# UNITED STATES
# SECURITIES AND EXCHANGE COMMISSION
**Washington, D.C. 20549**

# FORM 8-K

**CURRENT REPORT**

**Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

Date of report (date of earliest event reported): **July 16, 2025**

# TONIX PHARMACEUTICALS HOLDING CORP.
**(Exact name of registrant as specified in its charter)**

| **Nevada** | **001-36019** | **26-1434750** |
|---|---|---|
| **(State or Other Jurisdiction of Incorporation)** | **(Commission File Number)** | **(IRS Employer Identification No.)** |

**26 Main Street, Chatham, New Jersey, 07928**
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: **(862) 904-8182**

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

| Title of each class | Trading Symbol(s) | Name of each exchange on which registered |
|---|---|---|
| Common Stock | TNXP | The NASDAQ Capital Market |

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§ 230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§ 240.12b-2 of this chapter).

Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

**Item 7.01 Regulation FD Disclosure.**

Tonix Pharmaceuticals Holding Corp. (the "Company") updated its investor presentation, which is used to conduct meetings with investors, stockholders and analysts and at investor conferences, and which the Company intends to place on its website, which may contain nonpublic information. A copy of the presentation is filed as Exhibit 99.01 hereto and incorporated herein by reference.

The information in this Item 7.01 of this Current Report on Form 8-K, including Exhibit 99.01 attached hereto, shall not be deemed "filed" for purposes of Section 18 of the United States Securities Exchange Act of 1934 (the "Exchange Act") or otherwise subject to the liabilities of that section, nor shall they be deemed incorporated by reference in any filing under the United States Securities Act of 1933 or the Exchange Act, except as shall be expressly set forth by specific reference in such a filing.

**Item 8.01 Other Events.**

On July 16, 2025, the Company disclosed that it is planning a sales force for its TNX-102 SL product candidate for the management of fibromyalgia of between 70 and 90 sales representatives in the event the U.S. Food and Drug Administration approves the Company's New Drug Application for TNX-102 SL.

*Forward-Looking Statements*

This Current Report on Form 8-K contains certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 and Private Securities Litigation Reform Act, as amended, including those relating to the Company's product development, clinical trials, clinical and regulatory timelines, market opportunity, competitive position, possible or assumed future results of operations, business strategies, potential growth opportunities and other statement that are predictive in nature. These forward-looking statements are based on current expectations, estimates, forecasts and projections about the industry and markets in which we operate and management's current beliefs and assumptions.

These statements may be identified by the use of forward-looking expressions, including, but not limited to, "expect," "anticipate," "intend," "plan," "believe," "estimate," "potential," "predict," "project," "should," "would" and similar expressions and the negatives of those terms. These statements relate to future events or our financial performance and involve known and unknown risks, uncertainties, and other factors which may cause actual results, performance or achievements to be materially different

from any future results, performance or achievements expressed or implied by the forward-looking statements. Such factors include those set forth in the Company's filings with the SEC. Prospective investors are cautioned not to place undue reliance on such forward-looking statements, which speak only as of the date of this press release. The Company undertakes no obligation to publicly update any forward-looking statement, whether as a result of new information, future events or otherwise.

**Item 9.01 Financial Statements and Exhibits.**

(d)

| Exhibit No. | Description. |
|---|---|
| 99.01 | Corporate Presentation by the Company for July 2025 |
| 104 | Cover Page Interactive Data File (embedded within the Inline XBRL document) |

**SIGNATURE**

Pursuant to the requirement of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

**TONIX PHARMACEUTICALS HOLDING CORP.**

Date: July 16, 2025

By: /s/ Bradley Saenger
Bradley Saenger
Chief Financial Officer

**Exhibit 99.01**


## 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, 2024, as filed with the Securities and Exchange Commission (the "SEC") on March 18, 2025, 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.

TONIX PHARMACEUTICALS

# OUR MISSION

TONIX PHARMACEUTICALS

*Empowering Patients Through Possibility*

Committed to improving health by ***inventing, developing and delivering*** impactful solutions, through robust in-house capabilities and creative collaborations, to address important unmet needs in ***nociplastic pain, immunology / immuno-oncology, and infectious disease.***





## Fully-Integrated Biotech: Key Commercial, Clinical & Preclinical Programs

| | Molecule* | Indication | Phase 1 | Phase 2 | Phase 3 | NDA Submission | Approved |
|---|---|---|---|---|---|---|---|
| CNS Portfolio | **TNX-102 SL** Cyclobenzaprine HCl Sublingual Tablets | **Fibromyalgia** *Granted FDA Fast Track Designation* | | | PDUFA** goal date of August 15, 2025 | Potential Product Launch Q4 2025 | |
| | | **Acute Stress Disorder** | | | Phase 2 Enrolling*** | Topline Expected 2nd Half 2026 | |
| | **Tosymra®** | **Treatment of acute migraine** | | | | | |
| | **Zembrace®** | **Treatment of acute migraine** | | | | | |
| Immunology & Immuno-oncology Portfolio | **TNX-1500** Anti-CD40L mAb | **Organ Transplant Rejection/ Autoimmune Conditions** | | Phase 1 Study Completed | Topline Reported 1st Quarter 2025 | | |
| | **TNX-1700** TFF2-HSA fusion protein | **Treatment of Gastric and Colorectal Cancer** | Pre-Clinical | | | | |
| Infectious Disease Portfolio | **TNX-801** Live virus horsepox vaccine | **Prevention of Mpox or Smallpox** | Pre-Clinical | | | | |
| | **TNX-4200** Broad Spectrum Antiviral | **Protection of the Warfighter from Viral Pathogens** | Pre-Clinical | | | | |

*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



## Fibromyalgia (FM) is a Large, Underserved and Dissatisfied population

***chronic pain disorder resulting from amplified sensory and pain signaling within the CNS - a syndrome comprised of the symptoms: chronic widespread pain, nonrestorative sleep, and fatigue***


**>10 million U.S. adults are affected – predominantly women[1,2]**

- Debilitating and life altering condition
- Significant economic impact

**Patients have expressed dissatisfaction with currently available therapies[3,4]**

- **85%** of patients fail first-line therapy, citing efficacy and tolerability issues[4]

**2.7 million patients diagnosed and treated annually[5]**

- **~15** million prescriptions are written for the treatment of FM (on- and off-label usage) each year[6]

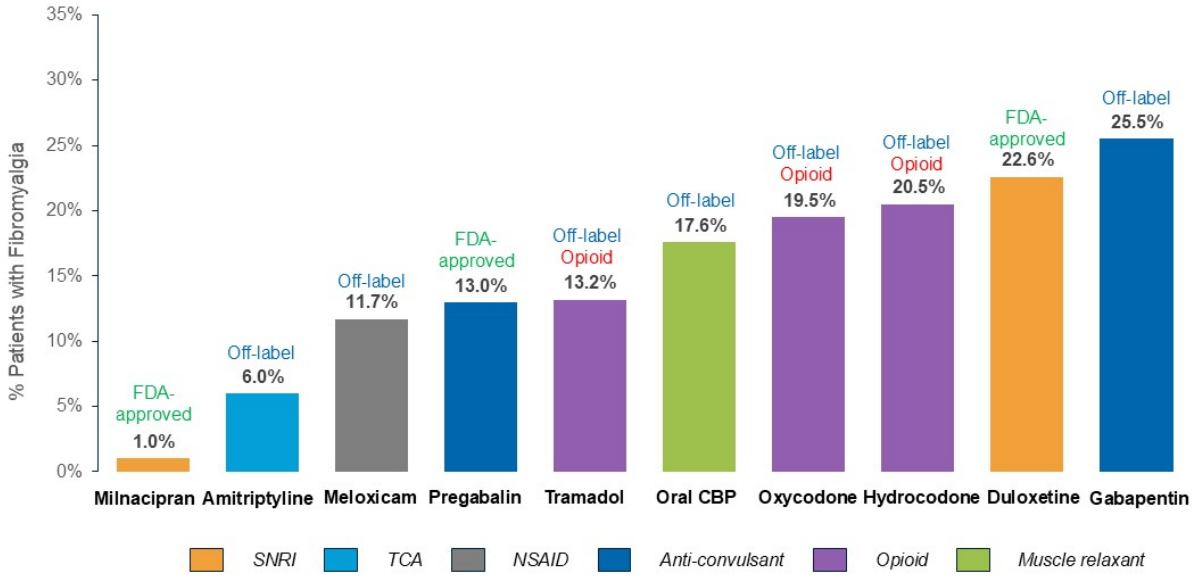
**High patient churn on currently available FM treatments**

- Typical for patients to rotate between different therapies and to be on multiple drugs at the same time
- **79%** of patients are on multiple therapies[4]

**15** **no approved FDA fibromyalgia therapies in over 15 years[4]**

[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]Robinson RL, et al. *Pain Med*. 2012;13(10):1366-76. doi: 10.1111; 85% received drug treatment
[4]EVERSANA primary physician research, May 2024; commissioned by Tonix
[5]EVERSANA analysis of claims database, May 2024, commissioned by Tonix
[6]Symphony Market data, May 2025. Prescription data includes on-label FM prescriptions and patients with FM diagnoses who received commonly prescribed off-label therapies

## Within 18 Months After Fibromyalgia Diagnosis Over 75% of Prescriptions are Off-Label and ~50% are for Off-Label Opioids




CBP, cyclobenzaprine; NSAID, nonsteroidal anti-inflammatory drug; SNRI, serotonin norepinephrine reuptake inhibitor; TCA, tricyclic antidepressant.
Eversana analysis of claims database, May 2024.





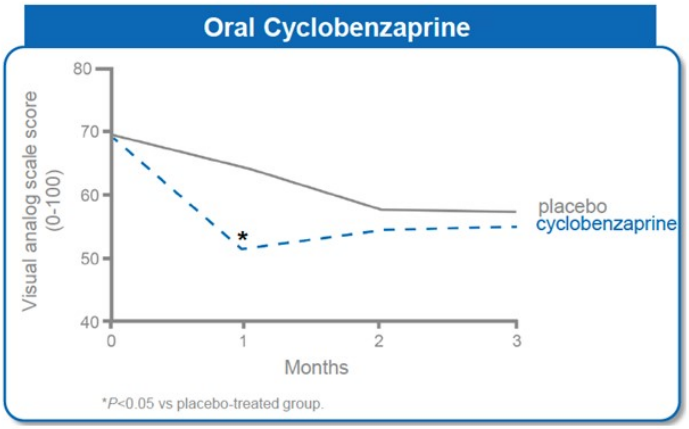
## Poor Sleep and Pain have Bidirectional Reinforcing Effects[1]

- **Harvey Moldofsky – recognition of unrefreshing/non-restorative sleep in fibromyalgia**


- **Poor sleep and pain form a <u>vicious cycle</u> in driving fibromyalgia <u>decompensation</u>**
  - 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

# Bedtime Oral Cyclobenzaprine Fails to Provide Durable (>1 Month) Activity on Pain Relief in Fibromyalgia[1]




- **Study[1]:**
  - Double-blind, randomized
  - 3 arms
  - N=208
  - 6 months
- **Dosing:**
  - Cyclobenzaprine 20 mg at bedtime[1]
    - CBP dosing near maximum for muscle spasm[2]

CBP, cyclobenzaprine.
Figure modified and redrawn from Carette S, et al. *Arthritis Rheum.* 1994;37(1):32-40.
1. Carette S, et al. *Arthritis Rheum.* 1994;37(1):32-40. 2. Flexeril® (cyclobenzaprine HCl) tablets [Prescribing Information].



TONIX PHARMACEUTICALS





# TNX-102 SL (Cyclobenzaprine HCl Sublingual Tablets) 5.6 mg[1]

***Potential to be the first FDA-approved therapy for fibromyalgia in over 15 years***



***A unique, sublingual, proprietary formulation of cyclobenzaprine (CBP) designed to optimize absorption and delivery***

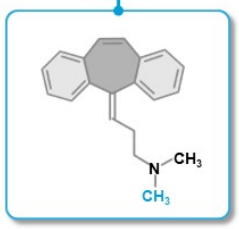
- Two pivotal studies demonstrated:
  - ***Durable reduction in fibromyalgia (FM) pain (primary endpoint)***
  - ***Improved quality of sleep and less fatigue (key secondary endpoints)***
- Non-opioid analgesic: there is heavy off-label use of opioids by those who suffer with FM[2]
- Rapid drug exposure following once-nightly sublingual administration
- Reduced levels of norCyclobenzaprine (norCBP), an active metabolite of CBP
  - norCBP is believed to negatively impact effectiveness of Cyclobenzaprine on pain relief when used chronically
- Generally well-tolerated with safety profile similar to oral Cyclobenzaprine (45-year plus safety profile)
- PDUFA goal date August 15, 2025, with potential US commercial launch in Q4 2025
- Patent Protection: Composition extending to 2034; pending method of use would extend to 2044[3]

[1]5.6 mg once-daily at bedtime, TNX-102 SL is an investigational new drug, its efficacy and safety have not been established and it has not been approved for any indication
[2]EVERSANA analysis of claims database 2022 - 2023, May 2024; commissioned by Tonix
[3]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

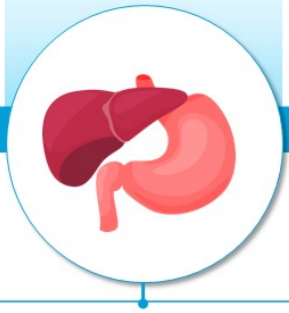
TONIX PHARMACEUTICALS

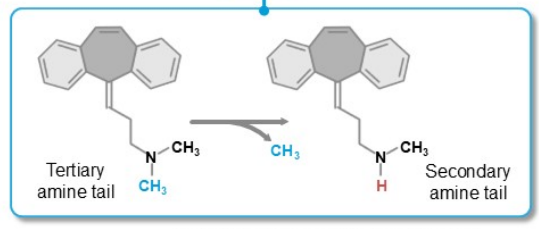
# Oral CBP Undergoes First-pass Metabolism, Leading to Increased Concentrations of norCBP Relative to CBP Over Time

CBP administered as a swallowed oral dose

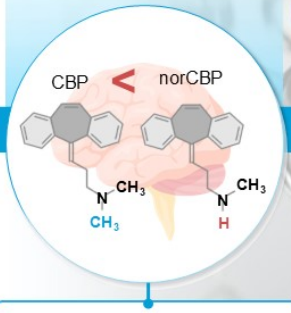




CBP undergoes "first-pass" hepatic metabolism and is ~50% converted to the persistent active metabolite norCyclobenzaprine (norCBP)






CBP and norCBP enter the brain



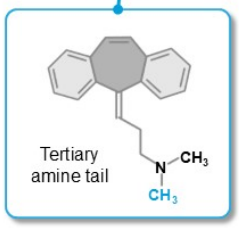

**A swallowed oral dose leads to increased concentrations of norCBP relative to CBP over time**





# TNX-102 SL Bypasses First-pass Metabolism, Leading to Faster Absorption and Reduced norCBP

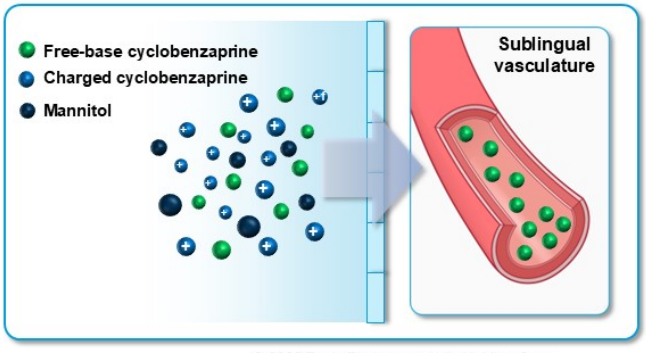
TNX-102 SL is administered sublingually

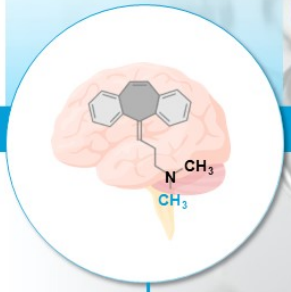

The sublingual tablet rapidly disintegrates, dissolves, and releases solubilized CBP into the saliva adjacent to the mucosal membrane

The base drives formation of CBP free-base, which enters the circulatory system across the mucosal membrane (transmucosal absorption)

Tonix's proprietary eutectic formulation contains a basic ingredient that enhances efficient transmucosal absorption and results in a stable tablet with a long shelf-life




CBP enters the brain directly via the circulatory system



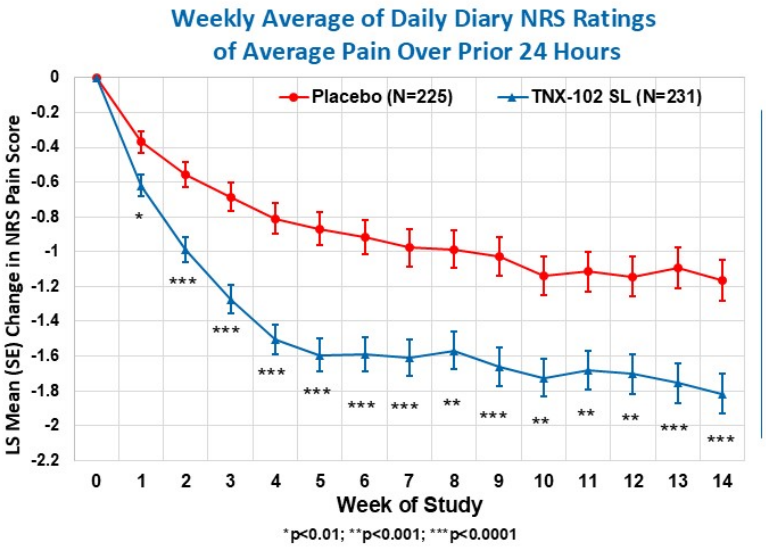

**Transmucosal CBP administered sublingually bypasses "first-pass" hepatic metabolism, leading to faster absorption and reduced norCBP**

# *RESILIENT* Primary Outcome Measure[1]

## *Reduction in Widespread Pain*

RESILIENT Study

CNS PORTFOLIO




**Dosing**

- TNX-102 SL 5.6 mg at bedtime
  - First two weeks, TNX-102 SL 2.8 mg at bedtime

**Study**

- Double-blind, randomized
- 2 arms
- n=457
- 3 months on 5.6 mg (after 2 weeks at 2.8 mg)

[1]Lederman S, et al. *Pain Med.* 2025 :doi: 10.1093/pm/pnaf089. Epub ahead of print.

**Week 14 LS mean (SE) change from baseline for TNX-102 SL -1.82 (0.12) and for placebo -1.16 (0.12); LSMD from placebo -0.65 (0.16); p=0.00005***

*Based on Mixed Model Repeated Measures with Multiple Imputation, with fixed categorical effects of treatment, center, study week, and treatment by study week interaction, as well as baseline value and baseline value-by-study week interaction. Abbreviations: LS, least squares; LSMD, least squares mean difference; NRS, numerical rating scale; SE, standard error

TONIX PHARMACEUTICALS





# *RESILIENT* Summary of Activity

RESILIENT Study

CNS PORTFOLIO

**Primary Pain, and Key Secondary Endpoints**

- Pain (primary endpoint, daily pain diary): *p*-value = 0.00005
- Fatigue (PROMIS fatigue): *p*-value = 0.00009
- Sleep (PROMIS sleep disturbance): *p*-value = 0.0000001
- Global (PGIC) *p*-value = 0.00013
- Symptoms (FIQR Symptoms *p*-value = 0.000002
- Function (FIQR Function) *p*-value = 0.001

**Exploratory Endpoints**

- Female Sexual Function (CSFQ) *p*-value = 0.010
- Depression (BDI-II) *p*-value < 0.001
- Depression (FIQR): *p*-value < 0.001
- Anxiety (FIQR): *p*-value = 0.001
- Sensitivity to environment* (FIQR): *p*-value = 0.020
- Memory (FIQR) : *p*-value = 0.001
- Energy (FIQR): *p*-value < 0.001

*loud noises, bright lights, odors, and cold

TONIX PHARMACEUTICALS

## *RESILIENT* Tolerability

RESILIENT Study

CNS PORTFOLIO

### Treatment-Emergent Adverse Events (TEAEs) at Rate of ≥ 3% in Either Treatment Group

| System Organ Class<br>Preferred Term | TNX-102 SL<br>N=231 | Placebo<br>N=226 | Total*<br>N=457 |
|---|---|---|---|
| **Systemic Adverse Events** | | | |
| COVID-19 | 10 (4.3%) | 7 (3.1%) | 17 (3.7%) |
| Somnolence | 7 (3.0%) | 3 (1.3%) | 10 (2.2%) |
| Headache | 7 (3.0%) | 4 (1.8%) | 11 (2.4%) |
| **Oral Cavity Adverse Events** | | | |
| Hypoaesthesia oral | 55 (23.8%) | 1 (0.4%) | 56 (12.3%) |
| Product taste abnormal | 27 (11.7%) | 2 (0.9%) | 29 (6.3%) |
| Paraesthesia oral | 16 (6.9%) | 2 (0.9%) | 18 (3.9%) |
| Tongue discomfort | 16 (6.9%) | 0 (0.0%) | 16 (3.5%) |

TONIX PHARMACEUTICALS





## *RESILIENT* Summary of Activity and Tolerability

RESILIENT Study

CNS PORTFOLIO

### Activity: TNX-102 SL has "broad spectrum" or "syndromal" activity

- Broad spectrum: activity across several symptoms
- Syndromal: improves the syndrome (most of the symptoms) closer to the root of the problem
- Potential for a broad-spectrum drug to reduce the use of multiple drugs or "polypharmacy"

### Tolerability: TNX-102 SL is generally well tolerated

- Somnolence and headache in 3% of TNX-102 SL treated patients *v.* 1.3% and 1.8% of placebo controls, respectively

### Potential for a fibromyalgia drug that combines activity and tolerability

- May address reluctance of physicians to make the diagnosis of fibromyalgia
- May support long term use (persistence)

TONIX PHARMACEUTICALS

## Current FDA-Approved Fibromyalgia Drugs[1]

***No current FDA-Approved FM drug addresses pain, poor sleep and fatigue***

- Improvement in fibromyalgia pain was primary endpoint of currently-approved FM drugs
- Tolerability issues may limit long term use for many patients

| Drug | | Pregabalin *(Lyrica, brand name)* | Duloxetine *(Cymbalta, brand name)* | Milnacipran (Savella, brand name) |
|---|---|---|---|---|
| **Class** | | Gabapentinoid | SNRI | SNRI |
| **Fibromyalgia Activity** | **Pain Reduction** | Yes | Yes | Yes |
| | **Sleep Improvement** | Yes | - | - |
| | **Fatigue Reduction** | - | Yes | Yes |
| **Tolerability Issues** | Fatigue increase | **YES** | - | - |
| | Sleep problems | - | **YES** | **YES** |
| | Weight gain | **YES** | - | - |
| | Blood Pressure increase | - | **YES** | **YES** |
| | Sexual impairment | - | **YES** | **YES** |
| | GI issues | - | **YES** | **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.







## 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.

# If Approved, TNX-102 SL will Join Tonix Medicine's Two Existing Proprietary CNS Drugs: Both are Non-Oral Formulations of Sumatriptan

**Tonix Medicines Commercial Subsidiary: Complete Commercialized Capabilities & Infrastructure**

- Trade, Managed Care & Government contracting
- Team of professionals including Sales, Marketing, and Medical Affairs personnel
- Manage supply chain and contract manufacturers
- Distribution

- Tosymra® and Zembrace® are 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)

**Tosymra®**
**(sumatriptan nasal spray)**
**10 mg[2]**

**Zembrace® SymTouch®**
**(sumatriptan injection) 3 mg[1]**

[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.



TONIX PHARMACEUTICALS





# Tonix Medicines' Commercial Team has ~100 Years of Commercial and Launch Expertise

CNS PORTFOLIO

**Thomas Englese**
EVP Commercial/ President

Mallinckrodt Pharmaceuticals · ELUTIA · Tris PHARMA

**Bradley Raudabaugh**
VP Mktg & Commercial Ops

AMGEN · insmed · axsome

**Gary Ainsworth**
VP Market Access

Roche · Baxter · HAVAS Gemini

**Scott Szymanski**
VP Sales

ZOGENIX · theranica · Syneos Health

TONIX PHARMACEUTICALS

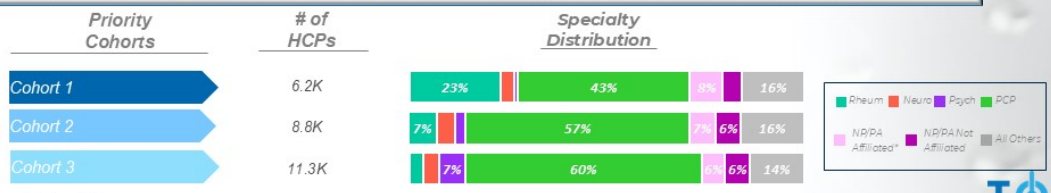
# Concentration of High Prescribing HCPs in Fibromyalgia Allows Tonix Medicines to Sell *via* Targeted Model and Omni Channel Marketing

***Of the ~470k prescribing HCPS, ~6% are responsible for writing ~70% of all FM prescriptions & diagnosing ~70% of all patients***

| Decile | Number of HCPS | Avg Annual TRX per HCP (Pregabalin, Duloxetine, Savella)[1,2] | Average Fibromyalgia Diagnosed Patients Per HCP [3] |
|---|---|---|---|
| Cohort 1 | ~6,200 | 112 | 87 |
| Cohort 2 | ~8,800 | 55 | 35 |
| Cohort 3 | ~11,300 | 36 | 21 |
| … | | | |
| Cohort 10 | ~281,500 | 1 | 4 |

[1] Paid Rx (APLD) in the recent 12 months (Feb'24 to Jan'25)
[2] Rx (FACT) in the recent 12 months (Feb'24 to Jan'25)
[3] FBM DX 2020-2025

***Initial efforts will primarily focus on Rheumatologists and High Prescribing PCPs***




*NP/PA in the same address as Rheum, Neuro, Psych, or PCPs
Top specialties in the 'All Others' group include Anesthesiology, Pain Medicine, Physical Medicine & Rehabilitation, and Emergency Medicine





# Both Patients and HCPs are Challenged by the Fibromyalgia Journey[1]

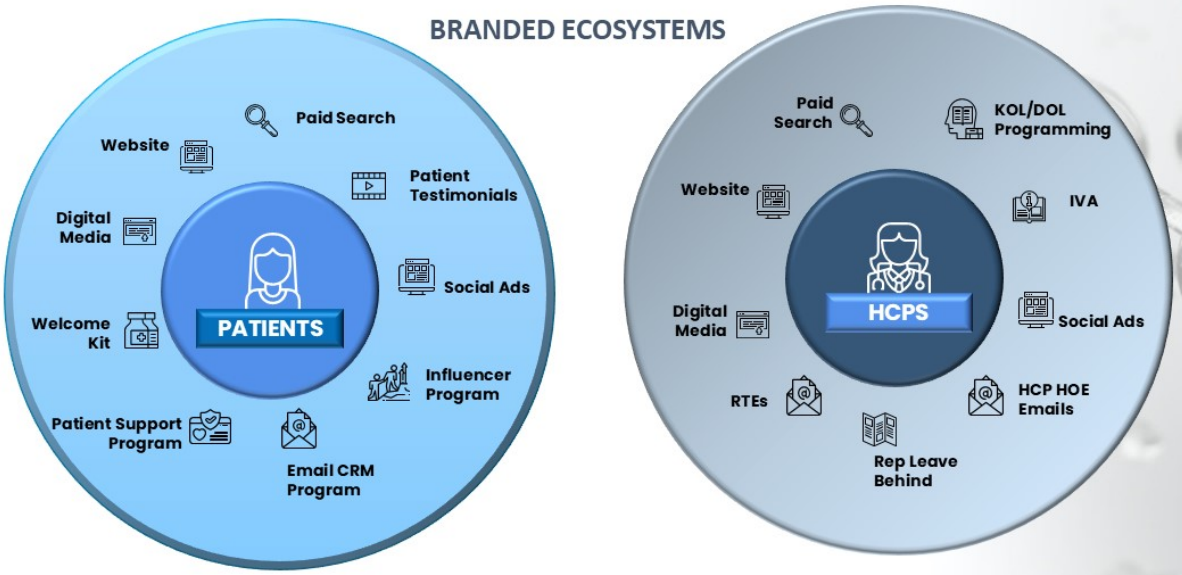

# Our branded strategy: Treat the bigger picture of fibromyalgia

**Motivate patients to request TNX-102 SL as a treatment that treats a bigger picture of their fibromyalgia.**

**Drive HCPs to see TNX-102 SL as a potential new product that finally addresses multiple fibromyalgia symptoms and works fast.**

[1]Market research commissioned by Tonix, January 2025

# Omni Channel Marketing and Messaging Campaign Planned to Maximize Reach Within the Retail and Specialty Channels




Personal Promotion: Planning to field a sales force of ~70-90 representatives at launch*

*Approximately 60-80 sales reps expected to be contracted, with ~10 internal reps





TONIX PHARMACEUTICALS



TONIX PHARMACEUTICALS

# Immunology & Immuno-oncology Portfolio: Key Candidates

# TNX-1500[1]

## Next (Third) Generation $\alpha$-CD40 Ligand (CD40L) Antibody

**The CD40-CD40L pathway is a pivotal immune system modulator and a well-established and promising treatment target**

**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.

[1]TNX-1500 has not been approved for any indication. Patents filed.

### Prevention of Allograft and Bone Marrow Transplant Rejection

Status: Phase 1 study – completed

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

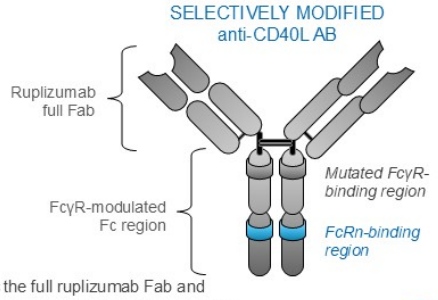
**Next Steps:** Initiate Phase 2 study in Kidney Transplant Recipients

### Autoimmune Diseases

Status: Potential future indications include:

***Sjögren's Syndrome, Systemic Lupus Erythematosus***

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




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

TONIX PHARMACEUTICALS



# TNX-1500 Phase 1 Topline Results and Conclusions

IMMUNOLOGY PORTFOLIO

### Phase 1: single ascending dose study in healthy participants to evaluate safety and pharmacokinetics/pharmacodynamics (PK/PD)

- At total of 26 participants were enrolled in three cohorts (3 mg/kg, 10 mg/kg, and 30 mg/kg *i.v.*)

### Topline results

- **Pharmacodynamics (PD):** TNX-1500 blocked the primary and secondary antibody responses to a test antigen (KLH) at the 10 and 30 mg/kg *i.v.* doses
- **Pharmacokinetics (PK)**: 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.



TONIX PHARMACEUTICALS

# TNX-1700[1]

## Gastric and Colorectal Cancers Recombinant Trefoil Factor 2 (hTFF2) Fusion Protein

**mTNX-1700 (mTFF2) has effects on cancer by altering the tumor micro-environment**

**Differentiator: No product yet identified consistently augments PD1 effects on cold tumors**

**Mechanism of Action:** suppresses myeloid-derived suppressor cells and activates anti-cancer CD8+ T cells

**Potential synergies with anti-PD-1 or antil-PD-L1 monoclonal antibodies (mAbs)**

**Licensed from Columbia University:** developing in partnership under sponsored research agreement. Patents filed.

[1]TNX-1700 is in the pre-IND stage of development and has not been approved for any indication.
[2]Dubeykovskaya Z, et al. J Biol Chem. 2009;284(6):3650-3662.
[3]Balkwill F. Semin Cancer Biol. 2004;14(3):171-179.
[4]Teixidó J, et al. Int J Biochem Cell Biol. 2018;95:121-131.

### Preclinical Evidence for Inhibiting Growth of Cancer Cells

- Data showed that mTFF2-CTP augmented the efficacy of mAb anti-PD-1 therapy. Anti-PD-1 in combination with mTFF2-CTP showed greater anti-tumor activity in PD-L1-overexpressing mice

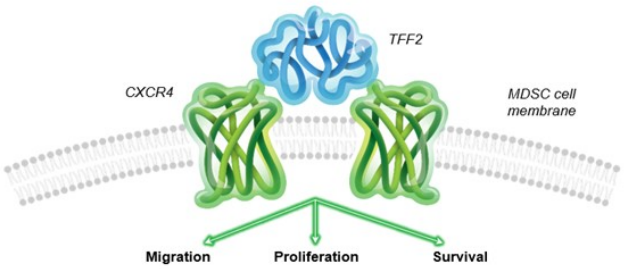
### Status:

- Preclinical, progressing to IND

### Market Entry:

- Immuno-oncology, combination therapy with PD1 blockers for gastric and colorectal cancer

**TFF2 Modulates MDSC Function via CXCR4 Signaling[2-4]**



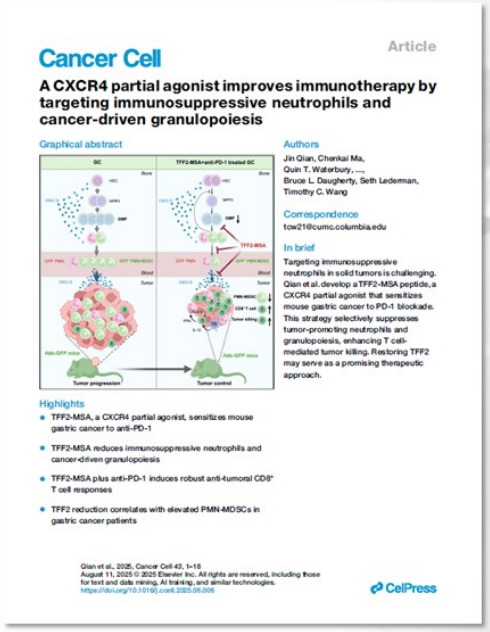

TONIX PHARMACEUTICALS



## TNX-1700 – Recent Publication in *Cancer Cell*

*Combination treatment of mTNX-1700 MSA fusion protein) with anti-PD1 associated with increased survival and decreased metastases in animal models of gastric cancer relative to anti-PD1 alone*

*mTNX-1700 treatment was associated with activation of cancer-killing CD8+ T Cells and limiting neutrophil-mediated immune evasion*



Cancer Cell

Article

**A CXCR4 partial agonist improves immunotherapy by targeting immunosuppressive neutrophils and cancer-driven granulopoiesis**

Graphical abstract

Authors

Jin Qian, Chenkai Ma, Quin T. Waterbury, ..., Bruce L. Daugherty, Seth Lederman, Timothy C. Wang

Correspondence

tcw21@cumc.columbia.edu

In brief

Targeting immunosuppressive neutrophils in solid tumors is challenging. Qian et al. develop a TFF2-MSA peptide, a CXCR4 partial agonist that sensitizes mouse gastric cancer to PD-1 blockade. This strategy selectively suppresses tumor-promoting neutrophils and granulopoiesis, enhancing T cell-mediated tumor killing. Restoring TFF2 may serve as a promising therapeutic approach.

Highlights

- TFF2-MSA, a CXCR4 partial agonist, sensitizes mouse gastric cancer to anti-PD-1
- TFF2-MSA reduces immunosuppressive neutrophils and cancer-driven granulopoiesis
- TFF2-MSA plus anti-PD-1 induces robust anti-tumoral CD8+ T cell responses
- TFF2 reduction correlates with elevated PMN-MDSCs in gastric cancer patients



CellPress

IMMUNOLOGY PORTFOLIO

TONIX PHARMACEUTICALS

# Infectious Disease Portfolio: Key Candidates





## Tonix Research and Development Center (RDC)


- Supports expanding infectious disease pipeline by accelerating internal discovery and development of vaccines and antiviral drugs
- Located in Frederick, MD (close to Fort Detrick/ USAMRIID)
- 48,000 square foot facility
- Main building is BSL-2 with certain areas designated BSL-3
- At full capacity, the RDC can employ up to 100 scientists and technical support staff

# TNX-801[1]

## Recombinant Pox Vaccine (RPV) Platform Using Live Virus Technology

**Cloned version of horsepox[2] purified from cell culture**

**Differentiators: Live virus vaccines are the most established vaccine technology. Prevents forward transmission and 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:** believed to be stable without freezing (thermostable) in ultimate lyophilized formulation

[1]TNX-801 is in the pre-IND stage of development and has not been approved for any indication.
[2]Noyce et al., 2018. *PLoS One.* 13(1):e0188453.
[3]Noyce RS, et al. *Viruses.* 2023 5(2):356. Doi: 10.3390/v15020356. PMID: 36851570; PMCID: PMC9965234
[4]Bavari, S. July 10, 2025. Presentation: World Congress on Vaccines (Vienna). "TNX-801, a single-dose live vaccine platform for Mpox and other emerging viral diseases: Safety, Immunogenicity, and Efficacy"

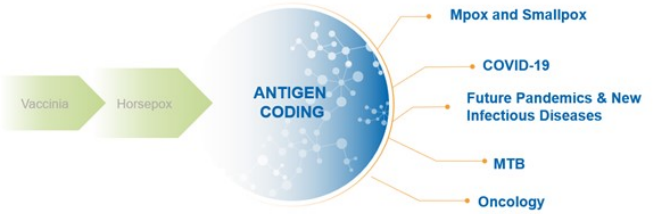


### Attenuated, minimally replicative, live virus

- Based on synthetic horsepox-vector, believed related to first smallpox vaccine used by Dr. Edward Jenner in 1796[3]
- Single-dose subcutaneous[3,4]
- Expected durable T-cell immunity similar to 19th Century vaccinia

### Design supports potential real-world effectiveness

- One-dose vaccine, allows for ring vaccination strategy and eliminates dropouts between doses
- Working to develop microneedle one-dose delivery to drive local accessibility




TONIX PHARMACEUTICALS



# TNX-4200[1]

## Broad-spectrum Host-directed Therapeutics: CD45 Inhibitor as Antiviral

**Small molecule therapeutics that reduce endogenous levels of CD45, a protein tyrosine phosphatase**

**Differentiators: Reduction in CD45 has potential to protect against many viruses.**

**Department of Defense Contract:** awarded Tonix a $34M contract over five years to advance development of TNX-4200 for medical countermeasures

**Broad antiviral application**: objective of this program is to find an orally available small molecule inhibitor of CD45 activity and show protection against multiple viral infections

[1]TNX-4200 is in the pre-IND stage of development and has not been approved for any indication.
[2]Panchal RG, et al., Cell Host Microbe. 2009 6(2):162-73. doi: 10.1016/j.chom.2009.07.003. PMID: 19683682.
[3]Panchal RG, et al. J Biol Chem. 2009 284(19):12874-85. doi: 10.1074/jbc.M809633200

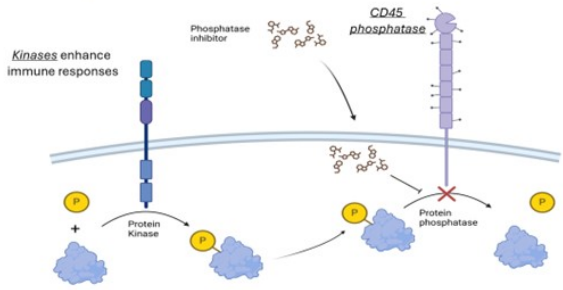


### Department of Defense Contract

- Represents a move away from "one drug, one bug" approach. Broad antiviral application has potential to protect against multiple viruses ("one drug, multiple bugs").
- 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

### Enhances viral immunity by inhibiting CD45 phosphatase

- CD45 is a transmembrane protein tyrosine phosphatase (PTPase) expressed on most hematopoietic cells, including T lymphocytes
- CD45 regulates receptor signaling pathways, particularly T cell activation
- Dephosphorylates the negative regulatory tyrosine kinases (e.g., lck and src)
- Decreased levels of CD45 enhance antiviral[2] and antibacterial immunity in animals[3]




TONIX PHARMACEUTICALS

# Tonix's scientific expertise validated by numerous mutually beneficial government and academic collaborations

- Reduces internal spend
- Increases number of trials
- Potentially speeds time to market
- Grants, contracts, cost-sharing or "in-kind" arrangements

**TNX-102 SL:** ACUTE STRESS DISORDER

U.S. Department of Defense | The University of North Carolina at Chapel Hill

**TNX-2900:** PRADER-WILLI SYNDROME

InsermTransfert | CHU de Toulouse | Aix-Marseille université

**TNX-1800:** COVID-19 VACCINE

NIH National Institutes of Health | NIH National Institute of Allergy and Infectious Diseases

**TNX-4200:** BROAD-SPECTRUM ANTIVIRAL

U.S. Department of Defense | DTRA Defense Threat Reduction Agency

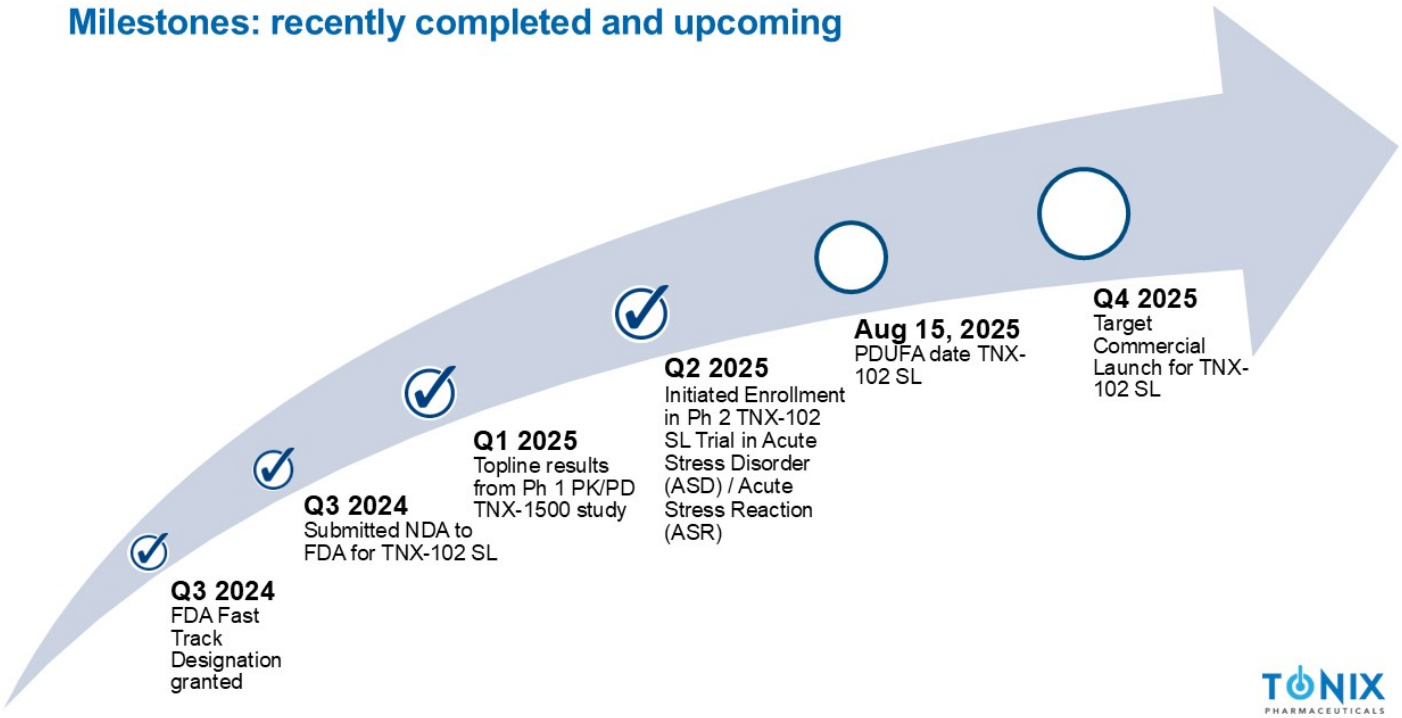
**TNX-1500:** ALLOGRAFT REJECTION

Massachusetts General Hospital | Harvard Medical School | Makana Therapeutics





## Milestones: recently completed and upcoming



# THANK YOU





## Zembrace® Important Safety Information (1 of 2)

**Zembrace SymTouch (Zembrace) can cause serious side effects, including heart attack and other heart problems, which may lead to death. Stop use and get emergency help if you have any signs of a heart attack:**

- Discomfort in the center of your chest that lasts for more than a few minutes or goes away and comes back; severe tightness, pain, pressure, or heaviness in your chest, throat, neck, or jaw; pain or discomfort in your arms, back, neck, jaw or stomach; shortness of breath with or without chest discomfort; breaking out in a cold sweat; nausea or vomiting; feeling lightheaded

Zembrace is not for people with risk factors for heart disease (high blood pressure or cholesterol, smoking, overweight, diabetes, family history of heart disease) unless a heart exam shows no problem.

Do not use Zembrace if you have:

- History of heart problems; narrowing of blood vessels to your legs, arms, stomach, or kidney (peripheral vascular disease); uncontrolled high blood pressure; hemiplegic or basilar migraines. If you are not sure if you have these, ask your provider.
- Had a stroke, transient ischemic attacks (TIAs), or problems with blood circulation; severe liver problems; taken any of the following medicines in the last 24 hours: almotriptan, eletriptan, frovatriptan, naratriptan, rizatriptan, ergotamines, dihydroergotamine; are taking certain antidepressants, known as monoamine oxidase (MAO)-A inhibitors or it has been 2 weeks or less since you stopped taking a MAO-A inhibitor. Ask your provider for a list of these medicines if you are not sure.
- An allergy to sumatriptan or any of the components of Zembrace

Tell your provider about all of your medical conditions and medicines you take, including vitamins and supplements.

Zembrace can cause dizziness, weakness, or drowsiness. If so, do not drive a car, use machinery, or do anything where you need to be alert.

# Zembrace® Important Safety Information (2 of 2)

**Zembrace may cause serious side effects including:**

- Changes in color or sensation in your fingers and toes; sudden or severe stomach pain, stomach pain after meals, weight loss, nausea or vomiting, constipation or diarrhea, bloody diarrhea, fever; cramping and pain in your legs or hips; feeling of heaviness or tightness in your leg muscles; burning or aching pain in your feet or toes while resting; numbness, tingling, or weakness in your legs; cold feeling or color changes in one or both legs or feet; increased blood pressure including a sudden severe increase even if you have no history of high blood pressure; medication overuse headaches from using migraine medicine for 10 or more days each month. If your headaches get worse, call your provider.
- Serotonin syndrome, a rare but serious problem that can happen in people using Zembrace, especially when used with anti-depressant medicines called SSRIs or SNRIs. Call your provider right away if you have: mental changes such as seeing things that are not there (hallucinations), agitation, or coma; fast heartbeat; changes in blood pressure; high body temperature; tight muscles; or trouble walking.
- Hives (itchy bumps); swelling of your tongue, mouth, or throat
- Seizures even in people who have never had seizures before

The most common side effects of Zembrace include: pain and redness at injection site; tingling or numbness in your fingers or toes; dizziness; warm, hot, burning feeling to your face (flushing); discomfort or stiffness in your neck; feeling weak, drowsy, or tired.

Tell your provider if you have any side effect that bothers you or does not go away. These are not all the possible side effects of Zembrace. For more information, ask your provider.

This is the most important information to know about Zembrace but is not comprehensive. For more information, talk to your provider and read the Patient Information and Instructions for Use. For full Prescribing Information, visit: https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=6e5b104f-2b9e-416e-92fb-ef1bdaea867d

You are encouraged to report adverse effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch or call 1-800-FDA-1088.

Zembrace is a prescription medicine used to treat acute migraine headaches with or without aura in adults who have been diagnosed with migraine.

Zembrace is not used to prevent migraines. It is not known if it is safe and effective in children under 18 years of age.







# Tosymra® Important Safety Information (1 of 2)

**Tosymra® can cause serious side effects, including heart attack and other heart problems, which may lead to death. Stop Tosymra and get emergency medical help if you have any signs of heart attack:**

- Discomfort in the center of your chest that lasts for more than a few minutes or goes away and comes back; severe tightness, pain, pressure, or heaviness in your chest, throat, neck, or jaw; pain or discomfort in your arms, back, neck, jaw, or stomach; shortness of breath with or without chest discomfort; breaking out in a cold sweat; nausea or vomiting; feeling lightheaded

Tosymra is not for people with risk factors for heart disease (high blood pressure or cholesterol, smoking, overweight, diabetes, family history of heart disease) unless a heart exam is done and shows no problem.

Do not use Tosymra if you have:

- History of heart problems; narrowing of blood vessels to your legs, arms, stomach, or kidney (peripheral vascular disease); uncontrolled high blood pressure; severe liver problems; hemiplegic or basilar migraines. If you are not sure if you have these, ask your healthcare provider.
- Had a stroke, transient ischemic attacks (TIAs), or problems with blood circulation; taken any of the following medicines in the last 24 hours: almotriptan, eletriptan, frovatriptan, naratriptan, rizatriptan, ergotamines, or dihydroergotamine. Ask your provider if you are not sure if your medicine is listed above
- are taking certain antidepressants, known as monoamine oxidase (MAO)-A inhibitors or it has been 2 weeks or less since you stopped taking a MAO-A inhibitor. Ask your provider for a list of these medicines if you are not sure
- An allergy to sumatriptan or any ingredient in Tosymra

Tell your provider about all of your medical conditions and medicines you take, including vitamins and supplements. Tosymra can cause dizziness, weakness, or drowsiness. If so, do not drive a car, use machinery, or do anything where you need to be alert.

# Tosymra® Important Safety Information (2 of 2)

**Tosymra may cause serious side effects including:**

- Changes in color or sensation in your fingers and toes; sudden or severe stomach pain, stomach pain after meals, weight loss, nausea or vomiting, constipation or diarrhea, bloody diarrhea, fever; cramping and pain in your legs or hips, feeling of heaviness or tightness in your leg muscles, burning or aching pain in your feet or toes while resting, numbness, tingling, or weakness in your legs, cold feeling or color changes in one or both legs or feet; increased blood pressure including a sudden severe increase even if you have no history of high blood pressure; medication overuse headaches from using migraine medicine for 10 or more days each month. **If your headaches get worse, call your provider**.
- Serotonin syndrome, a rare but serious problem that can happen in people using Tosymra, especially when used with anti-depressant medicines called SSRIs or SNRIs. **Call your provider right away if you have**: mental changes such as seeing things that are not there (hallucinations), agitation, or coma; fast heartbeat; changes in blood pressure; high body temperature; tight muscles; or trouble walking.
- Seizures even in people who have never had seizures before

**The most common side effects of Tosymra include**:

tingling, dizziness, feeling warm or hot, burning feeling, feeling of heaviness, feeling of pressure, flushing, feeling of tightness, numbness, application site (nasal) reactions, abnormal taste, and throat irritation.
Tell your provider if you have any side effect that bothers you or does not go away. These are not all the possible side effects of Tosymra. For more information, ask your provider.
This is the most important information to know about Tosymra but is not comprehensive. For more information, talk to your provider and read the Patient Information and Instructions for use. For full Prescribing Information, visit:
https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=015a5cf9-f246-48bc-b91e-cd730a53d8aa.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch, or call 1-800-FDA-1088.
Tosymra is a prescription medicine used to treat acute migraine headaches with or without aura in adults.
Tosymra is not used to treat other types of headaches such as hemiplegic or basilar migraines or cluster headaches.
Tosymra is not used to prevent migraines. It is not known if Tosymra is safe and effective in children under 18 years of age.