Zacks Small-Cap Research

Sponsored – Impartial - Comprehensive

April 12, 2019
John D. Vandermosten, CFA
312-265-9588 / jvandermosten@zacks.com

scr.zacks.com 10 S. Riverside Plaza, Suite 1600, Chicago, IL 60606

Phio Pharmaceuticals Corp (PHIO - NASDAQ)

Activation in the Tumor Microenvironment

Based on our DCF model and a 15% discount rate, Phio Pharmaceuticals is valued at approximately $2.00 per share. Our model applies a 15% probability of ultimate approval and commercialization for RXI-109 and Samcyprone. The model includes contributions from the US, EU and rest of world.

Current Price (4/11/2019)	$0.45
Valuation	**$2.00**

OUTLOOK

Phio Pharmaceuticals has developed a unique composition of interference RNA that is able to self-deliver into the cellular cytoplasm. The compound, sd-rxRNA, combines features of RNAi and antisense, and is able to silence unwanted gene expression with a limited side effect profile.

The company has two Phase II dermal assets and one Phase I/II ocular asset which are expected to be partnered and provide development capital for earlier stage immuno-oncology (IO) programs.

Phio recently directed its primary research focus towards its preclinical IO program that is being developed to augment existing cell therapies. A favorable investment and regulatory environment are supportive of IO and should allow for rapid entry into the clinic.

We attach a valuation for the Phase I/II and Phase II assets and expect to see regulatory approvals and subsequent commercialization over the 2022 to 2024 period as described in our analysis.

SUMMARY DATA

52-Week High	**2.56**
52-Week Low	**0.27**
One-Year Return (%)	**-84.2**
Beta	**2.11**
Average Daily Volume (sh)	**685,654**
Shares Outstanding (mil)	**22.3**
Market Capitalization ($mil)	**10.1**
Short Interest Ratio (days)	**0.29**
Institutional Ownership (%)	**13.7**
Insider Ownership (%)	**5.9**
Annual Cash Dividend	**$0.00**
Dividend Yield (%)	**0.00**
5-Yr. Historical Growth Rates	
Sales (%)	**N/A**
Earnings Per Share (%)	**N/A**
Dividend (%)	**N/A**
P/E using TTM EPS	**N/A**
P/E using 2018 Estimate	**N/A**
P/E using 2019 Estimate	**N/A**
Zacks Rank	**N/A**

Risk Level	**Above Average**
Type of Stock	**Small-Growth**
Industry	**Med-Biomed/Gene**

ZACKS ESTIMATES

Revenue
(In millions of USD)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2017	$0.0 A	$0.0 A	$0.0 A	$0.0 A	$0.0 A
2018	$0.0 A	$0.1 A	$0.1 A	$0.0 A	$0.1 A
2019					$0.0 E
2020					$0.0 E

Earnings per Share

	Q1	Q2	Q3	Q4	Year
2017	-$2.65 A	-$1.12 A	-$1.05 A	-$0.84 A	-$5.52 A
2018	-$0.90 A	-$0.46 A	-$0.34 A	-$0.09 A	-$1.80 A
2019					-$0.37 E
2020					-$0.35 E

WHAT'S NEW

Phio Pharmaceuticals Corp. (NASDAQ: PHIO) reported fourth quarter and full year results and filed its Form 10-K on March 27, 2018. Key operational events in 2018 include data presentations on NK cells, collaborations with Karolinska Institutet and Iovance Biotherapeutics and positive results from the Phase II assets. Other accomplishments include a change in the corporate name to Phio Pharmaceuticals, publication of sd-rxRNA immuno-oncology successes in Molecular Therapy and the elevation of Dr. Gerrit Dispersyn to Chief Executive Officer. We are eagerly awaiting news regarding progress on the sale of the dermatology and ophthalmology assets and RXI-762's progress towards the clinic.

Phio's lead candidate, RXI-762, is pursuing immuno-oncology indications in collaboration with Center for Cancer Immune Therapy (CCIT) and Iovance Biotherapeutics. Development efforts are centered on reducing the immune checkpoints that appear on the surface of tumor infiltrating lymphocytes (TILs) in an approach that can be layered on to current manufacturing processes. *In-vitro* efficacy and safety data is being generated and regulatory work is underway in order to prepare the investigational new drug (IND) application. Phio is currently developing the data set needed to satisfy the requirements for the IND and we expect a further update on progress in a few months.

Financial results for 2018 show a sharp decline in spending as the Phase II studies for RXI-109 and Samcyprone were completed, as headcount was reduced and as the focus turned toward lower capital intensity pre-clinical work. The absence of $4.7 million of in-process R&D in 2018 compared to 2017 also contributed to the difference. Total expenses dropped 47% over prior year levels with research and development contracting 19% and G&A falling 21%.

As of December 31, 2018, cash stood at $14.9 million and debt remained at zero. Cash burn was ($7.5) million for the year, compared to ($9.7) million in 2017. Issuance of stock and exercise of warrants contributed $18.8 million in cash from financing, which is expected to be sufficient to fund the company until 2H:20.

Dermatology and Ophthalmology Assets

Phio continues to meet with potential acquirors and partners for RXI-109 and Samcyprone. The company is seeking a large dermatology player for the scarring indication and feedback has been limited. Potential buyers are seeking an advanced asset that can be approved within a short time period or a 505(b)(2) type of asset that is already understood by the regulatory agencies and RXI-109 for scarring is outside of this zone. We continue to see value here and anticipate that Phio will continue meeting with interested suitors until the environment shifts in their favor. Samcyprone can address an unmet need in warts and we think it can be more of a commercial or retail product. The asset also can extend into other areas such as genetal warts, precancerous lesions and has an orphan designation for skin cancer. No deals have yet been announced for this asset. Data for RXI-109 for retinal fibrosis and corneal scarring was the last to be fully available for review and could have the greatest near term value of the for sale assets. Just last week Regeneron and Alnylam announced a collaboration with $800 million in upfront cash to focus on disease targets expressed in the eye and central nervous system. This demonstrates that there is value recognized for RNAi in ophthalmology indications and we are hopeful that the value of Phio's asset will also be acknowledged. Despite the slow pace, there is value in the development work done so far and in the platform and patients will be required to successfully monetize these partially developed assets.

Poster Presentation

On March 25, 2019, Phio presented a poster entitled Feasibility and efficacy using self-delivering RNAi against TGFβ1 to reduce TME immunosuppression at the American Association for Cancer Research (AACR) Annual Meeting. The poster and presentation highlighted the ability of sd-rxRNA to downregulate TGFβ1[1] and reduce immunosuppressive activity and promote T cell anti-tumor activity.

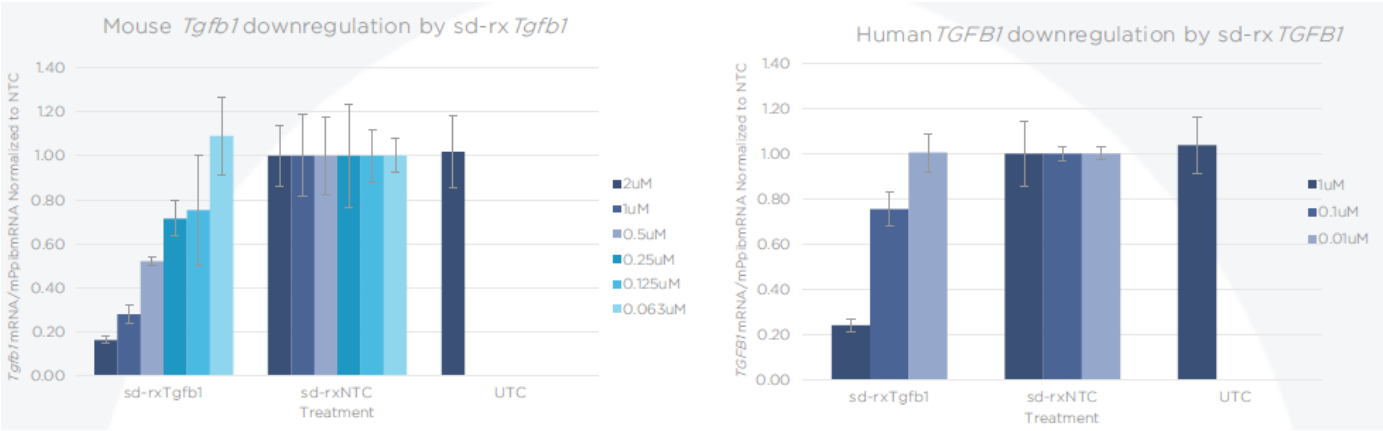
The study found that sd-rxRNA was efficiently taken up by cancer and immune cells in a mouse model of breast cancer. In the model, the sd-rx TGFβ1 demonstrated favorable distribution and target pathway downregulation.

[1] Courtesy of Wikipedia: https://en.wikipedia.org/wiki/TGF_beta_1 Transforming growth factor beta 1 or TGF-β1 is a polypeptide member of the transforming growth factor beta superfamily of cytokines. It is a secreted protein that performs many cellular functions, including the control of cell growth, cell proliferation, cell differentiation, and apoptosis. In humans, TGF-β1 is encoded by the TGFB1 gene.

Futher conclusions from the study show that injections of sd-rx TGFβ1 can reduce the reduce immuno-suppression and boost immune effector cell activity. Work here paves the way for future clinical development activities in combination with adoptive cell therapy or other immuno-oncology efforts.

sd-rx TGFβ1 was incubated with breast cancer or NSCLC cells for 72 hours, and demonstrated a dose response of silencing gene expression as illustrated in the leftmost grouping in each of the two following panels. This *ex-vivo* model is supportive of favorably modulating the immunosuppressive tumor microenvironment to allow T cells to clear cancer cells.

Exhibit I – Ex vivo Modulation of Tgfβ1 in Simulated Tumor Microenvironment[2]



Glycostem Collaboration

On March 28th, Phio announced a collaboration with Glycostem which will combine sd-rxRNA with Glycostem's oNKord cell therapy products. Glycostem is a Netherlands-based cell therapy company that has developed a platform technology employing *ex vivo* expansion of natural killer (NK) cells for use in immuno-oncology. The goal of the collaboration is to advance Glycostem's celular immunotherapies for the treatment of cancer. sd-rxRNA may provide new and effective methods for expanding and differentiating NK cells and address immunosuppressive environments that NK cells may encounter. Glycostem joins other Phio collaborators including CCIT, Medigene AG, Iovance Biotherapeutics and others.

CEO Appointment and Management Changes

As of March 1st, Gerrit Dispersyn was appointed chief executive officer (CEO). Dr. Dispersyn joined the company in April 2017 as Chief Development Officer and was promoted to President and Chief Operating Officer in 2018. He takes the reins from Dr. Geert Cauwenbergh, who will remain as member of Phio's board of directors.

On April 10, Phio appointed Dr. John Barrett as Chief Development Officer. Dr. Barrett's background at Ziopharm Oncology for the past eight years provided experience in drug discovery and in developing cell-based immuno-oncology therapies.

Programs & Partnerships

Phio maintains a relationship with the CCIT at Herlev Hospital to develop tumor-infiltrating lymphocytes (TILs) for cell therapies. Phio's sd-rxRNA is being used with TILs to modify their use in order to target immune checkpoints in cells from melanoma and other cancer patients. The use of sd-rxRNA with TILs has reduced the number of PD-1 receptors on their surface of in a pilot study.

Phio is working with Iovance Biotherapeutics to develop and commercialize autologous cellular immunotherapies with tumor directed TILs. Work with Iovance will combine sd-rxRNA with Iovance's autologous cell therapy

[2] Mouse breast cancer 4T1 cells (left) or human non-small cell lung cancer A549 cells (right) were incubated with sd-rx-Tgfb1 targeting mouse Tgfb1, or sd-rx-Tgfb1 targeting human TGFB1, respectively in culture media containing 2% FBS. Seventy two hours after incubation, downregulation of Tgfb1 mRNA was evaluated by branched-DNA assay or RT-PCR.

approach in the treatment of cancer. Work with Iovance has shown a knock-down of PD-1 was associated with phenotypic changes suggesting TIL activation. Future efforts will evaluate the impact of sd-rxRNA on TIL activty.

The Medigene AG collaboration is combining sd-rxRNA with T cell receptors (TCR) to enhance the safety and efficiacy of their use in the treatment of cancer patients. Initial work with Medigene reduced PD-1 levels in T cells and the future goal is to expand to additional targets.

Combined efforts with Gustave Roussy are employing sd-rxRNA in the tumor micro environment (TME). Intra-tumoral injection is applied to silence gene expression. Study results demonstrated an 80 – 85% reduction of the target gene expression in a melanoma mouse model.

Pipeline Candidates

The following illustrates Phio's pipeline, which also includes undisclosed compounds in adoptive cell therapy (ACT) and tumor microenvironment. The lead aset is RXI-762, which seeks to increase the expression of PD-1 in cell based therapies. Earlier stage programs are targeting the immune receptor TIGIT in solid tumors among other checkpoints. Cell differentiation is another program that is seeking to extend the life of modified immune cells so they will work longer.

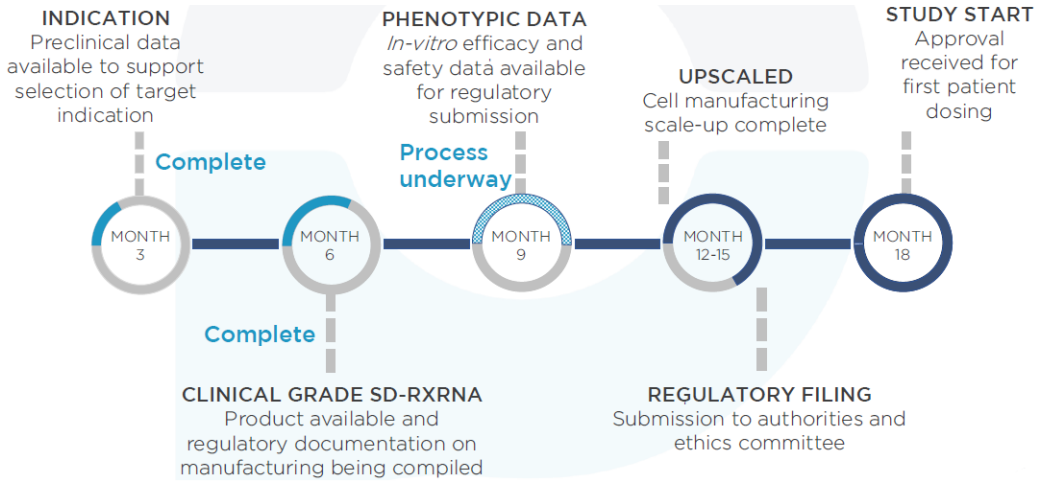
Exhibit II – Phio Pipeline

TREATMENT	INDICATION	DISCOVERY	PRE-IND	CLINICAL
Checkpoint Inhibition in ACT (TILs)	Melanoma	RXI-762		
Checkpoint Inhibition in ACT (TILs)	Ovarian Cancer	RXI-762		
Checkpoint Inhibition in ACT (TILs)	Head & Neck	RXI-762		
Checkpoint Inhibition in ACT (TCRs)	Other	RXI-762		
Checkpoint Inhibition with T-cells	Various	RXI-804		
Checkpoint Inhibition with ACT	Various	RXI-804		
Cell Maturation with ACT	Various	Undisclosed		
Cell Metabolism with ACT	Various	Undisclosed		
Direct Tumor	Melanoma	Undisclosed		
Tumor Microenvironment	Various	Undisclosed		
Tumor Microenvironment	Various	Undisclosed		

2018 Milestones:

- Equity capital raise – 2Q:18 / 4Q:18
- Patent grant for use of sd-rxRNA targeting CTGF for treatment of fibrotic disorders – May 2018
- Partner Iovance added for TIL development – May 2018
- Report of Retinal Scarring trial results – 2Q:18
- Cutaneous Warts study results – May 2018, 2018 at IID
- Retinal Scarring study results – August 2018
- Partnership/Sale of Dermatology and Ophthalmology Programs – 2H:18
- Manufacture of clinical grade batch of RXI-762 – 3Q:18
- Addition of partner Glycostem for NK IO treatment development – March 2019
- Preparation of IND for RXI-762 – 2H:19
- Entry of Immuno-Oncology Programs into the Clinic – 2020

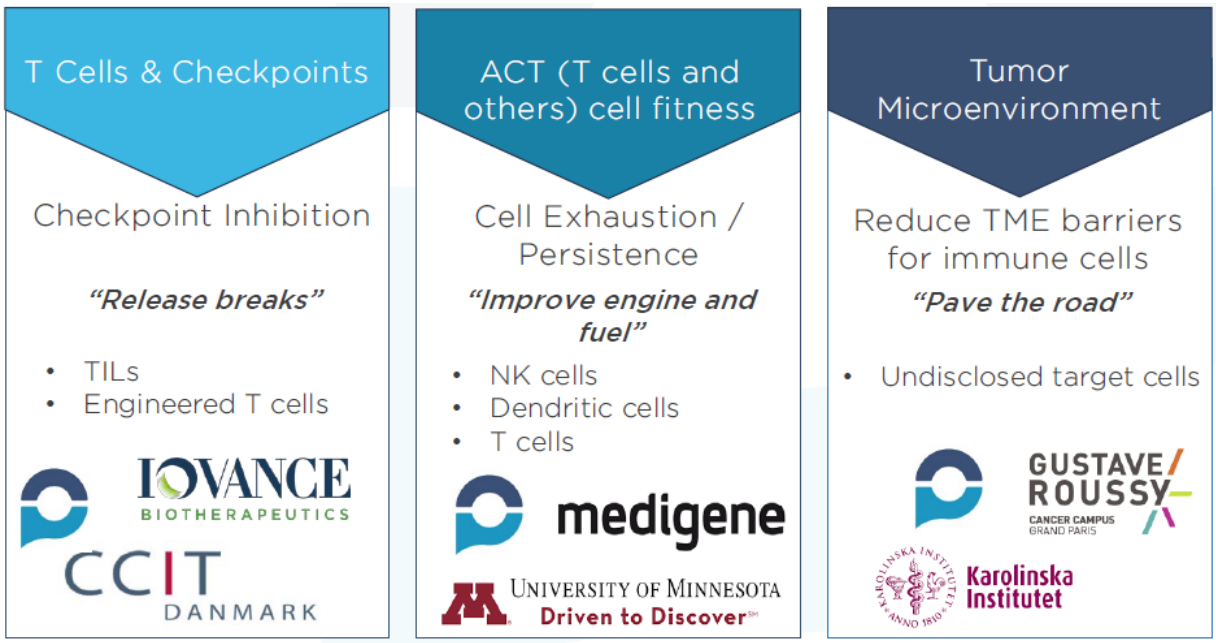
Exhibit III – Clinical Development Path RXI-762[3]



Focus Areas

Phio's efforts are centered on three areas in immuno-oncology. The first area serves to reduce the expression of immune checkpoints on T-cells in conjunction with adoptive cell therapy (ACT) where sd-rxRNA is used *ex-vivo* to modify the expression of checkpoint proteins on the the T-cell's surface. The second area also is conducted in conjunction with ACT and is used to improve other immune cells such as natural killer (NK) cells. This program also seeks to improve the function, fitness and persistence of immune cells, allowing them to fulfill their purpose with more endurance than they would without sd-rxRNA. The third area uses the company's proprietary technology to directly influence the tumor microenvironment.

Exhibit IV – Focus Areas



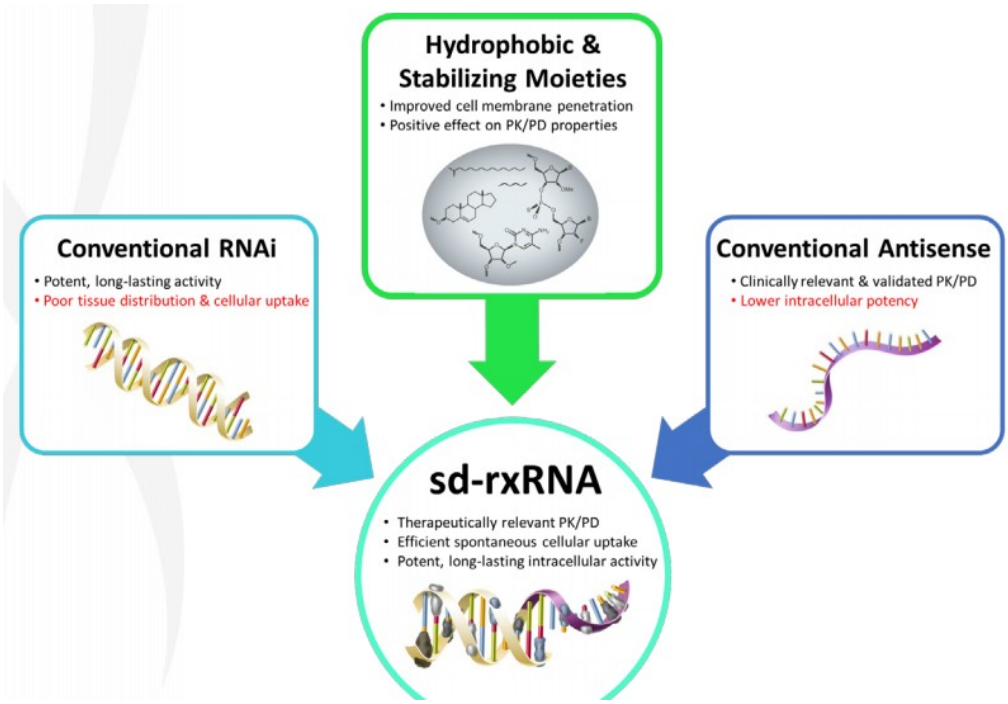
Work related to downregulating PD-1 receptors is being conducted with CCIT, Iovance and Medigene in the company's lead candidate RXI-762. sd-rxRNA has been effective with reducing PD-1 on tumor infiltrating lymphocytes (TILs) and with a variety of T-cells, including engineered and non-engineered.

[3] As of latest update, January 2019. From January 7, 2019 Phio Corporate Presentation

Phio has made marked progress ACT and is working with the Karolinska Institutet to expand the utility of the platform to modify cell differentiation. The goal of the program is to produce anti-tumor adoptive cell therapy grafts that can exceed the capability of checkpoint blockade alone. Internal work has also progressed for ACT, especially with NK cells, that are attractive targets in immuno-oncology due to their role as first line defense against tumors. sd-rxRNA has demonstrated the ability to downrregulate checkpoints on TIGIT and Cbl-b.

Collaboration with Gustave Roussy is focused on the tumor microenvironment where data is being generated on the direct use of sd-rxRNA in intratumoral injection. Gene expression was reduced by 80 to 85% following the intratumoral injection. The platform is very specific and can differentiate among isoforms, providing a material benefit as compared to small molecules and antibodies.

Exhibit V – sd-rxRNA Therapeutic Platform



Summary

Phio remains in negotiations with potential buyers regarding the dermatology and ophthalmology assets. We are hopeful that this will be able to add to cash levels and be reflected in the valuation.[4] Phio has a multi-pronged approach to its immuno-oncology efforts, with three broad areas of research which is being conducted in collaboration with partners. Immuno-oncology is an attractive area for development as the FDA frequently provides preferential consideration for candidates pursuing a cancer indication and there is broad demand for therapies in this pathology. Phio has indicated that they have sufficient cash to support activity until 2H:20, a runway that may be extended with funds generated from asset sales. We maintain our target price at $2.00 per share.

[4] We discuss the Samcyprone and PHIO-109 in a previous report found here.
https://s1.q4cdn.com/460208960/files/News/2018/Zacks_SCR_Research_08202018_PHIOI_Vandermosten.pdf

PROJECTED FINANCIALS

Phio Pharmaceuticals Corp. - Income Statement

Phio Pharmaceuticals Corp	2017 A	Q1 A	Q2 A	Q3 A	Q4 A	2018	2019 E	2020 E
Total Revenues	**$0.0**	**$0.0**	**$0.1**	**$0.1**	**$0.0**	**$0.1**	**$0.0**	**$0.0**
YOY Growth								
Research & Development	$5.4	$1.4	$1.2	$0.8	$0.9	$4.3	$4.3	$5.0
Acquired In-process R&D	$4.7	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
General & Administrative	$4.0	$0.9	$0.8	$0.7	$0.8	$3.2	$3.8	$4.0
Income from operations	($14.1)	($2.2)	($1.9)	($1.5)	($1.7)	($7.4)	($8.1)	($9.0)
Operating Margin	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Interest Income	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Other Income	($0.0)	$0.0	($0.0)	($0.0)	$0.0	$0.0	$0.0	$0.0
Pre-Tax Income	($14.1)	($2.2)	($1.9)	($1.5)	($1.7)	($7.4)	($8.1)	($9.0)
Provision for Income Tax	($1.6)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Tax Rate	*11.5%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Net Income	**($12.5)**	**($2.2)**	**($1.9)**	**($1.5)**	**($1.7)**	**($7.4)**	**($8.1)**	**($9.0)**
			$0.0					
Reported EPS	**($5.52)**	**($0.90)**	**($0.46)**	**($0.34)**	**($0.09)**	**($1.80)**	**($0.37)**	**($0.35)**
YOY Growth								
Basic Shares Outstanding	2.26	2.49	4.10	4.37	18.75	7.04	22.11	26.00

Source: Company Filing // Zacks Investment Research, Inc. Estimates

HISTORICAL STOCK PRICE

Phio Pharmaceuticals Corp. – Share Price Chart

DISCLOSURES

The following disclosures relate to relationships between Zacks Small-Cap Research ("Zacks SCR"), a division of Zacks Investment Research ("ZIR"), and the issuers covered by the Zacks SCR Analysts in the Small-Cap Universe.

ANALYST DISCLOSURES

I, John Vandermosten, hereby certify that the view expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the recommendations or views expressed in this research report. I believe the information used for the creation of this report has been obtained from sources I considered to be reliable, but I can neither guarantee nor represent the completeness or accuracy of the information herewith. Such information and the opinions expressed are subject to change without notice.

INVESTMENT BANKING AND FEES FOR SERVICES

Zacks SCR does not provide investment banking services nor has it received compensation for investment banking services from the issuers of the securities covered in this report or article.
Zacks SCR has received compensation from the issuer directly or from an investor relations consulting firm engaged by the issuer for providing non-investment banking services to this issuer and expects to receive additional compensation for such non-investment banking services provided to this issuer. The non-investment banking services provided to the issuer includes the preparation of this report, investor relations services, investment software, financial database analysis, organization of non-deal road shows, and attendance fees for conferences sponsored or co-sponsored by Zacks SCR. The fees for these services vary on a per-client basis and are subject to the number and types of services contracted. Fees typically range between ten thousand and fifty thousand dollars per annum. Details of fees paid by this issuer are available upon request.

POLICY DISCLOSURES

This report provides an objective valuation of the issuer today and expected valuations of the issuer at various future dates based on applying standard investment valuation methodologies to the revenue and EPS forecasts made by the SCR Analyst of the issuer's business.
SCR Analysts are restricted from holding or trading securities in the issuers that they cover. ZIR and Zacks SCR do not make a market in any security followed by SCR nor do they act as dealers in these securities. Each Zacks SCR Analyst has full discretion over the valuation of the issuer included in this report based on his or her own due diligence. SCR Analysts are paid based on the number of companies they cover. SCR Analyst compensation is not, was not, nor will be, directly or indirectly, related to the specific valuations or views expressed in any report or article.

ADDITIONAL INFORMATION

Additional information is available upon request. Zacks SCR reports and articles are based on data obtained from sources that it believes to be reliable, but are not guaranteed to be accurate nor do they purport to be complete. Because of individual financial or investment objectives and/or financial circumstances, this report or article should not be construed as advice designed to meet the particular investment needs of any investor. Investing involves risk. Any opinions expressed by Zacks SCR Analysts are subject to change without notice. Reports or articles or tweets are not to be construed as an offer or solicitation of an offer to buy or sell the securities herein mentioned.