



Harnessing the body's own defence systems to combat cancer



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Letter from the CEO

Dear Shareholders,

Since the company's last newsletter Patrys has made significant headway on corporate, operational and scientific activities, and I am very pleased to share this update with you.

Since the Annual General Meeting update in November 2017 and our Corporate update on 15 January 2018 we have made a number of announcements around developments with the Deoxymab platform which was licensed from Yale University in March 2016. Patrys has established a strong position in the field of DNA damage repair (DDR) therapeutics with a novel approach that utilizes cell-penetrating antibodies to selectively kill cancer cells.

We were very pleased to announce the publication of a scientific manuscript on the humanization process that Deoxymab 3E10 underwent to identify our lead candidate PAT-DX1 and to confirm the filing of a provisional patent application to protect this discovery.

Several research discoveries have been made and reported on over the past 6-months:

- *in vitro* studies indicate that PAT-DX1 acts synergistically with olaparib, the first approved PARP (poly (ADP-ribose) polymerase) inhibitor;
- PAT-DX1 is able to cross the blood brain barrier to reduce brain tumor size and improve survival rates in an orthotopic mouse model of glioblastoma and;



- PAT-DX1 conjugated to nanoparticles (PAT-DX1-NP) preferentially targets tumors and may have a role in binding to metastases, broadening potential use in the clinical setting.

Some of these observations were presented at this year's prestigious American Association for Cancer Research (AACR) Annual Meeting on April 14th – 18th 2018 in Chicago, Illinois.

We are expecting to make further announcements around preclinical data in the 2018 calendar year which will include the following:

- Dynamics of PAT-DX1 nanoparticle localization in the brain (May)
- PAT-DX1 pharmacokinetics in triple negative breast cancer model (June)
- Initiate stable cell line development (June)
- PAT-DX1 solid cancer animal model data (August)
- Selection of target indication for PAT-DX1 clinical development (Q3)
- PAT-DX1 – additional solid cancer animal model data (October)
- PAT-DX1 in combination with temozolomide and radiation in brain cancer animal model (Q4)

Patrys reported that its cash balance as at 31 March 2018 was \$2,811,000, reflecting the recent closure of a \$2.4 million fully underwritten Rights Issue in February and receipt of a \$293,000 payment as part of the Federal government's R&D Tax Incentive Refund. Funds will be used to accelerate development of the Deoxymab platform, and support further operational activities such as establishment of a stable cell line and continuing work with our collaborators at Yale University. The Company continues to progress discussions around non-dilutive capital inflows, specifically insurance recoveries, and looks forward to reporting to shareholders on these developments.

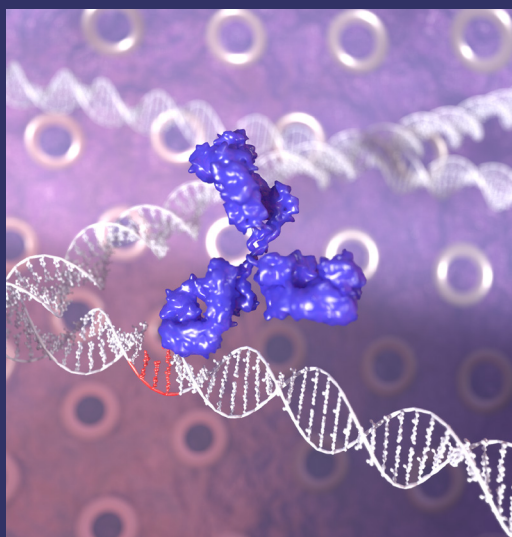
Finally, we were pleased for NDF Research to initiate coverage of Patrys with a target price of 13 cents in the period – the first plank of our program to increase awareness of the company and its assets globally. A follow up note on our preclinical research announcements was also released on our website in May 2018.

The announcements over the last 6 months are outlined further in this newsletter. We are looking forward to another positive quarter, and year, as we continue to focus on the development of novel antibody technologies for treating cancer.

Sincerely,

James Campbell

CEO and Managing Director



An Overview and Update on Deoxymabs

Our last newsletter reported on the selection of our humanized lead candidate, PAT-DX1, from a number of variants tested from the Deoxymab 3E10 technology. Since that time we have made considerable progress generating preclinical data for PAT-DX1 and positioning Patrys as an exciting new entrant in the DNA Damage Repair (DDR) therapeutic space.

In December 2017, Patrys reported on a study comparing PAT-DX1 with olaparib. The Hansen laboratory at Yale University found that both molecules killed a range of different cancer cells as single agents.

Combinations of PAT-DX1 and olaparib (an approved targeted therapy used to treat people with BRCA1 or BRCA2 mutations in various cancers) were tested on both brain and colon cancer cells with defective DNA repair pathways. In both cancers PAT-DX1 and olaparib by themselves were toxic to the cells in a dose responsive manner, and when used in combination they synergized to significantly increase cancer cell death compared to use of either agent singly. Cancer cells with intact DNA repair mechanisms were not killed by PAT-DX1, olaparib, or the combination.

Taken together, these findings suggest a potential for combinations of PAT-DX1 and PARP inhibitors to have an increased impact on DNA repair-deficient tumors while still sparing normal tissues. The discovery that PAT-DX1 works synergistically with a PARP inhibitor expands the clinical prospects for this asset and its positioning in the DDR space.

Further in February 2018, we reported that PAT-DX1 administered by tail vein injection crossed the blood brain barrier to significantly reduce tumor size in an orthotopic animal model of glioblastoma using human tumor explants. Evaluation of brain sections showed that the glioblastoma tumors in mice treated with PAT-DX1 were more than 40% smaller than the comparable tumors in control mice. In March we also reported that in the same model PAT-DX1 showed improved survival, living more than 20% longer than control animals. These combined observations in a superior model of glioblastoma are very encouraging. Further preclinical work to optimise dosing and scheduling of PAT-DX1 in a range of cancers will continue in 2018.

In June 2017 Patrys licensed further intellectual property from Yale University around technology that allows the conjugation of Deoxymab to nanoparticles. Since that time we have been conducting a number of preclinical studies with our humanized version PAT-DX1 and have named this technology PAT-DX1-NP. In January 2018, we reported on a study in mice with xenograft triple negative breast cancer tumors. It was found that PAT-DX1-NPs localised at the tumour sites whilst unconjugated nanoparticles did not. In addition, we observed that PAT-DX1-NP localised to metastases in this model. We are continuing further pre-clinical work with PAT-DX1-NP and considering numerous development opportunities around delivery.

Pleasingly, we have published the first joint Patrys-Yale publication in *Biochemical and Biophysical Research Communication* (2018: 496(3):858-864) on the humanization process that Deoxymab underwent to identify our lead candidate PAT-DX1 and confirmed the filing of a provisional patent application to protect this discovery.

Glioblastoma

Glioblastoma is the most common form of brain cancer, affecting particular neuronal cells called astrocytes (which form part of the supportive tissue of the brain). Glioblastoma can affect any age group, but is more common in older people. The exact cause of glioblastoma is not known. Glioblastoma tumors usually grow very fast, and can easily invade surrounding normal brain tissue, making it a particularly aggressive form of cancer where treatment success is still very limited. Historically, five-year survival for glioblastoma patients is only 2-4%, and today medium overall survival for patients on standard-of-care temozolomide plus radiotherapy is only 15 months. We believe the glioblastoma market presents an exciting opportunity for PAT-DX1 going forward.

Introducing Dr. Pamela M. Klein

Member of Patrys' Scientific Advisory Board

Your career has spanned research, clinical development and commercialization of a range of different cancer therapies – what trends have you seen over the past 20 years?

I began my career at the National Cancer Institute (NCI), at the National Institute of Health in Bethesda, Maryland as the Research Director for the NCI-Navy National Breast Care Center focusing on breast cancer genetics and biomarkers of disease. Cancer genetics was still an emerging area and testing for mutations that increased the risk of developing breast cancer was not yet standard of care. Treatment for breast cancer consisted of chemotherapy

and anti-estrogens. In the mid 1990's, Genentech demonstrated that the monoclonal antibody, trastuzumab (Herceptin) could increase survival in women whose breast cancer had high levels of the HER2 gene. This required the development of a diagnostic test to distinguish tumors with high levels from those with low levels.

In 2001, Genentech offered me a position working on further development of Herceptin and I made the move to biotechnology. Working on Herceptin was a crash course on the reality of drug development with a diagnostic focus – it's very complex. During my tenure at Genentech, I had the privilege of leading programs which included Rituxan, Tarceva, Pertuzumab and ApoMab and Apo2-Ligand-Trail (the last two targeting the apoptosis pathway). Several of these drugs are now standard of care in cancer treatment, although much of the development occurred post approval.

I left Genentech in 2008 to work with earlier stage, biotechnology start-ups including Intellikine, which focused on the development of small molecule inhibitors targeting the mTOR/PI3K pathway. Additionally, I have worked on HDAC inhibitors, novel antibodies, and antibody- drug conjugates as well as dabbled in immune-oncology.

Over the last two decades we have made tremendous scientific advancements in the understanding of cancer. We can identify genes that increase the risk of certain cancers; we have drugs that can target very specific molecular defects in some cancers, and diagnostic tests that help us identify which patients have those defects. The field of immuno-oncology has allowed the development of drugs that help the immune system fight cancers. Many patients don't respond to any of these available drugs, and even those that respond may ultimately stop responding. Despite advances that have been made, there is still much more that needs to be done.

What learnings can you share from your experience of leading the build out of the Intellikine development team, and working with a small biotech start-up?

I firmly believe there are many advantages that a small biotech has over a larger biotech and pharma companies. While it is true that larger companies may have the time and resources to explore a multitude of possibilities for each asset; small biotech must work smarter and more efficiently which often leads to moving faster. Small biotech needs to stay laser focused on the science and biology, prioritization of the most important questions and the willingness to take calculated risk.

It is amazing what a small group of people with crystal clear focus can accomplish. It is important to bring together professionals with deep experience in their respective fields. No one needs to have all the answers, but everyone has to be committed to working together to figure it out. A key mantra that has served me well both when I treated patients and now in drug development is to continually ask myself how much information I need to make a decision. When treating patients, it meant asking if the results of a test would change my treatment recommendation? If the answer was "no", than it usually meant that there was no reason to get the test. The same applies to drug development. Will the results of 2 more non-clinical models change anything; and if the answer is no, than don't do them. Will 3 more months of work inform the decisions that I might make in an early clinical trial? In science, there is always a desire to gather more information, but the very long timelines involved in drug development sometimes require making a decision with 90% of the information instead of 100%.



Hire really smart people, and make educated decisions when planning an early development strategy. Keep everyone on course, but be nimble enough to respond to emerging data quickly and adapt your plans to follow the science.

What led you to accept a Scientific Advisory Board position?

I first heard about Patrys through Board member, Suzy Jones who enticed me with enough of the science to spark my interest. Suzy introduced me to James Campbell who arranged for me to speak with Dr James Hansen.

Dr Hansen, the inventor of the Deoxymab platform is dedicated to seeing this into the clinic and his expertise is invaluable. The science behind Patrys is extremely novel and may one day enable multiple therapeutics across various indications. Based on James Campbell's leadership, the commitment of the Patrys team, and the novel platform, I eagerly agreed to join the Scientific Advisory Board. It is a privilege to work with the SAB and other Patrys team members who are as excited about the potential for Deoxymab as I am.

Can you explain the novelty of the Deoxymab platform and the various development paths available?

While antibody therapy has become part of the standard toolkit used to treat various types of cancer, they are only able to target proteins either on the surface or external to cancer cells as they are not able to penetrate the cell membrane. The Deoxymab platform is unique in that it can penetrate the cell membrane and then target DNA repair mechanisms. Many cancer cells already have defects in their ability to repair DNA damage, and thus Deoxymab can preferentially damage cancer cells while sparing healthy cells.

Chemo is still mainstay of many treatments and many of the drugs are quite good, however the side effects often limit their utility. Deoxymabs have been shown in animal models to enhance the effects of chemotherapy, and similarly enhance the effectiveness of radiation, another therapy that remains incredibly useful for the treatment of certain cancers but is limited by toxicity. Additionally, because of its unique ability to penetrate into cells, the Deoxymab platform could potentially be used as a molecular delivery vehicle in a broad range of diseases. While there is still a lot of work to do, there is great potential.

What changes do you expect in cancer space and glioblastoma in particular?

Cancer therapies will increasingly become more targeted as we continue to understand the hundreds of defects that drive malignancy. Treatments will become more individualized and better tolerated as we are able to target the cancer cells while sparing healthy cells. Increasingly, we will analyze tumors by DNA sequencing and other techniques to understand all the different mechanisms that contribute and drive cancer growth. Patients might be spared toxicity from treatments that are unlikely to work in favor of drugs that will.

Historically, we have developed drugs specifically for a type of cancer such as breast, colon or lung cancer. Today, we are developing drugs based on molecular abnormalities or defects that may cross cancer indications. For example, Herceptin was initially developed in HER2 positive breast cancer but today is now approved in gastric cancers with high levels of HER2. Another big advancement is our ability to work with the body's own immune system to help treat cancer. This has been an area that has been studied for decades but has only really become standard within the last few years. Despite all the advances we have made, immuno-oncology agents only work in a small percentage of patients, so there is still much to learn.

Glioblastoma (GBM), one of the most aggressive types of brain cancers has been very difficult to treat in part because many of our current drugs are unable to get through the blood brain barrier. Chemotherapy and targeted agents are mostly ineffective and surgery and radiation are the mainstay of treatment. As we continue to understand the pathways that contribute to the malignant nature of GBM we can develop new drugs that may target these defects. One such defect is the DNA repair gene MGMT, which Patrys' technology can target. Patrys recently demonstrated that PAT-DX1, a humanized version of their novel antibody candidate showed strong efficacy in a non-clinical model of GBM. The ability of PAT-DX1 to cross the blood brain barrier represents a unique opportunity to treat this deadly disease.

IgM Assets

Patrys currently has two clinical stage IgM assets – one partnered and the other seeking additional co-development partner(s).

The PAT-SC1 program, Patrys' most mature product candidate is progressing under Patrys' Chinese license partner, Hefei Co-source Biomedical. This development program is overseen by a Joint Development Committee that meets face to face annually, and electronically as appropriate. Hefei Co-source undertakes new drug research and development and undertakes manufacturing, preclinical research and clinical studies in multiple provinces within China.

The deal with Hefei Co-source Biomedical covers the exclusive development and commercialisation of PAT-SC1 in China and Patrys is seeking similar partners for this asset in other jurisdictions. To date, Hefei has successfully developed a stable cell line and are continuing to undertake further preclinical work. Hefei has developed a clinical development program and are interested in undertaking a clinical trial for PAT-SC1 in China.

Patrys' other lead IgM asset PAT-SM6 has completed two clinical trials, the first in 2012 in melanoma and the second a Phase 1/2a clinical trial of PAT-SM6 in multiple myeloma in March 2014. Patrys has identified a potentially improved manufacturing process for PAT-SM6, and can reactivate a clinical development program if appropriate partnership funding is obtained.



Patrys Overview

Patrys is a biopharmaceutical drug company with operations in Australia and the United States of America.

Patrys' expertise and assets target antibody therapeutics in the field of oncology with both IgM antibodies and IgG antibody fragments under development.

Patrys has successfully out-licensed a clinical candidate, PAT-SC1 for the Chinese oncology market and has conducted two clinical trials with another lead candidate from its IgM platform, PAT-SM6. Patrys has in-licensed from Yale University a suite of novel, nuclear-penetrating antibodies (Deoxymabs 3E10 and 5C6) and conjugated Deoxymab 3E10 to nanoparticles which it will progress through development. Patrys will continue to advance lead candidates from both technology platforms towards the market.

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