

# LA TECNOLOGIA oggi ... e domani

**Milano, 7 giugno 2025**

**Asst Grande Ospedale Metropolitano Niguarda**

**IV SESSIONE • Le applicazioni della tecnologia**

## NELLE FORME SECONDARIE DI DIABETE

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SS Diabetologia \_ SC Endocrinologia

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Policlinico di Milano

# DIABETE - Classificazione

## CLASSIFICATION

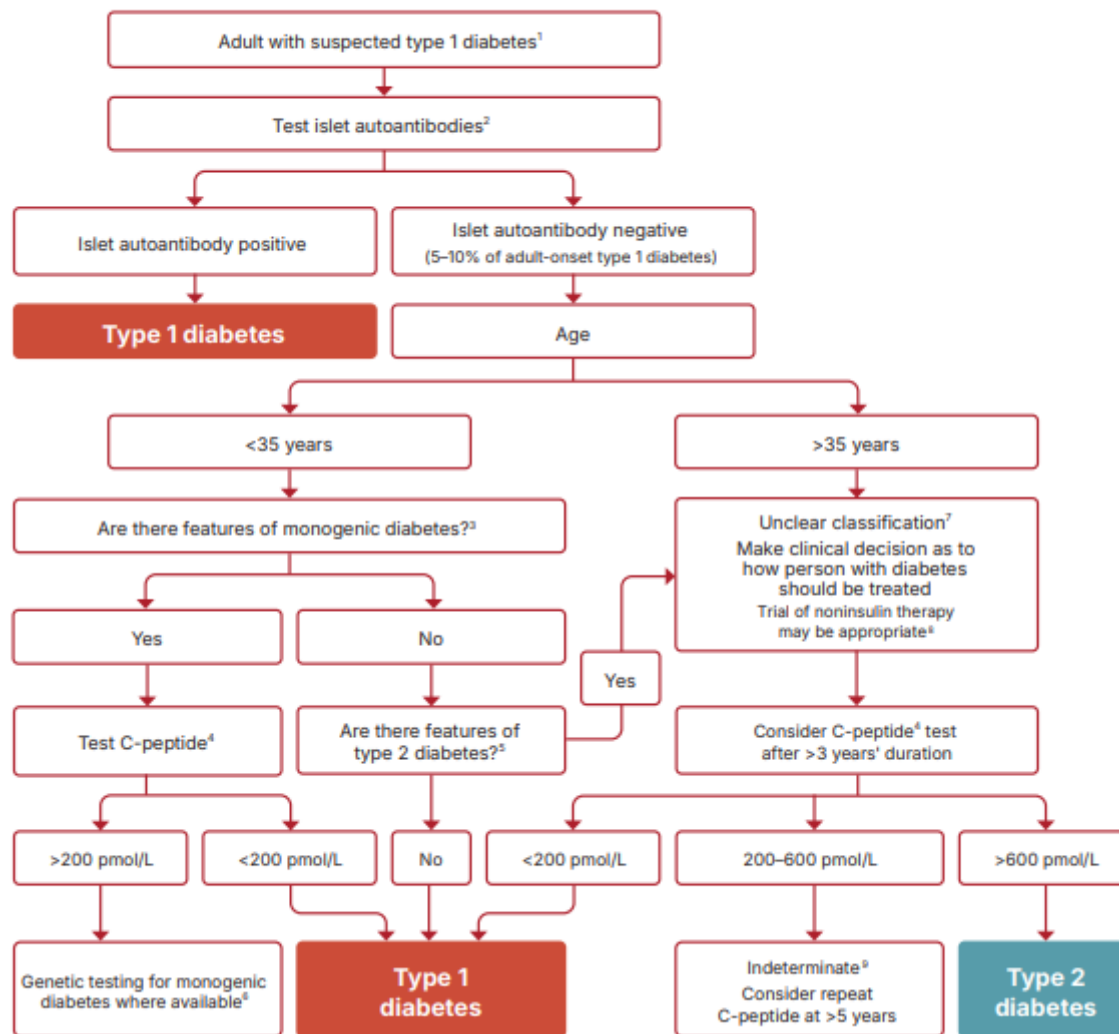
### Recommendation

**2.5** Classify people with hyperglycemia into appropriate diagnostic categories to aid in personalized management. **E**

1. Type 1 diabetes (due to autoimmune  $\beta$ -cell destruction, usually leading to absolute insulin deficiency, including latent autoimmune diabetes in adults)
2. Type 2 diabetes (due to a nonautoimmune progressive loss of adequate  $\beta$ -cell insulin secretion, frequently on the background of insulin resistance)
3. Specific types of diabetes due to other causes, e.g., monogenic diabetes syndromes, diseases of the exocrine pancreas, and drug- or chemical-induced diabetes
4. Gestational diabetes mellitus (diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation or other types of diabetes occurring throughout pregnancy, such as type 1 diabetes).



Flowchart for investigation of suspected type 1 diabetes in newly diagnosed adults, based on data from White European populations



# DIABETE - Classificazione

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### Recommendation

**2.5** Classify people with hyperglycemia into appropriate diagnostic categories to aid in personalized management. **E**

One useful clinical tool for distinguishing diabetes type is the **AABBCC** approach: **A**ge (e.g., for individuals <35 years old, consider type 1 diabetes); **A**utoimmunity (e.g., personal or family history of autoimmune disease or polyglandular autoimmune syndromes); **B**ody habitus (e.g., BMI <25 kg/m<sup>2</sup>); **B**ackground (e.g., family history of type 1 diabetes); **C**ontrol (preferred term is "goal," i.e., the inability to achieve glycemic goals on noninsulin therapies); and **C**omorbidities (e.g., treatment with immune checkpoint inhibitors for cancer can cause acute autoimmune type 1 diabetes) (36).

A - age: valutare età del paziente

A - autoimmunity: valutare presenza di altre autoimmunità

B – body habitus: considerare habitus corporeo

B - background: ricercare familiarità per altre autoimmunità

C - control: difficoltà nell'ottenere il goal glicemico con terapie non insuliniche

C - comorbidities: valutare le eventuali comorbilità



# DIABETE - Classificazione

## Update on Diabetes Classification



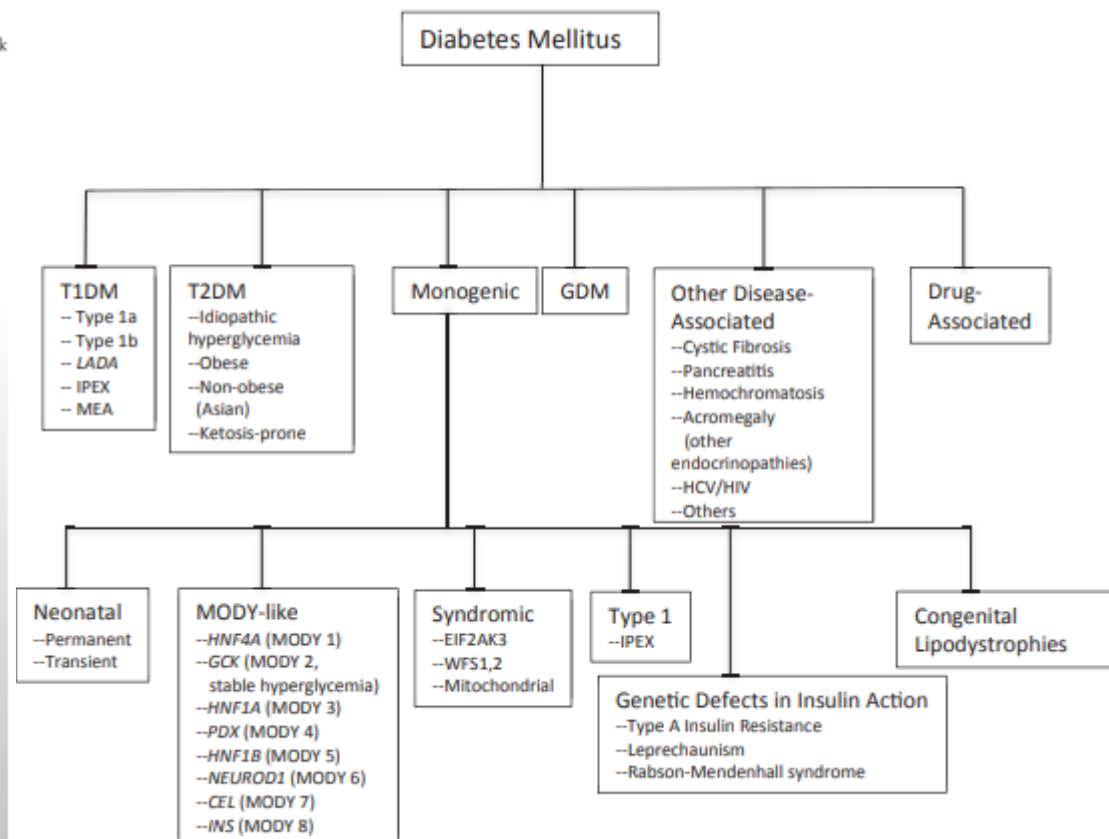
Celeste C. Thomas, MD, MS<sup>a,\*</sup>, Louis H. Philipson, MD, PhD<sup>a,b</sup>

### KEYWORDS

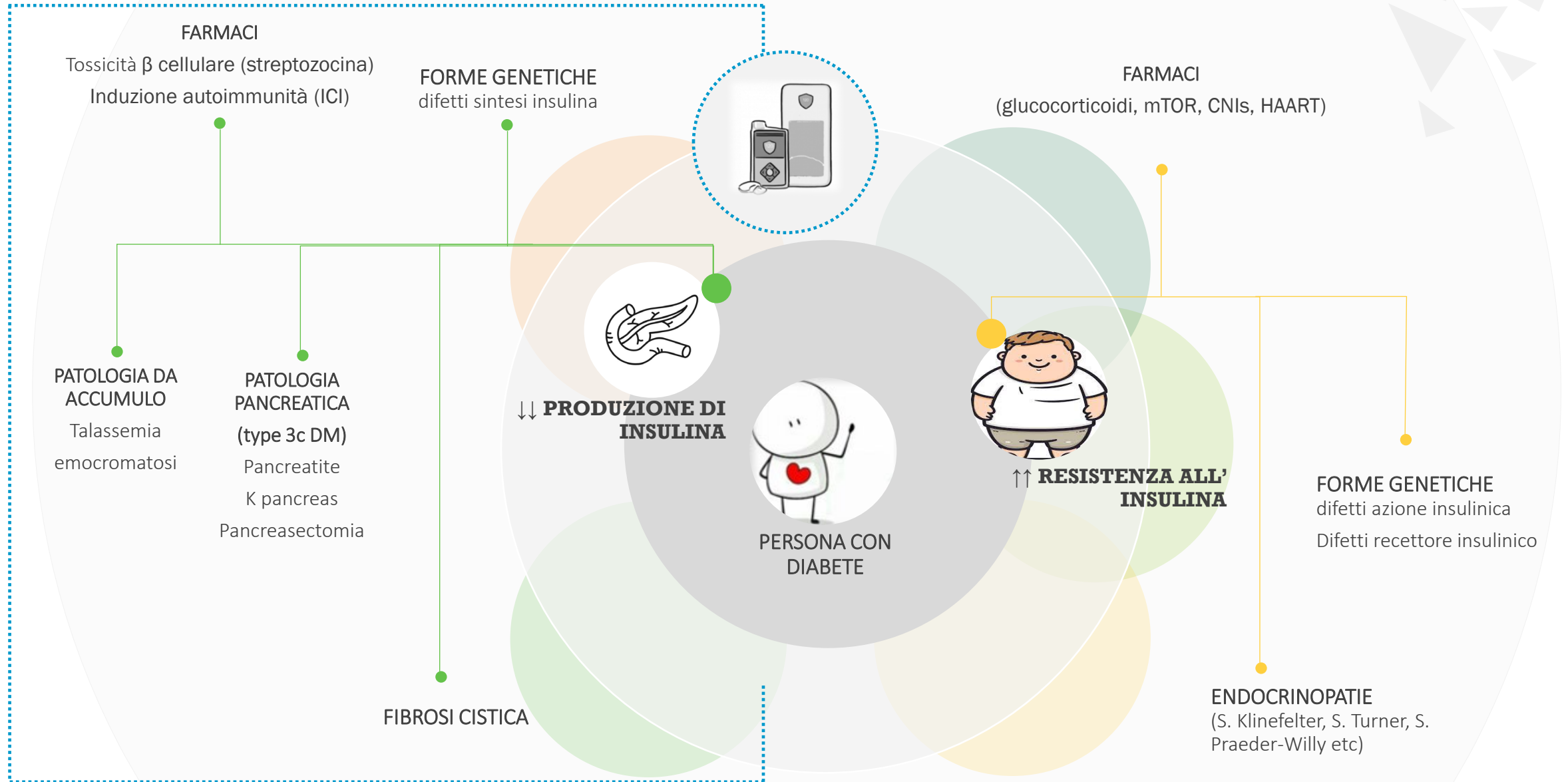
- Classification of diabetes mellitus • Gestational diabetes mellitus
- Latent autoimmune diabetes of adults • Monogenic diabetes
- Maturity-onset diabetes of the young • Neonatal diabetes • Secondary diabetes
- Type 1 and Type 2 diabetes mellitus

### KEY POINTS

- The classification of diabetes mellitus is evolving as we work to fully understand the pathogenesis of the major forms.
- The goal of classification is to say something meaningful about the cause, natural history, genetics, heritability, clinical phenotype and optimum treatments of a disease. In the case of diabetes, this is getting harder to do rather than easier.
- Monogenic diabetes mellitus remains undiagnosed in more than 90% of the individuals who have this form of diabetes caused by one of the known gene mutations.



# DM, FORME SECONDARIE – quale spazio per la tecnologia?



# DM, FORME SECONDARIE – quali indicazioni?

**7.15** Recommend real-time CGM (rtCGM) **A** or intermittently scanned CGM (isCGM) for diabetes management to youth **C** and adults **B** with diabetes on any type of insulin therapy. The choice of CGM device should be made based on the individual's circumstances, preferences, and needs.



**7.16** Consider using rtCGM and isCGM in adults with type 2 diabetes treated with glucose-lowering medications other than insulin to achieve and maintain individualized glycemic goals. The choice of device should be made based on the individual's circumstances, preferences, and needs. **B**

**7.26** AID systems should be the preferred insulin delivery method to improve glycemic outcomes and reduce hypoglycemia and disparities in youth and adults with type 1 diabetes **A** and other types of insulin-deficient diabetes **E** who are capable of using the device (either by themselves or with a caregiver). Choice of an AID system should be made based on the individual's circumstances, preferences, and needs. **A**



**7.27** Insulin pump therapy, preferably with CGM, should be offered for diabetes management to youth and adults on MDI with type 2 diabetes who can use the device safely (either by themselves or with a caregiver). The choice of device should be made based on the individual's circumstances, preferences, and needs. **A**

**7.24** Offer connected insulin pens for people with diabetes taking multiple daily insulin injections. **B**

**7.25** FDA-approved insulin dose calculators/decision support systems may be helpful for calculating insulin doses. **B**



**7.29** Support and provide diabetes management advice to people with diabetes who choose to use an open-source closed-loop system. **B**



# AID – lo stato attuale



# AID – il panorama attuale

EXPERT  
REVIEW

OF MEDICAL DEVICES

Expert Review of Medical Devices

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/ierd20>

## Closed-loop insulin delivery: update on the state of the field and emerging technologies

Julia Ware & Roman Hovorka

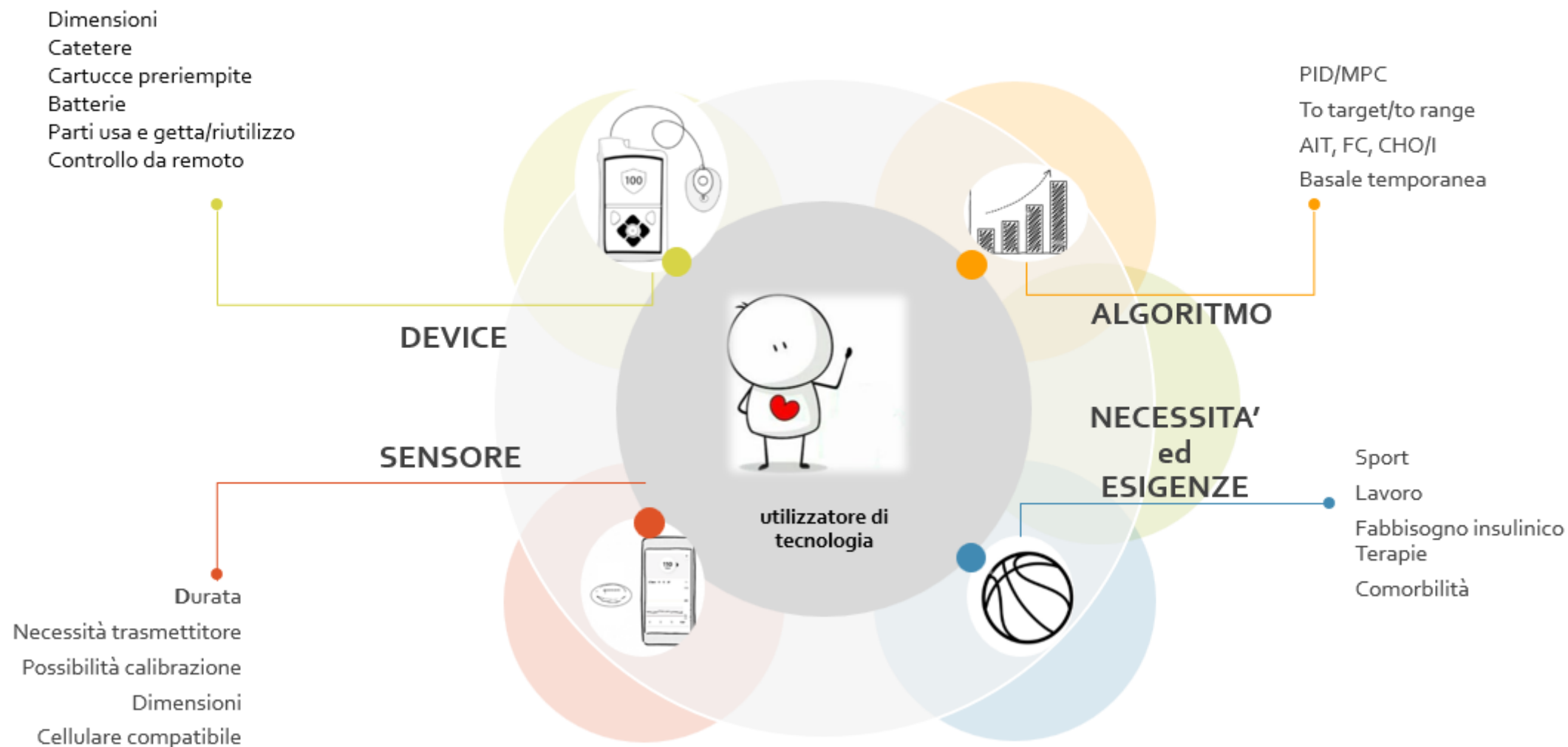
Table 1. Comparison of commercially available hybrid closed-loop systems.

|                                                                 | Medtronic 670G HCL/780G AHCL                                                                          | Tandem Control-IQ                                | CamAPS FX                                                         | Diabeloop DBLG1                                          | Omnipod 5 HCL                                                     |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------|
| <b>Regulatory approvals</b>                                     |                                                                                                       |                                                  |                                                                   |                                                          |                                                                   |
| <b>Age licensed for</b>                                         | 7 years +                                                                                             | 6 years +                                        | 1 year +<br>Pregnancy                                             | 18 years +                                               | 6 years + (USA)<br>2 years+ (Europe)                              |
| <b>Countries licensed in</b>                                    | USA & Europe                                                                                          | USA & Europe                                     | Europe, Canada, Australia                                         | Europe                                                   | USA & Europe                                                      |
| <b>Location of algorithm</b>                                    | Pump-integrated                                                                                       | Pump-integrated                                  | App-based                                                         | App-based                                                | Pod-integrated                                                    |
| <b>Factory-calibrated CGM</b>                                   | Yes: Guardian 4 (780 G)<br>No: Guardian 3 (670 G)                                                     | Yes – Dexcom G6                                  | Yes – Dexcom G6                                                   | Yes – Dexcom G6                                          | Yes – Dexcom G6                                                   |
| <b>Compatible insulin pumps</b>                                 | Minimed 670G<br>Minimed 780G                                                                          | T-slim X:2                                       | Dana RS and Dana-i<br>YpsoPump                                    | Accucheck Insight<br>Kaleido                             | Omnipod                                                           |
| <b>Insulins licensed for System features</b>                    | Rapid-acting                                                                                          | Rapid-acting                                     | Rapid- and ultra-rapid                                            | Rapid-acting                                             | Rapid-acting                                                      |
| <b>Type of algorithm</b>                                        | PID with insulin feedback with adaptive insulin limits (670G) and model based auto-corrections (780G) | MPC                                              | MPC                                                               | MPC                                                      | MPC                                                               |
| <b>Adaptive learning</b>                                        | TDI and estimate of fasting glucose and the plasma insulin concentration at the time of fasting       | None                                             | TDI, diurnal, meals                                               | TDI, diurnal, meals                                      | TDI                                                               |
| <b>Target type</b>                                              | Treat-to-target                                                                                       | Treat-to-range                                   | Treat-to-target                                                   | Treat-to-target                                          | Treat-to-target                                                   |
| <b>User-adjustable settings</b>                                 | Target glucose (780G only), active insulin time, ICR, activity mode                                   | Basal rates, ICR, ISF, activity mode, sleep mode | Target glucose, ICR, activity mode, Boost mode                    | Target glucose, TDI, algorithm treatment reactivity, ICR | Target glucose, ICR, activity mode                                |
| <b>Adjustable glucose target</b>                                | 670G: Non-adjustable (6.7 mmol/L)<br>780G: 5.1, 5.6, 6.7 mmol/L                                       | Non-adjustable target range of 6.2 to 8.9 mmol/L | Personalized target 4.4 to 11 mmol/L; up to 48 timeblocks per day | Personalized target 5.6 to 7.2 mmol/L                    | Personalized target 6.1 to 8.3 mmol/L; up to 8 timeblocks per day |
| <b>Pre-set basal rates influence automated insulin delivery</b> | No                                                                                                    | Yes                                              | No                                                                | No                                                       | No (inform automated insulin delivery for first 48 hours)         |
| <b>Active insulin time</b>                                      | Adjustable 2–8 hours                                                                                  | 5 hours; non-adjustable                          | Automatically adjusted based on adaptive learning                 | Automatically adjusted based on adaptive learning        | Adjustable 2–6 hours                                              |
| <b>Automated correction bolus</b>                               | 670G: No<br>780G: Yes                                                                                 | Yes                                              | No (incorporated into continuous insulin delivery)                | Yes                                                      | No (incorporated into continuous insulin delivery)                |
| <b>Automode exits</b>                                           | Yes (multiple (670G); min/max insulin delivery (780G))                                                | No                                               | No                                                                | No                                                       | Yes (min/max insulin delivery)                                    |
| <b>Automated data upload to cloud</b>                           | 670G: No<br>780G: Yes                                                                                 | Yes (USA only)                                   | Yes                                                               | No                                                       | Yes                                                               |
| <b>User features</b>                                            |                                                                                                       |                                                  |                                                                   |                                                          |                                                                   |
| <b>Phone-based bolusing</b>                                     | No                                                                                                    | Yes (USA only)                                   | Yes                                                               | Yes                                                      | Yes                                                               |
| <b>Activity mode</b>                                            | Yes                                                                                                   | Yes                                              | Yes                                                               | Yes                                                      | Yes                                                               |
| <b>Other modes</b>                                              | No                                                                                                    | Sleep Activity (target range 6.1–6.7 mmol/L)     | Boost mode (increases insulin delivery)                           | Zen mode (increases glucose target)                      | No                                                                |
| <b>Remote data monitoring</b>                                   | 670 G: No<br>780 G: Glucose data                                                                      | Glucose data via Dexcom Follow                   | All data via Diasend app; SMS alerts                              | Glucose data via Dexcom Follow                           | Glucose data via Dexcom Follow                                    |

[CGM – continuous glucose monitoring; PID – proportional integral derivative; MPC – model predictive control; TDI – total daily insulin; ICR – insulin to carbohydrate ratio; ISF – insulin sensitivity factor]

Le applicazioni della tecnologia nelle forme secondarie di diabete – Valeria Grancini

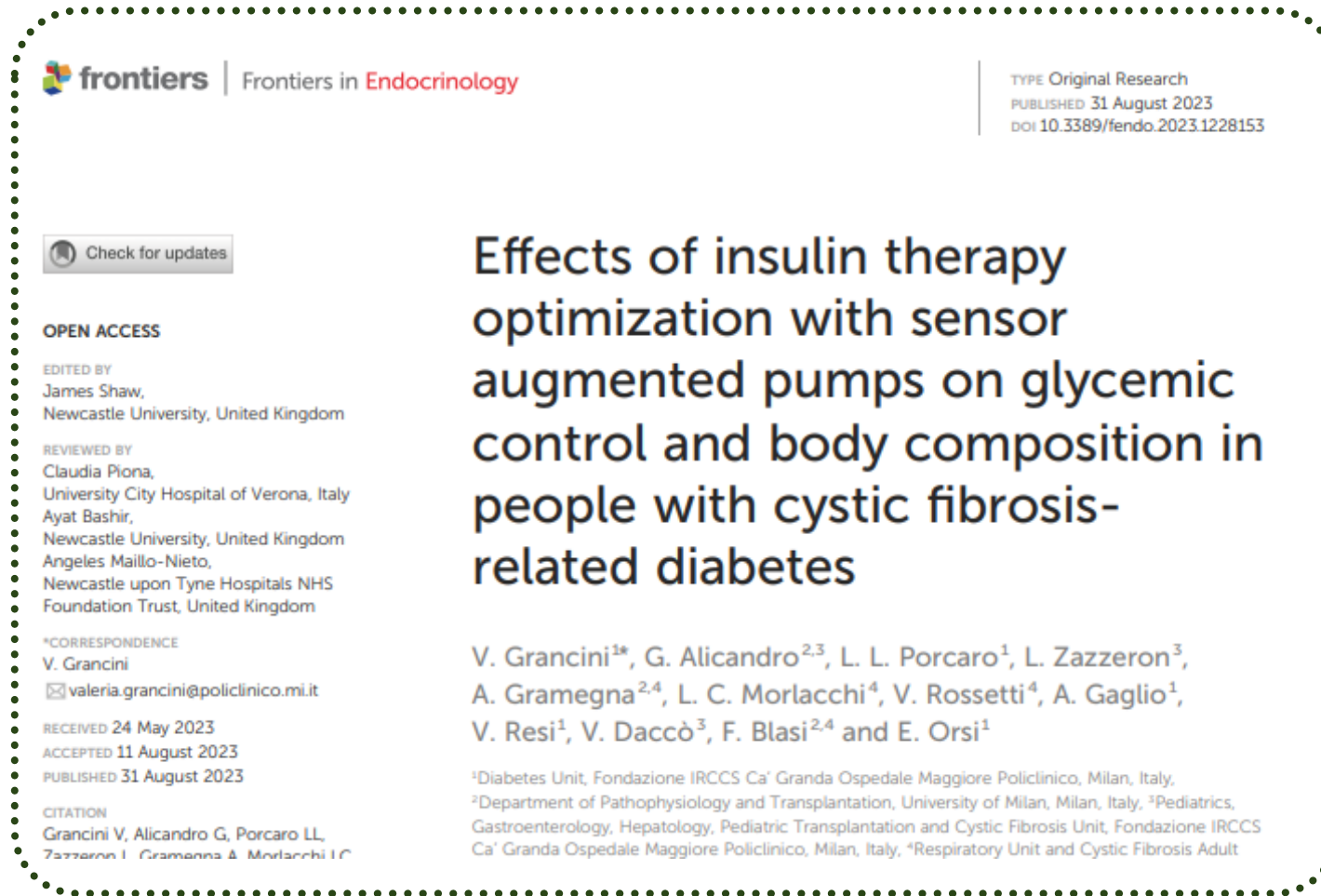
# AID – terapia sartoriale



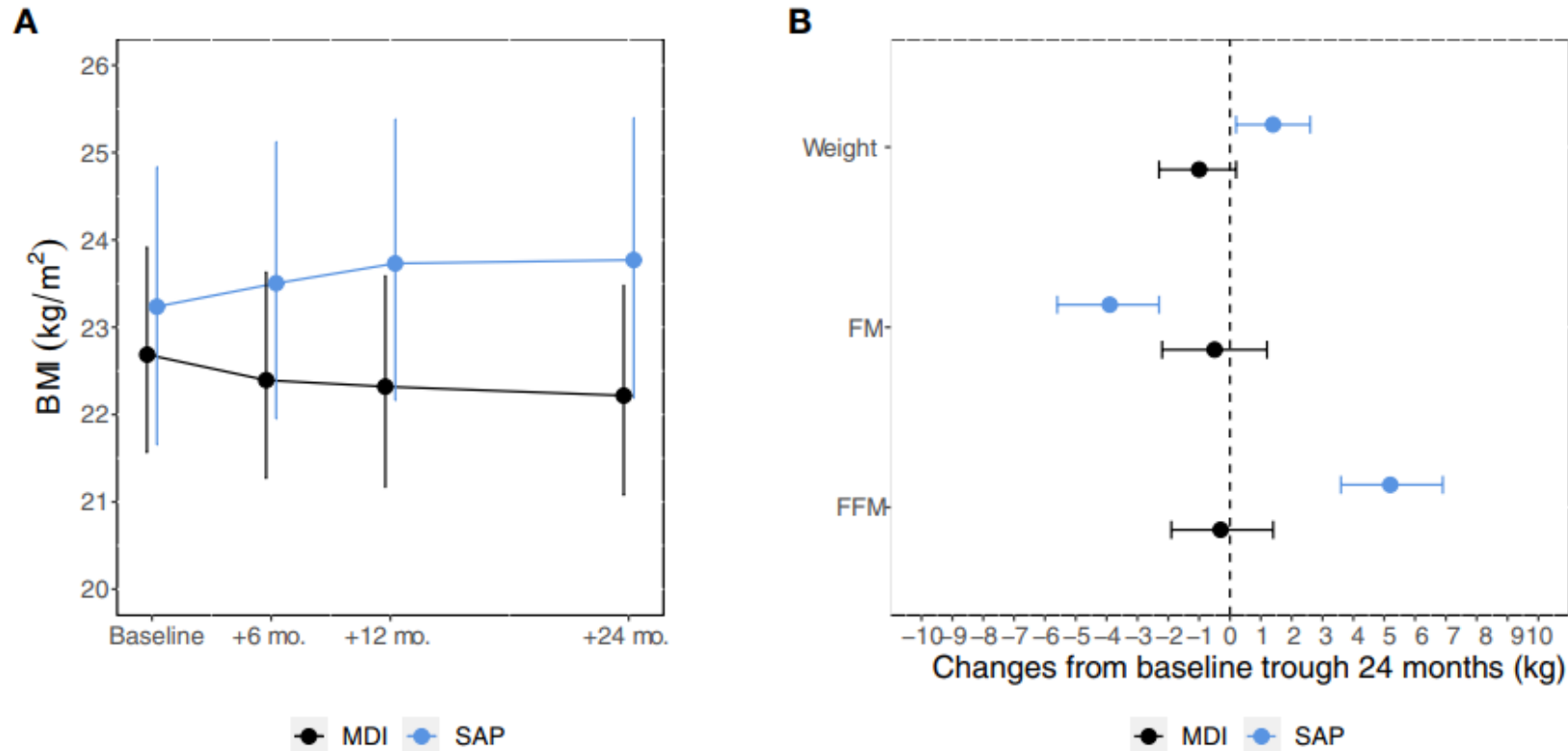
# AID – forme secondarie: cystic fibrosis related diabetes

|                            | DM1                 | DM2                             | CFRD                  |
|----------------------------|---------------------|---------------------------------|-----------------------|
| Prevalenza                 | 0.2%                | 11%                             | 35%                   |
| Insorgenza                 | Acuta               | Insidiosa                       | Insidiosa             |
| Età media alla diagnosi    | Bambini/adolescenti | Adulti                          | 18-24 anni            |
| Fenotipo abituale          | Normopeso           | Sovrappeso/Obeso                | Normopeso/sottopeso   |
| Eziologia autoimmune       | Sì                  | No                              | no                    |
| Deficit insulinico         | Competo             | Parziale, variabile             | Grave ma non completo |
| Sensibilità insulinica     | normale             | Ridotta                         | variabile             |
| Rischio DKA                | Sì                  | Raro                            | Raro                  |
| Terapia                    | Insulina            | Insulinosensibilizzati/insulina | insulina              |
| Complicanze microvascolari | Sì                  | Sì                              | sì                    |
| Complicanze macrovascolari | Sì                  | Sì                              | no                    |
| Sindrome metabolica        | No                  | Si                              | No                    |
| Principale causa di morte  | Cardiovascolare     | Cardiovascolare                 | Respiratoria          |

# AID – forme secondarie: cystic fibrosis related diabetes



# DM, forme secondarie: cystic fibrosis related diabetes



**FIGURE 3**

Model-based means of BMI **(A)** from baseline through 24 months and 24-month changes in weight, FM and FFM **(B)** among participants in the MDI versus SAP therapy group. Points estimates (dots) and 95% confidence intervals (bars) were estimated using linear mixed-effects regression models. FM, Fat mass; FFM, Fat-free mass; MDI, Multiple daily injections. SAP, Sensor augmented pump.

are 95% bootstrap confidence intervals of the mean.

# DM, forme secondarie: cystic fibrosis related diabetes

OR: NEW TECHNOLOGY—INSULIN DELIVERY SYSTEMS | JUNE 14 2024

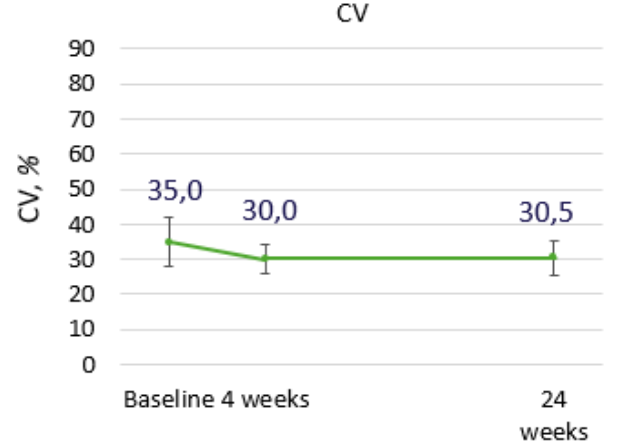
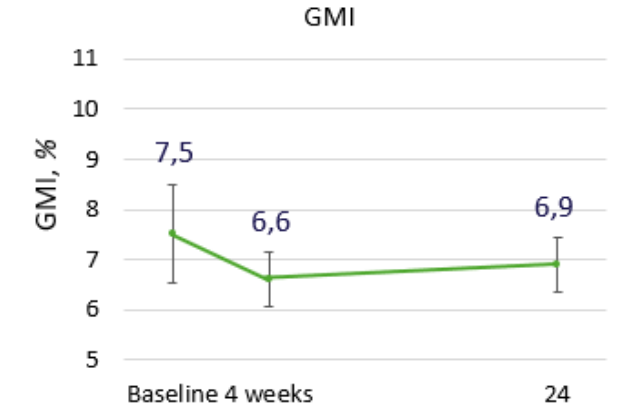
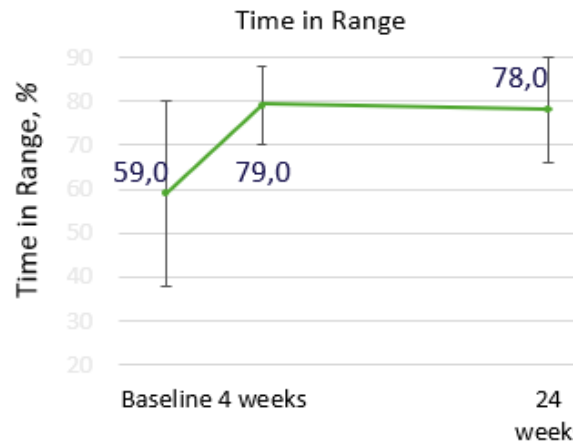
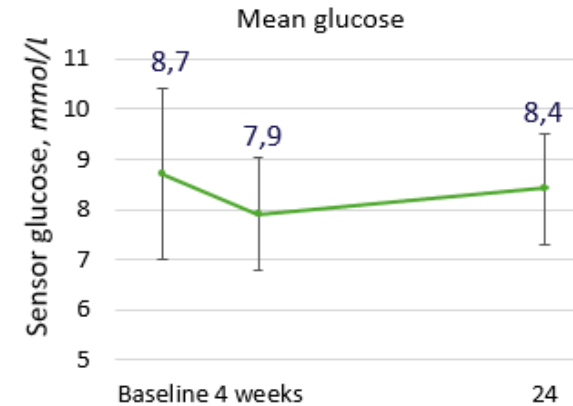
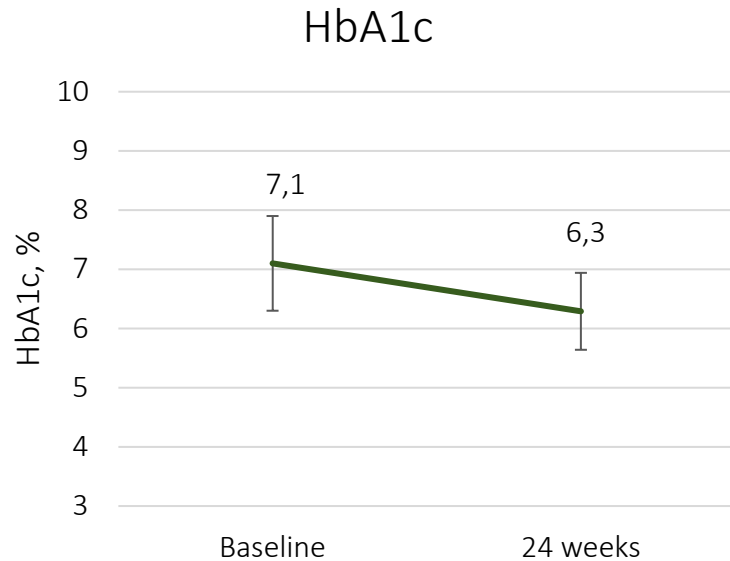
## 271-OR: Automated Hybrid Closed-Loop (AHCL) Systems for the Treatment of Cystic Fibrosis Related Diabetes (CFRD) ✓

VALERIA GRANCINI; IRENE COGLIATI; ALESSIA GAGLIO; VERONICA RESI; EMANUELA ORSI



84<sup>TH</sup> SCIENTIFIC SESSIONS

ORLANDO, FL / HYBRID | JUNE 21-24, 2024



# CFRD – gestione degli eventi avversi



## Skin Solutions

Check out our comprehensive list of tips for placement, preventing skin irritation, extra sticking power, removal and healing as well as some of our favorite products.

## Soluciones para la Piel

¡Hechele un vistazo a nuestra lista completa de recomendaciones para la colocación, prevención de irritación en la piel, opciones para adhesivo adicional, cómo remover y sanar al igual que algunos de nuestros productos favoritos!

### FIVE TIPS FOR DEVICE PLACEMENT

#### CHOOSE HEALTHY SKIN

Avoid broken skin, scabs, cuts, and scrapes, and any area of healing irritation. Wait at least a week before reusing a site.

#### NO BENDY AREAS

Do not place devices in areas where the skin creases with bending, like the waistline.

#### SWOLLEN TISSUE

Insulin infusion can cause swelling under the skin called lipohypertrophy. If this is present, try not to inject insulin/place infusion sets in this tissue. CGM sensors are okay.

#### PINCH IT UP

People wear sensors on many different parts of the body—abdomen, buttocks, hips, legs, arms, forearm. Choose an area that has enough fat to “pinch”, and an area that is comfortable for you.

#### ROTATE

Try to use as many sites as possible! Even if you use only one or two areas of the body, make sure to rotate sites 1-2 inches away from other sites.

### FIVE TIPS PREVENTING SKIN IRRITATION



#### CLEAN!

Make sure to wash your skin with antibacterial soap and water and dry thoroughly — this will remove excess oils and lotions from the skin. Making sure skin is dry is also key!

#### NO ALCOHOL

If the skin is cleaned thoroughly with antibacterial soap, avoid using alcohol, which may further irritate the skin.

#### SKIN PREPS

There are many types of skin barrier wipes to help prevent skin reactions. Apply to the skin and **let dry thoroughly before inserting the sensor.**

#### HYDROCOLLOIDS FOR ALLERGY

If there is severe reaction or persistent allergic reaction, thick hydrocolloid bandages can be used underneath the sensor/set tape. Some people insert the sensor directly through the hydrocolloid bandage, while others cut a small hole (which may lead to more skin exposure to the sensor tape, but may reduce chance of damaging the sensor).

#### STEROID FOR ALLERGY

Many people spray 1-2 layers of fluticasone (brand name: Flonase) to the skin prior to any sensor adhesives, and then let it dry completely. This may reduce allergic reaction to the chemicals in the sensor tape.

*Note: Fluticasone is not intended to be used this way (it is a nasal spray), so it is unknown long term if this has any lasting side effects on the skin.*

### FIVE TIPS FOR EXTRA STICKING POWER

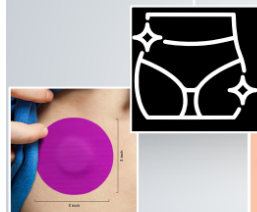
#### BASIC SKIN PREP

To give your sensor the best chance of sticking, make sure to prepare your skin well, including:

- Shaving excess hair from the area
- Washing with soap and water to remove oils and lotions
- Make sure the area is completely dry

#### BARRIERS CAN DOUBLE AS STICKING AGENTS

Some of the barrier wipes described above also increase the sticking power of your sensor. Apply to the skin and let dry thoroughly before inserting the sensor.



#### EXTRA TAPE

There are several types of tape and patches that can be applied over the sensor tape.

#### TAPING TECHNIQUE

How you add extra tapes matters as well. If you cutting your own tape, consider the “picture frame” approach around the transmitter, by holding down the 4 sides of the sensor adhesive. Sometimes device specific patches come pre-cut into the shape that you want. This usually means there is a hole cut out in them for the transmitter, but sometimes also covers the transmitter.

#### NON-TAPE SOLUTIONS

If sensors are worn on the arms, non-adhesive wraps or covers can be used to help the sensor stay on the skin. Be careful to not wrap the arm too tightly, as this can cause the sensor to poke into muscle tissue and read falsely low glucose readings.

### FIVE TIPS FOR REMOVAL & HEALING

#### USE PRODUCTS TO HELP IT UNSTICK

There are a variety of products that can help peel tape from the skin. The simplest solutions may already be in your house—baby oil or olive oil! Wet a paper towel with oil and rub the oil under the corner of the tape. Slowly peel and continue to wipe oil under the tape until the entire sensor is removed.

#### LOW AND SLOW

To minimize the chance of tearing skin, try removing tape by gently folding back on itself (low) and pulling very slowly (slow). This is the “low and slow” technique.

#### CREAMS & LOTIONS

Once the sensor is off the skin, you can condition the area as needed.

- For dryness, use lotion
- For redness, itching, or irritation, use hydrocortisone cream (as directed on tube)
- For skin tears or pain, try an antibiotic cream (as directed on the tube)

#### LEAVE IT ALONE

Make sure to leave the skin to heal for about 1 week before placing another sensor in the area. Do not cover with tape for at least a week.

#### GETTING WORSE

If there is pain, puss, warmth, or spreading redness that persists for 1-2 days after the sensor/set is removed, call your doctor to let them know you may have a site infection. They may prescribe you a stronger antibiotic to treat the infection.

# DM, forme secondarie: talassemia

Archives of Disease in Childhood, 1988, 63, 58–62

## Insulin dependent diabetes in thalassaemia

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Blood Cells, Molecules and Diseases 88 (2021) 102547

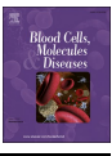


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**Blood Cells, Molecules and Diseases**

journal homepage: [www.elsevier.com/locate/bcmd](http://www.elsevier.com/locate/bcmd)



## Clinical and health-related quality of life outcomes of transfusion-dependent thalassaemia patients in Singapore

Joyce Ching Mei Lam<sup>a,b,\*</sup>, Shir Ying Lee<sup>c,d</sup>, Pei Lin Koh<sup>e,f</sup>, Sing Zern Fong<sup>g,h</sup>, Nur Insyirah Abdul-Kadir<sup>a</sup>, Chiew Ying Lim<sup>a</sup>, Xiao Zhang<sup>i</sup>, Rajat Bhattacharyya<sup>a</sup>, Shui Yen Soh<sup>a</sup>, Mei Yoke Chan<sup>a</sup>, Ah Moy Tan<sup>a</sup>, Ponnudurai Kuperan<sup>g,h</sup>, Ai Leen Ang<sup>i</sup>

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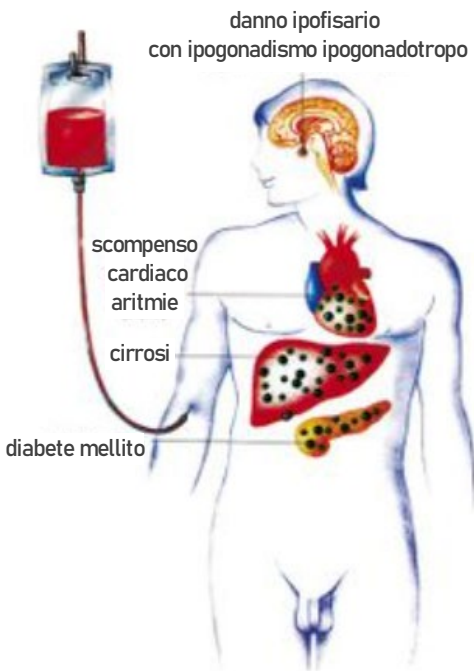
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**Table 2**  
Transfusion-associated complications in study cohort.

| Transfusion-associated complication | Number of subjects    |                |             |             |             |
|-------------------------------------|-----------------------|----------------|-------------|-------------|-------------|
|                                     | Total number screened | 0–10 years     | 11–20 years | 21–30 years | 31–50 years |
| Liver iron loading <sup>a</sup>     | 62                    | 4 <sup>a</sup> | 17          | 24          | 17          |
| Present                             | 49 (79%)              | 4 (100%)       | 16 (94.1%)  | 16 (66.7%)  | 13 (76.5%)  |
| Cardiac iron loading <sup>a</sup>   | 60                    | 4 <sup>a</sup> | 17          | 22          | 17          |
| Present                             | 17 (28.3%)            | 0              | 1 (5.9%)    | 9 (40.9%)   | 7 (41.1%)   |
| Cardiac risk groups <sup>a</sup>    | 59                    | 4 <sup>a</sup> | 17          | 22          | 16          |
| Low risk >20 ms                     | 42 (71.2%)            | 4 (100%)       | 16 (94.1%)  | 13 (59.1%)  | 9 (56.2%)   |
| Warning 10–20 ms                    | 10 (16.9%)            | 0              | 1 (5.9%)    | 5 (22.7%)   | 4 (25.0%)   |
| High risk <10 ms                    | 7 (11.9%)             | 0              | 0           | 4 (18.2%)   | 3 (18.8%)   |
| Cardiac arrhythmia                  | 73                    | 12             | 20          | 24          | 17          |
| Present                             | 4 (5.5%)              | 0              | 0           | 2 (8.3%)    | 2 (11.8%)   |
| Cardiac failure                     | 73                    | 12             | 20          | 24          | 17          |
| Present                             | 1 (1.4%)              | 0              | 0           | 0           | 1 (5.9%)    |
| Endocrinopathy                      | 73                    | 12             | 20          | 24          | 17          |
| Present (any)                       | 25 (34.2%)            | 0              | 0           | 12 (50%)    | 13 (76.5%)  |
| Type of endocrinopathy              |                       |                |             |             |             |
| Hypogonadism                        | 16 (21.9%)            | 0              | 0           | 4 (16.7%)   | 12 (70.6%)  |
| Hypothyroidism                      | 14 (19.2%)            | 0              | 0           | 6 (25.0%)   | 8 (47%)     |
| Impaired glucose                    | 9 (12.3%)             | 0              | 0           | 6 (25.0%)   | 3 (17.6%)   |
| Tolerance                           | 5 (6.8%)              | 0              | 0           | 0           | 5 (29.4%)   |
| Diabetes mellitus                   | 9 (12.3%)             | 0              | 0           | 3 (12.5%)   | 6 (35.3%)   |
| Osteoporosis                        | 4 (5.5%)              | 0              | 0           | 2 (8.3%)    | 2 (11.8%)   |
| Growth hormone deficiency           | 1 (1.4%)              | 0              | 0           | 0           | 1 (5.9%)    |
| Hypoparathyroidism                  | 3 (4.1%)              | 0              | 0           | 2 (8.3%)    | 3 (17.6%)   |
| Others                              |                       |                |             |             |             |
| Viral infections                    | 72                    | 11             | 20          | 24          | 17          |
| Hepatitis B                         | 0                     | 0              | 0           | 0           | 0           |
| Hepatitis C                         | 1 (1.4%)              | 0              | 0           | 0           | 1 (!)       |
| HIV                                 | 0                     | 0              | 0           | 0           | 0           |

<sup>a</sup> Liver and cardiac iron loading was diagnosed based on MRI T2\* scan were performed only for patients aged 10 and above. MRI T2\* scan resu available for 87% of subjects aged 10–20 and for all subjects aged above.



# AID – forme secondarie: Talassemia – OR, 31 aa ♀

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**AFAM:** negativa per DM

**AFIS:** lavora come maestra scuola primaria. No fumo, consumo saltuario di alcolici, stile di vita attivo: palestra 2 vv/Sett, camminate. Oligomenorrea con periodi di amenorrea. Alimentazione varia, normocalorica

**APR:** talassemia trasfusione-dipendente seguita presso il Centro Malattie Rare della nostra Fondazione da ottobre 2020. trasfonde in media 2 sacche GCR ogni 21 giorni, in terapia ferrochelante

**APP:** diabete mellito secondario a talassemia in terapia insulinica MDI, monitoraggio glicemico tramite sistema flash. Giunge in prima visita a dicembre 2023, non effettua conteggio cho

**TERAPIA:** deferasirox 1170 mg/die (19 mg/kg/die), ac folico, insulina Glargine 100 15 U, insulina lispro 100 3 U a colazione, 5 U a pranzo, 4 U a cena

# DM, forme secondarie: Talassemia – OR, 31 aa

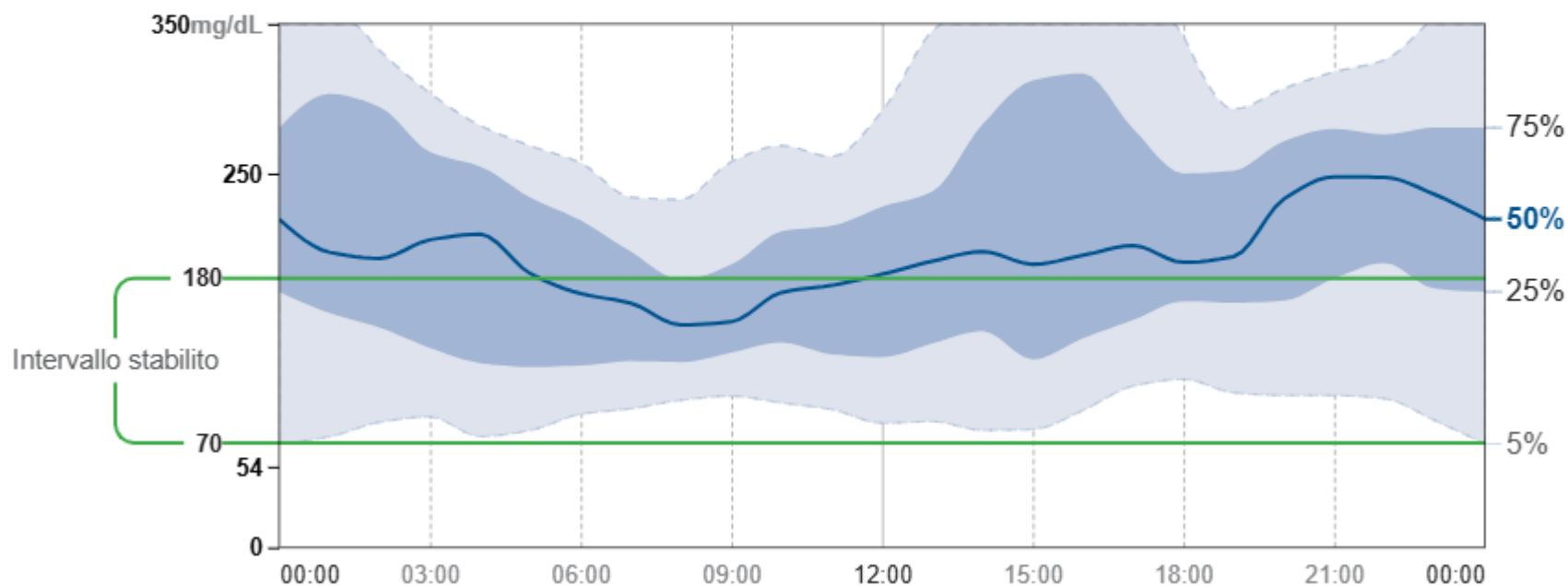


ESAMI: gli 123 mg/dl, HbA1c 7,4% (?), fruttosamina 341  $\mu\text{mol/L}$  (vn 200-285), creat 0,6 mg/dl, esame urine glicosuria 500 mg

EO: Peso 61,5 kg, h 169 cm

## PROFILO DI GLUCOSIO AMBULATORIALE (AGP)

AGP è un riepilogo dei valori di glucosio del periodo di riferimento, con la mediana (50%) e gli altri percentili mostrati come se si fossero verificati in un solo giorno.



# DM, forme secondarie: Talassemia – OR, 31 aa



Si propone partecipazione al corso di conteggio CHO

Si propone passaggio a terapia con sistema AID

Si imposta Lispro secondo erogazione basale:

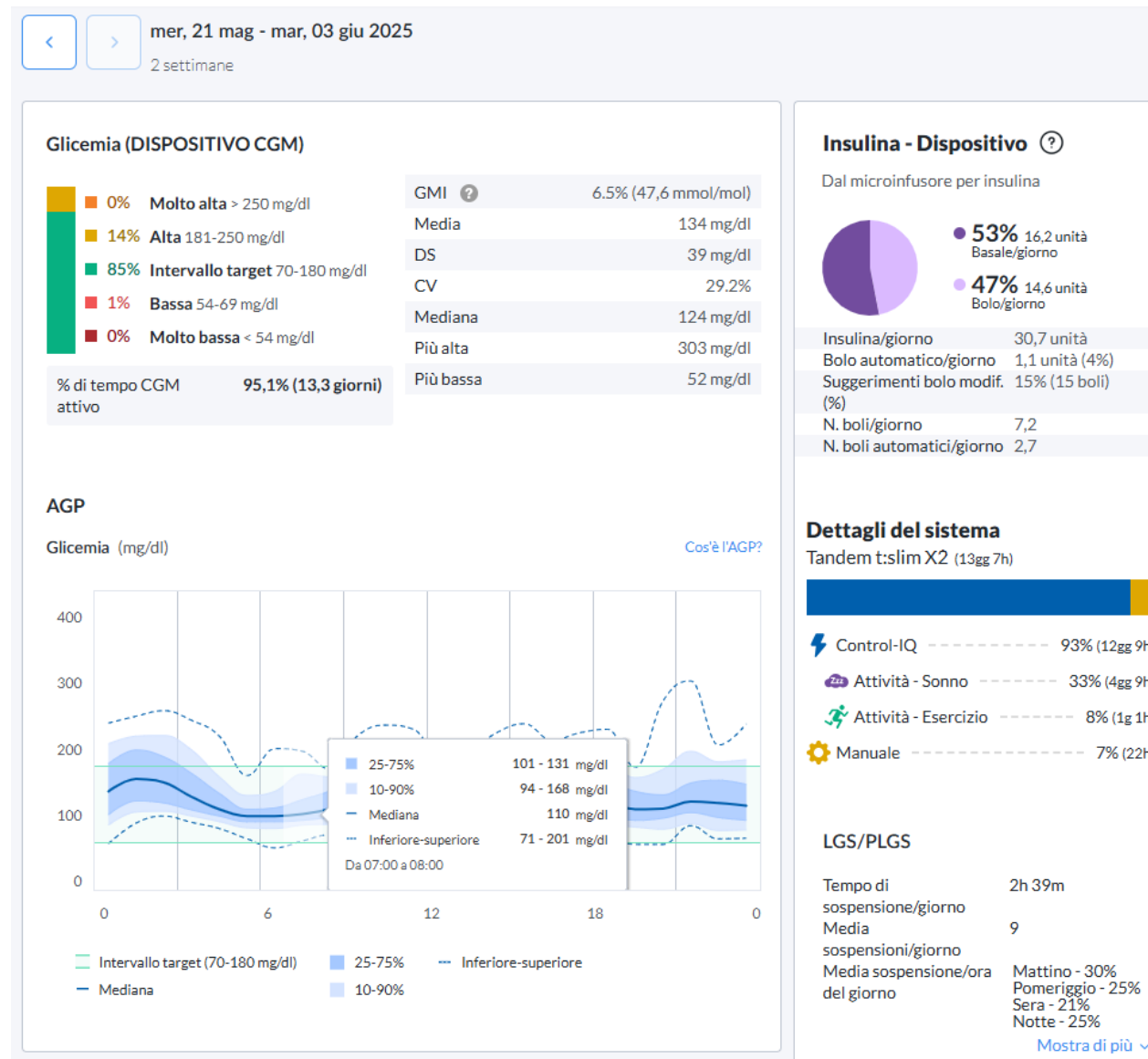
00,00-12,00: 0,6 U/h

12,00-24,00: 0,7 U/h

Tot 15,6 U/die

Si stimano rapporti CHO/I 18 a colazione, 25 a pranzo, 15 a merenda e 25 a cena

Ultima visita di controllo: 03/06/2025



# DM, forme secondarie: Talassemia – GL, 54 aa



ESAMI: gli 171 mg/dl, hBA1c 7,1% (?), fruttosamina ND, esame urine nulla di patologico

DIARIO: glicemia al risveglio 120-140, in rialzo nel corso della giornata, valori preprandiali 140.160, alcuni valori post prandiali > 220

si propone:

- Sospendere repaglinide
- Sostituire Glargine 100 con Glargine 300
- Proseguire metformina allo stesso dosaggio
- Introdurre insulina Lispro 2 U a colazione, 3 U a pranzo e 3 U a cena
- Passaggio a monitoraggio glicemico capillare flash
- Partecipazione a corso di conteggio dei carboidrati

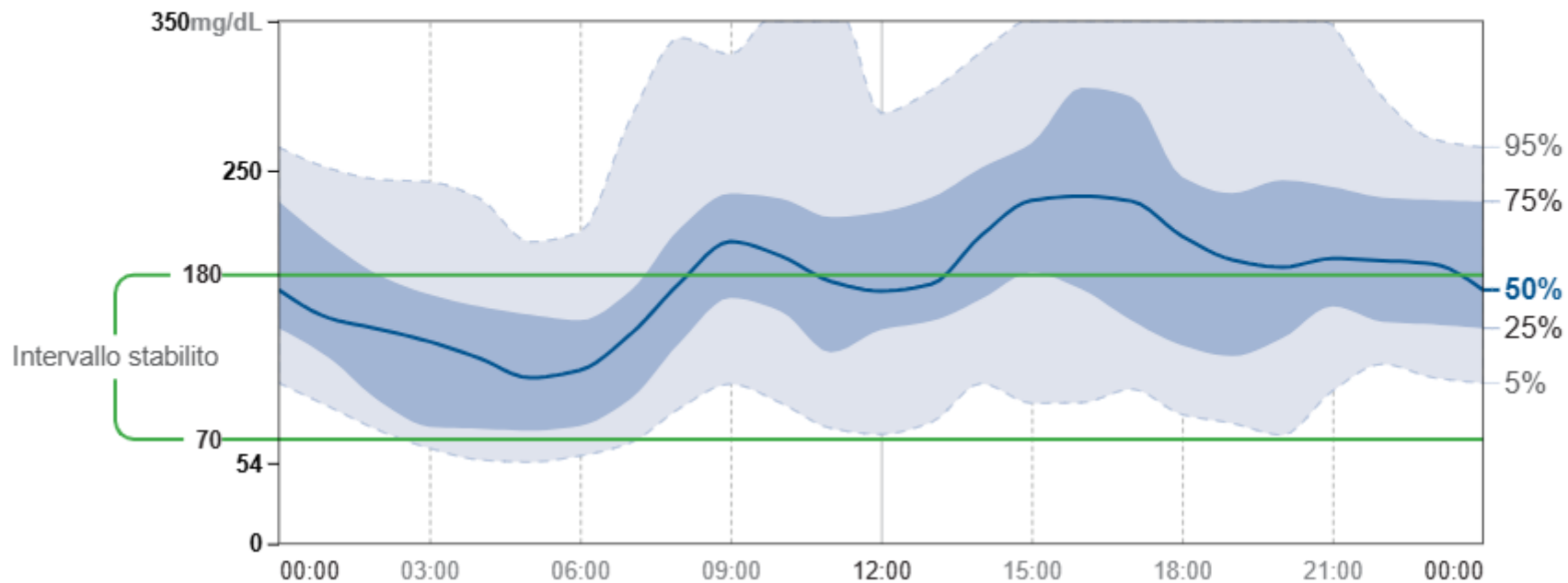
# DM, forme secondarie: Talassemia – GL, 54 aa



27 marzo 2025 – 9 aprile 2025

## PROFILO DI GLUCOSIO AMBULATORIALE (AGP)

AGP è un riepilogo dei valori di glucosio del periodo di riferimento, con la mediana (50%) e gli altri percentili mostrati come se si fossero verificati in un solo giorno.

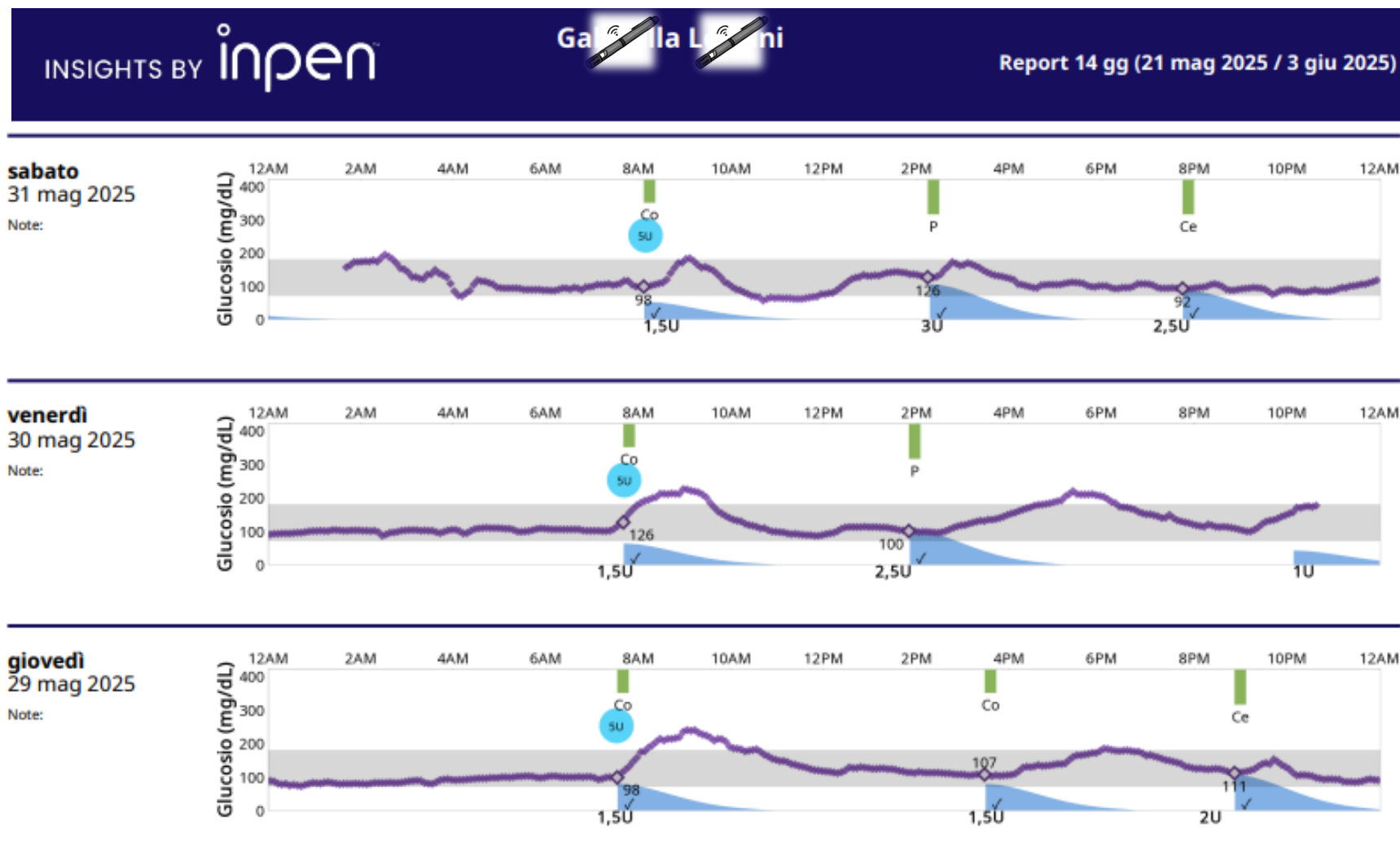


La paziente riferisce numerose dimenticanze/ritardo nella somministrazione di insulina Lispro ai pasti

# DM, forme secondarie: Talassemia – GL, 54 aa



Si propone passaggio a smart MDI: target glicemico 120 mg/dl, FSI 100 mg/dl, rapporti CHO/I NA, AIT 3 ore



# DM, forme secondarie: pancreasectomia

Received: 22 September 2019 | Revised: 2 February 2020 | Accepted: 2 February 2020

DOI: 10.1111/cen.14168

## REVIEW ARTICLE

WILEY

### Risk factors for development of diabetes mellitus (Type 3c) after partial pancreatectomy: A systematic review

Linda Wu<sup>1</sup>  | Christopher B. Nahm<sup>2,3</sup> | Nigel B. Jamieson<sup>2</sup> | Jaswinder Samra<sup>2,4</sup> | Roderick Clifton-Bligh<sup>1,3</sup>  | Anubhav Mittal<sup>2,3</sup> | Venessa Tsang<sup>1,3</sup>

## REVIEW

### New-onset Diabetes After Distal Pancreatectomy A Systematic Review

Kirstin M. J. De Bruijn, MD and Casper H. J. van Eijck, PhD

#### Original Article

### Mechanisms of Impaired Fasting Glucose and Glucose Intolerance Induced by a ~50% Pancreatectomy

Aleksey V. Matveyenko,<sup>1</sup> Johannes D. Veldhuis,<sup>2</sup> and Peter C. Butler<sup>1</sup>

Wu L et al, Clin Endocrinol (Oxf). 2020 May;92(5):396-406  
De Bruijn KM et al, Ann Surg. 2015 May;261(5):854-61.  
Zhao T et al, Front Endocrinol (Lausanne). 2023 Feb 13;14:1097139  
Roberts KJ et al, HPB (Oxford). 2014 Sep;16(9):814-21  
Matveyenko Av et al. Diabetes. 2006 Aug;55(8):2347-56

 frontiers | Frontiers in Endocrinology

TYPE Original Research  
PUBLISHED 13 February 2023  
DOI 10.3389/fendo.2023.1097139



#### OPEN ACCESS

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### Diabetes management in patients undergoing total pancreatectomy: A single center cohort study

Tianyi Zhao<sup>1</sup>, Yong Fu<sup>1</sup>, Taiping Zhang<sup>2</sup>, Junchao Guo<sup>2</sup>, Quan Liao<sup>2</sup>, Shuoning Song<sup>1</sup>, Yanbei Duo<sup>1</sup>, Yuting Gao<sup>1</sup>, Tao Yuan<sup>1\*</sup> and Weigang Zhao<sup>1\*</sup>

DOI:10.1111/hpb.12203

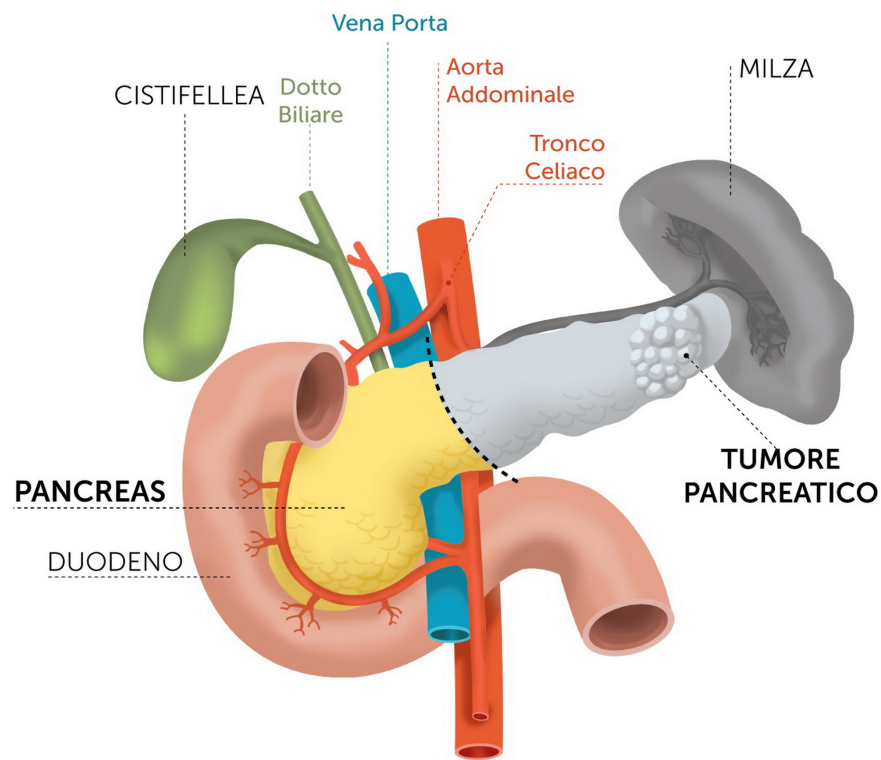
HPB

#### ORIGINAL ARTICLE

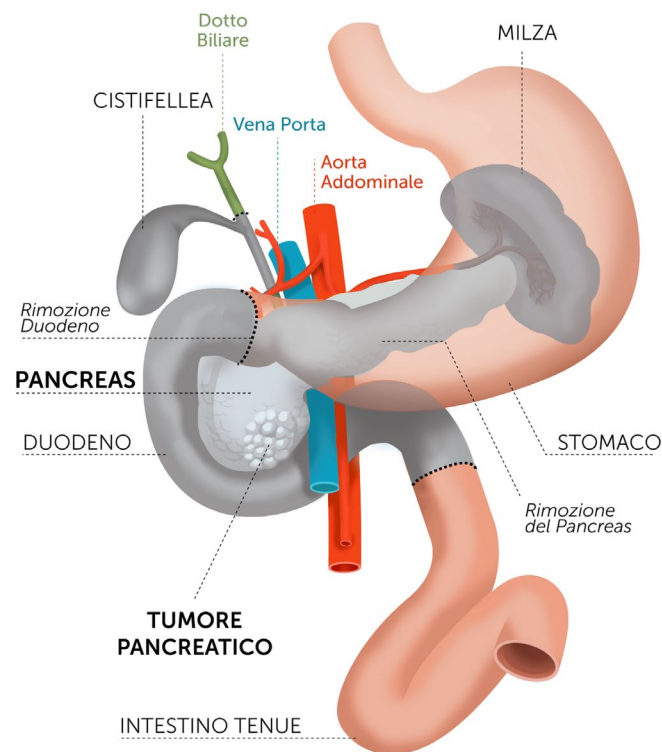
### How severe is diabetes after total pancreatectomy? A case-matched analysis

Keith J. Roberts<sup>1</sup>, Georgina Blanco<sup>1</sup>, Jonathan Webber<sup>2</sup>, Ravi Marudanayagam<sup>1</sup>, Robert P. Sutcliffe<sup>1</sup>, Paolo Muiresan<sup>1</sup>, Simon R. Bramhall<sup>1</sup>, John Isaac<sup>1</sup> & Darius F. Mirza<sup>1</sup>

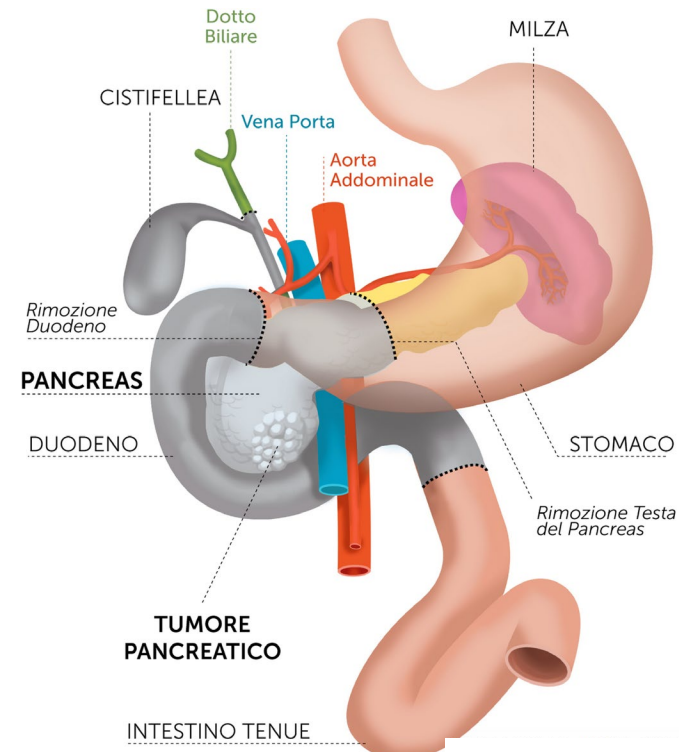
# DM, forme secondarie: pancreasectomia



PANCREASECTOMIA DISTALE



PANCREASECTOMIA TOTALE



DUODENOCEFALOPANCREASECTOMIA

# DM post Pancreasectomia – LO, 79 aa

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**AFAM:** positiva per DM1 e DM2

**AFIS:** pensionato, vive al domicilio con la moglie, autonomo nell'espletare le funzioni quotidiane, no fumo, consumo saltuario di alcolici, dieta varia, normocalorica

**APR:** dissecazione aortica nel 2001, intervento complicato da ARDS e shock settico, ipoacusia iatrogena bilaterale, ipertensione arteriosa, IPB, asma allergico, FA cronica

**APP:** DCP a marzo 2025 per k duodenale, quindi necrosi pancreatica per cui sottoposto a pancreasectomia totale. Da allora DM in terapia insulinica multiniettiva

**TERAPIA:** bisoprololo 1,25 mg, apixaban 2,5 mg x 2, tamsulosina 0,4 mg, omeprazolo 20 mg, pancrelipasi, insulina Glargine 300 6 U, insulina Glulisina 3 U a colazione, 4 U a pranzo, 3 U a cena

# DM post Pancreasectomia – LO, 79 aa♂

ESAMI: gli 306 mg/dl, HbA1c nd, creat 0,98mg/dl, esame urine glicosuria 1000 mg  
EO: Peso 58 kg, h 173 cm

## Report AGP

28 marzo 2025 – 10 aprile 2025 (14 Giorni)

LibreView

### STATISTICHE E TARGET GLUCOSIO

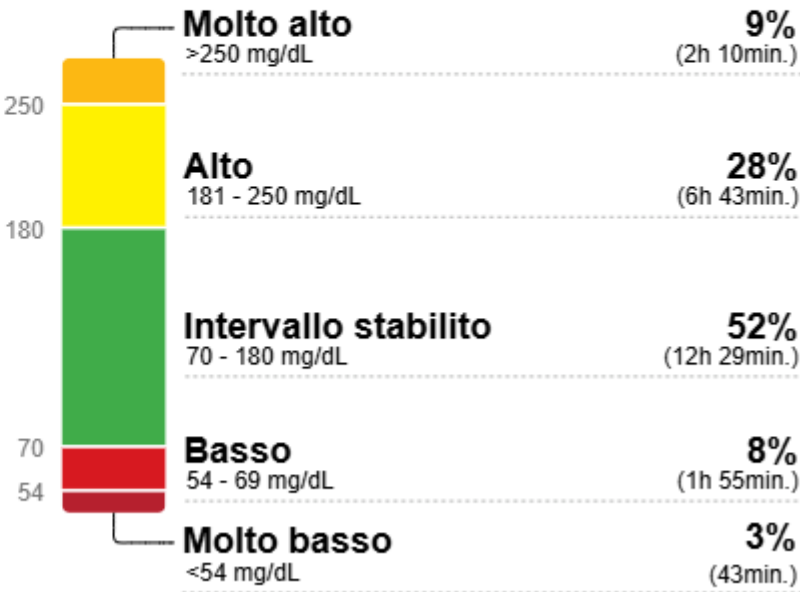
28 marzo 2025 – 10 aprile 2025 **14 Giorni**  
Tempo in cui il sensore è attivo: **98%**

Intervallo e target per Diabete tipo 1 o tipo 2

| Intervallo di glucosio                                                                   | Target % di letture (Ora/Giorno) |
|------------------------------------------------------------------------------------------|----------------------------------|
| Intervallo stabilito 70-180 mg/dL                                                        | Superiore a 70% (16h 48min.)     |
| Inferiore a 70 mg/dL                                                                     | Inferiore a 4% (58min.)          |
| Inferiore a 54 mg/dL                                                                     | Inferiore a 1% (14min.)          |
| Superiore a 180 mg/dL                                                                    | Inferiore a 25% (6h)             |
| Superiore a 250 mg/dL                                                                    | Inferiore a 5% (1h 12min.)       |
| Ogni aumento del 5% del tempo nell'intervallo (70-180 mg/dL) è clinicamente vantaggioso. |                                  |

**Valore medio del glucosio** **156** mg/dL  
**Indicatore di gestione del glucosio (GMI)** **7,0% o 54 mmol/mol**  
**Variabilità del glucosio** **42,8%**  
Definito come percentuale del coefficiente di variazione (%CV); obiettivo ≤36%

### TEMPO NEGLI INTERVALLI



# DM post Pancreasectomia – LO, 79 aa ♂

## Impostazioni dispositivo

In base alle impostazioni del dispositivo al momento dell'ultimo trasferimento: 04/06/2025

TARGET SMARTGUARD™  
110 mg/dL

PERIODO INSULINA ATTIVA  
2 h 30 min

RAPPORTO INS/CARB (G/U)



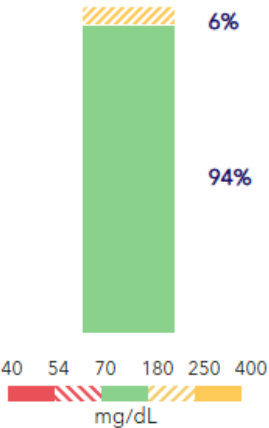
## Panoramica del glucosio

MEDIA GLUCOSIO SENSORE  
135 ± 27 mg/dL

GLUCOSE MANAGEMENT INDICATOR (GMI)  
6.5%

COEFFICIENTE DI VARIAZIONE (CV)  
20%

## Tempo in range



## Insulina giornaliera

DOSE TOTALE GIORNALIERA  
22 U

BOLO (70%)  
15.4 U  
CORREZIONE AUTOMATICA 1.9U (12%)

BASALE (30%)  
6.6 U

# DM, forme secondarie: DM post SEU

Frontiers in **Pediatrics**

**CASE REPORT**  
published: 30 May 2022  
doi: 10.3389/fped.2022.882319



## Glucose Control in Post-hemolytic-Uremic Syndrome Diabetes: A New Approach Offered by Sensor-Augmented Pump Therapy

Valeria Grancini<sup>1\*</sup>, Federica Alessandra Vianello<sup>2</sup>, Santo Colosimo<sup>1,3</sup>, Alessia Gaglio<sup>1</sup>, Veronica Resi<sup>1</sup>, Maura Arosio<sup>1,4</sup>, Gianluigi Ardissino<sup>2</sup>, Giovanni Montini<sup>2,4</sup> and Emanuela Orsi<sup>1</sup>

### Nutritional strategy

### Insulin scheme

TPN

Insulin basal rate:

00.00–06.00: 0.025 U/h

06.00–18.00: 0.050 U/h

18.00–24.00: 0.025 U/h

OPN + liquid diet

Insulin basal rate:

00.00–06.00: 0.15 U/h

06.00–18.00: 0.050 U/h

18.00–24.00: 0.15 U/h

Standard insulin bolus at meals (0.1 U for meals with at least 50 gr CHO)

OPN + minimal enteral feeding  
via naso-gastric tube

Insulin basal rate:

00.00–06.00: 0.025 U/h

06.00–18.00: 0.050 U/h

18.00–24.00: 0.025 U/h

3-h square insulin bolus for enteral nutrition (0.025 U for 8 gr CHO)

OPN + *ad libitum* oral diet

Insulin basal rate:

00.00–06.00: 0.15 U/h

06.00–20.00: 0.050 U/h

20.00–24.00: 0.15 U/h

Wizard bolus at meals (Insulin/CHO ratio

0.1/100 at meals. correction factor 0.1/250)

TPN, Total Parenteral Nutrition; U, Units; OPN, Overnight Parenteral Nutrition; CHO, Carbohydrates.

# Diabete di tipo 2

## Treatment Intensification With Insulin Pumps and Other Technologies in Patients With Type 2 Diabetes: Results of a Physician Survey in the United States

George Grunberger,<sup>1</sup> David Sze,<sup>2</sup> Anastasia Ermakova,<sup>2</sup> Ray Sieradzan,<sup>2</sup> Teresa Oliveria,<sup>2</sup> and Eden M. Miller<sup>3</sup>

Drugs - Real World Outcomes (2020) 7:31–40  
https://doi.org/10.1007/s40801-019-00173-8

ORIGINAL RESEARCH ARTICLE



## Effectiveness of V-Go® for Patients with Type 2 Diabetes in a Real-World Setting: A Prospective Observational Study

George Grunberger<sup>1,2</sup> · Cheryl R. Rosenfeld<sup>3,4</sup> · Bruce W. Bode<sup>5</sup> · Scott D. Abbott<sup>6</sup> · Carla Nikkel<sup>6</sup> · Leon Shi<sup>7</sup> · Poul Strange<sup>7</sup>

Letter to the Editor

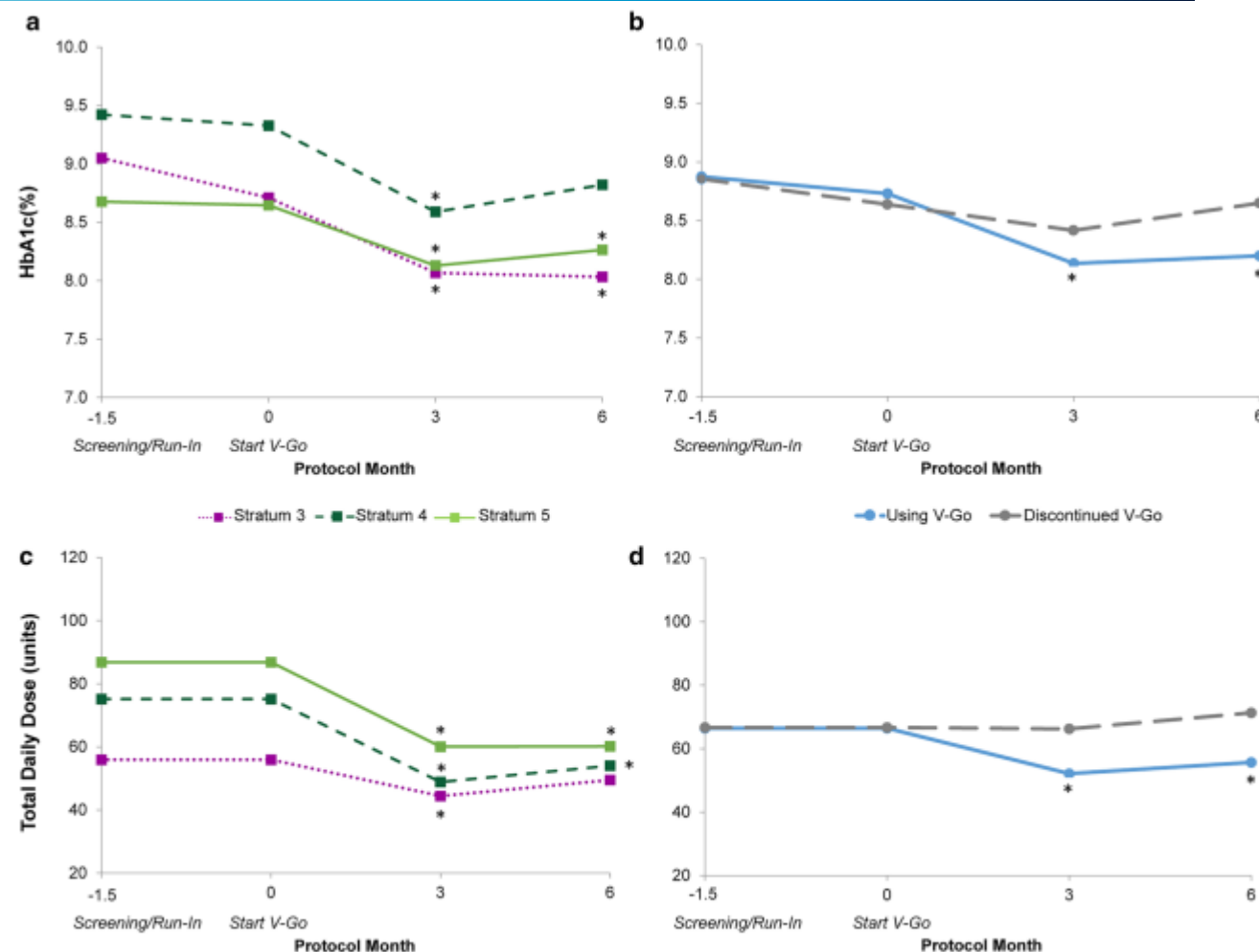
## Efficacy of a Tubeless Patch Pump in Patients With Type 2 Diabetes Previously Treated With Multiple Daily Injections

Jennifer E. Layne, PhD<sup>1</sup>, Christopher G. Parkin, MS<sup>2</sup>, and Howard Zisser, MD<sup>1</sup>

Journal of Diabetes Science and Technology  
2017, Vol. 11(1) 178–179  
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sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1932296816653143  
journals.sagepub.com/home/dst  
SAGE

## Insulin pump treatment compared with multiple daily injections for treatment of type 2 diabetes (OpT2mise): a randomised open-label controlled trial

Yves Reznik, Ohad Cohen, Ronnie Aronson, Ignacio Conget, Sarah Runzis, Javier Castaneda, Scott W Lee, for the OpT2mise Study Group



**Fig. 1** Comparison of change in HbA1c over time by strata and V-Go use. **a** Mean HbA1c from screening to month 6; **b** HbA1c for all patients using V-Go vs. patients discontinuing V-Go; **c** mean total daily dose from screening to month 6; **d** total daily dose of all patients using V-Go vs. patients discontinuing V-Go. Stratum 3 (S3)=once/twice-daily long-acting insulin injection ± OADs/non-insulin injectable; stratum 4 (S4)=1–3 daily pre-mix insulin injections ± OADs/ non-insulin injectable; and stratum 5 (S5)=multiple daily injection (MDI) therapy with 3+ daily insulin injections ± OADs/non-insulin injectable. OADs oral antihyperglycemic drugs

tion ± OADs/non-insulin injectable; stratum 4 (S4)=1–3 daily pre-mix insulin injections ± OADs/ non-insulin injectable; and stratum 5 (S5)=multiple daily injection (MDI) therapy with 3+ daily insulin injections ± OADs/non-insulin injectable. OADs oral antihyperglycemic drugs

# DM, forme secondarie: diabete post trapianto d'organo

Acta Diabetologica  
<https://doi.org/10.1007/s00592-024-02419-6>

## CASE REPORT



### Automated insulin delivery systems for the management of insulin therapy in post-transplant diabetes mellitus: a case series from a single center population

Valeria Grancini<sup>1</sup> · Irene Cogliati<sup>1</sup> · Alessia Gaglio<sup>1</sup> · Carlo Alfieri<sup>2,3</sup> · Giuseppe Castellano<sup>2,3</sup> · Emanuela Orsi<sup>1</sup> · Veronica Resi<sup>1</sup>

Received: 9 September 2024 / Accepted: 12 November 2024  
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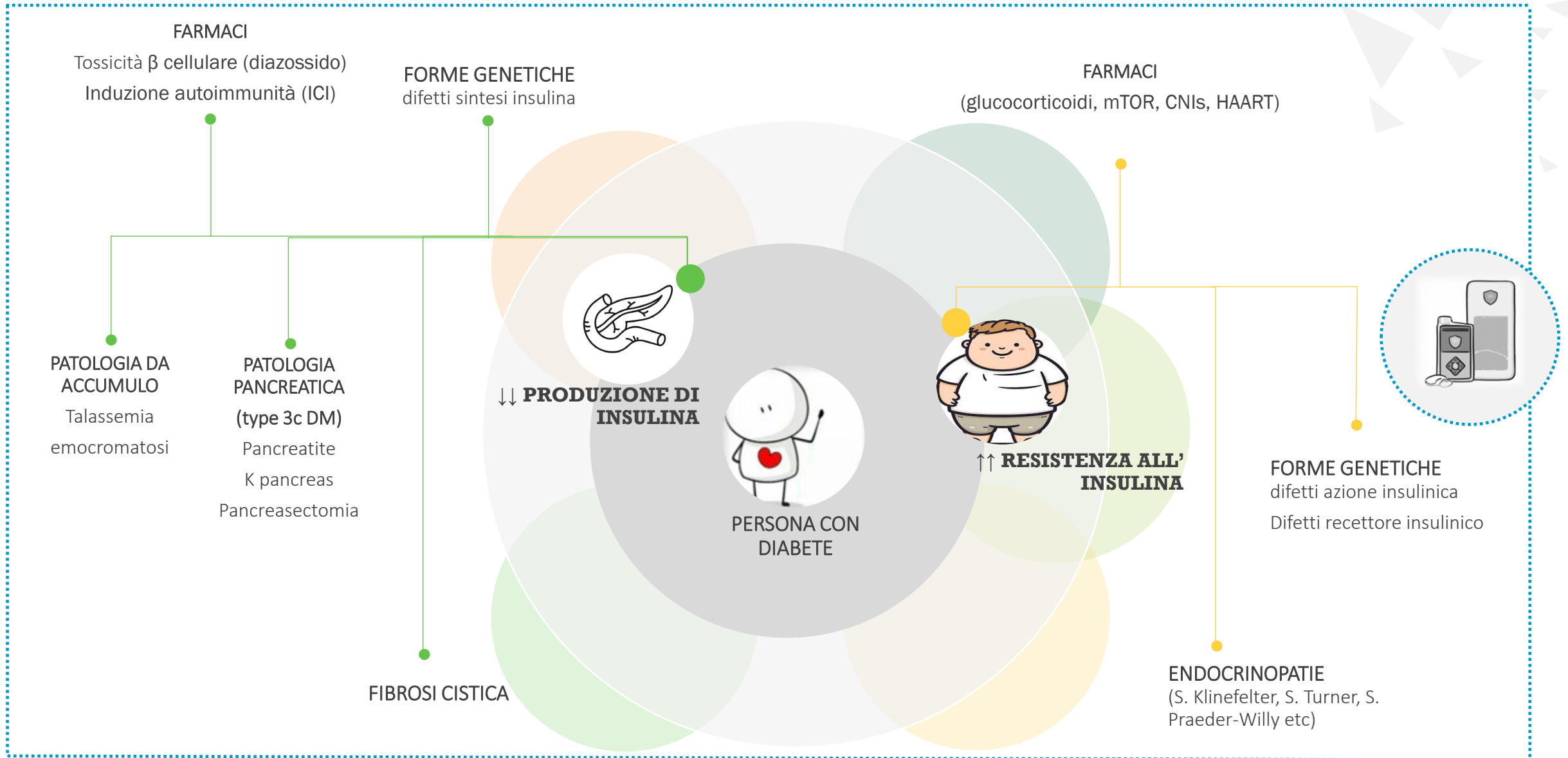


| AGE                      | 80                                                                                                                                                                                                                                                                                       | 74                                                                                                                                                                                   | 73                                                                                                                                                                                             | 60                                                                                                                                                                       | 76                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SEX                      | M                                                                                                                                                                                                                                                                                        | M                                                                                                                                                                                    | M                                                                                                                                                                                              | M                                                                                                                                                                        | M                                                                                                                                                                                                                                                                                                                                             |
| ETNICITY                 | Caucasian                                                                                                                                                                                                                                                                                | Caucasian                                                                                                                                                                            | Caucasian                                                                                                                                                                                      | Caucasian                                                                                                                                                                | Caucasian                                                                                                                                                                                                                                                                                                                                     |
| TRANSPLANTED ORGAN       |                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                      |                                                                                                                                                                                                |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                               |
| BMI (Kg/m <sup>2</sup> ) | 29.2                                                                                                                                                                                                                                                                                     | 20.2                                                                                                                                                                                 | 23.8                                                                                                                                                                                           | 32.5                                                                                                                                                                     | 24.4                                                                                                                                                                                                                                                                                                                                          |
| CONCOMITANT THERAPIES    | tacrolimus 2 mg, nifedipine 60 mg, erythropoietin 10 mg, atorvastatin 20 mg, calcium carbonate 500 mg, acetylsalicylic acid 100 mg, doxazosin 6 mg, calcifediol 10 gtt, fentanyl 100 mg, nitroglycerin, omeprazole 20 mg, finasteride 5 mg, rifaximin 400 mg, sodium bicarbonate 3000 mg | prednisone 5 mg, tacrolimus 6 mg, mycophenolate 360 mg, bisoprolol 1.25 mg, acetylsalicylic acid 100 mg, calcifediol 15 gtt, empagliflozin 25 mg, nifedipine 30 mg, omeprazole 20 mg | tacrolimus 0.5 mg, prednisone 10 mg, baricitinib 1 mg, ImmunoHBs 1000 U.I., omeprazole 20 mg, cholecalciferol 50.000 U.I., apixban 10 mg, furosemide 25 mg, canrenone 50 mg, rosuvastatin 5 mg | prednisone 5 mg, mycophenolate 1000 mg, carvedilol 6.25 mg, omeprazole 20 mg, clopidogrel+acetylsalicylic acid, nifedipine 20 mg, atorvastatin 20 mg, dulaglutide 1.5 mg | canagliflozin 100 mg, ciclosporin 100 mg, mycophenolate 1250 mg, lamivudine 100 mg, tenofovir, ImmunoHBs 540 U 2ft/2 weeks, sodium polystyrene sulfonate, valsartan 80 mg, ursodeoxycholic acid 900 mg, omeprazole 20 mg, bisoprolol 3.75 mg, nitroglycerin, clopidogrel+acetylsalicylic acid, valsartan, allopurinol 100 mg, ezetimibe 10 mg |
| CONCOMITANT DISEASES     | rheumatic pericarditis, hypertension, IBD, coronary artery disease, chronic gastritis, ESRD                                                                                                                                                                                              | coronary artery disease, hypertension, IPMN, diabetic retinopathy                                                                                                                    | sleep apnea, an everolimus associated interstitial lung disease, chronic HBV infection, squamous cell carcinoma                                                                                | hypertension, dyslipidemia, cerebellar stroke                                                                                                                            | chronic HBV infection, hypertension, dyslipidemia, CKD, multifocal coronary artery disease, bile duct lithiasis and stricture of the main bile duct.                                                                                                                                                                                          |

# DM, forme secondarie: diabete post trapianto d'organo

|                        |                     |                                                                                    |            |                                                                                     |            |                                                                                     |            |                                                                                     |            |                                                                                     |            |
|------------------------|---------------------|------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|------------|
|                        |                     |  |            |  |            |  |            |  |            |  |            |
|                        |                     | Before CSII                                                                        | Last visit | Before CSII                                                                         | Last visit | Before CSII                                                                         | Last visit | Before CSII                                                                         | Last visit | Before CSII                                                                         | Last visit |
| Glucose control        | Glucose (mg/dl)     | 112                                                                                | 147        | 146                                                                                 | 105        | 129                                                                                 | 82         | 166                                                                                 | 92         | 201                                                                                 | 116        |
|                        | HbA1c (%)           | 7.7                                                                                | 6.9        | 5.8                                                                                 | 5.8        | 8.5                                                                                 | 7.0        | 8.1                                                                                 | 6.3        | 8.7                                                                                 | 6.3        |
| 14 days - AGP metrics  | AG (mg/dl)          | 169                                                                                | 141        | 123                                                                                 | 136        | 197                                                                                 | 152        | 188                                                                                 | 128        | 233                                                                                 | 158        |
|                        | CV                  | 39.3                                                                               | 31.5       | 22.3                                                                                | 25.1       | 44                                                                                  | 29         | 39                                                                                  | 26.5       | 44                                                                                  | 28.9       |
|                        | GMI (%)             | 7.4                                                                                | 6.7        | 6.1                                                                                 | 6.6        | 8.6                                                                                 | 6.8        | 8.3                                                                                 | 6.4        | 8.5                                                                                 | 7.1        |
|                        | TIR (%)             | 63                                                                                 | 84         | 92                                                                                  | 89         | 43                                                                                  | 75         | 51                                                                                  | 88         | 43                                                                                  | 83         |
|                        | TAR (%)             | 37                                                                                 | 14         | 5                                                                                   | 10         | 55                                                                                  | 25         | 48                                                                                  | 12         | 56                                                                                  | 17         |
|                        | TBR (%)             | 0                                                                                  | 2          | 2                                                                                   | 1          | 2                                                                                   | 0          | 1                                                                                   | 0          | 1                                                                                   | 0          |
|                        |                     |                                                                                    |            |                                                                                     |            |                                                                                     |            |                                                                                     |            |                                                                                     |            |
| Insulin Requirements   | TDD (U)             | 61                                                                                 | 41.8       | 45                                                                                  | 35.5       | 48                                                                                  | 34.2       | 63                                                                                  | 68.4       | 31                                                                                  | 27.2       |
|                        | Basal amount (U)    | 40                                                                                 | 27.8       | 10                                                                                  | 8.4        | 24                                                                                  | 22.2       | 36                                                                                  | 40.1       | 12                                                                                  | 7.3        |
|                        | Auto Correction (U) | -                                                                                  | 3.4        | -                                                                                   | 0.9        | -                                                                                   | 6.1        | -                                                                                   | 12.4       | -                                                                                   | 2.1        |
|                        | Bolus Amount (U)    | 21                                                                                 | 14         | 35                                                                                  | 27.1       | 24                                                                                  | 12         | 27                                                                                  | 28.3       | 19                                                                                  | 19.9       |
| CSII settings          | AI (h)              | -                                                                                  | -          | -                                                                                   | 5          | -                                                                                   | -          | -                                                                                   | 2.30       | -                                                                                   | 5.00       |
|                        | Target (mg/dl)      | -                                                                                  | 105        | -                                                                                   | 110        | -                                                                                   | 105        | -                                                                                   | 100        | -                                                                                   | 110        |
|                        | ISF (mg/dl)         | -                                                                                  | 60         | -                                                                                   | 60         | -                                                                                   | 55         | -                                                                                   | 50         | -                                                                                   | 65         |
|                        | IC ratio (U/gr)     | -                                                                                  |            | -                                                                                   |            | -                                                                                   |            | -                                                                                   |            | -                                                                                   |            |
|                        | Breakfast           |                                                                                    | 1/10       |                                                                                     | 1/10       |                                                                                     | 1/14       |                                                                                     | 1/9        |                                                                                     | 1/14       |
|                        | Lunch               |                                                                                    | 1/12       |                                                                                     | 1/10       |                                                                                     | 1/10       |                                                                                     | 1/12       |                                                                                     | 1/12       |
|                        | dinner              |                                                                                    | 1/11       |                                                                                     | 1/10       |                                                                                     | 1/13       |                                                                                     | 1/10       |                                                                                     | 1/16       |
| Questionnaires Outputs | DTSQ total score    | 27                                                                                 | 31         | 24                                                                                  | 32         | 27                                                                                  | 31         | 26                                                                                  | 28         | 29                                                                                  | 31         |
|                        | ADDQoL AWI score    | -2.43                                                                              | -0.89      | -2.99                                                                               | -0.78      | -2.13                                                                               | -1.10      | -2.01                                                                               | -1.33      | -2.18                                                                               | -1.19      |

# DM, FORME SECONDARIE – quale spazio per la tecnologia?



# Take home messages

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I rtCGM o isCGM sono la metodologia di monitoraggio glicemico da raccomandare a tutti i soggetti con diabete in terapia con insulina (qualsiasi forma di diabete, qualsiasi schema insulinico)



I sistemi AID dovrebbero essere proposti a tutti i soggetti con DM1 e altre forme di DM caratterizzato da deficit insulinico, a condizione che siano in grado di gestire tale terapia (essi stessi o i caregiver). Dovrebbero inoltre essere considerati nelle altre forme di DM, nel caso sia posta indicazione a terapia insulinica.



No approccio one-size-fits-all: la terapia con sistemi AID deve essere PERSONALIZZATA



Ruolo fondamentale dell'EDUCAZIONE, sotto forma di training e supporto nel corso del follow up

#EssereSID



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*Essere SID: da 60 anni al fianco  
del paziente per scrivere  
il Futuro della diabetologia  
in Italia*

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THANKYOU!