ZERION
IMPROVING DRUG SOLUBILITY

# Dispersome® Technology

Next generation bioavailability enhancement

Better Bioavailability • Better drug loading • Better solubility

# Why does it matter?

**Ease the daily pill burden** → lowering drug dose and/or increasing drug load reduces number and size of tablets improving patients daily life and compliance.

**Enable new and better drugs to the market** → The Dispersome® technology works across all small molecule modalities and can be applied at any stage of drug development including preclinical tox studies, First-in-human, replacement of existing drug formulations that present suboptimal bioavailability and life cycle management (LCM).

**Improving drug safety and administration** → Lowering drug dose may result in fewer side effects. Increasing drug solubility may enable the administration independent of food intake.

**Compatibility with standard manufacturing processes** → Dispersome® formulations can be manufactured at a large-scale using spray drying, the most widely used process for manufacturing amorphous solid dispersions (ASDs). Hence, it can directly be plugged into existing manufacturing lines.

**Environmentally responsible** – using a renewable, natural protein over synthetic polymers → Zerion Pharma is committed to delivering smarter, simpler, and greener drug formulations. By using naturally sourced excipients and reducing dependency on fossil-based polymers, the company aligns pharmaceutical innovation with environmental responsibility.

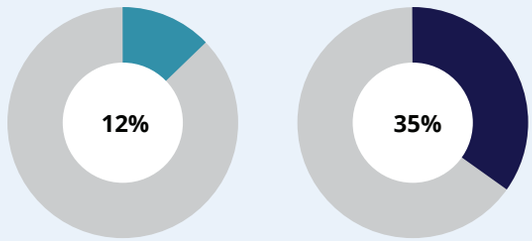
**Patent protection extending beyond 2040** → The Dispersome® technology is protected by several patent families and available for licensing on an exclusive basis within your product scope, securing a unique protection with possible life cycle extension beyond 2040.

## For patients, the environment and your business

## Partner Project Highlights

### Example 1:

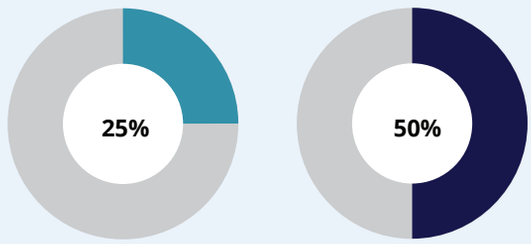
- New chemical entity (NCE)
- **2-fold higher bioavailability (BA) (dog) than best ASD @2.9-fold higher DL**




Best Alternative | **Dispersome®**

### Example 2:

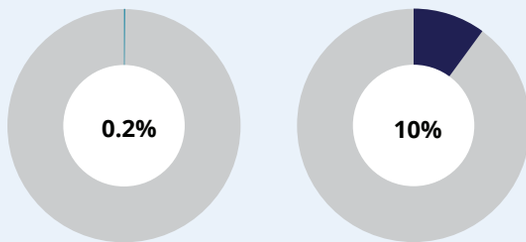
- NCE (Targeted protein degrader)
- **1.7-fold higher BA (rat) than best ASD @2-fold higher DL**




Best Alternative | **Dispersome®**

### Example 3:

- NCE / LCM
- **Bioequivalence (BE) to best alternative (LbDDS) @50-fold higher DL**




Best Alternative | **Dispersome®**

# Dispersome® - Make your drugs soluble

The well-known solubility problem continues to challenge the pharmaceutical industry: no single technology can solve it all. Millions of patients do not receive the most effective oral medications simply because of poor bioavailability, caused by low drug solubility. The issue is fundamental: a drug is not a drug until it is made soluble. When solubility is low, absorption is limited, leading directly to reduced bioavailability and therapeutic impact.

**Dispersome® is a solubility enhancing technology that relies on an innovative and naturally occurring excipient to develop an amorphous formulation with high drug loading (DL) and high bioavailability (BA).**

### Beta-lactoglobulin as pharmaceutical excipient

We use Beta-lactoglobulin (BLG) as a new type of protein excipient for preparing amorphous formulations with superior drug solubility.

### Stable formulations with high drug loading

The use of Dispersome® technology enables drug loadings above 50% w/w while maintaining stability and improving API solubility. At a drug loading of 50%, stable amorphous formulations are obtained for more than 80% of all drugs tested.

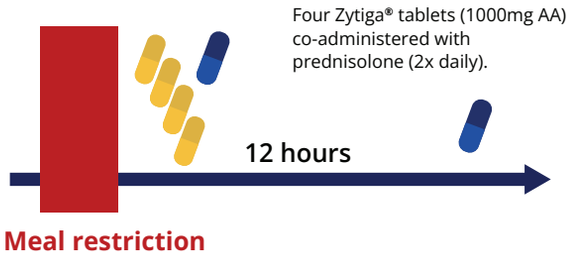
### A safe and manufacturable excipient

We work with world leading suppliers to source and qualify our BLG material, ensuring high quality and large scale. BLG is a natural ingredient used in food and nutrition products and is easy to use in your existing processes.

## Abiraterone Acetate

### Dispersome® ZN002 shows 10x increase in bioavailability in dog studies.

**Current treatment**




Meal restriction

**New treatment**

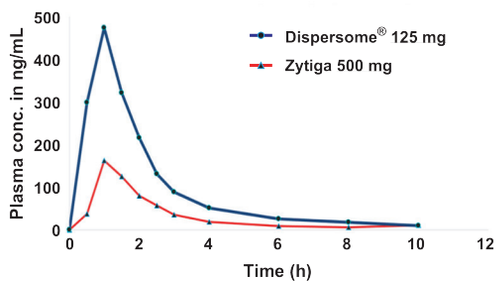

NO Meal restriction

- Zerion compared Zytiga 500mg (Abiraterone Acetate) to its 125mg Dispersome® Abiraterone formulation in a dog study
- The Dispersome® formulation (125mg) delivered 10X higher bioavailability than Zytiga (500mg)
- This translates to a potential reduction **from 4 tablets of 250mg to 1 Dispersome® tablet** (taking into account the scaling effect from dog data to human)

***IN VIVO***

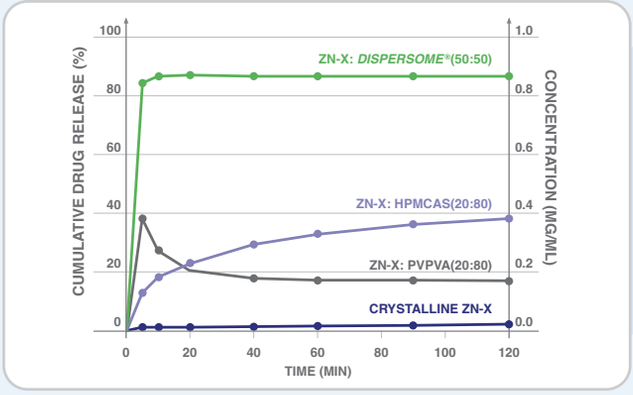
**Protocol**
Oral gavage to male beagle dogs.

**Samples**
One Dispersome® tablet (125mg AA) or two Zytiga® tablets (500mg AA).

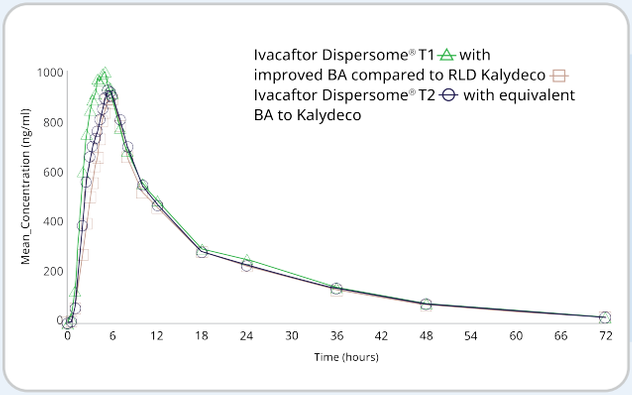


# What sets Dispersome® apart?

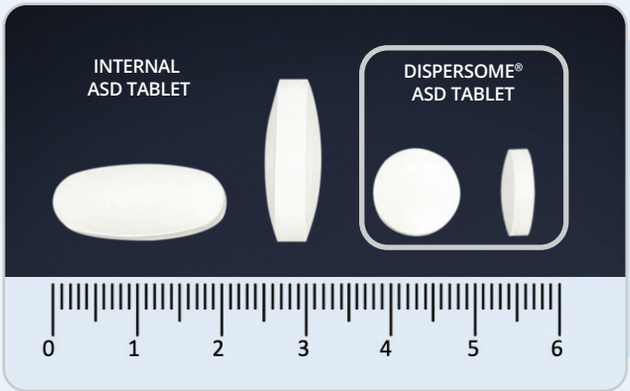
**The Dispersome® technology is proven *in vitro, in vivo* through animal PK studies and clinical studies and experience with >80 different drugs.**




Dispersome® formulation achieves a superior dissolution rate and better solubility compared to other solid dispersions when addressing a poorly soluble drug, ZN-X provided by a Top20 Pharma company.




A first clinical pilot study yielded positive results of a Dispersome® formulation of the drug Ivacaftor.




Increasing drug loading enables reduction in pill size or pill burden. On the left is an example from one of our partner development programs. A high drug loaded Dispersome® resulted in a **significantly decreased tablet size**.

**Overview of relevant physico-chemical properties of native BLG**

| | Molecular weight | pI* | $T_g$ # | Primary structure | Conformational structure |
|---|---|---|---|---|---|
| Properties | 18.3 kDa | 5.2 | 240.4°C | 162 amino acids; 2 disulfide bridges | Globular |

*pI: Isoelectric point
#$T_g$: Glass transition temperature

BLG has a very high Tg compared to other excipients used as amorphous stabilizers. This contributes to the good amorphous stabilization in Dispersomes.

# How does Dispersome® work?

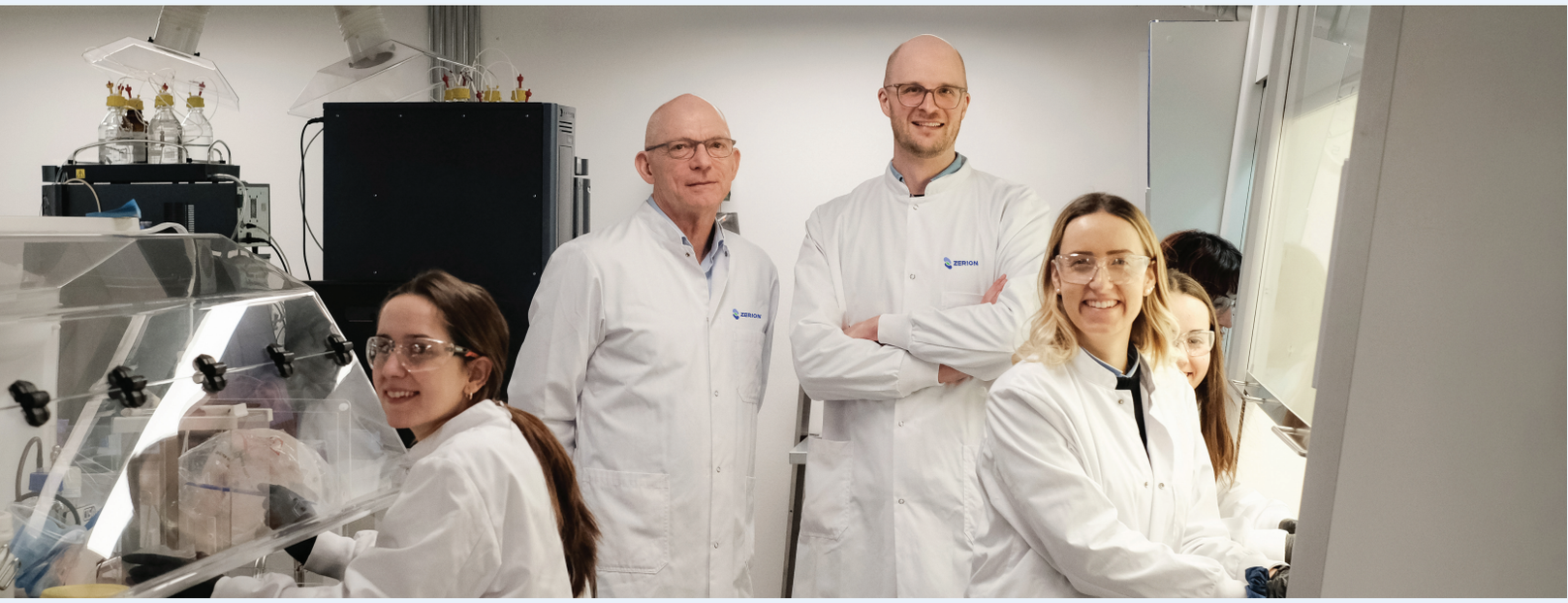
**The Dispersome® technology** is based on the use of Beta-lactoglobulin to create Dispersomes – a unique amorphous composition of small molecule drugs and proteins. The preparation of a Dispersome® formulation is straightforward and easy to integrate in existing industry standard manufacturing processes.

At Zerion Pharma, science is at the core of everything we do. Our proprietary Dispersome® technology is grounded in cutting-edge research and validated through a growing portfolio of peer-reviewed scientific publications.

This strong scientific foundation reinforces the performance, safety, and innovation behind our solutions.

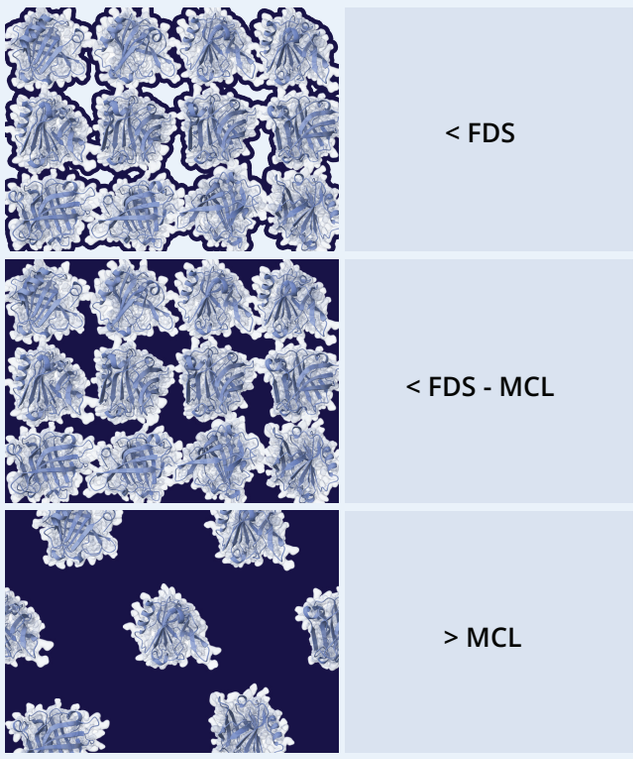
A recent highlight is our 2024 publication in the European Journal of Pharmaceutics and Biopharmaceutics, showcasing the latest advancements in protein-based amorphous solid dispersions:

Zhuo, Jasiukenaite, Löbmann. Eur. J. Pharm. Biopharm. 2024;202:114396. doi.org/10.1016/j.ejpb.2024.114396



Schematic visualization of the amorphous stabilization in BLG-based ASDs depending on the DL as well as the storage condition. BLG is depicted as light blue, whereas the drug is depicted as dark blue. The drug molecules preferably locate themselves on the BLG surface at lower DLs, forming a first drug shell (FDS). At concentrations below the FDS, the drug molecules bind to the BLG surface in the BLG matrix and are very stable even under accelerated humid conditions. The FDS is drug-dependent, and was found to be around 30–40 % for the investigated drugs.

However, the BLG-stabilization effect was not only limited to the FDS, but also efficient to some extent for drug molecules located in the additional layers having no contact to the BLG surface. Above the FDS and below the matrix capacity limit (MCL), the drug fills up the available space in the BLG matrix. The BLG matrix provides a stabilizing effect in dry conditions. Depending on the drug, the stabilization was found effective up to DLs of 80%.




# Zerion Pharma

Zerion Pharma was established in 2019 as a spin-out from the University of Copenhagen based on almost a decade of research. Zerion develops its own proprietary drug formulations and offers its Dispersome® technology platform to established pharma companies as a means **to solve the most challenging drug solubility problems**.

We invite you to test the performance of our Dispersome® technology in a fast and informative feasibility study. We have successfully used this technology on multiple drug molecules from pharma companies.

For more information on Zerion Pharma's Dispersome® technology and partnership opportunities, please visit **https://www.zerion.eu/partnering**

Contact us today to solve your solubility challenges:
info@zerion.eu | www.zerion.eu

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