TONIX PHARMACEUTICALS

Corporate Presentation Investor Summit

March 11, 2025

NASDAQ: TNXP

PO6052 March 11, 2025 (Doc 1568)

Cautionary Note on Forward-Looking Statements

Certain statements in this presentation regarding strategic plans, expectations and objectives for future operations or results are “forward-looking statements” as defined by the Private Securities Litigation Reform Act of 1995. These statements may be identified by the use of forward-looking words such as “anticipate,” “believe,” “forecast,” “estimate” and “intend,” among others. These forward-looking statements are based on Tonix’s current expectations and actual results could differ materially. There are a number of factors that could cause actual events to differ materially from those indicated by such forward-looking statements. These factors include, but are not limited to, the risks related to failure to obtain FDA clearances or approvals and noncompliance with FDA regulations; risks related to the failure to successfully market any of our products; risks related to the timing and progress of clinical development of our product candidates; our need for additional financing; uncertainties of patent protection and litigation; uncertainties of government or third party payor reimbursement; limited research and development efforts and dependence upon third parties; and substantial competition. As with any pharmaceutical under development, there are significant risks in the development, regulatory approval and commercialization of new products. The forward-looking statements in this presentation are made as of the date of this presentation, even if subsequently made available by Tonix on its website or otherwise. Tonix does not undertake an obligation to update or revise any forward-looking statement, except as required by law. Investors should read the risk factors set forth in the Annual Report on Form 10-K for the year ended December 31, 2023, as filed with the Securities and Exchange Commission (the “SEC”) on April 1, 2024, and periodic reports and current reports filed with the SEC on or after the date thereof. All of Tonix's forward-looking statements are expressly qualified by all such risk factors and other cautionary statements.

Who We Are

Tonix is committed to developing and marketing therapeutics to treat pain, neurologic, psychiatric and addiction conditions through our ***central nervous system portfolio*** and within other areas of ***high unmet need***, including immunology, infectious disease, and rare disease

…Transforming therapies for pain management and vaccines for public health challenges…

CNS-Focused Fully-Integrated Biopharma with Preclinical, Clinical and Commercial Stage Products

TNX-102 SL[1] for Fibromyalgia: FDA Decision on marketing authorization expected August 15, 2025

- Granted FDA Fast Track Designation
- Two Phase 3 trials completed with statistical significance on primary endpoint
- Potential product launch in 2025

Marketed Products

- Zembrace® and Tosymra® indicated for the treatment of acute migraine

Pipeline[1]

- Phase 2 biologic cocaine antidote, FDA "Breakthrough Therapy Designation"
- Phase 1 anti-CD40L monoclonal antibody to prevent organ transplant rejection

Strategic Partnerships

- With government institutions, world-class academic & research organizations

Internal Capabilities

- Commercial prescription drug sales
- R&D and potential for clinical-trial scale manufacturing

[1]*All of Tonix's product candidates are investigational new drugs or biologics; their safety and efficacy have not been established and none has been approved for any indication.*

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Pipeline Overview

Molecule*	Indication	Phase 1	Phase 2	Phase 3	NDA Submission
TNX-102 SL Cyclobenzaprine HCl Sublingual Tablets	**Fibromyalgia** *Granted FDA Fast Track Designation*	*PDUFA** goal date of August 15, 2025*			
	Acute Stress Disorder	*Phase 2 Study*** Start Expected 1Q'25*			
TNX-1300 Cocaine Esterase *NIDA Funded*	**Cocaine Intoxication** *Granted FDA Breakthrough Therapy Designation*	*Phase 2 Study Ongoing*			
TNX-1500 Anti-CD40L mAb	**Organ Transplant Rejection/ Autoimmune Conditions**	*Topline for Phase 1 reported*			
TNX-4200 Broad-Spectrum Antiviral	**Prevention and Treatment of Viral Diseases**	*Pre-IND / Preclinical*	*Contract awarded from DoD/DTRA*** for up to $34 M*		
TNX-801 Live virus horsepox vaccine	**Mpox / Smallpox**	*Pre-IND / Preclinical*			

**All of Tonix's product candidates are investigational new drugs or biologics; their safety and efficacy have not been established, and none has been approved for any indication.*
***PDUFA=Prescription Drug User Fee Act*
****Investigator-initiated study*

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“Flash” Financials

8-K Filed February 3, 2025 with updated financial information

- Common stock outstanding as of 1/31/25: ~5.6 million (adjusted for 1-for-100 reverse stock split)
- Cash as of 12/31/24: $98.8 million; raised $30.4 million from sales under an at-the-market facility YTD through February 3, 2025
- Net cash used in operating activities for the year ended December 31, 2024 was $60.9 million, compared to $102.0 million for the year ended December 31, 2023
- Capital expenditures for the year ended December 31, 2024 was approximately $0.1, compared to $29.1 million for the year ended December 31, 2023
- Repaid $9.6 million ($11 million face value) mortgage on our two existing facilities RDC (Dartmouth, MA) and ADC (Frederick, MD); Company is now debt free
- Company believes that it will meet its operating and capital expenditure requirements into the first quarter of 2026

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CNS:
TNX-102 SL* (Cyclobenzaprine HCl Sublingual Tablets) for Fibromyalgia

*5.6 mg once-daily at bedtime

About Fibromyalgia

*Fibromyalgia is a **chronic pain disorder** resulting from amplified sensory and pain signaling within the CNS – now recognized as **nociplastic pain**[1-4]*

*Fibromyalgia is a **syndrome** comprised of the **symptoms**: chronic widespread pain, **nonrestorative sleep**, and fatigue*

Fibromyalgia is considered a **chronic overlapping pain condition (COPC)**[5]
*- the **only COPC** with any **FDA-approved drugs**[6]*

Fibromyalgia is the prototypic nociplastic syndrome

[1]Trouvin AP, et al. *Best Pract Res Clin Rheumatol*. 2019;33(3):101415.
[2]Fitzcharles MA, et al. *Lancet* 2021;397:2098-110
[3]Kaplan CM, et al. *Nat Rev Neurol.* 2024 20(6):347-363..
[4]Clauw DJ. *Ann Rheum Dis.* 2024 ard-2023-225327. doi: 10.1136/ard-2023-225327.
[5]Maixner W, et al. *J Pain*. 2016;17(9 Suppl):T93-T107.
[6]The three drugs with FDA approval for the treatment of fibromyalgia: Pregabalin (Lyrica®); Duloxetine (Cymbalta®); Milnacipran (Savella®)

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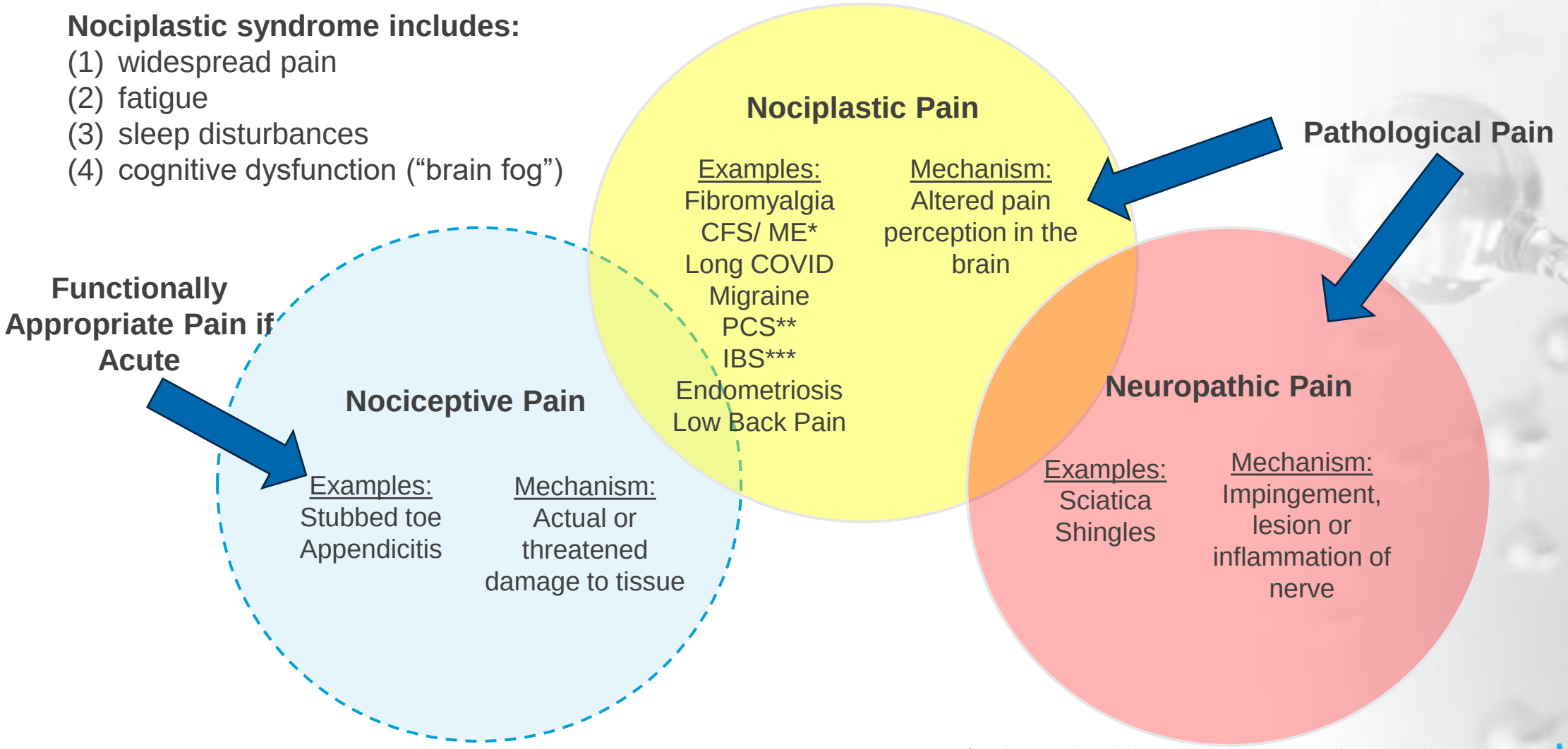
The Third Primary Type of Pain: Nociplastic Pain[1-5]

Nociplastic syndrome includes:
(1) widespread pain
(2) fatigue
(3) sleep disturbances
(4) cognitive dysfunction (“brain fog”)



[1]Trouvin AP, et al. *Best Pract Res Clin Rheumatol*. 2019;33(3):101415.
[2]Fitzcharles MA, et al. *Lancet* 2021;397:2098-110
[3]Kaplan CM, et al. *Nat Rev Neurol.* 2024 20(6):347-363..
[4]Clauw DJ. *Ann Rheum Dis.* 2024 ard-2023-225327. doi: 10.1136/ard-2023-225327.
[5]Kureshi S et al. *Healthcare* (Basel) 2024 12(3): 289.

*ME/CFS = chronic fatigue syndrome / myalgic encephalomyelitis
**PCS = post concussive syndrome.
**IBD – irritable bowel syndrome

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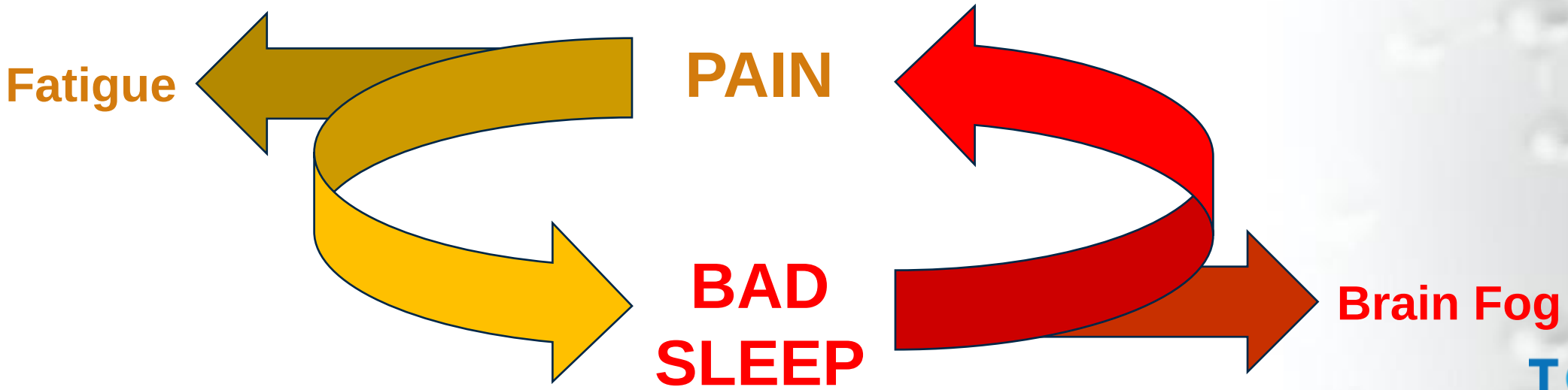
Poor Sleep and Pain have Bi-directional Reinforcing Effects[1]

- **Harvey Moldofsky – recognition of unrefreshing/non-restorative sleep in fibromyalgia**
- **Poor sleep and pain form a vicious cycle in driving fibromyalgia decompensation**
  - Can't sleep → worse pain / In pain → can't sleep
  - Poor sleep and pain contribute to persistence, chronicity and severity
  - Syndrome includes symptoms of fatigue and brain fog
- **Treating sleep disturbance in fibromyalgia has the potential to break the vicious cycle**
  - Potential to remove an obstacle to recovery
  - Using the right medicine is important – some sedative/hypnotics don't work[1,2]



[1]Moldofsky H, et al. *J Rheumatol*. 1996;23:529–533.
[2]Grönbald M, et al. *Clin Rheumatol*. 1993;12(2):186–191

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Fibromyalgia is a Large, Underserved and Dissatisfied Population

- **More than 10 million U.S. adults are affected – predominantly women[1,2]**
  - One of the more common chronic pain disorders
  - FDA considers Fibromyalgia to be “serious condition”[3]
  - Debilitating and life altering condition
  - Significant economic impact
- **Patients have expressed dissatisfaction, despite three FDA approved drugs[4,5]**
  - 85% of patients fail first-line therapy[5]: efficacy variability, tolerability issues especially when used long-term and lack of broad-spectrum activity
  - Typical for patients to rotate between drugs and be on multiple drugs at the same time; 79% of FM patients are on multiple therapies[6]
- **~2.7 million FM patients diagnosed and treated[7]**
  - Large population but underdiagnosed[2] relative to prevalence rate
  - >22 million prescriptions are issued for the treatment of fibromyalgia (on- and off-label usage) each year[8,9]
- **No new R*x* product since 2009**
- *The treatment objective is to **restore functionality** and **quality of life** while avoiding significant side effects*

[1]American College of Rheumatology (www.ACRPatientInfo.org accessed May 7, 2019) – prevalence rate of 2-4% for U.S. adult population (~250 million)
[2]Vincent A, et al. *Arthritis Care Res (Hoboken)*. 2013 65(5):786-92. doi: 10.1002; diagnosed prevalence rate was 1.1% of adult population or 50% of the prevalent population
[3]FDA granted Fast Track Designation to TNX-102 SL for fibromyalgia and one of the criteria for Fast Track is that the indication is a “Serious Condition”
[4]Robinson RL, et al. *Pain Med*. 2012 13(10):1366-76. doi: 10.1111; 85% received drug treatment
[4]The three drugs with FDA approval for the treatment of fibromyalgia: Pregabalin (Lyrica); Duloxetine (Cymbalta); Milnacipran (Savella)
[6]EVERSANA primary physician research, May 2024; commissioned by Tonix
[7]EVERSANA analysis of claims database, May 2024; commissioned by Tonix
[8]Product sales derived from IMS MIDAS; IMS NDTI used to factor usage for fibromyalgia; data accessed April 2015.
[9]Market research by Frost & Sullivan, commissioned by Tonix, 2011

TNX-102 SL*

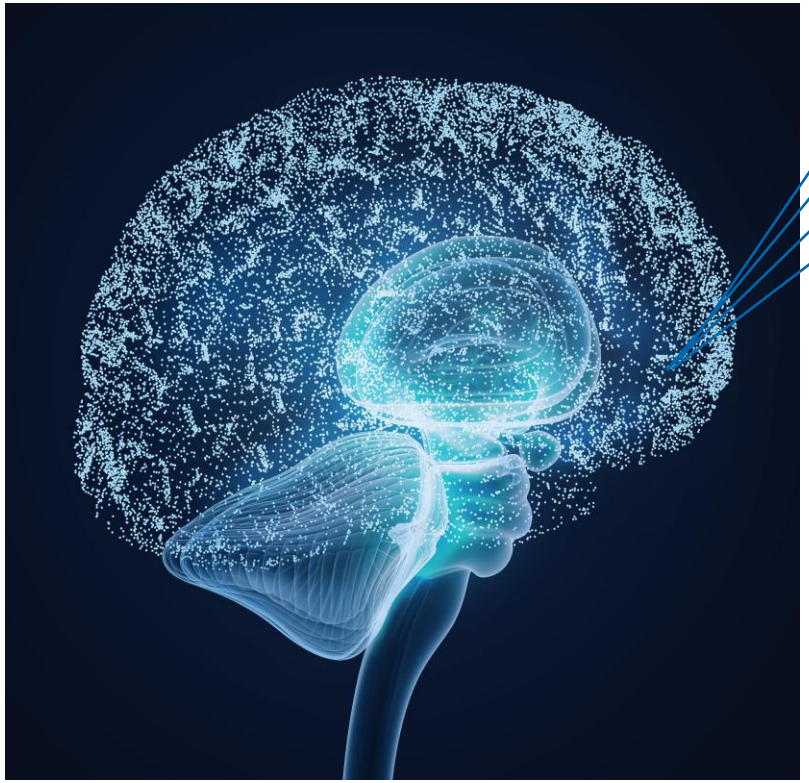
(Cyclobenzaprine HCl Sublingual Tablets)

A unique, sublingual formulation of cyclobenzaprine designed to optimize delivery and absorption

*5.6 mg once-daily at bedtime

TNX-102 SL[1] for FM: Non-opioid, Centrally-Acting Analgesic that Offers a Potentially Transformative Approach by Facilitating Restorative Sleep[1]

Potent binding and antagonist activities at four key receptors facilitate ***restorative sleep***



- *serotonergic-5-HT2A*
- *adrenergic-α1*
- *histaminergic-H1*
- *muscarinic-M1*

Issued patents expected to provide exclusivity to 2034

Key Features

- Broad spectrum activity on pain, sleep and fatigue
- Proprietary, sublingual transmucosal formulation of cyclobenzaprine designed to optimize delivery and provide rapid absorption
- Not a traditional hypnotic or sedative: improves sleep quality, not quantity

Relative to Oral Cyclobenzaprine

- Lower daytime exposure
- Avoids first-pass metabolism
- Reduces risk of pharmacological interference from major metabolite

Relative to Approved Drugs

- Potential for better tolerability while maintaining efficacy
- Not scheduled, with No recognized abuse potential

[1]TNX-102 SL is an investigational new drug and has not been approved for any indication.

TNX-102 SL (5.6 mg) Fibromyalgia Regulatory Status

- **NDA can be filed without abuse potential assessment studies**
  - April 2017
- **Granted FDA Fast Track Designation**
  - July 2024
- **Submitted NDA to FDA**
  - October 2024
- **NDA assigned a PDUFA goal date of August 15, 2025**[1]
  - December 2024

Next Milestone:

FDA decision on marketing authorization expected August 15, 2025

[1]PDUFA = Prescription Drug User Fee Act

Fibromyalgia Clinical Program

- **First pivotal Phase 3 study (*RELIEF*) reported – December 2020**[1]
  - Statistically significant reduction in daily pain compared to placebo (p = 0.010)
- **Second Phase 3 study (*RALLY*) missed primary endpoint – July 2021**
  - Missed primary endpoint
- **Confirmatory pivotal Phase 3 study (*RESILIENT*) reported – December 2023**
  - Statistically significant reduction in daily pain compared to placebo (p = 0.00005)

[1]Lederman S, et al. *Arthritis Care Res (Hoboken)*. 2023 Nov;75(11):2359-2368. doi: 10.1002.

Safety and Tolerability

- **Completion Rate (safety population): TNX-102 SL: 81.0% and Placebo: 79.2%**
- **No new safety signals observed**
- **Only systemic adverse events (AEs) at rate ≥ 3.0% (TNX-102 SL v. Placebo)**
  - COVID-19 (4.3% v. 3.1%), somnolence (3.0% v. 1.3%), and headache (3.0% v. 1.8%)
- **As previously observed TNX-102 SL associated with administration site reactions**
  - Hypoaesthesia oral (23.8% v. 0.4%), product taste abnormal (11.7% v. 0.9%), paraesthesia oral (6.9% v. 0.9%), and tongue discomfort (6.9% v. 0%)
- **No clinically meaningful differences from placebo in Week 14 change from baseline for weight or blood pressure (BP)**
  - Weight: Week 14 change from baseline for TNX-102 SL of +0.04 lbs.; and for Placebo of +0.44 lbs.
  - Systolic BP: Week 14 change from baseline for TNX-102 SL of +0.7 mmHg; and for Placebo of +0.5 mmHg
  - Diastolic BP: Week 14 change from baseline for TNX-102 SL of +1.1 mmHg; and for Placebo of +0.2 mmHg
- **No sexual dysfunction AEs and improved female sexual functioning**
  - No reported AEs of any type of sexual dysfunction
  - Improvement in female sexual function using Changes in Sexual Functioning Questionnaire (p=0.010)

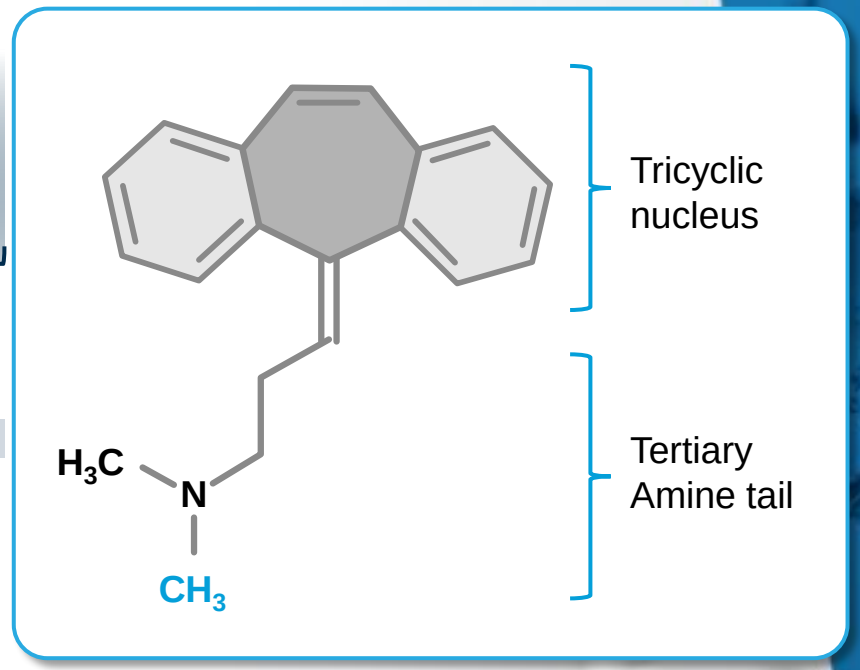
Cyclobenzaprine (CBP) as an Oral Immediate Release (IR) Tablet for Muscle Spasm and Investigational Product for Fibromyalgia

1977 — Flexeril® approved in 1977 for the treatment of muscle spasm[1]

1988 → **2004** — 6 published studies of oral CBP in fibromyalgia: Short-term, but not sustained benefit[2-8]

1999 — Postmarketing surveillance program[1]

2007 — AMRIX® controlled release oral CBP approved for muscle spasm

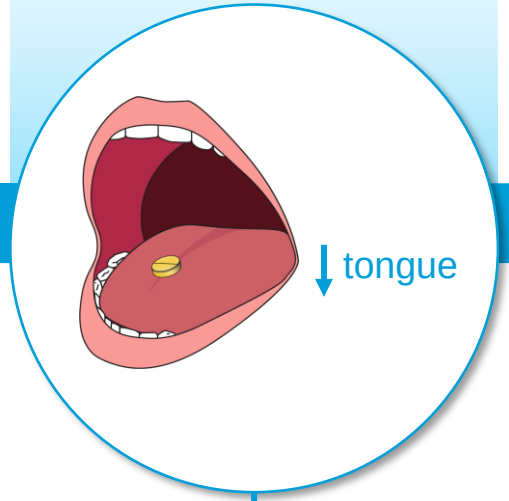


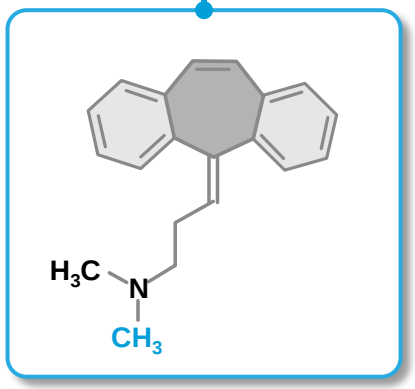
Oral CBP has an **extensive safety record** in humans for **over 45 years**[9]

1. 1999 Merck OTC AdCom Briefing Package. 2. Bennett RM, et al. *Arthritis Rheum* 1988; 31:1535–42. 3. Quimby LG, et al. *J Rheumatol Suppl.* 1989; Nov 19:140–3. 4. Reynolds WJ, et al. *J Rheumatol.* 1991; 18:452–4. 5. Santandrea S, et al. *J Int Med Res.* 1993; 21:74–80. 6. Cantini F, et al. *Minerva Med.* 1994; 85:97–100. 7. Carette S, et al. *Arthritis Rheum.* 1994; 37:32–40. 8. Tofferi JK, et al. *Arthritis Rheum.* 2004; 51:9–13. 9. IMS report 2011 of cyclobenzaprine use in 2009 – Data on File.

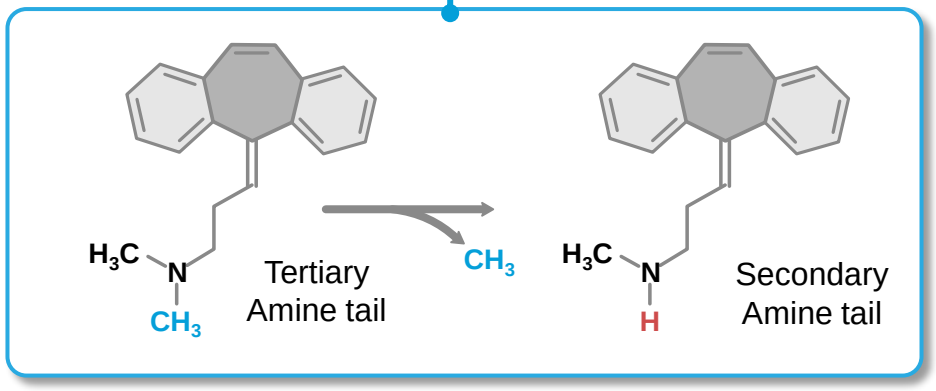
Oral CBP Undergoes First-Pass Metabolism

CBP administered as a swallowed oral dose

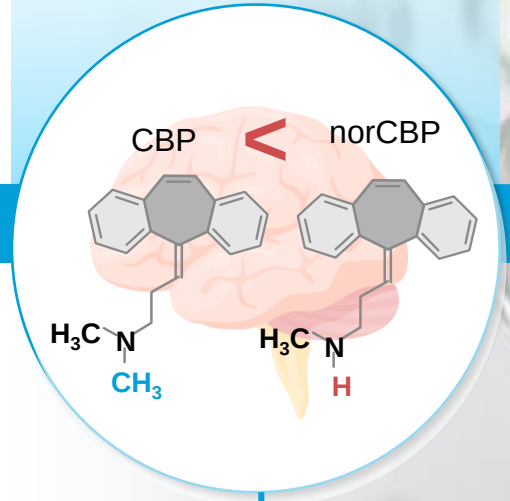




CBP undergoes “first pass” hepatic metabolism and is ~50% converted to the persistent active metabolite norCyclobenzaprine (norCBP)



CBP and norCBP enter the brain



A swallowed oral dose leads to increased concentrations of norCBP relative to CBP over time

CNS PORTFOLIO

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CBP Binding Affinities for Receptors and Transporters

	H_1	5-HT_{2A}	α_{1A}	α_{1B}	M_1	SERT	NET
Cyclobenzaprine (CBP)	**1.3**	**5.2**	**5.6**	**9.1**	**7.9**	**29**	**35**
norCyclobenzaprine (norCBP)	**5.6**	**13**	**34**	**11**	**30**	**91**	**2.6**

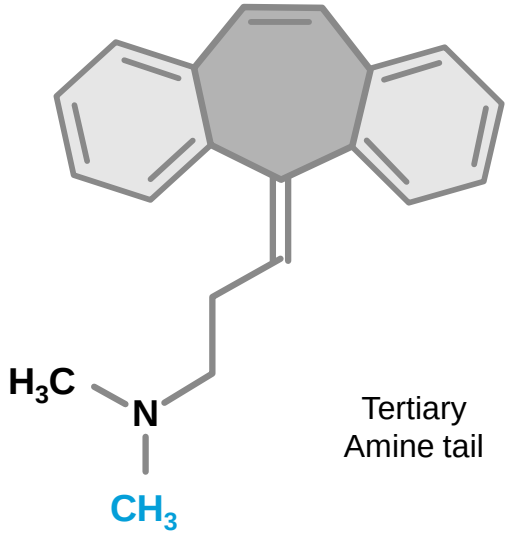
CBP/norCBP Activity: Antagonist | Inhibitor

CBP: more active (lower K_d) at the key receptors involved in sleep quality
norCBP: more active on the norepinephrine transporter (NET)
Note: inhibitors of NET are generally “activating”

~50% of Oral CBP is Converted to norCBP by the Liver

norCBP has "Flat" PK and Accumulates with Chronic Dosing

Cyclobenzaprine (CBP)



Dynamic pharmacokinetics

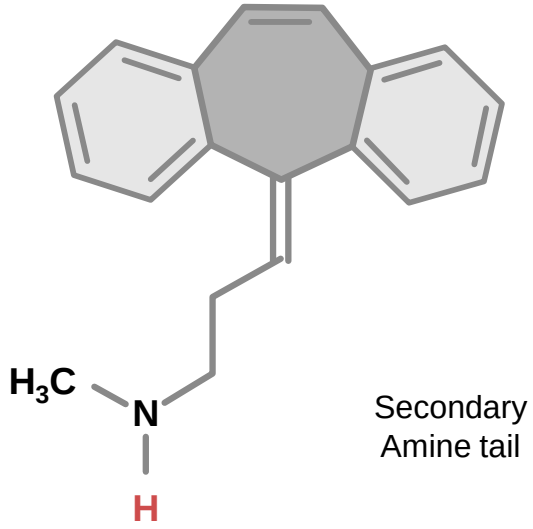
Bed time dosing – blood levels peak ~5 hours after dosing and then rapidly fall to waking

"First pass" hepatic metabolism

CH_3

demethylation

norCyclobenzaprine (norCBP)



"Flat" pharmacokinetics

Accumulates with oral dosing – little diurnal variation in blood levels

Many CNS drugs have pharmacodynamic effects from rising and falling drug blood levels

TNX-102 SL: Sublingual Formulation is Designed for Long-Term Daily Administration at Bedtime and Transmucosal Absorption

- **Cyclobenzaprine (CBP) - Tertiary Amine Tricyclic (TAT)**
  - Dynamic pharmacokinetics (PK)
    - Elimination by *N*-glucuronidation
- **Oral administration results in first-pass metabolism**
  - Generation of active metabolite, norCBP
- **NorCyclobenzaprine (norCBP) – Secondary Amine Tricyclic (SAT)**
  - Flat pharmacokinetics (PK)
    - No elimination by *N*-glucuronidation
- **TNX-102 SL delivers CBP by transmucosal absorption and is designed to bypass first-pass hepatic metabolism and lower norCBP accumulation**
  - Provides rapid absorption for bedtime dosing

Fibromyalgia Market Characteristics

Current FDA-Approved Fibromyalgia Drugs[1]

Improvement in fibromyalgia pain was primary endpoint for approval

- No current product addresses pain, poor sleep and fatigue
- Tolerability issues limit long term use for many patients

Drug		Pregabalin	Duloxetine Milnacipran
Class		Gabapentinoid	SNRI
Fibromyalgia Activity	**Pain Reduction**	YES	YES
	Sleep Improvement	YES	-
	Fatigue Reduction	-	YES
Tolerability Issues	Fatigue increase	YES	-
	Sleep problems	-	YES
	Weight gain	YES	-
	Blood Pressure increase	-	YES
	Sexual impairment	-	YES
	GI issues	-	YES
	Hip Fractures[2]	YES	-
	DEA Scheduled	YES	-

[1]The three drugs with FDA approval for the management of fibromyalgia are Pregabalin (Lyrica®); Duloxetine (Cymbalta®); and Milnacipran (Savella®)

[2]Leung MTY, et al. *JAMA Netw Open*. 2024;7(11):e2444488. doi: 10.1001/jamanetworkopen.2024.44488. PMID: 39535796; PMCID: PMC11561685.

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Opportunity for a New, Unique Fibromyalgia Treatment Option: Results of Primary Research from EVERSANA[1,2]

FM Landscape

- Prescribers indicate a **very high unmet need** in FM (ranked ≥4.0 on a 5-point scale)
- Prescribers report there is **no standard of care in FM**, employ an **individualized approach** based on symptomology
- No new treatments approved since 2009
- Prescribers report minimal promotional activities by any pharmaceutical company
- Highly concentrated prescriber base with 50% of patients treated by ~16k physicians

Physician Primary Market Research

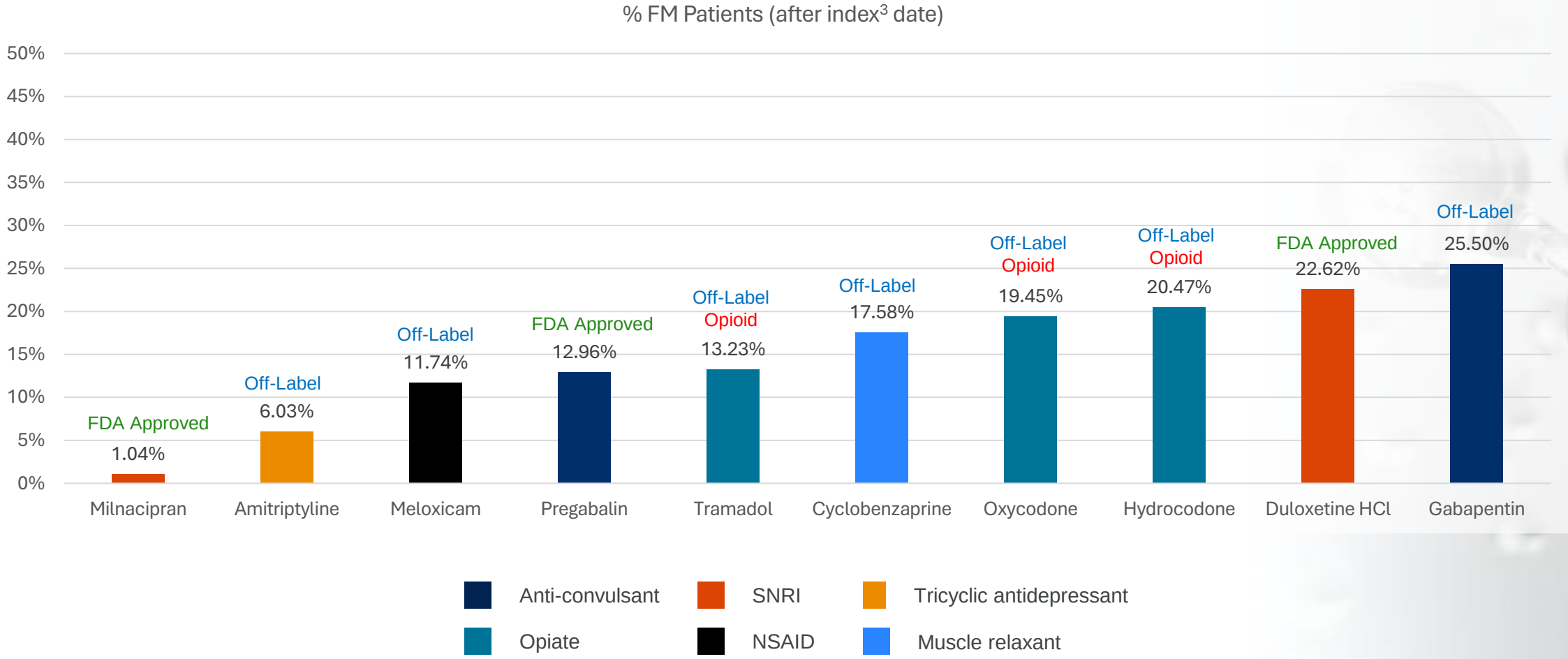
- **Physicians reacted positively to the efficacy and safety profile of TNX-102 SL (based on Phase 3 Study results)**
- Median interest = 4.0 on a 5-point scale
- Driving attributes included **strong efficacy, safety and tolerability**
- Unique & differentiating efficacy features included improvements in **sleep and fatigue**

Anticipated Use

- **Physicians indicated intended use in 40% of their FM patients**
- Majority of respondents indicated TNX-102 SL would be their first choice, if accessible
- Physicians surveyed indicated they are well-equipped to deal with access restrictions including prior authorizations and step-edits

[1] EVERSANA primary physician research, May 2024; commissioned by Tonix
[2] EVERSANA analysis of claims database, May 2024; commissioned by Tonix

Many Fibromyalgia Patients are Prescribed Off-Label Drugs; ~53% FM Patients Prescribed Opioids Off-Label[1,2]



[1] 2022-2023
[2] EVERSANA analysis of claims database, May 2024; commissioned by Tonix
[3] Index date refers to date when ICD10 code was entered into database

TNX-102 SL Other Indications

TNX-102 SL for Acute Stress Reaction (ASR) / Acute Stress Disorder (ASD)

ASR/ASD are acute stress conditions resulting from trauma which can affect both civilian and military populations.

Large unmet need:

- According to National Center for PTSD, about 60% of men and 50% of women in the US are exposed least one traumatic experience in their lives[1]
- In the US alone, one-third of emergency department visits (40-50 million patients per year) are for evaluation after trauma exposures[2]

Current standard of care:

- No medications are currently available at or near the point of care to treat patients suffering from acute traumatic events and support long-term health

[1]National Center for PTSD. How Common is PTSD in Adults? https://www.ptsd.va.gov/understand/common/common_adults.asp
[2]Wisco et al. *J Clin Psychiatry*. 2014.75(12):1338-46

TNX-102 SL for ASR/ASD: Program Status

Status: Expect to start investigator-initiated Phase 2 in 1Q 2025; received IND clearance from FDA

Investigator-initiated Phase 2 Trial Funded by DoD grant to University of North Carolina (UNC)

- UNC Institute for Trauma Recovery awarded a $3M grant from the Department of Defense (DoD)
- OASIS trial will build upon infrastructure developed through the UNC-led, $40M AURORA initiative
  - AURORA study is a major national research initiative to improve the understanding, prevention, and recovery of individuals who have experienced a traumatic event
  - Supported in part by funding from the National Institutes of Health (NIH) and the health care arm of Google's parent company Alphabet
- Opportunity to investigate the correlation between motor vehicle collisions and the emergence of ASD and PTSD
- Supported by multiple clinical trials:
  - Phase 2 trial in military-related PTSD (AtEase or NCT02277704)
  - Phase 3 trial in military-related PTSD (HONOR or NCT03062540)
  - Phase 3 trial in primarily civilian PTSD (RECOVERY or NCT03841773)
- In each of these studies, early and sustained improvements in sleep were associated with TNX-102 SL treatment by the PROMIS sleep disturbance (SD) scale and the Clinician Administered PTSD Scale (CAPS-5) "sleep disturbance" item.

Together these studies provide preliminary evidence that TNX-102 SL is generally well-tolerated and may promote recovery from PTSD via a pharmacodynamic facilitation of sleep-dependent emotional memory processing

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TNX-102 SL for Long-COVID: Significant Overlap between Fibromyalgia and Long-COVID

National Institutes of Health (NIH)-sponsored RECOVER study found many Long COVID patients suffer from pain at multiple sites[1]

- Suggests that many Long-COVID patients may meet the diagnostic criteria for fibromyalgia

Tonix has previously presented its analysis of real-world evidence from the TriNetX claims database suggesting that ***over 40% of Long COVID patients present with a constellation of symptoms that overlap with fibromyalgia***[2,3]

[1]Thaweethai T, et al. *JAMA*. 2023 329(22):1934-1946.
[2]Feb 22, 2023 Tonix Pharmaceuticals Press Release. URL: https://ir.tonixpharma.com/news-events/press-releases/detail/1369/tonix-pharmaceuticals-describes-emerging-research-on-the
[3]September 21, 2022, Tonix Pharmaceuticals Poster at the IASP, "Retrospective observational database study of patients with Long COVID with multi-site pain, fatigue and insomnia". URL: www.tonixpharma.com/wp-content/uploads/2022/09/Retrospective-Observational-Database-Study-of-Patients-with-Long-COVID-with-Multi-Site-Pain-Fatigue-and-Insomnia_A-Real-World-Analysis-of-Symptomatology-and-Opioid-Use.pdf

NASEM Definition of Long-COVID

- In June 2024, the US National Academies of Sciences, Engineering and Medicine (NASEM) described **fibromyalgia as a 'diagnosable condition' in people suffering from Long COVID**[1]
- This definition provides guidance to government, healthcare professionals and industry that fibromyalgia can arise after infection with the SARS-CoV-2 virus and can be diagnosed in Long COVID patients

Fibromyalgia prevalence prior to COVID-19 pandemic: >10M adults in the US[2]

Long-COVID prevalence: 5.3% or ~14M adults in the US[3]

Tonix believes that diagnosing fibromyalgia in Long COVID patients will increase the potential market for TNX-102 SL as compared to market estimates from before the COVID-19 pandemic

[1]U.S. National Academies of Sciences, Engineering, and Medicine. 2024. *A Long COVID Definition: A chronic, systemic disease state with profound consequences.* Washington, DC: The National Academies Press. https://doi.org/10.17226/27768. http://www.nationalacademies.org/long-covid-definition.
[2]Vincent A, et al. Arthritis Care Res (Hoboken). 2013 65(5):786-92. doi: 10.1002
[3]National Center for Health Statistics. U.S. Census Bureau, Household Pulse Survey, 2022–2024. Long COVID. Generated interactively: July 22, 2024 from https://www.cdc.gov/nchs/covid19/pulse/long-covid.htm

TNX-102 SL: Patents and Patent Applications

- **U.S. Composition:***
  - A 75:25 cyclobenzaprine HCl - mannitol eutectic (dependent claims add a basifying agent).
    - 5 US Patents (Expire November 2034)
    - 1 Pending US Application (Would expire November 2034)
  - A composition of a cyclobenzaprine HCl and a basifying agent suitable for sublingual absorption.
    - 1 Pending US Application (Would expire June 2033)

- **U.S. Methods of Use* (Specific Indications):**
  - Fibromyalgia
    - Pain, Sleep Disturbance, Fatigue
      - 1 Pending US Application (Would expire December 2041)
    - Early Onset Response
      - 1 Pending US Provisional Application (Would expire December 2044)
    - Depressive Symptoms
      - 1 Pending US Application (Would expire March 2032)
  - Sexual Dysfunction
    - 1 Pending US Application (Would expire October 2041)
  - PASC
    - 1 Pending US Application (Would expire June 2043)
  - PTSD
    - 1 US Patent (Expires November 2030)
  - Agitation (Dementia)
    - 1 US Patent (Expires December 2038)
    - 1 Pending US Application (Would expire December 2038)
  - Alcohol Use Disorder
    - 1 Pending US Application (Would expire November 2041)

- **Foreign Filings**
  - Corresponding foreign patents have been filed and some have issued:
    - Composition (25 patents, 3 allowed applications, 16 pending applications)
    - Methods of Use (9 patents, 54 pending applications)

Patents based on TNX-102 SL's eutectic composition and its properties have issued in the U.S., E.U., Japan, China and many other jurisdictions around the world and provide market protection into 2034.

The European Patent Office's Opposition Division maintained Tonix's European Patent EP 2 968 992 in unamended form after an Opposition was filed against it by a Sandoz subsidiary, Hexal AG. Hexal AG did not appeal that decision.

*US Patents: Issued: US Patent Nos. 9,636,408; 9,956,188; 10,117,936; 10,864,175; 11,839,594; 9,918,948; 11,826,321. Pending: US Patent Application Nos. 13/918,692; 18/385,468; 13/412,571; 18/265,525; 63/612,352; 18/382,262; 18/037,815; 17/226,058; 18/212,500.

TONIX MEDICINES: MARKETED PRODUCTS

Tonix Markets Two Proprietary Migraine Drugs

Non-oral Formulations of Sumatriptan

Zembrace® SymTouch®

(sumatriptan injection) 3 mg[1]

Tosymra®

(sumatriptan nasal spray) 10 mg[2]

- Each indicated for the ***treatment of acute migraine with or without aura in adults***
- Sumatriptan remains the acute migraine 'gold standard' treatment for many patients and continues to represent the largest segment of the market in terms of unit sales[3]
- Each may provide migraine ***pain relief in as few as 10 minutes*** for some patients[1,2,4,5]
- Patents to 2036 (Zembrace) and 2031 (Tosymra)

Tonix Medicines Commercial Subsidiary

- Complete commercialization capability
  - Manage supply chain and contract manufacturer
  - Distribution
  - Trade, Managed Care & Government contracting
- Team of professionals including Sales & Marketing personnel

[1]Zembrace SymTouch [package insert]. For more information, talk to your provider and read the Patient Information and Instructions for Use. – Important Safety Information is provided in the appendix

[2]Tosymra [package insert]. For more information, talk to your provider and read the Patient Information and Instructions for use– Important Safety Information is provided in the appendix

[3]Tonix Medicines, Inc.; Data On File, 2023

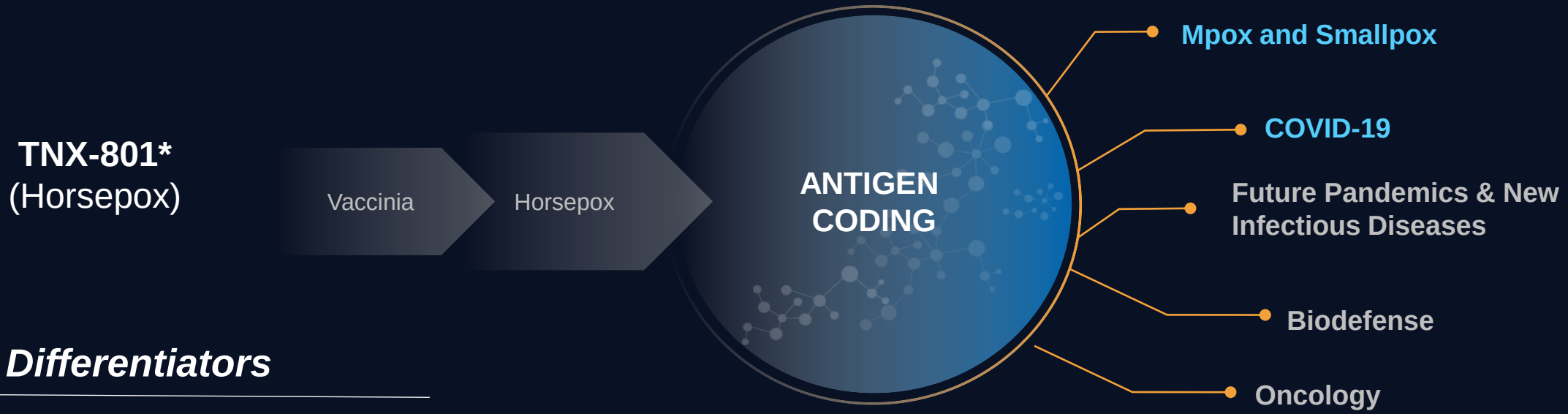
[4]Mathew NT, et al. Dose ranging efficacy and safety of subcutaneous sumatriptan in the acute treatment of migraine. US Sumatriptan Research Group. Arch Neurol. 1992;49(12):1271-1276.

[5]Wendt J, et al. A randomized, double-blind, placebo-controlled trial of the efficacy and tolerability of a 4-mg dose of subcutaneous sumatriptan for the treatment of acute migraine attacks in adults. Clinical Therapeutics. 2006;28(4):517-526.

INFECTIOUS DISEASE: KEY CANDIDATES

TNX-801: Recombinant Pox Vaccine (RPV) Platform Using Live Virus Technology

Cloned version of horsepox[1] purified from cell culture



Key Differentiators

Live virus vaccines are the most established vaccine technology

- Prevents forward transmission
- Effective in eliciting durable or long-term immunity

Economical to manufacture at scale

- Low dose because replication amplifies dose *in vivo*
- Single administration

Standard refrigeration for shipping and storage

*TNX-801 is in the pre-IND stage of development and has not been approved for any indication.
[1]Noyce et al., 2018. *PLoS One*. 13(1):e0188453.

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TNX-801: Pre-IND Ready Candidate Mpox Vaccine

- Based on synthetic horsepox-vector, believed related to first smallpox vaccine used by Dr. Edward Jenner in 1796[1]
- Single-dose percutaneous[2]
- Attenuated live virus[3]
- Expected durable T-cell immunity similar to 19th Century vaccinia
- Believed to be thermo-stable in ultimate lyophilized formulation
- Eventual presentation using Microneedle Array Patch – working with developers

R&D Center- Maryland
Operational BSL-3 capable

Advanced Manufacturing Center- MA
GMP-manufacturing capability*

*GMP Suites currently decommissioned

[1]Noyce RS, et al. *PLoS One.* 2018 Jan 19;13(1):e0188453. doi: 10.1371/journal.pone.0188453. PMID: 29351298; PMCID: PMC5774680.
[2]Noyce RS, et al. *Viruses*. 2023 Jan 26;15(2):356. Doi: 10.3390/v15020356. PMID: 36851570; PMCID: PMC9965234
[3]Trefry SV, et al. *mSphere*. 2024 Nov 13:e0026524. doi: 10.1128/msphere.00265-24. Epub ahead of print. PMID: 39535212.

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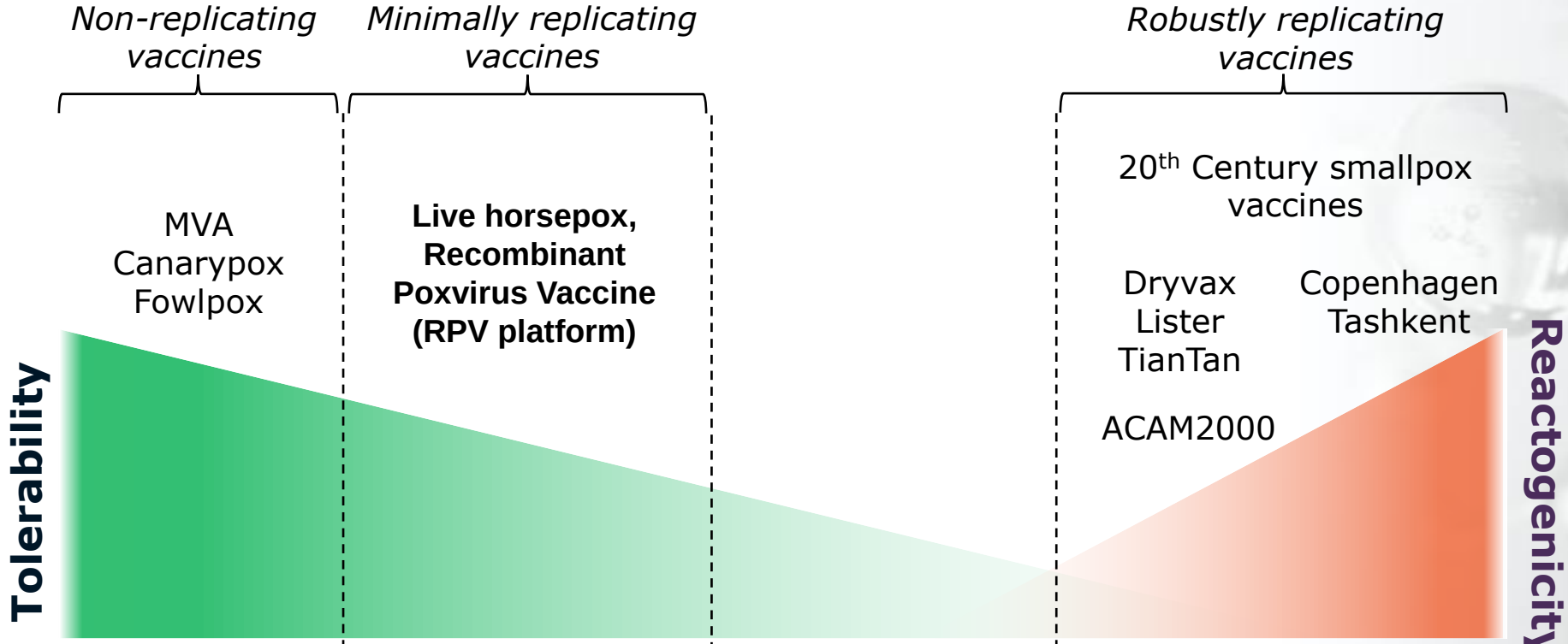
Illustrative Safety Spectrum Of Pox-based Vaccine Vectors as Live Virus Vaccines



	Non-replicating vaccines	Minimally replicating vaccines	Robustly replicating vaccines
# of doses	Two	Single-dose	Single-dose
Durability of protection	Waning	Long	Decades
Transgene expression	Poor	Robust	Robust

Mpox Declared Public Health Emergency of International Concern (PHEIC) by WHO* on August 14, 2024: New Clade I = "Clade Ib"

- **Clade Ib - first wave in Democratic Republic of Congo (DRC)**
  - Affects children
  - New mutations
  - ~0.5% mortality
  - Affects both MSM (men who have sex with men) + heterosexual transmission primarily in adults
  - 2024 mpox epidemic has spread to 16 countries in Africa
  - Outside of Africa cases identified in Sweden, Thailand, Singapore, India, Germany and England

- **Two FDA**-approved vaccines:**
  - Jynneos® (Bavarian-Nordic) – requires 2 dose regimen
    - Durability of neutralization antibody titers being studied[1-3]
    - Also approved for use in adults by the WHO[4]
  - ACAM 2000 (Emergent) – single-dose, reactogenic
    - Provides durable protection
    - Approved for people at high risk of mpox infection[5]

*WHO = World Health Organization

[1]Zaeck LM, *Nat Med.* 2023 29(1):270-278. doi: 10.1038/s41591-022-02090
[2]Berens-Riha N, et al. *Euro Surveill.* 2022 27(48):2200894. doi: 10.2807/1560-7917.ES.2022.27.48.2200894.
[3]Collier AY, et al. *JAMA*. 2024 Oct 3. doi: 10.1001/jama.2024.20951. Epub ahead of print. PMID: 39361499. https://pubmed.ncbi.nlm.nih.gov/39361499/
[4]Keaton, J. Sept. 13, 2024. *Associated Press.* "WHO grants first mpox vaccine approval to ramp up response to disease in Africa." URL: https://bit.ly/4e4yyeb
[5]https://www.fda.gov/vaccines-blood-biologics/vaccines/key-facts-about-vaccines-prevent-mpox-disease#:~:text=ACAM2000%20Vaccine,for%20smallpox%20or%20mpox%20infection.

Broad-Spectrum Antiviral Discovery Programs

Host-directed antiviral discovery programs

- **TNX-4200*: CD45 targeted therapeutics**
  - Small molecule therapeutics that reduce endogenous levels of CD45, a protein tyrosine phosphatase
  - Reduction in CD45 protects against many viruses including the Ebola virus
- **Cathepsin inhibitors**
  - Small molecule therapeutics that inhibit ***essential cathepsins*** which are required by viruses such as coronaviruses and filoviruses to infect cells
  - Activity as monotherapy and in combination with other antivirals

Virus-directed antivirals discovery program

- **Viral glycan-targeted engineered biologics**
  - Bind to viral densely branched high-mannose (DBH) glycans
  - ***Neutralize circulating virus*** and stop the entry of the progeny virus into cells
  - Antiviral activity against a broad range of RNA viruses
  - Activity as monotherapy and in combination with other antivirals

R&D Center (RDC): Frederick, MD

- Accelerated development of vaccines and antiviral drugs against infectious diseases
- ~48,000 square feet, BSL-2 with some areas designated BSL-3

*TNX-4200 is in the pre-IND stage of development and has not been approved for any indication

Tonix Awarded Contract from DoD

U.S. Department of Defense

Defense Threat Reduction Agency (DTRA) contract is expected to advance development of Tonix's broad-spectrum oral antiviral program, TNX-4200, for medical countermeasures

- Other Transaction Agreement (OTA) with a potential for up to $34 million over five years
- Objective is to develop small molecule, broad-spectrum antiviral agents for the prevention or treatment of infections to improve the medical readiness of military personnel in biological threat environments
- Tonix's focus is to develop an orally available CD45 antagonist with broad-spectrum efficacy against a range of viral families through preclinical evaluation
    - Program is expected to establish physicochemical properties, pharmacokinetics, and safety attributes to support an IND submission and to fund a first-in-human Phase 1 clinical study

TNX-1500: Next Generation anti-CD40L mAb

Re-engineered to better modulate the binding of Fcγ R and mitigate risk of thrombosis

Clinical Stage of Phase 1 study completed; positive topline results reported

Key Differentiators

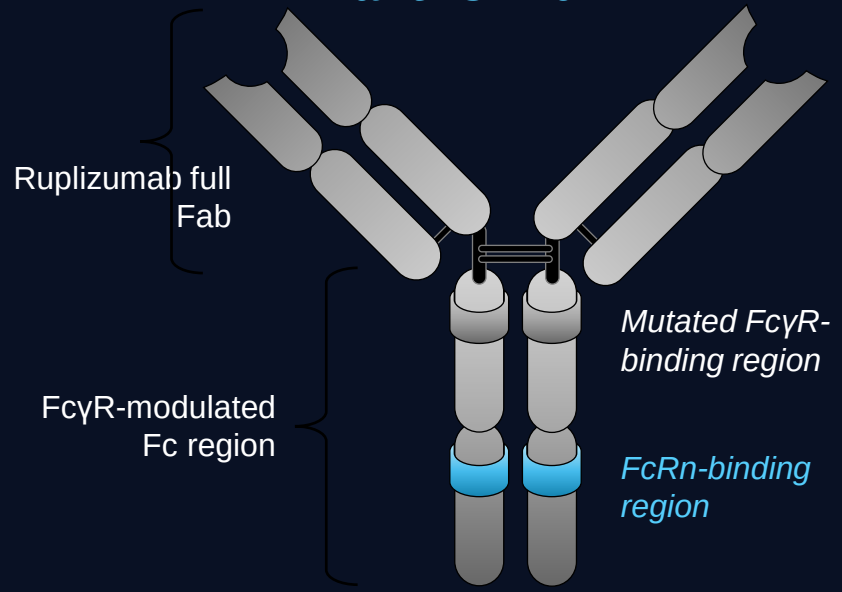
Expected to deliver efficacy without compromising safety

First Generation: Development halted due to thromboembolic (TE) complications—blood clots—traced to Fc gamma receptor (FcγR)

Second Generation: Eliminated the FcγR TE complication but potency and half life was reduced, limiting utility

Third Generation (TNX-1500): Re-engineered to better modulate the binding of FcγR.

Selectively Modified anti-CD40L AB



Contains the full ruplizumab Fab and the engineered Fc region that modulates FcγR-binding, while preserving FcRn function

*TNX-1500 has not been approved for any indication.

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TNX-1500 Phase 1 Topline Results and Conclusions

Phase 1 design – single ascending dose study in healthy participants

- Goals: Evaluate safety, pharmacodynamics and pharmacokinetics
- At total of 26 participants were enrolled in three cohorts
  - 3 mg/kg, 10 mg/kg, and 30 mg/kg

Topline results

- Pharmacodynamics: TNX-1500 blocked the primary and secondary antibody responses to a test antigen (KLH) at the 10 and 30 mg/kg IV doses
- Pharmacokinetics: mean half-life ($t_{1/2}$) for the 10 mg/kg and 30 mg/kg doses of 34-38 days
- TNX-1500 was generally well-tolerated with a favorable safety profile
- Tolerability: TNX-1500 was generally well-tolerated with a favorable safety and tolerability profile. The only TEAE occurring in ≥ 3 participants among all TNX-1500 groups was Aphthous ulcer, occurring in one participant each in the 3 mg/kg, 10 mg/kg, and 30 mg/kg groups; all were rated as mild, possibly related, and resolved in 2-10 days.

Conclusions

- Results support proceeding to develop Phase 2 trial for the prevention of kidney transplant rejection
- Fc modifications we engineered to TNX-1500 for safety did not attenuate the potency of TNX-1500 relative to humanized 5c8 (hu5c8, ruplizumab, BG9588)[1-3]
- We believe the results of this study and our prior animal studies[4,5] indicate that TNX-1500 is potentially best-in-class among anti-CD40L mAbs in development

1. Lederman S, et al, *J Exp Med*. 1992 Apr 1;175(4):1091-101. doi: 10.1084/jem.175.4.1091. PMID: 1348081; PMCID: PMC2119166.
2. Boumpas DT, et. al. *Arthritis Rheum*. 2003;48(3):719-27. doi: 10.1002/art.10856. PMID: 12632425.
3. Pierson RN 3rd, et al. *Transplantation*. 1999;68(11):1800-5. doi: 10.1097/00007890-199912150-00026. PMID: 10609959.
4. Lassiter G, et al. *Am J Transplant*. 2023;23(8):1171-1181. doi: 10.1016/j.ajt.2023.03.022.
5. Miura S, et al. *Am J Transplant*. 2023;23(8):1182-1193. doi: 10.1016/j.ajt.2023.03.025.

TNX-1500 Strategy and Status

1 Proposed Initial Indication: Prevention of Allograft Rejection

Status: ***Clinical stage Phase 1 completed – positive topline reported in 1st Quarter 2025***

Collaborations ongoing with Mass General Hospital on heart and kidney transplantation in non-human primates

- Collaboration with Boston Children's on bone marrow transplantation in non-human primates

Next Steps: Proceed to develop Phase 2 study in Kidney Transplant Recipients

2 Second Indication: Hematopoietic Cell Transplant (Bone Marrow Transplant)

- Potential to reduce GvHD

3 Third Indication (and beyond): Autoimmune Diseases (e.g., Multiple Sclerosis, Sjögren's Syndrome, Systemic Lupus Erythematosus)

- These indications require large studies, but represent large target markets

TONIX PHARMACEUTICALS

TEAM, NETWORK, & UPCOMING MILESTONES

Management Team

Seth Lederman, MD
Co-Founder, CEO & Chairman

Gregory Sullivan, MD
Chief Medical Officer

Bradley Saenger, CPA
Chief Financial Officer

Jessica Morris
Chief Operating Officer

Siobhan Fogarty
Chief Technical Officer

Milestones: Recently Completed and Upcoming

TNX-102 SL for the Management of Fibromyalgia Milestones

☑ 3rd Quarter 2024	FDA Fast Track Designation granted by FDA
☑ October 2024	Submitted NDA to FDA for TNX-102 SL for fibromyalgia in October 2024
☑ December 2024	FDA assigned a PDUFA* goal date of August 15, 2025
❑ August 15, 2025	FDA decision expected on marketing authorization

Other Key Program Milestones

☑ 3rd Quarter 2024	U.S. DoD / DTRA Awarded up to $34 M contract (over 5 years) for broad spectrum antiviral development (TNX-4200)
☑ 3rd Quarter 2024	Initiate Phase 2 study of TNX-1300 for the treatment of cocaine intoxication
☑ 1st Quarter 2025	Topline results from First in Human Phase 1 Pharmacokinetic and Pharmacodynamic study of TNX-1500 (in development for prevention of organ transplant and treatment of autoimmunity
❑ 1st Quarter 2025	Initiate Phase 2 Investigator-Initiated study at UNC of TNX-102 SL for the treatment of Acute Stress Disorder (ASD) / Acute Stress Reaction (ASR)
❑ 3rd Quarter 2025	Topline results from Phase 2 study of TNX-1300 for the treatment of cocaine intoxication

*PDUFA = Prescription Drug User Fee Act

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THANK YOU