



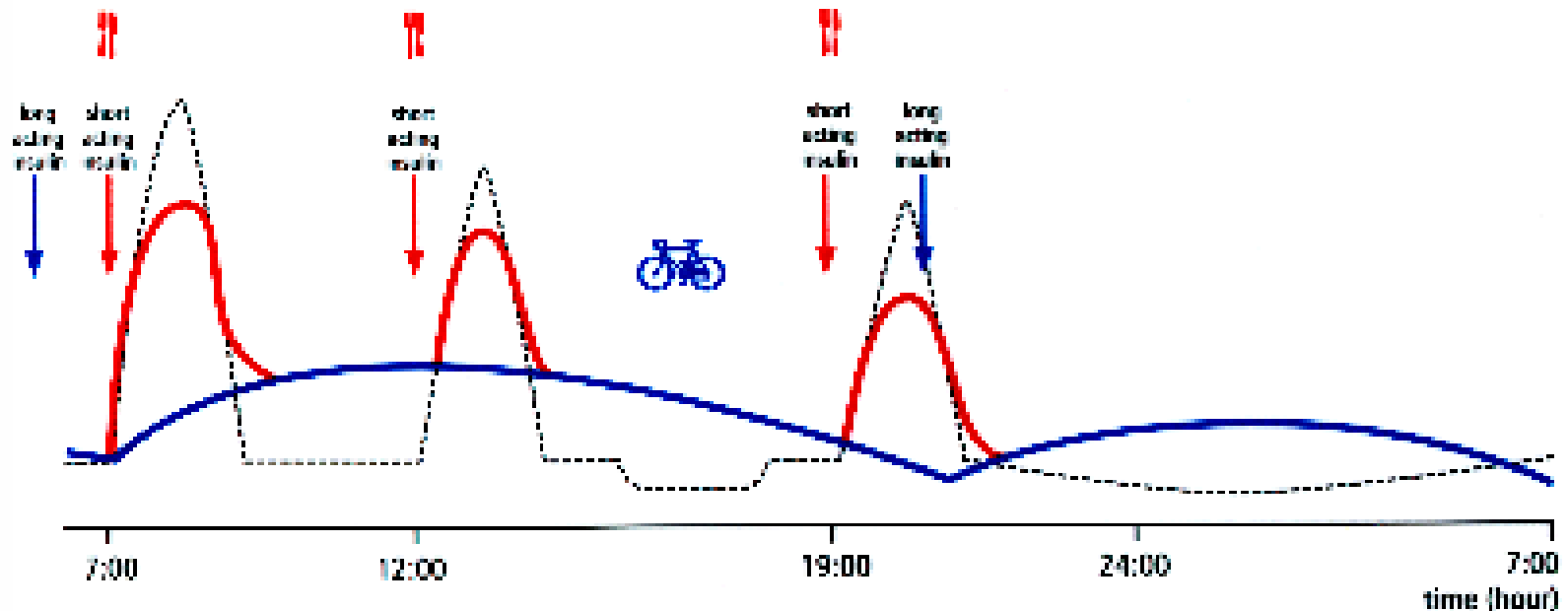
# Insulin Pump Meeting

# Insulin Pump Therapy

- Continuous Subcutaneous Insulin Infusion (CSII)
- Insulin pumps deliver insulin needed for an actual 24 hour period (basal), as well as the insulin needed to cover food intake or high blood sugars (bolus)
- Insulin pumps are the most physiological form of insulin delivery known today.

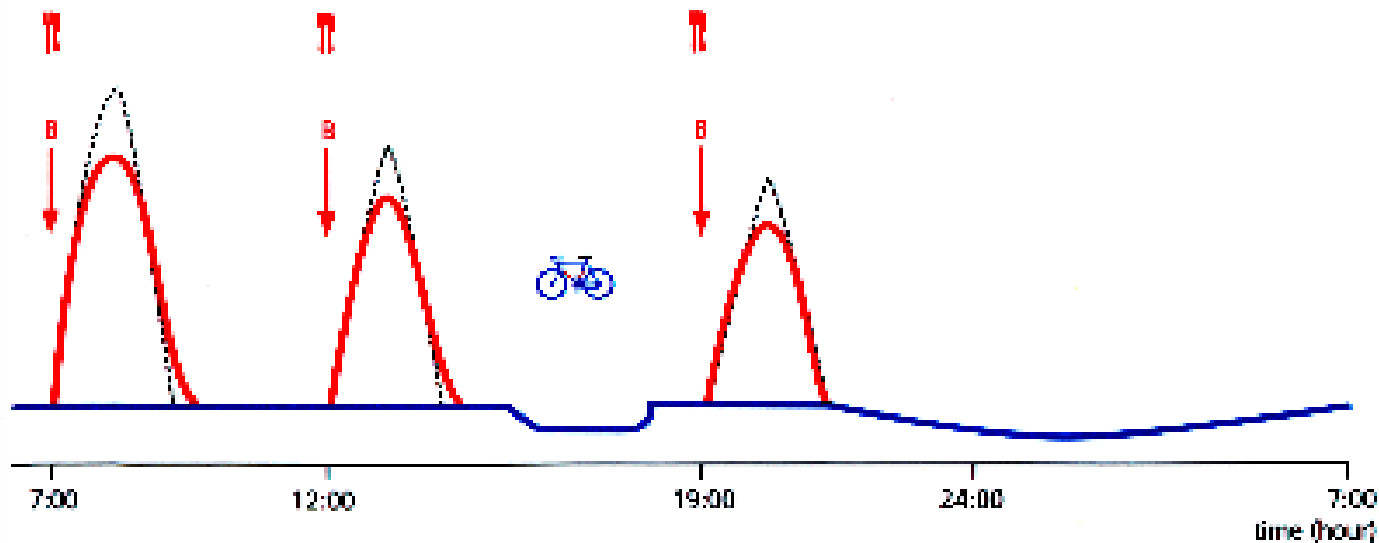
# Insulin Injection Therapy

## Insulin Delivery with Intensive Conventional Therapy (ICT)



# Continuous Subcutaneous Infusion

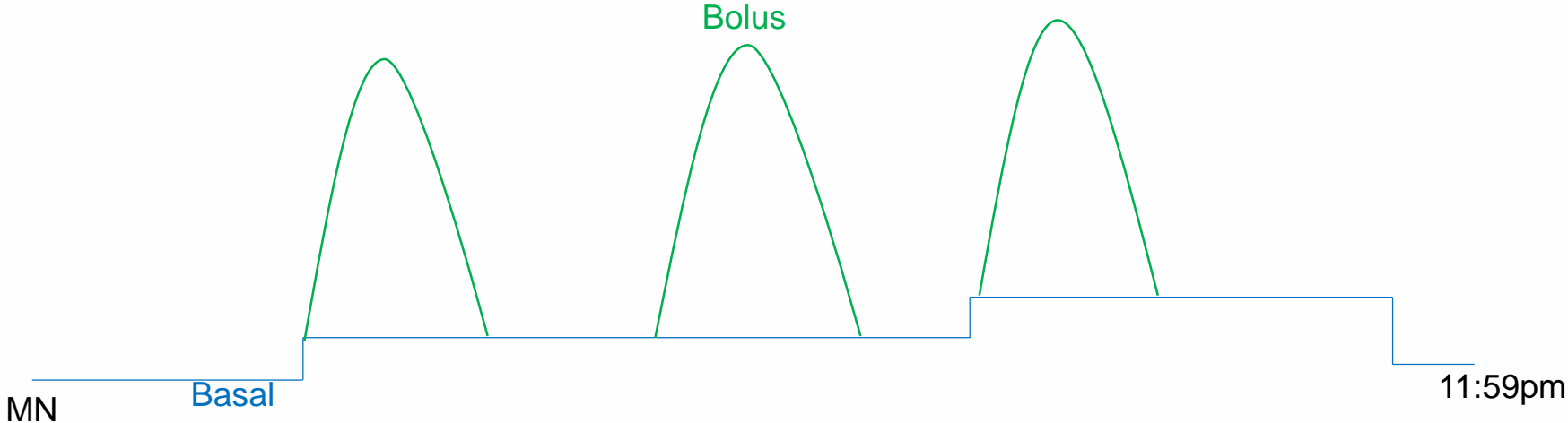
## Insulin Delivery with Continuous Subcutaneous Insulin Infusion (CSII)



# Basal vs. Bolus

- **Basal** insulin – the insulin that the pump delivers at a continuous rate every hour
- **Bolus** insulin – the insulin that is given to cover food or correct a high blood sugar

# Basal and Bolus Insulin



# Carb to Insulin Ratio

- The amount of insulin (quick acting) given to cover the carbohydrates eaten at each meal
- Example: 15:1 (1 unit insulin for every 15 grams of carbohydrates eaten)

# Correction Bolus

The purpose is to lower or correct a high blood sugar to the target level. To do this you need to understand the following variables:

- Correction Factor/Insulin Sensitivity Factor
- Duration of insulin action
- Insulin on board
- Target glucose level



# Correction Factor/Insulin Sensitivity Factor

- The amount the blood sugar would decrease when given 1 unit of insulin.
- Example: Correction Factor of 75 mg/dl  
1 unit will lower the blood sugar 75 points

# Correction Dose Example

- Current blood sugar = 180 mg/dl
- Target blood sugar = 120 mg/dl
- Correction Factor = 30 mg/dl
  
- $180 - 120 = 60$
- $60 \text{ divided by } 30 = 2$
- 2 units of insulin will return the blood sugar to target

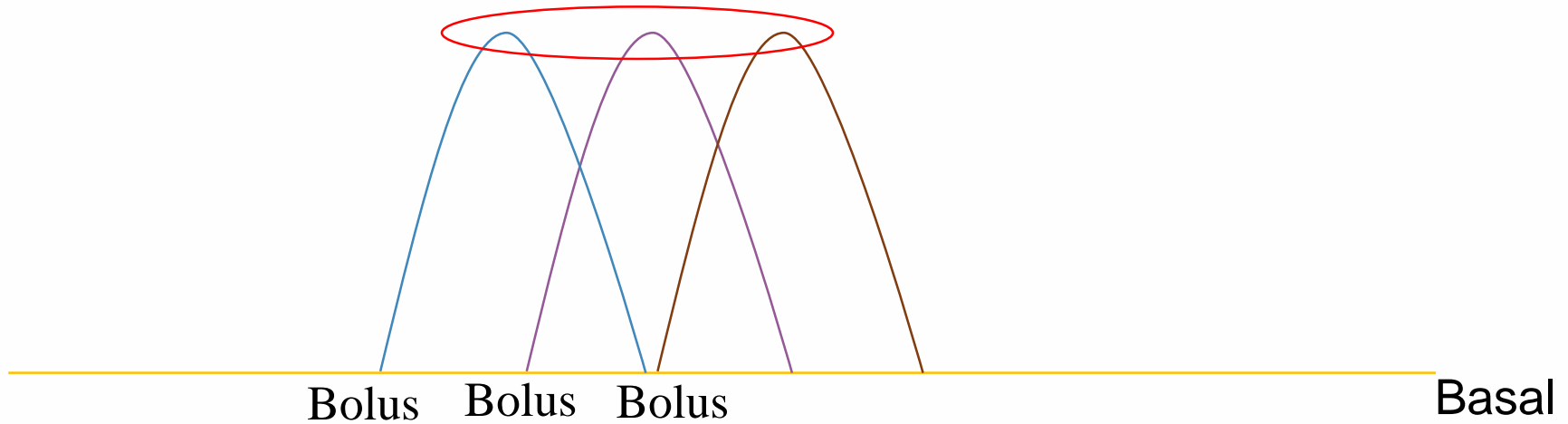
# Duration of Insulin Action

- The amount of time that insulin effectively lowers blood sugar.
- Humalog/Novolog/Admelog starts working within 15 minutes and works in the body for about 3-5 hours.
- Each pump can be set for your specific duration time 2-8 hours.

# Insulin on Board

- The amount of insulin that is still active in the body from a previous bolus. This feature is designed to prevent over-bolusing and stacking of insulin which are major causes of low blood sugars.

# Stacking Insulin



Stacking insulin can lead to low blood sugars

# Smart Pumps

- Accurate boluses through carb ratios, targets, and correction factors
- Avoid insulin stacking
- History to improve analysis

# Dexcom G6



# MiniMed Sensor





# Freestyle Libre



# Benefits of Insulin Pump Therapy

- Flexibility of lifestyle
  - mealtimes
  - sleeping in
- Less fluctuation of blood sugar levels
  - tighter blood sugar control
  - more physiological release of insulin
- Prevent/prolong long-term complications

# Insulin Pump Myths

- I won't have to take another insulin shot again
- I can eat whatever I want, whenever I want
- The pump is a cure for diabetes
- I don't have to test my blood sugars on the pump because the pump reads my blood sugars and then gives me insulin
- I can't be on a pump because I play sports/am too active

# Contraindications For Pump Therapy

- Unwillingness to admit they have diabetes to others
- Body-image conscious
- Poor compliance of with current regimen and keeping scheduled appointments
- Lack of consistent blood sugar monitoring (<4x/day) and unable to calculate carbohydrates eaten

# Risks of Pump Therapy

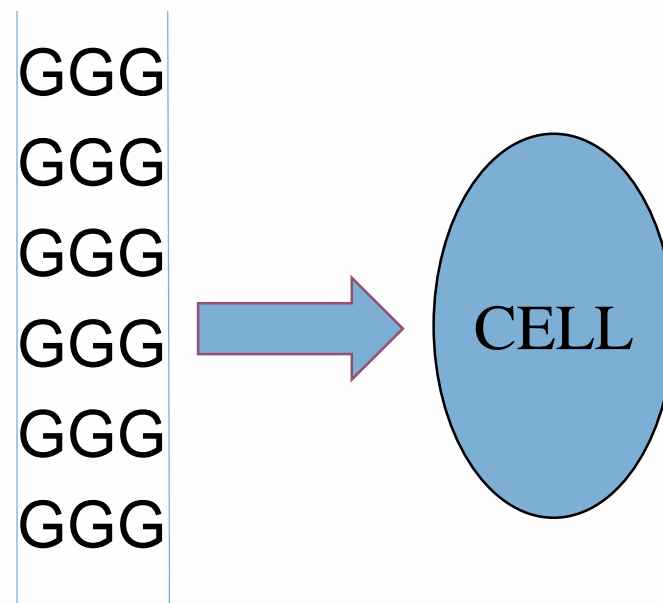
- Accelerated DKA
- Catheter/tubing occlusion
- Pump failure
- \$\$\$\$\$
- #1 risk the pump is that it only works as well as the person using it

# Diabetes Ketoacidosis (DKA)

- Due to lack of insulin to transport sugar into our cells
- Body begins to burn fat for energy
- Acids build up from burning fat
- Common symptoms includes fruity odor to breath, nausea, vomiting, drowsiness
- #1 reason for hospitalization in children with diabetes
- Early detection and treatment of ketones prevents hospitalization

# Causes of DKA

- Incorrect/forgotten insulin dosing
- Interruption of insulin
- Sickness/Stress
- Pump malfunction
- Catheter problems
- Insulin that has lost potency



Missing the insulin bridge

# Homework/Responsibilities

- Demonstrate mastery of basic diabetes skills
- Blood sugar records for 2 weeks
  - Record checks before meals, 2 hours after meals
  - Record checks at Midnight and 3am 3xweek
  - Record any other checks (low or ill)
  - Record all insulin given (meals and corrections)



# Pump Process

- Turn in homework packet to Diabetes Team once complete
- Diabetes Team will contact you once the homework is reviewed
- Choose which pump you would like and contact that pump company to start the process of getting the pump
- Once the pump is received, training will be scheduled with the diabetes nurse, dietitian and a certified pump trainer
- After starting on the pump, frequent calls to the office to adjust doses are needed

# Living with a pump

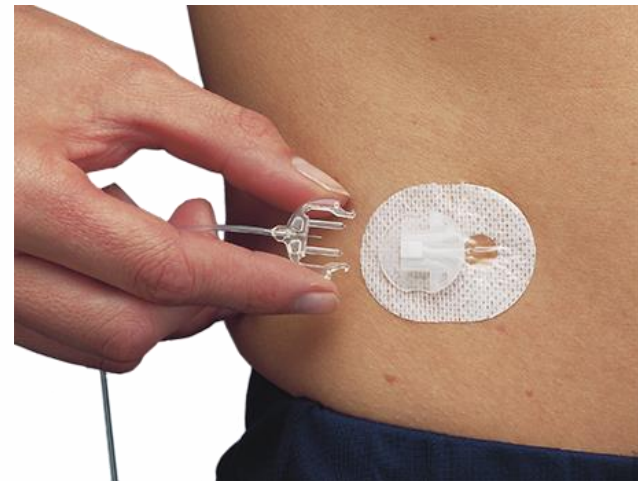
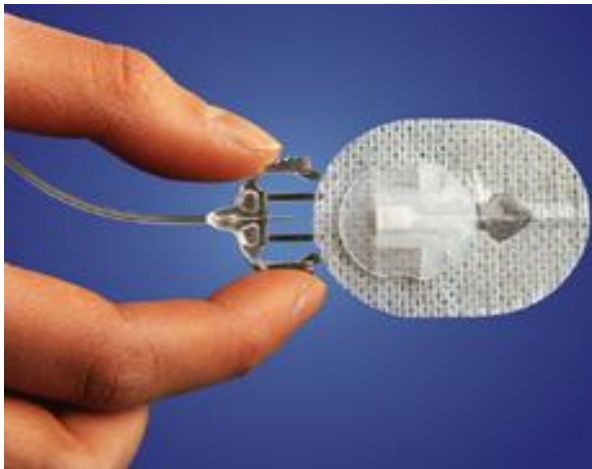
- Disconnecting and reconnecting for sports, swimming, bathing, etc.
- Catheter care and insertion sites
- Batteries/Charging
- Alarms
- Wearing the pump – day and night
- Adjusting for exercise, sick day, and travel

# Troubleshooting Checklist

- Assess the infusion site
- Assess the infusion set tubing
- Assess the reservoir/cartridge
- Assess the pump
- Assess the insulin

# Pumps with tubing

- **Infusion set:** The tubing that connects from the cartridge in the pump to the infusion site.
- **Cartridge:** The “syringe” that serves as the insulin container in the pump. Can hold a two to three day supply of insulin



# Medtronic 630G/670G



# Tandem T-Slim



# Omnipod PDM /DASH



# We've Come A Long Way!





# Questions?

