2023年10月2日

Zacks Small-Cap Researchによる当社レポートの発表に関するお知らせ

現地時間の9月29日、米国シカゴに本拠を置く投資家向け情報サービス企業Zacks Small-Cap ResearchのDavid Bautz氏による、当社レポートが発表されましたので、参考情報としてお知らせいたします。

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https://scr.zacks.com/

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Sponsored – Impartial - Comprehensive

September 29, 2023
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MediciNova, Inc. (MNOV-NASDAQ)

MNOV: Positive Results for MN-166 in Chlorine Gas-Induced Acute Lung Injury Model…

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 $27.00/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 (09/29/23)	$2.12
Valuation	**$27.00**

OUTLOOK

On September 27, 2023, MediciNova, Inc. (MNOV) announced results of nonclinical studies conducted under the BARDA contract to develop MN-166 (ibudilast) as a medical countermeasure (MCM) for the treatment of chlorine gas-induced lung injury. The studies included both a single-dose and multi-dose evaluation of MN-166 following chlorine gas exposure. The multi-dose study showed that treatment with high-dose MN-166 resulted in greater improvement in PaO_2/FiO_2 (ratio of arterial oxygen partial pressure to fractional inspired oxygen) compared to low-dose MN-166, the positive control rolipram, and negative control (P=0.0001). The company plans to meet with the FDA to determine the next steps for the program.

SUMMARY DATA

52-Week High	**$2.66**
52-Week Low	**$1.95**
One-Year Return (%)	**-3.20**
Beta	**0.93**
Average Daily Volume (sh)	**23,797**
Shares Outstanding (mil)	**49**
Market Capitalization ($mil)	**$104**
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

WHAT'S NEW

Business Update

Positive Results for MN-166 in Nonclinical Model of Chlorine Gas-Induced Lung Injury

On September 27, 2023, MediciNova, Inc. (MNOV) announced results from the nonclinical studies conducted under its contract with the Biomedical Advanced Research and Development Authority (BARDA) to develop MN-166 (ibudilast) as a potential medical countermeasure (MCM) against chlorine gas (Cl_2)-induced lung damage such as acute respiratory distress syndrome (ARDS) and acute lung injury (ALI).

The primary objective of the study was to determine the safety and pharmacological activity of MN-166 following ALI induced by Cl_2 gas inhalation. Both single- and multi-dose treatments were evaluated. The primary endpoint of the study was pulmonary function as measured by PaO_2/FiO_2, the ratio of arterial oxygen partial pressure to fractional inspired oxygen. ARDS is defined as a PaO_2/FiO_2 ratio < 300 mmHg while moderate ALI is defined as a mean PaO_2/FiO_2 < 200 mmHg.

Following Cl_2 gas-induced moderate ALI, the animals were divided into four different treatment groups: two doses of MN-166 (high dose or low dose), a positive control (rolipram), and a negative control. Treatments were given intravenously (IV) over 30 minutes. In the single-dose treatment study the animals were treated only once following the Cl_2 gas challenge while in the multi-dose study they were treated every 12 hours for a total of four doses following Cl_2 gas challenge.

The results of the single-dose study showed that MN-166 high dose and the positive control were more efficacious than MN-166 low dose and the negative control until 12 hours after Cl_2 exposure. However, there was not a statistically significant difference in overall pulmonary function. MN-166 was well tolerated and there were no safety concerns observed.

In the multi-dose trial, treatment with MN-166 high dose resulted in a statistically significant improvement in the mean PaO_2/FiO_2 ratio when compared to MN-166 low dose, rolipram, and the negative control (*P*=0.0001). The following table shows the PaO_2/FiO_2 ratio at baseline and 48 hours after Cl_2 gas exposure for the negative control group and the high-dose MN-166 group.

	PaO2/FiO2 (mmHg)	
	Baseline	48 Hours
Negative Control	518.7	224.8
High Dose MN-166	516.0	327.8

Source: MediciNova, Inc. / Zacks SCR

The PaO_2/FiO_2 ratio was 46% higher (a higher value is better) in the high dose MN-166 group than in the negative control group. In addition, since ARDS is defined as a PaO_2/FiO_2 ratio < 300 mmHg, the values at 48 hours indicate that the negative control group was still categorized as having mild ARDS but the high dose MN-166 group had recovered sufficiently to no longer be defined as having ARDS. MN-166 was well tolerated and there were no safety concerns observed.

The BARDA contract had called for two different animal models of Cl_2 gas induced lung injury to be evaluated, however MediciNova's subcontractor was unable to establish the feasibility of a second model and thus there were no evaluable efficacy results obtained from that second model.

Background on ARDS

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).

Conclusion

The positive results from the Cl_2 gas-induced lung injury model evaluating MN-166 as an MCM are very encouraging and we look forward to updates from the company on next steps for the program, which will likely occur after meeting with the FDA. Development of MN-166 as an MCM would not require efficacy trials in humans, thus it could represent a faster path to approval for the drug along with the potential for a PRV. We have increased the probability of MN-166 being approved as an MCM, which has slightly increased our valuation to $27 per share.

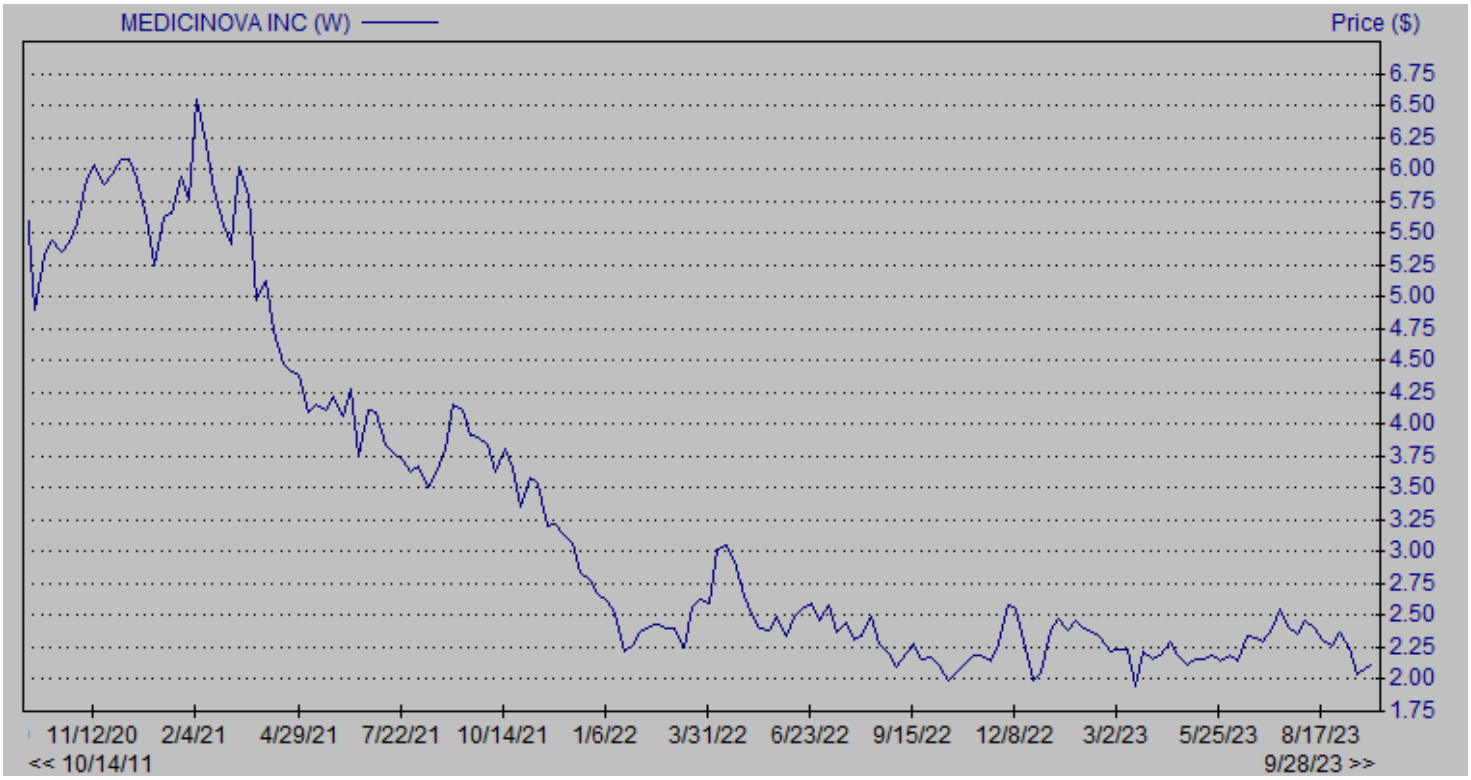
PROJECTED FINANCIALS

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*

HISTORICAL STOCK PRICE



Source: Zacks Small Cap Research

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