

DISH

À LA CARTE



SUMMER
MINI-SESSIONS

Insulin Basics

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Session Objectives

- Review physiologic insulin secretion patterns
- Discuss modern plans for insulin administration in children with diabetes
- Review basics of how long-acting and rapid-acting insulin work
- Identify variables that can cause variation in insulin action

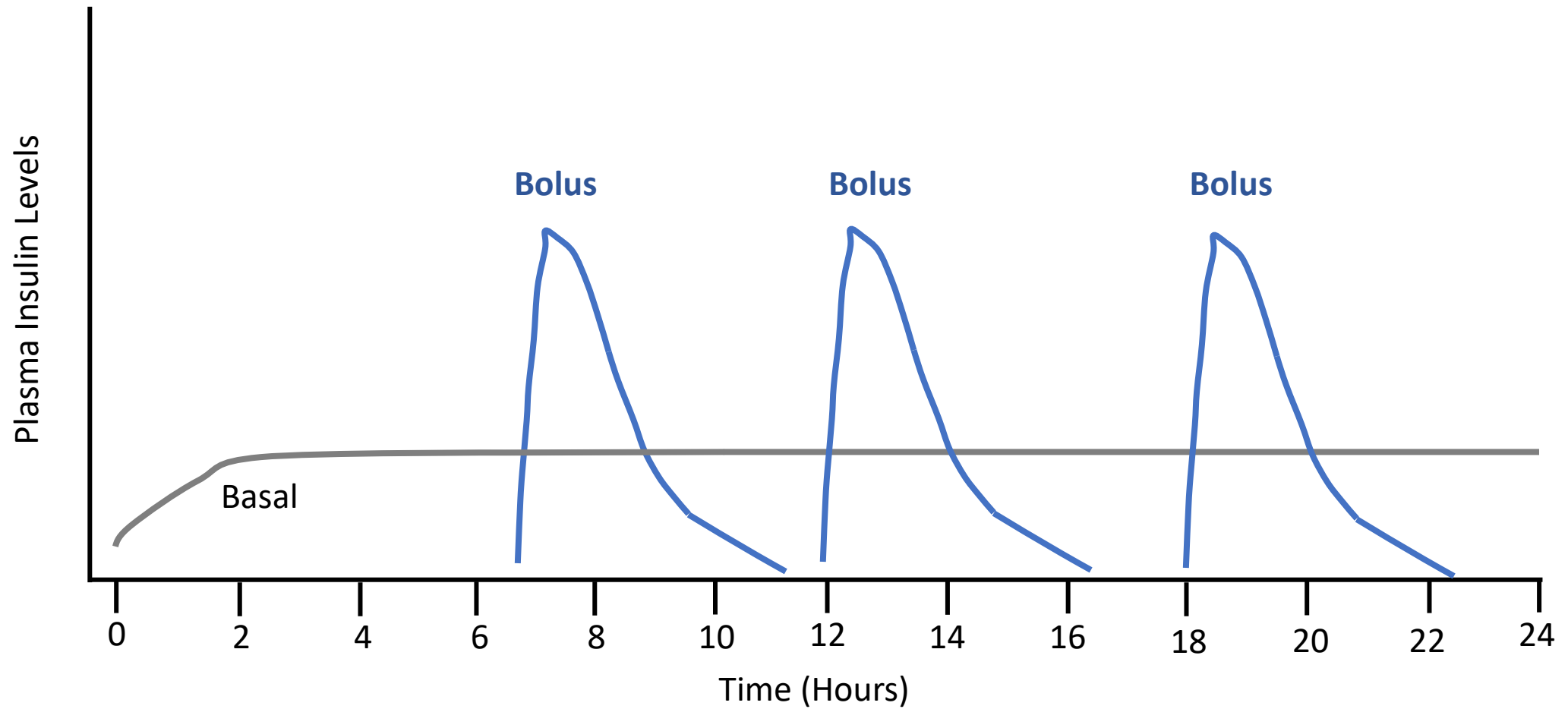
How does the body usually secrete insulin?

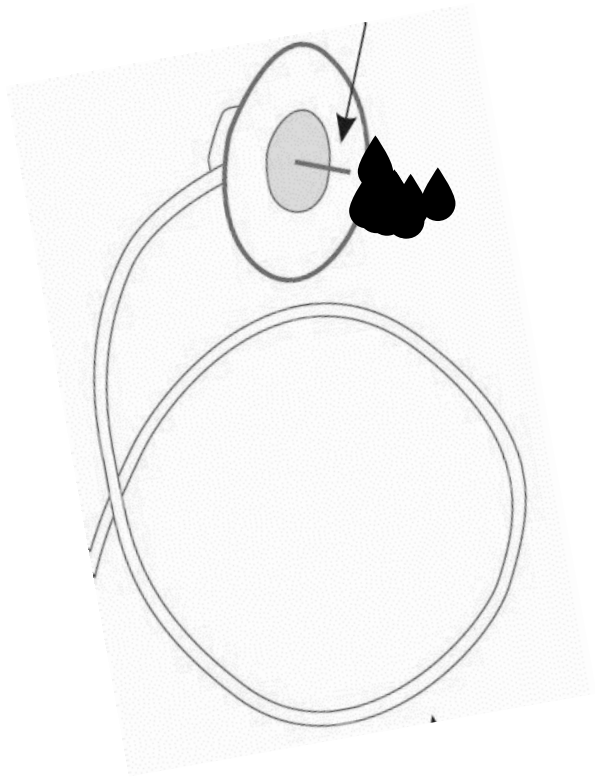
- Insulin is a hormone made in the islet cells of the pancreas
 - Some cells make insulin (beta) and some make glucagon (alpha)
- Normal secretion includes
 - **Basal Secretion:** small amounts of insulin secreted even when not eating. This is triggered by a thermostat-like sensor in the islet cells that monitors blood glucose level.
 - **Mealtime Secretion:** larger amounts of insulin to help the body use glucose from food for energy. This is triggered by the taste, breakdown and movement of food in the digestive tract

Modern Insulin Plans

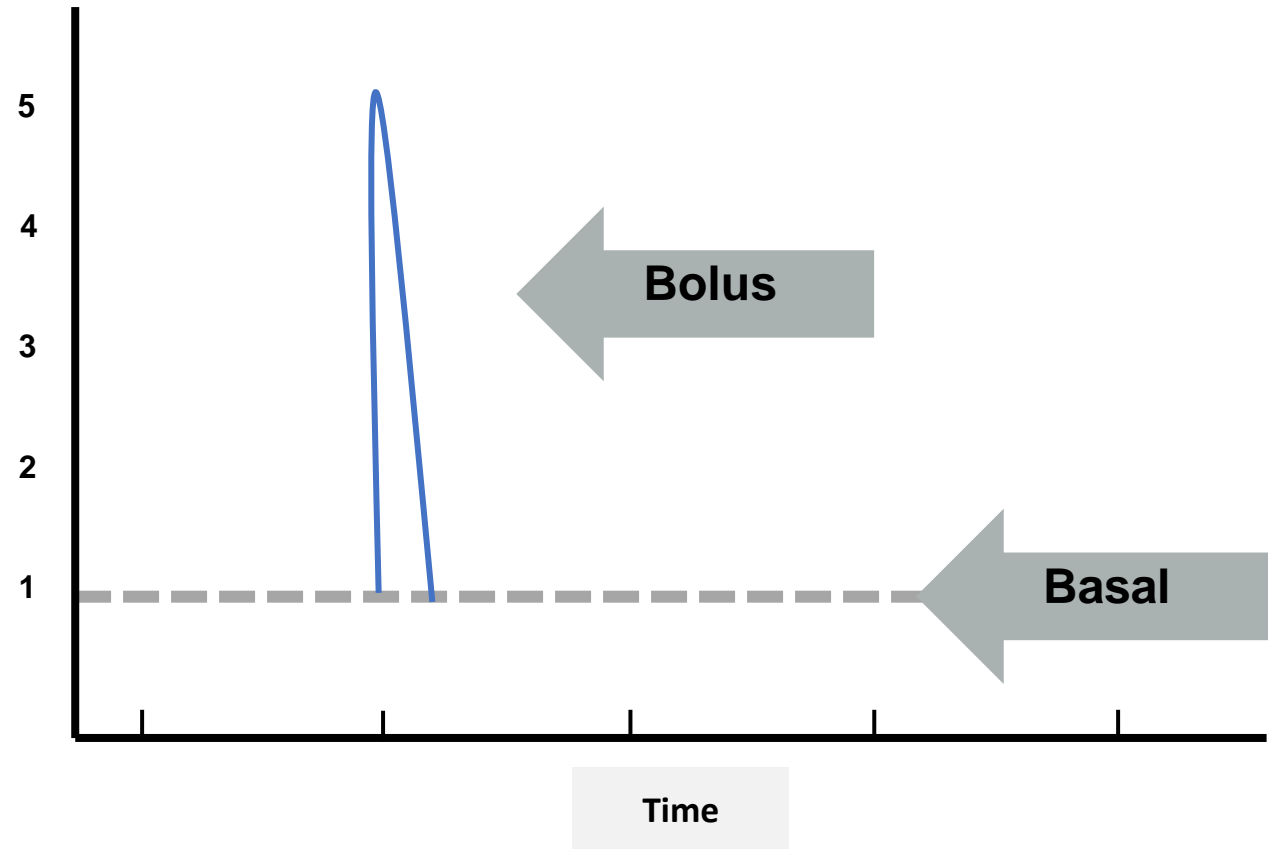
- Designed to mimic physiologic insulin secretion from the pancreas
- Multiple Daily Injections (MDI)
 - **Basal insulin** given 1 time daily, each dose lasting all day
 - **Bolus insulin** given with meals/snacks and to correct a high blood sugar, each dose lasting about 4 hours
- Insulin Pump
 - **Basal insulin** given continuously by infusion, therefore lasting all day
 - **Bolus insulin** given on-demand so the pump can deliver doses for meals/snacks and to correct a high blood sugar, each dose lasting about 4 hours

Multiple Daily Injections





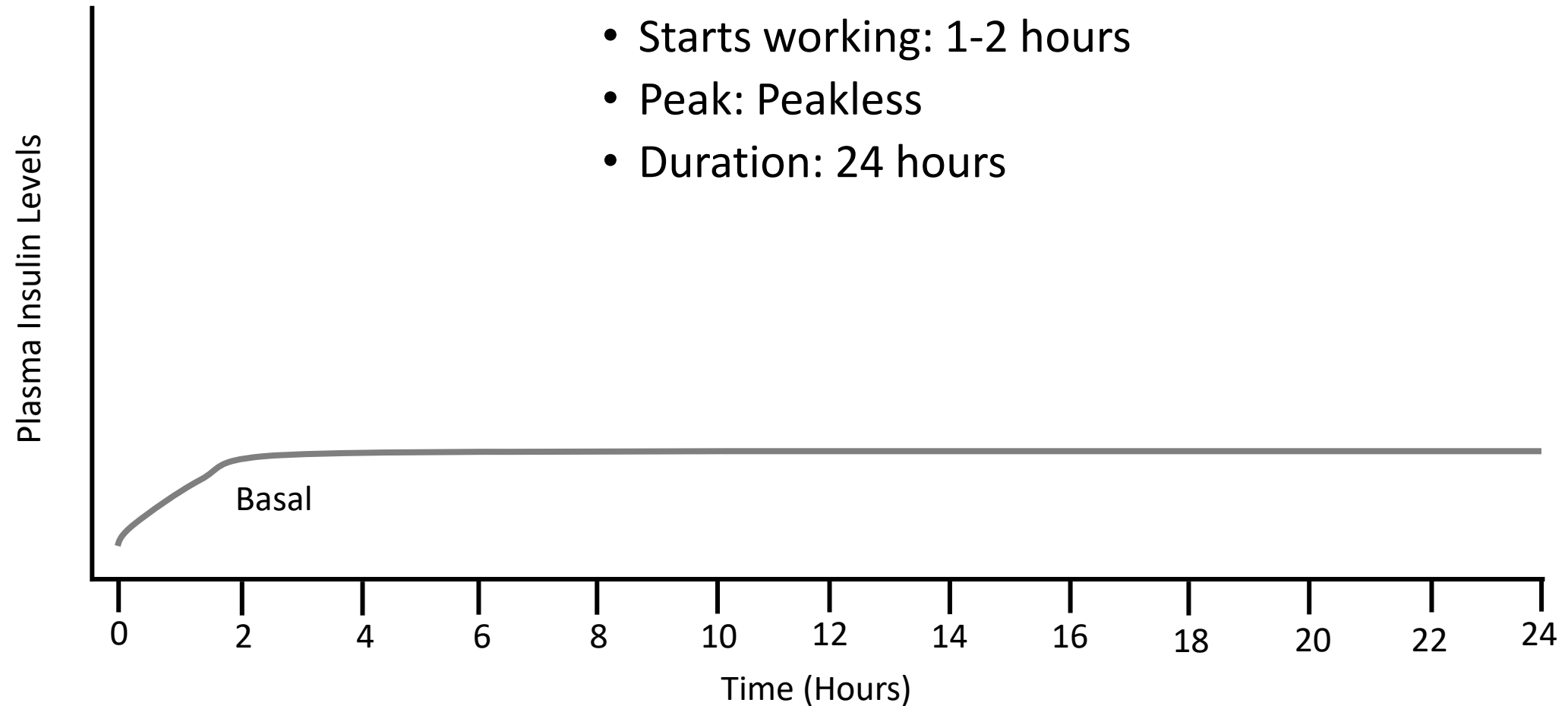
Rapid-Acting Insulin (Units)



Basal Insulin

- Insulin Glargine
 - Like basal insulin output from pancreas
 - Covers non-eating related insulin needs
 - Typically injected under the skin one time daily and is slowly absorbed over about 24 hours
 - Takes about 2-3 days to reach a steady state

Glargine Action Profile



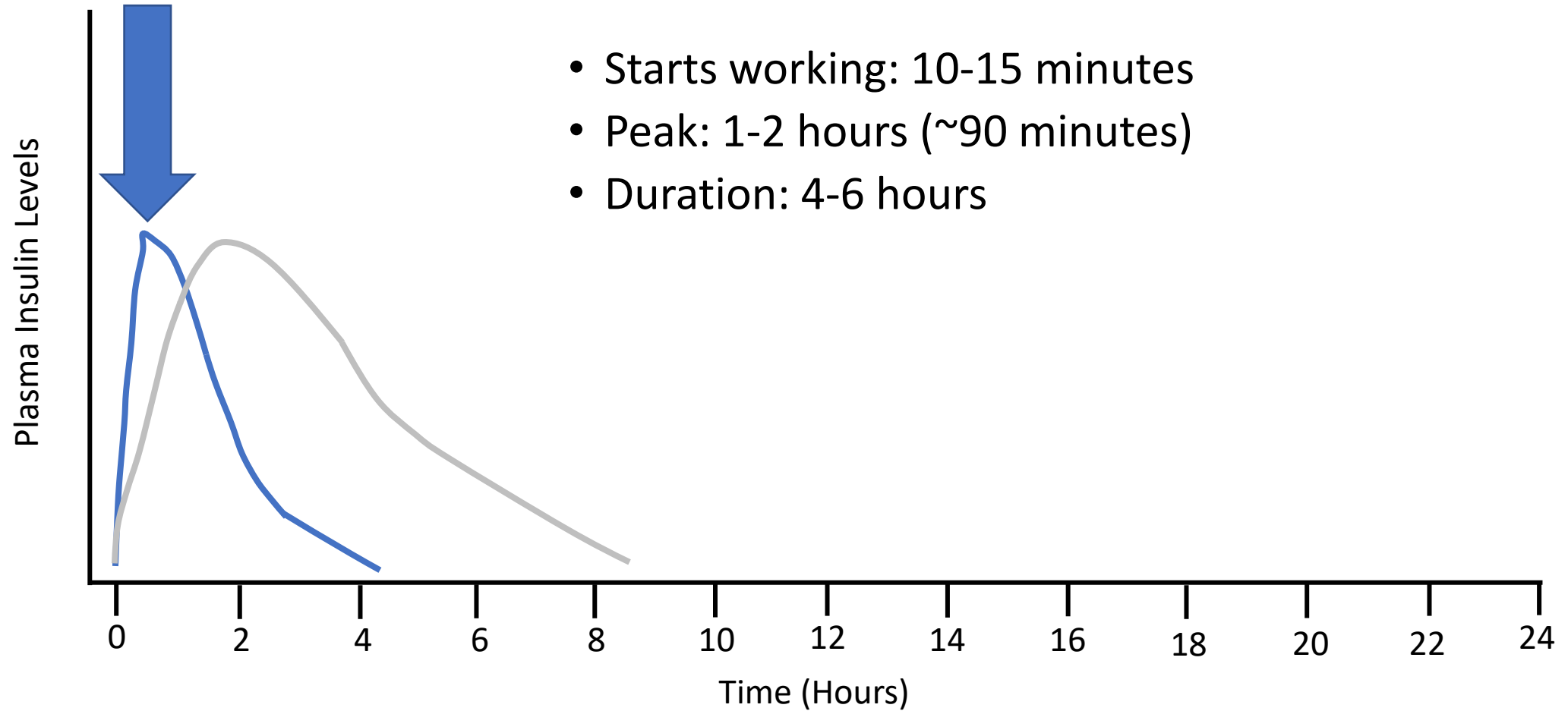
Bolus Insulin

- **Rapid-Acting Insulin**

- Given to cover carbs in meals or snacks OR to treat a high blood sugar
- Lower chance of post-meal and overnight hypoglycemia because this insulin doesn't last as long as regular insulin (especially when given before eating)
- Dose determined by insulin to carbohydrate ratio (for eating) and correction insulin (for high sugar)

- Commonly this is Novolog (insulin aspart) or Humalog (insulin lispro)

Rapid-Acting Insulin Profile



Variation is the Norm

- Insulin action times vary from person to person
- Even in the same person, the way insulin works will vary day to day

Factor	Impact on Insulin Absorption
Site of Injection	↑ ↓
Increased Temperature (bath/hot tub/hot day)	↑
Exercise	↑
Hydration Status	→ ↓

There are some newer insulins...

- **Basal - Ultra Long-acting Insulin (Tresiba and Toujeo)**
 - Offer longer duration of action that can reduce variation in blood sugars and provide more flexibility in dose timing
- **Bolus - Ultra Rapid-acting Insulin (Fiasp and Lyumjev)**
 - More rapid onset
- These newer options aren't routinely used in our practice yet and are often not covered by insurance in pediatric patients.

This information was based on:

References

The Pink Panther Book: Understanding Diabetes (A handbook for people who are living with diabetes(14th Ed, 2020)). H. Peter Chase and David M. Maahs.

Lilly Diabetes (11/2019). [Humalog \(insulin lispro\) Prescribing Information.](#)

Novo Nordisk (3/2021). [Novolog \(insulin aspart\) Prescribing Information.](#)

Sanofi-Aventis (2020). [Lantus \(insulin glargine\) Prescribing Information.](#)

Lilly Diabetes (11/2019). [Basaglar \(insulin glargine\) Prescribing Information.](#)

Suggested Resources

[DiaTribe 42 Factors that affect Blood Glucose](#)

[ADA Insulin Basics](#)