Zacks Small-Cap Research
Sponsored – Impartial - Comprehensive

August 21, 2023
David Bautz, PhD
312-265-9471
dbautz@zacks.com

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

MediciNova, Inc. (MNOV-NASDAQ)

MNOV: Expecting Data for MN-166 in GBM and Chlorine Gas-Induced Lung Injury…

Based on our probability adjusted DCF model that takes into account potential future revenues from MN-166 in ALS, progressive MS, addiction, and as an MCM; and MN-001 in NAFLD, MNOV is valued at $26.00/share. This model is highly dependent upon continued clinical success of the company's assets and will be adjusted accordingly based upon future clinical results.

Current Price (08/21/23)	$2.31
Valuation	**$26.00**

OUTLOOK

MediciNova, Inc. (MNOV) recently filed form 10-Q with financial results for the second quarter of 2023. The company has a large number of indications for its two lead development compounds, and we anticipate data for two of those programs in the near term. Part 2 of a Phase 2 clinical trial of MN-166 (ibudilast) in glioblastoma (GBM) was fully enrolled as of January 2023. Since there is a six-month treatment period, we anticipate data from that study will be forthcoming. In addition, now that the contract with BARDA has expired regarding MN-166 as a medical countermeasure against chlorine gas-induced lung injury, we anticipate the results of those studies being announced in the near term.

SUMMARY DATA

52-Week High	**$2.66**
52-Week Low	**$1.95**
One-Year Return (%)	**1.32**
Beta	**0.98**
Average Daily Volume (sh)	**16,757**
Shares Outstanding (mil)	**49**
Market Capitalization ($mil)	**$113**
Short Interest Ratio (days)	**N/A**
Institutional Ownership (%)	**11**
Insider Ownership (%)	**17**
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**

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

ZACKS ESTIMATES

Revenue
(In millions of $)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2022	0 A	0 A	0 A	0 A	0 A
2023	0 A	0 A	0 E	0 E	0 E
2024					0 E
2025					0 E

Earnings per Share

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2022	-$0.07 A	-$0.08 A	-$0.07 A	-$0.06 A	-$0.29 A
2023	-$0.06 A	-$0.06 A	-$0.08 E	-$0.08 E	-$0.28 E
2024					-$0.32 E
2025					-$0.35 E

© Copyright 2023, Zacks Investment Research. All Rights Reserved.

WHAT'S NEW

Business Update

Data Expected for MN-166 in GBM

In January 2023, MediciNova, Inc. (MNOV) announced that the Phase 2 trial of MN-166 (ibudilast) in combination with temozolomide (TMZ) for the treatment of glioblastoma (GBM) was fully enrolled (NCT03782415). This is a two-part trial taking place at Dana-Farber Cancer Institute; Part 1 of the trial evaluated the safety and tolerability of MN-166 in combination with TMZ and determined the optimal dose of MN-166 to use in Part 2 of the study. In August 2021, MediciNova announced completion of a safety review of Part 1 of the trial, which enrolled 15 subjects. There were no concerning safety signals observed in Part 1 and there were no serious adverse events related to MN-166. Five out of 15 subjects completed cycle 6 without disease progression, i.e. 33% of subjects were progression-free at 6 months. Part 2 will evaluate the efficacy of MN-166 and TMZ as measured by the proportion of subjects who are progression-free at 6 months. Additional outcome measures will include overall survival, response rate, and median six-month progression-free survival.

In February 2023, MediciNova announced the presentation of new data regarding tumor tissue analysis and clinical outcome from Part 1 of the study (the dose ranging portion of the trial). The tumor tissues were analyzed to determine potential predictors of tumor response to MN-166 and TMZ combination therapy. Study participants were divided into two groups: non-responders (disease progression within five months of receiving MN-166/TMZ) and responders (no disease progression for five months after receiving MN-166/TMZ). The data showed that responders had a lower percentage of CD3+ T cells than non-responders (P<0.05). In addition, CD74 expression was also lower in the responders compared to the non-responders (P=0.06). The best predictor for tumor progression for five months in recurrent GBM patients was CD3 expression.

The use of MN-166 in GBM is based on a proteomic profiling study of GBM samples from 30 GBM patients which was presented at the 2017 American Society of Clinical Oncology (ASCO) annual meeting (McDonald *et al*). The results showed that macrophage migration inhibitory factor (MIF) was expressed in "poor responders" (e.g., those that lived < 1 year). MIF is an inflammatory-related cytokine that is secreted by cancer stem cells. The researchers then examined an additional 168 GBM samples and found co-expression of MIF and its receptor CD74 in 57% of the samples. In addition, co-expression of MIF and CD74 was significantly associated with poor survival. These results point to MIF being a suitable target for GBM treatment. MN-166 is an inhibitor of MIF (Cho *et al*., 2010).

An *in vivo* study was previously performed using RN1 GBM cells, which were intracranially injected into the brains of mice followed by no treatment or a combination of TMZ and MN-166 at two different concentrations. Results showed that mice treated with the combination of TMZ and MN-166 had significantly enhanced survival (median overall survival 114 days vs. 100.5 days, P=0.005) with suppression of MIF and CD74 expression also noted.

On August 17, 2023, MediciNova announced that an abstract regarding tumor tissue analysis data from a clinical trial of MN-166 has been selected for a poster presentation at the 28th Annual Meeting of the Society for Neuro-Oncology (SNO), which is being held November 15-19, 2023. The title of the presentation is: "Immunohistochemistry evaluation on pre-treatment tumor tissue predicts treatment response to MN-166 (ibudilast) and Temozolomide combination therapy in glioblastoma patients".

Glioblastoma (GBM) is a primary malignant brain tumor that is complex and difficult to treat. The five-year survival rate for glioblastoma patients is only 6.9%, and the average length of survival is estimated to be only 8 months (National Brain Tumor Society). Despite available treatments including surgery, radiation, and chemotherapy, survival rates and mortality statistics for GBM have been virtually unchanged for decades. There have only been a few drugs ever approved by the FDA specifically for the treatment of glioblastoma, and none of these treatments have succeeded in significantly extending survival beyond a few extra months. As such, there is a great unmet medical need for better treatments for GBM.

Update on MN-166 as a Medical Countermeasure

In March 2021, MediciNova, Inc. (MNOV) announced a partnership with the Biomedical Advanced Research and Development Authority (BARDA) to test the potential for MN-166 (ibudilast) as a medical countermeasure (MCM) for the treatment of chlorine gas-induced acute respiratory distress syndrome (ARDS) and acute lung injury (ALI). MN-166 is being evaluated in preclinical efficacy models of chlorine gas-induced ALI, and these experiments could help support the use of MN-166 in ARDS/ALI caused by other ailments, including the flu, infections, severe burns, and pancreatitis. Under the FDA animal rule (FDA), development of MCMs do not require human clinical trials to establish efficacy as these would not be ethical or feasible. The FDA can grant approval of a drug for an MCM indication based on well-controlled animal studies, when the results of these studies establish that the drug is reasonably likely to produce clinical benefit in humans.

ARDS is a serious lung disorder that results from the small blood vessels of the lung leaking fluid that fills up the alveoli, thus preventing proper oxygen exchange (Stevens *et al*., 2018). There are many causes of ARDS, including infections (e.g., pneumonia), severe burns, pancreatitis, inhalation of smoke or chemicals, or other serious illnesses. An excessive inflammatory response appears to be involved in the pathogenesis of ARDS (Li *et al*., 2019). Current treatment options involve supportive care while the lungs heal, which involves oxygen therapy supplied through a ventilator. There are no pharmacological treatments specifically for ARDS and approximately 40% of hospitalized patients die from it (Siegel *et al*., 2020).

According to the NIH, infections are the most common risk factors for ARDS (NIH). The most common infections are due to influenza (and other respiratory viruses), pneumonia, and sepsis. There are approximately one million adults hospitalized in the U.S. each year for pneumonia (ATS), approximately 400,000 hospitalizations due to influenza each year in the U.S. (CDC), and approximately 1 million hospitalizations due to sepsis (UMich). While not all of these patients will go on to develop ARDS, it is this pool of patients that are at a high-risk of developing ARDS that will be the target market for MediciNova.

The release of toxic chemicals, either deliberately through chemical weapons or accidentally through an industrial accident, can also result in ALI or ARDS. Chlorine is a widely used industrial chemical (e.g., water purification) that has been previously implicated in both intentional and accidental releases:

- During World War I, Germany launched the first known chemical weapon attack by releasing chlorine gas from 6,000 cylinders against French troops, which caused >1,000 casualties.

- Multiple times in the past decade, the Syrian government of Bashar al-Assad used chlorine as a chemical weapon against its enemies, and a report by the U.S. government in 2020 claimed the regime continues to pursue chemical weapons development.

- In June 2005, a train derailment in South Carolina resulted in the accidental release of 40-60 tons of chlorine gas (Van Sickle *et al*., 2009). Nine individuals died and >250 were treated for toxic chlorine exposure.

- A mixture of sodium hypochlorite and hydrochloric acid is sometimes used as a cleaning solution. The chlorine gas that is produced can cause airway damage and reactive airways dysfunction syndrome (RADS) (Gorguner *et al*., 2004).

Chlorine inhalation results in the formation of hydrochloric acid (HCl) and hypochlorous acid (HOCl) as it dissolves into the airway surface liquid. Both of those compounds can result in oxidative injury following the formation of reactive oxygen species, which can result in edema, inflammation, and immediate airway constriction. In addition, chlorine exposure results in the recruitment of inflammatory neutrophils and macrophages (Balakrishna *et al*., 2014). The inflammatory response is accompanied by increases in various inflammatory markers such as CXCL1, GM-CSF, IL-6, and VEGF.

Current treatment for chlorine inhalation is mostly supportive care. For patients who show airway obstruction, inhaled β-2-adrenergic agonists are used (Wang *et al*., 2004) with early administration of corticosteroids shown to prevent ALI in mouse models (Jonasson *et al*., 2013). Humidified oxygen is typically administered to all victims, however supplemental oxygen could worsen cardiopulmonary function (Okponyia *et al*., 2018).

The Department of Homeland Security estimates that a deliberate release of highly concentrated chlorine gas upwind of an urban area with 700,000 individuals would lead to approximately 5% being exposed to a lethal dose of chlorine with approximately 17,500 fatalities and 100,000 hospitalizations (Department of Homeland Security). Chlorine gas is fairly easy to produce, thus the U.S. government is interested in finding MCMs to treat lung injuries caused by chlorine exposure.

The potential market opportunity for MN-166 in chlorine gas-induced ALI is significant as the U.S. government would likely decide to purchase large quantities of the drug for public health emergencies in the homeland (Strategic National Stockpile) and to protect U.S. military personnel abroad.

In addition, drugs approved as MCMs are eligible for a priority review voucher (PRV). A PRV allows the holder of the voucher to receive an expedited six-month review from the FDA for a new drug application (NDA) or biologics license application (BLA) instead of the usual ten-month review. PRVs are fully transferrable and in the past couple of years a number of them have sold for approximately $100 million each.

MN-166 was previously tested in a lipopolysaccharide (LPS) ARDS mouse model (Yang *et al*., 2020). While this model induces ARDS through a different mechanism than chlorine gas exposure, a number of the resulting phenotypes are similar between the two models. MN-166 was shown to reduce the overexpression of PDE4, reduce the overexpression of different inflammatory cytokines (e.g., TNF-α, IL-1b, IL-6, MCP-1), reduce pulmonary edema, and reduce lung cell apoptosis. Since ARDS can be induced by a number of different pathologic insults, success in one model system (e.g., LPS-induced ARDS) is likely to translate to success in other models (e.g., chlorine gas-induced ARDS).

In June 2022, MediciNova announced positive results from a Phase 2 clinical trial of MN-166 (ibudilast) in hospitalized COVID-19 patients at risk for developing ARDS. The trial achieved statistical significance for one of the co-primary endpoints (the proportion of subjects free of respiratory failure), and achieved statistical significance for the proportion of subjects discharged from the hospital. A total of 34 subjects were randomized 1:1 to receive MN-166 or placebo for seven days, and on Day 7, 71% of subjects in the MN-166 group and 35% of the placebo group were free of respiratory failure (P=0.02).

Phase 2 Trial of MN-166 in AUD Not Successful

In June 2023, MediciNova announced that results of the Phase 2b trial of MN-166 in alcohol use disorder (AUD) were presented at the 46th Annual Research Society on Alcoholism Scientific Meeting. The study was a randomized, double blind, placebo controlled trial in treatment-seeking men and women with moderate or severe AUD. Participants were administered MN-166 50 mg or placebo twice a day for 12 weeks. A total of 102 subjects were enrolled in the study. The primary objective was to evaluate the effects of MN-166 compared to placebo on percent heavy drinking days (≥5 drinks for men and ≥4 drinks for women over the course of a 12-week treatment period.

The results of the study showed that MN-166 was not superior to placebo for reducing percent heavy drinking days. Nor was MN-166 superior to placebo for multiple secondary endpoints. This was due to the fact that both MN-166 and the placebo decreased heavy drinking days by equal magnitudes. It's notable that all of the patients in this study, including the placebo-treated patients, were "treatment-seeking" individuals who were highly motivated to reduce their drinking and this made it more difficult to show a difference using MN-166.

Financial Update

On August 9, 2023, MediciNova filed Form 10-Q with financial results for the second quarter of 2023. As expected, the company did not report any revenues in the second quarter of 2023. R&D expenses in the second quarter of 2023 were $1.7 million compared to $2.6 million in the second quarter of 2022. The decrease was primarily due to a decrease in manufacturing expenses. G&A expenses in the second quarter of 2023 were $1.6 million compared to $1.5 million in the second quarter of 2022. The increase was primarily due to increased non-cash stock-based compensation.

Net cash used in operating activities was $2.4 million for the second quarter of 2023. MediciNova exited the second quarter of 2023 with approximately $52.9 million in cash and cash equivalents. We estimate the

company has sufficient capital to fund operations for at least the next few years. As of August 9, 2023, the company had approximately 49.0 million shares outstanding and when factoring in stock options a fully diluted share count of approximately 57.3 million.

Conclusion

We look forward to results from Part 2 of the Phase 2 trial of MN-166 in GBM as well as results from the studies of MN-166 as a MCM against chlorine gas-induced lung injury in the near future. We have removed MN-166 as a treatment for AUD, which has caused a very slight decrease in our valuation by $1 to $26 per share.

PROJECTED FINANCIALS

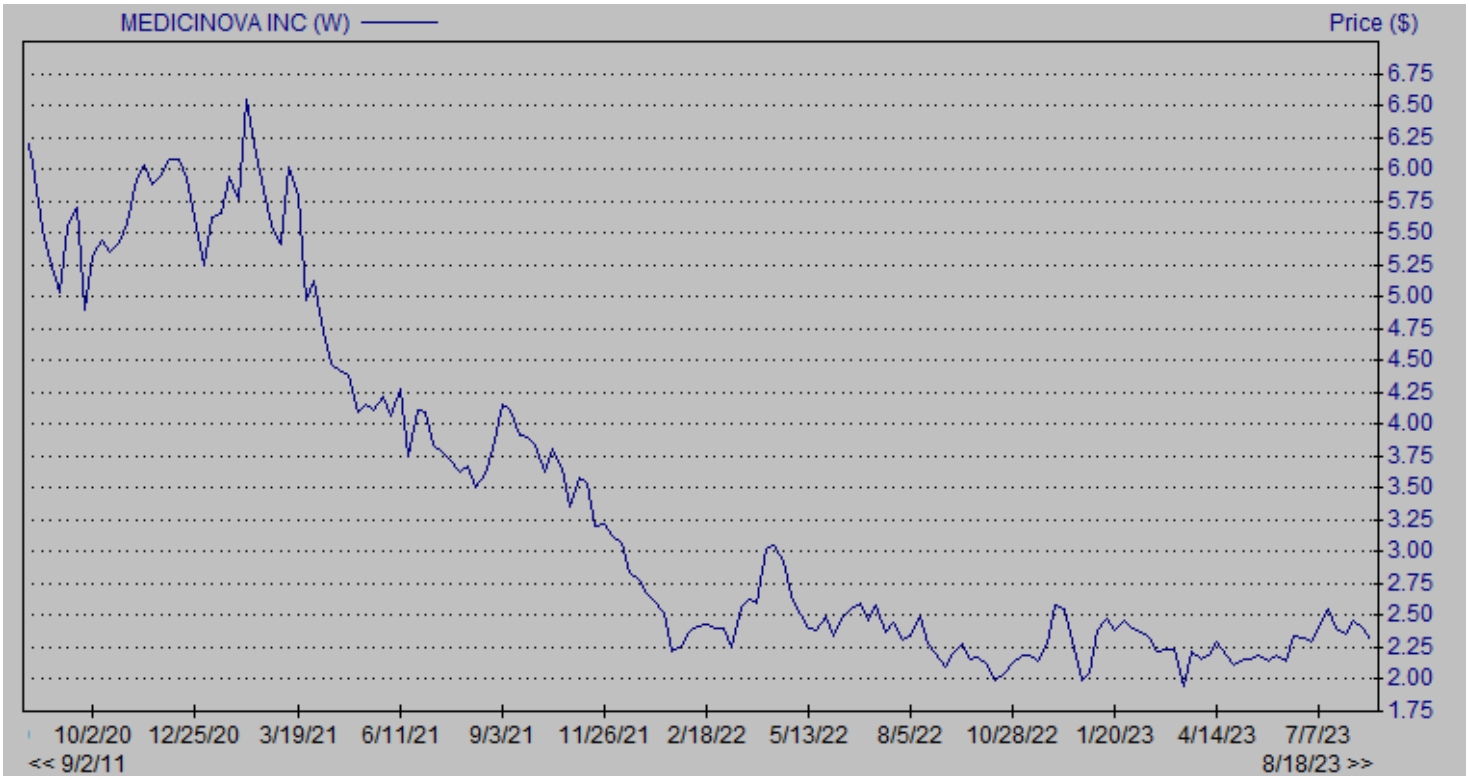
MediciNova Inc.
Income Statement

MediciNova, Inc.	2022 A	Q1 A	Q2 A	Q3 E	Q4 E	2023 E	2024 E	2025 E
MN-166 (Multiple Sclerosis)	$0	$0	$0	$0	$0	$0	$0	$0
MN-166 (ALS)	$0	$0	$0	$0	$0	$0	$0	$0
MN-166 (DCM)	$0	$0	$0	$0	$0	$0	$0	$0
MN-001 (NASH)	$0	$0	$0	$0	$0	$0	$0	$0
Grants & Collaborative Revenue	$0	$0	$0	$0	$0	$0	$0	$0
Total Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Cost of Sales	$0	$0	$0	$0	$0	$0	$0	$0
Product Gross Margin	-	-	-	-	-	-	-	-
Research & Development	$9.1	$1.5	$1.7	$2.5	$2.6	$8.3	$10.0	$11.0
General & Administrative	$5.5	$1.5	$1.6	$1.5	$1.6	$6.2	$6.0	$6.5
Other Expenses	$0	$0	$0	$0	$0	$0	$0	$0
Operating Income	($14.6)	($3.0)	($3.3)	($4.0)	($4.2)	($14.5)	($16.0)	($17.5)
Operating Margin	-	-	-	-	-	-	-	-
Non-Operating Expenses (Net)	$0.6	$0.0	$0.4	$0.2	$0.2	$0.9	$0.1	$0.1
Pre-Tax Income	($14.1)	($2.9)	($2.9)	($3.8)	($4.0)	($13.6)	($15.9)	($17.4)
Income Taxes Paid	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Net Income	**($14.1)**	**($2.9)**	**($2.9)**	**($3.8)**	**($4.0)**	**($13.6)**	**($15.9)**	**($17.4)**
Net Margin	-	-	-	-	-	-	-	-
Reported EPS	**($0.29)**	**($0.06)**	**($0.06)**	**($0.08)**	**($0.08)**	**($0.28)**	**($0.32)**	**($0.35)**
YOY Growth	-	-	-	-	-	-	-	-
Basic Shares Outstanding	49.045	49.046	49.046	49.050	49.050	49.048	49.200	49.500

Source: Zacks Investment Research, Inc. *David Bautz, PhD*

© Copyright 2023, Zacks Investment Research. All Rights Reserved.

HISTORICAL STOCK PRICE



Source: Zacks Small Cap Research

© Copyright 2023, Zacks Investment Research. All Rights Reserved.

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, David Bautz, PhD, 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, from an investment manager, 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.

CANADIAN COVERAGE

This research report is a product of Zacks SCR and prepared by a research analyst who is employed by or is a consultant to Zacks SCR. The research analyst preparing the research report is resident outside of Canada, and is not an associated person of any Canadian registered adviser and/or dealer. Therefore, the analyst is not subject to supervision by a Canadian registered adviser and/or dealer, and is not required to satisfy the regulatory licensing requirements of any Canadian provincial securities regulators, the Investment Industry Regulatory Organization of Canada and is not required to otherwise comply with Canadian rules or regulations.