RT-102 Phase I Study
Part 2: Repeat-Dose Update

December 2022

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This presentation and the accompanying oral statements contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 as contained in Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act. Forward-looking statements are based on information available at the time those statements are made or on management's good faith beliefs and assumptions as of that time with respect to future events, and are subject to risks and uncertainties that could cause actual performance or results to differ materially from those expressed in, or suggested by, the forward-looking statements. In light of these risks and uncertainties, the forward-looking events and circumstances discussed in this presentation and the accompanying oral statements may not occur and actual results could differ materially from those anticipated or implied in the forward-looking statements. These risks and uncertainties include Rani Therapeutics Holdings, Inc.'s ("Rani," "we," "us," or "our") future financial performance, including our expectations regarding our revenues, cost of revenues, operating expenses, and our ability to achieve and maintain future profitability, those risks inherent in the preclinical and clinical development process and the regulatory approval process, the risks and uncertainties in commercialization and gaining market acceptance, the commercial potential of oral biologics, our ability to complete development of the RaniPill® HC or any redesign and conduct additional preclinical and clinical studies of the RaniPill HC or any future design of the RaniPill to accommodate higher target payloads, the risks associated with protecting and defending our patents or other proprietary rights, the risk that our proprietary rights may be insufficient to protect our product candidates, the risk that we will be unable to obtain necessary capital when needed on acceptable terms or at all, our ability to enter into strategic partnerships and to achieve the potential benefits of such partnerships, competition from other products or procedures, our reliance on third-parties to conduct our clinical and non-clinical trials, our reliance on single-source third-party suppliers to manufacture clinical, non-clinical and any future commercial supplies of our product candidates, our ability to continue to scale and optimize our manufacturing processes by expanding our use of automation, our expectations regarding the period during which we qualify as an emerging growth company under the JOBS Act, the extent and duration of the COVID-19 pandemic and the conflict between Ukraine and Russia, our expectations regarding customer demand for our product candidates, increased regulatory requirements and other factors that are set forth in our filings with the Securities and Exchange Commission ("SEC"), including under the caption "Risk Factors" in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2022, which was filed with the SEC on May 11, 2022, and our other public filings made with the SEC and available at www.sec.gov.

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Presentation Overview

- Topline results from Part 2 of our RT-102 Phase 1 study
  - Seven-day repeat-dose study in healthy volunteers
- First repeat-dose study of RaniPill capsule in humans collecting data on:
  - Safety
  - Tolerability
  - Device Reliability
- Important data
  - For the RT-102 program and Phase 2 plan for 2023
  - For RaniPill platform in general

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RT-102 Phase 1 Study Design

Objective: To Evaluate the Safety, Tolerability and Pharmacokinetics of Parathyroid Hormone (1-34) (PTH) Administered Orally via RaniPill™ Capsule

Part 1 : Single ascending doses of RT-102

- RT-102 Group 1: 20µg (N=15)
- RT-102 Group 2: 80µg (N=15)
- Control Group: Forteo® SC 20µg (N=10)

Part 2: Repeat-doses of RT-102

- Once daily dose of RT-102 20µg for 7 days in healthy and post-menopausal women (N=10)

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Part 1 Summary

- Safety & Tolerability
  - Both doses of RT-102 were well tolerated
  - No serious adverse events (SAEs) reported in the study
  - No adverse events (AEs) related to RaniPill reported

- Device Performance
  - Drug delivery success rate of 95%

- Pharmacokinetics
  - Bioavailability of PTH delivered via RT-102 was >300% higher than subcutaneous (SC) injection

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Part 2:
Arvinder Dhalla, PhD
Vice President, Clinical Development

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Part 2 Study Overview

A Phase I Study to Evaluate the Pharmacokinetics of Parathyroid Hormone (1-34) (PTH) Administered Orally via RaniPill™ Capsule	
Objective	To evaluate the safety and tolerability of repeat-doses of RT-102
Study Population	Healthy women and Post-menopausal women (N=10)
Study Site	Single Site in Australia
Study Group	A single group receiving RT-102 20µg dose for 7 days
End Points	• Safety and tolerability of repeat-doses of RT-102 • Reliability of drug delivery
Start Date	August 1, 2022

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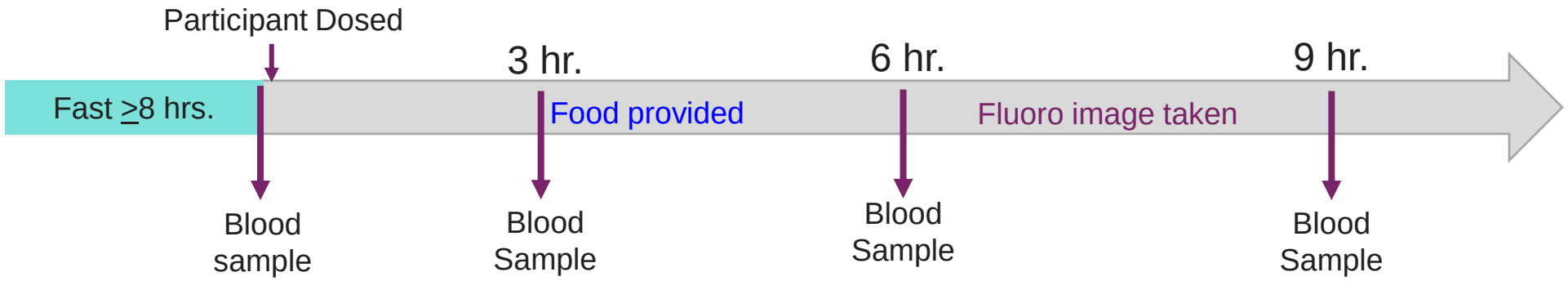
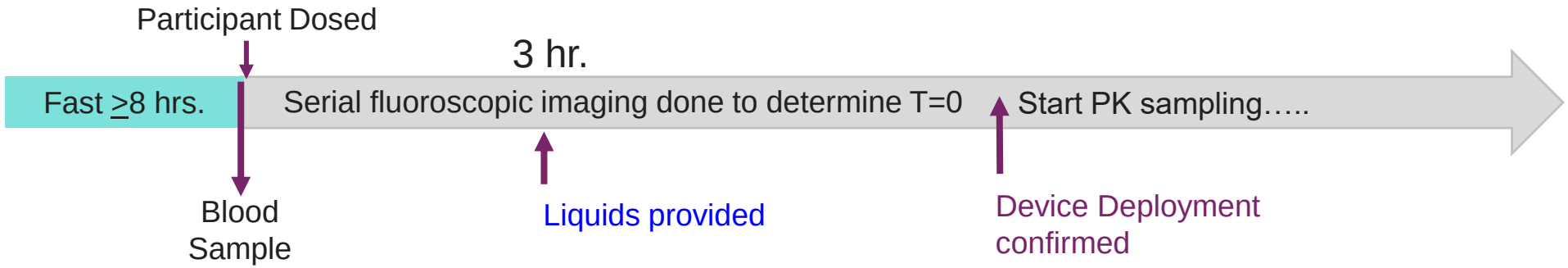
Repeat-Dose: Study Procedures

Days 1-6



Day 7



Participation in the study was considered complete if a participant was able to complete all doses for 7 days and go through pharmacokinetic sampling on Day 7

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Topline Results

Study Demographics

	Healthy Women	Post-Menopausal
	N=5	N=5
Age	25.6 years (22 - 35)	60 years (54 - 65)
Race	**% (n/N)**	**% (n/N)**
Hispanic	20 (1/5)	0 (0/5)
White-non-hispanic	20 (1/5)	100 (5/5)
Asian	40 (2/5)	0 (0/5)
Asian-Pacific Islander	20 (1/5)	0 (0/5)
	Mean ± SD (Min - Max)	Mean ± SD (Min - Max)
Weight (kg)	60.6 ± 9.8 (50.2 - 76)	64.3 ± 10.1 (55.6 - 75.4)
Body Mass Index (kg/m^2)	23.7 ± 2.5 (20.4 - 26.9)	25.3 ± 5 (20.9 - 31.7)

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Exclusions after Enrollment

- Enrollment was done on a rolling basis to complete ten subjects, total number of participants enrolled were 17
- Seven participants did not complete 7 days of dosing due to exclusions per protocol
  - Two participants started menstruation on Day 4
  - One participant had cannulation issues on Day 7
  - One participant had elevated eosinophils on Day 4 due to an earring infection
  - One participant had >7 hr. gastric residence time (GRT) on Day 7
  - Two participants had pill remnants exceeding the number (≥3) allowed by protocol

None of the participants stopped the dosing due to any adverse events related to the RaniPill

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Adverse Events

	Adverse Event	Incidence
PTH-related	Constipation*	1 (10%)
	Diarrhea*	1 (10%)
RaniPill-related	Abdominal Pain	1 (10%)

* Same subject reported both AEs on different days

Daily Drug Delivery by RaniPill with Repeat-Dosing

Drug signal detected in 63 out of 69 deployments* = **at least 91% Success Rate**

#	Subject Type	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
1	HW	✓	✓	✓	✓	✓	✓	✓
2	HW	✓	✓	✓	✓	✓	✓	✓
3	HW	✓	×	✓	✓	✓	✓	✓
4	HW	×	✓	✓	✓	✓	✓	✓
5	HW	✓	×	✓	✓	✓	✓	✓
6	PM	✓	✓	✓	✓	✓	✓	✓
7	PM	×	✓	✓	✓	✓	✓	✓
8	PM	NA	✓	✓	×	✓	×	✓
9	PM	✓	✓	✓	✓	✓	✓	✓
10	PM	✓	✓	✓	✓	✓	✓	✓

*Deployment confirmed by imaging but not tracked; samples taken at 3 hr. intervals post-dose. Some misses could be due to mismatch of sampling and deployment time

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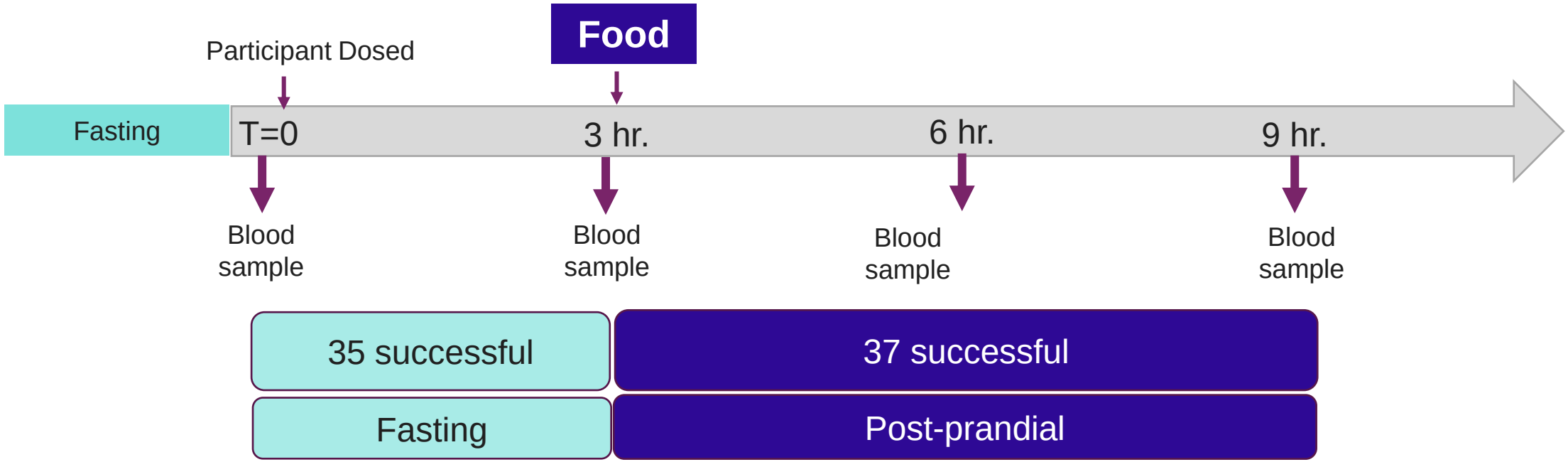
HW: healthy women, PM: post-menopausal,
✓ indicates drug signal detected, × indicates drug signal not detected
NA: Pill not deployed at the time of blood sampling

Presence of Food Did Not Impact Device Performance

- On Days 1-6, food was consumed at 3 hrs. after capsule administration to all enrolled subjects
- During this period, there were a total of 72 successful deployments
- 35 were recorded before food was consumed (fasted)
- 37 were recorded after food was consumed (post-prandial)

These data suggest that drug delivery by the RaniPill was unaffected by presence of food



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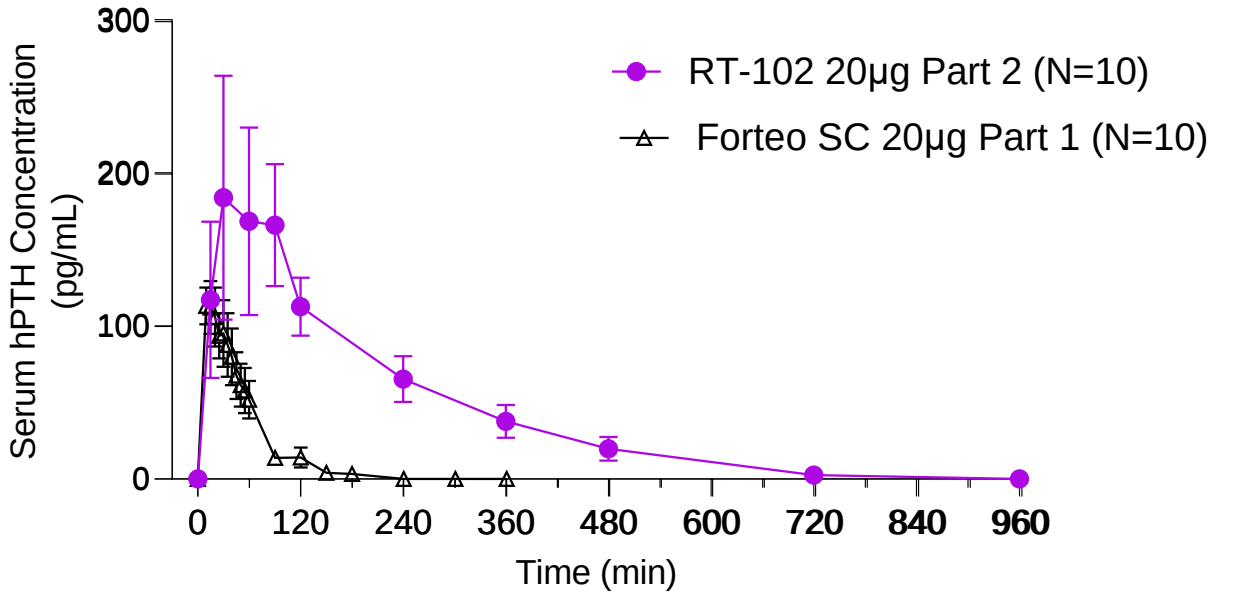
PK Profile of PTH Delivered via RaniPill

Drug levels were observed in all 10 subjects on Day 7 = 100% success rate



- These data corroborate the high bioavailability observed in Part 1 and suggest that RT-102 may be efficacious at doses lower than 20µg

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Sampling time points are different between RT-102 and SC groups (Data are Mean ± SEM)

Repeat Doses of RT-102 Key Takeaways

- RT-102 was well tolerated with repeat dosing
- No SAEs were reported in the study
- Device remnants were eliminated without sequelae in all subjects

- RT-102 RaniPill delivered PTH with reliability of >90%
- Device performance was unaffected by presence of food

- Cmax comparable to SC Forteo
- No accumulation of PTH observed

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Next Steps
Talat Imran, CEO

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Next Steps and Upcoming Potential Milestones

- Pre-IND meeting request
- Conduct 28-day GLP study
  - Early 2023
- Initiate Phase 2 Study
  - 2H 2023
- Plan to publish RT-102 Phase 1 Study results
- Additional 2023 prospective milestones:
  - Initiation of a Phase 1 study of RT-111 containing an ustekinumab biosimilar
  - Initiation of a Phase 1 study of RT-105 containing an adalimumab biosimilar
  - Initiation of a Phase 1 study of RT-110 containing PTH for hypo-parathyroidism

Appendix

Study Demographics

	Total Cohort (N=17)		Completed Dosing (N=10)	
	Healthy Women	Post-menopausal	Healthy Women	Post-menopausal
	N=11	N=6	N=5	N=5
Age	28 years (22 - 49)	58.8 years (53 - 65)	25.6 years (22 - 35)	60 years (54 - 65)
Race	**% (n/N)**	**% (n/N)**	**% (n/N)**	**% (n/N)**
Hispanic	18.2 (2/11)	0 (0/6)	20 (1/5)	0 (0/5)
White-non-hispanic	45.4 (5/11)	100 (6/6)	20 (1/5)	100 (5/5)
Asian	11.8 (2/11)	0 (0/6)	40 (2/5)	0 (0/5)
Asian-Pacific Islander	11.8 (2/11)	0 (0/6)	20 (1/5)	0 (0/5)
	Mean ± SD (Min - Max)	Mean ± SD (Min - Max)	Mean ± SD (Min - Max)	Mean ± SD (Min - Max)
Weight (kg)	62.2 ± 8.7 (50.2 - 77.6)	63.7 ± 9.2 (55.6 - 75.4)	60.6 ± 9.8 (50.2 - 76)	64.3 ± 10.1 (55.6 - 75.4)
Body Mass Index (kg/m^2)	24.2 ± 2.6 (20.4 - 29.9)	24.8 ± 4.7 (20.9 - 31.7)	23.7 ± 2.5 (20.4 - 26.9)	25.3 ± 5 (20.9 - 31.7)

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Data from Part 2 of the Phase 1 study of RT-102.

Adverse Events

	Adverse Event	All Enrolled Participants (N=17)	Participants Completed 7 days (N=10)
PTH-related	Constipation*	1 (5.9%)	1 (10%)
	Diarrhea*	1 (5.9%)	1 (10%)
	Headache	1 (5.9%)	0
RaniPill-related	Abdominal Pain	2 (11.8%)	1 (10%)
	Burping	1 (5.9%)	0

Data from Part 2 of the Phase 1 study of RT-102.

* Same subject reported both AEs on different days

Device Performance with Repeat Doses

Data from 10 participants who completed the 7-day repeat-dosing

Drug signal detected in 63 out of 69 deployments* **At least 91% Success Rate**

Data from all 17 participants

Drug signal detected in 82 out of 93 deployments* **At least 88% Success Rate**

*Deployment confirmed by imaging but not tracked
Samples taken at 3 hr. intervals post-dose
Some misses could be due to mismatch of sampling and deployment time

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Data from Part 2 of the Phase 1 study of RT-102.

RT-102 Phase 1: Oral Administration of PTH (1-34) Via the RaniPill and PD Studies for Osteoporosis

RT-102 Phase 1 Study Overview

Study Design

To evaluate the safety, tolerability and pharmacokinetics (PK) of Parathyroid Hormone (1-34) (PTH) administered orally via the RaniPill Capsule in single ascending doses*

Study Details

- Two RT-102 treatment groups in healthy women volunteers
  - RaniPill containing 20µg of PTH
  - RaniPill containing 80µg of PTH
- Control group of 20µg SC Forteo®**
- Single site in Australia

Methods

- Transit of RaniPill capsule in GI tract tracked via frequent fluoroscopic imaging***
- Deployment confirmed before starting PK sampling
- PK sampling done for 360 minutes

Endpoints

- PK parameters of RT-102
- Safety and Tolerability of RT-102

* Part 1 of the Phase 1 study is single-ascending doses. Part 2, involving repeat doses, is ongoing.
** Forteo® is a registered trademark of Eli Lilly and Company.
*** Per protocol, in instances where RaniPill capsule did not exit the stomach within 7 hours, participants were excluded from the study. Based on the exclusion criteria, 3 participants were excluded from the study.1 additional subject was excluded due to vomiting the capsule intact.

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RT-102 Phase 1 (Part 1) Study Results

Study Results

- RT-102 was generally well-tolerated by all subjects
- No serious adverse events noted in the study
- No subject excluded due to difficulty swallowing the capsule
- Capsule remnants passed out in all subjects

Incidence of Adverse Events

	Adverse Events	RT-102 20µg (N=15)	RT-102 80µg (N=14)*	Forteo SC 20µg (N=10)
	All	**0**	**2 (14%)**	**5 (50%)**
Drug-Related Adverse Events	Light headedness	0	0	2 (20%)
	Nausea	0	1 (7%)	3 (30%)
	Vomiting	0	1 (7%)	0
RaniPill-Related Adverse Events	All	0	0	N/A

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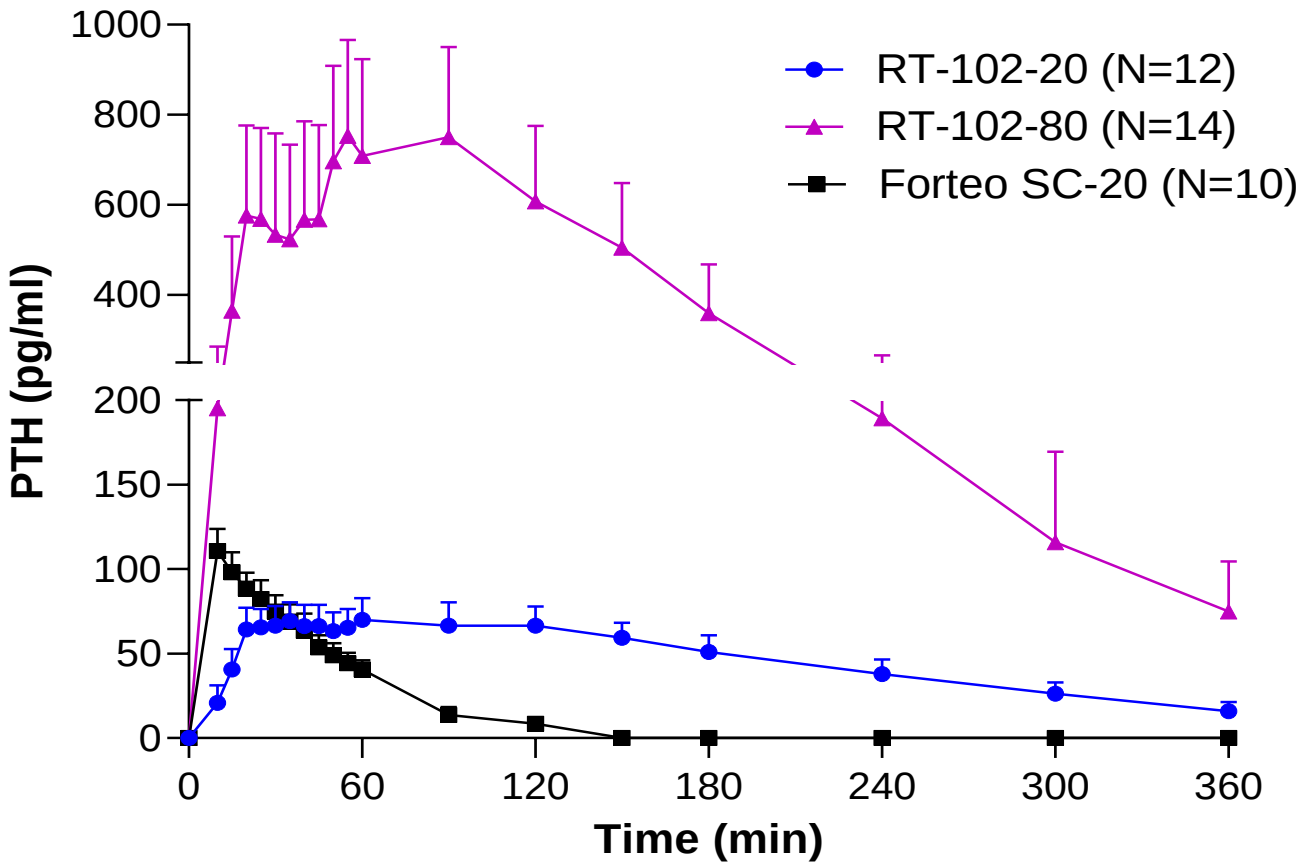
* Of excluded subjects from RT-102 80µg group, 1 subject experienced bloating and 1 vomited the capsule intact

RaniPill Delivered PTH with Higher Bioavailability than SC



PK Parameters

	Forteo SC 20µg	RT-102 20µg	RT-102 80µg
Cmax (pg/mL)	128 ± 20	98 ± 10	971 ± 223
Tmax (minutes)	13	68	60
AUC (pg*h/mL)	126 ± 64	342 ± 36	2600 ± 649
Relative BA (%)		~300%	~400%

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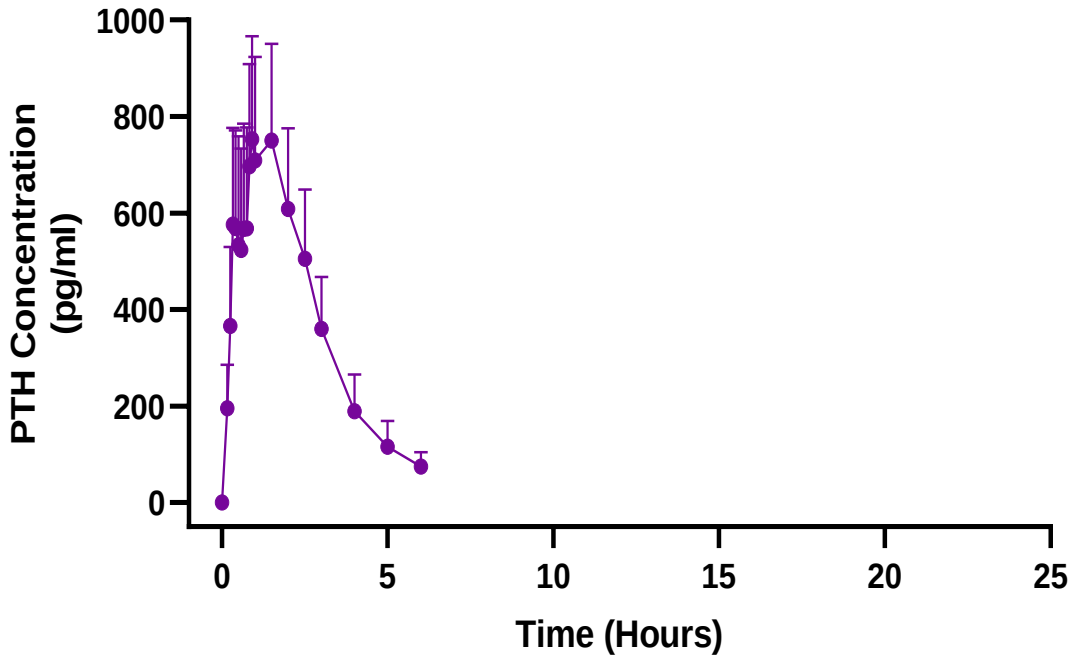
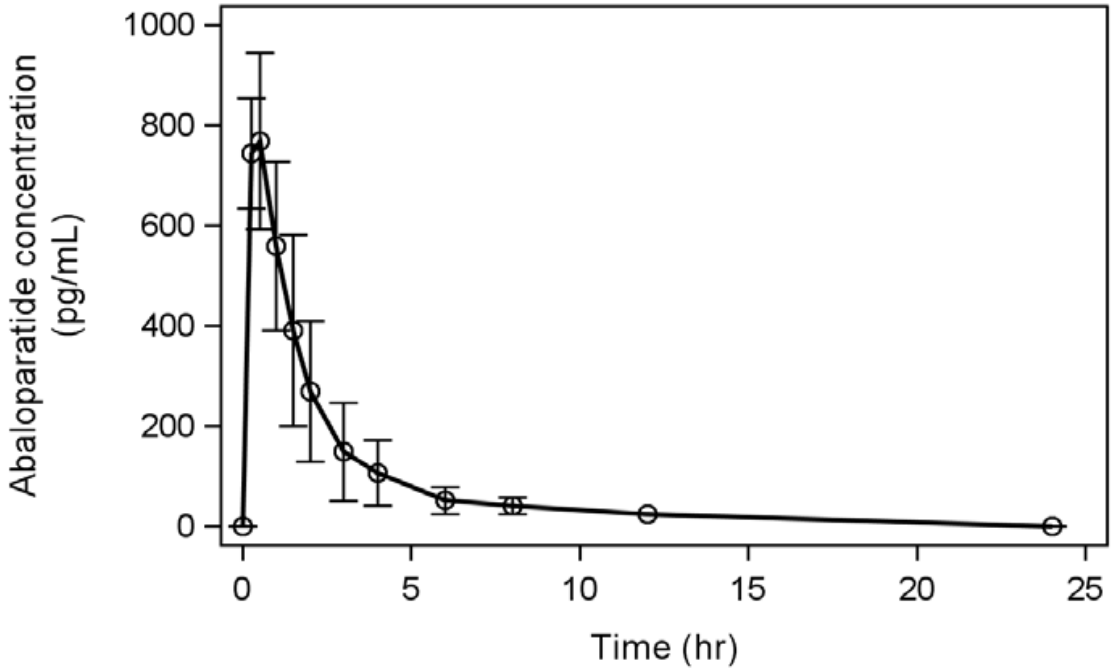
RT-102 80µg PK Profile is Similar to Tymlos®* at 80µg**

RT-102 Phase I Data - Dose 80µg



- C_{max} 971 (223) pg/mL
- AUC_{0-24} 2600 (649) pg·hr/mL

Tymlos Package Insert - Dose 80µg



- C_{max} 812 (118) pg/mL
- AUC_{0-24} 1622 (641) pg·hr/mL

80µg abaloparatide (Tymlos) showed bone mineral density improvements significantly greater than 20µg teriparatide (Forteo) at several bone sites in a Phase 3 study***

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* Tymlos® is a registered trademark of Radius Health, Inc.
** The effect of this similarity in PK profile has not been evaluated to determine effects on any clinical outcomes.
*** JAMA. 2016;316(7):722-733. doi:10.1001/jama.2016.11136.

RT-102 DS* is Osteoanabolic in a Rat Model of Osteoporosis

Study Objective

To evaluate the effect of daily dosing with RT-102 drug substance (*DS; teriparatide in Rani formulation) on bone mineral density (BMD) in an ovariectomized (OVX) rat model of osteoporosis

Model & Study Design

Model: Juvenile female rats with 8 weeks of bone depletion following ovariectomy

Design: Groups of 10 rats received daily doses for 6 weeks of saline or drugs (@5 µg/kg/day) as follows:

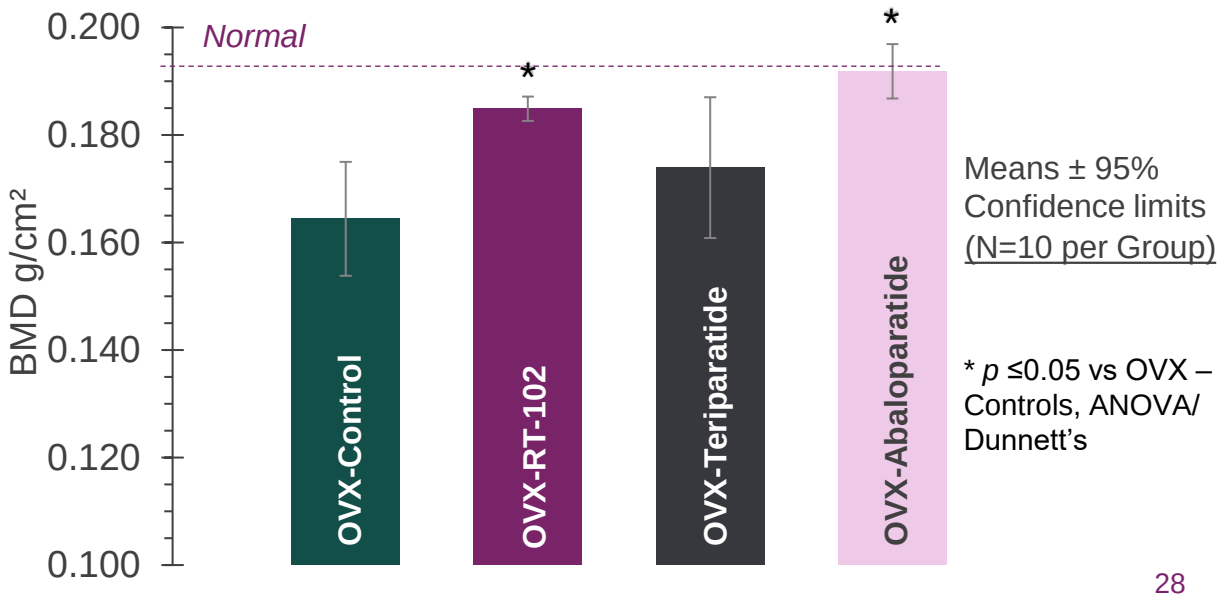
- OVX-Controls: Saline via IP route*
- OVX-RT-102: RT-102 DS via IP route*
- OVX-Teriparatide: Teriparatide via SC route
- OVX-Abaloparatide: Abaloparatide via SC route

** IP or intraperitoneal route mimics RaniPill delivery*

Key Endpoint

- Change in BMD following 6 weeks of treatment

Results: Osteoanabolic Effect of RT-102 DS on Whole Body BMD



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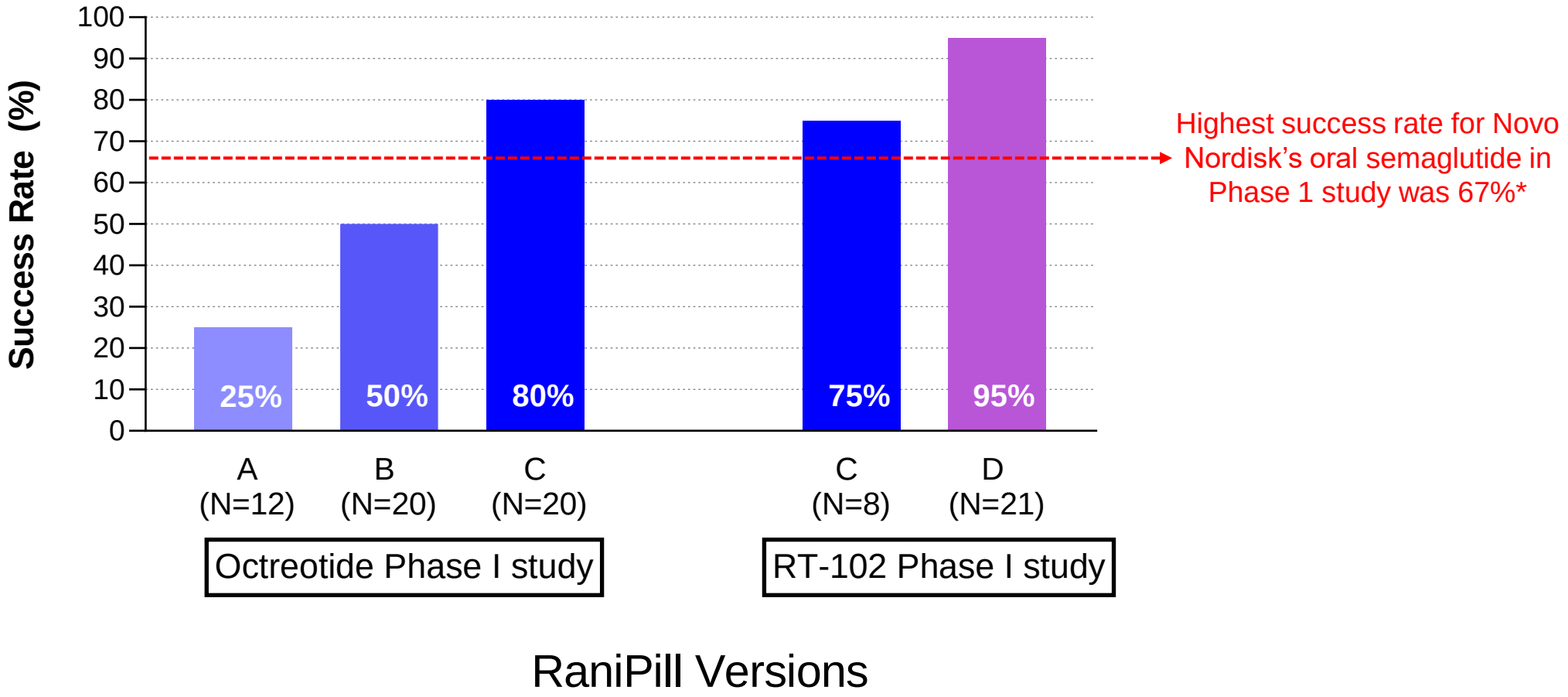
Device Performance: Progression of Drug Delivery Success Rate



* Granhall et al, Clinical Pharmacokinetics (2019) 58:781–791 2019

Phase I (Part 1) Study Summary

0

Adverse events related to the RaniPill platform

95%

RaniPill platform drug delivery success rate*

>300%

RT-102 bioavailability compared to SC injection

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* Success rate of Version D of the RaniPill in the per protocol population.