September 6, 2017

To Our Stockholders:

This is a very exciting time for the cell therapy industry. Recently, there have been several developments which may point to the industry achieving an increased level of validation amongst investors, partners, and the general public:

- On August 30th, the U.S. Food and Drug Administration (FDA) approved the first CAR-T therapy, Kymriah, which is made by Novartis and approved for children and young adults for B-cell acute lymphoblastic leukemia. Separately, FDA approved a Roche monoclonal antibody therapy, Actemra, for the treatment of a potential side effect of CAR-T therapy known as cytokine release syndrome.

- On August 28th, Gilead Sciences, Inc., another large cap pharmaceutical company, entered the cell therapy field, agreeing to acquire Kite Pharma for $11.9 billion.

- Also on August 28th, FDA issued a statement about the cell therapy industry outlining enforcement policies regarding unscrupulous actors, while providing the following supportive language regarding the industry: "One of the most promising new fields of science and medicine is the area of cell therapies and their use in regenerative medicine. These new technologies, most of which are in early stages of development, hold significant promise for transformative and potentially curative treatments for some of humanity's most troubling and intractable maladies."

We have been getting some questions from our investors about what these and other recent events might mean for Asterias. While these questions have focused on a number of individual matters, they all point to the same line of inquiry. That is, where does Asterias fit within the evolving landscape for cell therapy companies; and especially for cancer immunotherapy companies?

The short answer is that that we believe our cancer immunotherapy product candidates could play a meaningful role in the fight against cancer as low-toxicity remission maintenance therapies which could be used in conjunction with other remission induction therapies.

There is a lot to that answer. Let's take a step back and review what we are doing here at Asterias, the cancer immunotherapy field, and how Asterias could play a meaningful role in the war on cancer.

Asterias seeks to address two different therapeutic areas with our pluripotent stem cell technology platform: (i) spinal cord injury, and (ii) cancer immunotherapy. While the focus of this letter is on our cancer immunotherapy program, it is important to note that we remain very excited about our progress in spinal cord injury. Here is a quick reminder of that progress**:**

By way of background, we are conducting a Phase 1/2a clinical study under an Investigational New Drug application (IND) that was previously accepted for filing by the FDA. After successfully completing an initial safety group in which patients with severe spinal cord injuries resulting in quadriplegia were given 2 million cells called Oligodendrocyte Progenitor Cells ("OPCs"), FDA allowed Asterias to move forward with larger doses with our goal of showing that the product candidate actually works. By "works" I mean that the dosing of 10 million or 20 million OPCs would allow clinical trial participants to attain at

least 2 motor levels of improvement under a specific test, allowing them to use their arms, hands and fingers.

We have been reporting positive results from our initial 10 million cell group on a roughly quarterly basis and have now enrolled two more groups, so our overall data set will soon be significantly larger. So far, through 9 months of follow-up with our first group, we have seen 50% (3/6) of our clinical trial participants recover at least 2 levels of motor function. Our 12 month read-out is scheduled for late September / early October, and we believe that holding onto the gains our trial participants have already achieved would be a "win."

As an aside, I should note how honored I was to meet a couple of our trial participants after one of them, Lucas Lindner, threw out the ceremonial first pitch at a Major League Baseball game. That event has been covered extensively by local and national media so I won't go into the details, other than to say that I learned quite a bit from both Lucas and the other trial participant I met that day – about things like courage, dignity and grace.

In our spinal cord injury program, we seek to supplement patients' normal supply of OPCs to support patients' natural healing function following a trauma to the spinal cord. On a very general, "30,000 foot," level, this is quite similar to what we seek to do in our cancer immunotherapy program – support patients' natural cancer fighting function. What does this mean? To answer that question, let's take a brief look at the cancer immunotherapy landscape:

- Cancer, from an Immunotherapy Perspective. Cancer is characterized by the uncontrolled proliferation of abnormal cells. The first line of defense against abnormal cells in the body (including things like viruses and bacteria) is the immune system. However, the immune system can have difficulty recognizing and attacking cancer cells for at least a couple reasons. First, cancer cells are from the body itself, so they can seem "normal" to the immune system. Second, cancer cells have specific properties that can shut down or otherwise evade the immune response. So, much of the recent work and advances in cancer treatment have been focused on bolstering the immune system's response to cancer cells.

- The Immune System's Workhorse: T Cells. The most important cell type in the immune response is the T cell. T cells are critical to the immune response, and a central ideal in cancer immunotherapy is the notion that if we can better mobilize T cells and make them even better at performing their attack function, we might be able to provide better outcomes for cancer patients. Asterias, Kite Pharma and many other companies are all trying to do the same thing – fire up the T Cell response to cancer cells. In this regard, we are all T Cell Cancer Treatment Companies. But there are different approaches in firing up the T Cell response.

- Different T Cell Approaches. There are three main T Cell Approaches being actively pursued in the fight against cancer:

    - *Outside the Body T Cell Re-Programming*. This is what companies like Kite, Bluebird, Juno and others are trying to do. T Cells are extracted from a patient and then genetically modified or otherwise "re-programmed" to express a certain receptor that can better find and bind to cancer cells that express a targeted protein, or "antigen". Most of the positive results to date have centered around a certain protein called "CD19" but the industry is working to target other proteins that reside either on the surface of or inside cancer cells. These re-programmed T Cells are then "expanded" or multiplied to get to a sufficient quantity of cells, and then delivered back into the patient.

- *Inside the Body T Cell Training*. This is our approach at Asterias. T Cells naturally learn to recognize foreign or otherwise "bad" cells in the body, or antigens, after encountering them for the first time. This is called the "adaptive" immune system and is an important element in the body's defense system. At Asterias, we use a certain kind of antigen presenting cell known as a "Dendritic Cell" that we program to train T Cells inside the body to locate and attack cells that present a certain type of protein called "telomerase" that is present in about 85% to 90% of cancer cells. The basic theory is that if a patient's T Cells can be trained to be on the lookout for and to attack cells that present telomerase, and if telomerase is a good marker for cancer cells, then we are simply training the immune system to better respond to the presence of cancer cells. To generate these antigen presenting Dendritic Cells, we use two methods:

    - Autologous (from the patient). Just like the CAR-T therapies, we take cells from the patient, re-program them, and inject them back in the patient. This is the approach we took in our VAC1 Phase 2 trial in Acute Myeloid Leukemia (AML) which showed promising results in terms of extending remission, especially for older people who are typically not eligible for other remission extension therapies like second-round chemotherapy or bone marrow transplant.

    - Allogeneic (off-the-shelf). This is the approach we are taking in our upcoming VAC2 trial in Non-Small Cell Lung Cancer (NSCLC) which is being sponsored and funded by Cancer Research UK, the world's largest independent cancer research charity. Here we seek to use pluripotent stem cells to derive a commercial supply of antigen presenting Dendritic Cells. These cells are intended to perform just like patient-sourced cells and we have performed extensive testing on our VAC2 cells to show that they have similar functional properties to VAC1. As an off-the-shelf product, VAC2 would avoid various treatment delivery complexities associated with patient-derived materials.

- Keeping T Cells from Being Turned Off. Cancer cells have a way of shutting down, or at least significantly reducing, the T Cell response (including T Cells that have been re-programmed outside the body and T Cells that have been trained inside the body). There is a class of (non-cell therapy) drugs that seek to stop this cancer cell mechanism and thus allow T Cells to continue to do their job. These drugs are called checkpoint inhibitors and there are three such drugs that have been approved by the FDA: Bristol Myers Squibb's Yervoy and Opdivo, and Merck's Keytruda. There is a significant amount of research in the cell therapy industry exploring how therapies that "rev-up" the T Cell response can work in a complimentary fashion with checkpoint inhibitors, and we believe that could be an interesting area for our own immunotherapy program.

So what does it all mean? There are a number of larger, better capitalized companies placing significant bets on immunotherapy, both in terms of R&D spend and corporate acquisition investment. But the war on cancer is a massive undertaking which started, if not sooner, with the signing of the National Cancer Act of 1971. In 2016 in the United States alone, 45 years after that war was officially declared, approximately 600,000 people died from cancer. So there remains much work to do. There are numerous individual cancer indications, involving both liquid and solid tumors, and different mechanisms of action targeting different markers or proteins. There are also different ways to think about treatment itself. Goals can range from reducing the size of a tumor (e.g., chemotherapy) to taking cancer cells below the level of being detectable where chemotherapy is not sufficient (e.g., CAR-T therapy) to dealing with the side effects of such remission inducement therapies. Another way to group treatments is to separate treatments that are designed to induce remission ("induction therapies") and

treatments that are designed to further maintain remission ("maintenance therapies"). Yet another framework is the balance between efficacy and safety.

Our current thinking is that Asterias' VAC1 and VAC2 product candidates could play a meaningful role in the fight against cancer by providing low-toxicity remission maintenance therapies which could be used in conjunction with other remission induction therapies. As such, we do not view CAR-T therapies or checkpoint inhibitors as competitors but rather as potential partners, or "brothers-in-arms" in the war on cancer. Some of those other therapies are either approved or further along in their development cycles and, as discussed at the beginning of this letter, have generated significant excitement in the market. We hope to achieve our own level of increased validation as a player in the fight against cancer and believe there is an important role in that fight for remission maintenance therapies with strong safety profiles like our VAC1 and VAC2 product candidates.

There is, of course, significant distance between "here and there." But we are excited about our technology platform, the progress we have made to date, and the recent positive attention being focused on the cell therapy industry.

As a final note, I would just like to say thank you to all of our stockholders, employees and other partners for your continued support.

Best,

Michael Mulroy
President & Chief Executive Officer

Cautionary Statement Regarding Certain Information

This communication contains "forward-looking statements" within the meaning of the federal securities laws. Such statements include statements concerning anticipated future events and expectations that are not historical facts. All statements other than statements of historical fact are statements that could be deemed forward-looking statements. Actual results may vary materially from those expressed or implied by forward-looking statements based on a number of factors, including the factors described under "Risk Factors" in Part I, Item 1A of our Annual Report on Form 10-K for the fiscal year ended December 31, 2016, as updated or supplemented by subsequent reports we file with the SEC. We do not assume any obligation to publicly update any forward-looking statement after they are made, whether as a result of new information, future events or otherwise.