

# palvella

THERAPEUTICS

First-in-disease therapies for patients  
with rare genetic skin diseases



Corporate Presentation  
December 2024

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A young child with light brown hair and blue goggles is swimming in a pool. The child is smiling and has their arms outstretched, splashing water. The background shows the pool's edge with a decorative pattern. The overall scene is bright and cheerful, with a strong blue and cyan color palette.

**Building the leading therapeutics  
company focused on  
rare genetic skin diseases**



# What Sets Palvella Apart



## First-in-Disease Therapies

- Exclusively focused on developing transformational therapies for rare diseases with no FDA approved treatments



## Rare Disease Expertise

- Team with expertise in rare disease drug development, including regulatory and patient interactions
- Proven track record building successful rare disease companies, including Insmed



## Capital Efficiency

- Disciplined approach to operating business with our investors' capital top of mind



## Late-stage Pipeline and Platform

- Lead product candidate, QTORIN rapamycin, in two ongoing studies: Phase 3 (microcystic LMs) and Phase 2 (cutaneous VMs)
- Versatile QTORIN platform with potential across rare diseases

**Our Mission is to Serve Patients with Rare Diseases**

# QTORIN™ Rapamycin: Landmark Phase 3 Study Sets Stage for Potential U.S. Launch

## Highly statistically significant Phase 2 results in Microcystic LMs

100% of patients (n=12) “much” or “very much” improved with QTORIN™ rapamycin on Clinician Global Impression of Change (p<0.0001)

## Phase 3 designed for success & expedited regulatory pathway

Single arm Phase 3 study coupled with FDA’s Breakthrough Designation; recently awarded FDA Orphan Product Grant up to \$2.6mm to support Phase 3 study

## U.S. peak sales potential > \$1bn in two uncontested indications

Microcystic LMs (estimated > 30k U.S. diagnosed patients) & Cutaneous Venous Malformations (estimated > 75k U.S. diagnosed patients)

## QTORIN™ platform is reproducible with broad applicability

To estimated 600 rare skin diseases, most of which have no approved therapies

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**Striving to be  
first for rare  
disease patients**

# Recent listing on NASDAQ with funding from syndicate of leading healthcare-dedicated investors

Building leading company focused on rare genetic skin diseases

## July 2024

Palvella Therapeutics announces reverse merger with Pieris Pharmaceuticals and \$78.9 million PIPE



## December 2024

Merger closes and Palvella debuts as publicly listed company (NASDAQ:PVLA)

Company has approximately \$80.0 million of cash at close

Private Investors



Select New PIPE Investors





OUR LEAD INNOVATION

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QTORIN™ 3.9%  
RAPAMYCIN  
ANHYDROUS GEL

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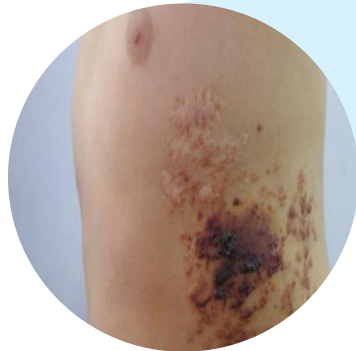
# Broad Potential for mTOR Inhibition in Rare Skin Diseases

mTOR is a key driver for genetic skin diseases

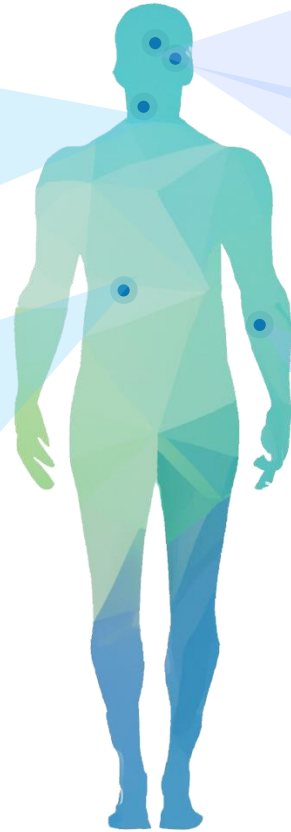
**Lead  
Indications**



**Venous Malformations<sup>1</sup>**



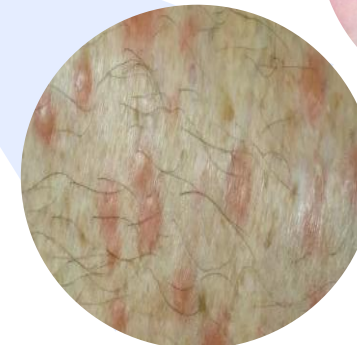
**Microcystic LMs<sup>2</sup>**



**Refractory  
Vascular Tumors<sup>3</sup>**



**Capillary  
Malformations<sup>4</sup>**



**Cutaneous Sarcoidosis<sup>5</sup>**

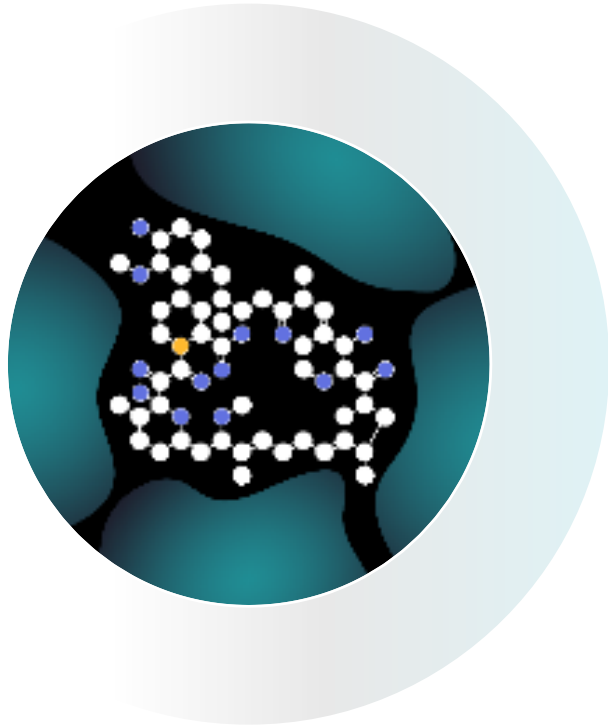
**Subsequent  
Additional  
Potential  
Indications**





# Our Innovation: QTORIN™ Platform

Reproducible platform for generation of novel topical product candidates for rare diseases



**High payload capacity optimizes potential for therapeutic activity:**

Accommodates high API concentrations, i.e., 3.9% rapamycin

**Delivery to dermis with limited systemic absorption:** Delivers large molecular weight molecules to dermis while overcoming 500 Dalton Rule

**Favorable patient tolerability:** Precisely selected composition of inactive excipients enables chronic dosing for lifelong genetic diseases

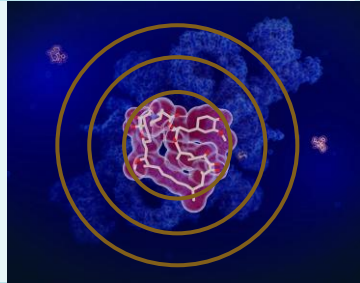
**Scalable cGMP process:** Physical and chemical stability at room temperature providing for long-term shelf life

QTORIN™ product candidates eligible for composition IP on formulation

# QTORIN™ 3.9% Rapamycin Anhydrous Gel

## RAPAMYCIN

**Direct mechanistic engagement of causal mTOR pathway**



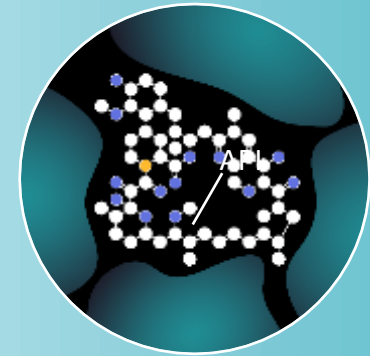
## QTORIN™

**1000x higher rapamycin levels at site of disease vs. systemic rapamycin<sup>1</sup>**



## TOPICAL

**Limited-to-undetectable systemic absorption<sup>2</sup>**




**Granted U.S. patents through at least 2038**

**Stable at room temperature for > 2 years**

*QTORIN™ 3.9% rapamycin anhydrous gel is for investigational use only and has not been approved or cleared by the FDA or by any other regulatory agency. The safety or efficacy has not been established for any use.*

1. Data on file.

2. Clinical Study Report PALV-0609.



QTORIN™ 3.9% RAPAMYCIN

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FOR

Microcystic Lymphatic  
Malformations and  
Cutaneous Venous  
Malformations

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# Microcystic Lymphatic Malformations: *Serious, Debilitating, and Lifelong*

> 30k patients

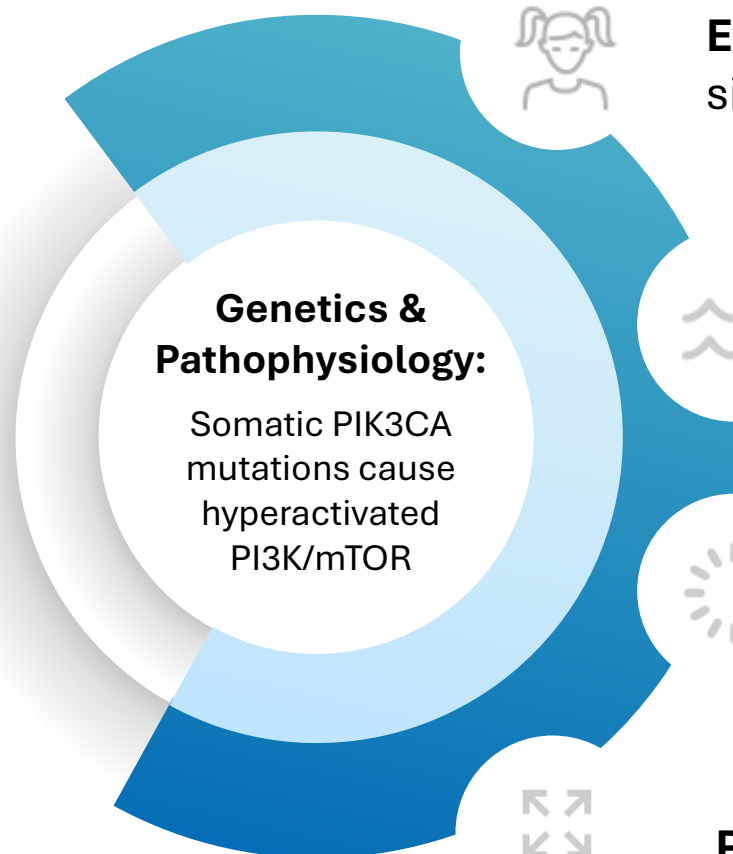
ESTIMATED DIAGNOSED IN THE US<sup>1</sup>



**Leads to serious impact to quality of life and hospitalizations, with no FDA approved therapies**

Current options: repeated surgeries, off label systemic pharmacotherapies limited by toxicities

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## Genetics & Pathophysiology:

Somatic PIK3CA mutations cause hyperactivated PI3K/mTOR



**Early onset:** Present at birth and significant impact to adolescents



**Lymphorrhea:** Persistent discharge of lymphatic fluid through skin layers



**Deep infections:** Cellulitis and other serious infections



**Proliferation** of infiltrative lesions over time with no spontaneous resolution



# No Spontaneous Regression Well-Established in Microcystic LMs

A 34-year, 28-subject study confirmed no spontaneous regression

Types	Microcystic
Subtotal	28
Sex (F:M)	14:14
Age (y), mean ± SD	0.89 ± 1.4
Maximum diameter (cm), mean ± SD	—
Spontaneous regression	
Positive	0
Negative	28

OPEN

PRSGlobalOpen ORIGINAL ARTICLE  
Reconstructive

## Spontaneous Regression of Lymphangiomas in a Single Center Over 34 Years

Monte Kato, MD\*  
Shoji Watanabe, MD, PhD\*  
Reiko Kato, MD\*  
Hiroshi Kawahima, MD, PhD\*  
Takuya Ieda, MD, PhD\*  
Azusa Watanabe, MD, PhD\*

**Background:** A lymphangioma, also called a lymphatic malformation, is a congenital condition that frequently occurs in young children. It is classified into 3 groups depending on the size of the cysts (macrocytic, microcystic, and mixed). Spontaneous regression occurs in some cases; however, the characteristics of patients who show regression have not been studied previously. Furthermore, the types and the timing of the initial treatment are still controversial. Therefore, we statistically analyzed the occurrence of short-term spontaneous regression, patient age at original occurrence, cyst types, cyst sizes, and cyst locations in patients diagnosed with peripheral localized lymphangiomas in a single children center over 34 years.

**Methods:** We retrospectively collected the data of 153 patients and reviewed the medical charts.

**Results:** Spontaneous regression occurred only in macrocystic or mixed type; regression was most frequent in patients who, at the time of onset, were more than 2 years old.

**Conclusions:** We concluded that elderly patients with macrocystic or mixed type lymphangioma may have to wait for treatment for over 3 months from the initial onset. Conversely, microcystic type could not be expected to show regression in a short period, and prompt initiation of the treatments may be required. The difference of the regression or not may depend on the characteristics of the lymph flow. (*Plast Reconstr Surg Glob Open* 2017;5:e1501; doi: 10.1097/GOX.0000000000001501; Published online 25 September 2017.)

### MATERIALS AND METHODS

We retrospectively reviewed the medical charts of 150 patients who were diagnosed with lymphangiomas or lymphatic malformations in our hospital over 34 years (April 1983 to December 2016). Lymphangioma cases that showed peripheral localization and were observed for more than 3 months without medical or surgical intervention were included. The diagnosis was reconfirmed on the basis of radiological findings and the clinical course according to the vascular anomalies classification of the International Society for the Study of Vascular Anomalies.<sup>1</sup>

Patients diagnosed with lymphangiomatosis, Gorham disease, combined vascular anomalies (Klippel-Trenaunay

syndrome, Proteus syndrome, and Maffucci syndrome), intraabdominal lesions, and/or intrathoracic lymphangiomas were excluded from this study. Additionally, patients who were misdiagnosed, those who did not undergo radiological assessments (ultrasound, computed tomography, or magnetic resonance imaging), those who were not followed for 6 months after onset, and those who were administered treatments for the lesions (medication, aspiration, sclerotherapy, and/or surgery) within 3 months after the original onset were excluded (Table 1; Fig. 1). Patients who were prescribed acetaminophen and/or antibiotics for pain and/or infection and those with peripheral lesions that connected to the intrapleural region were included.

Spontaneous regression was considered as an over 20% decrease in the lesion size over 3 months when compared with the size at the original onset. We analyzed the patient age at the original onset, original lesion size, and lesion location retrospectively. Congenital lesions were considered as having an onset at 0 years of age, even when diagnosed prenatally.

Statistical analyses involved the 2-sided *t* test for normally distributed data and the *F*-test for assessment of less than 5 patients. A receiver operating characteristic (ROC) curve was drawn using the SPSS software (IBM Corp., Ar-

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1

\* Consistent with well-established history of PI3K Related Overgrowth Spectrum, which includes microcystic LM

\*\*Kato M et al., *Plast Reconstr Surg Glob Open*. 2017 Sep 25;5(9):e1501.

# QTORIN™ Rapamycin: Phase 2 Study in Microcystic LMs

n=12; QD dose



James Treat, M.D.



Joyce Teng, M.D., Ph.D.



Steve Kempers, M.D.



Milton Waner, M.D.



Alison Small, M.D.



Baseline  
(4 weeks)



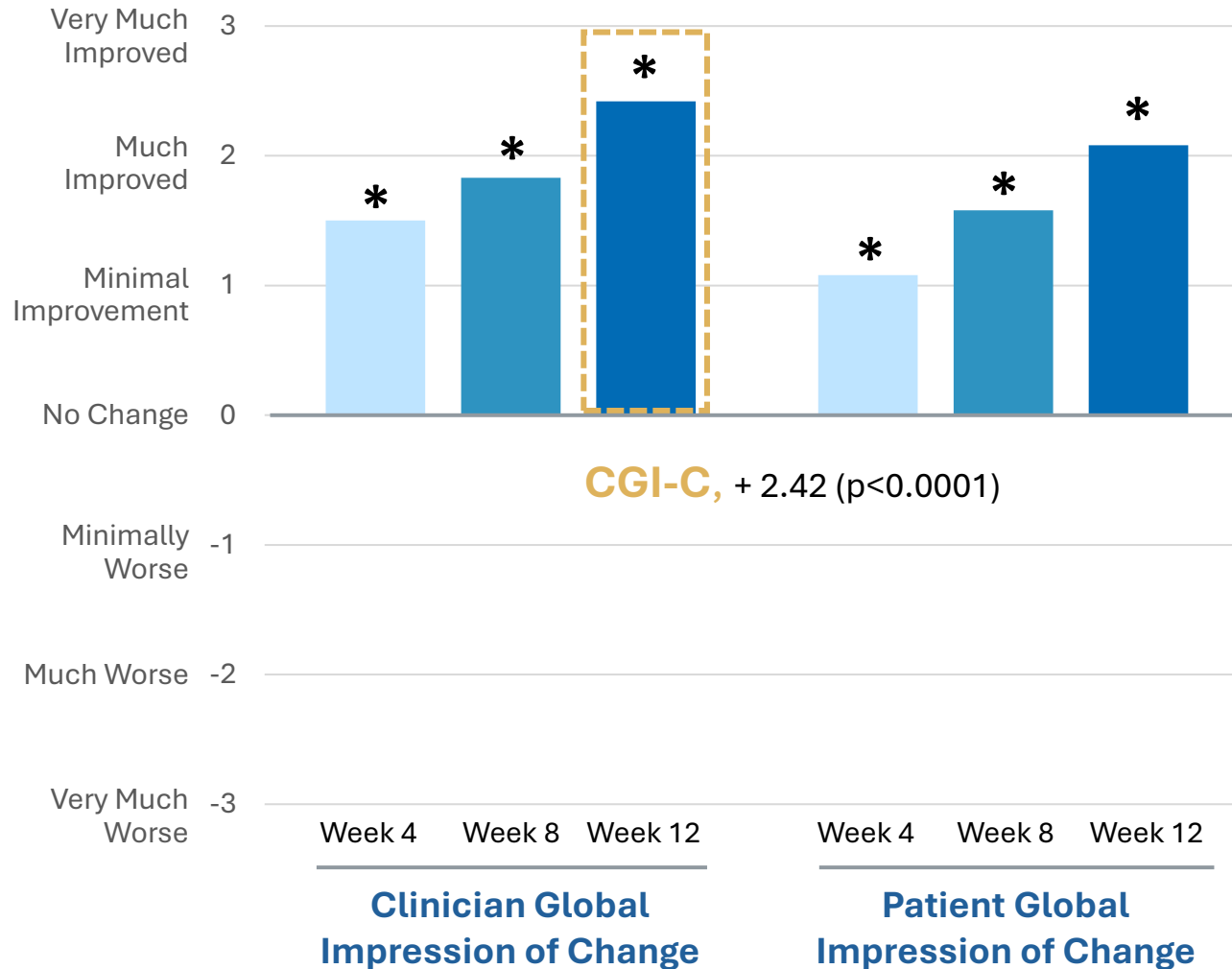
Single arm, QTORIN™ rapamycin treatment (QD)  
(12 weeks)

**Study Objectives:** Safety and efficacy

## Results

- Clinically & statistically significant on pre-specified global and individual endpoints
- Patient exit interviews and photographs align with clinical data

# Phase 2: Clinically Meaningful, Statistically Significant Improvements



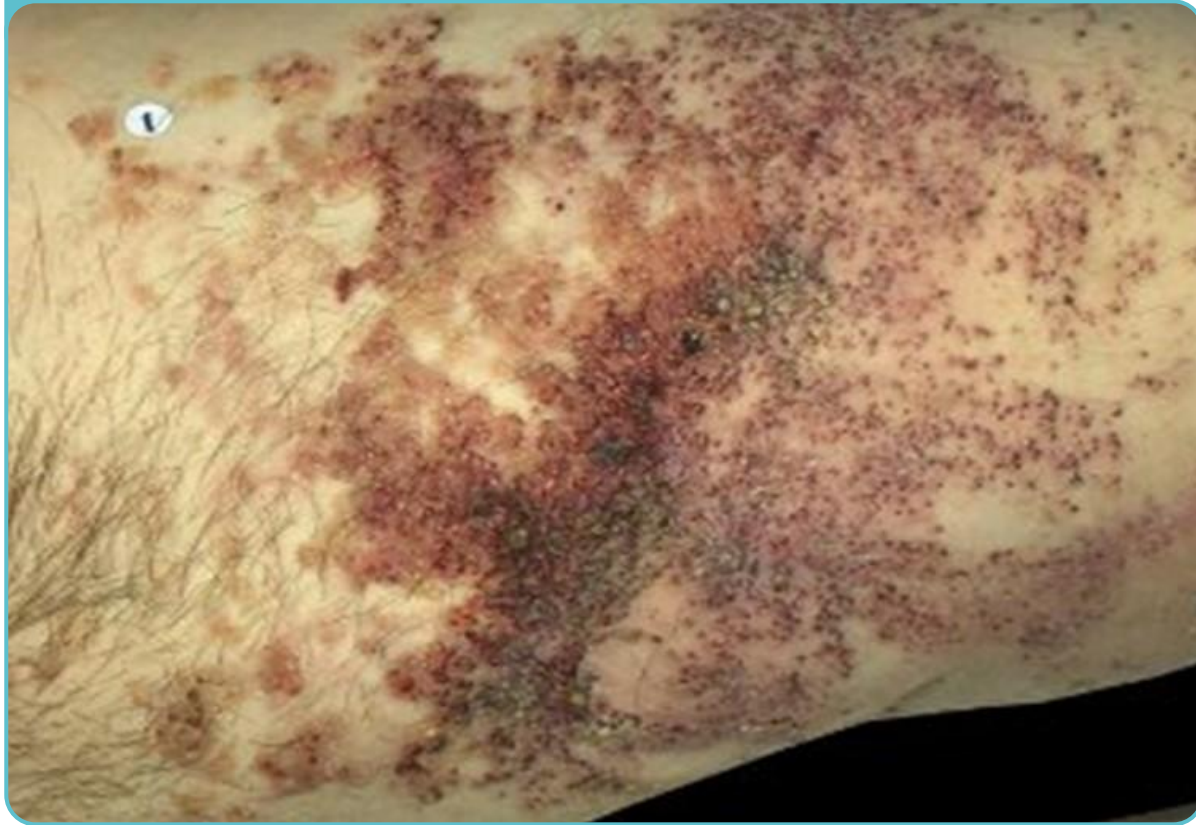
*Individual Clinical Signs: Rapid Onset and Time Dependent Improvements*

Statistically significant across key individual signs of microcystic LM at week 12

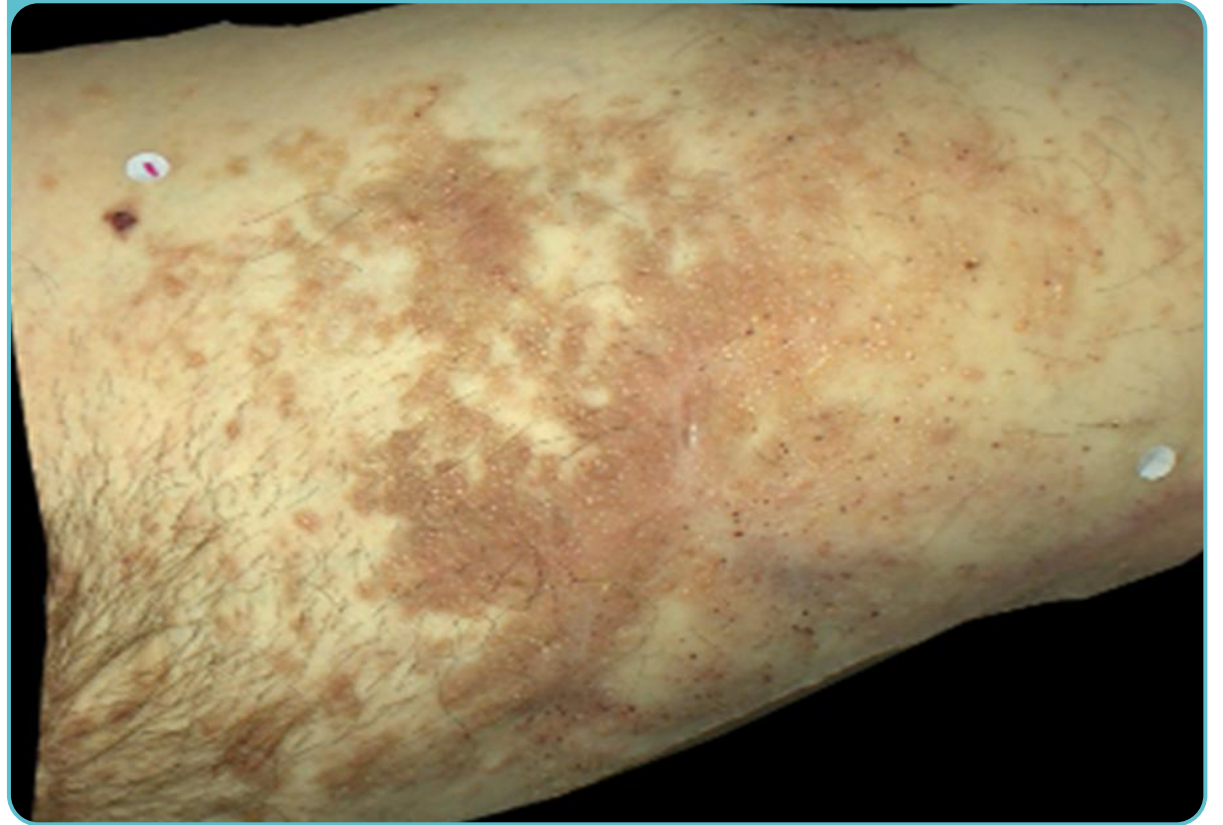
- Height (p<0.0001)
- Leaking (p<0.005)
- Bleeding (p<0.05)
- Erythema (p<0.005)
- Hyperkeratosis (p<0.005)

# Phase 2 Results: Visible Improvement

Baseline



Week 12





# Phase 2 Results: Visible Improvement

Baseline



Week 12





# Microcystic Lymphatic Malformation: Phase 2

## All Treatment-Related Adverse Events



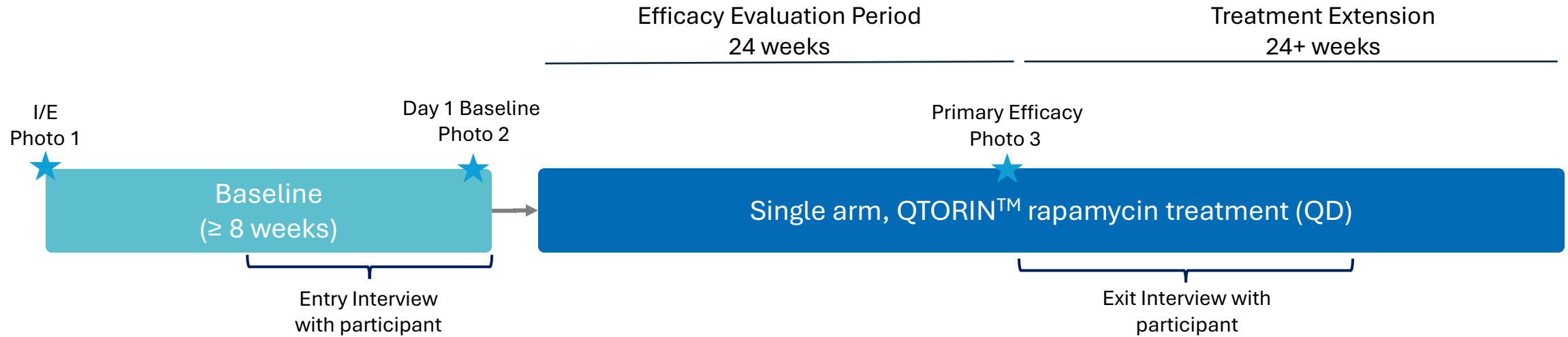
**Low blood levels of rapamycin detected in some patients:  
120.98 pg/mL (mean)**

<b>TREATMENT RELATED AES</b>	<b>RELATED ANY GRADE EVENTS (%, N=12)</b>
Application site pain	3 (25)
Application site pruritus	3 (25)
Application site discharge	1 (8.3)
Application site erythema	1 (8.3)
Application site paraesthesia	1 (8.3)
Nodule	1 (8.3)
Eczema	1 (8.3)
Skin exfoliation	1 (8.3)
Diarrhea	1 (8.3)
Headache	1 (8.3)

- QTORIN™ rapamycin had favorable safety profile and was well tolerated
- All Treatment Related Adverse Events were moderate or mild (no severe events)
- No discontinuations due to AEs
- No unexpected AEs

# SELVA Phase 3 Study: Single-Arm, Baseline-Controlled

n=40; QD dose



## Primary Efficacy

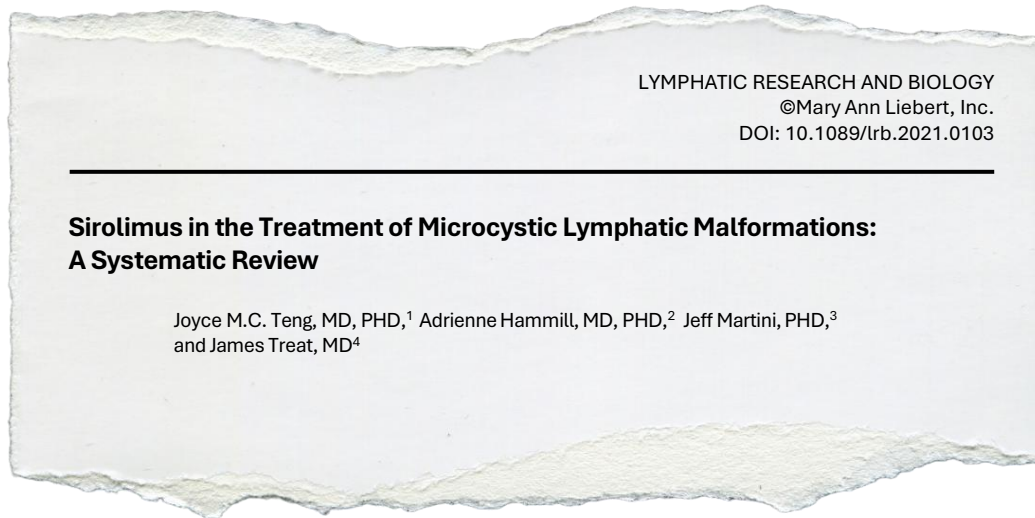
- mLM-IGA, a 7-point clinician change scale

## Key Secondary

- Blinded mLM Multi-Component Static Scale (mLM- MCSS)

**Data anticipated  
Q1 2026**

# Real World Evidence and OUS Treatment Guidelines



*“Micro LMs represent therapeutically challenging congenital vascular lesions. There is no universally accepted gold standard of care and there are no FDA approved therapies...this review examines clinical data over the last 10 years on the role of sirolimus [rapamycin]...a total of 16 studies were identified...clinically meaningful, long-term improvement (up to 3 years) was noted...however, developing a commercial topical sirolimus formulation faces important challenges.”*



*“Sirolimus [rapamycin] is the disease-modifying treatment of choice. It should be started early in life (early childhood) to prevent the increase in volume of the LM.”*

# Regulatory Overview: NDA Submission Planned for 2026<sup>1</sup>



**Phase 3 study in microcystic LMs** ongoing; data expected in Q1 2026



Seeking **full FDA approval** based on clinical endpoints utilized in prospective Phase 2 and Phase 3 studies



505(b)(2) pathway leveraging **prior FDA approvals of rapamycin**

**Rolling NDA submission with potential for six-month priority review planned for 2026**

**Breakthrough Therapy Designation**

**Fast Track Designation**

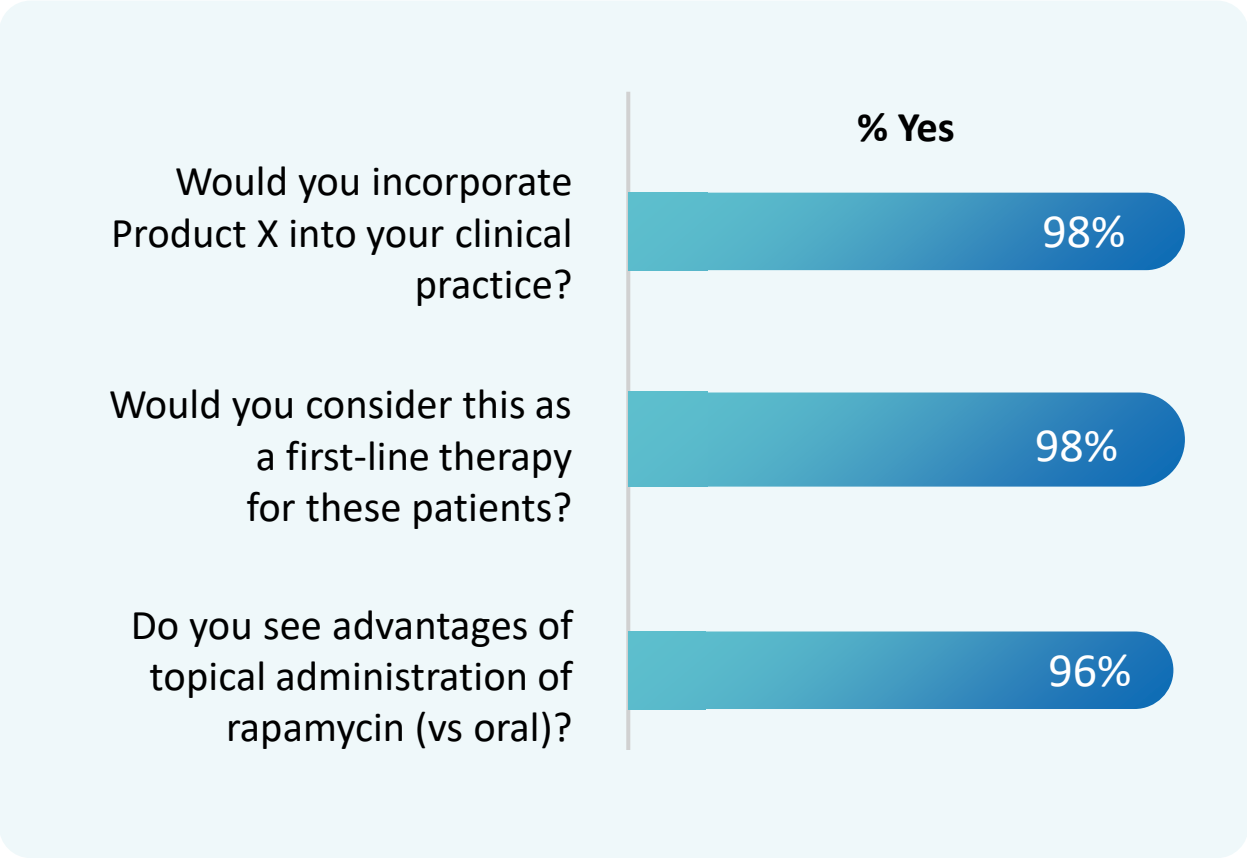
**Orphan Drug Designation**

# Market Research (May 2024): Strong Uptake in U.S. Anticipated

Product X: topical 3.9% rapamycin gel

Percent of my microcystic LM patients I would prescribe Product X:

**75%**



”

*“It would be a first choice medical therapy”*

*“I believe patient acceptance would be great”*

Survey of 52 high-volume dermatologists and hematologists (average of 11.7 cutaneous microcystic lymphatic malformation patients)



# Favorable Market Dynamics Enable Potential for Self-Commercialization

1

**First and only market position in a serious disease with no FDA-approved therapies**

2

**Relatively small number of US vascular anomaly centers (n=142), mostly within academic medical centers, streamline our commercial and medical affairs efforts**

3

**Well-defined disease with clear diagnostic parameters, including alignment from the International Society for the Study of Vascular Anomalies (ISSVA) on classification**

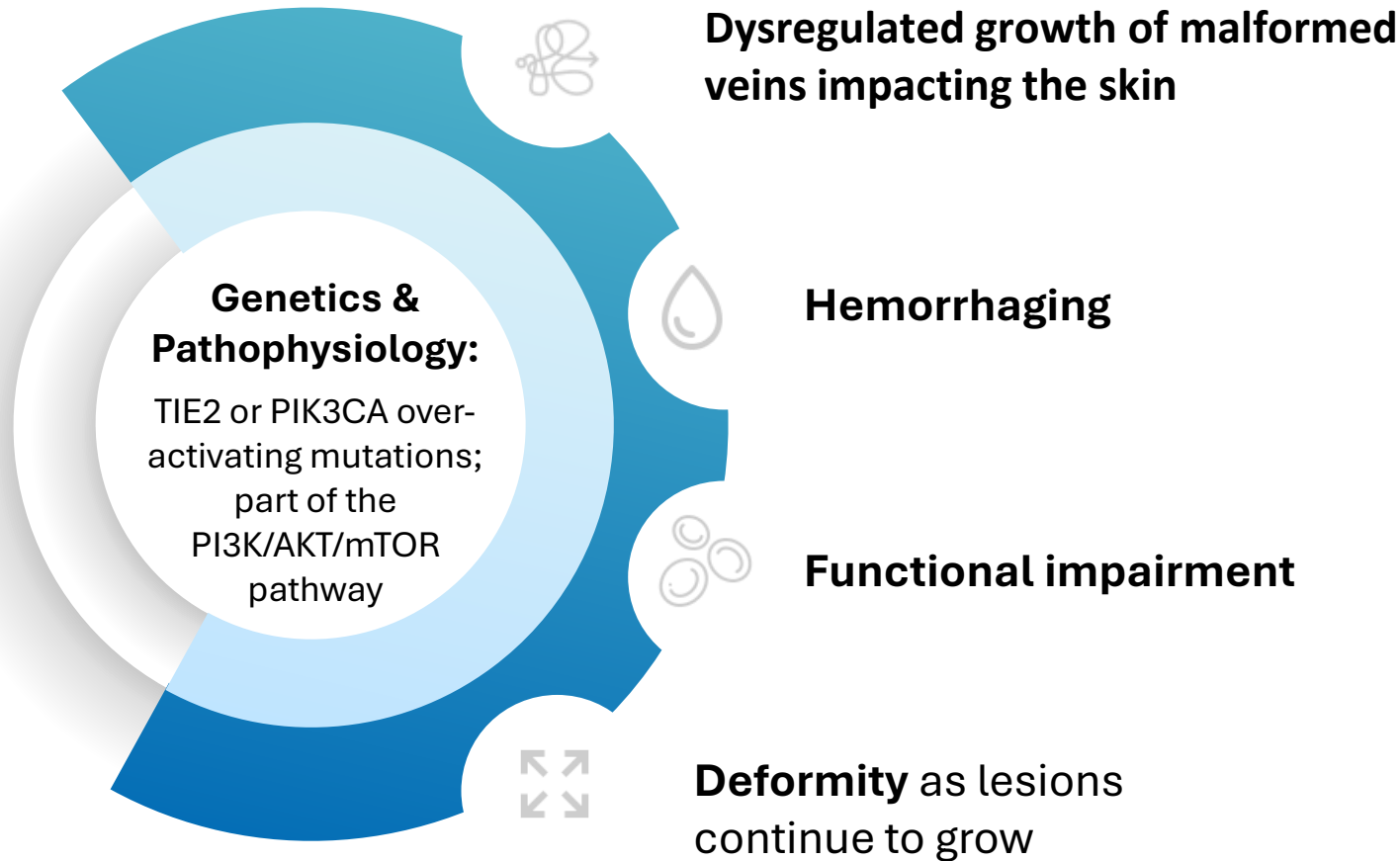
4

**Convenient at-home administration for patients and shelf-stable product not requiring cold chain distribution**

5

**Second indication (cutaneous VMs) has many synergies with Microcystic LMs**

# Cutaneous Venous Malformations: *Serious, High Unmet Need*



> 75k patients

ESTIMATED DIAGNOSED IN THE US<sup>1</sup>

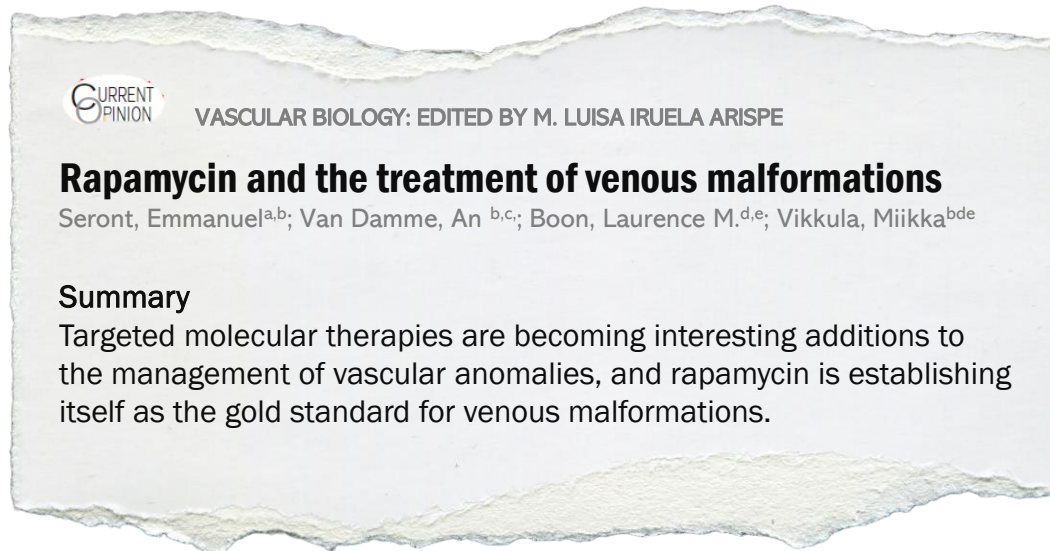


**Leads to physical & functional impairment, psychological distress, with no FDA approved therapies**

Current options: laser treatment, off label systemic pharmacotherapies limited by toxicities

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# Substantial Body of Research Supporting Rapamycin's Potential in VM Led to FDA Fast Track Designation for QTORIN™ Rapamycin



## Summary Takeaways

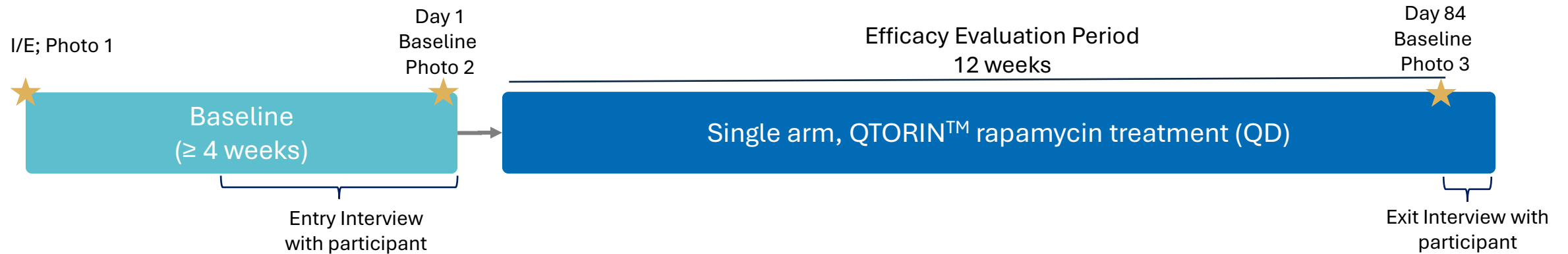
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- 1 High potential of rapamycin**  
*“Rapamycin is the first targeted therapy that improves considerably the QoL of these patients”*
- 2 Need for topical therapies**  
*“Topical agents...could abolish the need for systemic treatments that have wider toxicity”*

**Current unmet need for targeted, localized therapy for Cutaneous Venous Malformations**

# Cutaneous Venous Malformations Phase 2 Study

n=~15; QD dose



## Safety

- Safety and tolerability

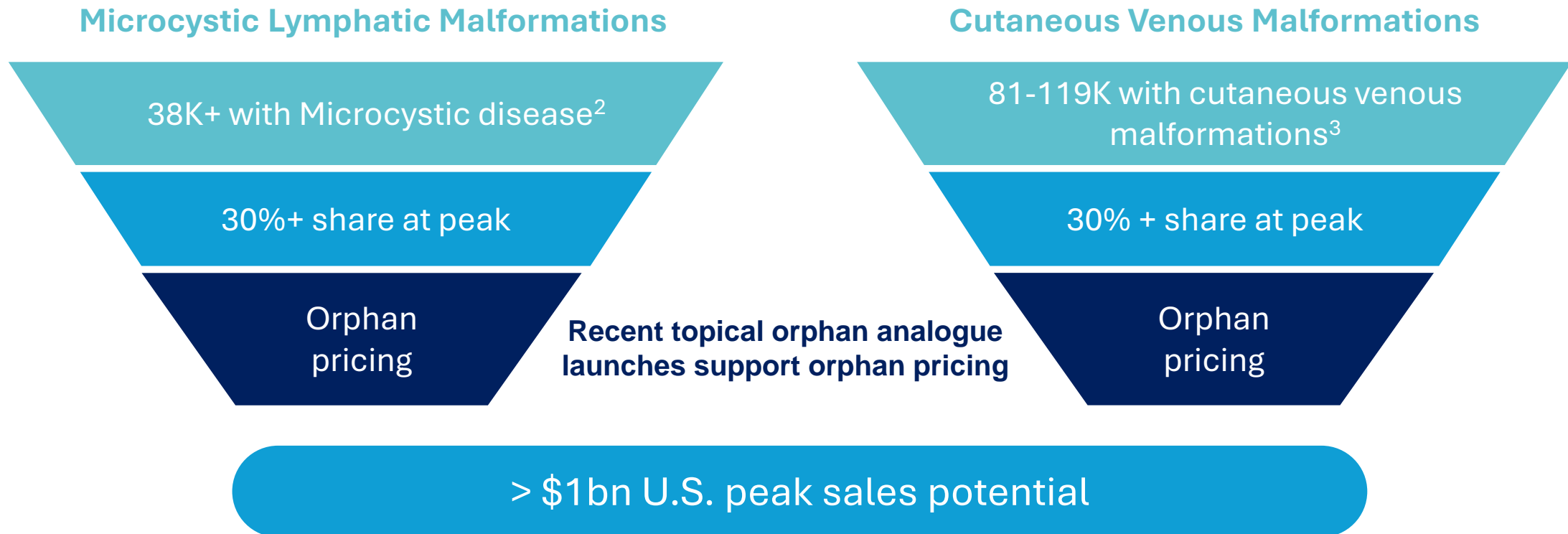
## Efficacy

- Cutaneous venous malformation – investigators' global assessment (7-point clinician change scale)
- Cutaneous venous malformation - multicomponent static scale
- Other clinician and patient-reported outcomes

**Data anticipated  
Q4 2025**

# QTORIN™ Rapamycin: > \$1B Peak Sales Potential in Five Years<sup>1</sup>

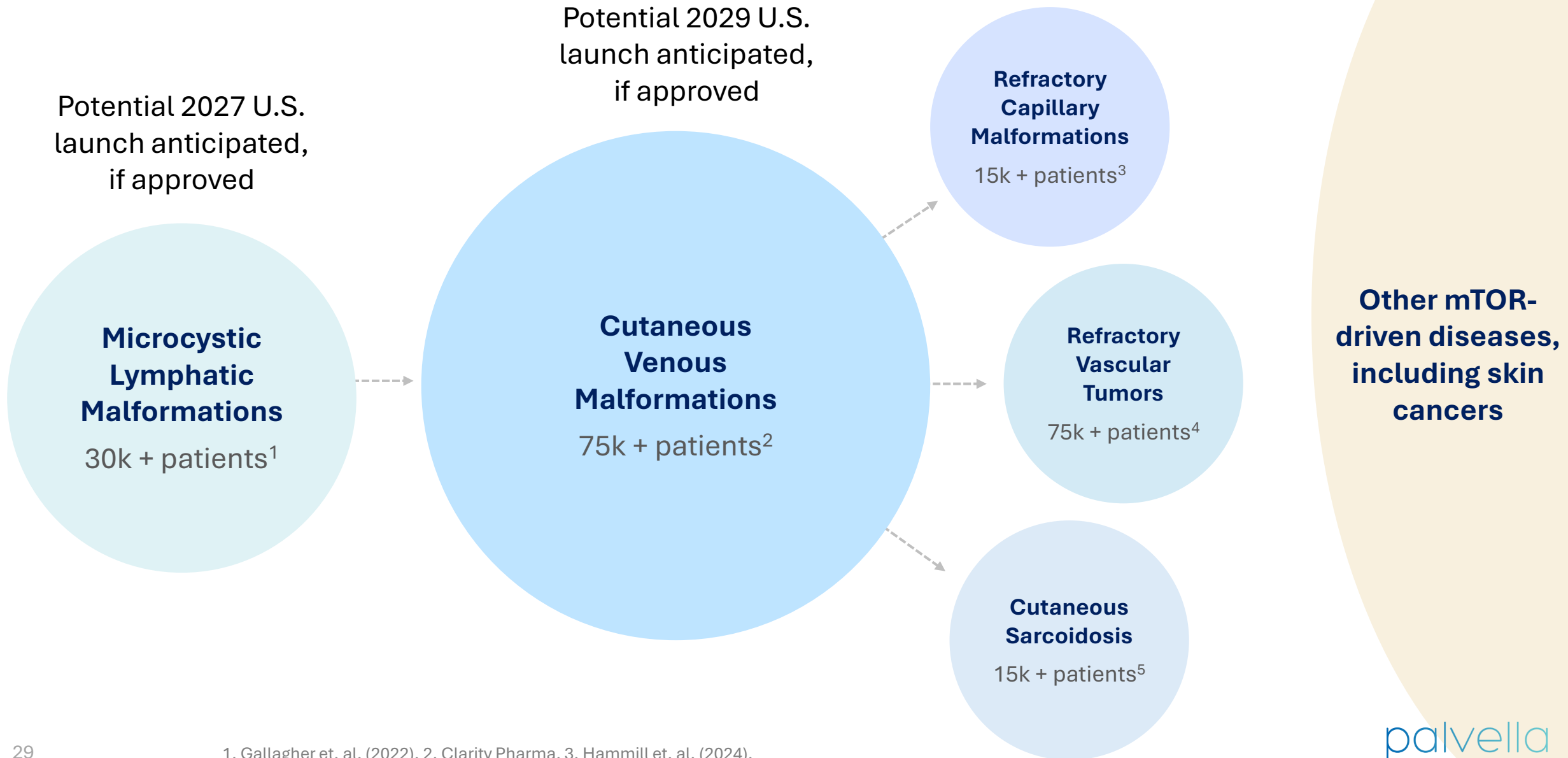
- **Recent (June 2024) claims data analysis confirms significant commercial opportunity in both diseases**



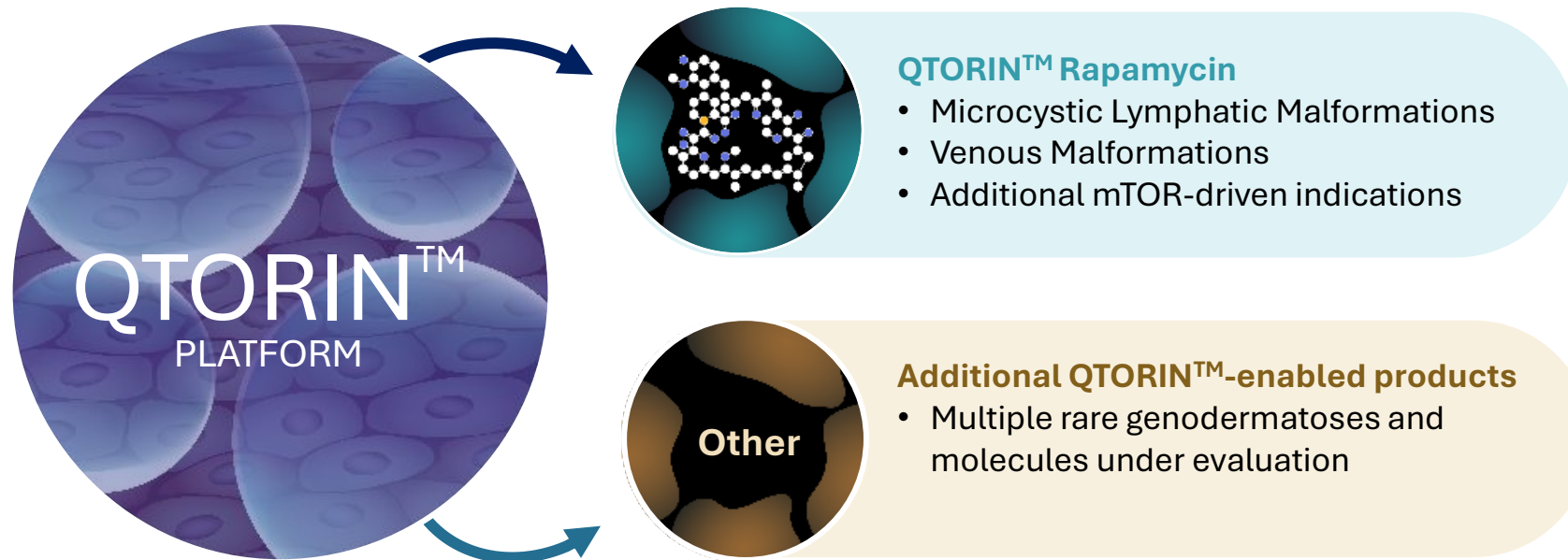
1. Primary prospective research conducted by Clarity Pharma and Sentero Pharma, claims analysis conducted by Trinity Research (June 2024).  
2. Includes microcystic LM and mixed LM (patients with both microcystic and macrocystic disease).  
3. Includes cutaneous only and mixed venous malformations.



# Pipeline in a Product for mTOR-driven skin diseases



# QTORIN™ Platform has Broad Potential Across Rare Dermatological Diseases



*“We have begun to see interest from investors and companies in developing treatments for a rare disease such as epidermolysis bullosa, but there are many other diseases within dermatology that remain unaddressed”*

John Doux, M.D., Barriers and Opportunities Across the Development Divide, *The Society of Investigative Dermatology*, 2015

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**Striving to be  
first for rare  
disease patients**



# Thank You

*Striving to be first for rare disease patients*

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