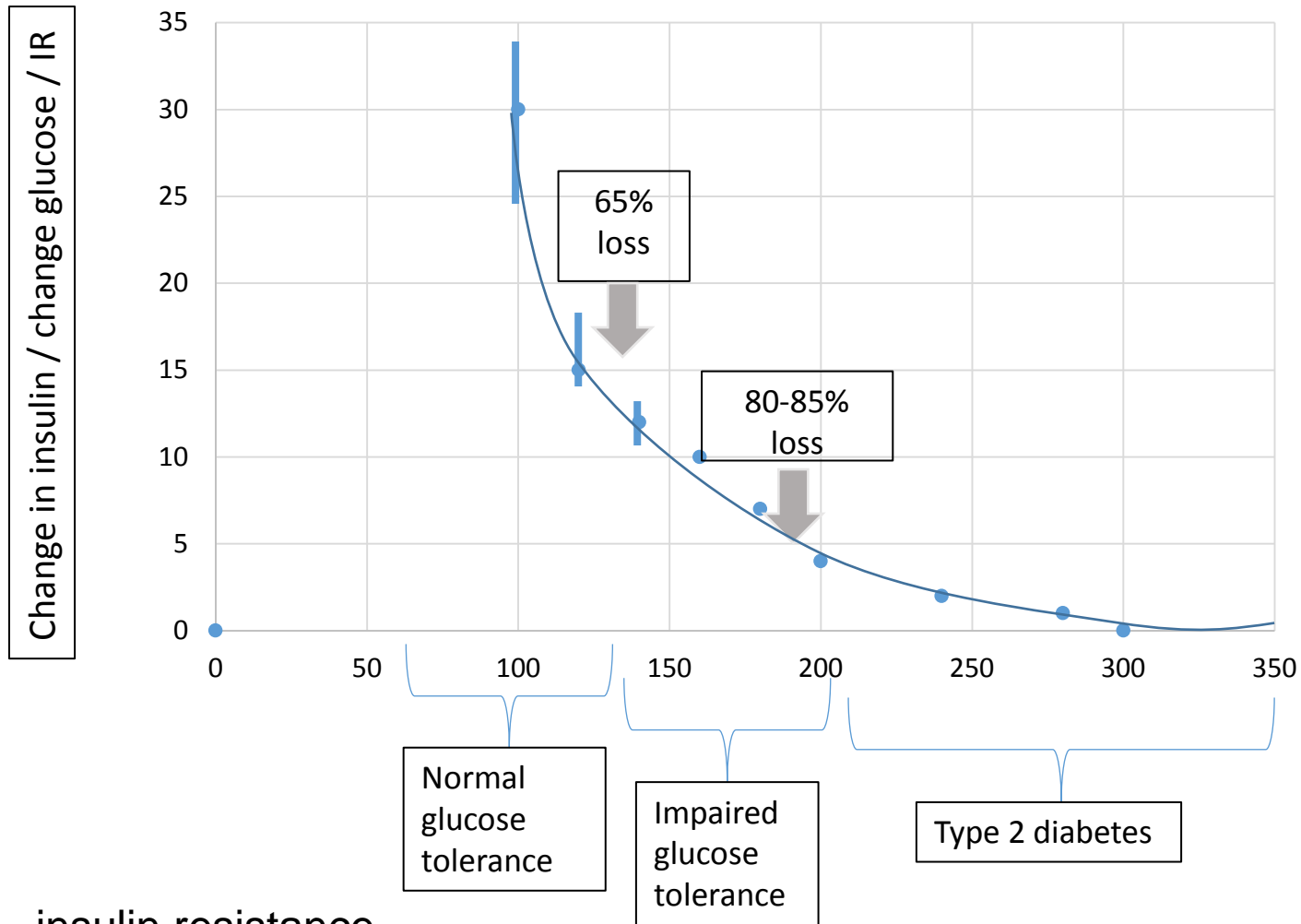
**29.1 million
with Diabetes**

**86 million
with Prediabetes**

Why is Glucose Control Important?

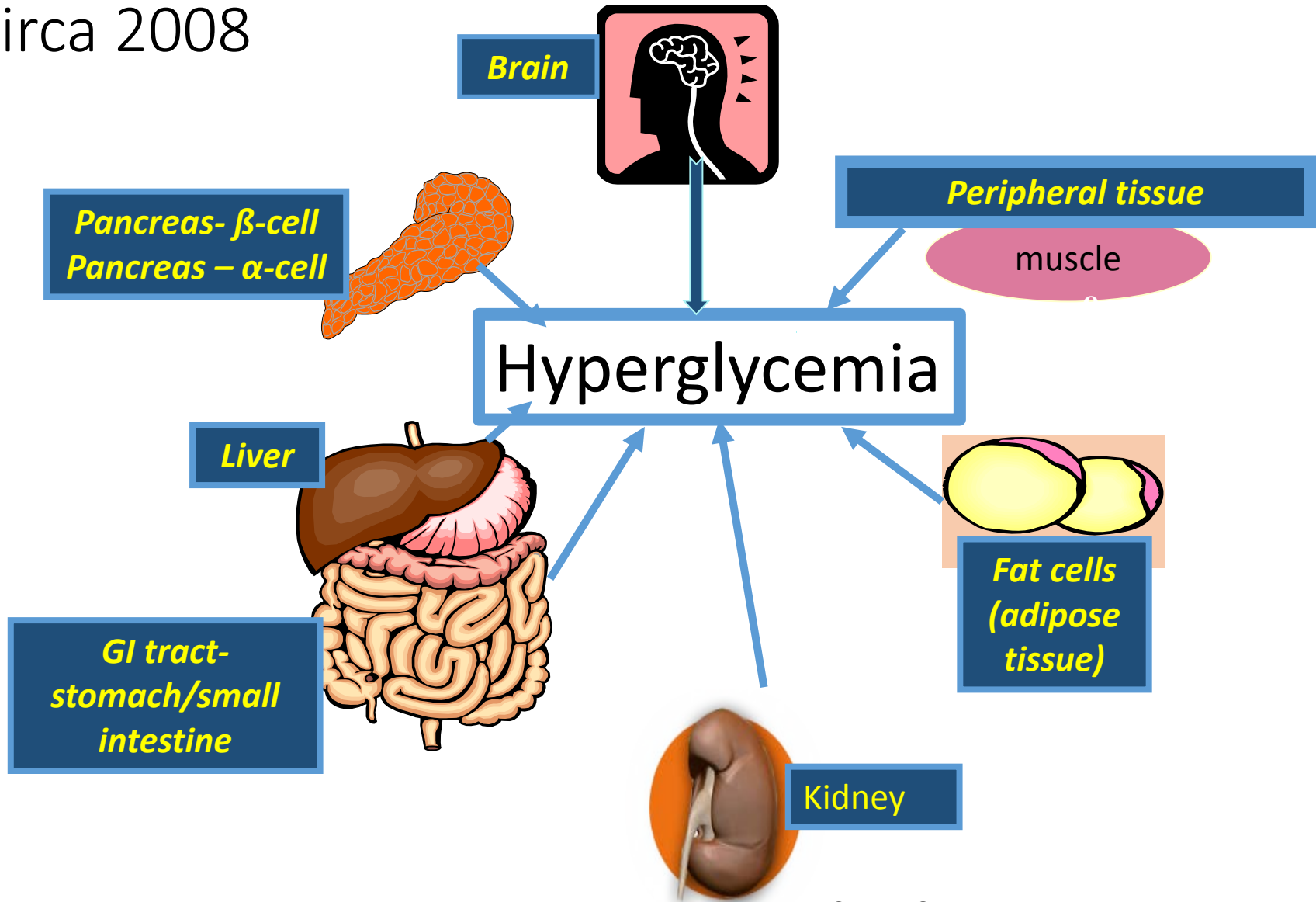
- 60% of people with type 2 diabetes have at least one complication because of diabetes
 - Complications are often present at time of diagnosis

β -cell Decline in Prediabetes and T2DM



IR = insulin resistance

The Ominous Octet: Circa 2008



Treatment Approach to T2DM

- Dietary changes
 - Reduce consumption of calories
 - Reduce consumption of simple carbohydrates

- Increase physical activity

- Medications
 - Improve or replace insulin secretion
 - Reduce insulin resistance
 - Reduce glucagon secretion
 - Reduce hepatic glucose production
 - Increase urinary glucose excretion

ADA Standards of Medical Care (2017)

Start with Monotherapy unless:

A1C is greater than or equal to 9%, **consider Dual Therapy.**

A1C is greater than or equal to 10%, blood glucose is greater than or equal to 300 mg/dL, or patient is markedly symptomatic, **consider Combination Injectable Therapy** (See Figure 8.2).

Monotherapy

Metformin

Lifestyle Management

EFFICACY*	high
HYPO RISK	low risk
WEIGHT	neutral/loss
SIDE EFFECTS	GI/lactic acidosis
COSTS*	low

If A1C target not achieved after approximately 3 months of monotherapy, proceed to 2-drug combination (order not meant to denote any specific preference — choice dependent on a variety of patient- & disease-specific factors):

Dual Therapy

Metformin +

Lifestyle Management

	Sulfonylurea	Thiazolidinedione	DPP-4 inhibitor	SGLT2 inhibitor	GLP-1 receptor agonist	Insulin (basal)
EFFICACY*	high	high	intermediate	intermediate	high	highest
HYPO RISK	moderate risk	low risk	low risk	low risk	low risk	high risk
WEIGHT	gain	gain	neutral	loss	loss	gain
SIDE EFFECTS	hypoglycemia	edema, HF, fxs	rare	GU, dehydration, fxs	GI	hypoglycemia
COSTS*	low	low	high	high	high	high

If A1C target not achieved after approximately 3 months of dual therapy, proceed to 3-drug combination (order not meant to denote any specific preference — choice dependent on a variety of patient- & disease-specific factors):

Triple Therapy

Metformin +

Lifestyle Management

	Sulfonylurea +	Thiazolidinedione +	DPP-4 inhibitor +	SGLT2 inhibitor +	GLP-1 receptor agonist +	Insulin (basal) +
	TZD	SU	SU	SU	SU	TZD
or	DPP-4-i	or DPP-4-i	or TZD	or TZD	or TZD	or DPP-4-i
or	SGLT2-i	or SGLT2-i	or SGLT2-i	or DPP-4-i	or SGLT2-i	or SGLT2-i
or	GLP-1-RA	or GLP-1-RA	or Insulin*	or GLP-1-RA	or Insulin*	or GLP-1-RA
or	Insulin*	or Insulin*		or Insulin*		

If A1C target not achieved after approximately 3 months of triple therapy and patient (1) on oral combination, move to basal insulin or GLP-1 RA, (2) on GLP-1 RA, add basal insulin, or (3) on optimally titrated basal insulin, add GLP-1 RA or mealtime insulin. Metformin therapy should be maintained, while other oral agents may be discontinued on an individual basis to avoid unnecessarily complex or costly regimens (i.e., adding a fourth antihyperglycemic agent).

Combination Injectable Therapy

(See Figure 8.2)

LIFESTYLE THERAPY

(Including Medically Assisted Weight Loss)

Entry A1C < 7.5%

Entry A1C ≥ 7.5%

Entry A1C > 9.0%

MONOTHERAPY*

- ✓ Metformin
- ✓ GLP-1 RA
- ✓ SGLT-2i
- ✓ DPP-4i
- ⚠ TZD
- ✓ AGi
- ⚠ SU/GLN

If not at goal in 3 months proceed to Dual Therapy

DUAL THERAPY*

- ✓ GLP-1 RA
 - ✓ SGLT-2i
 - ✓ DPP-4i
 - ⚠ TZD
 - ⚠ Basal Insulin
 - ✓ Colesevelam
 - ✓ Bromocriptine QR
 - ✓ AGi
 - ⚠ SU/GLN
- MET**
or other 1st-line agent

If not at goal in 3 months proceed to Triple Therapy

TRIPLE THERAPY*

- ✓ GLP-1 RA
 - ✓ SGLT-2i
 - ⚠ TZD
 - ⚠ Basal insulin
 - ✓ DPP-4i
 - ✓ Colesevelam
 - ✓ Bromocriptine QR
 - ✓ AGi
 - ⚠ SU/GLN
- MET**
or other 1st-line agent + 2nd-line agent

If not at goal in 3 months proceed to or intensify insulin therapy

SYMPTOMS

NO

YES

DUAL Therapy

OR

TRIPLE Therapy

INSULIN ± Other Agents

ADD OR INTENSIFY INSULIN

Refer to Insulin Algorithm

LEGEND

- ✓ Few adverse events and/or possible benefits
- ⚠ Use with caution

* Order of medications represents a suggested hierarchy of usage; length of line reflects strength of recommendation

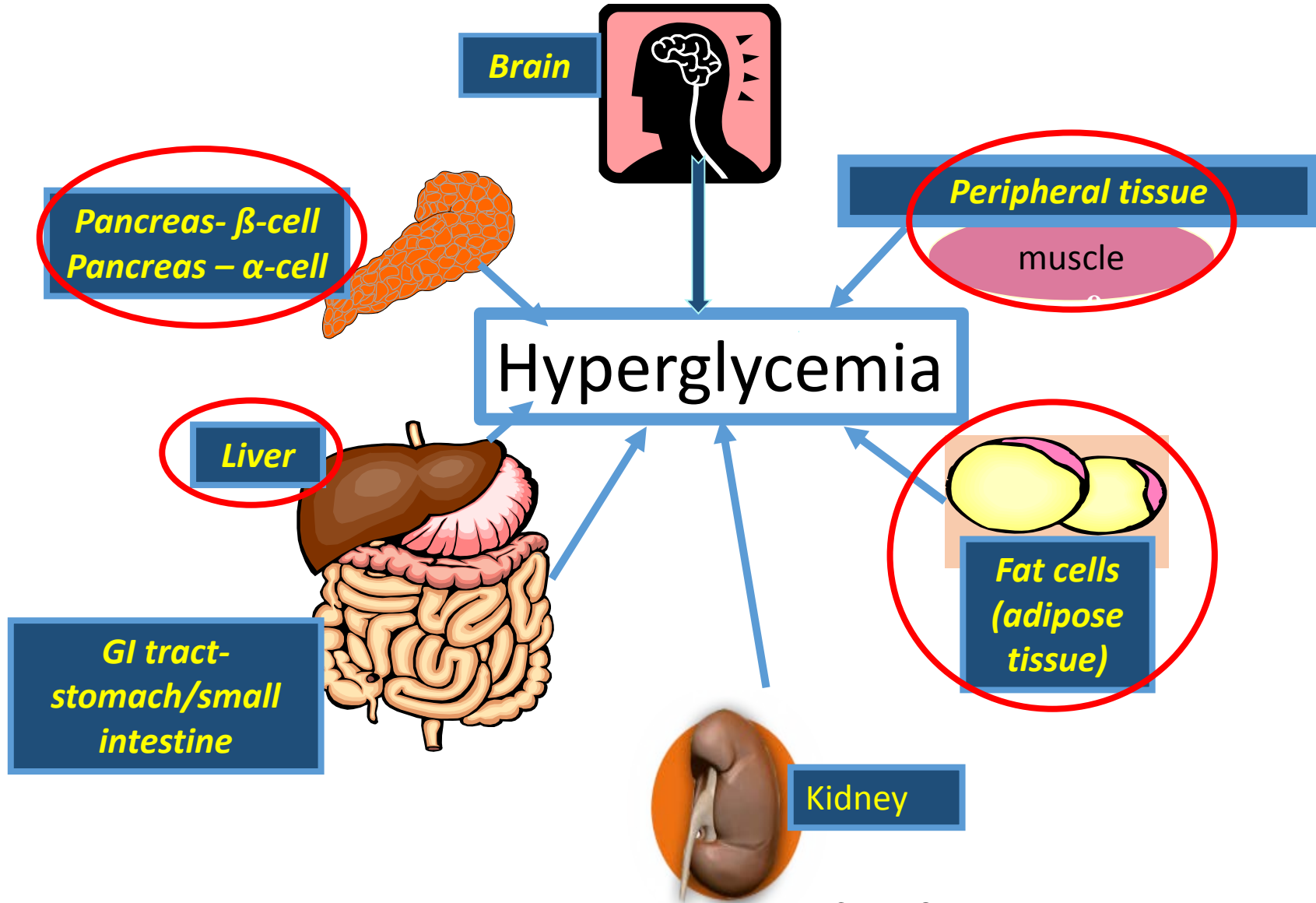
PROGRESSION OF DISEASE

Glucose-Lowering Comparison

Monotherapy	Used in Pre-Diabetes	Targets Insulin Resistance	Target Glucose: FPG or PPG	A1C Reduction (%)
Sulfonylurea	No	No	Both	1.5-2.0
Metformin	Yes	Maybe?	FPG	1.5
Glitazones	Yes	Yes	Both	1.0-1.5
Meglitinides	No	No	PPG	0.5-2.0
AGIs	Yes	No	PPG	0.5-1.0
DPP-4 inhibitors	No	No	PPG	0.5-0.7
Bile acid sequestrant	No	No	PPG	0.4
Dopamine agonists	No	No	PPG	0.4
SGLT-2 inhibitors	No	Maybe?	FPG	0.7 – 1.1
GLP-1 agonists	Yes	No	Short-acting – PPG Long-acting – Both	0.8-1.5
Amylin analogs	No	No	PPG	0.6
Insulin	No	Yes (to a degree)	Basal – FPG Bolus – PPG	↓ as much as needed

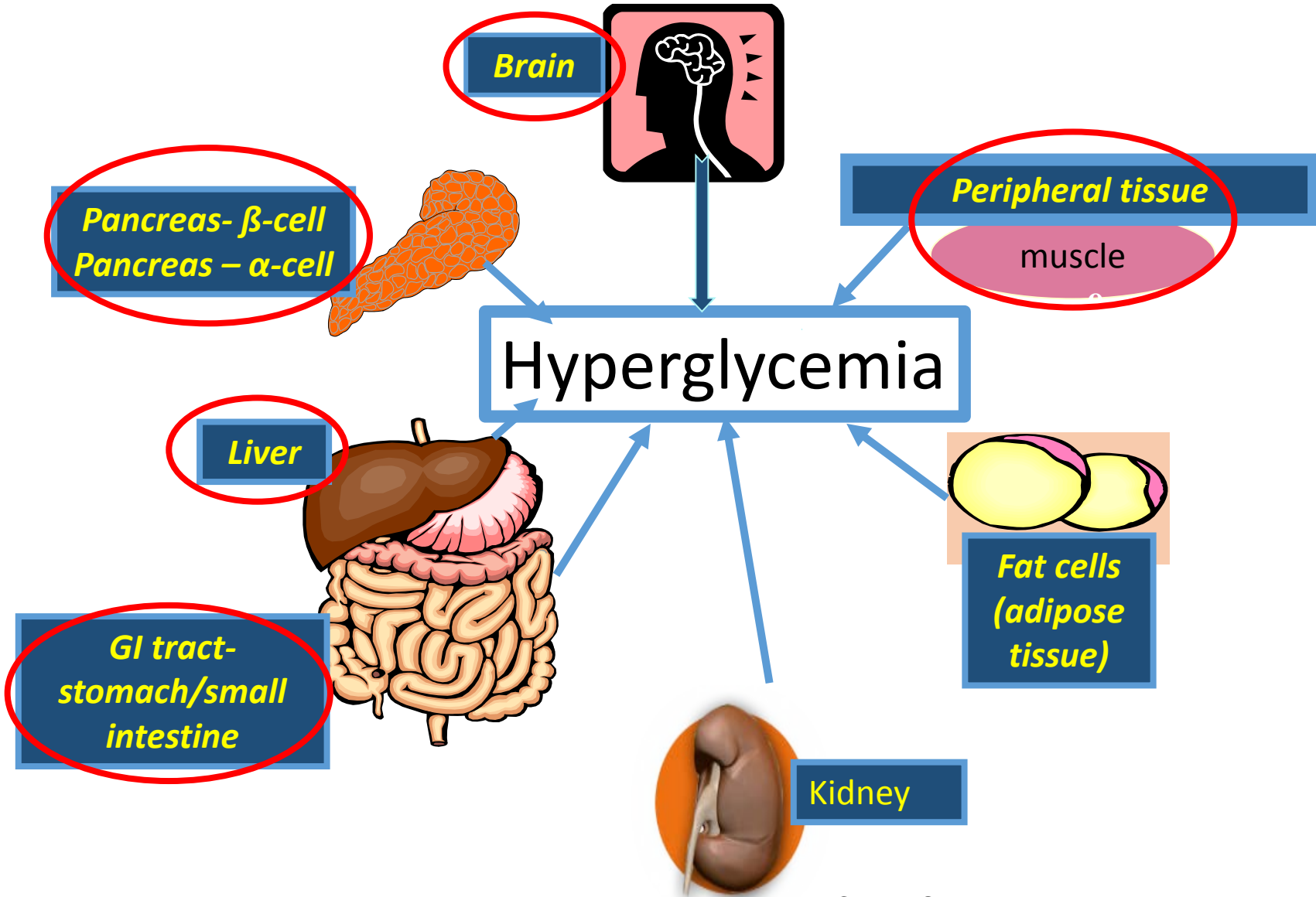
AGIs = alpha-glucosidase inhibitors; DPP-4 = dipeptidyl peptidase 4; GLP-1 = glucagon-like peptide-1; FPG = fasting plasma glucose; PPG = postprandial glucose; SGLT-2 = sodium-glucose cotransporter 2.

Insulin “fixes 5 defects



Cornell S et al. *Postgrad Med.* 2012; 124:84-94.
DeFronzo RA. *Diabetes.* 2009; 58:773-95.

GLP-1RA “fixes” 6 defects



Cornell S et al. *Postgrad Med.* 2012; 124:84-94.
DeFronzo RA. *Diabetes.* 2009; 58:773-95.

Insulin Resistance

- Major defect in individuals with type 2 diabetes
- Reduced biological response to insulin
- Closely associated with obesity
- Associated with cardiovascular risk
- Type 1 diabetes patients can be insulin resistant as well

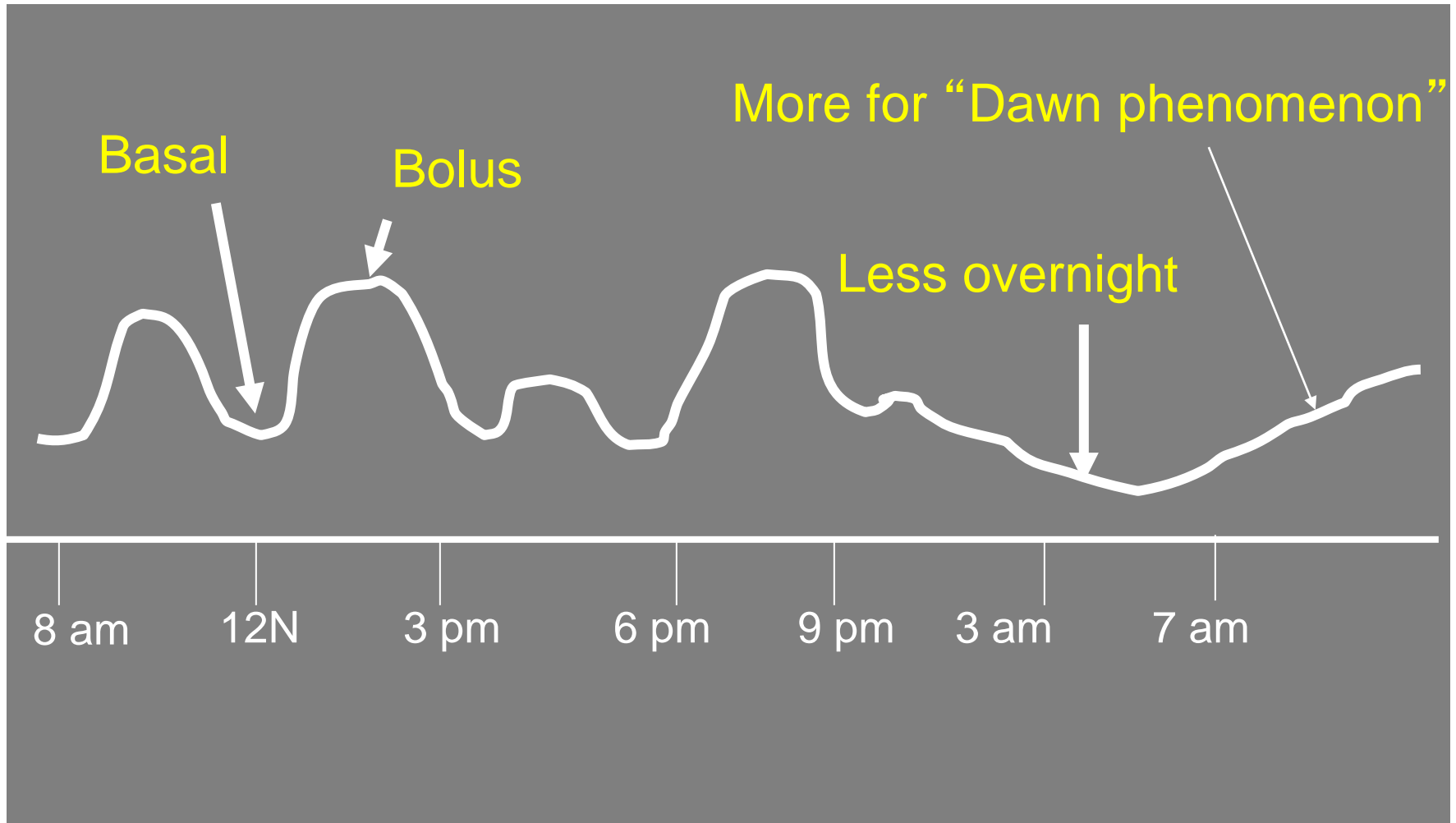
Insulin Therapy for Insulin Resistance

- Insulin, insulin, and yet more insulin!
 - Causes weight gain and fluid retention
 - Increased risk of hypoglycemia
 - Expensive at high volumes (especially the pens)
 - Multiple injections per day often needed
- Pumps not practical with high-volume insulin usage

High Doses of Insulin

- Concerns:
 - Hypoglycemia
 - Medication errors in dosing
 - Absorption issues
 - Patient insulin variability (pharmacokinetics and pharmacodynamics)
- Problems:
 - Over-basalization
 - Failure to treat the physiological defects
 - Insulin resistance
 - Decrease satiety

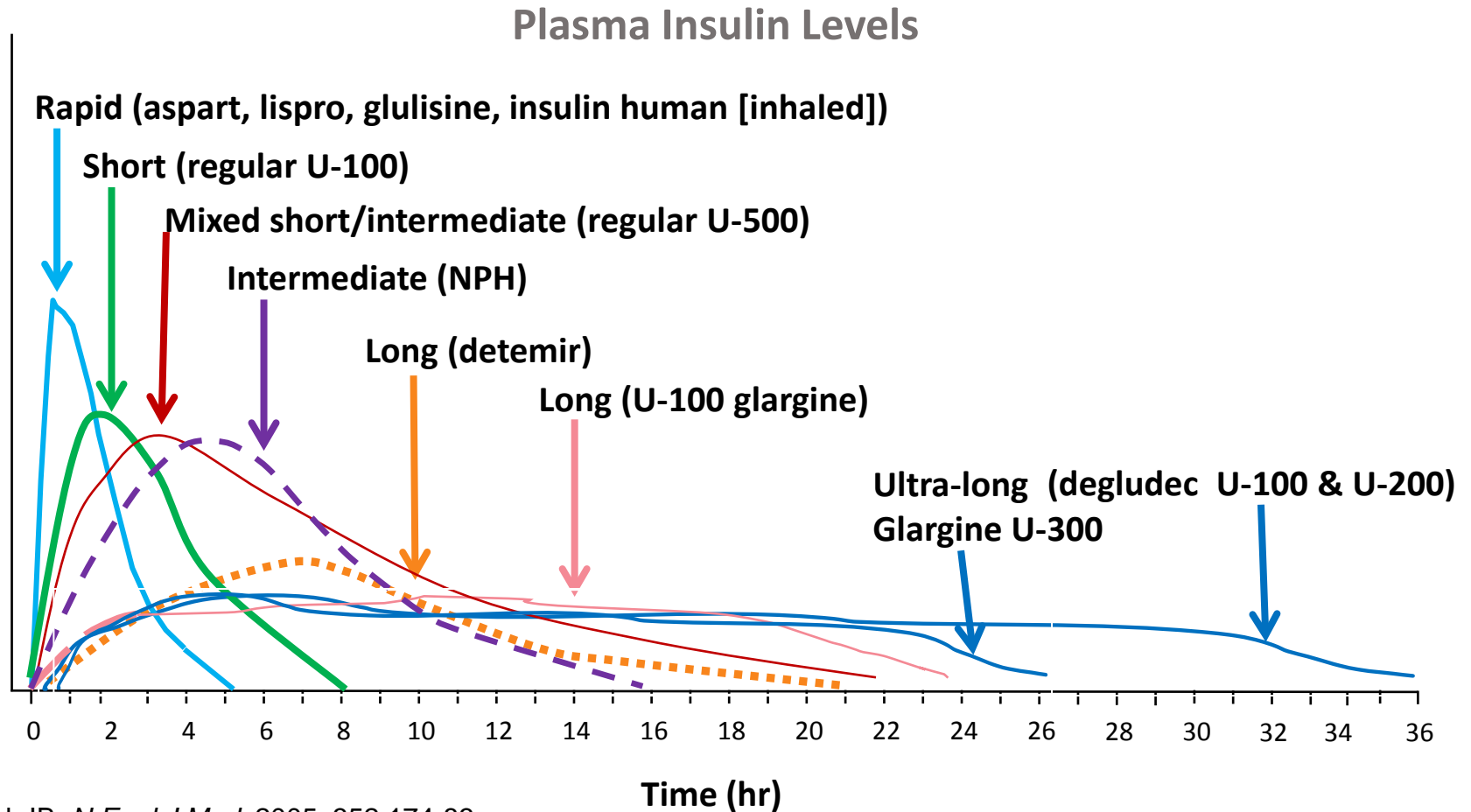
Thinking like a Pancreas



The Basal-Bolus Concept

- “Components” of Insulin Replacement
- Basal insulin: 50% of daily needs
 - Controls nighttime and between-meal glucose at a nearly constant level
- Bolus insulin: 50% of daily needs
 - Controls mealtime glucose
 - 10% to 20% of total daily insulin requirement at each meal
- Correction dose (sensitivity factor)
 - Additional insulin needed (usually pre-meal)
 - Often to correct for fasting hyperglycemia

Pharmacokinetic Profile of Currently Available Insulins



Hirsch IB. *N Engl J Med.* 2005; 352:174-83.

Flood TM. *J Fam Pract.* 2007; 56(suppl 1):S1-S12.

Becker RH et al. *Diabetes Care.* 2015; 38:637-43.

Insulin Comparison

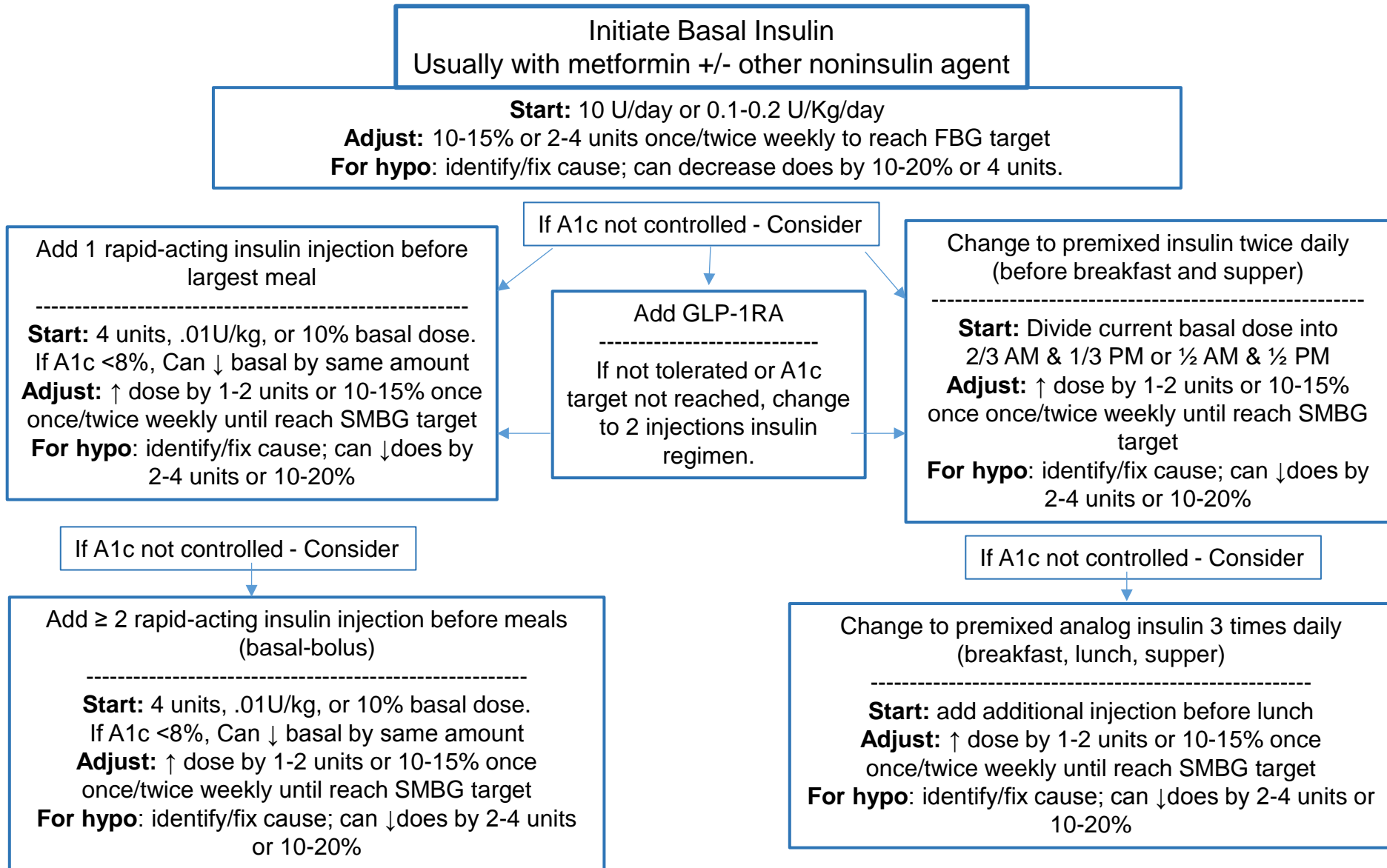
Insulin	Onset (hr)	Peak (hr)	Duration (hr)	Appearance
Insulin Lispro U100 & U200	within 15 min	0.5- 1.5	3-5	Clear
Insulin Aspart	within 15 min	1-3	3-5	Clear
Insulin Glulisine	0.25-0.5	0.5-1	4	Clear
Regular U100	0.5 – 1	2-4	5-8	Clear
Regular inhaled	Within 5 min	20-40 minutes	3	Powder
Regular U-500	30 min	2-4	Up to 24 hr	Clear
NPH	1-2	4-10	14+	Cloudy
Insulin Detemir	3-4	6-8 (though relatively flat)	up to 20-24	Clear
Insulin Glargine U100	1.5	flat	24	Clear
Insulin Glargine U300	1.5	flat	26	Clear
Insulin Degludec U100 & U200	0.5 – 1	flat	>30	Clear
Lispro Mix 50/50	0.25-0.5	0.5-3	14-24	Cloudy
Lispro Mix 75/25	0.25-0.5	0.5-2.5	14-24	Cloudy
Aspart Mix 70/30	0.1-0.2	1-4	18-24	Cloudy
Degludec/aspart Mix 70/30	0.23 – 1.2	2.3	>24	Cloudy

Note: Patient specific onset, peak, duration may vary from times listed in table. Peak and duration are often very dose-dependent with shorter duration of actions with smaller doses and vice versa.

Insulin Strategies in T2DM

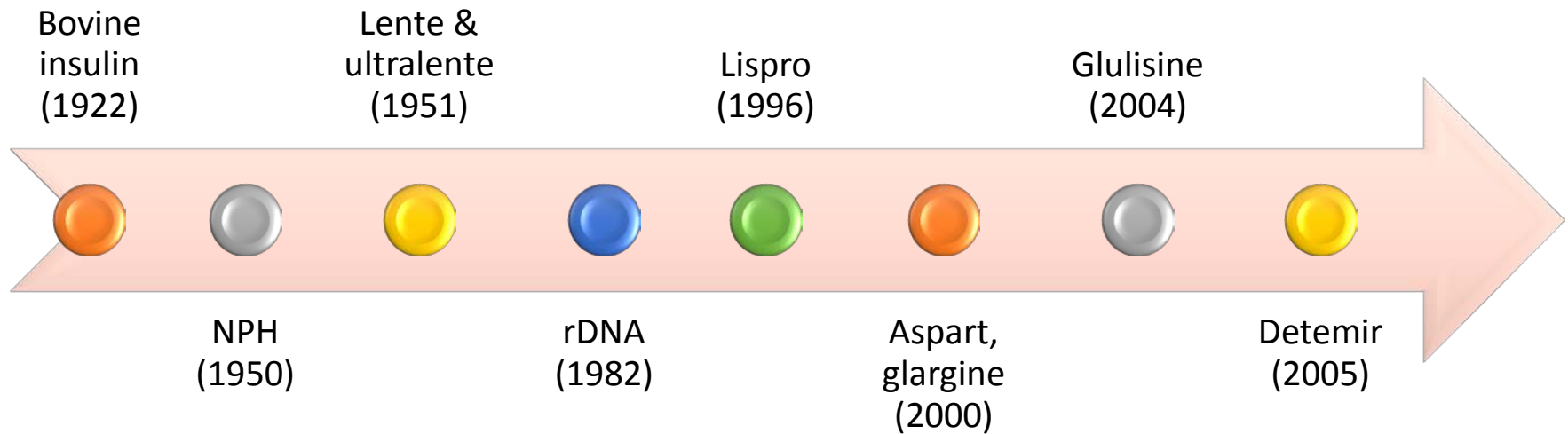
- Metformin + basal insulin
 - Fasting coverage
 - Hypoglycemic risk
 - Glargine, detemir, degludec – lower risk
 - Human insulin isophane (NPH) – higher risk
 - Weight gain/neutral
- Basal insulin + bolus insulin (with or without metformin)
 - Fasting and postprandial coverage
 - High hypoglycemic risk (mostly from bolus)
 - Regular, aspart, lispro, glulisine
 - Weight gain
- Basal insulin + GLP-1 agonist (with or without metformin)
 - Fasting and postprandial coverage
 - Low hypoglycemic risk (glargine, detemir, degludec)
 - Weight neutral/loss

Approach To Starting and Adjusting Insulin in T2D



Concentrated & “Low Volume” Insulin

The Evolution of Insulin



The history of insulin. www.karger.com/ProdukteDB/Katalogteile/isbn3_8055/83/53/Insulin_02.pdf
(accessed 2016 Aug 20).

Polling Question #1

Which insulin is not a true basal insulin?

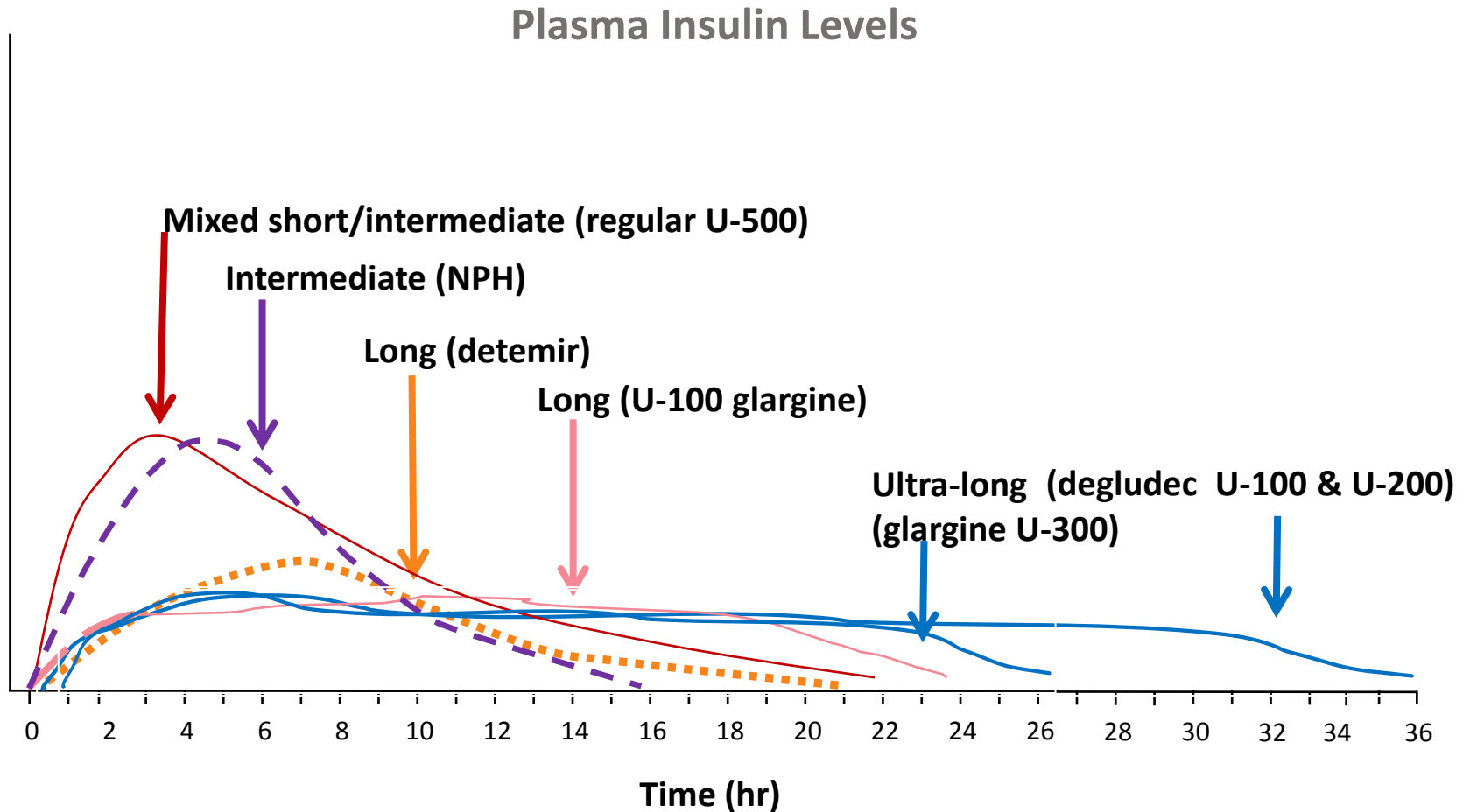
1. Insulin detemir U-100
2. Insulin glargine U-100
3. NPH U-100
4. Regular insulin U-500



“Concentrated and/or Low Volume” Insulins

- Basal
 - Insulin degludec (U-100, U-200)
 - Insulin glargine (U-300)
- Bolus
 - Insulin lispro (U-200)
- Bolus that thinks it’s a basal
 - Insulin human regular (U-500 pen)

Pharmacokinetic Profile of Currently Available “Basal” Insulins



Hirsch IB. *N Engl J Med.* 2005; 352:174-83.

Flood TM. *J Fam Pract.* 2007; 56(suppl 1):S1-S12.

Becker RH et al. *Diabetes Care.* 2015; 38:637-43.

“Basal” Insulin Comparison

Insulin - Bolus	Onset (hr)	Peak (hr)	Duration (hr)	Appearance
Regular U-500	30 min	2-4	Up to 24 hr	Clear
Insulin - Basal				
NPH	1-2	4-10	14+	Cloudy
Insulin Detemir	3-4	6-8 (though relatively flat)	up to 16-20	Clear
Insulin Glargine U100	1.5	flat	20-24	Clear
Insulin Glargine U300	1.5	flat	26	Clear
Insulin Degludec U100 & U200	0.5 – 1	flat	>30	Clear

Note: Patient specific onset, peak, duration may vary from times listed in table. Peak and duration are often very dose dependent with shorter duration of actions with smaller doses and vice versa.

Candidates for Concentrated/ Low Volume Insulin

Condition	Rationale	Product to Consider
Nocturnal hypoglycemia	Needs peak-less (flat) basal insulin profile	Degludec U-100, U-200 Glargine U-300
Insulin resistance (severe with high insulin requirements; e.g. >200 units TDD)	Temporary “fix” for insulin resistance	Regular U-500
High basal insulin needs (> 80 units per injection)	High dose requires 2+ basal injections/day	Degludec U-200 Glargine U-300
High bolus insulin needs (> 20 units per day)	Reduces the number of pen changes per month	Lispro U-200

TDD = total daily dose

Safety Concerns with “Newer” Insulins

- Familiarity with new products
- Understanding of pharmacokinetic and pharmacodynamic nuances
- Knowledge on dose adjustments and conversions
- “Lack” of interchangeability

Rationale for Concentrated Insulin Use

- When daily insulin requirements are in excess of 200 units/day, the volume of U-100 injected insulin may become an issue
- Physically too large for a single subcutaneous administration
- Multiple injections are required to deliver a single dose
- Increased injections may lead to compliance issues and poor glycemic control
- Discomfort
- Unpredictable absorption (rate-limiting step in insulin activity)

Insulin Human Regular U-500

- Insulin characteristics

- Five times as concentrated as U-100 insulin
- Decreased injection volume (vs. U-100)
- Solely for severely insulin-resistant patients
 - Total daily dose exceeding 200 units/day

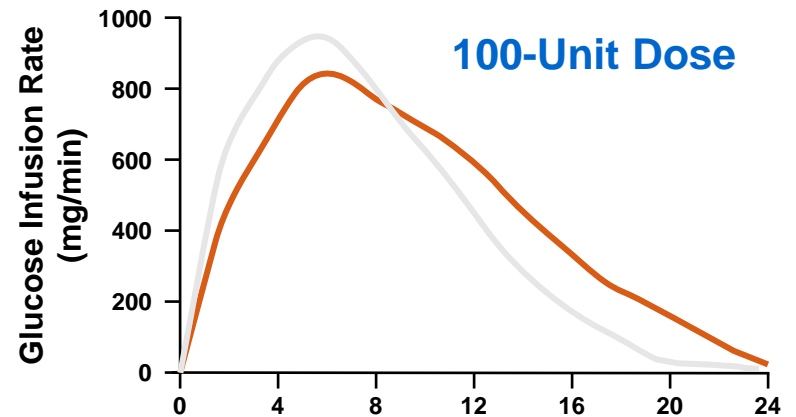
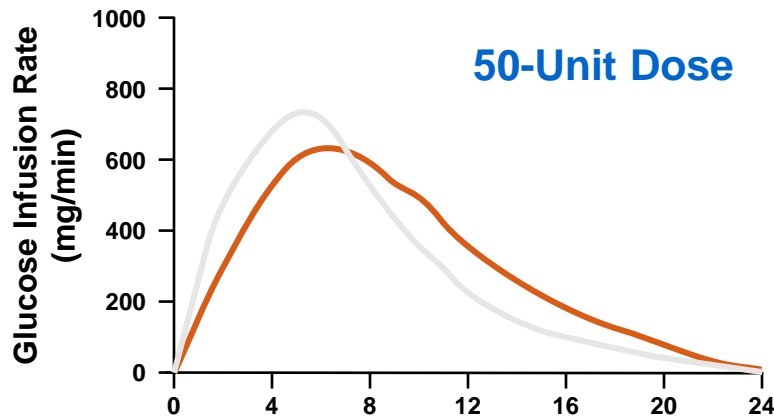
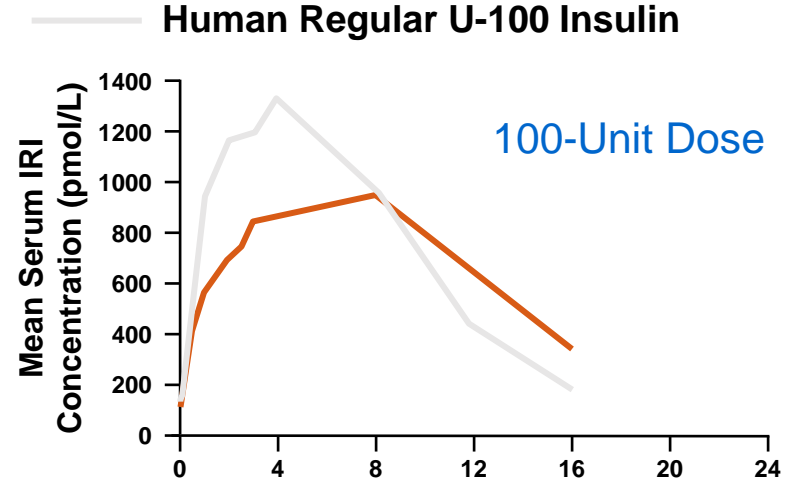
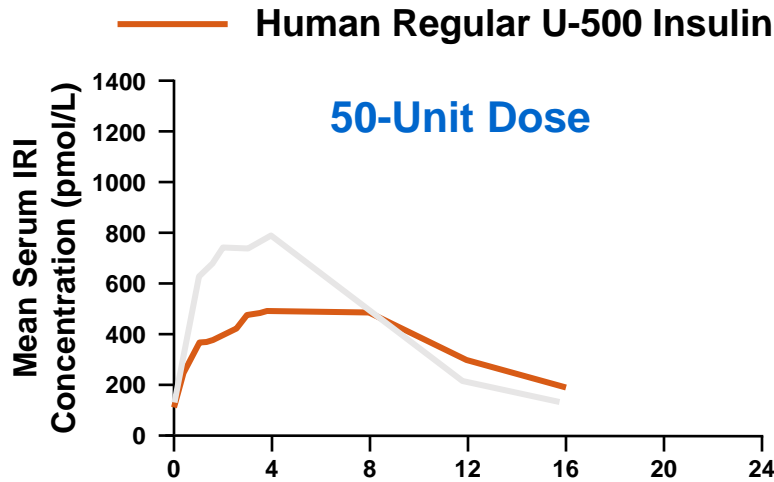
- Pharmacokinetics/pharmacodynamics

- Mean onset of action 15 minutes
- Mean duration of action 21 hours (range 13-24 hours)
 - Each individual patient varies in their response depending on:
 - Site of injection
 - Exercise patterns
 - Other variables

- Clinical pearls

- Time to onset: similar to U-100 regular insulin
- Duration of effect: similar to NPH insulin
- Consider it a “mixed short/intermediate” type insulin

PK and PD profiles for U-500 vs U-100 Human Insulin



IRI = immunoreactive insulin; PK = pharmacokinetic; PD = pharmacodynamic.

de la Peña A, et al. *Diabetes Care*. 2011;34(12):2496-2501.

Human Regular U-500

- Now available in an insulin pen:
 - 1500 units/pen
 - Maximum 300 units/injection
 - No “dose conversions” needed
 - Dials in increments of **5 units**
- Still available in vial form (20 mL)
 - New syringe dedicated for U-500 approved July 2016
 - Use with U-500 insulin only



Regular U-100 to U-500 Dosing

- Converting from any U-100 insulin to U-500 human regular insulin:
 - A1C \leq 8%: empiric reductions in total daily dose (TDD) of 10-20% have been recommended
 - A1C \geq 10%: empiric increases in TDD of 10-20% can be considered
- Distributing the Total Daily Dose (TDD):
 - Recommendations vary from 2-3 doses per day
 - Algorithm available
 - Administer 30 minutes before meals due to the relatively short onset of action

Regular U-500 to U-100 Dosing

- No recommendations are currently available on how to convert from Regular U-500 to basal-bolus U100 dosing
 - Can differ based on delivery device used
 - Pen vs. U-100 insulin syringe or TB syringe
- Clinical expertise warranted

Concentrated Glargine (U-300)

- Smaller depot surface area
- Reduced rate of absorption
- Relatively flat and prolonged PK/PD profiles
 - Half-life ~23 hours
 - Steady state in 4 days
 - Duration of action \leq 36 hours
- Available only in a pen
 - 450 units/pen (1.5 mL)
 - Maximum 80 units/injection
 - 3 pens per box

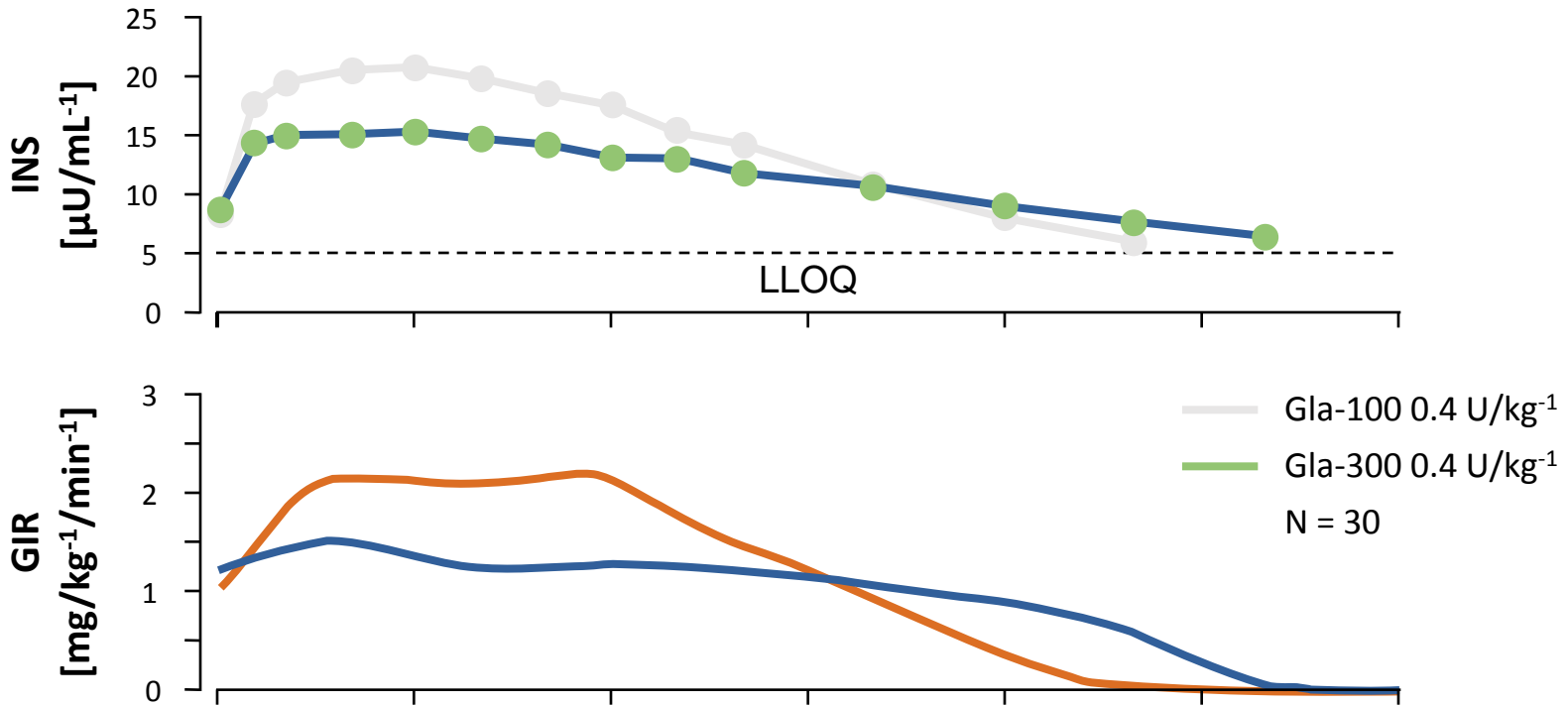
Garber AJ. *Diabetes Obes Metab.* 2014;16(6):483-491.

Owens DR, et al. *Diabetes Metab Res Rev.* 2014;30(2):104-119.

Steinstraesser A, et al. *Diabetes Obes Metab.* 2014;16(9):873-876.

PK and PD of U-300 Insulin Glargine vs U-100 Insulin Glargine

U-300 glargine displays a more even and prolonged PK/PD profile compared with U-100 glargine, offering blood glucose control beyond 24 hours



LLOQ = lower limit of quantification; GIR = glucose infusion rate.

Glargine U-100 to U-300 Dosing

- Changing from once daily long-acting:
 - Initial dose can be same U-100 insulin glargine
 - Expect that a higher daily dose of U-300 insulin glargine will be needed to maintain the same level of glycemic control
- Changing from BID NPH insulin:
 - Initial dose is 80% of the total daily NPH dosage

Glargine U-300 to U-100 Dosing

- When converting from U-300 to U-100
 - A 20% reduction is recommended to minimize hypoglycemic risk with the U-100 insulin product

Insulin Degludec (U-100 & U-200)

- “Ultra long acting” insulin
- Relatively flat and prolonged PK/PD profiles
 - Duration of action ~42 hours (at least)
 - Half-life ~25 hours
 - Steady state in 3 to 4 days
 - Less patient insulin variability
- Flexible dosing schedule
- Available only in a pen
 - U-200: 600 units/pen (3 mL), max 160 units/injection
 - **Dial in increments of 2 units!**
 - U-100: 300 units/pen (3 mL), max 80 units/injection

Garber AJ. Diabetes Obes Metab. 2014;16(6):483-491.

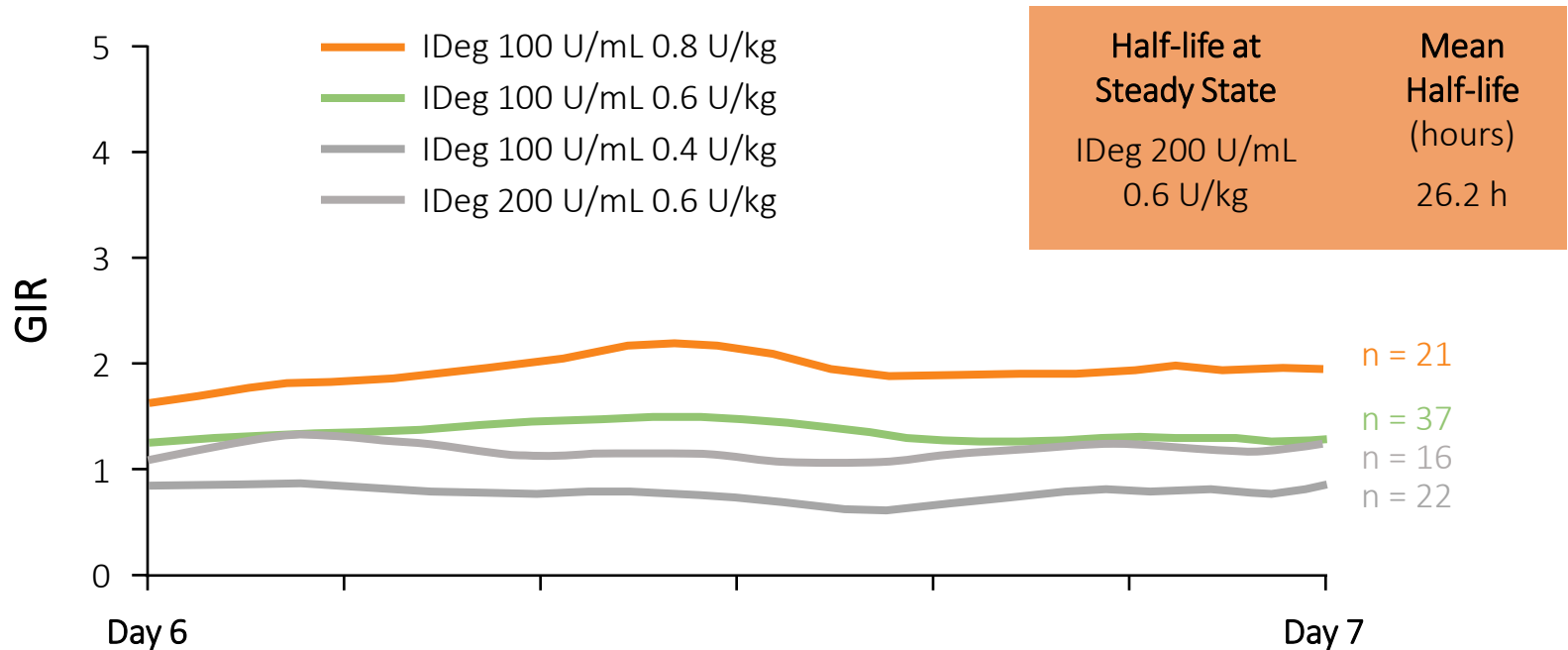
Owens DR, et al. Diabetes Metab Res Rev. 2014;30(2):104-119.

US Food and Drug Administration. www.accessdata.fda.gov/scripts/cder/drugsatfda/

Basal Insulin Degludec

Flat, stable profile of both 100 unit/mL and 200 unit/mL formulations

Mean 24-Hour GIR Profile of the Two Insulin Degludec Formulations at Steady State



GIR = glucose infusion rate.

Heise T, et al. *Diabetes*. 2012;61(suppl 1):A91 [abstract 349-OR]. Heise T, et al. *Diabetes Obes Metab*. 2012;14(10):944-950.

Degludec U-200 Dosing

- Changing from once daily long-acting:
 - The dose is 1 to 1
 - Initial degludec dose can be same as the current U-100 insulin the patient is using
 - Glargine/detemir/degludec
- Changing from BID NPH insulin:
 - The dose is 1 to 1:
 - Initial degludec (once daily) dose is same as the total daily NPH dosage

Degludec U-200 to U-100 Dosing

- When converting from U-200 to U-100
 - The dose is a 1 to 1 conversion
 - No change in the initial dose is necessary

Concentrated Basal Insulin Dosing Conversion Comparison

Glargine U-300		Degludec U-200		Human R U-500	
True basal insulin		True basal insulin		Mixed basal/bolus insulin	
1 daily injection	1 to 1	1 daily injection	1 to 1	Multiple daily injections of basal-bolus	Total daily dose divided into 2 or 3
2 daily injections	80% of total daily basal dose	2 daily injections	80% of total daily basal dose		
Maximum single-dose injection	80 units	Maximum single-dose injection	160 units	Maximum single-dose injection	300 units
Dialed in 1-unit increments		Dialed in 2-unit increments		Dialed in 5-unit increments	
450 units of insulin per pen		600 units of insulin per pen		1500 units of insulin per pen	
Expect higher daily dose of glargine U-300 to maintain glycemic control				Monitor for hypoglycemia; administer with meals	

Insulin lispro (U-200)

- No difference in kinetics from U-100 lispro
 - Half-life: 1 hour
 - Duration of action: ~3 hours
- Available only in a pen
 - 600 units/pen (3 mL)
 - Maximum 60 units/injection
 - 2 pens per box
- Addresses the problem of frequent pen turnover

Patient Education

- Equipment and supplies needed to effectively manage insulin therapy at home:
 - Insulin
 - Syringes or pen needles
 - Blood glucose meter and strips
 - Lancets and lancing device
 - Glucagon emergency kit
 - Contact information of diabetes care provider(s)

What Patients Need to Know About Insulin AND Delivery Devices

- Storage and expiration
- When it should be refrigerated
- When it can be at room temperature
- When medication expires after first use
- How to prepare product for first use
- How to properly use the device
- How to dispose of the device

Product Expiration

Products/Device	Refrigerated	Unrefrigerated	Once used (opened)
Vials			
Insulin lispro U-100	Expiration Date	28 days	28 days
Insulin aspart			
Insulin glulisine			
Insulin glargine			
Vials			
Insulin human N	Expiration Date	31 days	31 days
Insulin human R			
Pens			
Insulin lispro U-100, U-200	Expiration Date	28 days	<i>Do not refrigerate</i> Lispro, glargine, glulisine: 28 days
Insulin aspart			
Insulin glulisine		Glargine U-300: 42 days	Aspart: 14 days
Insulin glargine U-100			
Insulin glargine U-300			
Vials & pens: Insulin detemir	Expiration Date	42 days	42 days (pens should not be refrigerated)
Pens: Insulin degludec U-100, U-200	Expiration Date	56 days	56 days (pens should not be refrigerated)
Inhaled: Insulin human	—	Expiration Date	15 days for device

Patient Cases

Case #1: JL

JL is a 67-year-old retiree who was diagnosed with T2D 6 years ago. Three months ago, he had an A1C of 8.4%, with no changes to his diabetes therapy at that time. He presents today for a follow up visit.

Current Medications

- Metformin 1000 mg PO BID
- Lisinopril 20 mg PO daily
- Atorvastatin 40 mg PO daily
- Omeprazole 20mg PO daily

SMBG:

- Usually checks every morning
- FPG range 130-189 mg/dL

Case #1: JL

• Social History

- Nonsmoking with no illicit drug use
- Occasional alcohol use (~3 drinks per week)
- Self-reported inconsistent eating schedule
 - Usually eats breakfast and dinner
 - Often skips lunch
 - Largest meal of day is dinner
- Married with 2 grown children
- His wife does the cooking

Physical Exam, Vitals & Labs

- A1C – 8.4%
- Weight – 194 lbs.
- BMI – 28 kg/m²
- BP – 132/80 mmHg
- HR – 70 bpm
- Lipid panel – WNL
- SCr – 1.0 mg/dL
- eGFR – >100 mL/min/1.73 m²

Case #1: JL

Polling Question

JL is agreeable to starting basal insulin, as long as he only needs to “take 1 shot per day.”

How many units of basal insulin would you start JL on?

1. 5 units
2. 10 units
3. 20 units
4. 30 units

Case #1: JL

Polling question

JL calls you 5 days later to ask if he should increase his insulin dose.

Degludec U-100: 10 units every morning

SMBG: He has been checking every morning

Monday	189mg/dL
Tuesday	197mg/dL
Wednesday	170mg/dL
Thursday	178mg/dL
Friday	172mg/dL

What do you recommend?

1. Increase to 12 units every morning and call back in 1 week
2. Increase to 14 units every morning and call back in 1 week
3. Increase to 12 units every morning and call back in 1 month
4. No changes at this time, have JL call back in 1 month

Case #2: 59 year old with T2D

SR is a 59-year-old who was diagnosed with T2D 8 years ago. He presents to the ED today c/o a painful ulcer on his left foot.

Current Medications

- Insulin glargine U-300 (pen) 75 units once daily
- Insulin aspart (pen) 20-30 units per meal + Correction
- Lisinopril 10 mg daily
- Atorvastatin 10mg daily

Patient reports:

- Checks BG every morning and usually checks before each meal
 - FPG range 110-170 mg/dL
 - Pre-meal range 100 – 240 mg/dl

Case #1: SR

Social History

- Non-smoking with no illicit drug use
- Occasional alcohol use (~2 drinks per week)
- Self-reported inconsistent eating schedule:
 - Usually skips breakfast
 - Lunch is the largest meal of daily (often fast food or restaurant)
 - Dinner is usually late (after 8pm)
- Divorced, lives alone. Has a niece that lives 1 mile away who checks in on him occasionally.

Vitals & Labs at ED

- POC BG – 240 mg/dl
- Waiting A1C results
- Height – 5 feet 6 inches
- Weight – 280 lbs.
- Body Mass Index (BMI) – 45 kg/m²
- Blood Pressure – 114/66 mm Hg
- Heart rate – 94 bpm

Previous labs (3 months ago)

- A1c – 8.4%
- Lipid panel – WNL
- SCr – 1.0 mg/dL
- eGFR – >100 mL/min/1.73 m²

Case #1: SR

Polling Question

The hospital only has glargine U-100 on formulary.
What dose would be appropriate to start SR on?

1. 45 units once daily
2. 60 units once daily
3. 75 units once daily
4. 90 units once daily

Clinical Pearls/Take-Aways

- Watch for over-basalization
 - High basal dose with no or little bolus insulin
- Continually increasing insulin doses does not reduce insulin resistance
- New, long-acting basal insulin analogs may provide benefit compared to “older” basal insulins
 - Flatter time-action profiles with less variability
 - Less hypoglycemia, particularly nocturnal hypoglycemia
- Patients need to know how to properly use insulin devices
 - Patient technique should be reviewed at initiation and periodically thereafter