

# Corporate Investor Presentation April 2024

### Safe Harbor Statement

#### SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This document contains forward-looking statements concerning TFF Pharmaceuticals, Inc. ("TFF", "TFF Pharmaceuticals", the "Company," "we," "us," and "our"). The words "believe," "may," "will," "potentially," "estimate," "continue," "anticipate," "intend," "could," "would," "project," "plan," "expect" and similar expressions that convey uncertainty of future events or outcomes are intended to identify forward-looking statements. These forward-looking statements include, but are not limited to, statements concerning the following:

- the benefits of our TFF platform;
- advancement of TFF TAC and TFF VORI into potentially registration-enabling studies;
- TFF TAC's and TFF VORI's substantial market opportunity;
- the expectation that the further data from the ongoing Phase 2 clinical trial for TFF TAC and TFF VORI will be consistent with the data readouts for each product candidate to date; and
- our exploration of strategic alternatives for TFF VORI, including partnering opportunities, collaborations, and government-based funding sources.

Those forward-looking statements involve known and unknown risks, uncertainties and other factors that could cause actual results to differ materially. Among those factors are: (i) the risk that the further data from the ongoing Phase 2 clinical trials for TFF TAC and TFF VORI will not be favorably consistent with the initial data readouts, (ii) the risk that we may not be able to advance to registration-enabling studies for TFF TAC, (iii) the risk we may not be successful in our pursuit of strategic alternatives for TFF VORI; (iv) success in early phases of pre-clinical and clinicals trials do not ensure later clinical trials will be successful; (v) no drug product incorporating the TFF platform has received FDA pre-market approval or otherwise been incorporated into a commercial drug product, (vi) the Company has no current agreements or understandings with any large pharmaceutical companies for the development of a drug product incorporating the TFF platform, (vii) the risk that the Company may not be able to obtain additional working capital with which to continue the Phase 2 clinical trials and or advance to the initiation of registration-enabling studies, for TFF TAC as and when needed and (viii) those other risks disclosed in the section "Risk Factors" included in the Company's Annual Report on Form 10-K filed with the SEC on March 28, 2024 and subsequently filed reports. TFF Pharmaceuticals cautions readers not to place undue reliance on any forward-looking statements. TFF Pharmaceuticals does not undertake, and specifically disclaims, any obligation to update or revise such statements to reflect new circumstances or unanticipated events as they occur, except as required by law.

This document contains only basic information concerning TFF. Because it is a summary it does not contain all of the information you should consider before investing. Please refer to our reports and registration statements on file with the SEC for more comprehensive information concerning TFF Pharmaceuticals.



### **Investment Highlights**

# Thin Film Freezing (TFF)

- Unique technology for generation of dry powder formulations optimized for inhalational delivery
  - Driving efficacy and minimizing systemic toxicities
- Over 170 patents issued or pending

# Strong Internal Pipeline

- TFF TAC (Tacrolimus Inhalation Powder) for lung transplantation with >\$2 billion annual peak sales potential
- TFF VORI (Voriconazole Inhalation Powder) for serious pulmonary fungal infections with >\$1 billion annual peak sales potential

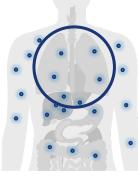
# Positive Initial Clinical Data

- Recent data supports Company moving into registration enabling trials
- Favorable efficacy, safety and tolerability in both programs
- Both programs qualify for 505(b)2 pathway

## Broadly Applicable Platform

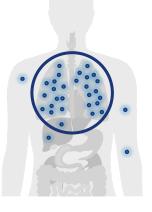
- Created dry powder formulations for a variety of small and large molecules
- Significant number of collaborations in place





Lower efficacy, Higher adverse events

#### Inhaled



Higher efficacy, Lower adverse events



### **Thin Film Freezing Process**

#### **Bulk drug material**



### **Proprietary freezing process**

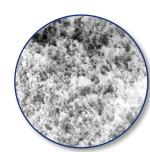


- ✓ Use proprietary combination of freezing rate and liquid surface to volume ratio
- Confers advantages in engineering particles for various routes of administration
- Stabilizes biologics not achievable with other process technologies

**Drying and** lyophilization







TFF technology enables the generation of dry powder formulations optimized for inhalational delivery via an easy-to-use dry powder inhaler

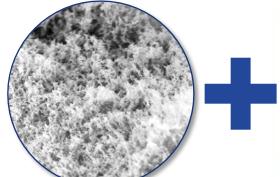


### **Inhalation Device for Lung Deposition**

Bulk drug material



Brittle matrix powder



Commercial dry powder inhaler



Removal of protective cap



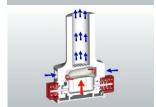
Open mouthpiece to access capsule housing



Insert capsule into housing



Close mouthpiece



Actuate pushbuttons to pierce the capsule and inhale



### **Delivering Value with an Internal Pipeline**

ASSET	PLATFORM	INDICATION	PRECLINICAL	PHASE 1	PHASE 2	PHASE 3	ACHIEVED MILESTONES
TFF TAC	Tacrolimus inhalation powder	Prophylaxis of organ rejection in lung transplant					sitive initial P2 data reported Dec 2023 Iditional P2 data reported in March 2024
TFF VORI	Voriconazole inhalation powder	Serious pulmonary fungal infections					sitive initial P2 data reported Dec 2023 Iditional P2 data reported in March 2024

- ≥\$2 billion market opportunity for TFF TAC¹
- ≥\$1 billion market opportunity for TFF VORI¹
- >70 granted U.S. and ex-U.S. patents and patent applications for TFF TAC and TFF VORI with patent term extending to 2043



## **TFF TAC Clinical Development**

Tacrolimus Inhalation Powder Program



# TFF TAC: Addressing Significant Unmet Need in Lung Transplant Rejection

#### TFF TAC is in Phase 2 development for prevention of rejection in lung transplant recipients

- Tacrolimus is first-line calcineurin inhibitor for prevention of rejection in lung transplant
- Significant toxicities associated with oral tacrolimus
- TFF TAC delivers tacrolimus directly to the lung to drive efficacy through immune suppression locally in the lung, where inflammation leads to rejection and allograft failure, while limiting systemic exposure thus systemic toxicities
- High unmet medical need with ~50% mortality in 5 years<sup>1</sup> due to narrow therapeutic index:
  - Too little immune suppression leads to acute rejection or chronic rejection leading to chronic lung allograft dysfunction (CLAD)
  - Too much immune suppression leads to infections, chronic kidney disease, and post transplant lymphoproliferative disease

~40,000 new and existing patients worldwide<sup>2</sup>

≥\$2 billion peak TFF TAC global gross sales forecast<sup>3</sup>

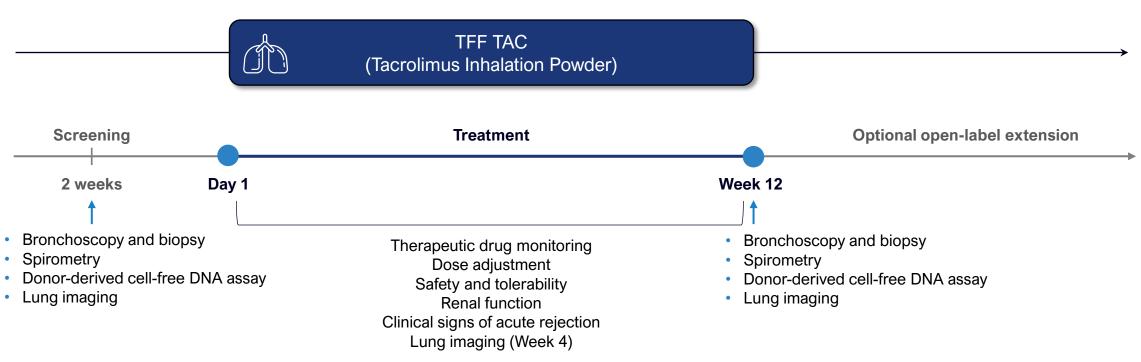
TFF TAC is intended to increase lung delivery to drive efficacy while minimizing systemic exposures and toxicities



- 1. Costa, Benvenuto, and Sonett, Best Practice & Research Clinical Anesthesiology, 2017
- 2. UpToDate; OPTN, UNOS, and Transplant Literature
- Internal estimates

# TFF TAC: Phase 2 Australia Trial Design in Lung Transplant Patients

- **Design**: Open label study of TFF TAC in lung transplant patients who require reduced tacrolimus blood levels due to kidney toxicity
- **Duration**: Part A: 12 weeks; Part B: optional safety extension
- Endpoints: Safety and tolerability, kidney function, acute allograft rejection





## **TFF TAC:** Baseline Characteristics and Demographics

Patient	Age (years)	Sex	Race	Years since transplant	CLAD	Years with kidney disease	Time on TFF Tac (weeks)	Disposition
Pt 1	73	М	W	9	No	5	49.0	Chose to proceed to Part B
Pt 2	73	F	W	8	No	6	40.0	Chose to proceed to Part B
Pt 3	68	М	W	5	No	4	33.0	Chose to proceed to Part B
Pt 4	67	F	W	3	No	2.5	20.0	Chose to proceed to Part B
Pt 5	64	М	W	3	No	2.5	11.9	Still in Part A
Pt 6	52	F	W	23	No	7	9.0	Still in Part A
Pt 7	41	F	W	0.75	No	N/A	5.9	Still in Part A
Pt 8	56	М	NH	1.25	No	N/A	5.0	Still in Part A

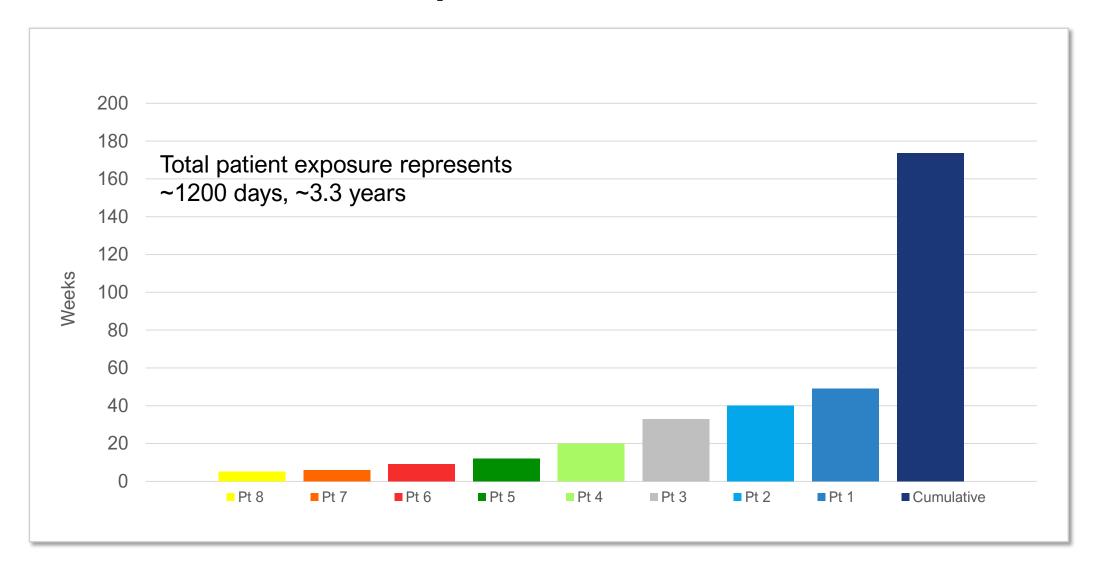
CLAD: chronic lung allograft dysfunction

W: white; F: female; M: male; NH: Native Hawaiian

N/A: not available



### **TFF TAC: Total Patient Exposure**





# TFF TAC: Data suggest TFF TAC prevents rejection at reduced systemic exposure

#### **Efficacy**

- Successful transition of 8/8 patients from oral Tacrolimus to TFF TAC
- No evidence of acute rejection
  - No signs and symptoms suggestive of acute rejection
  - No use of pulse corticosteroids for treatment of rejection
  - No spirometry deterioration suggestive of acute rejection
  - No chest x-ray findings suggestive of acute rejection
  - Biomarker data to be disclosed in late April 2024
- 4/4 patients who completed Part A chose to remain on TFF TAC and proceeded to Part B

#### **Safety**

- No mortality
- No TFF TAC discontinuation due to an AE
- Majority of TEAEs were Grade 2 or lower in severity
- Maintenance of kidney function

#### **Key Takeaways**

- Interim clinical data suggest:
  - Lower doses of TFF TAC compared to oral Tacrolimus are sufficient to prevent rejection.
  - TFF TAC prevents rejection at reduced systemic Tacrolimus blood levels, thus lowering the risk of systemic toxicity.

Mean Stable TFF TAC Dose / Mean Stable oral Tacrolimus Dose	Stable Trough Tacrolimus Blood Levels: TFF TAC / Oral Tacrolimus	
~1/6 (~17%)	~2/3 (~66%)	n=8



## **TFF VORI Clinical Development**

Voriconazole Inhalation Powder Program



# TFF VORI: Addressing Significant Unmet Need in Pulmonary Fungal Infections

TFF VORI is in Phase 2 development for the treatment of pulmonary fungal infections including invasive pulmonary aspergillosis (IPA)

- IPA primarily impacts immune compromised patients (hematologic malignancies, solid organ, and stem cell transplant recipients)
- Oral and intravenous voriconazole is first-line therapy for the treatment of IPA
- Narrow therapeutic window associated with oral and IV voriconazole
  - Significant toxicities
    - Liver toxicity, arrhythmias and QT prolongation, infusion related reactions, visual disturbances, severe cutaneous adverse reactions, photosensitivity and renal toxicity<sup>1</sup>
  - Drug-drug interactions
- High unmet medical need with ~30% mortality in 12 weeks² due to high rate of toxicity and drug-drug interactions limiting
  systemic dosing and overall efficacy

~250,000 invasive aspergillosis (IA) patients worldwide<sup>3</sup>

≥\$1 billion peak TFF VORI global gross sales forecast<sup>4</sup>

TFF VORI is intended to increase lung delivery to drive efficacy while minimizing systemic exposures, toxicities, and drug-drug interactions



- 1. Voriconazole Package Insert; Warning and Precautions section, 5.2 and 5.3
- 2. <u>Maertens et. al. Lancet 2016; 387:760-769.</u>

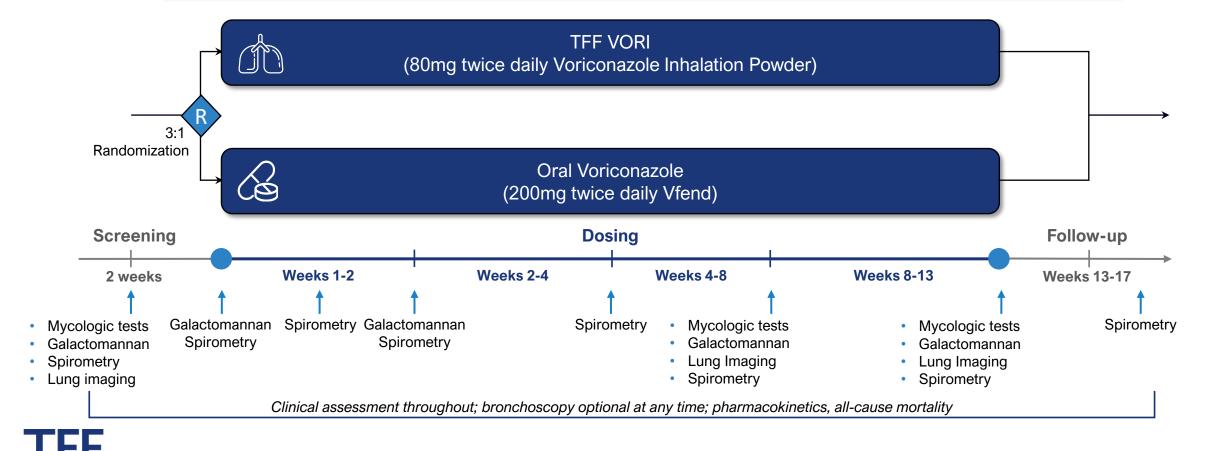
- 3. Bongomin et. al. Journal of Fungi. 2017
- 4. Internal estimates. Assumes indication for acute treatment of IPA

# TFF VORI: Phase 2 Trial Design in Patients with Invasive Pulmonary Aspergillosis

- Design: Open label randomized study; TFF VORI vs. oral voriconazole
- **Duration**: 13 weeks of treatment

**PHARMACEUTICALS** 

Endpoints: Safety/tolerability, clinical response, radiologic response, mycologic response, all-cause mortality



### TFF VORI: Expanded Access Program (EAP)

- The Expanded Access Program (EAP) enrolls patients with the following diagnoses who have limited or no other treatment options or who have had an unfavorable response to adequate standard of care therapy:
  - Pulmonary aspergillosis:
    - Invasive pulmonary aspergillosis (IPA)
    - Chronic pulmonary aspergillosis (CPA)
    - Allergic bronchopulmonary aspergillosis (ABPA)
    - Aspergillus tracheobronchitis
    - Aspergillus bronchoanastomotic infection
  - Voriconazole responsive pulmonary fungal infections
- US expanded access protocol prepared and submitted to the FDA: <a href="https://clinicaltrials.gov/ct2/show/NCT05897294">https://clinicaltrials.gov/ct2/show/NCT05897294</a>
- Available in the US, Canada, Australia, UK, and select EU countries



### **TFF VORI: Summary of Results**

IPA is a pulmonary fungal infection with ~30% mortality in 12 weeks

#### **Efficacy**

- Of the six patients treated for at least 12 weeks with TFF VORI:
  - Five patients achieved a clinical response (improvement in signs, symptoms and/or spirometry)
  - Five patients achieved a mycologic response (presumed or proven)
  - Three of four patients achieved a radiologic response (4 patients with abnormal baseline and follow up chest CT)
  - No need for continued anti-fungal use after treatment with TFF VORI in all six patients

#### Safety

- Of the 8 patients treated with TFF VORI for any length of time with follow-up safety data:
  - No IPA-related mortality
  - No all-cause mortality
  - One TFF VORI discontinuation due to an unrelated AE of COVID infection that required intubation
  - Majority of TEAEs deemed unrelated to TFF VORI
  - Majority of TEAEs were Grade 2 or lower in severity
  - No hepatic toxicity
  - No visual disturbances

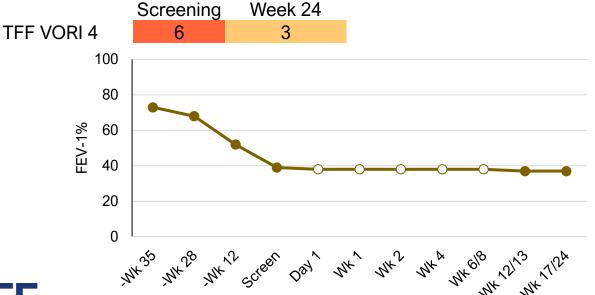


### TFF VORI: Patient TFF VORI 4 (EAP)

50-yr-old white male lung transplant recipient with **CLAD** presented with moderate cough, dyspnea (shortness of breath) and respiratory insufficiency and BAL\* evidence of Scedosporium, which is voriconazole sensitive, and Lomentospora

Patient	Treatment duration	Clinical response		Clinical response Mycologic response		All-cause mortality
		Improved signs and symptoms	Stable or improved spirometry	No evidence of infection	Improved CT findings	
TFF VORI 4	24 weeks	✓	✓	✓	✓	No

#### **Total Symptom Scores**

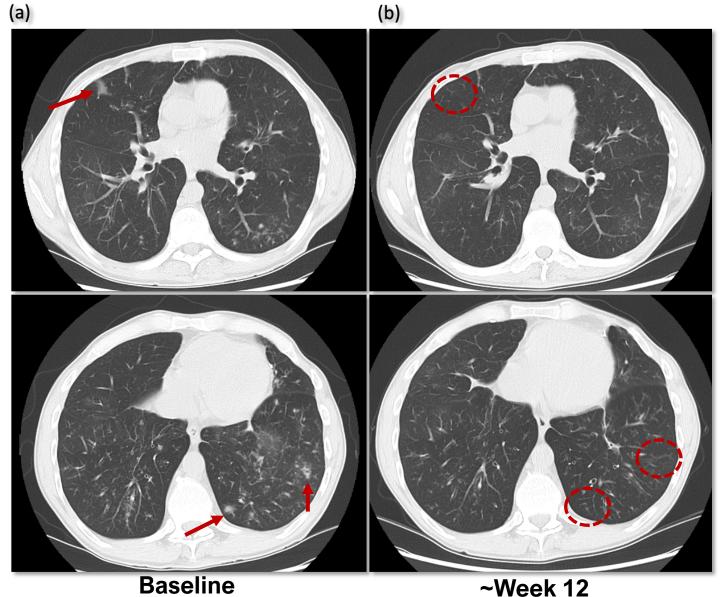


#### Follow up mycologic assessment:

BAL\* culture for Scedosporium negative



# TFF VORI: Patient TFF VORI 4 (EAP)





~Week 12

### **Collaborations**

Leveraging TFF's Platform for New Opportunities



### **Recent Government Collaborations**







#### June 26, 2023

TFF Pharmaceuticals awarded \$2.97 million by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institute of Health (NIH), to develop a universal influenza vaccine using the company's Thin Film Freezing technology.



#### May 4, 2023

TFF Pharmaceuticals enters into CRADA with the National Institute of Environmental Health Sciences (NIEHS) to develop dry powder formulations of Hyaluronan to prevent and treat respiratory diseases.





#### May 1, 2023

TFF Pharmaceuticals receives additional funding from Leidos to advance next generation countermeasures for military and healthcare personnel under the DARPA Personalized Protective Biosystems (PPB) program.



Recent grants and contracts with various government agencies is further validation of Thin Film Freezing's potential

### **Business Development Opportunities for TFF's Platform**

30%

### **Internal Pipeline**

• TFF VORI (inhaled voriconazole dry powder)

TFF TAC (inhaled tacrolimus dry powder)

#### **Vaccines**

 Reformulation and development of new vaccines for intranasal and inhalational delivery and eliminating need for cold chain supply requirements

### **Biologics**

mRNA

mAbs

sRNA

- Peptides
- Bacteriophages
- Peptoids

#### Government

- CRADA agreements with USAMRIID to formulate dry powder neutralizing antibodies against national priority biodefense threats
- CRADA agreement with NIEHS to develop dry powder formulations of Hyaluronan to prevent and treat respiratory diseases
- LEIDOS/DARPA contract
- SBIR with NIAID, Cleveland Clinic, and University of Georgia

### **New Chemical Entities (NCEs)**

 Formulating new product opportunities for both small and large molecules

#### Academia

 R&D collaborations with the Albert Einstein College of Medicine, Georgia Tech, and UPenn to develop biologics



### TFF Leadership



Harlan F. Weisman, M.D. Chief Executive Officer

- 30 years experience as a senior healthcare executive
- Former CEO of Flame Biosciences and Coronado Biosciences
- Former Group Company Chairman and President of J&J Pharmaceutical R&D



Zamaneh Mikhak, M.D. Chief Medical Officer

- Physician-scientist, board certified in Allergy/ Immunology, with extensive clinical, drug development, and basic and translational research experience
- Previously served in senior clinical research & development roles at Cogent Biosciences, Boston Pharmaceuticals, Kiniksa Pharmaceuticals



Kirk Coleman
Chief Financial Officer

- Over 20 years of financial and accounting experience
- Previously served as an executive officer of Steelhead Capital Management, LLC and Bios Partners, LP



Anthony Hickey, Ph.D. Senior Scientific Advisor and Chairman of the Scientific Advisory Committee

- Professor Emeritus in Pharmacoengineering & Molecular Pharmaceutics at UNC Chapel Hill
- Pharmaceuticals and CSO of Oriel Therapeutics; author of multiple texts on inhalation and pharmaceutical process engineering



### **TFF Board and Advisors**

### **Board of Directors**

Harlan F. Weisman, M.D.

**Chief Executive Officer** 

Johnson-Johnson

**Thomas King** 

Director

Catherine Lee, J.D.

Director

**Robert S. Mills** 

Director

Michael Patane, Ph.D.

Director

**Brandi Roberts** 

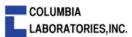
Director

**Stephen Rocamboli** 

Director













### **Scientific Advisory Board**

#### **Anthony Hickey, Ph.D.**

Senior Scientific Advisor, and Chairman of the Scientific Advisory Committee

#### David N. Cornfield, M.D.

Professor of Pulmonary Medicine, Stanford University

#### Prof. David Denning, FRCP, FRCPath, DCH, FMedSci

Professor of Infectious Diseases, University of Manchester

#### Jay Peters, M.D.

Chief of Pulmonary and Critical Care Medicine, University of Texas Health Science Center at San Antonio

#### Ted M. Ross, Ph.D.

Professor, Center for Vaccines and Immunology, Department of Infectious Diseases, University of Georgia

#### Mike Saag, M.D.

Professor of Medicine, University of Alabama at Birmingham

#### Drew Weissman, M.D., Ph.D.

Roberts Family Professor, Vaccine Research at the Perelman School of Medicine, University of Pennsylvania



### **Investment Highlights**

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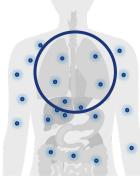
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- Favorable efficacy, safety and tolerability in both programs
- Both programs qualify for 505(b)2 pathway

## Broadly Applicable Platform

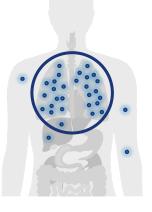
- Created dry powder formulations for a variety of small and large molecules
- Significant number of collaborations in place





Lower efficacy, Higher adverse events

#### Inhaled



Higher efficacy, Lower adverse events





THANK YOU

## **TFF TAC Additional Information**

Preclinical Data, Phase 1 Study Design, and Phase 1 Data



# TFF TAC: Preclinical and Phase 1 provided safety, tolerability, and pharmacokinetic data and enabled Phase 2 planning

#### **Preclinical POC Data:**

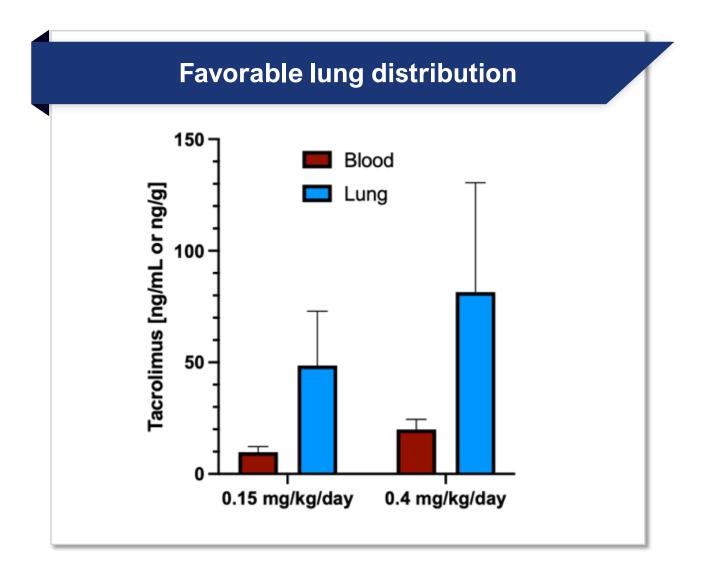
- Inhaled tacrolimus had similar efficacy compared to intramuscular tacrolimus in a rat lung transplant model
- Improved drug delivery to the lung

#### Phase 1 data:

- Successfully completed single and multiple ascending dosing of TFF TAC in healthy subjects in Phase 1 trial
- Doses up to 5 mg (single dose) and 1.5 mg (repeated dose) daily were generally well tolerated



### TFF TAC Preclinical Data – Improved Drug Delivery to the Lung





### **Phase 1 Study Design**

#### **Study Overview**

#### Design:

- Randomized, double-blind, placebocontrolled study of TFF TAC in 57 healthy adult volunteers
- Single ascending dose (SAD) and multiple ascending dose (MAD) phases

#### **Endpoints:**

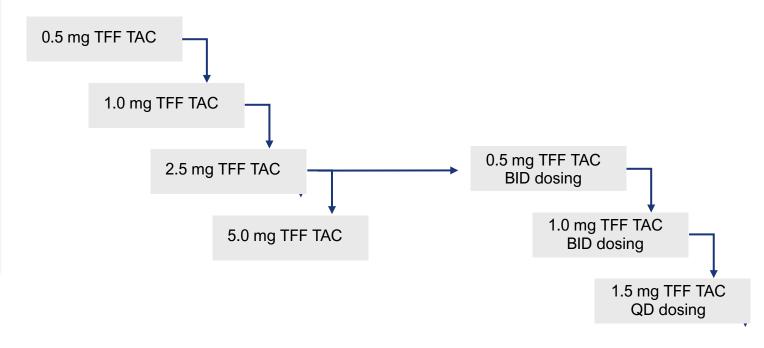
- Safety and tolerability
- Pulmonary function
- Pharmacokinetics

#### PART A: SINGLE ASCENDING DOSE

N=32 healthy volunteers 3:1 active to placebo in each group

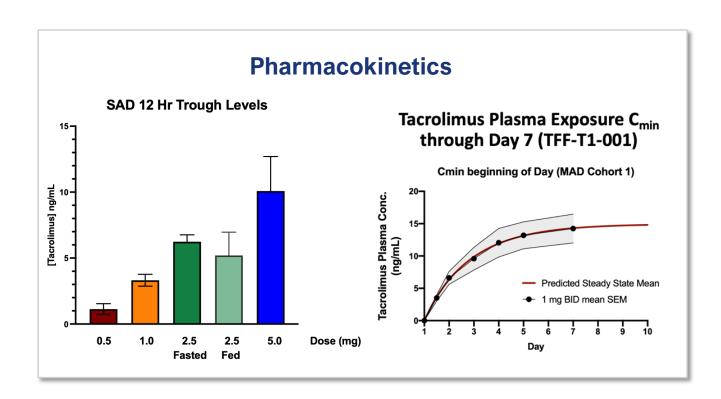


N=25 healthy volunteers
3:1 active to placebo in each group





### Phase 1 Results Showed TFF TAC was Safe and Well-Tolerated



### **Safety**

- Overall, TFF TAC was safe and welltolerated
- No dose-related increase in overall treatment-emergent adverse events (TEAEs) was observed

### TFF TAC demonstrated excellent safety and tolerability



## **TFF VORI Additional Information**

Preclinical, Phase 1, and Compassionate Use Data



### The Problem: Toxicity of IV and Oral Voriconazole

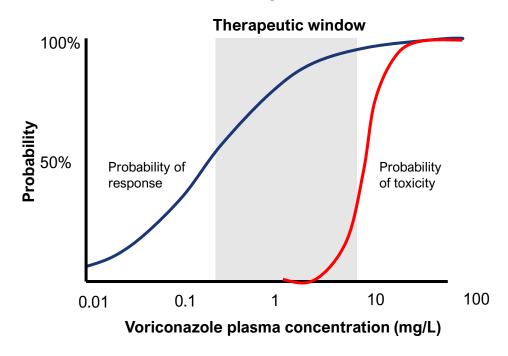
#### Poor side effect profile

#### **Side Effects:**

- Hepatic toxicity, arrhythmias and QT prolongation, infusion related reactions, visual disturbances, severe cutaneous adverse reactions, photosensitivity and renal toxicity<sup>1</sup>
- Alternatives:

Oral and IV amphotericin B, echinocandins, and azoles, which are also limited by a narrow therapeutic window

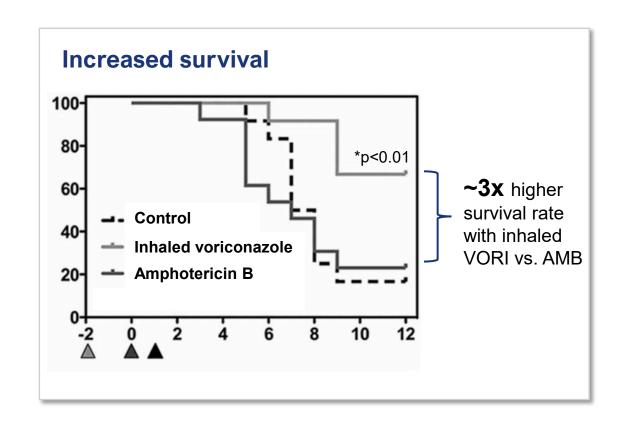
# **Current SOC voriconazole has** narrow therapeutic window<sup>2</sup>

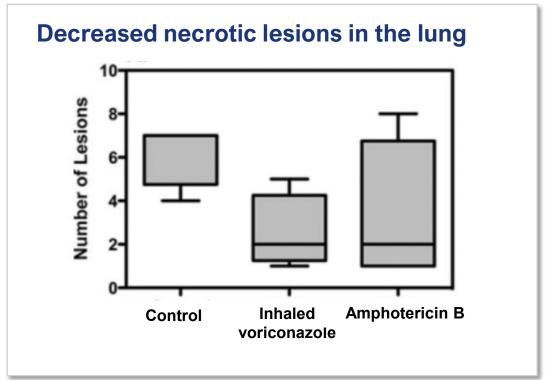




<sup>1.</sup> Voriconazole Package Insert; Warning and Precautions section, 5.2 and 5.3 2 Therapeutic window adapted from Pascual A et al. *Clinical Infectious Diseases* 2008.

### **Preclinical Data of Inhaled Voriconazole**







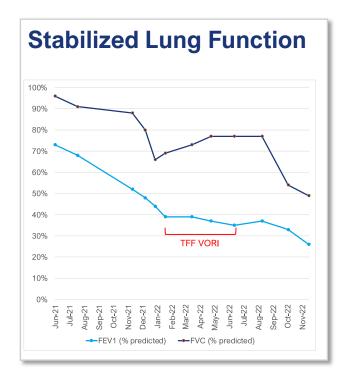
# TFF VORI: Phase 1 studies and compassionate use data provided safety, tolerability, pharmacokinetic, and early efficacy data

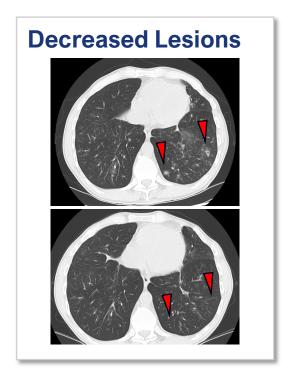
#### Phase 1 Results:

- Phase 1a (n=65 healthy volunteers) and Phase 1b (n=16 patients with mild stable asthma)
- Doses up to 80mg twice daily were well tolerated and showed no signs of the toxicities previously reported for the oral or intravenous forms.

**Compassionate Use Results:** Two lung transplant recipients with history of recurrent pulmonary fungal infections and toxicities to systemic available standard of care therapy. Following treatment with TFF VORI:

- Lung function stabilized/maintained
- Lung lesions improved
- Aspergillus infection cleared
- No need for hospitalization
- No drug-drug interactions
- No adverse events reported





### **Phase 1 Study Design**

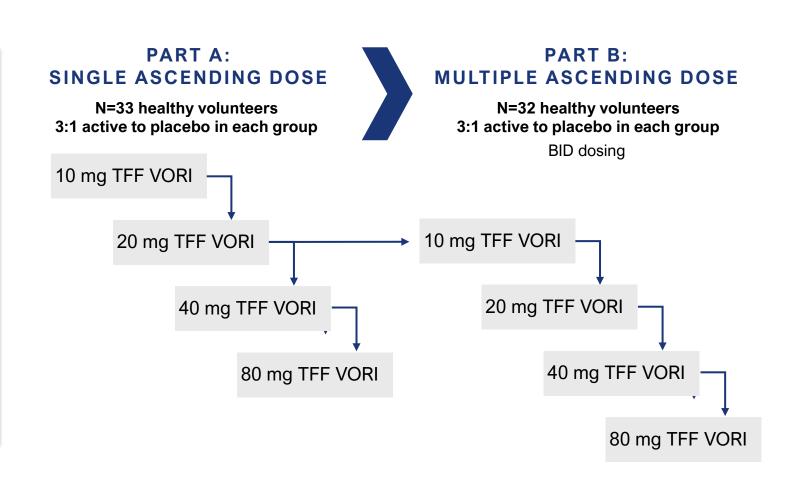
#### **Study Overview**

#### Design:

- Randomized, double-blind, placebocontrolled study of TFF VORI in 65 healthy adult volunteers
- Single ascending dose (SAD) and multiple ascending dose (MAD) phases

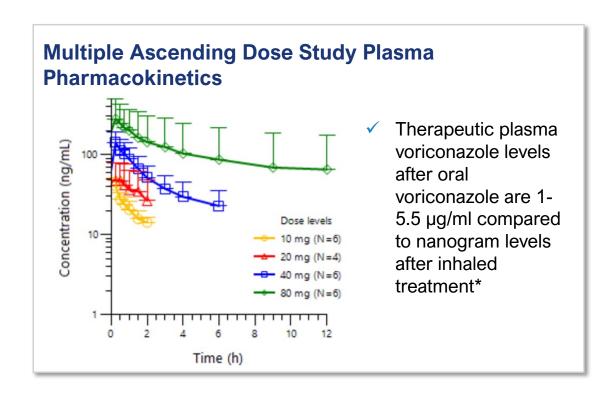
#### **Endpoints:**

- Safety and tolerability
- Pulmonary function
- Pharmacokinetics





### Phase 1 Results Showed TFF VORI was Safe and Well-Tolerated



### **Safety**

No clinically meaningful differences between TFF VORI and placebo in:

- √ % of patients with treatment emergent adverse events (TEAEs)
- Safety laboratory test results, vital signs, and pulse oximetry
- Pulmonary function tests, electrocardiograms, and eye examination
- Single and multiple doses of TFF VORI (10 mg, 20 mg, 40mg, and 80mg) were well tolerated
- No dose limiting toxicities
- Most TEAEs were Grade 1. There were no Grade 3 or higher TEAEs
- All TEAEs but one (headache) occurred in a single subject

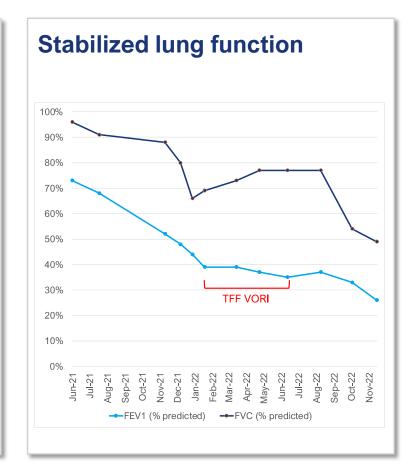
TFF VORI showed 10-50-fold lower plasma exposure compared to oral with excellent safety and tolerability

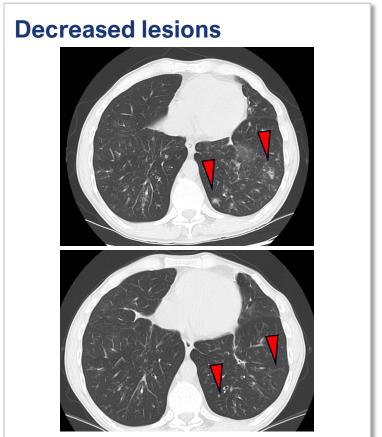


### **Compassionate Use: Patient 1**

#### **Patient characteristics**

- 50-year-old man
- Lung transplant in 2019, treated with tacrolimus
- Multiple prior fungal infections
- Unable to take systemic voriconazole due to prior skin cancers including melanoma
- Posaconazole discontinued due to systemic toxicity
- 6 hospitalizations over 12 months before treatment
- Treated with TFF VORI, 80 mg, BID for 6 months





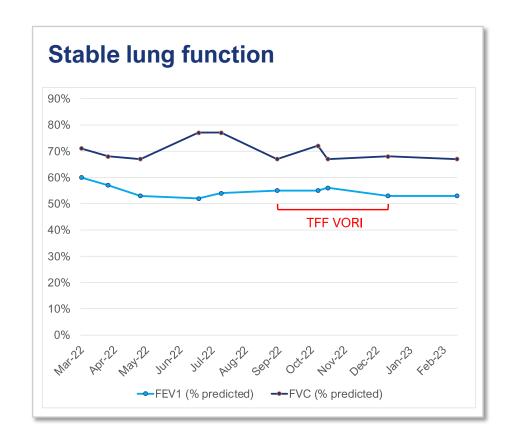
Patient's lung function stabilized; lung lesions improved with no evidence of drug-drug interaction



### **Compassionate Use: Patient 2**

#### **Patient characteristics**

- 54-year-old woman
- Lung transplant in 1993, treated with tacrolimus
- Multiple prior fungal infections
- Prior treatment with systemic voriconazole and posaconazole
- Posaconazole discontinued due to systemic toxicities
- Treated with TFF VORI, 80 mg, BID for 13 weeks



Patient maintained stable lung function; experienced mycological cure in 6 weeks with no drug-drug interactions

