

Medtronic SmartGuard in Pregnancy

Pregnancy is not a Health Canada approved indication for the Medtronic 780G insulin pump with SmartGuard, but it has been used in the Calgary Diabetes in Pregnancy clinics. This document summarizes provisional guidelines based on current practice.

Reservoir capacity = 300 units

Preconception

- Move towards the following SmartGuard settings **as safe to do so**:
 - **Glucose target** = 5.5 mmol/L.
 - **Active insulin time** = 2 hours.
 - **Bolus increment** = 0.025 units
- **Pre-bolus** 10 to 15 min prior to meals

First trimester

- **SmartGuard settings:**
 - **Glucose target** = 5.5 mmol/L.
 - **Active insulin time** = 2 hours.
 - **Bolus increment** = 0.025 units
- **Carb Ratio:** 400/weekly average TDD, or stronger.
- **Pre-bolus** 10 to 15 minutes
- Update basal settings to reflect what's being delivered in automation.
- **Post-prandial hyperglycemia?**
 - If **safe meal bolus** occurs when strengthening Carb Ratio, weaken Carb Ratio and **consider adding phantom carbs**; 25 to 50% greater than what is consumed. This generally doesn't happen until after 20 weeks gestation.
 - May also consider lowering carb intake at meals and/or addition of post-meal activity.

Second trimester

- **SmartGuard settings:**
 - **Glucose target** = 5.5 mmol/L.
 - **Active insulin time** = 2 hours.
 - **Bolus increment** = 0.025 units
- Weekly titration from 16 weeks, as insulin resistance increases.
- **Review programmed max bolus** and increase if required.
- **Carb Ratio:** 400/weekly average TDD, or stronger.
- **Pre-bolus** 20 to 30 minutes with increasing insulin resistance.
- **Adjust basal settings every 4 weeks** to reflect what is being delivered in automation.
- **Post-prandial hyperglycemia?**
 - If **safe meal bolus** occurs when strengthening Carb Ratio, weaken Carb Ratio and **consider adding phantom carbs**; 25 to 50% greater than what is consumed.
 - May also consider lowering carb intake at meals and/or addition of post-meal activity.

Third trimester
<ul style="list-style-type: none">• SmartGuard settings:<ul style="list-style-type: none">○ Glucose target = 5.5 mmol/L.○ Active insulin time = 2 hours.○ Bolus increment = 0.025 units• Carb Ratio: 400/weekly average TDD, or stronger.• Pre-bolus 30 to 45 minutes. Do not pre-bolus if running low.• Adjust basal and bolus settings every 4 weeks to reflect what is being delivered in automation.• Post-prandial hyperglycemia?<ul style="list-style-type: none">○ If safe meal bolus occurs when strengthening Carb Ratio, weaken Carb Ratio and consider adding phantom carbs; 25 to 50% greater than what is consumed.○ May also consider lowering carb intake at meals and/or addition of post-meal activity.• Confirm delivery plan. MD: Enter orders in CC.

During Delivery
<ul style="list-style-type: none">• Switch SmartGuard settings at the start of pushing for vaginal delivery, or just prior to (within 1 h) caesarean sections (or immediately postpartum, if the previous options were not feasible). Leave SmartGuard turned on; the basal rates are used as back-up only.• SmartGuard settings:<ul style="list-style-type: none">○ Glucose target: Can increase to 6.1 or 6.7 mmol/L. Use temporary target (8.3 mmol/L), if there's hypoglycemia using higher targets.○ Active insulin time = 2 hours.○ Bolus increment = 0.025 units• Basal rates = 2/3 of pre-pregnancy rates. If pre-pregnancy settings aren't known, enter 50% reduction to rates being delivered in automation in 3rd trimester.• Carb Ratio: 10 to 20% weaker than pre-pregnancy. Note: If pre-pregnancy settings aren't known, consider carb ratio 50% weaker than third trimester setting [Double the third trimester carb ratio to reduce meal bolus by 50%]

Post Partum
<ul style="list-style-type: none">▪ SmartGuard settings:<ul style="list-style-type: none">○ Glucose target: Can increase to 6.1 or 6.7 mmol/L. Use temporary target (8.3 mmol/L), if there's hypoglycemia using higher targets.○ Active insulin time = 2 hours.○ Bolus increment = 0.025 units▪ Leave SmartGuard turned on; the basal rates are used as back-up only. Basal rates = 2/3 of pre-pregnancy rates. If pre-pregnancy settings aren't known, enter 50% reduction to rates being delivered in automation in 3rd trimester.▪ Carb Ratio: 10 to 20% weaker than pre-pregnancy. Note: If pre-pregnancy settings aren't known, consider carb ratio 50% weaker than third trimester setting [i.e. Double the third trimester carb ratio to reduce meal bolus by 50%]. If breast-feeding, the carb ratio may need to be up to 80% weaker than third trimester.▪ Resume pre-bolus 10 to 15 minutes

ACKNOWLEDGEMENTS AND REFERENCES

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1. Benhalima K, Beunen K, Van Wilder N, Ballaux D, Vanhaverbeke G, Taes Y, Aers XP, Nobels F, Marlier J, Lee D, Cuypers J, Preumont V, Siegelaar SE, Painter RC, Laenen A, Gillard P, Mathieu C. Comparing advanced hybrid closed loop therapy and standard insulin therapy in pregnant women with type 1 diabetes (CRISTAL): a parallel-group, open-label, randomised controlled trial. *Lancet Diabetes Endocrinol.* 2024 Jun;12(6):390-403. doi: 10.1016/S2213-8587(24)00089-5. Epub 2024 Apr 30. PMID: 38697182.
2. Beunen K, Gillard P, Van Wilder N, Ballaux D, Vanhaverbeke G, Taes Y, Aers XP, Nobels F, Van Huffel L, Marlier J, Lee D, Cuypers J, Preumont V, Siegelaar SE, Painter RC, Laenen A, Mathieu C, Benhalima K. Advanced Hybrid Closed-Loop Therapy Compared With Standard Insulin Therapy Intrapartum and Early Postpartum in Women With Type 1 Diabetes: A Secondary Observational Analysis From the CRISTAL Randomized Controlled Trial. *Diabetes Care.* 2024 Nov 1;47(11):2002-2011. doi: 10.2337/dc24-1320. PMID: 39331059.