Innovative Solutions to Pain Management, Ophthalmology, and Oncology

January 10, 2018

George Yeh – President

tlc

Delivering Hope for Life

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TLC's focus and recent highlights

- **Extensive experience in liposomal science**
- **Core technologies utilizing complex liposome technology (LipAD™)**
  - **BioSeizer™** for sustained release
    Complete pharmacokinetic (PK) control designed for immediate onset and extended duration
  - **NanoX™** for targeted delivery
    Prolonged PK profiles and enhanced, tissue-specific delivery
- **Recent milestones**

TLC599: BioSeizer dexamethasone for intraarticular injection
Phase II for knee OA LPI completed; data readout 2H18

TLC590: BioSeizer ropivacaine for post-op pain
Pre-IND meeting completed; IND submission & Phase I/II initiation 1H18

TLC399: BioSeizer dexamethasone for intravitreal injection
Phase II for macular edema due to RVO interim data 1H19

TLC178: NanoX vinorelbine for rhabdomyosarcoma
IND submission & Phase I/II initiation for pRMS 1H18

Experienced and dedicated management, board, and advisors with drug development know-how

Name and Title	Experience
Keelung Hong, Ph.D. *Founder, Chairman, CEO*	▪ Since 2002 ▪ >20 years at UCSF Cancer Research Institute
George Yeh, M.B.A. *President*	▪ Since 2002 ▪ AsiaWired Group, General Bank, Hermes Biosciences
Nicole Lin, M.B.A. *CFO & Vice President*	▪ MA Labs Inc., Taiwan Securities Company
Yunlong Tseng, Ph.D. *Vice President, R&D*	▪ Founding member of R&D team ▪ 19 publications on liposome research
Wenji Chen, Ph.D., M.B.A. *Vice President, Corporate Development*	▪ >25 years industrial experience in R&D ▪ GlaxoSmithKline
Sheue Fang Shih, Ph.D. *Senior Director, Product Development*	▪ Since 2002 ▪ >15 years drug development experience
Terry Tai, M.D. *Director, Portfolio & Strategy*	▪ >10 years experience regulator science ▪ Taiwan Center for Drug Evaluation
Bella Kuo *Quality Assurance*	▪ >19 years Pharma experience ▪ PharmaEngine Inc., TTY Biopharm Co.

MERCK

UCSF University of California San Francisco

gsk

Morgan Stanley

Johnson & Johnson

TTY BIOPHARM 台灣東洋藥品

財團法人醫藥品查驗中心 Center for Drug Evaluation, Taiwan

衛生福利部 Ministry of Health and Welfare

H&Q Asia Pacific

衛生福利部中央健康保險署

Board Member	Affiliation & Experience
Keelung Hong, Ph.D. – Chair	CEO, TLC
Hong-Jen Chang, M.D.	Taiwan Global Biofund
Anupam Dalal, M.D., M.B.A.	Acuta Capital Partners
May Kang, M.B.A.	Del Mar Technology Inc.
Beatrice Liu, Ph.D.	BDO Taiwan
Tom Chen, Ph.D.	Merck Research (previously)
Chan Lee	Xiang Investment Company
Moun-Rong Lin, M.B.A.	H&Q Asia Pacific (previously)
Supervisors	**Affiliation & Experience**
Chin-Fen Huang	Young Chaio Ching Corporation
Matthew Chan, M.B.A.	Morgan Stanley (previously)
Eric Chu, M.B.A.	Mega Bank (previously)

PharmaEngine 智擎生技製藥

NRI 未來創発 Dream up the future.

Scientific Advisory Board Member
▪ Luke Guo, Ph.D.
▪ Jer-Jye Chiu, Ph.D.
▪ Michael H. Silverman M.D., F.A.C.P.
▪ Jeroen Rovers, Ph.D., M.D.

The evolution of TLC's lipid-based products – from oncology to pain management and more

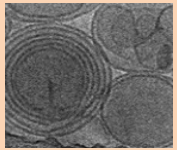
BioSeizer
Sustained Release

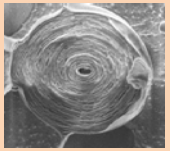
2011
Pacira
Exparel

TLC599

TLC590

TLC399

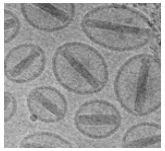




- Controlled density of multi-layers for release
- Fast onset & sustained release designed for >6M(TLC399)/ >3M(TLC599)
- Applied to small/ large molecules
- Possibility for robust scale-up
- No need for entirely aseptic process

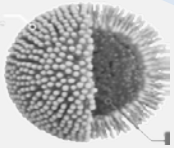
Pain

Ophthalmology

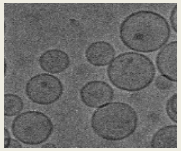


1995
Sequus/Alza/J&J
Doxil

NanoX
Target Delivery



2015
Hermes/Merrimack/Ipsen
Onivyde



TLC178

- Enhance distribution to tumor site
- Reduce toxicity
- Reduce dose frequency
- Applied with >50 compounds
- Efficient particle size
- Robust scale-up process (~400L)

Oncology

2015 FDA Liposome Guidance

Pipeline

Program	Preclinical	Phase I	Phase II	Phase III	Projected Milestones
Pain Management					
TLC599	Osteoarthritis Pain				*Ph II data 2H18*
TLC590	Post-op pain				*IND & Ph I/II initiation 1H18*
Ophthalmology					
TLC399	Macular edema				*Interim Ph II data 1H19*
Oncology					
TLC178	Advanced malignancies pRMS*/STS**				*IND & Ph I/II initiation for pRMS 1H18*

*Pediatric rhabdomyosarcoma (pRMS); designated Drug for Rare Pediatric Disease (RPD)
**Soft Tissue Sarcoma (STS) ; Orphan Drug Designation (ODD)

Osteoarthritis (OA) pain program: TLC599 target product profile

Current treatment landscape for knee OA pain

- Estimated 30.8 million OA patients in US[1]; estimated 20% of people >65 years will be at risk for knee OA by 2030[2]
- Immediate release corticosteroid injections: too short in duration[3]
- Hyaluronic acid injections: inconclusive efficacy[4]
- Recently approved extended release steroid injection: only a modest advance with conceivable chondrotoxicity[5]

Our solution TLC599 - BioSeizer dexamethasone sodium phosphate (DSP) intraarticular injection

- Rapid onset with long residence time
- Designed for best-in-class duration with least chondrotoxicity
- Improved drug residence in joint with efficient particle size
- Flexibility of needle size to allow for future expanded indications (small joints)

Development stage

- Ongoing randomized, double-blind, placebo-controlled Phase II study in knee OA
- Offers chance to confirm potential benefit duration of six months
- Topline data 2H 2018
- Planned pivotal trial 1H 2019

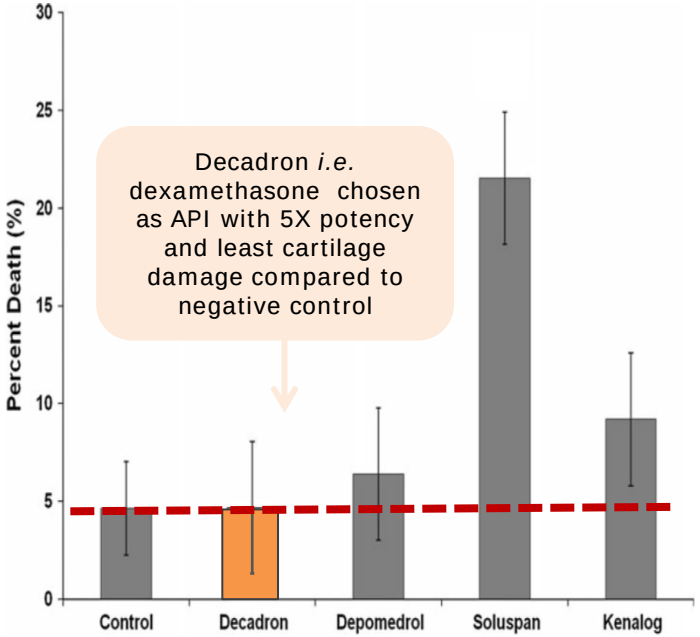
[1] Arthritis Foundation. Arthritis By the Numbers / Book of Trusted Facts & Figures. [2] National Institutes of Health. FACT SHEET – Osteoarthritis., 2010 [3] Intra-articular steroid injections for painful knees. Can Fam Physician 2004;50:241-248. [4] State-of-the-Art management of knee osteoarthritis. World J Clin Cases 2015; 3(2): 89-101. [5] The chondrotoxicity of single-dose corticosteroids. Knee Surg Sports Traumatol Arthrosc. 2012 Sep;20(9):1809-14.

TLC599: potential to become a best-in-class treatment for OA pain

Desired Effect	TLC599 Design
Fast-acting	Engineered % of free DSP on outer layers to provide immediate therapeutic effect
Sustained relief	Core lipid layers trap and maintain release of hydrophilic molecules for more than 3 months
Minimal cartilage damage	Dexamethasone: water-soluble steroid with minimal chondrotoxicity
Avoid steroid comorbidity	Drug retention in joint ⇒ reduced systemic exposure
Extended joint exposure	Strategic size (~0.4μm) ⇒ intra-joint sequestration, less Mϕ phagocytosis[1]
Broader usage	Flexibility in needle sizes (21G~30G) reduces injection-related complications and allows opportunity in small joint OA

[1] Drug delivery systems for intra-articular treatment of osteoarthritis. Expert Opin. Drug Deliv. (2014) 11(2) 269-282.

Preclinical studies: TLC599's API dexamethasone is least toxic and cartilage sparing

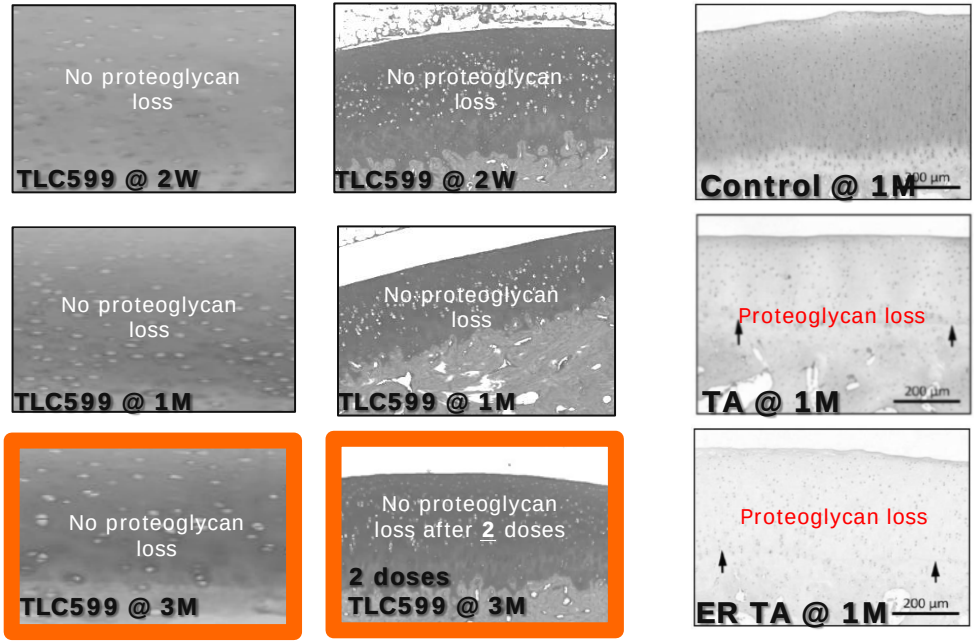


Source: Dragoo et al. Knee Surg Sports Traumatol Arthrosc (2012) 20:1809–14

TLC599 Single Dose
Canine: 12mg DSP (eq. to 60mg TA)

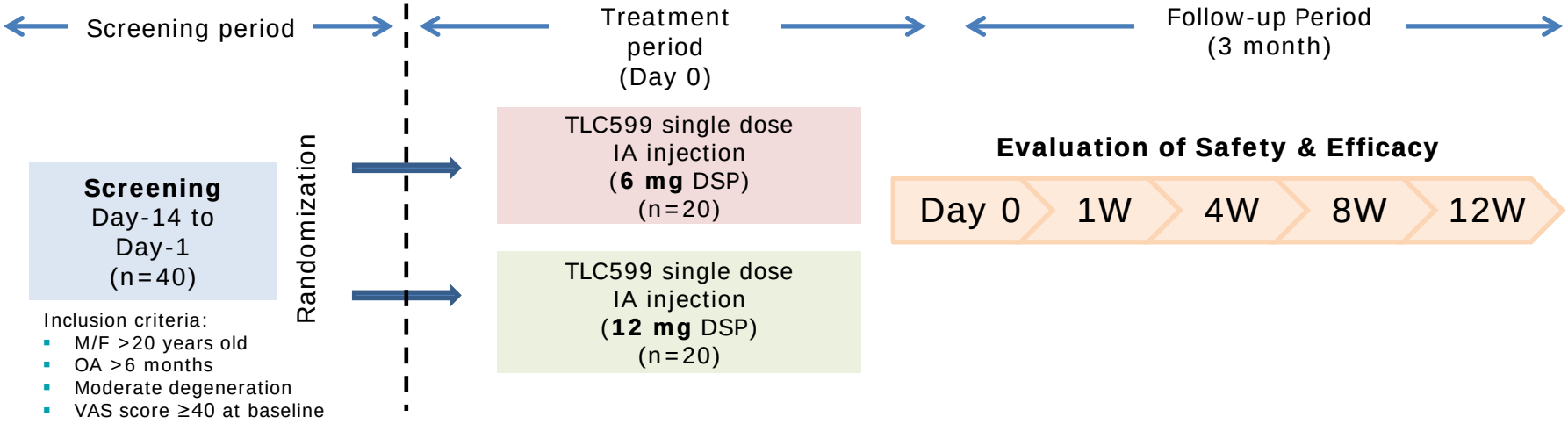
TLC599 Repeated Doses
Rabbit: 1.2mg DSP (eq. to 6mg TA)

TA & ER TA Single Dose
Canine: 18.75mg TA



Source: TLC internal study

Completed TLC599 Phase I/II clinical trial: design & objectives



Primary objective:

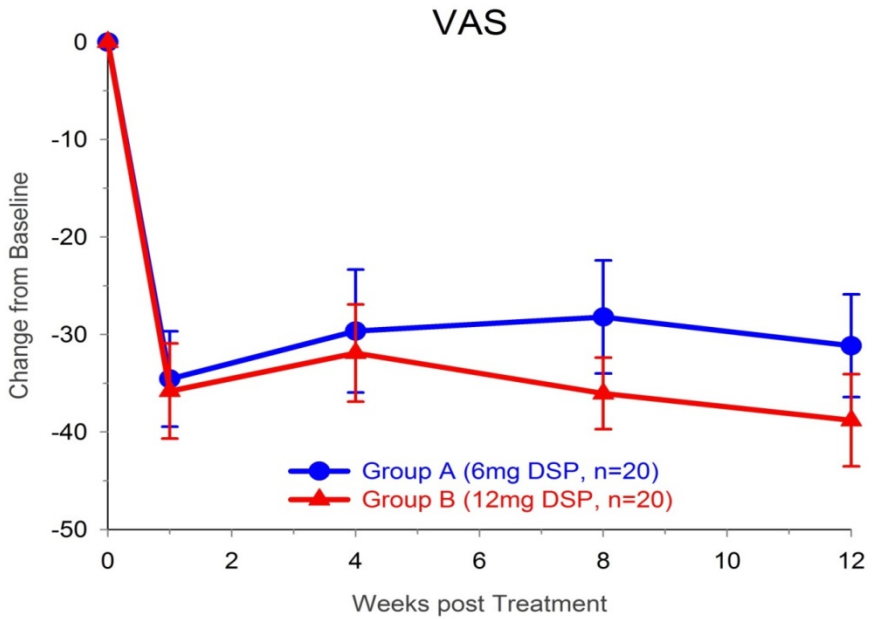
- Evaluate the **safety** and **tolerability** profile of TLC599 with two dose levels of DSP lipid formulation

Secondary objective:

- Evaluate **efficacy** using the following:
  - **Pain score in VAS** / **WOMAC score** / IGART questionnaire
- Evaluate number of subjects with 30% and 50% or more decrease from baseline in VAS and WOMAC
- Evaluate change in plasma cortisol

TLC599 Phase I/II clinical trial results: TLC599 demonstrated rapid onset with sustained release

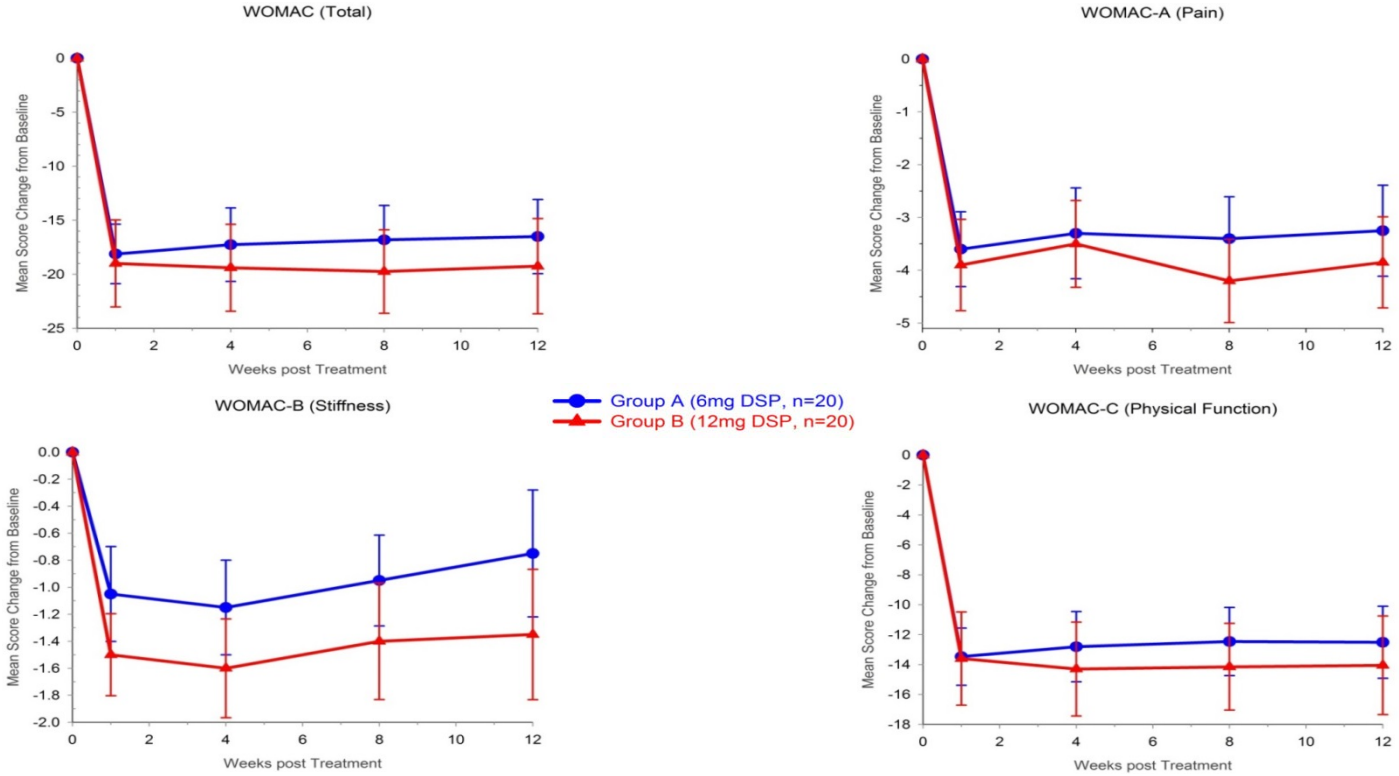
Phase I/II efficacy of TLC599 in knee OA — onset within 1W, persisted to 12W



- Strong immediate pain relief by first assessment
- Clear dose response over course of trial
- Continued downward trend after initial dose
- Sustained effects to 12 weeks

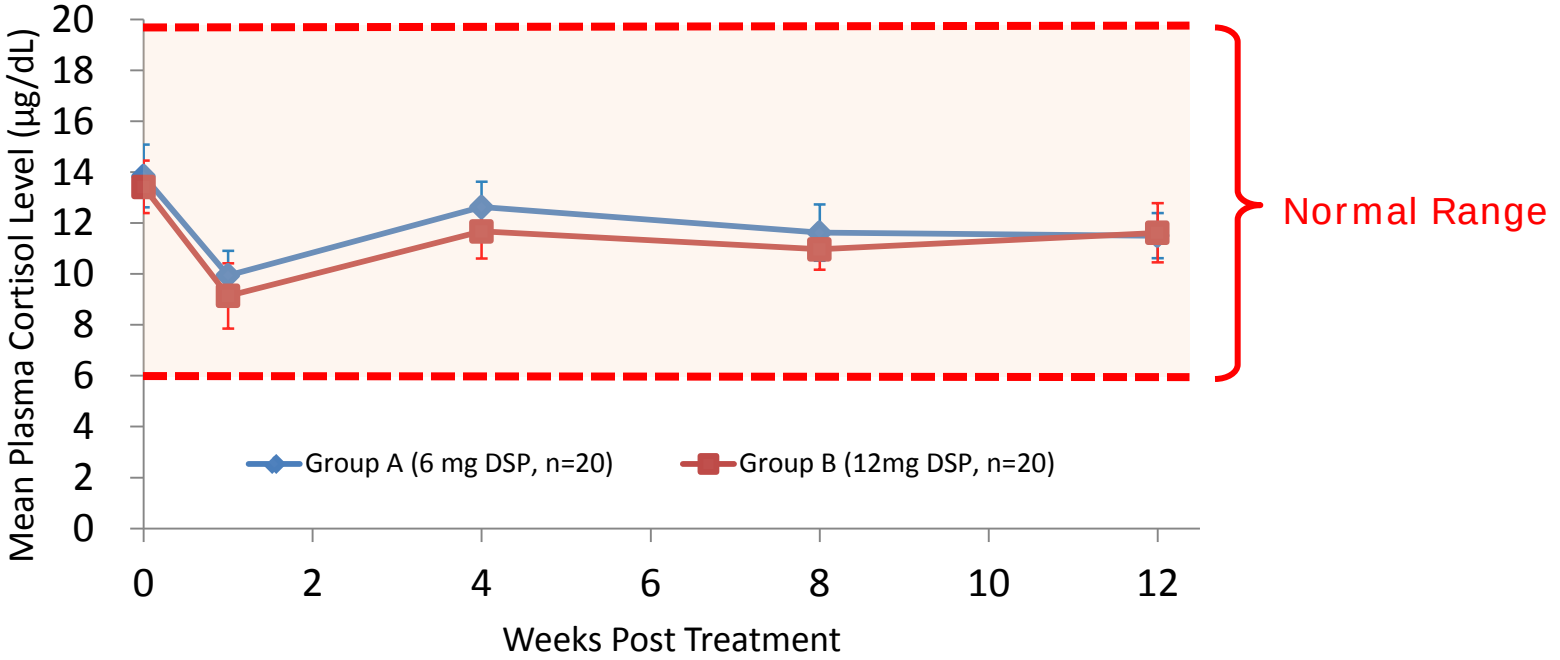
TLC599 Phase I/II clinical trial results: Improvements across WOMAC scales

Phase I/II efficacy of TLC599 in knee OA: demonstrated onset within 1W, persisted relief to 12W

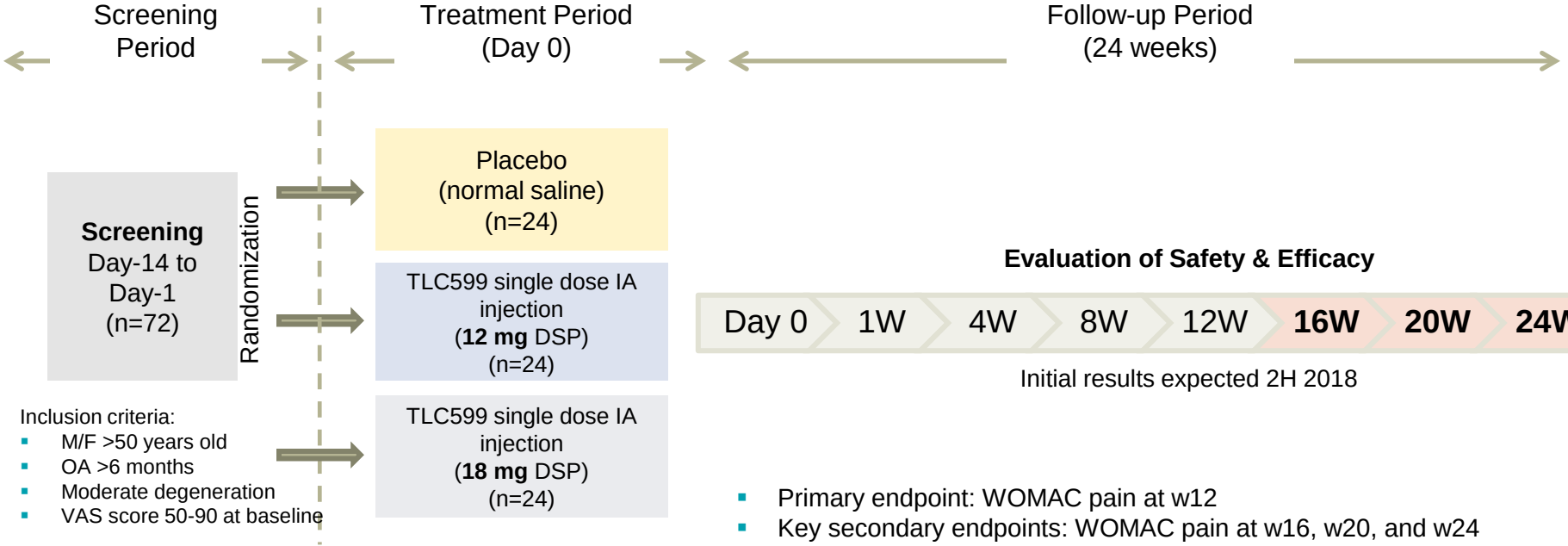


Plasma cortisol levels in Phase I/II clinical trial remained in the normal range

Cortisol is monitored due to its role in blood sugar metabolism and the body's response to stress.



Ongoing TLC599 Phase II clinical trial: evaluation at 24W to confirm preliminary data



- Primary endpoint: WOMAC pain at w12
- Key secondary endpoints: WOMAC pain at w16, w20, and w24

Post-surgical pain program: TLC590 target product profile

Current treatment landscape for post-surgical pain

- 96 million surgical procedures are performed in the US in 2012[1]
- Local anesthetics play a major role in the management of post-surgical pain[2]
- Long acting agents have modestly expanded duration, but the API in current marketed liposomal formulation of bupivacaine has higher toxicities[3]

Our solution TLC590 – BioSeizer ropivacaine infiltration injection

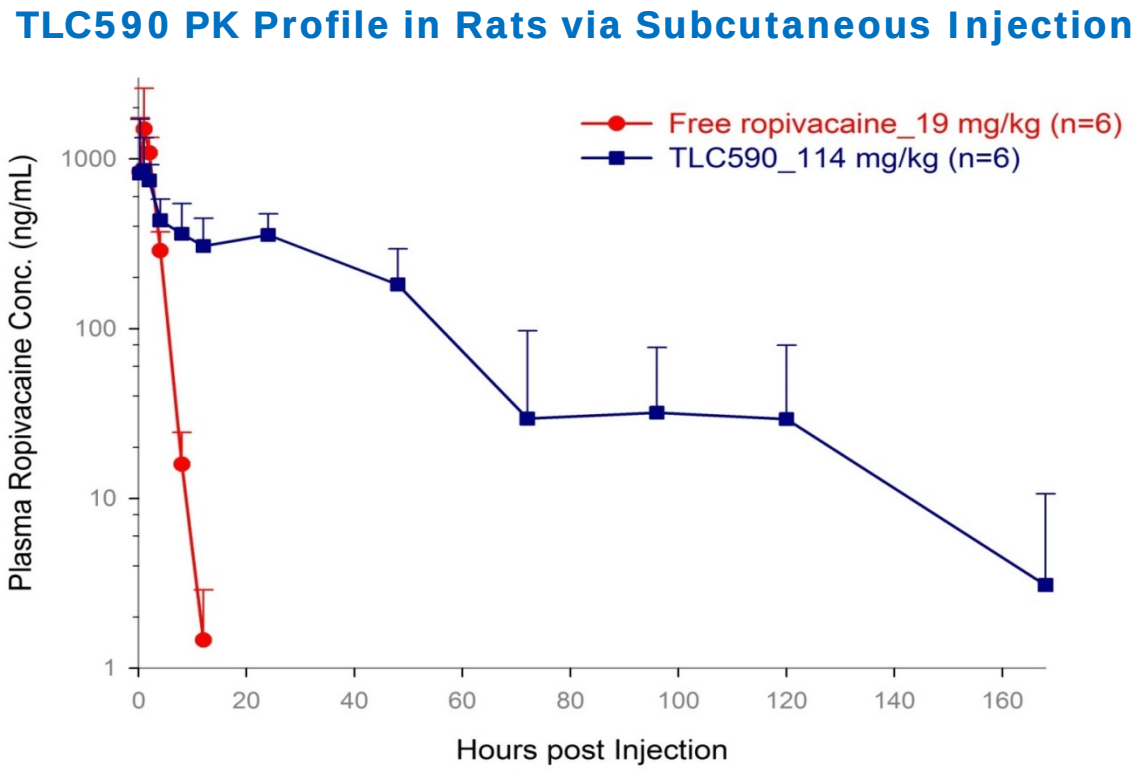
- Fast, immediate onset
- Extended pain relief of up to 72 hours
- Safer API: less cardiovascular and central nervous system toxicity
- Potential for lower COGS allows for monetization of hospital opportunity

Development stage

- Completed pre-IND meeting with FDA
- File IND 1H 2018 followed by initiation of Phase I/II trial

[1] World Bank. Number of surgical Procedures . [2] Infiltration of Local Anesthetics for Postoperative Analgesia. Pfiedler Enterprises. 2015. [3] Local Anesthetics Systemic Toxicity Association with Exparel (Bupivacaine Liposome)- A Pharmacovigilance evaluation, Expert Opinion on Drug Safety. Expert Opin Drug Saf. 2017 Jun 5:1-7

TLC590 extends the effective half-life of ropivacaine by ~20 fold in rat models



Ophthalmic disease program: TLC399 target product profile

Current treatment landscape for macular edema due to retinal vein occlusion (RVO)

- RVO affects >16 million adults worldwide[1]
- Steroids still play a prominent role in the management of RVO even post the advent of anti-VEGF[2]
- Current marketed steroid injection has 1-3 month duration[3] but its implant takes up to 6 months to dissolve[4]

Our solution TLC399 – BioSeizer DSP intravitreal injection

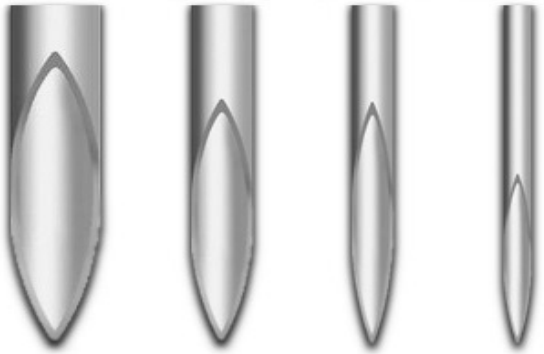
- Rapid onset
- Designed to achieve best-in-class sustained release duration of greater than six months
- Administration needle 2.3 times smaller than diameter of current marketed steroid injection, reducing risk of conjunctival hemorrhaging and infections

Development stage

- Ongoing randomized, double-blind Phase II in macular edema due to RVO
- Last patient enrollment 1H 2018; interim report 1H 2019
- Planned Pivotal trial 2H 2019
- Planned development in anti-VEGF combo to treat diabetic macular edema

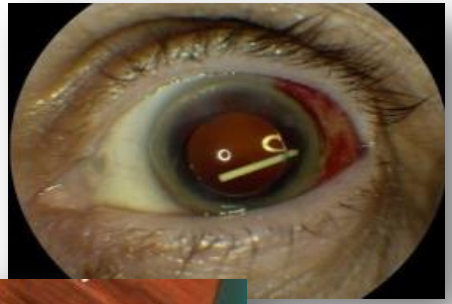
[1] Sophie Rogers et al, "The Presence of Retinal Vein Occlusion: Pooled Data from Population Studies from the United States, Europe, Asia and Australia; 117(2): 313-9el. (2010). [2] Effect of intravitreal triamcinolone in diabetic macular edema unresponsive to intravitreal bevacizumab. Jeon S1, Lee WK. Retina. 2014 Aug;34(8):1606-11. [3] Ozurdex® Prescribing Information [4] Ozurdex drug delivery implant for eyes, The Macula Center, Dana M. Deupree, MD, FACS & Michael Tolentino, MD

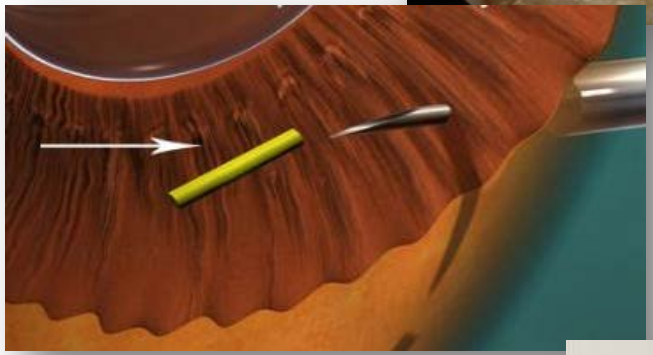
Administration of TLC399 with smaller needle potentially means less risk of bleeding/infections



Approved brand
22G
0.7176mm

TLC399
30G
0.3112mm

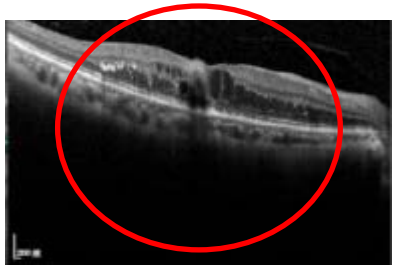
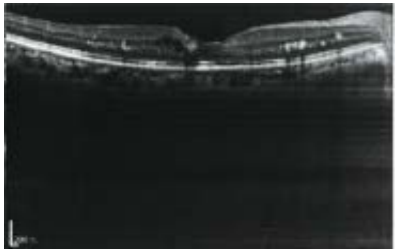
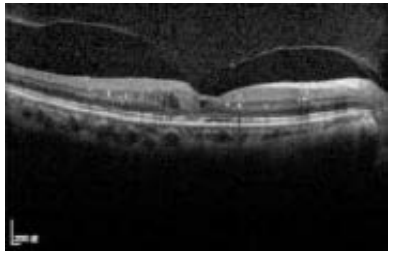
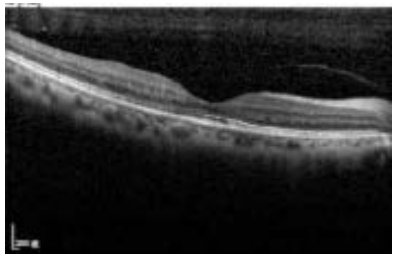




- Injections using 22G needle cause bleeding in 23% of patients[1]
- TLC399 uses 30G needle and no implants ⇒ potentially less risk of bleeding and infections ⇒ fewer complications

[1] Ozurdex® Prescribing Information

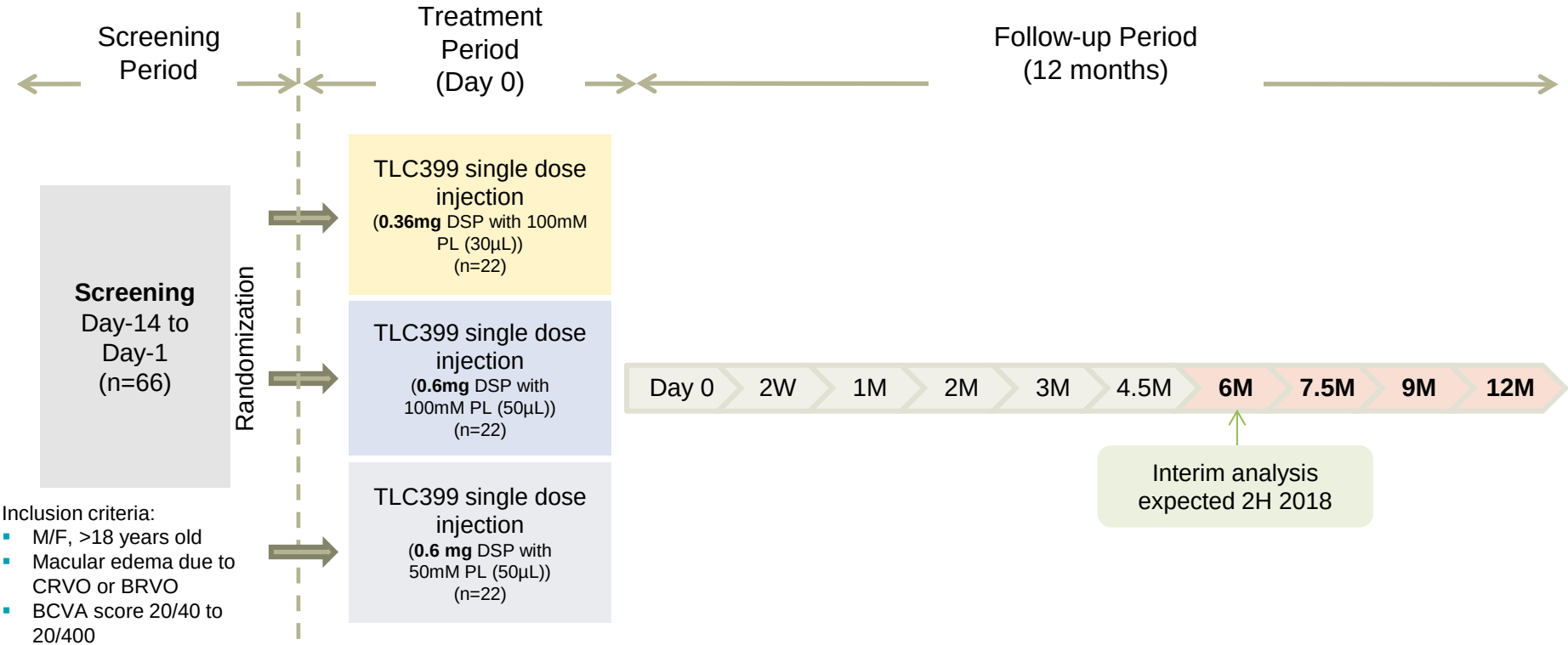
TLC399 Phase I/II clinical trial (0.6mg DSP): decrease in CST up to 12M after single injection

Day 0	Day 90	Day 180	Day 360
			
CST 386 µm	**253 µm**	**264 µm**	**206 µm**

CST (Central subfield thickness)

- Improved/stabilized vision for 6 to 12 months
- Improved OCT results for 6 to 12 months

TLC399 Phase II clinical trial design



Soft tissue sarcoma (STS) program: TLC178 target product profile

Current treatment landscape for rhabdomyosarcoma (RMS), a type of STS

- Vinorelbine is listed by the National Comprehensive Cancer Network (NCCN) Guidelines as therapy agent with activity in RMS in combination with cyclophosphamide, or as a single agent only for palliative therapy[1], but with significant dose limiting myelosuppression[2] [3]
- Vinorelbine and gemcitabine combo is active regimen in STS and NSCLC[4] [5]

Our Strategic Solution

- Improve selective delivery to tumor versus non-tumor tissue
- Higher drug concentration at tumor confers higher activity
- Less drug to non-tumor reduces myelosuppression, thus enabling higher dose intensity
- Efficacy improvement in treatment response rate and duration of response

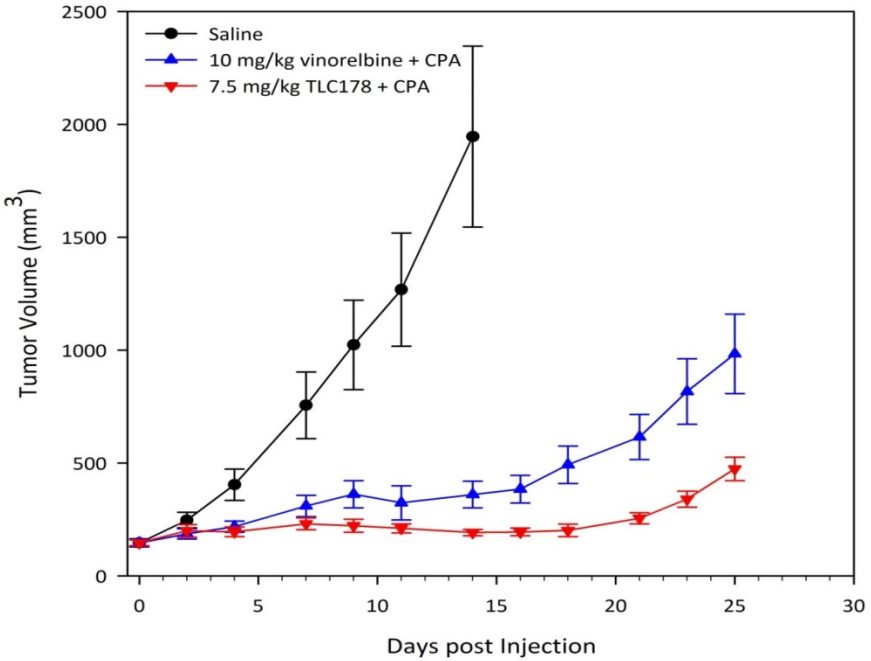
Development Stage

- Ongoing Phase I/II dose-escalation study in adults
- IND for pediatric RMS 1H 2018, followed by Phase I/II initiation (US FDA Rare Pediatric Disease Designation)
- Pivotal initiation for pediatric RMS 2H 2019
- Further expansion in gemcitabine combo into STS (US FDA Orphan Drug Designation) and NSCLC

[1] National Comprehensive Cancer Network, NCCN Clinical Practice Guidelines in Oncology – Soft Tissue Sarcoma, Version 1.2018, October 31, 2017. [2] Phase II Evaluation of Intravenous Vinorelbine (Navelbine) in Recurrent or Refractory Pediatric Malignancies: A Children's Oncology Group Study. Pediatric Blood Cancer. 2009 October ; 53(4): 590–93. [3] Vinorelbine in Previously Treated Advanced Childhood Sarcomas .Cancer 2002;94:3263–68. [4] Gemcitabine and Vinorelbine Combination Chemotherapy for Patients With Advanced Soft Tissue Sarcomas. Cancer 2007;109:1863-69. [5] The Novel and Effective Non-platinum, Nontaxane Combination of Gemcitabine and Vinorelbine in Advanced Non-small Cell Lung Carcinoma. Cancer 2002;95(2)340-53.

TLC178 demonstrates more effective control of tumor growth than free vinorelbine in CPA combo preclinical studies

Antitumor efficacy of TLC178 + Cyclophosphamide(CPA) in a mouse xenograft model of human alveolar RMS



Compared to free vinorelbine, TLC178 potentially has…

- Better pharmacokinetics
- Lower toxicities
- Reduced myelosuppressive side-effects
- Longer dosing intervals
- Higher vinorelbine concentration at neovascular-rich and subcutaneous tumor sites
- Capability to broaden indications

TLC summary

Focus

- LipAD™
  - BioSeizer™ sustained release
  - NanoX™ targeted delivery

Strategy

- Rapidly advance current product candidates
- Continue to leverage proprietary technology
- Take advantage of opportunities for streamlined regulatory approval
- Expand pipeline with one new IND every 18 months
- Selectively pursue additional indications in areas of unmet need
- 35 patents and 65 patent applications worldwide

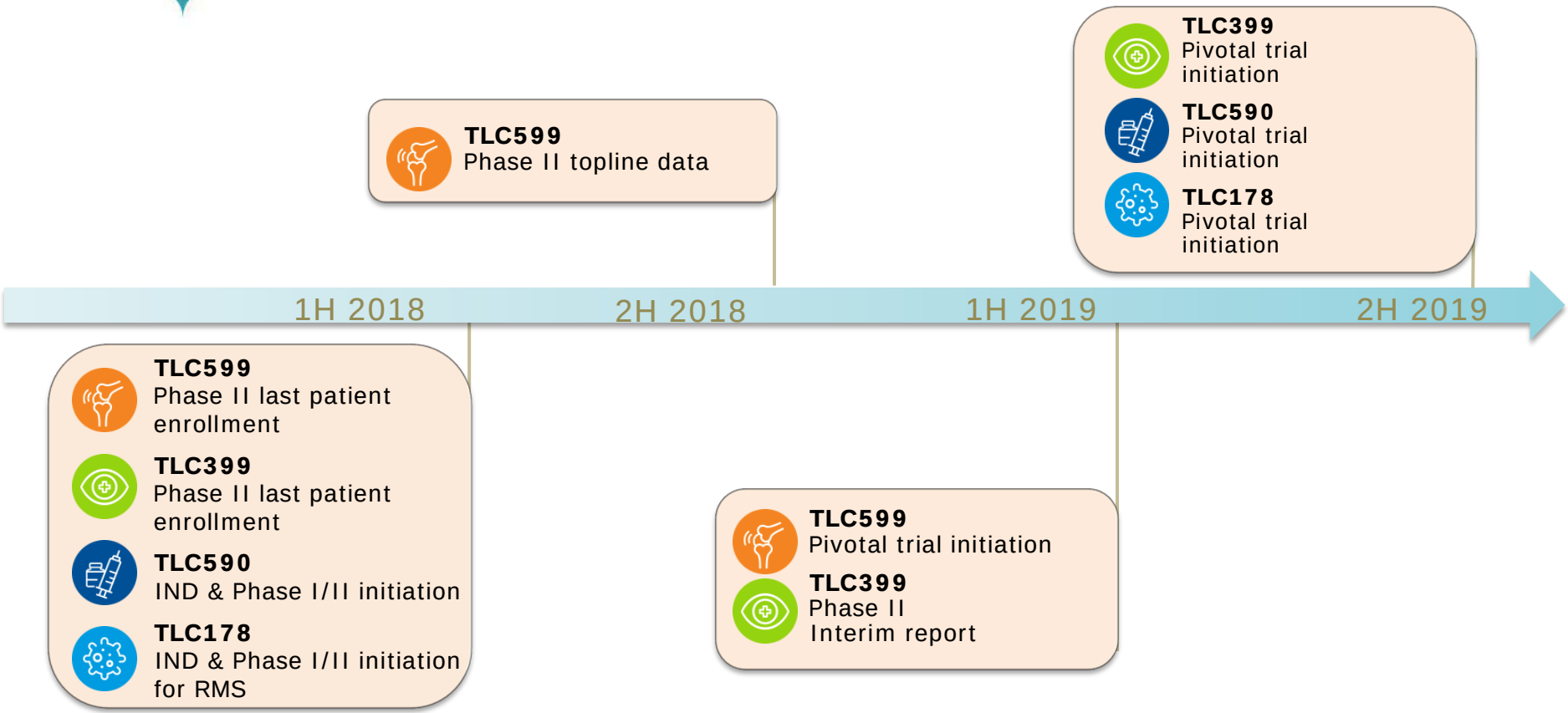
Pipeline

- 2 products approved/marketed in Asia & partnered globally
- 4 product candidates expected to be in pivotal trials in 2019

Corporate

- Partnerships signed with Sandoz, Hospira and Asian pharma companies
- Listed on Taipei Exchange (TPEx) since Dec 2012
- Consistently ranked Top 5% in Corporate Governance Evaluation among all TPEx listed companies
- 8 offices worldwide

Projected milestones:
Four programs expected in pivotal stage by 2019




Thank you
tlc
Delivering Hope for Life