Idera Pharmaceuticals Announces Positive Phase 1 Data of IMO-2125 in Null Responder HCV Patients at EASL 2010

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- IMO-2125 Shown to Induce Interferon-alpha and Other Cytokines -

- Interferon-alpha Induction Correlates with Viral Load Reductions -

CAMBRIDGE, Mass., Apr 15, 2010 (BUSINESS WIRE) --Idera Pharmaceuticals, Inc. (Nasdaq: IDRA) announced today that positive interim data from a Phase 1 clinical trial of IMO-2125, a Toll-like Receptor 9 (TLR9) agonist, in null responder patients with chronic hepatitis C virus (HCV) infection were presented at the 45th Annual Meeting of the European Association for the Study of the Liver (EASL). The oral presentation, entitled "A Phase 1, Multi-Center, Randomized, Placebo-controlled, Dose-escalation Study of IMO-2125, a TLR9 Agonist, in Hepatitis C Non-responders", was made by John McHutchison, M.D., Associate Director, Duke Clinical Research Institute and Director, Gastroenterology and Hepatology Research, Duke University Medical Center, Principal Investigator for the trial. The presentation provided additional detail from the trial regarding the interim data that was announced in December 2009.

In this trial, null responder HCV patients received IMO-2125 or placebo treatment once per week for four weeks. IMO-2125 was well tolerated by all patients receiving IMO-2125 through the first four dose levels. These patients showed dose-dependent increases in endogenous interferon-alpha and other anti-viral proteins. In addition, serum concentrations of induced interferon-alpha correlated with decreases in HCV viral load, and six of the eight null responder HCV patients who received IMO-2125 at 0.32 mg/kg/week showed maximum viral load reductions ranging from 1.0 to 3.5 logs at least once during the treatment period.

"In this interim report from a Phase 1 study, the results seen in patients receiving IMO-2125 are encouraging and warrant further study," said Dr. McHutchison. "New therapeutic approaches, including novel classes of immune modulators, are needed for the null responder HCV patient population, who show no benefit from standard of care therapy."

"Results from this first-in-man trial confirm the intended mechanism of action of IMO-2125. Based on these data, we have extended the trial to a fifth dose level and are evaluating dosage and treatment schedules in preparation for a planned Phase 2 trial in combination with ribavirin in the null responder HCV patient population," said Robert Arbeit, M.D., Vice President of Clinical Development at Idera. "In parallel we are conducting a Phase 1 clinical trial of IMO-2125 in combination with ribavirin in treatment-naïve HCV patients."

"We are encouraged with the results to date, which show that IMO-2125 induction of endogenous interferon-alpha and other cytokines correlates with anti-viral activity in this difficult-to-treat patient population," said Sudhir Agrawal, D.Phil., Chief Executive Officer and Chief Scientific Officer at Idera. "IMO-2125 was designed based on our expertise in nucleic acid chemistry and our application of structure-activity relationship studies to the creation of TLR-targeted therapeutics."

The presentation includes results at four dose levels of IMO-2125, 0.04, 0.08, 0.16, and 0.32 mg/kg, administered by weekly subcutaneous injection. Highlights of the interim data are as follows:

- All patients enrolled in the trial are null responders, which is defined as patients who have failed to achieve a 2 log10 reduction in viral load during previous 12 to 24 weeks of treatment with pegylated recombinant interferon-alpha plus ribavirin, the current standard of care treatment.
- Forty of the 41 patients enrolled in the first four dose levels were genotype 1a or 1b. Other baseline characteristics are summarized in the following table.

Characteristic	N = 41
Age (mean ± SD)	51 ± 6.6 years
Gender male	N = 29 (71%)
Race white	N = 33 (81%)
HCV RNA (mean ± SD)	6.8 ± 0.5 log10 copies/mL
Serum IP-10 (mean ± SD)	561 ± 271 pg/mL
Serum interferon-alpha < limit of quantification	N = 41 (100%)

- IMO-2125 at 0.04, 0.08, 0.16, and 0.32 mg/kg/week was well tolerated for the four weeks of treatment, with no drug-related treatment discontinuations.
- 89% of adverse events were mild, 11% were moderate; most common were "flu-like symptoms" that typically lasted less than 1 day. There were no clinically significant adverse effects on safety laboratory parameters.

- IMO-2125 induction of endogenous interferon-alpha was dose-dependent. At increasing dose levels, interferon-alpha responses were both more frequent and of greater magnitude.
- IMO-2125 induction of endogenous interferon-alpha was stronger after the fourth dose compared to the first dose. More patients had detectable serum interferon-alpha after the fourth dose than after the first dose, and the concentrations observed were higher.
- Consistent with the intended mechanism of action, IMO-2125 induced dose-dependent increases in serum concentrations of interferon-inducible protein 10 (IP-10), and 2', 5'-oligoadenylate synthetase (2', 5'-OAS), which also have been shown to have anti-viral activity.
- At dose levels of 0.08 to 0.32 mg/kg/week, an increasing percentage of patients achieved maximum reduction in viral load of 1 log10 or more at least once during the treatment period as shown in the following table.

Dosage (mg/kg/wk)	N	Pts with greater-than or equal to 1 log10 decrease in HCV RNA	Mean maximum log10 reduction in HCV RNA	Range of decreases greater-than or equal to 1 log10
Placebo	8	0/8	-0.4	NA
0.04	8	0/8	-0.5	NA
0.08	9	4/9	-1.1	-1.1 to -2.3
0.16	8	5/8	-1.2	-1.2 to -2.0
0.32	8	6/8	-1.7*	-1.0 to -3.5

*p<0.001 compared to placebo

- Six of 8 null responder HCV patients who received IMO-2125 at 0.32 mg/kg/week showed maximum viral load reductions ranging from 1.0 to 3.5 log10 at least once during the treatment period.
- Serum concentrations of endogenous interferon-alpha induced by IMO-2125 treatment correlated with reductions in HCV RNA viral titers.

Enrollment is continuing at the IMO-2125 dose level of 0.48 mg/kg/week. Planned next steps for evaluation of IMO-2125 in null responder HCV patients include investigation of twice-weekly dosing and conduct of a Phase 2 clinical trial in combination with ribavirin. Studies conducted in non-human primates have demonstrated consistent pharmacodynamics with twice-weekly dosing.

Idera also is conducting a Phase 1 clinical trial of IMO-2125 combined with ribavirin in treatment-naïve HCV patients (Trial 2125-201).

Additional authors of the presentation and study investigators include: Andrew Muir, M.D., MHS, of Duke Clinical Research Institute, Durham, NC; Reem Ghalib, M.D., of The Liver Institute, Dallas TX; Stuart Gordon, M.D., of Henry Ford Hospital, Detroit MI; Eric Lawitz, M.D., of Alamo Medical Research, San Antonio TX; Keyur Patel, M.D., of Duke University, Durham NC; Maribel Rodriguez-Torres, M.D., of Fundacion de Investigation de Diego, Santurce PR; and Aasim Sheikh, M.D., of Gastrointestinal Specialists of Georgia, Marietta GA; Shelly Sapp and Ramona Taylor of Duke Clinical Research Institute; Alice Bexon, MBChB, and Tim Sullivan, Ph.D., of Idera Pharmaceuticals, Inc.

In addition to the above presentation, Idera will present data from preclinical studies in a poster at EASL 2010 entitled "IMO-2125, an agonist of TLR9 that induces endogenous IFN-alpha, upregulates broader range of gene expression profiles compared to exogenously added IFN-alpha in human PBMCs". The poster will be presented by Idera scientists on April 16, 2010.

About IMO-2125

IMO-2125, a novel agonist of Toll-like Receptor 9 (TLR9), is designed to induce endogenous interferon-alpha along with other Th1-type cytokines and chemokines. IMO-2125 is Idera's lead drug candidate for the treatment of chronic hepatitis C virus (HCV) infection.

In preclinical studies, IMO-2125 induced high levels of endogenous interferon-alpha and Th1-type cytokines and chemokines in human peripheral blood mononuclear cells (PBMCs) and plasmacytoid dendritic cells (pDCs) *(data presented at 47th Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC), 2007, Abstract 2714)*. Subcutaneous administration of IMO-2125 in non-human primates led to dose-dependent induction of endogenous interferon-alpha, IP-10, and other cytokines. Cytokines induced in human PBMCs, pDCs, and *in vivo* in non-human primates demonstrated potent antiviral activity in the HCV replicon assay *(data presented at ICAAC 2007, Abstract 1583 and at 60th Annual Meeting of the American Association for the Study of Liver Diseases (AASLD), 2009, Abstract 1593)*.

IMO-2125 has been shown to mediate immune responses through TLR9 and associated interferon-signaling pathways involving MyD88 and interferon-regulatory factor 7 (IRF-7) as evaluated in gene microarray studies. Additionally, many type 1 interferon-response genes, interferon-inducible proteins, antiviral proteins, TLR9 signaling molecules and transcription factors have been shown to be up-regulated *(data presented at AASLD 2009, Abstract 1597)*.

About the Trial in Null Responder HCV Patients (2125-001)

In this trial, IMO-2125 was administered subcutaneously once per week for four weeks at four dose levels of 0.04, 0.08, 0.16, and 0.32 mg/kg and was

evaluated for safety, immunological activity, and effect on HCV viral load. Cohorts of ten patients were enrolled at each dose level with two patients randomized to receive placebo treatment. All patients enrolled in the trial were null responders, which is defined as patients who failed to achieve a 2 log10 reduction in viral load during previous 12 to 24 weeks of treatment with pegylated recombinant interferon-alpha plus ribavirin. The Company currently is enrolling patients at the dose level of 0.48 mg/kg/week. The trial is being conducted at six U.S. sites with a central laboratory for safety, immunology, and HCV RNA assessments.

About the Trial in HCV-infected Treatment-naïve Patients (2125-201)

The Company also is evaluating IMO-2125 in a Phase 1 clinical trial in combination with ribavirin in treatment-naïve patients with genotype 1 chronic HCV infection. In this clinical trial, patients receive IMO-2125 by subcutaneous injection once per week for four weeks at escalating dose levels in combination with daily oral administration of standard doses of ribavirin. A total of 15 patients are planned for the first cohort, with 12 randomized to receive IMO-2125 and three randomized to receive placebo. The trial protocol provides that subsequent cohorts will include 18 patients, with 12 randomized to receive IMO-2125 and six randomized to receive pegylated recombinant alfa-2a interferon. The primary objective of the trial is to assess the safety and tolerability of IMO-2125 in combination with standard doses of ribavirin. In addition, this trial is designed to monitor the effect of treatment on HCV viral load. The clinical trial is currently being conducted at sites in France and Russia.

About Idera Pharmaceuticals, Inc.

Idera Pharmaceuticals develops drug candidates to treat infectious diseases, autoimmune and inflammatory diseases, cancer, and respiratory diseases, and for use as vaccine adjuvants. Our proprietary drug candidates are designed to modulate specific Toll-like Receptors (TLRs), which are a family of immune system receptors that direct immune system responses. Our pioneering DNA and RNA chemistry expertise enables us to create drug candidates for our internal development programs and our partnered programs, and generates opportunities for additional collaborative alliances. For more information, visit www.iderapharma.com.

Idera Forward Looking Statements

This press release contains forward-looking statements concerning Idera Pharmaceuticals, Inc. that involve a number of risks and uncertainties. For this purpose, any statements contained herein that are not statements of historical fact may be deemed to be forward-looking statements. Without limiting the foregoing, the words "believes," "anticipates," "plans," "expects," "estimates," "intends," "should," "could," "will," "may," and similar expressions are intended to identify forward-looking statements. There are a number of important factors that could cause Idera's actual results to differ materially from those indicated by such forward-looking statements, including statements with respect to the interim results of this trial of IMO-2125 which may not be duplicated in future cohorts at different doses or in future clinical trials; whether results obtained in preclinical studies and early clinical trials such as the studies and trials referred to in this release will be indicative of results obtained in future clinical trials; whether products based on Idera's technology will advance into or through the clinical trial process on a timely basis or at all and receive approval from the United States Food and Drug Administration or equivalent foreign regulatory agencies; whether, if the Company's products receive approval, they will be successfully distributed and marketed; whether the Company's collaborations with Merck KGaA and an affiliate of Merck & Co., Inc. will be successful; whether the patents and patent applications owned or licensed by the Company will protect the Company's technology and prevent others from infringing it; whether Idera's cash resources will be sufficient to fund the Company's operations; and such other important factors as are set forth under the caption "Risk Factors" in Idera's Annual Report on Form 10-K for the year ended December 31, 2009, which important factors are incorporated herein by reference. Idera disclaims any intention or obligation to update any forward-looking statements.

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