The Promise of

Stem Cell Therapies for Chronic Diseases

ANDREW PECORA, M.D., Chief Medical Officer and Director at Neostem, discusses the company's work using stem cells for cardiovascular conditions. The company's lead product candidate, AMR-001, is for the preservation of heart function after a heart attack.

Dr. Andrew Pecora

PV: *What are the opportunities for stem cells in cardiovascular disease?*

PECORA: As life expectancy increases and our population swells, the cost to manage chronic disease is reaching a crisis phase. Regenerative medicine, and stem cell therapy in particular, offers the human body the promise to repair and regenerate itself. Breakthroughs employing adult stem cells offer a unique window into the potential of cellular therapies to turn back the tide of managing chronic disease. Nowhere is this more evident than in the treatment of cardiovascular disease.

With that being said, we see two major areas of opportunity for the use of adult stem cells in treating cardiovascular disease. One area is in the ability to spare cardiac tissue that has sustained an injury from ischemia but has not yet died through the prevention of apoptosis — programmed cell death — and revascularization at the cellular level. By preventing apoptosis and laying down lots of new blood vessels, the cardiomyocytes and their function are preserved. This helps to prevent cardiomyocyte death, allowing them to compensate for nonfunctioning cardiomyocytes and better perform their jobs. We believe CD34+ cells are the most capable of doing this. The other area of opportunity, which focuses on regenerating dead cardiac tissue, uses a different type of cell — a cardiac progenitor cell (CPC). A CPC holds the potential to actually generate new cardiomyocytes.

I see these as potentially synergistic — both being very useful for patients who have had large heart attacks and for patients who are in heart failure or have chronic myocardial ischemia.

PV: *What are the challenges of developing stem cell therapies?*

PECORA: Since this is a new class of therapy, there is the challenge of regulatory issues. The FDA has a long history of regulating drugs and devices, but regulating cellular therapies that employ cells from within our own bodies is a new frontier. Obviously, there are a host of business challenges, including distribution, sales, and reimbursement.

There are a number of challenges emanating from the unique qualities of human cells. With drugs there is typically a relationship between the amount of drugs that can be given to a patient and the effect. With cells, it could be just the reverse. It might mean giving a threshold dose of cells, and then the cells can grow and divide within the body. That sets up a different paradigm of pharmacology.

Finally, there is the issue of whether to use allogeneic stem cells — those foreign to the patient — or autologous stem cells — ones that are his or her own. There are certain areas and individual circumstances wherein there is a distinct advantage to using autologous cells. On the other hand, there are cases in which allogeneic cells might have a distinct advantage from a biological and medical perspective.

PV: *How can these challenges be addressed?*

PECORA: To address the regulatory challenges, it is crucial to have a close working relationship with the governing regulatory agency. The FDA has been very cooperative when it comes to stem cell therapies. Regulators want to see these therapies get through the regulatory process if they are proven to be safe and effective. I don't see any pushback there. In fact, I see great collaboration from the agencies here in the United States and abroad.

The challenges on the business side come from the fact that it is a new business model, but when there are lives at stake and there is extraordinary market potential, solutions can be found. Just because big pharma hasn't done things with this business model in the past, it doesn't mean that it can't in the future. If something works and there is a market for it, people will figure out how to provide it to the market in a cost-efficient way.

PV: *How is AMR-001 different from other therapies?*

PECORA: AMR-001 changes the paradigm of chronic or progressive heart disease and prevents or minimizes those risks. I think that principally AMR-001 takes advantage of the fact that the natural repair process that occurs in every living, multi-cellular organism is the relationship between hypoxia, SDF-1, and CXCR4+. When there is an ischemic event, a series of molecular events occur at the cellular level. These cells come to the site of injury, take up residence, prevent apoptosis and induce new blood vessel formation. There may be other mechanisms in play, but this is the most highly conserved mechanism.

We are currently in a Phase II trial for AMR-001. Our goal is to recruit and close the trial by the end of 2012. Six months after we close the Phase II trial, we will have our primary readout of data. At that point, we will make a decision based on the data and conversations with the FDA about how to move forward for a Phase III trial.

PV: *What are the benefits of an autologous product?*

PECORA: An autologous product is by definition going to be the safest product. I believe it has the least chance to do damage, but that is not to say that an allogeneic product will necessarily do damage. It is just implicitly safer to use your own cells rather than someone else's. Secondly, we believe that by taking advantage of the natural repair mechanism and accentuating it with a pharmaceutical dose of our cells, we will be best positioned to show effectiveness.

PV: *How receptive are payers likely to be?*

PECORA: After administering AMR-001 to patients who have had large heart attacks, we need to demonstrate that the cells are capable of laying down new blood vessels and preventing cardiomyocyte death. In addition, AMR-001 will need to preserve heart muscle function and, as a result, reduce the adverse clinical consequences of a large AMI. Once we accomplish all of this, we think it will be very well-received. PV

Sit back and relax while Almac manages your clinical supply chain.

Given the complex nature of clinical trials, it is reassuring to know that there is a company that can manage all of your clinical supply chain needs efficiently: Almac.

- Manufacturing & Blinding
- Patient Screening & Enrollment
- Biostatistical Services
- Randomization & Drug Assignment
- IXRS® Technology (IVR/IWR)
- Packaging & Labeling

From pre-trial planning to study closeout, Almac's integrated clinical supplies management solution works for you, so you have to work less.

- Global Distribution & Depot Network
- QP Release & Analytical Support
- Shipping Temperature Electronic Monitoring System (STEMS)
- Drug Inventory Management
- Study Closeout/Drug Reconciliation
- Data Integration & Reporting

Before outsourcing your clinical supply chain management to multiple vendors - call Almac.

Contact us today by scanning the QR Code ›

One Company. Seamless Integration. Limitless Benefits.

Almac Group
T +44 (0)28 3833 2200 (EU Inquiries)
T +1 (215) 660 8500 (US & Global Inquiries)
E info@almacgroup.com

ALMAC
Partnering to Advance Human Health


palio
INVENTIV HEALTH
Shaking up the status quo.
Shy we ain't. Or expected. We make noise the only place it matters: in the market. How? With proprietary research tools and social media tracking methods. They're how we create insights and ideas you won't find anywhere else. That's what makes Palio different. After all, if your agency doesn't stand out in a crowd, how will your brand?
palio.com
Never be forgotten.SM