

# Living well with type 1 diabetes

Exploring the impact of technology and insulin automation in real life

Chronic Disease at Work  
Feb 8<sup>th</sup>, 2022



The image features three large, solid-colored circles arranged horizontally. The leftmost circle is dark blue, the middle one is bright blue, and the rightmost one is magenta. Each circle contains text in a white, sans-serif font. The text in each circle is centered and consists of a bold title followed by a subtitle in italics.

**Understanding type 1 diabetes:** *complications, goals and successful management.*

**Living with type 1 diabetes:** *a personal and professional perspective.*

**Describing the impact:** *technology innovation.*

**Understanding type 1 diabetes:** *complications, goals and successful management.*

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# People living with type 1 diabetes require exogenous (external) insulin to survive

## Insulin Delivery Devices

### Type 1 diabetes<sup>1</sup>

Type 1 diabetes is a disease in which the pancreas does not produce any insulin. Insulin is an important hormone that helps your body to control the level of glucose (sugar) in your blood.

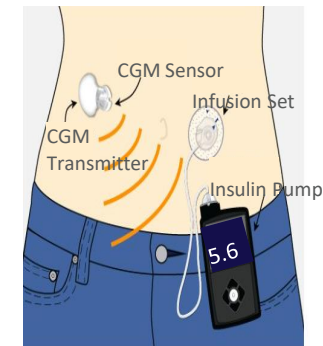
Roughly 10 per cent of people living with diabetes have type 1, insulin-dependent diabetes. Type 1 diabetes generally develops in childhood or adolescence, but can also develop in adulthood. People with type 1 need to inject insulin or use an insulin pump to ensure their bodies have the right amount of insulin.



Multiple Daily Injections<sup>2</sup>



Insulin Pens<sup>3</sup>



Insulin Pumps with or without CGM<sup>4</sup>

1. <https://www.diabetes.ca/about-diabetes/type-1>

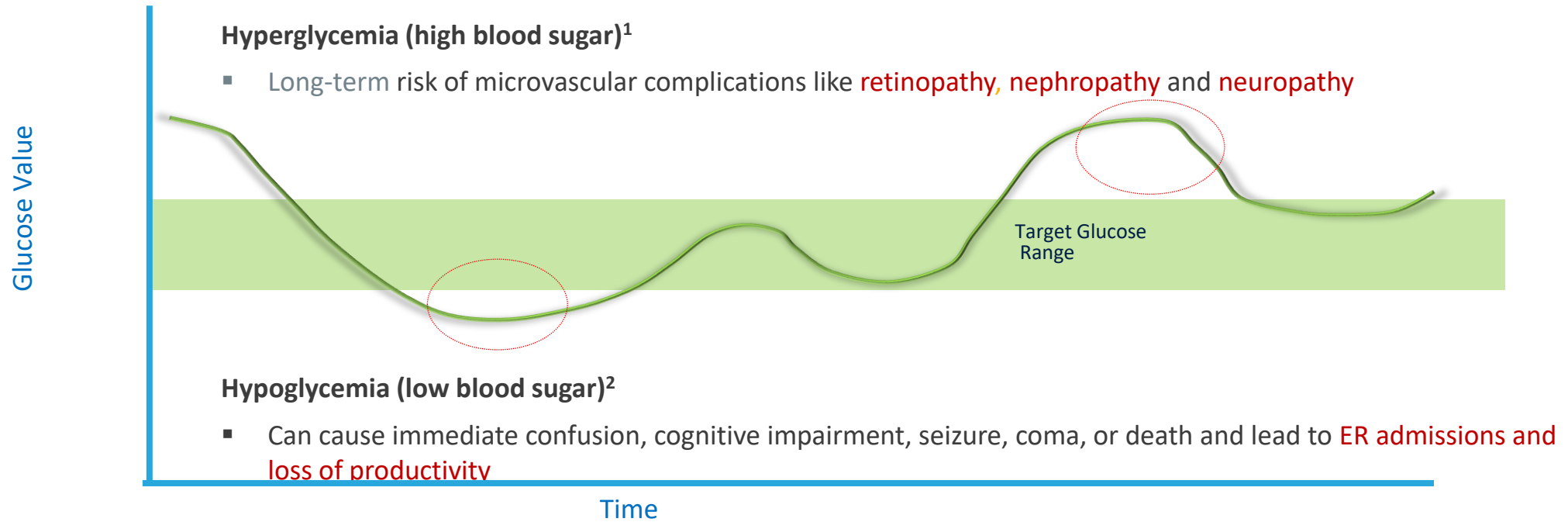
2. <https://www.wired.co.uk/article/type-1-diabetes-treatment>

3. <https://www.niddk.nih.gov/health-information/diabetes/overview/insulin-medicines-treatments>

4. <https://www.medtronic.com/ca-en/diabetes/home/support/product-support/minimed-670g.html>

# Living with type 1 diabetes is a balance of multiple factors

Variations in glycemic levels is associated with physiological and psychological changes



Time in Range = Time spent in the 3.9 - 10.0 mmol/L range

1. Skyler, J: Chronic Complications of Diabetes Endo Met Clin Am, vol 25, 2, p.243- 254, June 1996 Adapted from DCCT Research Group: *N England Journal of Medicine*. P977-986, 1993;329.
2. Philip C. Hypoglycemia, functional brain failure, and brain death. [J Clin Invest](#). 2007 Apr 2; 117(4): 868–870.

Meal  
Timing

# Living with type 1 diabetes is a balance of **multiple** **factors**

Variations in glycemic levels is associated with physiological and psychological changes

Stress &  
Illness

Time  
of  
Day

## 42 Factors that affect Blood Glucose

### FOOD

- ↑↑ 1 Carbohydrate quantity
- ↑ 2 Carbohydrate type
- ↑ 3 Fat
- ↑ 4 Protein
- ↑ 5 Caffeine
- ↓↑ 6 Alcohol
- ↓↑ 7 Meal timing
- ↑ 8 Dehydration
- ? 9 Personal microbiome

### MEDICATION

- ↓ 10 Medication dose
- ↓↑ 11 Medication timing
- ↓↑ 12 Medication interactions
- ↑↑ 13 Steroid administration
- ↑ 14 Niacin (Vitamin B3)

### ACTIVITY

- ↓ 15 Light exercise
- ↓↑ 16 High-intensity & moderate exercise
- ↓ 17 Level of fitness/training
- ↓↑ 18 Time of day
- ↓↑ 19 Food and insulin timing

### BIOLOGICAL

- ↑ 20 Too little sleep
- ↑ 21 Stress and illness
- ↓ 22 Recent hypoglycemia
- ↑ 23 During-sleep blood sugars
- ↑ 24 Dawn phenomenon
- ↑ 25 Infusion set issues
- ↑ 26 Scar tissue / lipodystrophy
- ↓↓ 27 Intramuscular insulin delivery
- ↑ 28 Allergies
- ↑ 29 A higher BG level (glucotoxicity)
- ↓↑ 30 Periods (menstruation)
- ↑↑ 31 Puberty
- ↓↑ 32 Celiac disease
- ↑ 33 Smoking

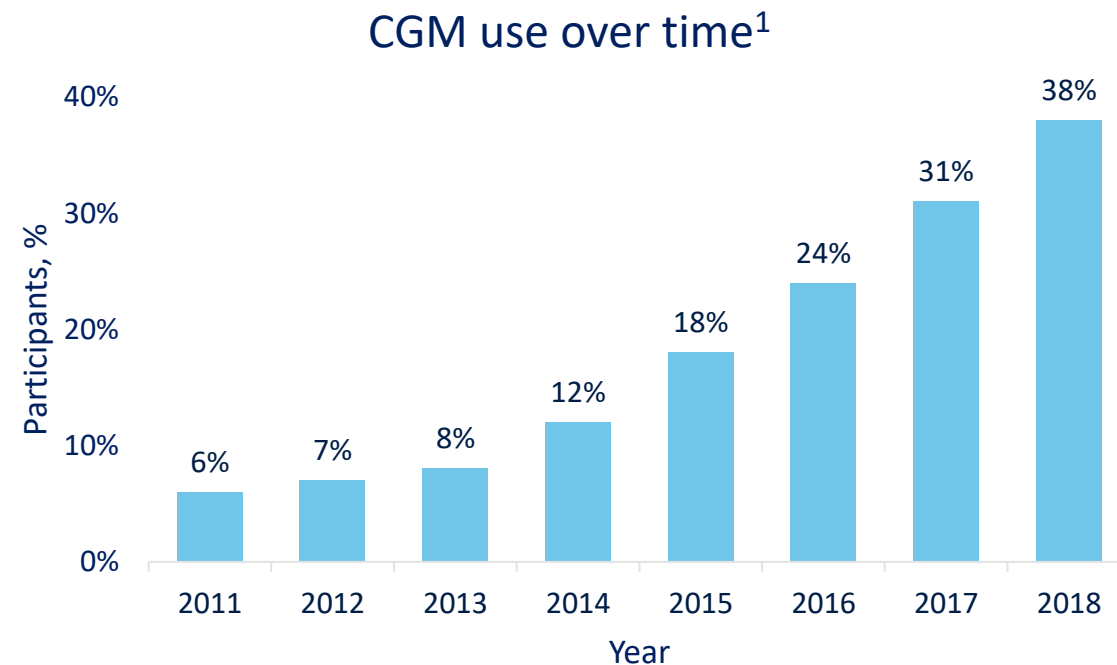
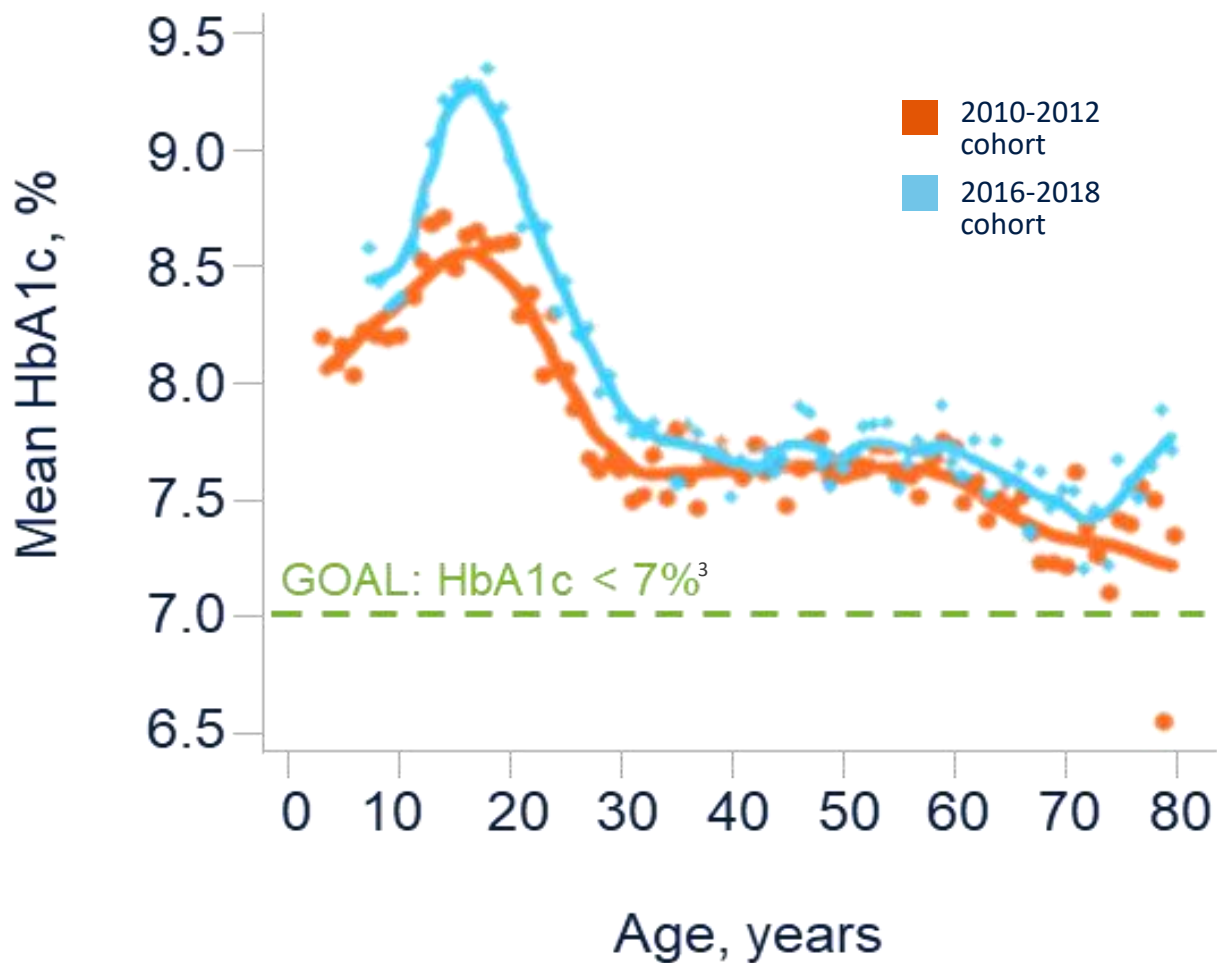
### ENVIRONMENTAL

- ↑ 34 Expired insulin
- ↓↑ 35 Inaccurate BG reading
- ↓↑ 36 Outside temperature
- ↑ 37 Sunburn
- ? 38 Altitude

### BEHAVIOR & DECISIONS

- ↓ 39 More frequent BG checks
- ↓↑ 40 Default options and choices
- ↓↑ 41 Decision-making biases
- ↓↑ 42 Family and social pressures

# Majority of type 1 diabetes patients not at target despite intensive management<sup>1,2</sup>



1. Foster NC. et al. Diabetes Technol Ther. 2019;21(2): 62-65. 2. Aronson et al. Diabetes Technol Ther. 2021 Jan;23(1):31-40; 3. Diabetes Canada Clinical Practice Guidelines, <http://guidelines.diabetes.ca/cpg>.



# Closed Loop Control: Safely Transfer Variability



Cruise control:

From:



To:



Thermostat:



Auto Mode:



# Hybrid Closed Loop Technology enabled Insulin Pump

Adapts to the real time insulin requirement of a user every 5 minutes

## Hybrid closed loop Technology

### Predicts:

Monitors sugars 24/7 and predicts highs and lows in advance.

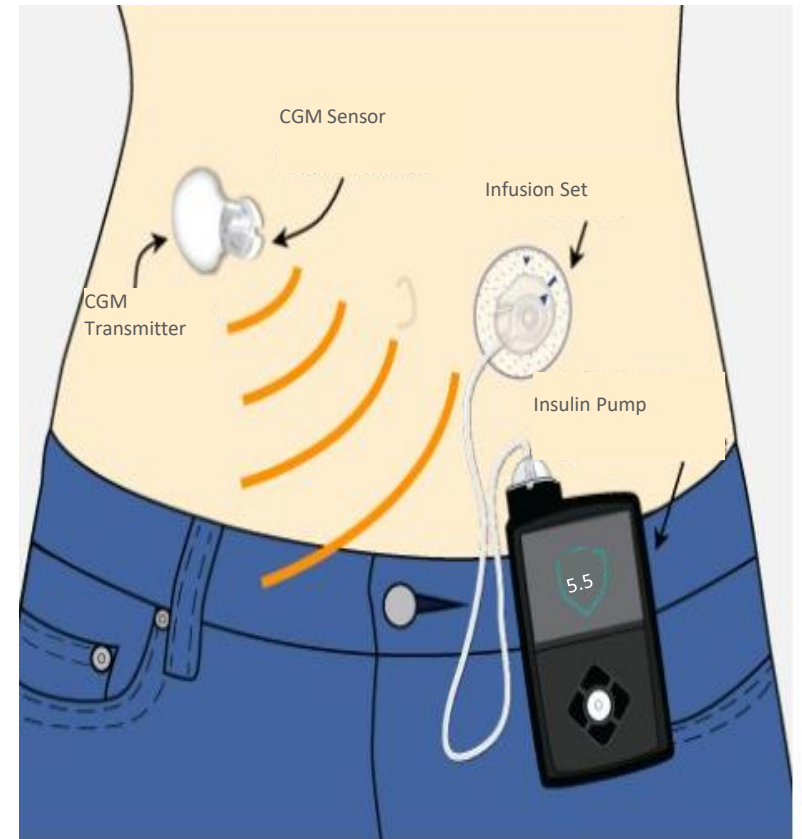
### Adapts:


Continuously adapts to insulin needs based on real-time data and personal trends.

### Self-Adjusts:

Helps smooth out highs and lows, adjusting insulin delivery every five minutes.\*

\* Some user interaction required





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# My journey



2009

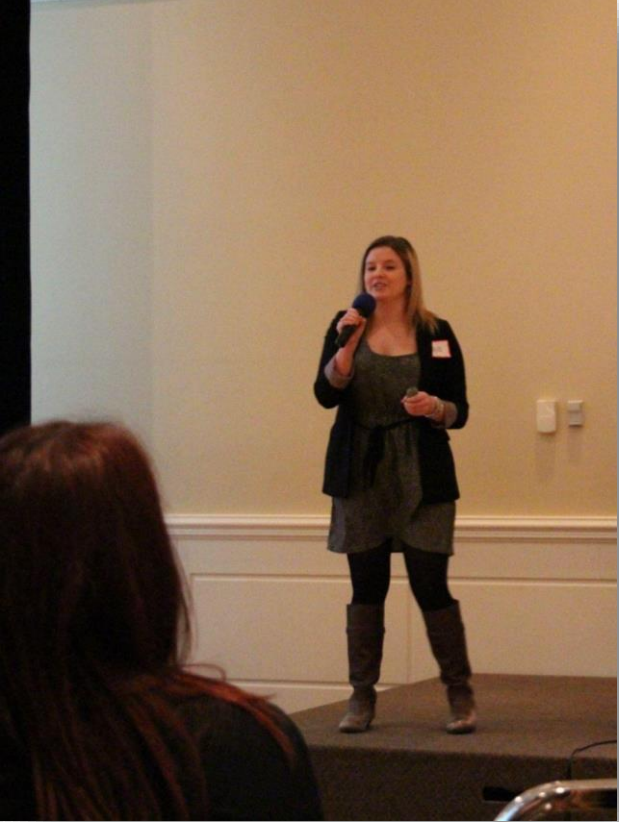


2021



2017

- **2009.** Diagnosed with Type 1 Diabetes.
- **2010.** Started an insulin pump.
- **2013.** Began using continuous glucose monitoring (CGM).
- **2020.** Started using an automated insulin delivery system.




# My fears

- Low blood sugars in public spaces/when alone
- Low blood sugars during the night
- Not knowing glucose levels/trends/predictions
- Not achieving my personal or professional goals

# My confidence

- Insulin automation helps prevent lows
- I will be alerted prior to expected glucose changes
- I can go to bed at night and sleep soundly without disruption
- I will achieve my personal and professional goals





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# The innovation journey continues – **automation, sensing, usability** and **data**

## **SIMPLER**



Simplify diabetes management

## **SMARTER**



Develop predictive analytics  
that adapt to individual needs

## **SMALLER**



Create more discreet products





“As a teacher working in a busy classroom, automation has been really helpful in keeping my blood sugars in range so I can focus on helping my students be successful.”

- MITCH KEENE  
ONTARIO, CANADA

# What **IMPACT** can you have?

## Check Your Diabetes Guidebook Checklist

<https://www.benefitscanada.com/microsite/benefits-canada/the-plan-sponsors-guide-to-diabetes/>

### **WORKPLACE SUPPORT**

e.g. avoiding stigma, workplace accommodations

### **BENEFIT PLAN DESIGN**

e.g. Access to insulin pump and CGM technology, offering vision care, mental health support

### **WORKPLACE PROGRAMS**

e.g. education and awareness, diabetes screening program, tools and activities

Technology continues to play a significant role in diabetes care.

Thank you!

Q&A