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

FORM 6-K

REPORT OF FOREIGN PRIVATE ISSUER
PURSUANT TO RULE 13a-16 OR 15d-16
UNDER THE SECURITIES EXCHANGE ACT OF 1934

For the Month of June 2018

Commission File Number: 001-38217

Nightstar Therapeutics plc
(Translation of registrant's name into English)

215 Euston Road
London NW1 2BE United Kingdom
(Address of principal executive office)

Indicate by check mark whether the registrant files or will file annual reports under cover of Form 20-F or Form 40-F:

☒ Form 20-F ☐ Form 40-F

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(1): ☐

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(7): ☐

Other Events

On June 6, 2018, Nightstar Therapeutics plc issued a press release announcing financial results for quarter ended March 31, 2018. The press release is attached as Exhibit 99.1 hereto and is incorporated by reference herein.

Exhibit	Description
99.1	Press Release issued on June 6, 2018

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.

NIGHTSTAR THERAPEUTICS PLC

Date: June 6, 2018

By: /s/ Bryan Yoon
Name: Bryan Yoon
Title: General Counsel and Secretary

Exhibit 99.1

Nightstar Therapeutics Reports First Quarter 2018 Financial Results and Acceleration of Preliminary NSR-RPGR Readout to Third Quarter 2018

Preliminary data from dose escalation study in the Phase 1/2 XIRIUS trial for X-Linked Retinitis Pigmentosa expected ahead of schedule in Q3 2018

Dose expansion study in the XIRIUS trial expected to begin enrollment in Q4 2018

WALTHAM, Mass. and LONDON – June 6, 2018 (GLOBE NEWSWIRE) – Nightstar Therapeutics plc (NASDAQ: NITE), a clinical-stage gene therapy company developing treatments for rare inherited retinal diseases, today reported financial results for the quarter ended March 31, 2018 and provided an update on recent achievements and upcoming clinical milestones.

"We started 2018 with a steadfast commitment to execution," said Dave Fellows, Chief Executive Officer. "We're pleased to announce that our program for the treatment of X-Linked Retinitis Pigmentosa (XLRP) is ahead of schedule. In the third quarter of this year, we expect to announce preliminary data from the dose escalation study of the Phase 1/2 XIRIUS trial and, in the fourth quarter of this year, begin enrollment in the expansion study in XIRIUS. This follows our achievement earlier this year of initiating our Phase 3 STAR trial in choroideremia ahead of schedule. We look forward to continuing our mission to cure inherited retinal diseases."

Anticipated Milestones for 2018 and 2019

- **NSR-RPGR for X-Linked Retinitis Pigmentosa**
    - **Q3 2018: Preliminary Data from Dose Escalation Study.** Preliminary efficacy and safety data of NSR-RPGR from the dose escalation study in the XIRIUS trial is expected to be presented at an upcoming medical meeting.
    - **Q4 2018: Initiation of Expansion Study.** The expansion study in the XIRIUS trial is intended to enroll approximately 30 patients at a therapeutic dose informed by the dose escalation study. It is anticipated that the expansion study will include a low-dose control group of approximately 15 patients.
    - **Mid 2019: Preliminary Data from Expansion Study**
    - **2H 2019: One-Year Follow-up Data from Dose Escalation Study**
    - **2020: One-Year Follow-up Data from Expansion Study**
- **NSR-REP1 for Choroideremia**
    - **1H 2019: Completion of Enrollment for Phase 3 STAR Registrational Trial for Choroideremia**
    - **2020: One-year Follow-up Data from Phase 3 STAR Trial**

First Quarter 2018 Financial Results

Research and development expenses for the quarter ended March 31, 2018 were $6.1 million versus $2.8 million for the quarter ended March 31, 2017. The increase of $3.3 million resulted from increases in program-related expenses of $1.0 million for NSR-REP1 and $1.4 million for NSR-RPGR, as well as a $1.4 million increase in personnel-related costs, partially offset by an

increase of $0.7 million of research and development tax credit from HM Revenue & Customs in the United Kingdom. Research and development personnel-related costs increased due to an increase in headcount in the first quarter of 2018 to support our growth and to assist in the further development of our product candidates and pipeline. The increase in research and development personnel-related costs includes $0.2 million of additional non-cash share-based compensation compared to the same period in 2017.

General and administrative expenses for the quarter ended March 31, 2018 were $2.8 million, compared to $0.7 million for the quarter ended March 31, 2017. The increase of $2.1 million was mainly due to a $0.7 million increase in consulting and professional fees including increased legal, accounting and audit fees, and a $1.1 million increase in personnel-related costs. General and administrative personnel-related costs increased due to an increase in employees to support our increased research and development activities and our status as a public company. The increase in general and administrative personnel-related costs included $0.5 million of additional non-cash share-based compensation compared to 2017.

Net loss for the quarter ended March 31, 2018 was $14.4 million, or $0.52 basic and diluted net loss per ordinary share, as compared to $3.5 million for the quarter ended March 31, 2017, or $0.30 basic and diluted net loss per ordinary share.

As of March 31, 2018, our cash and cash equivalents totaled $122.3 million, compared to $129.4 million at December 31, 2017. As of March 31, 2018, we had approximately 28.9 million ordinary shares outstanding.

About Nightstar

Nightstar is a leading clinical-stage gene therapy company focused on developing and commercializing novel one-time treatments for patients suffering from rare inherited retinal diseases that would otherwise progress to blindness. Nightstar's lead product candidate, NSR-REP1, is currently in Phase 3 development for the treatment of patients with choroideremia, a rare, degenerative, genetic retinal disorder that has no current treatments and affects approximately one in every 50,000 people. Positive results from a Phase 1/2 trials of NSR-REP1 were published in The Lancet in 2014 and in The New England Journal of Medicine in 2016. Nightstar's second product candidate, NSR-RPGR, is currently being evaluated in a clinical trial known as the XIRIUS trial for the treatment of patients with X-linked retinitis pigmentosa, an inherited X-linked recessive retinal disease that affects approximately one in every 40,000 people.

For more information about Nightstar or its clinical trials, please visit www.nightstartx.com.

Cautionary Language Concerning Forward-Looking Statements

This press release contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. The words "believe," "anticipate," "intend," "estimate," "will," "may," "should," "expect" or other similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. All statements contained in this press release other than statements of historical facts are forward-looking statements, including, without limitation: statements about our results of

operations for the first quarter of 2018, cash position and sufficiency of capital resources to fund our operating requirements, our planned and ongoing clinical trials for NSR-REP1 and NSR-RPGR, including our Phase 3 STAR trial in choroideremia, the dose escalation study in the XIRIUS trial for X-linked Retinitis Pigmentosa and the planned expansion study in the XIRIUS trial, the continued clinical development of our pipeline, the timelines associated with our research and development programs including the timing of patient enrollment and the release of data from ongoing clinical trials and studies, the prevalence of patient populations for our targeted indications, and the utility of prior preclinical and clinical data in determining future clinical results. These forward-looking statements are based on management's current expectations of future events and are subject to a number of involve substantial known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements, including the risks and uncertainties set forth in Item 3.D. "Risk Factors" section of our Annual Report on Form 20-F for the year ended December 31, 2017 and subsequent reports that we file with the U.S. Securities and Exchange Commission We may not actually achieve the plans, intentions, estimates or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions, estimates and expectations disclosed in the forward-looking statements we make. We anticipate that subsequent events and developments will cause our views to change. We are under no duty to update any of these forward-looking statements after the date of this press release to conform these statements to actual results or revised expectations, except as required by law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this press release.

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Investors:

Senthil Sundaram, Chief Financial Officer
Brian Luque, Sr. Manager, Investor Relations
investors@nightstartx.com

NIGHTSTAR THERAPEUTICS PLC

Consolidated Statements of Operations and Comprehensive Loss
(In thousands, except share and per share amounts)

	Three Months Ended March 31,	
	2018	2017
Operating expenses:		
Research and development	$ 6,064	$ 2,750
General and administrative	2,776	730
Total operating expenses	8,840	3,480
Other income (expense):		
Interest and other income	367	4
Other expense, net	(5,885)	4
Total other income (expense), net	(5,518)	8
Net loss	(14,358)	(3,472)
Other comprehensive loss:		
Foreign exchange translation adjustment	6,346	143
Total comprehensive loss	$ (8,012)	$ (3,329)
Basic and diluted net loss per ordinary share	$ (0.52)	$ (0.30)
Weighted average basic and diluted ordinary shares	27,861,709	11,679,707

NIGHTSTAR THERAPEUTICS PLC

Consolidated Balance Sheets
(In thousands)

	March 31, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$122,277	$ 129,404
Prepaid expenses and other assets	6,135	5,438
Total current assets	128,412	134,842
Property and equipment, net	352	355
Total assets	$128,764	$ 135,197
Liabilities and shareholders' equity		
Current liabilities:		
Accounts payable	$ 5,148	$ 3,196
Accrued expenses and other liabilities	4,980	6,189
Total current liabilities	10,128	9,385
Total liabilities	10,128	9,385
Total shareholders' equity	118,636	125,812
Total liabilities and shareholders' equity	$128,764	$ 135,197