

Type 1 Diabetes Mellitus

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Learning Objectives

- Review the background, prevalence, and pathophysiology of Type 1 Diabetes
- Assess key differences between Type 1 and Type 2 Diabetes
- Evaluate treatment options per the 2023 ADA Diabetes Standards of Care
- Present caveats related to insulin injection treatment
- Discuss the management of Diabetic Ketoacidosis (DKA)

What is Type 1 Diabetes Mellitus?

- Type 1 diabetes is chronic condition in which the pancreas produces very little or no insulin
- Insulin is a hormone that is produced by the body that moves sugar from the bloodstream into the cells to be utilized as energy
- People with type 1 diabetes **require** insulin administration to control blood sugar

Prevalence



Type 1 Diabetes Mellitus

Risk Factors

- Family history
- Genetics

Signs and Symptoms

- Increased thirst, hunger, and urination
- Fatigue
- Blurred vision
- Delayed wound healing
- Weight loss

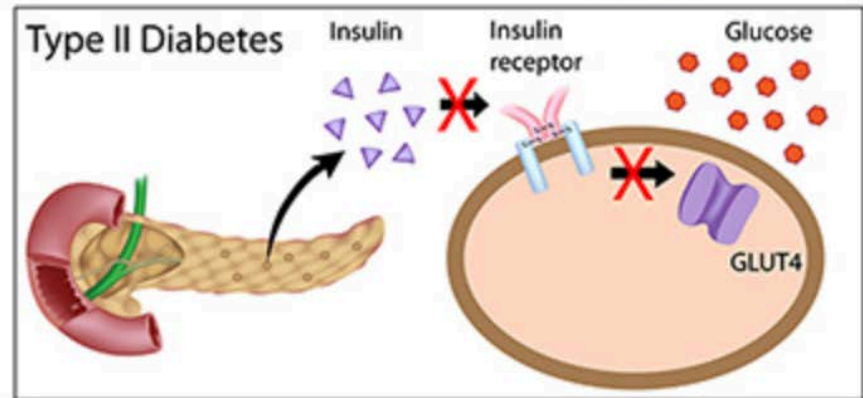
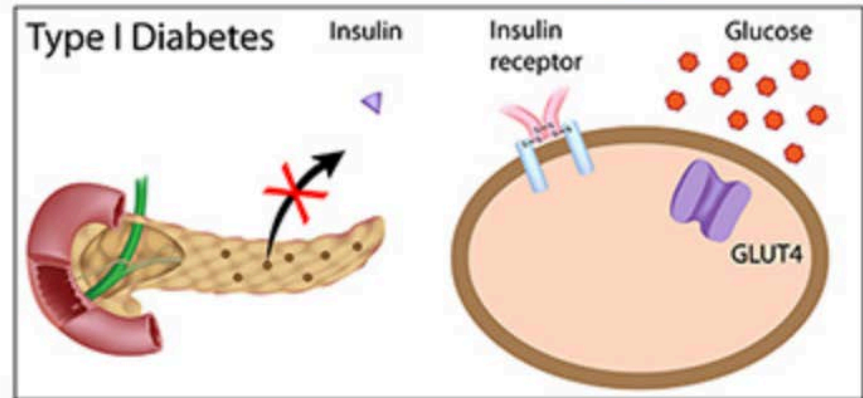
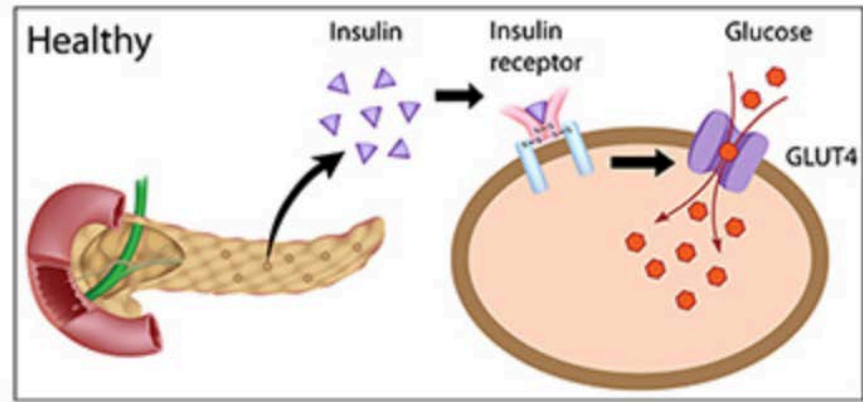
Diabetes Mellitus: Type 1 vs. Type 2

Type 1

- Often diagnosed in childhood & adolescence
- Insulin dependent
- Risk factors: genetics
- Managed with insulin

Type 2

- Often diagnosed in adulthood
- Insulin resistant
- Risk factors: family history, diet, weight, lifestyle choices
- Managed with diet, exercise, oral medication, and insulin



2023 Standards of Care – *Recommendations for Adults with Type 1 DM*

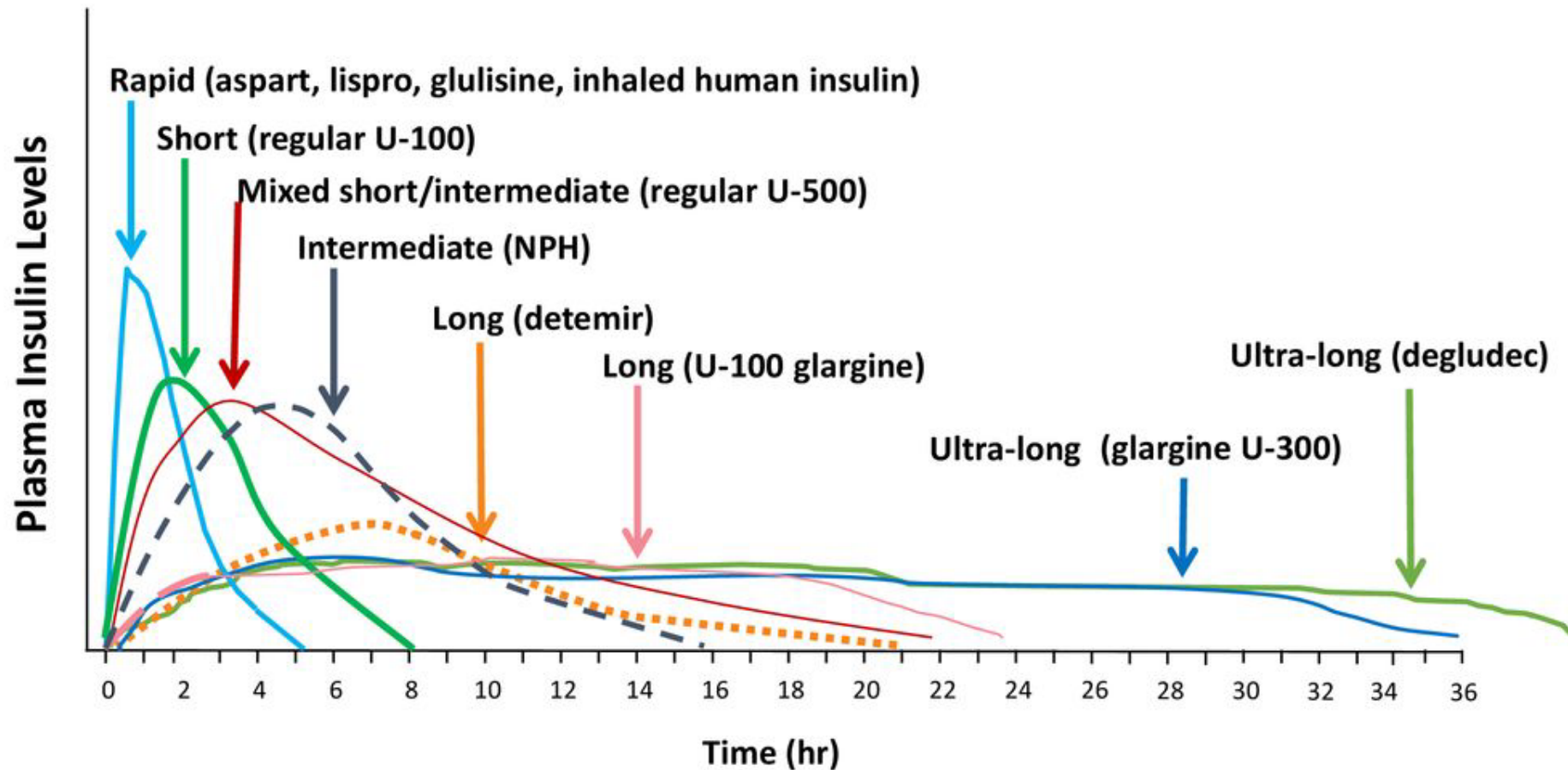
Recommendations

- 9.1** Most individuals with type 1 diabetes should be treated with multiple daily injections of prandial and basal insulin, or continuous subcutaneous insulin infusion. **A**
- 9.2** Most individuals with type 1 diabetes should use rapid-acting insulin analogs to reduce hypoglycemia risk. **A**
- 9.3** Individuals with type 1 diabetes should receive education on how to match mealtime insulin doses to carbohydrate intake, fat and protein content, and anticipated physical activity. **B**

Insulin Treatment

- Monitor blood glucose often (prevent episodes of hypoglycemia **and** hyperglycemia)
 - Often 6 – 10 times a day (or by CGM)
- Multiple Daily Injections (MDI) or Pump Therapy
- Types of Insulin
 - Rapid – acting
 - Short – acting
 - Intermediate – acting
 - Concentrated human regular insulin
 - Long – acting
 - Premixed insulin

Insulin Treatment



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.

Differences Related to Insulin Delivery Approaches - *MDI*

Injected insulin regimens	Flexibility	Lower risk of hypoglycemia	Higher costs
MDI with LAA + RAA or URAA	+++	+++	+++

Less-preferred, alternative injected insulin regimens

MDI with NPH + RAA or URAA	++	++	++
MDI with NPH + short-acting (regular) insulin	++	+	+
Two daily injections with NPH + short-acting (regular) insulin or premixed	+	+	+

Differences Related to Insulin Delivery Approaches – *Insulin Pump*

Continuous insulin infusion regimens	Flexibility	Lower risk of hypoglycemia	Higher costs
Hybrid closed-loop technology	+++++	+++++	+++++
Insulin pump with threshold/ predictive low-glucose suspend	++++	++++	++++
Insulin pump therapy without automation	+++	+++	++++

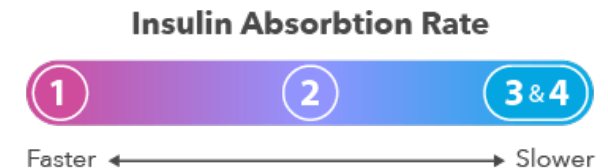
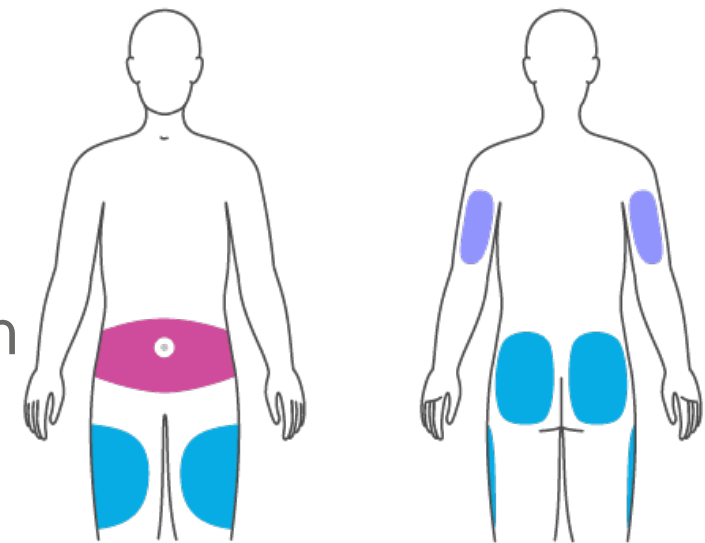
Caveats of MDI Insulin Therapy

- **Split dosing of Insulin Glargine**

- Consider when patients are receiving high doses of insulin
- Helps to improve insulin absorption
- Consideration for concentrated insulins

- **Administration Sites**

- Reminding patients to rotate sites
- Appropriate needle length to avoid IM injection
- Helps to improve insulin absorption



Caveats Continued

- **Overbasalization**

- Start to consider when basal insulin doses are greater than 0.5 units/kg and PP BG levels still elevated
 - Patient may achieve fasting goals but A1c still not at target
- Incorporation of meal time insulin

- **Availability of Insulin Therapies**

- Cost considerations
- R and N (separate as well as combo) available OTC

Diabetic Ketoacidosis (DKA)

- Serious complication, life–threatening complication of diabetes
 - Most common in type 1 diabetes
- DKA occurs when your body doesn't have enough insulin to allow blood sugar into your cells to be used for energy
- Early Signs and symptoms
 - High blood sugar (over 250)
 - Thirst, urination
- More Severe Symptoms
 - Fast, deep breathing
 - Headache
 - Fruity smelling breath
 - Muscle stiffness or aches
 - Nausea and vomiting
 - Stomach pain

Managing High Blood Sugars

- Test for Ketones if BG >240
 - Can test at home, strips OTC
 - Check every 4 – 6 hours
 - Test even if you don't have symptoms
 - Contact provider or seek care if ketones are Moderate or greater
- Treatment
 - Hydration
 - Insulin (per prescriber orders)
 - Management of symptoms

