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TYPE 1 DIABETES BURDEN

What is it?


How is it caused?

 Genetics, & NOT Environmental

- 1.5 M Americans have T1D and 1 in 10 are under the age of 20
- Most people are diagnosed before the age of 12
- ~1.5 hours of daily care
- ~\$1,100 per month in costs

STAKEHOLDERS

- T1D Patients (14-20)
- Parents
- Primary Care Providers

EXISTING SOLUTIONS

- Finger Prick
- DEXCOM CGM
- MySugr
- T1D Travel Kit

OUR NEEDS STATEMENT
 A way for **young adults (ages 14-20)** recently diagnosed with **Type 1 Diabetes (T1D)** to passively manage and monitor symptoms to reduce the stress and burden caused by T1D.



PROTOTYPES

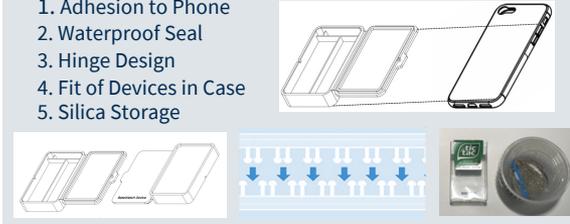
- Cardboard Case
- Initial Seal Design
- Fit Test
- Adhesion Design

CORE FUNCTIONS

- Assist passive T1D Management
- Alleviate Social Burden
- Educate on T1D Management
- Keep Parents Informed

KEY COMPONENTS

- Adhesion to Phone
- Waterproof Seal
- Hinge Design
- Fit of Devices in Case
- Silica Storage



FUTURE STEPS

- Optimize dynamics of case
- Consult for manufacturability options
- Continue further user testing



Supplemental Information



Presented by:

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With Novo Nordisk Partners:

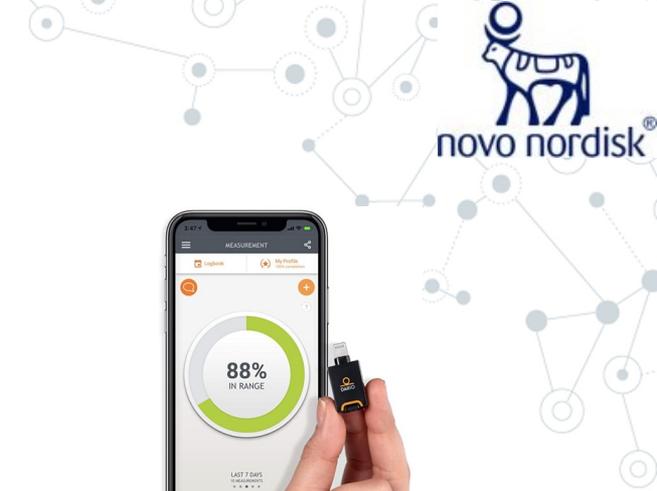
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Bluetooth Device Candidates



One Drop (\$49.99)



DIABNEXT Gluconext GA1 (\$29.99)



Dario Blood Glucometer (\$24.90)



iHeart Smart Wireless (\$29.99)



Contour Next One (\$6.99)



CURO G6s Glucose (\$19.99)

Final Candidates: One Drop & Contour Next One



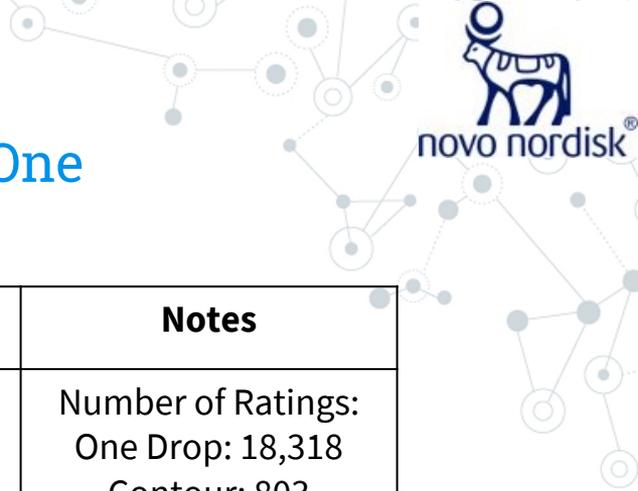
A) One Drop and B) Contour Next

Table 1. Accuracy comparison between the Contour One and One Drop glucometers

Experimental Trials	Glucometer Devices	
	One Drop Device glucose level (mg/dL)	Contour Next One Device glucose level (mg/dL)
Trial 1	134	147
Trial 2	149	135
Trial 3	152	150
Average	145±10.913 (95% CI)	144±8.982 (95% CI)
Standard Deviation	9.643	7.937

Final Candidates: One Drop & Contour Next One

Features	One Drop Device	Contour Device	Notes
Product Image			N/A
Product Cost (USD)	\$49.99	\$6.99	Kit included
Product Dimensions (LxWxH) - (mm)	70 x 30 x 10	97 x 28 x 14.9	N/A
Weight (g)	19.54	37.48	Large Difference



Final Candidates: One Drop & Contour Next One

Features	One Drop Device	Contour Device	Notes
App Store Rating	4.5	3.1	Number of Ratings: One Drop: 18,318 Contour: 803
Age Requirement	4+	17+	Significant Difference
App Download Cost	Free	Free	N/A
Subscription Options	✓	✗	N/A
Delivery Service	✓	✗	Different Options
Health Coach Service	✓	✗	\$19.99/mo. access
Reminders & Data	✓	✓	N/A



Prototype Evaluation: Fit Test



Glucometer



Clasp

4 Sanitary Wipes

Hinge

Lancets

8 Testing strips

Silica beads





Prototype Evaluation: Silica Bead Test

Goal:

Determine the amount of silica that will be required to sufficiently reduce humidity

Assumptions:

- 1. Silica beads contents optimized by Contour©
- 2. Negligible silica bead loss during extraction



Result: 0.35g silica required per strip





Prototype Evaluation: Humidity Testing

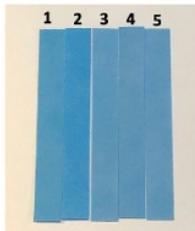
Goal:

Determine optimal seal for humidity and water resistance

Seals Tested:



Test for Humidity in Air



- 1) The control strip from the supply – used for reference
- 2) The strip that was left inside the silica bead container
- 3) The strip left in direct contact with the surrounding air
- 4) The strip inside the Tic Tac container and 5) Ice Breaker

12hr duration

Test for Water Resistance

5 sec. duration



(left strip) that is exposed to water, whereas (right strip) is not exposed to any sources of water.



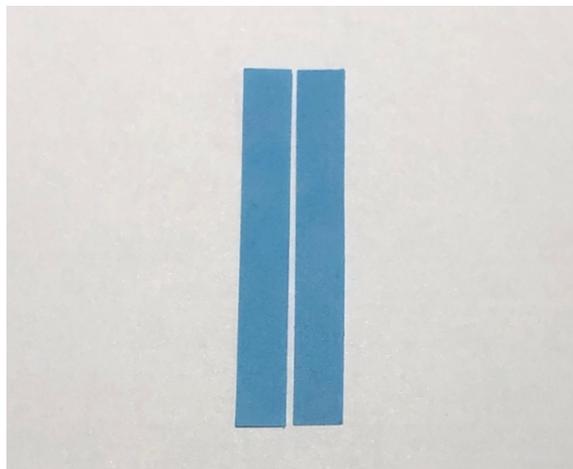
- 1) The control strip from the supply – used for reference
- 2) The Ice Breaker container exposed to water leakages
- 3) The Tic Tac container resistant to any water exposure
- 4) The silica bead container resisting any water exposure

Result:

Tic Tac container had the best seal, will be explored further

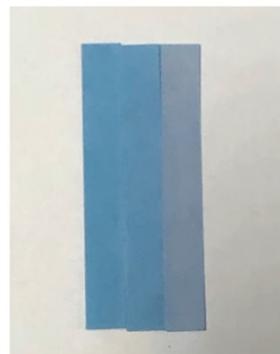


Prototype Evaluation: "Everyday Use"



The control strip **(left)** vs. the Tic Tac strip **(right)**

Tic Tac container on one person for 12-hours
Opened 10 times a day
(Repeated by 5 users 3 days each)



(left) Control strip
(middle) Tic Tac container
(right) Exposure to humid air

Next to shower curtain for 10 minutes
(Repeated 5 times)

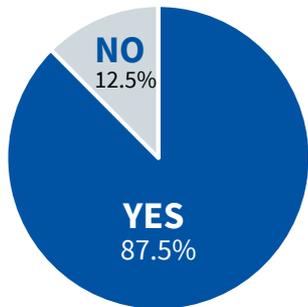
Result:

Tic Tac container as *interference* fit is appropriate for daily use, will be further tested

Survey Results

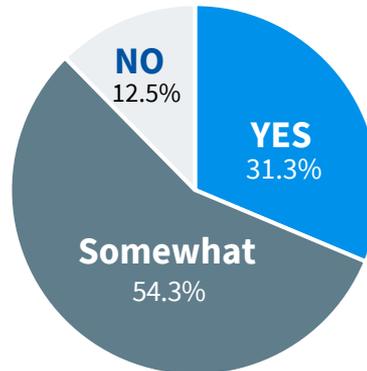


Do you use a finger prick glucose monitor?



- Yes, I use it sometimes
- No, used to use it but don't currently
- Yes, it is my primary device
- No, I have never used it

Are you aware of health monitoring apps such as MySugr, Apple Health, MyPlate, etc.?



- Yes, I have heard of them and am aware of some of the functions they may include
- Yes, I have heard of them but don't know much else about them
- No, I have never heard of them

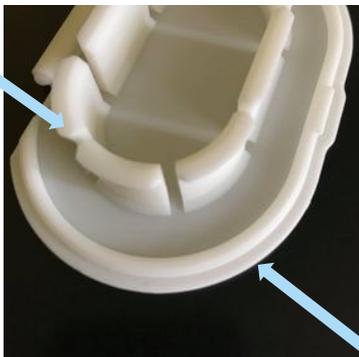
N= 16, responses still coming in

Result:

- Majority of patients use a finger prick glucose monitor
- Education of T1D apps is needed

Initial Seal Prototype

Excess
Material



Lid

Seal
design

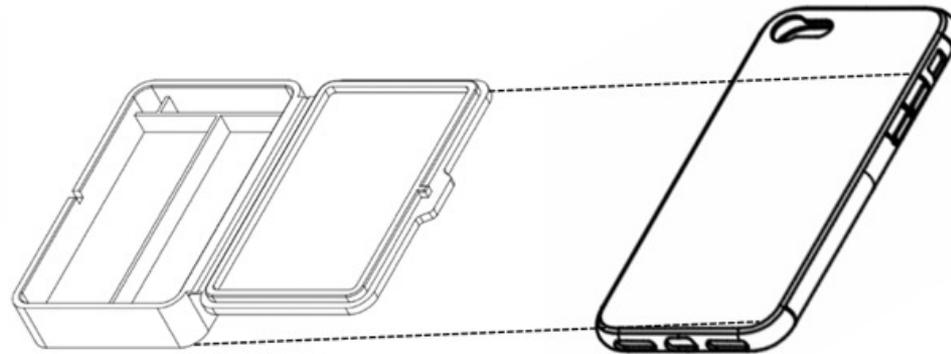
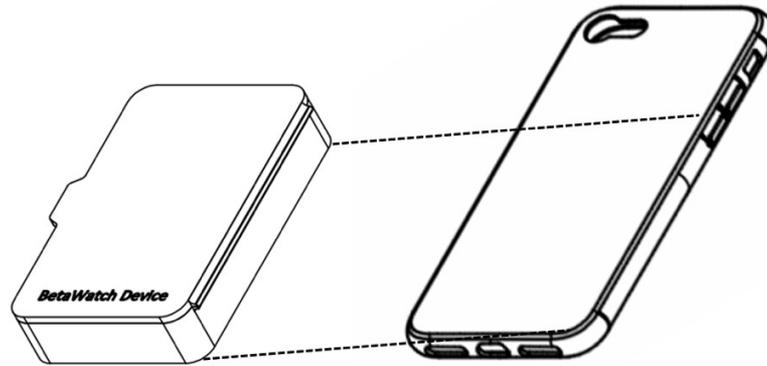


Fit of Lid to Container

Result:

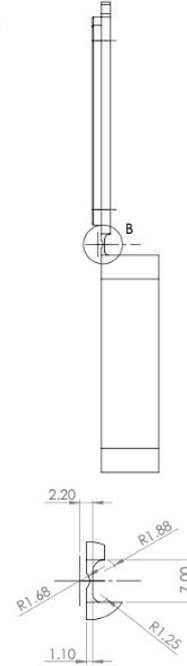
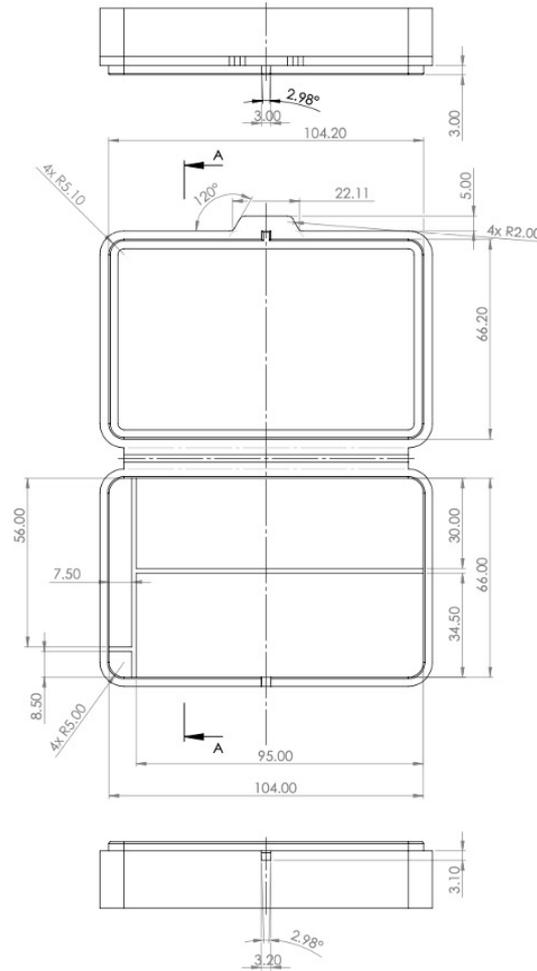
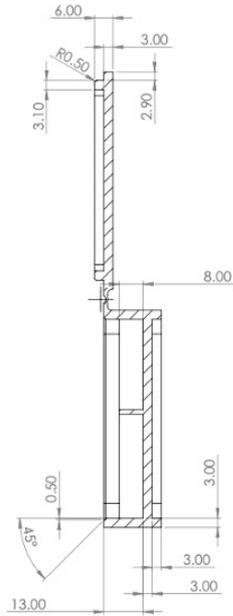
- Snap seal was achieved
- Further Humidity testing will be done
- Further materials research will be done

CAD Design





CAD Design



Top View



Side Views

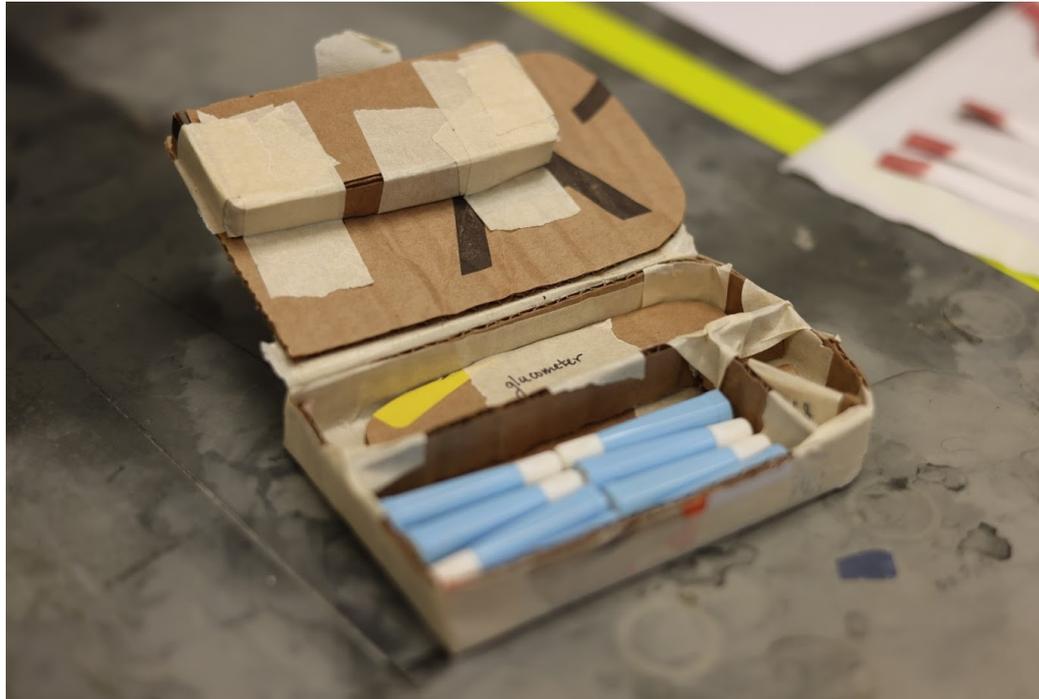




Integration with Phone



Previous Prototype





Supplemental Mobile Apps

App Name	Description	Assist Passive Management	Enable Parent Communication	Patient Education	Age Range
My Suger	Glucose tracking app, pairs with glucometer	✓	✓	✓	All Ages
Beyond Type 1	Community based app centered around discussion of different topics in diabetes management	✓	✓	✓	14+
One Drop	Glucose tracking and health coaching app	✓	✓	✓	4+