

INHALED INSULIN DOSING & POST-PRANDIAL GLUCOSE EXCURSIONS ACROSS MULTIPLE STUDIES

THE 19TH INTERNATIONAL CONFERENCE ON

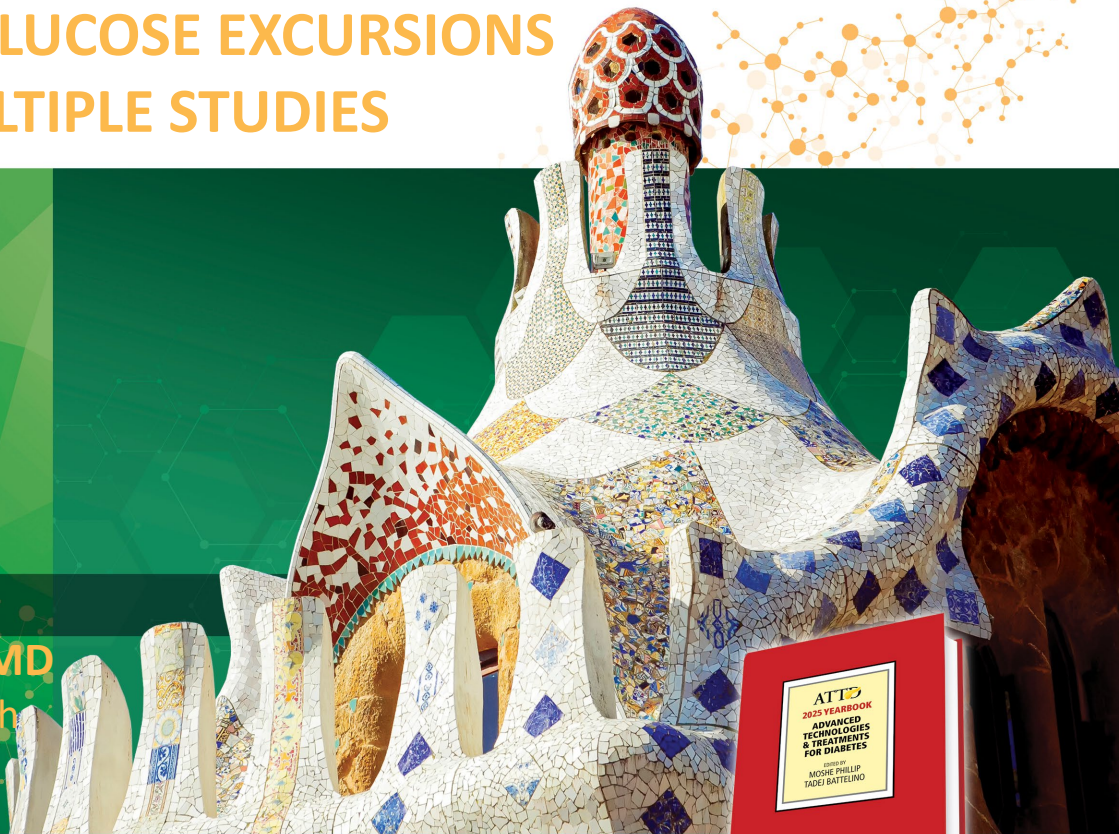
ADVANCED TECHNOLOGIES & TREATMENTS FOR DIABETES

11-14 MARCH 2026, BARCELONA, SPAIN

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	No, Nothing to disclose
X	Yes, please specify disclosures

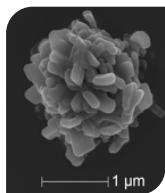
Company / Name	Honoraria / Expense	Consulting / Advisory Board	Funded Research	Royalties / Patent	Stock Options	Ownership / Equity Position	Employee	Other (Please specify)
MannKind Corp/ Kevin Kaiserman						X	X	

Technosphere Insulin (insulin human) Oral Inhalation Delivery¹

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Technosphere
Microparticles (FDKP)

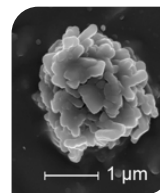


Water
+



=

Technosphere
Insulin (TI)

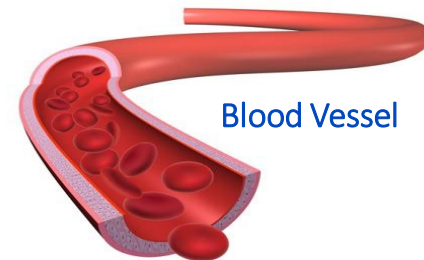
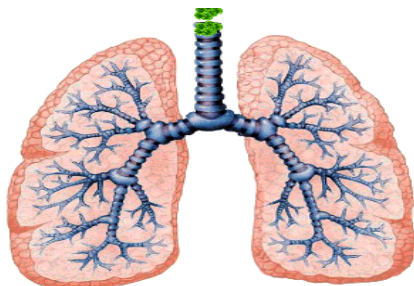


pH < 6
Technosphere Insulin
Insulin adsorption
onto FDKP particle

Breath-Powered
Oral Inhalation of
Dry Powder

pH > 6 (physiologic pH)

- Small particle size travels to deep lung
- Inhaled particles dissolve rapidly across alveolar membrane and separate
- FDKP and insulin are absorbed in the systemic circulation



Blood Vessel

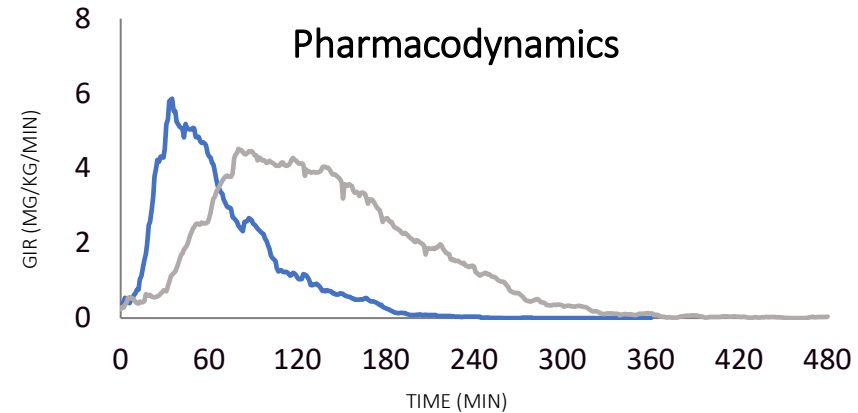
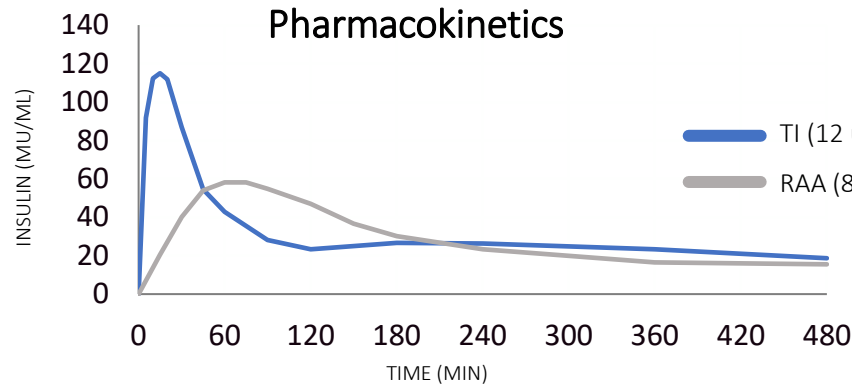
Insulin | FDKP

¹Pfützner A, et al. *Expert Opin Drug Deliv.* 2005;2(6):1097-1106.

Insulin Effect is a Function of Delivery^{1,2}

Inhaled insulin is not unit-to-unit equivalent to subcutaneous RAA

- From euglycemic clamp studies: faster insulin absorption is associated with higher peak concentration, but a shorter duration of exposure. Regular human insulin given IV is 100% bioavailable³ but overall has a decreased glucose lowering effect due to the short duration compared to SC administration.



- The glucose lowering impact of TI occurs earlier with a shorter duration compared to SC rapid acting insulin. For a 4U TI dose, time to first measurable effect ~12 minutes, peak effect ~35 minutes, return to baseline ~90 minutes⁴.

AUC, area under the curve; GIR, glucose infusion rate; IV, intravenous; RAA, rapid-acting insulin analog; SC, subcutaneous; SD, standard deviation; TI, Technosphere insulin.

¹Adapted from Heinemann L, et al. *J Diabetes Res.* 2018;2018:4568903. ²Adapted from Grant M, et al. *Clin Pharmacokinet.* 2022;61(3):413-422. ³Howey D, Bowsher R, Brunelle R, Woodworth J. *Diabetes.* 1994;43:396-402.

⁴Afrezza® (insulin human) Inhalation Powder Prescribing Information. MannKind Corporation.

Background & Objective

- Understanding the effect of TI prandial dosing on post-meal glucose control.
 - AUC provides a cumulative measure of exposure, consistent with PD.
- Several recent TI studies used a 2× RAA dose (rounded down) at initiation, now reflected in the adult USPI, and assessed post-prandial glucose response using standardized meal challenges.
 - Combined data from DOS, ABC, INHALE-3, and INHALE-1 (peds) enable a cross-study evaluation of TI's post-prandial glucose excursions.
- ***Objective:** Evaluate post-prandial glucose-excursion AUC from standardized meal challenges across multiple clinical studies using TI.*

ABC, Afrezza with Basal Combination; AUC, area under the curve; DOS, Dosing Optimization Study; PD, pharmacodynamics; RAA, rapid-acting insulin analog; TI, Technosphere insulin; USPI, United States Prescribing Information. Afrezza® (insulin human) Inhalation Powder Prescribing Information. MannKind Corporation.

Methods

- Primarily T1D studies with standardized meal data where TI was initiated at 2× RAA dose (rounded down).
- Glucose excursion AUC over the 2-hour post-prandial period were summarized descriptively from CGM data when available for INHALE-1 and INHALE-3, and fingerstick data for DOS and ABC. When available, comparison against control was provided.

TI Study Selection

Study	Population	Sample Size, N
DOS	TI, Adults	18
ABC	TI, Adults AID	23
	Control*, Adults AID	5
INHALE-3	TI, Adults MDI	51
	Control*, Adults MDI	26
INHALE-1	TI, Pediatrics MDI	217

*RAA bolus dosed 5-15 minutes before meal.

TI Conversion Dose (consistent with the 2026 Adult USPI**)

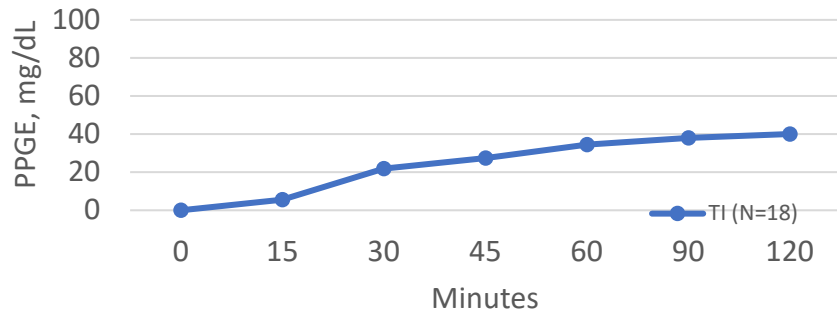
RAA Insulin Dose, units	TI dose, units
1 to 3	4
4 to 5	8
6 to 7	12
8 or more units	16

ABC, Afrezza with Basal Combination; AID, automated insulin delivery; AUC, area under the curve; CGM, continuous glucose monitoring; DOS, Dosing Optimization Study; MDI, multiple daily injections; RAA, rapid-acting insulin analog; TI, Technosphere insulin; USPI, United States Prescribing Information. **Adult studies were allowed dose conversions higher than 16 units. ¹Afrezza* (insulin human) Inhalation Powder Prescribing Information. MannKind Corporation.

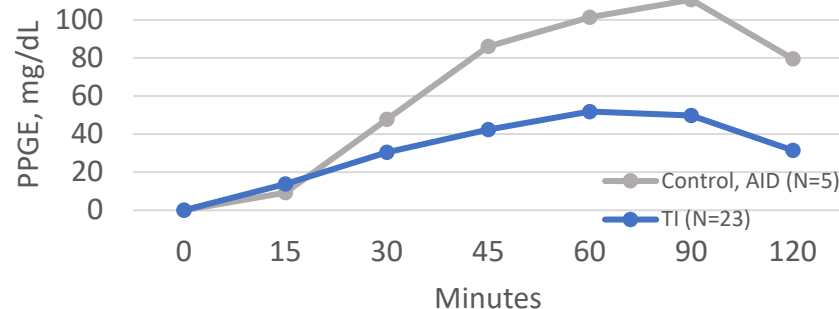
Results

Cross-Study Standardized Meal Challenges, Post-Prandial Glucose Excursion (PPGE)

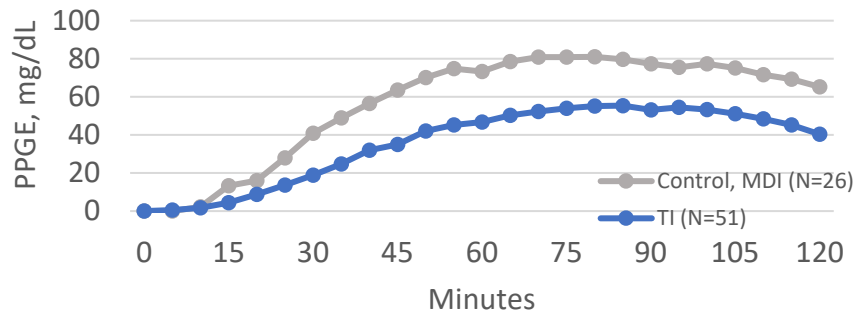
DOS, Adults; SMBG



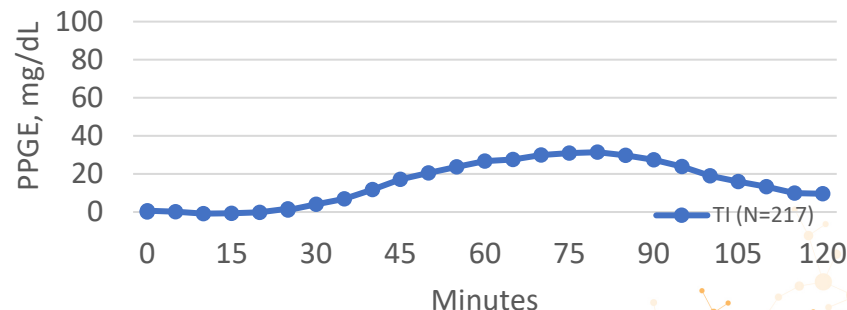
ABC, Adults-AID; SMBG



INHALE-3, Adults-MDI; CGM



INHALE-1, Pediatrics-MDI; CGM



ABC, Afrezza with Basal Combination; AID, automated insulin delivery; CGM, continuous glucose monitoring; DOS, Dosing Optimization Study; MDI, multiple daily injections; PPGE, post-prandial glucose excursion; SMBG, self-monitoring blood glucose; TI, Technosphere insulin; UC, usual care.

Results

Cross-Study 2-Hour Glucose Excursion Peak Glucose, Time to Peak Glucose, and AUC

Study Treatment Arm	Peak Glucose Excursion, Mean (mg/dL)	Time To Peak, Mean (min)	AUC, Mean (mg·min/dL)	% AUC Reduction (p-value)
DOS TI	78	85	3340	-
ABC TI	71	71	4431	50% (0.0003)
Control*	115	84	8939	
INHALE-3 TI	73	70	4368	38% (0.03)
Control*	101	78	7027	
INHALE-1 TI	59	63	1808	-

ABC, Afrezza with Basal Combination; AUC, area under the curve; DOS, Dosing Optimization Study; TI, Technosphere insulin.

*RAA bolus dosed 5-15 minutes before meal.

Summary

- Across multiple studies, TI reduced 2-hour post-prandial AUC versus RAA in adults. TI AUC was similar between studies.
- AUC was lower in pediatrics with TI (1808-mg·min/dL) than in TI adult arms (average: 4007-mg·min/dL).
- Findings underscore the 2x round-down conversion to TI dosing from RAA, reflected in the adult USPI, to improve post-prandial glucose control.

AUC, area under the curve; RAA, rapid-acting insulin analog; T1D, type 1 diabetes; TI, Technosphere insulin; USPI, United States Prescribing Information.

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