Mirum's Maralixibat Demonstrates Transplant-Free Survival for Pediatric Patients with Progressive Familial Intrahepatic Cholestasis

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- Maralixibat-treated patients achieving serum bile acid control have five-year native liver survival after treatment.

- Data demonstrate normalization and reductions of liver enzymes, reduced pruritus, and improved growth.

- Data selected for oral presentation at the Digital International Liver Congress 2020 being held August 27-29, 2020.

FOSTER CITY, Calif.--(BUSINESS WIRE)--Jun. 2, 2020-- Mirum Pharmaceuticals, Inc. (NASDAQ: MIRM) today reported an analysis from its Phase 2 INDIGO open-label study evaluating maralixibat in patients with bile acid salt export pump (BSEP) deficiency, or PFIC2. The data demonstrated that patients with long-term maralixibat treatment who achieved serum bile acid (sBA) control, have five-year transplant-free survival after treatment.

"Patients need alternatives to surgery or transplant to treat PFIC2, otherwise known as BSEP deficiency, and the long-term maralixibat data demonstrate the therapy's potential to provide an efficacious and well-tolerated treatment for this condition," said Richard Thompson, Professor of Molecular Hepatology at King's College London. "The long-term control of serum bile acids underscores the potential for maralixibat to transform the way PFIC2 is treated, as well as provide additional benefit across many of the quality of life measures that can be debilitating and significantly impact patients' lives."

A study recently published by the NAPPED Consortium established that sBA control (<102µmol/L or a 75% reduction) after interruption of the enterohepatic circulation by biliary diversion surgery was associated with native liver survival of up to 15 years. Similarly, maralixibat pharmacologically interrupts the enterohepatic circulation, and maralixibat responders from the INDIGO study surpassed the sBA thresholds described in the NAPPED study, which were statistically significant compared to baseline ($p<0.05$). In addition, maralixibat responders achieved normalization of liver enzyme and bilirubin levels, decreased pruritus, and improved z-scores in both height and weight.

The data and analysis have been selected by the European Association for the Study of the Liver (EASL) as a late-breaker and oral presentation at the Digital International Liver Congress 2020 being held August 27-29, 2020.

"We are thrilled with these data as they confirm our belief that maralixibat has the potential to treat PFIC2, preventing transplant and surgical diversion and alleviating many of the symptoms associated with the condition," said Chris Peetz, president and chief executive officer at Mirum. "Supporting this, we have cases of maralixibat-treated patients being removed from the liver transplant waiting list. There is a tremendous need for new medicines for the patients and families suffering from this disease, and it is our goal to develop a treatment that can address this rare and serious cholestatic liver disease."

About the Maralixibat Phase 2 INDIGO Study

The INDIGO Phase 2 study is an ongoing, open-label study evaluating the long-term treatment effects of interruption of enterohepatic circulation with maralixibat in children with PFIC. INDIGO included 19 PFIC2 patients with non-truncating BSEP mutations who received maralixibat 280 µg/kg once daily. Patients without response or with partial treatment response could escalate to 280 µg/kg twice daily in the optional extension period. Study endpoints were sBA, pruritus, quality of life, safety and tolerability.

Week 237 (n=7)	**Mean Value**	**Mean Reduction from Baseline**	**P value**
Serum bile acid (SE) µmol/L	44.2 (38.8)	-234.4 (80.5)	<0.05
ALT (SE) U/L	16.7	-41.1 (14.3)	<0.05
AST (SE) U/L	26.7	-35.4 (11.5)	<0.05
Total bilirubin (SE) mg/dL	0.7	-0.1 (0.3)	0.8
Direct bilirubin (SE) mg/dL	0.1	-0.4 (0.2)	0.13

Patients treated with maralixibat exhibited a clinically meaningful and statistically significant acceleration in height growth as measured by height z-score ($p<0.01$), as well as a clinically meaningful and statistically significant reduction in pruritus ($p<0.001$).

Of the enrolled patients, seven achieved sBA control and remained on study as of Week 237. Long-term treatment with maralixibat was well-tolerated. The most frequent treatment-emergent adverse events (TEAEs) were pyrexia, diarrhea, cough, abdominal pain, and vomiting. TEAEs were mild to

moderate in severity.

Patients with an sBA response continue to be treated with maralixibat for more than five years with improvements demonstrated across multiple parameters.

About Maralixibat

Maralixibat is a novel, minimally-absorbed, orally administered investigational drug being evaluated in several rare cholestatic liver diseases for pediatric populations. Maralixibat inhibits the apical sodium dependent bile acid transporter, resulting in more bile acids being excreted in the feces, leading to lower levels of bile acids systemically, thereby potentially reducing bile acid mediated liver damage and related effects and complications. More than 1,500 individuals have received maralixibat, including more than 100 children who have received maralixibat as an investigational treatment for Alagille syndrome (ALGS) and progressive familial intrahepatic cholestasis (PFIC). In the ICONIC Phase 2b ALGS clinical trial, patients taking maralixibat had significant reductions in bile acids and pruritus compared to placebo. In a Phase 2 PFIC study, a genetically defined subset of BSEP (bile salt export pump) deficient (PFIC2), patients responded to maralixibat. The FDA has granted maralixibat Breakthrough Therapy designation for pruritus associated with Alagille syndrome in patients one year of age and older and for PFIC2. Maralixibat was generally well-tolerated throughout the studies. The most frequent adverse events were diarrhea, abdominal pain, and vomiting. For more information about the Phase 3 study for maralixibat in pediatric patients with PFIC, visit PFICtrial.com. For more information about the North American Expanded Access Program please visit ALGSEAP.com.

About Mirum Pharmaceuticals

Mirum Pharmaceuticals, Inc. is a clinical-stage biopharmaceutical company focused on the development and commercialization of a late-stage pipeline of novel therapies for debilitating liver diseases. The company's lead product candidate, maralixibat, is an investigational oral drug in development for Alagille syndrome (ALGS) and progressive familial intrahepatic cholestasis (PFIC). For more information, visit MirumPharma.com. Follow Mirum on Twitter, Facebook and LinkedIn.

Forward-Looking Statements

Statements contained in this press release regarding matters that are not historical facts are "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. Such forward-looking statements include statements regarding, among other things, the results, conduct, progress and timing of Mirum's clinical trials and the regulatory approval path for maralixibat. Because such statements are subject to risks and uncertainties, actual results may differ materially from those expressed or implied by such forward-looking statements. Words such as "plans," "will", "believes," "anticipates," "expects," "intends," "goal," "potential" and similar expressions are intended to identify forward-looking statements. These forward-looking statements are based upon Mirum's current expectations and involve assumptions that may never materialize or may prove to be incorrect. Actual results could differ materially from those anticipated in such forward-looking statements as a result of various risks and uncertainties, which include, without limitation, risks and uncertainties associated with Mirum's business in general, the impact of the COVID-19 pandemic, and the other risks described in Mirum's filings with the Securities and Exchange Commission. In addition, the COVID-19 pandemic continues to rapidly evolve and actual results are highly uncertain and cannot be predicted with confidence. All forward-looking statements contained in this press release speak only as of the date on which they were made and are based on management's assumptions and estimates as of such date. Mirum undertakes no obligation to update such statements to reflect events that occur or circumstances that exist after the date on which they were made, except as required by law.

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