OBJECTIVE

- To compare ultra-rapid lisp (URLi) and Humalog with respect to the percentage of time with sensor glucose values within target range (70 to 180 mg/dL; TIR)

Background

- URLi is a novel ultra-rapid insulin lispro formulation developed to more closely match physiological insulin secretion and improve postprandial glucose (PPG) control
- URLi shows improved PPG control and similar compatibility with continuous subcutaneous insulin infusion (CSII) vs. Humalog
- The current study was designed to evaluate use of URLi in a hybrid closed loop system using Medtronic MiniMed™ 670G

STUDY DESIGN

Randomized, Double-blind, Crossover, Active-Controlled Trial

Entry criteria:

- Adults with type 1 diabetes
- CSII use ≥ 6 months
- Using MiniMed 670G ≥90 days
  - In AutoMode ≥70% per week
  - Using Guardian Sensor (≥)≥75% per week
- HbA1c 6 to 8%

KEY RESULTS

URLi and Humalog Achieved Comparable 24-Hour Glucose Control

Core CGM Metrics and Mean Sensor Glucose for the 24-Hour Period

Average values in both URLi and Humalog achieved glucose targets

Percent TIR and TIR Postmeal were similar between URLi and Humalog

Baseline Characteristics

- Average age 47.8 years (±13.8); weight, 78.0 kg (±15.5); BMI, 27.2 kg/m² (±4.2)
- Study population was 64.3% female; 95.2% white
- All patients completed the study
- No discontinuations of study treatment

Insulin Dose and Pump Settings

Insulin Dose and Pump Settings were similar for URLi and Humalog

Adverse Events

- No significant difference in basal, bolus and total insulin dose
- Ratio of bolus to total insulin dose was similar: URLi, 54.0%; Humalog, 54.2%
- Percent time in AutoMode per week was >90% for both treatments
- Overall carb ratio was similar between treatments
- Statistically significant but non-clinically meaningful higher carb ratio with URLi at lunch: URLi 8.8 vs. Humalog 8.4 g/unit
- Active insulin time was 3.4 hours for both treatments
- Insulin sensitivity factor did not change for both treatments (not applicable to Auto Mode function)

CONCLUSION

- While this study was designed to evaluate comparability, no obvious benefit was seen with use of an ultra-rapid insulin in this system
- The 670G system may not show the benefits of an ultra-rapid acting insulin due to the algorithm modulating basal insulin delivery
- May not be optimized for potential advantages of an insulin with differential effects that are seen primarily during bolus delivery
- There is potential for better outcomes in advanced hybrid closed-loop systems that automate correction boluses and fully closed-loop systems that automate meal and correction boluses

SUMMARY

- URLi demonstrated comparable glucose control relative to Humalog
- Basal algorithm accommodated accelerated PK profile of URLi
- URLi did not require different pump settings or insulin dose
- No significant difference in basal, bolus or total insulin dose, and ratio of bolus to total insulin dose
- URLi had a similar safety profile to Humalog when used in the 670G System