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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-Q

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended March 31, 2023

or

□ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission File Number: 001-37937

XENETIC BIOSCIENCES, INC.

(Exact name of registrant as specified in its charter)

Nevada	**45-2952962**
(State or other jurisdiction of incorporation or organization)	**(IRS Employer Identification No.)**

945 Concord Street
Framingham, Massachusetts 01701
(Address of principal executive offices and zip code)

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

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 (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days: Yes ☒ No □

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files): Yes ☒ No □

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act:

Large accelerated filer	□	Accelerated filer	□
Non-accelerated filer	☒	Smaller reporting company	☒
		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. □

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act): Yes □ No ☒

As of May 5, 2023, the number of outstanding shares of the registrant's common stock was 15,166,596.

XENETIC BIOSCIENCES, INC.
FORM 10-Q
QUARTERLY PERIOD ENDED MARCH 31, 2023

PART I – FINANCIAL INFORMATION

ITEM 1 - FINANCIAL STATEMENTS

XENETIC BIOSCIENCES, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS

	March 31, 2023 (Unaudited)	December 31, 2022
ASSETS		
Current assets:		
Cash	$ 11,994,827	$ 13,097,265
Prepaid expenses and other	876,539	556,094
Total current assets	12,871,366	13,653,359
Other assets	844,431	1,066,931
Total assets	$ 13,715,797	$ 14,720,290
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 259,180	$ 287,360
Accrued expenses and other current liabilities	597,185	785,796
Total current liabilities	856,365	1,073,156
Total liabilities	856,365	1,073,156
Commitments and contingencies (Note 9)		
Stockholders' equity:		
Preferred stock, 10,000,000 shares authorized		
Series B, $0.001 par value: 1,804,394 shares issued and outstanding as of March 31, 2023 and December 31, 2022	1,804	1,804
Series A, $0.001 par value: 970,000 shares issued and outstanding as of March 31, 2023 and December 31, 2022	970	970
Common stock, $0.001 par value; 100,000,000 shares authorized as of March 31, 2023 and December 31, 2022; 15,193,587 shares issued as of March 31, 2023 and December 31, 2022; 15,166,596 shares outstanding as of March 31, 2023 and December 31, 2022	15,192	15,192
Additional paid in capital	207,825,084	207,756,232
Accumulated deficit	(189,956,172)	(189,099,618)
Accumulated other comprehensive income	253,734	253,734
Treasury stock	(5,281,180)	(5,281,180)
Total stockholders' equity	12,859,432	13,647,134
Total liabilities and stockholders' equity	$ 13,715,797	$ 14,720,290

The accompanying notes are an integral part of these unaudited condensed consolidated financial statements.

XENETIC BIOSCIENCES, INC.
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(Unaudited)

	Three Months Ended March 31,	
	2023	**2022**
Revenue:		
Royalty revenue	$ 605,844	$ 388,993
Total revenue	605,844	388,993
Operating costs and expenses:		
Research and development	(595,276)	(1,101,399)
General and administrative	(925,743)	(907,309)
Total operating costs and expenses	(1,521,019)	(2,008,708)
Loss from operations	(915,175)	(1,619,715)
Other income:		
Other income	4,520	199
Interest income	54,101	25,905
Total other income	58,621	26,104
Net loss	$ (856,554)	$ (1,593,611)
Basic and diluted loss per share	$ (0.06)	$ (0.12)
Weighted-average shares of common stock outstanding, basic and diluted	15,166,596	13,440,057

The accompanying notes are an integral part of these unaudited condensed consolidated financial statements.

XENETIC BIOSCIENCES, INC.
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(Unaudited)

THREE MONTHS ENDED MARCH 31, 2023

	Preferred Stock		Common Stock						
	Number of Shares	Par Value ($0.001)	Number of Shares	Par Value ($0.001)	Additional Paid in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income	Treasury Stock	Total Stockholders' Equity
Balance as of January 1, 2023	2,774,394	$ 2,774	15,193,587	$ 15,192	$ 207,756,232	$ (189,099,618)	$ 253,734	$ (5,281,180)	$ 13,647,134
Share-based expense	–	–	–	–	68,852	–	–	–	68,852
Net loss	–	–	–	–	–	(856,554)	–	–	(856,554)
Balance as of March 31, 2023	2,774,394	$ 2,774	15,193,587	$ 15,192	$ 207,825,084	$ (189,956,172)	$ 253,734	$ (5,281,180)	$ 12,859,432

THREE MONTHS ENDED MARCH 31, 2022

	Preferred Stock		Common Stock						
	Number of Shares	Par Value ($0.001)	Number of Shares	Par Value ($0.001)	Additional Paid in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income	Treasury Stock	Total Stockholders' Equity
Balance as of January 1, 2022	2,774,394	$ 2,774	13,466,603	$ 13,465	$ 205,952,729	$ (182,547,265)	$ 253,734	$ (5,281,180)	$ 18,394,257
Share-based expense	–	–	–	–	119,595	–	–	–	119,595
Exercise of purchase warrants	–	–	1,684	2	(2)	–	–	–	–
Net loss	–	–	–	–	–	(1,593,611)	–	–	(1,593,611)
Balance as of March 31, 2022	2,774,394	$ 2,774	13,468,287	$ 13,467	$ 206,072,322	$ (184,140,876)	$ 253,734	$ (5,281,180)	$ 16,920,241

The accompanying notes are an integral part of these unaudited condensed consolidated financial statements.

XENETIC BIOSCIENCES, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)

	Three Months Ended March 31,	
	2023	**2022**
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net loss	$ (856,554)	$ (1,593,611)
Adjustments to reconcile net loss to net cash used in operating activities:		
Amortization of right of use asset	–	9,475
Share-based expense	68,852	119,595
Changes in operating assets and liabilities:		
Prepaid expenses and other	(320,445)	(262,444)
Other assets	222,500	(2,871)
Accounts payable, accrued expenses and other liabilities	(216,791)	(357,835)
Net cash used in operating activities	(1,102,438)	(2,087,691)
Net change in cash	(1,102,438)	(2,087,691)
Cash at beginning of period	13,097,265	18,244,030
Cash at end of period	$ 11,994,827	$ 16,156,339
SUPPLEMENTAL CASH FLOW INFORMATION:		
Cash paid for interest	$ –	$ –
SUPPLEMENTAL SCHEDULE OF NON-CASH INVESTING AND FINANCING ACTIVITIES:		
Issuance of common stock from cashless exercise of purchase warrants	$ –	$ 2

The accompanying notes are an integral part of these unaudited condensed consolidated financial statements.

1. The Company

Background

Xenetic Biosciences, Inc. ("Xenetic" or the "Company"), incorporated in the state of Nevada and based in Framingham, Massachusetts, is a biopharmaceutical company focused on advancing innovative immune-oncology technologies addressing hard to treat cancers. The Company's proprietary Deoxyribonuclease ("DNase") platform is designed to improve outcomes of existing treatments, including immunotherapies, by targeting neutrophil extracellular traps ("NETs"), which have been implicated in cancer progression and resistance to cancer treatments. Xenetic is currently focused on advancing its systemic DNase program into the clinic as an adjunctive therapy for pancreatic carcinoma and locally advanced or metastatic solid tumors. XCART™ is the Company's personalized Chimeric Antigen Receptor ("CAR") T platform technology engineered to target patient specific tumor neoantigens with a demonstrated proof of mechanism in B-cell lymphomas. Additionally, Xenetic has partnered with biotechnology and pharmaceutical companies to develop its proprietary drug delivery platform, PolyXen®, and receives royalty payments under an exclusive license arrangement in the field of blood coagulation disorders.

As used in this Quarterly Report on Form 10-Q ("Quarterly Report"), unless otherwise indicated, all references herein to "Xenetic," the "Company," "we" or "us" refer to Xenetic Biosciences, Inc. and its wholly-owned subsidiaries.

The Company, directly or indirectly, through its wholly-owned subsidiaries, Hesperix S.A. ("Hesperix") and Xenetic Biosciences (U.K.) Limited ("Xenetic UK"), and the wholly-owned subsidiaries of Xenetic UK, Lipoxen Technologies Limited ("Lipoxen"), Xenetic Bioscience, Incorporated and SymbioTec, GmbH ("SymbioTec"), own various United States ("U.S.") federal trademark registrations and applications along with unregistered trademarks and service marks, including but not limited to XCART, OncoHist™, PolyXen, ErepoXen™, and ImuXen™, which are used throughout this Quarterly Report. All other company and product names may be trademarks of the respective companies with which they are associated.

Going Concern and Management's Plan

Management evaluates whether there are conditions or events, considered in the aggregate that raise substantial doubt about the Company's ability to continue as a going concern within one year after the date that the financial statements are issued. The Company has incurred substantial losses since its inception and expects to continue to incur operating losses in the near-term. These factors raise substantial doubt about its ability to continue as a going concern. The Company believes that it has access to capital resources through possible public or private equity offerings, debt financings, corporate collaborations, related party funding, or other means to continue as a going concern. The Company believes that its existing resources will be adequate to fund the Company's operations for a period of at least twelve months from the date of these financial statements. However, the Company anticipates it may need additional capital in the long-term to pursue its business initiatives. The terms, timing and extent of any future financing will depend upon several factors, including the achievement of progress in its product development programs, its ability to identify and enter into licensing or other strategic arrangements, its continued listing on the Nasdaq Stock Market ("Nasdaq"), and factors related to financial, economic, geo-political, industry and market conditions, many of which are beyond its control. The capital markets for the biotech industry can be highly volatile, which make the terms, timing and extent of any future financing uncertain. On June 3, 2022, the Company received a written notification (the "Notice") from the Listing Qualifications Department of Nasdaq notifying the Company that the closing bid price for its common stock had been below $1.00 for 30 consecutive business days and that the Company therefore was not in compliance with the minimum bid price requirement for continued inclusion on the Nasdaq Capital Market under Nasdaq Listing Rule 5550(a)(2) (the "Bid Price Requirement"). The Notice has no immediate effect on the listing of the Company's common stock on the Nasdaq Capital Market. Under the Nasdaq Listing Rules, the Company had a period of 180 calendar days from the date of the Notice to regain compliance with the Bid Price Requirement. Accordingly, the Company had until November 30, 2022 to regain compliance with the Bid Price Requirement and was eligible for an additional 180 calendar day compliance period if certain other criteria were met. On December 1, 2022, the Company received a letter from Nasdaq informing it that although the Company's common stock had not regained compliance with the minimum $1.00 bid price per share requirement, Nasdaq had determined that the Company was eligible for an additional 180 calendar day period, or until May 29, 2023, to regain compliance. Nasdaq's determination was based on the Company meeting the continued listing requirement for market value of publicly held shares and all other applicable requirements for initial listing on the Nasdaq Capital Market with the exception of the bid price requirement, and the Company's written notice of its intention to cure the deficiency during the second compliance period by effecting a reverse stock split, if necessary.

2. Risks and Uncertainties

Effects of the COVID-19 Pandemic

During March 2020, a global pandemic was declared by the World Health Organization related to the outbreak of a novel strain of coronavirus, or COVID-19. The pandemic significantly affected economic conditions in the U.S., accelerating during the first half of March 2020 and continuing throughout 2021 and 2022 and into 2023, as federal, state and local governments reacted to the public health crisis with mitigation measures, creating significant uncertainties in the U.S. economy. The Company continues to evaluate the effects of the COVID-19 pandemic on its business and while there has been no significant impact to the Company's operations to date, the Company at this time remains uncertain of the impact this event may have on the Company's future operations. The extent to which the COVID-19 pandemic affects our business, operations and financial results will depend on numerous evolving factors that we may not be able to accurately predict, and such uncertainty is expected to continue for some time.

Impact of the conflict in Ukraine on Operations

The short and long-term implications of Russia's invasion of Ukraine are difficult to predict at this time. The imposition of sanctions and counter sanctions may have an adverse effect on the economic markets generally and could impact our business, financial condition, and results of operations.

3. Summary of Significant Accounting Policies

Preparation of Interim Financial Statements

The accompanying condensed consolidated interim financial statements were prepared by the Company pursuant to the rules and regulations of the Securities and Exchange Commission ("SEC") and, in the opinion of management, include all normal and recurring adjustments necessary to present fairly the results of the interim periods shown. Certain information and footnote disclosures normally included in financial statements prepared in accordance with U.S. generally accepted accounting principles have been condensed or omitted pursuant to such SEC rules and regulations. Management believes that the disclosures made are adequate to make the information presented not misleading. The results for the interim periods are not necessarily indicative of results for the full year. The condensed consolidated financial statements contained herein should be read in conjunction with the consolidated financial statements and notes thereto included in the Company's Annual Report on Form 10-K for the year ended December 31, 2022 filed with the SEC on March 22, 2023, and amended on April 28, 2023.

Principles of Consolidation

The condensed consolidated financial statements of the Company include the accounts of Hesperix, Xenetic UK and Xenetic UK's wholly owned subsidiaries: Lipoxen, Xenetic Bioscience, Incorporated, and SymbioTec. All intercompany balances and transactions have been eliminated in consolidation.

Cash and concentrations of credit risk

The Company considers all highly liquid investments with an original maturity of 90 days or less from the date of purchase to be cash equivalents. Investments with original maturities of greater than 90 days from the date of purchase but less than one year from the balance sheet date are classified as short-term investments, while investments with maturities of one year or beyond from the balance sheet date are classified as long-term investments. Management determines the appropriate classification of its cash equivalents and investment securities at the time of purchase and re-evaluates such determination as of each balance sheet date. The carrying amount of cash equivalents approximate their fair value due to the short-term nature of these instruments.

Financial instruments that potentially subject the Company to credit risk consist primarily of cash on deposit with financial institutions, the balances of which frequently exceed federally insured limits. On March 10, 2023, Silicon Valley Bank ("SVB") was closed by the California Department of Financial Protection and Innovation, which appointed the Federal Deposit Insurance Corporation ("FDIC") as receiver. The Company's cash consisted primarily of money market funds held at SVB. On March 12, 2023, the U.S. Treasury, Federal Reserve and FDIC rolled out emergency measures to fully protect all depositors of SVB and on March 13, 2023, we had full access to our cash on deposit with SVB. As of March 31, 2023, the Company had transferred its primary banking relationship to a large financial institution and all cash on deposit is covered under federally insured limits.

Basic and Diluted Net Loss per Share

The Company computes basic net loss per share by dividing net loss applicable to common stockholders by the weighted-average number of shares of the Company's common stock outstanding during the period. The Company computes diluted net loss per share after giving consideration to the dilutive effect of stock options that are outstanding during the period, except where such non-participating securities would be anti-dilutive.

For the three months ended March 31, 2023 and 2022, basic and diluted net loss per share are the same for each respective period due to the Company's net loss position. Potentially dilutive, non-participating securities have not been included in the calculations of diluted net loss per share, as their inclusion would be anti-dilutive.

Recently Adopted Accounting Standards

In June 2016, the Financial Accounting Standards Board issued Accounting Standards Update ("ASU") 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*. The guidance modified the measurement and recognition of credit losses for most financial assets and certain other instruments. The amendment updated the guidance for measuring and recording credit losses on financial assets measured at amortized cost by replacing the "incurred loss" model with an "expected loss" model. This may result in earlier recognition of allowance for losses. The Company adopted ASU 2016-13 as of January 1, 2023 and the adoption did not have a material effect on our consolidated financial statements.

4. Significant Strategic Collaborations

Takeda Pharmaceutical Co. Ltd. (together with its wholly-owned subsidiaries, "Takeda")

In October 2017, the Company granted to Takeda the right to grant a non-exclusive sublicense to certain patents related to the Company's PolyXen technology that were previously exclusively licensed to Takeda in connection with products related to the treatment of blood and bleeding disorders. Royalty payments of approximately $0.6 million and $0.4 million were recorded as revenue by the Company during the three months ended March 31, 2023 and 2022, respectively, and are based on single digit royalties on net sales of certain covered products. The Company's policy is to recognize royalty payments as revenue when they are reliably measurable, which is upon receipt of reports from Takeda. The Company receives these reports in the quarter subsequent to the actual sublicensee sales. At the time the revenue was received, there were no remaining performance obligations and all other revenue recognition criteria were met.

CLS Therapeutics Ltd. ("CLS")

On April 26, 2022, the Company entered into an Exclusive Sublicense Agreement (the "Sublicense Agreement") with CLS pursuant to which the Company received an exclusive license, under certain patent rights and know-how owned or controlled by CLS, to develop and commercialize pharmaceutical products and methods incorporating DNase enzyme for use in treatment of cancer (the "Sublicensed Products"). Under the terms of the Sublicense Agreement, the Company will have sole responsibility for, and shall use commercially reasonable efforts to, among other things, research, develop and obtain marketing approval for the Sublicensed Products in the U.S. and certain European markets, and to commercialize such Sublicensed Products in the relevant market once marketing approval is obtained.

Concurrent with the Sublicense Agreement, the Company entered into an Exclusive License Agreement (the "License Agreement") with CLS, pursuant to which the Company received an exclusive license under certain patent rights and know-how owned or controlled by CLS to develop and commercialize pharmaceutical products and methods incorporating DNase in conjunction with CAR T therapies (the "Licensed Products"). Under the terms of the License Agreement, the Company will have sole responsibility for, and shall use commercially reasonable efforts to, among other things, research, develop and obtain marketing approval for the Licensed Products in the U.S. and certain European markets, and to commercialize such Licensed Products in the relevant market once marketing approval is obtained.

Volition Collaboration

On August 2, 2022, the Company announced a research and development collaboration with Volition to develop NETs-targeted adoptive cell therapies for the treatment of cancer. The collaboration is an early exploratory program to evaluate the potential combination of Volition's Nu.Q® technology Test and the Company's DNase-Armored CAR T platform to develop proprietary adoptive cell therapies potentially targeting multiple types of solid cancers. Under the terms of the collaboration agreement, Volition will fund a research program and the two parties will share proceeds from commercialization or licensing of any products arising from the collaboration.

Catalent Pharma Solutions LLC ("Catalent")

On June 30, 2022, the Company entered into a Statement of Work (the "SOW") with Catalent to outline the general scope of work, timeline, and pricing pursuant to which Catalent will provide certain services to the Company to perform cGMP manufacturing of the Company's recombinant protein, Human DNase I. The parties agreed to enter into a Master Services Agreement ("MSA") that will contain terms and conditions to govern the project contemplated by the SOW and that will supersede the addendum to the SOW containing Catalent's standard terms and conditions. In addition, in the event of any conflict between the project-specific terms and conditions set forth in the SOW and the MSA, the MSA terms and conditions shall govern. The estimated total cost of the project contemplated by the SOW is expected to be up to approximately $5 million (exclusive of certain fees and potential alternatives) for the manufacturing services over the course of the term of the project with each phase of the project invoiced separately in connection with the commencement of such phase. Unless earlier amended or terminated, the manufacturing services contemplated by the SOW are currently targeted to be completed by the first half of 2024. The SOW is terminable by the Company at any time with 30 days' prior written notice to Catalent. The SOW also contains customary provisions related to, among other things, confidentiality, warranties, intellectual property and indemnification. The Company has paid Catalent approximately $1.0 million through March 31, 2023, of which $0.4 million and $0.3 million has been recognized as an advance payment and is included in prepaid expenses and other as of March 31, 2023 and December 31, 2022, respectively.

Scripps Research

On March 17, 2023, the Company and Scripps Research entered into a Research Funding and Option Agreement (the "Agreement"), pursuant to which the Company has agreed to provide Scripps Research an aggregate of up to $938,000 to fund research relating to advancing the pre-clinical development of the Company's DNase oncology platform technology. The research funding is payable by the Company to Scripps Research on a monthly basis in accordance with a negotiated budget, which provides for an initial payment of approximately $78,000 on the date of the Agreement and subsequent monthly payments of approximately $78,000 over a 12-month period. Under the Agreement, the Company has the option to acquire a worldwide exclusive license to Scripps Research's rights in the Technology or Patent Rights (as defined in the Agreement), as well as a non-exclusive, royalty-free, non-transferrable license to make and use TSRI Technology (as defined in the Agreement) solely for the Company's internal research purposes during the performance of the research program contemplated by the Agreement.

Unless earlier terminated, the term of the Agreement continues from the date of the Agreement for fifteen (15) months. The Agreement may be terminated by the Company with 30 days advance written notice to Scripps Research beginning six (6) months after the Effective Date (as defined in the Agreement) or by Scripps Research if the Company fails to make timely payments due under the Agreement, subject to 30 days' written notice to cure such nonpayment. The Agreement may further be terminated by either party in the event of the other party's uncured failure to perform any obligations under the Agreement or the bankruptcy of the other party.

No payments were made to Scripps Research under this agreement through March 31, 2023. As of March 31, 2023, the Company has recorded accrued program expense of approximately $40,000 in connection with this agreement as a component of accrued expenses and other current liabilities.

Other Agreements

The Company has also entered into various research, development, license and supply agreements with Serum Institute of India ("Serum Institute"), PJSC Pharmsynthez ("Pharmsynthez") and SynBio LLC ("SynBio"), a wholly owned subsidiary of Pharmsynthez. The Company and its collaborative partners continue to engage in research and development activities with no resultant commercial products through March 31, 2023. No amounts were recognized as revenue related to the Serum Institute, Pharmsynthez or SynBio agreements during the three months ended March 31, 2023 and 2022, respectively.

5. Fair Value Measurements

Accounting Standards Codification Topic 820, *Fair Value Measurement,* defines fair value as the price that would be received to sell an asset or be paid to transfer a liability in an orderly transaction between market participants at the measurement date. The Company applies the following fair value hierarchy, which prioritizes the inputs used to measure fair value into three levels and bases the categorization within the hierarchy upon the lowest level of input that is available and significant to the fair value measurement. Level 1 inputs are quoted prices in active markets for identical assets or liabilities that the reporting entity has the ability to access at the measurement date. Level 2 utilizes quoted market prices in markets that are not active, broker or dealer quotations, or alternative pricing sources with reasonable levels of price transparency. Level 3 inputs are unobservable inputs for the asset or liability in which there is little, if any, market activity for the asset or liability at the measurement date. As of March 31, 2023 and December 31, 2022, the carrying amounts of the Company's financial instruments approximates fair value due to their short maturities. There were no financial instruments classified as Level 3 in the fair value hierarchy during the three months ended March 31, 2023 and 2022.

6. Stockholders' Equity

Warrants

In connection with its July 2021 private placement, the Company issued warrants to purchase an aggregate of 4,629,630 shares of the Company's common stock (the "Series A Warrants"). The Series A Warrants are immediately exercisable at a price of $3.30 per share of common stock and expire on February 23, 2025. No Series A Warrants were exercised or forfeited during the three months ended March 31, 2023 and 2022.

In addition, the Company has publicly traded warrants to purchase approximately 21,000 shares of common stock outstanding as of both March 31, 2023 and December 31, 2022. These warrants have an exercise price of $13.00 per share and expire on July 17, 2024. The warrants trade on Nasdaq under the symbol "XBIOW." The warrants also provide that if the weighted-average price of common stock on any trading day on or after 30 days after issuance is lower than the then-applicable exercise price per share, each warrant may be exercised, at the option of the holder, on a cashless basis for one share of common stock. None of these warrants were exercised during the three months ended March 31, 2023. Warrants to purchase 1,684 shares of common stock were exercised on a cashless, one-for-one basis during the three months ended March 31, 2022. None of these warrants were forfeited during the three months ended March 31, 2023 and 2022.

The Company also has outstanding warrants to purchase approximately 8,000 shares of the Company's common stock as of March 31, 2023 and December 31, 2022. These warrants have an exercise price of $2.91 per share and expire on July 3, 2026. None of these warrants were exercised or forfeited during the three months ended March 31, 2023 and 2022.

7. Share-Based Expense

Total share-based expense related to stock options and restricted stock units ("RSUs") was approximately $0.1 million during each of the three months ended March 31, 2023 and 2022.

Share-based expense is classified in the condensed consolidated statements of operations as follows:

	Three Months Ended March 31,	
	2023	**2022**
Research and development expenses	$ 13,688	$ 19,178
General and administrative expenses	55,164	100,417
	$ 68,852	$ 119,595

Employee Stock Options

No stock option awards to purchase shares of common stock were granted during the three months ended March 31, 2023. During the three months ended March 31, 2022, the Company granted 200,000 stock option awards to purchase shares of common stock. The Company recognized a total of approximately $0.1 million of compensation expense related to employee stock options during each of the three months ended March 31, 2023 and 2022. No employee stock options or RSUs were exercised and none expired during the three months ended March 31, 2023 and 2022.

Non-Employee Stock Options

There were no non-employee stock options granted or exercised during the three months ended March 31, 2023 and 2022, respectively. During the three months ended March 31, 2023, non-employee stock option grants to purchase approximately 1,000 shares of common stock expired. No non-employee stock option grants expired during the three months ended March 31, 2022. The Company did not recognize any expense related to non-employee stock options during the three months ended March 31, 2023 and 2022, respectively.

8. Income Taxes

During the three months ended March 31, 2023 and 2022, there was no provision for income taxes as the Company incurred losses during both periods. Deferred tax assets and liabilities reflect the net tax effect of temporary differences between the carrying amount of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. The Company records a valuation allowance against its deferred tax assets as the Company believes it is more likely than not the deferred tax assets will not be realized. The valuation allowance against deferred tax assets was approximately $38.7 million and $38.6 million as of March 31, 2023 and December 31, 2022, respectively.

As of March 31, 2023 and December 31, 2022, the Company did not record any unrecognized tax positions.

9. Commitments and contingencies

Supplemental cash flow information and non-cash activity related to our operating leases are as follows:

	Three Months Ended March 31, 2023	Three Months Ended March 31, 2022
Operating cash flow information:		
Cash paid for amounts included in the measurement of lease liabilities	$ –	$ 9,475

Supplemental balance sheet information related to our operating leases is as follows:

	Balance Sheet Classification	March 31, 2023	March 31, 2022
Right-of-use assets - ST	Prepaid expenses and other	$ –	$ 17,568
Current lease liabilities	Accrued expenses and other current liabilities	$ –	$ 17,568

10. Related Party Transactions

The Company has entered into various research, development, license and supply agreements with Serum Institute and Pharmsynthez, each a related party whose relationship has not materially changed from that disclosed in the Company's Annual Report on Form 10-K for the year ended December 31, 2022 filed with the SEC on March 22, 2023, as amended on April 28, 2023.

During the fourth quarter of 2019, the Company entered into a loan agreement with Pharmsynthez (the "Pharmsynthez Loan"), pursuant to which the Company advanced Pharmsynthez an aggregate principal amount of up to $500,000 to be used for the development of a specific product under the Company's Co-Development Agreement with Pharmsynthez. The Pharmsynthez Loan had an initial term of 15-months and accrued interest at a rate of 10% per annum. The Pharmsynthez Loan is guaranteed by all of the operating subsidiaries of Pharmsynthez, including SynBio and AS Kevelt, and is secured by all of the common and preferred stock of the Company owned by Pharmsynthez and SynBio.

The Pharmsynthez Loan has been amended at various times primarily to extend the principal repayment schedule and maturity date. The Pharmsynthez Loan, as amended, currently has a maturity date of May 31, 2023 and requires the repayment of the remaining principal amount, plus interest, in seven (7) monthly installments from November 30, 2022 through May 31, 2023 as well as certain other terms and conditions. While Pharmsynthez has made certain payments in accordance with the repayment schedule, all principal and interest payments required to date under the Pharmsynthez Loan, as amended, have not been made. As a result, the Company has classified the loan receivable as long-term as of March 31, 2023 and December 31, 2022. The Company assessed the collectability of the loan and determined that the U.S.-based collateral held by the Company, consisting of all of the common and preferred stock of the Company owned by Pharmsynthez and SynBio, was adequate to support the repayment of the outstanding principal balance. As of March 31, 2023 and December 31, 2022, approximately $0.2 million and $0.4 million, respectively, was included in other assets on the condensed consolidated balance sheet. The Company did not recognize any interest income related to this loan during the three months ended March 31, 2023. The Company recognized approximately $9,000 of interest income related to this loan during the three months ended March 31, 2022.

11. Subsequent Events

The Company performed a review of events subsequent to the balance sheet date through the date the financial statements were issued and determined that there were no such events requiring recognition or disclosure in the financial statements.

ITEM 2 – MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This report contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 27A of the Securities Act of 1933, as amended. All statements contained in this Quarterly Report other than statements of historical fact, including statements regarding our future results of operations and financial position, our business strategy and plans, future revenues, projected costs, prospects and our objectives for future operations, are forward-looking statements. These forward-looking statements include, but are not limited to, statements concerning: the lingering effects of the coronavirus, or COVID-19, global pandemic and the responses thereto, including the pandemic's impact on general economic and market conditions, as well as on our business, results of operations and financial condition; anticipated effects of geopolitical events, including the conflict between Russia and Ukraine and associated sanctions imposed by the United States ("U.S.") and other countries in response; our plans to develop our proposed drug candidates; our expectations regarding the nature, timing and extent of clinical trials and proposed clinical trials; our expectations regarding the timing for proposed submissions of regulatory filings, including but not limited to, any Investigational New Drug filing or any New Drug Application; the nature, timing and extent of collaboration arrangements; the expected results pursuant to collaboration arrangements, including the receipts of future payments that may arise pursuant to collaboration arrangements; the outcome of our plans to obtain regulatory approval of our drug candidates; the outcome of our plans for the commercialization of our drug candidates; our plans to address certain markets, engage third party manufacturers, and evaluate additional drug candidates for subsequent commercial development along with the likelihood and extent of competition to our drug candidates; our plans to advance innovative immune-oncology technologies addressing hard to treat oncology indications; expectations regarding our Deoxyribonuclease ("DNase") platform, such as regarding the DNase platform being in development for the treatment of solid tumors and being aimed at improving outcomes of existing treatments, including immunotherapies, by targeting Neutrophil Extracellular Traps ("NETs") and our expectations to prioritize our efforts and resources on this newly licensed technology; the development of the XCART™ Chimeric Antigen Receptor ("CAR") T cell ("XCART") technology and plans to develop cell-based therapeutics by targeting the unique B cell receptor on the surface of an individual patient's malignant tumor cells for the treatment of B-cell lymphomas; and our expectations regarding our PolyXen® platform, including concerning our plans to leverage the platform by partnering with biotechnology and pharmaceutical companies and its application to protein or peptide therapeutics and its application to improve the half-life and other pharmaceutical properties of next-generation biologic drugs.

In some cases, these statements may be identified by terminology such as "may," "will," "would," "could," "should," "expect," "plan," "anticipate," "believe," "estimate," "seek," "approximately," "intend," "predict," "potential," "projects," or "continue," or the negative of such terms and other comparable terminology. Although we believe that the expectations reflected in the forward-looking statements contained herein are reasonable, we cannot guarantee future results, the levels of activity, performance or achievements. These statements involve known and unknown risks and uncertainties that may cause our or our industry's results, levels of activity, performance or achievements to be materially different from those expressed or implied by forward-looking statements.

The Management's Discussion and Analysis of Financial Condition and Results of Operations (the "MD&A") should be read together with our condensed consolidated financial statements and related notes included elsewhere in this Quarterly Report. This Quarterly Report, including the MD&A, contains trend analysis and other forward-looking statements. Any statements in this Quarterly Report that are not statements of historical facts are forward-looking statements. These forward-looking statements made herein are based on our current expectations, involve a number of risks and uncertainties and should not be considered as guarantees of future performance.

Some factors that could cause actual results to differ materially include without limitation:

- unexpected costs, charges or expenses resulting from the transaction with CLS Therapeutics LTD ("CLS") and the licensing of the DNase platform;
- uncertainty of the expected financial performance of the Company following completion of the transaction with CLS and the licensing of the DNase platform;

- failure to realize the anticipated potential of the DNase, XCART or PolyXen technologies;
- our ability to implement our business strategy;
- our failure to meet the continued listing requirements of the Nasdaq Capital Market;
- our need to raise additional working capital in the future for the purpose of further developing our pipeline and to continue as a going concern;
- our ability to finance our business;
- our ability to successfully execute, manage and integrate key acquisitions and mergers;
- product development and commercialization risks, including our ability to successfully develop the DNase technology;
- the impact of adverse safety outcomes and clinical trial results for our therapies;
- our ability to secure and maintain a manufacturer for our technologies;
- the impact of new therapies and new uses of existing therapies on the competitive environment;
- our ability to successfully commercialize our current and future drug candidates;
- our ability to achieve milestone and other payments associated with our current and future co-development collaborations and strategic arrangements;
- our reliance on consultants, advisors, vendors and business partners to conduct work on our behalf;
- the impact of new technologies on our drug candidates and our competition;
- changes in laws or regulations of governmental agencies;
- interruptions or cancellation of existing contracts;
- impact of competitive products and pricing;
- product demand and market acceptance and risks;
- the presence of competitors with greater financial resources;
- continued availability of supplies or materials used in manufacturing at the current prices;
- the ability of management to execute plans and motivate personnel in the execution of those plans;
- our ability to attract and retain key personnel;
- adverse publicity related to our products or the Company itself;
- adverse claims relating to our intellectual property;
- the adoption of new, or changes in, accounting principles;
- the costs inherent with complying with statutes and regulations applicable to public reporting companies, such as the Sarbanes-Oxley Act of 2002;
- other new lines of business that the Company may enter in the future;
- general economic and business conditions, as well as inflationary trends and financial market instability or disruptions to the banking system due to bank failures;
- the impact of natural disasters or public health emergencies, such as the COVID-19 global pandemic, and geopolitical events, such as the Russian invasion of Ukraine, and related sanctions and other economic disruptions or concerns, on our financial condition and results of operations; and
- other factors set forth in the Risk Factors section of our Annual Report on Form 10-K and in subsequent filings with the Securities and Exchange Commission ("SEC").

These factors are not necessarily all of the important factors that could cause actual results to differ materially from those expressed in the forward-looking statements in this Quarterly Report. Other unknown or unpredictable factors also could have material adverse effects on our future results, including, but not limited to, those discussed in the section titled "Risk Factors." The forward-looking statements in this Quarterly Report are made only as of the date of this Quarterly Report, and we do not undertake any obligation to publicly update any forward-looking statements to reflect subsequent events or circumstances. We intend that all forward-looking statements be subject to the safe-harbor provisions of the Private Securities Litigation Reform Act of 1995.

BUSINESS OVERVIEW

We are a biopharmaceutical company focused on advancing innovative immune-oncology technologies addressing hard to treat cancers. Our DNase platform is designed to improve outcomes of existing treatments, including immunotherapies, by targeting NETs, which have been implicated in cancer progression and resistance to cancer treatments. We licensed the DNase oncology platform in April 2022 and are focusing the majority of our resources on advancing our systemic DNase program into the clinic as an adjunctive therapy for pancreatic carcinoma and locally advanced or metastatic solid tumors. We also have a personalized CAR T platform technology, XCART™, to develop cell-based therapeutics targeting the unique B-cell receptor on the surface of an individual patient's malignant tumor cells, for the treatment of B-cell lymphomas. Additionally, we have partnered with biotechnology and pharmaceutical companies to develop our proprietary drug delivery platform, PolyXen, and receive royalty payments under an exclusive license arrangement in the field of blood coagulation disorders.

We incorporate our patented and proprietary technologies into drug candidates currently under development with biotechnology and pharmaceutical industry collaborators to create what we believe will be the next-generation biologic drugs with improved pharmacological properties over existing therapeutics. Our drug candidates have resulted from our research activities or that of our collaborators and are in the development stage. As a result, we continue to commit a significant amount of our resources to our research and development activities and anticipate continuing to do so for the near future. To date, none of our drug candidates have received regulatory marketing authorization or approval in the U.S. by the Food and Drug Administration nor in any other countries or territories by any applicable agencies. We are receiving ongoing royalties pursuant to a license of our PolyXen technology to an industry partner. Although we hold a broad patent portfolio, the focus of our internal efforts during the three months ended March 31, 2023, was on the licensing and advancement of our DNase platform.

Impact of the Conflict in Ukraine on Our Operations

The short and long-term implications of Russia's invasion of Ukraine are difficult to predict at this time. The imposition of sanctions and counter sanctions may have an adverse effect on the economic markets generally and could impact our business, financial condition, and results of operations.

RESULTS OF OPERATIONS

Comparison of Quarter Ended March 31, 2023 and 2022

The comparison of our historical results of operations for the fiscal quarter ended March 31, 2023 to the fiscal quarter ended March 31, 2022 is as follows:

Description	Quarter Ended March 31, 2023	Quarter Ended March 31, 2022	Increase (Decrease)	Percentage Change
Revenue:				
Royalty revenue	$ 605,844	$ 388,993	$ 216,851	55.7
Operating costs and expenses:				
Research and development	(595,276)	(1,101,399)	(506,123)	(46.0)
General and administrative	(925,743)	(907,309)	18,434	2.0
Total operating costs and expenses	(1,521,019)	(2,008,708)	(487,689)	(24.3)
Loss from operations	(915,175)	(1,619,715)	(704,540)	(43.5)
Other income:				
Other income	4,520	199	4,321	2,171.4
Interest income	54,101	25,905	28,196	108.8
Net loss	$ (856,554)	$ (1,593,611)	$ (737,057)	(46.3)

Revenue

Revenue for the three months ended March 31, 2023 increased by $0.2 million, or 55.7%, to $0.6 million from approximately $0.4 million for the three months ended March 31, 2022. This increase represents an increase in royalty revenue related to our sublicense agreement with Takeda Pharmaceuticals Co. Ltd. as compared to the same period in 2022.

Research and Development Expenses

Research & development ("R&D") expenses for the three months ended March 31, 2023 decreased by approximately $0.5 million, or 46.0%, to approximately $0.6 million from approximately $1.1 million in the comparable quarter in 2022. The table below sets forth the R&D costs incurred by the Company by category of expense for the quarters ended March 31, 2023 and 2022:

	Quarter Ended	
Category of Expense	**March 31, 2023**	**March 31, 2022**
Outside services and contract research organizations	$ 423,868	$ 833,670
Personnel costs	124,793	111,984
Share-based expense	13,688	19,178
Other	32,927	136,567
Total research and development expense	$ 595,276	$ 1,101,399

The decrease in outside services and contract research organizations expense was primarily due to decreased spending in connection with our XCART platform technology which was partially offset by costs related to our initial development efforts associated with our DNase platform. We licensed the DNase platform in April 2022 and expect to direct our efforts and resources on the development of this newly acquired technology. As a result, we suspended development of our XCART technology platform. The decrease in other expense was due to lower consulting costs incurred during the first quarter of 2023 compared to the same period in 2022. Consulting costs during the three months ended March 31, 2002 were related to the licensing of the DNase oncology platform from CLS. There were no similar consulting costs incurred during the three months ended March 31, 2023.

General and Administrative Expenses

General and administrative expenses for the three months ended March 31, 2023 increased by approximately $18,000, or 2.0%, to approximately $926,000 from approximately $907,000 in the comparable quarter in 2022. The increase was primarily due to an increase in accounting fees during the three months ended March 31, 2023 compared to the same period in 2022.

Other Income

Other income was approximately $4,500 for the three months ended March 31, 2023 compared to approximately $200 of other income for the same period in 2022. This increase in other income was primarily related to favorable changes in foreign currency exchange rates during the three months ended March 31, 2023 as compared to the same period in 2022.

Interest Income

Interest income increased to approximately $54,000 during the three months ended March 31, 2023 as compared to approximately $26,000 for the same period in the prior year. This increase is primarily due to higher interest rates on invested funds during the three months ended March 31, 2023 compared to the same period in 2022. This increase was partially offset by a decrease in interest income on our loan with Pharmsynthez.

Liquidity and Capital Resources

We incurred a net loss of approximately $0.9 million for the three months ended March 31, 2023. We had an accumulated deficit of approximately $190.0 million at March 31, 2023, as compared to an accumulated deficit of approximately $189.1 million at December 31, 2022. Working capital was approximately $12.0 million at March 31, 2023, and $12.6 million at December 31, 2022. During the three months ended March 31, 2023, our working capital decreased by $0.6 million primarily due to our net loss for the three months ended March 31, 2023.

Our principal source of liquidity consists of cash. At March 31, 2023, we had approximately $12.0 million in cash and $0.9 million in current liabilities. At December 31, 2022, we had approximately $13.1 million in cash and $1.1 million in current liabilities. We have historically relied upon sales of our equity securities to fund our operations.

We evaluate whether there are conditions or events, considered in the aggregate that raise substantial doubt about our ability to continue as a going concern within one year after the date that the financial statements are issued. We have incurred substantial losses since our inception, and we expect to continue to incur operating losses in the near-term. These factors raise substantial doubt about our ability to continue as a going concern. We believe that we have access to capital resources through possible public or private equity offerings, debt financings, corporate collaborations, related party funding, or other means to continue as a going concern. We believe that our existing resources will be adequate to fund our operations for a period of at least twelve months from the date of these financial statements. However, we anticipate we may need additional capital in the long-term to pursue our business initiatives. The terms, timing and extent of any future financing will depend upon several factors, including the achievement of progress in our clinical development programs, our ability to identify and enter into licensing or other strategic arrangements, our continued listing on the Nasdaq Stock Market ("Nasdaq"), and factors related to financial, economic, geo-political, industry and market conditions, many of which are beyond our control. The capital markets for the biotech industry can be highly volatile, which make the terms, timing and extent of any future financing uncertain. On June 3, 2022, we received a written notification (the "Notice") from the Listing Qualifications Department of Nasdaq notifying us that the closing bid price for our common stock had been below $1.00 for 30 consecutive business days and that we therefore were not in compliance with the minimum bid price requirement for continued inclusion on the Nasdaq Capital Market under Nasdaq Listing Rule 5550(a)(2) (the "Bid Price Requirement"). The Notice has no immediate effect on the listing of our common stock on the Nasdaq Capital Market. Under the Nasdaq Listing Rules, we had a period of 180 calendar days from the date of the Notice to regain compliance with the Bid Price Requirement. Accordingly, we had until November 30, 2022 to regain compliance with the Bid Price Requirement and were eligible for an additional 180 calendar day compliance period if certain other criteria were met. On December 1, 2022, we received a letter from Nasdaq informing us that although our common stock had not regained compliance with the minimum $1.00 bid price per share requirement, Nasdaq had determined that we were eligible for an additional 180 calendar day period, or until May 29, 2023, to regain compliance. Nasdaq's determination was based on the Company meeting the continued listing requirement for market value of publicly held shares and all other applicable requirements for initial listing on the Nasdaq Capital Market with the exception of the bid price requirement, and our written notice of our intention to cure the deficiency during the second compliance period by effecting a reverse stock split, if necessary.

On March 10, 2023, Silicon Valley Bank ("SVB") was closed by the California Department of Financial Protection and Innovation, which appointed the Federal Deposit Insurance Corporation ("FDIC") as receiver. We maintained our cash primarily with SVB. On March 12, 2023, the U.S. Treasury, Federal Reserve and FDIC rolled out emergency measures to fully protect all depositors of SVB and, on March 13, 2023, we had full access to our cash on deposit with SVB. As of March 31, 2023, we have transferred our primary banking relationship to a large financial institution and all cash on deposit is covered under federally insured limits.

Cash Flows from Operating Activities

Cash flows used in operating activities for the three months ended March 31, 2023 totaled approximately $1.1 million, which was primarily due to our net loss for the period, partially offset by non-cash charges associated with share-based expense and principal repayments on the Pharmsynthez Loan. In addition, prepaid expenses increased and current liabilities decreased during the three months ended March 31, 2023. Cash flows used in operating activities for the three months ended March 31, 2022 totaled approximately $2.1 million, which was primarily due to our net loss for the period offset by non-cash charges associated with share-based expense. In addition, prepaid expenses increased and current liabilities decreased during the three months ended March 31, 2022.

Cash Flows from Investing Activities

There were no cash flows from investing activities for the three months ended March 31, 2023 and 2022.

Cash Flow from Financing Activities

There were no cash flows from financing activities for the three months ended March 31, 2023 and 2022.

Contractual Obligations and Commitments

As of March 31, 2023, there were no material changes in our contractual obligations and commitments from those disclosed in our Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 22, 2023, as amended on April 28, 2023.

Off Balance Sheet Arrangements

We do not have any off-balance sheet financing arrangements that have or are reasonably likely to have a current or future material effect on our financial condition, change in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures, or capital resources.

Recent Accounting Standards

See Note 3 in our Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 22, 2023, as amended on April 28, 2023, for a discussion of recent accounting standards.

Critical Accounting Estimates

Our condensed consolidated financial statements are prepared in accordance with U.S. generally accepted accounting principles. The preparation of our condensed consolidated financial statements requires us to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities, revenue, costs and expenses. We base our estimates and assumptions on historical experience and other factors that we believe to be reasonable under the circumstances. We evaluate our estimates and assumptions on an ongoing basis. The result of these evaluations forms the basis for making judgments about the carrying values of assets and liabilities and the reported amount of expenses that are not readily apparent from other sources. Because future events and their effects cannot be determined with certainty, actual results and outcomes may differ materially from our estimates, judgments and assumptions. There have been no material changes in our critical accounting estimates from those disclosed in our Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 22, 2023, as amended on April 28, 2023.

ITEM 3 – QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are not required to provide the information required by this Item because we are a “smaller reporting company” (as defined in Rule 12b-2 of the Exchange Act).

ITEM 4 – CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer (principal executive officer) and Chief Financial Officer (principal financial officer), evaluated the effectiveness of our disclosure controls and procedures as defined in Rules 13a-15(e) or 15d-15(e) under the Exchange Act, as of the end of the period covered by this Quarterly Report.

Based on this evaluation, our management, including our Chief Executive Officer and Chief Financial Officer, concluded that as of the end of the period covered by this Quarterly Report, our disclosure controls and procedures are designed at a reasonable assurance level and are effective to provide reasonable assurance that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting that occurred during the period covered by this Quarterly Report that would have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II – OTHER INFORMATION

ITEM 1 – LEGAL PROCEEDINGS

We are not currently subject to any material legal proceedings, nor, to our knowledge, is any material legal proceeding threatened against us. From time to time, we may be a party to certain legal proceedings, incidental to the normal course of our business. While the outcome of these legal proceedings cannot be predicted with certainty, we do not expect that these proceedings will have a material effect upon our financial condition or results of operations.

ITEM 1A – RISK FACTORS

There have been no material changes to the risk factors previously disclosed in our Annual Report on Form 10-K for the year ended December 31, 2022 filed with the SEC on March 22, 2023, as amended on April 28, 2023.

ITEM 2 – UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

None.

ITEM 3 – DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4 – MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5 – OTHER INFORMATION

None.

ITEM 6 – EXHIBITS

The following exhibits are incorporated herein by reference or filed as part of this report.

EXHIBIT NUMBER	DESCRIPTION
10.1*#	Research Funding and Option Agreement, dated March 17, 2023, between the Company and the Scripps Research Institute.
31.1*	Certification of Jeffrey F. Eisenberg, Principal Executive Officer, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of James Parslow, Principal Financial Officer, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certifications of Jeffrey F. Eisenberg, Principal Executive Officer, and James Parslow, Principal Financial Officer, pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101*	The following financial statements from the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2023, formatted in inline XBRL, include: (i) Condensed Consolidated Balance Sheets, (ii) Condensed Consolidated Statements of Operations, (iii) Condensed Consolidated Statements of Stockholders' Equity, (iv) Condensed Consolidated Statements of Cash Flows and (v) the Notes to the Condensed Consolidated Financial Statements.
104*	Cover Page Interactive Data File (formatted in XBRL and included in Exhibit 101).

* Filed herewith.

** Exhibit 32.1 is being furnished and shall not be deemed to be "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liability of that section, nor shall such exhibits be deemed to be incorporated by reference in any registration statement or other document filed under the Securities Act of 1933, as amended or the Securities Exchange Act of 1934, as amended, except as otherwise stated in such filing.

Portions of this exhibit, marked by brackets and asterisks, have been omitted pursuant to Item 601(b)(10) of Regulation S-K under the Securities Act of 1933, as amended, because they are both (i) not material and (ii) would likely cause competitive harm to the registrant if publicly disclosed. The registrant undertakes to promptly provide an unredacted copy of the exhibit on a supplemental basis, if requested by the Commission or its staff.

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, thereunto duly authorized.

XENETIC BIOSCIENCES, INC.

May 11, 2023

By: /s/ JEFFREY F. EISENBERG
Jeffrey F. Eisenberg
Chief Executive Officer
(Principal Executive Officer)

By: /s/ JAMES PARSLOW
James Parslow
Chief Financial Officer
(Principal Financial Officer and Principal Accounting Officer)

Exhibit 10.1

CERTAIN INFORMATION IDENTIFIED IN THIS DOCUMENT, MARKED BY BRACKETS AND ASTERISKS ("[***]"), HAS BEEN EXCLUDED PURSUANT TO ITEM 601(B)(10) OF REGULATION S-K UNDER THE SECURITIES ACT OF 1933, AS AMENDED, BECAUSE IT IS (I) NOT MATERIAL AND (II) WOULD LIKELY CAUSE COMPETITIVE HARM TO THE REGISTRANT IF PUBLICLY DISCLOSED.

RESEARCH FUNDING AND OPTION AGREEMENT

This Agreement is entered into this 17th day of March 2023 (the "Effective Date"), by and between The Scripps Research Institute, a California nonprofit public benefit corporation located at 10550 North Torrey Pines Road, La Jolla, California 92037 ("TSRI"), and Xenetic Biosciences Inc., a for-profit corporation located at 945 Concord Street, Framingham, Massachusetts 01701 ("Sponsor"), with respect to the facts set forth below. Each of TSRI and Sponsor is a "Party" and collectively, the "Parties."

RECITALS

A. TSRI is engaged in fundamental scientific biomedical and biochemical research including research relating to the development of CAR-T technology and DNase 1 enzyme.

B. Sponsor is engaged in research and development of pharmaceutical products.

C. Sponsor desires to provide certain funding as part of TSRI's research activities described above.

D. Subject to any non-exclusive rights of the U.S. Government, TSRI is willing to grant to Sponsor an option to acquire rights and licenses to certain intellectual property arising from the Research Program.

AGREEMENT

NOW, THEREFORE, in consideration of the mutual covenants and conditions outlined herein, TSRI and Sponsor hereby agree as follows:

1. DEFINITIONS.

1.1 Affiliate. The term "Affiliate" shall mean any entity which directly or indirectly controls or is controlled by Sponsor. The term "control" as used herein means (a) in the case of corporate entities, direct or indirect ownership of at least fifty percent (50%) of the stock or shares entitled to vote for the election of directors; or (b) in the case of non-corporate entities, direct or indirect ownership of at least fifty percent (50%) of the equity interest with the power to direct the management and policies of such non-corporate entities. Unless otherwise specified, the term Sponsor includes Affiliates.

1.2 Agreement Number. This Agreement is TSRI number 2022-0134.

1.3 Biological Materials. The term "Biological Materials" shall mean any Technology in the form of tangible materials together with any progeny, mutants, or derivatives thereof developed in performance of the Research Program.

1.4 Confidential Information. The term "Confidential Information" shall mean any and all proprietary information of TSRI or Sponsor which may be exchanged between the parties at any time and from time to time during the term hereof. The fact that a party may have marked or identified as confidential or proprietary any specific information shall be indicative that such party believes such information to be confidential or proprietary, but the failure to so mark information shall not conclusively determine that such information was or was not considered confidential information by such party. Confidential Information shall also include any information which, given the circumstances surrounding the disclosure, would be considered confidential by the disclosing party. Information shall not be considered confidential to the extent that it:

a. Is publicly disclosed through no fault of any party hereto, either before or after it becomes known to the receiving party; or

b. Was known to the receiving party prior to the Effective Date, which knowledge was acquired independently and not from the other party hereto (including such party's employees); or

c. Is subsequently disclosed to the receiving party in good faith by a third party who has a right to make such disclosure; or

d. Was independently developed by or on behalf of the receiving party without use of or reference to the other party's Confidential Information.

1.5 Field. The term "Field" shall mean the use of CAR-T cells and/or DNase with or without a therapeutic agent or targeting agent for the treatment of a disease or syndrome.

1.6 Joint Technology. The term "Joint Technology" shall mean any Technology developed jointly by TSRI and Sponsor under principles arising under US intellectual property laws.

1.7 Patent Rights. The term "Patent Rights" shall mean:

(a) U.S. patents or patent application(s) directed to the Technology;

(b) Foreign counterpart patents or patent applications claiming and entitled to the priority date of the respective patents and patent application(s) referenced in sub-clause (a) above;

(c) Divisionals and continuations of any patents or patent applications referenced in sub-clauses (a) and (b) above;

(d) Any claim(s) of a continuation-in-part claiming and entitled to the priority date of the respective patents and patent application(s) referenced in sub-clause (a) above; and

(e) Reissues, reexaminations, renewals and patent term extensions of the patents referenced in sub-clauses (a) - (d) above.

1.8 Principal Investigator. The term "Principal Investigator" shall mean Dr. Alexey Stepanov, together with such replacement persons selected in accordance with the provisions of Section 2.2 hereof.

1.9 Research Program. The term "Research Program" shall mean the research program to be undertaken by TSRI under the direction and control of the Principal Investigator as expressly set forth in an SOW that is attached as Exhibit A hereto.

1.10 Research Tool. The term “Research Tool” shall mean any Technology which is designed or utilized for basic research purposes or internal drug discovery purposes and which is not utilized to produce, or incorporated into, a product.

1.11 Sponsor Technology. The term “Sponsor Technology” shall mean any Technology developed solely by Sponsor under principles applicable under the laws of the United States of America governing intellectual property.

1.12 Technology. The term "Technology" shall mean any invention, discovery, know-how, Biological Material, software, information and data, whether patentable or not, first conceived and reduced to practice during and as a result of the performance of the Research Program.

1.13 TSRI Technology. The term "TSRI Technology" shall mean any Technology developed solely by TSRI under principles applicable under the laws of the United States of America governing intellectual property.

2. CONDUCT OF RESEARCH PROGRAM.

2.1 Conduct of Research Program. TSRI hereby agrees to use reasonable efforts to perform the Research Program subject to the provisions of this Agreement and as set forth in a Statement of Work (“SOW”), which shall be attached to this Agreement. To the extent that any term in a SOW conflicts with this Agreement, the terms of this Agreement shall take precedence unless the Parties mutually agree in writing in the SOW that the term(s) in the SOW shall take precedence. Additionally, the Parties may amend or modify each SOW from time-to-time upon the mutual written consent of the Parties. Notwithstanding the foregoing, TSRI makes no warranties or representations regarding its ability to achieve, nor shall it be bound to accomplish, any particular research objective or results.

2.2 Supervision of Research Program. TSRI agrees that the Research Program at TSRI shall be conducted by or under the direct supervision of the Principal Investigator. In the event that the Principal Investigator leaves TSRI, or terminates his/her involvement in the Research Program, TSRI shall use its best efforts to find a replacement Principal Investigator acceptable to Sponsor, which acceptance shall not be unreasonably withheld. In the event that TSRI shall fail to appoint a replacement Principal Investigator reasonably acceptable to Sponsor, Sponsor shall have a right to terminate this Agreement upon delivery to TSRI of written notice of intent to terminate pursuant to this Section 2.2, which notice must be delivered to TSRI not less than thirty (30) days nor more than ninety (90) days after delivery by TSRI to Sponsor of the name of the replacement Principal Investigator.

2.3 Reports. TSRI agrees that it will provide weekly informal reports that summarize the work conducted under the Research Program during the prior week by TSRI. The reports shall include at a minimum, the identification of each experiment conducted, the procedure followed, a summary of any results from those experiments and any conclusions that can be drawn from the results. Additionally, within sixty (60) days following the last day of each calendar year during the term of this Agreement, and at the completion of any project that is the subject of an SOW, TSRI shall furnish Sponsor with a written report providing a general summary of the results of the research included within the scope of the Research Program conducted by TSRI, during the immediately preceding calendar year, including but not limited to all data, conclusions, results, observations and a detailed description of all procedures. All such reports described in this Section 2.3 shall be treated as Confidential Information by Sponsor.

2.4 Financial and Staffing Obligations

(a) Contributions of Parties to Research Program. Contributions in the form of financial support, equipment, personnel, technology and other necessary components for the conduct of the Research Program shall be made by the parties in accordance with the terms set forth on Exhibit B. All payments due to TSRI by Sponsor shall be payable in U.S. Dollars in quarterly installments in advance, within ten (10) days of the dates set forth in the following payment schedule:

1st invoice: $78,184.06 (USD)	To be submitted: Effective Date
2nd invoice: $78,184.06 (USD)	To be submitted: at the start of the first month after Effective Date
3rd invoice: $78,184.06 (USD)	To be submitted: at the start of the second month after Effective Date
4th invoice: $78,184.06 (USD)	To be submitted: at the start of the third month after Effective Date
5th Invoice: $78,184.06 (USD)	To be submitted: at the start of the fourth month after Effective Date
6th Invoice: $78,184.06 (USD)	To be submitted: at the start of the fifth month after Effective Date
7th Invoice: $78,184.06 (USD)	To be submitted: at the start of the sixth month after Effective Date
8th Invoice: $78,184.06 (USD)	To be submitted: at the start of the seventh month after Effective Date
9th Invoice: $78,184.06 (USD)	To be submitted: at the start of the eighth month after Effective Date
10th Invoice: $78,184.06 (USD)	To be submitted: at the start of the ninth month after Effective Date
11th Invoice: $78,184.06 (USD)	To be submitted: at the start of the tenth month after Effective Date
12th Invoice: $78,184.06 (USD)	To be submitted: at the start of the eleventh month after Effective Date

All invoices shall be sent to Sponsor via e-mail at ap@xeneticbio.com. Each invoice and payment must reference the Research Project title, Agreement Number and Principal Investigator for purposes of identification. Payments under this Section 2.4(a) shall be sent to:

The Scripps Research Institute
10550 North Torrey Pines Road, TPC-7
La Jolla, California 92037
Attn: Senior Director, Sponsored Programs

TSRI shall not be obligated to perform any of the research specified herein or to take any other action required under this Agreement if the funding is not provided as set forth in Exhibit B and in accordance with the payment schedule as set forth in this Section 2.4(a). Furthermore, should Sponsor fail to make the first payment to TSRI in accordance with this Section 2.4(a), TSRI shall have the right to immediately terminate this Agreement and this Agreement shall be null and void *ab initio*.

The Parties agree that other than those amounts set forth in this Agreement in this Section 2.4 that are to be paid by Sponsor to TSRI, Sponsor owes no other money to TSRI pursuant to the terms of this Agreement or any prior agreements entered into previously by the Parties.

(b) Capital Equipment. Equipment purchased by TSRI with funds provided by Sponsor shall be the property of TSRI. All capital equipment provided under this Agreement by Sponsor for the use of TSRI remains the property of the Sponsor unless other disposition is mutually agreed upon in writing by the parties. If title to this equipment remains with the Sponsor, Sponsor is responsible for maintenance and repair of the equipment, insuring the equipment against damage or loss, and the costs of its transportation to and from the site where it will be used.

(c) Indirect Cost Adjustment. TSRI shall have the right to adjust the payments payable under Section 2.4(a) above to reflect changes in the indirect cost rate negotiated between TSRI and the U.S. Government that is in effect during the quarter that the work is performed. TSRI will notify Sponsor in writing of any change in the indirect cost rate before the effective date of such change. The corresponding direct costs will remain fixed as specified in Exhibit B.

3. OPTION, LICENSE AND PROSECUTION.

3.1 Grant of Option. Subject to the terms of this Agreement and the reservation of rights specified in Sections 4.2 and 4.3, TSRI hereby grants to Sponsor:

(a) an exclusive option (the "Option") to acquire an exclusive, worldwide license, including the right to sublicense, under TSRI's rights in any Patent Rights that claim any inventions within the TSRI Technology to offer for sale, sell and have sold products, processes and Biological Materials in the Field. In the event that a product, process or Biological Material utilizes a Research Tool, such Research Tool shall be made available for Sponsor's sole use on a non-exclusive, royalty-free, non-transferable basis solely in connection with Sponsor's exercise of its license rights to the Technology and Patent Rights granted hereunder.

(b) a non-exclusive, royalty-free, non-transferable license, with the right to grant sublicenses, to make and use TSRI Technology solely for Sponsor's internal research and development purposes, including clinical development during the performance of the Research Program. Any transfer of materials to Sponsor under this Section 3.1(b) shall require the execution of a Material Transfer Agreement on reasonable terms and conditions consistent with this Agreement. Further, in the event that Sponsor desires to sublicense the rights under this Section 3.1(b), such sublicensing will be limited to its sublicensees who have sublicensed rights to any Sponsor Technology, including Sponsor's share of the Joint Technology.

3.2 Disclosure of Technology Subject to Option. After the Principal Investigator submits an invention disclosure covering any Technology to TSRI's Office of Technology Development, TSRI shall disclose such Technology in writing to Sponsor (the "Technology Disclosure"). TSRI shall use reasonable efforts to provide a Technology Disclosure that contains sufficient detail to (i) enable both parties to determine whether or not the particular Technology is TSRI Technology or Joint Technology; and (ii) enable Sponsor to evaluate the advisability of exercising the Option granted hereunder with respect to such Technology. All such Technology Disclosures shall be maintained in confidence by Sponsor as Confidential Information of TSRI.

3.3 Option Period. Sponsor shall have a period of ninety (90) days from receipt of the Technology Disclosure from TSRI (the "Option Period") within which to exercise its Option with respect to the particular Technology disclosed therein. Upon delivery of written notice that Sponsor waives its Option, or upon the failure of Sponsor to exercise its Option in writing during the Option Period, Sponsor shall have no further rights to the particular TSRI Technology, and TSRI may license the TSRI Technology to third parties as it sees fit.

3.4 Exercise of Option. Sponsor shall exercise its Option by delivering to TSRI a written notice within the Option Period which specifies the particular Technology for which the Option is being exercised. Upon such notification, Sponsor and TSRI shall have a period of one hundred and eighty (180) days within which to negotiate a definitive license agreement in good faith. The definitive license agreement shall include terms and conditions substantially similar to those outlined in Exhibit C. In the event that Sponsor exercises the Option within the Option Period and the license agreement contemplated in this Section 3.4 is not concluded within the relevant negotiation period, or any mutually agreed-upon extension thereof, then rights to such Technology shall be disposed of in accordance with TSRI's policies, with no further obligation, but subject to any licenses granted herein. Notwithstanding the foregoing, within one (1) year of the end of such negotiation period in which a license was not entered into pursuant to this Section 3.4 following the exercise of Sponsor's Option hereunder, TSRI will not enter into any agreement with any third party that includes a license in and to the applicable Technology on terms and conditions that, on the whole, are more favorable than those last offered to Sponsor pursuant to this Section 3.4.

3.5 Prosecution of Patent Rights. TSRI shall direct and control the preparation, filing and prosecution of patent applications and patents within the Patent Rights. As consideration for the Option, Sponsor shall pay all fees and costs, and any and all future fees and costs associated with work performed by TSRI's Office of Patent Counsel and any independent counsel engaged by TSRI related to the preparation, filing, prosecution and maintenance of the Patent Rights. Payment shall be made within thirty (30) days after Sponsor receives an invoice therefor. Failure of Sponsor to pay patent fees and expenses as set forth above shall immediately relieve TSRI from its obligation to incur any further patent fees and expenses with regard to the Technology that is the subject matter of the patents for which such fees and expenses are payable. Sponsor's obligation to pay all patent fees and costs incurred pursuant to this Agreement shall survive the termination or expiration of this Agreement. Both parties hereto agree that TSRI may, at its sole discretion, utilize TSRI's Office of Patent Counsel in lieu of or in addition to independent counsel for patent prosecution and maintenance of patent application(s). Sponsor shall have full rights of consultation with the patent attorneys so selected on all matters relating to patent application(s), provided that TSRI shall have the final determination in all such matters.

3.6 Joint Technology. The parties hereby agree that in the event that the disclosed Technology is Joint Technology and that Sponsor either does not exercise its Option or does not sign a license agreement with TSRI, both parties shall (i) have no further obligations to each other with respect to such Joint Technology and any Patent Rights directed to such Joint Technology; and (ii) be free to independently license or otherwise dispose of their rights to such Joint Technology, and any Patent Rights directed to such Joint Technology, on a worldwide basis without accounting to the other party.

4. INTERESTS AND RIGHTS IN INTELLECTUAL PROPERTY.

4.1 Title.

(a) TSRI shall retain sole ownership and title to TSRI Technology and to all intellectual property rights related thereto. TSRI shall, in the good faith exercise of its discretion, undertake reasonable efforts to preserve and maintain its ownership and title in and to the TSRI Technology as TSRI deems appropriate.

(b) Sponsor shall retain sole ownership and title to Sponsor Technology and to all intellectual property rights related thereto. Sponsor shall, in the good faith exercise of its discretion, undertake reasonable efforts to preserve and maintain its ownership and title in and to the Sponsor Technology as Sponsor deems appropriate.

(c) Ownership of and title to Joint Technology shall be vested jointly in TSRI and Sponsor, with each owning an undivided interest therein. Ownership of Patent Rights shall follow inventorship under principles arising under U.S. patent law.

4.2 Governmental Interest. TSRI and Sponsor acknowledge that TSRI has received, and expects to continue to receive, funding from the United States Government in support of TSRI's research activities. TSRI and Sponsor acknowledge and agree that their respective rights and obligations pursuant to this Agreement shall be subject to the rights of the United States Government, existing and as amended, which may arise or result from TSRI's receipt of research support from the United States Government, including but not limited to, 37 CFR 401, the NIH Grants Policy Statement and the NIH Guidelines for Obtaining and Disseminating Biomedical Research Resources.

4.3 Reservation of Rights. All rights that are not expressly granted under this Agreement are hereby reserved. Without limiting the foregoing, TSRI reserves the right to use for any internal, within TSRI, academic, non-commercial research or educational purpose any Patent Rights or Research Tools, without TSRI being obligated to pay Sponsor any royalties or other compensation. In addition, TSRI reserves the right to grant non-exclusive research and educational use licenses to other nonprofit or academic institutions to Patent Rights or Research Tools, without the other non-profit entity being obligated to pay Sponsor any royalties or other compensation, provided that TSRI shall notify Sponsor of any such grant and discuss in good faith any concerns that Sponsor may have with respect to such grant and such nonprofit or academic institution shall not use the Patent Rights or Research Tools for commercial development, either by themselves or with a third-Party.

5. CONFIDENTIALITY AND PUBLICATION.

5.1 Treatment of Confidential Information. The parties agree that during the term of this Agreement, and for a period of seven (7) years after this Agreement terminates, a party receiving Confidential Information of the other party will (a) maintain in confidence such Confidential Information to the same extent such party maintains its own proprietary information; (b) not disclose such Confidential Information to any third party without the prior written consent of the other party; and (c) not use such Confidential Information for any purpose except those permitted by this Agreement.

If Confidential Information is required to be disclosed by law or court order, the Party required to make such disclosure shall limit the same to the minimum required to comply with the law or court order, and shall use reasonable efforts to attempt to seek confidential treatment for that disclosure, and prior to making such disclosure that Party shall notify the other party, not later than ten (10) days (or such shorter period of time as may be reasonably practicable under the circumstances) before the disclosure in order to allow that other Party to comment and/or to obtain a protective or other order, including extensions of time and the like, with respect to such disclosure.

5.2 Publications. Sponsor acknowledges that it is the general policy of TSRI to encourage publication of research results in technical or scientific journals; and Sponsor agrees that TSRI shall have a right to publish in accordance with its general policy. TSRI shall submit to Sponsor copies of proposed publications which describe Technology and afford Sponsor a period of thirty (30) days to review the publication to (i) ascertain whether Sponsor's Confidential Information would be disclosed by the publication; and (ii) ascertain whether or not the publication discloses any Technology with regard to which Sponsor wishes to exercise the Option. If such proposed publication would disclose Sponsor's Confidential Information, then upon Sponsor's written request TSRI shall remove such Confidential Information of Sponsor or delay publication for up to an additional thirty (30) days to allow Sponsor to protect its Confidential Information by filing a patent application(s). In the event that Sponsor identifies any Technology to which it wishes to exercise its Option, Sponsor shall notify TSRI of such in writing. Upon such notification, TSRI shall (i) file any patent applications necessary to protect the proprietary positions of both parties in the Technology at Sponsor's sole expense; and (ii) provide Sponsor with a Technology Disclosure in accordance with Section 3.2. Absent receipt by TSRI of any written instruction by Sponsor within the thirty (30) day period, TSRI shall be free to publish the proposed publication.

5.3 Publicity. Except as otherwise provided herein or required by law, regulation, or stock exchange rule, no party shall originate any publication, news release or other public announcement, written or oral, whether in the public press, stockholders' reports, or otherwise, relating to this Agreement or to the performance hereunder without the prior written approval of the other party, which approval shall not be unreasonably withheld. Scientific publications published in accordance with Section 5.2 of this Agreement shall not be construed as publicity governed by this Section 5.3.

6. WARRANTY AND DISCLAIMER.

TSRI hereby represents and warrants that it has full right and power to enter into this Agreement. TSRI MAKES NO OTHER WARRANTIES CONCERNING THE CONDUCT OR RESULTS OF THE RESEARCH PROGRAM, PATENT RIGHTS, TECHNOLOGY, RESEARCH TOOLS, BIOLOGICAL MATERIALS OR ANY OTHER MATTER WHATSOEVER, INCLUDING WITHOUT LIMITATION, ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT OF THIRD PARTY RIGHTS, OR ARISING OUT OF COURSE OF CONDUCT OR TRADE CUSTOM OR USAGE, AND TSRI DISCLAIMS ALL SUCH EXPRESS OR IMPLIED WARRANTIES. TSRI MAKES NO WARRANTY OR REPRESENTATION AS TO THE VALIDITY OR SCOPE OF PATENT RIGHTS, OR THAT ANY PRODUCT, PROCESS, SERVICE, BIOLOGICAL MATERIAL, OR RESEARCH TOOL WILL BE FREE FROM AN INFRINGEMENT ON PATENTS OR OTHER INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES, OR THAT NO THIRD PARTIES ARE IN ANY WAY INFRINGING UPON ANY PATENT RIGHTS, TECHNOLOGY**,** RESEARCH TOOLS OR BIOLOGICAL MATERIALS COVERED BY THIS AGREEMENT. FURTHER, TSRI HAS MADE NO INVESTIGATION AND MAKES NO REPRESENTATION THAT THE PATENT RIGHTS, RESEARCH TOOLS OR BIOLOGICAL MATERIALS ARE SUITABLE FOR SPONSOR'S PURPOSES.

IN NO EVENT SHALL TSRI BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR EXPECTED SAVINGS OR OTHER ECONOMIC LOSSES, OR FOR INJURY TO PERSONS OR PROPERTY) ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT OR ITS SUBJECT MATTER. TSRI'S AGGREGATE LIABILITY, IF ANY, FOR ALL DAMAGES OF ANY KIND RELATING TO THIS AGREEMENT OR ITS SUBJECT MATTER SHALL NOT EXCEED THE AMOUNT PAID BY SPONSOR TO TSRI UNDER THIS AGREEMENT. THE FOREGOING EXCLUSIONS AND LIMITATIONS SHALL APPLY TO ALL CLAIMS AND ACTIONS OF ANY KIND AND ON ANY THEORY OF LIABILITY, WHETHER BASED ON CONTRACT, TORT (INCLUDING, BUT NOT LIMITED TO NEGLIGENCE OR STRICT LIABILITY), OR ANY OTHER GROUNDS, AND REGARDLESS OF WHETHER TSRI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. THE PARTIES FURTHER AGREE THAT EACH WARRANTY DISCLAIMER, EXCLUSION OF DAMAGES OR OTHER LIMITATION OF LIABILITY HEREIN IS INTENDED TO BE SEVERABLE AND INDEPENDENT OF THE OTHER PROVISIONS SINCE THEY EACH REPRESENT SEPARATE ELEMENTS OF RISK ALLOCATION BETWEEN THE PARTIES. NOTHING IN THIS AGREEMENT SHALL LIMIT OR EXCLUDE LIABILITY FOR FRAUD, WILLFUL MISCONDUCT, PERSONAL INJURY OR DEATH CAUSED BY GROSS NEGLIGENCE OR ANY MATTER WHICH CANNOT, AS A MATTER OF LAW CANNOT BE LIMITED OR EXCLUDED.

7. TERM AND TERMINATION.

7.1 Term. Unless terminated sooner, the initial term of this Agreement shall commence on the Effective Date and shall continue for fifteen (15) months (the "Term").

7.2 Termination by Sponsor. Beginning six (6) months after the Effective Date, Sponsor may terminate this Agreement without cause by giving thirty (30) days advance written notice of termination to TSRI.

7.3 Termination Upon Non-Payment. In the event that Sponsor fails to pay to TSRI any payment within the time frame set forth in Section 2.4(a), TSRI shall not be obligated to perform any of the research specified herein or to take any other action required under this Agreement, and may terminate this Agreement, after having given Sponsor 30 days' prior written notice to remedy the non-payment, if payment is not made within such 30 days. Termination pursuant to this Section 7.3 shall not relieve Sponsor of any liability under this Agreement.

7.4 Termination Upon Default. Except as specified in Sections 7.3 and 7.5, the failure of a party to perform any obligation required of it to be performed hereunder and the failure to cure within sixty (60) days after receipt of notice from the other party specifying in reasonable detail the nature of such default, shall constitute an event of default hereunder. Upon the occurrence of an event of default, the non-defaulting party may deliver to the defaulting party written notice of intent to terminate, such termination to be effective upon the date set forth in such notice. Such termination rights shall be in addition to and not in substitution for any other remedies that may be available to the non-defaulting party serving such notice against the defaulting party. Termination pursuant to this Section 7.4 shall not relieve the defaulting party of liability and damages to the non-defaulting party for breach of this Agreement. Waiver by any party of a single default or a succession of defaults shall not deprive such party of any right to terminate this Agreement arising by reason of any subsequent default.

7.5 Termination Upon Insolvency. This Agreement may be terminated as to any party ("Insolvent Party") by another party giving written notice of termination to the Insolvent Party upon the filing of bankruptcy or bankruptcy of the Insolvent Party or the appointment of a receiver of any of the Insolvent Party's assets, or the making by the Insolvent Party of any assignment for the benefit of creditors, or the institution of any proceedings against the Insolvent Party under any bankruptcy law. Termination shall be effective upon the date specified in this notice.

7.6 Effect of Expiration or Termination

a. Termination without Cause by Sponsor. Upon termination of this Agreement by Sponsor without Cause, neither party shall have any further rights or obligations with respect to this Agreement, other than the obligation of Sponsor to make any and all final payments accrued prior to the date of termination. Upon such termination of this Agreement, the parties shall continue to abide by their non-disclosure obligations as described in Section 5.1 and each party hereto shall fulfill any other obligations incurred prior to such termination. Any such termination of this Agreement shall not constitute the termination of any license or any other agreements between the parties which are then in effect except as expressly provided therein. In addition, upon such termination, Sponsor’s Option under Section 3.1 shall be deemed automatically cancelled, and Sections 4, 6, 7 and 9 shall survive any such termination.

b. Termination Upon Material Default of Sponsor. Upon the termination of this Agreement by reason of a material default by Sponsor, neither party shall have any further rights or obligations with respect to this Agreement, other than the obligation of Sponsor to make any and all final payments accrued prior to the date of termination, the obligation of the parties to make all reports required hereunder, and except as provided below. Upon such termination of this Agreement, the parties shall continue to abide by their non-disclosure obligations as described in Section 5.1 and each party hereto shall fulfill any other obligations incurred prior to such termination. Any such termination of this Agreement shall not constitute the termination of any license or any other agreements between the parties which are then in effect except as expressly provided therein. In addition, upon such termination, Sponsor’s Option under Section 3.1 shall be deemed automatically cancelled, and Sections 4, 6, 7 and 9 shall survive any such termination.

c. Expiration or Termination upon Default of TSRI. Upon the expiration of this Agreement at its regularly scheduled expiration date, or upon a termination of this Agreement on account of a default by TSRI, then TSRI shall make the disclosures required by Section 3.2 for TSRI Technology conceived or reduced to practice up to the date of said expiration or termination; and Sponsor shall have the right to exercise its Option with respect to said TSRI Technology in accordance with the schedule and procedures specified in Sections 3.3 and 3.4 above; and any non-exclusive licenses that have been granted under Section 3.1 shall survive. Additionally, each party shall perform all other obligations up to the date of said expiration or termination; and the parties shall continue to abide by their non-disclosure obligations described in Section 5.1; and any previously existing license agreements or other agreements between the parties shall continue in effect. In addition, upon such expiration or termination, Sections 4, 6, 7 and 9 shall survive.

7.7 Effect of Termination by Sponsor on Sublicense Agreement. If Sponsor terminates this Agreement prior to the end of the Term, whether with cause or without, to the extent that Sponsor has sublicensed all or some of its rights under this Agreement, the sublicensee shall have the right to have its agreement continue in full force and such sublicense agreement shall then be with TSRI and not Sponsor for the remainder of any term of such sublicense agreement, provided that the terms of any such sublicense shall not impose any additional obligations on TSRI and shall be at least as favorable to TSRI as the terms of this Agreement, including with respect to the limitations of liability set forth in this Agreement. Further, promptly following any such termination Sponsor shall cause the relevant surviving sublicensee to enter into a direct relationship with TSRI with respect to the applicable licensed rights and under the terms set forth in the sublicense agreement with Sponsor or if a new agreement is negotiated, the terms of the new agreement shall not be more restrictive than those in the sublicense agreement. Additionally, if Sponsor gives notice of its intention to terminate this Agreement under section 7.3, 7.4 or 7.5, TSRI agrees to negotiate in good faith with the joint patent owner of any Sponsor Technology, including the Sponsor's share of the Joint Technology, to novate any relevant SOW to that joint patent owner to enable work to continue under it, but shall have no obligations to do so absent reaching any such agreement.

8. ASSIGNMENT; SUCCESSORS.

8.1 Assignment. Any and all assignments by Sponsor of this Agreement or any rights granted hereunder without the prior written consent of TSRI are void except for assignments to an Affiliate of Sponsor. Notwithstanding the foregoing, Sponsor may assign this Agreement to a sublicensee of Sponsor that entered into a sublicense agreement in accordance with the terms of this Agreement or to a joint owner of any Sponsor Technology including Sponsor's share of the Joint Technology, including Belgian Volition SRL, provided that the relevant assignee provide notice to TSRI and expressly assume all past and future obligations of Sponsor under this Agreement.

8.2 Binding Upon Successors and Assigns. Subject to the limitations on assignment set forth herein, this Agreement shall be binding upon and inure to the benefit of any successors in interest and assigns of TSRI and Sponsor. Any such successor to or assignee of a party's interest shall expressly assume in writing the performance of all the terms and conditions of this Agreement to be performed by such party and such written assumption shall be delivered to the other Party.

9. GENERAL PROVISIONS.

9.1 Independent Contractors. The relationship between TSRI and Sponsor is that of independent contractors. TSRI and Sponsor are not joint venturers, partners, principal and agent, master and servant, employer or employee, and have no other relationship other than independent contracting parties. TSRI and Sponsor shall have no power to bind or obligate each other in any manner, other than as is expressly set forth in this Agreement.

9.2 Dispute Resolution. Any dispute or claim between the parties arising out of or relating to this Agreement, including without limitation the breach thereof, shall be resolved according to the following dispute resolution procedures:

(a) Such dispute shall be first addressed by the representatives of TSRI and Sponsor who have primary responsibility for managing this Agreement.

(b) If the dispute is not resolved by such representatives within fifteen (15) days after the date either party gives written notice that such dispute exists, then the dispute shall be referred to and addressed by the senior management of each party.

(c) If such dispute is not resolved by the parties' senior management within thirty (30) days after the date the dispute is referred to them, then the dispute shall be submitted to mediation. The mediator shall be a retired judge or other neutral third party mutually selected by TSRI and Sponsor who has at least ten (10) years' experience in mediating or arbitrating cases in the bio-pharmaceutical industry and regarding the same or substantially similar subject matter as the dispute between Sponsor and TSRI. If the parties are unable to agree on such mediator within twenty (20) days after they exchange initial lists of potential mediators, a mediator with the same qualifications will be selected by the JAMS office in San Diego located at 401 B Street, San Diego, CA 92101 (after consultation with the parties).

(d) The location of the mediation shall be in the County of San Diego, California. TSRI and Sponsor hereby irrevocably submit to the exclusive jurisdiction and venue of the mediator mutually selected by the parties or to the neutral mediator selected by JAMS of San Diego for purposes of the mediation, and to the exclusive jurisdiction and venue of the federal and state courts located in San Diego County, California for any action or proceeding regarding this Agreement in the event mediation is unsuccessful as provided in sub-clause (e) below, or as provided in sub-clause (f) below, and waive any right to contest or otherwise object to such exclusive jurisdiction or venue, including without limitation any claim that such exclusive venue is not a convenient forum.

(e) If the dispute is not resolved through mediation, either party may refer the dispute to a court of competent jurisdiction in San Diego County, California.

(f) Notwithstanding anything to the contrary in this Agreement, prior to or while a mediation proceeding is pending, either party has the right to seek and obtain injunctive and other equitable relief from a court of competent jurisdiction to enforce that party's rights hereunder.

9.3 Entire Agreement; Modification. This Agreement and all of the attached Exhibits set forth the entire agreement and understanding between the parties as to the subject matter hereof and supersede all prior or contemporaneous written or oral agreements. There shall be no amendments or modifications to this Agreement, except by a written document which is signed by both parties.

9.4 California Law. This Agreement shall be construed and enforced in accordance with the laws of the State of California notwithstanding any conflicts or choice of laws provisions.

9.5 No Use of Name. The use of the name "The Scripps Research Institute", "Scripps", "TSRI" or any variation thereof in connection with the advertising, sale or performance of Products, Processes, Services, Biological Materials or Research Tools is expressly prohibited.

9.6 Headings. The headings for each article and section in this Agreement have been inserted for the convenience of reference only and are not intended to limit or expand on the meaning of the language contained in the particular article or section.

9.7 Severability. Should any one or more of the provisions of this Agreement be held invalid or unenforceable by a court of competent jurisdiction, it shall be considered severed from this Agreement and shall not serve to invalidate the remaining provisions thereof. The parties shall make a good faith effort to replace any invalid or unenforceable provision with a valid and enforceable one such that the objectives contemplated by them when entering this Agreement may be realized.

9.8 No Waiver. Any delay in enforcing a party's rights under this Agreement or any waiver as to a particular default or other matter shall not constitute a waiver of such party's rights to the future enforcement of its rights under this Agreement, excepting only as to an express written and signed waiver as to a particular matter for a particular period of time.

9.9 Attorneys' Fees. In the event of a dispute among the parties hereto or in the event of any default hereunder, the party prevailing in the resolution of any such dispute or default shall be entitled to recover its reasonable attorneys' fees and other costs incurred in connection with resolving such dispute or default.

9.10 Notices. Any notices required by this Agreement shall be in writing, shall specifically refer to this Agreement and shall be sent by registered or certified airmail, postage prepaid, or by telefax, telex or cable, charges prepaid, or by overnight courier, postage prepaid, and shall be forwarded to the respective addresses set forth below unless subsequently changed by written notice to the other party:

FOR TSRI:	The Scripps Research Institute 10550 North Torrey Pines Road, TPC-9 La Jolla, California 92037 Attn: OTD
With a copy to:	The Scripps Research Institute 10550 North Torrey Pines Road, TPC-8 La Jolla, California 92037 Attention: General Counsel
FOR SPONSOR:	Xenetic Biosciences, Inc. 40 Speen St., Ste 102 Framingham, Massachusetts 01701 Attn: Curtis Lockshin, Chief Scientific Officer
With a copy to:	Entralta PLLC 4500 Williams Dr., Ste 212, PMB 511 Georgetown, Texas 78633 Attention: Peter Weinstein

Notices shall be deemed delivered upon the earlier of (i) when received; (ii) three (3) days after deposit into the U.S. mail; (iii) the date notice is sent via telefax, telex or cable; or (iv) the day immediately following delivery to an overnight courier guaranteeing next-day delivery (except Sunday and holidays).

9.11 Compliance with U.S. Laws. Nothing contained in this Agreement shall require or permit TSRI or Sponsor to do any act inconsistent with the requirements of any United States law, regulation, or executive order as the same may be in effect from time to time.

9.12 Export Controls. The Parties expressly acknowledge that performance under this Agreement is contingent upon full compliance with all U.S. export control laws and regulations, including but not limited to the International Traffic in Arms Regulations (ITAR) (22 CFR §§ 120-130), Export Administration Regulations (EAR) (15 CFR §§ 730-774), and regulations administered by the Office of Foreign Assets Control (OFAC) (31 CFR §§ 500-598). Accordingly, Sponsor shall not transfer any export-controlled information or items to TSRI without written notice and prior authorization. In the event that such transfer is necessary and export-controlled under the ITAR, EAR, or subject to regulations governing access to the information/items, Sponsor will notify TSRI's Export Control Officer in writing (export@scripps.edu) thirty (30) days in advance of transfer, including the appropriate export classification, so that proper steps are taken to ensure compliance. In the event Sponsor violates applicable export control laws and regulations, Sponsor shall bear sole responsibility for any violation of such laws and regulations, including consequential liability, penalties, or enforcement actions undertaken by a U.S. government agency or any other party in relation to such action. TSRI may limit or decline to receive, without penalty, any export restricted items or information under this Agreement. In the event that any party or its related business entity becomes subject to any U.S. government list of prohibited or restricted parties, TSRI may in its sole discretion, terminate any and all of its obligations under this Agreement without penalty or liability.

9.13 Indemnity. Sponsor shall indemnify, defend (by counsel reasonably acceptable to TSRI) and hold harmless TSRI and any parent, subsidiary or other affiliated entity of TSRI and their trustees, directors, officers, employees, scientists, agents, successors, assigns and other representatives (collectively, the "Indemnitees") from and against all claims, suits, actions, damages, liabilities, losses and other expenses, including without limitation reasonable attorney's fees, expert witness fees and costs incurred by or asserted against the Indemnitees, whether or not a lawsuit or other proceeding is filed (collectively "Claim"), that arise out of or relate to any allegations regarding Sponsor's use of the Technology or the exercise of its non-exclusive license rights under Section 3.1(b). Sponsor shall not enter into any settlement of such Claims that imposes any obligation on TSRI, that does not unconditionally release TSRI from all liability or that would have an adverse effect on TSRI's reputation or business without TSRI's prior written consent. Notwithstanding the above, Indemnitees, at their expense, shall have the right to retain separate independent counsel to assist in defending any such Claims. In the event Sponsor fails to promptly indemnify and defend such Claims and/or pay Indemnitees' expenses as provided above, Indemnitees shall have the right to defend themselves, and in that case, Sponsor shall reimburse Indemnitees for all of their reasonable attorney's fees, costs and damages incurred in settling or defending such Claims within thirty (30) days of each of the Indemnitees' written requests. This indemnity shall be a direct payment obligation and not merely a reimbursement obligation of Sponsor to Indemnitees.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, the parties have executed this Agreement by their duly authorized representatives as of the Effective Date.

TSRI:	SPONSOR:
THE SCRIPPS RESEARCH INSTITUTE	XENETIC BIOSCIENCES
By: /s/ Marshall Olin	By: /s/ Jeffrey Eisenberg
Name: Marshall Olin	Name: Jeffrey Eisenberg
Title: Chief Business Counsel	Title: Chief Executive Officer

EXHIBIT A: RESEARCH PROGRAM/STATEMENT OF WORK

Xenetic Biosciences Inc,
945 Concord Street
Framingham, MA 01701
("Sponsor")

Developed by [***],
Institute Investigator, The Scripps Research Institute,
("SCRIPPS")

[***]

EXHIBIT B: BUDGET

Study ID and Title	Price,$
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	
[***]	[***]
[***]	
PRICE	[***]
SCRIPPS Overheads [***]	[***]
TOTAL PRICE	[***]
Pass through to Volition Rx	[***]

EXHIBIT C

LICENSE TERMS

Licensed Patent	"Licensed Patent" means any patent application filed by TSRI from the work conducted under this Research Funding and Option Agreement to which Sponsor has exercised its exclusive license Option and any foreign patent application corresponding thereto, and any divisional, continuation, or reexamination application, and each patent that issues or reissues from these patent applications. Any claim of an unexpired Licensed Patent is presumed to be valid unless it has been held to be invalid by a final judgment of a court of competent jurisdiction from which no appeal can be or is taken.
Licensed Know-How	"Licensed Know-How" means any unpatented, technical and other information resulting from the work conducted under this Research Funding and Option Agreement to which Sponsor has exercised its exclusive license Option, including information comprising or relating to concepts, inventions, ideas, discoveries, data, formulae, research models, specifications, materials (including information as to biological or chemical structure or functions), methods, research plans, procedures for experiments and tests and data and other results arising from experimentation and testing.
Licensed Field of Use	1. The use of CAR-T Cells with one or more therapeutic and/or targeting agent(s) for the treatment of a disease or syndrome; and/or 2. The use of a DNase 1 alone or in combination with one or more additional therapeutic and/or targeting agents for the treatment of a disease or syndrome.
Licensed Territory	Worldwide
Royalty	[***] on Net Sales of Licensed Products, whether such sales are made by Sponsor, a sublicensee, or any other licensed party, with the amount to be paid by Sponsor to TSRI not to exceed [***] of all money received by Sponsor as a Royalty on Net Sales from a sublicensee or any other licensed party.
Sublicense Pass Through Income	Sponsor shall pay to TSRI the amount of [***] of all Pass Through Income received by Sponsor from a sublicensee.
Pass Through Income	"Pass Through Income" means any and all monetary consideration received by Sponsor from a sublicensee, not including royalties on Net Sales of Licensed Products.
Royalty Term	"Royalty Term" means on a country-by-country and Licensed Product-by-Licensed Product basis, the date that royalty payments would begin and would end. The Royalty Term shall begin for each Licensed Product on the date of the first commercial sale of such Licensed Product and shall end on the later to occur of: (a) 10 years following the first commercial sale; or (b) the date on the expiration of the last issued patent that covers such Licensed Product in such Country ("Royalty Term"), whichever is longer. Upon the expiration of the Royalty Term, the license grant to Sponsor will automatically convert to a royalty-free, fully paid-up license in the Territory.
Reduction for Blocking IP	With respect to any Third Party License pursuant to which Sponsor is granted rights under any blocking IP to make, use, offer to sell, sell or export a Licensed Product, Sponsor will be entitled to deduct [***] of any money paid to a third party under a third party license for rights to the Blocking IP from any Royalty on Net Sales owed to TSRI and if the total royalties owed by Sponsor to third parties other than TSRI to commercialize the Licensed Product [***] in total. The Reduction shall be applied on a country-by-country basis.
Milestone Payments	For the first Licensed Product only: · [***] upon first Commercial Sale; · [***] upon reaching aggregate Net Sales of [***] in any combination of markets and/or indications; · [***] upon reaching aggregate Net Sales of [***] in any combination of markets and/or indications. No other milestones shall be owed by Sponsor to TSRI under a definitive agreement other than those set forth above.
Sublicensing	Sponsor shall have a right to sublicense its rights under any License Agreement between the Parties to a third party of its choosing pursuant to this Term Sheet. The sublicense agreement shall contain terms no less restrictive than the License Agreement between the Parties pursuant to this Term Sheet.
Patent Prosecution Costs	Sponsor shall be solely responsible for the payment of all fees and costs related to the preparation, prosecution and maintenance of any Licensed Patents.
Change of Control Fee	There shall be no Change of Control Fee payable by Sponsor to TSRI pursuant to this agreement.
Other	The Agreement, when executed, will include usual and customary terms and conditions, including, without limitation, those regarding representations and warranties, indemnification, termination, and dispute resolution.

EXHIBIT 31.1

I, Jeffrey F. Eisenberg, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Xenetic Biosciences, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: May 11, 2023

By: /s/ Jeffrey F. Eisenberg
Jeffrey F. Eisenberg
Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 31.2

I, James Parslow, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Xenetic Biosciences, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: May 11, 2023

By: /s/ James Parslow
James Parslow
Chief Financial Officer
(Principal Financial and Principal Accounting Officer)

EXHIBIT 32.1

CERTIFICATION

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, (the "Exchange Act") and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), Jeffrey F. Eisenberg, Chief Executive Officer of Xenetic Biosciences, Inc. (the "Company"), and James Parslow, Chief Financial Officer of the Company, each hereby certifies that, to the best of his knowledge:

The Company's Quarterly Report on Form 10-Q for the period ended March 31, 2023, to which this Certification is attached as Exhibit 32.1 (the "Periodic Report"), fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act; and

The information contained in the Periodic Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 11, 2023

In Witness Whereof, the undersigned have set their hands hereto as of the 11th day of May 2023.

/s/ Jeffrey F. Eisenberg
Jeffrey F. Eisenberg
Chief Executive Officer

/s/ James Parslow
James Parslow
Chief Financial Officer

"This certification accompanies the Form 10-Q to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Xenetic Biosciences, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-Q), irrespective of any general incorporation language contained in such filing."