Deciphera Pharmaceuticals Reports Updated Interim Phase 1 Clinical Study Results with DCC-2618 at The 2018 American Society of Clinical Oncology Annual Meeting (ASCO) and Provides Additional Clinical and Regulatory Updates on DCC-2618

June 2, 2018

- Initial Objective Response Rates and Disease Control Rates in Second and Third Line GIST Patients Exceed Previously Published Results of Registrational Trials for Currently Approved Therapies -

- Mutational Profiling Data Across Second, Third and Fourth Line GIST Patients Demonstrates the Breadth of KIT Mutations and Ability of DCC-2618 to Reduce Mutant Allele Frequency (MAF) -

- Initiation of a Phase 3 Trial in Second Line GIST Patients Expected in 2018 -

- Interim Results with DCC-2618 Demonstrate Robust Clinical Activity in Heavily Pretreated GIST Patients, Including Patients Previously Treated with the Investigational Agent avapritinib (BLU-285) -

WALTHAM, Mass.--(BUSINESS WIRE)--Jun. 2, 2018-- Deciphera Pharmaceuticals, Inc. (NASDAQ:DCPH), a clinical-stage biopharmaceutical company focused on addressing key mechanisms of tumor drug resistance, announced the presentation

today of updated data from its ongoing Phase 1 clinical trial of DCC-2618, the company's broad-spectrum KIT and PDGFRα inhibitor, in patients with gastrointestinal stromal tumors (GIST) at the American Society of Clinical Oncology (ASCO) Annual Meeting 2018, in Chicago, Illinois and provided additional clinical and regulatory updates on DCC-2618.

Suzanne George, M.D. Assistant Professor of Medicine, Harvard Medical School and Clinical Director, Center for Sarcoma and Bone Oncology, Dana-Farber Cancer Institute presented the poster titled "Mutational Profile of Drug Resistant GIST Patients Enrolled in the Phase 1 Study of DCC-2618". In addition to describing the mutational profile of KIT in GIST patients, the poster includes details of locally-read Objective Response Rates (ORR) and Disease Control Rates (DCR) as assessed by Response Evaluation Criteria in Solid Tumors (RECIST) in second, third, and fourth and fourth line plus GIST patients that received DCC-2618 at doses of ≥100mg daily for at least one 28-day cycle prior to February 2, 2018:

Line of Therapy	GIST Patients (n)	DCR at 3 Months	ORR
2nd Line[1]	25	79%	24%
3rd Line[1]	29	82%	24%
≥4th Line	91	64%	9%
Total	145	70%	15%

[1]46 of 54 second and third line patients received 150mg once daily dose.

The combined 24% ORR and 80% 3-month DCR in second and third line patients receiving DCC-2618 at doses of ≥100mg per day exceeds previously published results of registrational trials for the currently approved therapies for second line (sunitinib) and third line (regorafenib), which have reported ORRs of 7.0% and 4.5%, respectively, and levels of disease control of 60% and 53%, respectively.

"The preliminary data presented today on DCC-2618's activity in second and third line GIST patients is very encouraging and supports the planned initiation later this year of our Phase 3 trial, INTRIGUE, in second line GIST patients," said Michael D. Taylor, Ph.D., President and Chief Executive Officer of Deciphera. "The mutational profiling data across second, third and fourth line GIST patients observed in the Phase 1 study

also demonstrates the need for the broadest spectrum of KIT inhibition in all GIST patients who previously received imatinib."

"We are very pleased with the results presented today demonstrating DCC-2618's potential to provide improved clinical benefit for not only heavily pre-treated patients, but also for second and third line GIST patients," said Oliver Rosen, M.D. Chief Medical Officer of Deciphera. "Combined with the tolerability data presented at AACR in April 2018, these results demonstrate the potential of DCC-2618 as an effective and well tolerated therapy for a wide range of GIST patients."

Highlights from the poster presentation include:

- Initial Objective Response Rates and Disease Control Rates with DCC-2618 at Doses of ≥100mg Daily in Second and Third Line GIST Patients Exceed Previously Published Results of Registrational Trials for Currently Approved Therapies, as well as the Results Observed in Heavily Pre-Treated GIST Patients Receiving DCC-2618:
    - 24% ORR with DCC-2618 observed to date in second and third line GIST patients is higher than that reported for sunitinib in second line patients (7.0%) or regorafenib in third line patients (4.5%).
    - These interim results show improved ORR and 3-month DCR in second line GIST patients treated with DCC-2618 compared to fourth and fourth line plus GIST patients treated with DCC-2618.
- Mutational Profiling Data Across Second, Third and Fourth Line GIST Patients Demonstrates the Breadth of KIT Mutations in GIST and the Ability of DCC-2618 to Reduce KIT Mutant Allele Frequency (MAF):
    - Resistance mutations in KIT in exons 13, 14, 17 and 18, or a combination thereof, occurs in second, third and, fourth and fourth line plus patients.
    - The KIT mutational profile in both tumors and plasma at baseline in GIST patient supports the need for a broad-spectrum KIT inhibitor in all post-imatinib lines of therapy.
    - 57 of 73 patients (78%) receiving DCC-2618 at doses of ≥100 mg daily demonstrated reductions in KIT MAF of more than 50%.

In addition, the company is providing the following clinical and regulatory updates on

DCC-2618:

- Planned Initiation of a Phase 3 Trial in Second Line GIST Patients in 2018
  - Preliminary efficacy results in second line patients together with recently presented tolerability data at the recommended phase 2 dose (RP2D) of 150mg QD support the planned, randomized Phase 3 trial, INTRIGUE, in second line GIST.
  - Following discussions with regulatory authorities in the United States and in Europe, the company has designed INTRIGUE as a randomized, multicenter, open-label, Phase 3 trial in second line GIST. This registration study is expected to enroll approximately 350 patients who will be randomized 1:1 to either DCC-2618 or sunitinib, the current standard of care in second line; with median progression free survival as the primary endpoint.

- Interim Results with DCC-2618 at Doses of ≥100mg Daily Demonstrate Robust Clinical Activity in Heavily Pretreated GIST Patients, Including Patients Previously Treated with the Investigational Agent avapritinib (BLU-285):
  - 10 patients with KIT-driven GIST who previously received avapritinib were enrolled and treated with DCC-2618 as of January 31, 2018.
  - 6 out of 10 (60%) of these patients achieved stable disease as best response by RECIST during treatment with DCC-2618. In addition, one patient achieved stable disease following intra-patient dose escalation to 150mg BID.
  - 5 out of 10 (50%) of these patients were on study as of April 18, 2018.
  - 3 out of 10 (30%) of these patients received DCC-2618 for more than six months. Two of these patients achieved continued stable disease and remain on study as of April 18, 2018. The third patient with progressive disease was dose escalated and was reported as off study as of April 18, 2018.

A copy of the poster presentation will be available on the Science section of the Deciphera website under “Presentations and Publications” at www.deciphera.com.

About DCC-2618

DCC-2618 is a KIT and PDGFRα kinase switch control inhibitor in clinical development for the treatment of KIT and/or PDGFRα-driven cancers, including gastrointestinal stromal tumors, or GIST, systemic mastocytosis, or SM, and glioblastoma multiforme. DCC-2618 was specifically designed to improve the treatment of GIST patients by inhibiting a broad spectrum of mutations in KIT and PDGFRα. DCC-2618 is a KIT and PDGFRα inhibitor that blocks initiating and secondary KIT mutations in exons 9, 11, 13, 14, 17, and 18, involved in GIST as well as the primary D816V exon 17 mutation involved in SM. DCC-2618 also inhibits primary PDGFRα mutations in exons 12, 14 and 18, including the exon 18 D842V mutation, involved in a subset of GIST.

About Deciphera Pharmaceuticals

Deciphera Pharmaceuticals is a clinical-stage biopharmaceutical company focused on improving the lives of cancer patients by tackling key mechanisms of drug resistance that limit the rate and/or durability of response to existing cancer therapies. Our small molecule drug candidates are directed against an important family of enzymes called kinases, known to be directly involved in the growth and spread of many cancers. We use our deep understanding of kinase biology together with a proprietary chemistry library to purposefully design compounds that maintain kinases in a “switched off” or inactivated conformation. These investigational therapies comprise tumor-targeted agents designed to address therapeutic resistance causing mutations and immuno-targeted agents designed to control the activation of immunokinases that suppress critical immune system regulators, such as macrophages. We have used our platform to develop a diverse pipeline of tumor-targeted and immuno-targeted drug candidates designed to improve outcomes for patients with cancer by improving the quality, rate and/or durability of their responses to treatment.

Availability of Other Information About Deciphera Pharmaceuticals

Investors and others should note that Deciphera Pharmaceuticals communicates with its investors and the public using its company website (www.deciphera.com), including but not limited to investor presentations and scientific presentations, Securities and Exchange Commission filings, press releases, public conference calls and webcasts. The information that Deciphera Pharmaceuticals posts on these channels and websites could be deemed to be material information. As a result, Deciphera

Pharmaceuticals encourages investors, the media and others interested in Deciphera Pharmaceuticals to review the information that it posts on these channels, including Deciphera Pharmaceuticals' investor relations website, on a regular basis. This list of channels may be updated from time to time on Deciphera Pharmaceuticals' investor relations website and may include other social media channels than the ones described above. The contents of Deciphera Pharmaceuticals' website or these channels, or any other website that may be accessed from its website or these channels, shall not be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended.

Cautionary Note Regarding Forward-Looking Statements

This press release contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended, including, without limitation, statements regarding the planned initiation later this year of our Phase 3 trial, INTRIGUE, in second line GIST patients; the need for a broad-spectrum KIT inhibitor in all post-imatinib lines of therapy; potential for DCC-2618 as an effective and well tolerated therapy to treat a wide range of patients with GIST, SM, glioblastoma multiforme and other diseases; statements regarding the potential benefits to patients of DCC-2618; statements regarding plans and timelines for the clinical development of DCC-2618; and Deciphera Pharmaceuticals' strategy, business plans and focus. The words "designed to," "may," "will," "could," "would," "should," "expect," "plan," "approximate," "anticipate," "intend," "believe," "estimate," "predict," "project," "potential," "continue," "target" and variations of these words or similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Any forward-looking statements in this press release are based on management's current expectations and beliefs and are subject to a number of risks, uncertainties and important factors that may cause actual events or results to differ materially from those expressed or implied by any forward-looking statements contained in this press release, including, without limitation, statements regarding the potential for DCC-2618 to treat GIST SM, glioblastoma multiforme and other diseases; statements regarding the potential benefits to patients of DCC-2618; statements regarding plans and timelines for the clinical development of DCC-2618; and Deciphera Pharmaceuticals' strategy, business

plans and focus. These and other risks and uncertainties are described in greater detail in the section entitled "Risk Factors" in Deciphera Pharmaceuticals' most recent annual report on Form 10-K, and other filings that Deciphera Pharmaceuticals may make with the SEC in the future. Any forward-looking statements contained in this press release represent Deciphera Pharmaceuticals' views only as of the date hereof and should not be relied upon as representing its views as of any subsequent date. Deciphera Pharmaceuticals explicitly disclaims any obligation to update any forward-looking statements.

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