UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-Q

(Mark One)

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

For the quarterly period ended September 30, 2018

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: 000-51173

Catalyst Biosciences, Inc.

(Exact Name of Registrant as Specified in its Charter)

Delaware	**56-2020050**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**
611 Gateway Blvd. Suite 710 South San Francisco, California	**94080**
(Address of Principal Executive Offices)	**(Zip Code)**

(650) 266-8674
(Registrant's Telephone Number, Including Area Code)

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 (§ 229.405 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 smaller reporting company, or an emerging growth company. See definitions of "large accelerated filer," "accelerated filer", "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act (Check one):

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 October 29, 2018, the number of outstanding shares of the registrant's common stock, par value $0.001 per share, was 11,942,729.

CATALYST BIOSCIENCES, INC.
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PART I. FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS

Catalyst Biosciences, Inc.
Condensed Consolidated Balance Sheets
(In thousands, except share and per share amounts)

	September 30, 2018 (Unaudited)	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$ 35,998	$ 14,472
Short-term investments	93,223	17,971
Restricted cash	50	5,333
Prepaid and other current assets	3,538	1,333
Total current assets	132,809	39,109
Other assets, noncurrent	352	128
Property and equipment, net	255	276
Total assets	$ 133,416	$ 39,513
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 369	$ 747
Accrued compensation	1,082	1,366
Other accrued liabilities	1,840	1,322
Deferred revenue	—	212
Deferred rent, current portion	13	7
Redeemable convertible notes	—	5,085
Total current liabilities	3,304	8,739
Deferred rent, noncurrent portion	161	—
Total liabilities	3,465	8,739
Stockholders' equity:		
Preferred stock, $0.001 par value, 5,000,000 shares authorized; 0 and 3,680 shares issued and outstanding at September 30, 2018 and December 31, 2017, respectively	—	—
Common stock, $0.001 par value, 100,000,000 shares authorized; 11,942,729 and 6,081,230 shares issued and outstanding at September 30, 2018 and December 31, 2017, respectively	12	6
Additional paid-in capital	322,468	204,262
Accumulated other comprehensive loss	(24)	—
Accumulated deficit	(192,505)	(173,494)
Total stockholders' equity	129,951	30,774
Total liabilities and stockholders' equity	$ 133,416	$ 39,513

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

Catalyst Biosciences, Inc.
Condensed Consolidated Statements of Operations
(In thousands, except share and per share amounts)
(Unaudited)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Contract revenue	$ —	$ 318	$ 6	$ 700
Operating expenses:				
Research and development	5,575	3,805	13,235	9,286
General and administrative	2,770	2,391	8,909	7,407
Total operating expenses	8,345	6,196	22,144	16,693
Loss from operations	(8,345)	(5,878)	(22,138)	(15,993)
Interest and other income, net	651	85	2,920	185
Net loss	$ (7,694)	$ (5,793)	$ (19,218)	$ (15,808)
Deemed dividend for convertible preferred stock beneficial conversion feature	—	—	—	(3,951)
Net loss attributable to common stockholders	$ (7,694)	$ (5,793)	$ (19,218)	$ (19,759)
Net loss per share attributable to common stockholders, basic and diluted	$ (0.64)	$ (1.34)	$ (1.75)	$ (6.49)
Shares used to compute net loss per share attributable to common stockholders, basic and diluted	11,942,729	4,310,561	10,967,750	3,043,919

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

Catalyst Biosciences, Inc.
Condensed Consolidated Statements of Comprehensive Loss
(In thousands)
(Unaudited)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Net loss	$ (7,694)	$ (5,793)	$ (19,218)	$ (15,808)
Other comprehensive income:				
Unrealized (loss) gain on available-for-sale securities	(28)	4	(24)	5
Total comprehensive loss	$ (7,722)	$ (5,789)	$ (19,242)	$ (15,803)

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

Catalyst Biosciences, Inc.
Condensed Consolidated Statement of Stockholders' Equity
(In thousands, except share amounts)
(Unaudited)

	Convertible Preferred Stock		Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity (Deficit)
	Shares	Amount	Shares	Amount				
Balance at December 31, 2017	3,680	$ —	6,081,230	$ 6	$ 204,262	$ —	$ (173,494)	$ 30,774
Opening balance adjustment - adoption of ASC 606	—	—	—	—	—	—	207	207
Balance at January 1, 2018	3,680	$ —	6,081,230	$ 6	$ 204,262	$ —	$ (173,287)	$ 30,981
Stock-based compensation expense	—	—	—	—	1,866	—	—	1,866
Issuance of common stock for follow-on offering, net of issuance costs	—	—	3,382,352	4	106,758	—	—	106,762
Issuance of common stock upon exercise of warrants	—	—	1,735,419	2	9,543	—	—	9,545
Conversion of preferred stock to common stock	(3,680)	—	736,000	—	—	—	—	—
Stock options exercised for common stock	—	—	7,707	—	36	—	—	36
Conversion of redeemable convertible notes to common stock	—	—	21	—	3	—	—	3
Unrealized loss on available-for-sale securities	—	—	—	—	—	(24)	—	(24)
Net loss	—	—	—	—	—	—	(19,218)	(19,218)
Balance at September 30, 2018	—	$ —	11,942,729	$ 12	$ 322,468	$ (24)	$ (192,505)	$ 129,951

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

Catalyst Biosciences, Inc.
Condensed Consolidated Statements of Cash Flows
(In thousands)
(Unaudited)

	Nine Months Ended September 30,	
	2018	2017
Operating Activities		
Net loss	$ (19,218)	$ (15,808)
Adjustments to reconcile net loss to net cash used in operating activities:		
Stock-based compensation expense	1,866	556
Depreciation and amortization	106	132
Loss on disposal of assets	116	—
Changes in operating assets and liabilities:		
Prepaid and other current assets	(2,429)	89
Accounts payable	(378)	623
Accrued compensation and other accrued liabilities	234	614
Deferred rent	167	(29)
Deferred revenue	(6)	200
Net cash flows used in operating activities	(19,542)	(13,623)
Investing Activities		
Proceeds from maturities of short-term investments	60,337	6,800
Purchase of short-term investments	(135,612)	(16,474)
Purchases of property and equipment	(201)	(3)
Net cash flows used in investing activities	(75,476)	(9,677)
Financing Activities		
Payments for the redemption of redeemable convertible notes	(5,082)	(13,915)
Proceeds from issuance of common stock, net of issuance costs	106,762	5,336
Proceeds from issuance of preferred stock, common stock and warrants for follow-on offering, net of issuance costs	—	18,563
Proceeds from exercise of stock options	36	—
Proceeds from exercise of warrants	9,545	159
Net cash flow provided by financing activities	111,261	10,143
Net increase (decrease) in cash, cash equivalents and restricted cash	16,243	(13,157)
Cash, cash equivalents and restricted cash at beginning of the period	19,805	29,857
Cash, cash equivalents and restricted cash at end of the period[a]	$ 36,048	$ 16,700
Supplemental Disclosure of Non-Cash Investing and Financing Activities:		
Deemed dividend for convertible preferred stock beneficial conversion feature	—	3,951
Adoption of ASC 606	207	—
Conversion of redeemable convertible notes to common stock	3	—
Unrealized (loss) gain on investments	(24)	1

(a) The following table provides a reconciliation of cash and restricted cash to amounts reported within the condensed consolidated balance sheets:

Cash and cash equivalents	$ 35,998	$ 10,973
Restricted cash	50	5,727
Total cash and restricted cash	$ 36,048	$ 16,700

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

1. Nature of Operations

Catalyst Biosciences, Inc. and its subsidiary (the "Company" or "Catalyst") is a clinical-stage biotechnology company focused on developing novel medicines to address hematology indications, including the treatment of hemophilia. Its facilities are in South San Francisco, California and it operates in one segment. Prior to August 20, 2015, the name of the Company was Targacept, Inc. ("Targacept"). On August 20, 2015, Targacept completed its business combination with Catalyst (the "Merger").

Based on the current status of its research and development plans, the Company believes that its existing cash, cash equivalents and short-term investments as of September 30, 2018 will be sufficient to fund its cash requirements for at least the next 12 months from the date of the filing of this quarterly report. If, at any time, the Company's prospects for financing its research and development programs decline, the Company may decide to reduce research and development expenses by delaying, discontinuing or reducing its funding of one or more of its research or development programs. Alternatively, the Company might raise funds through strategic collaborations, public or private financings or other arrangements. Such funding, if needed, may not be available on favorable terms, or at all.

2. Summary of Significant Accounting Policies

Basis of Presentation

The Company's condensed consolidated financial statements have been prepared in accordance with U.S. generally accepted accounting principles ("GAAP") and following the requirements of the Securities and Exchange Commission (the "SEC") for interim reporting. As permitted under those rules, certain footnotes or other financial information that are normally required by U.S. GAAP can be condensed or omitted. These financial statements have been prepared on the same basis as the Company's annual financial statements and, in the opinion of management, reflect all adjustments, consisting only of normal recurring adjustments, which are necessary for a fair presentation of the Company's financial information. These interim results and cash flows for any interim period are not necessarily indicative of the results to be expected for the full year.

The accompanying condensed consolidated financial statements and related financial information should be read in conjunction with the consolidated financial statements filed with the Company's Annual Report on Form 10-K for the year ended December 31, 2017 ("Annual Report").

The Company's significant accounting policies are included in "*Part II - Item 8 - Financial Statements and Supplementary Data - Note 2 – Summary of Significant Accounting Policies*" in the Company's Annual Report. As discussed in our Annual Report, the Company adopted the new revenue standards in the first quarter of 2018, using the modified retrospective method through a cumulative adjustment to equity. There have been no other significant changes to these accounting policies during the first nine months of 2018.

Effective January 1, 2018, the Company adopted Accounting Standards Codification ("ASC") 606 using the modified retrospective method through a cumulative adjustment to equity, which resulted in an immaterial $0.2 million decrease to our opening balance of accumulated deficit as of January 1, 2018. The Company enters into collaboration arrangements that may include the receipt of payments for up-front license fees, success-based milestone payments, full time equivalent based payments for research services, product supplies, and royalties on any future sales of commercialized products that result from the collaborations.

In determining the appropriate amount of revenue to be recognized as it fulfills its obligations under its agreements, the Company performs the following steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when the Company satisfies each performance obligation.

Accounting Pronouncements Recently Adopted

In November 2016, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2016-18, Restricted Cash, which requires amounts generally described as restricted cash and restricted cash equivalents be included with cash and cash equivalents when reconciling the total beginning and ending amounts for the periods shown on the statement of cash flows. The Company adopted ASU 2016-18 effective January 1, 2018, using a retrospective transition method to each period presented. The adoption of this ASU changed previously reported amounts in the condensed consolidated statement of cash flows for the nine months ended September 30, 2017, by decreasing the Company's cash flows provided by financing activities by $13.9 million as compared to previously reported amounts for the prior year period.

In August 2016, the FASB issued ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments. The standard provides guidance on how certain cash receipts and payments are presented and classified in the statement of cash flows. The standard is intended to reduce current diversity in practice. The Company adopted ASU 2016-15 effective January 1, 2018, and this guidance did not have an impact on the Company's financial statements.

In January 2016, the FASB issued ASU No. 2016-01, Financial Instruments – Overall (Topic 825-10), which updates certain aspects of recognition, measurement, presentation and disclosure of financial instruments. Subsequently, in February 2018, the FASB issued ASU No. 2018-03, Technical Corrections and Improvements to Financial Instruments - Overall (Topic 825-10), which clarifies certain aspects of ASU 2016-01, which includes provisions to accounting for equity investments, financial liabilities under the fair value option and presentation and disclosure requirements for financial instruments. The amended guidance requires equity securities, except for those accounted for under the equity method of accounting, with determinable fair values to be measured at fair value with changes in fair value recognized in net income (loss). The Company adopted ASU 2016-01 and 2018-03 effective January 1, 2018, and this guidance did not have a material impact on the Company's financial statements, as the Company only has debt securities.

In May 2014, the FASB issued ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606), which amends the existing accounting standards for revenue recognition. ASU 2014-09 is based on principles that govern the recognition of revenue at an amount an entity expects to be entitled when products are transferred to customers. Subsequently, the FASB has issued the following standards related to ASU 2014-09: ASU No. 2016-08, Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations; ASU No. 2016-10, Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing; and ASU No. 2016-12, Revenue from Contracts with Customers (Topic 606): Narrow-Scope Improvements and Practical Expedients, (collectively, the "new revenue standards"). The Company adopted the new revenue standards effective January 1, 2018, using the modified retrospective method through a cumulative adjustment to equity. The Company has identified that the most significant change relates to its accounting for collaboration arrangements with multiple deliverables, in particular, the ISU Abxis agreement. Under the old guidance, such deliverables and consideration must be accounted for under a single unit of accounting along with other arrangement deliverables and consideration that does not have stand-alone value and are recognized as revenue over the estimated period that the performance obligations are to be performed. Under the current new standard however, the total arrangement consideration is allocated to each performance obligation based on its estimated stand-alone selling price and revenue is recognized as each performance obligation is satisfied. As a result, revenue for this transaction is recorded in an earlier period than under the old guidance, resulting in a $0.2 million increase to the Company's opening balance of accumulated deficit as of January 1, 2018.

Adopting ASU No. 2014-09, Revenue from Contracts with Customers, or the new revenue standard, involved new estimates and judgments related to the estimates of stand-alone selling prices and the allocation of discounts and variable consideration in allocating the transaction price. The Company recognized revenue earlier under the current new standard and may have more variability due to significant estimates involved under the new accounting guidance.

Accounting Pronouncements Not Yet Adopted

In February 2016, the FASB issued ASU No. 2016-02, Leases (Topic 842), which replaces the existing guidance for leases. The new standard establishes a right-of-use ("ROU") model that requires a lessee to record a ROU asset and a lease liability on the balance sheet for all leases with terms longer than 12 months. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. In July 2018, the FASB issued ASU No. 2018-11, which provides entities with an additional transition method to adopt Topic 842. ASU 2016-02 will be effective for the Company beginning in the first quarter of 2019. Using the new transition method, the Company initially applies the new lease standard at the adoption date, versus at the beginning of the earliest period presented, and recognizes a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption.

The Company expects to elect this transition method at the adoption date of January 1, 2019. The Company continues to assess the effect the guidance will have on its existing accounting policies and the Consolidated Financial Statements, and expects there will be an increase in assets and liabilities on the Consolidated Balance Sheets at adoption due to the recording of right-of-use assets and corresponding lease liabilities, which is expected to be material. Refer to Note 10 — Commitments and Contingencies for information about the Company's lease obligations.

3. Fair Value Measurements

For a description of the fair value hierarchy and the Company's fair value methodology, see "*Part II - Item 8 - Financial Statements and Supplementary Data - Note 2 – Summary of Significant Accounting Policies*" in the Company's Annual Report. There were no significant changes in these methodologies during the nine months ended September 30, 2018.

Liabilities that are measured at fair value consist of the derivative liability associated with the redeemable convertible notes (see Note 5) and are valued using Level 3 inputs. There were no transfers in or out of Level 1, 2 or 3 during the periods presented. As of September 30, 2018 there was no derivative liability and as of December 31, 2017 the fair value of the derivative liability was immaterial.

The following tables present the fair value hierarchy for assets and liabilities measured at fair value on a recurring basis as of September 30, 2018 and December 31, 2017 (*in thousands*):

	September 30, 2018			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Money market funds(1)	$ 22,213	$ —	$ —	$ 22,213
U.S. government agency securities(2)	93,223	—	—	93,223
Agency securities(1)	—	13,648		13,648
Restricted cash (money market funds)	50	—	—	50
Total financial assets	$ 115,486	$ 13,648	$ —	$ 129,134

(1) Included in cash and cash equivalents on accompanying condensed consolidated balance sheets.
(2) Included in short-term investments on accompanying condensed consolidated balance sheets and are classified as available-for-sale securities.

	December 31, 2017			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Money market funds(1)	$ 14,334	$ —	$ —	$ 14,334
U.S. government agency securities(3)	16,471	—	—	16,471
Restricted cash (money market funds)(2)	5,333	—	—	5,333
Agency securities(3)	—	1,500	—	1,500
Total financial assets	$ 36,138	$ 1,500	$ —	$ 37,638

(1) Included in cash and cash equivalents on accompanying condensed consolidated balance sheets.
(2) $5.2 million of restricted cash in the Indenture serves as full collateral for the redeemable convertible notes and $0.1 million of restricted cash serves as collateral for the Company's corporate credit card and deposit for its facility lease.
(3) Included in short-term investments on accompanying condensed consolidated balance sheets and are classified as available-for-sale securities.

4. Financial Instruments

Cash equivalents, restricted cash and short-term investments which are classified as available-for-sale securities, consisted of the following (*in thousands*):

September 30, 2018	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Money market funds (cash equivalents)	$ 22,213	$ —	$ —	$ 22,213
U.S. government agency securities	93,246		(23)	93,223
Agency securities	13,649	—	(1)	13,648
Restricted cash (money market funds)	50	—	—	50
Total financial assets	$ 129,158	$ —	$ (24)	$ 129,134
Classified as:				
Cash and cash equivalents				$ 35,861
Short-term investments				93,223
Restricted cash (money market funds)				50
				$ 129,134

December 31, 2017	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Money market funds (cash equivalents)	$ 14,334	$ —	$ —	$ 14,334
U.S. government agency securities	16,474	—	(3)	16,471
Restricted cash (money market funds)	5,330	3	—	5,333
Agency securities	1,500	—	—	1,500
Total financial assets	$ 37,638	$ 3	$ (3)	$ 37,638
Classified as:				
Cash and cash equivalents				$ 14,334
Short-term investments				17,971
Restricted cash (money market funds)				5,333
				$ 37,638

There have been no material realized gains or losses on available-for-sale securities for the periods presented. The carrying amounts of cash, accounts receivable, other receivables, accounts payable, other payables and redeemable convertible notes approximate their fair values due to the short-term maturity of these instruments.

5. Redeemable Convertible Notes

On August 19, 2015, immediately prior to the Merger, the Company issued to Targacept stockholders non-interest bearing redeemable convertible notes (the “Notes”) in the aggregate principal amount of $37.0 million, which matured on February 19, 2018. The Notes did not bear interest. The principal amount of the Notes were convertible, at the option of each noteholder, into cash or into shares of the Company’s common stock at a conversion rate of $137.85 per share. On February 19, 2018, the Notes matured, and the remaining Notes were repaid in full with cash from the restricted cash indenture and an immaterial amount were converted to common stock. The Company has no outstanding Notes remaining as of September 30, 2018.

In connection with the issuance of the Notes, on August 19, 2015, Targacept entered into an indenture (the “Indenture”) with American Stock Transfer & Trust Company, LLC, as trustee, and an escrow agreement with American Stock Transfer & Trust Company, LLC and Delaware Trust Company, LLC, as escrow agent, under which $37.0 million, which represented the initial principal amount of the Notes, was deposited in a segregated escrow account for the benefit of the holders of the Notes in order to facilitate the payment of the notes upon redemption or at maturity (the amount of such deposit together with interest accrued and capitalized thereon, the “Escrow Funds”). The Notes were the Company’s secured obligation, and the Indenture did not limit its other indebtedness, secured or unsecured.

The conversion to common stock feature of the Notes was determined to be a derivative liability requiring bifurcation and separate accounting. The Company elected to accrete the entire debt discount as interest expense immediately after the Merger.

In addition, changes in the fair value of the derivative liability were being recorded within interest and other income in the consolidated statements of operations. The Company remeasured the derivative liability to fair value until the earlier of the conversion, redemption or maturity of the redeemable convertible notes.

As of September 30, 2018, there was no derivative liability and as of December 31, 2017, the fair value of the derivative liability was immaterial. The estimated reporting date fair value-based measurement of the derivative liability was calculated using the Black-Scholes valuation model.

6. Stock Based Compensation

2018 Omnibus Incentive Plan

In June 2018, stockholders of the Company approved the Company's 2018 Omnibus Incentive Plan (the "2018 Plan"). The 2018 Plan had previously been approved by the Company's Board of Directors (the "Board") and the Compensation Committee of the Board, subject to stockholder approval. The 2018 Plan became effective on June 13, 2018 and provided an additional 1,500,000 stock options, following receipt of the requisite stockholder approval. The 2018 Plan replaces the Company's 2015 Stock Incentive Plan, as amended (the "2015 Plan"). All awards outstanding under the 2015 Plan will remain in effect in accordance with their respective terms.

The following table summarizes stock option activity under the Company's equity incentive plans and related information:

	Number of Shares Underlying Outstanding Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (Years)
Outstanding — December 31, 2017	821,741	$ 13.69	9.17
Options granted	564,050	$ 13.43	
Options exercised	(7,707)	$ 4.63	
Options expired	(15,667)	$ 158.94	
Options canceled/forfeited	(43,315)	$ 7.76	
Outstanding — September 30, 2018	1,319,102	$ 12.10	8.92
Exercisable — September 30, 2018	344,273	$ 19.48	8.06

Valuation Assumptions

The Company estimated the fair value of stock options granted using the Black-Scholes option-pricing formula and a single option award approach. Due to its limited history as a public company and limited number of sales of its common stock, the Company estimated its volatility considering a number of factors including the use of the volatility of comparable public companies. The expected term of options granted under the Plan, all of which qualify as "plain vanilla" per SEC Staff Accounting Bulletin 107, is determined based on the simplified method due to the Company's limited operating history and is 5.97 years based on the average between the vesting period and the contractual life of the option. The risk-free rate is based on the yield of a U.S. Treasury security with a term consistent with the option. This fair value is being amortized ratably over the requisite service periods of the awards, which is generally the vesting period.

The fair value of employee stock options was estimated using the following weighted-average assumptions for the nine months ended September 30, 2018 and 2017:

	Nine Months Ended September 30, 2018	2017
Employee Stock Options:		
Risk-free interest rate	2.66%	2.02%
Expected term (in years)	5.97	5.99
Dividend yield	—	—
Volatility	93.60%	110.42%
Weighted-average fair value of stock options granted	$ 10.28	$ 3.79

Total stock-based compensation recognized was as follows (*in thousands*):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Research and development	$ 161	$ 62	$ 413	$ 97
General and administrative(1)	541	263	1,445	459
Total stock-based compensation	$ 702	$ 325	$ 1,858	$ 556

(1) 2018 includes $0.1 million in modification stock-based compensation expense related to a Board member's departure.

As of September 30, 2018, 1,349,818 shares of common stock were available for future grant and 1,319,102 options to purchase shares of common stock were outstanding. As of September 30, 2018, the Company had unrecognized employee stock-based compensation expense of $6.9 million, related to unvested stock awards, which is expected to be recognized over an estimated weighted-average period of 2.91 years.

2018 Employee Stock Purchase Plan

In June 2018, the Company's stockholders approved the 2018 Employee Stock Purchase Plan (the "ESPP"). The 2018 ESPP had previously been approved by the Board and the Compensation Committee of the Board, subject to stockholder approval which became effective as of June 13, 2018. Under the ESPP, employees meeting certain specific employment qualifications are eligible to participate and can purchase shares of common stock semi-annually through payroll deductions at the lower of 85% of the fair market value of the stock at the commencement or end of the offering period. The ESPP permits eligible employees to purchase shares of common stock through payroll deductions for up to 15% of qualified compensation.

A total of 120,000 shares of common stock may be granted in accordance with the terms of the ESPP. As of September 30, 2018, no shares of common stock have been issued to employees participating in the ESPP and 120,000 shares are available for issuance under the ESPP. Compensation expense, representing the discount to the quoted market price, for the ESPP was immaterial as of September 30, 2018.

7. Collaborations

ISU Abxis

On September 16, 2013, the Company signed a license and collaboration agreement with ISU Abxis, whereby the Company licensed its proprietary human Factor IX products to ISU Abxis for initial development in South Korea. Under the terms of the agreement, ISU Abxis is responsible for manufacturing, preclinical development activities and clinical development through completion of a proof-of-concept Phase 1/2 study in individuals with hemophilia B. The Company has the sole right and responsibility for worldwide development, manufacture, and commercialization of Factor IX products after Phase 1/2 development. ISU Abxis may exercise its right of first refusal to acquire commercialization rights in South Korea, in which case they would be entitled to profit sharing on worldwide sales. ISU Abxis's rights will also terminate if the Company enters into a license agreement with another party to develop, manufacture and commercialize Factor IX products in the United States, European Union or Asia, subject to ISU Abxis's retained rights in South Korea.

ISU Abxis paid the Company an up-front signing fee of $1.75 million and is obligated to pay to the Company contingent milestone-based payments on the occurrence of certain defined development events, and reimbursement for a portion of the Company's costs relating to intellectual property filings and maintenance thereof on products. The Company is obligated to pay ISU Abxis a percentage of all net profits it receives from collaboration products if ISU Abxis makes an optional milestone payment to Catalyst.

Contract revenue of $0 and $0.3 million for the three months ended September 30, 2018 and 2017 and $0 and $0.7 million for the nine months ended September 30, 2018 and 2017, respectively, reflects (i) the amortization of the up-front fee over the estimated period of our performance obligations, which concluded in February 2018, and (ii) milestone payments received from ISU Abxis, which were recognized through February 2018, the estimated remaining period of the Company's performance obligation under the agreement, of which the Company received $0 and $0.9 million for the nine months ended September 30, 2018 and 2017, respectively. The adoption of the new revenue standards resulted in a $0.2 million cumulative adjustment to the Company's opening balance of accumulated deficit as of January 1, 2018. The deferred revenue balance related to the ISU Abxis collaboration was $0 and $0.2 million as of September 30, 2018 and December 31, 2017, respectively.

8. Net Loss per Share Attributable to Common Stockholders

The following table sets forth the computation of the basic and diluted net loss per common share during the three- and nine-months ended September 30, 2018 and 2017 (*in thousands, except share and per share data*):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Net loss attributable to common stockholders	$ (7,694)	$ (5,793)	$ (19,218)	$ (19,759)
Weighted-average number of shares used in computing net loss per share, basic and diluted	11,942,729	4,310,561	10,967,750	3,043,919
Net loss available for common stockholders per share, basic and diluted	$ (0.64)	$ (1.34)	$ (1.75)	$ (6.49)

Since the Company was in a loss position for all periods presented, diluted net loss per share is the same as basic net loss per share for all periods as the inclusion of all potential common shares outstanding would have been anti-dilutive. Potentially dilutive securities on an as-if converted basis that were not included in the diluted per share calculations because they would be anti-dilutive were as follows:

	Nine Months Ended September 30,	
	2018	2017
Options to purchase common stock	1,319,102	771,995
Convertible preferred stock(1)	—	1,100,000
Common stock warrants	12,039	2,053,114
Redeemable convertible notes	—	39,814
Total	1,331,141	3,964,923

(1) As of September 30, 2017, represents 5,500 shares of Series A Preferred Stock on an as converted basis to 1.1 million shares of common stock.

9. Stockholders' Equity

April 2017 Underwritten Public Offering — On April 12, 2017, the Company issued and sold in a registered, underwritten public offering an aggregate of (i) 1,470,000 shares of common stock (including 540,000 shares of common stock sold pursuant to the exercise of the Underwriter's overallotment option), (ii) 13,350 shares of Series A Preferred Stock, each convertible into 200 shares of common stock and (iii) warrants to purchase 2,070,000 shares of common stock at an exercise price of $5.50 per share (including 270,000 sold pursuant to the exercise of the Underwriter's overallotment option). The net proceeds to the Company, after deducting the underwriting discounts and commissions and offering expenses payable by the Company were approximately $18.6 million.

Series A Convertible Preferred Stock — In connection with the closing on April 12, 2017 of the public offering, the Company filed the Certificate of Designation of Preferences, Rights and Limitations of the Series A Preferred Stock (the "Certificate of Designation") with the Secretary of State of the State of Delaware. The Certificate of Designation describes the rights, preferences and privileges of the shares of Series A Preferred Stock. With certain exceptions, the shares of Series A Preferred Stock rank on par with the shares of the Common Stock, in each case, as to dividend rights and distributions of assets upon liquidation, dissolution or winding up of the Company.

Upon its issuance, the Series A Preferred Stock was not considered a liability or temporary equity and as such the Series A Preferred Stock was recorded in permanent equity on the Company's balance sheet.

During the nine months ended September 30, 2018 and 2017, 3,680 and 7,850 shares of the Company's Series A Preferred Stock were converted into 736,000 and 1,570,000 shares of common stock of the Company. As of September 30, 2018, there were no shares of Series A Preferred Stock issued and outstanding.

Warrants — In connection with the closing on April 12, 2017 of the public offering and the overallotment option, the Company issued warrants to purchase 2,070,000 shares of common stock at an exercise price of $5.50 per share. Upon their issuance, the common stock warrants were determined to be equity instruments under ASC 480 and ASC 815-40. The net proceeds allocated to the warrants on a relative fair value basis resulted in $5.0 million being allocated to the warrants. As of September 30, 2018, the Company has no warrants outstanding associated with this offering.

The following is a summary of warrant activity for the nine months ended September 30, 2018:

	Number of Shares Underlying Warrants		Weighted Average Exercise Price
Outstanding — December 31, 2017	1,751,708	$	6.46
Exercised	(1,735,419)	$	5.50
Forfeited	(4,250)	$	5.50
Outstanding —September 30, 2018	12,039	$	145.11

February 2018 Underwritten Public Offering — On February 13, 2018, the Company entered into an underwriting agreement with JonesTrading, in connection with a registered firm commitment underwritten public offering of 2,941,176 shares of common stock, pursuant to a shelf registration statement that was declared effective by the SEC on February 6, 2018. On February 15, 2018, the Company sold 3,382,352 shares of common stock (including 441,176 shares of common stock sold pursuant to the exercise of the underwriters' overallotment option) at a price to the public of $34.00 per share. The net proceeds to the Company, after deducting the underwriting discounts and commissions and offering expenses payable by the Company were approximately $106.8 million.

10. Commitments and Contingencies

Pfizer

Pursuant to the termination agreement entered on December 8, 2016, in connection with the termination of a prior license and development agreement, Pfizer granted the Company an exclusive license to Pfizer's proprietary rights for manufacturing materials and processes that apply to engineered Factor VIIa, CB 813a and marzeptacog alfa (activated) ("MarzAA"). Pfizer also transferred to the Company the IND application and documentation related to the development, manufacturing and testing of the Factor VIIa products as well as the orphan drug designation. The Company agreed to make contingent cash payments to Pfizer in an aggregate amount equal to up to $17.5 million, payable upon the achievement of clinical, regulatory and commercial milestones. Following commercialization of any covered product, Pfizer would also receive a single-digit royalty on net product sales on a country-by-country basis for a predefined royalty term. During the nine months ended September 30, 2018, the Company paid Pfizer a $1 million milestone payment based on the dosing of the first patient in the ongoing Phase 2 study, recorded as a R&D expense.

Manufacturing Agreements

On May 20, 2016, the Company signed a development and manufacturing services agreement with AGC Biologics, Inc. ("AGC"), formerly known as CMC ICOS Biologics, Inc., pursuant to which AGC will conduct manufacturing development and, together with AGC the Company has successfully manufactured MarzAA for the Phase 2 portion of a planned Phase 2/3 clinical trial. The Company has agreed to a total of $3.8 million in payments to AGC pursuant to the initial statement of work under the Agreement, subject to completion of applicable work stages. As of September 30, 2018, the Company has $0.3 million in payment obligations to AGC remaining under the initial statement of work for MarzAA and $0.3 million in accrued liabilities.

On February 21, 2018, the Company and AGC entered into a new statement of work under the development and manufacturing services agreement dated May 20, 2016, between the Company and AGC. Under the new statement of work, the Company has engaged AGC for the process transfer and commercial scale cGMP manufacturing of Dalcinonacog alfa ("DalcA") (formerly CB 2679d/ISU304), Catalyst's next-generation engineered coagulation Factor IX being developed for the treatment of severe hemophilia B. The Company has agreed to a total of approximately $5.6 million in payments pursuant to the new statement of work, including the commercial scale manufacturing of DalcA, subject to completion of applicable work stages. As of September 30, 2018, the Company has $3.9 million in payment obligations to AGC remaining under the initial statement of work for DalcA.

Operating Leases

The Company leases office and research space under operating leases that expired in February 2018. In November 2017, the Company entered into a new office lease agreement to lease approximately 8,606 rentable square feet of space located in South San Francisco, California. The term of the lease is five years and two months, starting February 16, 2018. The Company relocated its corporate headquarters into this new space in February 2018. On August 10, 2018, the Company entered into an amendment to the existing office lease agreement to lease an additional approximately 4,626 rentable square feet and will be coterminous with the original lease term above.

Future minimum annual lease payments under all non-cancelable operating leases as of September 30, 2018, were as follows (*in thousands*):

	Minimum Lease Payments
Remaining in 2018	$ 122
2019	563
2020	580
2021	598
2022	616
2023	209
Total future minimum lease payments	$ 2,688

11. Related Parties

On October 24, 2017 the Company announced a strategic research collaboration with Mosaic Biosciences, Inc. (“Mosaic”) to develop intravitreal anti-complement factor 3 (C3) products for the treatment of dry age-related macular degeneration (“AMD”) and other retinal diseases. According to the agreement, the Company and Mosaic will co-fund the research. Dr. Usman, our Chief Executive Officer and a member of our board of directors, and Mr. Lawlor, the chairman of our board of directors, are also members of the board of directors of Mosaic. Expenses related to the collaboration were $0.5 million and $0 for the three months ended September 30, 2018 and 2017 and $0.9 million and $0 for the nine months ended September 30, 2018 and 2017, respectively.

12. Interest and Other Income

The following table shows the detail of interest and other income/(expense), net for the three- and nine-month periods ended September 30, 2018 and 2017 (*in thousands*):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Interest income	$ 652	$ 85	$ 1,539	$ 185
Loss on disposal of property and equipment	—	—	(116)	—
Other income, net	(1)	—	1,497	—
Total interest and other income, net	$ 651	$ 85	$ 2,920	$ 185

Total other income of $1.5 million for the nine months ended September 30, 2018, reflects milestone payments received under an agreement associated with neuronal nicotinic receptor (“NNR”) assets sold in 2016.

ITEM 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

Unless otherwise indicated, in this Quarterly Report on Form 10-Q, (i) references to "Catalyst," "we," "us," "our" or the "Company" mean Catalyst Biosciences, Inc. and our subsidiaries. The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the consolidated financial statements and related notes that appear in this Quarterly Report on Form 10-Q ("Report").

In addition to historical information, this Report contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended ("The Exchange Act"). Forward-looking statements are identified by words such as "believe," "will," "may," "estimate," "continue," "anticipate," "intend," "should," "plan," "expect," "predict," "could," "potentially" or the negative of these terms or similar expressions. You should read these statements carefully because they discuss future expectations, contain projections of future results of operations or financial condition, or state other "forward-looking" information. These statements relate to our future plans, objectives, expectations, intentions and financial performance and the assumptions that underlie these statements. For example, forward-looking statements include any statements regarding the strategies, prospects, plans, expectations or objectives of management for future operations, the progress, scope or duration of the development of product candidates or programs, clinical trial plans, timelines and potential results, the benefits that may be derived from product candidates or the commercial or market opportunity in any target indication, our ability to protect intellectual property rights, our anticipated operations, financial position, revenues, costs or expenses, statements regarding future economic conditions or performance, statements of belief and any statement of assumptions underlying any of the foregoing. These forward-looking statements are subject to certain risks and uncertainties that could cause actual results to differ materially from those anticipated in the forward-looking statements. Factors that might cause such a difference include, but are not limited to, those discussed in this report in Part II, Item 1A — "Risk Factors," elsewhere in this Report and in Part I - Item 1A – "Risk Factors" in the Company's Annual Report on Form 10-K for the year ended December 31, 2017 ("Annual Report"). Forward-looking statements are based on our management's beliefs and assumptions and on information currently available to our management. These statements, like all statements in this report, speak only as of their date, and we undertake no obligation to update or revise these statements in light of future developments. We caution investors that our business and financial performance are subject to substantial risks and uncertainties.

Overview

We are a clinical-stage biopharmaceutical company focused on developing novel medicines to address serious medical conditions for individuals who need new or better treatment options. We are focusing our product development efforts in the field of hemostasis (the process that regulates bleeding) and have a mission to develop valuable therapies for individuals with hemophilia. We used a scientific approach to engineer several protease-based therapeutic candidates that regulate blood clotting.

Our most advanced program, a subcutaneously administered, next-generation engineered coagulation Factor VIIa, marzeptacog alfa (activated) ("MarzAA"), is currently enrolling individuals with hemophilia with an inhibitor in a Phase 2/3 subcutaneous dosing trial. The Phase 2 open-label subcutaneous efficacy trial will evaluate the ability of MarzAA to eliminate, or minimize, spontaneous bleeding episodes in individuals with hemophilia A or B with inhibitors. The trial will enroll up to 12 individuals with hemophilia and an inhibitor across up to ten clinical trial sites globally. MarzAA has successfully completed an intravenous Phase 1 clinical trial evaluating the pharmacokinetics, pharmacodynamics and coagulation activity in individuals with severe hemophilia A and B with and without an inhibitor. MarzAA has been granted orphan drug designation by the U.S. Food and Drug Administration ("FDA") for routine prophylaxis to prevent bleeding episodes in individuals with hemophilia A or B with inhibitors.

As of September 30, 2018, five subjects had been enrolled with a median annualized bleed rate ("ABR") of 17.9 (Range 12.2-26.7). One subject had revoked consent after a single intravenous dose. Two subjects with ABRs of 16.6 and 15.9, respectively, had completed the study with no bleeding at 30 µg/kg for 50 and 44 days, respectively, for calculated ABRs equal to zero. One subject with an ABR of 26.7 experienced a bleed on Day 46 days at 30 µg/kg and was then dose-escalated to 60 µg/kg for 50 days, for a calculated ABR equal to 3.8. This subject experienced a bleed 16 days after dosing termination. One subject with untreated severe hypertension experienced a fatal serious adverse event that was not related to study drug on day 11. Pharmacokinetics analysis has shown that MarzAA's half-life of 3.5 hours when dosed intravenously was increased to a half-life of 9.5 hours after subcutaneous dosing. No anti-drug antibodies to MarzAA, injection site reactions or thrombotic events have been detected to date. We anticipate completion of enrollment in the Phase 2 trial by the end of this year.

Our next most advanced hemophilia program, a next-generation engineered coagulation Factor IX, Dalcinonacog alfa ("DalcA") (formerly CB 2679d/ISU304), has completed enrollment of the originally planned five cohorts of a Phase 1/2 subcutaneous dosing trial in South Korea, that evaluated the safety and efficacy of DalcA in individuals with severe hemophilia B, sponsored by our collaborator, ISU Abxis. The objective of this study was to demonstrate the feasibility of increasing Factor IX activity trough levels from ~1% (severe hemophilia) to >12% (mild hemophilia with a reduced chance of spontaneous joint bleeds) with daily subcutaneous

injections. DalcA has been granted orphan drug designation by the FDA and orphan medicinal product designation by the Committee for Orphan Medicinal Products ("COMP") of the European Commission ("EC"). ISU Abxis initiated this trial in June 2017 and top line data was presented on February 9, 2018. Data from Cohorts 1 through 3 (three subjects in each cohort) showed that a single subcutaneous dose of either 70 or 140 IU/kg three days after a single intravenous dose of 70 IU/kg significantly increased the half-life of DalcA to 98.7 hours, equivalent to the half-life of extended-half-life intravenous agents. Cohort 4 was omitted as we observed sufficient activity of DalcA in cohorts 2 and 3.

In cohort 5, five subjects were dosed daily for six days with a subcutaneous dose of 140 IU/kg without an intravenous loading dose. We observed increased Factor IX activity levels in all five subjects from very low levels after washout of prior therapy to a median Factor IX activity level of 16% (range 11.5-18%), that is well into the mild hemophilia range (5-40%) and is higher than a level required to prevent spontaneous hemarthrosis, which is greater than 12%. According to the World Federation of Hemophilia, patients with Factor IX levels between 5% and 40% are considered to have mild hemophilia. The observed increase in Factor IX activity levels after daily dosing in cohort 5 was linear, indicating that continued subcutaneous dosing may achieve high-mild hemophilia Factor IX clotting activity.

Terminal subcutaneous half-life was 63.2 hours for subjects in cohort 5 (interquartile range 60.2-64 hours) with the result that activity levels were still 4-6.4%, 5 days after the last dose. During the originally planned cohorts no inhibitors to DalcA or Factor IX had been detected. One subject had moderate adverse events of pain, erythema and redness after the first 2 injections and mild rating after subsequent injections. Other subjects in cohort 5 reported some of these adverse events, mainly with initial injections. Two subjects had bruising after injection when Factor IX activity levels were low that did not occur with subsequent injections as Factor IX activity levels rose.

In April 2018, the Korean Ministry of Food and Drug Safety ("MFDS") approved the addition of a sixth cohort to the Phase 1/2 trial of DalcA in individuals with severe hemophilia B following positive data from the multi-dose cohort 5. Each individual received a single intravenous loading dose of 70 IU/kg, followed by nine daily subcutaneous doses of 140 IU/kg DalcA. The loading dose was administered 30 minutes before the first subcutaneous dose. The study is being conducted in South Korea in coordination with the Company's collaborator ISU Abxis.

As of September 30, 2018, ISU Abxis enrolled two patients out of a planned three to five in cohort 6 and DalcA has shown promising efficacy in both. During the treatment period, Factor IX activity levels always remained above 20% after the intravenous loading dose in both patients. The first patient then had a progressive increase in trough Factor IX activity level to 34% and the second patient achieved a trough activity level of 31%. However, both subjects in cohort 6 developed neutralizing antibodies ("nAbs") to DalcA and a reduction in Factor IX activity levels was observed. Blood testing revealed that the nAb was transient in one subject and was below the level of quantification at a follow up visit. The nAb in the second subject fell below 1 Bethesda Unit ("BU") at a follow up visit. A BU reflects the percentage reduction in Factor IX activity from the standard control of 100%, with 1 BU being 50% reduction; 2 BU being 75% reduction and 3 BU being 87.5% reduction. Importantly, from a safety perspective, the absence of binding to wildtype Factor IX allowed both patients to successfully resume treatment with their prescribed intravenous Factor IX prophylaxis therapies. Prior to cohort 6, no DalcA neutralizing antibodies had been detected in any of the patients treated with DalcA, including both patients in cohort 6 who had also participated in cohort 5. Subsequent to the detection of the nAbs, the investigator treating the two subjects determined that these subjects were cousins and had the identical Factor IX gene defect, however their human leukocyte antigen ("HLA") profiles were different. The HLA system is a gene complex encoding major histocompatibility complex ("MHC") proteins in humans. These cell-surface proteins are responsible for the regulation of the immune system in humans and allow the immune system to identify foreign proteins within the body. HLA type determines the range of possible immune responses to exogenous proteins and whether antibodies can be made. Studies in hemophilia A show that certain HLA alleles are associated with an increased occurrence of antibody formation.

We are conducting an analysis to assess the cause and impact of the antibody observations prior to deciding whether to initiate a Phase 2b study. To date we have completed several analyses to assess the immunogenicity risk of DalcA, or the risk that DalcA will cause patients to generate antibodies against it:

- A computer based, *in silico*, immunogenicity assessment compared DalcA's amino acid sequence with the BeneFIX® amino acid sequence, (a wild-type Factor IX marketed by Pfizer), to test if DalcA has a heightened immunogenicity profile. The result was that DalcA's *in silico* immunogenicity risk profile is similar to that of BeneFIX. The test results also predicted that the portions of the molecule most likely to trigger any antibody response were the same for DalcA and BeneFIX. According to this *in silico* assessment, the overall immunogenicity risk for antibodies developing against DalcA is minimal and comparable with BeneFIX.
- A Dendritic Cell (DC) T cell assay was completed to assess if DalcA's whole protein drug product and formulation induces CD4+ T cell proliferation, as a measure of anti-drug responses and immunogenicity risk. The study compared DalcA to BeneFIX, both in their respective drug product formulation buffers. The DC-T cell assay was conducted on a panel of cells

from 52 donors having HLA allele frequencies consistent with expectations within the global population. The result was that DalcA's DC-T cell immunogenicity risk profile is comparable to BeneFIX. Both DalcA and BeneFIX demonstrated comparably low immunogenicity risk. There was minimal response from the drug product formulation buffer alone.

- A MHC-associated peptide proteomics ("MAPPS") assay was used to directly identify the peptides that are presented by antigen-presenting cells to T cells when loaded with the DalcA drug product or BeneFIX to test if the DalcA molecule in the therapeutic formulation is more immunogenic than BeneFIX. A panel of cells from 12 donors were evaluated having HLA allele frequencies consistent with expectations within the global population. The result showed that the immunogenicity risk profile of DalcA as evaluated by the MAPPS assay is comparable with BeneFIX. Both DalcA and BeneFIX presented the same unique set of peptide fragments and at comparable frequency. One peptide, covering one amino acid that is in DalcA but not in BeneFIX, presented at a low frequency for both DalcA (1/12) and the BeneFIX comparator (2/12). All other presented peptides did not cover any sequences that differ between DalcA and BeneFIX.
- To assess if the DalcA drug product quality induces an increased immunogenicity risk, the DalcA drug product was compared to BeneFIX in a panel of release tests, including physicochemical and extended protein characterization analyses and host cell protein content analysis. The analytical testing and extended characterization showed that DalcA product quality attributes (potency, purity, identity, concentration and strength) are acceptable and comparable to both BeneFIX and RIXUBIS® (marketed by Shire).

The following activities and analysis to assess the cause and impact of the antibody observations are ongoing:

- To test if the specific amino acid differences between DalcA and BeneFIX lead to an increased immunogenicity risk, a Dendritic Cell ("DC") T cell assay will be used to identify whether sequences of DalcA can potentially elicit CD4+ T cell proliferation, a measure of anti-drug responses and immunogenicity risk. In this study the immunogenicity risk profile of peptides covering the three DalcA amino acid differences between DalcA and BeneFIX will be compared using a panel of cells from 52 donors having HLA allele frequencies consistent with expectations within the global population.
- To test if the DalcA drug product formulation may induce injection site reactions that might increase the immunogenicity risk, the therapeutic formulation of DalcA will be evaluated for inducing injection site reactions in a series of non-human primate studies.
- The two subjects who developed a neutralizing antibody were shown to have the same rare Factor IX genotype, but different HLA types. An analysis of the relevance of HLA types to immunogenicity risk is ongoing. HLA and genotyping is being carried out on the subjects exposed to DalcA who provide their consent. The identified HLA types will be evaluated to see if certain HLA and Factor IX genotypes have an increased risk of immunogenicity to DalcA.
- Various constructs of the DalcA molecule with single and double substitutions are being produced to map the binding epitope of the observed neutralizing antibodies to test which amino acid(s) form the epitope(s) on DalcA for the observed neutralizing antibodies.
- A DC-T cell assay will be used to assess whether furin contained in the DalcA drug product induces CD4+ T cell proliferation as a measure of anti-drug responses and immunogenicity risk. In this study furin alone, as well as, current DalcA drug product will be compared with new DalcA drug product in a DC-T assay using a panel of cells from 52 donors having HLA allele frequencies consistent with expectations within the global population to test whether furin in the DalcA manufacturing process leads to an increased immunogenicity risk.

We are planning to provide further updates on these analyses later in 2018. We may also conduct additional non-clinical tests of DalcA. Once our testing is complete, we will make a determination whether to resume clinical trials of DalcA, and there can be no assurance we will do so.

The enhanced potency of MarzAA and DalcA compared with existing treatment options may allow for effective subcutaneous prophylactic treatment of individuals with hemophilia A or B with an inhibitor or individuals with hemophilia B, respectively, especially in children, and may deliver substantially better outcomes for individuals with hemophilia.

We believe that subcutaneous dosing of our next-generation coagulation factors may result in progressive increases in activity levels until they reach a stable therapeutic target range in the blood. Conversely, dosing by intravenous infusions results in high initial factor activity levels in the blood followed by a rapid fall off in factor activity levels to a low trough level resulting in higher bleeding risk. Stable and higher factor levels could potentially yield a significant improvement in outcomes and have the added benefit of convenience over competing intravenous therapeutics, particularly when administered to children, and where venous access is challenging.

Based on industry reports and company reported sales, we estimate the 2018 global market opportunity for MarzAA and DalcA to be approximately $2.2 billion and $1.2 billion, respectively. Annual worldwide sales in 2017 for FDA-approved recombinant protease products for individuals with hemophilia A or B and an inhibitor were approximately $1.5 billion and approximately $2.2 billion when

including prothrombin complex concentrate products. We remain focused on advancing MarzAA through Phase 2/3 and continuing to evaluate DalcA for potential Phase 2b and Phase 3 clinical trials.

We also have several engineered Factor Xa proteases that have demonstrated efficacy in several preclinical models and have the potential to be used as a universal procoagulant. We have delayed initiating further work on our Factor Xa therapeutic program at this time to focus our efforts on the Factor VIIa and Factor IX clinical programs.

Finally, we have also developed novel protease molecules that target the complement cascade, a series of naturally occurring molecular processes that play a central role in the body's inflammatory and immune response. We continue to explore potential licensing opportunities for our dry AMD anti-complement program.

In October 2017, we announced a strategic research collaboration with Mosaic Biosciences, Inc., a related party, to develop intravitreal anti-complement factor 3 products for the treatment of dry AMD and other retinal diseases. The transaction was reviewed by disinterested members of our board of directors and approved by our audit committee. Expenses related to the collaboration were $0.5 million and $0 for the three months ended September 30, 2018 and 2017 and $0.9 million and $0 for the nine months ended September 30, 2018 and 2017, respectively.

Transactions with related parties, including the transaction referred to above, are reviewed and approved by independent members of our Board of Directors in accordance with our Code of Business Conduct and Ethics.

On June 29, 2009, we entered into a Research and License agreement with Wyeth Pharmaceuticals, Inc., subsequently acquired by Pfizer, whereby we and Pfizer collaborated on the development of novel human Factor VIIa products and we granted Pfizer the exclusive rights to develop and commercialize the licensed products on a worldwide basis. On April 2, 2015, Pfizer notified us that it was exercising its right to terminate the research and license agreement effective June 1, 2015. Accordingly, we revised the expected period of performance to end on June 1, 2015, and the deferred revenue balance was fully amortized as of that date. On December 8, 2016, we signed a definitive agreement related to the termination of the Pfizer Agreement. Pursuant to this termination agreement, Pfizer granted us an exclusive license to Pfizer's proprietary rights for manufacturing materials and processes that apply to engineered Factor VIIa, CB 813a and MarzAA. Pfizer also transferred to us the IND application and documentation related to the development, manufacturing and testing of the Factor VIIa products as well as the orphan drug designation.

Pursuant to this agreement, we agreed to make contingent cash payments to Pfizer in an aggregate amount equal to up to $17.5 million, payable upon the achievement of clinical, regulatory and commercial milestones. Following commercialization of any covered product, Pfizer would also receive a single-digit royalty on net product sales on a country-by-country basis for a predefined royalty term. In February 2018, we paid Pfizer a $1 million milestone payment based on the dosing of the first patient in the ongoing Phase 2 study.

In September 2013, we signed a license and collaboration agreement with ISU Abxis pursuant to which we licensed our proprietary human Factor IX products to ISU Abxis for initial development in South Korea. Under the agreement, ISU Abxis was responsible for manufacturing, preclinical development activities and clinical development through the completion of cohort five of a proof-of-concept Phase 1/2 study in individuals with hemophilia B that was conducted in South Korea. We funded cohort six and we have the sole rights and responsibility for worldwide development, manufacture, and commercialization of Factor IX products after Phase 1/2 development. ISU Abxis may exercise its right of first refusal to acquire commercialization rights in South Korea, in which case they would be entitled to profit sharing on worldwide sales. ISU Abxis paid us an up-front fee of $1.75 million and is obligated to pay to us contingent milestone-based payments on the occurrence of certain defined development events, of which two have been achieved as of September 30, 2018. Collaboration and license revenue related to the ISU Abxis agreement was $0 and $0.3 million during the three months ended September 30, 2018 and 2017 and $0 and $0.7 million for the nine months ended September 30, 2018 and 2017, respectively, reflects (i) the amortization of the up-front fee over the estimated period of our performance obligations, which concluded in February 2018, and (ii) milestone payments received from ISU Abxis, which were recognized through February 2018, the estimated remaining period of the Company's performance obligation under the agreement, of which the Company received $0 and $0.9 million for the nine months ended September 30, 2018 and 2017, respectively. The adoption of the new revenue standards resulted in a $0.2 million cumulative adjustment to the Company's opening balance of accumulated deficit as of January 1, 2018. We had no more deferred revenue balance as of September 30, 2018 related to the ISU Abxis collaboration.

We have never been profitable and have incurred significant operating losses in each year since inception. Our net losses were $7.7 million and $5.8 million for the three months ended September 30, 2018 and 2017 and $19.2 million and $15.8 million for the nine months ended September 30, 2018 and 2017, respectively. As of September 30, 2018, we had an accumulated deficit of $192.5 million. Substantially all our operating losses resulted from expenses incurred in our research and development programs and from general and administrative costs associated with our operations.

We expect to incur significant expenses and increasing operating losses for at least the next several years as we continue the preclinical, manufacturing and clinical development, and seek regulatory approval for our drug candidates. In addition, our expenses have increased due to hiring additional financial personnel, upgrading our financial information systems and incurring costs associated with being a public company. In addition, our operating losses may fluctuate significantly from quarter to quarter and year to year due to timing of preclinical, clinical development programs and regulatory approval.

Financial Operations Overview

Contract Revenue

We enter into collaboration arrangements that may include the receipt of payments for up-front license fees, success-based milestone payments, full time equivalent based payments for research services, product supplies, and royalties on any future sales of commercialized products that result from the collaborations. We have not generated any revenue from commercial product sales to date. ISU Abxis represents 100% of our total contract revenue for the three- and nine-months ended September 30, 2018 and 2017.

In determining the appropriate amount of revenue to be recognized as we fulfill our obligations under our agreements, we perform the following steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when we satisfy each performance obligation.

Research and Development Expenses

Research and development expenses represent costs incurred to conduct research, such as the discovery and development of our product candidates. We recognize all research and development costs as they are incurred.

Research and development expenses consist primarily of the following:

- employee-related expenses, which include salaries, benefits and stock-based compensation;
- laboratory and vendor expenses, including payments to consultants, related to the execution of preclinical, non-clinical, and clinical studies;
- the cost of acquiring and manufacturing preclinical and clinical materials and developing manufacturing processes;
- The cost of acquiring comparator drugs for our research studies;
- clinical trial expenses, including costs of third-party clinical research organizations;
- performing toxicity studies; and
- facilities and other allocated expenses, which include direct and allocated expenses for rent and maintenance of facilities, depreciation and amortization expense and other supplies.

The following table summarizes our research and development expenses during the three- and nine-months ended September 30, 2018 and 2017 (*in thousands*):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Personnel costs	$ 1,232	$ 563	$ 3,019	$ 1,318
Preclinical research	1,193	651	2,276	1,487
Clinical manufacturing	2,917	2,401	7,388	5,948
Facility and overhead	233	190	552	533
Total research and development expenses	$ 5,575	$ 3,805	$ 13,235	$ 9,286

The largest component of our total operating expenses has historically been our investment in research and development activities, including the clinical development of our product candidates. We are currently focusing substantially all our resources and development efforts on our clinical pipeline. Our internal resources, employees and infrastructure are not directly tied to individual product candidates or development programs. As such, we do not maintain information regarding these costs incurred for these research and development programs on a project-specific basis.

We expect our aggregate research and development expenses will increase during the next few quarters as we continue the preclinical, manufacturing and clinical development of our product candidates in the United States, particularly the manufacturing and clinical development costs of MarzAA and DalcA. While ISU has previously been responsible for clinical and development expenses for DalcA under our agreement with them, their funding obligations have expired and we are assuming responsibility for these expenses in the future.

On May 20, 2016, we signed a development and manufacturing services agreement with AGC Biologics, Inc. ("AGC"), formerly known as CMC ICOS Biologics, Inc., pursuant to which AGC will conduct manufacturing development of agreed upon product candidates. We will own all intellectual property developed in such manufacturing development activities that are specifically related to our product candidates and will have a royalty-free and perpetual license to use AGC's intellectual property to the extent reasonably necessary to make these product candidates, including commercial manufacturing. In 2016 we commenced manufacturing activities for MarzAA, and together with AGC we have successfully manufactured MarzAA for the Phase 2 portion of a planned Phase 2/3 clinical trial. In February 2018 we entered into a statement of work for AGC for process transfer and clinical scale manufacturing of DalcA.

We have agreed to a total of $3.8 million in payments to AGC pursuant to the initial statement of work for MarzAA under the Agreement, and an additional $5.6 million for the statement of work for DalcA, in each case subject to completion of applicable work stages. In the event that clinical manufacturing batches need to be cancelled or rescheduled, we would be obligated to pay for a portion of AGC's manufacturing fees less certain fees that AGC is able to mitigate. The initial term of the agreement is ten years or, if later, until all stages under outstanding statements of work have been completed. Either party may terminate the agreement in its entirety upon written notice of a material uncured breach or upon the other party's bankruptcy, and we may terminate the agreement upon prior notice for any reason. In addition, each party may terminate the agreement in the event that the manufacturing development activities cannot be completed for technical or scientific reasons. As of September 30, 2018, we have $0.3 million in payment obligations to AGC remaining under the initial statement of work for MarzAA and $3.9 million in payment obligations related to DalcA.

The process of conducting clinical trials necessary to obtain regulatory approval is costly and time consuming. We may never succeed in achieving marketing approval for our product candidates. The probability of success of each product candidate may be affected by numerous factors, including clinical data, competition, manufacturing capability and commercial viability. As a result, we are unable to determine the duration of and costs to complete our research and development projects or when and to what extent we will generate revenue from the commercialization and sale of any of our product candidates.

Successful development of current and future product candidates is highly uncertain. Completion dates and costs for our research programs can vary significantly for each current and future product candidate and are difficult to predict. Thus, we cannot estimate with any degree of certainty the costs we will incur in the development of our product candidates. We anticipate we will make determinations as to which programs and product candidates to pursue and how much funding to direct to each program and product candidate on an ongoing basis in response to the scientific success of early research programs, results of ongoing and future clinical trials, our ability to enter into collaborative agreements with respect to programs or potential product candidates, as well as ongoing assessments as to each current or future product candidate's commercial potential.

General and Administrative Expenses

General and administrative expenses consist of personnel costs, allocated expenses and other expenses for outside professional services, including legal, human resources, audit and accounting services. Personnel costs consist of salaries, bonus, benefits and stock-based compensation. We incur expenses associated with operating as a public company, including expenses related to compliance with the rules and regulations of the SEC and Nasdaq Stock Market LLC ("Nasdaq"), insurance expenses, audit expenses, investor relations activities, Sarbanes-Oxley compliance expenses and other administrative expenses and professional services. We expect such expenses to continue.

Interest and Other Income, Net

Interest and other income consists primarily of interest income on our investment portfolio and milestone payments received under an agreement associated with neuronal nicotinic receptor ("NNR") assets sold in 2016.

Results of Operations

The following tables set forth our results of operations data for the periods presented (*in thousands*):

	Three Months Ended September 30,			
	2018	2017	Change ($)	Change (%)
Contract revenue	$ —	$ 318	$ (318)	(100)%
Operating expenses:				
Research and development	5,575	3,805	1,770	47%
General and administrative	2,770	2,391	379	16%
Total operating expenses	8,345	6,196	2,149	35%
Loss from operations	(8,345)	(5,878)	(2,467)	42%
Interest and other income	651	85	566	666%
Net loss	$ (7,694)	$ (5,793)	$ (1,901)	33%

	Nine Months Ended September 30,			
	2018	2017	Change ($)	Change (%)
Contract revenue	$ 6	$ 700	$ (694)	(99)%
Operating expenses:				
Research and development	13,235	9,286	3,949	43%
General and administrative	8,909	7,407	1,502	20%
Total operating expenses	22,144	16,693	5,451	33%
Loss from operations	(22,138)	(15,993)	(6,145)	38%
Interest and other income	2,920	185	2,735	1478%
Net loss	$ (19,218)	$ (15,808)	$ (3,410)	22%

Contract Revenue

Contract revenue was $0 and $0.3 million during the three months ended September 30, 2018 and 2017, a decrease of $0.3 million, or 100%. The decrease was due primarily to the decrease in revenue recognition under our collaboration with ISU Abxis that concluded in February 2018.

Contract revenue was $0 and $0.7 million during the nine months ended September 30, 2018 and 2017, a decrease of $0.7 million, or 100%. The decrease was due primarily to the adoption of the new revenue standards which resulted in a $0.2 million cumulative adjustment to our opening balance of accumulated deficit as of January 1, 2018 and $0.5 million decrease in revenue recognized in 2018 under our collaboration with ISU Abxis that concluded in February 2018.

Research and Development Expenses

Research and development expenses were $5.6 million and $3.8 million during the three months ended September 30, 2018 and 2017, respectively, an increase of $1.8 million, or 47%. The increase was due primarily to an increase of $0.7 million in personnel-related costs, $0.6 million related to preclinical third-party research and development service contracts and $0.5 million related to manufacturing expenses for MarzAA and DalcA.

Research and development expenses were $13.2 million and $9.3 million during the nine months ended September 30, 2018 and 2017, respectively, an increase of $3.9 million, or 43%. The increase was due primarily to an increase $1.7 million in personnel-related costs, $1.4 million related to manufacturing expenses for MarzAA and DalcA and $0.8 million related to preclinical third-party research and development service contracts.

General and Administrative Expenses

General and administrative expenses was $2.8 million and $2.4 million during the three months ended September 30, 2018 and 2017, respectively, an increase of $0.4 million, or 16%. The increase was due primarily to an increase of $0.2 million in personnel-related costs and $0.2 million in professional service costs.

General and administrative expenses was $8.9 million and $7.4 million during the nine months ended September 30, 2018 and 2017, respectively, an increase of $1.5 million, or 20%. The increase was due primarily to an increase of $1.6 million in personnel-related costs, partially offset by a $0.1 million decrease in facilities and overhead.

Interest and Other Income

Interest and other income was $0.7 million and $0.1 million during the three months ended September 30, 2018 and 2017, respectively, an increase of $0.6 million, or 666%. The increase was due primarily to an increase of $0.6 million in investment and dividend income.

Interest and other income was $2.9 million and $0.2 million during the nine months ended September 30, 2018 and 2017, respectively, an increase of $2.7 million, or 1478%. The increase was due primarily to a $1.5 million net gain related to milestone payments received under an agreement associated with NNR assets sold in 2016 and an increase of $1.3 million in investment and dividend income, partially offset by a loss of $0.1 million in 2018 on the disposal of assets related to our headquarters move.

Recent Accounting Pronouncements

Accounting Pronouncements Recently Adopted

In November 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) No. 2016-18, Restricted Cash, which requires amounts generally described as restricted cash and restricted cash equivalents be included with cash and cash equivalents when reconciling the total beginning and ending amounts for the periods shown on the statement of cash flows. We adopted ASU 2016-18 effective January 1, 2018, using a retrospective transition method to each period presented. The adoption of this ASU changed previously reported amounts in the condensed consolidated statement of cash flows for the nine months ended September 30, 2017, by decreasing our cash flows from financing activities by $13.6 million as compared to previously reported amounts for the prior year period.

In August 2016, the FASB issued ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments. The standard provides guidance on how certain cash receipts and payments are presented and classified in the statement of cash flows, including beneficial interests in securitization. The standard is intended to reduce current diversity in practice. ASU 2016-15 will be effective for us beginning in the first quarter of 2018, but early adoption is permitted, including adoption in an interim period. We adopted ASU 2016-15 effective January 1, 2018 and this guidance did not have a material impact on our consolidated financial statements.

In January 2016, the FASB issued ASU No. 2016-01, Financial Instruments – Overall (Topic 825-10), which updates certain aspects of recognition, measurement, presentation and disclosure of financial instruments. Subsequently, in February 2018, the FASB issued ASU No. 2018-03, Technical Corrections and Improvements to Financial Instruments - Overall (Topic 825-10), which includes provisions to accounting for equity investments, financial liabilities under the fair value option and presentation and disclosure requirements for financial instruments. The amended guidance requires equity securities, except for those accounted for under the equity method of accounting, with determinable fair values to be measured at fair with changes in fair value recognized in net income (loss)The Company adopted ASU 2016-01 and 2018-03 effective January 1, 2018, and this guidance did not have a material impact on the Company’s financial statements, as the Company only has debt securities.

In May 2014, the FASB issued ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606), which amends the existing accounting standards for revenue recognition. ASU 2014-09 is based on principles that govern the recognition of revenue at an amount an entity expects to be entitled when products are transferred to customers. Subsequently, the FASB has issued the following standards related to ASU 2014-09: ASU No. 2016-08, Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations; ASU No. 2016-10, Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing; and ASU No. 2016-12, Revenue from Contracts with Customers (Topic 606): Narrow-Scope Improvements and Practical Expedients. We adopted the new revenue standards effective January 1, 2018, using the modified retrospective method through a cumulative adjustment to equity. While we have identified that the most significant change relates to its accounting for collaboration arrangements with multiple deliverables, in particular, the ISU Abxis agreement. Under the old guidance, such deliverables and consideration must be accounted for under a single unit of accounting along with other arrangement deliverables and consideration that do not have stand-alone value and are recognized as revenue over the estimated period that the performance obligations are to be performed. Under the current new standard however, the total arrangement consideration is allocated to each performance obligation

based on its estimated stand-alone selling price and revenue is recognized as each performance obligation is satisfied. As a result, revenue for this transaction may be recorded in an earlier period than under the old guidance, resulting in an $0.2 million increase to our opening balance of accumulated deficit as of January 1, 2018.

Adopting ASU No. 2014-09, Revenue from Contracts with Customers, or the new revenue standard, involved significant new estimates and judgments related to the estimates of stand-alone selling prices and the allocation of discounts and variable consideration in allocating the transaction price. We recognized revenue earlier under the current new standard and may have more variability due to significant estimates involved under the new accounting guidance.

Accounting Pronouncements Not Yet Adopted

In February 2016, the FASB issued ASU No. 2016-02, Leases (Topic 842), which replaces the existing guidance for leases. The new standard establishes a right-of-use ("ROU") model that requires a lessee to record a ROU asset and a lease liability on the balance sheet for all leases with terms longer than 12 months. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. In July 2018, the FASB issued ASU No. 2018-11, which provides entities with an additional transition method to adopt Topic 842. ASU 2016-02 will be effective for us beginning in the first quarter of 2019. Using the new transition method, we will initially apply the new lease standard at the adoption date, versus at the beginning of the earliest period presented, and recognizes a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption.

We expect to elect this transition method at the adoption date of January 1, 2019. We continue to assess the effect the guidance will have on our existing accounting policies and the Consolidated Financial Statements, and we expect there will be an increase in assets and liabilities on the Consolidated Balance Sheets at adoption due to the recording of right-of-use assets and corresponding lease liabilities, which is expected to be material.

Liquidity and Capital Resources

As of September 30, 2018, we had $129.2 million of cash, cash equivalents and short-term investments, a $19.2 million net loss and $19.5 million cash used in operating activities for the nine months ended September 30, 2018. We have an accumulated deficit of $192.5 million as of September 30, 2018. Our primary uses of cash are to fund operating expenses, including research and development expenditures and general and administrative expenditures. Cash used to fund operating expenses is impacted by the timing of when we pay these expenses, as reflected in the change in its outstanding accounts payable and accrued expenses.

On February 13, 2018, we entered into an underwriting agreement with JonesTrading, in connection with a registered firm commitment underwritten public offering of 2,941,176 shares of common stock, pursuant to a shelf registration statement that was declared effective by the SEC on February 6, 2018. On February 15, 2018 we sold 3,382,352 shares of common stock (including 441,176 shares of common stock sold pursuant to the exercise of the underwriters' overallotment option) at a price to the public of $34.00 per share. The net proceeds to us, after deducting the underwriting discounts and commissions and offering expenses payable by us were approximately $106.8 million.

We believe that our existing capital resources, including cash, cash equivalents and short-term investments will be sufficient to meet our projected operating requirements for at least the next 12 months from the date of this filing. We have based this estimate on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we currently expect. We plan to continue to fund losses from operations and capital funding needs through future equity and/or debt financings, as well as potential additional asset sales, licensing transactions, collaborations or strategic partnerships with other companies. The sale of additional equity or convertible debt could result in additional dilution to our stockholders. The incurrence of indebtedness would result in debt service obligations and could result in operating and financing covenants that would restrict our operations. Licensing transactions, collaborations or strategic partnerships may result in us relinquishing valuable rights. We can provide no assurance that financing will be available in the amounts we need or on terms acceptable to us, if at all. If we are not able to secure adequate additional funding we may be forced to delay, make reductions in spending, extend payment terms with suppliers, liquidate assets where possible, and/or suspend or curtail planned programs. Any of these actions could materially harm our business.

The following table summarizes our cash flows for the periods presented (*in thousands*):

	Nine Months Ended September 30,	
	2018	2017
Cash used in operating activities	$ (19,542)	$ (13,623)
Cash used in investing activities	(75,476)	(9,677)
Cash provided by financing activities	111,261	10,143
Net increase in cash, cash equivalents and restricted cash	$ 16,243	$ (13,157)

Cash Flows from Operating Activities

Cash used in operating activities for the nine months ended September 30, 2018 was $19.5 million, due primarily to a net loss of $19.2 million, the change in our net operating assets and liabilities of $2.4 million due primarily to a $2.4 million increase in prepaid expenses related to manufacturing and clinical trials of our Factor VIIa and Factor IX programs and $0.4 million decrease in accounts payable, partially offset by a $0.2 million increase in accrued compensation and other accrued liabilities and $0.2 million increase in deferred rent. Non-cash charges of $1.9 million were recorded for stock-based compensation, $0.1 million depreciation and amortization and a $0.1 million for loss on the disposal of assets.

Cash used in operating activities for the nine months ended September 30, 2017 was $13.6 million, due primarily to a net loss of $15.8 million, partially offset by the change in our net operating assets and liabilities of $1.5 million due primarily to a $0.6 million increase in accrued compensation and other accrued liabilities, $0.6 million increase in accounts payable, $0.2 million increase in deferred revenue due to the additional milestone fees from our collaborations and a $0.1 million decrease in prepaid expenses. Non-cash charges of $0.6 million were recorded for stock-based compensation and $0.1 million for depreciation and amortization.

Cash Flows from Investing Activities

Cash used in investing activities for the nine months ended September 30, 2018 was $75.5 million, due primarily to $135.6 million in purchases of investments and $0.2 million in purchases of property and equipment, partially offset by $60.3 million in proceeds from maturities of investments.

Cash provided by investing activities for the nine months ended September 30, 2017 was $9.7 million, due primarily to $16.5 million in purchases of investments, partially offset by $6.8 million in proceeds from maturities of investments.

Cash Flows from Financing Activities

Cash provided by financing activities for the nine months ended September 30, 2018 was $111.3 million, due primarily to $106.8 million in net proceeds from the issuance of common stock related to our underwritten public offering in February 2018, $9.5 million in proceeds from the exercise of common stock warrants and $0.1 million in proceeds from the exercise of stock options, partially offset by payments of $5.1 million related to the maturity and redemption of the remaining redeemable convertible notes.

Cash provided by financing activities for the nine months ended September 30, 2017 was $10.1 million, due primarily to $18.6 million in net proceeds from the issuance of preferred stock, common stock and warrants related to our underwritten public offering in April 2017, $5.3 million in net proceeds from issuance of common stock in Capital on Demand™ transactions and $0.2 million in proceeds from the exercise of common stock warrants, partially offset by payments of $13.9 million related to the redemption of some of the redeemable convertible notes.

Contractual Obligations

The following table summarizes our fixed contractual obligations as of September 30, 2018 (*in thousands*):

	Payments due by period				
	Less than 1 year	1 to 3 years	3 to 5 years	More than 5 years	Total
Contractual Obligations:					
Operating lease obligations(1)	$ 544	$ 1,169	$ 975	$ —	$ 2,688
AGC Manufacturing obligations(2)	1,548	2,325	—	—	3,873
Total contractual obligations(3)	$ 2,092	$ 3,494	$ 975	$ —	$ 6,561

(1) Represents future minimum lease payments under the non-cancelable lease for our headquarters in South San Francisco, California. The minimum lease payments above do not include any related common area maintenance charges or real estate taxes.

(2) Represents future payments due under our development and manufacturing services agreement initial statement of work, subject to the completion of applicable work stages, which we expect to occur in less than one year.

(3) We may be obligated to pay ISU Abxis up to $2.0 million in potential milestone payments. As the achievement and timing of these milestones are uncertain and not estimable, such commitments have not been included in the contractual obligation disclosed above. We may be obligated to pay Pfizer certain milestone payments up to $17.5 million. The achievement and timing of these milestones are uncertain and not estimable and have not been included in the contractual obligation disclosed above.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements.

Critical Accounting Polices and Estimates

Certain of our accounting policies that involve a higher degree of judgment and complexity are discussed *in "Part II - Item 7 - Management's Discussion and Analysis of Financial Condition and Results of Operation - Critical Accounting Estimates"* in the Annual Report. There have been no significant changes to these critical accounting estimates during the first six months of 2018.

Effective January 1, 2018, we adopted the new revenue standards using the modified retrospective method through a cumulative adjustment to equity, which resulted in an immaterial $0.2 million decrease to our opening balance of accumulated deficit as of January 1, 2018. See Recent Accounting Pronouncements above for effects of adoption on our condensed consolidated statement of operations for the nine months ended September 30, 2018 and on our consolidated balance sheet as of December 31, 2017.

ITEM 3. Quantitative and Qualitative Disclosures About Market Risk

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and interest rates. We are exposed to market risks in the ordinary course of our business. Our primary exposure to market risk is interest income sensitivity in our investment portfolio. Fixed rate securities and borrowings may have their fair market value adversely impacted due to fluctuations in interest rates, while floating rate securities may produce less income than expected if interest rates fall and floating rate borrowings may lead to additional interest expense if interest rates increase. Due in part to these factors, our future investment income may fall short of expectations due to changes in interest rates or we may suffer losses in principal if forced to sell securities which have declined in market value due to changes in interest rates.

However, because of the short-term nature of the instruments in our portfolio, a sudden change in market interest rates would not be expected to have a material impact on the fair market value of our investment portfolio. As of September 30, 2018, we had cash and cash equivalents and short-term investments of $129.2 million, which consisted of bank deposits and money market funds and short-term investments of $93.2 million. Accordingly, we do not expect our operating results or cash flows to be affected to any significant degree by the effect of a sudden change in market interest rates on our investment portfolio.

ITEM 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Management, with the participation of our Chief Executive Officer and our Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of September 30, 2018. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to our management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure.

Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of September 30, 2018, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Changes in Internal Control Over Financial Reporting

There has been no change in our internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act) identified during the three months ended September 30, 2018 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

We are not a party to any material legal proceedings.

ITEM 1A. RISK FACTORS

The following section includes the most significant factors that may adversely affect our business and operations. You should carefully consider the risks and uncertainties described below and all information contained in this Quarterly Report on Form 10-Q before deciding to invest in our common stock. If any of the following risks actually occur, our business, financial condition, results of operations and growth prospects may be materially and adversely affected. In that event, the trading price of our common stock could decline, and you could lose all or part of your investment.

Those risk factors below denoted with a "" are newly added or have been materially updated from our Annual Report on 10-K filed with the Securities and Exchange Commission, or the SEC, on March 19, 2018.*

Risks related to our financial condition and capital requirements

*** We have incurred significant losses since our inception and are expected to continue to incur significant losses for the foreseeable future.**

We are a clinical-stage biotechnology company, and we have not yet generated significant revenues. We have incurred net losses in each year since our inception in August 2002, including net losses of $21.6 million and $16.9 million for the years ended December 31, 2017 and 2016, respectively, and $19.2 million and $15.8 million for the nine months ended September 30, 2018 and 2017, respectively. As of September 30, 2018, we had an accumulated deficit of $192.5 million.

We are still in the early stages of development of our product candidates, and have no products approved for commercial sale. To date, we have financed our operations primarily through issuances of shares of common stock, from private placements of convertible preferred stock, and from payments under collaboration agreements.

We have devoted most of our financial resources to research and development, including our preclinical development activities. We expect to continue to incur significant expenses and operating losses over the next several years. Our operating losses may fluctuate significantly from quarter to quarter and year to year. We are expected to continue to incur significant expenses and increasing operating losses for at least the next several years, and our expenses will increase substantially if and as we:

- continue clinical development of marzeptacog alfa (activated) ("MarzAA");
- continue clinical development of Dalcinonacog alfa ("DalcA") (formerly CB 2679d/ISU304);
- further develop the manufacturing process for our product candidates;
- attract and retain skilled personnel;
- seek regulatory and marketing approvals for any of our product candidates that successfully complete clinical studies;
- establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain marketing approval;
- seek to identify and validate additional product candidates;
- acquire or in-license other product candidates and technologies;
- make milestone or other payments under collaboration agreements, or any in-license agreements;
- maintain, protect and expand our intellectual property portfolio;
- create additional infrastructure to support operations as a public company and our product development and planned future commercialization efforts; and
- experience any delays or other issues with any of the above.

In addition, in connection with the license granted to us by Pfizer, we agreed to make contingent cash payments to Pfizer in an aggregate amount equal to up to $17.5 million, payable upon the achievement of clinical, regulatory and commercial milestones, the timing of which is uncertain. Following commercialization of any Factor VIIa products, Pfizer would also receive a single-digit royalty on net product sales on a country-by-country basis for a predefined royalty term. See "*Note 10 – Commitments and Contingencies*" in this Quarterly Report on Form 10-Q.

Further, in connection with an initial statement of work under the Development and Manufacturing Agreement that we have entered into with AGC Biologics, Inc. ("AGC"), formerly known as CMC ICOS Biologics, Inc., we have agreed to a total of $3.8 million in payments to AGC, of which $3.5 million has been paid as of September 30, 2018, subject to the completion of work relating to the

manufacturing development of MarzAA. We have also agreed to pay AGC approximately $5.6 million the process transfer and commercial scale cGMP manufacturing of DalcA, Catalyst's next-generation engineered coagulation Factor IX being developed for the treatment of severe hemophilia B of which $1.7 million has been paid as of September 30, 2018. See "*Note 10 – Commitments and Contingencies*" in this Quarterly Report on Form 10-Q.

To become and remain profitable, we must succeed in developing and eventually commercializing products that generate significant revenue. This will require us to be successful in a range of challenging activities, including completing preclinical testing and clinical trials of product candidates, obtaining regulatory approval for these product candidates and manufacturing, marketing and selling any products for which regulatory approval is obtained. We are only in the preliminary stages of most of these activities. We may never succeed in these activities and, even if we do, we may never generate revenues that are significant enough to achieve profitability.

Because of the numerous risks and uncertainties associated with pharmaceutical product development, we are unable to accurately predict the timing or amount of increased expenses or when, or if, we will be able to achieve profitability. Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Failure to become and remain profitable would depress the value of the company and could impair our ability to raise capital, expand our business, maintain research and development efforts, diversify product offerings or even continue operations. A decline in the value of the Company could also cause you to lose all or part of your investment.

***We may need additional capital. If we are unable to raise sufficient capital, we will be forced to delay, reduce or eliminate product development programs.**

Developing pharmaceutical products, including conducting preclinical studies and clinical trials, is expensive. We expect our research and development expenses to increase with our ongoing activities, particularly activities related to the continued clinical development of MarzAA and DalcA, including clinical efficacy trials for each compound. We believe that our available cash will be sufficient to fund our operations at for at least the next 12 months from the date of this Quarterly Report on Form 10-Q. However, we may need to raise substantial additional capital to complete the development and commercialization of MarzAA, DalcA, and depending on the availability of capital, may need to delay development of some of our product candidates.

Until we can generate a sufficient revenue from our product candidates, if ever, we expect to finance future cash needs through public or private equity offerings, debt financings, corporate collaborations and/or licensing arrangements. Additional funds may not be available when we need them on terms that are acceptable, or at all. If adequate funds are not available, we may be required to delay, reduce the scope of or eliminate one or more of our research or development programs.

Because successful development of our product candidates is uncertain, we are unable to estimate the actual funds required to complete research and development and commercialize our products under development. Our future funding requirements, both near and long-term, will depend on many factors, including, but not limited to:

- the initiation, progress, timing, costs and results of clinical trials for our product candidates in hemophilia, including MarzAA and DalcA;
- the number and characteristics of product candidates that we pursue;
- the terms and timing of any future collaboration, licensing or other arrangements that we may establish;
- the outcome, timing and cost of regulatory approvals;
- the cost of obtaining, maintaining, defending and enforcing intellectual property rights, including patent rights;
- the effect of competing technological and market developments;
- the cost and timing of completing outsourced manufacturing activities;
- market acceptance of any product candidates for which we may receive regulatory approval;
- the cost of establishing sales, marketing and distribution capabilities for any product candidates for which we may receive regulatory approval; and
- the extent to which we acquire, license or invest in businesses, products or technologies.

Raising additional funds by issuing securities or through licensing arrangements may cause dilution to stockholders, restrict our operations or require us to relinquish proprietary rights.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, stockholders will be diluted, and the terms of these new securities may include liquidation or other preferences that adversely affect the rights of common stockholders.

Debt financing, if available at all, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or licensing arrangements with third parties, we may have to relinquish valuable rights to our

technologies, product candidates or future revenue streams or grant licenses on terms that are not favorable to us. We may also seek to access the public or private capital markets whenever conditions are favorable, even if we do not have an immediate need for additional capital at that time. There can be no assurance that we will be able to obtain additional funding if, and when necessary. If we are unable to obtain adequate financing on a timely basis, we could be required to delay, curtail or eliminate one or more, or all, of our development programs or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

In March 2016, we filed a shelf registration statement on Form S-3 with the SEC, which registration statement was declared effective on April 28, 2016 and allows us to offer up to $50 million of securities from time to time in one or more offerings (the 2016 Registration Statement). Through a Capital on Demand™ Sales Agreement with JonesTrading Institutional Services LLC ("JonesTrading"), we sold an aggregate of 479,681 shares of common stock in the open market at a weighted-average selling price of $13.55 per share, for net proceeds (net of commissions) of $6.3 million through December 31, 2017, of which $5.5 million were sold in the year ended December 31, 2017, in the Capital on Demand™ program. In addition, in December 2017, we sold an aggregate of 1,105,263 registered shares of common stock at a price to the public of $9.50 per share, for net proceeds to us, after deducting underwriting discounts and commissions and offering expenses payable by us, of approximately $9.7 million. Pursuant to the 2016 Registration Statement, we may sell up to approximately $33 million in additional securities in one or more offerings. In addition, in January 2018, we filed a shelf registration statement with the SEC, which registration statement was declared effective on February 6, 2018, and allows us to offer up to $150 million of securities from time to time in one or more offerings. (the 2018 Registration Statement). On February 13, 2018, we sold an aggregate of 3,382,352 registered shares of common stock at a price to the public of $34 per share, for net proceeds to us, after deducting underwriting discounts and offering expenses payable by us, of approximately $106.7 million. Pursuant to the 2018 Registration Statement, we may sell up to approximately $35 million in additional securities in one or more offerings.

Any additional sales in the public market of our common stock or other securities under these shelf registration statements could adversely affect prevailing market prices for our common stock.

We have no history of clinical development or commercialization of pharmaceutical products, which may make it difficult to evaluate the prospects for the company's future viability.

We began operations in August 2002. Our operations to date have been limited to financing and staffing the company, developing our technology and product candidates and establishing collaborations. We have not yet demonstrated an ability to successfully conduct a clinical trial, obtain marketing approvals, manufacture a product for clinical trials or at commercial scale, or arrange for a third-party to do so on our behalf, or conduct sales and marketing activities necessary for successful product commercialization. Consequently, predictions about the company's future success or viability may not be as accurate as they could be if we had a longer operating history or a history of successfully developing and commercializing pharmaceutical products.

Risks related to the discovery, development and commercialization of our product candidates

*** We are substantially dependent upon the success of MarzAA and DalcA.**

The failure of MarzAA or DalcA to achieve successful clinical trial endpoints, delays in clinical development, unanticipated adverse side effects, the cessation of clinical development or any other adverse developments or information related to MarzAA or DalcA would significantly harm our business, its prospects and the value of the company's common stock. We expect to complete enrollment of the Phase 2 portion of a Phase 2/3 subcutaneous dosing trial of MarzAA in individuals with hemophilia A and B inhibitors this year. We may also advance DalcA into a Phase 2b study, although there is no assurance we will do so. In Cohort 6 of the Phase 1/2 subcutaneous dosing trial of DalcA, two patients developed neutralizing antibodies (nAbS) to DalcA. These antibodies bind to DalcA and furin, a manufacturing constituent, but not to wildtype Factor IX. Further analysis of these antibody responses is underway. The DalcA Phase 2b study may not proceed if we determine, based on the analysis of the cause of the nAbs or other factors, that continued development of DalcA is not warranted. There is no guarantee that the results of further clinical trials of MarzAA or DalcA, if they occur, will be positive or will not generate unanticipated safety concerns. The Phase 1 clinical trial of MarzAA was a single-dose escalation trial that would not, compared to multi-dose trials, be expected to exclude the possibility of an immunological response to MarzAA in individuals who received the product candidate. While so far none of the patients in the Phase 2/3 subcutaneous dosing trial of MarzAA developed any inhibitory antibodies, there can be no assurance that such antibodies will not be observed in the future. If neutralizing antibodies or other antibodies generated by patients receiving either MarzAA or of DalcA lead to concerns about patient safety, the long-term efficacy, or commercial viability of either product candidate, development of such product candidate could be halted. Even if the trials of MarzAA and DalcA are positive, each product candidate may require substantial additional trials and other testing before being approved for marketing.

MarzAA and DalcA are not expected to be commercially available in the near term, if at all. Further, the commercial success of each product candidate will depend upon its acceptance by physicians, patients, third-party payors and other key decision-makers as a therapeutic and cost-effective alternative to currently available products. If we are unable to successfully develop, obtain regulatory approval for and commercialize MarzAA and DalcA, our ability to generate revenue from product sales will be significantly delayed and our business will be materially and adversely affected, and we may not be able to earn sufficient revenues to continue as a going concern.

Even if the FDA or other regulatory agency approves MarzAA or DalcA, the approval may impose significant restrictions on the indicated uses, conditions for use, labeling, advertising, promotion, marketing and/or production of such product and may impose ongoing commitments or requirements for post-approval studies, including additional research and development and clinical trials. The FDA and other agencies also may impose various civil or criminal sanctions for failure to comply with regulatory requirements, including withdrawal of product approval. Regulatory approval from authorities in foreign countries will be needed to market MarzAA or DalcA in those countries. Approval by one regulatory authority does not ensure approval by regulatory authorities in other jurisdictions. If we fail to obtain approvals from foreign jurisdictions, the geographic market for MarzAA or DalcA would be limited.

*** We are developing the clinical trial plan for DalcA, and the timing and expense of future clinical trials of DalcA, if any, are uncertain.**

While we have announced top-line data from our Phase 1/2 study of subcutaneous prophylactic candidate DalcA, we may not proceed with further clinical trials of DalcA for a variety of reasons, including without limitation, if the cause of the nAbs observed in cohort 6 of the Phase 1/2 trial is related to the drug candidate itself or the current manufacturing process, the engineered amino acid substitutions of DalcA, manufacturing issues with the drug substance, formulation issues of the drug product, or to the route of administration. We may also determine that continued development is not commercially justifiable. Even if we elect to proceed with a Phase 2b study of DalcA, the design of the Phase 2b study may change and could result in a delay in initiation of dosing. We are not certain when additional trials of DalcA will begin, how long such trials will take to enroll or complete, or how much they will cost. Any additional trials we conduct may not start when anticipated, may take longer to enroll or cost more than expected, and may not generate positive results.

*** We are conducting clinical trials for subcutaneous dosing trials of MarzAA and DalcA, which is an untested route of administration for these product candidates in humans, and we are exploring combinations of intravenous and subcutaneous administration, which has also been untested in these product candidates in humans.**

We are conducting a subcutaneous prophylaxis clinical trial of MarzAA, and we have reported the results from five out of an anticipated twelve subjects expected to participate in the trial. There can be no assurance that MarzAA will achieve efficacious levels of biological activity in a sufficient number of patients when administered subcutaneously. There can also be no assurance that the clinical trial results will be positive or that the clinical trials will not generate unanticipated safety concerns. In addition, ISU Abxis had conducted a subcutaneous prophylaxis clinical trial of DalcA, including a cohort (Cohort 6) that received intravenous dosing followed by subcutaneous dosing. While efficacy data from this trial has been encouraging, the first two patients in this cohort developed neutralizing antibodies that limited the efficacy of DalcA in those patients. Further analysis of these antibody responses is underway. The failure of either product to achieve successful clinical trial endpoints, delays in clinical development, unanticipated adverse side effects, adverse immunological responses, or any other adverse developments or information related to our product candidates would significantly harm our business, its prospects and the value of our common stock.

*** DalcA has caused and MarzAA may cause the generation of neutralizing antibodies, which could prevent their further development.**

Both MarzAA and DalcA are protein molecules which may cause the generation of antibodies in individuals who receive them. The Phase 1 clinical trial of MarzAA was a single-dose intravenous escalation trial that would not, compared with multi-dose trials or higher doses administered subcutaneously, be expected to exclude the possibility of an immunological response to MarzAA in individuals who received the product candidate. Two patients who received DalcA subcutaneously following intravenous dosing developed neutralizing antibodies that inhibit the activity of DalcA. These antibody responses are under investigation. There can be no assurance that such antibodies will not be observed in the future, either in the patients who have already received DalcA or MarzAA, or in new patients. If clinical trials demonstrate a treatment-related neutralizing immunological response in individuals that causes safety concerns or would limit the efficacy of either product candidate, development of the product candidate could be halted.

MarzAA and DalcA are in early clinical trials, and all of our other product candidates are still in preclinical development. If we are unable to obtain regulatory clearance and commercialize our product candidates or experience significant delays in doing so, our business will be materially harmed.

MarzAA and DalcA are in Phase 2/3 and Phase 1/2 clinical trials, respectively. All our other product candidates are still in preclinical development. Engineered protease biopharmaceuticals are a relatively new class of therapeutics. There can be no assurance as to the length of the trial period, the number of individuals the FDA will require to be enrolled in the trials to establish the safety, efficacy, purity and potency of the engineered protease products, or that the data generated in these trials will be acceptable to the FDA or foreign regulatory agencies to support marketing approval. Our ability to generate product revenues, which we do not expect will occur for many years, if ever, will depend heavily on the successful development and eventual commercialization of our product candidates. The success of our product candidates will depend on several factors, including the following:

- successful completion of preclinical studies and clinical trials;
- receipt of marketing approvals from applicable regulatory authorities;
- obtaining and maintaining patent and trade secret protection and regulatory exclusivity for our product candidates;
- making arrangements with third-party manufacturers for, or establishing, commercial manufacturing capabilities;
- launching commercial sales of the products, if and when approved, whether alone or in collaboration with others;
- acceptance of the products, if and when approved, by patients, the medical community and third-party payors;
- effectively competing with other therapies;
- obtaining and maintaining healthcare coverage and adequate reimbursement;
- protecting our rights in our intellectual property portfolio; and
- maintaining a continued acceptable safety profile of the products following approval.

If we do not achieve one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize our product candidates, which would materially harm our business.

Clinical drug development involves a lengthy and expensive process with an uncertain outcome. Results from our successful Phase 1 or Phase 2 trials may not be confirmed in later trials, and if serious adverse or unacceptable side effects are identified during the development of our product candidates, we may need to abandon or limit our development of some of our product candidates.

Clinical testing is expensive, time consuming and uncertain as to outcome. We cannot guarantee that any preclinical studies and clinical trials will be conducted as planned or completed on schedule, if at all. The clinical development of our product candidates is susceptible to the risk of failure at any stage of drug development, including failure to demonstrate efficacy in a clinical trial or across a suitable population of patients, the occurrence of severe or medically or commercially unacceptable adverse events, failure to comply with protocols or applicable regulatory requirements and determination by the FDA or any comparable foreign regulatory authority that a drug product is not approvable. It is possible that even if one or more of our product candidates has a beneficial effect, that effect will not be detected during clinical evaluation as a result of one or more of a variety of factors, including the size, duration, design, measurements, conduct or analysis of our clinical trials. Conversely, as a result of the same factors, our clinical trials may indicate an apparent positive effect of a product candidate that is greater than the actual positive effect, if any. Similarly, in our clinical trials we may fail to detect toxicity of or intolerability caused by our product candidates, or mistakenly believe that our product candidates are toxic or not well tolerated when that is not in fact the case.

In addition, the outcome of preclinical studies and early clinical trials may not be predictive of the success of later clinical trials. Our Phase 2 trial of MarzAA is being conducted in twelve patients, and DalcA has been dosed repeatedly in a subcutaneous prophylaxis trial in only five patients. Trials of these product candidates in larger numbers of patients may not have similar efficacy results and could result in adverse effects that were not observed in the earlier trials with smaller numbers of patients.

Many companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials after achieving positive results in earlier development, and we may face similar setbacks. The design of a clinical trial can determine whether our results will support approval of a product and flaws in the design of a clinical trial may not become apparent until the clinical trial is well advanced. We have limited experience in designing clinical trials and may be unable to design and execute a clinical trial to support marketing approval. In addition, preclinical and clinical data are often susceptible to varying interpretations and analyses. Many companies that believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval for the product candidates. Even if we believe that the results of clinical trials for our product candidates warrant marketing approval, the FDA or comparable foreign regulatory authorities may disagree and may not grant marketing approval of our product candidates.

In some instances, there can be significant variability in safety or efficacy results between different clinical trials of the same product candidate due to numerous factors, including changes in trial procedures set forth in protocols, differences in the size and type of the

patient populations, changes in and adherence to the dosing regimen and other clinical trial protocols and the rate of dropout among clinical trial participants. Any Phase 2, Phase 3 or other clinical trials that we may conduct may not demonstrate the efficacy and safety necessary to obtain regulatory approval to market our product candidates.

If our product candidates are associated with undesirable side effects in clinical trials or have characteristics that are unexpected, we may need to abandon development or limit development of the product candidate to more narrow uses or subpopulations in which the undesirable side effects or other characteristics are less prevalent, less severe or more acceptable from a risk-benefit perspective. Any such limitations could adversely affect the value of our product candidates or common stock.

If we experience delays or difficulties in the enrollment of patients in clinical trials, our receipt of necessary regulatory approvals could be delayed or prevented.

We or our collaborators may not be able to initiate or continue clinical trials for our product candidates if we are unable to locate, enroll and maintain enrolment of a sufficient number of eligible patients to participate in these trials as required by the FDA or similar regulatory authorities outside the United States. In particular, there is a relatively small number of individuals with hemophilia, that may cause delays in enrollment of clinical trials of MarzAA in individuals with hemophilia A and B with an inhibitor or DalcA in individuals with hemophilia B. In addition, some of our competitors have ongoing clinical trials for product candidates that treat the same indications as our product candidates, and patients who would otherwise be eligible for our clinical trials may instead enroll in clinical trials of our competitors' product candidates.

Patient enrollment is affected by other factors including:

- the severity of the disease under investigation;
- the eligibility criteria for the study in question;
- the perceived risks and benefits of the product candidate under study;
- the efforts to facilitate timely enrollment in clinical trials;
- the patient referral practices of physicians;
- the ability to monitor patients adequately during and after treatment; and
- the proximity and availability of clinical trial sites for prospective patients.

Our inability to enroll a sufficient number of patients for our clinical trials will result in significant delays and could require us to abandon one or more clinical trials altogether. Enrollment delays in clinical trials conducted by us may also result in increased development costs for our product candidates, which would cause the value of the company to decline and limit our ability to obtain additional financing.

Risks related to our reliance on third parties

*** We have depended on our collaborative relationship with ISU Abxis for the initial development of DalcA.**

We have a collaboration agreement with ISU Abxis for preclinical and Phase 1/2 development of an improved, next-generation Factor IX product, DalcA, to enable an investigational new drug application, which requires ISU Abxis to obtain approval from South Korean regulatory authorities to conduct trials. Under this agreement, ISU Abxis has been responsible for manufacturing and Phase 1/2 clinical trials of this product candidate, and we have depended on ISU Abxis to complete these activities.

If DalcA continues in clinical development, we will be responsible for its clinical development and manufacturing, and will need to transfer technology and information from ISU to ourselves or third-parties, such as our third party contract manufacturer. We may also have disputes with ISU Abxis regarding their obligations to reimburse certain expenses, or for other matters related to the collaboration, which could divert management's time and attention from other activities.

We expect to seek to establish additional collaborations, and, if we are not able to establish them on commercially reasonable terms, we may have to alter our development and commercialization plans.

Our drug development programs and the potential commercialization of our product candidates will require substantial additional cash to fund expenses. Accordingly, we may seek one or more additional collaborators for the development and commercialization of one or more of our product candidates. For example, we may seek a new collaborator to develop MarzAA and might also seek collaborators for DalcA or our earlier stage programs. In addition, full development efforts on the use of our novel proteases for the treatment of dry AMD will likely involve significant cost, and we do not expect to conduct any such efforts except in collaboration with one or more partners who are willing to pay for such costs.

We face significant competition in seeking appropriate collaborators. Whether we can reach a definitive agreement with a collaborator will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include the design or results of preclinical trials, the likelihood of approval by the FDA or comparable foreign regulatory authorities and the regulatory pathway for any such approval, the potential market for the product candidate, the costs and complexities of manufacturing and delivering the product to patients and the potential of competing products. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available for collaboration and whether such a collaboration could be more attractive than the one with us. There can also be no assurance that any collaboration agreements will be on favorable terms.

Collaborations are complex and time consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. We may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of the product candidate for which we are seeking to collaborate, reduce or delay our development program or one or more of our other development programs, delay our potential commercialization or reduce the scope of any sales or marketing activities, and increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to further develop our product candidates or bring them to market and generate product revenue.

We contract with third parties for the manufacture of our product candidates for preclinical testing and expect to continue to do so for clinical testing and commercialization. This reliance on third parties increases the risk that we will not have sufficient quantities of our product candidates or products or such quantities at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts.

We currently have no internal capabilities to manufacture our product candidates for clinical use or for preclinical trials following good manufacturing practices, or GMP, or good laboratory practices, or GLP. We expect to rely on one or more third-party contractors to manufacture, package, label and distribute clinical supplies and commercial quantities of any product candidate that we commercialize following approval for marketing by applicable regulatory authorities. We also expect to rely on one or more third-party contractors to manufacture our product candidates for use in our clinical trials. Reliance on such third-party contractors entails risks, including:

- our inability to identify and negotiate manufacturing and supply agreements with suitable manufacturers;
- manufacturing delays if our third-party contractors give greater priority to the supply of other products over our product candidates or otherwise do not satisfactorily perform according to the terms of the agreements between us and them;
- the possible termination or nonrenewal of agreements by our third-party contractors at a time that is costly or inconvenient for us;
- the possible breach by the third-party contractors of our agreements with them;
- the failure of third-party contractors to comply with applicable regulatory requirements;
- the possible mislabeling of clinical supplies, potentially resulting in the wrong dose amounts being supplied or active drug or placebo not being properly identified;
- the possibility of clinical supplies not being delivered to clinical sites on time, leading to clinical trial interruptions, or of drug supplies not being distributed to commercial vendors in a timely manner, resulting in lost sales; and
- the possible misappropriation of our proprietary information, including our trade secrets and know-how.

We may incur delays in product development resulting from the need to identify or qualify manufacturers for our product candidates. Our current and anticipated future dependence upon others for the manufacture of our product candidates may adversely affect our future profit margins and our ability to commercialize any products that receive marketing approval on a timely and competitive basis.

*** We are transitioning manufacturing and clinical activities related to MarzAA and DalcA from Pfizer and ISU Abxis, respectively, to AGC and continuing to optimize the manufacturing processes for these candidates. This process will be lengthy and its outcome uncertain.**

Pfizer, through its wholly-owned subsidiary Wyeth, conducted the Phase 1 clinical trial of MarzAA pursuant to a research and license agreement. Pfizer terminated this agreement effective June 1, 2015. ISU Abxis conducted the Phase 1/2 clinical trial of DalcA and was responsible for manufacturing clinical trial materials for this study.

In March 2016, we engaged AGC to conduct manufacturing development and, upon successful development of the manufacturing process, manufacture the MarzAA that we intend to use in our clinical trials on a fee-for-services basis. In addition, in February 2018,

we engaged AGC to conduct process transfer and commercial scale manufacturing of DalcA for use in our clinical trials. Manufacturing of biological therapeutics such as MarzAA and DalcA is complex and scale-dependent, and we may need to further optimize the manufacturing process of these product candidates. There can be no assurance that AGC will be able to manufacture sufficient quantities of MarzAA to satisfy our clinical trial requirements in a timely manner, within expected budgets or at all. Delays in the manufacture of DalcA could delay the start of future clinical trials of DalcA, if any.

We and our contract manufacturers will be subject to significant regulation with respect to manufacturing our products. The manufacturing facilities on which we will rely may not continue to meet regulatory requirements and have limited capacity.

All entities involved in the preparation of therapeutics for clinical studies or commercial sale, including any contract manufacturers for our product candidates, are subject to extensive regulation. Components of a finished therapeutic product approved for commercial sale or used in late-stage clinical studies must be manufactured in accordance with GMP. These regulations govern manufacturing processes and procedures (including record keeping) and the implementation and operation of quality systems to control and assure the quality of investigational products and products approved for sale. Poor control of production processes can lead to the introduction of adventitious agents or other contaminants, or to inadvertent changes in the properties or stability of our product candidates that may not be detectable in final product testing. We or our contract manufacturers must supply all necessary documentation in support of a biologics license application ("BLA") on a timely basis and must adhere to the FDA's good laboratory practices, or GLP, and GMP regulations enforced by the FDA through its facilities inspection program. Our facilities and quality systems and the facilities and quality systems of some or all our third-party contractors must pass a pre-approval inspection for compliance with the applicable regulations as a condition of regulatory approval of our product candidates. In addition, the regulatory authorities may, at any time, audit or inspect a manufacturing facility involved with the preparation of our product candidates or the associated quality systems for compliance with the regulations applicable to the activities being conducted. If these facilities do not pass a pre-approval plant inspection or do not have a GMP compliance status acceptable for the FDA, FDA approval of the products will not be granted.

The regulatory authorities also may, at any time following approval of a product for sale, audit our manufacturing facilities or those of our third- party contractors. If any such inspection or audit identifies a failure to comply with applicable regulations or if a violation of our product specifications or applicable regulations occurs independent of such an inspection or audit, we or the relevant regulatory authority may require remedial measures that may be costly and/or time-consuming for us or a third-party to implement and that may include the temporary or permanent suspension of a clinical study or commercial sales or the temporary or permanent closure of a facility. Any such remedial measures imposed upon us or third parties with whom we contract could materially harm our business.

If we or any of our third-party manufacturers fail to maintain regulatory compliance, the FDA can impose regulatory sanctions including, among other things, refusal to approve a pending application for a new drug product or biologic product, or revocation of a pre-existing approval. As a result, our business, financial condition and results of operations may be materially harmed.

Additionally, if supply from one approved manufacturer is interrupted, there could be a significant disruption in commercial supply. An alternative manufacturer would need to be qualified through a BLA supplement which could result in further delay. The regulatory agencies may also require additional studies if a new manufacturer is relied upon for commercial production. Switching manufacturers may involve substantial costs and is likely to result in a delay in our desired clinical and commercial timelines.

These factors could cause the delay of clinical studies, regulatory submissions, required approvals or commercialization of our product candidates, cause us to incur higher costs and prevent us from commercializing our products successfully. Furthermore, if our suppliers fail to meet contractual requirements, and we are unable to secure one or more replacement suppliers capable of production at a substantially equivalent cost, our clinical studies may be delayed, or we could lose potential revenue.

We expect to rely on third parties to conduct our clinical trials, and those third parties may not perform satisfactorily, including failing to meet deadlines for the completion of such trials.

We expect to rely on third parties such as contract research organizations, or CROs, medical institutions and clinical investigators to enroll qualified patients and conduct, supervise and monitor clinical trials. Our reliance on these third parties for clinical development activities will reduce our control over these activities. Our reliance on these third parties, however, will not relieve us of our regulatory responsibilities, including ensuring that our clinical studies are conducted in accordance with good clinical practices, or GCP, and the investigational plan and protocols contained in the relevant regulatory application, such as an investigational new drug application, or IND. In addition, the CROs with whom we contract may not complete activities on schedule or may not conduct our preclinical studies or clinical studies in accordance with regulatory requirements or our clinical study design. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, our efforts to obtain regulatory approvals for, and to commercialize, our product candidates may be delayed or prevented.

We expect to seek to establish additional collaborations, and, if we are not able to establish them on commercially reasonable terms, we may have to alter our development and commercialization plans.

Our drug development programs and the potential commercialization of our product candidates will require substantial additional cash to fund expenses. We have previously relied on collaborators, such as Pfizer and ISU Abxis, to contribute to the development of our product candidates, and we are currently working with Mosaic Biosciences to support the development of our dry AMD product candidates. We may seek one or more additional collaborators for the development and commercialization of one or more of our product candidates. For example, we may seek a new collaborator to develop MarzAA and might also seek collaborators for DalcA or our earlier stage programs. In addition, full development efforts on the use of our novel proteases for the treatment of dry AMD will likely involve significant cost, and we do not expect to conduct any such efforts except in collaboration with one or more partners who are willing to pay for such costs.

We face significant competition in seeking appropriate collaborators. Whether we can reach a definitive agreement with a collaborator will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include the design or results of preclinical trials, the likelihood of approval by the FDA or comparable foreign regulatory authorities and the regulatory pathway for any such approval, the potential market for the product candidate, the costs and complexities of manufacturing and delivering the product to patients and the potential of competing products. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available for collaboration and whether such a collaboration could be more attractive than the one with us. There can also be no assurance that any collaboration agreements will be on favorable terms.

Collaborations are complex and time consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. We may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of the product candidate for which we are seeking to collaborate, reduce or delay our development program or one or more of our other development programs, delay our potential commercialization or reduce the scope of any sales or marketing activities, and increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to further develop our product candidates or bring them to market and generate product revenue.

Risks related to employee matters, managing growth and our business operations

Our future success depends on our ability to retain key executives and to attract, retain and motivate qualified personnel.

Our ability to compete in the highly competitive biotechnology and pharmaceutical industries depends upon our ability to attract and retain highly qualified managerial, scientific and medical personnel. We are highly dependent on our management and scientific personnel, including our President and Chief Executive Officer, Dr. Nassim Usman, our Chief Medical Officer, Dr. Howard Levy, our Chief Financial Officer, Fletcher Payne, our Senior Vice President of Technical Operations, Andrew Hetherington and our Vice President of Translational Research, Dr. Grant Blouse. We do not maintain "key man" insurance policies on the lives of these individuals or the lives of any of our other employees. In addition, we will need to add personnel to achieve our business objectives. The loss of the services of any of our executive officers, other key employees, and our inability to find suitable replacements, or our inability to hire new clinical development and manufacturing personnel, could result in delays in product development and harm our business.

We conduct operations at our facility in the San Francisco Bay Area. This region is headquarters to many other biopharmaceutical companies and many academic and research institutions. Competition for skilled personnel in our market is intense and may limit our ability to hire and retain highly qualified personnel on acceptable terms or at all.

To induce valuable employees to remain at Catalyst, in addition to salary and cash incentives, we have provided stock options that vest over time. The value to employees of stock options that vest over time may be significantly affected by movements in the company's stock price that are beyond our control and may at any time be insufficient to counteract more lucrative offers from other companies. Despite our efforts to retain valuable employees, members of management and scientific and development teams may terminate their employment with the company on short notice. Our employees are under at-will employment arrangements, which means that any of our employees can leave employment with Catalyst at any time, with or without notice. Failure to retain, replace or recruit personnel could harm our business.

Our employees, principal investigators, consultants and commercial partners may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of fraud or other misconduct by our employees, principal investigators, consultants and collaborators. Misconduct by these parties could include intentional failures to comply with the regulations of the FDA and non-US regulators, to provide accurate information to the FDA and non-US regulators, to comply with healthcare fraud and abuse laws and regulations in the United States and abroad, to report financial information or data accurately or to disclose unauthorized activities to us. In particular, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Such misconduct could also involve the improper use of information obtained during clinical studies that could result in regulatory sanctions and cause serious harm to our reputation. It is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of significant fines or other sanctions.

*** We will continue to incur significant costs as a result of operating as a public company, and our management is required to devote substantial time to compliance initiatives.**

As a public company, we have and will continue to incur significant legal, accounting and other expenses that we did not incur as a private company, including costs associated with public company reporting and corporate governance requirements, in order to comply with the rules and regulations imposed by the Sarbanes-Oxley Act and the Dodd-Frank Wall Street Reform and Consumer Protection, or the Dodd-Frank Act, as well as rules implemented by the SEC and Nasdaq. Stockholder activism, the political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact the manner in which we operate our business in ways that are not currently anticipated. Our management and other personnel need to devote a substantial amount of time to these compliance initiatives. In addition, these rules and regulations make it difficult and expensive for us to obtain director and officer liability insurance, and we may be required to incur substantial costs to maintain our current levels of such coverage. We expect that we will annually incur significant expenses to comply with the requirements imposed on us as a public company.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective internal controls over financial reporting and disclosure controls and procedures. In particular, as a public company, we are required to perform system and process evaluations and testing of our internal control over financial reporting to allow management and our independent registered public accounting firm to report on the effectiveness of our internal controls over financial reporting, as required by Section 404 of the Sarbanes-Oxley Act. However, our independent registered public accounting firm was not required to report on the effectiveness of our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act for the year ended December 31, 2017, based on the SEC's guidance for reporting over smaller reporting companies. In addition, our testing, or the subsequent testing in the future by our independent registered public accounting firm, may reveal deficiencies in our internal control over financial reporting that may be deemed to be material weaknesses. Our compliance with Section 404 will require that we incur substantial accounting expense and management time on compliance-related issues. Moreover, if we are not able to comply with the requirements of Section 404 in a timely manner, or if we or our independent registered public accounting firm identify deficiencies in our internal control over financial reporting that are deemed to be material weaknesses, we could lose investor confidence in the accuracy and completeness of our financial reports, which could cause our stock price to decline.

We or the third parties upon whom we depend may be adversely affected by earthquakes or other natural disasters and our business continuity and disaster recovery plans may not adequately protect U.S. from a serious disaster.

Our offices are located in the San Francisco Bay Area, which is prone to earthquakes. Earthquakes or other natural disasters could severely disrupt our operations, and have a material adverse effect on our business, results of operations, financial condition and prospects. If a natural disaster, power outage or other event occurred that prevented U.S. from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as the manufacturing facilities of our third-party contract manufacturers, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for U.S. to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place currently are limited and are unlikely to prove adequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans that, particularly when taken together with our lack of earthquake insurance, could have a material adverse effect on our business.

Risks related to our intellectual property

If we are unable to obtain, protect or enforce intellectual property rights related to our product candidates, we may not be able to compete effectively in our markets.

We rely upon a combination of patents, trade secret protection and confidentiality agreements to protect the intellectual property related to our product candidates. The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. Third parties may challenge the validity, enforceability or scope of our patents, that may result in those patents being narrowed or invalidated. The patent applications that we own may fail to result in issued patents with claims that cover our product candidates in the United States or in other foreign countries. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property, provide exclusivity for our product candidates or prevent others from designing around our claims. Certain of our patents also cover processes, for which enforcement can be difficult. Any of these outcomes could impair our ability to prevent competition from third parties that may have an adverse impact on our business.

If the patents or patent applications we hold or have in-licensed for our programs or product candidates are invalidated or fail to issue, if their breadth or strength of protection is threatened, or if they fail to provide meaningful exclusivity for our product candidates, it could threaten our ability to commercialize future products. Further, if we encounter delays in regulatory approvals, the period of time during which we could market a product candidate under patent protection could be reduced. In addition, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. Various extensions may be available; however the life of a patent, and the protection it affords, is limited. Once the patent life has expired for a product, we may be open to competition from generic medications.

In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable or that we elect not to patent and other elements of our product candidate discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. However, trade secrets can be difficult to protect. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our employees, consultants, scientific advisors and contractors. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors.

Although we expect all of our employees and consultants to assign their inventions to us, and all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information or technology to enter into confidentiality agreements, we cannot provide any assurances that all such agreements have been duly executed or that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Misappropriation or unauthorized disclosure of our trade secrets could impair our competitive position and may have a material adverse effect on our business. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating the trade secret. In addition, others may independently discover our trade secrets and proprietary information.

Further, filing, prosecuting and defending patents on product candidates in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In addition, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the United States and abroad. If we are unable to prevent material disclosure of the non-patented intellectual property related to our technologies to third parties, and there is no guarantee that we will have any such enforceable trade secret protection, we may not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, results of operations and financial condition.

Third-party claims of intellectual property infringement or challenging the inventorship or ownership of our patents may prevent or delay our development and commercialization efforts.

Our commercial success depends in part on avoiding infringement of the patents and proprietary rights of third parties. There is a substantial amount of litigation, both within and outside the United States, involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries, including patent infringement lawsuits, interferences, oppositions and *inter partes* reexamination proceedings before the U.S. Patent and Trademark Office, or U.S. PTO, and corresponding foreign patent offices. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are pursuing development candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the patent rights of third parties.

Third parties may assert that the manufacture, use or sale of our product candidates infringes patents held by such third parties, or that we are employing their proprietary technology without authorization. For example, we are aware of a patent that has been issued in Europe (with counterparts in Australia, China, Japan, Poland, and South Korea) and includes a claim that may read on MarzAA. An opposition proceeding with respect to this patent sustained this patent, and we filed an appeal on November 11, 2016. There can also be no assurance whether or not the claims of such patent would be found to read on MarzAA even if a claim survives the opposition. There may be third-party patents or patent applications with claims to compositions of matter, materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. Because patent applications can take many years to issue, there may be currently pending patent applications that may later result in issued patents that our product candidates may infringe.

In addition, we have received confidential and proprietary information from third parties, and we employ individuals who were previously employed at other biotechnology or pharmaceutical companies. We may be subject to claims that our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed confidential information of these third parties or our employees' former employers. Litigation may be necessary to defend against these claims.

Parties making claims against us may obtain injunctive or other equitable relief that could effectively block our ability to further develop and commercialize one or more of our product candidates unless we redesigned infringing products (which may be impossible) or obtained a license under the applicable patents (which may not be available on commercially reasonable terms or at all), or until such patents expire.

We may be involved in lawsuits to protect or enforce our patents.

Competitors may infringe our patents. To counter infringement or unauthorized use, we or our collaborators may be required to file infringement claims that can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that one of our patents is not valid, is unenforceable and/or is not infringed, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of not issuing.

Interference proceedings provoked by third parties or brought by us may be necessary to determine the priority of inventions with respect to our patents or patent applications or those of our licensors. An unfavorable outcome could require us to cease using the related technology or to attempt to license rights from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms. We may not be able to prevent, alone or with our licensors, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

Intellectual property litigation could cause us to spend substantial resources and distract our personnel from their normal responsibilities.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims, regardless of their merit, would cause us to incur significant expenses, and could distract our technical and management personnel from their normal responsibilities. In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, in addition to paying royalties, redesign infringing products or obtain one or more licenses from third parties that, may be impossible or require substantial time and monetary expenditure. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities

analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. We may not have sufficient financial or other resources to conduct such litigation or proceedings adequately. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could compromise our ability to compete in the marketplace.

We may need to license certain intellectual property from third parties, and such licenses may not be available or may not be available on commercially reasonable terms.

A third-party may hold intellectual property, including patent rights, that is important or necessary to the development of our products. It may be necessary for us to use the patented or proprietary technology of third parties to commercialize our products, in which case we would be required to obtain a license from these third parties on commercially reasonable terms, or our business could be harmed, possibly materially.

Recent patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, and changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

On September 16, 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law. The Leahy-Smith Act includes a number of significant changes to U.S. patent law, including provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. The U.S. PTO is currently developing regulations and procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and in particular, the first to file provisions, were enacted March 16, 2013. However, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business.

Risks related to regulatory approval of our product candidates and other legal compliance matters

If we are not able to obtain, or if there are delays in obtaining, required regulatory approvals, we will not be able to commercialize our product candidates, and our ability to generate revenue will be materially impaired.

While we have multiple drug candidates in clinical and advanced preclinical development for a range of diseases, we have not yet submitted BLAs, for our engineered human proteases to the FDA, or similar approval filings to comparable foreign authorities. Submission of a BLA requires extensive preclinical and clinical data and supporting information that demonstrates the product candidate's safety, purity, and potency, also known as safety and effectiveness, for each desired indication. A BLA must also include significant information regarding the chemistry, manufacturing and controls for the product. MarzAA is in a Phase 2 part of a Phase 2/3 clinical trial, and DalcA has completed a Phase 1/2 clinical trial. However, failure of one or more clinical trials can occur at any stage in the clinical trial process. Accordingly, the regulatory pathway for our product candidates is still uncertain, complex, and lengthy, and ultimately, approval may not be obtained.

We may experience delays in completing planned clinical trials for a variety of reasons, including delays related to:

- the availability of financial resources to commence and complete the planned trials;
- inability to reach agreement on acceptable terms with prospective CROs and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- obtaining approval at each clinical trial site by an independent institutional review board, or IRB;
- recruiting suitable patients to participate in trials;
- having patients complete a trial or return for post-treatment follow-up;
- clinical trial sites deviating from trial protocol or dropping out of a trial;
- adding new clinical trial sites; and
- manufacturing sufficient quantities of qualified materials under cGMPs and applying them on a subject by subject basis for use in clinical trials.

We could also experience delays in obtaining approval if physicians encounter unresolved ethical issues associated with enrolling patients in clinical trials of our product candidates in lieu of prescribing existing treatments that have established safety and efficacy profiles given the serious nature of the diseases for the core indications for our product candidates. Additionally, a clinical trial may be suspended or terminated by us, the IRBs for the institutions in which the trials are being conducted, the Data Monitoring Committee for the trial, or by the FDA or other regulatory authorities for a number of reasons, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or

other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues, or adverse side effects, failure to demonstrate a benefit from using a product candidate, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial. If we experience termination of, or delays in the completion of, any clinical trial of our product candidates, our ability to commercialize our product candidates will be harmed and our ability to generate revenue will be materially impaired. Additionally, delays in completing trials will increase costs, slow down our product development and approval process, and impair our ability to commence product sales and generate revenue. Many of the factors that could create or lead to a delay in the commencement or completion of clinical trials may lead to the denial of regulatory approval for our product candidates.

The FDA may disagree with our regulatory plan and we may fail to obtain regulatory approval of our product candidates.

The results of clinical trials we conduct may not support regulatory approval of our product candidates. Our product candidates could fail to receive regulatory approval for many reasons, including the following:

- the FDA or comparable foreign regulatory authorities may disagree with the design or implementation of our clinical trials;
- We may be unable to demonstrate to the satisfaction of the FDA or comparable foreign authorities that our product candidates are safe and effective for any of their proposed indications;
- the results of clinical trials may not meet the level of statistical significance required by the FDA or comparable foreign regulatory authorities for approval;
- We may be unable to demonstrate that our product candidates' clinical and other benefits outweigh their safety risks;
- the FDA or comparable foreign regulatory authorities may disagree with our interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials of our product candidates may not be sufficient to the satisfaction of the FDA or comparable foreign regulatory authorities to support the submission of a BLA or other comparable submission in foreign jurisdictions or to obtain regulatory approval in the United States or elsewhere;
- the FDA or comparable foreign regulatory authorities may fail to approve the manufacturing processes or facilities of third-party manufacturers with which we contract for clinical and commercial supplies; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our clinical data insufficient for approval.

Our relationships with customers and third-party payors will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers, physicians and third-party payors will play a primary role in the recommendation and prescription of any product candidates for which we obtain marketing approval. Our future arrangements with third-party payors and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we would market, sell and distribute our products. As a pharmaceutical company, even though we do not and may not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payors, federal and state healthcare laws and regulations pertaining to fraud and abuse and patients' rights are and will be applicable to our business. These regulations include:

- the Federal Healthcare Anti-Kickback Statute that, prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under a federal healthcare program such as Medicare and Medicaid, and which will constrain our marketing practices and the marketing practices of our licensees, educational programs, pricing policies, and relationships with healthcare providers or other entities;
- the federal physician self-referral prohibition, commonly known as the Stark Law, which prohibits physicians from referring Medicare or Medicaid patients to providers of "designated health services" with whom the physician or a member of the physician's immediate family has an ownership interest or compensation arrangement, unless a statutory or regulatory exception applies;
- federal false claims laws that prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment from Medicare, Medicaid, or other government reimbursement programs that are false or fraudulent, and which may expose entities that provide coding and billing advice to customers to potential criminal and civil penalties, including through civil whistleblower or qui tam actions, and including as a result of claims presented in violation of the Federal Healthcare Anti- Kickback Statute, the Stark Law or other healthcare-related laws, including laws enforced by the FDA;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also created federal criminal

laws that prohibit knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statements in connection with the delivery of or payment for healthcare benefits, items or services that, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;

- federal physician sunshine requirements under the Affordable Care Act, which requires manufacturers of drugs, devices, biologics and medical supplies to report annually to the U.S. Department of Health and Human Services or HHS, information related to payments and other transfers of value to physicians, other healthcare providers, and teaching hospitals, and ownership and investment interests held by physicians and other healthcare providers and their immediate family members and applicable group purchasing organizations;
- the Federal Food, Drug, and Cosmetic Act, which, among other things, strictly regulates drug product marketing, prohibits manufacturers from marketing drug products for off-label use and regulates the distribution of drug samples; and
- state and foreign law equivalents of each of the above federal laws, such as anti-kickback and false claims laws, which may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, state laws requiring pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government and which may require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures, and state and foreign laws governing the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways and often are not preempted by federal laws such as HIPAA, thus complicating compliance efforts.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, imprisonment, exclusion from government funded healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations. If any physicians or other healthcare providers or entities with whom we expect to do business are found to not be in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

Recently enacted and future legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize our product candidates and affect the prices for our product candidates.

In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to profitably sell any product candidates for which we obtain marketing approval.

In the United States, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, or the MMA, changed the way Medicare covers and pays for pharmaceutical products. The legislation expanded Medicare coverage for drug purchases by the elderly and introduced a new reimbursement methodology based on average sales prices for physician-administered drugs. In addition, this legislation provided authority for limiting the number of drugs that will be covered in any therapeutic class. Cost reduction initiatives and other provisions of this legislation could decrease the coverage and price that we receive for any approved products. While the MMA applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates. Therefore, any reduction in reimbursement that results from the MMA may result in a similar reduction in payments from private payors.

More recently, in March 2010, President Obama signed into law the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, or collectively the PPACA, a sweeping law intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for the healthcare and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms.

Among the provisions of the PPACA of importance to our potential product candidates are the following:

- an annual, nondeductible fee on any entity that manufactures or imports specified branded prescription drugs and biologic agents;
- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program;
- expansion of healthcare fraud and abuse laws, including the False Claims Act and the Anti-Kickback Statute, new government investigative powers, and enhanced penalties for noncompliance;
- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts off negotiated prices;
- extension of manufacturers' Medicaid rebate liability;
- expansion of eligibility criteria for Medicaid programs;
- expansion of the entities eligible for discounts under the Public Health Service pharmaceutical pricing program;
- new requirements to report financial arrangements with physicians and teaching hospitals;
- a new requirement to annually report drug samples that manufacturers and distributors provide to physicians; and
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research.

In addition, other legislative changes have been proposed and adopted since the PPACA was enacted. These changes included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, starting in 2013. In January 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, reduced Medicare payments to several providers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws may result in additional reductions in Medicare and other healthcare funding.

Since its enactment, there have been judicial and Congressional challenges to certain aspects of the PPACA, and we expect there will be additional challenges and amendments to the Affordable Care Act in the future. The new Presidential Administration and U.S. Congress will likely continue to seek to modify, repeal, or otherwise invalidate all, or certain provisions of, the PPACA. It is uncertain the extent to which any such changes may impact our business or financial condition. In addition, individual states in the United States have also become increasingly aggressive in passing legislation and implementing regulations designed to control pharmaceutical product and medical device pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. For example, in October 2017, California passed a new law, to become effective in January 2019, which will require transparency from biopharmaceutical companies regarding price increases for prescription drugs. In addition, regional healthcare authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and medical devices to purchase and which suppliers will be included in their prescription drug and other healthcare programs. We expect that the PPACA, as well as other healthcare reform measures that may be adopted in the future, may result in more rigorous coverage criteria and in additional downward pressure on the price that we or our collaborators may receive for any approved product. Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors. The implementation of cost containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain profitability, or commercialize our products.

Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. We cannot be sure whether additional legislative changes will be enacted, or whether the FDA regulations, guidance or interpretations will be changed, or what the impact of such changes on the marketing approvals of our product candidates, if any, may be. In addition, increased scrutiny by the U.S. Congress of the FDA's approval process may significantly delay or prevent marketing approval, as well as subject us to more stringent product labeling and post-marketing testing and other requirements.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could harm our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. From time to time and in the future, our operations may involve the use of hazardous and flammable materials, including chemicals and biological materials, and may also produce hazardous waste products. Even if we contract with third parties for the disposal of these materials and waste products, we cannot completely eliminate the risk of contamination or injury resulting from these materials. In the event of contamination or injury resulting from the use or disposal of our hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties for failure to comply with such laws and regulations.

We maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials, but this insurance may not provide adequate coverage against potential liabilities. However, we do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us.

In addition, we may incur substantial costs to comply with current or future environmental, health and safety laws and regulations. Current or future environmental laws and regulations may impair our research, development or production efforts that, could adversely affect our business, financial condition, results of operations or prospects. In addition, failure to comply with these laws and regulations may result in substantial fines, penalties or other sanctions.

We face potential product liability, and, if successful claims are brought against us, we may incur substantial liability and costs. If the use of our product candidates harms patients or is perceived to harm patients even when such harm is unrelated to our product candidates, regulatory approvals could be revoked or otherwise negatively impacted and we could be subject to costly and damaging product liability claims.

The use of our product candidates in clinical trials and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by consumers, healthcare providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. There is a risk that our product candidates may induce adverse events. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation;
- withdrawal of clinical trial participants;
- costs due to related litigation;
- distraction of management's attention from our primary business;
- substantial monetary awards to patients or other claimants;
- the inability to commercialize our product candidates; and
- decreased demand for our product candidates, if approved for commercial sale.

We carry product liability insurance of $10,000,000 per occurrence and $10,000,000 aggregate limit. We believe our product liability insurance coverage is sufficient for our current clinical programs; however, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. If we obtain marketing approval for product candidates, we intend to expand our insurance coverage to include the sale of commercial products; however, we may be unable to obtain product liability insurance on commercially reasonable terms or in adequate amounts. On occasion, large judgments have been awarded in class action lawsuits based on drugs or medical treatments that had unanticipated adverse effects. A successful product liability claim or series of claims brought against us could cause our stock price to decline and, if judgments exceed insurance coverage, could adversely affect our results of operations and business.

Patients with the diseases targeted by our product candidates are often already in severe and advanced stages of disease and have both known and unknown significant pre-existing and potentially life-threatening health risks. During treatment, patients may suffer adverse events, including death, for reasons that may be related to our product candidates. Such events could subject us to costly litigation, require us to pay substantial amounts of money to injured patients, delay, negatively impact or end our opportunity to receive or maintain regulatory approval to market our products, or require us to suspend or abandon our commercialization efforts. Even in a circumstance in which we do not believe that an adverse event is related to our products, the investigation into the circumstance may be time-consuming or inconclusive. These investigations may interrupt our sales efforts, delay our regulatory approval process in other countries, or impact and limit the type of regulatory approvals our product candidates receive or maintain. As a result of these factors, a product liability claim, even if successfully defended, could have a material adverse effect on our business, financial condition, results of operations, or cash flows.

Risks related to commercialization of our product candidates

Even if any of our product candidates receives marketing approval, we may fail to achieve the degree of market acceptance by physicians, patients, third-party payors and others in the medical community necessary for commercial success.

If any of our product candidates receives marketing approval, we may nonetheless fail to gain sufficient market acceptance by physicians, patients, third-party payors and others in the medical community. For example, current hemophilia treatments like intravenous NovoSeven® are well established in the medical community, and doctors may continue to rely on these treatments. If our product candidates do not achieve an adequate level of acceptance, we may not generate significant product revenues and we may not become profitable. The degree of market acceptance of our product candidates, if approved for commercial sale, will depend on several factors, including:

- the subcutaneous efficacy and potential advantages compared with alternative treatments;
- our ability to offer our products for sale at competitive prices;
- the convenience and ease of subcutaneous administration compared with alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of marketing and distribution support;
- the availability of third-party coverage and adequate reimbursement;
- the prevalence and severity of any side effects; and
- any restrictions on the use of our products together with other medications.

Our product candidates are years away from regulatory approval.

MarzAA and DalcA are not expected to be commercially available for several years, if at all. Further, the commercial success of either product candidate will depend upon its acceptance by physicians, individuals, third-party payors and other key decision-makers as a therapeutic and cost-effective alternative to products available at the time, which may include competing products currently under development by others. See “We face substantial competition that may result in others discovering, developing or commercializing products before or more successfully than we do.” If we are unable to successfully develop, obtain regulatory approval for and commercialize MarzAA or DalcA, our ability to generate revenue from product sales will be significantly delayed and our business will be materially and adversely affected, and we may not be able to earn sufficient revenues to continue as a going concern.

Even if the FDA or other regulatory agency approves MarzAA or DalcA, the approval may impose significant restrictions on the indicated uses, conditions for use, labeling, advertising, promotion, marketing and/or production of such product and may impose ongoing commitments or requirements for post-approval studies, including additional research and development and clinical trials. The FDA and other agencies also may impose various civil or criminal sanctions for failure to comply with regulatory requirements, including withdrawal of product approval. Regulatory approval from authorities in foreign countries will be needed to market MarzAA or DalcA in those countries. Approval by one regulatory authority does not ensure approval by regulatory authorities in other jurisdictions. If we fail to obtain approvals from foreign jurisdictions, the geographic market for MarzAA or DalcA would be limited.

If we are unable to establish sales, marketing and distribution capabilities, we may not be successful in commercializing our product candidates if they are approved.

We have not yet established a sales, marketing or product distribution infrastructure for our other product candidates, which are still in preclinical or early clinical development. Except for ISU Abxis’ potential rights to commercialize DalcA in South Korea, we generally expect to retain commercial rights for the company’s hemophilia product candidates. We believe that it will be possible to access the United States hemophilia market through a focused, specialized sales force. However, we have not yet developed a commercial strategy for hemophilia products outside of the United States, or for any other of our product candidates. To achieve commercial success for any product for which we obtain marketing approval, we will need to establish a sales and marketing organization within the United States, and develop a strategy for sales outside of the United States.

There are risks involved with establishing internal sales, marketing and distribution capabilities. For example, recruiting and training a sales force is expensive and time consuming and could delay any product launch. If the commercial launch of a product candidate for which we recruit a sales force and establish marketing capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses. This may be costly, and our investment would be lost if we cannot retain or reposition our sales and marketing personnel. If we are unable to establish sales, marketing and distribution capabilities and enter into additional arrangements with third parties to perform these services, then our product revenues and profitability, if any, are likely to be lower than if we were to market, sell and distribute any products that we develop ourselves.

*** We face substantial competition that may result in others discovering, developing or commercializing products before or more successfully than we do.**

The biotechnology and pharmaceutical industries are characterized by rapidly advancing technologies, intense competition, and a strong emphasis on proprietary products. We face potential competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions and governmental agencies, and public and private research institutions. Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future.

Specifically, there are a large number of companies developing or marketing treatments for hemophilia, including many major pharmaceutical and biotechnology companies, including Novo Nordisk, which has developed NovoSeven, a human recombinant coagulation Factor VIIa indicated for treatment of bleeding episodes that has been approved for use in treatment of hemophilia A or B individuals with inhibitors to Factor VIII or Factor IX and in individuals with Factor VII deficiency and Glanzmann's thrombasthenia, LFB that is marketing a biosimilar FVIIa, Baxter, which has developed BAX 817, a biosimilar of NovoSeven that recently completed an intravenous Phase 3 clinical trial and has been filed for marketing approval, Roche, which is marketing Hemlibra ACE910/Emicizumab, a recombinant humanized bispecific antibody that binds to activated Factor IX and Factor X and mimics the cofactor function of Factor VIIIa, that has been approved by the FDA to treat hemophilia A with inhibitors and is administered subcutaneously, Alnylam/Sanofi, which is developing an investigational subcutaneously administered RNAi therapeutic targeting antithrombin III, fitusiran, for the treatment of hemophilia and OPKO Biologics, whose recombinant Factor VIIa product that may also be administered subcutaneously has completed a part 1 of a planned Phase 1/2 clinical trial. There are numerous marketed factor IX-based products that are used to replace Factor IX intravenously. CSL is developing its marketed product Idelvion an albumin-linked Factor IX for subcutaneous administration. We are also aware of many companies focused on developing gene therapies that may compete with our planned hemophilia B indication, as well as several companies addressing other methods for modifying genes and regulating gene expression. Alnylam/Sanofi is developing an investigational RNAi therapeutic targeting antithrombin III, fitusiran and Pfizer, Novo Nordisk, Green Cross and Bayer are developing antibodies that inhibit Tissue Factor Pathway inhibitor ("TFPI"), and Apcintex has a serpine directed against Activated Protein C, all for the treatment of all forms of hemophilia.

Our commercial opportunity in different indications could be reduced or eliminated if competitors develop and market products or therapies that are more convenient to use, more effective, less expensive, and safer to use than our products. Furthermore, if competitors gain FDA approval earlier than we do, we may be unable to establish a strong market presence or to gain market share. The key competitive factors affecting the success of all our product candidates, if approved, are likely to be their efficacy, safety, convenience, price, the level of generic competition, and the availability of reimbursement from government and other third-party payors.

Many of the companies against which we are competing or against which we may compete in the future have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical, biotechnology and diagnostic industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and individual registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

Even if we commercialize any product candidates, the products may become subject to unfavorable pricing regulations, third-party reimbursement practices or healthcare reform initiatives that, would harm our business.

The regulations that govern marketing approvals, pricing, coverage and reimbursement for new drug products vary widely from country to country. Current and future legislation may significantly change the approval requirements in ways that could involve additional costs and cause delays in obtaining approvals. Some countries require approval of the sale price of a drug before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we may obtain marketing approval for a product in a particular country, but then be subject to price regulations that delay our commercial launch of the product, possibly for lengthy time periods, and negatively impact the revenues we are able to generate from the sale of the product in that country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more product candidates, even if our product candidates obtain marketing approval.

Our ability to commercialize any product candidates successfully also will depend in part on the extent to which coverage and adequate reimbursement for these products and related treatments will be available from government health administration authorities, private health insurers and other organizations. Government authorities and third-party payors, such as private health insurers and

health maintenance organizations, decide which medications they will pay for and establish reimbursement levels. A primary trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for certain medications. Increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. Coverage and reimbursement may not be available for any product that we or our collaborators commercialize and, even if these are available, the level of reimbursement may not be satisfactory. Reimbursement may affect the demand for, or the price of, any product candidate that receives marketing approval. Obtaining and maintaining adequate reimbursement for our products may be difficult. We may be required to conduct expensive pharmaco-economic studies to justify coverage and reimbursement or the level of reimbursement relative to other therapies. If coverage and adequate reimbursement are not available or reimbursement is available only to limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval.

There may be significant delays in obtaining reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the drug is approved by the FDA or similar regulatory authorities outside the United States. Moreover, eligibility for reimbursement does not imply that a drug will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale and distribution. Interim reimbursement levels for new drugs, if applicable, may also not be sufficient to cover our costs and may not be made permanent.

Reimbursement rates may vary according to the use of the drug and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost drugs and may be incorporated into existing payments for other services. Net prices for drugs may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their own reimbursement policies. Our inability to promptly obtain coverage and adequate reimbursement rates from both government-funded and private payors for any approved products that we develop could have a material adverse effect on our operating results, ability to raise capital needed to commercialize products and overall financial condition.

The insurance coverage and reimbursement status of newly-approved products is uncertain. Failure to obtain or maintain adequate coverage and reimbursement for new or current products could limit our ability to market those products and decrease our ability to generate revenue.

The availability and extent of reimbursement by governmental and private payors is essential for most patients to be able to afford expensive treatments. Sales of our product candidates will depend substantially, both domestically and abroad, on the extent to which the costs of our product candidates will be paid by health maintenance, managed care, pharmacy benefit and similar healthcare management organizations, or reimbursed by government health administration authorities, private health coverage insurers and other third-party payors. If reimbursement is not available, or is available only to limited levels, we may not be able to successfully commercialize our product candidates. Even if coverage is provided, the approved reimbursement amount may not be high enough to allow us to establish or maintain pricing sufficient to realize a sufficient return on our investment.

There is significant uncertainty related to the insurance coverage and reimbursement of newly approved products. Moreover, increasing efforts by governmental and third-party payors, in the United States and abroad, to cap or reduce healthcare costs may cause such organizations to limit both coverage and level of reimbursement for new products approved and, as a result, they may not cover or provide adequate payment for our product candidates. We expect to experience pricing pressures in connection with the sale of any of our product candidates, due to the trend toward managed healthcare, the increasing influence of health maintenance organizations and additional legislative changes. The downward pressure on healthcare costs in general has become very intense. As a result, increasingly high barriers are being erected to the entry of new products.

If the market opportunities for our product candidates are smaller than expected, our revenues may be adversely affected and our business may suffer.

We focus our research and product development on hemostasis and inflammation treatment. Our projections of both the number of people who suffer from related conditions, as well as the subset of people with these conditions who have the potential to benefit from treatment with our product candidates, are based on estimates. These estimates may prove to be incorrect and new studies may change the estimated incidence or prevalence of these diseases. The number of patients in the United States, Europe and elsewhere may turn out to be lower than expected or may not be otherwise amenable to treatment with our products, or new patients may become increasingly difficult to identify or gain access to, all of which would adversely affect our results of operations and our business.

Risks related to our common stock

The market price of our common stock has historically been highly volatile.

The trading price of our common stock has historically been highly volatile and there have been significant periods of time in which the trading volume of our common stock has been low, which can contribute to volatility in price. Additionally, the stock market in general has experienced extreme price and volume fluctuations. The market prices of securities of pharmaceutical, biopharmaceutical and biotechnology companies in particular have been extremely volatile and have experienced fluctuations that have often been unrelated or disproportionate to operating performance. Factors giving rise to this volatility may include:

- disclosure of clinical trial results;
- regulatory or political developments in both the United States and abroad;
- developments concerning proprietary rights, including patents and litigation matters;
- disclosure of new collaborations or other strategic transactions;
- public concern about the safety or efficacy of product candidates or technology, their components, or related technology or new technologies generally;
- public announcements by competitors or others regarding new products or new product candidates; and
- general market conditions and comments by securities analysts and investors.

Fluctuations in operating results could adversely affect the price of our common stock.

Our operating results are likely to fluctuate significantly from quarter to quarter and year to year. These fluctuations could cause our stock price to decline. Some of the factors that may cause operating results to fluctuate on a period-to-period basis include the scope, progress, duration results and costs of preclinical and clinical development programs, as well as non-clinical studies and assessments of product candidates and programs, restructuring costs, implementation or termination of collaboration, licensing, manufacturing or other material agreements with third parties, non-recurring revenue or expenses under any such agreement, the cost, timing and outcomes of regulatory compliance, approvals or other regulatory actions and general and industry-specific economic conditions, particularly as affects the pharmaceutical, biopharmaceutical or biotechnology industries in the United States. Period-to-period comparisons of our historical and future financial results may not be meaningful, and investors should not rely on them as an indication of future performance. Fluctuating losses may fail to meet the expectations of securities analysts or investors. Failure to meet these expectations may cause the price of our common stock to decline.

Sales of a significant number of shares of our common stock in the public markets, or the perception that such sales could occur, could depress the market price of our common stock.

Our current trading volumes are modest, and sales of a substantial number of shares of our common stock in the public market, or the perception that these sales could occur, could cause the market price to decline. We have effective registration statements on Form S-3 that enable us to sell up to $68 million in securities. Any additional sales in the public market of our common stock or other securities under these shelf registration statements could adversely affect prevailing market prices for our common stock. In addition, we have outstanding options to purchase 1,319,102 shares of common stock at a weighted average exercise price of $12.10 as of September 30, 2018. If such options are exercised and the shares are sold into the open market, such sales also might make it more difficult for us to sell equity securities in the future at a time and at a price that we deem appropriate. Conversion or exercise of these securities into shares of our common stock will cause dilution to the other holders of our common stock, and all such stock may be sold in the public market after conversion or exercise, subject to restrictions under the securities laws, which may lead to a decline in the market price of our common stock.

Anti-takeover provisions in our charter documents and provisions of Delaware law may make an acquisition more difficult and could result in the entrenchment of management.

We are incorporated in Delaware. Anti-takeover provisions of Delaware law and our charter documents may make a change in control or efforts to remove management more difficult. Also, under Delaware law, our board of directors may adopt additional anti-takeover measures. The existence of the following provisions of Delaware law and our restated certificate of incorporation and amended and restated bylaws could limit the price that investors might be willing to pay in the future for shares of our common stock.

Our restated certificate of incorporation authorizes our board of directors to issue up to 5,000,000 shares of preferred stock and to determine the terms of those shares of stock without any further action by our stockholders. If the board of directors exercises this power to issue preferred stock, it could be more difficult for a third-party to acquire a majority of our outstanding voting stock and vote the stock they acquire to remove management or directors.

Our restated certificate also provides staggered terms for the members of our board of directors, and that directors may be removed by stockholders only by vote of the holders of 66 2/3% of voting shares then outstanding. In addition, our amended and restated bylaws do not permit stockholders to call special or annual meetings of stockholders, or to act by written consent without a meeting. These provisions may prevent stockholders from replacing the entire board in a single proxy contest, making it more difficult for a third-party to acquire control without the consent of our board of directors. These provisions could also delay the removal of management by the board of directors with or without cause.

As a Delaware corporation, we are also subject to certain Delaware anti-takeover provisions. Under Delaware law, a publicly-held corporation may not engage in a business combination with any holder of 15% or more of our voting stock unless the holder has held the stock for three years or, among other things, the board of directors has approved the transaction. Our board of directors could rely on Delaware law to prevent or delay an acquisition.

We are a smaller reporting company and we cannot be certain if the reduced disclosure requirements applicable to smaller reporting companies will make our common stock less attractive to investors.

We have been a “smaller reporting company” as defined in the Securities Exchange Act of 1934, and thus have been allowed to provide simplified executive compensation disclosures in our filings, and have been exempt from the provisions of Section 404(b) of the Sarbanes-Oxley Act requiring that an independent registered public accounting firm provide an attestation report on the effectiveness of internal control over financial reporting. We have also had certain other decreased disclosure obligations in our SEC filings. We cannot predict whether investors find our common stock less attractive because of our reliance on any of these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

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

See Index to Exhibits at the end of this Report, which is incorporated by reference here. The Exhibits listed in the accompanying Index to Exhibits are filed as part of this Report

EXHIBIT INDEX

Exhibit Number	Description
10.1	Lease Amendment Agreement, dated August 10, 2018 by and between BXP 611 Gateway Center, LP and the Company (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, as filed with the SEC on August 15, 2018).
10.2*	Amended and Restated Employment Agreement, dated between August 28, 2018, by and between Catalyst Biosciences, Inc. and Dr. Nassim Usman, Ph. D. (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, as filed with the SEC on August 31, 2018).
10.3*	Amended and Restated Employment Agreement, dated as of August 29, 2018, by and between Catalyst Biosciences, Inc. and Dr. Levy, M.B.B.Ch., Ph.D., M.M.M. (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K, as filed with the SEC on August 31, 2018).
10.4*	Amended and Restated Employment Agreement, dated as of August 30, 2018, by and between Catalyst Biosciences, Inc. and Mr. Payne (incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K, as filed with the SEC on August 31, 2018).
31.1	Certification of the Principal Executive Officer pursuant to Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of the Principal Financial Officer pursuant to Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of the Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2	Certification of the Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101	The following materials from the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2018, formatted in XBRL (eXtensible Business Reporting Language): (i) the Consolidated Balance Sheets as of September 30, 2018 (unaudited) and December 31, 2017; (ii) the Consolidated Statements of Comprehensive Income for the three- and nine-months ended September 30, 2018 and 2017 (unaudited); (iii) the Consolidated Statement of Stockholders' Equity as of September 30, 2018 (unaudited); (iv) the Consolidated Statements of Cash Flows for the nine months ended September 30, 2018 and 2017 (unaudited); and (v) the Notes to Unaudited Interim Consolidated Financial Statements.

* Denotes management contract, compensatory plan or arrangement.

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.

CATALYST BIOSCIENCES, INC.

Date: November 1, 2018

/s/ Nassim Usman, Ph.D.
Nassim Usman, Ph.D.
President and Chief Executive Officer
(*Principal Executive Officer*)

Date: November 1, 2018

/s/ Fletcher Payne
Fletcher Payne
Chief Financial Officer
(*Principal Financial and Accounting Officer*)

Exhibit 31.1

CERTIFICATION PURSUANT TO RULE 13a-14(a) AND 15d-14(a) OF THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Nassim Usman, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Catalyst 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;

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: November 1, 2018

/s/ Nassim Usman, Ph.D.
Nassim Usman, Ph.D.

Exhibit 31.2

CERTIFICATION PURSUANT TO RULE 13a-14(a) AND 15d-14(a) OF THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Fletcher Payne, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Catalyst 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;

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: November 1, 2018

/s/ Fletcher Payne
Fletcher Payne

Exhibit 32.1

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of Catalyst Biosciences, Inc. (the "Company") for the period ended September 30, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Nassim Usman, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

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

Date: November 1, 2018

/s/ Nassim Usman, Ph.D.
Nassim Usman, Ph.D.
President and Chief Executive Officer
(*Principal Executive Officer*)

Exhibit 32.2

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of Catalyst Biosciences, Inc. (the "Company") for the period ended September 30, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Fletcher Payne, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

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

Date: November 1, 2018

/s/ Fletcher Payne
Fletcher Payne
Chief Financial Officer
(*Principal Financial and Accounting Officer)*