UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 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, 2019

OR

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

For the transition period from _____ to _____

Commission File Number: 001-38958

Karuna Therapeutics, Inc.
(Exact Name of Registrant as Specified in its Charter)

Delaware	**27-0605902**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
33 Arch Street, Suite 3110 Boston, Massachusetts	**02110**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (857) 449-2244

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.0001 par value per share	KRTX	Nasdaq Global Market

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

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

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

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒	Smaller reporting company	☒
Emerging growth company	☒		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

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

As of October 31, 2019, the registrant had 23,412,754 shares of common stock, $0.0001 par value per share, outstanding.

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PART I—FINANCIAL INFORMATION

Item 1. Financial Statements.

KARUNA THERAPEUTICS, INC.
BALANCE SHEETS
(In thousands, except share and per share data)
(Unaudited)

	September 30, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 54,144	$ 8,904
Short-term investments	107,461	4,983
Prepaid expenses and other current assets	2,323	1,709
Total current assets	163,928	15,596
Restricted cash	123	123
Property and equipment, net	176	138
Total assets	$ 164,227	$ 15,857
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Equity (Deficit)		
Current liabilities:		
Accounts payable (includes $10 and $112 at September 30, 2019 and December 31, 2018, respectively, due to related parties)	158	$ 269
Accrued expenses	1,319	538
Deferred lease obligation, short term portion	56	—
Derivative liability	—	389
Total current liabilities	1,533	1,196
Non-current convertible notes, net of discount	—	2,516
Deferred lease obligation, long term portion	164	102
Total liabilities	1,697	3,814
Commitments and Contingencies (Note 11)		
Redeemable convertible preferred stock		
Redeemable convertible preferred stock, Series Seed, $0.0001 par value; 0 and 4,412,500 shares authorized and outstanding at September 30, 2019 and December 31, 2018, respectively	—	1
Redeemable convertible preferred stock, Series A, $0.0001 par value; 0 and 3,126,700 shares authorized and outstanding at September 30, 2019 and December 31, 2018, respectively	—	41,964
Redeemable convertible preferred stock, Series B, $0.0001 par value; 0 shares authorized and outstanding at September 30, 2019 and December 31, 2018	—	—
Stockholders' equity (deficit):		
Preferred stock, $0.0001 par value; 10,000,000 and 0 shares authorized as of September 30, 2019 and December 31, 2018, respectively; 0 shares outstanding at September 30, 2019 and December 31, 2018	—	—
Common stock, $0.0001 par value; 150,000,000 and 12,337,650 shares authorized at September 30, 2019 and December 31, 2018, respectively; 23,412,754 and 12 shares issued and outstanding at September 30, 2019 and December 31, 2018, respectively	2	—
Additional paid-in capital	230,216	1,633
Accumulated deficit	(67,738)	(31,555)
Accumulated other comprehensive income	50	—
Total stockholders' equity (deficit)	162,530	(29,922)
Total liabilities, redeemable convertible preferred stock and stockholders' equity (deficit)	$ 164,227	$ 15,857

The accompanying notes are an integral part of these financial statements

KARUNA THERAPEUTICS, INC.
STATEMENTS OF OPERATIONS
(In thousands, except share and per share data)
(Unaudited)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
Revenue	—	—	—	—
Operating expenses:				
Research and development	$ 5,793	$ 1,417	$ 19,544	$ 4,816
General and administrative	4,103	1,056	16,995	1,548
Total operating expenses	9,896	2,473	36,539	6,364
Loss from operations	(9,896)	(2,473)	(36,539)	(6,364)
Other income (expense):				
Interest income (expense) (Note 4)	—	192	11	(396)
Interest income	858	—	1,425	—
Accretion of debt discount	—	(1,324)	(945)	(1,996)
Change in fair value of derivative	—	(2,633)	(135)	(429)
Total other income (expense), net	858	(3,765)	356	(2,821)
Net loss before income taxes	(9,038)	(6,238)	(36,183)	(9,185)
Income tax provision	—	—	—	—
Net loss attributable to common stockholders	$ (9,038)	$ (6,238)	$ (36,183)	$ (9,185)
Net loss per share, basic and diluted (Note 8)	$ (0.39)	$ (1,247,600)	$ (4.67)	$ (4,592,500)
Weighted average common shares outstanding used in computing net loss per share, basic and diluted	22,907,349	5	7,755,137	2

The accompanying notes are an integral part of these financial statements

KARUNA THERAPEUTICS, INC.
STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)
(Unaudited)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
Net loss	$ (9,038)	$ (6,238)	$ (36,183)	$ (9,185)
Other comprehensive income (loss):				
Unrealized (losses) gains on short-term investments	(21)	—	50	—
Comprehensive loss	$ (9,059)	$ (6,238)	$ (36,133)	$ (9,185)

The accompanying notes are an integral part of these financial statements

KARUNA THERAPEUTICS, INC.
STATEMENTS OF REDEEMABLE CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' EQUITY (DEFICIT)
(In thousands, except share data)
(Unaudited)

	Series Seed Redeemable Convertible Preferred Stock		Series A Redeemable Convertible Preferred Stock		Series B Redeemable Convertible Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income	Total Stockholders' Equity (Deficit)
	Shares	Value	Shares	Value	Shares	Value	Shares	Value				
Balance, December 31, 2018	4,412,500	$ 1	3,126,700	$ 41,964	—	$ —	12	$ —	$ 1,633	$ (31,555)	$ —	$ (29,922)
Issuance of Series B redeemable convertible preferred stock, net of issuance costs of $175	—	—	—	—	5,422,845	81,927	—	—	—	—	—	—
Stock-based compensation expense	—	—	—	—	—	—	—	—	9,945	—	—	9,945
Exercise of common warrants	—	—	—	—	—	—	19,986	—	58	—	—	58
Exercise of common options	—	—	—	—	—	—	38,961	—	4	—	—	4
Vesting of restricted stock units	—	—	—	—	—	—	105,163	—	—	—	—	—
Other comprehensive income	—	—	—	—	—	—	—	—	—	—	71	71
Net loss	—	—	—	—	—	—	—	—	—	(27,145)	—	(27,145)
Balance, June 30, 2019	4,412,500	$ 1	3,126,700	$ 41,964	5,422,845	$ 81,927	164,122	$ —	$ 11,640	$ (58,700)	$ 71	$ (46,989)
Issuance of common stock upon initial public offering, net of $7.2 million in under-writing discounts and commissions and $2.4 million in offering costs	—	—	—	—	—	—	6,414,842	1	93,043	—	—	93,044
Automatic conversion of preferred stock	(4,412,500)	(1)	(3,126,700)	(41,964)	(5,422,845)	(81,927)	16,833,790	1	123,891	—	—	123,892
Stock-based compensation expense	—	—	—	—	—	—	—	—	1,642	—	—	1,642
Other comprehensive loss	—	—	—	—	—	—	—	—	—	—	(21)	(21)
Net loss	—	—	—	—	—	—	—	—	—	(9,038)	—	(9,038)
Balance, September 30, 2019	—	—	—	—	—	—	23,412,754	2	230,216	(67,738)	50	162,530

	Series Seed Redeemable Convertible Preferred Stock		Series A Redeemable Convertible Preferred Stock		Series B Redeemable Convertible Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income	Total Stockholders' Equity (Deficit)
	Shares	Value	Shares	Value	Shares	Value	Shares	Value				
Balance, December 31, 2017	4,412,500	$ 1	—	$ —	—	$ —	—	$ —	$ 675	$ (14,043)	$ —	$ (13,368)
Stock-based compensation expense	—	—	—	—	—	—	—	—	128	—	—	128
Net loss	—	—	—	—	—	—	—	—	—	(2,947)	—	(2,947)
Balance, June 30, 2018	4,412,500	1	—	—	—	—	—	—	803	(16,990)	—	(16,187)
Issuance of Series A redeemable convertible preferred stock, net of issuance costs of $121	—	—	3,126,700	41,964	—	—	—	—	—	—	—	—
Stock-based compensation expense	—	—	—	—	—	—	—	—	415	—	—	415
Exercise of common warrants	—	—	—	—	—	—	12	—	—	—	—	—
Net loss	—	—	—	—	—	—	—	—	—	(6,238)	—	(6,238)
Balance, September 30, 2018	4,412,500	$ 1	3,126,700	$ 41,964	—	$ —	12	$ —	$ 1,218	$ (23,228)	$ —	$ (22,010)

The accompanying notes are an integral part of these financial statements

KARUNA THERAPEUTICS, INC.
STATEMENTS OF CASH FLOWS
(In thousands)
(Unaudited)

	Nine Months Ended September 30,	
	2019	**2018**
Cash flows from operating activities		
Net loss	$ (36,183)	$ (9,185)
Adjustments to reconcile net loss to net cash used in operating activities:		
Stock-based compensation expense	11,587	517
Accretion of debt discount	945	1,996
Non-cash interest income	(787)	—
Change in fair value of derivative liability	135	429
Depreciation and amortization expense	37	2
Non-cash interest (income) expense	(11)	396
Warrant expense	—	26
Changes in operating assets and liabilities:		
Accrued expenses	781	(16)
Prepaid expenses and other current assets	(614)	(2,076)
Deferred lease obligation	118	—
Accounts payable	(111)	(602)
Net cash used in operating activities	(24,103)	(8,513)
Cash flows from investing activities		
Purchases of short-term investments	(131,641)	—
Maturities of short-term investments	30,000	—
Acquisition of property and equipment	(75)	—
Net cash used in investing activities	(101,716)	—
Cash flows from financing activities		
Proceeds from initial public offering, net of $7.2 million in underwriting discounts and commissions	95,453	—
Payment of initial public offering costs	(2,409)	—
Proceeds from issuance of Series B redeemable convertible preferred stock, net of issuance costs	74,825	—
Proceeds from issuance of Series A redeemable convertible preferred stock, net of issuance costs	—	15,877
Proceeds from issuance of convertible notes	3,128	9,000
Proceeds from exercise of warrant	58	—
Proceeds from exercise of stock options	4	—
Net cash provided by financing activities	171,059	24,877
Net increase in cash, cash equivalents and restricted cash	45,240	16,364
Cash, cash equivalents and restricted cash at beginning of period	9,027	1,942
Cash, cash equivalents and restricted cash at end of period	$ 54,267	$ 18,306
Supplemental disclosures of cash flows information		
Conversion of redeemable convertible preferred stock into common stock	$ 123,892	$ -
Conversion of convertible notes, accrued interest and discount upon conversion to preferred stock	$ 7,102	$ 26,087

The accompanying notes are an integral part of these financial statements

Note 1. Nature of the Business

Karuna Therapeutics, Inc. (the "Company") was incorporated under the laws of the State of Delaware in July 2009 as Karuna Pharmaceuticals, Inc. and is headquartered in Boston, Massachusetts. In March 2019, the Company changed its name to Karuna Therapeutics, Inc. The Company is focused on the development of novel therapies to address disabling neuropsychiatric conditions characterized by significant unmet medical need.

Since the Company's inception, it has focused substantially all of its efforts and financial resources on organizing and staffing the Company, acquiring and developing its technology, raising capital, building its intellectual property portfolio, undertaking preclinical studies and clinical trials and providing general and administrative support for these activities. The Company has not generated any product revenue related to its primary business purpose to date and is subject to a number of risks similar to those of other early stage companies, including dependence on key individuals, regulatory approval of products, uncertainty of market acceptance of products, competition from substitute products and larger companies, compliance with government regulations, protection of proprietary technology, dependence on third parties, product liability and the need to obtain adequate additional financing to fund the development of its product candidates.

Forward Stock Split

On June 14, 2019, the Company effected a one-for-1.2987 stock split of its issued and outstanding shares of common stock and a proportional adjustment to the existing conversion ratios for each series of the Company's redeemable convertible preferred stock (see Note 5). Accordingly, all share and per share amounts for all periods presented in the accompanying financial statements and notes thereto have been adjusted retroactively, where applicable, to reflect this stock split and adjustment of the redeemable convertible preferred stock conversion ratios.

Initial Public Offering

On June 27, 2019, the Company's registration statement on Form S-1 relating to its initial public offering of its common stock ("IPO") was declared effective by the Securities and Exchange Commission ("SEC"). In the IPO, which closed on July 2, 2019, the Company issued and sold 6,414,842 shares of common stock, including full exercise of the underwriters' over-allotment option to purchase an additional 836,718 shares, at a public offering price of $16.00 per share. The aggregate net proceeds to the Company from the IPO, inclusive of proceeds from the over-allotment exercise, were approximately $93.0 million after deducting underwriting discounts and commissions of $7.2 million and offering expenses of $2.4 million. Upon closing of the IPO, all 12,962,045 shares of the Company's redeemable convertible preferred stock then outstanding converted into an aggregate of 16,833,790 shares of common stock.

Liquidity

The Company's financial statements have been prepared on the basis of continuity of operations, realization of assets and the satisfaction of liabilities in the ordinary course of business. The Company experienced negative operating cash flows of $24.1 million for the nine months ended September 30, 2019 and had an accumulated deficit of $67.7 million as of September 30, 2019. The Company expects to continue to generate operating losses for the foreseeable future.

The Company expects that its cash and cash equivalents and short-term investments of $161.6 million as of September 30, 2019 will be sufficient to fund its operating expenses and capital expenditure requirements through at least 12 months from the date of issuance of these financial statements. The future viability of the Company beyond that point is dependent on its ability to raise additional capital to fund its operations.

If the Company is unable to obtain funding, the Company could be forced to delay, reduce or eliminate some or all of its research and development programs, product portfolio expansion or commercialization efforts, which could adversely affect its business prospects, or the Company may be unable to continue operations. Although management continues to pursue these plans, there is no assurance that the Company will be successful in obtaining sufficient funding on terms acceptable to the Company to fund continuing operations, if at all.

NOTE 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation and Use of Estimates

The accompanying financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America ("U.S. GAAP"). Any reference in these notes to applicable guidance is meant to refer to the authoritative United States generally accepted accounting principles as found in the Accounting Standards Codification ("ASC") and Accounting Standards Updates ("ASUs") of the Financial Accounting Standards Board ("FASB").

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting periods. Significant estimates and assumptions reflected in these financial statements include, but are not limited to, the accrual for research and development expenses, the valuation of stock-based awards and prior to the IPO, the valuation of common stock, and derivative liabilities. Estimates are periodically reviewed in light of changes in circumstances, facts and experience. Changes in estimates are recorded in the period in which they become known. Actual results could differ from those estimates.

Unaudited Interim Financial Information

The accompanying balance sheet as of September 30, 2019, the statements of operations, comprehensive loss, and cash flows for the three and nine months ended September 30, 2019 and 2018, and the statements of redeemable convertible preferred stock and stockholders' equity (deficit) for the three and nine months ended September 30, 2019 and 2018 are unaudited. The unaudited interim financial statements have been prepared on the same basis as the audited annual financial statements and, in the opinion of management, reflect all adjustments, which include only normal recurring adjustments, necessary for the fair statement of the Company's financial position as of September 30, 2019 and the results of its operations and its cash flows for the three and nine months ended September 30, 2019 and 2018. Certain information and footnote disclosures typically included in annual financial statements prepared in accordance with U.S. GAAP have been condensed or omitted. Accordingly, these unaudited interim financial statements should be read in conjunction with the Company's financial statements as of and for the year ended December 31, 2018, which are included in the Company's prospectus related to the Company's IPO, filed June 28, 2019 (File No. 333-231863) with the SEC, pursuant to Rule 424(b) under the Securities Act of 1933, as amended. The results for the three and nine months ended September 30, 2019, are not necessarily indicative of results to be expected for the year ending December 31, 2019, any other interim periods, or any future year or period.

Cash and Cash Equivalents

The Company considers all short-term, highly liquid investments with original maturities of 90 days or less at acquisition date to be cash equivalents.

Short-term Investments

The Company's short-term investments are classified as available-for-sale and are carried at fair value with the unrealized gains and losses reported as a component of accumulated other comprehensive income (loss) in stockholders' equity. Realized gains and losses and declines in value judged to be other than temporary are included as a component of other income (expense), net based on the specific identification method.

Concentration of Manufacturing Risk

The Company is dependent on third-party manufacturers to supply products for research and development activities in its programs. In particular, the Company relies and expects to continue to rely on a small number of manufacturers to supply it with its requirements for the active pharmaceutical ingredients and formulated drugs related to these programs. These programs could be adversely affected by a significant interruption in the supply of active pharmaceutical ingredients and formulated drugs.

Deferred Offering Costs

The Company capitalizes certain legal, professional accounting and other third-party fees that are directly associated with in-process equity financings as deferred offering costs until such financings are consummated. After consummation of the equity financing, these costs are recorded in stockholders' equity (deficit) as a reduction of additional paid-in capital generated as a result of the offering. Should an in-process equity financing be abandoned, the deferred offering costs will be expensed immediately as a charge to operating expenses in the statements of operations. As of September 30, 2019 and December 31, 2018, there were no deferred offering costs outstanding. All deferred offering costs accumulated during 2019 and associated with the Company's IPO were recorded as a reduction of additional paid-in capital upon the close of the Company's IPO on July 2, 2019.

Fair Value of Financial Instruments

The Company's financial instruments consist of cash equivalents, short-term investments, prepaid expenses, interest receivable, accounts payable, accrued expenses, convertible notes and derivatives embedded within the convertible notes. The carrying amount of prepaid expenses, interest receivable, accounts payable and accrued expenses are considered a reasonable estimate of their fair value, due to the short-term maturity of these instruments. The Company's cash equivalents, short-term investments, convertible notes, and derivative liabilities are carried at fair value, determined according to the fair value hierarchy described below (see Note 10).

The Company follows the guidance in FASB ASC 820, *Fair Value Measurements and Disclosures*, which defines fair value and establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 measurements) and the lowest priority to unobservable inputs (Level 3 measurements). The three levels of the fair value hierarchy are described below:

Level 1: Quoted prices (unadjusted) in active markets for identical assets or liabilities that the reporting entity has the ability to access at the measurement date.

Level 2: Valuations based on quoted prices in markets that are not active or for which all significant inputs are observable, either directly or indirectly.

Level 3: Prices or valuations that require inputs that are both significant to the fair value measurement and unobservable.

To the extent that valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair value requires more judgment. Accordingly, the degree of judgment exercised by the Company in determining fair value is greatest for instruments categorized in Level 3. A financial instrument's level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement.

Fair value is a market-based measure considered from the perspective of a market participant rather than an entity-specific measure. Therefore, even when market assumptions are not readily available, the Company's own assumptions reflect those that market participants would use in pricing the asset or liability at the measurement date. The Company uses prices and inputs that are current as of the measurement date, including during periods of market dislocation. In periods of market dislocation, the observability of prices and inputs may be reduced for many instruments. This condition could cause an instrument to be reclassified from Level 1 to Level 2 or Level 2 to Level 3.

Convertible Notes and Derivative Liabilities

In connection with the issuance of the Wellcome Trust Convertible Notes and the Convertible Notes (see Note 4), the Company had identified embedded derivatives, which were recorded as liabilities on the Company's balance sheets and were remeasured to fair value at each reporting date until the derivative was settled. Changes in the fair value of the derivative liabilities are recognized as change in fair value of derivative in the statements of operations. The fair value of the derivative liabilities were determined at each period end using a with and without method, which assesses the likelihood and timing of events that would result in either a conversion or change-of-control feature being triggered, as well as changes in the market conditions.

Upon issuance of the notes, each note was recorded at cost, net of the derivative liability. The discount on each note was amortized as interest expense to the date such note was expected to convert using the effective interest rate method and is reflected in the statements of operations as accretion of debt discount.

The Company classified its derivative liabilities in the balance sheet as current or non-current based on its expectation of when the derivative will be settled, consistent with the assumptions used when determining the fair value of the derivative liabilities.

Redeemable Convertible Preferred Stock

Prior to the IPO, the Company recorded all shares of redeemable convertible preferred stock at their respective fair values on the dates of issuance, net of issuance costs. The redeemable convertible preferred stock was recorded outside of permanent equity because upon the occurrence of certain deemed liquidation events, the majority of the holders could opt to redeem the shares at the liquidation preference and these events, including a merger, acquisition or sale of substantially all of the assets, was considered not solely within the Company's control. Prior to the IPO, the Company had not adjusted the carrying values of the redeemable convertible preferred stock to its redemption value because it was uncertain whether or when a deemed liquidation event would occur. Upon closing of the IPO, all 12,962,045 shares of the Company's redeemable convertible preferred stock then outstanding converted into an aggregate of 16,833,790 shares of common stock.

Leases

Leases are classified at their inception as either operating or capital leases based on the economic substance of the agreement. The Company recognizes rent expense for its operating leases, inclusive of rent escalation provisions and rent holidays, on a straight-line basis over the respective lease term. Additionally, the Company recognizes tenant improvement allowances under the operating leases as a deferred lease obligation and amortizes the tenant improvement allowances as a reduction to rent expense on a straight-line basis over the respective lease term. At September 30, 2019 and December 31, 2018, no capital leases were recorded in the balance sheets.

Research and Development Costs

Research and development costs are expensed as incurred. Research and development costs include salaries and bonuses, stock compensation, employee benefits, consulting costs and external contract research and development and manufacturing expenses.

Upfront payments and milestone payments made for the licensing of technology are expensed as research and development in the period in which they are incurred. Advance payments for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. The prepaid amounts are expensed as the related goods are delivered or the services are performed.

Research Contract Costs and Accruals

The Company accrues for estimated costs of research and development activities conducted by third-party service providers, which include the conduct of preclinical studies and clinical trials, and contract manufacturing activities. The Company records the estimated costs of research and development activities based upon the estimated amount of services provided and includes these costs in accrued liabilities in the balance sheets and within research and development expense in the statements of operations. When evaluating the adequacy of the accrued liabilities, the Company analyzes progress of the research studies or clinical trials and manufacturing activities, including the phase or completion of events, invoices received and contracted costs. Significant judgments and estimates may be made in determining the accrued balances at the end of any reporting period. Actual results could differ from the Company's estimates. The Company's historical accrual estimates have not been materially different from the actual costs.

Stock-Based Compensation

The Company measures all stock options and other stock-based awards based on the date of the grant and recognizes compensation expense of those awards over the requisite service period, which is generally the vesting period of the respective award. The Company has mainly issued stock options with service-based vesting conditions and records the expense for these awards using the straight-line method. The Company has also issued stock options with performance-based vesting conditions and records the expense for these awards at the time that the achievement of the performance becomes highly probable or complete. The Company recognizes adjustments to stock-based compensation expense for forfeitures as they occur. The Company classifies stock-based compensation expense in its statements of operations in the same manner in which the award recipient's payroll costs are classified or in which the award recipients' service payments are classified.

The fair value of each stock option grant is estimated on the date of grant using the Black-Scholes option-pricing model. The Company historically has been a private company and lacked company-specific historical and implied volatility information. Therefore, it estimated its expected stock volatility based on the historical volatility of a publicly traded set of peer companies and expects to do so until such time as it has adequate historical data regarding the volatility of its own publicly traded stock price.

The expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla" options. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends and does not expect to pay any cash dividends in the foreseeable future.

The fair value for each restricted common stock award is estimated on the date of grant based on the fair value of the Company's common stock on that same date.

Net Loss Per Share

In July 2019, upon closing of the IPO, all outstanding shares of the Company's redeemable convertible preferred stock automatically converted to common stock. Prior to this conversion, the Company followed the two-class method when computing net income (loss) per share, as the Company has issued shares that met the definition of participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net income (loss) per share attributable to common stockholders is computed by dividing the net income (loss) attributable to common stockholders by the weighted average number of shares of common stock outstanding for the period. Diluted net income (loss) attributable to common stockholders is computed by adjusting income (loss) attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities, including outstanding stock options. Diluted net income (loss) per share attributable to common stockholders is computed by dividing the diluted net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period, including potential dilutive common shares assuming the dilutive effect of outstanding stock options.

Prior to the IPO, the Company's outstanding redeemable convertible preferred stock contractually entitled the holders of such shares to participate in distributions but contractually did not require the holders of such shares to participate in losses of the Company. Accordingly, in periods in which the Company reports a net loss attributable to common stockholders, diluted net loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders, since dilutive common shares are not assumed to have been issued if their effect is anti-dilutive.

Comprehensive Income (Loss)

Comprehensive income (loss) includes net loss as well as other changes in stockholders' equity (deficit) that result from transactions and economic events other than those with stockholders. For the three and nine months ended September 30, 2019, the Company's only element of other comprehensive income (loss) was unrealized gains and losses on short-term investments.

Recently Adopted Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board issued Accounting Standards Update No. 2014-09, *Revenue from Contracts with Customers* (Topic 606) ("ASC 606"), and further updated through ASU 2016-12, which amends the existing accounting standards for revenue recognition. For public business entities, this standard is effective for annual reporting periods beginning after December 15, 2017, including interim periods within that reporting period. For all other entities, this standard is effective for annual reporting periods beginning after December 15, 2018, and interim periods within annual periods beginning after December 15, 2019. Early adoption is permitted. Effective January 1, 2017, the Company adopted ASC 606, using the full retrospective method. The adoption did not have an impact on the Company's financial statements as the Company has historically not had contracts with customers or recorded revenue to date.

In June 2018, the FASB issued Accounting Standards Update 2018-07, *Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting* ("ASU 2018-07"), which expands the scope of Topic 718 to include all share-based payment transactions for acquiring goods and services from nonemployees. ASU 2018-07 specifies that Topic 718 applies to all share-based payment transactions in which the grantor acquires goods and services to be used or consumed in its own operations by issuing share-based payment awards. ASU 2018-07 also clarifies that Topic 718 does not apply to share-based payments used to effectively provide (1) financing to the issuer or (2) awards granted in conjunction with selling goods or services to customers as part of a contract accounted for under ASC 606. The transition method provided by ASU 2018-07 is a modified retrospective basis which recognizes a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. Effective January 1, 2017, the Company adopted ASU 2018-07, using the modified retrospective method. Management deems that non-employees who provide services to the Company have similar traits as employees with regard to their continued involvement in the Company, and therefore concluded that the adoption of ASU 2018-07 more fairly represented the results of the Company's operations. The cumulative effect of the change on the accumulated deficit for awards granted to non-employees as of January 1, 2017 was less than $0.1 million.

In August 2016, the FASB issued ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments. This guidance addresses specific cash flow issues with the objective of reducing the diversity in practice for the treatment of these issues. The areas identified include: debt prepayment or debt extinguishment costs; settlement of zero-coupon debt instruments; contingent consideration payments made after a business combination; proceeds from the settlement of insurance claims; proceeds from the settlement of corporate-owned life insurance policies; distributions received from equity method investees; beneficial interests in securitization transactions; and application of the predominance principle with respect to separately identifiable cash flows. The Company adopted this new guidance beginning January 1, 2017, on a retrospective basis, which did not result in a material impact on its financial statements and related disclosures.

In November 2016, the FASB issued ASU 2016-18, *Restricted Cash*. The new standard requires 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 has early adopted this new standard effective on January 1, 2018. The impact of the adoption was to reduce operating activities by the movement in restricted cash for each annual period presented, and to include cash, cash equivalents and restricted cash in a newly titled "Cash, cash equivalents, and restricted cash at beginning of year" and "Cash, cash equivalents, and restricted cash at the end of year" in the statements of cash flows.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation—Stock Compensation* (Topic 718): *Scope of Modification Accounting* ("ASU 2017-09"). This new guidance amends the scope of modification accounting for share-based payment awards. ASU 2017-09 provides guidance on the types of changes to the terms or conditions of share-based payment awards to which an entity would be required to apply modification accounting under ASC 718. Effective January 1, 2017, the Company adopted ASU No. 2017-09, using the full retrospective method and will be applied prospectively to an award modified on or after the adoption date. The cumulative effect of the changes as of January 1, 2017 for the adoption of ASU 2017-09 was immaterial. Hence, the Company did not recognize the cumulative effect adjustment in its financial statements.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU No. 2016-02, Leases ("ASU 2016-02"). ASU 2016-02 will require lessees to recognize most leases on their balance sheet as a right-of-use asset and a lease liability. Leases will be classified as either operating or finance, and classification will be based on criteria similar to current lease accounting, but without explicit bright lines. For public entities, the guidance is effective for annual reporting periods beginning after December 15, 2018 and for interim periods within those fiscal years. For non-public entities, the guidance is effective for annual reporting periods beginning after December 15, 2019. Early adoption is permitted for all entities. The Company is currently evaluating the impact that the adoption of ASU 2016-02 will have on its financial statements.

In August 2018, the FASB issued ASU No. 2018-13, Fair Value Measurement (Topic 820) ("ASU 2018-13"). ASU 2018-13 modifies fair value disclosure requirements, specifically around level transfers and valuation of Level 3 assets and liabilities. ASU 2018-13 is effective for financial statements issued for annual and interim periods beginning after December 15, 2019 for all entities. Early adoption of all or part of ASU No. 2018-13 is permitted. The Company does not expect that the adoption of this new standard will have a material impact on its disclosures.

Note 3. Prepaid Expenses and Other Current Assets and Accrued Expenses

Prepaid expenses and other current assets consisted of the following (in thousands):

	September 30, 2019	December 31, 2018
Prepaid insurance	$ 1,741	$ 23
Prepaid research and development expenses	359	1,686
Other	223	—
Total prepaid expenses and other current assets	$ 2,323	$ 1,709

Accrued expenses consisted of the following (in thousands):

	September 30, 2019	December 31, 2018
Accrued payroll and related expenses	$ 839	$ 311
Accrued research and development expenses	198	100
Professional fees	229	75
Other	53	52
Total accrued expenses	$ 1,319	$ 538

Note 4. Convertible Notes Payable

Wellcome Trust Convertible Notes

In June 2018, the Company entered into a second Company Funding Agreement with The Wellcome Trust, LLC (“Wellcome Trust”) to receive up to $8.0 million in gross proceeds from the issuance of a convertible note (the “2018 Convertible Note”). The Company received $2.0 million of proceeds in July 2018, $2.7 million in November 2018, $1.6 million in March 2019, and $1.6 million in April 2019. The Company is eligible to receive up to an aggregate of approximately $0.1 million in future funding under the terms of the 2018 Wellcome Funding Agreement, which would be payable by Wellcome Trust at the Company’s option upon the achievement of a specified clinical milestone.

The 2018 Convertible Note has a stated interest rate of 2% per annum above the three-month Dollar LIBOR rate, which is not payable until settlement of the principal. The note is subject to redemption upon written demand by Wellcome Trust any time after the fifth anniversary of the effective date, resulting in their classification as long-term liabilities as of December 31, 2018. The principal due under the 2018 Convertible Note converts into the class of the Company’s stock issued in the Company’s next qualified financing or upon event of default at a discounted conversion price between 0% and 25% of the purchase price per share of such securities issued. The accrued interest in such a circumstance would be forgiven.

At inception, the Company concluded that the 2018 Convertible Note contained a conversion option at a significant discount that was deemed to be an embedded derivative, which is required to be bifurcated and accounted for separately from the debt host. There were no debt issuance costs associated with the 2018 Convertible Note.

The Company recognized the following changes in the debt related to the 2018 Convertible Note during the year ended December 31, 2018 as well as the three and nine months ended September 30, 2019 and 2018 (in thousands):

			Financial statement impacted
Balance, December 31, 2017	$	3,985	
Accretion to settlement value		28	Statement of operations
Accrued interest		83	Statement of operations
Balance, June 30, 2018		4,096	
Issuance of 2018 Convertible Note		2,000	Balance sheet
Accretion to settlement value		23	Statement of operations
Accrued interest		19	Statement of operations
Interest forgiven upon conversion		(289)	Statement of operations
Conversion of Wellcome Trust Convertible Notes to redeemable convertible preferred stock		(5,849)	Balance sheet
Balance, September 30, 2018		—	
Issuance of 2018 Convertible Note		2,700	Balance sheet
Allocation of proceeds to derivative liability		(375)	Balance sheet
Accretion to settlement value		180	Statement of operations
Accrued interest		11	Statement of operations
Balance, December 31, 2018		2,516	
Issuance of 2018 Convertible Note		3,128	Balance sheet
Allocation of proceeds to derivative liability		(750)	Balance sheet
Accretion to settlement value		945	Statement of operations
Accrued interest		29	Statement of operations
Interest forgiven upon conversion		(40)	Statement of operations
Conversion of Wellcome Trust Convertible Notes to redeemable convertible preferred stock		(5,828)	Balance sheet
Balance, June 30, 2019	$	—	

There was no balance outstanding related to the 2018 Convertible Note as of September 30, 2019.

Convertible Notes

Since inception, the Company has issued $14.0 million of convertible notes (the “Convertible Notes”), of which $13.5 million was issued to PureTech Health LLC (“PureTech Health”), a related party (see Note 12). There were no debt issuance costs associated with the Convertible Notes.

The Company concluded that the Convertible Notes contained a conversion option at a significant premium that was deemed to be an embedded derivative, which is required to be bifurcated and accounted for separately from the debt host.

In August 2018, the then outstanding Convertible Notes were converted to Series A Preferred Stock.

The Company recognized the following changes in the debt related to the Convertible Notes during the three and nine months ended September 30, 2018 (in thousands):

			Financial statement impacted
Balance, December 31, 2017	$	7,674	
Issuance of new notes		7,000	Balance sheet
Allocation of proceeds to derivative liability		(1,418)	Balance sheet
Accretion to settlement value		644	Statement of operations
Accrued interest		505	Statement of operations
Balance, June 30, 2018		14,405	
Accretion to settlement value		1,301	Statement of operations
Accrued interest		125	Statement of operations
Interest forgiven upon conversion		(47)	Statement of operations
Conversion of Convertible Notes to redeemable convertible preferred stock		(15,784)	Balance sheet
Balance, September 30, 2018		—	

There were no Convertible Notes outstanding as of December 31, 2018 or issued during the nine months ended September 30, 2019.

Note 5. Redeemable Convertible Preferred Stock

Series Seed Redeemable Convertible Preferred Stock

Between 2009 and 2011, the Company authorized and issued 4,412,500 shares of Series Seed Preferred Stock at an issuance price of $0.0001 per share, for total proceeds of less than $0.1 million.

There were no issuance costs in connection with the Series Seed Preferred Stock issuance.

Series A Redeemable Convertible Preferred Stock

In August 2018, the Company authorized 3,126,700 shares of Series A Preferred Stock. The Company then issued 1,188,707 shares of Series A Preferred Stock at an issuance price of $13.46 per share resulting in gross proceeds of approximately $16.0 million. There were $0.1 million of issuance costs associated with the Series A Preferred Stock.

In conjunction with the August 2018 issuance of Series A Preferred Stock, all outstanding principal and accrued interest under the Wellcome Trust Notes and Convertible Notes converted to 1,937,993 shares of Series A Preferred Stock.

Series B Redeemable Convertible Preferred Stock

In March 2019, the Company authorized 5,422,845 shares of Series B Preferred Stock. The Company then issued 4,953,758 shares of Series B Preferred Stock at an issuance price of $15.14 per share resulting in gross proceeds of approximately $75.0 million. There were $0.2 million of issuance costs associated with the Series B Preferred Stock.

In conjunction with the March 2019 issuance of Series B Preferred Stock, all outstanding principal and accrued interest under the Wellcome Trust Notes converted to 331,344 shares of Series B Preferred Stock. In April 2019, the Company received $1.6 million from the issuance of the Wellcome Trust Notes, which were subsequently converted into 137,743 shares of Series B redeemable convertible preferred stock.

Upon closing of the Company's IPO, the then-outstanding shares of the Series Seed, Series A and Series B redeemable convertible preferred stock (together as "Preferred Stock") converted into common stock. As of September 30, 2019, there were no shares of redeemable convertible preferred stock authorized, issued or outstanding.

Note 6. Preferred Stock

On July 2, 2019, in connection with the closing of the Company's IPO, the Company filed its restated Certificate of Incorporation, which authorizes the Company to issue up to 10,000,000 shares of preferred stock, $0.0001 par value per share. There are no shares of preferred stock outstanding as of September 30, 2019.

Note 7. Common Stock

As of September 30, 2019, the Company's Certificate of Incorporation authorized the Company to issue 150,000,000 shares of common stock, $0.0001 par value per share.

Holders of the common stock are entitled to one vote for each share of common stock held at all meetings of stockholders and written actions in lieu of meetings. The holders of common stock shall be entitled to receive dividends out of funds legally available, as declared by the board of directors. These dividends are subject to the preferential dividend rights of the holders of the Company's preferred stock. Through September 30, 2019 and December 31, 2018, no cash dividends have been declared or paid.

Upon completion of the Company's IPO on July 2, 2019, all outstanding shares of Series Seed, Series A, and Series B Redeemable Convertible Preferred Stock converted to common stock. As of September 30, 2019, there were 23,412,754 shares of common stock outstanding.

Note 8. Net Loss per Share

The following table sets forth the computation of basic and diluted net loss per share of common stock for the three and nine months ended September 30, 2019 (in thousands, except share and per share data):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
Net Loss	$ (9,038)	$ (6,238)	$ (36,183)	$ (9,185)
Weighted-average shares used in computing net loss per share	22,907,349	5	7,755,137	2
Net loss per share, basic and diluted	$ (0.39)	$ (1,247,600)	$ (4.67)	$ (4,592,500)

The Company's potentially dilutive securities, which include stock options and convertible preferred stock, have been excluded from the computation of diluted net loss per share as the effect would be to reduce the net loss per share. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same.

Prior to the IPO, the Company's outstanding shares of Preferred Stock contractually entitled the holders of such shares to participate in distributions but contractually did not require the holders of such shares to participate in losses of the Company. Accordingly, these shares have not been included in the denominator used to calculate net loss per share.

Common Stock Equivalents

The following common stock equivalents presented based on amounts outstanding at each period end, have been excluded from the calculation of diluted net loss per share because including them would have had an anti-dilutive impact:

	September 30,	
	2019	2018
Redeemable convertible preferred stock (as converted to common stock)	—	9,791,151
Stock options to purchase common stock	4,671,906	2,245,981
Warrants to purchase common stock	—	19,986
	4,671,906	12,057,118

Note 9. Stock-based Compensation

Stock Options

In September 2009, the Company's board of directors approved the 2009 Stock Incentive Plan (the "2009 Plan") which provided for the grant of incentive stock options to employees and non-statutory stock options to directors, consultants, and non-employees of the Company. The aggregate common shares issuable were 3,911,138 under the 2009 Plan, as amended. The 2009 Plan terminated in July 2019 effective upon the completion of the Company's IPO. No additional options will be granted under the 2009 Plan. At September 30, 2019, there were 3,839,545 options and restricted stock units ("RSUs") outstanding under the 2009 Plan.

In May 2019, the board of directors approved the 2019 Stock Option and Incentive Plan (the "2019 Plan") which became effective on June 26, 2019, the date immediately prior to the date on which the registration statement related to the IPO was declared effective by the SEC. The 2019 Plan will expire in May 2029. Under the 2019 Plan, the Company may grant incentive stock options, non-statutory stock options, restricted stock awards, RSUs and other stock-based awards. There were 1,709,832 shares of the Company's common stock initially reserved for issuance under the 2019 Plan. In addition, the number of shares of common stock that may be issued under the 2019 Plan will automatically increase on January 1, 2020 and each January 1 thereafter by 4% of the number of shares of common stock outstanding on the immediately preceding December 31, subject to limitation. As of September 30, 2019, there were 772,308 common shares available for issuance and 937,524 options outstanding under the 2019 Plan.

Options under the 2019 Plan generally vest based on the grantee's continued service with the Company during a specified period following a grant as determined by the board of directors and expire ten years from the grant date. In general, awards typically vest in four years, but vesting conditions can vary based on the discretion of the Company's board of directors.

A summary of the Company's stock option activity and related information is as follows:

	Number of Shares	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (in thousands)
Outstanding as of December 31, 2018	2,310,369	$ 4.49	7.1	$ 6,420
Granted	2,554,146	11.93		
Exercised	(38,961)	0.11		
Forfeited	(153,648)	5.00		
Outstanding as of September 30, 2019	4,671,906	8.58	8.2	36,423
Options vested and expected to vest as of September 30, 2019	4,671,906	$ 8.58	8.2	$ 36,423
Options exercisable as of September 30, 2019	3,111,295	$ 8.00	7.7	$ 26,147

The aggregate intrinsic values of options outstanding, exercisable, vested and expected to vest were calculated as the difference between the exercise price of the options and the fair value of the Company's common stock as of September 30, 2019.

As of September 30, 2019, there was $6.1 million of unrecognized compensation cost, which is expected to be recognized over a weighted-average period of 2.6 years.

The fair value of all option activity was estimated at the date of grant using the Black-Scholes model with the following assumptions:

	Nine Months Ended September 30, 2019
Fair value of options	$ 3.83 - 8.05
Fair value of common stock	$ 9.20 - 20.02
Expected term (in years)	5.02 - 6.16
Expected volatility	43.57% - 44.41%
Risk-free interest rate	1.76% - 2.44%
Expected dividend yield	0.00%

On May 16, 2019, the Company issued 105,163 fully vested restricted common stock units. The average grant date fair value was $10.97 per share. As of September 30, 2019, there was no unrecognized compensation expense related to unvested RSUs.

Warrants

In October 2016, PureTech Health, a related party, agreed to provide management services to the Company in exchange for a warrant to purchase up to 19,998 shares of the Company's common stock. The warrants vested monthly as services were performed over a 24-month period and had a purchase price of $2.92 per share. The total expense for the three and nine months ended September 30, 2018 for the warrant was less than $0.1 million. The warrant was fully vested as of October 2018.

In August 2018, PureTech Health exercised the warrant to purchase 12 shares resulting in proceeds to the Company of less than $0.1 million. In March 2019, PureTech Health exercised the warrant to purchase the remaining 19,986 shares resulting in proceeds to the Company of $0.1 million. There are no outstanding warrants as of September 30, 2019.

Stock-based Compensation Expense

Stock-based compensation expense is classified in the statements of operations for the three and nine months ended September 30, 2019 and 2018 as follows (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
Research and development	$ 147	$ 28	$ 371	$ 71
General and administrative	1,496	378	$ 11,217	446
Total stock based compensation expense	$ 1,642	$ 406	$ 11,587	$ 517

Note 10. Fair Value of Financial Assets and Liabilities

The following tables present information about the Company's assets and liabilities as of September 30, 2019 and December 31, 2018 that are measured at fair value on a recurring basis and indicates the level of the fair value hierarchy utilized to determine such fair values (in thousands):

	Fair Value Measurement at September 30, 2019 Using			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents (Money Market Fund)	$ 22,406	$ —	$ —	$ 22,406
Cash equivalents (US Treasuries)	22,519			22,519
Short-term investments (US Treasuries)	107,461	—	—	107,461
Total	$ 152,386	$ —	$ —	$ 152,386

	Fair Value Measurement at December 31, 2018 Using			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents (US Treasuries)	$ 5,042	$ —	$ —	$ 5,042
Short-term investments (US Treasuries)	4,983	—	—	4,983
Total	$ 10,025	$ —	$ —	$ 10,025
Liabilities:				
Derivative instrument	$ —	$ —	$ 389	$ 389
Total	$ —	$ —	$ 389	$ 389

The estimated fair value and amortized cost of the Company's short-term investments by contractual maturity are summarized as follows (in thousands):

	September 30, 2019			
	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Due in one year or less	$ 107,411	$ 50	$ —	$ 107,461
Total	$ 107,411	$ 50	$ —	$ 107,461

	December 31, 2018			
	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Due in one year or less	$ 4,984	$ —	$ (1)	$ 4,983
Total	$ 4,984	$ —	$ (1)	$ 4,983

The derivative liability is considered a Level 3 liability because its fair value measurement is based, in part, on significant inputs not observed in the market. Any reasonable changes in the assumptions used in the valuation could materially affect the financial results of the Company. The Company recognized the following changes in the fair value of derivative liabilities during the year ended December 31, 2018 and the three and nine months ended September 30, 2019 (in thousands):

Balance, December 31, 2017	$ 2,606
Allocation of note issuance proceeds to derivative	1,418
Change in fair value of derivative	(2,203)
Balance, June 30, 2018	1,821
Change in fair value of derivative	2,633
Conversion of convertible debt to Series A preferred stock	(4,454)
Balance, September 30, 2018	—
Allocation of note issuance proceeds to derivative	375
Change in fair value of derivative	14
Balance, December 31, 2018	389
Allocation of note issuance proceeds to derivative	750
Change in fair value of derivative	135
Conversion of convertible debt to Series B preferred stock	(1,274)
Balance, June 30, 2019	$ —

There was no derivative liability recorded as of September 30, 2019.

Note 11. Commitments and Contingencies

Leases

The Company entered into a 51-month lease for office space in Boston, Massachusetts that began in December 2018 and expires in February 2023. The Company is required to maintain a cash balance of $0.1 million to secure a letter of credit associated with this lease. The amount was classified as restricted cash in the balance sheet at December 31, 2018 and September 30, 2019.

The Company recorded rent expense of $0.3 million during the nine months ended September 30, 2019.

Future minimum lease payments under non-cancelable operating lease agreements as of September 30, 2019, are as follows (in thousands):

As of September 30,	Minimum Lease Payments
Less than 1 year	$ 498
1 to 2 years	504
2 to 3 years	512
3 to 4 years	214
4 to 5 years	—
Total	$ 1,728

Intellectual Property License with Eli Lilly and Company

In May 2012, the Company entered into an exclusive license agreement, or the Lilly License Agreement, with Eli Lilly, pursuant to which Eli Lilly assigned to us all of its rights to certain patents (now expired), regulatory documentation, data records and materials related to xanomeline. The Company is also entitled to sublicense or otherwise transfer the rights granted in connection with the Lilly License Agreement.

Under the Lilly License Agreement, the Company is obligated to use commercially reasonable efforts to develop, manufacture, commercialize and seek and maintain regulatory approval for xanomeline, in any formulation, for use in humans.

The Company paid Eli Lilly an upfront payment of $0.1 million and has agreed to make milestone payments to Eli Lilly of up to an aggregate of $16 million upon the achievement of specified regulatory milestones and up to an aggregate of $54 million in commercial milestones. In addition, the Company is obligated to pay Eli Lilly tiered royalties, at rates in the low to mid single-digit percentages, on the worldwide net sales of any commercialized product on a country-by-country basis until the expiration of the applicable royalty term, which is the longer of six years from the date of first commercial sale of each licensed product within a country or data exclusivity in such country. During the royalty term, Eli Lilly is prohibited from granting any third party rights to the patents, regulatory documentation, data records and materials that have been licensed to us under the Lilly License Agreement.

The Lilly License Agreement will expire on the later of (i) the expiration of the last-to-expire royalty term on a licensed product-by-licensed product basis or (ii) the date on which the Company has made all milestone payments pursuant to the terms of the Lilly License Agreement, unless terminated earlier by the parties. In no event will the term of the Lilly License Agreement exceed 15 years past the anniversary of the first commercial sale of a xanomeline product. The Company may terminate the Lilly License Agreement for any reason with proper prior notice to Eli Lilly. Either party may terminate the Lilly License Agreement upon an uncured material breach by the other party.

The initial upfront payment of $0.1 million was expensed when incurred in May 2012. As of September 30, 2019, no milestones have been reached, and accordingly, no milestone payments have been made.

Intellectual Property License with PureTech Health

In March 2011, the Company entered into an exclusive license agreement, or the Patent License Agreement, with PureTech Health, pursuant to which PureTech Health granted us an exclusive license to patent rights relating to combinations of a muscarinic activator with a muscarinic inhibitor for the treatment of central nervous system disorders.

In connection with the Patent License Agreement, the Company has agreed to make milestone payments to PureTech Health of up to an aggregate of $10 million upon the achievement of specified development and regulatory milestones. In addition, the Company is obligated to pay PureTech Health low single-digit royalties on the worldwide net sales of any commercialized product covered by the licenses granted under the Patent License Agreement. In the event that the Company sublicenses any of the patent rights granted under the Patent License Agreement, the Company will be obligated to pay PureTech Health royalties within the range of 15% to 25% on any income we receive from the sublicensee, excluding royalties.

The Company may terminate the Patent License Agreement for any reason with proper prior notice to PureTech Health. Either party may terminate the Patent License Agreement upon an uncured material breach by the other party.

The Company incurred no expenses related to the Patent License provided by PureTech Health during the nine months ended September 30, 2019 and 2018. The Company had no outstanding liabilities to PureTech Health related to the Patent License at December 31, 2018 and September 30, 2019.

Indemnification

In the normal course of business, the Company enters into contracts and agreements that contain a variety of representations and warranties and provide for general indemnifications. The Company's exposure under these agreements is unknown because it involves claims that may be made against the Company in the future but have not yet been made. To date, the Company has not paid any claims or been required to defend any action related to its indemnification obligations. However, the Company may incur charges in the future as a result of these indemnification obligations.

Contingencies

From time to time, the Company may have certain contingent liabilities that arise in the ordinary course of its business activities. The Company accrues a liability for such matters when it is probable that future expenditures will be made, and such expenditures can be reasonably estimated.

Litigation

The Company is not a party to any litigation and does not have contingency reserves established for any litigation liabilities as of September 30, 2019.

Note 12. Related Party Transactions

PureTech Health Management Consulting Services and Overhead Agreement

The Company engages PureTech Health, a related party, to provide, among other things, management expertise, strategic advice, administrative support, computer and telecommunications services and office infrastructure. In exchange for providing such services, the Company pays PureTech Health a monthly fee. In addition, PureTech Health periodically invoices the Company for out-of-pocket expenses reasonably incurred in connection with providing such business services.

The Company incurred general and administrative costs for management services provided by PureTech Health totaling less than $0.1 million in the nine months ended September 30, 2019, and totaling $0.2 million in the nine months ended September 30, 2018. The Company had outstanding current liabilities to PureTech Health of less than $0.1 million and $0.1 million at September 30, 2019 and December 31, 2018, respectively, which are recorded as accounts payable in the balance sheet.

Note 13. 401(k) Savings Plan

The Company has a 401(k) retirement plan in which substantially all U.S. employees are eligible to participate. Eligible employees may elect to contribute up to the maximum limits, as set by the Internal Revenue Service, of their eligible compensation. The total contribution matching expense for the Company was less than $0.1 million for each of the nine months ended September 30, 2019 and 2018.

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

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our unaudited financial statements and related notes appearing elsewhere in this Quarterly Report on Form 10-Q and our audited financial statements and related notes for the year ended December 31, 2018 included in our final prospectus for our initial public offering of our common stock filed with the Securities and Exchange Commission (the "SEC") pursuant to Rule 424(b)(4) of the Securities Act on June 28, 2019, which we refer to as the Prospectus. This Quarterly Report on Form 10-Q contains "forward-looking statements" within the meaning of Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended, (the "Exchange Act"). These statements are often identified by the use of words such as "anticipate," "believe," "continue," "could," "estimate," "expect," "intend," "may," "plan," "project," "will," "would" or the negative or plural of these words or similar expressions or variations. Such forward-looking statements are subject to a number of risks, uncertainties, assumptions and other factors that could cause actual results and the timing of certain events to differ materially from future results expressed or implied by the forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those identified and discussed in the section titled "Risk Factors," set forth in Part II, Item 1A of our Quarterly Report on Form 10-Q, as amended, filed with the SEC on August 8, 2019, and in other SEC filings. You should not rely upon forward-looking statements as predictions of future events. Furthermore, such forward-looking statements speak only as of the date of this report. Except as required by law, we undertake no obligation to update any forward-looking statements to reflect events or circumstances after the date of such statements.

Overview

We are an innovative clinical-stage biopharmaceutical company primarily focused on developing novel therapies to address disabling neuropsychiatric conditions characterized by significant unmet medical need. Our pipeline is built on the broad therapeutic potential of our lead product candidate, KarXT, an oral modulator of muscarinic receptors that are located both in the central nervous system, or CNS, and various peripheral tissues. KarXT is our proprietary product candidate that combines xanomeline, a novel muscarinic agonist, with trospium, an approved muscarinic antagonist, to preferentially stimulate muscarinic receptors in the CNS. We are currently conducting a Phase 2 clinical trial of KarXT for the treatment of acute psychosis in patients with schizophrenia and expect preliminary results in late 2019. We also plan to initiate clinical trials of KarXT to evaluate its potential therapeutic benefit in other CNS disorders, including psychosis in Alzheimer's disease, or AD, as well as pain. We have assembled a team whose members have extensive expertise in the research, development and commercialization of numerous CNS agents, as well as deep familiarity with the biology of neuropsychiatric disorders, such as schizophrenia and AD, including the role of muscarinic receptors in their potential treatment. We plan to leverage this expertise to develop a pipeline of product candidates targeting a broad range of psychiatric and neurological conditions.

Since our inception in 2009, we have focused substantially all of our efforts and financial resources on organizing and staffing our company, acquiring and developing our technology, raising capital, building our intellectual property portfolio, undertaking preclinical studies and clinical trials and providing general and administrative support for these activities.

On June 27, 2019, our registration statement on Form S-1 relating to the initial public offering, or IPO, of our common stock was declared effective by the Securities and Exchange Commission, or SEC. In the IPO, which closed on July 2, 2019, we issued and sold 6,414,842 shares of our common stock, including full exercise of the underwriters' over-allotment option to purchase an additional 836,718 shares, at a public offering price of $16.00 per share. The aggregate net proceeds to us from the IPO, inclusive of proceeds from the over-allotment exercise, were $93.0 million after deducting underwriting discounts and commissions of $7.2 million and offering expenses of $2.4 million. Prior to the IPO, we had funded our operations primarily with proceeds from the sales of redeemable convertible preferred stock and the issuance of convertible notes. As of September 30, 2019, there were 23,412,754 shares of common stock outstanding.

We have never generated revenue and have incurred significant net losses since inception. For the nine months ended September 30, 2019, our net loss was $36.2 million. As of September 30, 2019, we had an accumulated deficit of $67.7 million. Our net losses may fluctuate significantly from quarter to quarter and year to year. We expect to incur significant expenses and increasing operating losses for the foreseeable future. We anticipate that our operating expenses and capital expenditures will increase substantially, particularly as we:

- invest significantly to further develop KarXT for our current and future indications;
- advance additional product candidates into preclinical and clinical development;
- seek regulatory approvals for any product candidates that successfully complete clinical trials;

- require the manufacture of larger quantities of our product candidates for clinical development and potential commercialization;
- hire additional clinical, scientific, management and administrative personnel;
- maintain, expand and protect our intellectual property portfolio;
- acquire or in-license other assets and technologies;
- add additional operational, financial and management information systems and processes to support our ongoing development efforts, any future manufacturing or commercialization efforts and our transition to operating as a public company; and
- incur additional costs associated with operating as a public company.

We do not expect to generate revenue from product sales unless and until we successfully complete development and obtain regulatory approval for a product candidate or enter into collaborative agreements with third parties, which we expect will take a number of years, if ever, and the outcome of which is subject to significant uncertainty. Additionally, we currently use third parties such as contract research organizations, or CROs, and contract manufacturing organizations, or CMOs, to carry out our preclinical and clinical development activities, and we do not yet have a sales organization. If we obtain regulatory approval for any product candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution.

As a result, we will need substantial additional funding to support our continuing operations and pursue our growth strategy. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through a combination of private and public equity offerings, debt financings, collaborations, strategic alliances and marketing, distribution or licensing arrangements with third parties. We may be unable to raise additional funds or enter into such other agreements or arrangements when needed on favorable terms, or at all. If we fail to raise capital or enter into such agreements as, and when, needed, we may have to significantly delay, scale back or discontinue the development and commercialization of one or more of our product candidates.

As of September 30, 2019, we had cash, cash equivalents and short-term investments of $161.6 million. We believe that our existing cash, cash equivalents and short-term investments will be sufficient to meet our anticipated operating and capital expenditure requirements through the first half of 2021. We have based this estimate on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect. See “Liquidity and Capital Resources.”

Components of Our Results of Operations

Revenue

To date, we have not generated any revenue and do not expect to generate any revenue in the foreseeable future, if at all. If our development efforts for our product candidates are successful and result in regulatory approval, we may generate revenue in the future from product sales. If we enter into license or collaboration agreements for any of our product candidates or intellectual property, we may generate revenue in the future from payments as a result of such license or collaboration agreements. We cannot predict if, when, or to what extent we will generate revenue from the commercialization and sale of our product candidates. We may never succeed in obtaining regulatory approval for any of our product candidates.

Operating Expenses

Research and Development Expenses

Research and development expenses consist primarily of costs incurred for the development of our product candidates and our drug discovery efforts, which include:

- personnel costs, including salaries and the related costs, and stock-based compensation expense, for employees engaged in research and development functions;
- expenses incurred in connection with the preclinical and clinical development of our product candidates, including under agreements with CROs;

- expenses incurred in connection with CMOs that manufacture drug products for use in our preclinical and clinical trials;
- formulation costs and chemistry, manufacturing and controls, or CMC, costs; and
- expenses incurred under agreements with consultants who supplement our internal capabilities.

We expense all research and development costs in the periods in which they are incurred. Costs for certain development activities are recognized based on an evaluation of the progress to completion of specific tasks using information and data provided to us by our vendors and third-party service providers.

We do not track our internal research and development expenses on an indication-by-indication basis as they primarily relate to personnel, early research and consumable costs, which are deployed across multiple projects under development. These costs are included in unallocated research and development expenses in the table below. A portion of our research and development costs are external costs, such as fees paid to consultants, central laboratories, contractors, CMOs and CROs in connection with our clinical development activities, which costs we do track on an indication-by-indication basis. Formulation costs and CMC costs and preclinical expenses consist of external costs associated with activities to support our current and future clinical programs, but are not allocated on an indication-by-indication basis due to the overlap of the potential benefit of those efforts across multiple indications that utilize KarXT. The following table summarizes our research and development expenses:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
	(in thousands)			
Schizophrenia clinical trials	$ 3,376	$ 498	$ 12,193	$ 2,474
Pain clinical trials	369	—	369	—
Alzheimer's Disease clinical trials	38	—	38	—
Formulation and CMC	176	392	1,536	620
Preclinical	217	71	1,704	523
Unallocated expenses	1,617	456	3,704	1,199
Total research and development expense	$ 5,793	$ 1,417	$ 19,544	$ 4,816

We expect our research and development expenses to increase substantially for the foreseeable future as we continue to invest in research and development activities related to developing our product candidates, including investments in manufacturing, as our programs advance into later stages of development and we continue to conduct clinical trials. The process of conducting the necessary clinical research to obtain regulatory approval is costly and time-consuming, and the successful development of our product candidates is highly uncertain.

Because of the numerous risks and uncertainties associated with conducting product development, we cannot determine with certainty the duration and completion costs of our current or future preclinical studies and clinical trials or if, when, or to what extent we will generate revenues from the commercialization and sale of our product candidates. We may never succeed in achieving regulatory approval for our product candidates. The duration, costs and timing of preclinical studies and clinical trials and development of our product candidates will depend on a variety of factors, if and as we:

- continue to develop and conduct clinical trials for KarXT for our current and future indications;
- initiate and continue research, preclinical and clinical development efforts for future product candidates;
- seek to identify additional product candidates;
- seek regulatory approvals for KarXT for our current and future indications as well as any other product candidates that successfully complete clinical development;
- add operational, financial and management information systems and personnel, including personnel to support our product development and help us comply with our obligations as a public company;
- hire and retain additional personnel, such as clinical, quality control, scientific, commercial and administrative personnel;
- maintain, expand and protect our intellectual property portfolio;

- establish sales, marketing, distribution, manufacturing, supply chain and other commercial infrastructure in the future to commercialize various products for which we may obtain regulatory approval, if any;
- add equipment and physical infrastructure to support our research and development; and
- acquire or in-license other product candidates and technologies.

A change in the outcome of any of these variables with respect to the development of any of our product candidates would significantly change the costs and timing associated with the development of that product candidate. We may never succeed in obtaining regulatory approval for any of our product candidates.

We do not believe that it is possible at this time to accurately project total indication-specific expenses through commercialization. There are numerous factors associated with the successful commercialization of any of our product candidates, including future trial design and various regulatory requirements, many of which cannot be determined with accuracy at this time based on our stage of development. Additionally, future commercial and regulatory factors beyond our control will impact our clinical development programs and plans.

General and Administrative Expenses

General and administrative expenses consist primarily of employee-related costs for personnel in executive, finance and administrative functions, costs related to maintenance and filing of intellectual property, facility-related costs, and other expenses for outside professional services, including legal, human resources, data management, audit and accounting services. Personnel costs consist of salaries, benefits, travel expense and stock-based compensation expense.

We anticipate that our general and administrative expenses will increase in the future as we increase our headcount to support our continued research activities and development of our product candidates. We will also incur increased accounting, audit, legal, regulatory, compliance and director and officer insurance costs as well as investor and public relations expenses associated with operating as a public company.

Other Income (Expense)

Interest Income (Expense). Interest income (expense) consists of interest accrued on the principal balance of convertible notes. A portion of the accrued interest was forgiven with respect to certain of the convertible notes upon their conversion into redeemable convertible preferred stock, and the forgiven interest is recorded as a reduction to interest expense.

Interest Income. Interest income consists of interest income from our short-term investments.

Accretion of Debt Discount. Upon issuance of our convertible notes, each note was recorded at cost, net of the derivative liability. This discount on each outstanding note, if any, was amortized as interest expense to the date such note was expected to convert using the effective interest rate method and is reflected in the statements of operations as accretion of debt discount.

Change in Fair Value of Derivative. Our convertible notes contained conversion options at a significant premium that were deemed to be embedded derivatives that are required to be bifurcated and accounted for separately from the convertible note. We remeasured the derivative liability to fair value at each reporting date, and we recognize changes in the fair value of the derivative liabilities in our statements of operations.

Results of Operations

Comparison of the Three Months Ended September 30, 2019 and 2018

	Three Months Ended September 30,		
	2019	2018	Change
	(in thousands)		
Revenue	$ —	$ —	$ —
Operating expenses:			
Research and development	5,793	1,417	4,376
General and administrative	4,103	1,056	3,047
Total operating expenses	9,896	2,473	7,423
Loss from operations	(9,896)	(2,473)	(7,423)
Total other income (expense), net	858	(3,765)	4,623
Net loss attributable to common stockholders	$ (9,038)	$ (6,238)	$ (2,800)

Research and Development Expenses

	Three Months Ended September 30,		
	2019	2018	Change
	(in thousands)		
Direct research and development expenses:			
Schizophrenia clinical trials	$ 3,376	$ 498	$ 2,878
Pain clinical trials	369	-	369
Alzheimer's Disease clinical trials	38	-	38
Formulation and CMC	176	392	(216)
Preclinical	217	71	146
Unallocated expenses:			
Personnel related (including stock-based compensation)	886	267	619
Consultant fees and other expenses	731	189	542
Total research and development expense	$ 5,793	$ 1,417	$ 4,376

Expenses related to our schizophrenia clinical trials increased by $2.9 million due to the completion of enrollment of our Phase 2 clinical trial for which enrollment began in September 2018. The $0.4 million and less than $0.1 million in expenses related to new pain and Alzheimer’s Disease clinical trials consist of study preparation and startup costs for Phase 1 clinical trials incurred in the three months ended September 30, 2019. Formulation and CMC expenses decreased by $0.2 million due to a decrease in manufacturing activities as sufficient supply was manufactured for the clinical trials referenced above. Preclinical expenses increased by $0.1 million due to the initiation and execution of toxicology studies. The increase of $0.6 million in personnel-related costs was primarily a result of an increase in headcount. The increase of $0.5 million in consultant fees and other expenses was due to a combination of an increase in consulting activities as well as costs associated with our discovery programs.

General and Administrative Expenses

	Three Months Ended September 30,		
	2019	2018	Change
	(in thousands)		
Personnel-related (including stock-based compensation)	$ 2,376	$ 677	$ 1,699
Professional and consultant fees	730	281	449
Other	997	98	899
Total general and administrative expense	$ 4,103	$ 1,056	$ 3,047

The increase of $1.7 million in personnel-related costs was primarily the result of increased headcount as well as an increase in stock-based compensation expense of $1.2 million. The increase of $0.4 million in professional and consultant fees was primarily due to an increase in audit fees, legal costs, and public relations consulting fees related to our ongoing business activities as a public company. The increase of $0.9 million in other costs was primarily due to insurance costs and our facility lease in Boston, Massachusetts.

Other Income (Expense), Net

	Three Months Ended September 30,		
	2019	2018	Change
		(in thousands)	
Interest income (expense)	$ —	$ 192	$ (192)
Interest income	858	—	858
Accretion of debt discount	—	(1,324)	1,324
Change in fair value of derivative	—	(2,633)	2,633
Total other income (expense), net	$ 858	$ (3,765)	$ 4,623

There was no interest income (expense) recorded during the three months ended September 30, 2019 because there were no convertible notes outstanding during the quarter. Interest income (expense) for the three months ended September 30, 2018 represents the forgiveness of accrued interest associated with the conversion of the outstanding notes issued to the Wellcome Trust, or the Wellcome Trust Notes, and other convertible notes during our Series A convertible preferred stock financing.

Interest income is attributable to interest earned on our short-term investments, which were purchased beginning in November 2018.

There was no debt outstanding during the three months ended September 30, 2019 and therefore no related accretion of debt discount. All outstanding Wellcome Trust Notes and other convertible notes as of August 1, 2018 were converted into shares of Series A convertible preferred stock and the debt discount was fully accreted at that time.

There was no change in fair value of derivative recorded during the three months ended September 30, 2019 because there were no convertible notes outstanding during the quarter. The change in fair value of derivative for the three months ended September 30, 2018 reflects the final mark-to-market of the derivative liabilities of the Wellcome Trust Notes and other convertible notes which were converted into shares of Series A convertible preferred stock.

Comparison of the nine months ended September 30, 2019 and 2018

	Nine Months Ended September 30,		
	2019	2018	Change
		(in thousands)	
Revenue	$ —	$ —	$ —
Operating expenses:			
Research and development	19,544	4,816	14,728
General and administrative	16,995	1,548	15,447
Total operating expenses	36,539	6,364	30,175
Loss from operations	(36,539)	(6,364)	(30,175)
Total other income (expense), net	356	(2,821)	3,177
Net loss attributable to common stockholders	$ (36,183)	$ (9,185)	$ (26,998)

Research and Development Expenses

	Nine Months Ended September 30,		
	2019	2018	Change
		(in thousands)	
Direct research and development expenses:			
Schizophrenia clinical trials	$ 12,193	$ 2,474	$ 9,719
Pain clinical trials	369	-	369
Alzheimer's Disease clinical trials	38	-	38
Formulation and CMC	1,536	620	916
Preclinical	1,704	523	1,181
Unallocated expenses:			
Personnel related (including stock-based compensation)	2,184	672	1,512
Consultant fees and other expenses	1,520	527	993
Total research and development expense	$ 19,544	$ 4,816	$ 14,728

Expenses related to our schizophrenia clinical trials increased by $9.7 million due to the continued enrollment of our Phase 2 clinical trial for which enrollment began in September 2018. The $0.4 million and less than $0.1 million in expenses related to new pain and Alzheimer's Disease clinical trials consist of study preparation and startup costs for Phase 1 clinical trials incurred in the three months ended September 30, 2019. Formulation and CMC expenses increased by $0.9 million due to an increase in formulation development activities. Preclinical expenses increased by $1.2 million due to the initiation and execution of toxicology studies. The increase of $1.5 million in personnel-related costs was primarily a result of an increase in headcount. The increase of $1.0 million in consultant fees and other expenses was due to a combination of increase in consulting activities as well as costs associated with our discovery programs.

General and Administrative Expenses

	Nine Months Ended September 30,		
	2019	2018	Change
		(in thousands)	
Personnel-related (including stock-based compensation)	$ 13,729	$ 877	$ 12,852
Professional and consultant fees	1,444	526	918
Other	1,822	145	1,677
Total general and administrative expense	$ 16,995	$ 1,548	$ 15,447

The increase of $12.9 million in personnel-related costs was primarily the result of increased headcount as well as an increase in stock-based compensation expense of $10.8 million. The increase of $0.9 million in professional and consultant fees was primarily due to an increase in audit fees, legal costs, and public relations consulting fees related to our preparations to be, and our ongoing business activities as, a public company. The increase of $1.7 million in other costs was primarily due to insurance costs and our facility lease in Boston, Massachusetts.

Other Income (Expense), Net

	Nine Months Ended September 30,		
	2019	2018	Change
		(in thousands)	
Interest income (expense)	$ 11	$ (396)	$ 407
Interest income	1,425	—	1,425
Accretion of debt discount	(945)	(1,996)	1,051
Change in fair value of derivative	(135)	(429)	294
Total other income (expense), net	$ 356	$ (2,821)	$ 3,177

Interest income (expense) for the nine months ended September 30, 2019 reflects excess of interest forgiven on the Wellcome Trust Notes at the time of conversion over interest expense accrued on all convertible notes outstanding during the period. Interest income (expense) for the nine months ended September 30, 2018 represents interest expense accrued on outstanding convertible notes net of the impact of the forgiveness of accrued interest associated with the conversion of the outstanding Wellcome Trust Notes and other convertible notes during our Series A convertible preferred stock financing.

Interest income is attributable to interest earned on our short-term investments, which were purchased beginning in November 2018.

The accretion of debt discount for the nine months ended September 30, 2019 was attributable to the convertible notes issued in accordance with the Wellcome Trust Notes. These notes were subsequently converted in March and April 2019 into shares of our Series B convertible preferred stock. The related debt discounts were fully accreted at the time of each respective conversion. The accretion of debt discount for the nine months ended September 30, 2018 was attributable to the outstanding Wellcome Trust Notes and other convertible notes which were converted in the Series A convertible preferred stock financing on August 1, 2018.

The change in fair value of derivative for the nine months ended September 30, 2019 reflects the mark-to-market of the convertible note derivative liabilities prior to the conversion of the associated notes in March 2019 into shares of our Series B convertible preferred stock. The change in fair value of derivative for the nine months ended September 30, 2018 reflects the mark-to-market of the convertible note derivative liabilities prior to the conversion of the associated notes in August 2018 into shares of our Series A convertible preferred stock.

Liquidity and Capital Resources

Since our inception, we have incurred significant operating losses. We have not yet commercialized any of our product candidates and we do not expect to generate revenue from sales of any product candidates for several years, if at all. To date, we have funded our operations primarily with proceeds from the sale of redeemable convertible preferred stock, issuance of convertible notes, and sales of our common stock. Through September 30, 2019, our operations have been financed by gross proceeds of $24.1 million from the issuance of convertible notes, $91.0 million from the sale of shares of our redeemable convertible preferred stock, and $93.0 million from the sale of our common stock in our initial public offering. As of September 30, 2019, we had $161.6 million in cash, cash equivalents and short-term investments, and an accumulated deficit of $67.7 million.

Our primary use of cash has been to fund operating expenses, which consist of research and development 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 our outstanding accounts payable and accrued expenses.

Cash Flows

The following table summarizes our sources and uses of cash for each of the periods presented:

	Nine Months Ended September 30,	
	2019	2018
	(in thousands)	
Net cash used in operating activities	$ (24,103)	$ (8,513)
Net cash used in investing activities	(101,716)	—
Net cash provided by financing activities	171,059	24,877
Net increase in cash, cash equivalents and restricted cash	$ 45,240	$ 16,364

Cash Flows from Operating Activities

Cash used in operating activities for the nine months ended September 30, 2019 was $24.1 million, consisting of a net loss of $36.2 million partially offset by non-cash items, including stock-based compensation expense of $11.6 million, the accretion of debt discount related to the convertible notes of $0.9 million, and $0.1 million resulting from the change in fair value of the convertible note derivative liabilities. Net loss was also adjusted for $0.8 million of non-cash interest income. The change in our net operating assets and liabilities was due to an increase in accrued expenses of $0.8 million as well as $0.1 million related to an increase in deferred lease obligation, partially offset by an increase in prepaid expenses and other current assets of $0.6 million, and decrease to accounts payable of $0.1 million, which were driven by timing of payments to CROs and CMOs.

Cash used in operating activities for the nine months ended September 30, 2018 was $8.5 million, consisting of a net loss of $9.2 million partially offset by noncash items, including the accretion of debt discount related to the convertible notes of $2.0 million, non-cash interest expense of $0.4 million, stock-based compensation expense of $0.5 million and $0.4 million resulting from the change in fair value of the convertible note derivative liabilities. The change in our net operating assets and liabilities was due primarily to an increase in prepaid expenses and other current assets of $2.1 million primarily due to CRO payment timing, as well as by a decrease in accounts payable of $0.6 million.

Cash Flows from Investing Activities

Cash used in investing activities for the nine months ended September 30, 2019 was $101.7 million, primarily attributable to the purchases of short-term investments of $131.6 million, and partially offset by maturities of short-term investments of $30.0 million.

During the nine months ended September 30, 2018, there was no cash used in investing activities.

Cash Flows from Financing Activities

Cash provided by financing activities for the nine months ended September 30, 2019 was $171.1 million and was related primarily to $95.5 million of proceeds from the sale of our common stock in our initial public offering, net of $7.2 million in underwriting discounts and commissions and partially offset by $2.4 million in payments of initial public offering costs, $74.8 million of net proceeds from the issuance of redeemable convertible preferred stock, as well as $3.1 million related to proceeds from the issuance of convertible notes.

Cash provided by financing activities for the nine months ended September 30, 2018 was $24.9 million and was related to $15.9 million of proceeds from the issuance of Series A redeemable convertible preferred stock, net of issuance costs and $9.0 million of proceeds from the issuance of convertible notes.

Future Funding Requirements

We expect our expenses to increase substantially in connection with our ongoing activities, in particular as we continue to advance our product candidates through clinical trials. In addition, we expect to incur additional costs associated with operating as a public company.

As of September 30, 2019, we had cash and cash equivalents and short-term investments of $161.6 million. Based on our current plans, we believe that our existing cash, cash equivalents and short-term investments will be sufficient to meet our anticipated operating and capital expenditure requirements through the first half of 2021.

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. Because of the numerous risks and uncertainties associated with research, development and commercialization of pharmaceutical product candidates, we are unable to estimate the exact amount of our working capital requirements. Our future funding requirements will depend on and could increase significantly as a result of many factors, including:

- the scope, progress, results and costs of researching and developing KarXT for our current and future indications as well as other product candidates we may develop;
- the timing of, and the costs involved in, obtaining marketing approvals for KarXT for our current and future indications as well as future product candidates we may develop and pursue;
- the number of future indications and product candidates that we pursue and their development requirements;
- if approved, the costs of commercialization activities for KarXT for the approved indication, or any other product candidate that receives regulatory approval to the extent such costs are not the responsibility of any future collaborators, including the costs and timing of establishing product sales, marketing, distribution and manufacturing capabilities;
- subject to receipt of regulatory approval, revenue, if any, received from commercial sales of KarXT for any program or revenues received from any future product candidates;
- the extent to which we in-license or acquire rights to other products, product candidates or technologies;

- our headcount growth and associated costs as we expand our research and development and establish a commercial infrastructure;
- the costs of preparing, filing and prosecuting patent applications, maintaining and protecting our intellectual property rights including enforcing and defending intellectual property related claims; and
- the ongoing costs of operating as a public company.

A change in the outcome of any of these or other variables with respect to the development of any of our product candidates could significantly change the costs and timing associated with the development of that product candidate. Further, our operating plans may change in the future, and we may need additional funds to meet operational needs and capital requirements associated with such operating plans.

Until such time, if ever, as we can generate substantial product revenue, we expect to finance our operations through a combination of equity financings, debt financings, collaborations with other companies or other strategic transactions. We do not currently have any committed external source of funds. To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholders' ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect our stockholders' rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making acquisitions or capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings or other arrangements when needed, we may be required to delay, limit, reduce or terminate our research, product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Further, our operating plans may change, and we may need additional funds to meet operational needs and capital requirements for clinical trials and other research and development activities. We currently have no credit facility or committed sources of capital. Because of the numerous risks and uncertainties associated with the development and commercialization of our product candidates, we are unable to estimate the amounts of increased capital outlays and operating expenditures associated with our current and anticipated product development programs.

Contractual Obligations and Other Commitments

The following table summarizes our outstanding contractual obligations as of payment due date by period at September 30, 2019.

	Payments Due by Period				
	Total	Less Than 1 Year	1 to 3 Years	3 to 5 Years	More than 5 Years
	(in thousands)				
Operating lease commitments(1)	$ 1,728	$ 498	$ 1,016	$ 214	$ —
Total	$ 1,728	$ 498	$ 1,016	$ 214	$ —

(1) Reflects payments due for our lease of office space in Boston, Massachusetts under an operating lease agreement that expires in February 2023.

We enter into contracts in the normal course of business with CROs, CMOs and other third parties for clinical trials, preclinical research studies and testing and manufacturing services. These contracts are cancelable by us upon prior written notice. Payments due upon cancellation consist only of payments for services provided or expenses incurred, including noncancelable obligations of our service providers, up to the date of cancellation. These payments are not included in the preceding table as the amount and timing of such payments are not known.

We are also party to certain license and collaboration agreements with PureTech Health and Eli Lilly and Company. We have not included future payments under these agreements in the table of contractual obligations above since obligations under these agreements are contingent upon future events such as our achievement of specified development, regulatory and commercial milestones, or royalties on net product sales. As of September 30, 2019, we were unable to estimate the timing or likelihood of achieving these milestones or generating future product sales.

Critical Accounting Polices and Estimates

Our financial statements are prepared in accordance with generally accepted accounting principles in the United States. The preparation of our financial statements and related disclosures requires us to make estimates, assumptions and judgments that affect the reported amount of assets, liabilities, revenue, costs and expenses, and related disclosures. We believe that of our critical accounting policies described under the heading “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies and Estimates” in our final prospectus for our initial public offering filed pursuant to Rule 424(b)(4) under the Securities Act of 1933, as amended, with the SEC on June 28, 2019, the following involve the most judgment and complexity:

- research and development contract costs and accruals;
- convertible notes and derivative liabilities;
- determination of fair value of common stock; and
- stock-based compensation expense.

Accordingly, we believe the policies set forth above are critical to fully understanding and evaluating our financial condition and results of operations. If actual results or events differ materially from the estimates, judgments and assumptions used by us in applying these policies, our reported financial condition and results of operations could be materially affected.

Off-Balance Sheet Arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, as defined in the rules and regulations of the Securities and Exchange Commission.

JOBS Act Accounting Election

We are an “emerging growth company,” as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. Under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act until such time as those standards apply to private companies. Other exemptions and reduced reporting requirements under the JOBS Act for emerging growth companies include an exemption from the requirement to provide an auditor’s report on internal controls over financial reporting pursuant to the Sarbanes-Oxley Act of 2012, and an exemption from any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation. We have elected to use the extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies until the earlier of the date that (i) we are no longer an emerging growth company or (ii) we affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, our financial statements may not be comparable to companies that comply with the new or revised accounting pronouncements as of public company effective dates.

We are also evaluating the benefits of relying on other exemptions and reduced reporting requirements under the JOBS Act. Subject to certain conditions, as an emerging growth company, we may rely on certain of these exemptions, including without limitation, providing an auditor’s attestation report on our system of internal controls over financial reporting pursuant to Section 404(b) of the Sarbanes-Oxley Act. We would cease to be an emerging growth company upon the earliest of: (1) the last day of the fiscal year ending after the fifth anniversary of our initial public offering; (2) the last day of the fiscal year in which we have more than $1.07 billion in annual revenue; (3) the last day of the fiscal year in which we qualify as a “large accelerated filer,” with at least $700.0 million of equity securities held by non-affiliates as of the prior June 30th; or (4) the issuance, in any three-year period, by our company of more than $1.0 billion in non-convertible debt securities held by non-affiliates.

Recently Issued and Adopted Accounting Pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position and results of operations is disclosed in Note 2 to our financial statements appearing elsewhere in this Quarterly Report on Form 10-Q.

Item 3. Quantitative and Qualitative Disclosures About Market Risk.

We are exposed to market risk related to changes in interest rates. Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates, particularly because our cash equivalents and short-term investments are primarily invested in short-term U.S. Treasuries. However, because of the short-term nature of the investments in our portfolio, an immediate one percentage point change in market interest rates would not have a material impact on the fair market value of our investment portfolio or on our financial position or results of operations.

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates; however, we have contracted with and may continue to contract with vendors that are located outside of the United States. As a result, our operations may be subject to fluctuations in foreign currency exchange rates in the future.

Inflation generally affects us by increasing our cost of labor. We do not believe that inflation had a material effect on our business, financial condition or results of operations during the three and nine months ended September 30, 2019 and 2018.

Item 4. Limitations on Effectiveness of Controls and Procedures.

The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, refers to controls and procedures 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 the company’s management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

In designing and evaluating our disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Principal Executive Officer and Principal Financial Officer, evaluated, as of the end of the period covered by this Quarterly Report on Form 10-Q, the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act of 1934). Based on that evaluation, our Principal Executive Officer and Principal Financial Officer concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of September 30, 2019.

Changes in Internal Control Over Financial Reporting

No change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) has occurred during the three months ended September 30, 2019 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 currently subject to any material legal proceedings.

Item 1A. Risk Factors.

There have been no material changes from the risk factors previously disclosed in Part II, Item 1A (Risk Factors) of our Quarterly Report on Form 10-Q, as amended, for the three months ended June 30, 2019.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

Use of Proceeds from Initial Public Offering of Common Stock

On July 2, 2019, we closed our initial public offering of 6,414,842 shares of our common stock at a public offering price of $16.00 per share for an aggregate offering of $102.6 million. The offer and sale of all of the shares in the offering were registered under the Securities Act of 1933, as amended, pursuant to registration statement on Form S-1 (File No. 333-231863), which was declared effective by the SEC on June 27, 2019. Goldman Sachs & Co. LLC and Citigroup Global Markets Inc. acted as representatives of the underwriters for the offering. The offering commenced on June 27, 2019 and did not terminate until the sale of all of the shares offered.

We received aggregate net proceeds from the offering of $93.0 million, after deducting underwriting discounts and commissions of $7.2 million and offering expenses of $2.4 million payable by us. None of the underwriting discounts and commissions or offering expenses were incurred or paid to directors or officers of ours or their associates or to persons owning 10% or more of our common stock or to any affiliates of ours.

As of September 30, 2019, we have invested the net proceeds from the offering in cash equivalents and short-term investments. There has been no material change in our planned use of the net proceeds from the offering as described in our prospectus dated June 28, 2019.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Other Information.

Not applicable.

Item 6. Exhibits.

The exhibits listed on the Exhibit Index immediately preceding such exhibits, which is incorporated herein by reference, are filed or furnished as part of this Quarterly Report on Form 10-Q.

Exhibit Number	Description
10.1#	Amended and Restated Employment Agreement, dated July 3, 2019, by and between Karuna Therapeutics, Inc. and Troy Ignelzi.
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1+	Certification of Principal Executive Officer and 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.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

# Indicates a management contract or any compensatory plan, contract or arrangement.

+ The certification furnished in Exhibit 32.1 hereto is deemed to accompany this Quarterly Report on Form 10-Q and will not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, except to the extent that the Registrant specifically incorporates it by reference. Such certification will not be deemed to be incorporated by reference into any filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent that the Registrant specifically incorporates it by reference.

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.

KARUNA THERAPEUTICS, INC.

Date: November 7, 2019

By: /s/ Steven Paul, M.D.

Steven Paul, M.D.
Chief Executive Officer, President and Chairman (principal executive officer)

Date: November 7, 2019

By: /s/ Troy Ignelzi

Troy Ignelzi
Chief Financial Officer (principal financial officer)

Exhibit 10.1

AMENDED AND RESTATED EMPLOYMENT AGREEMENT

This Amended and Restated Employment Agreement ("Agreement") is made between Karuna Therapeutics, Inc., a Delaware corporation (the "Company"), and Troy Ignelzi (the "Executive") and is made effective as of the closing of the Company's first underwritten public offering of its equity securities pursuant to an effective registration statement under the Securities Act of 1933, as amended (the "Effective Date").

WHEREAS, the Company (formerly, Karuna Pharmaceuticals, Inc.) and the Executive are parties to an employment offer letter, dated February 12, 2019 (the "Prior Agreement"), which the Company and the Executive intend to amend and restate in its entirety; and

WHEREAS, the Company desires to continue to employ the Executive and the Executive desires to continue to be employed by the Company on the new terms and conditions contained herein.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree to amend and restate the Prior Agreement in its entirety as follows:

1. Employment.

(a) Term. The term of this Agreement shall commence on the Effective Date and continue until terminated in accordance with the provisions hereof (the "Term"). The Executive's employment with the Company shall be "at will," meaning that the Executive's employment may be terminated by the Company or the Executive at any time and for any reason, subject to the terms of this Agreement.

(b) Position and Duties. During the Term, the Executive shall serve as the Chief Financial Officer of the Company ("CFO") and shall have such powers and duties as may from time to time be prescribed by the Board of Directors (the "Board") or the Chief Executive Officer of the Company (the "CEO"). The Executive shall devote his full time efforts to the business and affairs of the Company; provided that he will be required to travel as necessary for business-related purposes. Notwithstanding the foregoing, the Executive may serve on other boards of directors, with the approval of the Board, or engage in religious, charitable or other community activities or other business activities as long as such services and activities are disclosed to the Board and do not interfere with the Executive's performance of his duties to the Company, provided the Executive shall not perform an operational or fundraising role for another for-profit entity.

2. Compensation and Related Matters.

(a) Base Salary. During the Term, the Executive's initial base salary shall be paid at the rate of $400,000 per year. The Executive's base salary shall be reviewed annually by the Board or the Compensation Committee of the Board (the "Compensation Committee"). The base salary in effect at any given time is referred to herein as "Base Salary." The Base Salary shall be payable in a manner that is consistent with the Company's usual payroll practices for executive officers.

(b) Incentive Compensation. During the Term, the Executive shall be eligible to receive cash incentive compensation as determined by the Board or the Compensation Committee from time to time. The Executive's initial target annual incentive compensation shall be 40 percent of his Base Salary (the "Target Bonus") and be based on predetermined metrics as determined by the Board or the Compensation Committee. Except as otherwise provided herein, to earn incentive compensation, the Executive must be employed by the Company on the day such incentive compensation is paid.

(c) Expenses. The Executive shall be entitled to receive prompt reimbursement for all reasonable expenses incurred by him during the Term in performing services hereunder, in accordance with the policies and procedures then in effect and established by the Company for its executive officers.

(d) Other Benefits. During the Term, the Executive shall be eligible to participate in or receive benefits under the Company's employee benefit plans in effect from time to time, subject to the terms of such plans.

(e) Vacations. During the Term, the Executive shall be entitled to take paid time off in accordance with the Company's applicable paid time off policy for executives as may be in effect from time to time. The Executive shall also be entitled to all paid holidays given by the Company to its executive officers.

(f) Equity. The equity awards held by the Executive shall continue to be governed by the terms and conditions of the Company's applicable equity incentive plan(s) and the applicable award agreement(s) governing the terms of such equity awards held by the Executive (collectively, the "Equity Documents"); provided, however, and notwithstanding anything to the contrary in the Equity Documents, Section 6(a)(ii) of this Agreement shall apply in the event of a termination by the Company without Cause or by the Executive for Good Reason in either event within the Change in Control Period (as such terms are defined below).

(g) Commuting and Moving Expenses. The Company shall reimburse you for all reasonable and properly documented commuting expenses incurred by you in connection with your commute to Boston, Massachusetts from your current residence, including temporary housing in Boston, Massachusetts through the earlier of (1) your establishment of a residence in Massachusetts or (2) October 31, 2019, in accordance with the Company's regular reimbursement procedures and practices in effect at the time such expenses are incurred. Within ten (10) days of establishing your residence in Massachusetts, the Company shall provide you with a one-time lump sum relocation bonus of $50,000 to use for your move from your current residence to Cambridge. This reflects your twelve (12) month commitment to the Company, and should you decide to leave the Company within the first year of your employment, you will be expected to repay the bonus back on a pro-rated basis, according to the Company's relocation policy. All payments are subject to legally required tax withholdings.

3. Termination. During the Term, the Executive's employment hereunder may be terminated without any breach of this Agreement under the following circumstances:

(a) Death. The Executive's employment hereunder shall terminate upon his death.

(b) Disability. The Company may terminate the Executive's employment if he is disabled and unable to perform the essential functions of the Executive's then existing position or positions under this Agreement with or without reasonable accommodation for a period of 180 days (which need not be consecutive) in any 12-month period. If any question shall arise as to whether during any period the Executive is disabled so as to be unable to perform the essential functions of the Executive's then existing position or positions with or without reasonable accommodation, the Executive may, and at the request of the Company shall, submit to the Company a certification in reasonable detail by a physician selected by the Company to whom the Executive or the Executive's guardian has no reasonable objection as to whether the Executive is so disabled or how long such disability is expected to continue, and such certification shall for the purposes of this Agreement be conclusive of the issue. The Executive shall cooperate with any reasonable request of the physician in connection with such certification. If such question shall arise and the Executive shall fail to submit such certification, the Company's determination of such issue shall be binding on the Executive. Nothing in this Section 3(b) shall be construed to waive the Executive's rights, if any, under existing law including, without limitation, the Family and Medical Leave Act of 1993, 29 U.S.C. §2601 *et seq*. and the Americans with Disabilities Act, 42 U.S.C. §12101 *et seq.*

(c) Termination by Company for Cause. The Company may terminate the Executive's employment hereunder for Cause. For purposes of this Agreement, "Cause" shall mean: (i) conduct by the Executive constituting a material act of misconduct in connection with the performance of his duties, including, without limitation, willful failure or refusal to perform material responsibilities that have been requested by the Board, misappropriation of funds or property of the Company or any of its subsidiaries or affiliates other than the occasional, customary and de minimis use of Company property for personal purposes, or dishonesty to the Board with respect to any material matter; (ii) the commission by the Executive of any acts satisfying the elements of felony or a misdemeanor involving moral turpitude, deceit, dishonesty or fraud, or any conduct by the Executive that would reasonably be expected to result in material injury or reputational harm to the Company or any of its subsidiaries or affiliates if he were retained in his position; (iii) continued non-performance by the Executive of his duties hereunder (other than by reason of the Executive's physical or mental illness, incapacity or disability) which has continued for more than 30 days following written notice of such non-performance from the CEO; (iv) a breach by the Executive of any of the provisions contained in Section 8 of this Agreement or the Restrictive Covenants Agreements; (v) a material violation by the Executive of the Company's written employment policies; or (vi) failure to cooperate with a bona fide internal investigation or an investigation by regulatory or law enforcement authorities, after being instructed by the Company to cooperate, or the willful destruction or failure to preserve documents or other materials known to be relevant to such investigation or the inducement of others to fail to cooperate or to produce documents or other materials in connection with such investigation.

(d) Termination without Cause. The Company may terminate the Executive's employment hereunder at any time without Cause. Any termination by the Company of the Executive's employment under this Agreement which does not constitute a termination for Cause under Section 3(c) and does not result from the death or disability of the Executive under Section 3(a) or (b) shall be deemed a termination without Cause.

(e) Termination by the Executive. The Executive may terminate his employment hereunder at any time for any reason, including but not limited to Good Reason. For purposes of this Agreement, "Good Reason" shall mean that the Executive has complied with the "Good Reason Process" (hereinafter defined) following the occurrence of any of the following events: (i) a material diminution in the Executive's responsibilities, authority or duties; (ii) a material diminution in the Executive's Base Salary except for across-the-board salary reductions based on the Company's financial performance similarly affecting all or substantially all senior management employees of the Company; (iii) a material change in the geographic location at which the Executive provides services to the Company; or (iv) the material breach of this Agreement by the Company. "Good Reason Process" shall mean that (i) the Executive reasonably determines in good faith that a "Good Reason" condition has occurred; (ii) the Executive notifies the Company in writing of the first occurrence of the Good Reason condition within 60 days of the first occurrence of such condition; (iii) the Executive cooperates in good faith with the Company's efforts, for a period not less than 30 days following such notice (the "Cure Period"), to remedy the condition; (iv) notwithstanding such efforts, the Good Reason condition continues to exist; and (v) the Executive terminates his employment within 60 days after the end of the Cure Period. If the Company cures the Good Reason condition during the Cure Period, Good Reason shall be deemed not to have occurred.

4. Notice and Date of Termination.

(a) Notice of Termination. Except for termination as specified in Section 3(a), any termination of the Executive's employment by the Company or any such termination by the Executive shall be communicated by written Notice of Termination to the other party hereto. For purposes of this Agreement, a "Notice of Termination" shall mean a notice which shall indicate the specific termination provision in this Agreement relied upon.

(b) Date of Termination. "Date of Termination" shall mean: (i) if the Executive's employment is terminated by his death, the date of his death; (ii) if the Executive's employment is terminated on account of disability under Section 3(b) or by the Company for Cause under Section 3(c), the date on which Notice of Termination is given; (iii) if the Executive's employment is terminated by the Company under Section 3(d), the date on which a Notice of Termination is given or another date as specified in the Notice of Termination; (iv) if the Executive's employment is terminated by the Executive under Section 3(e) without Good Reason, 30 days after the date on which a Notice of Termination is given, and (v) if the Executive's employment is terminated by the Executive under Section 3(e) for Good Reason, the date on which a Notice of Termination is given after the end of the Cure Period. Notwithstanding the foregoing, in the event that the Executive gives a Notice of Termination to the Company, the Company may unilaterally accelerate the Date of Termination and such acceleration shall not result in a termination by the Company for purposes of this Agreement.

5. Compensation Upon Termination.

(a) Termination Generally. If the Executive's employment with the Company is terminated for any reason, the Company shall pay or provide to the Executive (or to his authorized representative or estate) (i) any Base Salary earned through the Date of Termination, unpaid expense reimbursements (subject to, and in accordance with, Section 2(c) of this Agreement) and unused vacation that accrued through the Date of Termination on or before the time required by law but in no event more than 30 days after the Executive's Date of Termination; and (ii) any vested benefits the Executive may have under any employee benefit plan of the Company through the Date of Termination, which vested benefits shall be paid and/or provided in accordance with the terms of such employee benefit plans (collectively, the "Accrued Benefit").

(b) Termination by the Company without Cause or by the Executive with Good Reason. During the Term, if the Executive's employment is terminated by the Company without Cause as provided in Section 3(d), or the Executive terminates his employment for Good Reason as provided in Section 3(e), then the Company shall pay the Executive his Accrued Benefit. In addition, subject to (i) the Executive signing a separation agreement in a form and manner satisfactory to the Company, which shall contain, among other provisions, a general release of claims in favor of the Company and related persons and entities, confidentiality, return of property and non-disparagement and a reaffirmation of all of the Executive's Continuing Obligations (as defined below) (the "Separation Agreement and Release") and (ii) the Separation Agreement and Release becoming fully irrevocable, all within 60 days after the Date of Termination (or such shorter period as set forth in the Separation Agreement and Release), which shall include a seven (7) business day revocation period:

(i) the Company shall pay the Executive an amount equal to nine (9) months of the Executive's then current Base Salary; and

(ii) the Company shall pay the Executive a pro-rata amount of the Executive's Target Bonus based on the performance of the Company and consistent with bonuses paid to other Company executives, both as determined by the Board in its reasonable good faith discretion; and

(iii) if the Executive was participating in the Company's group health plan immediately prior to the Date of Termination and elects COBRA health continuation, then the Company shall pay to the Executive a monthly cash payment for nine (9) months or the Executive's COBRA health continuation period, whichever ends earlier, in an amount equal to the monthly employer contribution that the Company would have made to provide health insurance to the Executive if the Executive had remained employed by the Company; and

The amounts payable under Sections 5(b)(i) and (iii) shall be paid out in substantially equal installments in accordance with the Company's payroll practice over nine (9) months commencing within 60 days after the Date of Termination; provided, however, that if the 60-day period begins in one calendar year and ends in a second calendar year, such payments, to the extent they qualify as "non-qualified deferred compensation" within the meaning of Section 409A of the Internal Revenue Code of 1986, as amended (the "Code"), shall begin to be paid in the second calendar year by the last day of such 60-day period; provided, further, that the initial payment shall include a catch-up payment to cover amounts retroactive to the day immediately following the Date of Termination. Each payment pursuant to this Agreement is intended to constitute a separate payment for purposes of Treasury Regulation Section 1.409A-2(b)(2). The amount payable under Section 4(b)(ii) shall be paid on the date bonuses are paid to the Company's other executives but no later than March 15 following the year in which the Date of Termination occurs.

Notwithstanding the foregoing, if the Executive breaches any of the provisions contained in Section 8 of this Agreement or the Restrictive Covenants Agreements (as defined below), all payments under this Sections 5(b) shall immediately cease.

6. Change in Control Payment. The provisions of this Section 6 set forth certain terms of an agreement reached between the Executive and the Company regarding the Executive's rights and obligations upon the occurrence of a Change in Control of the Company. These provisions are intended to assure and encourage in advance the Executive's continued attention and dedication to his assigned duties and his objectivity during the pendency and after the occurrence of any such event. These provisions shall apply in lieu of, and expressly supersede, the provisions of Section 5(b) regarding severance pay and benefits upon a termination of employment, if such termination of employment occurs within twelve (12) months after the occurrence of the first event constituting a Change in Control (the "Change in Control Period"). These provisions shall terminate and be of no further force or effect beginning after the Change in Control Period.

(a) Change in Control. During the Term, if during the Change in Control Period, the Executive's employment is terminated by the Company without Cause as provided in Section 3(d) or the Executive terminates his employment for Good Reason as provided in Section 3(e), then, subject to the Executive signing a Separation Agreement and Release that conforms with the requirements of Section 5(b)(i) and the Separation Agreement and Release becoming fully irrevocable, all within 60 days after the Date of Termination (or such shorter period as set forth in the Separation Agreement and Release), which shall include a seven (7) business day revocation period:

(i) the Company shall pay the Executive a lump sum in cash in an amount equal to one times the sum of (A) the Executive's then current Base Salary (or the Executive's Base Salary in effect immediately prior to the Change in Control, if higher) plus (B) the Executive's Target Bonus for the then current year; and

(ii) notwithstanding anything to the contrary in any applicable option agreement or other equity award agreement, all outstanding equity grants subject to time-based vesting held by the Executive shall immediately accelerate and become fully exercisable or nonforfeitable as of the Date of Termination; and

(iii) if the Executive was participating in the Company's group health plan immediately prior to the Date of Termination and elects COBRA health continuation, then the Company shall pay to the Executive a monthly cash payment for twelve (12) months or the Executive's COBRA health continuation period, whichever ends earlier, in an amount equal to the monthly employer contribution that the Company would have made to provide health insurance to the Executive if the Executive had remained employed by the Company; and

The amounts payable under Sections 6(a)(i) and (iii) shall be paid or commence to be paid within 60 days after the Date of Termination; provided, however, that if the 60-day period begins in one calendar year and ends in a second calendar year, such payments, to the extent they qualify as "non-qualified deferred compensation" within the meaning of Section 409A of the Code, shall be paid or commence to be paid in the second calendar year by the last day of such 60-day period. Notwithstanding the foregoing, if the Executive breaches any of the provisions contained in Section 8 of this Agreement, all payments under this Section 6(a) shall immediately cease.

(b) Additional Limitation.

(i) Anything in this Agreement to the contrary notwithstanding, in the event that the amount of any compensation, payment or distribution by the Company to or for the benefit of the Executive, whether paid or payable or distributed or distributable pursuant to the terms of this Agreement or otherwise, calculated in a manner consistent with Section 280G of the Code and the applicable regulations thereunder (the "Aggregate Payments"), would be subject to the excise tax imposed by Section 4999 of the Code, then the Aggregate Payments shall be reduced (but not below zero) so that the sum of all of the Aggregate Payments shall be $1.00 less than the amount at which the Executive becomes subject to the excise tax imposed by Section 4999 of the Code; provided that such reduction shall only occur if it would result in the Executive receiving a higher After Tax Amount (as defined below) than the Executive would receive if the Aggregate Payments were not subject to such reduction. In such event, the Aggregate Payments shall be reduced in the following order, in each case, in reverse chronological order beginning with the Aggregate Payments that are to be paid the furthest in time from consummation of the transaction that is subject to Section 280G of the Code: (1) cash payments not subject to Section 409A of the Code; (2) cash payments subject to Section 409A of the Code; (3) equity-based payments and acceleration; and (4) non-cash forms of benefits; provided that in the case of all the foregoing Aggregate Payments all amounts or payments that are not subject to calculation under Treas. Reg. §1.280G-1, Q&A-24(b) or (c) shall be reduced before any amounts that are subject to calculation under Treas. Reg. §1.280G-1, Q&A-24(b) or (c).

(ii) For purposes of this Section 6(b), the "After Tax Amount" means the amount of the Aggregate Payments less all federal, state, and local income, excise and employment taxes imposed on the Executive as a result of the Executive's receipt of the Aggregate Payments. For purposes of determining the After Tax Amount, the Executive shall be deemed to pay federal income taxes at the highest marginal rate of federal income taxation applicable to individuals for the calendar year in which the determination is to be made, and state and local income taxes at the highest marginal rates of individual taxation in each applicable state and locality, net of the maximum reduction in federal income taxes which could be obtained from deduction of such state and local taxes.

(iii) The determination as to whether a reduction in the Aggregate Payments shall be made pursuant to Section 6(b)(i) shall be made by a nationally recognized accounting firm selected by the Company (the "Accounting Firm"), which shall provide detailed supporting calculations both to the Company and the Executive within 15 business days of the Date of Termination, if applicable, or at such earlier time as is reasonably requested by the Company or the Executive. Any determination by the Accounting Firm shall be binding upon the Company and the Executive.

(c) Definitions. For purposes of this Section 5, the following terms shall have the following meanings:

"Change in Control" shall mean any of the following:

(i) any "person," as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended (the "Act") (other than the Company, any of its subsidiaries, or any trustee, fiduciary or other person or entity holding securities under any employee benefit plan or trust of the Company or any of its subsidiaries), together with all "affiliates" and "associates" (as such terms are defined in Rule 12b-2 under the Act) of such person, shall become the "beneficial owner" (as such term is defined in Rule 13d-3 under the Act), directly or indirectly, of securities of the Company representing 50 percent or more of the combined voting power of the Company's then outstanding securities having the right to vote in an election of the Board ("Voting Securities") (in such case other than as a result of an acquisition of securities directly from the Company); or

(ii) the date a majority of the members of the Board is replaced during any 12-month period by directors whose appointment or election is not endorsed by a majority of the members of the Board before the date of the appointment or election; or

(iii) the consummation of (A) any consolidation or merger of the Company where the stockholders of the Company, immediately prior to the consolidation or merger, would not, immediately after the consolidation or merger, beneficially own (as such term is defined in Rule 13d-3 under the Act), directly or indirectly, shares representing in the aggregate more than 50 percent of the voting shares of the Company issuing cash or securities in the consolidation or merger (or of its ultimate parent corporation, if any), or (B) any sale or other transfer (in one transaction or a series of transactions contemplated or arranged by any party as a single plan) of all or substantially all of the assets of the Company.

Notwithstanding the foregoing, a "Change in Control" shall not be deemed to have occurred for purposes of the foregoing clause (i) solely as the result of an acquisition of securities by the Company which, by reducing the number of shares of Voting Securities outstanding, increases the proportionate number of Voting Securities beneficially owned by any person to 50 percent or more of the combined voting power of all of the then outstanding Voting Securities; provided, however, that if any person referred to in this sentence shall thereafter become the beneficial owner of any additional shares of Voting Securities (other than pursuant to a stock split, stock dividend, or similar transaction or as a result of an acquisition of securities directly from the Company) and immediately thereafter beneficially owns 50 percent or more of the combined voting power of all of the then outstanding Voting Securities, then a "Change in Control" shall be deemed to have occurred for purposes of the foregoing clause (i).

7. Section 409A.

(a) Anything in this Agreement to the contrary notwithstanding, if at the time of the Executive's separation from service within the meaning of Section 409A of the Code, the Company determines that the Executive is a "specified employee" within the meaning of Section 409A(a)(2)(B)(i) of the Code, then to the extent any payment or benefit that the Executive becomes entitled to under this Agreement on account of the Executive's separation from service would be considered deferred compensation otherwise subject to the 20 percent additional tax imposed pursuant to Section 409A(a) of the Code as a result of the application of Section 409A(a)(2)(B)(i) of the Code, such payment shall not be payable and such benefit shall not be provided until the date that is the earlier of (A) six months and one day after the Executive's separation from service, or (B) the Executive's death. If any such delayed cash payment is otherwise payable on an installment basis, the first payment shall include a catch-up payment covering amounts that would otherwise have been paid during the six-month period but for the application of this provision, and the balance of the installments shall be payable in accordance with their original schedule.

(b) All in-kind benefits provided and expenses eligible for reimbursement under this Agreement shall be provided by the Company or incurred by the Executive during the time periods set forth in this Agreement. All reimbursements shall be paid as soon as administratively practicable, but in no event shall any reimbursement be paid after the last day of the taxable year following the taxable year in which the expense was incurred. The amount of in-kind benefits provided or reimbursable expenses incurred in one taxable year shall not affect the in-kind benefits to be provided or the expenses eligible for reimbursement in any other taxable year (except for any lifetime or other aggregate limitation applicable to medical expenses). Such right to reimbursement or in-kind benefits is not subject to liquidation or exchange for another benefit.

(c) To the extent that any payment or benefit described in this Agreement constitutes "non-qualified deferred compensation" under Section 409A of the Code, and to the extent that such payment or benefit is payable upon the Executive's termination of employment, then such payments or benefits shall be payable only upon the Executive's "separation from service." The determination of whether and when a separation from service has occurred shall be made in accordance with the presumptions set forth in Treasury Regulation Section 1.409A-1(h).

(d) The parties intend that this Agreement will be administered in accordance with Section 409A of the Code. To the extent that any provision of this Agreement is ambiguous as to its compliance with Section 409A of the Code, the provision shall be read in such a manner so that all payments hereunder comply with Section 409A of the Code. Each payment pursuant to this Agreement is intended to constitute a separate payment for purposes of Treasury Regulation Section 1.409A-2(b)(2). The parties agree that this Agreement may be amended, as reasonably requested by either party, and as may be necessary to fully comply with Section 409A of the Code and all related rules and regulations in order to preserve the payments and benefits provided hereunder without additional cost to either party.

(e) The Company makes no representation or warranty and shall have no liability to the Executive or any other person if any provisions of this Agreement are determined to constitute deferred compensation subject to Section 409A of the Code but do not satisfy an exemption from, or the conditions of, such Section.

8. Continuing Obligations.

(a) Restrictive Covenants Agreement. The Executive has previously entered into the Employee Invention and Non-Disclosure Agreement dated March 11, 2019, attached hereto as Exhibit A and the Non-Competition and Non-Solicitation Agreement dated March 11, 2019, attached hereto as Exhibit B (together, the "Restrictive Covenants Agreements"). The terms of the Restrictive Covenants Agreements continue to remain in full force and effect. For purposes of this Agreement, the obligations in this Section 8 and those that arise in the Restrictive Covenants Agreements and any other agreement relating to confidentiality, assignment of inventions, or other restrictive covenants shall collectively be referred to as the "Continuing Obligations."

(b) Protected Disclosures and Other Protected Action. Nothing in this Agreement shall be interpreted or applied to prohibit the Executive from making any good faith report to any governmental agency or other governmental entity (a "Government Agency") concerning any act or omission that the Executive reasonably believes constitutes a possible violation of federal or state law or making other disclosures that are protected under the anti-retaliation or whistleblower provisions of applicable federal or state law or regulation. In addition, nothing contained in this Agreement limits the Executive's ability to communicate with any Government Agency or otherwise participate in any investigation or proceeding that may be conducted by any Government Agency, including the Executive's ability to provide documents or other information, without

notice to the Company. In addition, for the avoidance of doubt, pursuant to the federal Defend Trade Secrets Act of 2016, the Executive shall not be held criminally or civilly liable under any federal or state trade secret law or under this Agreement or the Restrictive Covenants Agreements for the disclosure of a trade secret that (a) is made (i) in confidence to a federal, state, or local government official, either directly or indirectly, or to an attorney; and (ii) solely for the purpose of reporting or investigating a suspected violation of law; or (b) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal.

9. Consent to Jurisdiction. The parties hereby consent to the jurisdiction of the state and federal courts of the Commonwealth of Massachusetts. Accordingly, with respect to any such court action, the Executive (a) submits to the personal jurisdiction of such courts; (b) consents to service of process; and (c) waives any other requirement (whether imposed by statute, rule of court, or otherwise) with respect to personal jurisdiction or service of process.

10. Integration. This Agreement, along with the Restrictive Covenants Agreements, constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior agreements between the parties concerning such subject matter, including the Prior Agreement, provided that the Restrictive Covenants Agreement and the Equity Documents remain in full force and effect.

11. Withholding; Tax Effect. All payments made by the Company to the Executive under this Agreement shall be net of any tax or other amounts required to be withheld by the Company under applicable law. Nothing in this Agreement shall be construed to require the Company to make any payments to compensate the Executive for any adverse tax effect associated with any payments or benefits or for any deduction or withholding from any payment or benefit.

12. Successor to the Executive. This Agreement shall inure to the benefit of and be enforceable by the Executive's personal representatives, executors, administrators, heirs, distributees, devisees and legatees. In the event of the Executive's death after his termination of employment but prior to the completion by the Company of all payments due him under this Agreement, the Company shall continue such payments to the Executive's beneficiary designated in writing to the Company prior to his death (or to his estate, if the Executive fails to make such designation).

13. Enforceability. If any portion or provision of this Agreement (including, without limitation, any portion or provision of any section of this Agreement) shall to any extent be declared illegal or unenforceable by a court of competent jurisdiction, then the remainder of this Agreement, or the application of such portion or provision in circumstances other than those as to which it is so declared illegal or unenforceable, shall not be affected thereby, and each portion and provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law.

14. Survival. The provisions of this Agreement shall survive the termination of this Agreement and/or the termination of the Executive's employment to the extent necessary to effectuate the terms contained herein.

15. Waiver. No waiver of any provision hereof shall be effective unless made in writing and signed by the waiving party. The failure of any party to require the performance of any term or obligation of this Agreement, or the waiver by any party of any breach of this Agreement, shall not prevent any subsequent enforcement of such term or obligation or be deemed a waiver of any subsequent breach.

16. Notices. Any notices, requests, demands and other communications provided for by this Agreement shall be sufficient if in writing and delivered in person or sent by a nationally recognized overnight courier service or by registered or certified mail, postage prepaid, return receipt requested, to the Executive at the last address the Executive has filed in writing with the Company or, in the case of the Company, at its main offices, attention of the Board.

17. Amendment. This Agreement may be amended or modified only by a written instrument signed by the Executive and by a duly authorized representative of the Company.

18. Effect on Other Plans and Agreements. An election by the Executive to resign for Good Reason under the provisions of this Agreement shall not be deemed a voluntary termination of employment by the Executive for the purpose of interpreting the provisions of any of the Company's benefit plans, programs or policies. Nothing in this Agreement shall be construed to limit the rights of the Executive under the Company's benefit plans, programs or policies except as otherwise provided in Section 8 hereof, and except that the Executive shall have no rights to any severance benefits under any Company severance pay plan, offer letter or otherwise. In the event that the Executive is party to an agreement with the Company providing for payments or benefits under such agreement and this Agreement, the terms of this Agreement shall govern and the Executive may receive payment under this Agreement only and not both. Further, Section 5 and Section 6 of this Agreement are mutually exclusive and in no event shall the Executive be entitled to payments or benefits pursuant to Section 5 and Section 6 of this Agreement.

19. Governing Law. This is a Massachusetts contract and shall be construed under and be governed in all respects by the laws of the Commonwealth of Massachusetts, without giving effect to the conflict of laws principles thereof. With respect to any disputes concerning federal law, such disputes shall be determined in accordance with the law as it would be interpreted and applied by the United States Court of Appeals for the First Circuit.

20. Counterparts. This Agreement may be executed in any number of counterparts, each of which when so executed and delivered shall be taken to be an original; but such counterparts shall together constitute one and the same document.

21. Successor to Company. The Company shall require any successor (whether direct or indirect, by purchase, merger, consolidation or otherwise) to all or substantially all of the business or assets of the Company expressly to assume and agree to perform this Agreement to the same extent that the Company would be required to perform it if no succession had taken place. Failure of the Company to obtain an assumption of this Agreement at or prior to the effectiveness of any succession shall be a material breach of this Agreement.

22. Gender Neutral. Wherever used herein, a pronoun in the masculine gender shall be considered as including the feminine gender unless the context clearly indicates otherwise.

IN WITNESS WHEREOF, the parties have executed this Agreement effective on the date and year first above written.

KARUNA THERAPEUTICS, INC.

By: _____
Its: _____

EXECUTIVE

_____
Troy Ignelzi

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO RULES 13A-14(A) AND 15D-14(A) UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF SARBANES-OXLEY ACT OF 2002

I, Steven Paul, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Karuna Therapeutics, 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)) 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) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

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

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

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

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

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

Dated: November 7, 2019

/s/ Steven Paul, M.D.

Steven Paul, M.D.
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO RULES 13A-14(A) AND 15D-14(A) UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF SARBANES-OXLEY ACT OF 2002

I, Troy Ignelzi, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Karuna Therapeutics, 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)) 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) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

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

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

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

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

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

Dated: November 7, 2019

/s/ Troy Ignelzi

Troy Ignelzi
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER 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 Karuna Therapeutics, Inc. (the "Company") for the quarterly period ended September 30, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Steven Paul and Troy Ignelzi, Chief Executive Officer of the Company and Chief Financial Officer of the Company, respectively, 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 their 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.

Dated: November 7, 2019

/s/ Steven Paul, M.D.

Steven Paul, M.D.
Chief Executive Officer
(Principal Executive Officer)

Dated: November 7, 2019

/s/ Troy Ignelzi

Troy Ignelzi
Chief Financial Officer
(Principal Financial Officer)