

With Clinical Data Showing Achievement of Pharmacokinetic Bio Equivalence for their Bronchodilator for use in COPD in the European Market and Qualified Infectious Disease Product Status from the FDA for their Inhaled Antifungal to treat Cystic Fibrosis, Pulmatrix is positioned for Continued Growth in 2017



Dr. Robert Clarke
CEO

Pulmatrix
<http://pulmatrix.com/index.php>

Interview conducted by:
Bud Wayne, Editorial Executive
CEOCFO Magazine

CEOCFO: *Dr. Clarke, would you give us a short introductory to Pulmatrix, the diseases that you are involved with and why the medical and research communities has had such a hard time finding answers to these areas of unmet needs?*

Dr. Clarke: Pulmatrix is a clinical-stage drug development

company focused on pulmonary drug delivery via inhalation to the airways to treat diseases of the lung. This is all based on a platform technology that we invented in-house called iSPERSE™, which is an acronym but the key point is it is intended to capture the dispersibility of the platform. iSPERSE is an engineered dry powder that flies easily into the airways of the patient. The diseases that we focus on with this technology are chronic obstructive pulmonary disorder (or COPD), severe asthma, cystic fibrosis and idiopathic pulmonary fibrosis. We have products in development for each of these indications. Our lead clinical stage products are an inhaled anti-fungal agent to treat fungal infections in the lungs of severe asthma and cystic fibrosis patients and a novel anti-inflammatory agent that we recently in-licensed from Janssen that is targeted for COPD. Combining these therapeutics with our iSPERSE technology, we can address significant unmet needs for patients.

“We believe the company is poised to be in a stronger financial position with high value programs that will have significant clinical data and partnerships over the next 12-15 months.”- Dr. Robert Clarke

CEOCFO: *How does that differ from the traditional way of treating these diseases?*

Dr. Clarke: Traditional inhalation involves a couple of different technologies. You either can have nebulized formulations which are liquid droplets, meter dose inhalers which are pressurized asthma puffers or you can have lactose blend dry powders where you use a lactose carrier to deliver the drug into the airwaves of the patient. Each has relatively low efficiency so you use a lot of drug to get a little into the airways relatively speaking. Also there is limitation of flow-rate dependence so that the drugs and the amount that the patient may get into his/her airways can be affected by the patient status on that day. With our approach, we can deliver three times or more of the drug in a single inhalation with no flow-rate dependence and that is what allows us to consider some of the targets we are looking at. For example if you take the antifungal drug orally, it takes two to four hundred milligrams in a single dose. With our inhalation approach, we believe the targeted antifungal dose to the lungs is ten to twenty milligrams. We are able to cut down the amount of drugs that the patient is exposed to by an order of magnitude. Also, patients can have compromised lung function that causes them to struggle to generate enough inspiratory flow to get a drug delivered into their airways with conventional technology. Our engineered approach has flow-rate independence meaning the particles fly incredibly easily, get into the airways of the

patients easily and therefore allow us to more effectively deliver doses to the lung where we want the drug to go to treat the disease.

CEOCFO: *Would you tell us about your dry powder delivery system and inhaled therapies, and why it such a benefit for patients with serious pulmonary and respiratory diseases?*

Dr. Clarke: The technology was invented by scientists at the company including myself. We call it a small dense and dispersible platform technology which are the hallmarks of the technology and that is where it differentiates from other engineered approaches that have come before it. Examples of prior engineered approaches include the Acorda Therapeutics ARCUS technology and the Nektar PulmoSpheres which are based on large and porous particles that are highly dispersible. In our case, the small and dense particles actually give us additional device flexibility and we have our own differentiated patent estate so the technology itself is protected well into the 2030s.

CEOCFO: *Would you tell us about clinical development status on your pipeline programs in the iSPERSE™ technology?*

Dr. Clarke: Our focus is advancing our two lead programs (PUR1900/PUR1800) in severe asthma and COPD to the clinic, with expected clinical milestones in the next 15 months. Our inhaled antifungal program, PUR1900, is an inhaled version of the antifungal drug itraconazole that received qualified infectious disease product (QIDP) status from the FDA earlier this year for cystic fibrosis. What that means is the program will have additional years of market exclusivity upon approval. We are targeting to have our PUR1900 program enter the clinic and into patients within the next few months. Our PUR1800 program is the novel anti-inflammatory in-license compound from Janssen that has already been into patients. There is a 14-day COPD study in COPD patients that demonstrated target engagement as well as anti-inflammatory benefit demonstrated by reduced inflammatory cell count in the sputum of COPD patients. Using an iSPERSE formulation of the molecule, we are looking to duplicate the previous Janssen clinical results via a Phase IIA trial early next year as a bridge back to a Phase IIB proof-of-concept trial immediately after. In addition to our lead programs, PUR0200 is our legacy COPD program that is a copy of a currently marketed once daily bronchodilator product that is a \$5 billion drug worldwide. PUR0200 has received favorable regulatory advice from two EU countries on a PK equivalence pivotal path and is on a 505(b)(2) path for US approval. We are in active discussions to partner PUR0200 either globally or geographically.

CEOCFO: *In May, Pulmatrix received an important patent for inhaled drug for COPD. Would you tell us about that; which country the patent was issued in and why it is so important?*

Dr. Clarke: The noted patent was issued in the US for our PUR0200 program. In addition to what I described regarding the European path to approval for that program for pharmacokinetic bio equivalence, we also have the ability to bring that program forward in the US via a 505-B2 regulatory pathway. Earlier in the year, we received grant of a base patent regarding the iSPERSE technology in Europe and now have patents covering the general iSPERSE platform in the US, the EU and Japan. Our patent estate provides broad coverage on our platform technology and programs well into the 2030s.

CEOCFO: *Would you tell us about the novel drug candidate you licensed from RespiVert, Ltd (subsidiary of Janssen Biotech, Inc.) and how it fits with your other clinical programs?*

Dr. Clarke: When we invented the iSPERSE technology which has a number of benefits for patients, we wanted to look at product opportunities that would allow us to take advantage of the traits of the platform but at the same time give us product opportunities that we could move more quickly to the clinic and then eventually registration. It started with PUR0200 which is the copy of a marketed product and that allowed us to go quickly into clinical proof-of-concept with an expedited path to market. Our PUR1900 inhaled antifungal is a repurpose of an oral antifungal agent. Through the iSPERSE technology, we essentially make a better mouse trap by inhaling the antifungal drug directly to the site of infection. Because we are repurposing approved drugs, these are 505-B2 opportunities in the US. That allows us to move more quickly through drug development and our commercial assessment suggests we have a significant opportunity on our hands with PUR1900 by making the drug inhaled versus the current oral version. The in-licensed Janssen compounds are our first foray into new chemical entities – these drugs are novel. Our lead in-licensed drug hits multiple targets for the airways in the inflammatory cascade, so it is a multi-factorial molecule, called a narrow spectrum kinase inhibitor. By acting on more than one kinase we believe the drug will have the ability to more effectively mitigate inflammation in the airways of COPD patients. As we entered the conversations with Janssen around these compounds, we felt strongly there was an opportunity here for us to leverage our technology combined with the lead compound that will allow us to have something of real interest in COPD. In COPD in general, there have been a lot of attempts at innovation but really over the past two decades the trend and paradigm has not changed. Treatment is still driven by long-acting beta agonists, long-acting muscarinic antagonists and inhaled corticosteroids (ICS). Where we fit in, which is the real Holy Grail, is to

come up with additional anti-inflammatory modalities that are not steroids that patients can use and that is where these Janssen compounds fit in. We are looking to move forward in the clinic to demonstrate Proof of Concept regarding the anti-inflammatory benefit of the compound and at the same time we will be looking to improve outcomes of exacerbations in these patients, and exacerbations are what really drive the COPD patients on the unfortunate downward spiral of their disease. We hope we can intervene and slow that progression and improve the quality of life.

CEOCFO: *Would you tell us about your board and how they have helped advance Pulmatrix?*

Dr. Clarke: We have a strong board with a long history of success in the biotech space, in private and public companies. Most recently we have had a couple of new additions. Dr. Matthew L. Sherman, M.D. joined our board late last year and he is the chief medical officer at Acceleron Pharma, Inc. Matt brings a depth of clinical experience in terms of clinical trial design as well as his medical knowledge around a variety of disease states including respiratory. Most recently Amit D. Munshi joined our board, and Amit is the CEO of Arena Pharmaceuticals. Amit has had a number of significant positive outcomes with smaller biotech companies that have been sold to larger pharma companies – most notably Kythera Biopharmaceuticals, which was in the aesthetics space in dermatology. Mark Iwicki is our chairman. Mark was the CEO at Civitas Pharmaceuticals when they were acquired by Acorda Therapeutics, for inhaled L-Dopamine, and previously had been CEO of Sunovion/Sepracor, which is another company with a significant focus on respiratory. Mark is currently the CEO of Kala Pharmaceuticals which just completed a successful IPO. Representing our core investors are Terrance McGuire and Steven Gillis, PhD from Polaris Partners and ARCH Venture Partners respectively. Both Terry and Steve have been with the company for a long time and are well known in the biotech community as both supportive and successful venture capitalists that have had multiple significant successes in the biotech space.

CEOCFO: *What is the financial picture for Pulmatrix? Are you currently focused on partnerships or raising capital?*

Dr. Clarke: We are focused on the former right now. We believe the company is poised to be in a stronger financial position with high value programs including PUR1900 (antifungal for asthma/CF) and PUR1800 (anti-inflammatory for COPD) that will have significant clinical data and partnerships over the next 12-15 months. Earlier in the year, when we received QIDP status for our inhaled antifungal program, both the stock price and share trade volume went up significantly. As a result, we were able to complete two separate registered direct offerings that brought in additional cash via the sale of stock without needing to offer warrants. That cash provides us with funding into next year and that allows us to focus on our pipeline development around PUR1900 and PUR1800. We are actively talking to potential partners about a variety of potential structures to work together. We've stated publicly that we intend to partner PUR0200 either globally or geographically. We are also pursuing potential opportunities around our other pipeline programs that could provide additional non-dilutive opportunities. With a strong, supportive board of directors and a multiple shots on goal approach to meet the needs of patients and satisfy investors, we hope to move Pulmatrix to significant inflection in value as a next step in our growth.

