# Rocket Pharmaceuticals Presents Updated Data from Phase 1/2 Gene Therapy Trial of RP-L102 in Patients with Fanconi Anemia at the American Society of Gene & Cell Therapy (ASGCT) Annual Meeting

May 18, 2018

*- Continued Clinical Evidence Demonstrates RP-L102 Can Restore Bone Marrow Function of Fanconi Anemia Patients Without Conditioning -*

*- Increases in Gene-Corrected Leukocytes Demonstrate Bone Marrow Rescue Leading to Hematologic Stabilization -*

*- All Four Patients Followed for Six Months or Longer Demonstrate Mixed Chimerism; Two Patients with Higher Product Doses Exhibit Sustained Mosaic Phenotype -*

*- First Patient Treated with Transduction-Enhanced RP-L102 Shows Highest Transduction Efficiency and Earliest Engraftment to Date -*

NEW YORK--(BUSINESS WIRE)--May 18, 2018-- Rocket Pharmaceuticals, Inc. (NASDAQ: RCKT) ("Rocket"), a leading U.S.-based multi-platform gene therapy company, announced the presentation of updated data from the ongoing Phase 1/2 clinical trial of RP-L102, the Company's lead lentiviral vector (LVV)-based gene therapy, for Fanconi Anemia (FA). The data were highlighted today in an oral presentation during the distinguished Presidential Symposium at the ASGCT 2018 Annual Meeting, by Dr. Juan Bueren, Head of the Hematopoietic Innovative Therapies Division at the Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) in Spain / CIBER-Rare Diseases / IIS-Fundación Jiménez Díaz (FJD), and program principal investigator of the RP-L102 trial.

"Several important observations are emerging from our ongoing Phase 1/2 trial in FA. First, even without myeloablative conditioning, there are increasing levels of bone marrow engraftment following administration of RP-L102. Second, the improvement of chromosomal stability in corrected FA cells indicates that RP-L102 is reversing the FA phenotype. Third, the natural progression of bone marrow failure in these patients is reversed. In fact, the bone marrow cells of the two patients who received higher doses demonstrate conversion to a somatic mosaic status that is sustained over the course of several months. Finally, the progressive increases of corrected, versus non-corrected, peripheral blood leukocytes indicate that RP-L102 is restoring functionality of bone marrow hematopoietic stem cells. This translates to a stabilization in peripheral blood cell counts which would otherwise continue to decline in the absence of treatment. Based on these encouraging results, I believe that RP-L102 has the potential to be a transformative and minimally toxic prevention of bone marrow failure for FA," said Dr. Bueren.

This Phase 1/2 study is an ongoing, open-label, single-center study designed to evaluate the safety and efficacy of RP-L102 in FA type A without the use of myeloablative conditioning. Julian Sevilla, M.D., Ph.D., of the hospital of Niño Jesús in Madrid, is the clinical trial principal investigator. Five patients have been treated to date. The first four patients have been followed for 12-24 months, and a fifth patient, treated with transduction-enhanced RP-L102, has been followed for two months.

Key efficacy measurements include:

- **Genetic correction of bone marrow cells (engraftment)**: measured by peripheral blood vector copy number (VCN)
- **Functional and phenotypic correction of bone marrow cells**: measured by resistance to mitomycin-C (MMC)
- **Functional and phenotypic correction of blood cells:** measured by chromosomal stability of T-lymphocytes in the presence of diepoxybutane (DEB)
- **Hematologic correction**: measured by changes in previously declining pre-treatment blood count trajectories

Other measured parameters include safety, vector integration profile, and clonal repertoire.

**Updated Results Presented at ASGCT 2018**:

Data presented today includes all five patients treated to date with RP-L102 under academic protocol:

- All patients demonstrated continued improvement in engraftment following administration of RP-L102. In patient 02002—the first patient treated with higher doses—peripheral blood VCN increased to 44% at 24 months, from 34% at 19

months and 17% at 12 months.

- Sustained phenotypic reversals and earlier evidence of gene correction were seen in higher-dosed patients (02002 and 02006) within months of treatment. Notably, based on MMC and DEB assays, these two patients showed durable improvements consistent with somatic mosaicism that has persisted over the course of several months. Somatic mosaicism is an FA phenomenon where patients largely do not develop the typical FA manifestations of bone marrow failure and leukemia[1]. Moreover, in patient 02002, the bone marrow resistance to MMC increased to 70% at 24 months (up from ~20% at 12 months), approaching the phenotype of a healthy donor.
- Patients 02004 and 02005 received non-optimized and lower doses of RP-L102. Nonetheless, evidence of gene-corrected and phenotypically-normalized cells was seen, but after longer durations.
- One patient (01003) received RP-L102 manufactured in the presence of transduction enhancers. Based on early data, RP-L102 transduction efficiency (drug product VCN) was the highest to date—more than five-fold higher compared to the best previously achieved (0.53 for patient 2006 and 0.43 for patient 2002). Additionally, early engraftment accelerated more than three-fold compared to earlier patients.
- No serious drug-related adverse events have been observed to date.

“We are very pleased by the trajectory of progressively increasing gene markings and reversion to a phenotype where the blood and bone marrow cells are resistant to DNA damaging agents. Moreover, it appears that the stabilization of blood counts, which previously were declining, resulted from an increase in gene-corrected peripheral blood cell lineages,” said Gaurav Shah, M.D., Chief Executive Officer and President of Rocket. “Moving forward, we plan to use a further optimized process with the addition of transduction enhancers and treat patients earlier in their disease course. These modifications are expected to enable more robust responses.”

“The value creation we seek, relative to standard transplant, is to enable intervention soon after diagnosis as a preventative measure. Therefore, stability of blood counts is going to be an important indicator of the potential benefit of our FANCA-focused LVV gene therapy programs for this life-threatening disease,” continued Dr. Shah. “Rocket remains committed to advancing the standard of care in FA, and to the continued advancement of our pipeline of five LVV and AAV-based gene therapy programs. We will continue to innovate and aspire to create new options for patients with devastating diseases.”

Additional patient data from the FA program is expected over the next 12-18 months. Based on these promising preliminary results, Rocket will engage with regulatory authorities to progress RP-L102 towards a potential global registrational study in 2019.

Presentations from ASGCT will be posted on Rocket’s website at: www.rocketpharma.com/pipeline/. Updated data from the ongoing Phase 1/2 trial in FA will be submitted for publication.

**About RP-L102 (LVV-based gene therapy for Fanconi Anemia):**

RP-L102 is Rocket’s lentiviral vector (LVV)-based gene therapy in development for patients with FA with Rocket’s collaboration partners at Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) in Spain, CIBER-Rare Diseases and IIS-Fundación Jiménez Díaz. The International Fanconi Anemia Gene Therapy Working Group helped develop the structure of RP-L102, which begins with a HIV-1-derived, self-inactivating lentiviral vector. RP-L102’s lentiviral vector carries the FANC-A gene as part of the PGK-FANCA-WPRE expression cassette which includes a phosphoglycerate kinase (PKG) promoter and an optimized woodchuck hepatitis virus posttranscriptional regulatory element (WPRE). The *ex vivo* administration process begins with the removal and isolation of hematopoietic stem cells using a CD34+ selection process. Autologous genetically modified CD34+ enriched hematopoietic cells (fresh or cryopreserved) are infused back into patients to restore function. RP-L102 is currently being studied in a Phase 1/2 clinical trial in the European Union with an Investigational Medicinal Product Dossier (IMPD) in place with the Spanish Agency for Medicines and Health Products. RP-L102 has been granted Orphan Drug designation for the treatment of Fanconi Anemia type A in the United States and in Europe.

**About Fanconi Anemia**

Fanconi Anemia (FA) is a rare pediatric disease characterized by bone marrow failure, malformations and cancer predisposition. The primary cause of death among patients with FA is bone marrow failure, which typically occurs during the first decade of life. Allogeneic hematopoietic stem cell transplantation (HSCT), when available, corrects the hematologic component of FA, but requires myeloablative conditioning, which is highly toxic for the patient. HSCT is frequently complicated by graft versus host disease and also increases the risk of many solid organ malignancies. Approximately 60-70% of patients with FA have a FANC-A gene mutation, which encodes for a protein essential for DNA repair. Mutation in the FANC-A gene leads to chromosomal breakage and increased sensitivity to oxidative and environmental stress. Chromosome fragility induced by DNA-alkylating agents such as mitomycin-C (MMC) or diepoxybutane (DEB) is the ‘gold standard’ test for FA diagnosis. The DEB assay can further differentiate FA patients from somatic mosaic patients. Somatic mosaicism occurs when there is a spontaneous reversion mutation that can lead to a mixed chimerism of corrected and uncorrected bone marrow cells leading to stabilization or correction of an FA patient’s blood counts in the absence of any administered therapy. Somatic mosaicism provides strong rationale for the development of FA gene therapy and demonstrates the selective advantage of gene-corrected hematopoietic cells in FA[1].

**About Rocket Pharmaceuticals, Inc.**

Rocket Pharmaceuticals, Inc. (NASDAQ: RCKT) (“Rocket”) is an emerging, clinical-stage biotechnology company focused on developing first-in-class gene therapy treatment options for rare, devastating diseases. Rocket’s multi-platform development approach applies the well-established lentiviral vector (LVV) and adeno-associated viral vector (AAV) gene therapy platforms. Rocket's lead clinical program is a LVV-based gene therapy for the treatment of Fanconi Anemia (FA), a difficult to treat genetic disease that leads to bone marrow failure and potentially cancer. Preclinical studies of additional bone marrow-derived disorders are ongoing and target Pyruvate Kinase Deficiency (PKD), Leukocyte Adhesion Deficiency-I (LAD-I) and Infantile Malignant Osteopetrosis (IMO). Rocket is also developing an AAV-based gene therapy program for an undisclosed rare pediatric disease. For more information about Rocket, please visit www.rocketpharma.com.

**Cautionary Statement Regarding Forward-Looking Statements**

Various statements in this release concerning Rocket's future expectations, plans and prospects, including without limitation, Rocket's expectations regarding the safety, effectiveness and timing of product candidates that Rocket may develop, including in collaboration with academic partners, to treat Fanconi Anemia (FA), Leukocyte Adhesion Deficiency-I (LAD-I), Pyruvate Kinase Deficiency (PKD) and Infantile Malignant Osteopetrosis (IMO), and the safety, effectiveness and timing of related pre-clinical studies and clinical trials, may constitute forward-looking statements for the purposes of the safe harbor provisions under the Private Securities Litigation Reform Act of 1995 and other federal securities laws and are subject to substantial risks, uncertainties and assumptions. You should not place reliance on these forward-looking statements, which often include words such as "believe", "expect", "anticipate", "intend", "plan", "will give", "estimate", "seek", "will", "may", "suggest" or similar terms, variations of such terms or the negative of those terms. Although Rocket believes that the expectations reflected in the forward-looking statements are reasonable, Rocket cannot guarantee such outcomes. Actual results may differ materially from those indicated by these forward-looking statements as a result of various important factors, including, without limitation, Rocket's ability to successfully demonstrate the efficacy and safety of such products and pre-clinical studies and clinical trials, its gene therapy programs, the preclinical and clinical results for its product candidates, which may not support further development and marketing approval, Rocket's ability to commence a registrational study in FA within the projected time periods, the potential advantages of Rocket's product candidates, actions of regulatory agencies, which may affect the initiation, timing and progress of pre-clinical studies and clinical trials of its product candidates, Rocket's and its licensors ability to obtain, maintain and protect its and their respective intellectual property, the timing, cost or other aspects of a potential commercial launch of Rocket's product candidates, Rocket's ability to manage operating expenses, Rocket's ability to obtain additional funding to support its business activities and establish and maintain strategic business alliances and new business initiatives, Rocket's dependence on third parties for development, manufacture, marketing, sales and distribution of product candidates, the outcome of litigation, and unexpected expenditures, as well as those risks more fully discussed in the section entitled "Risk Factors" in Rocket's Annual Report on Form 10-K for the year ended December 31, 2017. Accordingly, you should not place undue reliance on these forward-looking statements. All such statements speak only as of the date made, and Rocket undertakes no obligation to update or revise publicly any forward-looking statements, whether as a result of new information, future events or otherwise.

[1]Soulier, J.,et al. (2005) Detection of somatic mosaicism and classification of Fanconi anemia patients by analysis of the FA/BRCA pathway. *Blood* 105: 1329-1336

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