The Johns Hopkins Patient Guide to Diabetes
hopkinsdiabetesinfo.org

Providing a trusted and reliable resource based on the latest evidence that people with diabetes or interested in diabetes can use to live healthier lives.
Preface

The Johns Hopkins Patient Guide to Diabetes website (hopkinsdiabetesinfo.org) provides evidence-based educational resources for those affected by diabetes, as well as others interested in gaining knowledge for health optimization.

Essential components on the website include:

1. **About Diabetes**: Causes, types, risk factors, clinical and personal management.
2. **Living with Diabetes**: Routine and preventative for improved diabetes health.
3. **Complications**: Types and preventions
4. **Treatment**: Treatment types based on the type of diabetes.
5. **Helpful Tools**: Diabetes coping skills, including downloadable tools
6. **Ask the Expert**: Advice & tips from medical experts
7. **Videos**: From general knowledge to interactive hands-on learning
8. **Real Stories**: Sharing personal experiences of living with diabetes
9. **Nutrition and Lifestyle Blog**: written by expert dietitians and educators
10. **Podcasts**: special guest speakers on various topics related to diabetes

The rise in modern medical technology has transformed diabetes care. Insulin pumps and continuous glucose monitors facilitate diabetes prevention, treatment, and reduction in diabetes complications. Given the ever expanding number of devices available, this Diabetes Technology Guide was written by our diabetes editorial team to bring together complex and up-to-date information on the latest diabetes devices to one convenient location for clarity, comparison, and confidence in decision-making, and to serve as a resource that is easily downloadable from the website.

Yours in Health,

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Suggested Citation


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The Johns Hopkins Patient Guide to Diabetes website was made possible through the generous philanthropic support of the The Frannie Foundation, whose mission is to enhance the lives of individuals who have diabetes and other cardiovascular-related diseases. More information about this non-profit organization may be found at www.thefranniefoundation.org
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Diabetes Technology Guide
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Diabetes is a global health epidemic that affects more than 500 million people around the world and is projected to increase even more in the future.
Diabetes

[dīə'bēdēz, dīə'bēdis] noun

*Type 1 Diabetes*: A chronic autoimmune disease caused by mistaken recognition and destruction of islets of Langerhans - the only source of insulin in the body - leading eventually to absolute insulin deficiency.

*Type 2 Diabetes*: A chronic disease due to insulin resistance primarily in the muscles, liver, and fat tissue. The body initially produces more insulin in response but is no longer able to compensate over time - leading to relative insulin deficiency.

In all types of diabetes, blood glucose levels are too high at diagnosis, and can lead to an increased risk of short and long-term complications without appropriate treatment.
“The person with diabetes who knows most, lives the longest.”

Elliot Joslin
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After their 1921 discovery, Banting & Macleod shared the 1923 Nobel Prize in Physiology or Medicine.

Invention of first Insulin Pump (1963)
Backpack-style prototype developed by Dr. Arnold Kadish.

Introduction of first commercial Insulin Pump (1979)
SOOIL insulin pump undergoes clinical evaluation

Introduction of external smart pumps (1990s)
Development of hand-sized external, functional pumps with novel “smart” features (i.e. bolus calculator & alarm setting)

First Hybrid Closed-Loop System (2016)
First FDA approved hybrid closed loop pump (Medtronic 670G)

Cgm not needing fingerstick calibration (2017, 2018)
Abbott Freestyle Libre Flash and Dexcom G6 were first CGMs to be FDA approved that no longer require fingerstick calibration

First DIY-APS (2015)
Individually-built artificial pancreas system that is do-it-yourself at home (not FDA-approved)
Insulin Pump
Delivers doses of insulin on a pre-programmed schedule through small, computerized devices.

Both Type 1 and Type 2 persons with diabetes can use insulin pumps. Manual injections and insulin pump therapy work very differently. One-on-one training is a crucial part of insulin pump therapy.

I've been hearing some great things about diabetes technology, such as insulin pumps. May I ask what the benefits are from using this device?

Here are some upsides:
1. Consistent, adjustable insulin delivery (both basal & bolus)
2. Fewer manual insulin injections
3. Flexibility and privacy
4. Improved blood sugar levels.

Thanks! That's really interesting. Anything I should take into consideration?

Great question! Here are some considerations:
1. Cost: Device & additional supplies
2. Infusion-site reactions
3. User compatibility: motivation, persistence, competence, teamwork, training
Hybrid closed-loop system with SmartGuard Auto Mode: Designed to reduce hypoglycemia & hyperglycemia

CareLink Personal Software: upload data to software for creating and sharing reports

Blood Sugar Readings: View from pump display & MiniMed CGM App

Active Insulin
- Today 1.5 U Act. Insulin
- 0.5 U Active Insulin

9:45am
- 102 mg/dL
### Key Features
- Programmed to change insulin basal setting every 5 mins that match to current glucose level
- SmartGuard Auto Mode intended for reducing hypoglycemic/hyperglycemic events
- Blood sugar readings can be viewed from pump display & smartphones with MiniMed CGM App (with Bluetooth connection)
- CareLink Personal Software: upload data from pump to software to create reports & share data with healthcare providers for enhanced patient-centered care & treatment.

### CGM/BG
- **CGM:**
  - Guardian Link 3 Transmitter
  - Duration: ≤7 days

- **BG Meter:**
  - Accu-Chek Guide Blood Glucose Meter

### Bolus/Basal
- **Bolus:**
  - Range: 0-25 units
  - Standard: 1.5 units/min
  - Quick: 15 units/min
  - Increments: 0.025 unit, 0.05 unit, 0.1 unit

- **Basal:**
  - 0-25 units/hr or set to max basal rate.

### Infusion
- Medtronic Infusion Set: 4 types
  - Mio/Advance
  - Silhouette
  - Sure-T
  - Quick-set

### Specifications
- **Pump:**
  - 2.1 x 3.78 x 0.96 inches (5.3 x 9.6 x 2.4 cm)
  - Wt: 3 oz (85 g)
  - 300-unit reservoir
  - Battery: AA (1); lithium/alkaline/ NiMH (FR6)
  - Waterproof:
    - 12 ft (3.6m) ≤ 12 hrs
    - Sensor/Transmitter: 8 ft (2.4m) < 30 mins

- **Battery:** AA (1); lithium/alkaline/ NiMH (FR6)

### Notes
- Approved for T1Ds ≥ 2 yrs old.
- CareLink Personal software (downloadable on Windows & Mac)
- Compatible with MiniMed Mobile App via Bluetooth connection
- **Warranty:**
  - Pump: 4 yrs
  - CGM: 1yr
Hybrid closed-loop system
wireless communication between insulin pump & CGM

Insulin delivery:
Insulin stoppable 30 mins before potential hyperglycemia & restarted when blood glucose back within optimal range.

SmartGuide Feature:
Monitors CGM blood glucose readings & bolus action to adjust basal insulin dosage.
Key Features

- Hybrid closed-loop pump with wireless communication between insulin pump & CGM.
- SmartGuide feature: Monitors CGM blood glucose readings & bolus action to adjust basal insulin dosage.
- Insulin administration can be stopped 30 mins before potential hyperglycemic episode & restarted when blood glucose back within optimal range.

CGM/BG

CGM:
- Guardian Link 3 Transmitter
- Duration: ≤7 days

BG Meter:
- Contour Next Link 2.4 Meter (wireless connection)

Bolus & Basal

Bolus Range:
- 0.025-25 units

Basal Range:
- 0.025-35 units/hr

Increments:
- 0.025 units
- 0.05 units
- 0.1 units

Insulin-to-Carb:
- Fraction grams available

Infusion

Medtronic Infusion Set: 4 types
- Mio/Advance
- Silhouette
- Sure-T
- Quick-set

Specifications

Pump:
- 1.4 x 1.12 x 0.37"
- (3.6 x 2.8 x 0.94 cm)
- Wt: 0.19 oz (5.4g) w/o sensor

3.81 x 2.11 x 0.98 in
- (9.68 x 5.36 x 2.49 cm)
- Wt: 3.8 oz (106 g) (without battery/consumables)

Transmitter:
- rechargeable
- Charger: AAA battery (1)

Waterproof: 8ft (2.4m)
- ≤ 30 mins

Receiver:
- 2.1 x 3.78 x 0.96 in
- (5.3 x 9.6 x 2.4 cm)
- 3.7 oz (105g) without battery & unfilled reservoir

Manual pre-meal calculation & dosing still strongly recommended.

Notes

- Approved for T1Ds ages ≥ 7 yrs old.
- CareLink Personal software (downloadable on Windows & Mac)
- Not compatible with MiniMed Mobile App
- Warranty: 4 yrs (pump) & 1 yr (CGM)

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SmartGuard: Responds to hypoglycemia-related events by stopping insulin delivery for ≤ 2 hrs.
**Key Features**
- Built-in CGM & SmartGuard feature.
- SmartGuard: Responds to hypoglycemia-related events by stopping insulin delivery for $\leq 2$ hrs.
- Blood sugar lower than personalized low range
- No response to hypoglycemia

**CGM/BG**
- Pump functions both as insulin pump & CGM.
- Guardian Sensor 3 built-in.
  - (duration: $\leq 7$ days)
- BG Meter:
  - Contour Next Link 2.4 Meter (wireless communication)

**CGM:**
- Battery: AA (1); Lithium/alkaline/NiMH
- Waterproof: 12 ft (3.6m) $\leq 24$ hrs

**BG Meter:**
- Bolus/Basal
  - Bolus Range: 0-26 units
  - Default amt: 10 units
  - Basal: 0-35 units/hr
  - Increments:
    - 0.025 units/hr: $\leq 0.975$ units/hr
    - 0.05 units/hr: $\leq 9.95$ units/hr
    - 1 unit/hr: $\geq 10$ units/hr

**Infusion**
- Medtronic Infusion Set: 4 types
  - Mio/Advance
  - Silhouette
  - Sure-T
  - Quick-set

**Specifications**
- Pump:
  - 2.1 x 3.78 x 0.96 in
  - (5.3 x 9.6 x 2.4 cm)
  - $\approx 3.7$ oz (105g)
  - 300-unit reservoir
- Battery: AA (1); Lithium/alkaline/NiMH
- Waterproof: 12 ft (3.6m) $\leq 24$ hrs

**Bolus/Basal**
- Bolus Range: 0-26 units
- Default amt: 10 units
- Basal: 0-35 units/hr
- Increments:
  - 0.025 units/hr: $\leq 0.975$ units/hr
  - 0.05 units/hr: $\leq 9.95$ units/hr
  - 1 unit/hr: $\geq 10$ units/hr

**Notes**
- T1Ds ages $\geq 14$ yrs old
- T1Ds ages $\geq 16$ yrs old
- CareLink Personal software (downloadable on Windows & Mac)
- Warranty: 4 yrs (pump) & 1 yr (CGM)
Auto Mode disabled by user

Assessment and Progress
8/1/2016-8/7/2016 (7 Days)

Time in Range
Carbs entered (per day)

High SG Auto Mode
Sensor Expired

Alarm
Large time/date change

Pump Suspend by user

Carb Ratio (g/U)

Hypoglycemic patterns (2)
4:19 AM-5:09 AM (1 occurrences)
10:45 PM-11:30 PM (1 occurrences)

Hypoglycemic patterns (1)
10:20 AM-11:50 AM (1 occurrences)

Statistics
Auto Mode Exits

Checklist
No Calibration
Large SG Auto Mode
No Carbs
Skin Glucose Unreadable
Sensor Upgrading
No SQ Curve
Sensor Expiry
Auto Mode disabled by user
Alarms
Pump suspend by user
Large time/date change
Unidentified

Statistics
Auto Mode (per week) 88% (6d 20hrs)
Manual Mode (per week) 96% (3hrs)
Average BG 176 ± 13g
Estimated A1C 8.5 / 5.0
770G

Hybrid closed-loop insulin pump system that allows caregivers to directly adjust insulin delivery settings through Bluetooth.

- Designed to reduce hypoglycemic & hyperglycemic event: background insulin setting is automatically fine-tuned every five minutes based on real-time CGM blood sugar readings.
- Compatible with MiniMed Mobile App via Bluetooth connection
- Waterproof: 12 ft (3.6m) ≤ 12 hrs
- Approved for T1Ds ages ≥ 2 yrs old.

670G

Hybrid closed loop system with two novel features for optimal prevention of hypoglycemia and hyperglycemia.

- Background insulin delivery setting automatically fine-tunes every five minutes based on real-time CGM blood sugar readings.
- SmartGuide algorithm set to stop background insulin delivery 30 mins before potential hypoglycemic episode and restart when blood glucose returns back to the optimal range.
- Waterproof: 8 ft (2.4m) ≤ 30 min
- Approved for T1Ds ages ≥ 7 yrs old.

630G

A non-hybrid closed loop insulin pump system that communicates with CGM for detecting and responding to real-time hypoglycemia.

- Stops insulin delivery for ≤ 2 hrs.
- Waterproof: 12 ft (3.6m) ≤ 24 hrs
- T1Ds ages ≥ 14 yrs old

Summary
Control IQ:
Basal insulin settings match to anticipated blood sugar 30 mins from current time.

Hybrid Close-Loop System: Control IQ and Dexcom G6 CGM.

Control IQ:
Basal insulin settings match to anticipated blood sugar 30 mins from current time.
Key Features

- Hybrid closed-loop system: pump & Dexcom G6 CGM together enable Control IQ technology.
- Control IQ feature: Basal insulin settings match to anticipated blood sugar 30 mins from current time.
- For glucose level expected to rise ≥ 180 mg/dL, correction bolus initiated (nearly 60% of regular correction setting), for ≥ 160 mg/dL, higher basal is given, while glucose level expected to drop ≤ 112.5 mg/dL basal setting is lowered.

CGM/BG

CGM:
Dexcom G6
(duration: 10 days)

Specifications

Pump:
3.13 x 2 x 0.6 in
(8 x 5.1 x 1.5 cm)
Wt: 3.95 oz (112g) (with battery & full reservoir
300-unit cartridge
Battery: Rechargeable
Waterproof: 3ft (0.91m) ≤ 30 min.

Bolus/Basal

Max bolus range:
0.05–25 units
Insulin-to-Carb:
Fraction grams available
Basal range:
0.1–15 units/hr
Increment:
0.001 unit only

Infusion

Tandem infusion set: 3 different types
- Autosoft 30/90/XC
- Trusteel
- Varisoft

Notes

- Approved for ages ≥ 14 yrs old.
- T:connect Diabetes Management
- Compatible Software: Tidepool & Glooko
- Control IQ does not replace pre-meal bolus.
- Pump updates completed via computer only for in-warranty pumps.
Insulin delivery resumes following blood sugar returning to normal level.

Basal-IQ feature:
Designed to stop insulin delivery in either real-time hypoglycemia or downward trend towards hypoglycemia with pump-CGM connection.

Basal IQ and Dexcom G6 CGM
Key Features

- Basal-IQ feature: Designed to stop insulin delivery in either of these hypoglycemic-related episodes with pump-CGM connection:
  - Blood sugar reading showing $\leq 70\text{mg/dL}$
  - Downward trend of reaching $\leq 80\text{mg/dL}$ within 30 mins
- Insulin delivery resumes following blood sugar returning to normal level.

Specifications

Pump:
3.13 x 2 x 0.6 in
(8 x 5.1 x 1.5 cm)
3.95 oz (112g) with battery & full reservoir
300-unit cartridge
Battery: Rechargeable
Waterproof: 3ft (0.91m) $\leq$ 30 mins.

Bolus/Basal

Bolus Range:
0.05-25 units
Max amt:
Add’l 25 units
Insulin-to-Carb:
Fraction grams available
Basal Range:
0.1-15 units/hr
Increment:
0.001 unit only

CGM/BG

CGM:
Dexcom G6
(duration: 10 days)

Notes

- Approved for ages $\geq 6$ yrs old.
- T:connect Diabetes Management
- Compatible with:
  - Tidepool
  - Glooko

Infusion

Tandem infusion set: 3 different types
- Autosoft 30/90/XC
- Trusteel
- Varisoft

Basal IQ

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Dashboard

3 Days 1 Week 2 Weeks 1 Month Custom Apr 10-16

Continuous Glucose Monitoring Summary

Highest CGM Reading Average CGM Reading Lowest CGM Reading
230 140 68

Average CGM Reading 274.57 times/day

Above Target > 180 mg/dL 14% 285 times

Target Range 70-180 mg/dL 84% 1607 times

Below Target < 70mg/dL 2% 38 times

Number of Days CGM in Use: 6 days 17 hrs. 17 min.

Control-IQ Technology

Average Reading 140 mg/dL

Time in Use 96% 6 d 17 hrs.

Control IQ Set to Off

CGM Inactive

Pump Inactive

Average Sleep & Exercise

Daily Sleep 14%

Weekly Exercise 84%

2%

140 mg/dL 6 d 17 hrs. 0 min.

7 hrs. 31 min.

5265 times/day

1607 times

38 times

6 days 17 hrs. 17 min.

> 180 mg/dL 274.57 times/day

70-180 mg/dL 84% 1607 times

< 70 mg/dL 2% 38 times

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Control IQ

• First Tandem hybrid closed-loop system.
• Control IQ feature: Automated adjustments in basal insulin settings (cessation/correction bolus) that matches to anticipated blood sugar 30 mins from current time.
• Assesses glucose trends in order to adjust basal rates.
• Control IQ does not replace pre-meal bolus.
• Approved for ages ≥ 14 yrs old.

Basal IQ

• Non-hybrid closed loop system that responds to real-time or anticipated hypoglycemic-related episodes with automatic cessation of insulin delivery.
• Insulin administration resumes following blood sugar returning to normal level.
• Approved for ages ≥ 6 yrs old.
Hybrid closed-loop system: Pump & Dexcom G6 CGM

HypoProtect: Automatic cessation for hypoglycemia; lowering of basal insulin delivery for exercise.

SmartAdjust: Live basal adjustments every 5 mins, dependent on current/predicted glucose trends from CGM, insulin on board (IOB), insulin sensitivity factors, and HypoProtect; better personalized basal accuracy after 2-3 pods of use, or ~9 days.
Key Features

- Hybrid closed-loop system: pump & Dexcom G6 CGM together enable Automated Insulin Delivery System.
- Automated Insulin Delivery System (AID): The SmartAdjust technology controlled with Omnipod 5 controller or with mobile app.
- SmartAdjust: live basal adjustments every 5 mins, dependent on current/predicted glucose trends from CGM, IOB, insulin sensitivity factors, and HypoProtect; better personalized basal accuracy after 2-3 pods of use, or ~9 days.
- Glucose targets: Adjustable and customizable (quantity/time) in 10mg/dL increments (110-150 mg/dL).
- HypoProtect: automatic cessation for hypoglycemia, max limit at 150 mg/dL; lowering of basal insulin delivery for exercise.
- SmartBolus Calculator
- Omnipod 5 App: View real-time BG data, insulin delivery, alerts & reminders.

Specifications

Pod
1.53 x 2.05 x 0.57 in
(3.9 x 5.2 x 1.4 cm)
Wt: 1.2 oz (34g) (with full reservoir); battery included
85-200 units of insulin

Controller
Battery: Rechargeable
Watertight: 25ft (7.6m) ≤ 60 mins

Bolus/Basal

Infusion

No infusion set needed
- Insulin delivery via cannula attached to pod

Notes

- Approved for T1Ds ages ≥ 6 yrs old.
- SmartAdjust does not replace pre-meal bolus.
Pod Info

Pod:
- Tubeless & wireless pod
- Personal Diabetes Manager (PDM) & Contour Next One.

PDM:
- Functions as Freestyle blood sugar meter.
- Carries nutrition info of ≥ 1,000 foods & ≤ 36 personalized easy-to-reach carb info.
**Key Features**

- Tubeless & wireless insulin pump, controlled with Personal Diabetes Manager (PDM).
- Color touch screen PDM for viewing blood sugar data & insulin delivery.
- Contour Next One: Delivers blood glucose data to PDM wirelessly, can be viewed from PDM & selected smartphone devices with Omnipod Display app.
- PDM: Programmed with Calorie King food library (≥ 80,000 foods/drinks & ≤ 50 personalized, easy-to-reach carb info)

**Specifications**

**Pod:**
1.53 x 2.05 x 0.57 in 
(3.9 x 5.2 x 1.4 cm)
Wt: 1.2 oz (34g) (with full reservoir); battery included 
200-unit built-in reservoir

**PDM:**
3.7 oz (106g)
Battery: rechargeable
Watertight: 25ft (7.6m) ≤ 60 mins

**CGM/BG**

- Pod:
  3-day use
- CGM: none

**BG Meter:** Contour Next One Blood Glucose Meter

**Bolus & Basal**

- Bolus Range:
  0.05-30 units

- Increments:
  • 0.05 units
  • 0.1 units
  • 0.5 units
  • 1 unit

- Insulin-to-Carb: 0.1 unit

- Optional zero basal rate setting

- Bolus & Basal Range:
  0.05-30 units/hr

- Increments:
  0.05 units

**Infusion**

- No infusion set needed
- Insulin delivery via cannula attached to pod

**Notes**

- Approved for ages ≥ 2 yrs old.
- Requires PDM to be ≤ 5 ft from pod for successful bolus delivery. (not applicable for basal)
- Compatible Software:
  - Tidepool
  - Glooko
- Apps:
  - Omnipod Display (for self-management)
  - Omnipod Vie (for ≤ 12 caregivers)
- Warranty: ≤ 4 yrs for PDM from purchase date
Tubeless & wireless insulin pump (3-day use), with Personal Diabetes Manager (PDM)

Pod: (lasting ≤ 72 hrs)

PDM:
Functions as Freestyle blood sugar meter. Carries nutrition info of ≥ 1,000 foods & ≤ 36 personalized easy-to-reach carb info.

Omnipod System
Key Features

- First tubeless & wireless insulin pump.
- Consists of pod (lasting ≤ 72 hrs) & Personal Diabetes Manager (PDM) which also functions as Freestyle blood sugar meter.
- PDM: Carries nutrition info of ≥ 1,000 foods & ≤ 36 personalized easy-to-reach carb info.

Specifications

Pod:
1.53 x 2.05 x 0.57 in
(3.9 x 5.2 x 1.4 cm)
Wt: 1.2 oz (34g) (with full reservoir); battery included
200-unit built-in reservoir
Watertight: 25 ft (7.6 m) ≤ 60 min

PDM:
2.4 x 4.4 x 0.82 in
(6.1 x 11 x 2.1 cm)
Wt: 4.4 oz (125g) (with batteries)
Battery: AAA (2); Alkaline

CGM/BG

PDM functions as both wireless insulin pump & blood glucose meter

CGM: none

BG Meter:
FreeStyle Blood Glucose Meter

Pod:
(duration: ≤ 3 days)

Bolus & Basal

Bolus Range:
0.05-30 units

Increments:
• 0.05 units
• 0.1 units
• 0.5 units
• 1 unit

Insulin-to-Carb:
Only whole unit increments available
0.05-30 units/hr

Increments:
0.05 units

Infusion

No infusion set needed

Insulin delivery with cannula attached to pod with PDM connection

Notes

• FDA-approved for all ages.
• Requires PDM to be ≤ 5 ft from pod for successful bolus delivery. (not applicable for basal)
• Nightlight port for test-strip, food dictionary, bolus calculator/ changes (also for basal), setting reminders/alerts.
• Compatible Software:
  ○ Tidepool
  ○ Glooko
• Warranty: ≤ 4 yrs for PDM from purchase date
First Omnipod hybrid closed-loop system: Pump & Dexcom G6 CGM.
Automated Insulin Delivery System (AID): The SmartAdjust technology controlled w/ Omnipod 5 PDM/Receiver or with mobile app.
SmartAdjust: Live basal adjustments every 5 mins, dependent on current/predicted glucose trends from several indicators; does not replace pre-meal bolus.
Better personalized basal accuracy after 2-3 pods of use, or ~9 days.
HypoProtect: automatic cessation for hypoglycemia, max limit at 150 mg/dL; lowering of basal insulin delivery for exercise.
Approved for T1Ds ages ≥ 6 yrs old.

Second generation Omnipod system
Upgraded PDM (the receiver): Color touchscreen
Includes Contour Next One, an external blood glucose meter, from PDM system.
Delivers blood glucose data to PDM wirelessly, viewable from PDM & with Omnipod Display app.
Approved for ages ≥ 2 yrs old.

First generation Omnipod system
PDM Controller: viewing blood sugar data & insulin delivery.
pre-programmed basal settings and bolus calculations
FDA-approved for children & adults
Hassle-free & pre-filled insulin cartridge: programmed to deliver customized bolus (even simultaneously for different settings) & basal.

Aviva Insight
Key Features

- Tubeless & wireless insulin pump.
- Consists of pod (lasting ≤ 72 hrs) & Personal Diabetes Manager (PDM) which also functions as Freestyle blood sugar meter.
- PDM: Carries nutrition info of ≥ 1,000 foods & ≤ 36 personalized easy-to-reach carb info.

Specifications

Pod:
1.53 x 2.05 x 0.57 in
(3.9 x 5.2 x 1.4cm)
Wt: 1.2 oz (34g) (with full reservoir); battery included
200-unit built-in reservoir
Watertight: 25ft (7.6m) ≤ 60 min

PDM:
2.4 x 4.4 x 0.82 in
(6.1 x 11 x 2.1 cm)
Wt: 4.4 oz (125g) (with batteries)
Battery: AAA (2); Alkaline

CGM/BG

PDM functions as both wireless insulin pump & blood glucose meter
CGM: none
BG Meter: FreeStyle Blood Glucose Meter
Pod:
(duration: ≤ 3 days)

Bolus & Basal

Bolus Range:
0.05-30 units

Increments:
• 0.05 units
• 0.1 units
• 0.5 units
• 1 unit

Insulin-to-Carb:
Only whole unit increments available
0.05-30 units/hr

Increments:
0.05 units

Infusion

No infusion set needed
Insulin delivery with cannula attached to pod with PDM connection

Notes

- FDA-approved for all ages.
- Requires PDM to be ≤ 5 ft from pod for successful bolus delivery. (not applicable for basal)
- Nightlight port for test-strip, food dictionary, bolus calculator/ changes (also for basal), setting reminders/alerts.
- Compatible Software:
  - Tidepool
  - Glooko
- Warranty: ≤ 4 yrs for PDM from purchase date

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120 mg/dL
6:30, 24 Mar 2021

- Time of test: Before meal
- Carbohydrates: 30g
- Health events: Exercise

Note:
Done
Key Features

- Tubeless, detachable micropump with touchscreen
- PDM integrated with blood glucose meter for optimal dosing and delivery of insulin.
- Customizable notifications and alarms.

Specifications

Pump:
2.4 x 1.5 x 0.51 in
(6.1 x 3.8 x 1.3 cm)
Wt: <29g (with full reservoir)

Battery: 1.4V zinc-air
80-200 units of insulin

PDM:
12.4 x 6.4 x 1.7 cm
Wt: 140g

CGM/BG
PDM functions as both wireless insulin pump & blood glucose meter
CGM: compatibility for some
MicroPump:
(duration: ≤ 4 days)

Bolus & Basal

Bolus Range:
0.2-50 units

Types:
Standard bolus
Quick bolus
Extended bolus
Multiwave bolus

*Time extension for extended bolus & multiwave bolus adjustable every 15 min for ≤ 24 hrs.

Increments:
- 0.05 units
- 0.1 units
- 0.2 units
- 1.0 unit

Quick bolus
- 0.2 units
- 0.5 units
- 1.0 unit
- 2.0 units

Basal:
0.1-25.0 units/hr

5 customizable profiles

Increments:
- 0.01 units
- 0.1 units

Temporary Basal Rate:
0–90% & 110–250%; increments of 10% and adjustable every 15 mins ≤ 24 hrs.
5 is max TBRs.

Infusion

2 cannulas: different length and insertion depth
- Orange: 6mm
- Blue: 9 mm

Notes

- FDA-approved
- 1.5 meters between devices

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Key Features

- Simplistically designed pump device with icon display delivering insulin, both bolus & basal.

Specifications

- Pump:
  2.95 x 1.77 x 0.74 in 
  (7.5 x 4.5 x 1.9 cm)
  Wt: 2.15 oz (61g)

- 300-unit reservoir

- Battery: 3.6-volt DC lithium (1)

- Waterproof: 3.3 ft (1m) ≤ 1 hr

Bolus & Basal

- Bolus Range:
  0.1-80 units

- Increments:
  • 0.1 units
  • 0.5 units
  • 1 unit

  0.04-16 units/hr

  Increments:
  • 0.01 units
  • 0.1 units

Infusion

- Infusion set: 3 different types
  • Soft Release O/ST
  • Easy Release I/II
  • Superline-ST

Notes

- Approved for T1Ds ages ≥ 7 yrs old.
- Compatible App: DiabecareDana-I
- Warranty: 4 yrs
3.5-day use
Fast occlusion detection even at lowest infusion speed

Hi, Angela
BG
SG
Bolus
1.50U
0.75U
1.50U/hr

Data
Home
154
146
mg/dL
mg/dL

-3 hr
-2 hr
-1 hr
Now

-300
-150
70
300

1.50U
0.75U
1.50U/hr

Home
Data
Now

EO Patch

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Key Features

- 3.5-day use (84 hrs)
- Fast occlusion detection even at lowest infusion speed
- Notification for secure insertion
- Insertion speed painless and soft cannula

CGM/BG

CGM:
Only compatible with specific CGM devices

Bolus & Basal

8 bolus and basal programs

Specifications

Patch:
49.5x39x14.5mm
12 mos shelf life
200-unit reservoir; 80 unit min

Battery:
3.7V, 1,130 mAh

Controller:
116.5x64.5x114 (mm)
110g with battery
Korean/English

Waterproof:
IPx8 (1m) ≤ 24hrs

Infusion

Soft cannula: insertion depth: 4.75mm (vertical)

Notes

- Narsha: smartphone app
- EObridge software
- Affordable option for a tubeless & wireless insulin pump
- Not yet approved by the FDA & CE.
- Originated in South Korea; available for international purchase.
Simplistic design for efficient insulin delivery and blood glucose monitoring.

<table>
<thead>
<tr>
<th>Time</th>
<th>Last carbohydrates</th>
<th>Last bolus</th>
<th>Current basal rate</th>
<th>Insulin on board</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.08.22 11:20</td>
<td>60 g</td>
<td>12.0 u</td>
<td>13:00-14:00</td>
<td>0.90 u/h</td>
</tr>
<tr>
<td></td>
<td>22.05.25</td>
<td>12:00</td>
<td></td>
<td>4.1 u</td>
</tr>
</tbody>
</table>

Compatible with Dexcom G6.
Key Features

- Empty reservoir filled with pre-filled insulin cartridge
- Refilled insulin: 16ml (160u)
- Bluetooth connection

CGM/BG

- CGM: Compatible with Dexcom G6

Specifications

Pump:
- 7.8x4.6x1.6cm
- 83g (including battery & filled cartridge)
- Pre-filled/self-filled single-use insulin cartridge: 1.6ml/160 units
- Battery: 1.5 V alkaline (LR03), AAA; avg 30-day use (54 U/day)

Controller:
- OLED touchscreen, 4.1x1.6cm
- Waterproof: IPX8 according to EN 60529 (immersion to depth of 1 m for up to 60 mins).

Bolus & Basal

Mylife YpsoPump Orbit infusion set with mylife Orbit Inserter

- Range: 0-40 units/hr
- 2 personalized programs: A & B.
- Temporary basal rate available

- Increments:
  - 0.01 (≤1.00u/hr)
  - 0.02 (≤2.00u/hr)
  - 0.1 (≤15.0u/hr)
  - 0.5 (≤40.0u/hr)

Notes

- Compatible App: mylife Assist, mylife App
- Mylife Software
- Originated and primarily available in Switzerland; available for international purchase.
- Compatible rapid-acting insulin reservoir: Fiasp, NovoRapid, Humalog, Apidra, Insulin lispro Sanofi, Lyumjev

Infusion

- Bolus Types:
  - Standard
  - Extended
  - Combination
  - Blind bolus
  - Stacked bolus

- Bolus Range: 0.1 – 30 units
- Increments:
  - 0.1u
  - 0.5u
  - 1.0u
  - 2.0u

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Incompatible with any software/meters/CGMs.

Delivers bolus by pressing button instead of electronic signaling.
**Key Features**

Non-electric, manually functioning, insulin patch that delivers bolus incrementally with a push of a button.
- Patch: replaced daily, cost-saving, co-pay card available.
- Basal rate: Preset & administered with needle instead of attached tube.
- Incompatible with any software/meters/CGMs.

**Specifications**

Pump:
- 2.4 x 1.3 x 0.5 in
- (6.1 x 3.3 x 1.3 cm)
- Wt: 0.7-1.8 oz (20-51g) (with full cartridge)

Battery: None required

Reservoir types:
- V-Go 20: 56 units
- V-Go 30: 66 units
- V-Go 40: 76 units

**Bolus & Basal**

V-Go 20: 36 units
V-Go 30: 66 units
V-Go 40: 76 units

Increments:
- 2 units only

V-Go 20: 20 units in 1 day
V-Go 30: 30 units in 1 day
V-Go 40: 40 units used in 1 day

**CGM/BG**

None

**Infusion**

Tubeless, built-in stainless-steel needle

**Notes**

- Approved for T1D & T2D adults

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Continuous Glucose Monitor
Continuous glucose monitors (CGMs) are devices that monitor blood glucose every few minutes, display past, current, and predicted blood glucose frequently throughout the day.

People with both Type 1 and Type 2 diabetes can use continuous glucose monitors. Most often, these devices are compatible with Apple/Android phones for convenient blood glucose view.
Guardian Connect App:
View real-time glucose data; customizable alert with fully integrated Medtronic devices

Readings: BG updated every 5 mins
Key Features

- Designed for 7-day use with Guardian sensor and transmitter
- Readings: BG updated every 5 mins
- Alerts: Personalized & preset alerts prior to hypoglycemia & hyperglycemia episode. (Urgent low [55mg/dL] alarm always on.)
- Tracking markers: insulin delivery, meal, exercise
- Guardian Connect app: View real-time glucose data; customizable alerts

Specifications

- Real Time CGM
- Sensor Life: ≤ 7 days
- Transmitter:
  - 1.41 x 1.13 x 0.38 in
  - (3.58 x 2.9 x 0.97 cm)
  - 0.04 oz (1.13g) with sensor; rechargeable
- Battery: AAA (1) (charger)
- Waterproof: 8 ft ≤ 30 mins

Apps/Software

- Guardian Connect App (Apple & Android devices)
- Sugar.IQ App
- CareLink Software (for most Windows/Mac)

Connection/Calibration

- Transmitter must be ≤ 20 ft from smartphone device
- When dosing insulin, glucose reading must be confirmed with fingerstick reading.
- Calibration every 12 hrs

Notes

- 670G: Approved for children & adults ≥ 7 yrs old
- Guardian Connect System: Approved for children & adults ≥ 14 yrs old.
- Acetaminophen may change accuracy of blood glucose readings.
- Compatible with Apple Watch.
CGM Data:
Can be sent to selected smartphone devices with Dexcom G6 App downloaded. Share feature allows glucose data to be shared with ≤ 10 followers (e.g., parents, etc) for remote monitoring.

Designed for 10-day non-adjustive use & compatible with specific insulin pumps.

G6 vs. G5: G6 doesn’t require calibration, has longer wear time, & is slimmer in size for transmitter & larger for receiver.
Key Features

- **Designed for 10-day non-adjustive use & compatible with pumps.**
- **G6 vs. G5:** G6 does not require calibration, has longer wear time, & is slimmer in size for transmitter & larger for receiver.
- **Alerts:** Personalized alerts for hypoglycemia & hyperglycemia episodes / trends. (Urgent low [55mg/dL] alarm always on.)
- **CGM Data:** Can be sent to selected smartphone devices with Dexcom G6 App downloaded. Share feature allows glucose data to be shared with ≤ 10 followers (e.g., parents, etc) for remote monitoring.

Notes

- Approved for children & adults ≥ 2 yrs old.
- Glucose readings not affected by taking acetaminophen 1000 mg every ≤ 6hrs.
- Compatible with Tandem pumps & Apple Watch.

Apps/Software

- **Dexcom Clarity App**
- **Dexcom Follow App** (some Apple/Android devices, Tandem t:slim X2 pump): ≤ 10 people viewing current glucose level
- **Glooko**
- **Tidepool**

Connection/Calibration

- Receiver or smartphone with Dexcom app must be ≤ 20 ft from transmitter & sensor.
- 2 hrs after sensor setup
- No calibration

Specifications

**Real Time CGM**

- **Sensor Life:** 10 days

- **Transmitter:**
  - 1.68 x 0.86 x 0.33 in
  - (4.23 x 2.18 x 0.84 cm)
  - Wt: 0.42 oz (11.91g) (with sensor; built-in battery lasting ~3 mos.)

- **Waterproof:** 8 ft ≤ 24 hrs

- **Receiver:**
  - 4.02 x 2.44 x 0.46 in
  - (10.21 x 6.2 x 1.17 cm)
  - Wt: 3.3 oz (93.6g)

- **Battery:** rechargeable

Dexcom G6

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Dexcom G5 App:
CGM data & alerts transferrable

Designed for non-adjustive use (7-day) & compatible with Tandem pumps.
Key Features

- Designed for non-adjustive use (7-day) & compatible with pumps.
- G5 vs. G6: Compared to Dexcom G6, Dexcom G5 transmitter thicker but slightly smaller in size.
- Alerts: Personalized alerts for hypoglycemia & hyperglycemia episode / trend (Urgent low [55mg/dL] alarm always on.)
- Dexcom G5 App: CGM data & alerts transferrable
- Dexcom Follow App: Glucose data shareable with ≤ 5 followers (e.g. parents) for remote monitoring

Apps/Software

- Dexcom Clarity App
- Dexcom Follow App (some Apple/Android devices): ≤ 5 people viewing current glucose level
- Glooko
- Tidepool

Notes

- Approved for children & adults ≥ 2 yrs old.
- Acetaminophen may change accuracy of blood glucose readings
- Compatible with Tandem pumps & Apple Watch

Specifications

Real Time CGM

Sensor Life: 7 days

Transmitter:
1.52 x 0.88 x 0.47 in
(3.86 x 2.24 x 1.19 cm)
0.4 oz (11.3g) with sensor; built-in battery lasting ~ 3 mos

Waterproof: 8 ft ≤ 24 hrs

Receiver:
4 x 1.8 x 0.5 in
(10.2 x 4.6 x 1.3 cm)
2.4 oz (68g)

Battery: rechargeable

Connection/Calibration

- Receiver/smartphone with Dexcom app must be ≤ 20 ft from transmitter & sensor.
- 2 hrs after sensor setup
- Finger-stick reading not required
- Calibration every 12 hrs: manual input required
- BG reading range: 40–400 mg/dL.

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14 days Sat Feb 9, 2019 - Fri Feb 22, 2019

Avg. Glucose
mg/dL

Very Low
< 54 mg/dL

Low
54-70 mg/dL

In Target
70-180 mg/dL

High
> 180 mg/dL

Very High
> 250 mg/dL

Coefficient of Variation
SD

% Time CGM Active

98%

Curves/plots represent glucose frequency distributions by time regardless of date

Ambulatory Glucose Profile

Sat Feb 9, 2019 - Fri Feb 22, 2019 (14.0 days)

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### G6 CGM System

- 10-day use with optional calibration.
- Compared to G5, G6 does not require calibration, has longer wear time, & is slimmer in size for transmitter & larger for receiver.
- Dexcom Follow App shareable with ≤ 10 followers

### G5 CGM System

- 7-day use with calibration recommended.
- Compared to Dexcom G6, Dexcom G5 transmitter is thicker but slightly smaller in size.
- Dexcom Follow App shareable with ≤ 5 followers.
FreeStyle Libre 2

Ends in 12 days

12:24

5.2 mmol/L

12:40

5.2 mmol/L

15:00

ADD NOTES

My Glucose

GLUCOSE IN RANGE

1 m ago

14:00

18:00

22:00

Readings: Manual scanning (receiver to sensor) required.

FreeStyle Libre 2 App: Programmed as reader.

Designed for 14-day use with FreeStyle Libre 2 app

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## Key Features
- Designed for 14-day use with built-in FreeStyle blood sugar meter that shows glucose readings.
- Readings: manual scanning (receiver to sensor) required.
- Alerts: Alarms for hypoglycemia / hyperglycemia not built into device.

## Connection/Calibration
- Reader must be \( \leq 1.5 \) inches from sensor for scanning.
- 1 hr wait time following sensor setup & scanning
- No calibration

## Specifications

<table>
<thead>
<tr>
<th>Component</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Life</td>
<td>14 days</td>
</tr>
<tr>
<td>Transmitter</td>
<td>1.38 in (diameter) x 0.2 in</td>
</tr>
<tr>
<td></td>
<td>( 3.5 \text{cm} \times 0.51 \text{cm} )</td>
</tr>
<tr>
<td></td>
<td>0.18 oz (5.1g)</td>
</tr>
<tr>
<td>Battery</td>
<td>Silver oxide (1)</td>
</tr>
<tr>
<td>Waterproof</td>
<td>3 ft ( \leq 30 \text{ min} )</td>
</tr>
<tr>
<td>Receiver</td>
<td>2.36 x 3.74 x 0.63 in</td>
</tr>
<tr>
<td></td>
<td>( 6 \times 9.5 \times 1.6 \text{ cm} )</td>
</tr>
<tr>
<td></td>
<td>2.3 oz (65.2g)</td>
</tr>
<tr>
<td>Battery</td>
<td>Lithium-ion rechargeable (1)</td>
</tr>
</tbody>
</table>

## Apps/Software
- LibreView Software: \( \leq 20 \) people for viewing (downloadable on Windows & Mac)
- FreeStyle LibreLink (for some Apple & Android devices)

## Notes
- Approved for adults \( \geq 18 \) yrs old.
- Glucose readings not affected by taking acetaminophen 1000 mg every \( \leq 6 \text{ hrs} \).
Designed for 14-day use with built-in FreeStyle blood sugar meter that shows glucose readings.

Readings: manual scanning (receiver to sensor) required.
Key Features

- Designed for 14-day use with built-in FreeStyle blood sugar meter that shows glucose readings.
- Readings: manual scanning (receiver to sensor) required.
- Alerts: Alarms for hypoglycemia / hyperglycemia not built into device.

Connection/Calibration

- Reader must be ≤ 1.5 inches from sensor for scanning.
- 1 hr wait time following sensor setup & scanning.
- No calibration.

Specifications

Flash CGM
Sensor Life: 14 days

Transmitter:
1.38 in (diameter) x 0.2 in
(3.5cm x 0.51 cm)
0.18 oz (5.1g)
Battery: silver oxide (1)
Waterproof: 3 ft ≤ 30 min

Receiver:
2.36 x 3.74 x 0.63 in
(6 x 9.5 x 1.6 cm)
2.3 oz (65.2g)
Battery: lithium-ion rechargeable (1)

Apps/Software

- LibreView Software: ≤ 20 people for viewing (downloadable on Windows & Mac)
- FreeStyle LibreLink (for some Apple & Android devices)

Notes

- Approved for adults ≥ 18 yrs old.
- Glucose readings not affected by taking acetaminophen 1000 mg every ≤ 6hrs.
FreeStyle Libre 14-Day System

- Designed for 14-day use with built-in FreeStyle blood sugar meter that shows glucose readings.
- Alarms for hypoglycemia / hyperglycemia not built into device.
- For adults and children ≥ 4 yrs old.

FreeStyle Libre 2

- Designed for 14-day use with FreeStyle Libre 2 App
- Alarms for hypoglycemia / hyperglycemia are built into device.
- FreeStyle Libre 2 App (iPhone only): can be programmed as reader.
- For adults ≥18 yrs old.
February 2013 (14 days)

Estimated A1c 6.2%

Average Glucose

DAILY CARBS 226 grams/day

Insulin

RAPID-ACTING INSULIN

Meal

Correction

Basal Change

Manual

LONG-ACTING INSULIN 17.1 units/day

Total Daily Insulin

Comments

There was a ketone test. The result was 1.4 mmol/L.

Ratio of average correction insulin is 24%.

9 user-changes of the suggested insulin.
Sensor (90-day use) surgically placed underneath skin in upper arm by trained healthcare provider.

Readings:
Removable transmitter is positioned externally on top of sensor which sends blood sugar readings to selected smartphone devices, updating every 5 mins.

Glucose Within Target Levels

124 mg/dL

6PM 7PM 8PM

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Key Features
- Sensor (90-day use) surgically placed underneath skin in upper arm by trained healthcare provider.
- After 90 days, sensor is then removed and replaced with a new sensor placed in arm.
- Readings: Removable transmitter is positioned externally on top of sensor which sends blood sugar readings to selected smartphone devices, updating every 5 mins.
- Alerts: On-body active vibration alert for dynamic/anticipated hypoglycemia & hyperglycemia episodes even without smartphone device nearby.
- Calibrations: ≥ 2 calibrations/day required.

Connection/Calibration
- Transmitter must be ≤ 25 ft from smartphone device.
- 24 hrs wait time after sensor setup
- Requires ≥ 2 calibrations/day
- BG reading range: 40-400 mg/dL.

Specifications
- Implantable CGM
  Sensor Life: ≤ 90 days
- Transmitter:
  1.48 x 1.89 x 0.35 in
  (3.8 x 4.8 x 0.89 cm)
  0.39 oz (11.1g)
- Battery: lithium polymer battery, rechargeable
  Waterproof
  No receiver needed, readings sent to smartphone

Apps/Software
- Eversense App: ≤ 5 people viewing current glucose level (on Apple/Android devices)
- Eversense Data Management System Software
- Glooko

Notes
- Approved for adults ≥ 18 yrs old.
- Approved for MRI scan.
- Glucose readings not affected by taking acetaminophen.
- Contraindicated in people for whom dexamethasone is not encouraged for use since silicone collar contains 1.75 mg dexamethasone to reduce inflammation around sensor.