Deciphera Pharmaceuticals, Inc. Reports Data Analysis from the Ongoing Phase 1 Clinical Trial of DCC-2618 at the Annual Meeting of The Connective Tissue Oncology Society

- Data Support the Selection of the Recommended Daily Dose of 150 mg -

- Durable Disease Control Rates in Heavily Pretreated GIST Patients and Reductions in KIT Mutations Supporting pan-KIT Activity of DCC-2618 Across Spectrum of Exons -

- DCC-2618 Continues to Demonstrate Good Tolerability with Over 120 Patients Dosed to Date -

Waltham, MA – November 10, 2017 – Deciphera Pharmaceuticals, Inc. (NASDAQ:DCPH) a clinical-stage biopharmaceutical company focused on addressing key mechanisms of tumor drug resistance, today announced the presentation of data analysis from its ongoing Phase 1 clinical trial of DCC-2618, the Company's pan-KIT and PDGFRα inhibitor. The analysis and update was presented at the Annual Meeting of The Connective Tissue Oncology Society (CTOS) on November 10, 2017, in Maui, HI, USA. The presentation reviews data from the same trial presented at the European Society for Medical Oncology (ESMO) 2017 Congress in September 2017, and provides pharmacodynamic support for the recommended dose of 150 mg once daily. As reported at ESMO, the data showed that in heavily pretreated patients with gastrointestinal stromal tumors (GIST), treatment with DCC-2618 at $\geq$100 mg daily resulted in disease control rates of 76% at 12 weeks and 57% at 24 weeks.

Deciphera also provided an update on enrollment of the ongoing Phase 1 clinical trial announcing that as of October 31, 2017, a total of 125 patients had been dosed with DCC-2618 of which 109 were GIST patients, including 54 GIST patients in three expansion cohorts of the Phase 1 trial, which are enrolling 2nd-line, 3rd-line, and fourth-to-fifth line GIST patients, respectively.

"The analysis presented at CTOS supports the selection of 150 mg once daily as the recommend dose and supports the planned evaluation of DCC-2618 in a placebo-controlled, randomized, pivotal Phase 3 trial in patients with GIST, who have previously failed all three approved therapies," said Michael D. Taylor, Ph.D., President and Chief Executive Officer of Deciphera Pharmaceuticals. "There are no approved therapies for these fourth-line GIST patients and new treatment options are desperately needed."

"The clinical profile of DCC-2618 continues to demonstrate good tolerability and durable responses in GIST patients who were resistant to other kinase inhibitors," said Oliver Rosen, M.D., Chief Medical Officer of Deciphera Pharmaceuticals. "The extent of the reductions in KIT mutant allele frequencies observed at doses as low as 100 mg daily across the spectrum of exons 9, 11, 13, 14, 17 and 18 mutations both supports the selection of 150 mg once daily as the recommend dose and provides clinical evidence in these patients of the pan-KIT profile of DCC-2618."

In an oral presentation, titled "DCC-2618, a novel pan-KIT and PDGFRα kinase switch control inhibitor demonstrates encouraging activity in patients (pts) with gastrointestinal stromal tumor (GIST)," Dr. Neeta Somaiah, M.D., The University of Texas MD Anderson Cancer Center, presented safety data from 70 patients, 57 of which were heavily pretreated GIST patients. As of July 28, 2017, data showed:

- DCC-2618 was generally well-tolerated at all dose levels studied with three dose limiting toxicity events determined to be not clinically significant (two Grade 3 lipase elevations and one Grade 4 CPK elevation).

- At daily doses of 100 mg or greater, GIST patients with KIT or PDGFRα driven disease on DCC-2618 showed a disease control rate (DCR) of 76% at 12 weeks (n=25) and a DCR of 57% at 24 weeks (n=21). DCR is defined as patients with stable disease, partial response or complete response as assessed by Response Evaluation Criteria in Solid Tumors, or RECIST.

- Treatment with DCC-2618 resulted in reductions in cfDNA KIT mutant allele frequencies (MAF) compared to baseline values (n=19) at doses as low as 100 mg daily supporting the selection of 150 mg once daily as the recommended dose and supporting the pan-KIT profile of DCC-2618.

About DCC-2618

DCC-2618 is currently in a first-in-human Phase 1 clinical trial. DCC-2618 is a pan-KIT and PDGFRα kinase switch control inhibitor in clinical development for the treatment of KIT and/or PDGFRα-driven cancers, including gastrointestinal stromal tumors, glioblastoma multiforme and systemic mastocytosis.

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 plans and timelines for the clinical development of DCC-2618, DCC-3014 and rebastinib; the timing of updated clinical data for Deciphera Pharmaceuticals' Phase 1 clinical trials for DCC-2618 and DCC-3014; expectations regarding Deciphera Pharmaceuticals' existing cash and cash equivalents; and Deciphera Pharmaceuticals' strategy, business plans and focus. The words "may," "will," "could," "would," "should," "expect," "plan," "anticipate," "intend," "believe," "estimate," "predict," "project," "potential," "continue," "target" and 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, risks and uncertainties related to the delay of any current or planned clinical trials or the development of Deciphera Pharmaceuticals' drug candidates, including DCC-2618, DCC-3014 and rebastinib; Deciphera Pharmaceuticals' advancement of multiple early-stage efforts; Deciphera Pharmaceuticals' ability to successfully demonstrate the efficacy and safety of its drug candidates; the preclinical and clinical results for Deciphera Pharmaceuticals' drug candidates, which may not support further development of such drug candidates; and actions of regulatory agencies, which may affect the initiation, timing and progress of clinical trials; Deciphera Pharmaceuticals' ability to develop and commercialize companion diagnostic tests for its current and future drug candidates. These and other risks and uncertainties are described in greater detail in the section entitled "Risk Factors" in Deciphera Pharmaceuticals' Form 424B4, as filed with the Securities and Exchange Commission (SEC) on September 28, 2017, 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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