Advanced Hybrid Closed Loop ed algoritmi

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Dichiarazione Conflitto d'Interessi

La sottoscritta Dott.ssa Cristina Bianchi
DICHIARA
di aver ricevuto negli ultimi due anni compensi o finanziamenti dalle seguenti Aziende Farmaceutiche e/o Diagnostiche:

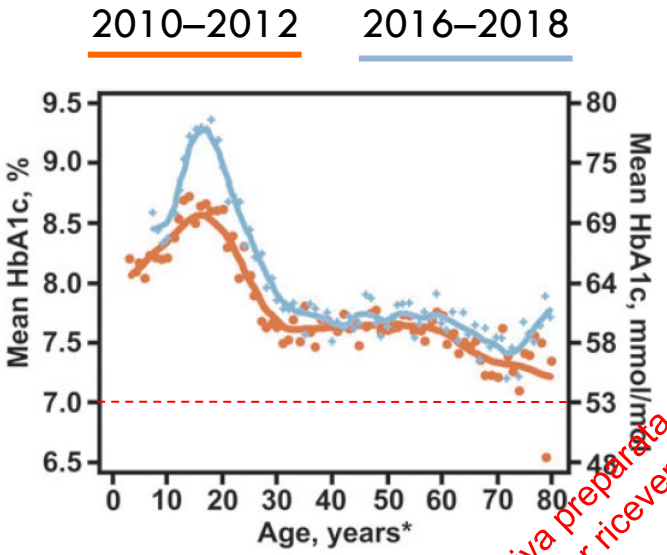
- Novonordisk
- Lilly
- MSD

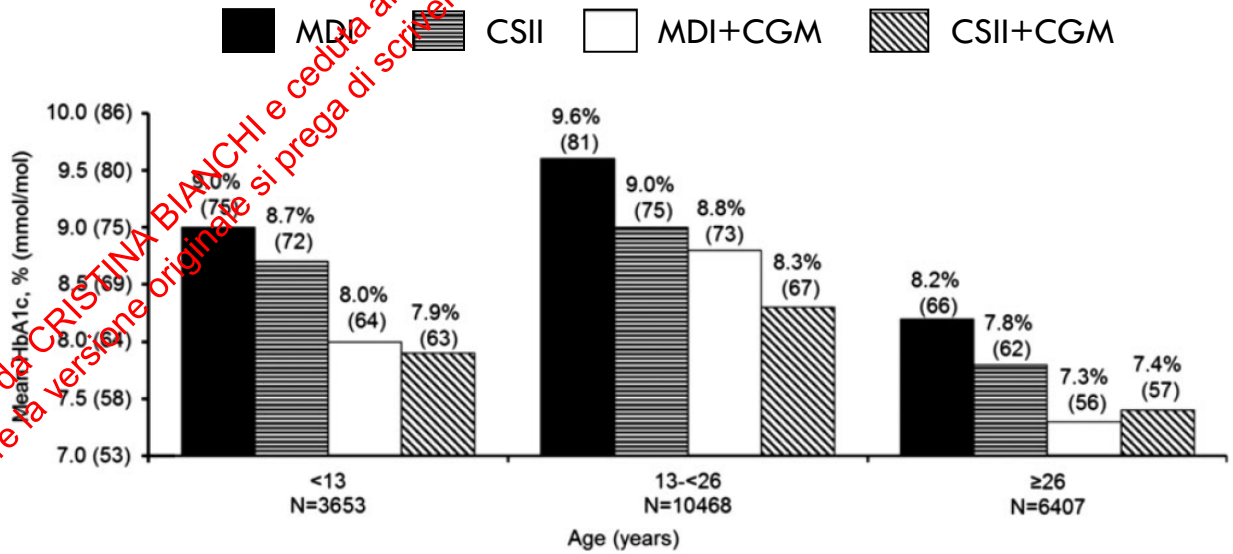
Dichiara altresì il proprio impegno ad astenersi, nell'ambito dell'evento, dal nominare, in qualsivoglia modo o forma, aziende farmaceutiche e/o denominazione commerciale e di non fare pubblicità di qualsiasi tipo relativamente a specifici prodotti di interesse sanitario (farmaci, strumenti, dispositivi medico-chirurgici, ecc.)

Cristina Bianchi, MD PhD

State of Type 1 Diabetes Management

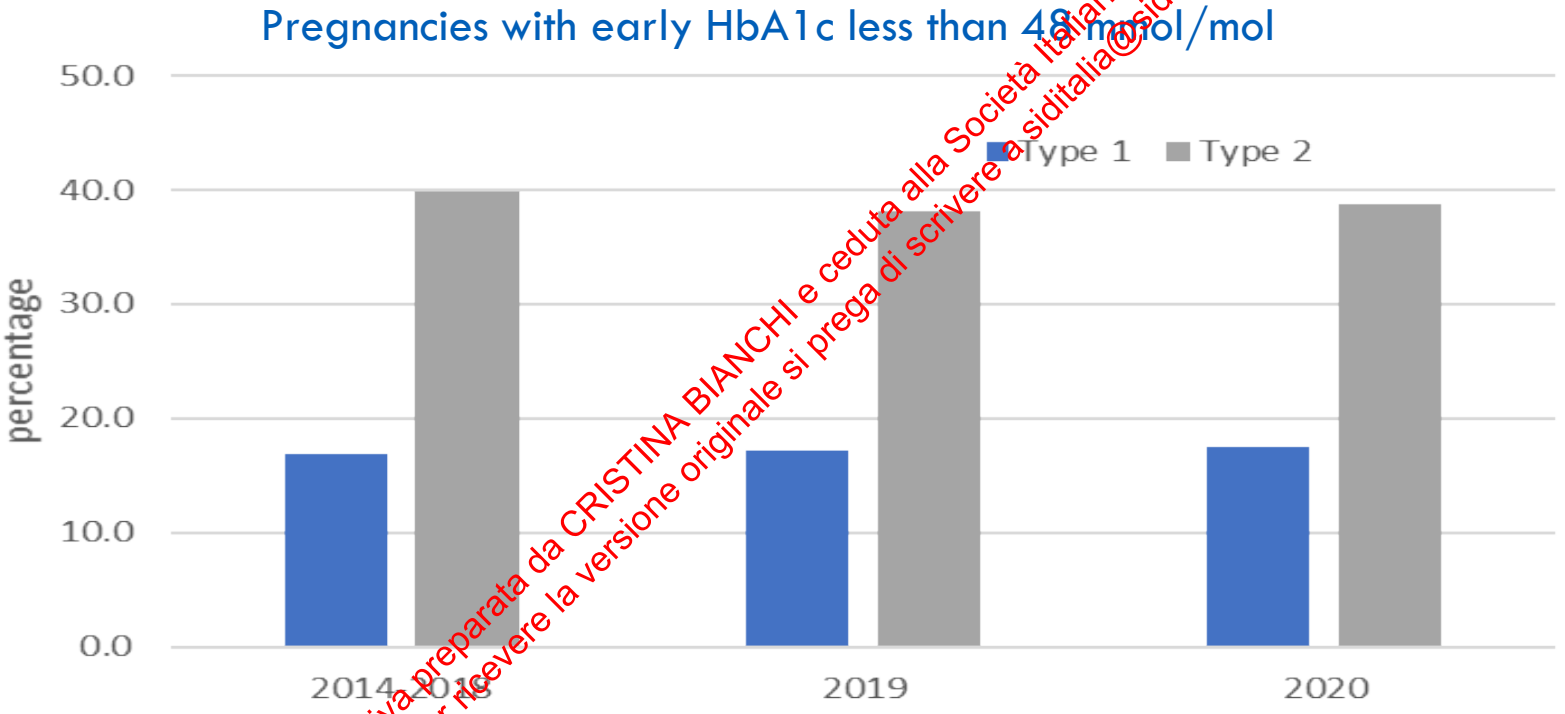
22,697 US registry participants (age 1–93 years) collected between 2016 and 2018, compared with data collected in 2010–2012 for 25,529 US registry participants





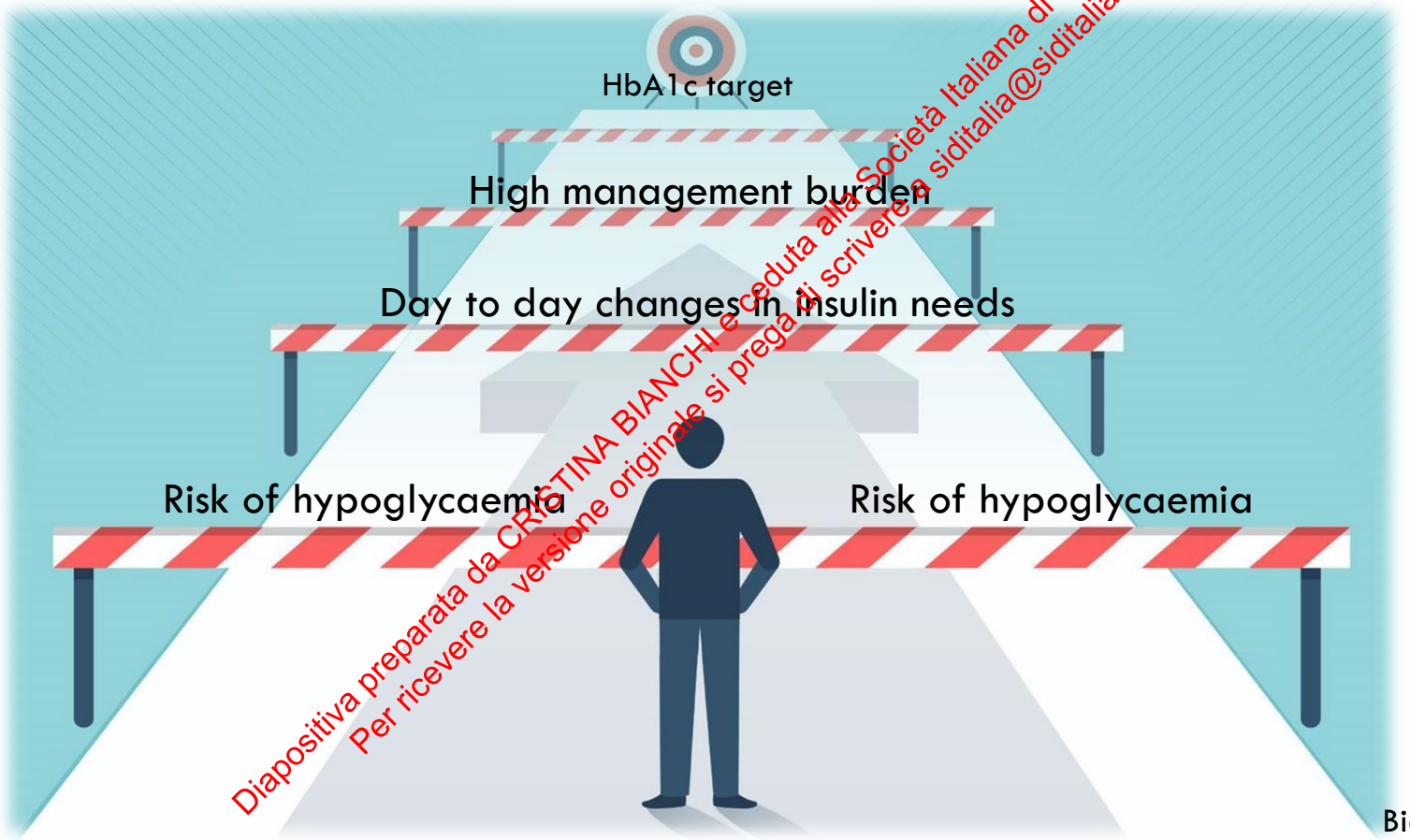
Foster NC. Diabetes Technol Ther 2019;21(2):66-72

State of Diabetes management in early pregnancy



NHS Digital - National Pregnancy in Diabetes (NPID) Audit Report 2020, 2021

Barriers to achieve good glycaemic control in Type 1 Diabetes

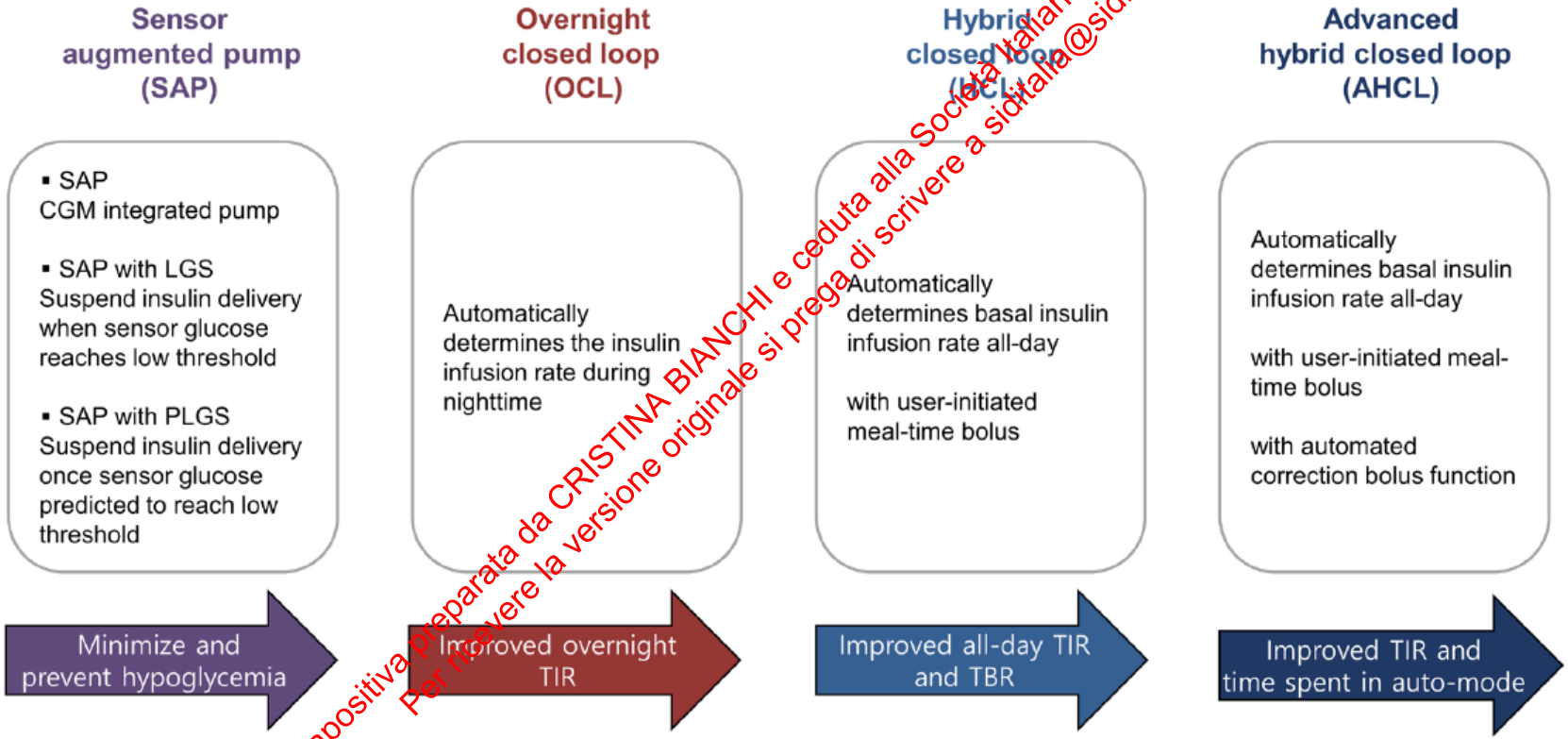


Bianchi C. 2025

Timeline of development of the artificial pancreas system

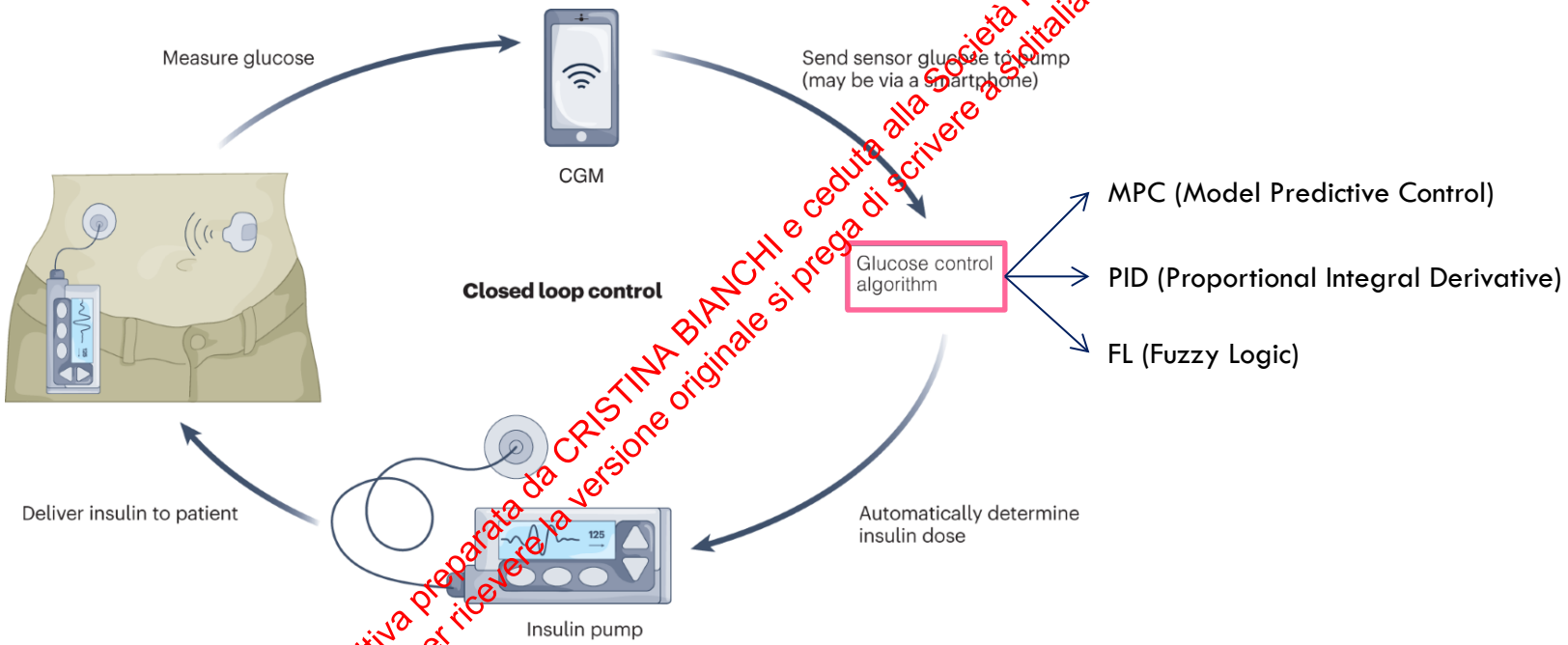
Moon SJ. Diabetes Metab J 2021;45:813-839

Key features of SAP and artificial pancreas systems

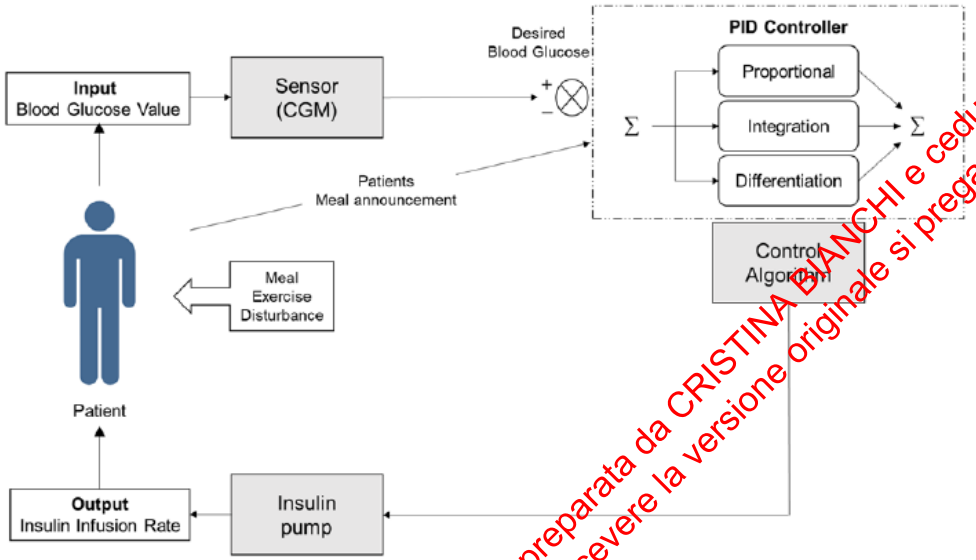


Moon SJ. Diabetes Metab J 2021;45:813-839

Advanced Hybrid Closed-Loop



Control algorithms of artificial pancreas system: proportional integral derivative control (PID) algorithm



PID controllers modify insulin rates by evaluating glucose excursions from three perspectives:

- proportional component: deviation from target glucose
- integral component: area under the curve between measured and target glucose level
- derivative component: rate of change of measured glucose levels

Moon SJ. Diabetes Metab J 2021;45:813-839 - Lakshman R. Endocr Connect 2023;12(8):e230132

Control algorithms of artificial pancreas system: proportional integral derivative control (PID) algorithm

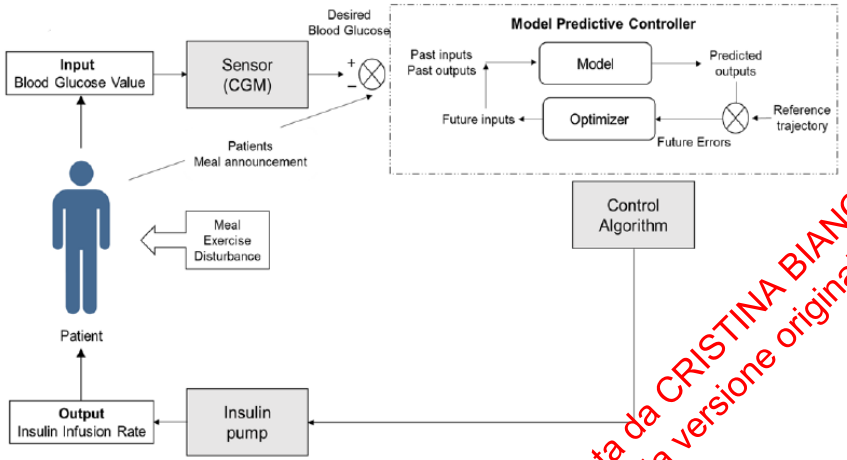
"derivative component" corresponds to the future, predicting the future direction of changes in the glucose level

"integral component" corresponds to the past to see the area deviating from the target in the previous trajectory

"proportional component" corresponds to the present because it detects how far away the glucose level is from the target right now

Lakshman R. Endocr Connect 2023;12(8):e230132

Control algorithms of artificial pancreas system: model predictive control (MPC) algorithm



MPC algorithms predict future glycaemic excursions and adjust insulin delivery based on inputs including:

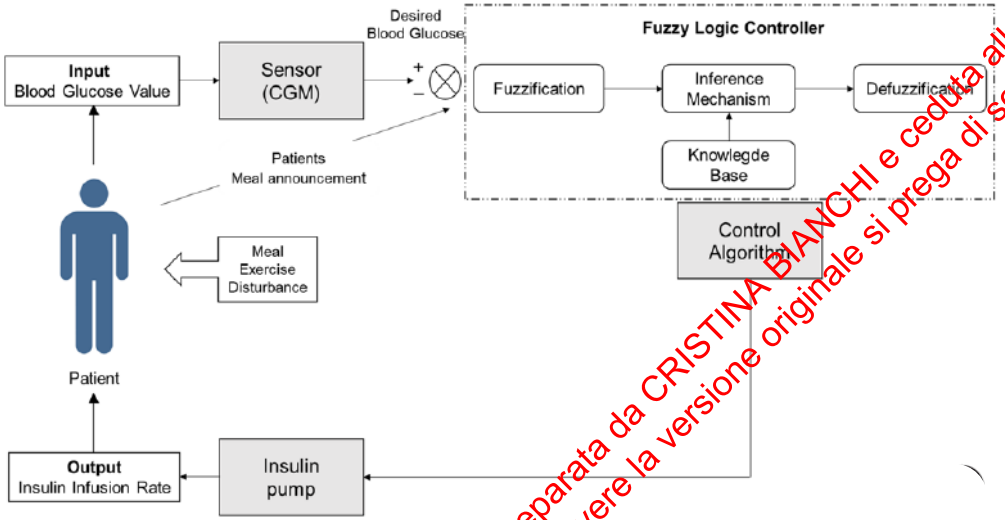
- sensor glucose levels and
- insulin boluses given,

simultaneously considering:

- insulin absorption delays,
- active insulin, and
- diurnal and post-prandial variability in glucose levels

Moon SJ. Diabetes Metab J 2021;45:813-839 - Lakshman R. Endocr Connect 2023;12(8):e230132

Control algorithms of artificial pancreas system: fuzzy logic algorithm



The fuzzy logic approach involves modulating insulin delivery based on rules which reflect the reasoning of experienced diabetes practitioners.

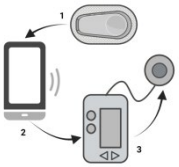
The fuzzy logic operates through supervised learning based on expert opinions to establish a specific decision

Moon SJ. Diabetes Metab J 2021;45:813-839 - Lakshman R. Endocr Connect 2023;12(8):e230132

AID: comparison of algorithms

	Smart Guard	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Algorithm	PID with insulin feedback	Adaptive MPC	MPC with Machin Learning	Adaptive MPC	Adaptive MPC
Automatic basal rate modulation	✓	✓	✓	✓	✓
Correction insulin delivery	Automated correction boluses (up to 12 per hour)	Automated basal rate adjustment every 5 min and automated correction boluses (up to 1 per hour)	Automated correction boluses	Automated corrections via intensive basal rate adjustments	Automated corrections via intensive basal rate adjustments
Correction boluses	✓	✓	✓	✗	✗
Algorith location	Pump integrated	Pump-integrated	Dedicated handset	App-based	Pod-integrated
Pre-set basal insulin rates influence AID	No	Yes (users can set multiple basal rates and different basal profiles)	No	No	No (informs AID for first 48 h)
Glucose target	100-120 mg/dl	112.5-160 mg/dl	100-130 mg/dl	80-200 mg/dl	110-150 mg/dl

Treating Hypoglycemia and Hyperglycemia with AID

		Hypoglycemia	Hyperglycemia
How AID system functions		Reduces and/or suspend insulin delivery when the glucose is predicted to go below a certain value within a certain period time	Increases basal insulin delivery or administers a small bolus when the glucose is predicted to go above a certain value within a certain period time

AID: strategies for addressing interplandial hyperglycemia

	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Educate • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For meals with high fat and protein contents suggest adding carbohydrate equivalents for fat/proteins and splitting the bolus	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • Suggest enabling the Sleep activity mode in the sleeping hours • For meals with high fat and protein contents suggest disabling the Sleep activity mode in the sleeping hours	*Educate* • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For meals with high fat and protein contents suggest ticking "high fat meal" in the "meal" menu	*Educate* • Suggest enabling the "Boost" function to intensify algorithm driven insulin delivery • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For meals with high fat and protein contents suggest splitting the bolus and ticking 'slowly absorbed meal' in the "add meal" menu	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For dinner meals with high fat and protein contents • suggest adding carbohydrate equivalents for fat/proteins and splitting the bolus
Adjust • Reduce the AIT by 30-60 min • Lower the GT level by 10 mg/dl	*Adjust* • Increase the basal rate by 10-20% • Reduce the ISF by 10-20%	*Adjust* • Increase the HA by 10% when SG lies above the hyperglycemia threshold • Increase the NA by 10% when SG lies within the hyperglycemia threshold • Lower the GT level by 10 mg/dl	*Adjust* • Lower the GT level by 10 mg/dl	*Adjust* • Lower the GT level by 10 mg/dl • For hyperglycemic episodes persisting despite user-initiated correction boluses, consider lowering the "correct above" threshold or reducing the ISF and/or the AIT

Di Molfetta S. Diabetes Res Clin Pract 2025

AID: strategies for addressing interprandial hypoglycemia

	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Educate • Suggest taking 5-10 grams of fast acting sugars	*Educate* • Suggest taking 5-10 grams of fast acting sugars	*Educate* • Suggest taking the recommended amount of rescue carbs	*Educate* • Suggest taking 5-10 grams of fast acting sugars and ticking "hypo treatment" in the "add meal" menu	*Educate* • Suggest taking 5-10 grams of fast acting sugars
Adjust • Raise the GT level by 10 mg/dl • Increase the AIT by 30-60 min	*Adjust* • Reduce the basal rate by 10-20% • Increase the ISF by 10-20%	*Adjust* • Reduce the HA by 10% • Reduce the NA by 10% • Raise the GT level by 10 mg/dl • Raise the hypoglycemia threshold by 5-10 mg/d	*Adjust* • Raise the GT level by 10 mg/dl	*Adjust* • Raise the GT level by 10 mg/dl • For hypoglycemic episodes following user-initiated correction boluses, consider raising the "correct above" threshold or increasing the ISF and/or the AIT

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AID: strategies for addressing nocturnal hyperglycemia

	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Educate • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For dinner meals with high fat and protein contents suggest adding carbohydrate equivalents for fat/proteins and splitting the bolus	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • Suggest enabling the Sleep activity mode in the sleeping hours • For dinner meals with high fat and protein contents suggest disabling the Sleep activity mode in the sleeping hours	*Educate* • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For meals with high fat and protein contents suggest ticking "high fat meal" in the "meal" menu	*Educate* • Suggest enabling the "Boost" function to intensify algorithm driven insulin delivery • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For dinner meals with high fat and protein contents suggest splitting the bolus and ticking 'slowly absorbed meal' in the "add meal" menu	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • In case of sustained hyperglycemia suggest measuring blood glucose (by glucometer), monitoring ketones and performing an infusion set change • For dinner meals with high fat and protein contents • suggest adding carbohydrate equivalents for fat/proteins and splitting the bolus
Adjust • Reduce the AIT by 30-60 min • Lower the GT level by 10 mg/dl	*Adjust* • Increase the basal rate by 10-20% • Reduce the ISF by 10-20%	*Adjust* • Increase the HA by 10% when SG lies above the hyperglycemia threshold • Increase the NA by 10% when SG lies within the hyperglycemia threshold • Lower the GT level by 10 mg/dl	*Adjust* • Lower the GT level by 10 mg/dl	*Adjust* • Lower the GT level by 10 mg/dl • For hyperglycemic episodes persisting despite user-initiated correction boluses, consider lowering the "correct above" threshold or reducing the ISF and/or the AIT

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AID: strategies for addressing nocturnal hypoglycemia

	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Educate • Suggest taking 5-10 grams of fast acting sugars	*Educate* • Suggest taking 5-10 grams of fast acting sugars	*Educate* • Suggest taking the recommended amount of rescue carbs	*Educate* • Suggest taking 5-10 grams of fast acting sugars and ticking "hypo treatment" in the "add meal" menu	*Educate* • Suggest taking 5-10 grams of fast acting sugars
Adjust • Raise the GT level by 10 mg/dl • Increase the AIT by 30-60 min	*Adjust* • Reduce the basal rate by 10-20% • Increase the ISF by 10-20%	*Adjust* • Reduce the NA by 10% • Raise the GT by 10 mg/dl • Raise the hypoglycemia threshold by 5-10 mg/dl	*Adjust* • Raise the GT level by 10 mg/dl	*Adjust* • Raise the GT level by 10 mg/dl • For hypoglycemic episodes following user-initiated correction boluses, consider raising the "correct above" threshold or increasing the ISF and/or the AIT

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Advanced *Hybrid* Closed Loop

Meals

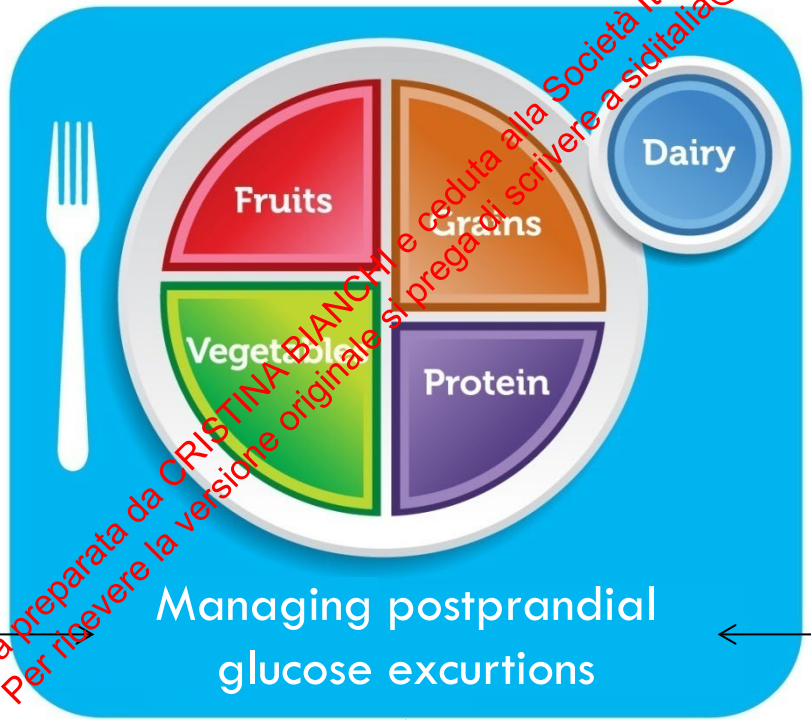
Physical activity

Meals and Advanced Hybrid Closed Loop

Current automated AID systems are *hybrid*,
requiring carbohydrate content to be "announced" for insulin dose calculation before a meal starts

Timing premeal bolus

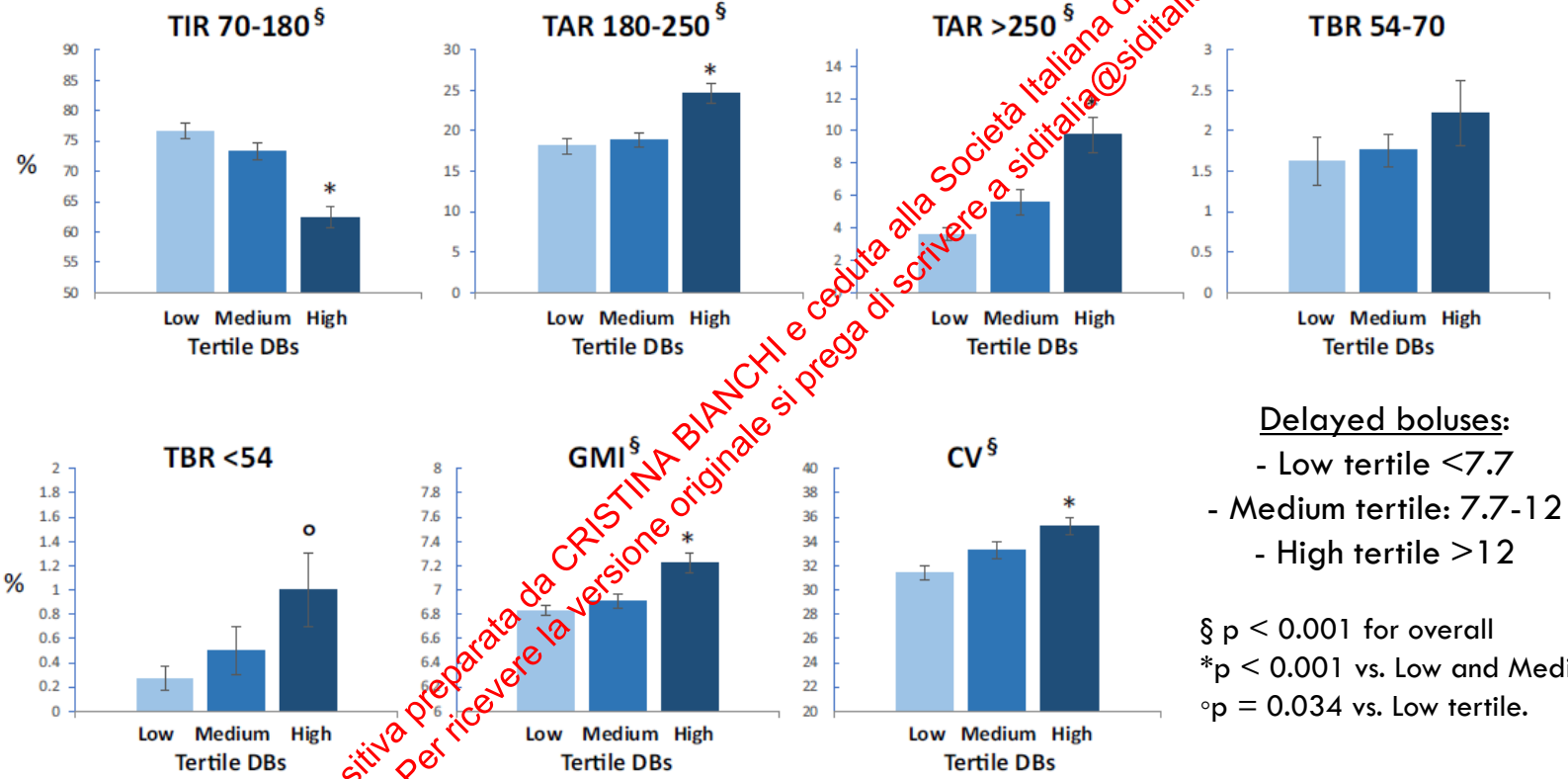
Missed meal bolus



Accurate CHO counting

Meal fat and protein content

Delayed prandial insulin boluses and glucose control



<u>Delayed boluses</u>:

- Low tertile <7.7
- Medium tertile: 7.7-12
- High tertile >12

§ $p < 0.001$ for overall

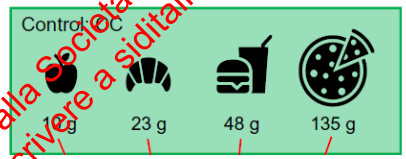
*$p < 0.001$ vs. Low and Medium tertiles

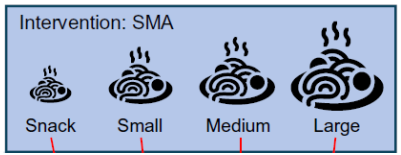
°$p = 0.034$ vs. Low tertile.

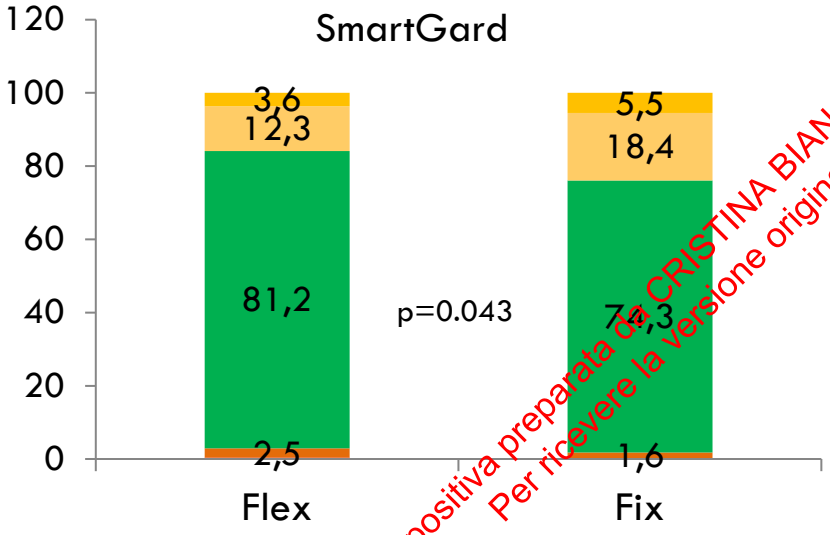
Annuzzi G. J Diabetes Complications 2024;38(2):108689

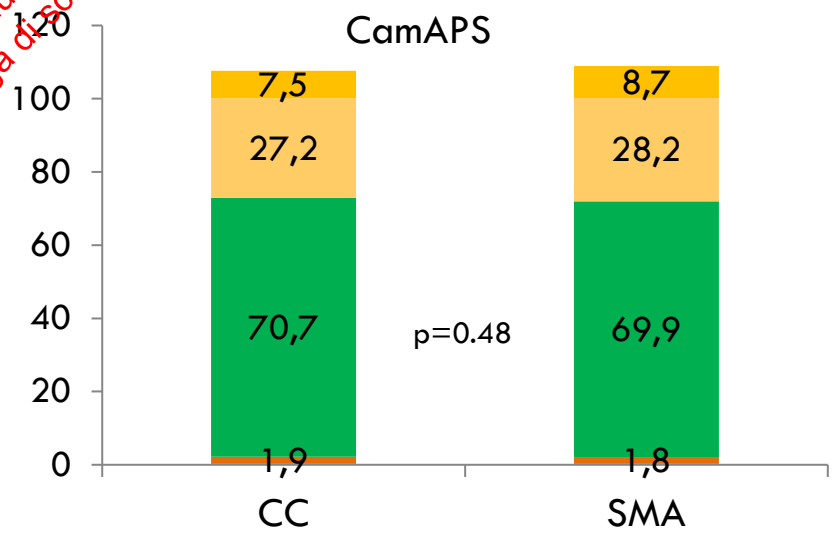
Strategies to improve post-prandial glucose control with AID

Using a qualitative estimate of carbohydrate content ("small," "medium," or "large") instead of accurate carbohydrate count requirement









Petrovski G. Diabetes Care 2023;46(3):544-550 - Laesser CI. Diabetologia 2025;68(2):295-307

AID: strategies for addressing postprandial hyperglycemia

	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Educate • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • Review and reinforce carbohydrate counting skills • Suggest increasing the time interval between the (insulin) bolus and the meal	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • Review and reinforce carbohydrate counting skills • Suggest increasing the time interval between the (insulin) bolus and the meal	*Educate* • Review and reinforce carbohydrate counting skills • Suggest increasing the time interval between the (insulin) bolus and the meal	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • Suggest enabling the "Boost" function to intensify algorithm driven insulin delivery • Review and reinforce carbohydrate counting skills • Suggest increasing the time interval between the (insulin)	*Educate* • Suggest considering the administration of a correction bolus through the in-built calculator of the pump • Review and reinforce carbohydrate counting skills • Suggest tapping "Use sensor" to use sensor glucose trend for bolus calculation • Suggest increasing the time interval between the (insulin) bolus and the meal
Adjust • Reduce the ICR by 10-20%	*Adjust* • Reduce the ICR by 10-20%	*Adjust* • Increase aggressiveness for breakfast – lunch - dinner by10-20%	*Adjust* • Reduce the ICR by 10-20% • Lower the GT level by 10 mg/dl • Switch to ultra-rapid acting insulin analogs (faster aspart, ultrarapid lispro)	*Adjust* • Reduce the ICR by 10-20% • Turn reverse correction OFF • Lower the GT level by 10 mg/dl • Lower the "correct above" threshold as appropriate

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AID: strategies for addressing postprandial hypoglycemia

	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Educate • Suggest taking 10-15 grams of fast acting sugars • Review and reinforce carbohydrate counting skills • Suggest reducing the time interval between the (insulin) bolus and the meal • For slowly absorbed meals suggest splitting the bolus	*Educate* • Suggest taking 10-15 grams of fast acting sugars • Review and reinforce carbohydrate counting skills • Suggest reducing the time interval between the (insulin) bolus and the meal • For slowly absorbed meals suggest use of extended bolus feature (1-2h)	*Educate* • Suggest taking the recommended amount of rescue carbs • Review and reinforce carbohydrate counting skills • Suggest reducing the time interval between the (insulin) bolus and the meal • For slowly absorbed meals suggest splitting the bolus	*Educate* • Suggest taking 10-15 grams of fast acting sugars and ticking “hypo treatment” in the “add meal” menu • Review and reinforce carbohydrate counting skills • Suggest reducing the time interval between the (insulin) bolus and the meal • For slowly absorbed meals suggest splitting the bolus and ticking 'slowly absorbed meal' in the “add meal” menu	*Educate* • Suggest taking 10-15 grams of fast acting sugars • Review and reinforce carbohydrate counting skills • Suggest tapping “Use sensor” to use sensor glucose trend for bolus calculation • Suggest reducing the time interval between the (insulin) bolus and the meal • For slowly absorbed meals suggest splitting the bolus
Adjust • Increase the ICR by 10-20%	*Adjust* • Increase the ICR by 10-20% • Reduce the basal rate by 10-20% • Increase the ISF by 10-20%	*Adjust* • Reduce aggressiveness for breakfast – lunch - dinner by10-20%	*Adjust* • Increase the ICR by 10-20% • Raise the GT level by 10 mg/dl	*Adjust* • Increase the ICR by 10-20% • Turn reverse correction ON • Raise the GT level by 10 mg/dl • Raise the “correct above” threshold as Appropriate

Di Molfetta S. Diabetes Res Clin Pract 2025

Physical activity and Advanced Hybrid Closed Loop

Exercise intensity and mode	 Postprandial, continous, sustained, prolonged aerobic exercise (low stress hormon response)	 Mixed activity; individual and team sports	 Overnight fasted, burst, explosive, competitive anaerobic exercise (high stress hormon response)
Avarage glucose response to exercise			  
Exogenous insulin requirements around exercise			  
Carbohydrate intake requirement around exercise			  

Moser O. Diabetologia 2025;68(2):255-280

Physical activity and Advanced Hybrid Closed Loop

CGM trend arrow	• Start an activity under stable glucose conditions
Glucose target	• Set a higher glucose target 1–2 h before PA
Insulin on board (IOB)	• Aim for low IOB at onset of PA
Carbohydrates (CHO)	• Consume CHO just before PA if needed
Time of day and prandial status	• Adjust bolus insulin dose for meals consumed <2 h prior to PA according with PA intensity and duration
Placement of insulin pump and CGM devices	• Consider location of the infusion set and CGM placement in areas less likely to fail, based on activity type
Blood glucose and ketone monitoring	• Have a glucose meter readily available • Have a ketone monitorimg system available if the PA is prolonged or intense

Moser O. Diabetologia 2025;68(2):255-280

Physical activity and AID

Planned physical activity

Before PA (1–2 h before)		During PA (every 20–30 min)	After PA[a]
Glucose level	Strategy		
>15.0 mmol/l or Previous history where increase in glucose expected during PA	• May not need higher glucose target • Usual prandial insulin dose before PA • If glucose >15.0 mmol/l (and symptoms of DKA exist), check infusion site for any noticeable causes of blockages, such as kinked tubing or pressure/discomfort at infusion site, and test for ketones	• If glucose <7.0 mmol/l, consume 3–20 g CHO depending on CGM trend arrow	• If glucose >15.0 mmol/l after PA, resume usual settings and continue to monitor ketones and glucose levels
5.0–15.0 mmol/l	• Start higher glucose target • If PA occurs <2 h after meal, perform 25–33% prandial bolus reduction		• If glucose 5.0–15.0 mmol/l after PA, resume usual settings
<5.0 mmol/l or Previous history where decrease in glucose expected during PA	• Start higher glucose target • If PA occurs <2 h after meal, perform 25–33% prandial bolus reduction • CHO (10–20 g) snack at PA onset with no prandial insulin		• If glucose <5.0 mmol/l, consider 3–20 g CHO and maintain higher glucose target for up to 2 h post PA

[a]Consider 25–33% reduction in prandial bolus insulin with the following meal after PA. For unplanned PA, the frequency of CHO intake is generally expected to be higher and closer to the upper limit of CHO amount recommendations than that for planned PA

[b]If PA occurs after a meal where a prandial bolus dose is delivered, set the higher glucose target before performing the prandial bolus reduction

Unlanned physical activity

At PA onset		During PA (every 20–30 min)	After PA[a]
Glucose level	Strategy		
>15.0 mmol/l or Previous history where increase in glucose expected during PA	• May not need higher glucose target • If glucose >15.0 mmol/l (and symptoms of DKA exist), check infusion site for any noticeable causes of blockages, such as kinked tubing or pressure/discomfort at infusion site, and consider testing for ketones	• If glucose <7.0 mmol/l, consume 3–20 g CHO depending on CGM trend arrow	• If glucose >15.0 mmol/l after PA, resume usual settings and continue to monitor ketones and glucose levels
5.0–15.0 mmol/l	• Start higher glucose target until end of PA[b] • May consider CHO (10–20 g) snack at PA onset with no prandial bolus insulin		• If glucose 5.0–15.0 mmol/l after PA, resume usual settings
<5.0 mmol/l or Previous history where decrease in glucose expected during PA	• Start higher glucose target until end of PA[b] • CHO (10–20 g) snack at PA onset with no prandial bolus insulin		• If glucose <5.0 mmol/l, consider 3–20 g CHO and maintain higher glucose target for up to 2 h post PA

[a]Consider 25–33% reduction in prandial bolus insulin with the following meal after PA. For unplanned PA, the frequency of CHO intake is generally expected to be higher and closer to the upper limit of CHO amount recommendations than that for planned PA

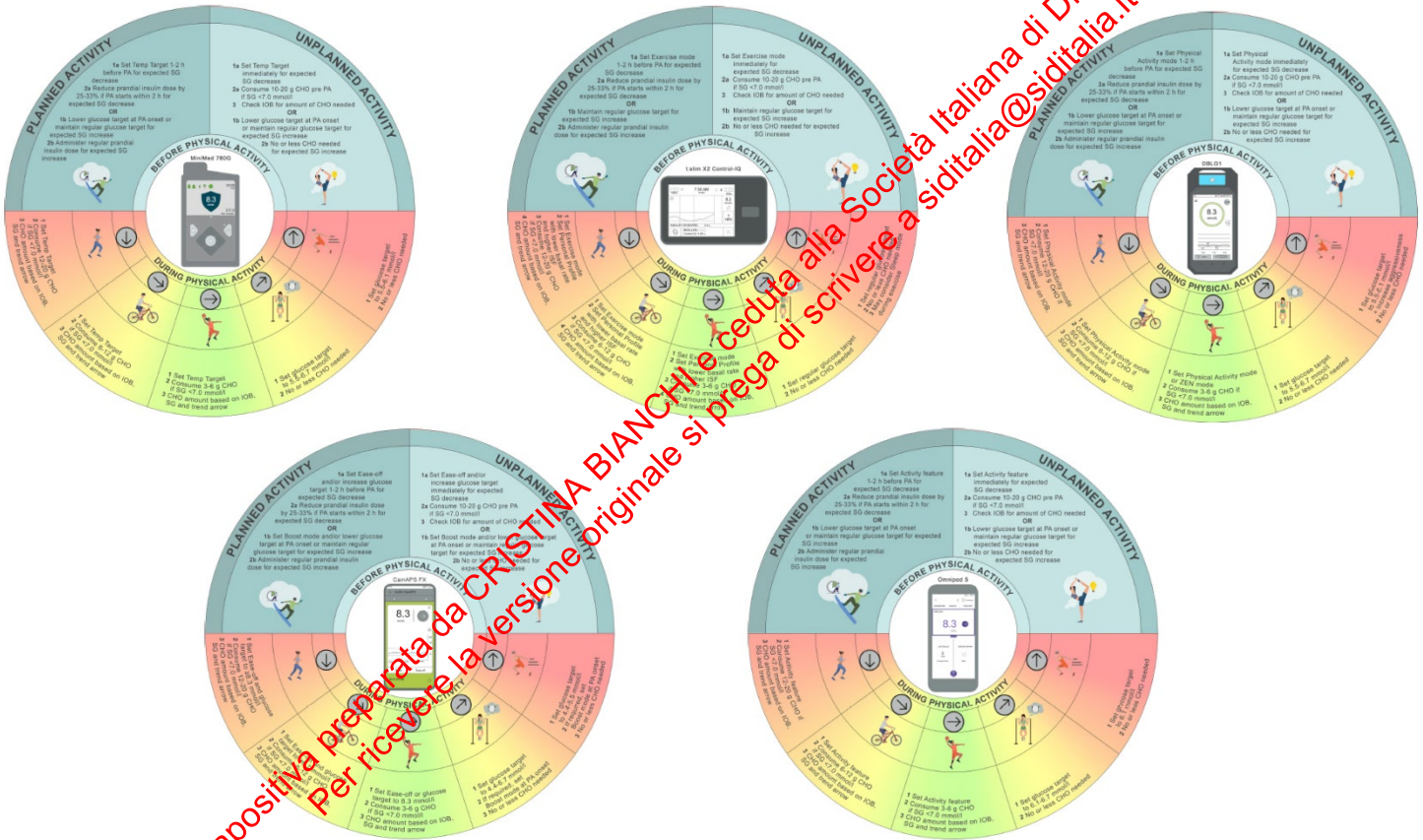
[b]If PA occurs after a meal where a prandial bolus dose is delivered, set the higher glucose target before performing the prandial bolus reduction

Moser O. Diabetologia 2025;68(2):255-280

AID: comparison of algorithms

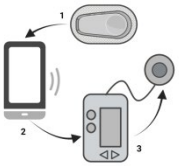
	Smart Guard	Control I-Q	DBLG1	CamAPS FX	SmartAdjust
Calibration	Optional	✗	✗	✗	✗
Glucose target	100-120 mg/dl	112.5-160 mg/dl	100-130 mg/dl	80-200 mg/dl	110-150 mg/dl
Other modes	*Activity mode*: target of 150 mg/dl and no autocorrections	*Exercise activity*: target 140-160 mg/dl *Sleep Activity*: target 112.5-120 mg/dl basal rate modulation only	*Activity mode*: target +68 mg/dl and less aggressive algorithm *Zen mode*: target +9–40 mg/dl and less aggressive algorithm	*Ease-off mode*: target 126 mg/dl, less insulin delivery (−35%) *Boost mode*: insulin delivery (+35%), more responsive algorithm	*Activity mode*: target 150 mg/dl restricted insulin delivery
Approved in pregnancy	✓	✗	✗	✓	✗

Physical activity and Advanced Hybrid Closed Loop



Moser O. Diabetologia 2025;68(2):255-280

Reverting to open loop/manual mode

How AID system functions		Aumented insulin delivery may not be able to respond quickly to rapid increases in insulin resisteance that occur during illiness, stress, steroid use	Generates alerts.
Users responsabilities		Guidelines should be in place for managing insulin during illiness, stress and medications that raise glucose	Respodn to AID and CGM alerts. Use blood glucose meter when symptoms don't match CGM reading.
Tips and best practices		Consider switching to manual mode during increased insulin needs such illiness, stress or steroid use.	Ensure users understanding when and how to use a back-up plan.

Challenges of AID in pregnancy

Implementing AID use during pregnancy requires unique configurations including:

- ability to safely achieve the tighter pregnancy TIR before conception and throughout gestation,
- algorithm adaptability to changes in insulin sensitivity throughout gestation,
- assertive postprandial insulin delivery, including a mechanism to respond to changes in glycemia postprandially,
- more aggressive glucose targets without an increased risk of maternal hypoglycemia,
- ability to rapidly adapt to changes in insulin requirements postpartum (through setting adjustments and algorithm adaptation)
- user-friendly, regardless of an individual's health care status or literacy, to maximize benefits and reduce risks throughout gestation.

Jacobs PG. Diabetes Technol Ther 2025;27(S3):S60-S71

AID: settings and adaptations in Pregnancy

	Smart Guard	Control I-Q	DBLG1	Cam-APS FX	SmartAdjust
Set up requirements	Glucose Target AIT CHO/INS	Basal Rates CHO/INS ISF Body weight	Glucose Target Mean CHO consumed Body Weight	Glucose Target Body Weight TDDI CHO/INS	Glucose Target CHO/INS
Glucose target	100 mg/dl (also available from 110-120) *Adjustable*	112.5-120 Sleep mode in 24 hours (no automatic correction boluses) Non-Adjustable	100* mg/dl (from 100 to 130 mg/dl) *Adjustable*	99 mg/dl up to the 16th week 81 mg/dL overnight 90 during the day from the 16th week *Adjustable*	110 mg/dl (from 110 to 150 mg/dl) *Adjustable*
Active Insulin Time (AIT)	2 hrs *Adjustable*	5 hrs *Non-Adjustable*	Adaptive learning *Automatically adjusted*	Adaptive learning *Automatically adjusted*	2 hrs *Adjustable*
CHO/INS	↑ 1st trimester ↓ 2nd and 3rd trimesters	↑ 1st trimester ↓ 2nd and 3rd trimesters (up to 400/TDD units/g)	Non-adjustable, bolus aggressiveness can be increased from the 2nd trimester	↑ 1st trimester ↓ 2nd and 3rd trimesters	↑ 1st trimester ↓ 2nd and 3rd trimesters
Insulin Sensitivity Factor (ISF)	-	*Adaptable* (up to 1620/TDD)	-	-	*Adaptable* (affects TDD)

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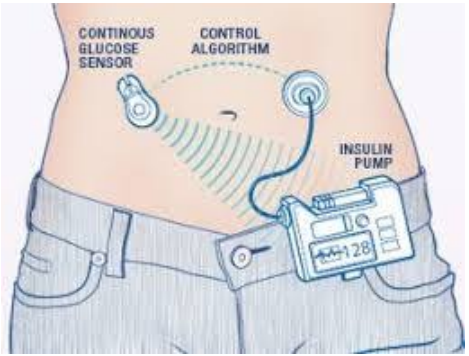
AID: strategies for addressing hyper- and hypoglicemia in pregnancy

	Postprandial Hyperglycemia		Hypoglycemic trend
	Settings	Strategies	
Smart Guard	Evaluate correction bolus through the CHO/INS Add a "fake" quantity of CHO at meal bolus Increase max bolus if needed	Anticipate bolus (10-15' in 1st trimester, 30'-45' in 2nd-3rd)	Temp Target 150 mg/dL
Control-IQ	Does not accept reduction of bolus <110 mg/dl Increase max bolus if needed Extended boluses (15 min-2 hrs)	Manual correction bolus e.g. 1-5 units no more than one every 2-3 hours with noCHO/INS, especially post-dinner and bedtime Anticipate bolus (10-15' in 1st trimester, 30'-45' in 2nd-3rd)	Exercise mode Target 140–160 mg/dL
DBLG1	Manual correction bolus with no CHO/INS	Anticipate bolus (10-15' in 1st trimester, 30'-45' in 2nd-3rd	Emergency carbohydrates Sport mode, Zen mode Raised target for 1–8 hrs)
CamAPS Fx	Boost function (+35% algorithm-driven insulin delivery) if post-prandial blood glucose > 140 mg/dl after 1 h Evaluate correction bolus through the CHO/INS if blood glucose > 180 mg/dl	Use minimum glucose threshold and evaluate if not to enter glucose value to deliver bolus without reverse correction Anticipate bolus (10-15' in 1st trimester, 30'-45' in 2nd-3rd)	Ease-off mode (increases glucose target by +45 mg/dL)
SmartAdjust	Evaluate correction bolus through the CHO/INS Turn "Reverse Correction" OFF	Anticipate bolus (10-15' in 1st trimester, 30-'45' in 2nd-3rd) The lowest "Correct Above" threshold	Exercise mode Target 150 mg/dL

Resi V. Acta Diabetologica 2025, *in press*

Conclusions: the *aid* of AID



- ✓ Advances in technology are transforming type 1 diabetes management, also in pregnancy.
- ✓ The landscape of AID has evolved rapidly over the past few decades into a range of refined algorithms and compact hardware options.
- ✓ The automated nature of closed loop and its ability to adapt to real-time glucose levels may improve glucose control and quality of life across a range of populations.
- ✓ However, AID systems are not fully automated in that they still require basic diabetes management skills, including carbohydrate counting, and require the users to announce meals and exercise.
- ✓ Therefore, for optimal use of diabetes technology, it is essential to improve the knowledge and skills of both healthcare professionals and users.

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Thanks for listening!

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