



## **Adeona Pharmaceuticals and Intrexon Announce Worldwide Exclusive Collaboration for Synthetic DNA-based Therapy for Pulmonary Arterial Hypertension**

### **For Immediate Release**

**Ann Arbor, MI, & Germantown, MD, November 21, 2011** – Adeona Pharmaceuticals, Inc. (NYSE Amex: AEN), a developer of innovative disease-modifying medicines for serious illnesses, and the Human Therapeutics Division of Intrexon Corporation, a synthetic biology company that utilizes its proprietary technologies to provide control over cellular function, announced today the formation of a global exclusive channel collaboration through which Adeona intends to develop and commercialize a DNA-based therapeutic using Intrexon's UltraVector® platform and RheoSwitch Therapeutic System® for the treatment of pulmonary arterial hypertension (PAH).

Under the collaboration, Adeona will utilize Intrexon's advanced transgene engineering platform for the controlled, precise and continuous *in vivo* cellular production of prostaglandin synthase (PGIS), a specific effector enzyme that regulates the production of prostacyclin. PGIS expression is decreased in the lungs of PAH patients and deficiency in prostacyclin production is strongly implicated in PAH. Prostacyclin is a short-acting vasodilator and inhibitor of platelet aggregation that has demonstrated a survival benefit in primary pulmonary hypertension patients when administered by continuous central venous catheter infusion ( $p < 0.003$ ).<sup>i</sup> DNA-based *in vivo* expression of PGIS has demonstrated the ability to increase prostacyclin levels and improve survival in animal models of PAH.<sup>ii</sup>

Intrexon employs its modular genetic engineering platform in the areas of therapeutics, protein production, animal sciences, industrial products, and agriculture products. The exclusive channel collaboration between Intrexon and Adeona has been established specifically for the *in vivo* production of PGIS for PAH. Under the collaboration, Intrexon will be responsible for technology discovery efforts and managing the patent estate as well as for certain aspects of manufacturing. Adeona will be responsible for conducting preclinical and clinical development of candidates, as well as for other aspects of manufacturing and the commercialization of the candidate product.

Intrexon's core synthetic biology technology is designed to create Better DNA™ at industrial scale, enabling unprecedented control over the function and output of living cells by providing external control over *in vivo* activation and regulation of potent effectors. This platform, called UltraVector®, provides speed, flexibility, consistency and precision to the design, production and testing of rationally designed complex transgenes and their encoded genetic circuits. These qualities allow an iterative and rational approach to transgene design, which can be continually engineered until the host cell performance is optimized. Through this process, Intrexon is able to overcome the challenges inherent in current therapeutic strategies, including recombinant protein therapies and constitutive gene therapies, thereby enhancing capabilities, improving safety and lowering cost for human therapeutics.

“Our collaboration with Intrexon is consistent with Adeona’s strategy of building shareholder value through continuous evaluation of new product opportunities and acting upon those that meet Adeona’s mission of delivering disease-modifying therapies for serious illnesses. We believe that this product opportunity and collaboration far and away exceeds these criteria, and we are pleased to be working

with Intrexon to make this important new therapy available to PAH patients,” stated Adeona’s Chairman, Jeffrey Riley.

“Current sales of approved therapies for PAH are an estimated \$3 billion per year. While current therapies may improve quality of life, they have for the most part shown only modest improvements in survival, if any. We believe that by having the ability to correct what is considered to be a critical pathophysiological defect in PAH, namely reduced expression of prostaglandin synthase, we may have the opportunity to fundamentally change the course of PAH. We further believe that the ‘second generation’ rational nature of Intrexon’s genetic engineering technology provides the enabling technology necessary to make this goal a practical reality for PAH patients. We are pleased to be working with Intrexon in this exciting and potentially disease changing collaboration,” stated James S. Kuo, M.D., M.B.A., Chief Executive Officer of Adeona.

"We are very pleased to collaborate with Adeona in this further demonstration of the breadth of Intrexon's UltraVector® platform and embedded controllable bioreactor approach to novel therapeutics. We are impressed with Adeona’s demonstrated ability to operate efficiently and decisively and we believe these qualities will serve both parties well as we navigate through the drug development process and commercialization," stated Glenn Nedwin, President, Human Therapeutics Division at Intrexon.

Under terms of the agreement:

- Subject to the pre-approval of the NYSE Amex, Adeona will issue to Intrexon at \$0.001 par value per share, 3,123,558 shares of its common stock, representing 9.995% of Adeona's issued and outstanding shares following and after taking into account such issuance; Adeona has agreed to issue to Intrexon an equal number of additional shares of its common stock at \$0.001 par value per share, representing an additional 9.995%, upon dosing of the first patient in an Adeona-sponsored U.S. Phase II clinical trial of the candidate product using Intrexon technology;
- Intrexon has been granted the right to purchase up to 19.99% of securities offerings that may be conducted by Adeona in the future, subject to certain conditions and limitations;
- Intrexon has been granted the right to make purchases of Adeona’s common stock in the open market up to an additional 10% of Adeona’s common stock; and
- Subject to certain expense allocations, Adeona will pay Intrexon 50% of the cumulative net quarterly profits derived from the sale of products developed from the channel collaboration.

“Because of the very wide breadth of applications that our technologies may enable, we believe that we can play a democratizing role among companies within traditional life science industries and among those in other industries that look to life science to supply solutions that their existing industrial processes have been otherwise unable to provide,” stated RJ Kirk, Intrexon’s Chairman and CEO. “In therapeutics, in particular, we see many opportunities for game changing strategies to be deployed against indications both large and small, complex and simple. In consequence, and as part of our business strategy, we look for opportunities to align ourselves with smaller, more entrepreneurial companies around focused opportunities that may be fully explored at costs and on timelines that previously were not available. Our new collaboration with Adeona around PAH exemplifies such an

alignment and we celebrate our partner's entrepreneurial spirit, vision and dedication to the service of patients as we begin the work of producing a meaningful improvement to the lives of people with this unfortunate but theoretically treatable condition."

If the NYSE Amex approval of the issuance of the securities described above is not received within 60 days of the date of the execution of the exclusive channel agreement, Intrexon has the right to terminate the exclusive channel collaboration.

Griffin Securities served as financial advisor to Intrexon in connection with the transaction.

### **About Pulmonary Arterial Hypertension (PAH)**

Pulmonary arterial hypertension is a progressive, disabling and life-threatening disorder characterized by abnormally high blood pressure (hypertension) in the pulmonary artery, the blood vessel that carries blood from the heart to the lungs. Hypertension occurs when most of the very small arteries throughout the lungs narrow in diameter, which increases the resistance to blood flow through the lungs. To overcome the increased resistance, pressure increases in the pulmonary artery and in the heart chamber that pumps blood into the pulmonary artery (the right ventricle). Signs and symptoms of pulmonary arterial hypertension occur when increased pressure cannot fully overcome the elevated resistance and blood flow to the body is insufficient. Shortness of breath during exertion and fainting spells are the most common early symptoms of pulmonary arterial hypertension. Despite current treatments, the outcome of PAH is generally very poor and associated with high rates of mortality within three to five years of diagnosis.

### **About Intrexon Corporation**

Intrexon Corporation is a privately held synthetic biology company that employs modular DNA control systems to enhance capabilities, improve safety and lower cost in [human therapeutics](#), [protein production](#), [industrial products](#), [agricultural biotechnology](#), and [animal science](#). The company's advanced [transgene](#) engineering platform enables [Better DNA™](#) technology by combining revolutionary DNA control systems with corresponding advancements in modular transgene design, assembly and optimization. More information about the company is available at [www.DNA.com](http://www.DNA.com).

### **About Adeona Pharmaceuticals, Inc.**

Adeona is a pharmaceutical company focused on the development of innovative disease-modifying medicines for serious illnesses. Adeona is developing, or has partnered the development of, drug product candidates to treat primary pulmonary hypertension, multiple sclerosis, fibromyalgia, amyotrophic lateral sclerosis (ALS) and Alzheimer's disease. For more information, please visit Adeona's website at [www.adeonapharma.com](http://www.adeonapharma.com).

*This release includes forward-looking statements on Adeona's current expectations and projections about future events. In some cases forward-looking statements can be identified by terminology such as "may," "should," "potential," "continue," "expects," "anticipates," "intends," "plans," "believes," "estimates," and similar expressions. These statements are based upon current beliefs, expectations and assumptions and are subject to a number of risks and uncertainties, many of which are difficult to predict and include statements regarding Adeona's intent to develop and commercialize a DNA-based therapeutic for PAH, Adeona's belief that the new product opportunity and collaboration will build shareholder value, Adeona's ability to use the technology to develop a product that will correct a biological defect in PAH and the benefits to be derived from Intrexon's genetic engineering technologies. The forward-looking statements are subject to risks and uncertainties that could cause actual*

*results to differ materially from those set forth or implied by any forward-looking statements. Important factors that could cause actual results to differ materially from those reflected in Adeona's forward-looking statements include, among others, a failure of Adeona's DNA-based therapeutic for the treatment of PAH to be successfully developed or commercialized, an inability to obtain regulatory approval of the PAH product candidates, a failure of the results of clinical trials to support Adeona's claims, a failure of the preclinical or clinical trials to proceed on schedules that are consistent with Adeona's current expectations or at all, Adeona's inability to protect its intellectual property and freedom to operate without interference of the patents of others, inability to maintain the effectiveness of the exclusive collaboration agreement, its reliance on third parties to develop its product candidates, the insufficiency of existing capital reserves to fund continued operations for a particular amount of time and uncertainties regarding Adeona's ability to obtain additional financing to support its operations thereafter and other factors described in Adeona's report on Form 10-K for the year ended December 31, 2010 and any other filings with the SEC. The information in this release is provided only as of the date of this release, and Adeona undertakes no obligation to update any forward-looking statements contained in this release on account of new information, future events, or otherwise, except as required by law.*

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<sup>i</sup> Humbert M, Sitbon O, Simonneau G., Treatment of pulmonary arterial hypertension, N Engl J Med. 2004 Sep 30;351(14):1425-36.

<sup>ii</sup> Ito T, Okada T, Mimuro J, Miyashita H, Uchibori R, Urabe M, Mizukami H, Kume A, Takahashi M, Ikeda U, Sakata Y, Shimada K, Ozawa K. Adenoassociated virus-mediated prostacyclin synthase expression prevents pulmonary arterial hypertension in rats. Hypertension. 2007 Sep;50(3):531-6.