Poster
FRI-415

Patient Preference and Proof-of-Concept for a Once-Daily Follicle Stimulating Hormone (FSH) Biosimilar Delivered via an Orally Ingestible Robotic Pill (RT-112)

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Rani THERAPEUTICS

INTRODUCTION AND STUDY RATIONALE

Biotherapeutics offer effective treatments for reproductive disorders, but require painful parenteral injections (e.g., subcutaneous (SC)), representing a burden for patients which interferes with comfort and quality of life. Rani Therapeutics has developed an orally ingestible Robotic Pill (RP) that can deliver biotherapeutic agents with bioavailability rivalling or surpassing that of parenteral injections. Here, we provide 1) clinical evidence of patient preference for the daily oral RP over parenteral injection therapy and 2) data from a study of awake canines demonstrating comparable serum exposures of FSH via oral RP versus SC injection.

METHODS

Patient Preference Study

A total of 150 participants currently using parenteral injections were enrolled and given a mock-RP having the same physical characteristics of a RP but without a needle or drug inside. After swallowing the mock-RP, participants were asked to complete a questionnaire evaluating their experience and their preference for a pill vs. parenteral injection.

Nonclinical Study

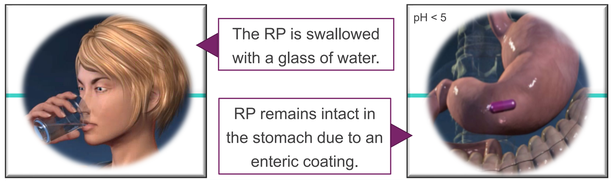
Single doses of RT-112 (150 IU (n=7) and 450 IU (n=8)) were orally administered to awake, fasted Beagle dogs (7.0-13.0 kg body weight); a control group (n=3) received a dose of 20 IU/kg (~180 IU) FSH via SC injection. Serial blood samples were collected over 5 days and serum FSH concentrations were quantified via a qualified ELISA.

DISCUSSION

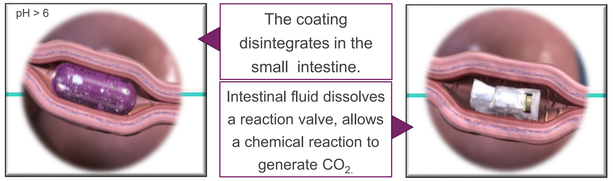
- All participants successfully swallowed the Mock-RP and 84% (126/150) indicated the pill was easy or somewhat easy to swallow.
- Data from the 150 participants currently on chronic injection therapy indicate:
  - The Mock-RP was easy to swallow
  - The majority of participants in all age groups would prefer an alternative orally ingestible treatment, such as the RP capsule, to their injection therapy.
- RT-112 successfully delivered FSH in the awake canine model with high reliability
- Dose proportional increases were seen between RT-112 dose groups, with 450 IU dose showing a 4-fold increase in the area under curve compared to the 150 IU dose.
- The relative bioavailability of FSH via RT-112 150 IU group was 99%

HOW THE ROBOTIC PILL WORKS

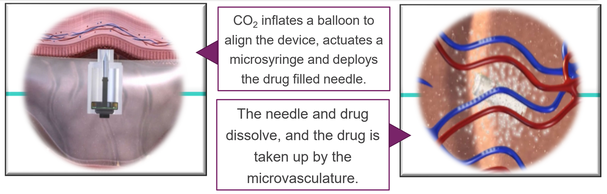
1. Enteric-coated Robotic Pill is Ingested



2. Enteric Coating Disintegrates in Small Intestine



3. Drug is Delivered



RESULTS

Table 1. Responses of participants by age to post-swallow questionnaire

Characteristic	21-50 years % (n/N)	51-65 years % (n/N)	66-75 years % (n/N)	Total % (n/N)
Able to Swallow Pill	100% (50 / 50)	100% (50 / 50)	100% (50 / 50)	100% (150 / 150)
Ease of Swallowing the Pill				
Easy	62% (31 / 50)	62% (31 / 50)	54% (27 / 50)	59% (89 / 150)
Somewhat easy	16% (8 / 50)	24% (14 / 50)	30% (15 / 50)	25% (37 / 150)
Neutral	10% (5 / 50)	8% (4 / 50)	12% (6 / 50)	10% (15 / 150)
Somewhat difficult	12% (6 / 50)	2% (1 / 50)	4% (2 / 50)	6% (9 / 150)
Difficult	0% (0 / 50)	0% (0 / 50)	0% (0 / 50)	0% (0 / 150)
Choose Pill Instead of Injection?				
No	12% (6 / 50)	4% (2 / 50)	12% (6 / 50)	9% (14 / 150)
Yes	88% (44 / 50)	96% (48 / 50)	88% (44 / 50)	91% (136 / 150)

Table 2. Rate of participants who would choose pill over injection

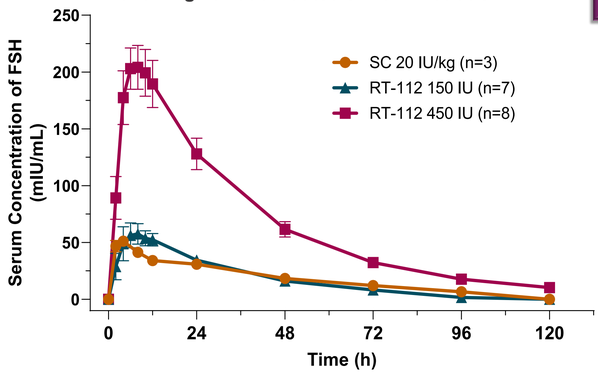
Choose RP?	Daily % (n/N)	Every 2 weeks % (n/N)	Weekly % (n/N)	≥ Monthly % (n/N)
No	10% (10 / 102)	0% (0 / 2)	6% (2 / 36)	20% (2 / 10)
Yes	90% (92 / 102)	100% (2 / 2)	94% (34 / 36)	80% (8 / 10)

Table 3. Summary of PK parameters in beagle dogs

Study Group	C_{max} (mIU/mL)	T_{max} (hours)	AUC (mIU*hr/mL)
SC 20 IU/kg (n=3)	52 ± 1	3 ± 1	2,131 ± 67
RT-112 150 IU (n=7)	65 ± 13	9 ± 1	2,101 ± 185
RT-112 450 IU (n=8)	224 ± 24	9 ± 1	8,179 ± 733

All data are mean ± SE

Mean Serum FSH Concentration-Time Profiles Following Various Routes of Administration



CONCLUSIONS

- A vast majority of patients (91%) prefer an oral therapeutic option over parenteral therapy.
- In awake canines, FSH delivered via oral RP yielded bioavailability nearly identical to SC injection.
- **These data provide early proof-of-concept of the feasibility of replacing the current parenteral injections of FSH with orally ingestible capsules utilizing the RP.**

Visit www.ranitherapeutics.com to learn more or scan the QR code to see a video of the Robotic Pill in action.

Check out our Phase 1 RT-102 clinical data here at ENDO – Poster SAT-235; or see the PK and PD profile of Robotic Pill with Teriparatide (RT-102) – Poster SAT-236