**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): **June 6, 2023**

## Xenetic Biosciences, Inc.

(Exact name of registrant as specified in charter)

| **Nevada** | **001-37937** | **45-2952962** |
|---|---|---|
| (State or other jurisdiction of incorporation) | (Commission File Number) | (IRS Employer Identification No.) |

| **945 Concord Street**<br>**Framingham, Massachusetts** | **01701** |
|---|---|
| (Address of principal executive offices) | (Zip Code) |

**(781) 778-7720**
(Registrant's telephone number, including area code)

**Not Applicable**
(Former name or former address, if changed since last report)

Check the appropriate box below if the Form 8-K 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, $0.001 par value per share | XBIO | The Nasdaq Stock Market |
| Purchase Warrants | XBIOW | The Nasdaq Stock Market |

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (17 CFR §230.405) or Rule 12b-2 of the Securities Exchange Act of 1934 (17 CFR §240.12b-2).

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.**

Attached to this report as Exhibit 99.1 is the current corporate presentation of Xenetic Biosciences, Inc. (the "Company"), which the Company has prepared in anticipation of potential upcoming investor meetings. The presentation is furnished pursuant to this Item 7.01 and shall not be deemed filed in this or any other filing of the Company with the Securities and Exchange Commission, unless expressly incorporated by specific reference in any such filing.

**Item 9.01.** Financial Statements and Exhibits.

(d) Exhibits

| Exhibit No. | Description |
|---|---|
| 99.1 | Updated 2023 Corporate Presentation |
| 104 | Cover Page Interactive Data File (formatted as inline XBRL). |

**SIGNATURES**

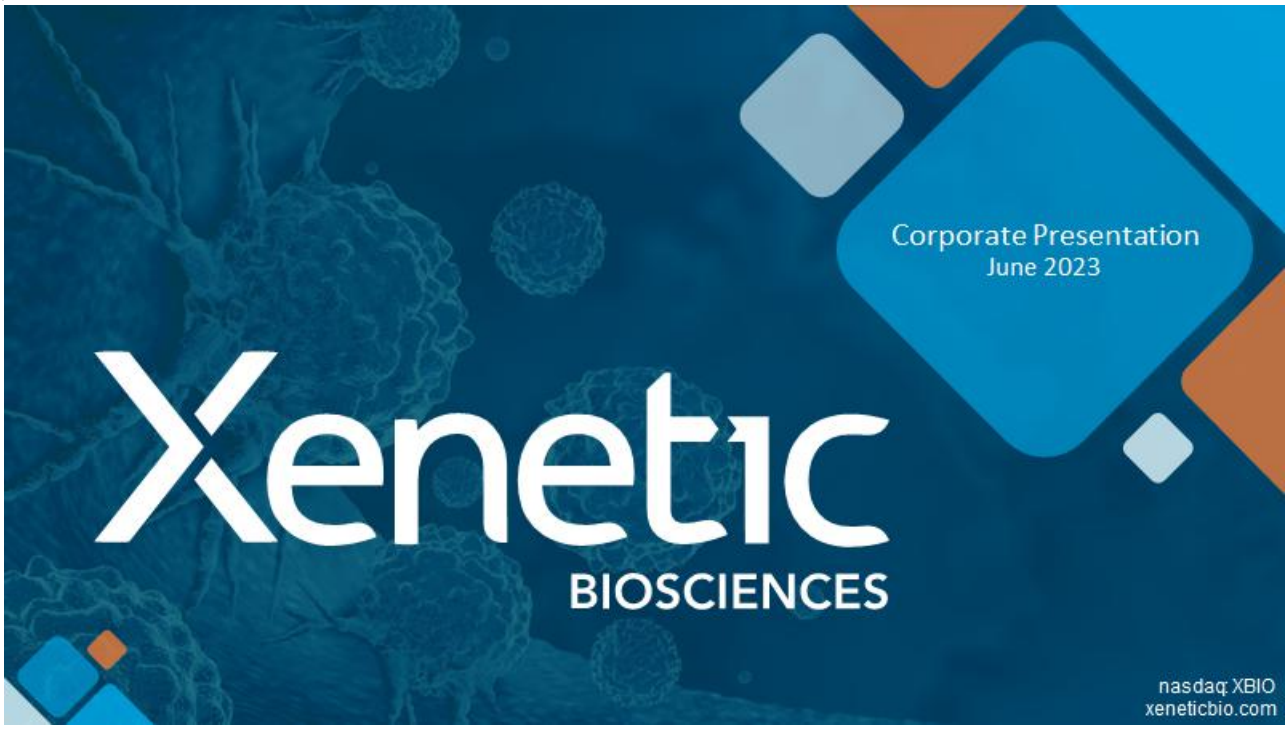
Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

**XENETIC BIOSCIENCES, INC.**

By: /s/ James Parslow
Name: James Parslow
Title: Chief Financial Officer

Date: June 6, 2023

**Exhibit 99.1**




# Forward Looking Statements

This presentation contains forward-looking statements that we intend to be subject to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. All statements contained in this presentation other than statements of historical facts may constitute forward-looking statements within the meaning of the federal securities laws. These statements can be identified by words such as "expects," "plans," "projects," "will," "may," "anticipates," "believes," "should," "intends," "estimates," and other words of similar meaning, including, but not limited to: all statements set forth under the "Investment Highlights" section of this presentation, including those relating to the DNase I technology platform; our statements regarding DNase I providing opportunity to address multiple oncology indication; our belief that DNase I has the potential to improve current cancer therapies; our currently planned Phase 1 study; our belief that we will be successful with respect to pancreatic cancer; our belief that targeting solid tumors provides opportunities for significant upside; our expectation of advancing with our collaboration with VolitionRX; and all statements under the "Investment Summary" section, including statements relating to advancing the technology platform.

Any forward-looking statements contained herein are based on current expectations and are subject to a number of risks and uncertainties. Many factors could cause our actual activities or results to differ materially from the activities and results anticipated in forward-looking statements. Important factors that could cause actual results to differ materially from such plans, estimates or expectations include, among others, (1) uncertainty of the expected financial performance of the Company; (2) failure to realize the anticipated potential of the DNase I platform or XCART or PolyXen technologies; (3) the ability of the Company to implement its business strategy; ; and (4) other risk factors as detailed from time to time in the Company's reports filed with the SEC, including its annual report on Form 10-K, periodic quarterly reports on Form 10-Q, periodic current reports on Form 8-K and other documents filed with the SEC. The foregoing list of important factors is not exclusive. In addition, forward-looking statements may also be adversely affected by general market factors, general business and economic conditions, including potential adverse effects of public health issues such as the COVID-19 pandemic, competitive product development, product availability, federal and state regulations and legislation, the regulatory process for new product candidates and indications, manufacturing issues that may arise, patent positions and litigation, among other factors. The forward-looking statements contained in this presentation speak only as of the date the statements were made, and the Company does not undertake any obligation to update forward-looking statements, except as required by law.

Disclaimer

The information contained in this presentation is provided for informational and discussion purposes only and is not, and may not be relied on in any manner as legal, business, financial, tax or investment advice or as an offer to sell or a solicitation of an offer to buy an interest in Xenetic Biosciences, Inc. or to participate in any trading strategy.

# Investment Highlights

Focused on advancing proprietary technology platform to address multiple high-value cancer indications

*DNase I Oncology Platform*
Aimed at improving immunotherapies by targeting Neutrophil Extracellular Traps (NETs)

## The Power of Leveraging DNase I

*The Problem*

NETs promote tumorigenesis and metastasis by shielding tumor cells from the immune system

NETs can also contribute to resistance to chemotherapy, checkpoint inhibitors and radiotherapy

*DNase I – Our Innovative Solution*

DNase I is an enzyme that digests DNA and can eliminate NETs

Exposes cancer cells to the immune system, chemotherapy and other targeted cancer treatments

Xenetic BIOSCIENCES



# Innovative Oncology Pipeline

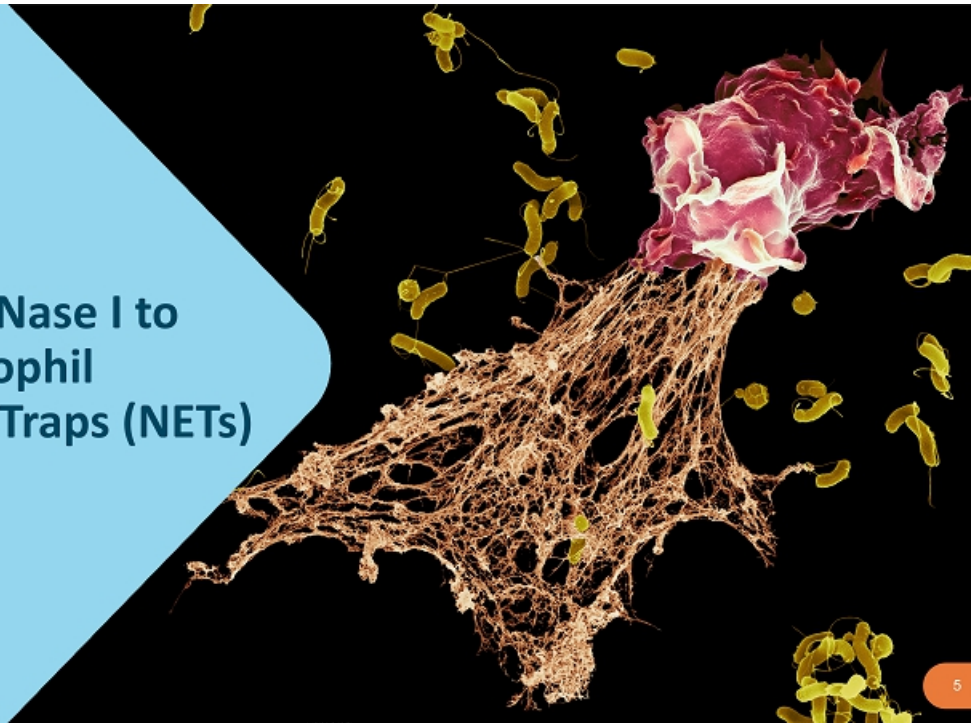
Opportunity to Address Multiple Oncology Indications

## DNase I

| PROGRAM | TECHNOLOGY | INDICATIONS | PRECLINICAL | IND ENABLING | PHASE 1 | PHASE 2 | HIGHLIGHTS |
|---|---|---|---|---|---|---|---|
| XBIO-015 | Systemic DNase I (+Chemo) | Pancreatic Carcinoma | | ○ | → | | Upcoming study to evaluate combination with chemo |
| | Systemic DNase I (+ICIs) | Solid Tumors | | ○ | → | | Upcoming study to evaluate combination with ICIs |
| | Systemic DNase I (+CAR T) | Solid Tumors | ○ | → | | | Potential to enhance CAR T cell function in the tumor microenvironment |
| XBIO-020 | DNase I-Armored CAR T | Solid Tumors | ○ | → | | | Potential to enhance CAR T cell function in the tumor microenvironment |

Xenetic BIOSCIENCES

# Leveraging DNase I to Target Neutrophil Extracellular Traps (NETs)



Xenetic



# The Role of Neutrophil Extracellular Traps (NETs)

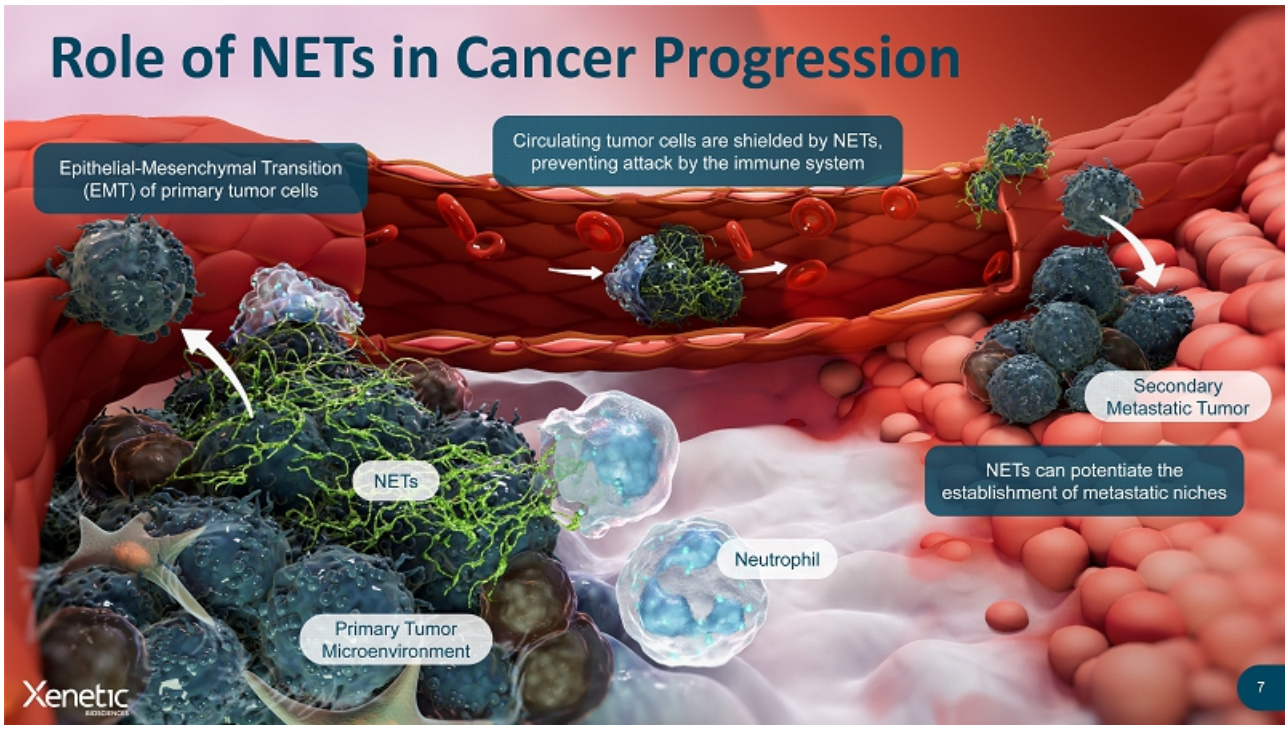
NETs are an Innate Immune Response to Kill Invading Pathogens

NETs are composed of cell-free DNA, histones, neutrophil elastase, MMP-9 and other proteins


***Elevated levels of NETs lead to inflammation and a pro-tumorigenic environment that potentiates coagulopathies and cancer progression***

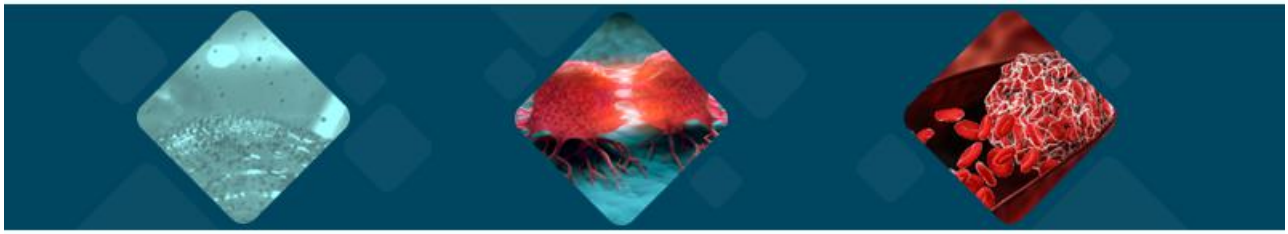
Xenetic

# Role of NETs in Cancer Progression






# NETs Can Limit the Effectiveness of Current Cancer Therapies



Shaping of the Tumor Microenvironment (TME)

Engaging in Pro-tumorigenic and Immunosuppressive Signaling, thereby Promoting Cancer Cell Proliferation, Invasion and Metastasis

Promoting Hypercoagulability and Treatment-Associated Thrombosis Exacerbated by Chemotherapy

Xenetic

# The Literature Confirms the Presence of NETs is Associated with a Poor Prognosis

*cancers*

**Neutrophils Extracellular Traps Inhibition Improves PD-1 Blockade Immunotherapy in Colorectal Cancer**

Hongji Zhang, Yu Wang, Anblessed Onuma, Jiayi He, Hua Wang, Yujia Xia, Rhea Lal 5, Xiang Cheng, Gyulnara Kasamova, Zhiwei Hu, Meihong Deng, Joel D. Beane, Alex C. Kim, Hai Huang, and Allan Tsung

CANCER RESEARCH

**Neutrophils Extracellular Traps Promote the Development and Progression of Liver Metastases after Surgical Stress**

Samer Tohme, Hamza O. Yazdani, Ahmed B. Al-Khafaji, Alexis P. Chidi, Patricia Loughran, Kerri Mowen, Yanming Wang, Richard L. Simmons, Hai Huang, Allan Tsung

JEM

**Interleukin-17-Induced Neutrophil Extracellular Traps Mediate Resistance to Checkpoint Blockade in Pancreatic Cancer**

Yu Zhang, Vidhi Chandra, Erick Riquelme Sanchez, Prasanta Dutta, Pompeyo R Quesada, Amanda Rakoski, Michelle Zoltan, Nivedita Arora, Seyda Baysoy, William Horne, Jared Burks, Hanwen Xu, Perwez Hussain, Huamin Wang, Sonal Gupta, Anirban Maitra, Jennifer M Bailey, Seyed J Moghaddam, Subagna Banerjee, Ismet Sahin, Pratip Bhattacharya, Florencia McAllister

HEPATOLOGY

**Neutrophil Extracellular Traps Promote Inflammation and Development of Hepatocellular Carcinoma in Nonalcoholic Steatohepatitis**

Dirk J van der Windt, Vikas Sud, Hongji Zhang, Patrick R Varley, Julie Goswami, Hamza O Yazdani, Samer Tohme, Patricia Loughran, Robert M O'Doherty, Maria I Minervini, Hai Huang, Richard L Simmons, Allan Tsung

BJHaem

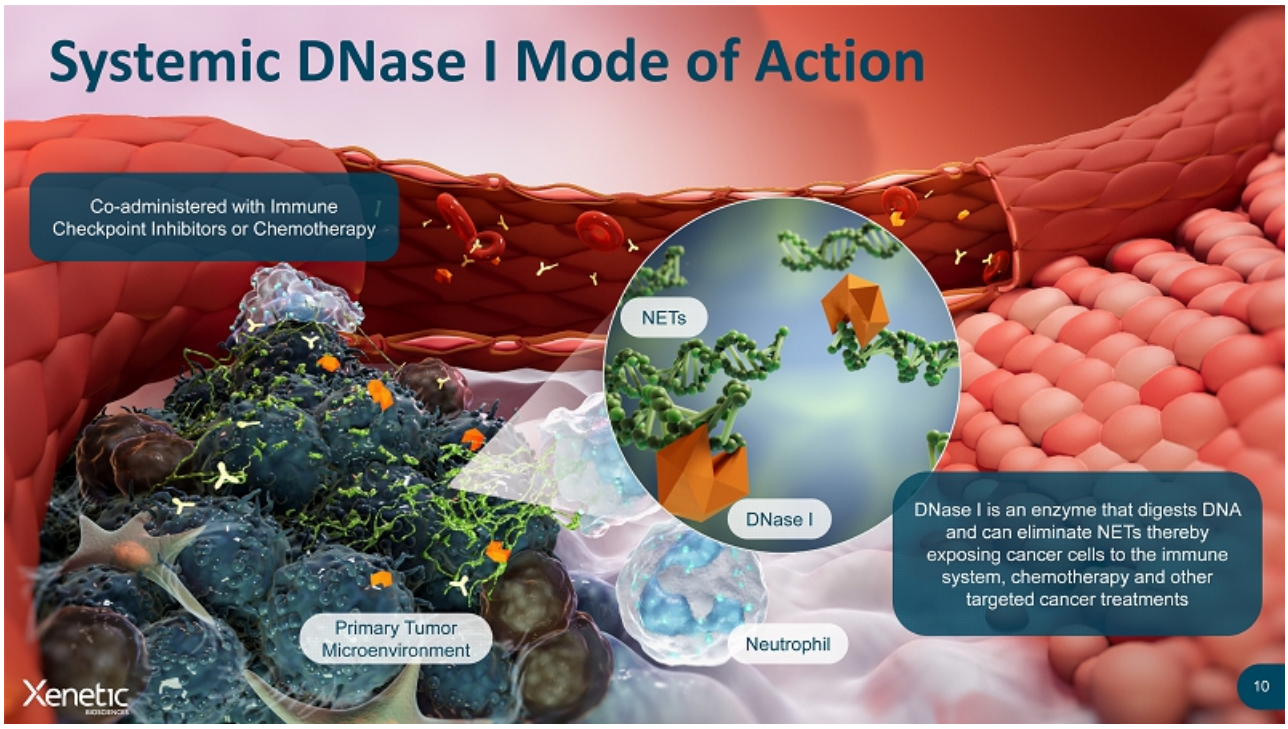
**Citrullinated Histone H3, a Biomarker for Neutrophil Extracellular Trap Formation, Predicts the Risk of Mortality in Patients with Cancer**

Ella Grilz, Lisa-Marie Mauracher, Florian Posch, Oliver Königsbrügge, Sabine Zöchbauer-Müller, Christine Marosi, Irene Lang, Ingrid Pabinger, Cihan Ay

Xenetic BIOSCIENCES



# Systemic DNase I Mode of Action




Xenetic BIOSCIENCES

# DNase I Has the Potential to Improve Current Cancer Therapies

Overcome T cell exclusion and immunosuppressive signals by the tumor microenvironment (TME)

Improve side effect profiles of current ChemoRx

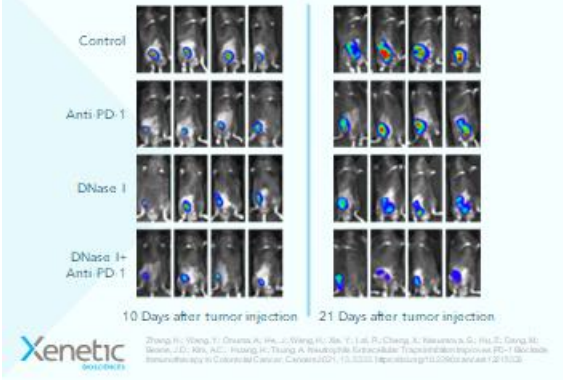
Xenetic

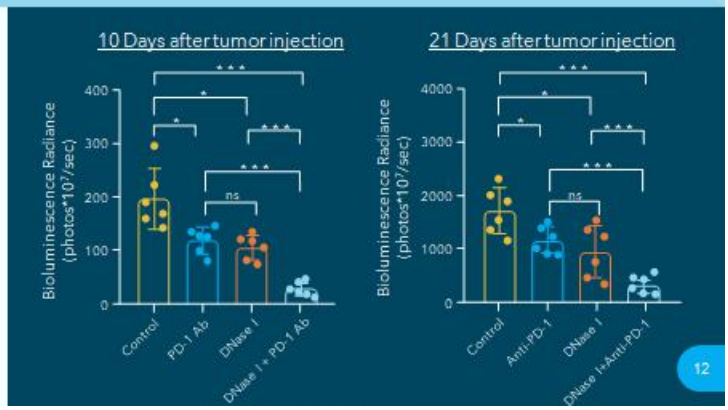


# DNase I Improves Efficacy of PD-1 Blockade

Systemic administration of DNase I improves the efficacy of PD-1 blockade to reduce the growth of cancer in MC38 colorectal cancer cell model

Combination of DNase I and anti-PD-1 mAb resulted in the lowest tumor volume growth, superior to either DNase I or anti-PD-1 alone

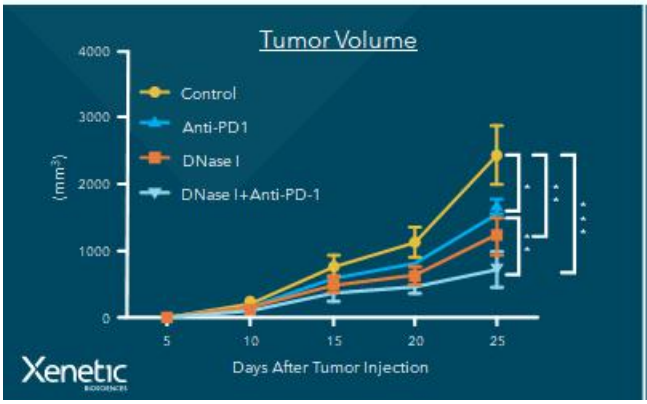


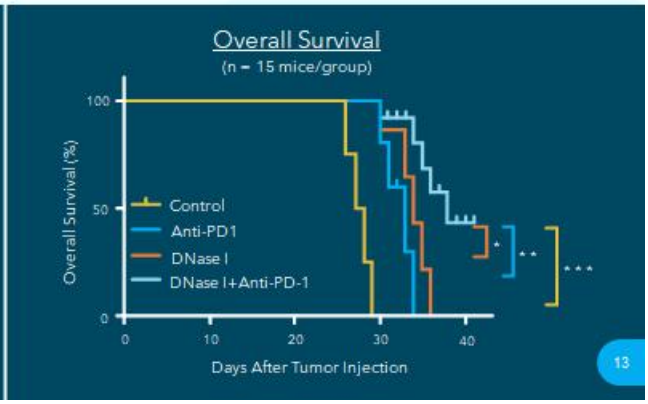




Xenetic

# DNase I Slowed Tumor Growth and Prolonged Survival

Systemic Administration of DNase I and Anti-PD-1 Resulted in the Slowest Tumor Growth and Prolonged Overall Survival in MC38 Colorectal Cancer Cell Model




Xenetic BIOSCIENCES

13

# DNase I for the Treatment of Pancreatic Carcinoma

*Advancing Toward First-In-Human Study*

Xenetic BIOSCIENCES

14

# Initially Targeting Pancreatic Carcinoma

Multi-Billion-Dollar Indication with Significant Unmet Need

Early detection is currently not feasible – most patients are diagnosed at advanced stages

5-year survival for advanced stage patients: ***~3%[1]***

**3rd** Deadliest Cancer in the United States[1]

**~62,000** Diagnosed Annually[2]

**~50,000** Deaths Annually[2]

**$4.8B** Projected Market by 2025[3]


1. U.S. Department of Health and Human Services. (n.d.). Common cancer sites- Cancer statistics. SEER. Retrieved March 17, 2023, from https://www.cancer.gov/statistics/html/common.html
2. NIH National Cancer Institute. Surveillance, Epidemiology and End Results Program.Cancer Stat Facts: Pancreatic Cancer. https://www.cancer.gov/statistics/html/pancreas.html
3. Grand View Research, Inc. (n.d.). Global pancreatic cancer treatment markets,size report,2025. Retrieved March 17, 2023, from https://www.grandviewresearch.com/industry-analysis/pancreatic-cancer-treatment-market




# Currently Planned Phase 1 Study

Multicenter, dose escalation and dose-expansion in subjects with locally advanced or metastatic solid tumors

IV administration of rhDNase I

*Monotherapy dose escalation followed by expansion in two cohorts*

- Combined with chemotherapy for pancreatic cancer patients
- Combined with immunotherapy for patients with other solid tumor indications

Primary Endpoints: safety, tolerability, efficacy, MTD and recommended Phase 2 dose

Secondary Endpoints: PK, Efficacy (ORR by RECIST)

# Key Drivers for Success

Pancreatic Cancer is a Challenging Indication but We Believe We Will Be Successful

1L PDAC has 40% ORR, 7.5 months PFS, 11.1 months OS

*Ipsen's NAPOLI-3 Study*[1]

NALIRIFOX demonstrated 42% ORR vs. 36% ORR for nab-paclitaxel and gemcitabine

mPFS for NALIRIFOX was 7.4 months vs. 5.6 months for nab-paclitaxel and gemcitabine

**Relatively Low Hurdle for Demonstrating Clinical Meaningfulness**

ORR > 50% or PFS > 9 Months Would be Meaningful Improvement to Current SOC

Xenetic

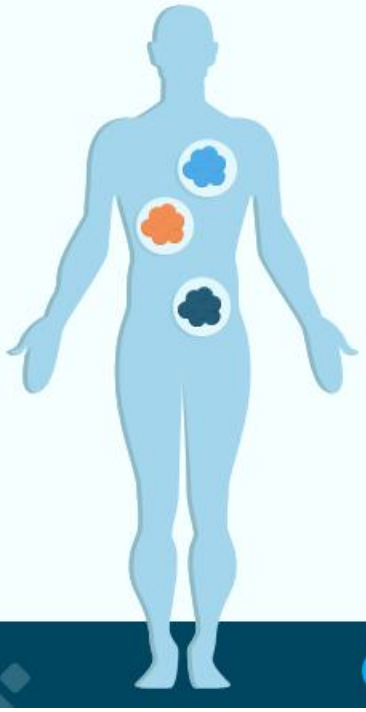
1. Ipsen presents phase III napoli-3 trial of Onivyde® regimen demonstrating positive survival results in previously untreated metastatic pancreatic ductal adenocarcinoma at ASCO GI. Ipsen. (2023, May 26). https://www.ipsen.com/press-releases/ipsen-presents-phase-iii-napoli-3-trial-of-onivyde-regimen-demonstrating-positive-survival-results-in-previously-untreated-metastatic-pancreatic-ductal-adenocarcinoma-at-asco-gi/



# Application Across a Number of Solid Tumors

~1.9 million new solid tumor cases in the U.S. in 2022[1]

~.6 million solid tumor related deaths in the U.S. in 2022[1]



| Breast | Lung | Gastrointestinal |
|---|---|---|
| ~290K | ~254K | ~343K |
| New Cases Annually[1] | New Cases Annually[1] | New Cases Annually[1] |

Xenetic

1. 2022, American Cancer Society, Inc. Surveillance and health Equity Science


# DNase I Armored CAR T for Solid Tumors

*Requirements for Successful T Cell Therapies in Solid Tumors*

- Find the tumor
- Infiltrate and persist in tumor
- Maintain cytotoxic function

*Barriers to Success in the Tumor Microenvironment*

- Physical barriers (e.g., extracellular matrix or NETs) impeding infiltration and occluding tumor cell contact
- Immunosuppressive signaling from bioactive elements within the TME

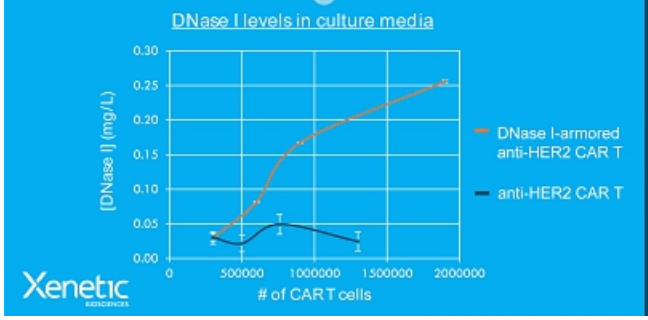
# DNase I-Armored CAR T for Solid Tumors


# DNase I Armored CAR T: Proof of Concept

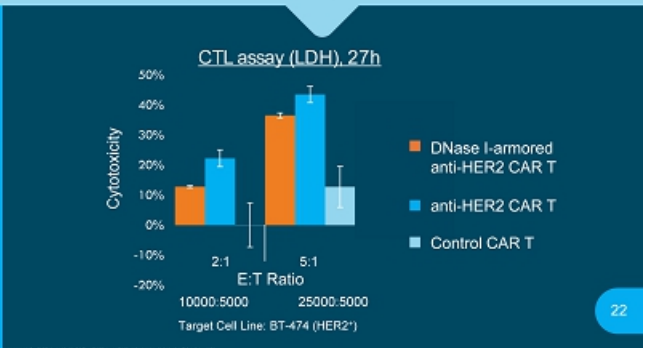
Ability to Design CAR T Cells That Deliver DNase I While Maintaining CAR T Function

HER2-Targeting, DNase I-Armored CAR T Cells:

Secrete DNase I




Retain Cytotoxic Function



# Advancing with Collaboration Partner, VolitionRX

Developing Proprietary Adoptive Cell Therapies Potentially Targeting Multiple Solid Cancer Types

Xenetic BIOSCIENCES

DNase I-Armored CAR T

Volition

Nu.Q® Technology

***Expect Volition to fund research program and two parties to share proceeds from commercialization or licensing of any products arising from the collaboration***



# Intellectual Property and Exclusivity

| Systemic DNase I | DNase I-Armored CAR T |
|---|---|
| *IP Portfolio*<br>Co-administration of Systemic DNase I with ICIs, Radiation, Chemo<br><br>*Orphan Designation*<br>DNase I for pancreatic cancer | *IP Portfolio*<br>Co-administration of Systemic DNase I with CAR T<br><br>DNase I-secreting CAR T cells |

# Team with Proven Expertise

**Jeffrey F. Eisenberg**
*Chief Executive Officer & Director*
Life Sciences executive with over 25 years of successful track record in value creation in both private and public companies; former CEO of Noven Pharmaceuticals, responsible for leading 2 product launches and Noven's Novogyne Women's Health joint venture with Novartis

**Curtis Lockshin, Ph.D.**
*Chief Scientific Officer*
25 years Biotech/Pharma management experience, including discovery, preclinical and clinical development and commercial manufacturing; former CEO of SciVac Therapeutics, CTO of VBI Vaccines and VP of Corporate R&D Initiatives for OPKO Health

**James F. Parslow, MBA, CPA**
*Chief Financial Officer*
Over 30 years of experience providing financial and business leadership to biotech, manufacturing, technology, business-to-business e-commerce and cleantech industries

**Scott N. Cullison**
*Business Development*
Over 20 years of experience in the pharmaceutical industry with a broad range of expertise across business development, alliance management, commercialization, product management, R&D program team leadership, and strategic planning.

**Reid P. Bissonnette, Ph.D.**
*Translational Research and Development*
Over 25 years of experience in small molecule drug discovery and development and biotherapeutics; well-established translational scientist, drug hunter and senior manager of Oncology and Inflammation drug R&D

Xenetic



# Scientific Advisory Board

**Dr. Jonathan Spicer**
Associate Professor of Surgery at McGill University and Medical Director of the McGill University Health Center (MUHC) Thoracic Oncology Network; recognized as a leader in understanding how neutrophils impact cancer progression, in particular, the role of NETs in cancer biology

**Dr. Matthew Frigault**
Medical Oncologist in the Hematologic Malignancy Program at the Massachusetts General Hospital Cancer Center, as well as Assistant Director of the Cellular Immunotherapy Program; serves as an Instructor at Harvard Medical School

**Dr. Maksim Mamonkin**
Assistant Professor, Pathology and Immunology and an independent faculty member at the Center for Cell and Gene Therapy at Baylor College of Medicine

**Dr. Allan Tsung**
Chair of the Department of Surgery at the University of Virginia School of Medicine and Director of the Cancer Therapeutics program at the University of Virginia Comprehensive Cancer Center; specializes in treating patients with liver, bile duct and pancreatic cancer

**Dr. Guenther Koehne**
Internationally recognized cancer specialist and current Chief of Blood & Marrow Transplant and Hematologic Oncology at the Miami Cancer Institute

Xenetic

# Financial Snapshot NASDAQ: XBIO

Receiving royalties on net sales through licensing arrangement in the field of blood coagulation disorders from legacy assets

| Cash Balance[1] | Market Cap[2] | Shares Outstanding[3] | Average Volume[2] |
|---|---|---|---|
| ~$12M | ~$5M | ~1.5M | ~23K |

1. As of March 31, 2023
2. As of May 30, 2023, with closing price of $3.15
3. As of May 12, 2023



# Key Upcoming Milestones

| Assets | 2022-2023 Activities | 2024-2025 Activities |
|---|---|---|
| ✓ IP supporting the use of DNase I in cancer | ✓ Engaged Catalent, preeminent CDMO for clinical manufacturing | Phase 1 study start |
| ✓ IND-enabling GLP Tox studies in 2 species for systemic DNase I | *Enhance preclinical data set* | Dose escalation and expansion data available |
| ✓ Cell line & established cGMP process and manufacturing | Business Development | |
| | Academic Collaborations | |

# Investment Summary

## Advancing Proprietary Technology Platform Aimed at Improving Immunotherapies by Targeting Neutrophil Extracellular Traps (NETs)

DNase I oncology platform has the potential to improve the efficacy of current cancer therapies

Initially targeting pancreatic carcinoma, a multi-billion-dollar indication with significant unmet need

Multiple key value-driving milestones expected over the next 12-24 months