

# Inhaled Insulin in Pediatric Diabetes Results of the INHALE-1 Trial

## OBJECTIVE

To assess efficacy and safety in pediatric subjects with Type 1 Diabetes with inhaled Technosphere® Insulin compared to Rapid Acting Insulin Analogs (RAA) over 26 weeks

## CONCLUSIONS

- INHALE-1 results support the safety of inhaled TI in a pediatric population with Type 1 Diabetes
- TI is an important mealtime insulin alternative to injected RAA for youth with diabetes

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## INTRODUCTION

Inhaled Technosphere® Insulin (TI) has an ultra-rapid acting profile, due to its unique pharmacokinetic and pharmacodynamic properties, resulting in a much faster time-to-peak effect and clearance compared to subcutaneously (SC) administered rapid-acting insulin analogs (RAA).

TI is approved for use in adults in USA, India, and Brazil and is available in three color-coded dosage cartridges: 4U (blue), 8U (green), and 12U (yellow)<sup>1</sup>.

## METHODS

### MKC-TI-155 Part 2 Study Design

MKC-TI-155 Part 2 is a Phase 3, open-label, randomized clinical study evaluating the efficacy and safety of TI + basal insulin versus injectable RAA insulin + basal insulin in pediatric subjects with type 1 or type 2 diabetes mellitus. Subjects were randomized and received 26 weeks of treatment according to their treatment group. 1) TI group: TI in combination with a basal insulin 2) RAA injection group: RAA insulin in combination with a basal insulin. Both groups used real-time CGM. Primary Endpoint: Change in HbA1c from baseline to Week 26, for noninferiority assessment.

### Eligibility Criteria

- Age 4 to <18 years
- T1D or T2D clinical diagnosis
- Used insulin for at least 6 months for T1D or at least 3 months for T2D
- MDI for at least 2 weeks
- HbA1c  $\geq 7.0\%$  and  $\leq 11.0\%$
- At least 2 units RAA per meal

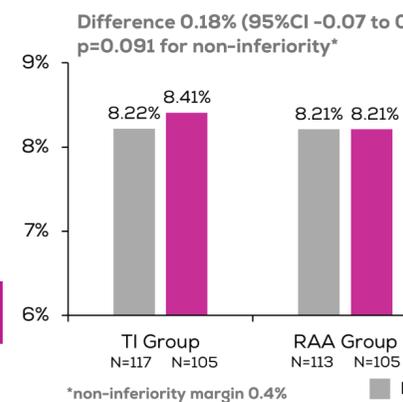
## RESULTS

**Table 1. Baseline Characteristics**

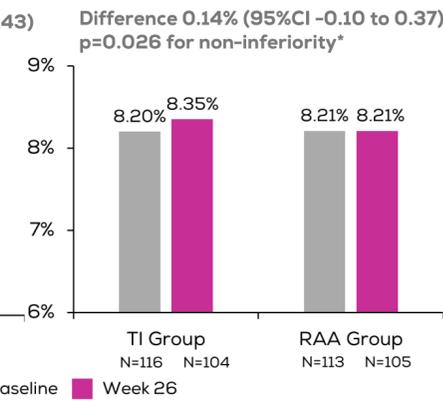
Age mean	12.6 yrs (range 4-17)
Female	38%
T1D/T2D	225 (98%) / 5 (2%)
Mean Diabetes Duration	4.4 yrs (range 0.5-15yrs)
Parent Education <BA	45%
Annual Household Income <100K	44%
Private Insurance	67%
BMI mean percentile / $\geq 95^{\text{th}}$ %	74 / 23%

230 study participants were randomized, N=117 in the TI group and N=113 in the RAA group. In the TI Group, N=105 completed 26 weeks and in the RAA Group, N=108 completed 26 weeks,

**Figure 1. HbA1c Primary Endpoint**



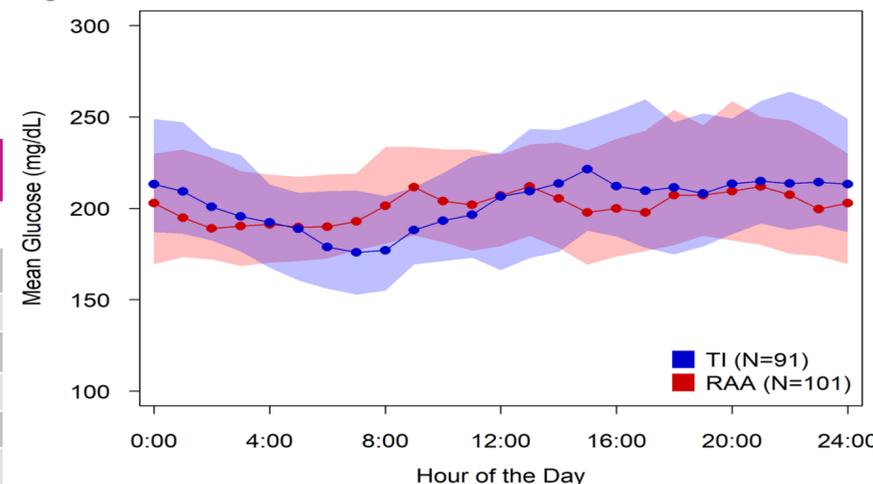
**Figure 2. HbA1c Sensitivity Analysis**



### Efficacy

Between-group comparison of HbA1c from Baseline to Week 26 resulted in a treatment difference of 0.18% (95% CI -0.07 to 0.43), p=0.091 for non-inferiority (NIM margin 0.4%), Figure 1. A sensitivity analysis excluding one outlier from the TI arm resulted in a treatment difference of 0.14% (95% CI -0.10 to 0.37), p=0.026 for non-inferiority, Figure 2. Mean CGM glucose by hour showed a similar trend between TI and RAA, Figure 3, with a comparable change in time below range, Table 2. Change in BMI percentile favored the TI Group, with a treatment difference of -4.2% (p=0.009), Figure 4. Patient reported outcomes showed higher treatment satisfaction for the TI Group in pooled teens and parents (p=0.004), Figure 5.

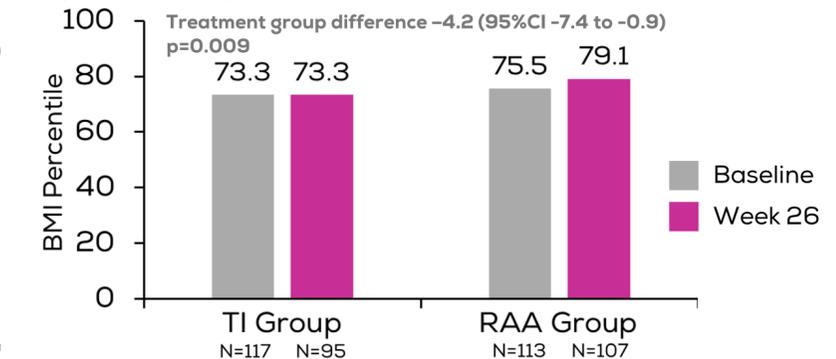
**Figure 3. Mean Glucose by Hour of the Day at 26 Weeks**



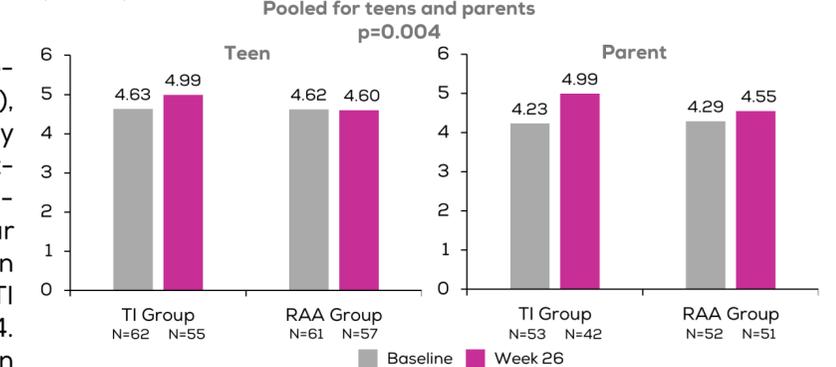
**Table 2. Change in % CGM Time Below Range from Baseline to Week 26**

	TI (n=117)	RAA (n=113)
Change in Percent Time <70 mg/dL	0.10%	0.10%
Change in Percent Time <54 mg/dL	0.00%	0.10%

**Figure 4. Change in BMI Percentile**



**Figure 5. Diabetes Treatment Satisfaction Questionnaire (DTSQ) TI Group vs. RAA Group Pooled for teens and parents**



### Safety

No new safety signals identified in the pediatric study including adverse events, hypoglycemia, and FEV1, Table 3, Figure 6.

**Table 3. Summary of Adverse Outcomes**

	TI (n=117)	RAA (n=113)
All Adverse Events (AEs) N Events	240	195
# of Participants with $\geq 1$ AE	88 (75%)	75 (66%)
Severe Hypoglycemia Events	2	1
Diabetic Ketoacidosis Events	0	1
Other Serious Adverse Events	1	2

**Figure 6. Percent Predicted FEV1 Results**

