

January 2024

# Liposphere – Enabling smooth articulation of joints

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**Liposphere**  
*Revolutionizing biolubrication.*

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### ***AqueousJoint***

## The first knee joint boundary lubricant for Osteoarthritis

- *500 million people globally suffer from Osteoarthritis, which causes daily pain and loss of mobility, and that number is growing 8% a year as obesity increases and the world's population lives longer.*
- *There are currently no effective non-surgical treatments that can consistently relieve the symptoms of OA on an ongoing basis.*
- *Liposphere has developed a unique, IP-protected, knee joint injectable biolubricant called **AqueousJoint** that forms a protective coating on the cartilage surface of the joint to provide safe, long-term pain relief and increased mobility while mechanically improving lubrication between the articulating surfaces.*
- *Liposphere is currently **raising USD 25m Series B to accelerate market access in Europe.***
- ***Further use cases** of the technology (established in collaboration with industrial market leaders): **cosmetic moisturizer; lubricious coating for contact lenses.***

**About us**

# Liposphere Company

*" We have developed a unique IP-protected platform technology of unmatched biolubricants for orthopedic applications."*

## Founders

A team since 2011!



**Ronit Goldberg**

Co-Founder, CEO

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PhD in Chemistry,  
Weizmann Institute

**Sabrina Jahn**

Co-Founder, CBO

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PhD in Physics,  
University of Cambridge



// Established in February 2019.

// 25 employees with > 60% women.

// ISO-certified to produce liposomes for human use.

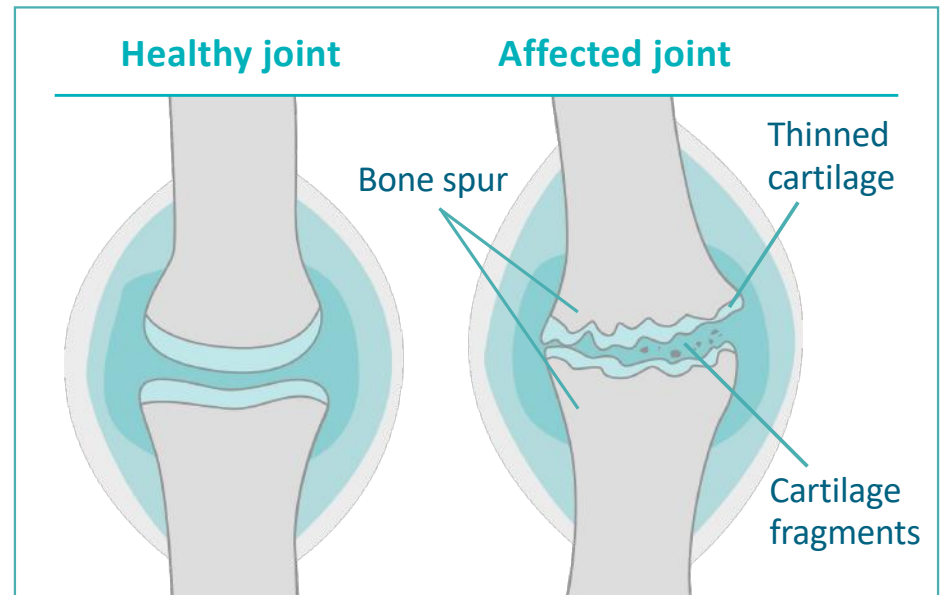
*Pinpointing the problem*

## Osteoarthritis (OA)

// Degenerative Joint Disease

- > Progressive breakdown/loss of cartilage
- > Pain and limitation of active lifestyle

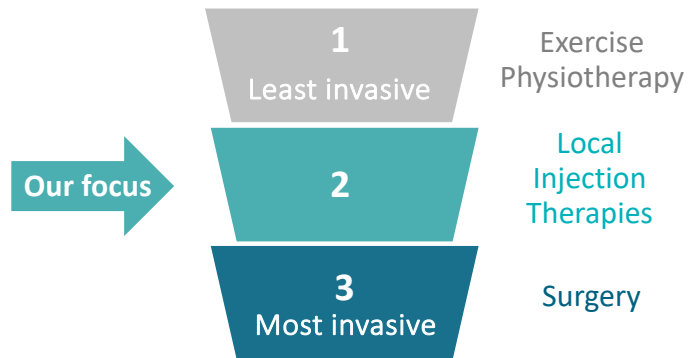
// Current treatment solutions:  
partially beneficial and time-limited



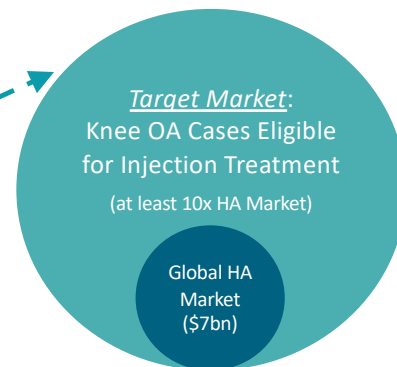
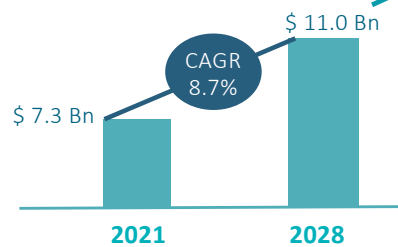
*Over 500M people globally suffer from Osteoarthritis.*

## Osteoarthritis

# Current solutions and market



### Global OA Therapeutics Market



### The main Stage II injectables

*Direct competitor*

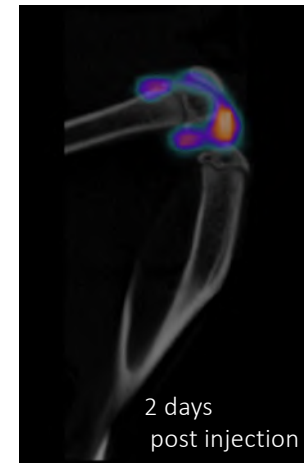
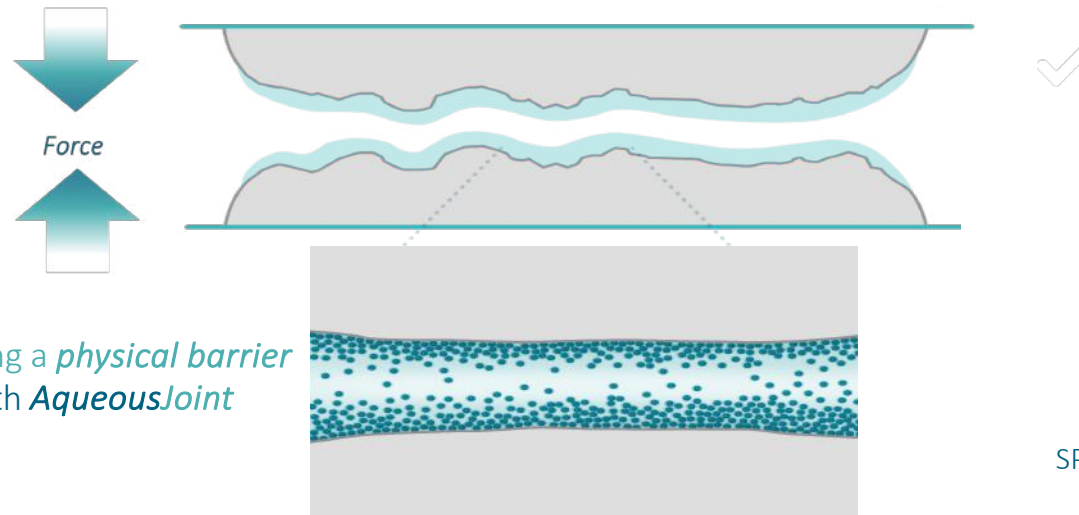
Corticosteroids Drug	Hyaluronic acid-based (HA) Viscosity enhancer
<ul style="list-style-type: none"> <li>// anti-inflammatory, pain relief</li> <li>// acts rapidly but short-term</li> <li>// restricted to 3-5x/year</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Exposed to rapid metabolic clearance</li> <li>// delayed pain relief effect</li> <li>// controversial clinical benefit</li> <li>// less effective in severe cases</li> </ul>
<p><b>Key players:</b> Sanofi, Ferring, Fidia, Seikagaku, Anika Therap., Zimmer Biomet...</p>	



*AqueousJoint*  
**Our Solution**

*“A revolutionary, injectable **knee joint articulation compound** that coats and protects cartilage to reduce wear-induced pain.”*

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SPECT CT image of radioactively labeled *AqueousJoint* in the rat knee joint

**Mode of action**

*Hydration Lubrication Mechanism enabling smooth articulation by mechanically reducing friction and wear.*



*Aqueous Joint technology*

# Liposphere's joint articulation compound



## Fluidity of Bound Hydration Layers

U. Raviv, J. Klein, Science, 297, 5586 (2002)



## nature

### Boundary lubrication under water

Briscoe, W., Titmuss, S., Tiberg, F. et al. Nature 444, 191-194 (2006)

### HYDROGELS

### Cartilage-inspired, lipid-based boundary-lubricated hydrogels

Lin W, Kluzek M, Luster N, Shimoni E, Kampf N, Goldberg R, Klein J., Science, 16, 370 (2020)

### ADVANCED MATERIALS

### Boundary Lubricants with Exceptionally Low Friction Coefficients Based on 2D Close-Packed Phosphatidylcholine Liposomes

R Goldberg, A Schroeder, G Silbert, K Turjeman, Y Barenholz, J Klein



**Key metrics**

# Accomplished Milestones

*Preclinical/clinical milestones*

- ✓ ISO 13485:2016 certification
- ✓ In-house manufacturing of clinical batches
- ✓ Preclinical efficacy and biocompatibility
- ✓ **First-In-Human clinical safety trial completed:**
  - Single intra-articular injection in moderate knee OA (~ 90% KL grade 3)
  - Safety demonstrated, efficacy shown
- ✓ **Clinical efficacy trial vs placebo ongoing**
  - Randomized, double-blinded, multi-centre; in Israel

*Strategic and business milestones*

- ✓ Established IP license (TTO Weizmann, Yeda)
- ✓ Filed own patents
- ✓ Raised private and governmental funding
- ✓ Finalist MassChallenge, Spinoff Prize, MIT IDEA<sup>2</sup>
- ✓ ATiO Best Early-Stage Company Award
- ✓ Winner AO development incubator
- ✓ AO Foundation Davos as 'strategic' partner



**Performance**

# Why *AqueousJoint*?

Preclinical

**// Demonstrated significant pain reduction in an OA animal model.**

- Surgically induced cartilage defect model in rats (DMM model)
- AqueousJoint injections have shown superior and long-lasting pain reduction compared to top HA injections (weight bearing assessment).

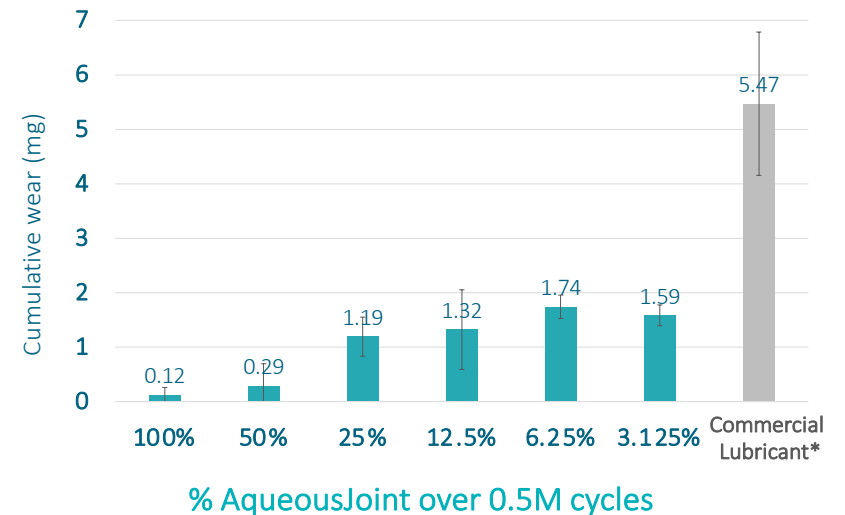
Clinical

**// Proven safety and efficacy in human clinical trials**

- Single local knee joint injection of AqueousJoint demonstrated safety (52 patients so far)
  - No adverse material-related side effects reported.
  - Significant pain reduction shown over study period of 6 months in FiH trial.
- Ongoing randomized, multi-centered, double-blinded efficacy trial:
  - Significant pain reduction from baseline for AJ at 12 weeks timepoint.
  - Superiority vs placebo shown at 12 weeks.

Synthetic Implant surface

**Wear reduction demonstration ex-vivo**



\* The commercial lubricant is Bovine Calf Serum, the standard for prosthetic implant approval wear testings.

An outlook

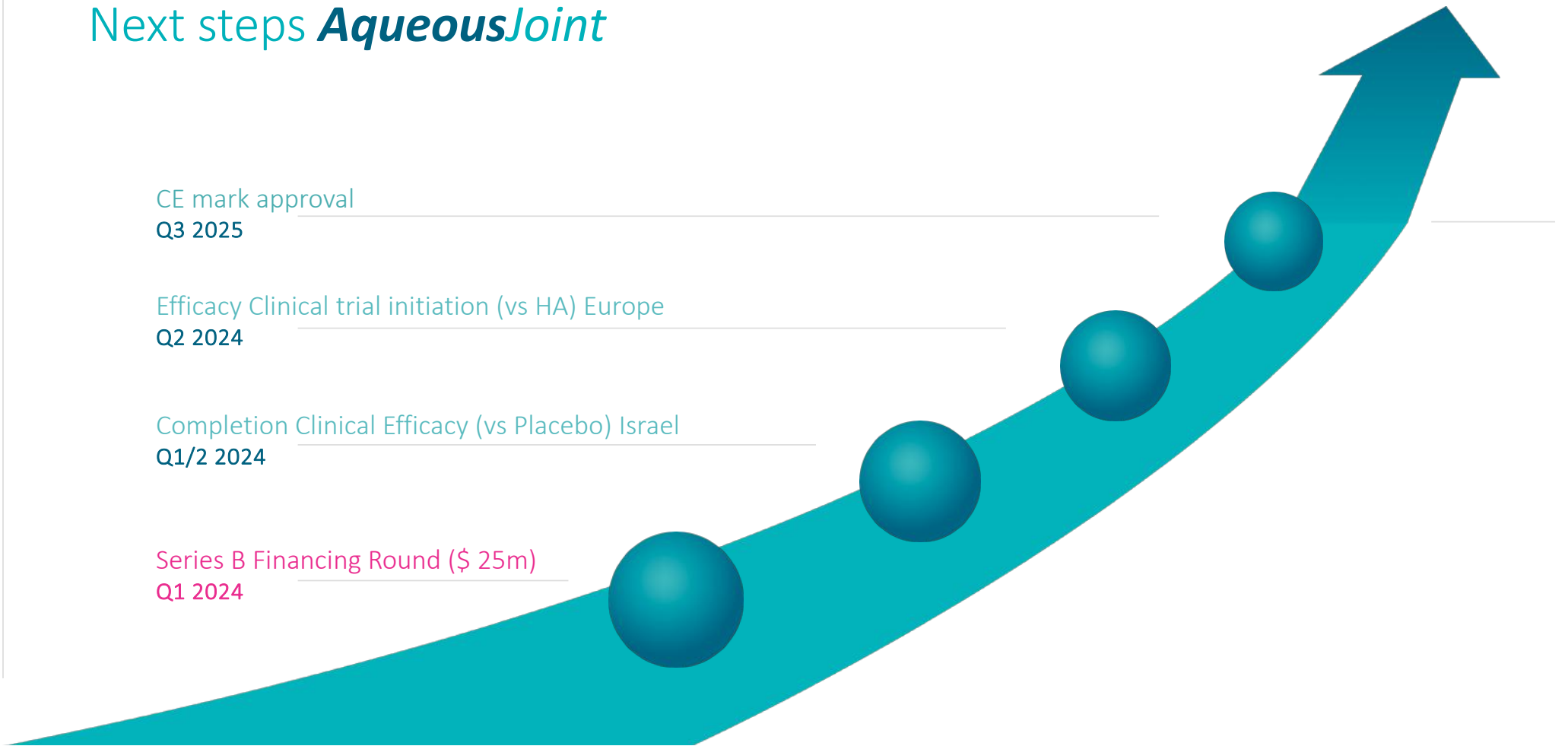
## Next steps *AqueousJoint*

CE mark approval  
Q3 2025

Efficacy Clinical trial initiation (vs HA) Europe  
Q2 2024

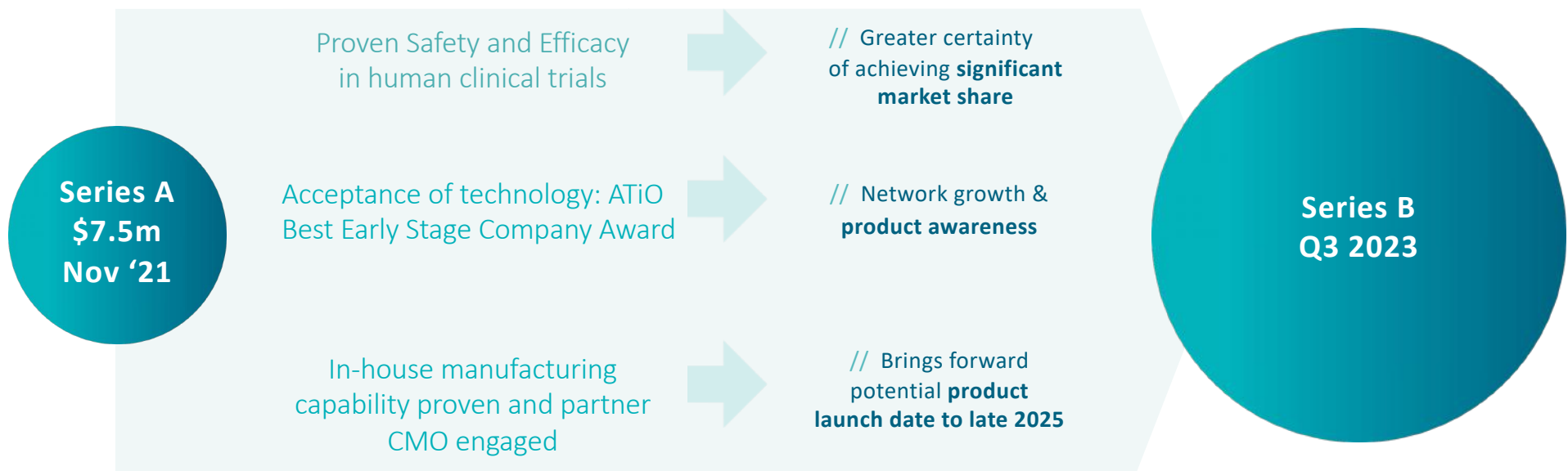
Completion Clinical Efficacy (vs Placebo) Israel  
Q1/2 2024

Series B Financing Round (\$ 25m)  
Q1 2024



*Series B*

## Accelerated timetable and de-risking since Series A

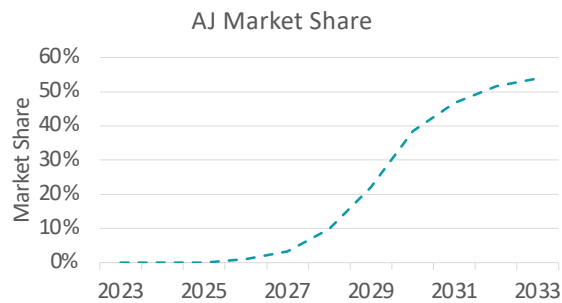


*Series B raise of USD 25m to accelerate market access in Europe.*

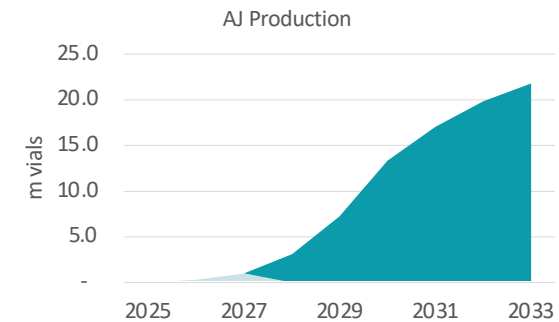
*Unlocking potential beyond Series B*

# Four key milestones to unlock upside valuations

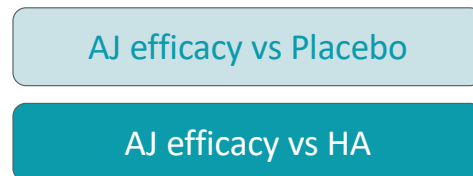
- 1 Sign with a major distribution partner to disrupt and dominate EU market



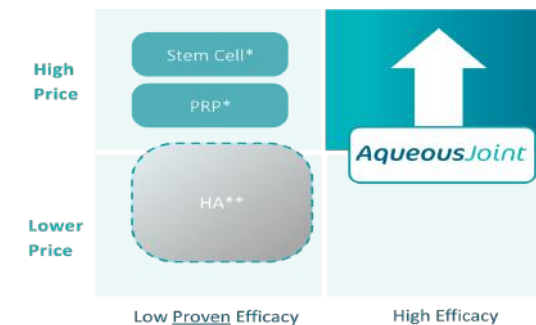
- 2 Plan, construct and operationalize a large manufacturing facility



- 3 Launch AJ across Europe (based on CE approval as a medical device)



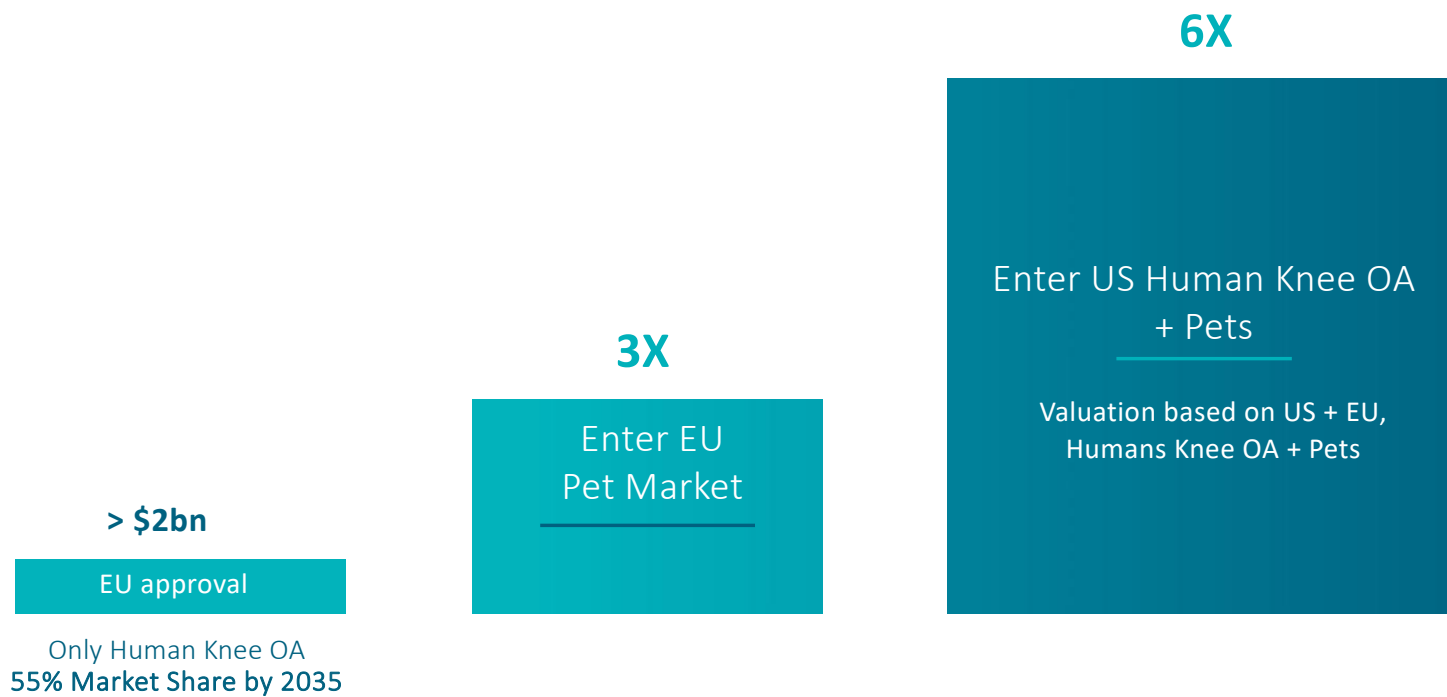
- 4 Achieve a significant price premium in the market (based on efficacy)



*Valuation upside*

# Investor upside from disruption and domination of knee OA market

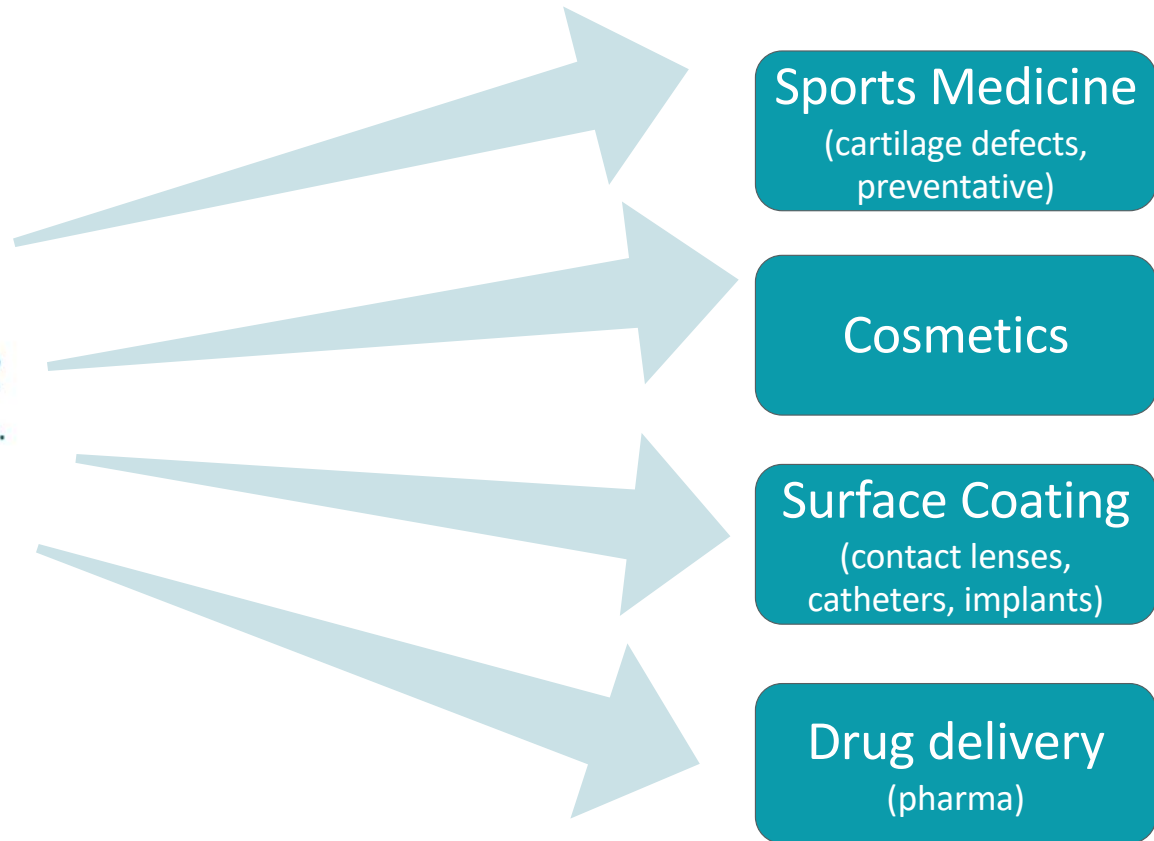
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*Expansion*

Liposphere's technology shows potential in other lucrative markets

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**Liposphere**  
*Revolutionizing biolubrication.*

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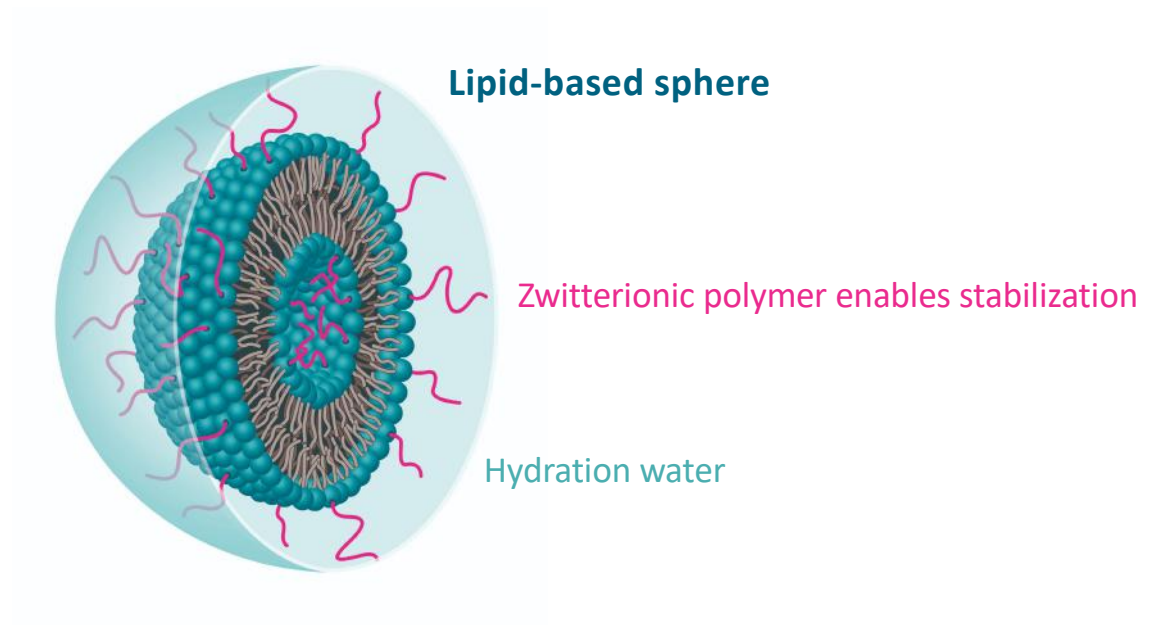


Follow us

AqueousJoint technology

## Liposphere's joint articulation compound

- ✓ Efficient at high-loads
- ✓ Reduces wear and friction
- ✓ Provides superior lubrication
- ✓ anticipated to be classified as medical device



*Formulations hold water in the most efficient way.*

*Water acts as the lubricating element.*