

Using their patented “RNA Reprogramming” Technology, Factor Biosciences has For the first time developed Patient-Specific Pluripotent Stem Cell-Based Therapies That can be Applied to Disease or Injury where there is Loss or Damage to Cells

**Healthcare
RNA Technology
Stem Cell Technology**

**Factor Bioscience
1035 Cambridge Street, Suite 10B
Cambridge, MA 02141
781-640-1031
www.factorbio.com**



**Matt Angel
CEO**

BIO: Dr. Angel has led Factor Bioscience since its founding in 2011. He received his bachelor’s degree in engineering from Princeton University in 2003, and later that year joined the Biodefense Systems Group at Lincoln Laboratory. Dr. Angel completed his Ph.D. at MIT in 2011, focusing on the study of protein expression and innate immunity. In addition to coordinating Factor’s business and intellectual-property strategies, Dr. Angel leads

Factor’s efforts to pioneer new applications of Factor’s core technologies.

About Factor Bioscience:

Factor Bioscience is a life-science company that develops nucleic-acid and cell-based research tools and therapeutics.

**Interview conducted by:
Lynn Fosse, Senior Editor
CEOCFO Magazine**

CEOCFO: Dr. Angel, what is the vision behind Factor Bioscience?

Dr. Angel: Factor Bioscience was founded by three MIT graduate students who saw the power of stem-cell technology to have a tremendous impact on personalized medicine. In 2006, Dr. Shinya Yamanaka discovered that by expressing certain proteins in skin cells using viruses, they could be transformed into cells that are indistinguishable from embryonic stem cells. This process is called “cellular reprogramming”. Embryonic stem-cell technologies are fraught with logistical, ethical, and technological issues, so the discovery of reprogramming gave great hope that there might be an alternative source of pluripotent stem cells. Unfortunately, early reprogramming methods, which used viruses, caused mutations and other abnormalities in the cells, making them unsuitable for therapeutic use. We started Factor Bioscience to develop a better way of generating these cells to enable, for the first time, the development of patient-specific pluripotent stem cell-based therapies.

CEOCFO: What is the approach that you have taken?

Dr. Angel: We developed and patented a technology called “RNA reprogramming”. We express reprogramming factors using RNA molecules, which do not cause mutations and are non-toxic. The patient-specific stem cells that we generate using this process can then be differentiated into any kind of cell, and re-implanted into the patient to treat a variety of diseases that currently have no other treatment.

CEOCFO: How do you accomplish this?

Dr. Angel: Our technology uses synthetic RNA molecules to express reprogramming factors. These molecules contain genetic information, but they do not disrupt the cell’s genome as many viruses and other DNA-based vectors do. We deliver our RNA molecules to cells, and the cells use these molecules as a template to translate reprogramming proteins. One of the advantages of our technology is that the reprogramming process is complete in about a week. This is unprecedented in the reprogramming field; typically, reprogramming takes at least a month. The speed of our process is important because cells can acquire mutations during extended periods in culture. As a result, we believe that the speed of our process makes our cells safer for therapeutic applications, as well as making it much easier for researchers to perform our process in their labs.

CEOCFO: Now that you can create this, what happens?

Dr. Angel: This week, we are releasing a reprogramming kit product designed for stem-cell researchers. They

can buy this kit, which contains two components- a cell culture medium and a tube of RNA molecules, and practice our process in their own labs. For example, a researcher studying Parkinson's disease can take Parkinson's patients' skin cells and use our product to reprogram them into stem cells, and then differentiate the resulting cells into neurons of the type that are damaged in Parkinson's disease. The longer-term plan is to enable our customers to make discoveries using our technologies, and then work with them to get therapeutics to the clinic as quickly and as safely as possible, which is our ultimate goal.

CEO CFO: Is it virtually any disease or are there particular diseases?

Dr. Angel: It is basically universal. Our technology can be applied to any disease or injury that includes loss of or damage to cells, including Type 1 diabetes, Parkinson's disease, spinal-cord injury, and many others. Last year, we received two NIH grants to apply our technology to Alzheimer's disease, a disease that has seen several recent high-profile failures of conventional drugs.

CEO CFO: Is the research community aware of Factor yet?

Dr. Angel: We have been keeping a low profile since our founding in 2011. When we started the company, we did not have any technology or intellectual property; we were just three scientists in a lab at a start-up incubator at U. Mass Boston. We kept our heads down and focused on developing our

technology. In the last year and a half we have made remarkable progress, and with the launch of our reprogramming kit, we expect rapid adoption of our technology by the research community.

CEO CFO: How do you let the world know?

Dr. Angel: We worked hard to find the best way to deploy our technology, advance the science, and get therapies based on our technology into the clinic. In the end, we came to the conclusion that the best strategy was to release a reprogramming kit. A number of our advisers were frankly against this idea. Their opinion was that because we have this technology that clearly has tremendous therapeutic

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potential, we should just keep it to ourselves, work behind the scenes with one or two large pharmaceutical companies, and let the broader scientific community struggle with existing technologies. We recognized that in the long term what is best not only for patients and for the research community, but for our company as well, is to deploy our technology as widely as possible, and get as many researchers using it as possible. We can then help these researchers take their discoveries to the next level and move forward

together towards the development of therapeutics based on safely reprogrammed cells.

CEO CFO: Could you tell us about the new lab?

Dr. Angel: It has been a very busy week. We just moved into a new 1100 sq. ft. lab in Cambridge, near Inman Square. As I mentioned, up until now we had been working in a start-up incubator. We were awarded two NIH grants and we are launching a new product, so we really needed more space. We have a therapeutic pipeline that we have not released any information about yet, and that work is also ramping up. Cambridge is an ideal location for Factor Bioscience, as it enables us to collaborate closely with the many scientists and life-science companies located here.

CEO CFO: Why should people in the business and investment community pay attention to Factor Bioscience?

Dr. Angel: Stem-cell research is at a tipping point. Scientists have been doing basic research for a long time trying to figure out how to generate patient-specific stem cells in a way that will be therapeutically relevant. This is what we have now achieved. There are companies that are currently using embryonic stem cells in clinical trials. Our technology could very easily be transplanted into those efforts, eliminating all of the drawbacks of embryonic stem-cell technology, and enabling a new class of stem-cell therapies.