

*It is not a question of if, but when...*

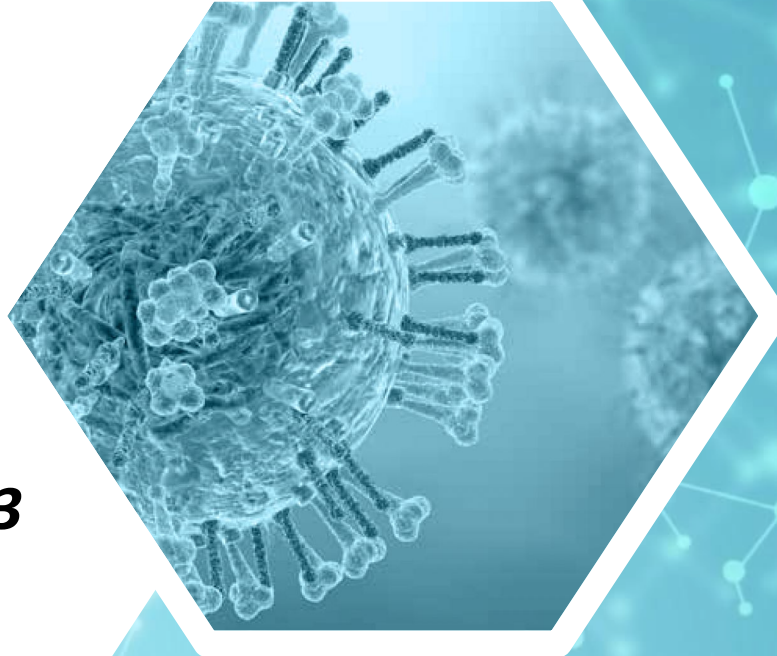


*...the next Influenza-induced epidemic will kill 650.000 people and strike 1 billion patients*



**PHARMAHOLDINGS**

***Investor/partner presentation 2023***



***Pharma Holdings develops innovative antivirals administered through a nasal spray in the treatment of respiratory viral infections (e.g. influenza) in fragile high-risk patients***

# BUILDING ON TWO DECADES OF SCIENCE

Headquarters  
**Tromsø, Norway**

Established  
**2017**

Key indication  
**Influenza in high-risk  
immunocompromised patients**

Product offering  
**Gel and Nasal spray**



## Prominent research environment

Close ties to the Tromsø research environment, a prominent Norwegian research environment



## Spin-off

Pharma Holdings is a spin-off of Lytix Biopharma, a company listed on Euronext Growth



## Topical treatment

A mucoadhesive nasal spray formulation has successfully been developed.



## Development stage

LTX-109 has completed initial trials showing a good safety profile when given topically. Clinical trials in vulnerable high-risk patients with respiratory viral infections are planned

# THE UNMET NEED: LTX-109 TO ADDRESS THE WEAKNESSES OF COMMON ANTIVIRAL APPROACHES AND TREATMENTS

## Most prevalent treatment methods



## Pharma Holdings' solution

### Topical treatment

#### Selected benefits of topical therapeutics

- I Direct virucidal effect as opposed to only viral replication inhibition
- II Less prone to effect deterioration
- III Able to address a variety of viruses
- IV Fewer side effects than systemic drugs

# DEVELOPMENT DRIVEN BY EXPERIENCED TEAM

## Management Team

## Board



**Christian Lütken**  
CEO (FTE)

- Several years of experience from various fields within medicine as a medical doctor
- Previous experience as Head of Department in a private healthcare company
- Experience from DNB's Global Healthcare Team as an industry expert financing global healthcare companies
- Holds a MD from the University of Oslo



**Torsteinn Erlingsson**  
CFO (FTE)

- More than 25 years of experience from Corporate Finance and Business development, where he worked on several biotech transactions
- Instrumental in securing soft-money and equity financing
- Holds a MSc from University of Tromsø



**Johnny I. Ryvoll**  
Vice President Projects (FTE)

- More than 25 years of experience from Corporate Finance, Project Management and Business Development
- Holds a BSc in Electrical Engineering from University of Utah and an MBA from University of Washington



**Bernt Endrerud**  
Chairman

- Active innovator and investor
- Has established and led several successful businesses
- More than 30 years of experience as a business owner and developer



**Lars Vorland**  
Board Member

- Holds a MD and a PhD, where he specialized in molecular biology and medical microbiology
- Previous experience working for the Norwegian Institute of Public Health and Helse Nord RHF



**Xavier Frapaise (MD)**  
Chief Medical Officer

- 40 years experience from Pharma industry – international experience from drug development, from early phase 1 to 3, both EU and US.
- Proven track record in securing funding for start up
- Experience in the space of infectious diseases, among them Covid-19.



**Niklas Hammarstedt**  
Chief Quality Officer (FTE)

- Several years' experience within Quality Assurance in diverse positions
- Chief Quality Officer in Atlas Antibodies
- Former Head of Production Documentation on Octapharma
- Holds a MSc in Chemistry and Pharmaceutical engineering from KTH Royal Institute of Technology



**Edvard Christian Fugset Dahl**  
Chief Business Development Officer (FTE)

- Several years of Sales and Marketing experience within healthcare industry
- Business Development Specialist for Inven2
- Former Director of Business Development I Mentis Cura
- Director of Business Development in Mediq



**Håvard Ebbestad**  
Board Member

- More than 20 years of experience as a chief executive at various pharma companies (incl CEO of Norwegian subsidiary of Pfizer)
- Current position: CEO of Fürst laboratories



**Øyvind K. Arnesen**  
Board Member

- Holds a MD from University of Oslo and has more than 10 years of clinical practice
- Extensive experience from the pharmaceutical industry, including Medical Director at BMS, Boehringer Ingelheim and CEO of Ultimovacs

# DEVELOPMENT SUPPORTED BY EXPERIENCED TEAM

## Advisory Team (Contracted)



**Rene Bommer**  
*Nasal Spray expert*

- >30 years experience from academia and pharma industry
- Ph.D in chemistry
- Published several articles in medical device and packaging journals
- Has regularly been invited as speaker at international drug delivery conferences



**Cecil Nick**  
*Regulatory Strategic Advisor*

- Vice President at Parexel Consulting
- 40 years experience from clinical development and regulatory affairs.
- Particular experience in development of anti-infective medicines including having supported many Covid-19 therapeutic interventions.



**Prof. David Smith (MD)**  
*Scientific Advisor (US)*

- Head of Division of Infectious diseases and public health at UC San Diego
- Awarded 37 mill USD in federal funding as PI
- Advisor to FDA in Covid-19 trials
- Speaker at Nobel Prize symposium 2022 (Covid-19 therapeutic interventions)



**Ass Prof. Martin Hoenigl (MD)**  
*Scientific Advisor (EU)*

- Works at Division of infectious disease at medical university of Graz, Austria.
- Awarded researcher of the year 2011
- Author on 250 publications in the field of infectious diseases.
- Particular experience in conducting research on clinical mycology, virology and respiratory viruses.



**Dr Med Lars Heggelund**  
*Scientific Advisor (Nordics)*

- Specialist in Infectious Diseases in 2018
- Head of Research at Drammen Hospital
- Professor at University of Bergen
- 51 scientific publications

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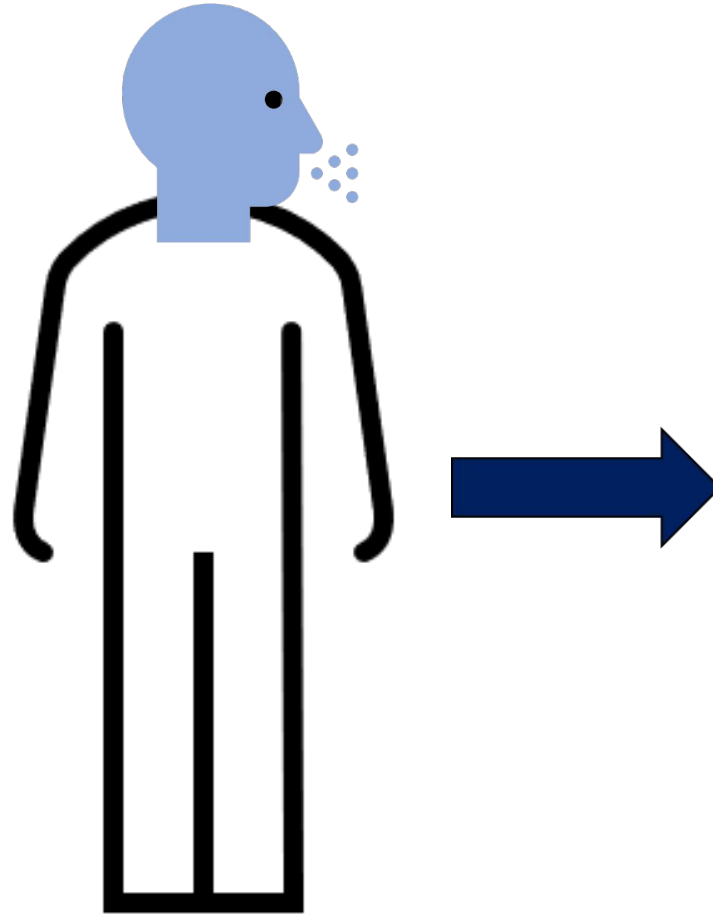
**NORDIC MENTOR NETWORK**  
*for ENTREPRENEURSHIP*

PHARMA HOLDINGS is a member of  
Novo Nordisk mentor program

# HIGH RISK PATIENTS AND UNMET NEED

## Immunocompromized patients

- ✓ High mortality
- ✓ Little/no effect of vaccines
- ✓ Longer hospital stays
- ✓ Prolonged viral shedding
- ✓ Prolonged course of disease
- ✓ Shortcomings of current SoC

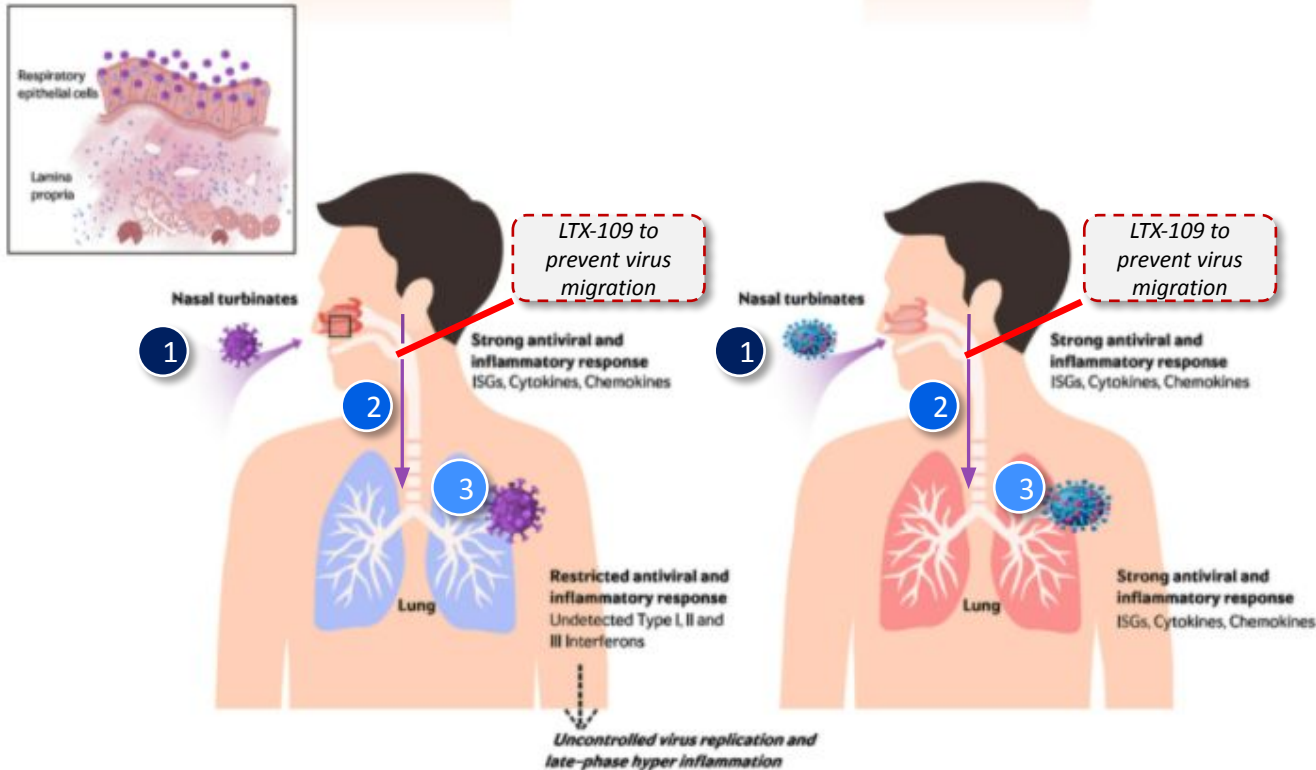


**LTX-109, as a direct virucidal, will demonstrate reduction in mortality rates, length of hospital stay and symptom duration in non-hospitalized early stage immunocompromized influenza patients, as an add-on to standard of care**

# THE NOSE IS THE INITIAL AND MAIN SITE FOR VIRAL REPLICATION

SARS-CoV-2<sup>1</sup>

Influenza<sup>2,3</sup>



1

Virus invade host cells and starts to replicate in nose

LTX-109 to prevent virus migration

2

5-7 days after onset of symptoms the viruses migrate to the lower respiratory tract

3

Progression to pneumonia and more severe disease

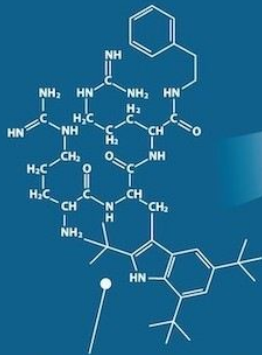
High Influenza viral load titers (nasal and pharyngeal swabs) seem to correlate with worse outcome and increased risk of mortality<sup>4</sup>

Source: 1) 'The central role of the nasal microenvironment in the transmission, modulation, and clinical progression of SARS-CoV-2 infection', Oreste Gallo ET AL. *Nature* 2020 2) 'RS-CoV-2 Reverse Genetics Reveals a Variable Infection Gradient in the Respiratory Tract', Yixuan J. Hou, et al, *The Cell* 2020 3) [www.journals.asm.org/doi/10.1128/JVI.00130-21](http://www.journals.asm.org/doi/10.1128/JVI.00130-21) 4) 3 a) Viral Factors Associated With the High Mortality Related to Human Infections With Clade 2.1 Influenza A/H5N1 Virus in Indonesia Pavestri et al 2020 Clinical infectious disease b) Every 10-fold increase in viral load results in 26% more patient deaths: a correlation analysis, Jiang et al. *Int J Clin Exp Med* 2019. c) Influence of viral load in the outcome of hospitalized patients with influenza virus infection, Lalueza et al.



# LTX-109 IN ACTION

**1** The peptide LTX-109 attaches to the cell membrane.



The chemical structure of the Peptide LTX-109 molecule

Peptide

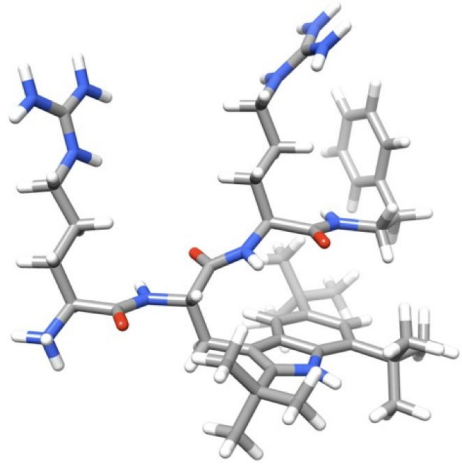
Bacterial cell



**2** The bacterial cell ruptures and dies. This effect is very fast. The cell has no time to defend itself and build up resistance.

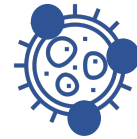
**3** Traditional antibiotics act from inside the bacterial cell. This works less well because the cell then has more time to build up resistance.

# MAIN FEATURES OF LTX-109



## LTX-109

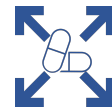
A patented cationic synthetic peptide based on lactoferrin, a protein found in cow and human milk, targeting both bacterial and viral diseases



**Rapid membrane lysing** mechanism of action



**Low propensity** for resistance development



**Broad spectrum** of antiviral and antibacterial activity



**Safe and well tolerated**

# PROMISING IN VITRO RESULTS AGAINST RESPIRATORY VIRUSES

## Enveloped viruses:

Virus	1% LTX-109 tested against RSV, IVA and SARS-CoV-2 (1 hour incubation)	
	Log decrease	Percentage

RSV	3.25	99.949
Influenza A	3.42	99.969
SARS-CoV-2	4.33	99.995

Virus	3% LTX-109 tested against RSV, IVA and SARS-CoV-2 (60 sec incubation)	
	Log decrease	Percentage

RSV	2.92	99.88
Influenza A	1.42	96.19
SARS-CoV-2	2.27	99.50

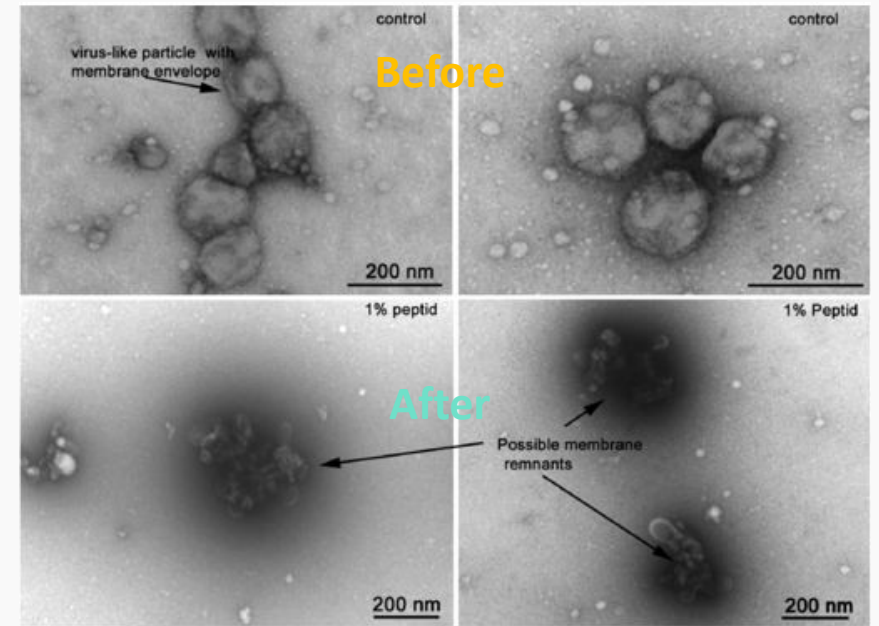


Figure 1: The image shows Lenti-virus-like particles with intact envelope (control) and dissolved envelope (1% LTX-109)

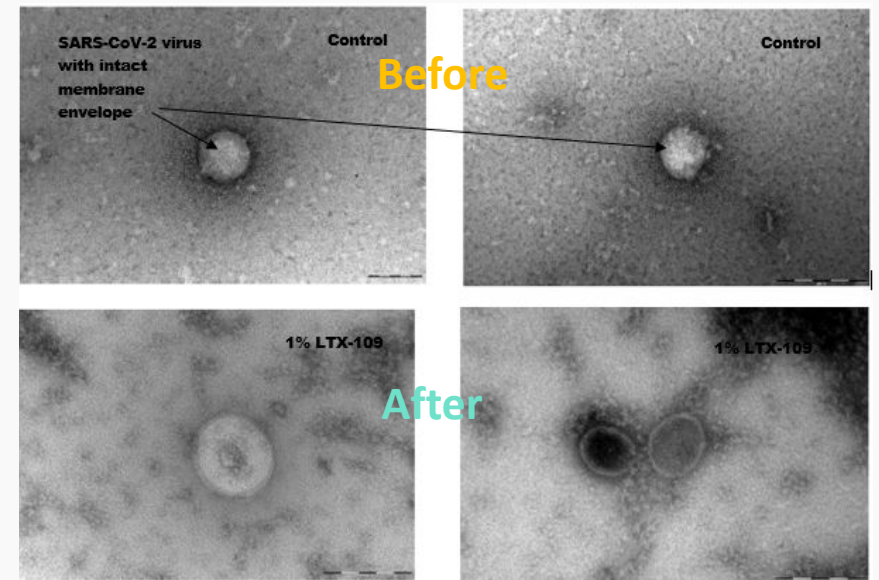
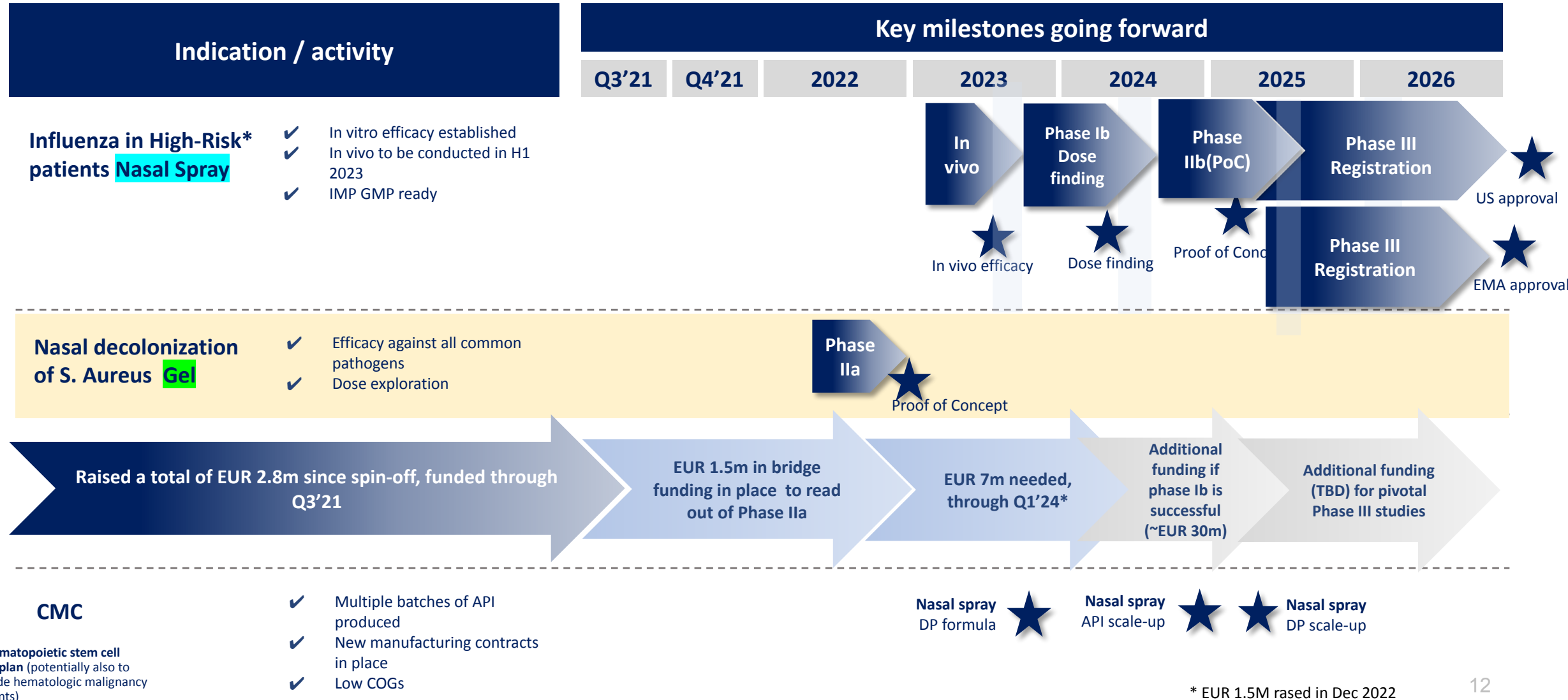


Figure 2: The loss of morphological integrity of the virus post-treatment with LTX-109, note the capsid of the virion without envelop

# DEVELOPMENT STAGE AND MAJOR MILESTONES



\* EUR 1.5M raised in Dec 2022

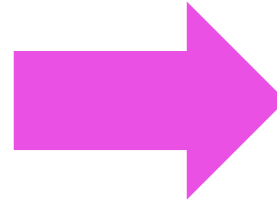
# MARKET EXTENSION POTENTIAL

## Primary market Influenza high risk US/EU:

*Infection rate: 1:8 (~5m)*

*Immunocompromised patients: ~40m*

*Tentative pricing: ~200 USD/treatment\*\*\**



## Primary market revenues:

*Market size: 1B USD*

*COGS per treatment\*: 10EUR*

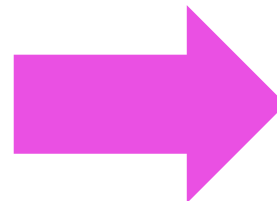
*Pharma Holdings' revenue per treatment: 40EUR*

***Potential revenues: 200M USD***



## MARKET EXTENSION:

- Other high-risk patients (elderly, COPD, heart failure etc)
- Other relevant respiratory viruses: SARS-CoV-2, RSV etc



## Market extension revenues:

*Market size: XX BUSD*

*COGS per treatment\*: 10EUR*

*Pharma Holdings' revenue per treatment: 40EUR*

***Potential revenues: Multibillion USD***

**GLOBAL SALES TAMIFLU+XOFLUZA 2022: 400M USD, EXPECTED GLOBAL SALES 2027: 650M USD\*\***

# EXECUTIVE SUMMARY

## *Our need towards success:*

- ❑ ***Funding of EUR 7m to secure runway through Phase Ib***
- ❑ ***Funding of EUR 30-35m to secure runway through Phase IIb PoC***
- ❑ ***Commercial partners to accelerate clinical development and secure market access***



### **Market and medical unmet need**

Urgent need to develop new antivirals – address a huge unmet medical need



### **Evidence**

Preclinical studies have provided a strong signal of antiviral activity. Nasal spray administration limits toxicity, side effects and drug – drug interactions



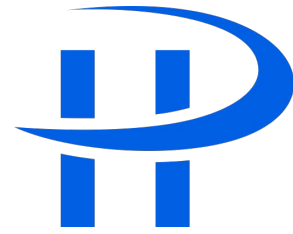
### **Influenza as proof-of-concept**

Study to be initiated H1 2023 in ferrets will provide info required by regulators and IRBs, and will guide dose-regimen selection for the first human studies to be initiated H2 2023



### **Development towards market approval**

The clinical development will be based on early signs of efficacy in FIH Phase Ib (H2 2023), then seamless transition through adaptive study design in the planned for Phase IIb/III



**PHARMAHOLDINGS**

*THANK YOU FOR YOUR ATTENTION*

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