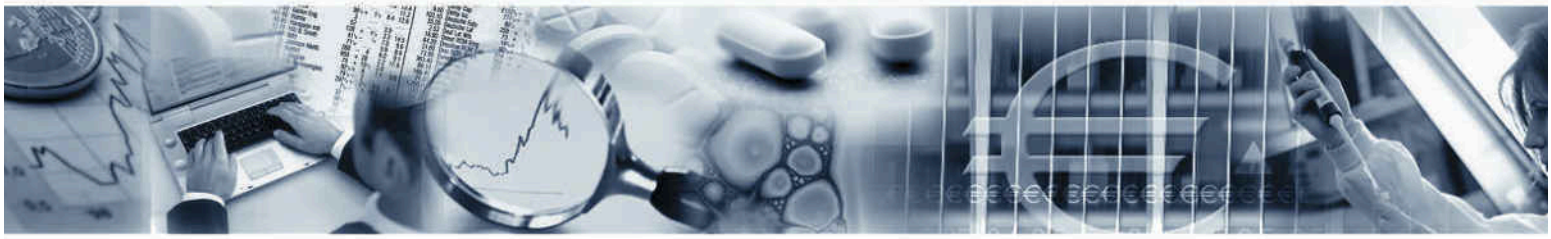


Research Note

RXi Pharmaceuticals

Building leadership in RNAi and Immunotherapy

RXi Pharmaceuticals
Next Generation in RNAi®

Chief Research Analyst

Marcel Wijma MSc

+1 (917) 460 6185 (US)

+31 (6) 8489 2954 (NL)

m.wijma@leeuwenhoeck.com

http://www.leeuwenhoeck.com

Date: 13 February 2017

Name:	**RXi Pharmaceuticals**
Country:	**United States**
Price:	**USD 0.74**
ISIN Code:	**US74979C5013**
Reuters Code:	**RXII**
Market Cap (USD m):	**12.4**
EV (USD m):	**-0.6**
Cash & cash eq. (USD m):	**13.0**
Shares outstanding (m):	**16.7**
Volume:	**868,019**
Free float:	**80%**
52-week Range:	**0.60-3.27**

USD m	2014A	2015A	2016E
Total Revenues	0.0	0.0	0.0
Net (Loss)/Profit	(8.800)	(10.223)	(9.500)
Net loss p.s. (cents)	(7.90)	(2.10)	(1.45)
R&D costs	5.680	6.925	6.000
Cash increase/(decrease)	(2.894)	(3.379)	8.000
Cash and market sec.	8.496	5.117	13.117

Executive Summary

- RXi is a clinical stage RNAi company developing innovative therapeutics based on its self-delivering RNAi (sd-rxRNA®) platform. Building on the pioneering discovery of RNAi, scientists at RXi have harnessed the naturally occurring RNAi process which has the ability to "silence" or down-regulate the expression of a specific gene that may be overexpressed in a disease condition. RXi developed a robust RNAi therapeutic platform including self-delivering RNA (sd-rxRNA®) compounds, that have the ability to highly selectively block the expression of any target in the genome, thus providing applicability to many therapeutic areas. Current clinical programs include dermatology and ophthalmology. The Company is also developing a small molecule, Samcyprone™, which is currently being evaluated in Phase II clinical trials for the treatment of cutaneous warts.

- At the beginning of this year the company concluded the acquisition of private biotech company MirImmune which expands RXi's pipeline to include cell-based immunotherapy to treat cancer. MirImmune had been focused on the development of next generation immunotherapies for the treatment of cancer. MirImmune combined two leading approaches to cancer treatment: immune checkpoint inhibition and cell-based immunotherapies. MirImmune already had an exclusive license to utilize RXi's proprietary sd-rxRNA technology for use ex vivo treatment of cell-based cancer immunotherapies.

- Using RXi's sd-rxRNA technology, MirImmune demonstrated in vitro that multiple sd-rxRNA compounds can be used alone or in combination to target and silence extracellular, as well as intracellular, checkpoints in immune cells. Additional in vitro data demonstrated that PD-1 silencing by sd-rxRNA in patient-derived tumor infiltrating lymphocytes (TILs) resulted in enhanced killing of melanoma tumor cells from the same patient in culture. MirImmune has also shown in a mouse model of human ovarian cancer

that in vivo treatment with mesothelin CAR T-cells transfected with a PD-1 targeting sd-rxRNA significantly reduced the rate of tumor growth as compared to vehicle control.

- The Company's lead product candidate and first RNAi clinical product candidate, RXI-109, is a self-delivering RNAi compound. RXI-109 is currently being evaluated in a Phase II clinical trial, Study 1402, to prevent or reduce dermal scarring following scar revision surgery of an existing hypertrophic scar and a Phase I/II clinical trial, Study 1502, to evaluate the safety and clinical activity of RXI-109 to prevent the progression of retinal scarring in subjects with wet age-related macular degeneration ("AMD").

- The market potential for RXi's products in development are large. Scarring represents a high unmet medical need as there are currently no FDA approved therapies for the treatment and prevention of scars in the skin. Despite a significant unmet need, no clinically-proven prescription anti-scarring treatment is available on the market today. In the U.S. alone, the estimated market potential for an effective anti-scarring treatment is over USD 4 billion annually. If approved, RXI-109 could be a "first-in-class" RNAi treatment for the prevention or reduction of post-surgical dermal scarring.

- End of last year, the company successfully raised USD 11.5 million from an underwritten public offering. After the raise, the Company's current cash position is USD 13.0 million, and we believe that this should be sufficient to carry out the further development of its pipeline in the coming 12-18 months. RXi plans to use the net proceeds to support the company's clinical trials, to support general corporate purposes and to finance the acquisition of MirImmune and the development of its pipeline.

- **Based on our NPV valuation, we believe that RXi Pharmaceuticals is substantially undervalued at the current share price of USD 0.74. Using our valuation model and taking into account the further development of its pipeline including the acquisition of MirImmune, the company's current total value should be USD 75-100 million, or USD 4.50-6.00 per share. This represents a substantial upside from the current share price.**

Company Profile & Technology

RXi Pharmaceuticals is a clinical-stage RNAi company developing innovative therapeutics that address unmet medical needs. The Company's development programs are based on its proprietary self-delivering RNAi (sd-rxRNA®) platform and Samcyprone™, a topical immunomodulator. Its clinical development programs include RXI-109, an sd-rxRNA for the treatment of dermal and ocular scarring, and Samcyprone™, for the treatment of such disorders as warts, alopecia areata, non-malignant skin tumors and cutaneous metastases of melanoma. Beginning of 2017 RXi concluded the acquisition of MirImmune, a privately-held company focused on the development of next generation immunotherapies for the treatment of cancer. MirImmune combined two leading approaches to cancer treatment: immune checkpoint inhibition and cell-based immunotherapies.

Drug delivery has been the primary challenge in developing RNAi therapeutics since its initial discovery. One conventional solution to the delivery problem involves encapsulation into a lipid-based particle, such as a liposome, to improve circulation time and cellular uptake. Scientists at RXi have used an alternative approach to delivery in which drug-like properties were built into the RNAi compound itself. These novel compounds are termed 'self-delivering' RNAi compounds or sd-rxRNA. In preclinical studies RXi has demonstrated efficient cellular uptake of sd-rxRNA in tissues such as skin, retina, spinal cord and liver. In March 2014, RXi out-licensed RXi's sd-rxRNA technology to MirImmune for ex vivo use in developing cell-based cancer immunotherapies, signifying validation of RXI's technology platform and paving the way for similar future agreements.

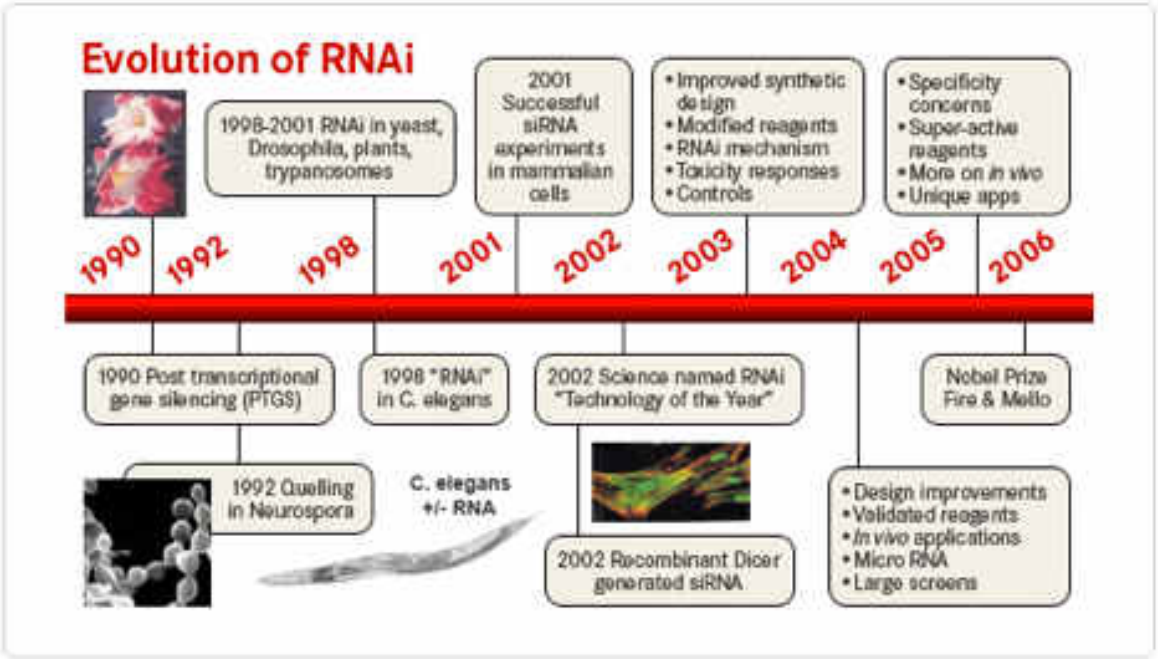
RNAi Technology: One of the Major Breakthroughs in Modern Biology

RNA Interference (RNAi) is one of the most important technological breakthroughs in modern biology, allowing us to directly observe the effects of the loss of function of specific genes in mammalian systems. It represents a breakthrough in understanding how genes are turned on and off in cells, and a completely new approach to drug discovery and development. Its discovery has

been heralded as "a major scientific breakthrough that happens once every decade or so," and represents one of the most promising and rapidly advancing frontiers in biology and drug discovery today. Fire and Mello won the 2006 Nobel Prize in Physiology or Medicine for their discovery of RNA interference.

RNAi is a natural mechanism for silencing specific genes present in all multicellular organisms. Genes provide cells with the instructions for making proteins, and proteins — or more specifically defective proteins — are the cause of a large number of human diseases. When a gene is silenced by RNAi, the mRNA coding for the targeted protein is reduced, thus decreasing the cell's ability to make the protein encoded by that gene, thereby reducing the occurrence of the associated disease. Viral infections are important potential targets for RNAi-based therapies. Reducing the activity of key viral genes can cripple the virus, and numerous studies have already hinted at the promise of RNAi for treating viral infections. In laboratory-grown human cells, investigators have stopped the growth of HIV, polio, hepatitis C, Ebola and other viruses using this approach.

The strength of RNAi as a research tool will also have an enormous potential impact on medicine. Knocking down a gene's activity yields a wealth of information about its functions in cellular pathways. Prior to the discovery of RNAi, the process was laborious and could take months. In the early 1990s, a number of scientists observed independently that RNA inhibited protein expression in plants and fungi. This phenomenon, identified but not understood, was then known as "post transcriptional gene silencing" and "quelling". In 1998 Fire and Mello observed in Caenorhabditis (C.) elegans that double-stranded RNA (dsRNA) was the source of sequence-specific inhibition of protein expression, which they called "RNA interference". While the studies in C. elegans were encouraging at that time the use of RNAi as a tool was limited to lower organisms because delivering long dsRNA for RNAi was nonspecifically inhibitory in mammalian cells.


Evolution of RNAi
1998-2001 RNAi in yeast, Drosophila, plants, trypanosomes
2001 Successful siRNA experiments in mammalian cells
• Improved synthetic design
• Modified reagents
• RNAi mechanism
• Toxicity responses
• Controls
• Specificity concerns
• Super-active reagents
• More on in vivo
• Unique apps
1990
1992
1998
2001
2002
2003
2004
2005
2006
1990 Post transcriptional gene silencing (PTGS)
1998 "RNAi" in C. elegans
2002 Science named RNAi "Technology of the Year"
Nobel Prize Fire & Mello
1992 Quelling in Neurospora
C. elegans +/- RNA
2002 Recombinant Dicer generated siRNA
• Design improvements
• Validated reagents
• In vivo applications
• Micro RNA
• Large screens

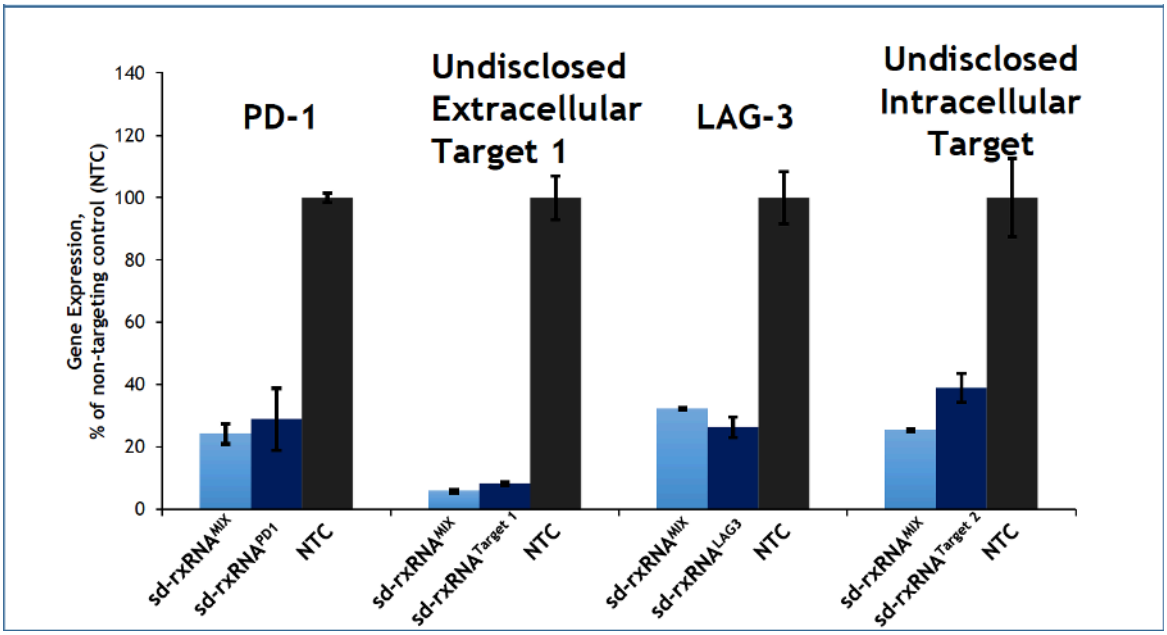
RXi Enters Immunotherapy with the acquisition of MirImmune

Late 2016, RXi announced that it entered into an exclusive option agreement to acquire MirImmune, for a share amount equal to 19.99% of the RXi common stock outstanding at the time of the close, plus certain undisclosed milestones. Already in the beginning of 2015, RXi had granted an exclusive license to MirImmune to utilize the Company's novel and proprietary sd-rxRNA technology for use treatment of ex vivo cell-based cancer immunotherapies. MirImmune has been focusing on immune checkpoint modulation since its inception in 2014.

Immune Checkpoint Modulators block the ability of certain proteins, called immune checkpoint proteins, to limit the strength and duration of immune responses. These proteins normally keep immune responses in check by preventing overly intense responses that might damage normal cells as well as abnormal cells. But, researchers have learned that tumors can commandeer these proteins and use them to suppress immune responses. PD-1 is an example of an Immune Checkpoint, others include CTLA-4, TIM3 and LAG-3.

Unlike other immunotherapies or cancer vaccines that work by strengthening the immune system or training it to attack tumor cells, checkpoint inhibitors work to defeat a cancer resistance mechanism that causes immune cells to see tumor cells as "self". Once this veil or "brake" is lifted, the immune response may be enough to defeat the cancer cells on its own, but a wide ranging array of therapeutic combinations is being tested. Blocking the activity of immune checkpoint proteins releases the "brakes" on the immune system, increasing its ability to destroy cancer cells. Several immune checkpoint inhibitors have been approved by the FDA. The first such drug to receive approval, ipilimumab (Yervoy®), for the treatment of advanced melanoma, is an antibody that blocks the activity of a checkpoint protein known as CTLA4, which is expressed on the surface of activated immune cells called cytotoxic T lymphocytes. CTLA4 acts as a "switch" to inactivate these T cells, thereby reducing the strength of immune responses; ipilimumab binds to CTLA4 and prevents it from sending its inhibitory signal.

Since licensing RXi's technology, MirImmune has identified six lead compounds against different extracellular and intracellular immune checkpoints including PD-1 and CTLA-4. It also demonstrated the silencing of all six targets in in vitro studies both singly and in combination. The ability to simultaneously silence multiple checkpoint genes and to target intracellular targets that antibodies cannot reach could be a competitive advantage of the technology.



Using RXi's sd-rxRNA technology, MirImmune demonstrated in vitro that multiple sd-rxRNA compounds can be used alone or in combination to target and silence extracellular, as well as intracellular, checkpoints in immune cells. The use of this technology ex vivo could be included as part of existing cell treatment protocols essential for all therapeutic cells such as CART. Additional in vitro data demonstrated that PD-1 silencing by sd-rxRNA in patient-derived tumor infiltrating lymphocytes (TILs) resulted in enhanced killing of melanoma tumor cells from the same patient in culture. MirImmune has also shown in a mouse model of human ovarian cancer that in vivo treatment with mesothelin CAR T-cells transfected with a PD-1 targeting sd-rxRNA significantly reduced the rate of tumor growth as compared to vehicle control. Furthermore, the silencing of

PD-1 in the CAR T-cells isolated from these tumors persisted for at least one month. End of last year, MirImmune provided new data demonstrating silencing of a number of undisclosed immunosuppressive targets in natural killer cells (NK cells) using RXi's sd-rxRNA compounds. This adds to a remarkable set of immune checkpoint modulation studies in human T-cells, including CAR T-cells and TILs. In most cell types, the sd-rxRNA treatment results in potent silencing while maintaining close to 100% transfection efficiency and nearly full cell viability. Moreover, the silencing effect has been validated in a number of clinically used cell treatment protocols.

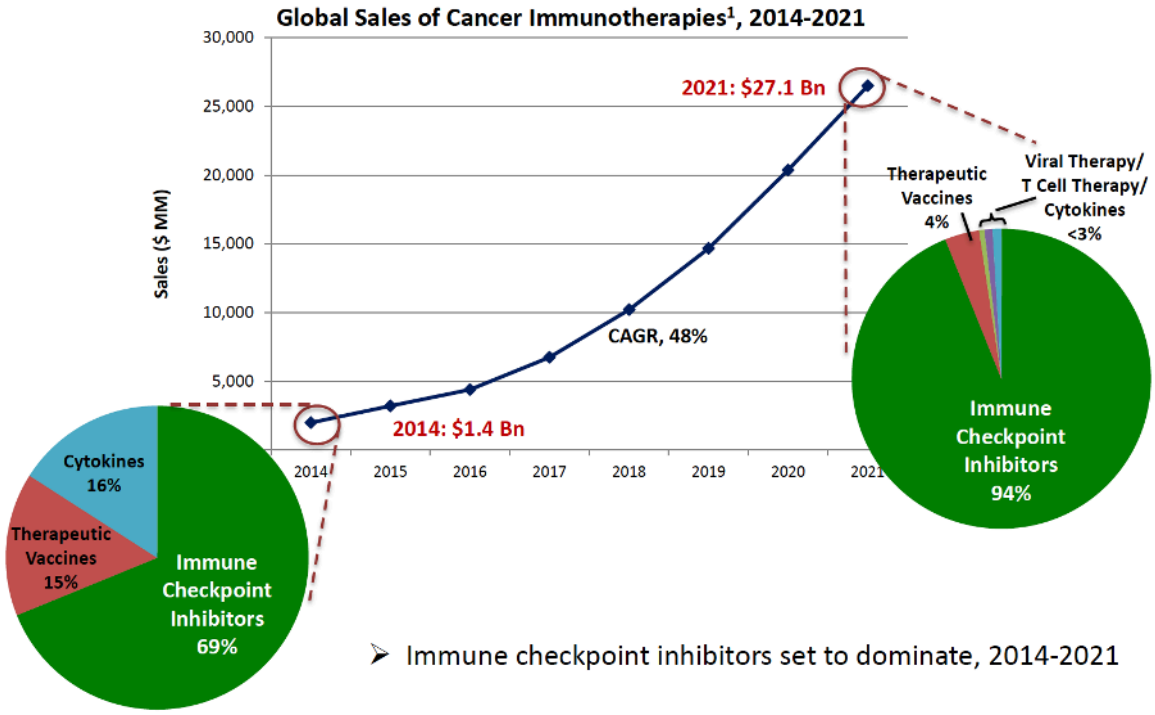
Several researchers estimate that the market for immunotherapeutic approaches in cancer treatment is expected to exceed USD 30 billion by 2023, driven by novel agents, combination therapy, longer treatment times and the emergence of predictive Biomarkers. Within cancer immunotherapy, immune checkpoint inhibitors are taking the bulk of the market with and expected CAGR more than 50%. See also the graph below.

The growth is driven by:

- High adoption rates in Western countries, given immunotherapies have a largely well-tolerated adverse event profile compared with conventional chemotherapy;

- Immunotherapy treatment months/patient to likely materially expand due to improved progression free survival (PFS) associated with immunotherapy, multiple lines of therapy during a patient's disease and maintenance usage;

- Likely use of repeat immunotherapy based approach in patients who lose their partial response, given well tolerated adverse event profile and mechanistic rationale;

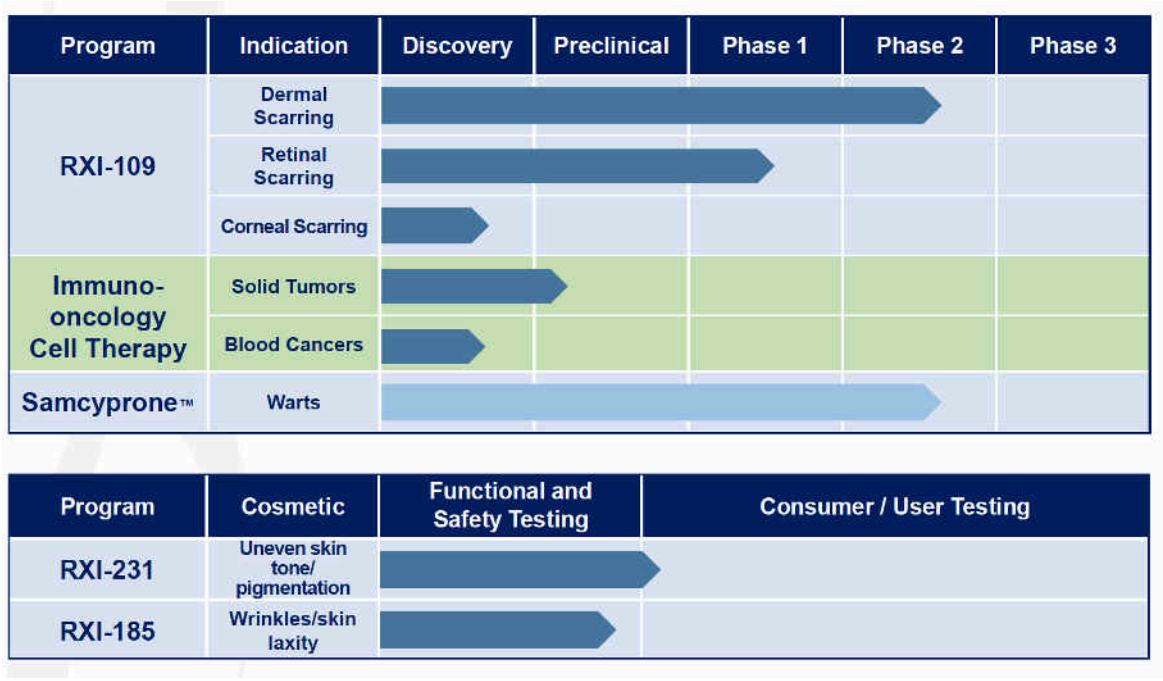


- Immune checkpoint inhibitors set to dominate, 2014-2021

Source: DR/Decision Resources LLC

Clinical Overview RXi Pipeline

RXi's pipeline is focused on the following areas: dermatology, ophthalmology and cosmetic product development. With the acquisition of MirImmune, RXi has expanded its focus to immune oncology. Its RNAi therapies are designed to "silence," or down-regulate, the expression of a specific gene that may be over-expressed in a disease condition and its immunotherapy agents will treat diseases by inducing or enhancing an immune response.

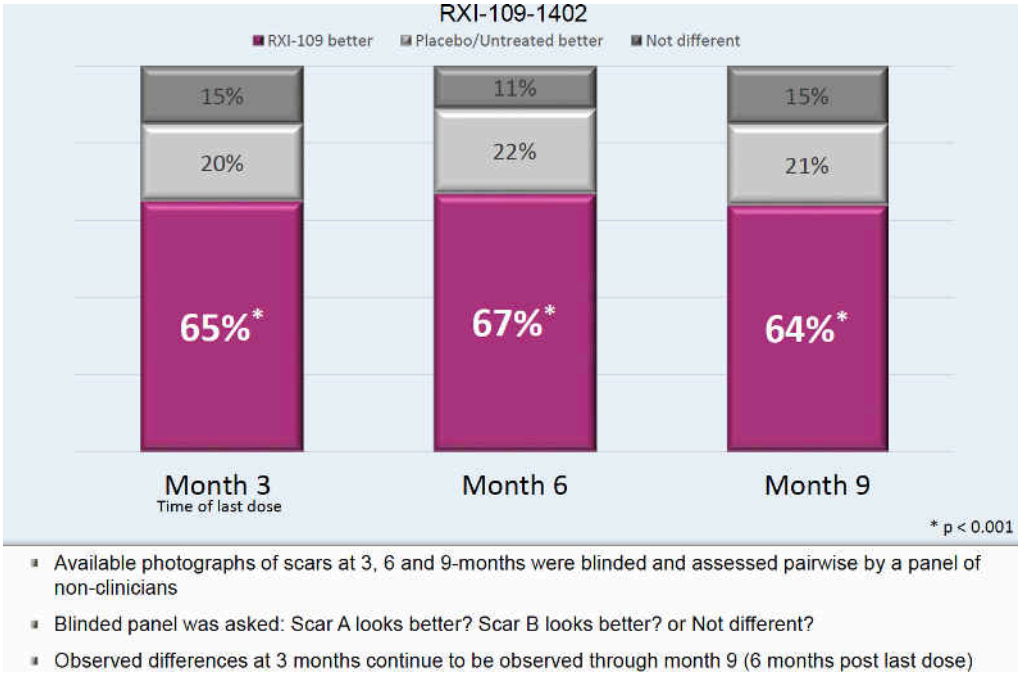


Source: RXi Pharmaceuticals

RXI-109: Novel treatment in scarring

The Company's lead product candidate and first RNAi clinical product candidate, RXI-109, is a self-delivering RNAi compound (sd-rxRNA) that started clinical trials in 2012. RXI-109 is designed to reduce the expression of connective tissue growth factor ("CTGF"), a critical regulator of several biological pathways involved in fibrosis, including scar formation in the skin and eye. RXI-109 is currently being evaluated in a Phase II clinical trial, Study 1402, to prevent or reduce dermal

scarring following scar revision surgery of an existing hypertrophic scar and a Phase I/II clinical trial, Study 1501, to evaluate the safety and clinical activity of RXI-109 to prevent the progression of retinal scarring in subjects with wet age-related macular degeneration ("AMD"). In December 2016, the Company announced that preliminary data from the first two cohorts from Study 1402 confirmed the positive differentiation of hypertrophic scars from untreated surgery incisions compared to the previously presented data for a subset of subjects treated with 5 mg/cm of RXI-109 over 3 months. In addition, these data extend this observation to all time points, including the post-treatment follow-up period through 9 months post-surgery. RXI-109 was safe and well tolerated. Additionally, as expected, the limited 3-month data available from Cohort 3 appear to align with that of the first two cohorts as these subjects all had the same dosing schedule through month 3. A complete read-out of the whole study, including all four cohorts with follow-up until 9 months post-surgery, is expected in 2017H2.



Source: RXi Pharmaceuticals

Samcyprone™: Warts

In December 2014, the Company broadened its clinical pipeline with an exclusive, global license to Samcyprone™, RXi's second clinical candidate. Samcyprone™ is a proprietary topical formulation of the small molecule diphenylcyclopropenone ("DPCP"), an immunomodulator that works by initiating a T-cell response. The use of Samcyprone™ allows sensitization using much lower concentrations of DPCP than are used with existing compounded DPCP solutions, avoiding hyper-sensitization to subsequent challenge doses. DPCP, the active ingredient in Samcyprone™, has long been used to treat warts and has also been used for several other indications, such as to stimulate hair re-growth in alopecia areata and to clear cutaneous metastases of melanoma. In March 2015, the FDA granted Orphan Drug Designation to the Company for Samcyprone™ for the treatment of malignant melanoma stage IIb to IV. Samcyprone™ is currently being evaluated in a Phase IIa clinical trial, Study 1502, for the clearance of common warts. Study 1502 was initiated in December 2015. In December 2016, the Company announced the results from a preliminary review of sensitization and wart clearance data from a subset subjects that have completed the 10 week treatment phase of Study 1502. Results showed that greater than 90% of the subjects demonstrated a sensitization response, a prerequisite to be able to develop a therapeutic response. Additionally, more than 60% of the subjects responded to the treatment by exhibiting either complete or greater than 50% clearance of all treated warts with up to 10 weekly treatments. Samcyprone™ treatment has been generally safe and well tolerated with expected drug-related adverse events being local reactions due to the sensitization and challenge responses in the skin. The complete readout of the final study is anticipated in the 2017H2.

Immuno-oncology Cell Therapies (previously MirImmune)

MirImmune's approach builds on current immunotherapy approaches, but provides some key advantages. One major advantage is that pretreatment with MirImmune's targeted compounds allow multiple immune checkpoints to be attenuated within the same therapeutic cell; an improvement which could dramatically increase their tumor cell killing capability. In addition, these therapeutic immune cells may lack some known side effects associated with the checkpoint inhibitor toxicity while potentially improving efficacy over current immunotherapy approaches. Using RXi's sd-rxRNA technology, MirImmune demonstrated in vitro that multiple sd-rxRNA

compounds can be used alone or in combination to target and silence extracellular, as well as intracellular, checkpoints in immune cells. Additional in vitro data demonstrated that PD-1 silencing by sd-rxRNA in patient-derived tumor infiltrating lymphocytes (TILs) resulted in enhanced killing of melanoma tumor cells from the same patient in culture. MirImmune has also shown in a mouse model of human ovarian cancer that in vivo treatment with mesothelin CAR T-cells transfected with a PD-1 targeting sd-rxRNA significantly reduced the rate of tumor growth as compared to vehicle control. Furthermore, the silencing of PD-1 in the CAR T-cells isolated from these tumors persisted for at least one month.

In December 2016, MirImmune provided new data demonstrating silencing of a number of undisclosed immunosuppressive targets in natural killer cells (NK cells) using RXi's sd-rxRNA compounds. This adds to a remarkable set of immune checkpoint modulation studies in human T-cells, including CAR-T cells and tumor Infiltrating lymphocytes (TILs). In most cell types, the sd-rxRNA treatment results in potent silencing while maintaining close to 100% transfection efficiency and nearly full cell viability. Moreover, the silencing effect has been validated in a number of clinically used cell treatment protocols.

Near Term Milestones

In the past year, RXi Pharmaceuticals has already reached a number of important milestones with the development of both its lead programs and the acquisition of MirImmune. In the coming 6-12 months we expect a number of important milestones that can drive the stock price upwards. These are:

- 2017Q1: Transition to include immuno-oncology research at RXi
- 2017Q1: Identify final patients for enrollment in RXI-109-1501
- 2017Q1: Initiate program to evaluate reduction of cytokines involved in cytokine release syndrome
- 2017Q3: Provide data on multiple checkpoint inhibiting sd-rxRNA compounds co-transfected in CAR T-cells in mouse models for ovarian cancer
- 2017Q3: Complete enrollment of RXI-SCP-1502 in warts
- 2017Q2: Complete enrollment in the RXI-231 consumer study
- 2017H2: Preclinical results on use of sd-rxRNA with TILs in melanoma
- 2017H2: Phase II study 1402 (RXI-109 hypertrophic scarring) final data read out
- 2017H2: Phase II Study 1501 (RXI-109 retinal scarring) complete subject participation
- 2017H2: Phase II Samcyprone cutaneous warts –data read out Study 1502 and possible out-licensing
- 2017H2: RXI-231 – consumer tolerance/functional performance data available
- 2018: Enter one sd-rxRNA checkpoint inhibitor in clinical development

Analyst: Marcel Wijma MSc
Marcel Wijma, Chief Research Officer and managing partner, has a longstanding history in financial biotech research. After selling Van Leeuwenhoeck Research (VLR) to SNS Securities in 2006, he established an award winning analyst team in biotech/life sciences at SNS Securities. In 2009, Marcel was awarded by Financial Times/Starmine as being one of the Top-3 biotech analysts in Europe. Later that year, Marcel purchased VLR from SNS Securities after which the company was reconstituted. At VLR, he leads the professional VLR research organisation, which is augmented by selected external financial researchers with a specialisation in Life Sciences. Mr. Wijma has a Masters degree in Financial Economics from Erasmus University in Rotterdam.