LET'S GET TECHNOLOGICAL! DIABETES TECHNOLOGY THAT IS…

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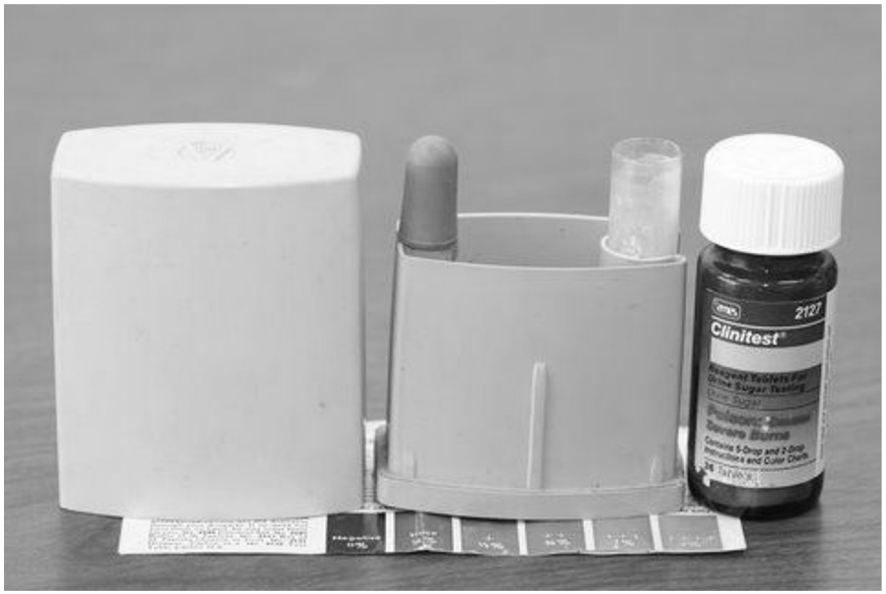
Disclosures to Participants

- **Conflict of Interest (COI) and Financial Relationship Disclosures:** Relevant disclosures (or lack thereof) among education activity speakers and planners are as follows:

Speaker/Planner disclosures:
Ashley Colnett, BSN, RN, CDCES, CSN – Certified Pump Trainer contracted with Tandem Diabetes and Beta Bionics

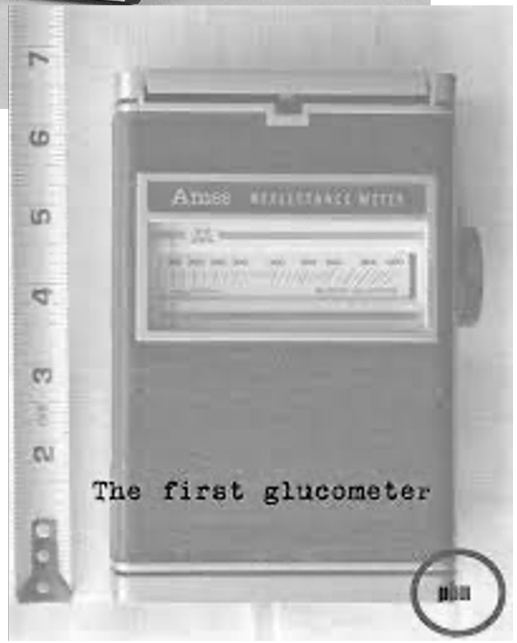
Disclosure and Mitigation of Relevant Conflicts of Interest: All identified relevant conflicts of interest have been mitigated.



HOW IT STARTED...

the first glucose meter

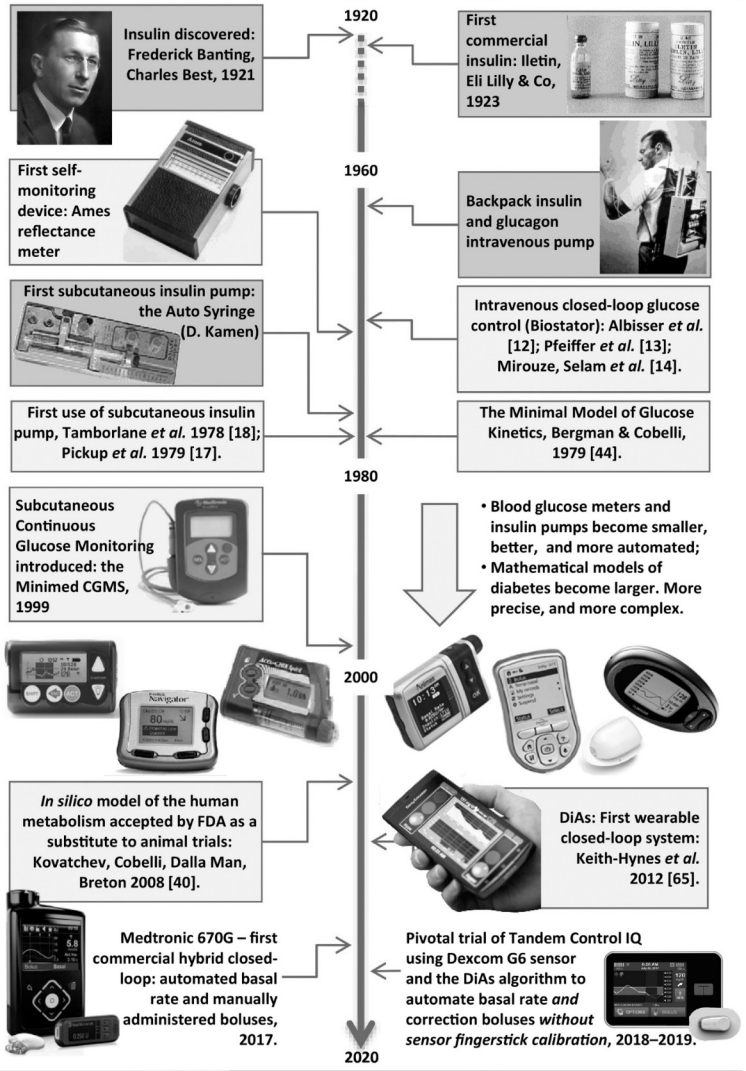
glucose meter now



WE'VE COME SO FAR...


1994
1996
2005
2010
104
2012 - 2015
110
2020
2018

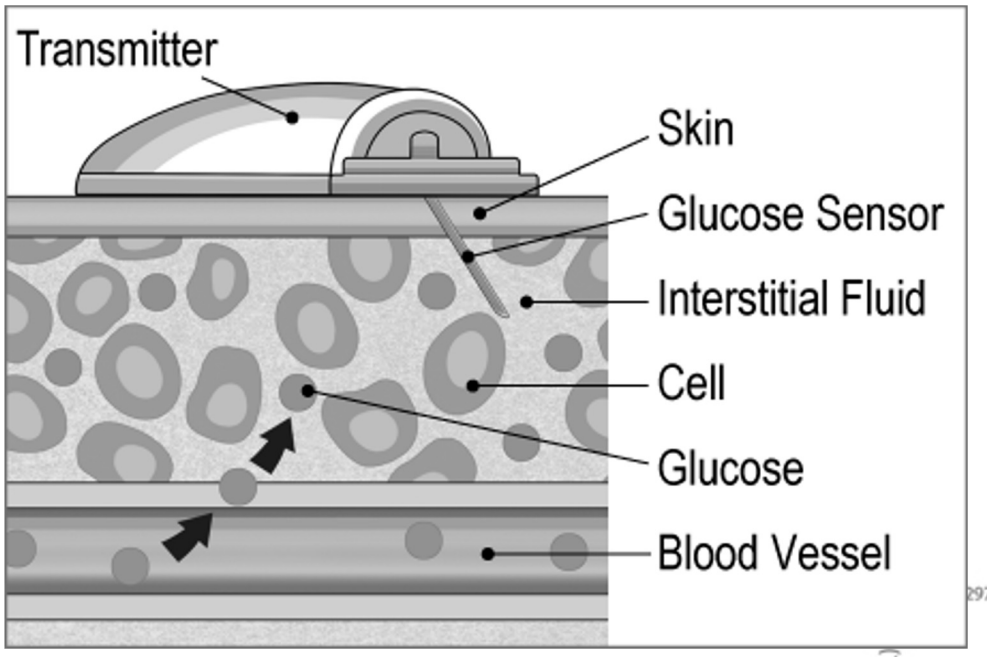
A century of diabetes technology

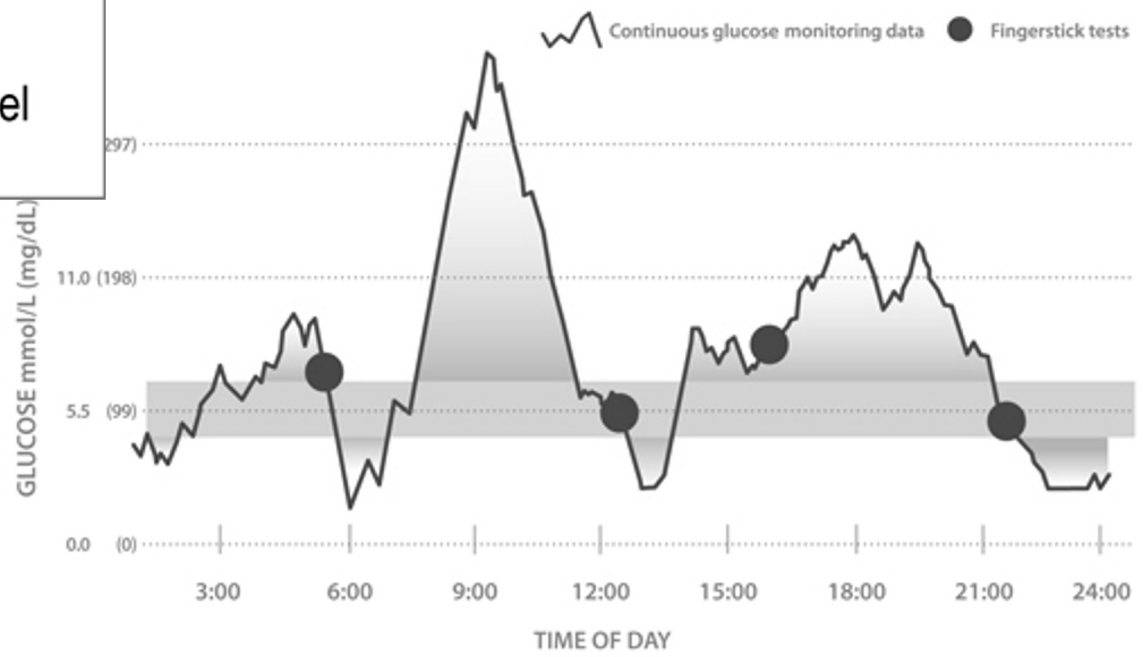


CONTINUOUS GLUCOSE MONITORING

WHAT IS CGM?

- A sensor (thin filament) that measures the glucose level of interstitial fluid under the skin
- Measures interstitial fluid glucose levels every 1-5 minutes/24 hours a day while worn **(288-1440 BGs a day!)**
- Alarms for highs and lows
- Used to identify trends and patterns of glucose fluctuations
- Some are approved to replace fingersticks (Dexcom G6 & G7/Libre 2, Libre 3)
- Blood sugars shown on a screen of pump, phone, or receiver, as a number and/or graph
  - Arrows show direction and speed blood sugars are moving
  - Approved to wear sensor 7 – 180 days, depending on the brand
  - Types:
    - Medtronic Guardian Connect
    - Dexcom G6 & G7
    - Freestyle Libre 2 & Libre 3
    - Eversense & Eversense E3 (implantable—not reviewed here today)

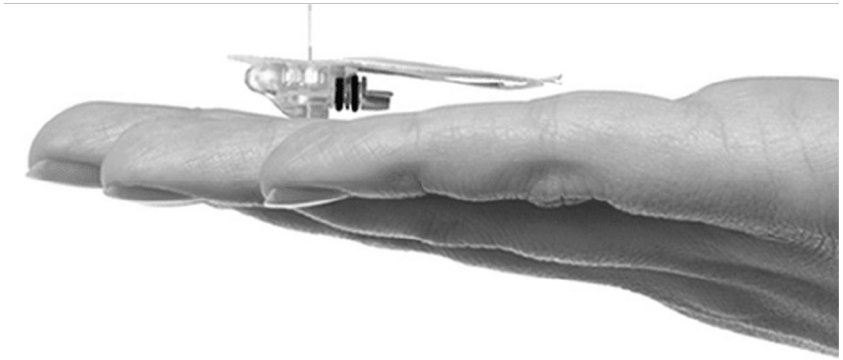

Transmitter
Skin
Glucose Sensor
Interstitial Fluid
Cell
Glucose
Blood Vessel


Continuous glucose monitoring data
Fingerstick tests
GLUCOSE mmol/L (mg/dL)
297)
11.0 (198)
5.5 (99)
0.0 (0)
3:00
6:00
9:00
12:00
15:00
18:00
21:00
24:00
TIME OF DAY

MEDTRONIC GUARDIAN CONNECT

- ❑ Uses smart technology to predict where glucoses are headed
- ❑ Alerts 10 - 60 minutes before a glucose excursion
- ❑ Bluetooth reads to a phone app
- ❑ 5-7 day wear
- ❑ Need to charge transmitter
- ❑ Needs 2 calibrations per day
- ❑ Automatically uploads to CareLink system
- ❑ Has "follow" capabilities


Sensor Glucose
118
Fettuccine Alfredo
BLT Sandwich
Sugar IQ Insight



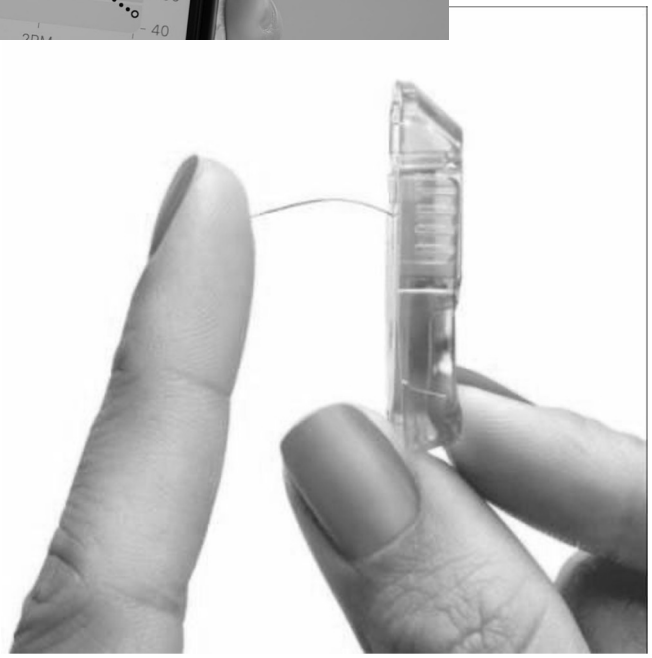
DEXCOM G6 & G7

Smart device sold separately.*

DEXCOM G6

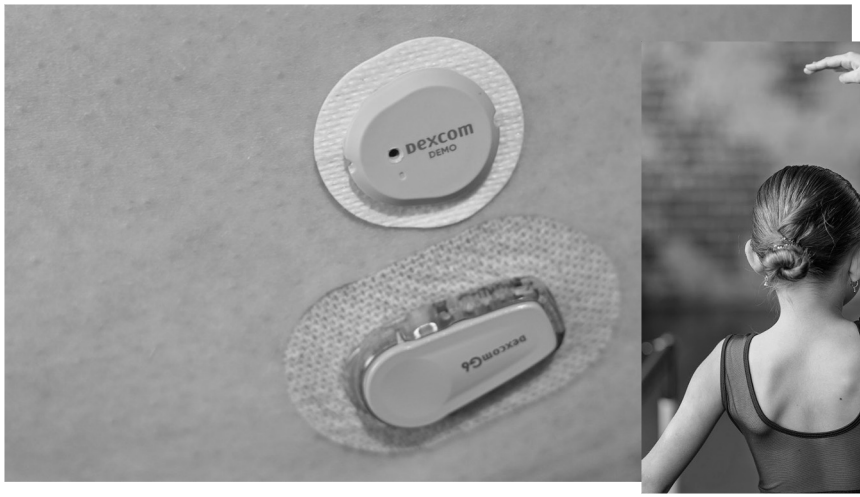
- ❑ Customizable alarms can be turned on and off
- ❑ Urgent Low Soon alarm (under 55 in 20 mins)
- ❑ **No calibrations**
- ❑ **Replaces fingersticks**
- ❑ **Approved to dose off**
- ❑ 10 day wear
- ❑ No charging transmitter (battery for 90 days)
- ❑ Easy insertion device--one step
- ❑ Works with many cell phone models, Apple watches, receiver
- ❑ Data can be shared (Dexcom Follow/Share)
- ❑ Live alarm sharing
- ❑ Dexcom Clarity app on phone or Clarity online
- ❑ Siri will verbally give blood sugar reading on iPhones
- ❑ For visually impaired, connect to Sugarmate app on phone and then enable Sugarmate Skill on Alexa to ask what BG is
- ❑ Integrated with Tandem x2 pumps, Omnipod 5, iLet

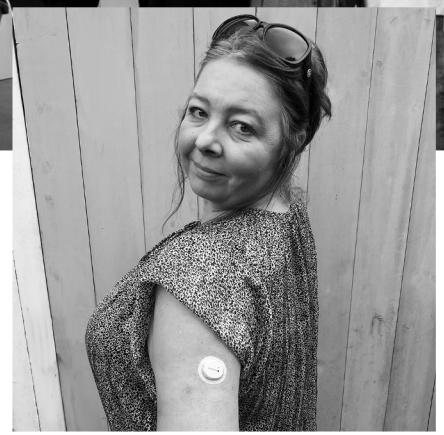

Verizon LTE
3:03 PM
15%
55 mg/dL within 20 minutes
Share
63
mg/dL
300
200
100
40
1PM



DEXCOM G7

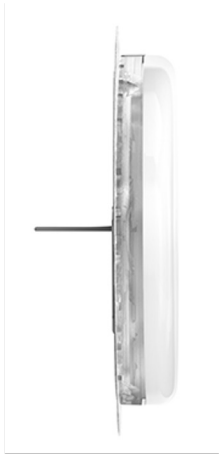
- ❑ Launched 2/17/23
- ❑ 2 years and older; approved for pregnancy
- ❑ **MARD 8.1% adults, 8.2% pediatrics** (vs 9% G6)
- ❑ 12-hour grace period to replace finished sensors
- ❑ Sensor/transmitter 1 piece—dispose whole unit after wear (60% smaller!)
- ❑ **Faster sensor warm up time—30 mins vs 2 hours**
- ❑ **No calibrations**
- ❑ **Replace fingersticks/Make dosing decisions**
- ❑ Approval for wear of back of arm (better accuracy)
- ❑ 90 degree insertion—less trauma/better accuracy
- ❑ More alert options
- ❑ Smartphone app or receiver
- ❑ **NOW integrated with Tandem CIQ and iLet! Expected soon for OP5**


dexcom
DEMO




dexcom
102→
mg/dL
300
160
55
40
6AM
7AM
8AM
Now


dexcomG7
G7
dexcomG7
REF
LOT

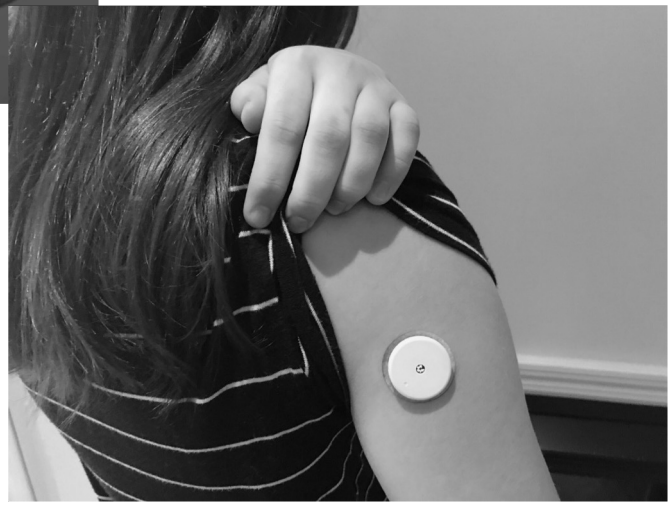


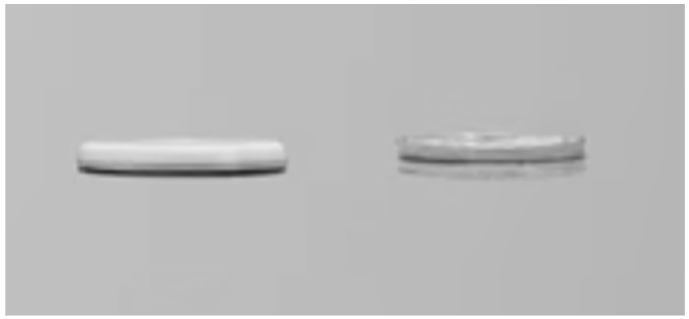
LIBRE 2

- ❑ Has high and low alarms, but **no automatic display/real time**
  - ❑ **Have to scan sensor to see BG**
- ❑ Receiver and phone app
  - ❑ Receiver is Blue in color and says Libre 2
- ❑ Downloads to LibreView account (automatic by app)
- ❑ Approved ages 4 years and up
- ❑ Same price as original Libre (much more affordable than Dexcom)
- ❑ 14 day wear, **back of arm only**
- ❑ Sensor and transmitter 1 piece—disposable
- ❑ **No calibrations, replaces fingersticks, can dose off**
- ❑ >500mg Vitamin C will give false high readings
- ❑ **Approval for pregnancy and FDA greenlight for integration with AID systems (aka pumps)—Tandem CIQ January 2024, expected for Omnipod 5 and iLet**
- ❑ Sharing capability
- ❑ Text to talk feature on app
- ❑ 'Check Glucose' symbol for rapidly changing BG


9:41
Meine Glukosewerte
GLUKOSE IM ZIELBEREICH
Vor 1M
112
mg/dL
22:23
Endet in 13 Tagen
112
350
250
150
50
14:00
18:00
22:00
FreeStyle Libre 2
Abbott

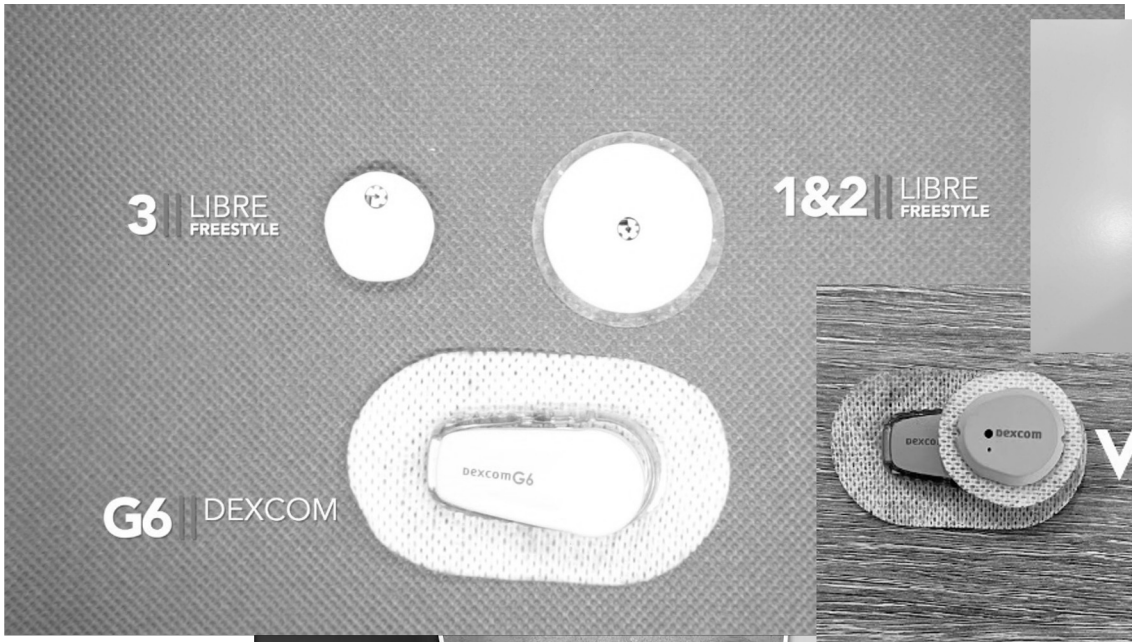

Scan position may vary for different phones.





LIBRE 3

- MARD 7.9% overall (8.9% with different testing)
- Approved ages 4 and older
- 14 day wear, back of arm
- **No calibrations**
- **Replaces fingersticks**
- **Much smaller! 2 stacked pennies**
  - Smallest and thinnest available on market
- **Real time readings—no more scanning!**
- Customizable alarms
- Data transmitted to smartphone **every 60 seconds** (Libre 3 app)
- Same price as previous versions
- 33 feet Bluetooth span (vs 20 feet with others)
- Still 1 piece applicator and all in 1 sensor/transmitter
- Approval for pregnancy and FDA greenlight for integration with AID systems (aka pumps)
- Expected integration with Tandem CIQ and OP5 later 2024 (iLet??)

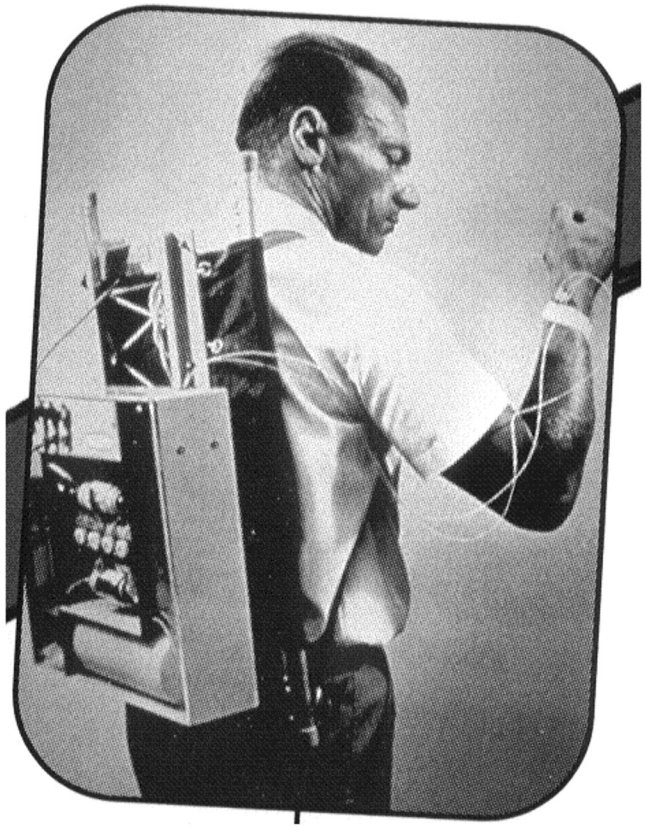

3 LIBRE FREESTYLE
1&2 LIBRE FREESTYLE
G6 DEXCOM
DexcomG6


Libre 3
Dexcom G7
dexcom
DEMO

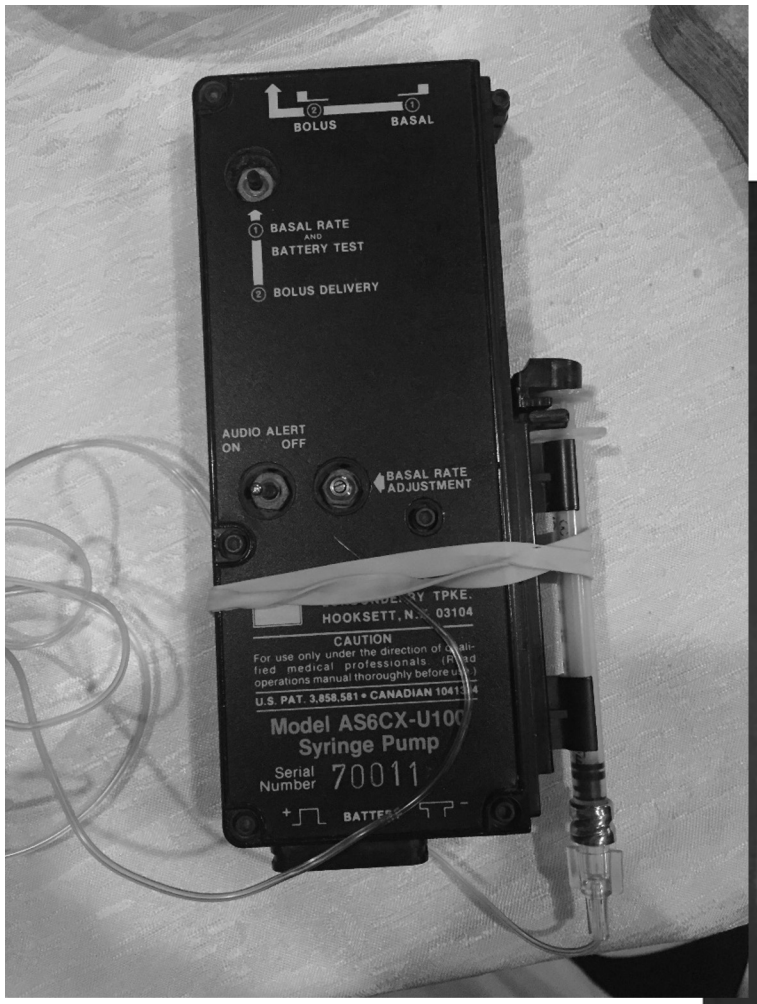

vs G6
vs Libre3


Freestyle libre
Abbott
FreeStyle Libre 3
SENSOR
CAPTEUR
SENSORE


Comparing Dexcom G7 Size to Other Sensors
Comparing Dexcom G7 Size to Other Sensors

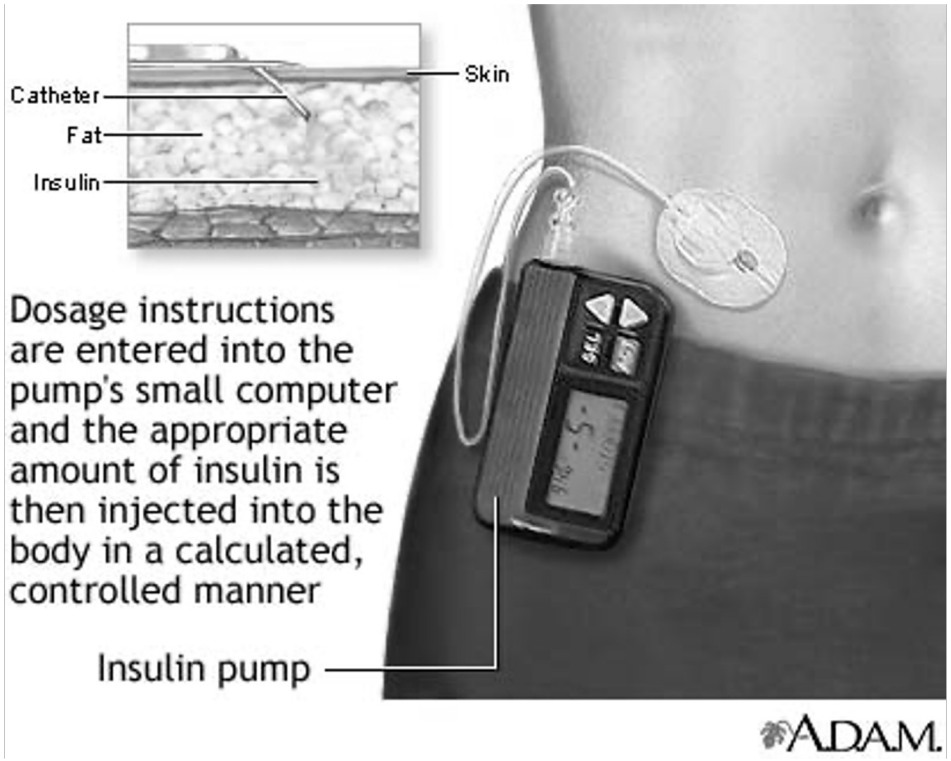


INSULIN PUMPS

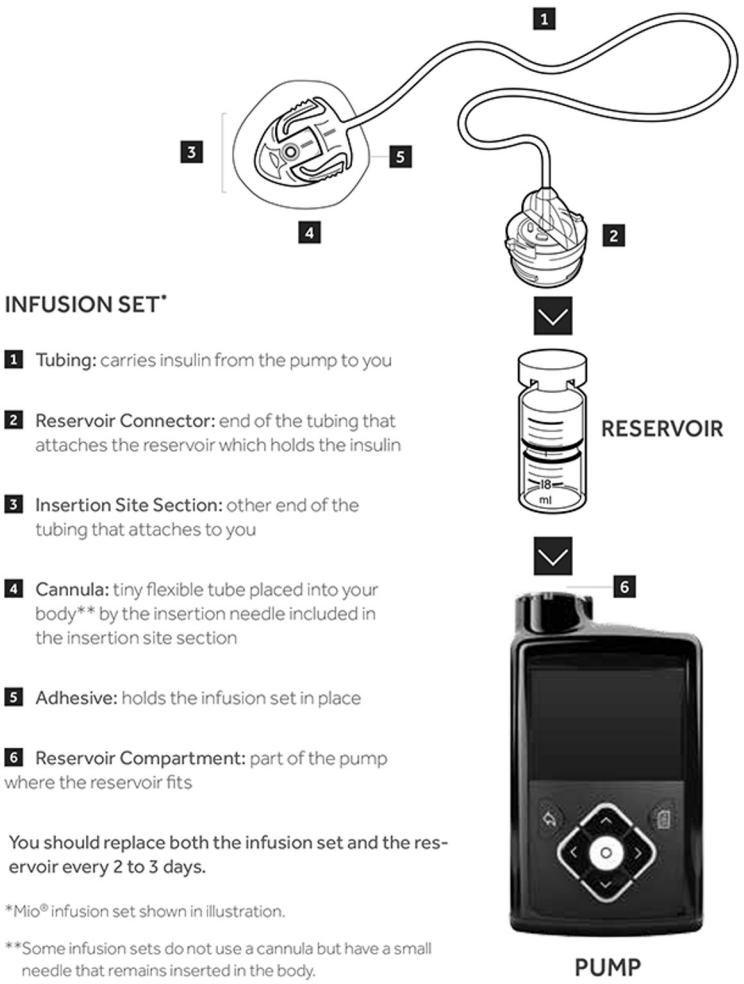

BOLUS
BASAL
BASAL RATE AND BATTERY TEST
BOLUS DELIVERY
AUDIO ALERT ON OFF
BASAL RATE ADJUSTMENT
HOOKSETT, N.
03104
CAUTION
For use only under the direction of qualified medical professionals
U.S. PAT. 3,858,581 • CANADIAN
Model AS6CX-U100
Syringe Pump
Serial Number 70011


MiniMed
506
MiniMed 507
SEL
ACT

ALL ABOUT INSULIN PUMPS



- Delivers rapid acting insulin through an infusion set
  - **No long-acting insulin**
- Infusion set is connected to a tiny plastic cannula or small steel needle that is inserted under the skin to deliver insulin on a continuous basis
- Infusion sets are changed every 2-3 days
- Rapid-acting insulin is drawn up in a reservoir/cartridge/pod



- ❑ The pump is programmed per physician's orders:
  - ❑ Basal Rates
  - ❑ Insulin to carb ratio
  - ❑ Correction/Sensitivity factor and Target BG
- ❑ Mimics normal physiologic insulin delivery
- ❑ Sites worn same areas injections given
- ❑ Gives insulin continuously over 24 hours – basal rates
  - ❑ Adjustable to different times of day and insulin needs
- ❑ For meals or high BG can give a dose of insulin – bolus
- ❑ Uses a "bolus calculator" to calculate the proper dose based on the regimen and the inputted blood sugar and grams of carbs
- ❑ Battery operated or chargeable

SPECIAL FEATURES

- ❑ Bolus Precision
  - ❑ Small increments for dosing (bolus calculator)
  - ❑ Subtracts from IOB and reverse correction
- ❑ Basal Manipulation & Additional Basal Patterns
- ❑ Temporary Basal Adjustments
  - ❑ Increase or decrease the administration of basal insulin
  - ❑ Most often used during exercise, illness/steroids, or stress
- ❑ IOB (insulin on board)
- ❑ Integrated CGMs
- ❑ Reminders (missed bolus, BG reminder)

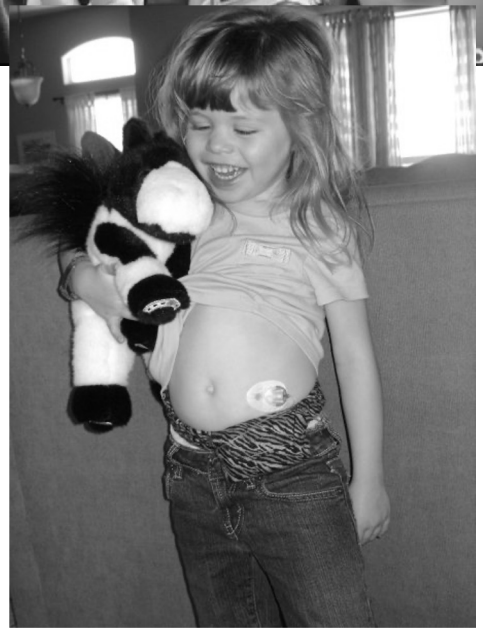
CLOSED LOOP PUMPS (CLPS)

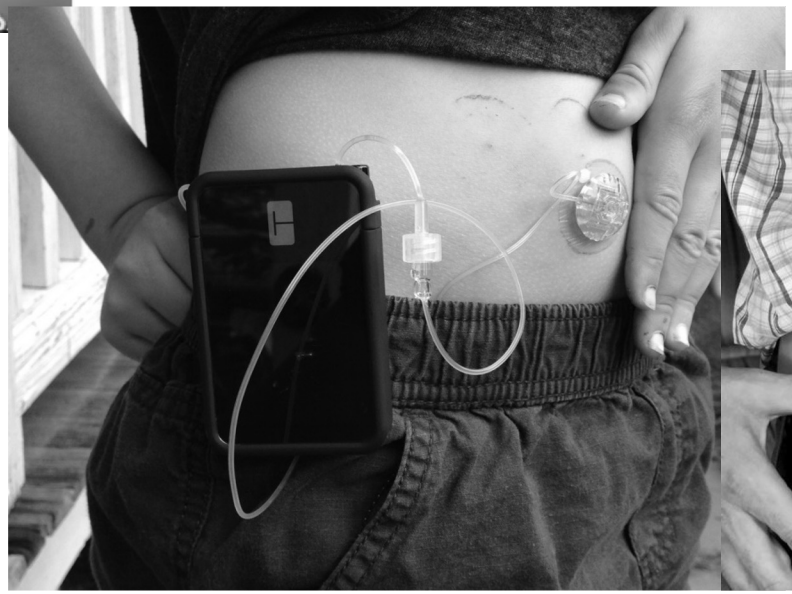
- CLP = Closed Loop Pump
- A system that works with both a CGM and a pump (integrated—CGM "talks" to the pump)
- The pump automatically adjusts the amount of insulin given (both basal and bolus) depending on the specific system algorithm and what the CGM value is
- CLPs are fantastic technology, they do a lot in the background to help prevent both highs and lows
- Current systems:
  - Medtronic CLP: Medtronic 780G with Smartguard
  - Tandem CLP: Tandem t:slim X2 with Control IQ (CIQ) & Mobi
  - Omnipod CLP: Omnipod 5 (OP5)
  - Beta Bionics CLP: iLet Bionic Pancreas


ACT


© adnama36/instagram

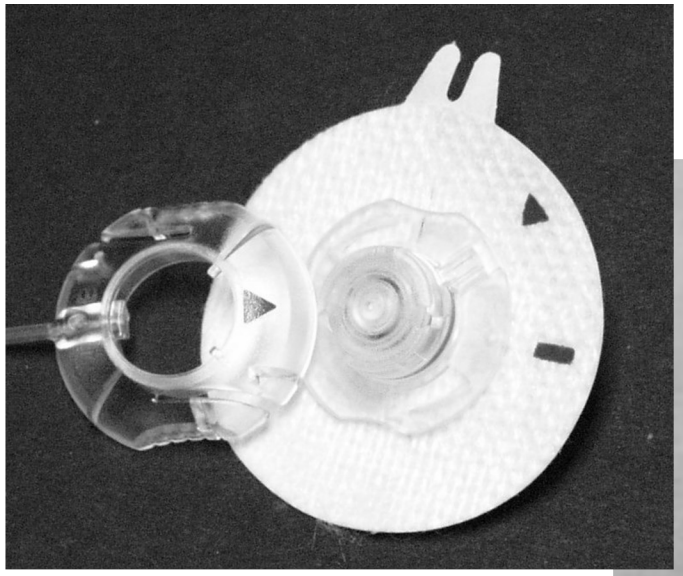

www.theprincessandthepump.com

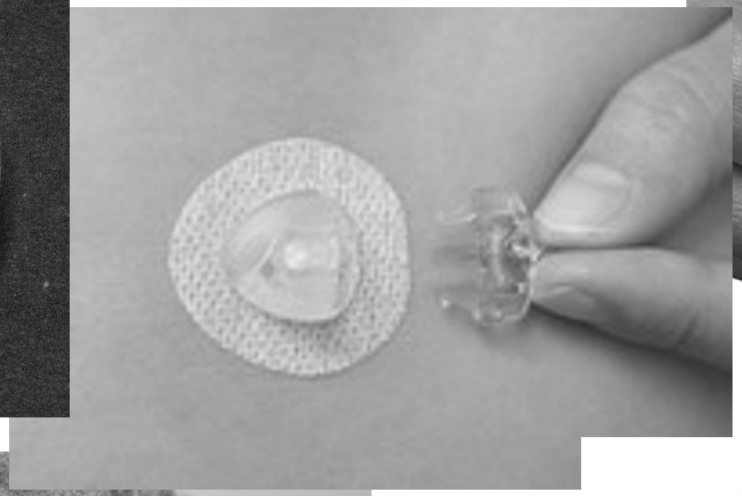


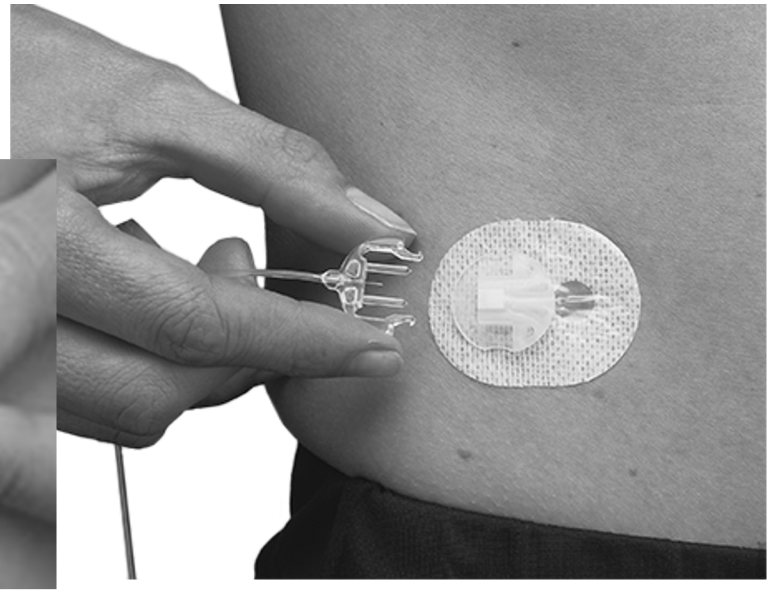


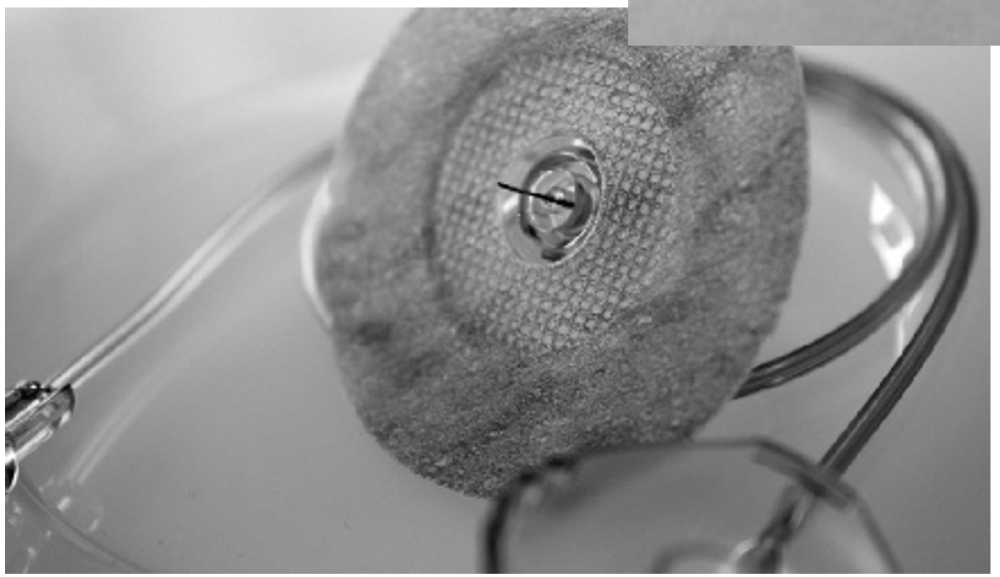
INFUSION SETS

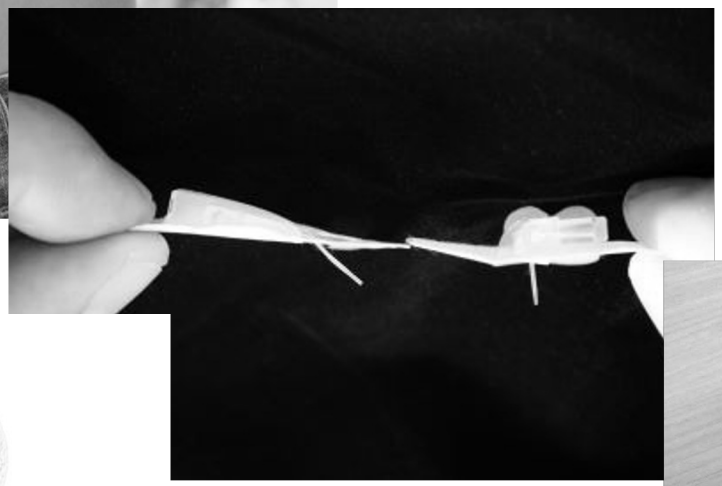
- A soft, plastic subcutaneous cannula or steel needle inserted at a 90 or 30/45 degree angle by the parent/child
  - Plastic cannula works like an IV—needle goes in and comes out, leaving cannula in place (but not in a vein ☺)
- An inserter is available for most sets or are incorporated in the set
- Some use a steel needle which remains in the subcutaneous tissue
- All infusion sets should be changed every 2- 3 days
  - Can place a site anywhere give an injection
  - Site rotation is still KEY!
- Possible to disconnect from pump without removing the site

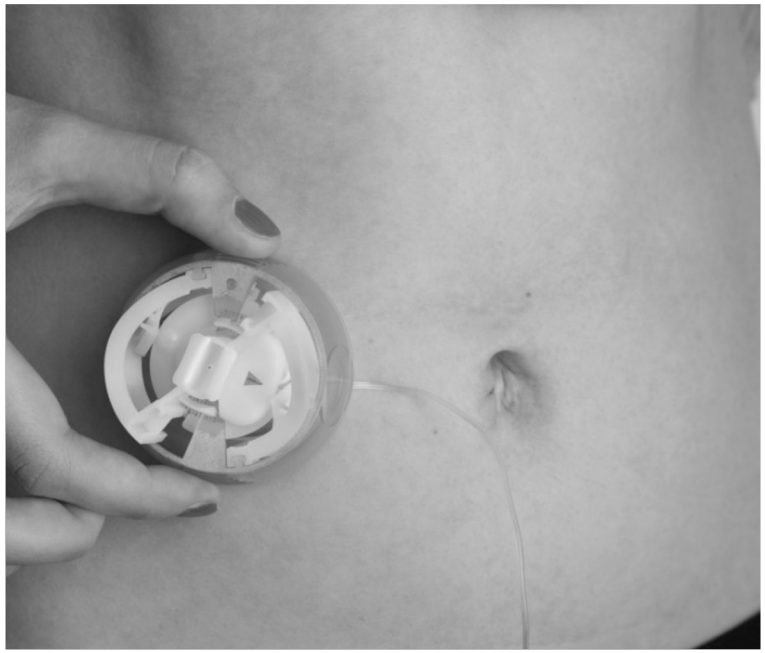


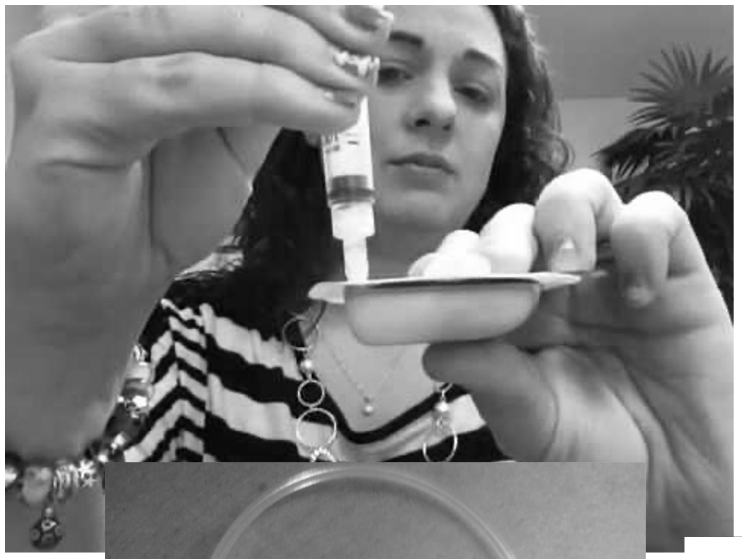


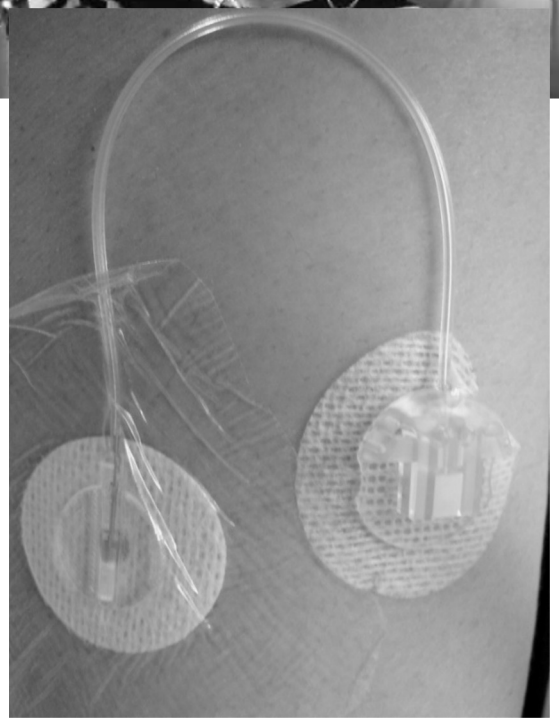


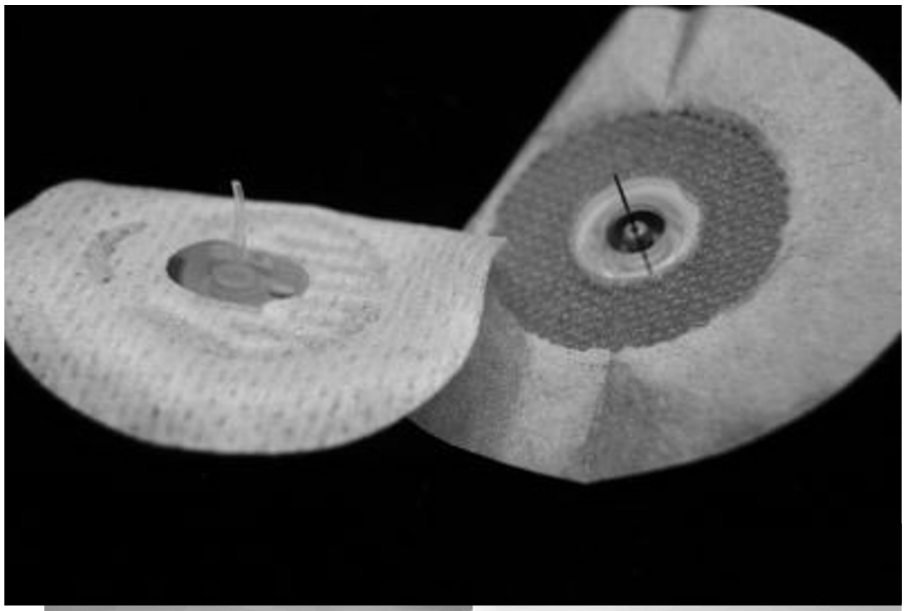




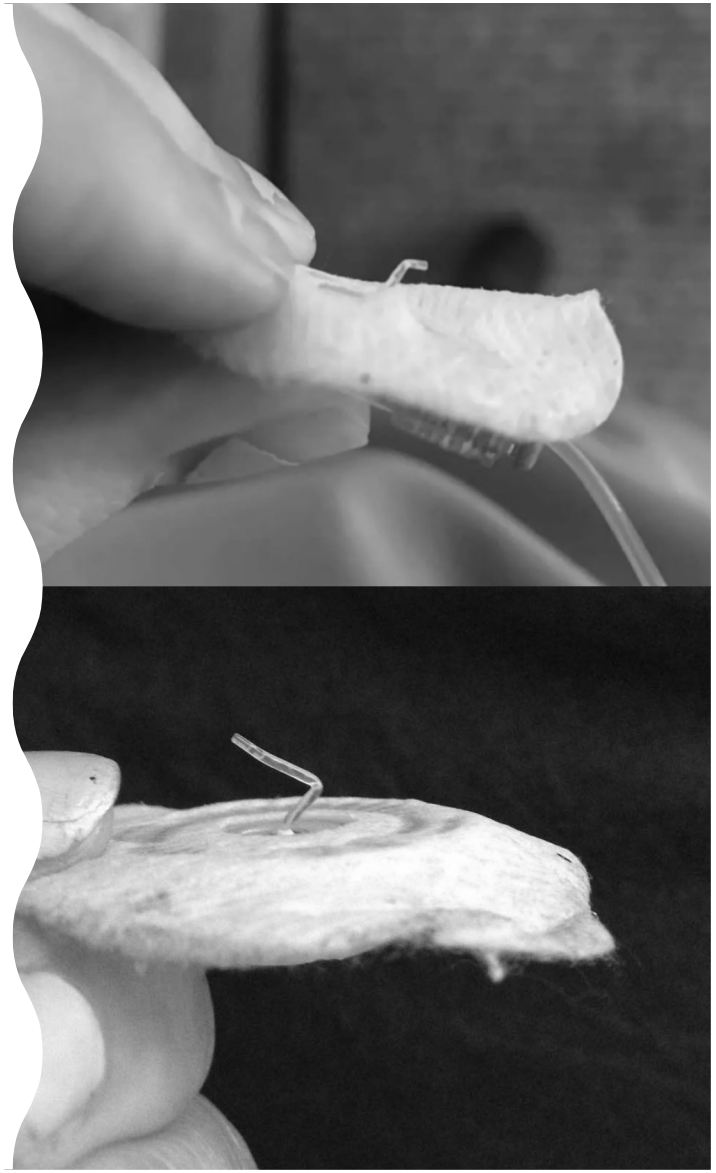









Medtronic
Silhouette INFUSION SET



WHAT SCHOOL NURSES NEED TO KNOW

- ❑ Risk for DKA
- ❑ Unexplained high BG? **THINK BAD SITE**
- ❑ Should not be off pump for more than 1-2 hours at a time
    - ❑ Can disconnect without removing site
- ❑ NOT waterproof, only *water resistant*
- ❑ Have extra pump supplies at school
    - ❑ Infusion sets, reservoirs/cartridges/pods, batteries, insulin, syringes
- ❑ Back up insulin in case of pump failure
    - ❑ Long-acting and Novolog/Humalog
- ❑ Call # in/on all pumps with Customer Service 24/7
- ❑ All pumps have history screens, can recall all boluses, basals given, and all pump activity
- ❑ **Lower CHO treatment for hypoglycemia on CLPs (5-10gms)**
- ❑ **No "free" CHOs on CLPs**

MEDTRONIC: 630G, 670G, 770G, 780G

HOW TO TELL WHICH IS WHICH

630G

670G

770G/780G

MEDTRONIC 780G

Components and apps
MiniMed™ 780G system

1. MiniMed™ 780G insulin pump
with advanced
SmartGuard™ technology

2. Guardian™ 4 sensor and transmitter
with no fingersticks with SmartGuard™ automation§

3. Medtronic Extended infusion set
for wear up to 7 days‖

4. MiniMed™ Mobile App*
View glucose levels, pump information, and insulin data on their phone or Apple Watch. View this reference chart for a list of compatible smartphones.

MiniMed™ Mobile app
For patients

- Displays pump and CGM data with customizable alerts
- Time in range viewed on demand

CareLink™ Connect app
For care partners

- All-in-one viewing and customizable alerts of patient's pump and CGM data

- ❑ **Approved 4/21/23**
- ❑ New algorithm (3 parts)—fights to keep in **SmartGuard** more, less kickouts
  - ❑ Automated Basal
  - ❑ Auto corrections
  - ❑ Meal Detection Technology
- ❑ Fewer alarms, simpler operation (extended periods for all kickout features)
- ❑ Adjustable target glucose as low as 100 mg/dL (lowest on the market)
- ❑ New CGM: Guardian 4 sensor & transmitter (MARD 10.4%)
- ❑ New 7 day wear infusion set
- ❑ 1 calibration on first day to enter SmartGuard, then 0 calibrations after (except in Manual Mode)
- ❑ Replaces fingersticks and can dose off CGM (in SmartGuard only)
- ❑ Automatic corrections when parameters met (auto corrections q 5 mins, 12 per hour)
- ❑ Software update capability
- ❑ Mobile app (view data, upload wirelessly)

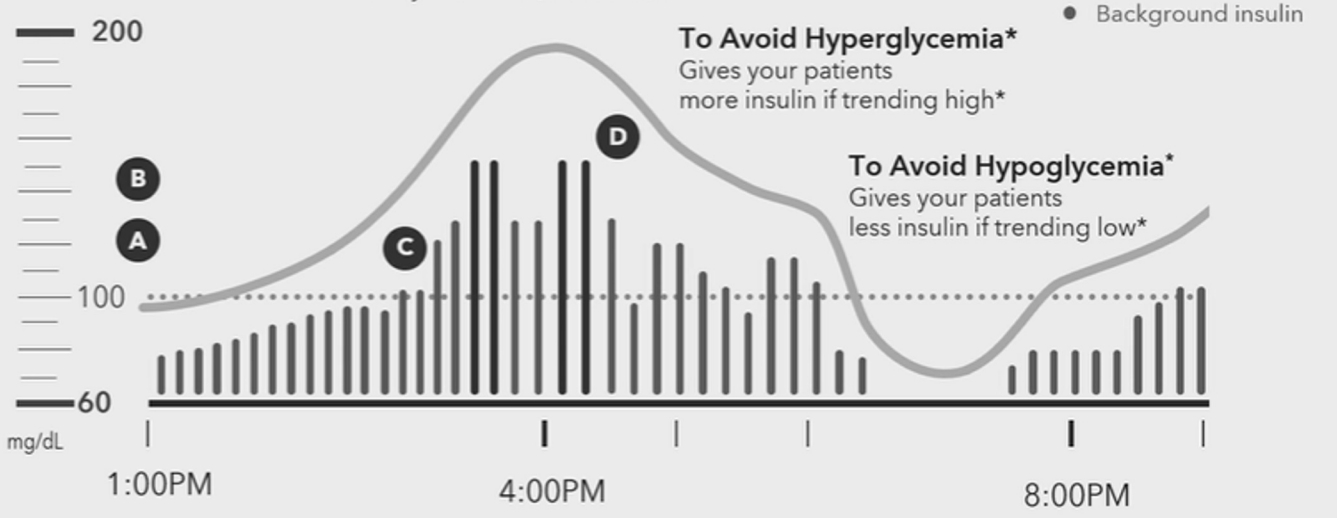
● LIVE

Adjusts and auto corrects

SmartGuard™ technology automatically delivers basal insulin and auto correction doses every five minutes, based on sensor glucose readings.*

Up to 288
adjustments and/or corrections done automatically per day*

- **A** Selection between a basal target of 100 mg/dL (Default), 110 mg/dL or 120 mg/dL
- **B** The auto correction target is set at 120 mg/dL
- **C** Adjusts basal insulin every 5 minutes based on SG values
- **D** Auto corrections delivered up to every 5 minutes
  - Max basal reached
  - SG ≥ 120 mg/dL



Medtronic

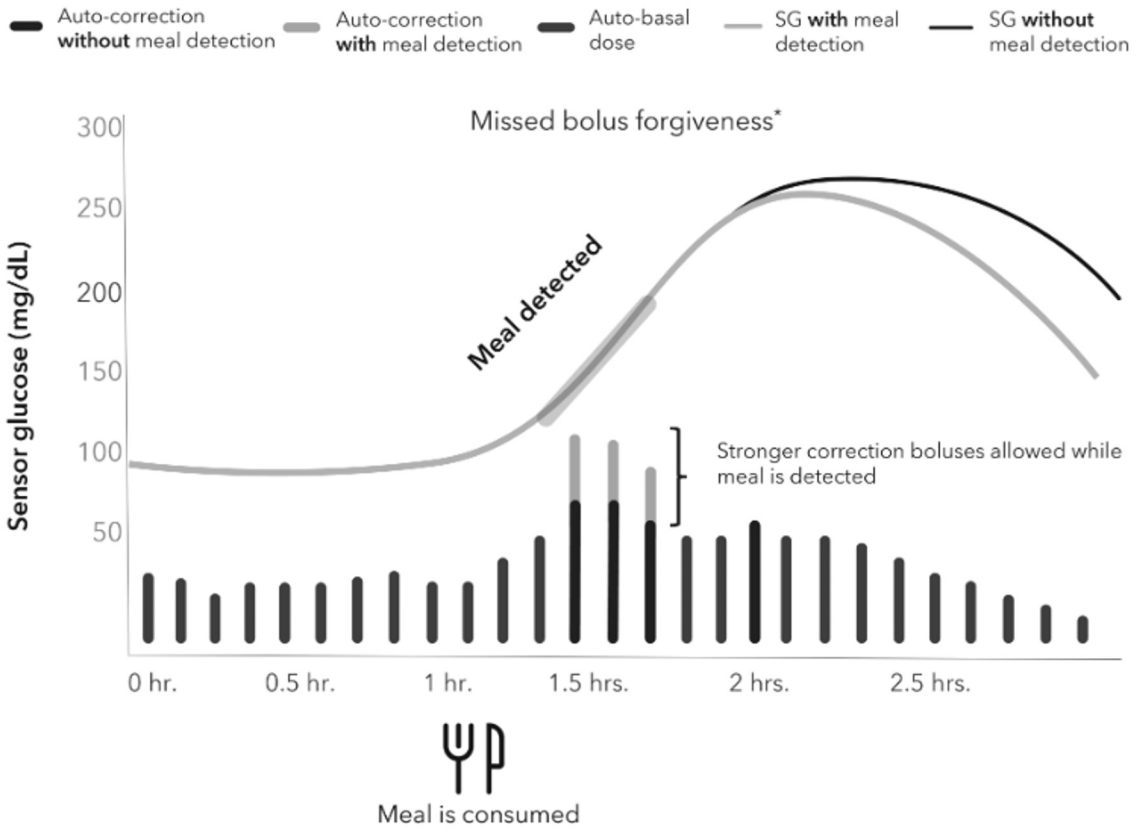
For illustrative purposes only.
*Refers to SmartGuard™ feature. Individual Results may vary.

What is meal detection technology?

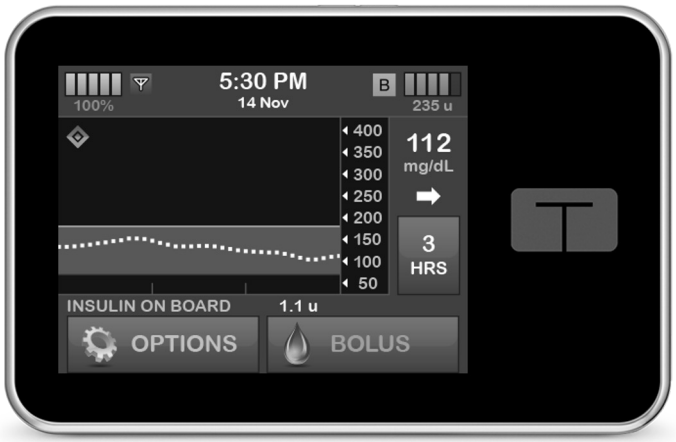
The MiniMed™ 780G system uses current and past sensor glucose trends to detect a missed meal bolus*

If the system detects a meal based on the sensor glucose rising rate of change, it can automatically deliver stronger correction doses while sensor glucose values are rising, up to every 5 minutes.

To learn more about how meal detection technology works, watch this video featuring distinguished engineer, Lou Lintereur.



TANDEM T:SLIM X2
CONTROL IQ & MOBI



TANDEM T:SLIM X2

- First touch screen and rechargeable pump
- Released 2016
- Software is upgradeable via computer connection
  - First pump capable of receiving software upgrades
- Holds 300 units of insulin via cartridge
- Recently stopped supporting Basal IQ
- Integrated with Dexcom G6 & G7
- **As of 1/8/24, now integrated with Libre 2 Plus**
- Libre 3 Plus?

TANDEM Diabetes Care + FreeStyle *Libre 2 Plus*

How Does Control-IQ Technology Work?

Control-IQ™ technology is designed to help increase time in range (70—180 mg/dL)* using Dexcom G6 continuous glucose monitoring (CGM) values to predict glucose levels 30 minutes ahead and adjust insulin delivery accordingly, including delivery of automatic correction boluses (up to one per hour).

		Control-IQ	Sleep Activity	Exercise Activity
Delivers	Delivers an automatic correction bolus if sensor glucose is predicted to be above ____ mg/dL	180	--	180
Increases	Increases basal insulin delivery if sensor glucose is predicted to be above ____ mg/dL	160	120	160
Maintains	Maintains active Personal Profile settings when sensor glucose is between ____ - ____ mg/dL	112.5 - 160	112.5 - 120	140 - 160
Decreases	Decreases basal insulin delivery if sensor glucose is predicted to be below ____ mg/dL	112.5	112.5	140
Stops	Stops basal insulin delivery if sensor glucose is predicted to be below ____ mg/dL	70	70	80

*As measured by CGM.

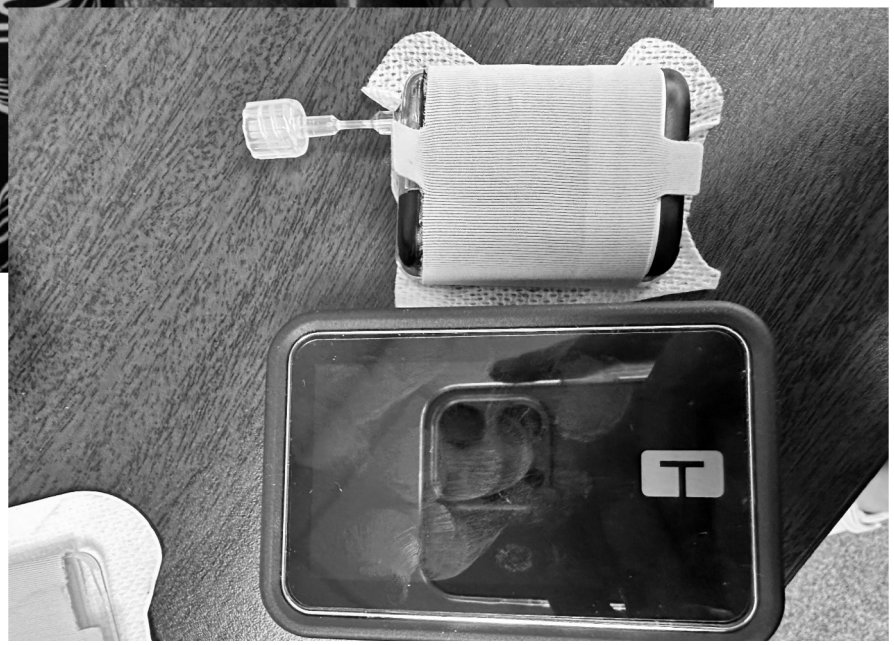
T:CONNECT MOBILE APP

- ❑ All Tandem x2 pumps have the ability to connect via Bluetooth to phone app
- ❑ App provides viewer with pump home screen info, Dexcom readings and graph, IOB, and all current Status info
- ❑ Uploads wirelessly to t:connect and can be connected to HCP office
- ❑ Pump alerts/alarms sent as notifications on phone
- ❑ **Can bolus from phone app!**

Tandem Mobi Pump

- ❑ ½ the size of x2
- ❑ Holds 200 units
- ❑ 4-5 inch tubing connects to infusion sets
- ❑ No screen, **100% controlled on phone app**
- ❑ On pump bolus button and suspend
- ❑ CIQ software and Dexcom G6 (G7 in April)
- ❑ **Commercial release April 2024! (Medicare & Medicaid)**

Tandem Mobi Pump




U-100 INSULIN
FCC ID: 2AA9B05
IC: 12208A-05
1004000
AW-1004982_D
Rx Only
Tandem Diabetes Care, Inc.
San Diego, CA 92121 • USA
IP28


0.5
1.0
1.5
2.0
ml
DEMO: NOT FOR HUMAN USE


DEMO: NOT FOR HUMAN USE

OMNIPOD: EROS, DASH, OP5

OMNIPOD

- ❑Only tubeless pump
- ❑All systems use PDM (Personal Diabetes Manager) that controls pod
- ❑Pod changed q 2-3 days, waterproof
- ❑Pod holds 200 units
- ❑Pod=pump and functions same as other pumps (basal rates, bolus via PDM)
- ❑Easier fill process, PDM primes and inserts cannula
- ❑PDM can deliver bolus as long as within 5-6 feet
- ❑Eros and DASH not CGM integrated; OP5 is CLP and integrated with Dexcom G6 (hopeful for G7 soon!)
- ❑Stopped supporting Eros end of 2023

OMNIPOD DASH

- DASH PDM is touch screen and Bluetooth technology, WiFi enabled (download software updates and wirelessly upload)
- PDM is "locked down" Android phone (cannot text/call, download apps)
- "View" app for caregivers – will allow remote monitoring (cannot bolus remotely)
- "Display" app on phone allows to view current status of pump/PDM
- Built in CalorieKing food library with insertion of carbs into carb calculator accessible in bolus calculator

OMNIPOD 5 (OP5)

Pod and Dexcom G6® shown without the necessary adhesive.

- FDA approved January 2022
  - Age 2 years and older
- Integrated with Dexcom G6 (G7 soon?!)
- New pods and controller (no longer PDM)
- Set for full control on mobile app (remote bolusing)—Android only right now, Apple approved Nov 2023 but not released (soon?!)
- 2 modes: Automated Mode and Manual Mode
- Every 5 minutes, SmartAdjust™ technology receives a CGM value and predicts where the BG will be in **60 minutes into the future**
  - Then, increases, decreases, or pauses automated insulin delivery based on target set in pump (basal only; NO bolus correction)
- Adjustable target 110-150, can adjust by time of day
- Exercise feature—allows temp target set at 150 and restricts insulin delivery
- Built in SMART Bolus calculator that is informed by BG **and** trends
- Algorithm updates after each pod change (takes few weeks to learn person and become more aggressive)

Omnipod® 5 System Communication

Omnipod 5 App

- Activates Pod
- Displays alerts/alarms
- Receives insulin delivery and CGM information

Dexcom G6 app

- Starts sensor
- Displays alerts/alarms

Omnipod 5 Pod

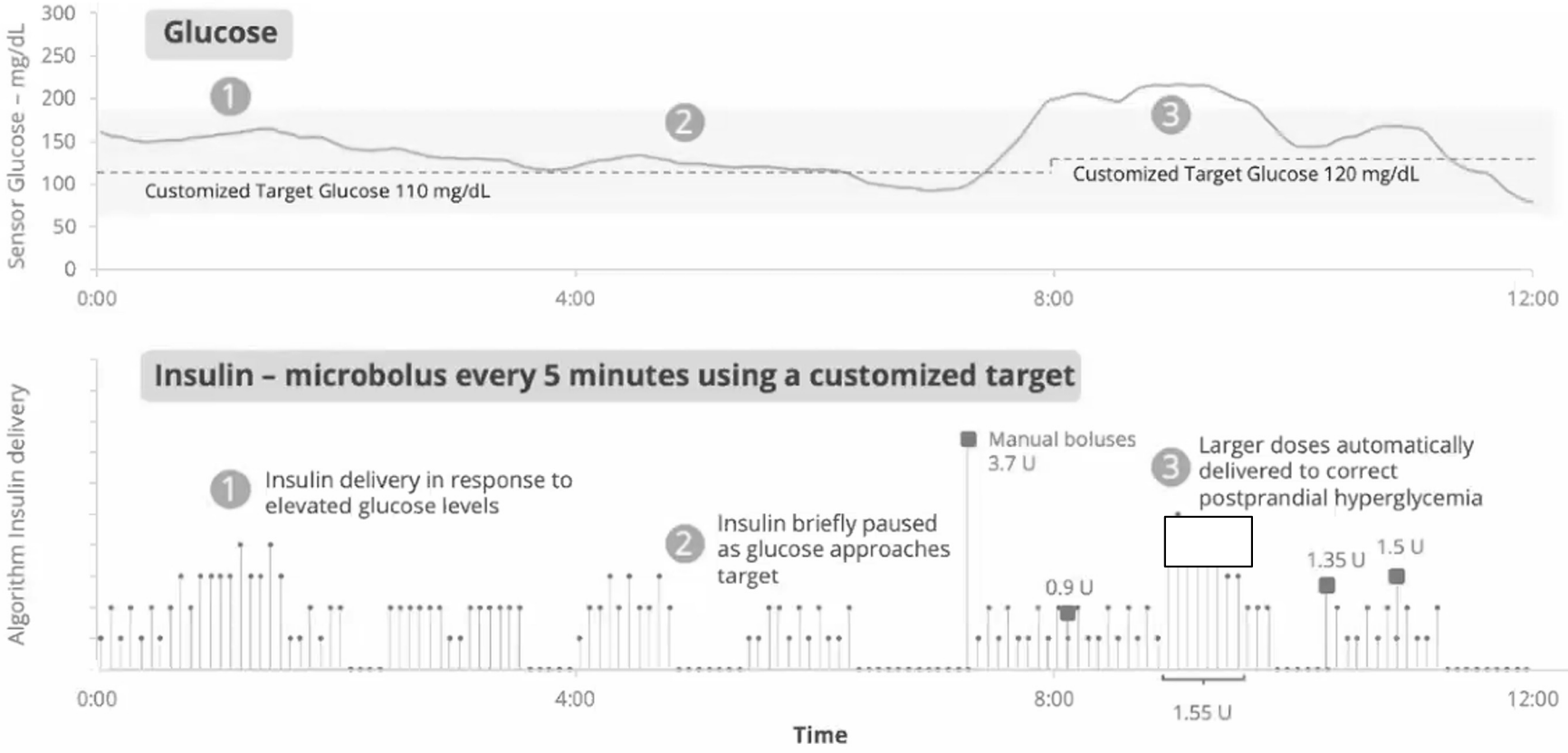
- Delivers bolus insulin commands from Omnipod 5 App
- SmartAdjust™ technology uses CGM values to automatically adjust insulin

Dexcom G6 CGM

- Sends sensor values to Pod and Dexcom G6® app

- The Omnipod® 5 App does not have to be near the Pod for basal insulin delivery in either Manual or Automated Mode.
- It is recommended to keep the Omnipod 5 App nearby as it displays important information such as alerts and alarms.

SmartAdjust™ Technology in Action



BETA BIONICS

iLet®

A fully automated bionic pancreas

CAUTION: The iLet® bionic pancreas is an investigational device limited by Federal (or United States) law to investigational use. Not available for sale.

ILET BIONIC PANCREAS PUMP

- **Approved 5/19/23**
- **Commercially available!**
- Age 6 and up for T1D
- HCL system integrated with Dexcom G6 & G7
- **Only need to enter body weight** (no carb ratio, sensitivity factor, basal rates, etc.) **and "Go Bionic"**
- NO carb counting!
- **Determines 100% of all insulin doses**
  - *No corrections, no calculating boluses*
- For dosing, users enter desired glucose target (usual, lower, or higher), the type of meal (breakfast, lunch, dinner), and the size of the meal (usual, less, or more)—"meal announcements"
- Adapt over time to respond to the users' individual insulin needs
- Cartridges only hold 180 units
  - *Prefilled Fiasp cartridges make set change ~1 minute*
- iLet app allows software updates and wireless upload

THERE'S AN APP FOR THAT…DEMOS!

*Not simulators

FreeStyle Libre 2 & 3

t:simulator

Tandem Mobi website: Tandem Mobi Simulator | Tandem Diabetes Care

Omnipod 5 Simulator

MiniMed Virtual Pumps
Diabetes - Webinars | Medtronic

Dexcom G6 Simulator

iLet simulator website:
Beta Bionics iLet Simulator (deploy-react-simapp.s3-website.us-east-2.amazonaws.com)

CHECK OUT COMPANY WEBSITES!

- All manufacturer websites have:
  - full User Guides as PDFs
    - **Medtronic and Beta Bionics have specific School Nurse Guides!**
  - Quick Reference Sheets/Guides
  - YouTube videos
  - Tutorials
  - FAQs
  - Plus, 24/7 Tech Support phone #s!

  - Medtronic: https://www.medtronicdiabetes.com/download-library
  - Tandem: https://www.tandemdiabetes.com/providers/education-and-resources/training
  - Omnipod: https://www.omnipod.com/current-podders/resources
  - Beta Bionics: https://www.betabionics.com/resources/
  - Dexcom: https://www.dexcom.com/en-us/guides
  - Libre: https://www.freestyle.abbott/us-en/support.html

- Other:
  - Panther Program: https://www.pantherprogram.org/
  - DiabetesWisePro: https://pro.diabeteswise.org/devices/device-library
  - ADA Consumer Guide: https://consumerguide.diabetes.org/
  - Dana Tech: https://www.adces.org/danatech/home

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