COMPARABLE GLYCEMIC RISK INDEX (GRI) OUTCOMES FOR INHALED VS RAPID-ACTING INSULIN IN PEDIATRIC TYPE 1 DIABETES (INHALE-1)

Authors: Eda Cengiz, MD[†]; Kevin Kaiserman, MD[‡]; Leah-Elena Mycue, MSc[‡]; Joseph Sylvan[‡]; Joanne Rinker, MS, RDN, BC-ADM, CDCES, FADCES[‡]; Jennifer Nguyen, PharmD[‡]; Avet Manukyan, PharmD[‡]; SuHak Lee, PharmD, PhD[‡]; Jennifer Rittenberry, MD

[†]University of California, San Francisco (UCSF), San Francisco, CA; [‡]MannKind Corporation, Westlake Village, CA

OBJECTIVE

To evaluate overall GRI between inhaled insulin and rapid-acting insulin analogs (RAA) after 26 weeks of treatment in youth with Type 1 diabetes from the INHALE-1 trial.

CONCLUSIONS

- Overall glycemic risk, assessed using the Glycemic Risk Index (GRI), was comparable between inhaled insulin and rapid-acting insulin analogs in the INHALE-1 study, suggesting similar glycemic safety over 26 weeks.
- These findings are consistent with previously reported CGM and HbA1c outcomes from INHALE-1 and further support inhaled insulin as a potential and safe treatment option for youth with type 1 diabetes.

INTRODUCTION

Glycemic Risk Index (GRI) is a CGM-derived metric that quantifies combined hypoglycemia and hyperglycemia risk in a single, clinically interpretable score (0-100 percentile scale; lower is better) and provides treatment outcome insights beyond HbA1c and TIR. INHALE-1 is a phase 3 clinical trial evaluating inhaled insulin versus rapid-acting insulin analogs (RAA) in youth (ages 4-17 yrs) with diabetes. GRI risk scores were calculated and compared between treatment groups to further characterize glycemic outcomes.

METHODS

GRI was calculated per Klonoff et al. (2022) using INHALE-1 CGM data from participants with type 1 diabetes over the 30 days preceding the Week 26 study visit, with hypoglycemia defined as percent time <70–≥54 mg/dL (level 1) and <54 mg/dL (level 2), and hyperglycemia defined as >180–≤250 mg/dL (level 1) and >250 mg/dL (level 2).

Participants in inhaled insulin and RAA arms were categorized into Zones A – E (from lower to higher glycemic risk).

RESULTS

A total of 184 participants were included in the analysis (inhaled insulin: N=86; RAA: N=98).

Table 1. INHALE-1 Participant Baseline Demographics

	Inhaled insulin	RAA
Age, mean yrs (SD)	12.8 (3.0)	12.4 (3.1)
HbA1c , mean % (SD)	8.1 (0.9)	8.2 (1.0)
Female, n (%)	29 (33.7)	38 (38.8)
T1D Duration, mean yrs (SD)	4.4 (0.8)	4.3 (0.7)

- Mean (SD) GRI in the inhaled insulin group (73.2 ± 19.8) and the RAA group (73.4 ± 18.7) were comparable (p=0.964).
- No significant differences were observed in the hypoglycemia component (p=0.931) or hyperglycemia component (p=0.947).
- GRI distribution by zone was similar between groups (Table 2).

Figure 1. Glycemic Risk Index Grid, INHALE-1 Inhaled Insulin

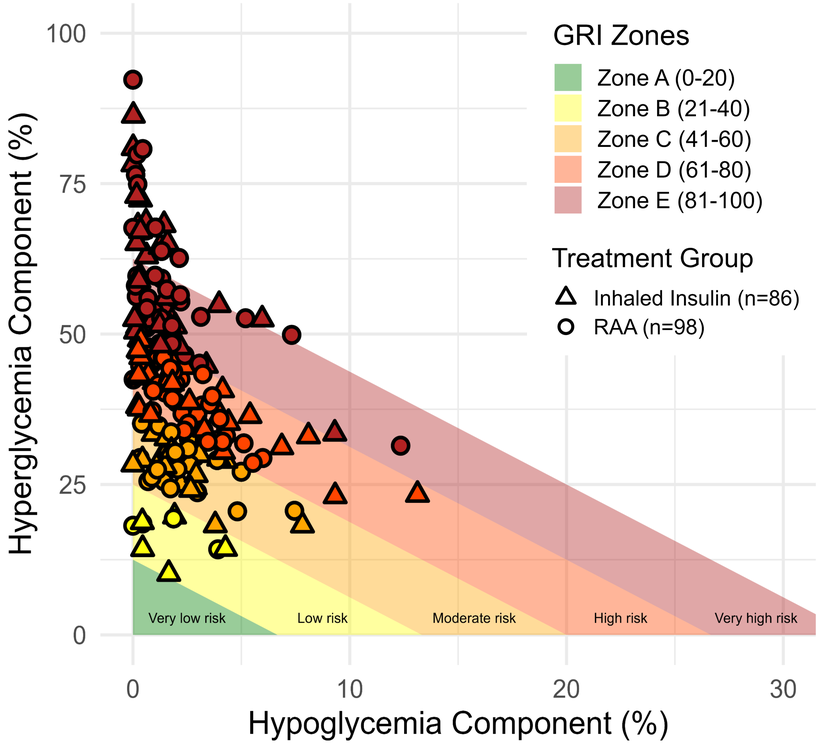

Table 2. GRI Zone Distribution of INHALE-1 Participants on Inhaled Insulin and RAA

	Zone A (0-20)	Zone B (21-40)	Zone C (41-60)	Zone D (61-80)	Zone E (81-100)
Inhaled Insulin	0 (0%)	5 (6%)	17 (20%)	31 (36%)	33 (38%)
RAA	0 (0%)	4 (4%)	21 (21%)	35 (36%)	38 (39%)

References

Klonoff DC, Wang J, Rodbard D, et al. A Glycemia Risk Index (GRI) of Hypoglycemia and Hyperglycemia for Continuous Glucose Monitoring Validated by Clinician Ratings. J Diabetes Sci Technol. 2023;17(5):1226-1242. doi:10.1177/19322968221085273