Forward-Looking Statements

This presentation contains forward-looking statements for purposes of 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 regarding: the CAR T focus and potential upside with PolyXen technology set forth under the “Investment Highlights” section of this presentation; XCART opportunities, including targeting tumor-specific antigens that are independent of CD19 or other antigens common to all B-Cells and advancing towards a Phase 1 study; plans to leverage academic collaborations with Scripps Research and Pharmsyntech; potential for XCART to result in increased efficacy, safety and tolerability over currently approved CAR T therapies; all statements set forth under the “Driving Development Through Academic Collaborations” section of this presentation, including statements regarding academic collaborations and upcoming potential milestones; all statements set forth under the “PolyXen: Next Generation Half-Life Extension Platform” section of this presentation, including those regarding potential utilities of PolyXen, royalty streams and positive data from a Phase 3 clinical trial; expectations regarding cash runway funding the Company through preclinical advancements towards an IND filing; all statements set forth under the “Investment Summary”, including those relating to advancing the XCART program; and all statements regarding expectations that the CAR T therapies will hold significant revenue share by 2026. 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) unexpected costs, charges or expenses resulting from the acquisition of the CAR T technology; (2) uncertainty of the expected financial performance of the Company; (3) failure to realize the anticipated potential of the XCART technology; (4) the ability of the Company to implement its business strategy; (5) failure of Scripps Research and/or Pharmsyntech or the other academic institutions in Belarus and Russia (as applicable) to perform their obligations under their respective agreements; (6) failure of the Company and Pharmsyntech to reach agreements with the contract sites on terms favorable to the Company, or at all; (7) failure of our licensees to successfully utilize the PolyXen technology and generate royalties for the Company; and (8) 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, 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

CAR T Focus:

Advancing XCART™, a personalized CAR T platform targeting cancers with a patient- and tumor-specific approach

Building on the proven success of CAR T therapy

Following established roadmap for significant early-stage value creation

Potential Upside with PolyXen® Technology:

Takeda: ongoing royalty stream through license agreement

Pharmsynthez: filed registration dossier in Russia for Epolong product candidate

XCART™ Opportunity

✓ Targeting tumor-specific antigens that are independent of CD19 or other antigens common to all B-Cells

✓ Advancing towards Phase 1 study

✓ Lead program targeting $7 billion B-Cell malignancy market¹

Leveraging academic collaborations

∞ Scripps Research

PHARMSYNTHEZ

¹: Triangle Insights: Company Commissioned Market Report
Team with Proven Expertise

Jeffrey F. Eisenberg
Chief Executive Officer & Director
Life Sciences executive with over 20 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
20 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
Scientific Advisory Board with Extensive Cell Therapy Development Experience

**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 Instructor at Harvard Medical School

**Dr. Alexander Gabibov**
Head of the Shemyakin & Ovchinnikov Institute of Bioorganic Chemistry at the Russian Academy of Science

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

**Dr. Greg MacMichael**
President and Founder of CMC BioServices, LLC; Previously served as the Senior VP of Technical Operations at Axovant Gene Therapies; VP of Development, Manufacturing and Quality Control at NantKwest Therapeutics; and Senior VP of Process, Development, Manufacturing and Quality Assurance at Rocket Pharma

**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. Jia Xie**
Assistant professor at University of Miami Department of Chemistry, assistant professor of Psychiatry and Behavior Science at University of Miami Miller School of Medicine; and visiting investigator at the Department of Chemistry at Scripps Research Institute

**Dr. Alexey V. Stepanov**
Senior Staff Scientist in the Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry; Senior Staff Scientist position in the Dmitry Rogachev National Medical Research Center of Pediatric Hematology, Oncology and Immunology in Russia; Professional scientific collaborator of Dr. Richard Lerner’s laboratory in The Scripps Research Institute
XCAT™ Platform

Personalized CAR T platform targeting cancers with a patient- and tumor-specific approach
Lymphoma

Group of blood cancers that develop from lymphocytes located in the lymph system

Two Types of Lymphocytes

B-Cells
- Produce and secrete antibodies in the form of B-Cell receptors (BCR) which selectively target a given antigen

T-Cells
- Helper T-Cells: modulate the function of B-Cells and killer T-Cells
- Killer T-Cells: selectively target (via T-Cell Receptors) and kill cells which display a given foreign or neo-antigen

Non-Hodgkin Lymphoma (NHL)

US Market Overview

- 90% of all lymphomas
- 7th most common cancer
- 77K new cases annually
- 90% of all NHL are B-Cell

1: Triangle Insights: Company Commissioned Market Report
B-Cells and Tumor Growth

B-Cell receptor (BCR) vs CD19

Current commercial therapies target the common CD19 receptor that is present on all B-Cells

Tumor develops with the unique BCR clone

>1,000,000,000 Unique B-Cell Clones

Malignant B-Cell Proliferation (Retains Unique BCR)
Anti-CD19 CAR T Therapies Work...

Current CAR T therapies target both normal and malignant B-Cells

- >80% complete or partial response when treated with Yescarta¹
- >80% remission rate when treated with Kymriah¹
- 47% survival rate at 39-months when treated with Yescarta²

¹ https://my.clevelandclinic.org/health/treatments/17726-car-t-cell-therapy/risks–benefits
² https://www.fiercepharma.com/pharma/ash-gilead-touts-astounding-yescarta-survival-results-at-3-years
...But There Is Need For Improvement

Significant shortcomings with currently approved CAR T therapies

Lack of Initial Efficacy of Anti-CD19 CAR T Due To:

- **CD19^{low}**: low initial levels of CD19 receptors on tumor cells
- **CD19^{-}**: initial lack of CD19 receptors on some or all tumor cells

CAR T Relapse: lack of durable response

- **T-Cell Exhaustion**: progressive loss of CAR T effector function

Toxicity Problems:

- Cytokine Release Syndrome (CRS)
- Neurotoxicity
- B-Cell Aplasia: elimination of all B-Cells
CD19 Escape: Emergence of CD19^− Tumor Cells Resulting from Anti-CD19 Treatments, including CAR T

Significant problem in treating B-Cell cancers, affecting the efficacy of currently approved therapies

~50% of CAR T treated patients relapse within 12 months\(^1\)

\(\sim 10\text{-}50\%\) Estimated percentage of patients who relapse due to CD19 escape\(^2\)

10-15% Of patients have a lower count of CD19-positive B-Cells due to prior therapies\(^2\)

Incidence of CD19 escape is expected to increase with growing number of anti-CD19 treatments

1: Schuster SJ, et al. Presented at 60th American Society of Hematology Annual Meeting; December 1-4, 2018; San Diego, CA. Abstract 1684
2: Triangle Insights: Company Commissioned Market Report

---

Anti-CD19 CAR T treatment

CD19^+ malignant B-Cells

CD19^− tumor cells emerging under selective pressure of anti-CD19 treatment

Remaining CD19^− malignant B-Cells
Anti-CD19 CAR T Targets the Tumor’s Unique BCR

Ability to address the CD19 escape phenomenon

Malignant B-Cell

Malignant B-Cell with CD19 Escape

Unique BCR

CD19

Anti-CD19 CAR T
XCAT™ Only Targets Malignant B-Cells

Potential for increased efficacy, safety and tolerability over currently approved CAR T therapies

Unique BCR Presents Tumor-Specific Target

Normal B-Cell Not Targeted

Only Malignant B-Cells Eliminated

Normal B-Cells are Spared

Malignant B-Cell Targeted
Selectively Kill Raji B-Cell Lines Expressing Target BCRs

Human CD8+ T cells were transduced with Lentiviral vectors coding for one of pepFL1-CAR, pepFL2-CAR, pepFL3-CAR or CD19-CAR constructs.

Raji B-cells (Raji-FL1, Raji-FL2 and Raji-FL3) expressing BCRs from the respective FL lymphomas were lysed by activated human CD8+ T cells bearing a corresponding cyclopeptide-CAR construct\(^1\).

XCART Addresses Need in Current Lymphoma Treatment Paradigm

**Follicular Lymphoma (FL)**

~14,000/year US Incidence

- **1st Line Therapy:** ~11,000 Patients
- **2nd Line Treatment:** ~5,000 Patients
- **XCART Opportunity:**
  - **3rd Line Treatment:** ~3,000 Patients

**Diffuse Large B-Cell Lymphoma (DLBCL)**

~26,000/year US Incidence

- **1st Line Therapy:** ~21,000 Patients
- **2nd Line Treatment:** ~6,000 Patients
- **XCART Opportunity:**
  - **3rd Line Treatment:** ~4,000 Patients

---

1: Triangle Insights: Company Commissioned Market Report
Leveraging Academic Collaborations

Expediting development pipeline with proven expertise and capabilities
Driving Development Through Academic Collaborations

Access to Manufacturing Suites

Established CMC and Regulatory Infrastructure for Manufacturing

Operational/Cost Efficiencies and Risk Mitigation

Upcoming Potential Milestones

✓ Ongoing exploratory patient biopsy study in Eastern Europe
Seeking U.S. FDA INTERACT meeting
Commence Phase 1 Trial in Eastern Europe

Demonstrate feasibility of manufacturing
Commencing clinical manufacturing process
File U.S. IND
Exploratory Patient Biopsy Study

Evaluating XCART platform in biopsy and blood samples from B-Cell NHL patients with various subtypes and stages of disease

1. Validate upstream workflow for isolating and screening tumor-specific neoantigens
2. Identify and characterize potential tumor-specific CAR constructs
3. Potential expansion to include development of manufacturing processes for producing autologous XCART-designed CAR T-Cells
4. Work being performed is expected to position the Company to conduct U.S. IND-enabling studies
Academic Collaborator

Scripps Research

- Leading research institution with world renowned immunology expertise
- One of the original developers of the XCART platform
- Design and implementation of the preclinical development program
- Method development activities supporting process development for clinical manufacturing
Academic Collaborator

**PHARMSYNTHEZ**

- Research organization coordinating activities with partnered academic institutions
- Provides access to patients and CAR T clinical manufacturing suites
- Optimize the overall XCART workflow
- Develop clinical manufacturing processes
- Access to clinical centers and B-Cell non-Hodgkin lymphoma (NHL) patients
- Conduct Phase 1 trial

Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry
Belarussian Research Center for Pediatric Oncology, Hematology and Immunology
Institute of Bioorganic Chemistry of the National Academy of Sciences of Belarus
Vitebsk Regional Clinical Oncological Center
PolyXen® PSA Technology Platform

Enables Next Generation Biologic Drugs
PolyXen: Next Generation Half-Life Extension Platform Technology

PolyXalylataion employs the biological polymer polysialic acid (PSA) to modulate the PK and PD profiles of protein drugs

- Clinically demonstrated to extend half-life of therapeutic proteins
- Applicable to franchise extensions as well as candidates in development
- Potential utility in other molecule classes such as peptides and small molecules

Generating Royalty Stream
Platform for Partnerships
Extensive IP protection

Receiving royalties on net sales through exclusive license agreement in the field of coagulation disorders

Partner filed registration dossier in Russia for Epolong, a polysialylated form of recombinant human erythropoietin as a treatment for anemia in patients with chronic kidney disease
Financial Snapshot
NASDAQ: XBIO

Cash runway expected to fund Company through preclinical advancements towards IND filing

- Market Cap\(^1\): $19M
- Shares Outstanding: 8.75M
- Average Volume\(^1\): 528K
- Cash Balance: $11.5M
  as of December 31, 2020

1: As of March 31, 2021
Advancing XCART program through preclinical development into the clinic as quickly as possible

Truly differentiated CAR T technology

Lead program targeting growing $7 billion B-Cell malignancy market\(^1\)

PolyXen upside through licensing agreements

Positioning to have a transformative impact in the CAR T space
Appendix
CAR T Therapies Expected to Hold Significant Revenue Share by 2026

US revenue for top products* targeting key B-Cell malignancies

<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
<th>Mechanism</th>
<th>First Approval^</th>
<th>Relevant Indications</th>
<th>2026 Revenue</th>
<th>CAGR (2019-2026)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polivy</td>
<td>CD79B antibody</td>
<td>06/2019 DLBCL</td>
<td>DLBCL</td>
<td>$805M</td>
<td>48%</td>
<td></td>
</tr>
<tr>
<td>Kymriah</td>
<td>CD19 CAR T</td>
<td>08/2017 ALL</td>
<td>DLBCL</td>
<td>$774M</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Yescarta</td>
<td>CD19 CAR T</td>
<td>10/2017 DLBCL</td>
<td>LBCL (including DLBCL patients)</td>
<td>$946M</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Liso-cel</td>
<td>Expected 2020</td>
<td></td>
<td></td>
<td>$849M</td>
<td>135%**</td>
<td></td>
</tr>
<tr>
<td>Tazverik</td>
<td>EZH2 inhibitor</td>
<td>06/2020 FL</td>
<td>FL</td>
<td>$1.05B</td>
<td>91%**</td>
<td></td>
</tr>
<tr>
<td>Calquence</td>
<td>BTK inhibitor</td>
<td>11/2019 CLL</td>
<td>MCL, CLL</td>
<td>$1.50B</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Rituxan</td>
<td>CD20 antibody</td>
<td>12/1997 FL</td>
<td>FL, DLBCL, CLL</td>
<td>$643M</td>
<td>-23%</td>
<td></td>
</tr>
<tr>
<td>Imbruvica</td>
<td>BTK inhibitor</td>
<td>02/2014 CLL</td>
<td>MCL, CLL, DLBCL</td>
<td>$6.71B</td>
<td>8%</td>
<td></td>
</tr>
</tbody>
</table>

* Top 7 products based on 2026 analyst revenue forecasts, plus Kymriah, are selected here
** CAGR from 2020-2026
^ First Approval relates to first approval among DLBCL, CLL, FL, or MCL; Source: EvaluatePharma, BMT, Accessed August 2020
†† Potential launch for DLBCL in 2021

Significant drop in Rituxan use anticipated due to the availability of alternate monoclonal antibody and small molecule treatment options (limited revenue attributed to biosimilar – 3 anticipated to be available in 2026)
Current CAR T Therapies Are Priced Over $300,000

Novel CAR-T therapy use in earlier lines of treatment may be limited by comparative treatment costs and are likely to face challenges gaining market access.

<table>
<thead>
<tr>
<th>Monoclonal Antibody</th>
<th>Cell Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approved Indications</strong></td>
<td><strong>Ex-US Pricing</strong></td>
</tr>
<tr>
<td>NHL (Including CLL and DLBCL)</td>
<td>$10-15K</td>
</tr>
<tr>
<td>LBCL (including DLBCL patients)</td>
<td>$300-355K</td>
</tr>
<tr>
<td>ALL, LBCL (including DLBCL patients)</td>
<td>$300-310K</td>
</tr>
</tbody>
</table>

6-course cost of Rituxan does not include potential maintenance dosing.