MATINAS BIOPHARMA

Corporate Presentation

February 2024

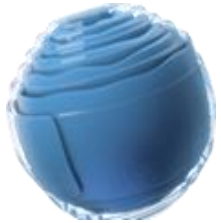
www.matinasbiopharma.com
NYSE American: MTNB

Forward Looking Statements

This presentation contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, including those relating to the Company's product development, clinical and regulatory timelines, market opportunity, cash flow and other statements that are predictive in nature, that depend upon or refer to future events or conditions. All statements other than statements of historical fact are statements that could be forward-looking statements. Forward-looking statements include words such as "expects," "anticipates," "intends," "plans," "could," "believes," "estimates" and similar expressions. These statements involve known and unknown risks, uncertainties and other factors which may cause actual results to be materially different from any future results expressed or implied by the forward-looking statements. Forward-looking statements are subject to a number of risks and uncertainties, including, but not limited to, our ability to obtain additional capital to meet our liquidity needs on acceptable terms, or at all, including the additional capital which will be necessary to complete the clinical trials of our product candidates; our ability to successfully complete research and further development and commercialization of our product candidates; the uncertainties inherent in clinical testing; the timing, cost and uncertainty of obtaining regulatory approvals; our ability to protect the Company's intellectual property; the loss of any executive officers or key personnel or consultants; competition; changes in the regulatory landscape or the imposition of regulations that affect the Company's products; and the other factors listed under "Risk Factors" in our filings with the SEC, including Forms 10-K, 10-Q and 8-K. Investors are cautioned not to place undue reliance on such forward-looking statements. Except as may be required by law, the Company does not undertake any obligation to release publicly any revisions to such forward-looking statements to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events. Matinas BioPharma's product candidates are all in a development stage and are not available for sale or use.

Matinas Investment Thesis: LNC Delivery Unlocks Therapeutic Value

Lipid Nanocrystals (LNCs)



- Intracellular delivery
- Oral administration
- Less toxicity
- Targeting beyond the liver

MAT2203

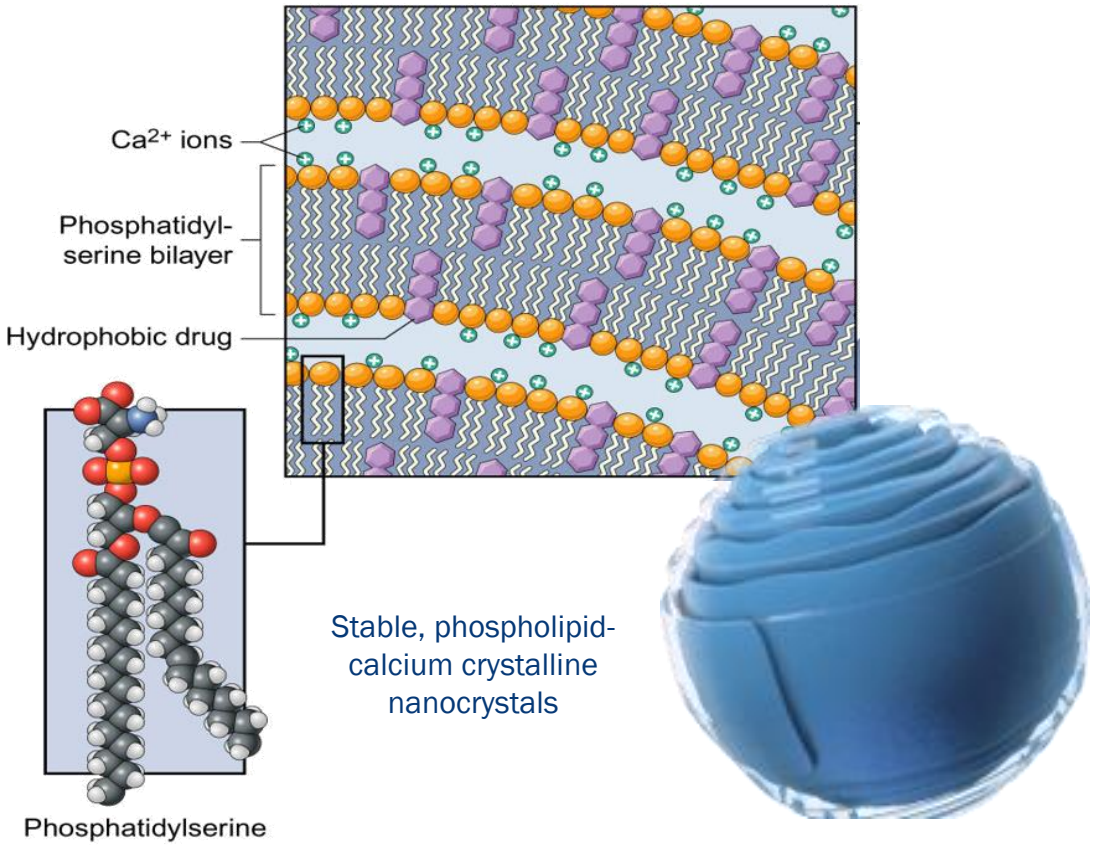
Clinical Validation of LNC Capabilities

- Oral Amphotericin B - without nephrotoxicity
- Phase 3–ready (Invasive Aspergillosis in ~216 patients with limited or no treatment options)
- Provides effective longer-term fungicidal stepdown therapy for Invasive Fungal Infections
- 12 years of exclusivity* *QIDP and Orphan designations

Pipeline Products and Opportunities

- Current efforts expanding LNC application beyond small molecules to include delivery of smaller oligonucleotides (ASOs, siRNA, RNAi)
- Expanding primary therapeutic applications from infectious disease (antifungal, antibiotic, antiviral) to ***inflammation*** and ***cancer***

Lipid Nanocrystals (LNCs): A Clinically Validated Intracellular Delivery Platform



Delivery of small molecules and small oligonucleotides

- Successful delivery of small molecules, proteins, small oligonucleotides (siRNA, ASOs), and vaccines

Extra-hepatic targeting

- Selective uptake driven by phosphatidylserine enables delivery in infection, inflammation, oncology
- Validated Blood-Brain-Barrier penetration (MAT2203)

Oral delivery

- Unique structure protects cargo in GI tract, avoids first-pass hepatic metabolism

Safe & stable

- Deliver high-target tissue concentrations of drug with low plasma levels and no absorption by non-target tissues
- No evidence of immunogenicity or cytotoxicity

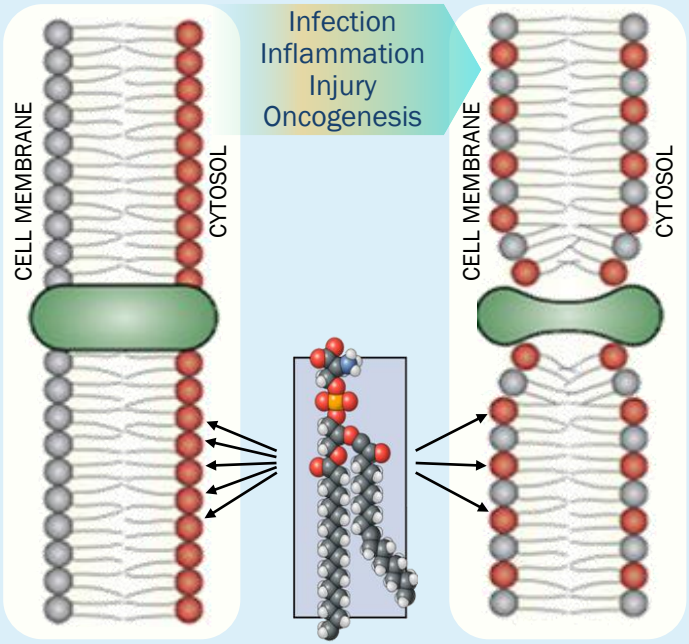
Phosphatidylserine Enables Cellular Targeting and Intracellular Delivery

Targeting

Stressed Cells Externalize PS

Normally, PS is confined to the inner layer (facing cytosol)

With injury, PS moves from the inner layer to the outer layer of the cell membrane



PHOSPHATIDYLSERINE (PS)

Delivery

With a wide variety of potential target cells

PS-containing LNCs deliver their cargo to the interior of cells by both phagocytosis and fusion

PROFESSIONAL PHAGOCYTES

- Macrophages/monocytes
- Neutrophils
- Dendritic cells

NON-PROFESSIONAL PHAGOCYTES

- Fibroblasts, epithelial cells, endothelial cells

INJURED/STRESSED CELLS

- Infection
- Inflammation
- Other physiologic stressors

TUMOR CELLS

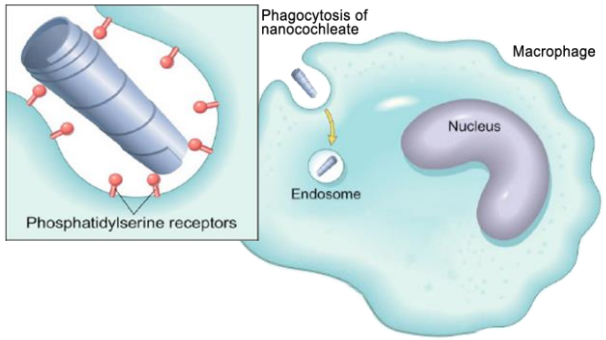
IMMUNE CELLS

- T-cells

OTHER ACTIVELY DIVIDING CELLS (including extracellular pathogens)

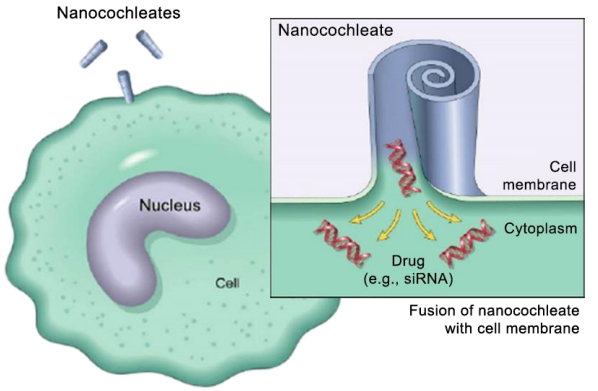
PHAGOCYTOSIS

PS on the outer layer of injured cells is an “eat-me” signal enabling recognition and uptake by professional phagocytes. Cargo-carrying LNCs can be taken up in a similar fashion, with subsequent endosomal escape of cargo.



FUSION

PS on the outer cell membrane is also a precursor for direct membrane-to-membrane fusion and more rapid direct cytosolic delivery by cargo-carrying LNCs to cells expressing PS on their outer membranes.



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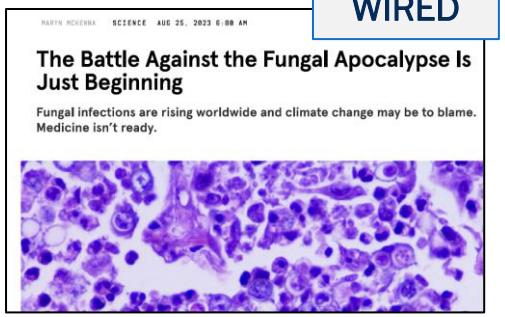
MAT2203
Oral Amphotericin B

Clinical Validation of LNC Delivery

The Growing Threat of Invasive Fungal Infections (IFIs)

WIRED



Nature Reviews Microbiology **2022**

New York Times

Wall Street Journal

WHO fungal priority pathogens list to guide research, development and public health action

World Health Organization

Scientific American

Wall Street Journal

NBC Nightly News

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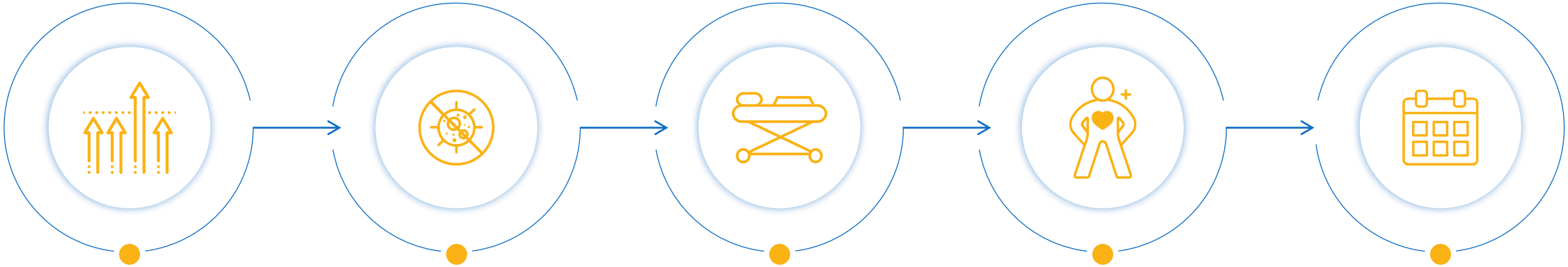
MAT2203: Unlocking the Full Potential of Amphotericin B

Innate Amphotericin B Characteristics		IV Amphotericin B Limitations	=	Unlocked Potential
✓	**POTENT –** broad-spectrum fungicidal	✗ Only available through IV administration		✓ Available systemically and orally (crosses BBB following oral administration)
✓	Minimal drug-drug interactions	✗ Significant toxicity and side effects		✓ Well-tolerated and safe
✓	Low propensity for resistance	✗ High systemic exposure distributed throughout the body		✓ Delivered directly into infected tissues
✓	Active against susceptible and emerging drug-resistant fungal infections	✗ Must be administered in hospital, increasing costs		✓ Cost-effective with potential for significant health economic benefits

MAT2203 is a promising potential therapeutic option
for the treatment of MULTIPLE serious and life-threatening fungal infections

EnACT: Phase 2 Clinical Validation of Safety and Efficacy

EnACT Clinical Data in Cryptococcal Meningitis Validates the Use of the LNC Platform to Enable Oral Administration and Overcome Toxicity



Exceeded the primary endpoint threshold

- EFA for MAT2203 was 0.42 (95% CI 0.29 to 0.55)

(primary endpoint threshold was 0.20)

All patients completing induction achieved CSF sterility

- 97% for patients receiving MAT2203
- 76% for patients receiving SOC

No breakthrough Infections

- Over 10 weeks, patients showed no breakthrough infections post-MAT2203 treatment

Survival at Day 30

- 98% for patients receiving MAT2203
- 88% for patients receiving IV AMPB (SOC)

MAT2203 was safe and well-tolerated over 6 weeks of treatment

- Repeat dosing showed no renal toxicity or electrolyte abnormalities
- No discontinuations due to AEs nor MAT2203-related SAEs

Results of EnACT Published in Highly-Regarded Peer-Reviewed Journal

Clinical Infectious Diseases

MAJOR ARTICLE

Oral Lipid Nanocrystal Amphotericin B for Cryptococcal Meningitis: A Randomized Clinical Trial

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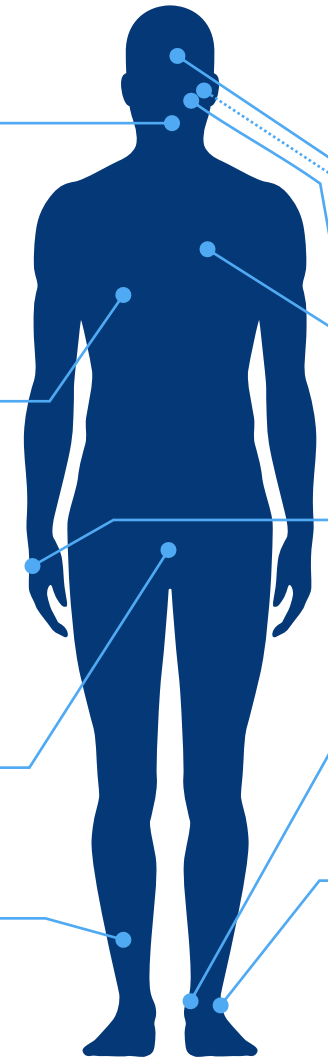
MAT2203 Expanded Access Program – Targeted Treatment of IFIs Throughout the Body



Sinus

Mucor nidicola
Pansinusitis (head)

Lung

Aspergillus calidoustus
Pulmonary aspergillosis

Fusarium
Pneumonia

Rhizopus microsporus, Aspergillus fumigatus
Deep tissue infection

Mucor and Aspergillus species
Pneumonia

Rhizopus oryzea (2 Cases)
Pulmonary mucormycosis

Bladder & Colon

Candida glabrata
Retroperitoneal abscess

Candida krusei
Chronic hemorrhagic cystitis

Skin graft

Fusarium falciforme
Wound infection

Brain

Coccidioidomycosis **(2 Cases)**
Meningitis

Cryptococcosis
Meningitis

Histoplasma
Meningitis

Fusarium solani
Meningitis

Aspergillus fumigataffinis
Brain abscess

Skin

Prototheca wickerhamii
Sporotrichoid Lymphocutaneous

Fusarium
Deep tissue infection

Rhizopus arrhizus
Cellulitis

Aspergillus fumigatus
Breast abscess

Bone

Rhodotorula mucilangionsa
Osteomyelitis

Rhizopus arrhizus mucormycosis
Osteomyelitis - FACE

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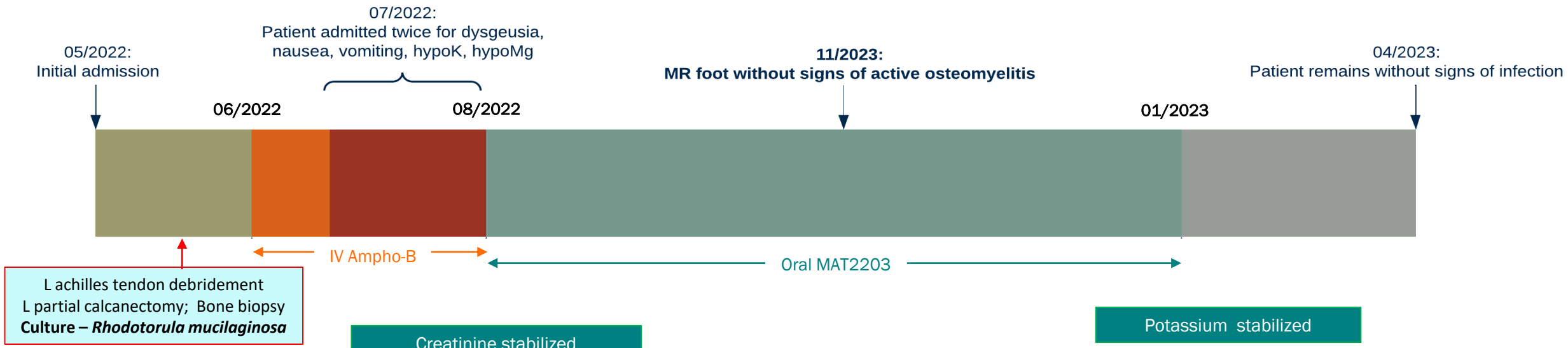
MAT2203 Expanded Access/Compassionate Use Program

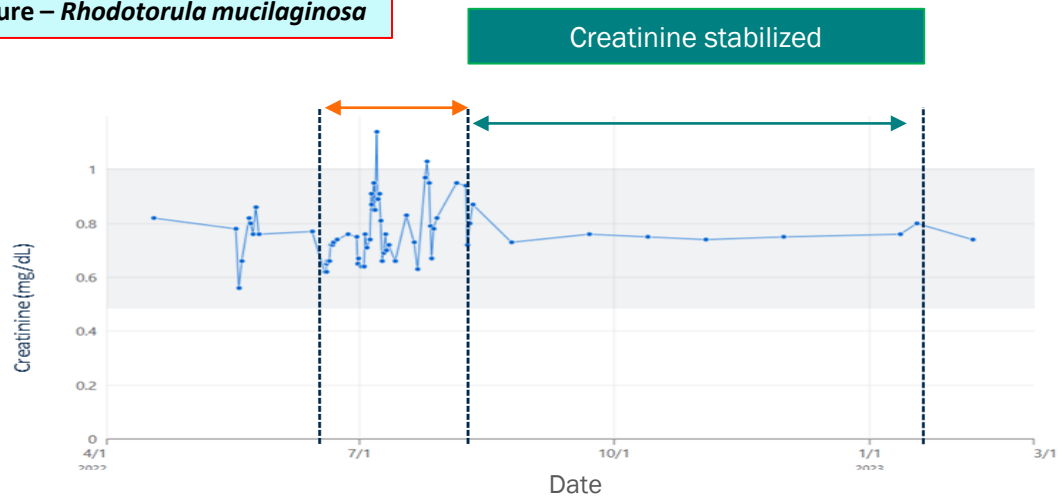
Demonstrated Efficacy in Treatment of Patients with Limited Treatment Options

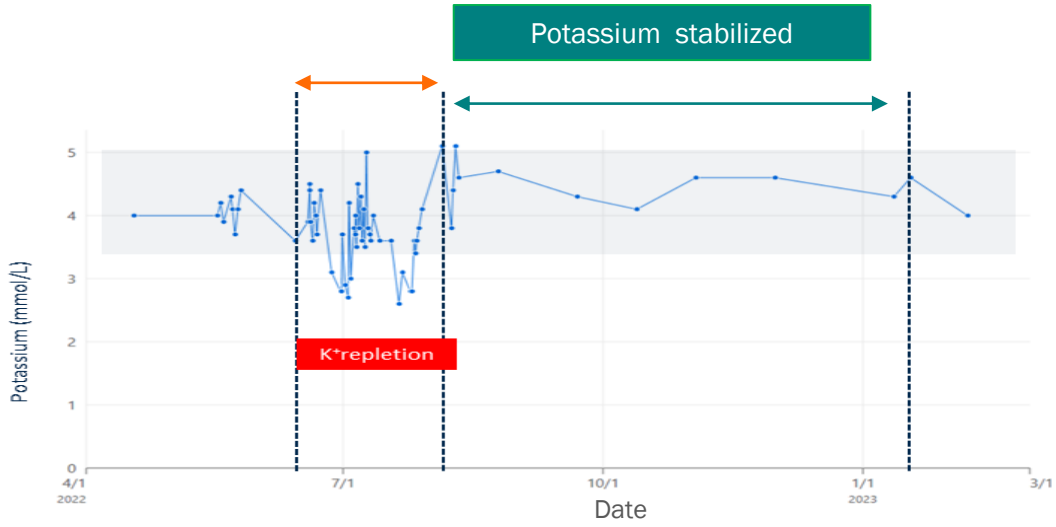
- 19 patients with no other treatment options have enrolled to receive or have completed treatment with MAT2203
  - Notable Healthcare Institutions: NIH, University of Michigan, Johns Hopkins, City of Hope, Nationwide Children's Hospital, Vanderbilt University Medical Center, Memorial Sloan Kettering, University of California at San Diego School of Medicine, Children's Hospital of Philadelphia
- Patients were not responding/resistant to, or unable to receive, azole therapy
- Patients were switched to treatment with IV Amphotericin B with clinical response but unable to tolerate treatment due renal toxicity
  - All patients hospitalized to monitor/manage renal safety and most received IV electrolyte supplementation
- Following oral MAT2203 initiation, patients were discharged to continue treatment at home
- Renal toxicity reversed and renal function returned to baseline after switching to MAT2203
- All patients who received at least two weeks or more of treatment had positive clinical outcomes with significant success stories of full recovery in majority of patients

Compassionate Use - *Recovery from IV Amphotericin B Kidney Toxicity with MAT2203*

A 38 y/o female with systemic lupus erythematosus on chronic hydroxychloroquine and prednisone presented with a progressively enlarging wound on her left foot.







High Unmet Medical Need in Treatment of Invasive Aspergillosis (IA)

- Invasive aspergillosis (IA) is a serious and life-threatening invasive fungal infection that occurs primarily in severely immunocompromised patients with hematological malignancies and transplant recipients
  - ~15,000 new cases per year in the U.S. alone
  - WHO, CDC, and FDA consider IA a ***critical priority*** and a global public health concern
- IDSA Guidelines recommend treatment with mold-active azoles as first-line treatment for 6-12 weeks
  - Azole use requires significant expertise to manage toxicities and significant drug-drug interactions that often limits duration of use
  - Resistance to azoles has been increasing globally
  - Recently, cases of breakthrough IA have been reported in patients receiving antifungal prophylaxis
    - Failures attributed to non-compliance, poor absorption, DDIs, or infection with a drug-resistant Aspergillus species
- Patients suffering from IA with little or no treatment options among the highest unmet medical need with approximately 3,000-5,000 cases per year (U.S. only)
  - Rare disease/orphan commercial opportunity

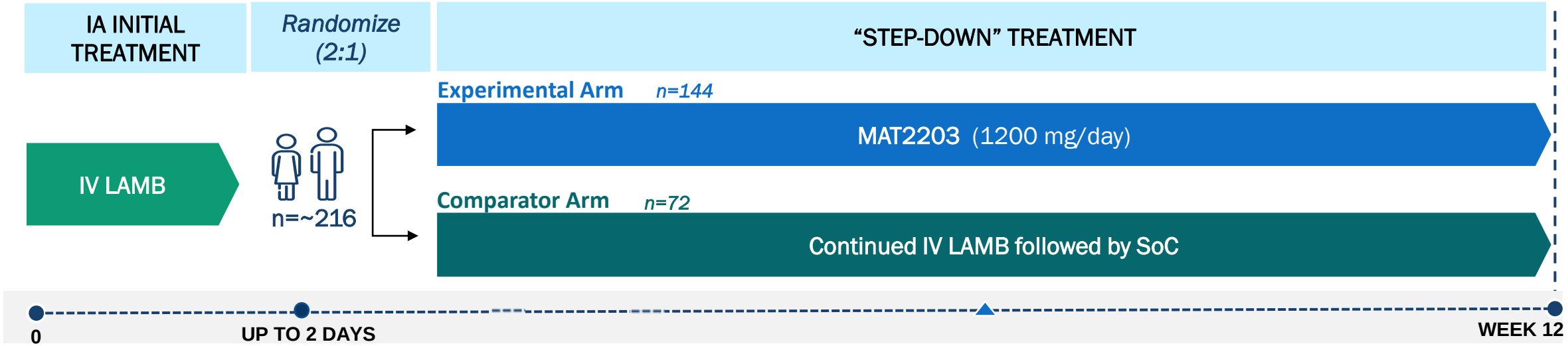
** Phase 3 trial dependent on securing partnership(s) or non-dilutive government funds*

MAT2203 Regulatory and Development Strategy

- Near-term development strategy refined to narrow initial target indication: treatment of invasive aspergillosis in patients with limited treatment options (azole-intolerant, azole-resistant, or not effectively managed with an azole)
  - Potential registration through leveraging LPAD pathway
  - Other regulatory designations protected and maintained (QIDP, ODD, Fast-Track, potential for Breakthrough Therapy)
- In February 2024, reached agreement with FDA on a single Phase 3 Registration Trial in support of an NDA for the treatment of invasive aspergillosis in patients with limited treatment options (the "ORALTO" Trial)
- Preparations underway with global CRO in preparation for Phase 3 study implementation
- Development and commercial partnership discussions remain ongoing

FDA-Agreed Phase 3 Study Design in Invasive Aspergillosis (IA) (the "ORALTO" Trial)

- To demonstrate that initial treatment with IV LAMB followed by step-down to oral MAT2203 is comparable to (noninferior) SoC treatment in adult patients with Invasive Aspergillosis (IA) who are unable to receive treatment with a mold-active azole and have limited alternative treatment options
- Patients will be randomized 2:1 to receive either oral MAT2203 (Experimental Arm) or continued IV LAMB followed by Standard of Care (Comparator Arm)



Treatment of IA in patients with LIMITED TREATMENT OPTIONS
- Fungal pathogen not susceptible to azoles
- Risk for toxicity or drug-drug interactions with azoles
- Other clinical contraindications for azole use

PRIMARY ENDPOINT
- All-Cause Mortality at Study Day 42

SECONDARY ENDPOINTS
- Global response to treatment
- All-cause mortality at 84 days
- Safety and tolerability
- Pharmacoeconomic impact

KEY SECONDARY SUPERIORITY SAFETY ENDPOINT
- Treatment discontinuation or dose adjustment due to treatment-related toxicity
  - Renal toxicity: serum creatinine >1.5X baseline
  - Hypokalemia: serum K^+ < 3.0 mmol/L or requiring K^+ supplementation
  - Infusion-related reaction
  - Hepatic toxicity
  - Clinically significant azole DDI requiring medical intervention
  - Severe GI intolerance requiring medical intervention
  - Other toxicity that resulted in discontinuation and/or change in dose

MAT2203 Value Proposition

AMPHOTERICIN B + ORAL ADMINISTRATION + LACK OF NEPHROTOXICITY = Safe, long-term oral step-down Tx with a potent fungicidal agent

LIFE CYCLE MANAGEMENT

Phase 2
Cryptococcal Meningitis
(Proof of Concept)

Phase 3
Invasive Aspergillosis
Oral step-down therapy
(Limited- or no-treatment Option Patients)

LCM
- Treatment of Other IFIs
- Prophylaxis

VALUE

Near-Term Development Strategy:
Focused strategy on Phase 3 registration trial in Invasive Aspergillosis in patients with limited or no treatment options under the Limited Population Pathway for Antifungal Drugs (LPAD)*

* NDA review issue

LNCs Beyond MAT2203

Efficient and Safe Delivery of Small Oligos

LNC Therapeutic Cargo Experience to Date

Infection

Inflammation

Oncology

In Vivo Animal Studies

Animal model	Cargo
Cystic fibrosis mouse model	Amikacin
BALB/c mouse flu model	ASO
	Flu protein
	siRNA
[Multiple mouse fungal models]	Amphotericin- B
Pneumocystis mouse model	Atovaquone
Mouse SARS-CoV-2 model	Remdesivir
Rat footpad inflammation model	NSAID
GvHD mouse model	ST1959
LPS mouse model	RNAi
Psoriasis (IMQ) mouse model*	RNAi
DSS colitis mouse model*	RNAi
Lymphocytic leukemia mouse model	ASO
Syngeneic mouse melanoma model*	Docetaxel

Human Clinical Trials

Indication	Cargo
Mucocutaneous candidiasis Job's syndrome, NIH	Amphotericin - B
Vulvovaginal Candidiasis (VVC) Phase 2	Amphotericin - B
HIV / cryptococcal meningitis, Phase 2	Amphotericin - B

* new

* new

* new

Unlocking the Full Potential of the LNC Platform

Matinas is working internally and with third parties to broaden its pipeline of LNC-based therapeutics

PROVEN

Oral Formulations of Anti-Infectives

- MAT2203
- Remdesivir
- MAT2501

Oral Formulations of Chemotherapeutics

- Docetaxel

UNDER EVALUATION

Intracellular Delivery of Nucleic Acids

- siRNA
- ASO

FUTURE

Potential Therapeutic Applications

INFECTION

- Anti-infectives
- Antivirals

*INFLAMMATION

- Autoimmune diseases
- Neuro-inflammatory diseases
- Acute/chronic Inflammatory diseases

*ONCOLOGY

- Hematologic & solid tumor malignancies

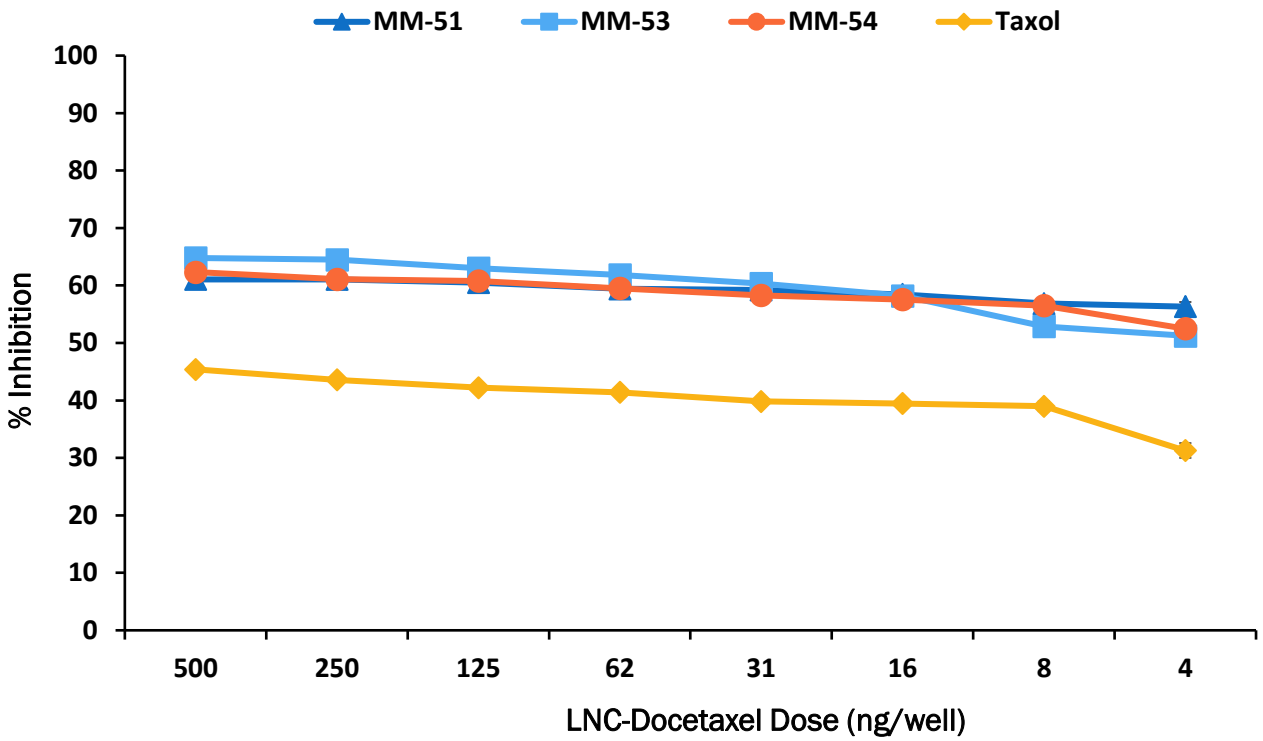
* Key Areas of Focus for Internal LNC Oral Small Oligonucleotides

In vitro Tumor Cell Inhibition with LNC Docetaxel Formulations

RATIONALE AND NEXT STEPS

- LNC Docetaxel program also provides insight into tumor uptake of LNCs
  - Foundation for subsequent small oligo work
- *In vitro* results demonstrate strong LNC efficacy in inhibiting tumor cell growth
- *In vivo* studies planned in multiple tumor models

3 LNC Formulations Demonstrated Significantly Better Tumor Cell Inhibition Than Unformulated Drug



MCF7 breast cancer cells

In vivo Therapeutic Efficacy of Oral Docetaxel LNCs in a Murine Syngeneic Melanoma Model

Female C57BL/6 mice

(n = 40)

10^6 B16F10 tumor cells

Injection

Tumor growth

5 days

Day 5

Begin Rx

4 Groups

Untreated control (with tumors)

Docetaxel 0.15 mg/mouse iv on day 5 and day 10

Oral LNC-docetaxel - high dose – 0.5 mg/day 5-13

Oral LNC-docetaxel - low dose – 0.17 mg/day 5-13

Tumor volume (caliper)

Treatment

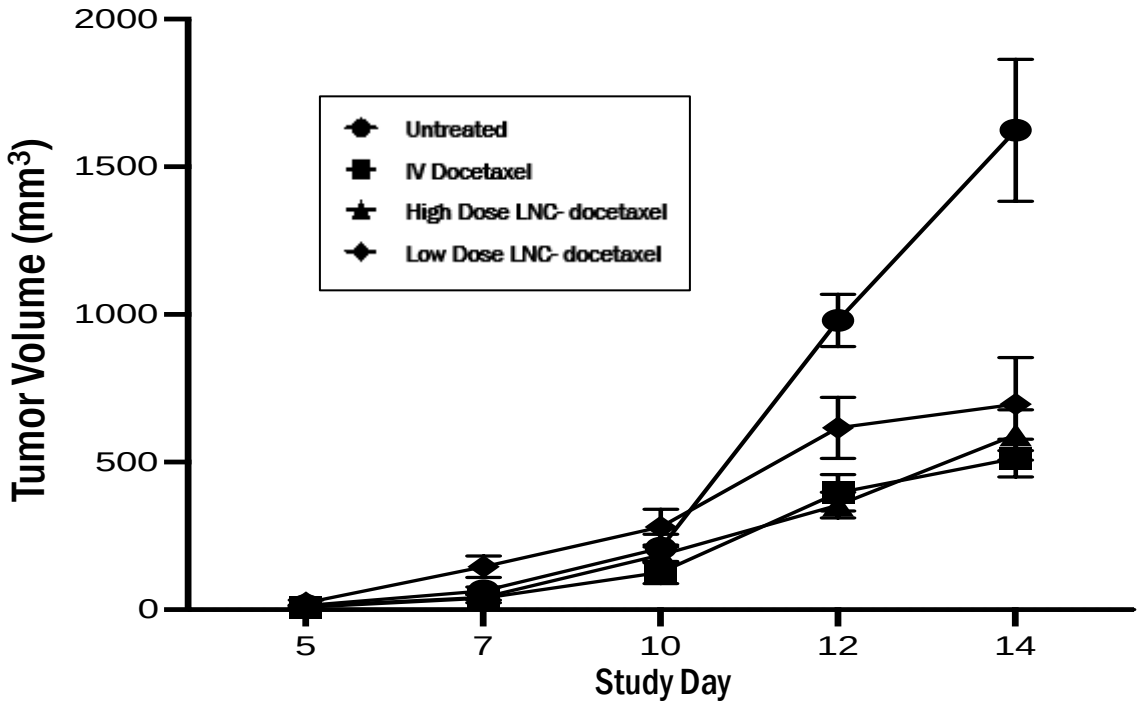
(9 Days)

Day 14

Sacrifice

Tumor weight

Hematology panel



Reductions in tumor volume and tumor weight comparable to that seen with IV docetaxel

No significant effect of daily oral docetaxel treatment on body weight or hematologic parameters

Next Steps

Further evaluation of safety vs IV Docetaxel

Screening of multiple tumor cells lines for LNC uptake

Evaluation in other tumor models

Other potential chemotherapies

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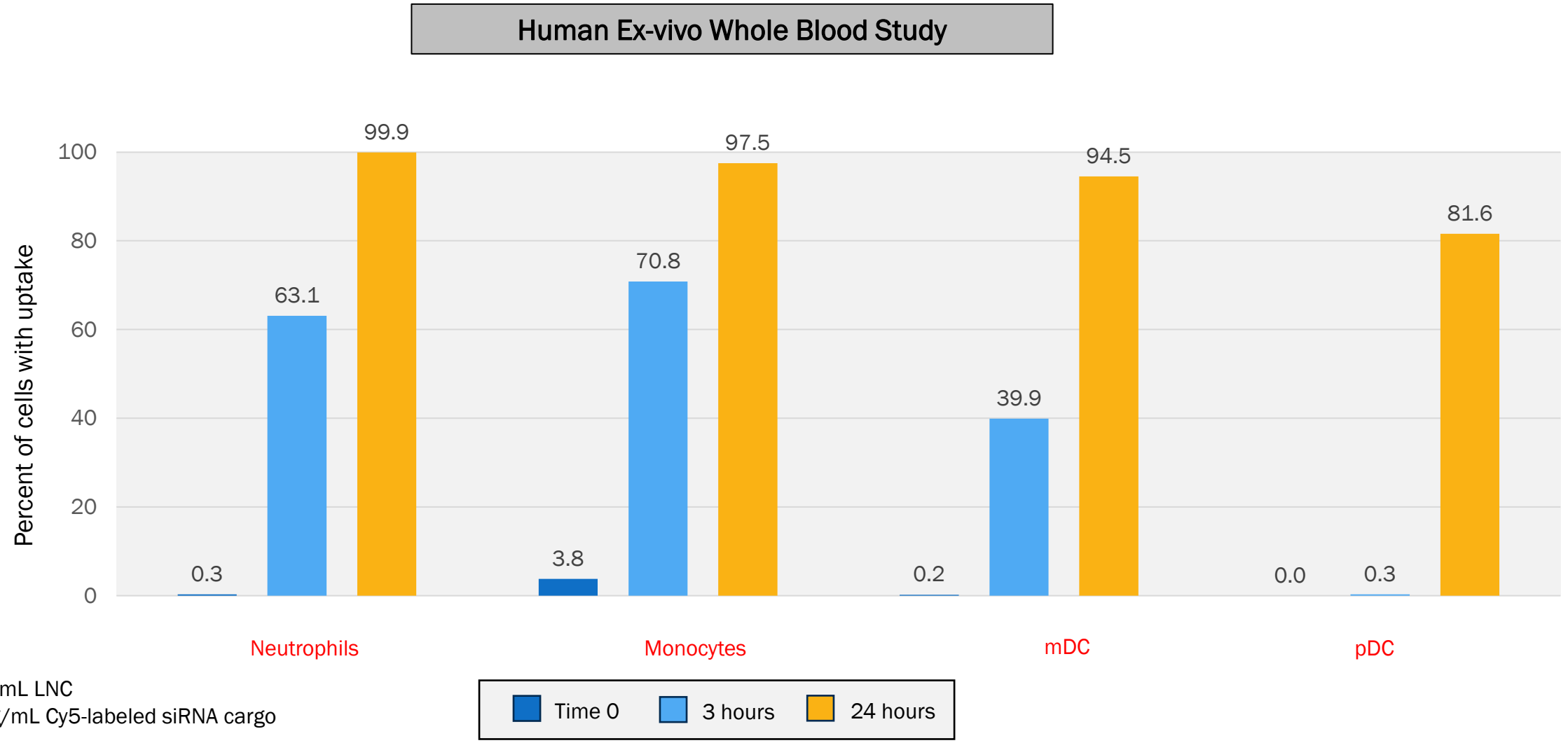
LNC-formulated Small Oligos Show Strong Uptake in Innate Immune Cells
Support Role in Treating Inflammation



80 ug/mL LNC
512 ng/mL Cy5-labeled siRNA cargo

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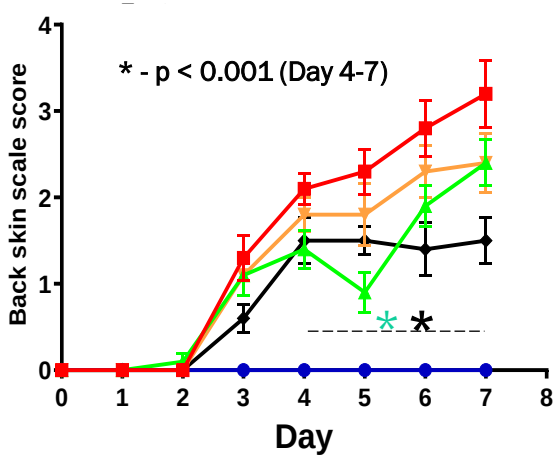
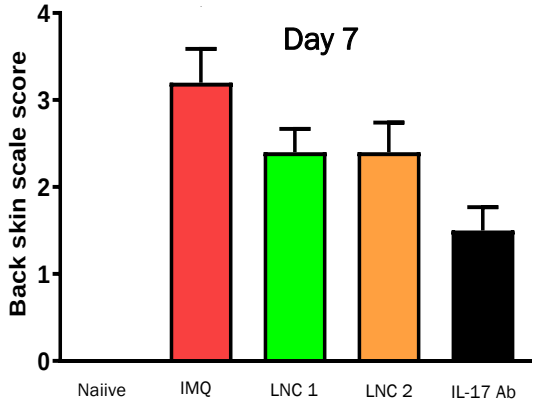
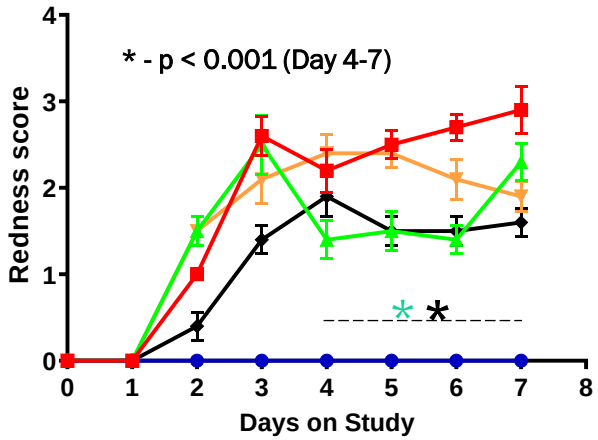
Effect of Oral LNC IL-17A RNAi in a Murine Imiquimod (IMQ) Psoriasis Model

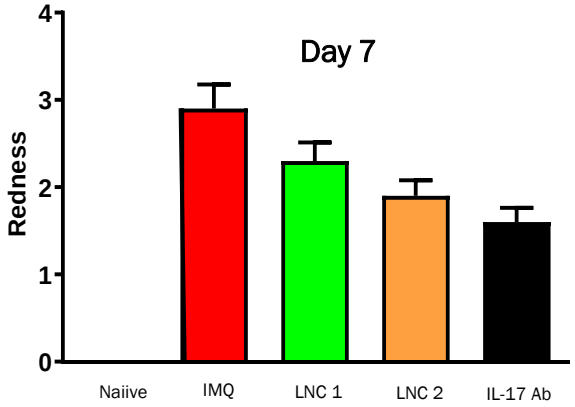
Scaling





Redness

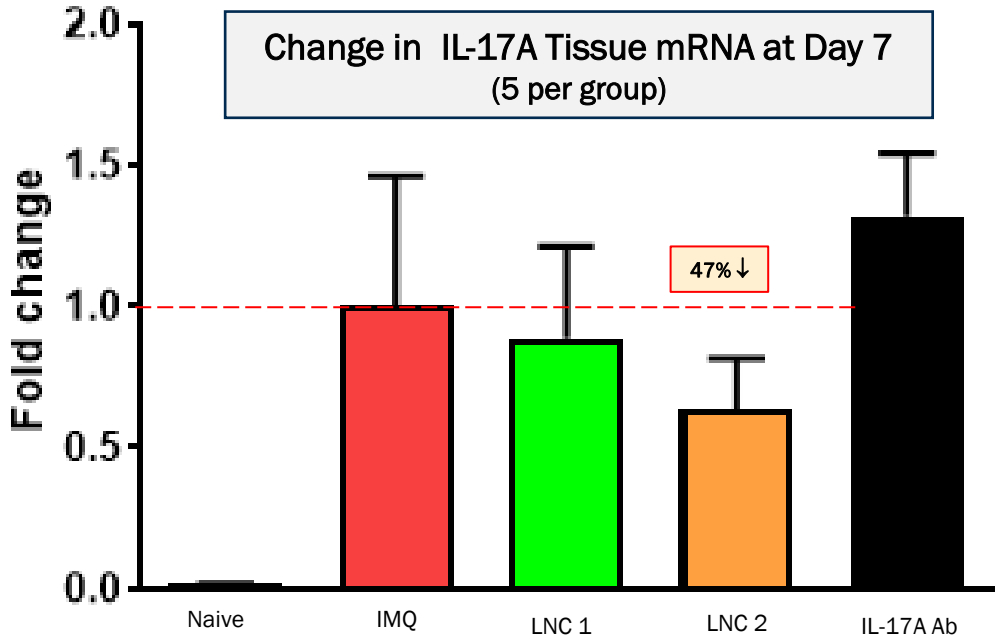




BalbC mice
(n = 50)

5 Groups

Naïve
IMQ only
LNC1
LNC2
10 µg/mouse daily (oral gavage)
IL-17A murine Ab 1 mg/kg i.p. qod



[Changes in serum cytokine levels not expected in this model]

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Effect of Oral LNC-TNFa RNAi in a Murine DSS Acute Colitis Model

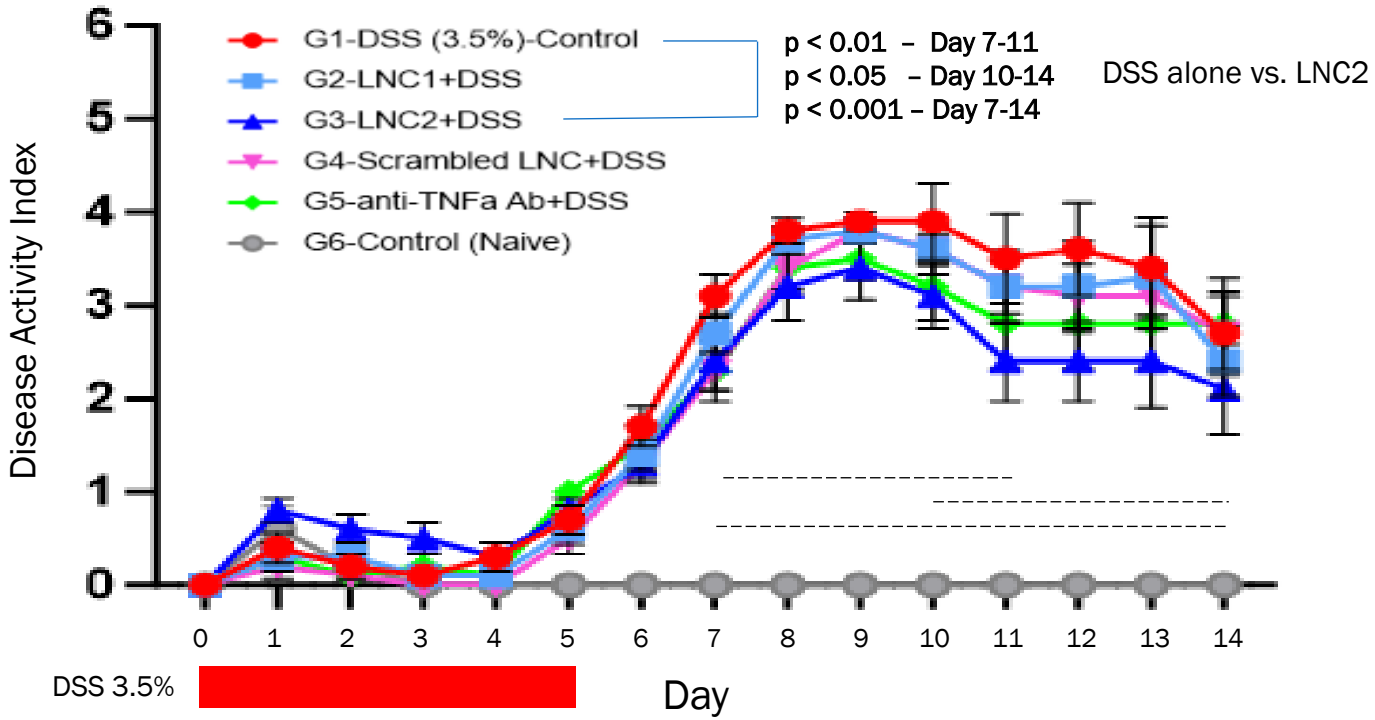
Female C57BL/6 mice
(n = 55)

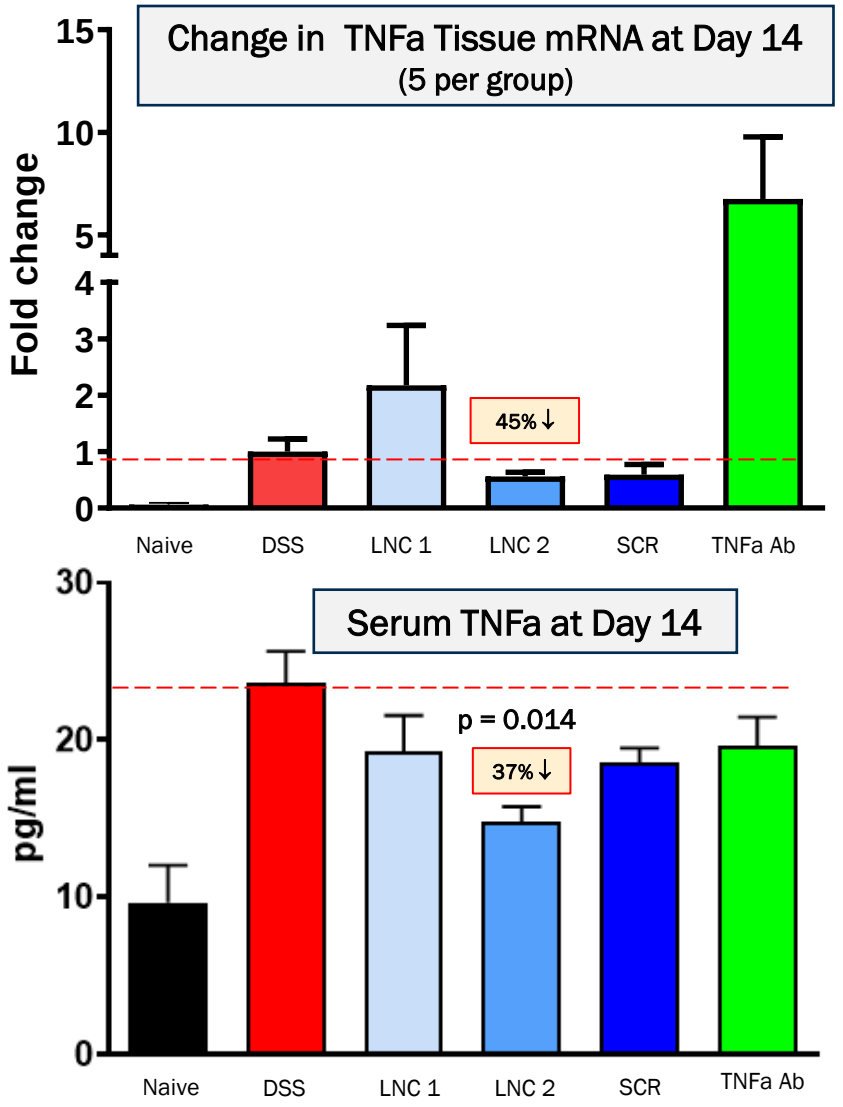
6 Groups

- Untreated control
- DSS alone
- DSS + oral LNC 1
- DSS + oral LNC 2
- DSS + oral Scrambled LNCs

pre-Rx for 2 days, then qd
10 ug/dose

- DSS + anti-TNFa Ab — 0.167 mg/mouse on day 0, 4 and 6





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Summary of Recent Key Advances

- Successful *in vivo* oral delivery of LNC-Docetaxel in a melanoma tumor model
  - Reductions in tumor weight and volume comparable to those seen with IV docetaxel
  - No adverse effects on body weight or hematologic parameters
- Successful *in vivo* oral delivery of LNC formulations of 2 different RNAi oligonucleotides targeting inflammatory cytokines
  - Documented biological activity and therapeutic impact in two different disease models.
    - **Psoriasis (IL-17A)**
      - Reduction in tissue IL-17A mRNA levels (skin)
      - Statistically significant improvement in clinical scoring of skin lesions
    - **Colitis (TNFa)**
      - Reductions in tissue TNFa mRNA levels (colon)
      - Statistically significant reductions in serum TNFα levels
      - Statistically significant improvement in disease activity scores

These results highlight and validate the unique capabilities of the LNC platform beyond MAT2203

1) **Oral delivery**
2) **Delivery of active therapeutics (small molecule and small oligo) to diseased tissues outside the liver**
3) **Low blood levels of active drug, with potential for improved safety**

Expanding LNC Intellectual Property Portfolio

Continuingly increasing our patent suite to increase protection and exclusivity

MAT2203 potentially entitled to **12+ years of exclusivity** (QIDP & Orphan status)

Global Platform IP base **protection out to 2037** with 20 patents issued in last 5 years

Recent patent applications **based on formulation work with small oligonucleotides**

Strong IP & Regulatory Designations

Experienced Leadership Team

EXECUTIVE TEAM

Jerome D. Jabbour, J.D.
Chief Executive Officer

Thomas Hoover, MBA
Chief Business Officer

Theresa Matkovits, Ph.D.
Chief Development Officer

James Ferguson, M.D.
Chief Medical Officer

Keith Kucinski, CPA, MBA
Chief Financial Officer

Hui Liu, Ph.D., MBA
Chief Technology Officer

BOARD OF DIRECTORS

Eric Ende, M.D., MBA
Chairman of the Board

Herbert Conrad
Director

James Scibetta
Director

Kathryn Corzo
Director

Natasha Giordano
Director

Matthew Wikler, M.D., MBA
Director

Jerome D. Jabbour, J.D.
CEO

Matinas Investment Thesis

Financial Summary

Runway into Q3 2024

$18.2M[1] in Cash, Cash Equivalents and Marketable Securities

[1] as of 09/30/23

Non-Dilutive Financing Options

Near-Term Milestones – Setup for Strong Start to 2024

✓	**Q1** – Successful Agreement with FDA for a Single Phase 3 Registration Trial to Support an NDA for MAT2203 for the Treatment of Invasive Aspergillosis (the "ORALTO" Trial)
	Q1 – LNC-docetaxel Maximum Tolerated Dose Longer Term Safety Study vs. IV-docetaxel
	Q1 – Additional *in vivo* Oral Delivery of Small Oligonucleotide Targeting Inflammation
	Q1 – Potential MAT2203 Domestic/Regional/Global Partnership
	Q1 – Screening of Tumor Cell Lines for LNC Uptake Including Breast, Brain, Liver & Lung
	Q1 – Evaluation of LNC-docetaxel in Additional Tumor Models
	Q2 – Potential New Platform Collaboration
	2024 – Potential BARDA Funding for MAT2203

Solid Value "Foundation"

MAT2203

- Clinically Validated
- Phase 3-ready asset
- Highest unmet need

Substantial UPSIDE

LNCs Facilitating ORAL Delivery of Small Oligonucleotides

And

Establishing Internal and External Pipelines