PROSPECTUS

Up to 34,487,159 Shares of Common Stock Offered by the Selling Stockholders



CELLECTAR BIOSCIENCES, INC. Common Stock

This prospectus relates to the resale, from time to time by the selling stockholders named in this prospectus (the "selling stockholders") of up to 34,487,159 shares of our common stock (the "Shares"), which consist of (i) 13,461,531 shares of our common stock issuable upon conversion of the Series E-1 Preferred Stock (the "Series E-1 Preferred Stock"), (ii) 13,846,146 shares of our common stock issuable upon conversion of the underlying shares of the Series E-3 Preferred Stock (the "Series E-3 Preferred Stock") and (iii) 7,179,482 shares of our common stock issuable upon conversion of the underlying shares of the Series E-4 Preferred Stock (the "Series E-4 Preferred Stock"). The Series E-1 Preferred Stock was issued on September 8, 2023 pursuant to the securities purchase agreement entered into on September 5, 2023 between Cellectar Biosciences, Inc. and the investors named thereto (the "Securities Purchase Agreement"). The Series E-3 Preferred Stock are issuable upon exercise of the tranche A warrants issued pursuant to the Securities Purchase Agreement on September 8, 2023 (the "Tranche A Warrants") and the Series E-4 Preferred Stock are issuable upon exercise of the tranche B warrants issued pursuant to the Securities Purchase Agreement on September 8, 2023 (the "Tranche B Warrants" and, together with the Tranche A Warrants, the "Warrants").

Our registration of shares of common stock covered by this prospectus does not mean that the selling stockholders will offer or sell any such shares. We are registering the offer and resale of the Securities to satisfy a covenant set forth in the securities purchase agreement entered into on September 5, 2023.

We will not receive any of the proceeds from the sale of our common stock by the selling stockholders, although we will receive proceeds from the cash exercise of any Warrants.

Any shares of our common stock subject to resale hereunder will have been issued by us and received by the selling stockholders prior to any resale of such shares pursuant to this prospectus.

The selling stockholders, or their donees, pledgees, transferees or other successors-in-interest may offer or resell the Shares from time to time through public or private transactions at prevailing market prices, at prices related to prevailing market prices or at privately negotiated prices. The selling stockholders will bear all commissions and discounts and similar selling expenses, if any, attributable to the sale of Shares. We will bear all costs, expenses and fees (other than commissions and discounts and similar selling expenses) in connection with the registration of the Shares. For additional information on the methods of sale that may be used by the selling stockholders, see "Plan of Distribution" beginning on page 13 of this prospectus.

Our common stock is listed on the Nasdaq Global Select Market under the symbol "CLRB." On October 30, 2023, the last reported sale price of our common stock was \$2.40.

Investing in our securities involves significant risks. We strongly recommend that you read carefully the risks we describe in this prospectus and in any accompanying prospectus supplement, as well as the risk factors that are incorporated by reference into this prospectus from our filings made with the Securities and Exchange Commission. See "Risk Factors" beginning on page 5 of this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The date of this prospectus is October 30, 2023.

TABLE OF CONTENTS

ABOUT THIS PROSPECTUS	<u>1</u>
SUMMARY	<u>2</u>
RISK FACTORS	<u>5</u>
FORWARD-LOOKING STATEMENTS	<u>6</u>
USE OF PROCEEDS	<u>7</u>
SELLING STOCKHOLDERS	<u>8</u>
PLAN OF DISTRIBUTION	<u>13</u>
LECAL MATTERS	<u>15</u>
<u>LEGAL MATTERS</u>	
<u>EXPERTS</u>	<u>15</u>
WHERE YOU CAN FIND MORE INFORMATION	<u>15</u>
INFORMATION INCORPORATED BY REFERENCE	<u>16</u>

ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we filed with the Securities and Exchange Commission (the "SEC"), using a "shelf" registration process. The selling stockholders may resell, from time to time, in one or more offerings, shares of our common stock offered by this prospectus. Information about the selling stockholders may change over time. When the selling stockholders sell shares of our common stock under this prospectus, we will, if necessary and required by law, provide a prospectus supplement that will contain specific information about the terms of that offering. Any prospectus supplement may also add to, update, modify or replace information contained in this prospectus. If a prospectus supplement is provided and the description of the offering in the prospectus supplement varies from the information in this prospectus, you should rely on the information in the prospectus supplement. You should carefully read this prospectus and the accompanying prospectus supplement, if any, along with all of the information incorporated by reference herein and therein, before making an investment decision.

You should rely only on the information contained or incorporated by reference in this prospectus and any applicable prospectus supplement. We have not, and the selling stockholders have not, authorized any other person to provide you with different or additional information. If anyone provides you with different or additional information, you should not rely on it. This prospectus is not an offer to sell, nor are the selling stockholders seeking an offer to buy, the shares offered by this prospectus in any jurisdiction where the offer and sale is not permitted. No offers or sales of any of the shares of our common stock are to be made in any jurisdiction in which such an offer or sale is not permitted. You should assume that the information contained in this prospectus or any applicable prospectus supplement is accurate only as of the date on the front cover thereof or the date of the document incorporated by reference, regardless of the time of delivery of this prospectus or any applicable prospectus supplement or any sales of the shares of our common stock offered hereby or thereby.

You should read the entire prospectus and any prospectus supplement and any related issuer free writing prospectus, as well as the documents incorporated by reference into this prospectus or any prospectus supplement or any related issuer free writing prospectus, before making an investment decision. Neither the delivery of this prospectus or any prospectus supplement or any issuer free writing prospectus nor any sale made hereunder shall under any circumstances imply that the information contained or incorporated by reference herein or in any prospectus supplement or issuer free writing prospectus, as applicable. You should assume that the information appearing in this prospectus, any prospectus supplement or any document incorporated by reference herein or therein is accurate only as of the date of the applicable documents, regardless of the time of delivery of this prospectus or any sale of securities. Our business, financial condition, results of operation and prospects may have changed since that date.

The terms "Cellectar Biosciences," "Cellectar," the "Company," "our," "us" and "we," as used in this prospectus, refer to Cellectar Biosciences, Inc., a Delaware corporation, and its subsidiaries unless we state otherwise or the context indicates otherwise.

1

SUMMARY

This summary highlights selected information contained elsewhere in this prospectus or incorporated by reference in this prospectus and does not contain all of the information that you need to consider in making your investment decision. You should carefully read the entire prospectus, any applicable prospectus supplement and any related free writing prospectus, including the risks of investing in our securities discussed under the heading "Risk Factors" contained in this prospectus, any applicable prospectus supplement and any related free writing prospectus, and under similar headings in the other documents that are incorporated by reference into this prospectus. You should also carefully read the information incorporated by reference into this prospectus, including our consolidated financial statements, and the exhibits to the registration statement of which this prospectus is a part.

Company Overview

We are a late-stage clinical biopharmaceutical company focused on the discovery, development and commercialization of drugs for the treatment of cancer. Our core objective is to leverage our proprietary phospholipid ether drug conjugateTM (PDCTM) delivery platform to develop PDCs that are designed to specifically target cancer cells and deliver improved efficacy and better safety as a result of fewer off-target effects. We believe that our PDC platform possesses the potential for the discovery and development of the next generation of cancer-targeting treatments, and we plan to develop PDCs both independently and through research and development collaborations.

Corporate Information

Our principal executive offices are located at 100 Campus Drive, Florham Park, New Jersey 07932 and the telephone number of our principal executive offices is (608) 441-8120. We maintain a website at www.cellectar.com. The information included or referred to on, or accessible through, our website does not constitute part of, and is not incorporated by reference into, this prospectus.

Description of Private Placement

On September 5, 2023, Cellectar Biosciences, Inc. (the "Company") entered into a securities purchase agreement (the "Securities Purchase Agreement") with certain accredited investors (the "Investors"), pursuant to which the Company agreed to issue and sell, in a private placement (the "Offering"), (i) 1,225 shares of Series E-1 Convertible Voting Preferred Stock, par value \$0.0001 per share (the "Series E-1 Preferred Stock"), (ii) Tranche A Warrants (the "Tranche A Warrants") to acquire shares of Series E-3 Convertible Voting Preferred Stock, par value \$0.0001 per share (the "Series E-3 Preferred Stock") and (iii) Tranche B Warrants (the "Tranche B Warrants," together with the Tranche A Warrants, the "Warrants") to acquire shares of Series E-4 Convertible Voting Preferred Stock, par value \$0.00001 per share (the "Series E-4 Preferred Stock" and together with the Series E-3 Preferred Stock, the "Warrant Shares") for an aggregate offering price of \$24.5 million.

Pursuant to the Certificate of Designation of Preferences, Rights and Limitations of Series E Convertible Voting Preferred Stock relating to the Series E Preferred Stock (the "Certificate of Designation"), each share of Series E-1 Preferred Stock is, subject to the Stockholder Approval (as defined below), automatically convertible into shares of our Common Stock, and/or, if applicable, shares of Series E-2 Preferred Stock, par value \$0.00001 per share, of the Company (the "Series E-2 Preferred Stock"), in lieu of Common Stock.

The aggregate exercise price of the Tranche A Warrants is approximately \$44.1 million, exercisable for an aggregate of 2,205 shares of Series E-3 Preferred Stock commencing on the Exercisability Date (as defined in the Tranche A Warrant) until the earlier of (i) ten (10) trading days following the date of the Company's public announcement of Positive Topline Data from its CLOVER-WaM Phase 2 pivotal study in patients with relapsed/refractory (r/r) and (ii) September 8, 2026.

The aggregate exercise price of the Tranche B Warrants is approximately \$34.3 million, exercisable for an aggregate of 1,715 shares of Series E-3 Preferred Stock commencing on the Exercisability Date (as defined in the Tranche B Warrant) until the earlier of (i) ten (10) trading days following the date of the Company's public announcement of its receipt of written approval from the FDA of its New Drug Application for iopofosine I 131 and (ii) September 8, 2028.

Subject to the terms and limitations contained in the Certificate of Designation, the Series E-1 Preferred Stock issued in the Offering will not become convertible until the Company's stockholders approve (i) the issuance of all Common Stock issuable upon conversion of the Series E Preferred Stock and (ii) the issuance of the Warrant Shares upon exercise of the Warrants (collectively, the "Stockholder Approval"). On the first (1st) Trading Day (as defined in the Certificate of Designation) following the announcement of the Stockholder Approval, each share of Series E-1 Preferred Stock shall automatically convert into Common Stock, at the conversion price of \$1.82 per share, and/or, if applicable, shares of Series E-2 Preferred Stock, in lieu of Common Stock, in each case subject to the terms and limitations contained in the Certificate of Designation. Subject to the limitations set forth in the Certificate of Designation, at the option of the holder, each share of Series E-2 Preferred Stock, Series E-3 Preferred Stock or Series E-4 Preferred Stock shall be convertible into Common Stock, at the conversion price of \$1.82 per share, \$3.185 per share and \$4.7775 per share, respectively, rounded down to the nearest whole share, and in each case subject to the terms and limitations contained in the Certificate of Designation.

Additionally, pursuant to the Securities Purchase Agreement and subject to customary conditions, the purchasers have certain board rights and registration rights. The registration statement of which this prospectus is a part is being filed pursuant to the Company's contractual obligation under the Securities Purchase Agreement and relates to the offer and resale of the shares of common issuable upon conversion of the Series E Preferred Stock.

Corporate Information

Our principal executive offices are located at 100 Campus Drive, Florham Park, New Jersey 07932 and the telephone number of our principal executive offices is (608) 441-8120. We maintain a website at www.cellectar.com. The information included or referred to on, or accessible through, our website does not constitute part of, and is not incorporated by reference into, this prospectus.

3

The Offering

Shares of common stock offered by us: None

Shares of common stock offered by the selling stockholders (assuming full exercise of the Tranche A Warrants and the Tranche B Warrants and full conversion of the Series E Preferred Stock into shares of our common stock and excluding any other anti-dilution or similar adjustments):

34,487,159

Shares of common stock outstanding after completion of this offering (assuming full exercise of the Tranche A Warrants and the Tranche B Warrants and full conversion of the Series E Preferred Stock into shares of our common stock):

44,430,543

Selling stockholders

All of the shares of our common stock are being offered by the selling stockholders. See "Selling Stockholders" on beginning on page 8 for additional information on the selling stockholders.

Use of Proceeds

We will not receive any proceeds from the resale of the shares of common stock by the selling stockholders. See "Use of Proceeds" beginning on page 7 for additional information on the use of proceeds.

Risk Factors

See "Risk Factors" on page 5 and the other information included in this prospectus for a discussion of factors you should carefully consider before deciding whether to purchase our securities.

Nasdaq symbol for common stock

"CLRB"

The number of shares of our common stock outstanding before and after this offering is based on 9,943,384 shares of common stock outstanding as of October 4, 2023 and excludes, as of that date:

- an aggregate of 2,280,756 shares of common stock issuable upon the exercise of outstanding stock options issued to employees, directors and consultants;
- an aggregate of 1,520,710 shares of common stock issuable upon the conversion of outstanding pre-funded warrants issued to investors in October 2022;
- · an aggregate of 111,111 shares of common stock issuable upon the conversion of outstanding shares of Series D preferred stock; and
- · an aggregate of 6,097,602 additional shares of common stock reserved for issuance under outstanding warrants having expiration dates between May 2024 and October 2027, and exercise prices ranging from \$178.00 to \$1.96 per share.

4

RISK FACTORS

An investment in our securities involves a high degree of risk. Prior to making a decision about investing in our securities, prospective investors should consider carefully all of the information included and incorporated by reference or deemed to be incorporated by reference in this prospectus, including the risk factors incorporated by reference herein from our Annual Report on Form 10-K for the fiscal year ended December 31, 2022 as updated by annual, quarterly and other reports and documents we file with the SEC after the date of this prospectus and that are incorporated by reference herein. Each of these risk factors could have a material adverse effect on our business, results of operations, financial position or cash flows, which may result in the loss of all or part of your investment. For more information, see "Where You Can Find More Information"

and "Incorporation of Certain Information by Reference."

The sale of a substantial number of shares of our common stock in the public market, including resale of the Securities issued or issuable to the selling stockholders, could adversely affect the prevailing market price for our common stock.

We are registering for resale up to 34,487,159 shares of our common stock consisting of fulfill our contractual obligations under the Securities Purchase Agreement. Sales of substantial amounts of shares of our common stock in the public market, or the perception that such sales might occur, could adversely affect the market price of our common stock. We cannot predict if and when the selling stockholders may sell such shares in the public markets or if the selling stockholders will choose to convert their shares of Series E Preferred Stock into shares of our common stock, or exercise their Warrants to purchase shares of Series E-3 Preferred Stock and Series E-4 Preferred Stock. In addition, the issuance of shares of common stock to the selling stockholders pursuant to the conversion of the Series E Preferred Stock could result in substantial dilution to our existing stockholders and could cause our stock price to decline.

5

FORWARD-LOOKING STATEMENTS

This prospectus, including the documents that we incorporate by reference, contains forward-looking statements within the meaning of Section 27A of the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). Examples of our forward-looking statements include:

- our current views with respect to our business strategy, business plan and research and development activities;
- the progress of our product development programs, including clinical testing and the timing of commencement and results thereof;
- · our projected operating results, including research and development expenses;
- · our ability to continue development plans for iopofosine I-131 (also known as CLR 131), CLR 1900 series, CLR 2000 series and CLR 12120;
- · our ability to continue development plans for our Phospholipid Drug Conjugates (PDC)TM;
- · our ability to maintain orphan drug designation in the U.S. for iopofosine as a therapeutic for the treatment of multiple myeloma, neuroblastoma, osteosarcoma, rhabdomyosarcoma, Ewing's sarcoma and lymphoplasmacytic lymphoma, and the expected benefits of orphan drug status;
- · any disruptions at our sole supplier of iopofosine;
- · our ability to pursue strategic alternatives;
- · our ability to advance our technologies into product candidates;
- · our enhancement and consumption of current resources along with ability to obtain additional funding;
- · our current view regarding general economic and market conditions, including our competitive strengths;
- · uncertainty and economic instability resulting from conflicts, military actions, terrorist attacks, natural disasters, public health crises, including the occurrence of a contagious disease or illness such as the COVID-19 pandemic, cyber-attacks and general instability;
- the future impacts of legislative and regulatory developments in the United States on the pricing and reimbursement of our product candidates;
- · our ability to meet the continued listing standards of Nasdag;
- · assumptions underlying any of the foregoing; and
- · any other statements that address events or developments that we intend or believe will or may occur in the future.

In some cases, you can identify forward-looking statements by terminology such as ""expects", "anticipates", "estimates", "estimates", "believes", "seeks", "may", "should", "could" or the negative of such terms or other similar expressions. Accordingly, these statements involve estimates, assumptions and uncertainties that could cause actual results to differ materially from those expressed in them. Forward-looking statements also involve risks and uncertainties, many of which are beyond our control. Any forward-looking statements are qualified in their entirety by reference to the factors discussed throughout this prospectus.

You should read this prospectus and the documents that we reference herein and therein and have filed as exhibits to the registration statement, of which this prospectus is part, completely and with the understanding that our actual future results may be materially different from what we expect. You should assume that the information appearing in this prospectus is accurate only as of the date on the front cover of this prospectus or such prospectus. Because the risk factors referred to above could cause actual results or outcomes to differ materially from those expressed in any forward-looking statements made by us or on our behalf, you should not place undue reliance on any forward-looking statements. Further, any forward-looking statement speaks only as of the date on which it is made, and we undertake no obligation to update any forward-looking statement to reflect events or circumstances after the date on which the statement is made or to reflect the occurrence of unanticipated events. New factors emerge from time to time, and it is not possible for us to predict which factors will arise. In addition, we cannot assess the impact of each factor on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements. We qualify all of the information presented in this prospectus and any accompanying prospectus supplement, and particularly our forward-looking statements, by these cautionary statements.

6

USE OF PROCEEDS

All proceeds from the resale of the shares of common stock offered by this prospectus will belong to the selling stockholders. We will not receive any proceeds from the sale or other disposition by the selling stockholders of the shares of our common stock covered by this prospectus.

However, we will receive proceeds upon any cash exercise of the Warrants. If the Warrants are all exercised for cash, we will receive gross proceeds of \$78.4 million. We intend to use any proceeds from any such exercise for working capital and general corporate purposes, excluding (a) the satisfaction of any portion of the Company's debt (other than

7

SELLING STOCKHOLDERS

The Shares being offered by the selling stockholders are shares that are issuable upon conversion of the Series E Preferred Stock, We have previously issued to the selling stockholders. Series E-1 Preferred Stock and Tranche A Warrants to exercisable for Series E-3 Preferred Stock and Tranche B Warrants exercisable for Series E-4 Preferred Stock. We are registering the Shares in order to permit the selling stockholders to offer the shares for resale from time to time after their issuance. For additional information regarding the Shares being offered by the selling stockholders pursuant to this prospectus, see "Summary—Description of Private Placement" above. Except for the ownership of our securities, the selling stockholders have not had any material relationship with us within the past three years.

The table below lists the selling stockholders and other information regarding the beneficial ownership of the shares of Common Stock by each of the selling stockholders. The second column lists the number of shares of common stock beneficially owned by each selling stockholder, based on its ownership of the shares of common stock as of October 2, 2023 and assuming full exercise of the Warrant Shares and full conversion of the Series E Preferred Stock on that date. The third column lists the shares of common stock being offered by this prospectus by the selling stockholders.

The fourth column assumes the sale of all Shares offered by the selling stockholders pursuant to this prospectus.

8

The information in the following table has been provided to us by or on behalf of the selling stockholders and the selling stockholders may have sold, transferred or otherwise disposed of all or a portion of their securities after the date on which they provided us with information regarding their securities. The selling stockholders may sell all, some or none of their Shares in this offering. See "Plan of Distribution."

	Ownership Before Offering		Ownership After Offering	
Selling Stockholder	Number of shares of common stock beneficially owned(1)	Maximum number of shares of common stock offered	Number of shares of common stock beneficially owned	Percentage of common stock beneficially owned(2)
ADAR1 Partners, LP (3)	4,574,828	4,574,828		*
Entities associated with Rosalind Advisors, Inc. (4)	13,006,544	9,853,478	3,153,066	7.10%
Entities associated with AIGH Capital Management LLC (5)	7,427,826	4,926,738	2,501,088	5.63%
Laurence W. Lytton (6)	5,639,119	4,504,446	1,134,673	2.56%
Nantahala Capital Partners Limited Partnership (7)	486,396	486,396	_	*
Nantahala Capital Partners II Limited Partnership (8)	244,283	244,283	_	*
NCP RFM LP (9)	837,902	837,902	_	*
Blackwell Partners LLC - Series A (10)	2,654,333	837,902	_	*
Bigger Capital Fund, LP (11)	747,635	739,010	8,625	*
District 2 Capital Fund, LP (12)	1,165,068	739,010	426,058	*
AuGC BioFund LP (13)	1,551,523	1,407,639	143,884	*
Healthcare Opportuntities Master Fund, LP (14)	1,055,728	1,055,728	_	*
The Hewlett Fund, LP (15)	1,279,357	703,819	575,538	1.30%
Lincoln Park Capital Fund, LLC (16)	1,694,868	703,819	991,049	2.23%
Triple Gate Partners, LP (17)	703,819	703,819	_	*
Boothbay Diversified Alpha Master Fund LP (18)	118,803	118,803	_	*
Boothbay Absolute Return Strategies, LP (19)	233,104	233,104	_	*

^{*} Represents ownership of less than one percent.

- (1) "Beneficial ownership" is a term broadly defined in Rule 13d-3 under the Exchange Act, and includes more than the typical form of stock ownership, that is, stock held in a person's name. The term also includes what is referred to as "indirect ownership," meaning ownership of shares as to which a person has or shares investment power. For purposes of this column, a person or group of persons is deemed to have "beneficial ownership" of any shares that such person or group of persons has the right to acquire within 60 days after October 2, 2023, including through the exercise of a warrant or the conversion of a security.
- Based on 44,430,543 shares of Common Stock outstanding, which assumes the issuance of all the Warrant Shares upon exercise of the Warrants and does not take into account the date of, or any limitations on, the exercise of the Warrants.
- (3) Consists of (i) 1,785,714 shares of Common Stock issuable upon conversion of 162.5 shares of Series E-1 Preferred Stock, (ii) 1,836,734 shares of Common Stock issuable upon conversion of 292.5 shares of Series E-3 Preferred Stock and (iii) 952,380 shares of Common Stock issuable upon conversion of 227.5 shares of Series E-4 Preferred Stock. The selling stockholder's address is 3503 Wild Cherry Drive, Building 9, Austin, TX 78738.
- Consists of (i) 3,153,066 shares of Common Stock, (ii) 3,846,153 shares of Common Stock issuable upon conversion of 350 shares of Series E-1 Preferred Stock, (iii) 3,956,043 shares of Common Stock issuable upon conversion of 630 shares of Series E-3 Preferred Stock and (iv) 2,051,282 shares of Common Stock issuable upon conversion of 490 shares of Series E-4 Preferred Stock. Each of Rosalind Advisors, Inc., Steven Salamon, and Gilad Aharon have shared voting and dispositive power with respect to these shares. The address for Rosalind Advisors, Inc., Rosalind Opportunities Fund I L.P., Mr. Salamon and Mr. Aharon is 15 Wellesley Street West, Suite 326, Toronto, Ontario, M4Y 0G7 Canada. The address for Rosalind Master Fund, L.P. is P.O. Box 309, Ugland House, Grand Cayman KY1-1104, Cayman Islands. The address of each of Investor Company ITF Rosalind Opportunities Fund I L.P and Investor Company ITF Rosalind Master Fund L.P. is c/o TD Waterhouse, 77 Bloor Street West, 3rd Floor, Toronto, ON M5S 1M2 Canada.

- Consists of (i) 2,501,088 shares of Common Stock, (ii) 1,923,076 shares of Common Stock issuable upon conversion of 175 shares of Series E-1 Preferred Stock, (iii) 1,978,021 shares of Common Stock issuable upon conversion of 315 shares of Series E-3 Preferred Stock and (iv) 1,025,641 shares of Common Stock issuable upon conversion of 245 shares of Series E-4 Preferred Stock. Mr. Orin Hirschman is the managing member of AIGH Capital Management, LLC, a Maryland limited liability company ("AIGH CM"), who is an advisor with respect to the securities held by AIGH Investment Partners, L.P. ("AIGH LP"), WVP Emerging Manager Onshore Fund, LLC AIGH Series and WVP Emerging Manager Onshore Fund, LLC Optimized Equity Series. The address for AIGH CM, AIGH LP, WVP Emerging Manager Onshore Fund, LLC Optimized Equity Series and Mr. Hirschman is 6006 Berkeley Avenue, Baltimore, Maryland 21209.
- (6) Consists of (i) 1,134,673 shares of Common Stock, (ii) 1,758,241 shares of Common Stock issuable upon conversion of 160 shares of Series E-1 Preferred Stock, (iii) 1,808,477 shares of Common Stock issuable upon conversion of 288 shares of Series E-3 Preferred Stock and (iv) 937,728 shares of Common Stock issuable upon conversion of 224 shares of Series E-4 Preferred Stock. The address of the stockholder is 467 Central Park West, New York, NY 10025.
- Consists of (i) 189,857 shares of Common Stock issuable upon conversion of 17.28 shares of Series E-1 Preferred Stock, (ii) 195,282 shares of Common Stock issuable upon conversion of 31.10 shares of Series E-3 Preferred Stock and (iii) 101,257 shares of Common Stock issuable upon conversion of 24.19 shares of Series E-4 Preferred Stock. Nantahala Capital Management, LLC is a Registered Investment Adviser and has been delegated the legal power to vote and/or direct the disposition of such securities on behalf of the selling stockholder as a General Partner, Investment Manager, or Sub-Advisor and would be considered the holder of such securities. The above shall not be deemed to be an admission by the record owners or the selling stockholder that they are themselves beneficial owners of these securities for purposes of Section 13(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or any other purpose. Wilmot Harkey and Daniel Mack are managing members of Nantahala Capital Management, LLC and may be deemed to have voting and dispositive power over the shares held by the selling stockholder. The business address for Nantahala Capital Partners Limited Partnership is 130 Main St., 2nd Floor, New Canaan, CT 06840.
- Consists of (i) 95,352 shares of Common Stock issuable upon conversion of 8.68 shares of Series E-1 Preferred Stock, (ii) 98,077 shares of Common Stock issuable upon conversion of 15.62 shares of Series E-3 Preferred Stock and (iii) 50,854 shares of Common Stock issuable upon conversion of 12.15 shares of Series E-4 Preferred Stock. Nantahala Capital Management, LLC is a Registered Investment Adviser and has been delegated the legal power to vote and/or direct the disposition of such securities on behalf of the selling stockholder as a General Partner, Investment Manager, or Sub-Advisor and would be considered the holder of such securities. The above shall not be deemed to be an admission by the record owners or the selling stockholder that they are themselves beneficial owners of these securities for purposes of Section 13(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or any other purpose. Wilmot Harkey and Daniel Mack are managing members of Nantahala Capital Management, LLC and may be deemed to have voting and dispositive power over the shares held by the selling stockholder. The business address for Nantahala Capital Partners II Limited Partnership is 130 Main St., 2nd Floor, New Canaan, CT 06840.
- (9) Consists of (i) 327,062 shares of Common Stock issuable upon conversion of 29.76 shares of Series E-1 Preferred Stock, (ii) 336,407 shares of Common Stock issuable upon conversion of 53.57 shares of Series E-3 Preferred Stock and (iii) 174,433 shares of Common Stock issuable upon conversion of 41.67 shares of Series E-4 Preferred Stock. Nantahala Capital Management, LLC is a Registered Investment Adviser and has been delegated the legal power to vote and/or direct the disposition of such securities on behalf of the selling stockholder as a General Partner, Investment Manager, or Sub-Advisor and would be considered the holder of such securities. The above shall not be deemed to be an admission by the record owners or the selling stockholder that they are themselves beneficial owners of these securities for purposes of Section 13(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or any other purpose. Wilmot Harkey and Daniel Mack are managing members of Nantahala Capital Management, LLC and may be deemed to have voting and dispositive power over the shares held by the selling stockholder. The business address for NCP RFM LP is 130 Main St., 2nd Floor, New Canaan, CT 06840.

10

- Consists of (i) 1,036,078 shares of Common Stock issuable upon conversion of 94.28 shares of Series E-1 Preferred Stock, (ii) 1,065,680 shares of Common Stock issuable upon conversion of 169.71 shares of Series E-3 Preferred Stock and (iii) 552,575 shares of Common Stock issuable upon conversion of 132 shares of Series E-4 Preferred Stock. Nantahala Capital Management, LLC is a Registered Investment Adviser and has been delegated the legal power to vote and/or direct the disposition of such securities on behalf of the selling stockholder as a General Partner, Investment Manager, or Sub-Advisor and would be considered the holder of such securities. The above shall not be deemed to be an admission by the record owners or the selling stockholder that they are themselves beneficial owners of these securities for purposes of Section 13(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or any other purpose. Wilmot Harkey and Daniel Mack are managing members of Nantahala Capital Management, LLC and may be deemed to have voting and dispositive power over the shares held by the selling stockholder. The business address for Blackwell Partners LLC Series A is 280 South Mangum Street, Suite 210, Durham, NC 27701.
- Consists of (i) 8,625 shares of Common Stock, (ii) 288,461 shares of Common Stock issuable upon conversion of 26.25 shares of Series E-1 Preferred Stock, (iii) 296,703 shares of Common Stock issuable upon conversion of 47.25 shares of Series E-3 Preferred Stock and (iv) 153,846 shares of Common Stock issuable upon conversion of 36.75 shares of Series E-4 Preferred Stock. Michael Bigger has the power to vote or dispose of the shares owned by Bigger Capital Fund, LP. The selling stockholder's address is 11700 W Charleston Blvd 170-659, Las Vegas, NV 89135.
- Consists of (i) 426,058 shares of Common Stock, (ii) 288,461 shares of Common Stock issuable upon conversion of 26.25 shares of Series E-1 Preferred Stock, (iii) 296,703 shares of Common Stock issuable upon conversion of 47.25 shares of Series E-3 Preferred Stock and (iv) 153,846 shares of Common Stock issuable upon conversion of 36.75 shares of Series E-4 Preferred Stock. Michael Bigger has the power to vote or dispose of the shares owned by District 2 Capital Fund LP. The selling stockholder's address is 14 Wall Street, 2nd Floor, Huntington, New York 11743.
- Consists of (i) 143,884 shares of Common Stock, (ii) 549,450 shares of Common Stock issuable upon conversion of 50 shares of Series E-1 Preferred Stock, (iii) 565,149 shares of Common Stock issuable upon conversion of 90 shares of Series E-3 Preferred Stock and (iv) 293,040 shares of Common Stock issuable upon conversion of 70 shares of Series E-4 Preferred Stock. Mr. Evan Markegard is the managing member of AuGC BioFund LP. The selling stockholder's address is 10875 Kemah Lane, San Diego, CA 92131.
- Consists of (i) 412.087 shares of Common Stock issuable upon conversion of 37.50 shares of Series E-1 Preferred Stock, (ii) 423,861 shares of Common Stock issuable upon conversion of 67.50 shares of Series E-3 Preferred Stock and (iii) 219,780 shares of Common Stock issuable upon conversion of 52.50 shares of Series E-4 Preferred Stock. The selling stockholder's address is 5425 Wisconsin Ave #600, Chevy Chase, MD 20815.
- Consists of (i) 575,538 shares of Common Stock, (ii) 274,725 shares of Common Stock issuable upon conversion of 25 shares of Series E-1 Preferred Stock, (iii) 282,574 shares of Common Stock issuable upon conversion of 45 shares of Series E-3 Preferred Stock and (iv) 146,520 shares of Common Stock issuable upon conversion of 35 shares of Series E-4 Preferred Stock. Mr. Martin Chop is the General Partner of The Hewlett Fund LP. The selling stockholder's address is 100 Merrick Road Suite 400W, Rockville Centre, NY 11570.
- Consists of (i) 991,049 shares of Common Stock, (ii) 274,725 shares of Common Stock issuable upon conversion of 25 shares of Series E-1 Preferred Stock, (iii) 282,574 shares of Common Stock issuable upon conversion of 45 shares of Series E-3 Preferred Stock and (iv) 146,520 shares of Common Stock issuable upon conversion of 35 shares of Series E-4 Preferred Stock. Joshua Scheinfeld and Jonathan Cope, the principals of Lincoln Park are deemed to be beneficial owners of all the common stock owned by Lincoln Park. Messrs. Scheinfeld and Cope have shared voting and disposition power. The selling stockholder's address is 440 N. Wells St., Suite 410, Chicago, IL 60654.
- Consists of (i) 274,725 shares of Common Stock issuable upon conversion of 25 shares of Series E-1 Preferred Stock, (ii) 282,574 shares of Common Stock issuable upon conversion of 45 shares of Series E-3 Preferred Stock and (iii) 146,520 shares of Common Stock issuable upon conversion of 35 shares of Series E-4 Preferred Stock. The selling stockholder's address is 961 Broadway, Suite 103, Woodmere, NY 11598.

- Consists of (i) 46,373 shares of Common Stock issuable upon conversion of 4.22 shares of Series E-1 Preferred Stock, (ii) 47,698 shares of Common Stock issuable upon conversion of 7.60 shares of Series E-3 Preferred Stock and (iii) 24,732 shares of Common Stock issuable upon conversion of 5.91 shares of Series E-4 Preferred Stock. Boothbay Diversified Alpha Master Fund LP, a Cayman Islands limited partnership ("BBDAMF"), is managed by Boothbay Fund Management, LLC, a Delaware limited liability company ("Boothbay"). Boothbay, in its capacity as the investment manager of BBDAMF, has the power to vote and the power to direct the disposition of all securities held by BBDAMF. Ari Glass is the Managing Member of Boothbay. Each ofBBDAMF, Boothbay and Mr. Glass disclaim beneficial ownership of these securities, except to the extent of any pecuniary interest therein. The selling stockholder's address is c/o Kingsbrook Partners LP, 689 Fifth Avenue, 12th Floor, New York, NY 10022.
- Consists of (i) 90,989 shares of Common Stock issuable upon conversion of 8.28 shares of Series E-1 Preferred Stock, (ii) 93,588 shares of Common Stock issuable upon conversion of 14.90 shares of Series E-3 Preferred Stock and (iii) 48,527 shares of Common Stock issuable upon conversion of 11.59 shares of Series E-4 Preferred Stock. Boothbay Absolute Return Strategies LP, a Delaware limited partnership ("BBARS"), is managed by Boothbay. Boothbay, in its capacity as the investment manager of BBARS, has the power to vote and the power to direct the disposition of all securities held by the Fund. Ari Glass is the Managing Member of BBARS. Each of BBARS, Boothbay and Mr. Glass disclaim beneficial ownership of these securities, except to the extent of any pecuniary interest therein. The selling stockholder's address is c/o Kingsbrook Partners LP, 689 Fifth Avenue, 12th Floor, New York, NY 10022.

12

PLAN OF DISTRIBUTION

The selling stockholders, including their pledgees, donees, transferees, distributees, beneficiaries or other successors in interest, may from time to time offer some or all of the shares of our common stock offered under this prospectus. We will not receive any of the proceeds from the sale of the shares of our common stock offered under this prospectus by the selling stockholders. We will bear all fees and expenses incident to our obligation to register the shares of our common stock offered under this prospectus.

The selling stockholders may sell all or a portion of the shares of our common stock beneficially owned by them and offered hereby from time to time directly or through one or more underwriters, broker-dealers or agents. If the shares of our common stock are sold through underwriters or broker-dealers, the selling stockholders will be responsible for underwriting discounts or commissions or agent's commissions. The shares of our common stock may be sold on any national securities exchange or quotation service on which the securities may be listed or quoted at the time of sale, in the over-the-counter market or in transactions otherwise than on these exchanges or systems or in the over-the-counter market and in one or more transactions at fixed prices, at prevailing market prices at the time of the sale, at varying prices determined at the time of sale, or at privately negotiated prices. These sales may be effected in transactions, which may involve crosses or block transactions.

The selling stockholders may use any one or more of the following methods when disposing of shares of our common stock or interests therein:

- · ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- · block trades in which the broker-dealer will attempt to sell shares of our common stock as agent, but may position and resell a portion of the block as principal to facilitate the transaction;
- · purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- · an over-the-counter distribution;
- an exchange distribution in accordance with the rules of the applicable exchange;
- · privately negotiated transactions;
- · short sales effected after the effective date of the registration statement of which this prospectus forms a part;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- · broker-dealers may agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- · a combination of any such methods of sale; or
- any other method permitted pursuant to applicable law.

The selling stockholders may, from time to time, pledge or grant a security interest in some or all of the shares of our common stock owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell the shares of our common stock, from time to time, under this prospectus, or under an amendment to this prospectus under Rule 424(b)(3) or other applicable provision of the Securities Act amending the list of selling stockholders to include the pledgee, transferee, or other successors in interest as selling stockholder under this prospectus. The selling stockholders also may transfer the shares of our common stock in other circumstances, in which case the transferees, pledgees or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

In connection with the sale of shares of our common stock or interests therein, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of shares of our common stock in the course of hedging the positions they assume. The selling stockholders may also sell shares of our common stock short and deliver these securities to close out its short positions, or loan or pledge the shares of our common stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or the creation of one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares of our common stock offered under this prospectus, which shares of our common stock such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

13

Broker-dealers engaged by the selling stockholders may arrange for other broker-dealers to participate in sales. If the selling stockholders effect certain transactions by selling shares of our common stock to or through underwriters, broker-dealers or agents, such underwriters, broker-dealers or agents may receive commissions in the form of discounts, concessions or commissions from the selling stockholders or commissions from purchasers of the shares of our common stock for whom they may act as agent or to whom they may sell as principal. Such commissions will be in amounts to be negotiated, but, except as set forth in a supplement to this prospectus, in the case of an agency transaction will not be in excess of a customary brokerage commission in compliance with applicable rules of the Financial Industry Regulatory Authority, Inc. ("FINRA"); and in the case of a principal transaction a markup or markdown in compliance with applicable FINRA rules.

The aggregate proceeds to the selling stockholders from the sale of the shares of our common stock offered under this prospectus will be the purchase price of the shares of common stock less discounts or commissions, if any. The selling stockholders reserve the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed purchase of shares of our common stock to be made directly or through agents. We will not receive any of the proceeds from the offering under this prospectus.

The selling stockholders also may resell all or a portion of the shares of our common stock offered under this prospectus in open market transactions in reliance upon Rule 144 under the Securities Act, provided that they meet the criteria and conforms to the requirements of that rule.

The selling stockholders and any underwriters, broker-dealers or agents that participate in the sale of the shares of our common stock or interests therein may be deemed to be "underwriters" within the meaning of Section 2(a)(11) of the Securities Act. Any discounts, commissions, concessions or profit they earn on any resale of the shares of our common stock may be underwriting discounts and commissions under the Securities Act. Each selling stockholder has informed us that it does not have any written or oral

agreement or understanding, directly or indirectly, with any person to distribute the securities. The selling stockholders are subject to the prospectus delivery requirements of the Securities Act.

To the extent required pursuant to Rule 424(b) under the Securities Act, the shares of our common stock to be sold, the name of the selling stockholders, the purchase price and public offering price, the names of any agents, dealer or underwriter, and any applicable commissions or discounts with respect to a particular offer will be set forth in an accompanying prospectus supplement or, if appropriate, a post-effective amendment to the registration statement that includes this prospectus.

We have agreed to keep this prospectus effective until the earliest to occur of the following events: (i) the date on which the selling stockholders shall have resold all the Securities covered hereby; and (ii) the date on which the Securities may be resold by the selling stockholders without registration and without regard to any volume or manner-of-sale limitations by reason of Rule 144, without the requirement for the Company to be in compliance with the current public information requirement under Rule 144 under the Securities Act or any other rule of similar effect. In order to comply with the securities laws of some states, if applicable, the shares of our common stock may be sold in these jurisdictions only through registered or licensed brokers or dealers. In addition, in some states the shares of our common stock may not be sold unless the shares been registered or qualified for sale or an exemption from registration or qualification requirements is available and is complied with.

The selling stockholders and any other person participating in a sale of shares of our common stock registered under this prospectus will be subject to applicable provisions of the Exchange Act, and the rules and regulations thereunder, including, without limitation, to the extent applicable, Regulation M of the Exchange Act, which may limit the timing of purchases and sales of any of the shares of our common stock by the selling stockholders and any other participating person. All of the foregoing may affect the marketability of the shares of our common stock and the ability of any person or entity to engage in market-making activities with respect to the shares of our common stock. In addition, we will make copies of this prospectus (as it may be supplemented or amended from time to time) available to the selling stockholders for the purpose of satisfying the prospectus delivery requirements of the Securities Act. The selling stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares of our common stock against certain liabilities, including liabilities arising under the Securities Act.

14

LEGAL MATTERS

The validity of the securities being offered hereby will be passed upon for us by Sidley Austin LLP, New York, New York.

EXPERTS

The consolidated financial statements for the year ended December 31, 2022 incorporated by reference in this prospectus and elsewhere in the registration statement have been so incorporated by reference in reliance upon the report, which includes an explanatory paragraph describing conditions that raise substantial doubt about the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements, of Baker Tilly US, LLP, independent registered public accountants, which upon the authority of said firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-3 under the Securities Act of 1933, as amended (the "Securities Act"), with respect to the securities offered by this prospectus and any applicable prospectus supplement. This prospectus and any applicable prospectus supplement do not contain all of the information set forth in the registration statement and its exhibits and schedules in accordance with SEC rules and regulations. For further information with respect to us and the securities being offered by this prospectus and any applicable prospectus supplement, you should read the registration statement, including its exhibits and schedules. Statements contained in this prospectus and any applicable prospectus supplement, including documents that we have incorporated by reference, as to the contents of any contract or other document referred to are not necessarily complete, and, with respect to any contract or other document filed as an exhibit to the registration statement or any other such document, each such statement is qualified in all respects by reference to the corresponding exhibit. You should review the complete contract or other document to evaluate these statements. You may obtain copies of the registration statement and its exhibits via the SEC's website at http://www.sec.gov.

You can read our Securities and Exchange Commission filings, including the registration statement, over the Internet at the SEC's website at www.sec.gov. You may also request a copy of these filings, at no cost, by writing us at 100 Campus Drive Florham Park, New Jersey 07932 or telephoning us at (608) 441-8120.

We are subject to the information and periodic reporting requirements of the Exchange Act, and we file periodic reports, proxy statements and other information with the SEC. These periodic reports, proxy statements and other information are available for inspection and copying at the website of the Securities and Exchange Commission referred to above. We maintain a website at https://www.cellectar.com. You may access our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the Securities and Exchange Commission free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the Securities and Exchange Commission. The information contained in, or that can be accessed through, our website is not incorporated by reference in, and is not part of, this prospectus.

15

INFORMATION INCORPORATED BY REFERENCE

The SEC allows us to "incorporate by reference" information into this prospectus. This means that we can disclose important information to you by referring you to another document filed separately with the SEC. The information incorporated by reference is considered to be a part of this prospectus, except for any information that is superseded by other information that is included in this prospectus.

We incorporate by reference into this prospectus the following document, which we have previously filed with the SEC:

- Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 9, 2023
- · Annual Report on Form 10-K/A for the year ended December 31, 2022, filed with the SEC on March 16, 2023
- The information contained in our definitive proxy statement on Schedule 14A for our 2022 annual meeting of stockholders filed with the SEC on April 28, 2023 to the extent incorporated by reference in Part III of the Form 10-K;
- · Quarterly Report on Form 10-Q for the period ended March 31, 2023, filed with the SEC on May 4, 2023
- · Quarterly Report on Form 10-Q for the period ended June 30, 2023, filed with the SEC on August 14, 2023 and

Current Reports on Form 8-K, filed with the SEC on January 4, 2023, June 13, 2023 (Item 8.01 only), June 14, 2023 (as amended by Form 8-K/A filed on June 20, 2023), June 29, 2023, June 29, 2023, August 21, 2023, September 8, 2023 and October 27, 2023.

In addition, all documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act prior to the termination of the offering will be deemed to be incorporated by reference into this prospectus.

You should rely only on the information contained in this prospectus, as updated and supplemented by any prospectus supplement, or that information to which this prospectus or any prospectus supplement has referred you by reference. We have not authorized anyone to provide you with any additional information.

Any statement contained in a document incorporated or deemed to be incorporated by reference herein will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained herein modifies or supersedes such statement. Any statement so modified or superseded will not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

You may request and obtain a copy of any of the filings incorporated herein by reference, at no cost, by writing or telephoning us at the following address or phone number:

Cellectar Biosciences, Inc. 100 Campus Drive Florham Park, New Jersey 07932 Attention: Chief Financial Officer (608) 441-8120

16

Up to 34,487,159 Shares of Common Stock Offered by the Selling Stockholders



PROSPECTUS

October 30, 2023

We have not authorized any dealer, salesperson or other person to give any information or represent anything not contained in this prospectus. You must not rely on any unauthorized information. If anyone provides you with different or inconsistent information, you should not rely on it. This prospectus does not offer to sell any securities in any jurisdiction where it is unlawful. Neither the delivery of this prospectus, nor any sale made hereunder, shall create any implication that the information in this prospectus is correct after the date hereof.