

## APTORUM GROUP LTD. (NasdaqGM/Euronext Paris: APM)

Aptorum Group Limited is a clinical stage biopharmaceutical company focused on the development of novel therapeutics and diagnostic technologies for unmet medical needs.

### COMPANY HIGHLIGHTS

- \* APM: Addressing Unmet Medical Needs
- \* In our view, Aptorum has compiled a promising pipeline of therapeutic and non-therapeutic assets that have the potential to drive significant long-term value. We also view the company's proprietary drug discovery and diagnostic technology platforms as additional value drivers.
- \* We are encouraged by the completion of Phase 1 clinical studies for ALS-4 (for bacterial infections) and SACT-1 (a repurposed drug for treatment of neuroblastoma) during the first half of 2022. We expect the programs to initiate Phase 2 (ALS-4) and Phase 1b/2a (SACT-1) studies by early 2023. In particular, we like that SACT-1 has received its first patent and was granted orphan drug designation by the U.S. FDA to date in 2022.
- \* The company's Aptorum Innovations subsidiary is co-developing a novel molecular-based rapid pathogen identification and detection diagnostics (RPIDD) technology, which is in the clinical validation and pre-commercialization stage. In April 2022, the U.S. Patent and Trademark Office granted a patent regarding the invention of an unbiased and simultaneous amplification method for DNA library preparation to A\*STAR institution, from whom Aptorum has an exclusive license over its technology. We see potential for this technology to disrupt the diagnostics market for infectious diseases by more accurately and cost-effectively detecting and identifying a wide range of pathogens.

*(continued on next page)*

### KEY STATISTICS

#### Key Stock Statistics

Recent price (11/1/22)	\$0.67
Fair Value Estimate	\$9.00
52 week high/low	\$2.56-\$0.58
Shares outstanding (M)	35.7
Market cap (M)	\$23.9
Dividend	Nil
Yield	Nil

#### Sector Overview

Sector	Healthcare
Sector % of S&P 500	14.1%

#### Financials (\$M, as of 6/30/22)

Cash & Mkt Securities	7.2
Debt	3.5
Working Capital (\$M)	1.1
Current Ratio	1.1
Total Debt/Equity (%)	22.5%
Payout ratio	NM
Revenue (M) TTM	1.4
Net Income (M) TTM	NM
Net Margin	NM

#### Risk

Beta	0.2
Inst. ownership	2%

#### Valuation

P/E forward EPS	NA
Price/Sales (TTM)	17.1
Price/Book (TTM)	1.0

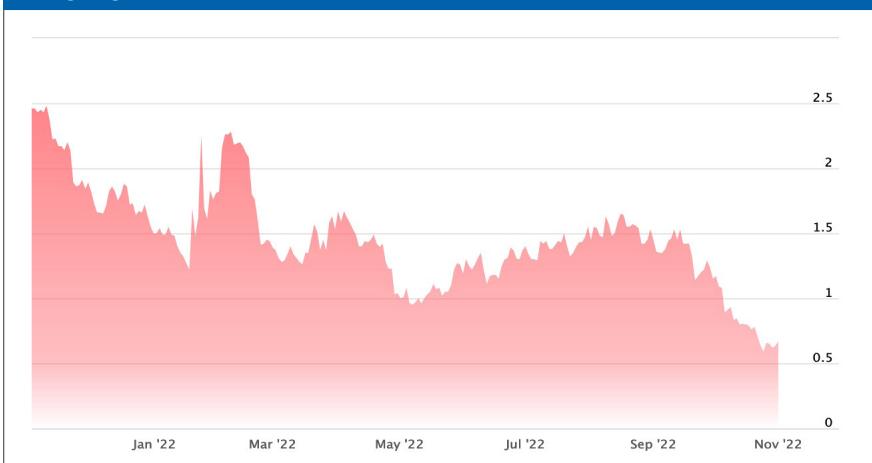
#### Top Holders

Geode Capital Management LLC  
Morgan Stanley  
Redmond Asset Management LLC

#### Management

CEO	Mr. Darren Lui
Head of Finance	Mr. Martin Siu
CMO	Dr. Clark Cheng
Company website	<a href="http://www.aptorumgroup.com">www.aptorumgroup.com</a>

### PRICE CHART



**COMPANY SPONSORED REPORT. SEE LAST PAGE FOR DISCLOSURES.**

- \* As of June 30, 2022, Aptomum had \$7.2 million in cash/restricted cash, and \$15.6 million in total equity. We see access to capital from established lines of credit and an “at the market” equity sale arrangement as providing sufficient resources to operate into 2023. Still, we expect an increasing need for capital to fund ongoing clinical trials and the potential commercialization of RPIDD as share overhangs.
- \* Our sum-of-the-parts NPV valuation for the company’s lead programs and IP and technology assets yields a fair value estimate of \$9 per share, well above current levels.

## INVESTMENT THESIS

Based in London, United Kingdom, Aptomum Group Limited is a clinical stage biopharmaceutical company dedicated to the discovery, development and commercializing of therapeutic and non-therapeutic assets to treat diseases with unmet medical needs, particularly in oncology (including orphan oncology indications) and infectious diseases.

Aptomum was incorporated in 2010. In early 2017, the company transitioned from a management-owned healthcare investment fund to a holding company with operating subsidiaries. It also began in-licensing assets to build a pipeline of internal drug and diagnostic product candidates.

Over the past five years, Aptomum has built a diverse portfolio of assets, both therapeutic and non-therapeutic in nature. Among its approximately 15 projects in development, three have emerged as “lead programs.” First is ALS-4, which targets bacterial infections using an anti-virulence (non-bactericidal) approach; second is SACT-1, a repurposed drug for the treatment of a rare cancer in pediatric patients, neuroblastoma, that resulted from computational and high-throughput screening of approved drugs against targets for over 7,000 potential orphan diseases; and third is the Rapid Pathogen Identification and Detection Diagnostics (“RPIDD”) technology, a rapid, accurate, cost-effective and untargeted method to identify and detect existing or emerging unknown pathogens through liquid biopsy.

ALS-4 is a first-in-class orally administered small molecule drug aimed at treating bacterial infections caused by Staphylococcus aureus, including Methicillin-resistant Staphylococcus aureus (MRSA), a difficult-to-treat pathogen, often referred to as a “super bug.” MRSA is associated with approximately 100,000 annual deaths globally, according to a recent study published by researchers at Oxford University. We estimate that MRSA drugs represent a more-than \$3 billion global market opportunity. Many marketed antibiotics have experienced increasing rates of resistance from these pathogens. As such, we expect demand for new treatments to continue, and for the overall market to expand as

new, orally active agents such as ALS-4 enable administration in outpatient and prophylactic market settings.

In pre-clinical studies, ALS-4 showed statistically significant improvements in survival in an in vivo study employing a rodent-lethal MRSA bacteremia model, and reduced the bacterial load in the kidneys by 99.5% over controls in non-lethal rodent models. The drug also was shown to inhibit production of staphyloxanthin, a golden pigment that covers the bacteria and is believed to be the key in enabling the bacteria to defend against the human body’s immune responses, in 11 strains of S. aureus. Since ALS-4 is not a bactericidal agent (non-antibiotic), the drug would likely not experience drug resistance concerns that are common among antibiotics due to selection pressure.

In addition, studies have shown that ALS-4 would not impact the minimum inhibitory concentration (MIC) of vancomycin, a leading antibiotic used in MRSA infection. We believe this suggests the potential for co-administration in order to increase the efficacy of standard of care regimens. In total, we believe such results would represent potential differentiating characteristics of ALS-4 over currently available agents, if replicated in human clinical studies.

In January 2022, Aptomum reported promising Phase 1 results in 72 healthy subjects. In both single and multiple ascending dose cohorts, there were no reported subject dropouts, observed serious adverse events (SAE), or relevant clinical changes to vital signs, ECG, clinical laboratory test results, and physical examinations compared to baselines. We anticipate Aptomum will file with the U.S. FDA to initiate a Phase 2 clinical study by early 2023, this to assess ALS-4’s efficacy in patients.

We see potential for ALS-4’s clinical path to be supported by a favorable regulatory backdrop for anti-bacterial drug candidates, particularly for candidates that can foster a shift from IV to oral administration. In late 2016, the U.S. Congress addressed declines in antibacterial drug research and increases in serious antibacterial drug-resistant infections by establishing the Limited Population Pathway for Antibiotic and Antifungal Drugs (LPAD), as part of the Twenty-First Century Cures Act. The LPAD enhances the FDA’s ability to approve antibacterial or antifungal drugs to help treat serious or life-threatening infections in patients with unmet needs. In our view, development programs for drugs eligible for approval under the LPAD pathway may follow the streamlined approaches described in the Act’s guidance for unmet medical needs and could involve smaller, shorter, or fewer clinical trials. As such, we think that ALS-4 could potentially secure approval under the LPAD pathway (upon approval from the U.S. FDA) for commercialization quicker than typical drug development timelines.

*(continued on next page)*

## PEER COMPARISON

Company	Ticker	Recent Price (\$)	52-Week High (\$)	52-Week Low (\$)	Mkt. Cap (\$MIL)	1-yr Price Change (%)	1-yr Rev Growth (%)	1 YR EPS Growth (%)	P/E Ratio	Beta	Yield (%)
APTORUM GROUP LTD	NASDAQ: APM	0.67	2.56	0.58	24	-73	69	NA	NA	0.2	NA
HUTCHMED (CHINA) LTD	NASDAQ: HCM	8.60	36.37	7.39	1440	-72	56	NA	NA	0.62	NA
WAVE LIFE SCIENCES LTD	NASDAQ: WVE	4.81	5.31	1.16	418	-1	104	NA	NA	0.66	NA
ZAI LAB LTD	NASDAQ: ZLAB	25.02	105.41	20.98	2220	-76	195	NA	NA	1.11	NA

Despite the unmet need, and despite industry leaders including Pfizer, Merck and Roivant making major acquisitions in the antibacterial space, many other leading firms have abandoned antibiotic development efforts. This is due to potentially challenging returns on investment because of the relatively lower price points for antibiotic agents compared with many other disease categories. We are encouraged by the background of ALS-4's team, as its inventor and principal investigator won the Innovation Academy Award at the Fourth International Conference on Prevention & Infection Control (ICPIC 2017).

In April 2019, Aptom established its Smart-ACT® (Accelerated Commercialization of Therapeutics) platform, a novel computational platform designed to enable repurposed drug discovery, modeling and validation of targets for orphan diseases or unmet medical needs. Despite favorable regulatory policy and economic pricing incentives, a large majority of more than 7,000 identified rare diseases remain without approved treatments. Repurposing drugs with validated efficacy and/or safety profiles holds the promise of significantly reducing time and cost for drug development. Aptom's focus areas for this platform include oncology, autoimmune, metabolic and genetic diseases.

Since launch, the Smart-ACT® (Accelerated Commercialization of Therapeutics) platform has screened over 2,600 approved small-molecule drugs and yielded lead candidate SACT-1 (for the treatment of neuroblastoma, a rare, aggressive cancer in nerve tissue found mostly in children). Patients with high-risk neuroblastoma face a less-than 50% long-term survival rate, according to the American Cancer Society, and account for a disproportionate percentage of pediatric cancer-related deaths. In addition, in vitro screening of SACT-1 against over 300 cancer cell lines has identified additional cancer types such as colorectal cancer, leukemia and lymphoma, among others, as areas of potential patient benefit.

SACT-1 has been reformulated to address the needs of pediatric neuroblastoma patients younger than five years of age, which also provides additional IP protection. In vitro studies have shown the drug to be effective and to have a promising safety profile when used against numerous neuroblastoma cell lines, including those associated with the highest-risk patient groups. Importantly, the combination of SACT-1 and traditional chemotherapy has shown synergistic properties in vitro, which could yield potential efficacy enhancement or dose reduction of chemotherapy. In vivo animal efficacy studies have also shown the beneficial effect of the drug in combination with standard chemotherapy.

In May 2022, Aptom announced results of a Phase 1, open-label human clinical trial, which examined the drug's bio-availability and food effects in healthy adult subjects and reported no observed SAE's. The data also suggested that any QT interval after administration was well within clinically acceptable limits. Aptom plans to file with the U.S. FDA to initiate a Phase 1b/2a trial before the end of 2022 or in early 2023. We view positively plans to file an eventual NDA under the 505(b)(2) pathway, which could enable regulatory approval using existing data (possibly reducing development time and cost).

We are encouraged by regulatory progress on SACT-1. Aptom announced in January 2022 that the U.S. Patent and Trademark Office granted the first patent for SACT-1, for composition and

method for treating or preventing cancer tumor growth (not limited to neuroblastoma) and/ or delaying the onset of cancer from tumor-initiating cells. We expect Aptom will seek additional IP protection in other global jurisdictions, as it advances the program. SACT-1 also was granted orphan-drug designation by the U.S. FDA, which we think bodes well for comparable designations in other global markets.

Besides having an established pre-existing safety profile, we think that SACT-1 also is well positioned to garner favorable regulatory status from the U.S. FDA and equivalent global jurisdictions, as a potential treatment for a rare form of cancer that focuses on a pediatric population -- two areas that historically have been granted accelerated pathways for approval by global regulatory agencies. As such, we think SACT-1 could establish a solid presence in a global market that we estimate to be approximately \$3 billion.

Further, we believe that the Smart-ACT® platform can generate a substantial number of candidates to enhance the value of Aptom's pipeline. Aptom has also selected two additional projects under its Smart-ACT® platform that have not yet been disclosed.

Besides Smart-ACT®, Aptom continues to launch new platforms that we think can enhance its drug discovery capabilities. In January 2022, the company launched an oncology and autoimmune discovery and development platform, with initial targets such as non-small cell lung cancer, lupus, rheumatoid arthritis, inflammatory bowel diseases, and others. The platform is designed to screen for novel first-in-class small molecule and PROTAC (Degradable) based drug candidates, and is currently conducting optimization for selected candidates that are seen as potentially serving unmet medical needs, despite existing therapies. We think such initiatives would represent robust opportunities for out-licensing and the infusion of non-dilutive capital over time.

Aptom Innovation, one of Aptom's subsidiaries, has partnered with the Singapore Agency for Science, Technology and Research (A\*STAR), to co-develop a novel molecular-based rapid pathogen identification and detection diagnostics (RPIDD) technology. The collaboration aims to utilize liquid biopsy technologies to accurately, but cost-effectively, identify and detect existing or emerging unknown pathogens, including DNA/RNA-based viruses such as coronavirus, antibiotic-resistant bacteria, and fungi.

RPIDD is a scalable service that can be integrated into hospitals and detect all types of pathogens. This could help overcome a key drawback in current laboratory testing, which is that up to 30% of current testing is unable to determine the etiology of certain infectious diseases -- limiting the ability for clinicians to prescribe appropriate medications. RPIDD's proprietary solution, which can also detect mutations that cause antibiotic resistance, offers other potential benefits as well. These include a turnaround time of less than 24-hours, offering valuable information that can advance the rapid administration of an appropriate antimicrobial therapy.

We are encouraged by the platform's rapid progress to the clinical validation stage. To date, Aptom Innovations has worked with industry leader Illumina to help evaluate the platform's sequencing capabilities, as it relates to accuracy, cost and turnaround time. Data has been cross-validated against standard of care diagnostics results, including blood culture technologies, and

the platform has achieved analytical sensitivity and specificity of samples of between 90%-100%, across low depth (60,000 reads) and high depth (1 million reads) sequencing. In September 2022, Aptomum announced that it has taken steps to set up a clinical laboratory in California, which we expect to be designed to satisfy requirements for CLIA certification, thus supporting commercialization and reimbursement.

In our view, Aptomum is uniquely positioned to create value and ultimately attract sub-licensing interest from this platform, given the company's expertise and focus on infectious diseases. Aptomum has further strengthened its presence in this field by joining the Biotech companies in Europe combating Antimicrobial Resistance Alliance ("BEAM Alliance"), a network of European companies involved in developing innovative products and kits to tackle antimicrobial resistance across multiple therapeutic modalities.

In recent years, the global market for liquid biopsy diagnostics, which we estimate to be over \$10 billion, has generated significant acquisition activity. Illumina's \$7 billion purchase of Grail, which has remained in the news due to regulatory antitrust challenges, and Exact Sciences' \$2 billion acquisition of Thrive are among recent notable transactions in the space. Despite these transactions, the industry remains fragmented, and we expect further consolidation.

As of June 2022, Aptomum was developing 15 projects covering therapeutic assets, diagnostic assets, natural supplements, and medical-device projects, in a broad range of areas across infectious diseases, cancers (including rare oncology indications), neurology, gastroenterology, metabolic disorders, and women's health. Among these are eight exclusively licensed projects (including ALS-4, which is licensed exclusively from the University of Hong Kong, and RPIDD, which is licensed exclusively from A\*STAR) and seven proprietary projects developed by company scientists (including SACT-1).

We are encouraged by the evolution and expansion of Aptomum's pipeline and its migration towards markets with attractive regulatory and market dynamics. Over the past few years, Aptomum has maintained the needed flexibility to reprioritize certain projects to lead status, which we attribute to its Scientific Advisory Board. Among non-core projects, Aptomum's pipeline features candidates for influenza, bacterial infections, COVID-19, obesity and endometriosis, among others. In April 2021, Aptomum entered into a material transfer and option agreement with Yale University to evaluate a group of preclinical stage novel immunomodulators that has potential to represent first-in-class opportunities in auto-immune and oncology diseases, and possibly infectious diseases. The latter two areas are notable, in our view, as they align well with the company's current pipeline focus. Aptomum has obtained an exclusive option to in-license these novel compounds, and would assume development costs, if exercised.

Aptomum has also taken steps to diversify operations to include several revenue-generating units in a non-therapeutic segment. During 2022, it launched commercialization of NativusWell®, a natural supplement for the relief of menopausal symptoms, which affects more than one billion women in multiple jurisdictions. This will represent a global market of over \$50 billion by 2025, growing at a 16% compounded annual growth rate, according to Grandview

Research. As females approach menopause, their ovaries reduce the production of estrogen leading to common symptoms such as hot flashes, night sweats, and headaches. NativusWell® consists of Chinese Yam extract containing DOI, a bioactive ingredient that has been shown preclinically to significantly increase estrogen production. DOI has also been shown in a preclinical model to increase bone mineral density, bone volume fraction, and trabecular thickness, which helps prevent osteoporosis, a common condition associated with menopause. The initial launch of NativusWell® is in Hong Kong, with Europe and the U.S. launches planned thereafter.

The company also has been operating an outpatient specialist clinic under the name Talem Medical since June 2018. The initial rollout has been modest, which we attribute to challenges presented by the COVID-19 pandemic. We expect clinics to remain a minor part of the emerging Aptomum growth story.

## RECENT DEVELOPMENTS

In 2021, Aptomum's stock declined by 39% compared with the S&P 500's 27% increase. We attribute this to a continued recalibration of market risk for clinical-stage companies with limited cash runways, and weakness across the biotechnology sector (as evidenced by the SPDR S&P ETF's (XBI) 20% decline in 2021, and its further decline of approximately 28% year-to-date). So far in 2022, Aptomum stock has declined 55%, compared with a 20% decline for the S&P 500.

In September 2022, Aptomum announced financial results for the first six months of 2022. During the period, the company reported net loss attributable to the company of \$1.9 million, or \$0.05 per share. That compares with a net loss attributable to the company of \$16.1 million, or \$0.47 per share, for the same period in 2021. Former-period results were boosted by \$5.6 million in non-marketable securities, while latter-period results were negatively impacted by a \$7.6 million loss on investments in marketable securities.

In September 2022, Aptomum announced the commercialization of its NativusWell® nutraceutical product for menopausal symptoms in Hong Kong.

In July 2022, Aptomum appointed Martin Siu as its head of finance. Mr. Siu has nearly 20 years of audit and regulatory consultancy experience, including with listed companies.

In May 2022, Aptomum appointed Darren Lui as its chief executive officer. Mr. Lui had been serving as the company's president.

In April 2022, the U.S. Patent and Trademark Office granted the first patent regarding the Aptomum's Rapid Pathogen Infectious Disease Liquid Biopsy Diagnostics (RPIDD), regarding the invention of an unbiased and simultaneous amplification method for DNA library preparation.

In January 2022, Aptomum announced the completion of Phase 1 clinical studies for lead candidates ALS-4 and SACT-1, with no serious adverse events (SAE's) reported. In January 2022, Aptomum announced that SACT-1 had received its first patent from the U.S. Patent and Trade Office as well as orphan-drug designation from the US FDA.

In January 2022, Aptomum announced the launch of an oncology and autoimmune discovery and development platform, with initial targets including non-small cell lung cancer, lupus, rheumatoid arthritis, and inflammatory bowel diseases.

## EARNINGS & GROWTH ANALYSIS

We forecast revenues of \$1.25 million in 2022 and \$2.2 million in 2023, which would represent a 19% decline and 76% growth, respectively. We expect latter-period revenues to include increased contribution from NativusWell®.

In our view, R&D investments are likely to increase in the coming years, as Aptorum advances its lead programs through human clinical trials. We forecast R&D expenses of \$10.5 million in 2022 and \$16 million in 2023, compared with approximately \$11 million in 2021. We are encouraged by the value creation from its R&D investments to date, as its SmartPharm and Aptorum Innovations subsidiaries have yielded compelling product candidates that Aptorum has accelerated into leading positions within its product portfolio. In all, we anticipate operating expenses of approximately \$18.7 million in 2021 and \$24.9 million in 2023.

We forecast net losses attributable to the company of \$0.31 per share in 2022 and \$0.53 per share in 2023. We expect Aptorum to end 2022 with approximately 36 million shares outstanding, and to end 2023 with approximately 45 million shares outstanding.

## FINANCIAL STRENGTH & DIVIDEND

Our financial strength rating for Aptorum is Medium-Low. As of June 30, 2022, Aptorum had \$7.2 million, made up of cash (\$4.1 million) and restricted cash (\$3.1 million). As of the filing of its six-month financials in September 2022, cash/restricted cash totaled \$4 million. As of June 30, 2022, Aptorum had access to a \$12 million from a line of credit, and has an “at the market” equity sale agreement for up to \$15 million with H.C. Wainwright. We expect minimal drawdowns from the latter, given the company’s equity valuation near \$1 per share amid prolonged biotech sector weakness. Although we view the company as sufficiently funded into 2023, we expect Aptorum to ramp operating expenses over the coming quarters, as it moves to Phase 2 study for its lead clinical candidates. We expect these assets to require significant additional capital before becoming commercialized.

We expect Aptorum to pursue partnerships for certain earlier-stage, non-lead programs across its pipeline, which we think could provide some non-dilutive capital and moderate its cash burn over time. An example of this is its May 2021 license deal for its novel preclinical candidate targeting women’s gynecological conditions to Exeltis, under which Exeltis will assume development costs and risk for this early-stage program. A key potential indication for this candidate is endometriosis, which we view as representing a roughly \$2 billion global opportunity.

In 2021, Aptorum’s net cash used by operations was \$14.7 million, which compares with \$15.9 million used in 2020. In 2021, cash inflows from investing activities totaled \$16.5 million, compared with inflows of \$1.8 million in 2020. We attribute former period results to the sale of \$20.1 million in marketable securities. In 2021, net cash inflows from financing activities totaled \$2.8 million, compared with \$12.4 million in 2020 (which was driven by proceeds from equity offerings in 2020).

As of June 30, 2022, Aptorum had a current ratio of 1.1, down from 2.9, and working capital of \$1.1 million, down from \$8.3 million at the end of 2021, respectively. Total equity attributable

to the shareholders of Aptorum was approximately \$15.6 as of June 30, 2022, compared with \$17.5 million at the end of 2021.

Aptorum does not pay a dividend, and we do not expect one to be initiated in the near term.

## MANAGEMENT

Mr. Darren Lui was appointed chief executive officer in June 2022, and also serves as executive director. He succeeds Mr. Ian Huen, Aptorum’s founder, who transitioned to a non-executive director role. Mr. Lui previously served as Aptorum’s president. Prior to joining Aptorum, Mr. Lui founded Hong Kong-based Varengold Capital Securities Limited and Varengold Capital Asset Management Limited and has held senior roles with Barclays Capital and Ernst & Young LLP (London).

Aptorum’s board has seven members, including four independent directors. We view this majority of independent directors favorably and note that Aptorum has assigned only independent directors to the audit, compensation and nominating, and corporate governance committees.

## RISKS

Risks include Aptorum’s status as a “controlled company,” as former CEO Mr. Ian Huen has a majority of the voting power. Class B ordinary shares carry a 10-to-1 voting power ratio over Class A shares, and Class B holders, including Aptorum’s executive officers and directors, hold about 78% of the company’s voting power, with 69% for Mr. Ian Huen alone.

Other risks include standard risks in drug development, such as establishing efficacy and safety and maintaining a competitive market position for its lead products. Lastly, Aptorum will likely need to raise capital in 2023 to continue funding its pipeline, as it proceeds into mid-stage testing. In our view, there is uncertainty of doing so on favorable terms, given protracted weakness to its valuation amid unfavorable investor sentiment towards the biotech industry, which increases the risk of equity dilution.

## COMPANY DESCRIPTION

Aptorum Group Ltd., a clinical stage biopharmaceutical company dedicated to the discovery, development and commercializing of therapeutic assets to treat diseases with unmet medical needs, particularly in oncology (including orphan oncology indications) and infectious diseases. Aptorum was incorporated in 2010 and went public in December 2018.

## VALUATION

We think that Aptorum’s therapeutic programs that address unmet medical needs are likely to secure orphan-drug or fast-track status from global regulatory bodies. The FDA’s recent granting of orphan designation for SACT-1 seemingly supports this view. As such, we expect Aptorum’s valuation to benefit over time from its prospects for a) smaller clinical trials required for orphan indications, and b) favorable regulatory pathways for areas of significant need.

That said, APM’s recent stock performance has been weak. We attribute this to a continued recalibration of market risk for clinical-stage companies with limited capital runway, compounded by significant declines in biotechnology indices and investor

sentiment, as well as to the broader equity markets. Further, we believe that the platform nature of its Smart-ACT® and, more recently, Aptorum Innovations' RPIDD, which has received its first patent, should provide out-licensing opportunities over time, which would help to limit dilution to its shareholders.

We continue to believe the company offers a compelling long-term growth opportunity, upon successful execution of its business plan, which seeks to advance its portfolio of assets through the achievement of mid-stage proof-of-concept.

Although the current valuation is markedly below our fair value estimate, we note that the APM shares traded as high as \$33 in mid-2019 and \$18 in 2020. In 2021, the biotechnology sector's SPDR S&P ETF (XBI) declined by 20%, and has declined by an additional 32% year-to-date (nearly 60% below its early 2021 peak). During this period, Aptorum has advanced its pipeline into clinical study and its innovative technology platforms into validation stages, despite industry-wide delays due to the COVID-19

pandemic. In addition, the company has expanded its IP portfolio, with patents on SACT-1 and RPIDD, respectively.

Applying a sum-of-the-parts NPV valuation for its lead programs and IP and technology assets, we arrive at a fair value of \$9 per share, well above current levels. Our valuation model applies a seven-times multiple to peak sales, and assumes peak annual revenues of \$750 million for ALS-4 for bacterial infections including MSRA, and 10 years to reach peak sales. The model also assumes \$1 billion in peak sales for SACT-1 for neuroblastoma, assuming 10 years to reach peak sales. Both programs are discounted at 45% annually, which reflects a heightened financing risk profile, and each contribute \$3 per share to its valuation. The balance (of \$3) is ascribed to the company's IP and technology assets, including an expanding portfolio of platforms that we think could identify new therapeutic candidates over time. Our estimates assume a share count of approximately 45 million at the end of 2023, up from approximately 36 million at the end of 2022.

Steve Silver,  
Argus Research Analyst

**INCOME STATEMENT**

<b>Growth Analysis (\$ML)</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>1H 2022</b>	<b>2H 2022E</b>	<b>2022E</b>	<b>1H 2023E</b>	<b>2H 2023E</b>	<b>2023E</b>
Revenue	0.4	0.5	0.9	1.5	0.5	0.8	1.3	1.0	1.3	2.3
Gross Profit	0.1	-0.3	-1.0	0.1			0.0			0.1
G&A	4.9	7.4	4.9	8.0			5.1			5.8
R&D	3.1	6.9	11.6	10.9			10.5			16.0
Operating Income	-10.3	-18.2	-21.2	-19.2			-18.7			-24.8
Interest Expense	-4.5	-3.7	-0.2	-0.1			-0.2			-0.2
Pretax Income	NA	NA	NA	-19.3			-25.2			-24.8
Tax Rate (%)	NA	NA	NA	NA			NA			NA
Net income	-15.1	-20.1	6.3	-25.0			-11.2			-22.3
Diluted Shares	27.9	29.0	31.5	35.0			35.8			42.0
EPS	-0.53	-0.64	0.20	0.71	-0.05	-0.26	-0.31	-0.26	-0.27	-0.53
Dividend	NA	NA	NA	NA			NA			NA
<b>Growth Rates (%)</b>										
Revenue	NA	30	82	69			-16			77
Operating Income	NA	NA	NA	NA			NA			NA
Net Income	NA	NA	NA	NA			NA			NA
EPS	NA	NA	NA	NA			NA			NA
<b>Valuation Analysis</b>										
Price (\$): High	15.85	33.28	18.25	4.94			NA			NA
Price (\$):Low	13.25	11.80	1.16	1.53			NA			NA
PE: High	NA	NA	NA	NA			NA			NA
PE: Low	NA	NA	NA	NA			NA			NA
PS: High	NA	NA	NA	NA			NA			NA
PS: Low	NA	NA	NA	NA			NA			NA
Yield: High	NA	NA	NA	NA			NA			NA
Yield: Low	NA	NA	NA	NA			NA			NA
<b>Financial &amp; Risk Analysis (\$ML)</b>										
Cash	26.1	5.3	32.0	7.2			NA			NA
Working Capital	16.5	5.3	29.8	1.1			NA			NA
Current Ratio	2.4	3.0	8.7	1.1			NA			NA
LTDebt/Equity (%)	0.4	43.3	5.8	0.1			NA			NA
Total Debt/Equity (%)	31.4	43.6	7.1	1.2			NA			NA
<b>Ratio Analysis</b>										
Gross Profit Margin	NA	NA	NA	NA			NA			NA
Operating Margin	NA	NA	NA	NA			NA			NA
Net Margin	NA	NA	NA	NA			NA			NA
Return on Assets (%)	NA	NA	NA	NA			NA			NA
Return on Equity (%)	NA	NA	NA	NA			NA			NA
Op Inc/Int Exp	NA	NA	NA	NA			NA			NA
Div Payout	NA	NA	NA	NA			NA			NA

## DISCLAIMER

Argus Research Co. has received a flat fee from the company discussed in this report as part of a “Sponsored Research” agreement between Argus and the company. No part of Argus Research’s compensation is directly or indirectly related to the content of this assessment or to other opinions expressed in this report. Argus Research provides a suite of Sponsored Research services including but not limited to initial reports with ongoing coverage and updates; proprietary Argus Research earnings estimates; distribution to Argus Research’s clients; a license to enable the company to proactively use and distribute the report ; a press release announcing our initial coverage and updates; and access to the Vickers Research database. The price for this suite of services generally ranges from \$22,000 to \$35,000 depending on the level of services selected. Argus Research receives no part of its compensation in the form of stock or other securities issued by the company discussed in this report, and has no long equity position or short sale position in the company’s stock. Argus Research is not involved in underwriting securities for the subject company, and will receive no proceeds or other financial benefit from any securities offering by the company. Argus Research; its officers, directors, and affiliates; and the author of this report have no financial interest in, or affiliation with, the subject firm. The report is disseminated primarily in electronic form and is made available at approximately the same time to all eligible recipients.

Argus Research Co. (ARC) is an independent investment research provider whose parent company, Argus Investors’ Counsel, Inc. (AIC), is registered with the U.S. Securities and Exchange Commission. Argus Investors’ Counsel is a subsidiary of The Argus Research Group, Inc. Neither The Argus Research Group nor any affiliate is a member of the FINRA or the SIPC. Argus Research is not a registered broker dealer and does not have investment banking operations. The Argus trademark, service mark and logo are the intellectual property of The Argus Research Group, Inc.

The information contained in this research report is produced and copyrighted by Argus Research Co., and any unauthorized use, duplication, redistribution or disclosure is prohibited by law and can result in prosecution. The content of this report may be derived from Argus research reports, notes, or analyses. The opinions and information contained herein have been obtained or derived from sources believed to be reliable, but Argus makes no representation as to their timeliness, accuracy or completeness or for their fitness for any particular purpose. This report is not an offer to sell or a solicitation of an offer to buy any security. The information and material presented in this report are for general information only and do not specifically address individual investment objectives, financial situations or the particular needs of any specific person who may receive this report. Investing in any security or investment strategies discussed may not be suitable for you and it is recommended that you consult an independent investment advisor. Nothing in this report constitutes individual investment, legal or tax advice. Argus may issue or may have issued other reports that are inconsistent with or may reach different conclusions than those represented in this report, and all opinions are reflective of judgments made on the original date of publication. Argus is under no obligation to ensure that other reports are brought to the attention of any recipient of this report. Argus shall accept no liability for any loss arising from the use of this report, nor shall Argus treat all recipients of this report as customers simply by virtue of their receipt of this material. Investments involve risk and an investor may incur either profits or losses. Past performance should not be taken as an indication or guarantee of future performance.

Argus has provided independent research since 1934. Argus Investors’ Counsel (AIC), a portfolio management business based in Stamford, Connecticut, is a customer of Argus Research Co. (ARC), based in New York. Argus Investors’ Counsel pays Argus Research Co. for research used in the management of the AIC core equity strategy and model portfolio and UIT products, and has the same access to Argus Research Co. reports as other customers. However, clients and prospective clients should note that Argus Investors’ Counsel and Argus Research Co., as units of The Argus Research Group, have certain employees in common, including those with both research and portfolio management responsibilities, and that Argus Research Co. employees participate in the management and marketing of the AIC core equity strategy and UIT and model portfolio products.