

ADULT TRACK

DIABETES TECHNOLOGIES IN ADULTS



Halis Kaan Akturk MD

Assistant Professor of Medicine and Pediatrics
Barbara Davis Center, Adult Clinic
University of Colorado



#EPICconf2019

www.EPICconferences.org



EPIC
DIABETES
CONFERENCE

MAY 11, 2019 | THE WESTIN DOWNTOWN DENVER

EMPOWERING PATIENTS
FOR
INDIVIDUALIZED CARE

The logo for the Barbara Davis Center for Diabetes, featuring a circular emblem with a silhouette of a person on a horse, surrounded by the text "Barbara Davis Center for Diabetes" and "Children's Diabetes Foundation".

COI

Research grant through University of Colorado:
Senseonics, REMD Pharmaceuticals, Eli Lilly, Mannkind



#EPICconf2019

www.EPICconferences.org



HISTORY OF INSULIN PUMP TECHNOLOGY



1960s/70s
present



1970s/80s



1990s



2000s



2009 to
present

John M. Holman, M.D., M.P.H., A. Diabetes 2011

MEDTRONIC 670 G- FIRST HYBRID CLOSED LOOP



- Target BG : 120 mg/dl
- Temporary target: 150 mg/dl
- Auto mode driven control
- Calibration required
- BDC has highest 670 G user volume

OMNIPOD DASH

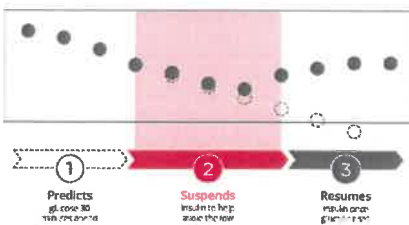


- Bluetooth-enabled Pod
- Mirroring to phone app
- Calorie King app integration
- Connectivity to glucose meter
- Side by side Dexcom CGM monitoring on app (No direct integration)

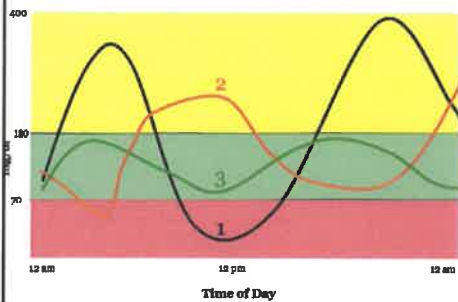
TANDEM X2 BASAL IQ



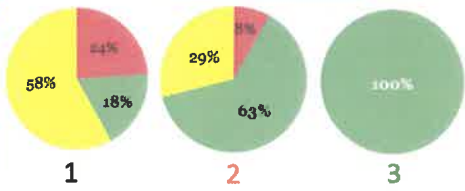
- Predictive low glucose suspend
- Integration with Dexcom G6
- No calibration



BEYOND HBA1C- TIME IN RANGE



The Many Faces of a 7% A1c
 Time spent **HIGH** **IN RANGE** **LOW**



CURRENT CGM TECHNOLOGIES

DEXCOM G6



- 10 day use
- No calibration
- Simplified insertion
- High/low alarms
- Sharing with loved ones



#EPICconf2019

www.EPICconferences.org



CURRENT CGM TECHNOLOGIES

FREESTYLE LIBRE



- 10 or 14-day wear options
- No calibration
- No high/low alarms
- 14-day version can use iPhone as a reader



#EPICconf2019

www.EPICconferences.org



CURRENT CGM TECHNOLOGIES

MEDTRONIC GUARDIAN SENSOR 3 AND GUARDIAN CONNECT



- 7-day wear
- 2 calibration per day (3-4 calibration can optimize accuracy)
- High/low alarms
- Sharing with loved ones
- Works with Sugar IQ Diabetes Assistant



#EPICconf2019

www.EPICconferences.org



CURRENT CGM TECHNOLOGIES

SENSEONICS EVERSENSE



- Implantable CGM- insertion in clinic visit
- 3-month wear*
- Wearable, rechargeable transmitter
- 2 calibration per day
- High/low alarms on phone/ on-body vibration alerts

*Current ongoing multi-center study (PROMISE) including BDC assesses 6-month use (Europe approval is 6 months)



#EPICconf2019

www.EPICconferences.org



DECISION MAKING TECHNOLOGIES

SUGAR IQ DIABETES ASSISTANT APP



#EPICconf2019

www.EPICconferences.org



SMART PENS- INPEN



- Pen is paired with app via Bluetooth
- Novolog or Humalog cartridges
- Insulin carb ratio, correction, insulin on board calculator (like using a pump)
- Insulin dose tracking/reminders
- Data sharing with others
- Integration with Dexcom G6 and some glucometers via smart phone health app (not a direct communication)



#EPICconf2019

www.EPICconferences.org



SMART PEN ADD ON- GOCAP



- Add on is paired with app via Bluetooth
- Works with all insulin pens
- Insulin dose tracking/reminders
- Temperature monitoring
- Data sharing with others
- USD rechargeable



#EPICconf2019

www.EPICconferences.org



FUTURE CLOSED-LOOP SYSTEMS

INSULIN ONLY

- Medtronic 780G*
- Tandem X2 Control IQ- Second half of 2019
- Omnipod Horizon
- Omnipod Tidepool Loop
- University of Cambridge[†]
- University of Virginia /Padova (TypeZero)[#]
- Bigfoot
- Illinois Institute of Technology
- Renssealer Polytechnic Institute

DUAL (INSULIN AND GLUCAGON)

- Boston University-Ilet (Beta Bionics)[‡]
- University of Montreal (Exercise management focused)^{**}
- University of Oregon (Exercise management focused)[§]

Some systems use insulin-amylin dual pump

*Diatrobe, [†]Baily L. Lancet 2017; [‡]Breton MD. Diab Care 2017; [‡]Russell SJ. NEJM 2014; ^{**}Taleb, Diabetologia, 2016; [§]Jacobs PG. Diab Obes Met 2016



#EPICconf2019

www.EPICconferences.org



CHALLENGES IN AP DEVELOPMENT

INSULIN ONLY

- Exercise
- Concomitant medications (SGLT 1-2, inhaled insulin)
- New faster insulins
- Meal input (or not)
- Cost

DUAL (INSULIN AND GLUCAGON)

- Same problems of insulin only systems PLUS
- Nausea*
- Adverse skin reactions
- Pump compatibility (Glucagon stabilization)→ Dasiglucagon (A new aqueous stable glucagon for pumps)*

*Taleb, Diabetologia, 2016; +Castle, DTT 2019

DIY AP

- NightScout #wearenotwaiting , x-Drip
- LOOP (Uses Medtronic and recently Omnipod)
- Open APS
- Android APS
- HAPP



Not FDA approved/regulated products

PUMP AND CGM DISCONTINUATION RESULTS

Most Common Reasons for Pump Discontinuation	
	Percent found important
Problems with insertion/adhesives	40%
Insulin expiring/not covered by insurance	45%
Interfered with sports or activities	42%
Discomfortable to wear	38%
Difficult securing the pump	36%
Interfered with intimacy	34%
Pump did not work properly	28%
Problem with high blood sugars when using the pump	28%
<small>Reasons for discontinuation did not necessarily add up to 100%</small>	


Most Common Reasons for CGM Discontinuation	
	Percent found important
Problems with the CGM working properly/not accurate enough	74%
Problem with the sensor insertion/adhesives	64%
Insulin expiring/not covered by insurance	58%
Sensor was uncomfortable to wear	43%
Using a pump and still not wear two sites on body	33%
The CGM was too big	28%
<small>Reasons for discontinuation did not necessarily add up to 100%</small>	

Courtesy of Dr. Shah, T1D Exchange Data



#EPICconf2019

www.EPICconferences.org



SUMMARY

- Diabetes Technology moves fast
- Individualizing the technology (Fits patient's lifestyle)
- Patient-centered approach with shared decision-making
- Close monitoring/ trouble shooting after introduction of a new technology

THANK YOU



Barbara Davis Center is working for a better life for people with diabetes

