Inhaled Technosphere Insulin (TI) Compared with Rapid-Acting Analog Insulin (RAA) in Gestational Diabetes

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American Diabetes Association. 2026 SCIENTIFIC SESSIONS

BACKGROUND

- Gestational diabetes (GDM) rates are rising and is associated with adverse outcomes.[1,2]
- Postprandial hyperglycemia is a strong correlate for fetal overgrowth and adverse outcomes.[3]
- Inhaled technosphere insulin (TI) is an ultra-rapid acting insulin administered by oral inhalation using a breathing powder inhaler with a max serum concentration 12-15min after use.[4]

OBJECTIVE

To compare the glucose excursion during 2 controlled breakfast visits using TI vs rapid acting insulin analog (RAA) in GDM pregnancies

METHODS

STUDY DESIGN

Multicenter, prospective, randomized crossover trial comparing postprandial glucose excursions across two identical standardized breakfast visits (~45–50 g carbohydrate, ~15 g fat, 10–15 g protein) conducted within 10 days. Participants received either RAA (pre-bolus 10 ± 5 min) or TI (TI-equivalent dosing = ~2 times RAA dose immediately prior to the meal).

PARTICIPANTS

Inclusion Criteria

- ≥ 18 years of age
- Singleton pregnancy <34 weeks
- GDM diagnosis
- Using RAA for breakfast treatment

Exclusion Criteria

- Preexisting diabetes
- Using >20 Units RAA at breakfast
- Lung disease or smoking (any product)

OUTCOMES

Glucose metrics (expressed mean ± std deviation)

- 3-hr glucose AUC >120 mg/dL
- Time to peak
- Excursion (difference) between baseline & peak
- Mean glucose during 3-hr postprandial
- Hypoglycemic events (any CBG <63 mg/dL)

RESULTS

Baseline Characteristics: To date, a total of 25 participants were enrolled in the study and **23** completed both meal sessions at time of analysis. Participants were 34 ± 5 years, had a pre-pregnancy BMI 36 ± 7 kg/m^2, 9% Asian, 35% White, 30% Black, 39% Hispanic or Latinx ethnicity, and at 29 ± 4 weeks gestational age at screening.

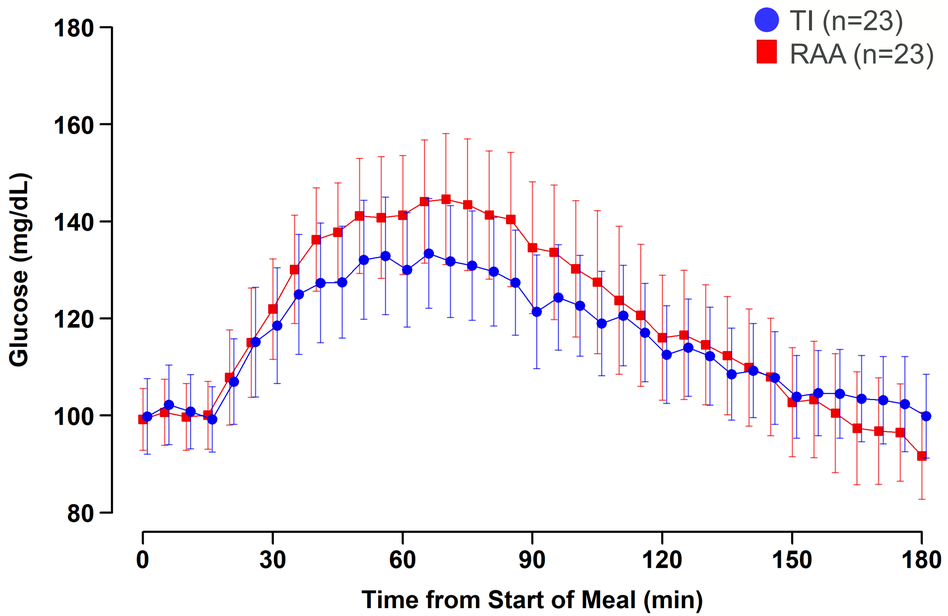

Figure. Postprandial CGM glucose measures (mean [95% CI]) across a standardized breakfast meal over 3 hours, comparing inhaled technosphere insulin (TI; blue) to rapid acting insulin analog (RAA; red)

CGM metric over 3 hours postprandial	TI	RAA	Difference (TI-RAA)
Area under curve >120 mg/dL	7.6 ± 9.3	11.3 ± 14.2	-3.7 ± 9.1
Peak glucose (mg/dL)	139.5 ± 24.4	149.7 ± 24.6	-10.2 ± 22.3
Excursion from time 0 to peak glucose (mg/dL)	39.7 ± 18.6	50.4 ± 14.3	-10.8 ± 19.8
Time above 120 mg/dL (%)	35.7 ± 29.6	43.4 ± 29.3	-7.8 ± 20.9
Time above 140 mg/dL (%)	16.6 ± 23.9	23.5 ± 24.7	-6.9 ± 14.7
Mean glucose (mg/dL)	113.4 ± 19.4	117.6 ± 22.5	-4.2 ± 13.4

Capillary blood glucose (CBG) metric	TI	RAA
1-hour glucose (mg/dL)	115.9 ± 19.4	129.7 ± 23.5
2-hour glucose (mg/dL)	99.6 ± 20.9	104.1 ± 25.8
Peak postprandial glucose over 3 hrs (mg/dL)	127.4 ± 17.8	139.0 ± 23.0
Hypoglycemic event (any CBG <63 mg/dL)	1 (4%)	6 (26%)

STRENGTHS and LIMITATIONS

Strengths

- **Identical standardized, real food meals** across 2 supervised meal sessions
- Investigator-initiated, multicenter (diverse population) and randomized

Limitations

- Different meal options, respecting dietary alternatives (variability)
- Small sample

CONCLUSIONS

- Participants using TI had ***lower*** postprandial glucose excursions following a standardized breakfast meal compared to using RAA with ***less*** hypoglycemic events
- TI was associated with ***lower*** peak postprandial glucose and ***less*** time above range (both 120 mg/dL [6.7 mmol/L] and 140 mg/dL [7.8 mmol/L]) compared to RAA

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Funding supported by mannkind