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 regarding the CAR T focus and potential upside with PolyXen technology, set forth under the “Investment Highlights” section of this presentation; X CART 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 outsourced relationships, potential for X CART to result in increased efficacy, safety and tolerability over currently approved CAR T therapies; the potential to conduct a Phase 1 trial with academic collaborators; potential utilities of PolyXen; and expectations regarding cash runway funding the Company through an IND filing; as well as all statements set forth under the “Driving Development Through Outsourced Relationships” section of this presentation, including those related to upcoming potential milestones, all statements set forth under the “Investment Summary” section of this presentation; all statements regarding expectations that the CAR T therapies will hold significant revenue share by 2026, including anticipations that there will be a significant drop in Rituxan use. 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 X CART technology; (4) the ability of the Company to implement its business strategy; (5) failure of Scripps Research and/or Pharmopsyne 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 Pharmopsyne 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, 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

**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:**
Ongoing royalty stream through license arrangement

Platform for partnerships

---

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 market\(^1\)

**Leveraging Outsourced Relationships**

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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. 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

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

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

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. 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
Xcart™ 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
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\textsuperscript{low}**: low initial levels of CD19 receptors on tumor cells
- **CD19\textsuperscript{−}**: 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

- Estimated percentage of patients who relapse due to CD19 escape
  - \(~10\text{-}50\%~\)
- Of patients have a lower count of CD19-positive B-Cells due to prior therapies
  - \(10\text{-}15\%~\)

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

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

- Anti-CD19 CAR T treatment
- CD19\(^-\) tumor cells emerging under selective pressure of anti-CD19 treatment

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
XCAR™ Targets the Tumor’s Unique BCR

Ability to address the CD19 escape phenomenon

Malignant B-Cell

Malignant B-Cell with CD19 Escape

XCAR™
**XcART™** Only Targets Malignant B-Cells

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

- Unique BCR Presents Tumor-Specific Target
- Only Malignant B-Cells Eliminated
- Normal B-Cells are Spared
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

### Follicular Lymphoma (FL)

<table>
<thead>
<tr>
<th>Line Therapy</th>
<th>Patients</th>
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<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
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<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
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**XCART Opportunity:**

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

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**XCART Opportunity:**

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<tbody>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>~4,000</td>
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</tbody>
</table>

1: Triangle Insights: Company Commissioned Market Report
Leveraging Outsourced Relationships

Expediting Development Pipeline with Proven Expertise and Capabilities
Driving Development Through Outsourced Relationships

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
File U.S. IND

Demonstrate feasibility of manufacturing
Commencing clinical manufacturing process
Commence Phase 1 Trial
Exploratory Patient Biopsy Study

Evaluating X CART platform in biopsy and blood samples from B-Cell NHL patients

1. Validate upstream workflow for isolating and screening tumor-specific neoantigens
2. Identify and characterize potential tumor-specific CAR constructs
3. Study has provided materials and methods needed to proceed with IND-enabling studies
Collaborators

Additional collaborations advancing XCART toward IND-enabling studies

Academic Collaborators

Working with world-renowned academic institutions, researchers and clinical investigators

Access to methods and materials, including clinical samples, for optimizing the overall XCART workflow

Scripps Research

(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

Outsourced Relationships

Leveraging additional vendors to expedite commercial development

Developing cost-effective clinical manufacturing process for patient-specific cell therapy products
Academic Collaborator

**PHARMSYNTHEZ**
Research organization coordinating activities with partnered academic institutions in Eastern Europe

- Supports optimization of overall X CART workflow
- Access to clinical centers and B-Cell non-Hodgkin lymphoma (NHL) patients
- Potential to conduct Phase 1 trial
PolyXen® PSA Technology Platform

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

Polysialylation 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

- Receiving royalties on net sales through licensing arrangement in the field of blood coagulation disorders
- Pharmsynthez 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

Potential utility in other molecule classes such as peptides and small molecules.
Cash runway expected to fund Company through X CART IND filing

<table>
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<tr>
<th>Cash Balance(^1)</th>
<th>Market Cap(^2)</th>
<th>Shares Outstanding(^1)</th>
<th>Average Volume(^2)</th>
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<tr>
<td>~$19.7M</td>
<td>~$18M</td>
<td>~13M</td>
<td>~515K</td>
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\(^1\) As of September 30, 2021
\(^2\) As of December 16, 2021
Investment Summary

Advancing X CART 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
Strong balance sheet expected to fund Company through IND filing
Upside through licensing arrangements

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

* 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>Type of Therapy</th>
<th>Approved Indications</th>
<th>Monoclonal Antibody</th>
<th>Cell Therapy</th>
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<tbody>
<tr>
<td></td>
<td>Ex-US Pricing</td>
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<tr>
<td></td>
<td></td>
<td>NHL (including CLL and DLBCL)</td>
<td>LBCL (including DLBCL patients)</td>
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<tr>
<td></td>
<td></td>
<td>$10-15K</td>
<td>$300-355K</td>
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