Barbara Davis Center for Diabetes

UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

Early-Stage Type 1 Diabetes: Education

BRIGITTE I. FROHNERT MD PHD

Outline

❖ Why is education important?
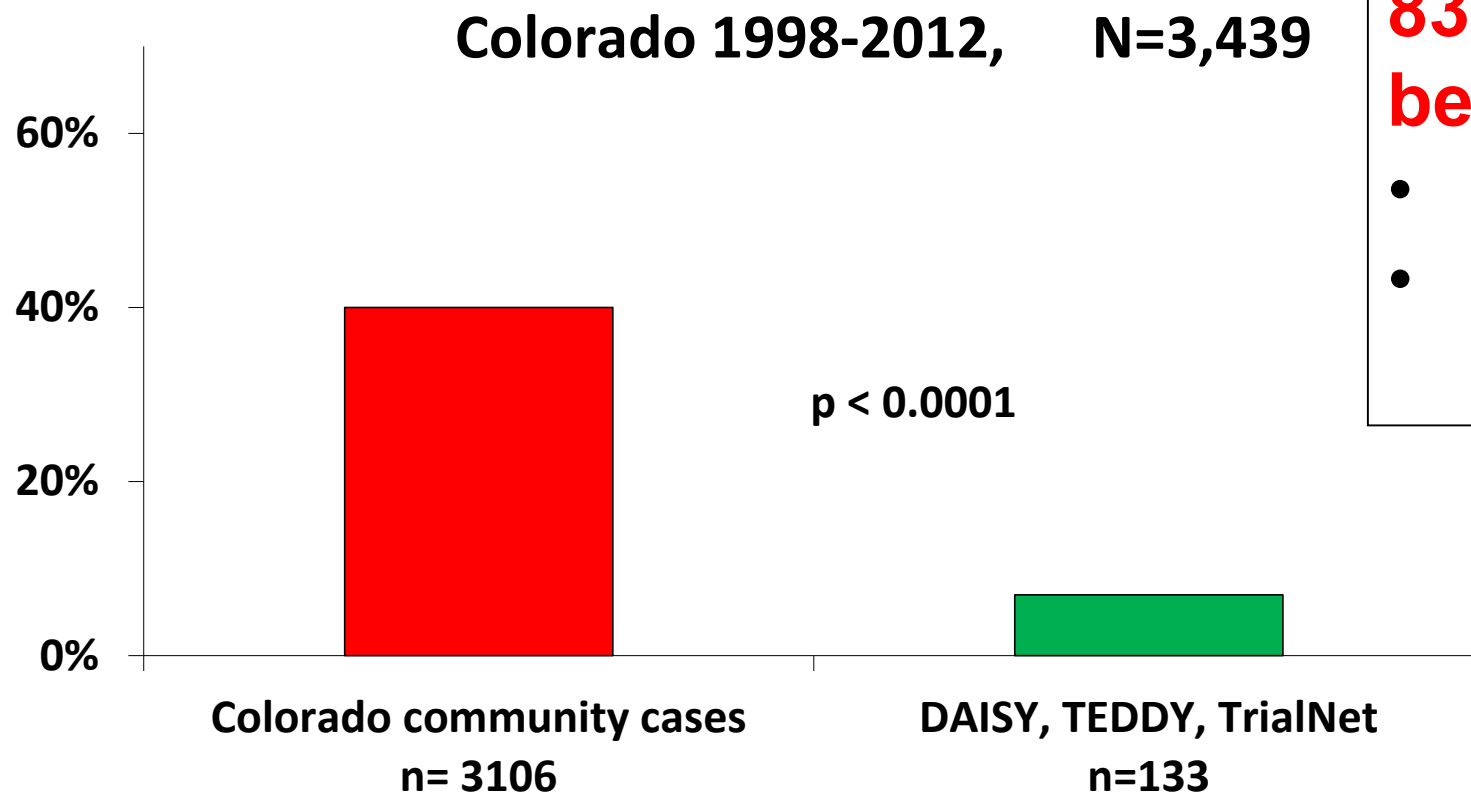
❖ Goals of patient education

❖ Content of education

Why educate at early-stage T1D?
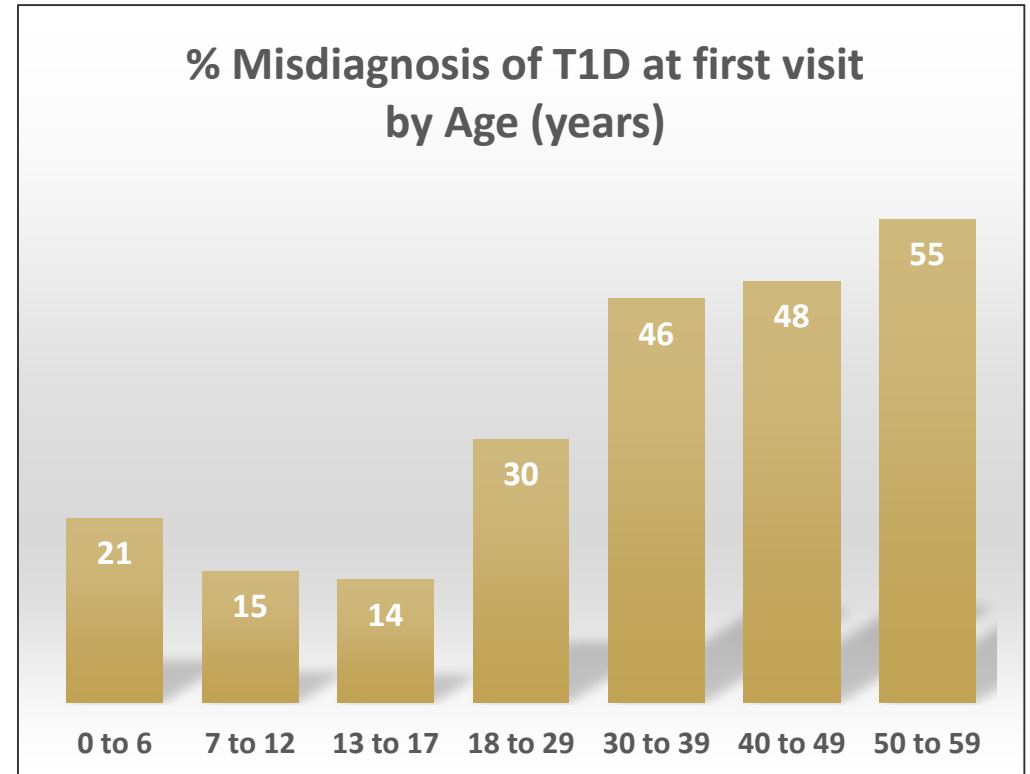# Address Disparities in Presentation

Risk factors for DKA at diagnosis:

- **Young age**
- **Ethnic minority population**
- **Limited or lack of insurance**
- **Lower parent education**
- **Lower family income**
- **Rural address**
- **Public insurance**
- Existing mental disorders

Initial symptoms may be nonspecific

25% were misdiagnosed at first visit

Misdiagnosis associated with 18% increased risk of DKA

% Misdiagnosis of T1D at first visit by Age (years)

Age (years)	% Misdiagnosis
0 to 6	21
7 to 12	15
13 to 17	14
18 to 29	30
30 to 39	46
40 to 49	48
50 to 59	55

Goals of Education

❖ Prevent DKA at stage 3
  ❖ Encourage participation in monitoring
  ❖ Recognizing changes in clinical status

❖ Inform about potential interventions

❖ Improve patient experience
  ❖ Alleviate anxiety
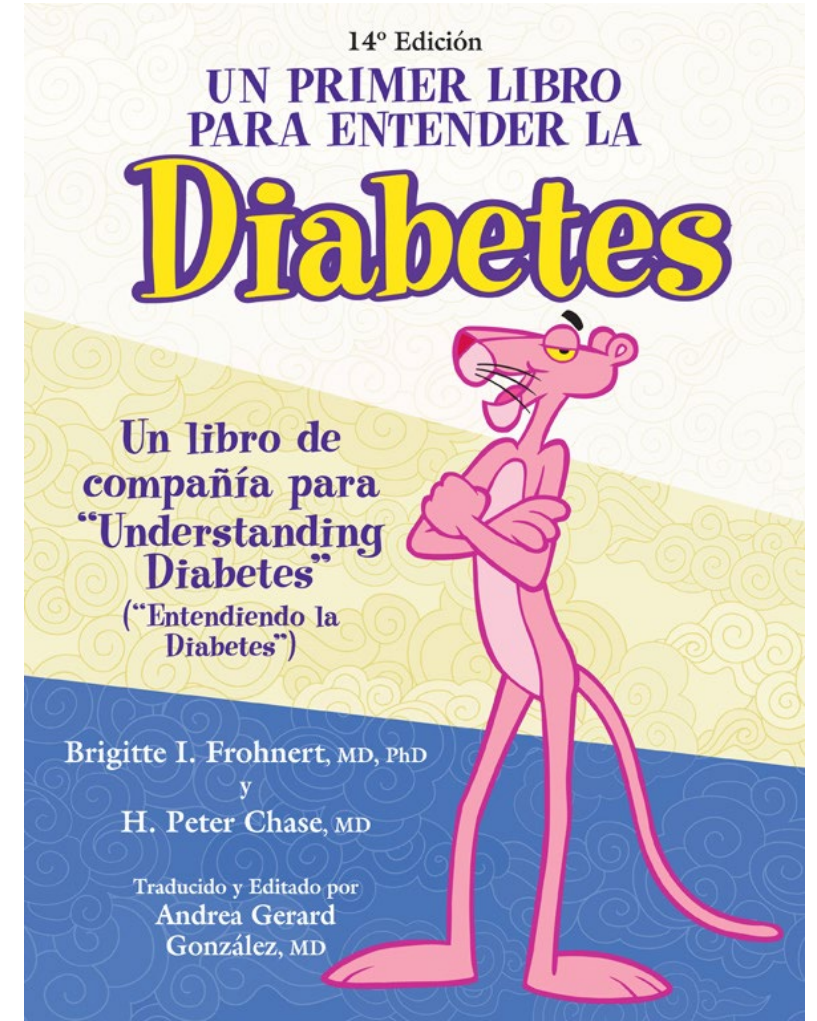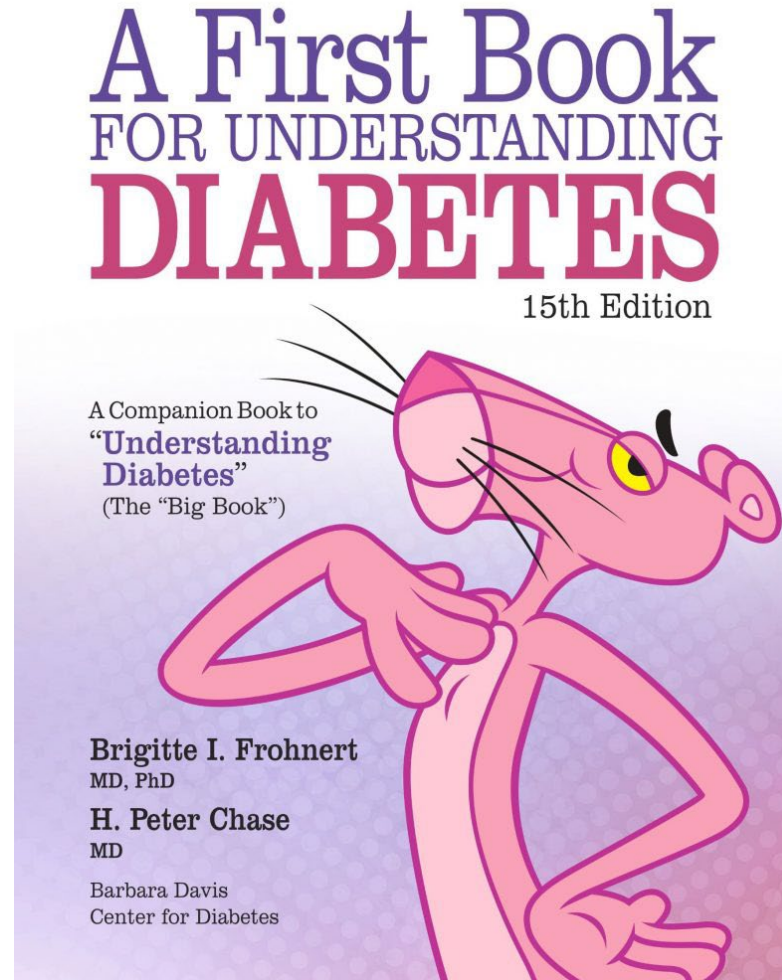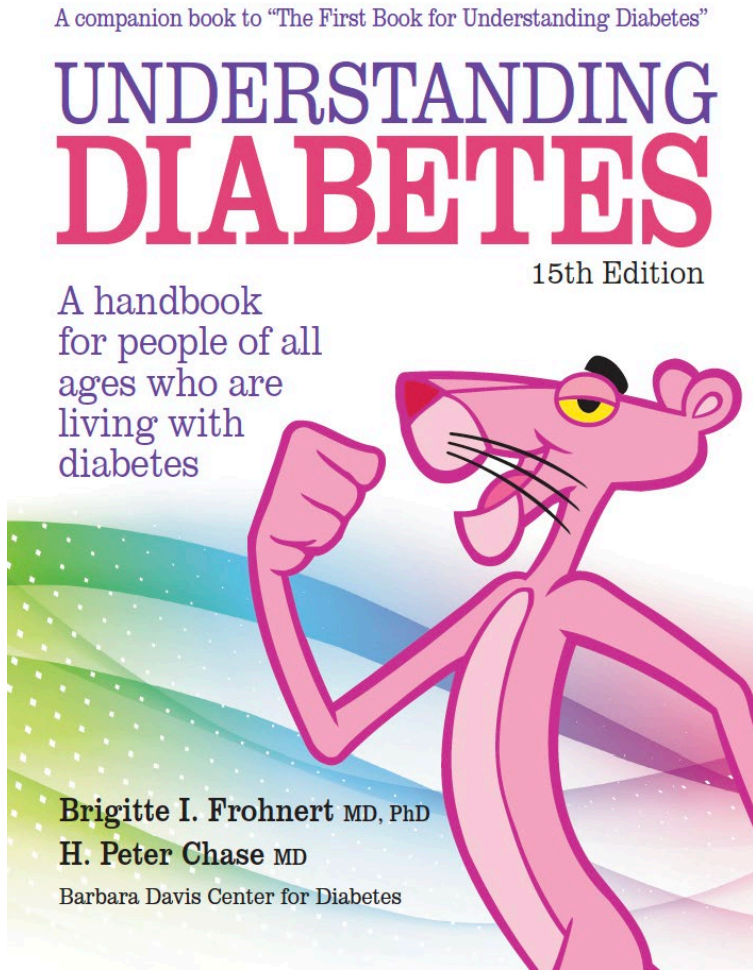 ❖ Empower with knowledge before start of insulin
  ❖ Promote healthy habits

Patient Education

Education Currently Directed at Stage 3 T1D

Pathophysiology of T1D

❖ Why did this happen?

❖ What happens next?
  ❖ understanding of the stages of T1D?

❖ Ketosis, illness and avoidance of DKA

❖ Clearing confusion regarding T1D/T2D

CHILDHOOD DIABETES (T1D)

3 STAGES OF T1D

A MICROSCOPIC VIEW OF HEALTHY BETA CELLS

STAGE 1

Stage 1 of developing T1D starts when a person has two or more autoantibodies. The immune system has begun to attack the beta cells in the pancreas.

At this time, there are a lot of healthy beta cells left. The body is able to produce enough insulin to keep blood sugars normal. There are no symptoms.

People with stage 1 of T1D should learn to monitor blood sugars.

7 out of 10 people in this stage will get to stage 3 (symptomatic) T1D within 10 years.

LOCATION OF THE PANCREAS, WHICH CONTAINS BETA CELLS

STAGE 2

Stage 2 starts when enough beta cells have been destroyed that the body is no longer able to keep blood sugars normal all of the time. At this stage, people do not notice any symptoms.

sugar challenge like a large meal of the oral glucose tolerance
es a person's average blood sugar over the last 3 months. During
er.

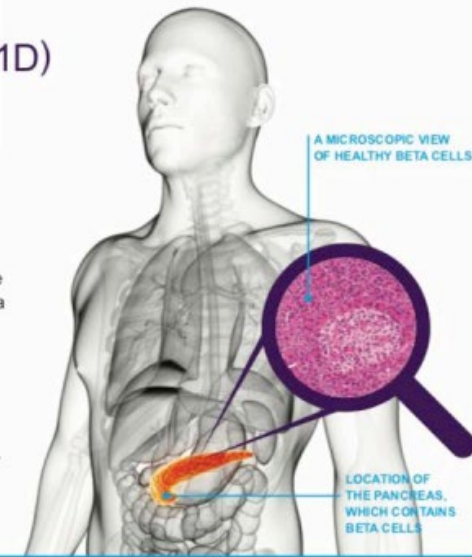| TYPE 1	TYPE 2
An autoimmune disease	Not an autoimmune disease
Autoantibodies are usually present	No presence of autoantibodies
Starts suddenly	Starts gradually
Can occur at any age, but usually in younger individuals	Occurs mostly adults, but rates are rising in younger individuals
Generally thin or normal body weight	Usually overweight or obese body weight
Body has low or no insulin production	Normal, decreased, or increased insulin production

STAGE 3

In stage 3, most of the beta cells have been destroyed. The beta cells that are left cannot produce enough insulin to keep the blood sugars normal. Symptoms of T1D occur, become more severe over time, and are life-threatening if medical treatment is not started.

Symptoms of T1D include:
- Intense thirst
- Frequent urination
- Bedwetting
  (in child who was previously "dry")
- Weight loss
- Lack of energy
- Blurred vision
- Behavior changes
- Yeast infections

a person with T1D is ill, under physical stress or taking steroids, blood
often become high. People with ANY STAGE of T1D should check
sugars more often during these times. **If your child seems confused,**
thing heavily or is vomiting, get medical attention right away.

Approved by the Colorado Multiple IRB #14-0553 Marian J Rewers, MD, PhD

Interventions

❖ Options
  ❖ Teplizumab
  ❖ TrialNet
  ❖ Other studies
❖ Eligibility criteria

Monitoring education

❖ Symptoms of highs and lows

❖ How to check glucose:

    ❖ Glucometer

    ❖ CGM

❖ When/how to check ketones

Education Materials for Monitoring

❖ Why are we checking blood sugar?

❖ When should you check blood sugar?
  ❖ At baseline
  ❖ During illness

❖ What should my child's blood sugar be?
  ❖ When to call

❖ What else should I look for?
  ❖ Review of symptoms

HOME GLUCOSE TESTING
Test 2-4 times per month and every day during illnesses

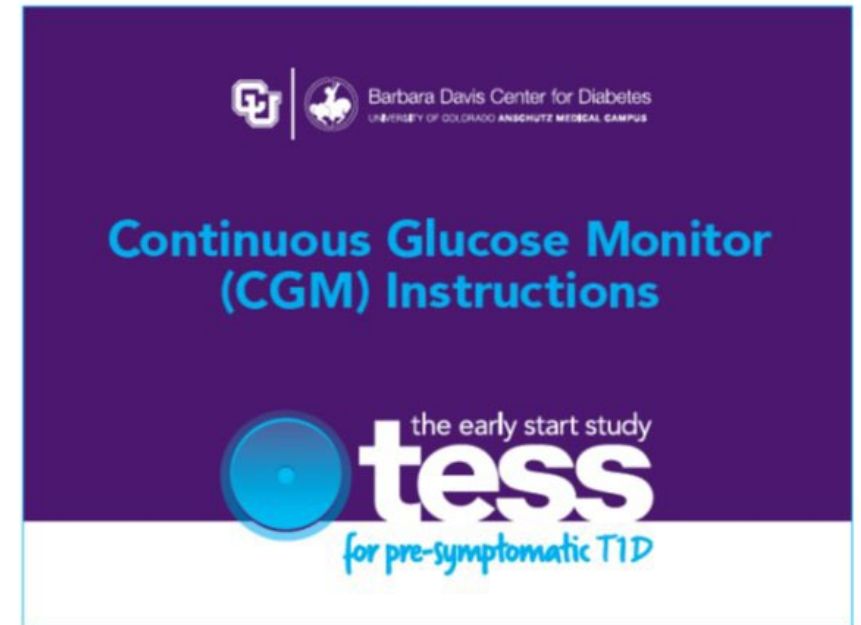| TIME blood glucose (BG) was tested	NORMAL BG	ELEVATED BG	HIGH BG
FASTING No food or drinks with any sugar for at least 8 hours	Below 100	100 – 124 Call **ASK** next business day	125 or higher Call **ASK** next business day
2 HOURS after meals	Below 140	140 – 199 Call **ASK** next business day	200 or higher **Repeat test and call ASK or health provider**

- Call: **ASK Study Clinic** at 303-724-1275 (8am-5pm M-F); or
- Call: **ASK Clinician** at 720-326-0430
- On evenings/weekends call: **303-724-2323** and identify your child as an ASK Study participant
- **You should also call your primary care provider**

If the meter beeps once and displays "**HI**" (no number displayed) your blood sugar reading is **over 600** mg/dL. This is a life-threatening situation and a medical emergency.
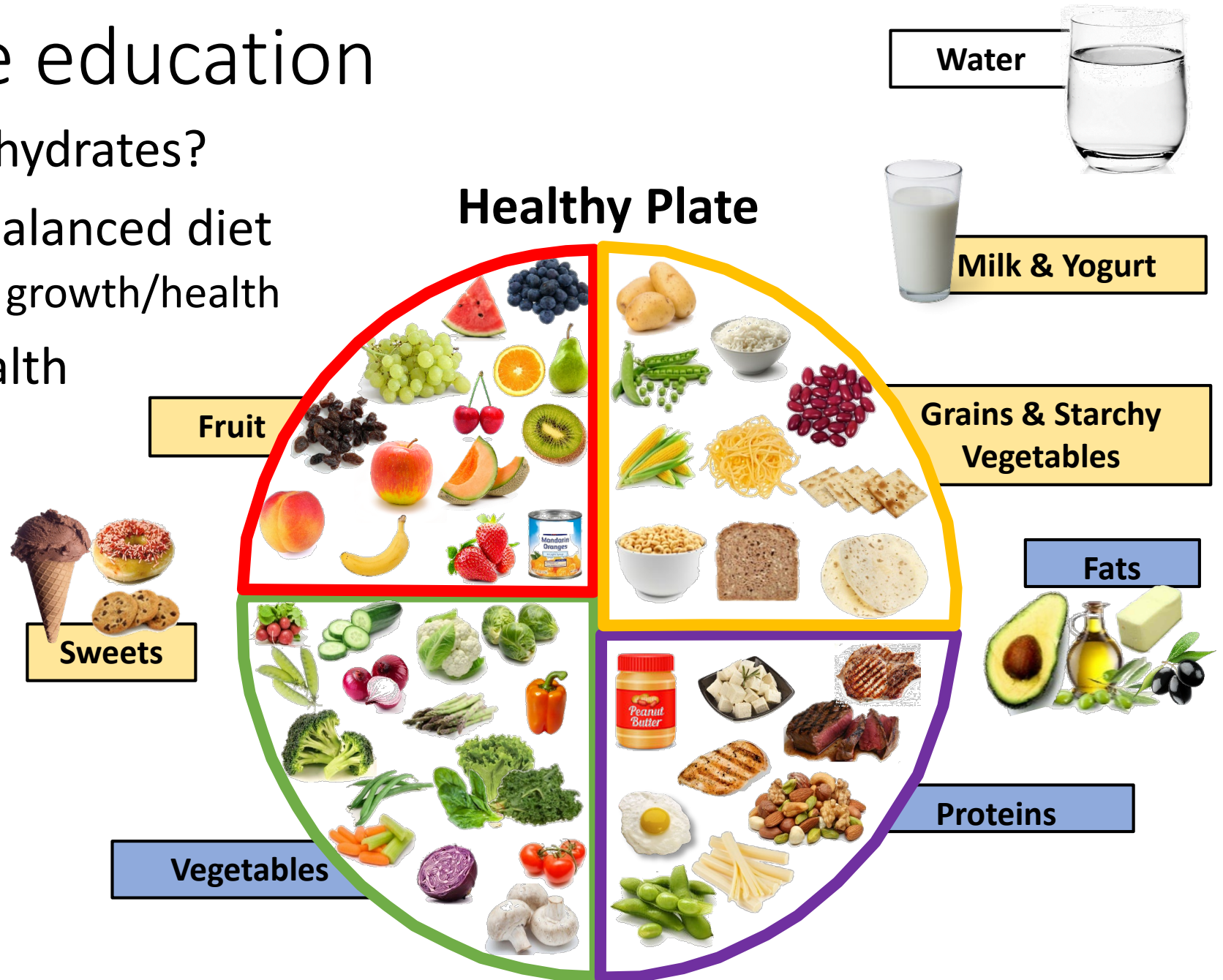**Immediately call ASK** or **303-724-2323** (if after hours)

Monitoring by Unblinded CGM

❖ Practical CGM use
  ❖ Troubleshooting problems
  ❖ When to double-check with glucometer

❖ Check Patterns at least once per CGM wear

❖ Highs (alarm usually set to 200 mg/dL)
  ❖ If >200 mg/dL or higher 2 hours after meal, wash hands and check fingerstick
  ❖ If >300 mg/dL for more than 2 hours, check ketones
  ❖ Call if confirmed >200 or if ketones are moderate or higher

❖ Lows (alert at or below 55mg/dL cannot be turned off)
  ❖ Check finger-stick glucose if possible.
  ❖ If 2 or more low alarms, call team
  ❖ False lows: dehydration, compression of sensor

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Continuous Glucose Monitor (CGM) Instructions
the early start study
tess
for pre-symptomatic T1D

Diet and lifestyle education

- What foods have carbohydrates?
- Healthy diet choices / balanced diet
  - Carbs are important for growth/health
- Exercise for lifetime health

Healthy Plate

Water

Milk & Yogurt

Grains & Starchy Vegetables

Fats

Proteins

Vegetables

Sweets

Fruit

Emotional and Family impacts

❖Family strengths/challenges

❖Assessment for depression/anxiety

❖Coping with uncertainty

❖Resources

A Case Study

Boy screened at 1 yo; Father with T1D

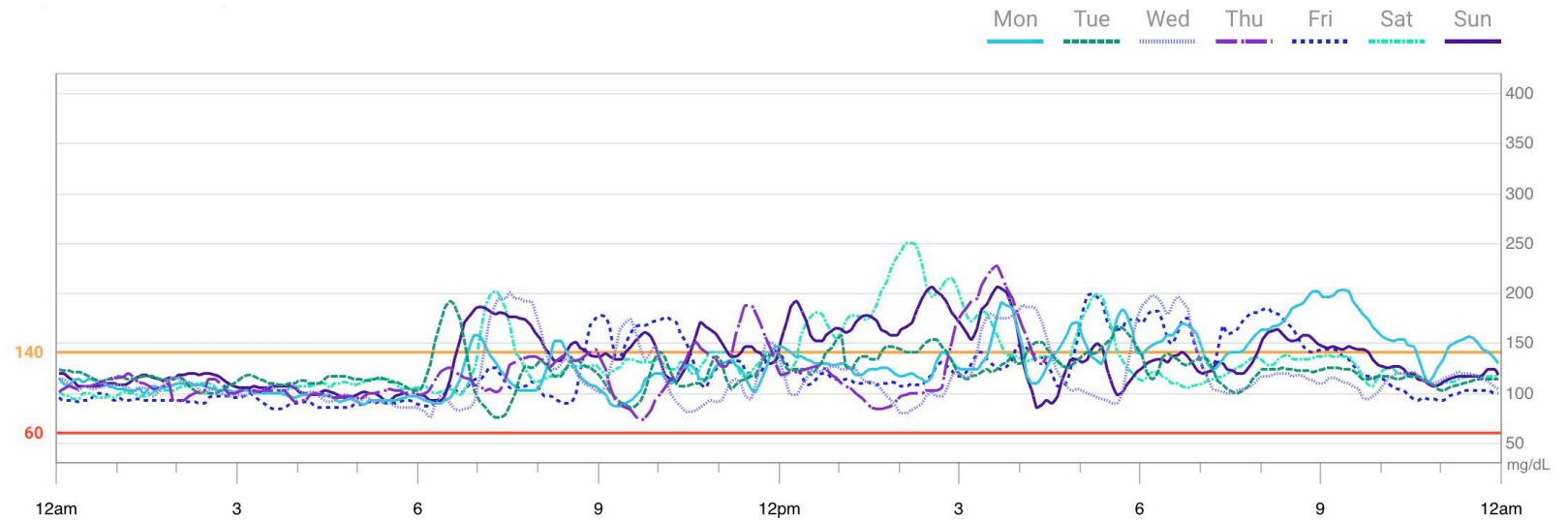| Age	GAD	IA-2	IAA	ZnT8	A1C
1.0	++	-	-	-	
1.1	++	-	-	-	4.9
1.3	++	-	+	-	5.2
1.5	++	-	+	-	5.2
1.8	++	-	+	-	5.1
2.1	++	-	+	-	5.1
2.5	++	-	+	-	5.3
2.8	++	-	-	-	5.4

3 yo - at Stage 2 T1D entry into
The Early Start Study

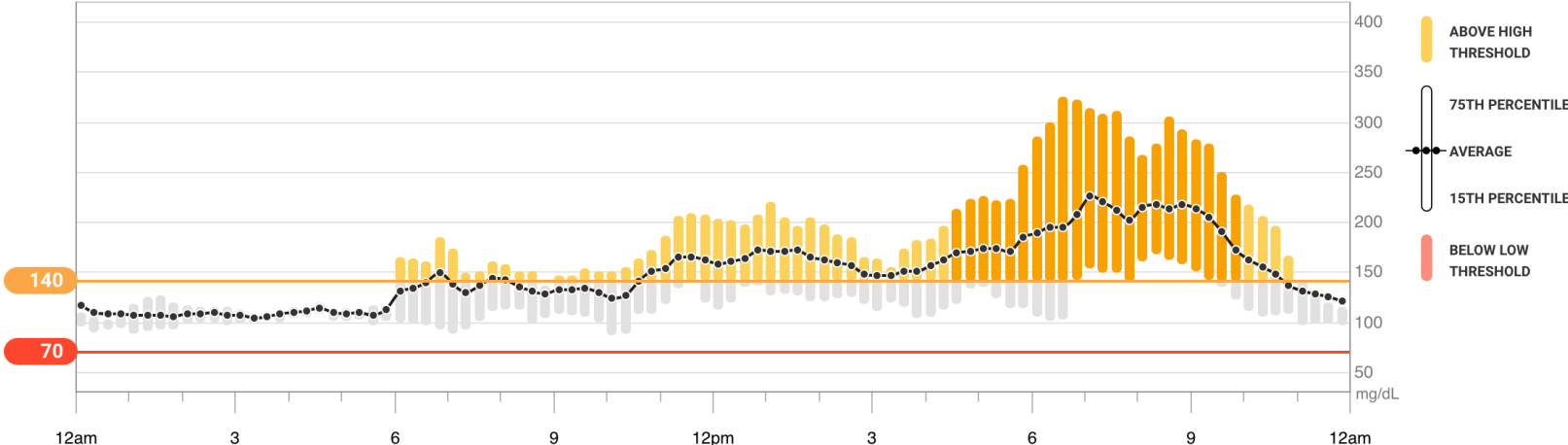| HbA1c	5.1%

CGM	
>140:	22%
Time in range:	78%
Avg SG (mg/dL):	123 ± 29

OGTT	mg/dL
0 min	81
Peak	185
120 min	**143**

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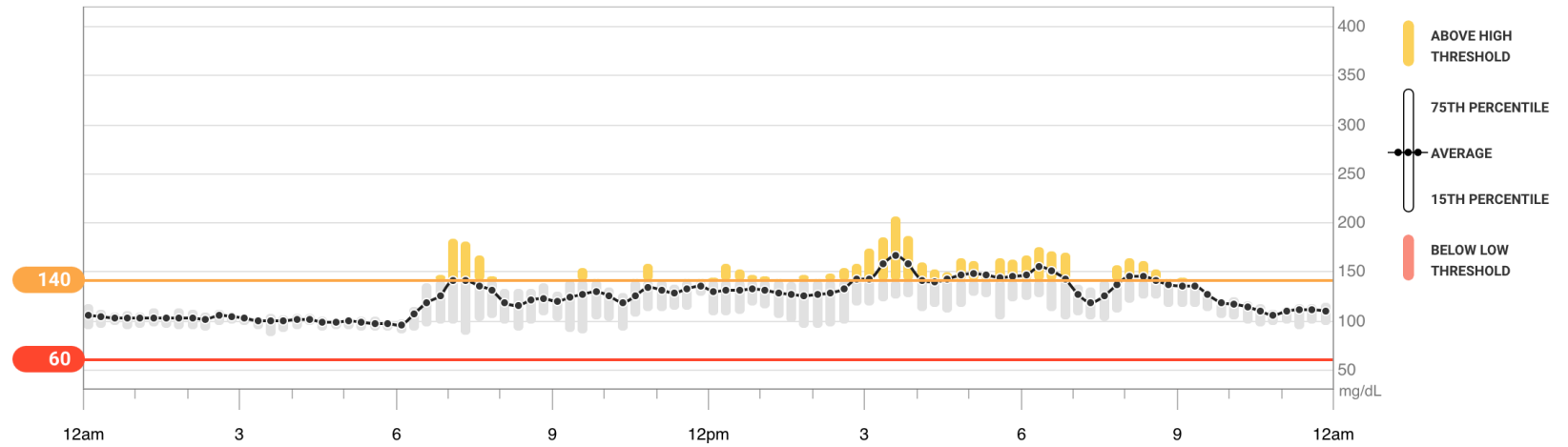
One week later, has an illness with fever

CGM	
>140:	44%
Time in range:	56%
Avg SG (mg/dL):	149 ± 54
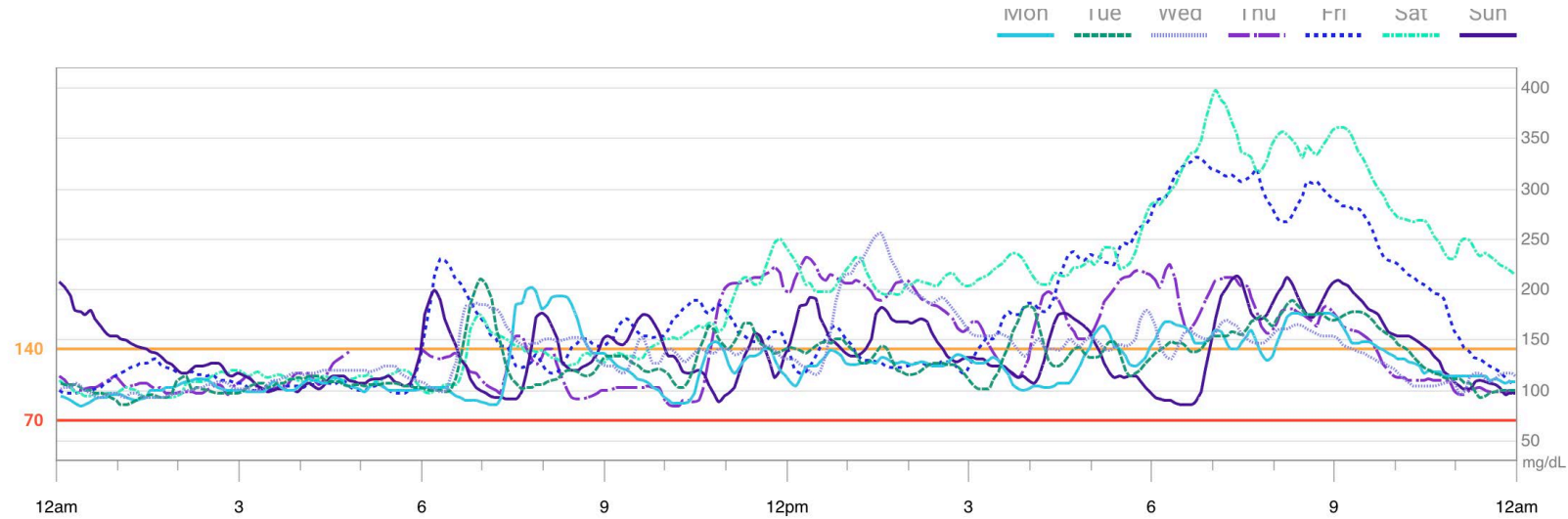
Two weeks later, illness resolved

CGM	
>140:	25%
Time in range:	74%
Avg SG (mg/dL):	123 ± 32

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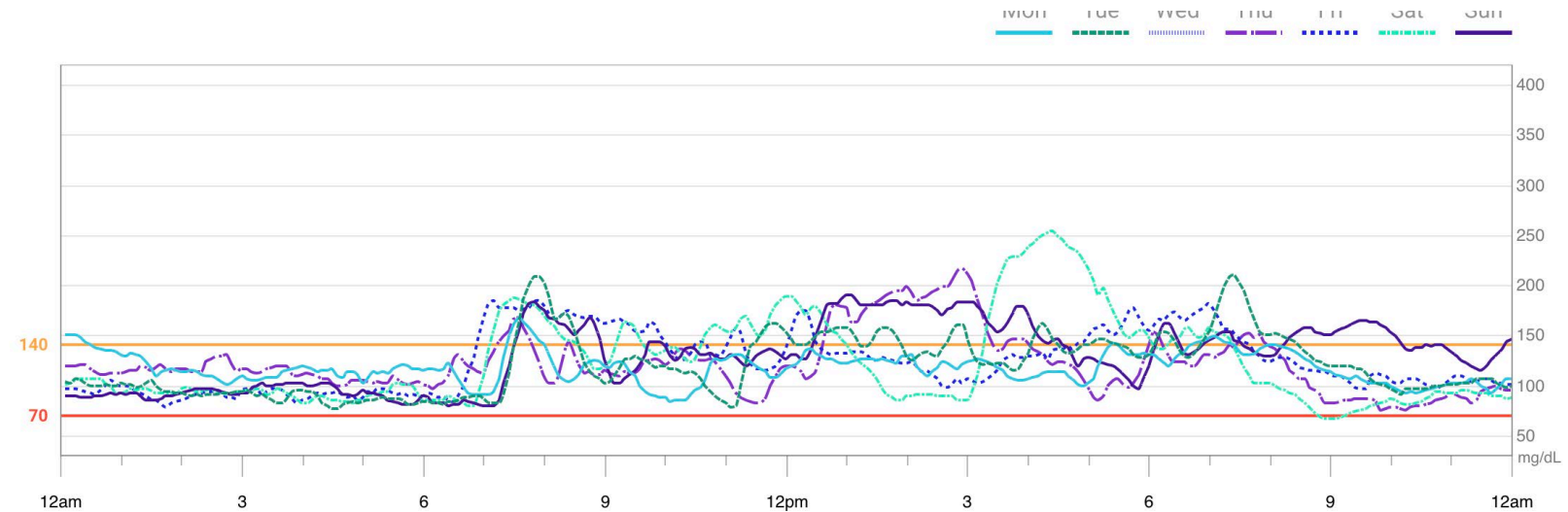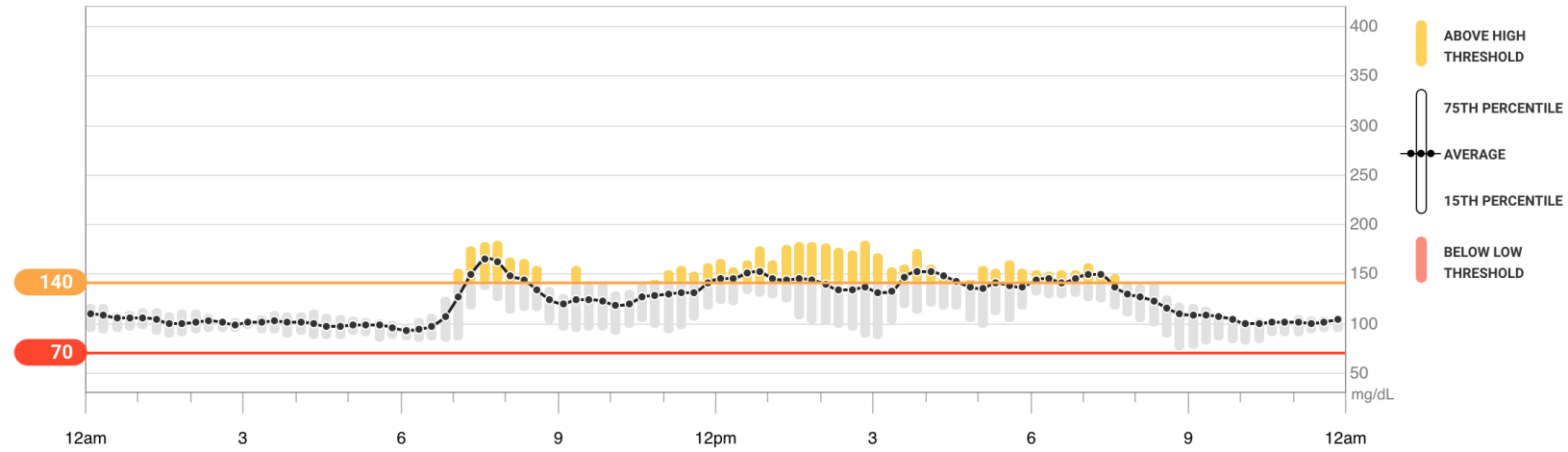
Two months later, diagnosed with Stage 3 T1D

HbA1c	6.0%

CGM	
>140:	56%
Time in range:	43%
Avg SG (mg/dL):	168 ± 59

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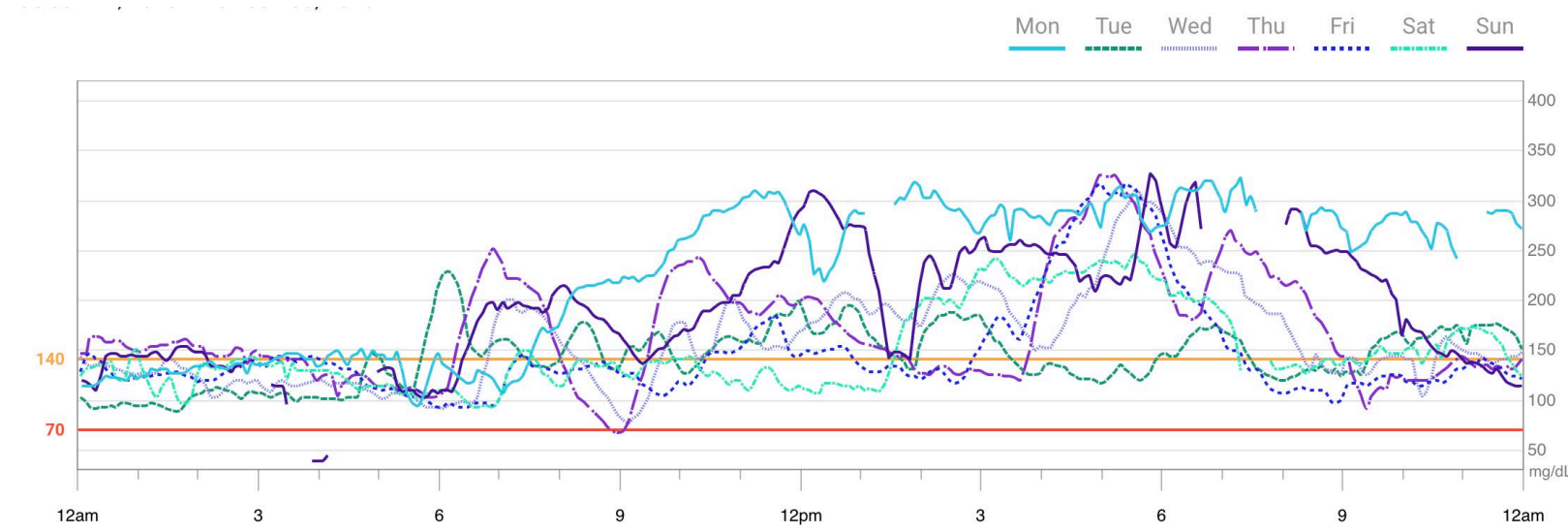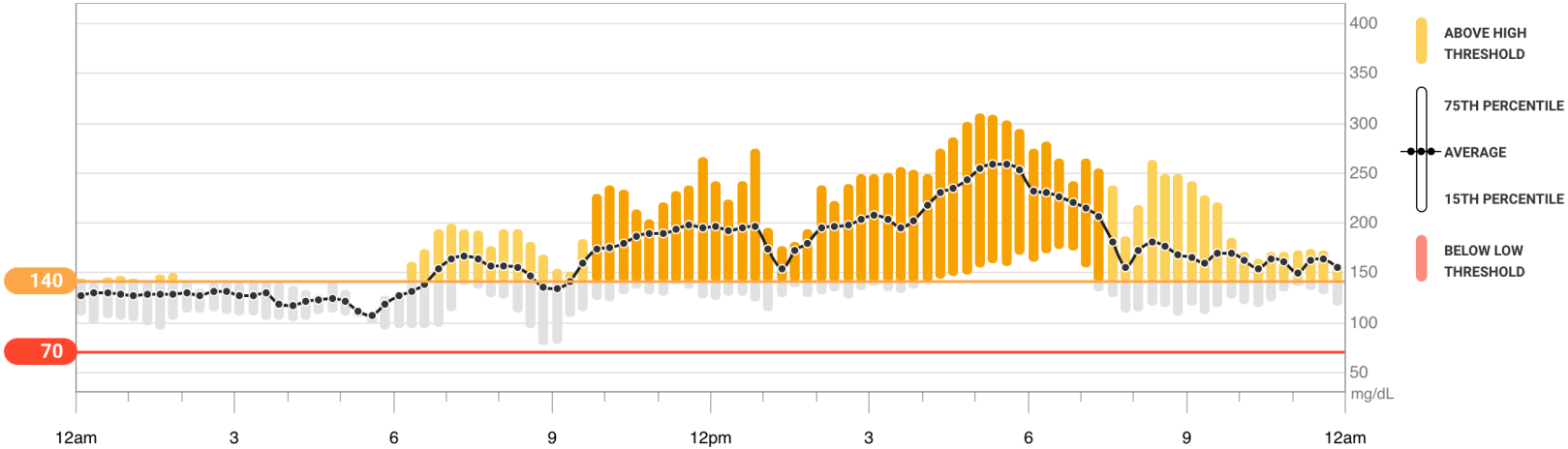
One month later, Short-acting insulin at dinner

CGM	
>140:	33%
Time in range:	65%
Avg SG (mg/dL):	127 ± 40
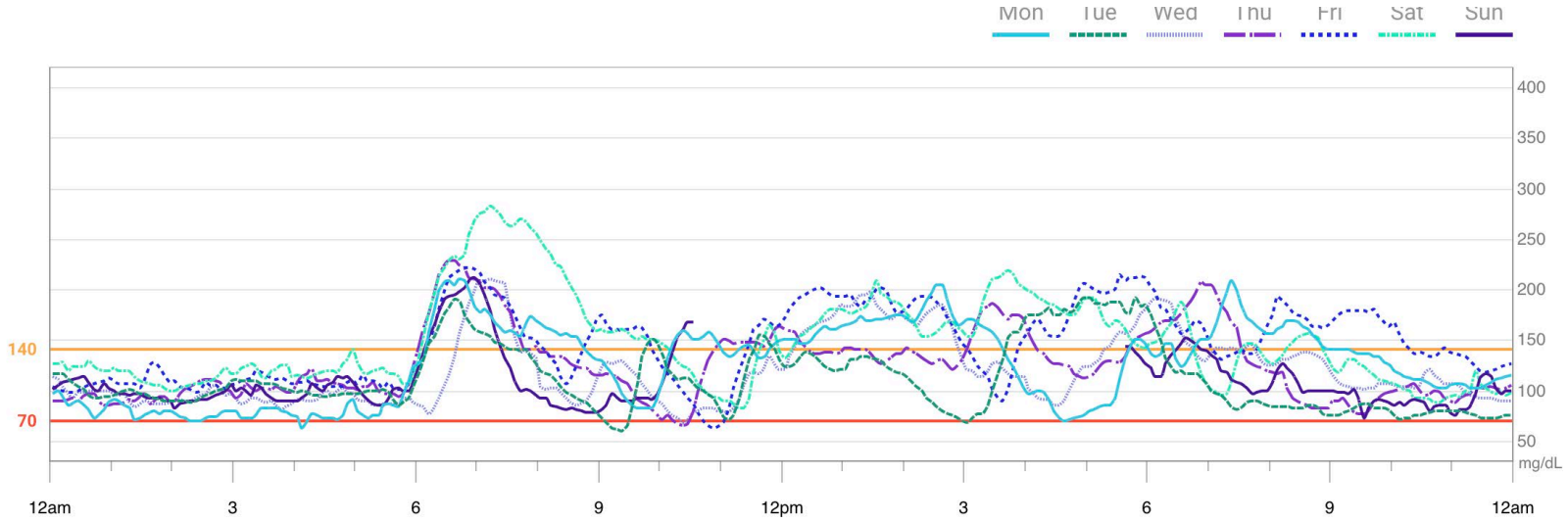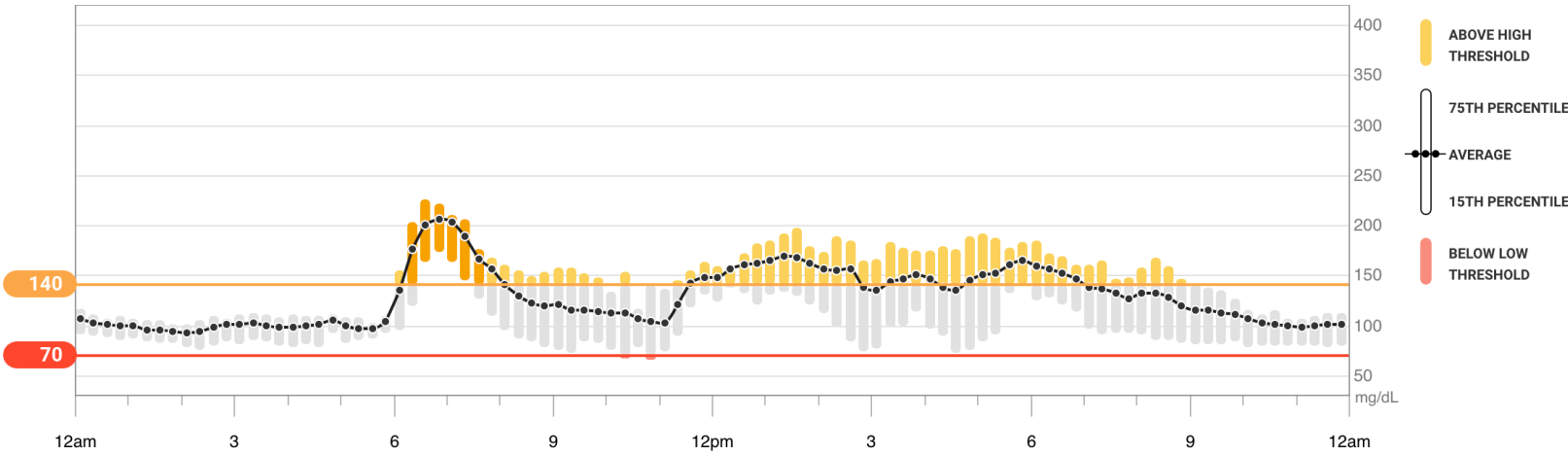
Use of CGM-Guided Education

❖Observation of patterns
  ❖Impact of diet and exercise on glycemic excursions
  ❖Trends with illness / hormones / changes in activity level
❖Recognition of need for insulin

Excerpts from JDRF Consensus Guidance for Monitoring: Education Working Group

❖ **Why?**
    ❖ Monitoring and education program can reduce DKA at stage 3

❖ **Who?**
    ❖ Provided by all health professionals involved in monitoring and care

❖ **When?**
    ❖ At diagnosis of each stage, annually for review and maintenance, during life transitions

❖ **What?**
    ❖ Education should accompany all monitoring plans
    ❖ Topics and intensity based on T1D stage and risk of progression

❖ **How?**
    ❖ Culturally and linguistically congruent
    ❖ Accessible, engaging and patient-centered (considering developmental, social, emotional needs of individual and/or family)

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tess — the early start study
for pre-symptomatic T1D