Initiation Report

YS BIOPHARMA CO. LTD.

DIAMOND EQUITY RESEARCH

YS Biopharma Co., Ltd. – Leveraging PIKA Platform and Initial Rabies Vaccine Success to Pioneer Novel Agents for Infectious Disease and Cancer

YS Biopharma Co., Ltd. (NASDAQ: YS)

YS BIOPHARMA

Share Price: $1.10	Valuation: $5.10

Key Statistics

52 Week Range	$1.10 - $18.44
Avg. Volume (3 months)	684.83K
Shares Outstanding	93.06M
Market Capitalization	$102.36M
EV/Revenue	1.30x
Cash Balance*	$43.15M
Analyst Coverage	1

***Cash balance as of June 2023**

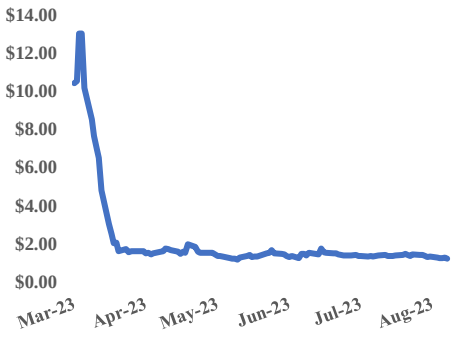
Revenue (in RMB millions)

Mar - FY	2023A	2024E	2025E
Q1	-	176.27	192.70
Q2	-	168.73	194.63
Q3	-	139.46	198.51
Q4	-	142.82	212.45
FY	687.20	627.28	798.29

EPS (in RMB)

Mar - FY	2023A	2024E	2025E
Q1	-	(0.75)	(0.32)
Q2	-	(0.62)	(0.23)
Q3	-	(0.51)	(0.21)
Q4	-	(0.51)	(0.03)
FY	(1.56)	(2.39)	(0.79)

Stock Price Chart (in $)



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Investment Highlights

- **PIKA® Platform Enabling Diversified Portfolio of Novel Vaccines and Immuno-oncology Therapeutics:** YS Biopharma's PIKA® platform is a transformative immunomodulating technology that enables the development of an array of vaccines and immuno-oncology therapeutics. By activating immune cells such as antigen-presenting cells and dendritic cells, PIKA® enhances the body's immune response, optimizing the effectiveness of vaccines against diseases like rabies, COVID-19, and Hepatitis B. Additionally, the technology has also shown significant improvements in ease of administration. For example, a shorter regimen of PIKA®-enabled rabies and HBV vaccine compared to existing alternatives can potentially enhance overall effectiveness and patient compliance. Moreover, in immuno-oncology, PIKA® stimulates T cells and alters the tumor microenvironment to enable the immune system to better combat cancer. This broad applicability of the PIKA® platform allows YS Biopharma to develop a diverse portfolio of novel and next-generation vaccines and therapeutics targeting diseases with unmet needs.

- **YSJA™ Rabies Vaccine Supporting Research Capabilities:** YSJA™, a conventional rabies vaccine, currently stands as the company's revenue-generating product. As a crucial part of the company's diversified vaccine portfolio, the product has generated a revenue of approximately RMB 687.2 million or U.S. $100 million in the year ended March 2023, registering a year-on-year growth of 37%. The revenue generated from the YSJA™ sales helps fund the company's ongoing R&D efforts, including the development and clinical testing of its novel PIKA® immunomodulating technology. The material revenue generated by the vaccine's success offers potential downside protection relative to traditional non-revenue generating biotechnology companies, as it provides a more stable financial foundation and reduces reliance on uncertain research and development outcomes. Furthermore, the company's success and growing market share of YSJA™ have provided the company with valuable experience and insights in areas such as regulatory approval processes, large-scale vaccine production, and distribution across the rabies vaccine market. These experiences, coupled with supportive financial capabilities, enhance the company's efforts to conduct research, develop and bring next-generation vaccine candidates to market.

- **Dual Growth Strategy – Solidifying Current Revenue and Leveraging Vaccine Innovations:** YS's investment value is rooted in a dual-pronged strategy. Firstly, there's the recurring and stable revenue stream from YSJA™, which shows consistent upward momentum. Secondly, the imminent approval of the PIKA® rabies vaccine could serve as a game changer for YS due to its ability to usher in revenues that are 4 or 5 times higher than those of YSJA™, indicating an insignificant impact of cannibalization of YSJA™. Furthermore, a distinctive advantage of the PIKA® rabies vaccine is its lower dosage requirement. This essentially means that a shift from YSJA™ to PIKA® can triple its production capacity, a highly advantageous move in a market that currently faces capacity constraints. This augmented capacity will not just cater to domestic demands but also opens the door for international expansion, positioning YS to potentially supply to emerging nations like the Philippines.

- **Valuation:** We have valued the company using a risk-adjusted discounted cash flow (DCF) as our primary valuation approach. Additionally, the valuation process also considered comparable analysis using the EV/sales valuation metric, yielding a blended valuation of $474.29 million or $5.10, contingent on successful execution by the company. Our view of the company's valuation is influenced predominantly by two key catalysts, the sustained and anticipated growth of YSJA™'s revenue and the forthcoming approval of the PIKA® rabies vaccine that holds the potential to considerably amplify revenue trajectories.

Company Description

YS Biopharma Co., Ltd. is a Beijing-based biopharmaceutical company founded in 2002. Specializing in vaccines and therapeutic biologics, it targets diseases such as Rabies, Coronavirus, Hepatitis B, Influenza and Shingles via a proprietary PIKA® immunomodulating technology platform. The firm operates in various regions including China, the U.S., and Southeast Asian Countries.

Please see last page for important disclosures

- **Robust Safety and Efficacy Across Multiple Clinical Candidates:** The company's most advanced clinical candidates in the company's pipeline are PIKA® recombinant COVID-19 vaccine and the PIKA® rabies vaccine. Both these vaccines are currently being evaluated in Phase III clinical trials and demonstrated robust safety and immunogenicity profile in earlier clinical and pre-clinical trials. In both Phase I and Phase II clinical trial, the PIKA® rabies vaccine demonstrated a higher seroconversion rate compared to the comparator Rabipur. The seroconversion rate indicates the percentage of vaccinated individuals who develop detectable antibodies against the targeted pathogen, indicating a successful immune response to the vaccine. It is a critical measure of vaccine efficacy. The PIKA® rabies vaccine swiftly generated high levels of rabies-neutralizing antibodies (RVNA) and initiated a durable immune response, indicating a strong defense against rabies. Similarly, the PIKA® recombinant COVID-19 vaccine proved to stimulate the production of high-level neutralizing antibodies against a variety of mutant strains. The preliminary Phase II data demonstrated superior immunogenicity when compared to the inactivated COVID-19 vaccine. Both prophylactics displayed sound safety and reactogenicity profile

- **Significant Market Potential Across Multiple Indications:** Rabies, COVID-19, and HBV vaccine markets in China and Southeast Asian countries present significant opportunities with a need for innovative solutions. The rabies vaccine market, though fragmented, presents opportunities for differentiation and improved offerings, such as YS Biopharma's aluminum-free and PIKA® immunomodulating vaccines. The rabies vaccine market in China is expected to reach RMB 22.1 billion in 2025 from RMB 9.4 billion in 2021 representing a CAGR of 23.8%. For COVID-19, a market dominated by Sinopharm, Sinovac, and Can Sino, there exists a continuous need for effective and safe prophylactic that can combat emergent vaccine-resistant variants creating a demand that could potentially be filled by disruptive vaccine developers. In the HBV vaccine market, supportive government policies and increasing government efforts to control the Hepatitis B epidemic have been paving the way for improved vaccine accessibility and heightened public awareness. Lot release for Hepatitis B prophylactic vaccine is expected to reach 85.4 million in 2025, at a CAGR of 4.9% from 2021 to 2025. The company's immuno-oncology therapeutic targets hard-to-kill solid tumors that represent 90% of all adult human cancer. Solid malignancies such as hepatocellular cancer, breast cancer, and pancreatic cancer are a few of the most challenging and prevalent cancers worldwide. The immuno-oncology therapies market is one of the fastest growing among all the markets targeted by the company's different products. China's immuno-oncology market is expected to grow from RMB 16.3 billion in 2021 to reach RMB 63.8 billion in 2025, growing at a CAGR of 40.6%.

Company Overview

YS Biopharma, headquartered in the Cayman Islands, is a global biopharmaceutical company at the forefront of discovering, developing, manufacturing, and commercializing vaccines and therapeutic biologics. Primarily aiming to address infectious diseases and cancer, YS Biopharma is committed to tackling multiple global health concerns that still have high unmet medical needs. Central to the company's operations is its proprietary PIKA® immunomodulating technology platform. This platform is based on biologic complexes that engage multiple pathways of immune signaling, specifically TLR3, RIG-I, and MDA5. When integrated with appropriate protein-based molecules, PIKA® technology facilitates the development of a broad spectrum of novel biotherapeutics. These include a new generation of antiviral vaccines, antiviral therapeutics, and anticancer therapeutics. The innovative PIKA® platform, thus, empowers YS Biopharma to create a diverse portfolio of products targeting diseases such as Rabies, Hepatitis B, Shingles, Influenza, and Coronavirus. YS Biopharma has earlier achieved significant strides with the rabies vaccine, the evidence of which is their YSJA™ vaccine. The YSJA™ vaccine, the first aluminum-free lyophilized rabies vaccine launched in China, is a testament to the company's prowess in research and development. The YSJA™ rabies vaccine has proven to be a critical product, with over 22.2 million doses sold to county-level CDCs in China as of June 30, 2023. The company manufactures its vaccines, including the YSJA™ rabies vaccine, in GMP-compliant facilities, indicating its commitment to meeting high regulatory standards.

YS Biopharma specializes in developing vaccines and biologic therapies for infectious diseases and cancer. Using its proprietary PIKA® technology, the firm creates a broad range of novel biotherapeutics by engaging various immune pathways

Exhibit 1: YS Biopharma Product Pipeline. Source: YS Biopharma Filings

A glance at YS Biopharma's R&D pipeline reveals a promising landscape. Currently, there are four clinical-stage product candidates—PIKA® rabies vaccine, PIKA® recombinant COVID-19 vaccine, PIKA® YS-ON-001, and PIKA® YS-HBV-001 vaccine. Additionally, four more preclinical-stage product candidates are in the pipeline, aiming to prevent diseases like Hepatitis B and cancer potentially. These pipeline products aim to meet unmet medical needs in areas such as HBV, influenza, rabies, and cancer, indicating high potential future growth.

YS Biopharma has extended its global footprint to key markets such as China, Singapore, the United States, the UAE, and the Philippines. Despite its recent incorporation into the Cayman Islands in 2020, the company's long-standing history and strong market presence point to stability and future global expansion potential. With a sizeable workforce of over 770 employees, YS Biopharma amalgamates local expertise with a global vision. This strategic blend positions the company to deftly navigate the challenges and seize the biopharmaceutical industry's opportunities.

YS Biopharma has a multi-faceted corporate structure with a mix of domestic and international operations. The equity ownership of the company is distributed among several major shareholders, which contributes to a broad-based governance structure. The major equity stakeholders include Yi Zhang and All Brilliance Investments. The rest of the equity ownership is spread among Hopeful World Company, Apex Pride Global, Action Town International, and other ordinary shareholders. On the operational front, YS Biopharma has established a strong global presence through its offshore entities. YS Biopharma US, Yisheng Singapore, and Yisheng HK are the primary offshore operational branches, each strategically located in key global markets. This geographical diversification supports the company's global market access and potentially mitigates the risk of operational disruption in any single market.

Domestically, YS Biopharma operates through two main entities: Liaoning Yisheng and Beijing Yisheng. These onshore operations signify the company's robust presence in China's domestic market.

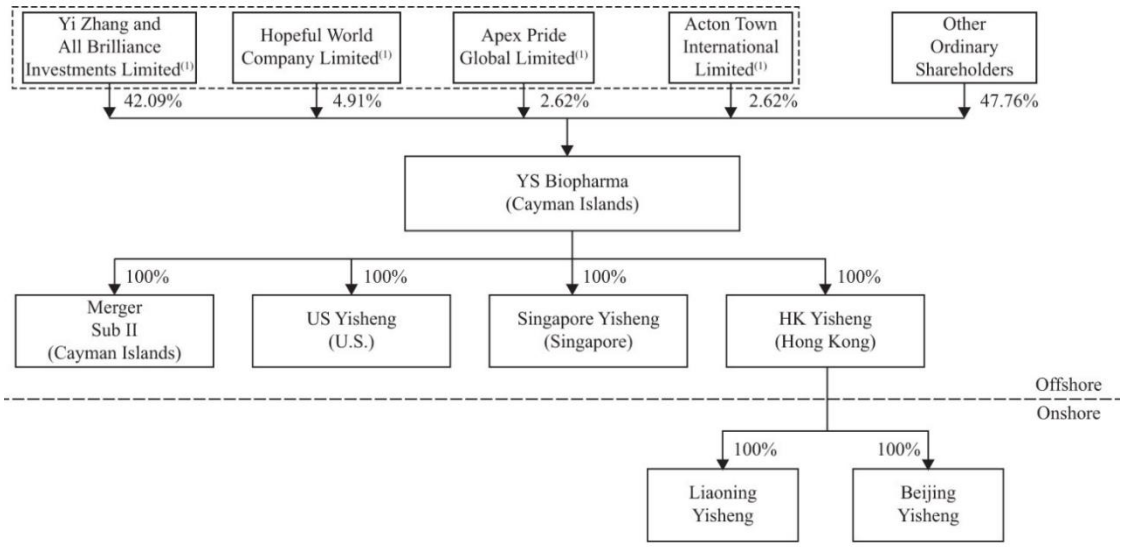

Exhibit 2: YS Biopharma Corporate Structure. Source: YS Biopharma Registration Filing

Innovative PIKA® Immunomodulating Technology Platform

YS Biopharma's core platform is the PIKA® technology, a synthetic biologic complex synthesized based on their proprietary GMP manufacturing technology. This technology triggers a multi-pronged approach of immunomodulation through TLR3, RIG-I, and MDA-5 signalling pathways, thereby inducing a prompt production of interferon, cytokines, chemokines, and co-stimulatory factors.

YS Biopharma's PIKA technology is a synthetic biologic complex inducing various immune responses. Used with suitable antigens, it enables development of new antiviral and anticancer treatments

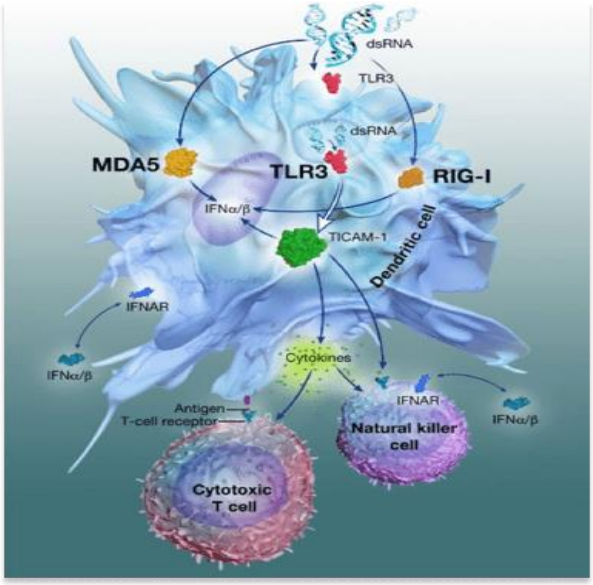

Exhibit 3: PIKA® Technology Overview. Source: YS Biopharma Filings

The PIKA® technology is derived from YS Biopharma's research in a class of well-defined dsRNA molecules synthesized using their proprietary technology. The endosomal dsRNA can be recognized by TLR3, while cytosolic dsRNA can be sensed by the RIG-I-like receptor family, which includes RIG-I and MDA-5. The antiviral and antitumor effects of interferon have been well established. The production of type I interferon upon PIKA® administration facilitates antigen cross-presentation by dendritic cells and augments CD4+ T-cell, CD8+ T-cell, and natural killer-cell responses, which makes PIKA®-based therapeutics suitable for both antiviral and antitumor applications.

When delivered with relevant antigen-based molecules, PIKA® technology can be applied to the development of a new generation of antiviral vaccines, antiviral therapeutics, and anticancer therapeutics. This offers a promising platform for the development of a wide variety of novel biologics to improve treatments that are currently available and address unmet medical needs. The robust response stimulated by PIKA® technology can offer significant improvements over traditional antiviral and anticancer therapies. Conventional treatments often focus on attacking the disease directly and may not fully leverage the body's own immune response. PIKA® technology, in contrast, harnesses and enhances the body's natural defences, providing a more holistic approach to treatment.

Moreover, PIKA® technology's ability to be coupled with antigen-based molecules offers another level of versatility. By delivering the PIKA® molecule alongside relevant antigens, YS Biopharma can develop targeted vaccines and therapeutics for various diseases. This ability to customize the immune response to specific diseases could allow for more effective and personalized treatments. YS Biopharma has been granted about 70 patents across more than 30 countries and regions relating to its PIKA® immunomodulating technology and prophylactic and therapeutic product innovations.

The potential applications of PIKA® technology are vast. From creating powerful new vaccines for infectious diseases to developing novel anticancer therapeutics, this platform could revolutionize many areas of medicine. Furthermore, by improving upon currently available treatments and addressing unmet medical needs, YS Biopharma is positioning itself as a leader in the field of immunotherapy. The future of PIKA® technology is promising—as our understanding of the immune system continues to grow, the potential for innovative platforms like PIKA® will only continue to expand. The versatile and powerful approach of PIKA® technology makes it a key player in the next generation of immunomodulating therapeutics.

YS Biopharma's PIKA technology is a synthetic biologic complex inducing various immune responses. Used with suitable antigens, it enables development of new antiviral and anticancer treatments

YS Biopharma's First Marketed Product: YSJA™ Vaccine for Rabies Prevention

YSJA™ Rabies Vaccine, the company's first marketed product, is also a first-of-its-kind inactivated vero cell-based rabies vaccine in China that does not contain aluminum, providing post-exposure protection against rabies. Additionally, it uses a fixed CTN-1 strain grown in Vero cells, which shares a higher similarity with most wild rabies strains in China, making it particularly effective. Since its introduction in 2003, approximately 98 million doses have been administered to patients. The vaccine stands out because of its improved suitability for rabies prevalent in China, its better tolerability, causing less pain, injection site discomfort, and a lower rate of fever compared to other locally available rabies vaccines. YS Biopharma's manufacturing facilities in Shenyang, China, which are compliant with Good Manufacturing Practices (GMP), have been producing the vaccine since February 2020. As of June 30, 2023, the company had produced more than 26.5 million doses, of which about 22.2 million have been sold to approximately 1,725 county-level CDCs in China, covering over 60% of all county-level CDCs in the country. The company is actively seeking partnerships and licensing agreements with prominent pharmaceutical companies to bring the YSJA™ rabies vaccine to the primary markets of Southeast Asia. Additionally, the company plans to extend its reach into Europe, Africa, and South America, aiming to boost the commercial success and visibility of its products across these diverse regions.

Diversified Vaccine Pipeline Enabled by PIKA® Immunomodulating Technology

YS Biopharma presents a comprehensive portfolio of vaccines anchored by its marketed YSJA™ rabies vaccines, which distinguishes itself by being the first aluminum-free lyophilized rabies vaccines introduced in China. Beyond its marketed product, the company is also actively developing new candidates leveraging its proprietary PIKA® immunomodulating technology platform. This innovative technology has facilitated the development of a spectrum of prophylactic, demonstrating the company's commitment to addressing a wide array of infectious diseases. The next-generation candidate, the PIKA® rabies vaccine, has completed Phase I and II clinical trials and promises fast seroconversion and broad protection against multiple virus strains. YS Biopharma is also progressing with the PIKA® recombinant COVID-19 vaccines, which have shown promising efficacy against a spectrum of COVID-19 variants. Further, the portfolio contains another clinical candidate, PIKA®-YS-HBV-001 targeting Hepatitis B, currently in a Phase 1 clinical trial. This wide-ranging portfolio, comprising a variety of clinical preventive vaccines along with several other pre-clinical candidates in the pipeline, underscores YS Biopharma's diversified approach to advancing prophylactic healthcare and therapeutic innovation.

YS Biopharma, known for its unique YSJA™ rabies vaccine, is using its PIKA technology to develop new vaccines for diseases like rabies, COVID-19, and Hepatitis B

Transforming Rabies Immunization with Next-Gen PIKA® Rabies Vaccine

Rabies is a vaccine-preventable zoonotic disease caused by infection with the rabies virus. Affecting the central nervous system, the disease has a 100% mortality rate if the necessary treatment is not administered timely. It continues to be a significant public health concern, ranking among the top three causes of death from notifiable infectious diseases in mainland China.[1] The current treatment option for the general population includes immunization after exposure (PEP) and pre-exposure prophylaxis (PrEP) for high-risk occupations such as veterinarians. We believe the company's novel PIKA® rabies vaccine provides a much safer and more efficacious alternative to currently marketed vaccines, exhibiting the potential to significantly enhance the current standard of care. This confidence stems from its unique mechanism of action and rapid immunization schedule. The PIKA® Rabies vaccine, developed by YS Biopharma, is an innovative vaccine candidate that showcases the group's proficiency in immunomodulatory technology. The vaccine is an evolution of the YSJA™ rabies vaccines, amalgamated with a proprietary PIKA® technology platform. Currently in Phase III clinical trial, the vaccine has exhibited robust efficacy and safety in multiple pre-clinical and clinical trials.

- **Prophylactic's Mechanism of Action and Potential Superiority**

The PIKA® rabies vaccine operates using a unique mechanism of action, harnessing the properties of the PIKA® adjuvant mixed with cell culture-derived rabies antigen. Administering the vaccine, the PIKA® adjuvant acts as a TLR3 (Toll-Like Receptor 3) agonist, which triggers an immune

[1] Wang DL, Zhang XF, Jin H, et al. post-exposure prophylaxis vaccination rate and risk factors of human rabies in mainland China: a meta-analysis. Epidemiology & Infection. 2019;147: e64. doi:10.1017/S0950268818003175

response in the body leading to the production of a variety of chemokines and cytokines essential for an effective protective response post-exposure. The activation of the immune response by the PIKA® adjuvant helps the body rapidly produce a strong cellular and humoral (antibody-mediated) immune response to the rabies antigen. The dual nature of this immune response is important. Cellular immunity helps destroy infected cells, while humoral immunity, via the production of neutralizing antibodies, helps neutralize the virus, preventing it from infecting new cells. Owing to its unique mechanism of action, the PIKA® rabies vaccine boasts several advantages over traditional vaccines.

- **Dual Functionality:** Serves as both a preventative and a treatment measure for rabies exposure.
- **Accelerated Antibody Production:** Prompts an early, robust immune response potentially within seven days of vaccination
- **Strong Cellular Immunity:** The vaccine triggers a potent T cell response, fortifying the body's cellular defense post-rabies exposure.
- **Potential to Enhance Protection Without Immunoglobulin:** Can potentially provide adequate protection even in environments with limited immunoglobulin supply.
- **Broad protection:** The dual mechanism of action offers broad protection against various strains.
- **Shorter Treatment Duration:** PIKA®'s accelerated regimen (two injections on days 0 and 3 and only one injection administered on day 7), when compared to traditional Essen (five injections administered on days 0, 3, 7, 14, and 28) and Zagreb (two injections administered on day 0 and one injection on days 7 and 21 each) schedule reduces treatment period.

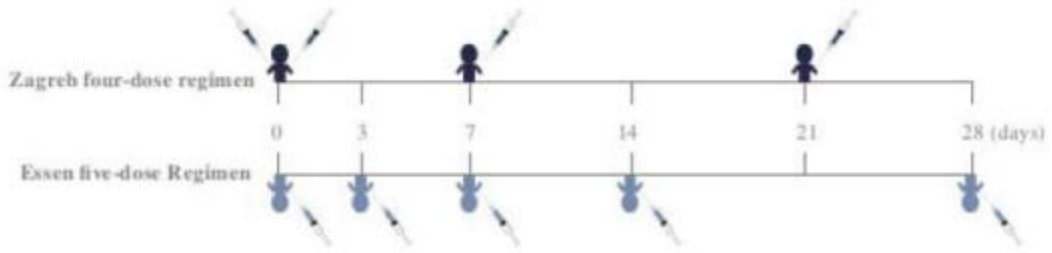

Exhibit 4: Essen Five-dose and the Zagreb 2-1-1 Dose Regimen. Source: Company Filings

- **Inferring Safety and Efficacy from Clinical and Pre-Clinical Trial Outcomes**

More than half a decade in development, the PIKA® rabies vaccine has undergone rigorous testing and evaluations. The drug has undergone multiple pre-clinical trials followed by two Phase I trial and the successful completion of one Phase II trial. The company has received the necessary regulatory approval to initiate Phase III clinical trials of the PIKA® rabies vaccine across multiple Asian nations, including the Philippines, Singapore, and Pakistan.

Following extensive development and testing, the PIKA rabies vaccine is set for Phase III trials in countries like the Philippines, Singapore, and Pakistan

Pre-Clinical Trial Results

The company has extensively evaluated the PIKA® rabies vaccine in multiple animal studies ascertaining the immunogenicity and protective efficacy of the drug. In a study involving hamsters exposed to a lethal dose of the BD06 strain of the rabies virus, the PIKA® rabies vaccine delivered promising results. It achieved a 67.7% survival rate with a standard regimen (days 0,3,7,14 and 28) and 80% with an accelerated one (double dose on day 0,2 and single dose on day 7), outperforming the 20% survival rate of the typical commercial vaccine with the standard regimen.[2] The PIKA® vaccines' accelerated regimen also spurred a significant antibody response within four days. Against seven global strains of the rabies virus, the vaccine provided over 80% protection, showcasing its broad efficacy. Furthermore, PIKA®'s onset of antibody production and its seroconversion rate exceeded that of commercial vaccines by day five post-vaccination, indicating its potential to offer a faster, stronger immune response. The vaccine enhanced both anti-body mediated and cellular immunity, significantly increasing survival rates to 70-80% compared to 20-30% with non-adjuvant vaccines.[2] The vaccine was well-tolerated in toxicity tests, highlighting its potential as a promising next-generation rabies vaccine with a rapid and robust immune response.

In animal studies, the PIKA rabies vaccine outperformed commercial vaccines with higher survival rates, faster antibody responses, and effectiveness against multiple rabies strains, indicating its potential as an advanced rabies vaccine

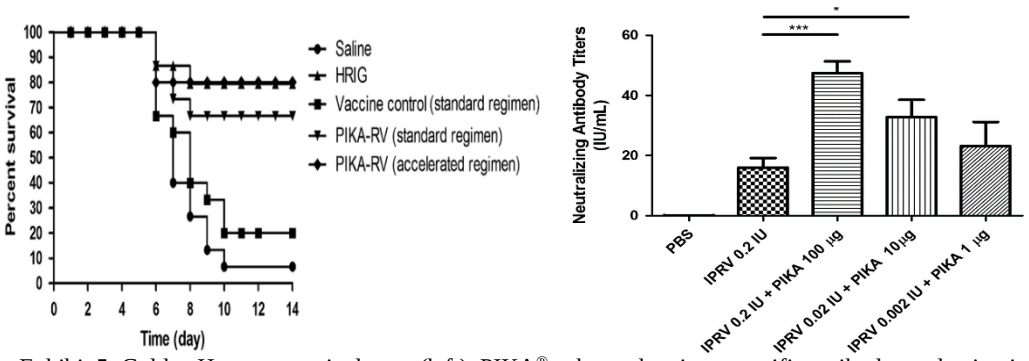

Exhibit 5: Golden Hamster survival rates (left), PIKA® enhanced antigen-specific antibody production in mice model (right) Source: Yi Zhang et al.

Clinical Trials Results

The company has successfully concluded Phase I and Phase II in a trial in Singapore, providing crucial insights into multiple endpoints, including safety, tolerability, and immunogenicity of the PIKA® rabies vaccine.

Phase I Clinical Trial

The Phase I clinical trial was an open-label, randomized study primarily aimed at evaluating the safety and immunogenicity of the PIKS rabies vaccine. Thirty-seven healthy adults were enrolled and given either Rabipur (n=12), a standard PIKA® rabies vaccine (n=13), or an accelerated PIKA® rabies vaccine (n=12). The Rabipur and the standard PIKA® vaccine group followed a 1-1-1-1 dosing regimen, while the accelerated PIKA® group received a 2-2-1 regimen.

[2] Zhang Y, Zhang S, Li W, et al. A novel rabies vaccine based on toll-like receptor 3 (TLR3) agonist PIKA adjuvant exhibiting excellent safety and efficacy in animal studies. Virology. 2016;489:165-172. doi:10.1016/j.virol.2015.10.029

Key Findings

- By day 7, 50% of subjects receiving the PIKA® vaccine were seroconverted (developed a sufficient rabies virus neutralizing antibody (RVNA)), compared to 16.7% of those receiving Rabipur.
- Under the accelerated PIKA® vaccine regimen, the seroconversion rate increased to 75% by day 7, significantly higher than the control group.
- The PIKA® vaccine also elicited a CD4-mediated T-cell response as early as day 7.
- All adverse events were mild, and no serious adverse events or deaths were reported, indicating good tolerance and safety of the PIKA® vaccine.

	Rabipur	PIKA Rabies Vaccine (1-1-1-1)	PIKA Rabies Vaccine (2-2-1)
	mean ± standard deviation 95% confidence interval	mean ± standard deviation 95% confidence interval	mean ± standard deviation 95% confidence interval
Neutralizing	9.72 ± 11.66	12.07 ± 10.07	20.06 ± 33.12
antibody titer	(-2.67, 22.11)	(-0.31, 24.46)	(8.26, 33.04)

Exhibit 6: Levels of Neutralizing Antibody Titer on Day 42. Source: Company Filings

The company conducted another Phase 1 trial in China, enrolling 96 subjects and investigating two dose levels and four dosing regimens. The study supported the findings of previous trials in Singapore, demonstrating the PIKA® vaccine's capability for a swift and robust antibody response. The early seroconversion (quick and strong antibody response) is clinically meaningful, as it is a primary indicator of early neutralizing antibody presence in the blood following grade 3 exposure without immunoglobulin administration.

Phase II Clinical Trial

The Phase II trial was a multicenter, open-label, randomized, non-inferiority study conducted across two hospitals in Singapore. The trial evaluated the safety and efficacy of the PIKA® rabies vaccine under an accelerated regimen (n=62) and Rabipur under a standard regimen in 126 healthy adults (n=64).[3]

Key Findings

- On day 7, the PIKA® vaccine group achieved a higher seroconversion rate of 57.6% compared to the Rabipur group at 43.8%.
- By the end of the trial, all participants from both groups had achieved seroconversion.
- The study met its primary endpoint of non-inferiority
- The safety and tolerability profile of the PIKA® vaccine was comparable to that of Rabipur, with the majority of adverse events being mild to moderate.

[3] Kalimuddin S, Wijaya L, Chan YFZ, et al. A phase II randomized study to determine the safety and immunogenicity of the novel PIKA rabies vaccine containing the PIKA adjuvant using an accelerated regimen. Vaccine. 2017;35(51):7127-7132. doi: 10.1016/j.vaccine.2017.10.097

- By day 42, the level of neutralizing antibodies in the PIKA® group was comparable to that of the control group.

	Rabipur	PIKA Rabies Vaccine (2-2-1)
	mean ± standard deviation 95% confidence interval	mean ± standard deviation 95% confidence interval
Neutralizing antibody titer	19.16 ± 13.53	21.59 ± 46.90
	(15.69, 22.62)	(9.15, 34.04)

Exhibit 7: Levels of Neutralizing Antibody Titer on Day 42 Source: Company Filings

The PIKA® rabies vaccine has shown significant potential in clinical trials. It swiftly produces high levels of rabies-neutralizing antibodies (RVNA) and initiates a durable immune response, indicating a strong defence against rabies. Additionally, it has a sound safety profile comparable to the established Rabipur vaccine. The dual mechanism of action - inducing a robust antibody and CD4-mediated T-cell response - confirms additional immunological benefits. The findings highlight PIKA® as a promising candidate for a faster, more effective rabies vaccine, with a Phase III trial expected to provide further information.

Phase III Clinical Trial

The company has initiated a Phase III clinical trial (NCT05667974) evaluating the novel vaccine enrolling a total of 4,500 subjects. The trial will be a randomized, comparator-controlled, double-blind, multicenter study conducted across various Southeast Asian Countries, including Singapore, the Philippines, Pakistan, and Vietnam. A key objective of the study includes demonstrating the immunologic non-inferiority of the PIKA® rabies vaccine compared to the Rabipur vaccine in terms of neutralizing antibody responses and seroconversion rates at Day 14 and Day 28.

YS Biopharma has initiated a Phase III trial involving 4,500 participants in Southeast Asian countries, focusing on the effectiveness and immune response of their PIKA rabies vaccine

Group	Vaccine	Regimen	Study Days of Vaccination					N
			0	3	7	14	28	
1	PIKA® Rabies Vaccine lot#1	2-2-1	XX	XX	X	O	O	1,500
2	PIKA® Rabies Vaccine lot#1	2-2-1	XX	XX	X	O	O	1,500
3	PIKA® Rabies Vaccine lot#1	2-2-1	XX	XX	X	O	O	1,500
4	Comparator	1-1-1-1-1	XO	XO	X	X	X	1,500
Total								4,500

Exhibit 8: Phase 3 Study Design. Source: Company Filings

Shaping the Future of Pandemic Response with PIKA® Recombinant COVID-19 Vaccine

Coronavirus disease (COVID-19), a highly contagious disease caused by the SARS-CoV-2 virus, has claimed the lives of millions of people across the globe in the past few years. The disease primarily spreads via respiratory droplets and affects various systems in the body, with severe cases leading to critical illnesses such as pneumonia, acute respiratory distress syndrome, and other severe complication. To combat this, numerous organizations and pharmaceutical companies have worked relentlessly to develop effective vaccines. One such vaccine currently in the late stages of development is PIKA® YS-SC2-010, a recombinant COVID-19 vaccine developed by

the YS Biopharma. The vaccine has been designed in a way that not only prevents the disease but also has therapeutic effects against it.

Mechanism of Action

The PIKA recombinant COVID-19 vaccines use a direct approach as opposed to FDA-approved mRNA and vector-based vaccines that introduces genetic instructions for cells to produce the spike protein.

The PIKA® recombinant COVID-19 vaccines use a direct approach as opposed to FDA-approved mRNA and vector-based vaccines that introduces genetic instructions for cells to produce the spike protein. The YS Biopharma's vaccine is a protein subunit vaccine, which uses the spike protein to stimulate an immune response. Spike proteins are expressed on the surface of the virus, and this is what viruses use to infect the cells. The YS Biopharma's vaccine introduces a stabilized, full-length version of the spike protein from the SARS-Cov -2 combined with a proprietary adjuvant called PIKA® that enhances the immune response. Once introduced into the body, the immune system recognizes the spike protein as a foreign invader and generates a protective response involving the production of neutralizing antibodies (that can block the virus and its variants from infecting cells) and T cells (that can kill virus-infected cells).

Preliminary results from multiple pre-clinical and clinical trials have suggested that PIKA® recombinant COVID-19 vaccine may hold multiple advantages over currently approved vaccines.

- Rapid Immune Response
- Long Lasting Immunity
- Broad Protection Against Multiple Variants
- Therapeutic Benefits
- Scalability and Biosafety
- Convenient Storage and Distribution
- Balanced Immune Response

- **Inferring Safety and Efficacy from Clinical and Pre-Clinical Trial Outcomes**

The PIKA® recombinant COVID vaccine has been extensively evaluated across multiple pre-clinical and clinical trials determining the optimal dosing regimen, evaluating the safety and immunogenicity, as well as examining its protective and potentially therapeutic efficacy against SARS-CoV-2.

Pre-clinical Trial Results

The company undertook multiple pre-clinical trials providing an extensive understanding of the novel vaccine's mechanism of action. The key insights from multiple animal models include

- Various dose levels of the S-Trimer (spike protein of SARS-COV-2) combined with the PIKA® adjuvant were tested. Even at the lowest dose tested, a high level of neutralizing antibodies was induced.
- Different dosing schedules were tried out, and a three-dose regimen gave the best results, producing high levels of antibodies quickly.

- The vaccine was found to induce a balanced Th1 and Th2 cellular immune response.
- PIKA® adjuvant was compared to other adjuvants and was found to be the best at enhancing the immune response when combined with the S-Trimer antigen.
- The PIKA® recombinant COVID-19 vaccine showed promising protective activity in preclinical tests with monkeys, effectively reducing the viral load upon exposure to SARS-CoV-2, thus demonstrating potent protective activity.
- In therapeutic activity trials, the PIKA® vaccine was shown to have potential post-exposure benefits. Even when administered after exposure to the virus, the vaccine significantly reduced the viral load, demonstrating its ability to effectively inhibit virus replication and suggesting potential therapeutic capabilities.

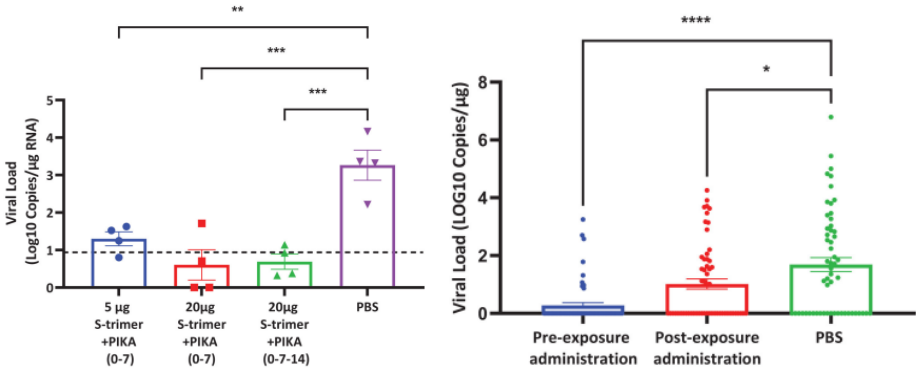

Exhibit 9: COVID-19 viral load in the lungs of cynomolgus monkeys 7 days after challenge. Source: Company filings

Phase I Clinical Trial

The Phase I trial is an open-label, dose-escalation study of three dose levels of SARS-Cov-2 spike antigen. The antigen is given via intramuscular injection alongside a consistent dosage of the PIKA® adjuvant vaccine. The study enrolled 135 patients who were segregated into two arms. Arm A consisted of individuals who either had never contracted COVID-19 or who had a COVID-19 infection at least six months before participating in the study. Arm B, on the other hand, includes individuals who will receive the PIKA® vaccine as a booster shot following primary vaccination with either inactivated or mRNA COVID-19 vaccines.

Arm		Regimen	Antigen Dosage	Sample Size
Arm A (Prime)	-	Two Shots (Day 0,7)	5μg	15
			10μg	15
			20μg	15
Arm B (Booster)	Arm B1	One Shot	5μg	15
			10μg	15
			20μg	15
	Arm B2	On Shot	5μg	15
			10μg	15
			20μg	15

Exhibit 10: Phase 1 Study Design Source: Company Filings

The study assessed the vaccine's safety, tolerability, and immunogenicity across three different dose levels of the antigen with 1 mg of PIKA®. The vaccine administered proved to stimulate the production of high-level neutralizing antibodies showcasing efficacy against a variety of mutant strains, including Delta and Omicron sublineages BA.1, BA.2, BA.3, BA.4/5, and BA. 2.12.1. Moreover, immunogenicity testing conducted 14 days after the booster dose in the low-dose group of Arm B indicated a significant increase in neutralizing antibody titers against different SARS-Cov-2 Variants. Notably, the antibody titer against the BA.2 variant reached 1,763, and against BA.4/5 was as high as 1,356. These were substantial increases from pre-vaccination titers, which were 31.81 and 23.5 for BA.2 and BA.4/5, respectively. In the study, the vaccine demonstrated a good safety profile. The most common side effects reported were minor such as pain at the injection site and fever, which all resolved quickly.[4] These side effects also decreased in frequency after the second dose. No significant immediate reactions were observed, affirming the vaccine's mechanism of action.

Phase II/III Clinical Trial

Post the successful completion of the Phase I trial exhibiting robust safety and immunogenicity profile, the company has begun the Phase II/III study (NCT05463419) designed to evaluate the efficacy, safety, and immunogenicity of the PIKA® COVID-19 vaccine as a booster dose in adults aged 18 or older who have already received two or more doses of an inactivated COVID-19 vaccine. Taking place in the Philippines and Singapore, the study will be double-blinded and randomized, comparing the results of the PIKA® vaccine to another inactivated COVID-19 vaccine. The company has completed the enrollment of 300 subjects and 5,656 subjects for Phase II part and Phase III part of the trial, respectively.

Trial Design and Subject Allocation				
Phase	**N**	**Vaccine**	**Vaccination**	**Blood Draws**
II	150	PIKA® COVID-19	Day 0	D0, 7,14,90,180,360
	150	Inactivated COVID-19	Day 0	
III	5656	PIKA® COVID-19	Day 0	D0, 7,14,360
		Inactivated COVID-19	Day 0	

Exhibit 11: Phase II/III Study Design Source: Company Filings

The company announced the interim data from Phase II part of Phase II/III head-to-head clinical study in March this year. The data demonstrated superior immunogenicity when compared to the inactivated COVID-19 vaccine, successfully meeting the primary and secondary endpoint. This was characterized by higher geometric mean titers (GMT) of neutralizing antibodies against the Omicron variant on Day 14, with a statistically significant result (95%CI: 2.1, 3.4, P<0.0001). The immunogenic superiority of the PIKA® vaccine was further indicated by a higher seroconversion rate of neutralizing antibodies against the Omicron variant from Day 0 to Day 14, with statistically significant results (95%CI: 2.1, 8.1, P<0.0001). Moreover, the PIKA® COVID-19 vaccine elicited a faster immune response showing a statistically significant increase in the GMT of neutralizing antibodies against the Omicron variant as early as day 7 post booster dose administration (95%CI:

[4] Yuan Liu, Lai Hock Tan, Nan Zhang, Yi Zhang, Zenaida Reynoso Mojares medRxiv 2022.11.20.22282565; doi: https://doi.org/10.1101/2022.11.20.22282565

1.5, 2.7, P<0.0001). The safety and reactogenicity profile of the PIKA® COVID-19 vaccine was satisfactory, with no significant safety concerns identified at the time of interim analysis.

PIKA® COVID-19 vaccine, with its enhanced immunogenicity and robust safety profile, presents a promising avenue in our struggle against COVID-19. As a potent booster, it may effectively improve immunity, especially in areas where the response to the initial inactivated vaccine may be waning. Its success in clinical trials underscores the value of continued research and development in vaccine technology to counter evolving threats and fortify global health security.

A New Approach to Hepatitis B Prevention with PIKA® YS-HBV-001

YS Biopharma's novel Hepatitis B vaccine, PIKA-YS-HBV-001, combines a modified Hepatitis B protein with their PIKA adjuvant to elicit a strong immune response, providing significant protection against the disease.

YS Biopharma's other clinical vaccine candidate PIKA® YS-HBV-001 is being developed for Hepatitis B. A major viral infection, Hepatitis B attacks the liver causing lifelong infection, cirrhosis of the liver, liver cancer, liver failure, and death. While the disease can't be cured, it can be prevented by administration of safe and effective vaccines. WHO recommends that the vaccine be administered to all newborns, children up to 18 years of age, and adults with a high risk for infection.[5]

YS Biopharma's PIKA®-YS-HBV-001 is a novel vaccine candidate that brings a fresh approach to the battle against Hepatitis B. Engineered with a genetically modified recombinant Hepatitis B surface antigen protein (HBsAg) coupled with innovative PIKA® adjuvant, the vaccine is designed to stimulate a robust immune response, providing the recipient with strong protection against Hepatitis B.

Mechanism of Action

The PIKA® HBV vaccine exhibits dual functionality, eliciting a strong specific antibody response and a robust, multifunctional cellular immune response to prevent HBV infection.

- Cellular Immunity Activation: The vaccine's PIKA® adjuvant acts as an immunomodulator, stimulating immune cells (dendritic cells) to present Hepatitis B virus protein (HBsAg) to T cells. This triggers T cells to become helper cells that assist B cells in producing more antibodies.
- Antibody Production: The vaccine includes Hepatitis B virus protein (HBsAg) expressed on the surface of the virus. Upon administration, our immune system recognizes this as foreign, generating specific antibodies against it.
- Long-term Immunity: The vaccine helps form memory cells from T cells and B cells, enabling rapid immune response upon future exposure to Hepatitis B, providing enduring protection.

Based on the vaccine's mechanism of action and results from pre-clinical and early clinical trials, the PIKA® YS-HBV-001 vaccine exhibits features with the potential to overcome limitations associated with existing vaccines on the market in China.

[5] https://www.who.int/news-room/fact-sheets/detail/hepatitis-b

- Easier Administration and Improved Adherence
- Enhanced Immunity
- Superior and Multifunctional T-cell response
- Accelerated Seroconversion
- Potentially Lower Costs

- **Inferring Safety and Efficacy from Clinical and Pre-Clinical Trial Outcomes**

The company has concluded pre-clinical trials and Phase I clinical trials providing insights into the effectiveness and safety of the PIKA® YS-HBV-001 vaccine.

Pre-clinical Trial

The pre-clinical studies performed on Balb/c mice demonstrated that PIKA®-YS-HBV-001 significantly increased the production of HBsAg- specific IgG antibodies compared to vaccines with antigen alone or antigen with alum adjuvant ($p<0.05$). This indicates a strong immune response to the vaccine. Additionally, the PIKA® vaccine improved T cell-mediated immune response in mice leading to increasing production of specific antibodies and T cells against the virus compared to other vaccines. In terms of safety and effectiveness, the vaccine outperformed both the adjuvant-free vaccine and the alum-adjuvant vaccine.

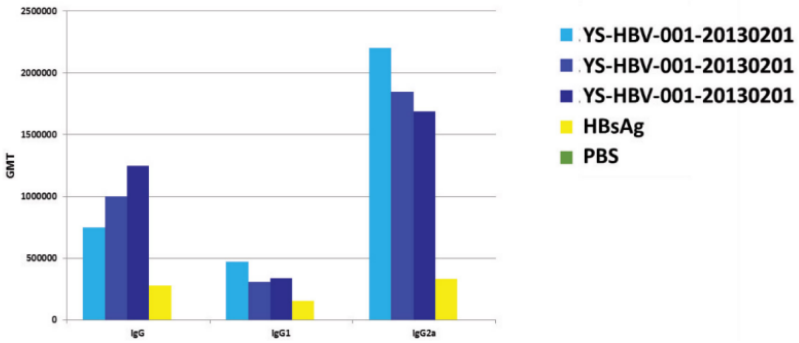

Exhibit 12: Anti-HBsAg antibody titers after vaccination in mice. Source: Company Filings

Phase I Clinical Trial

The company concluded the Phase I clinical trial for PIKA®-YS-HBV-001 in Singapore, enrolling 32 healthy individuals aged 21 to 65. The trial was designed as a randomized, double-blind, active control and parallel-group study. The results were compared to Engerix™, a commercial vaccine. The study found that PIKA®-YS-HBV-001 induced similar levels of immune response as the commercial vaccine, even when administered on a shortened schedule. Additionally, PIKA®-YS-HBV-001 was found to invoke a faster, stronger, and longer-lasting immune response when compared to the commercial vaccine. PIKA®-YS-HBV-001 also contributed to the production of multi-functional T cells. Importantly, no serious adverse events or significant health changes were observed, highlighting a good safety profile for PIKA®-YS-HBV-001.

Other PIKA®-enabled Vaccines

Beyond its three preventable vaccines, YS Biopharma has several other candidates in pre-clinical trials, all using the PIKA platform

In addition to the above three preventable vaccines, the company is also investing in the research and development of four additional novel vaccine candidates enabled by the company's PIKA® immunomodulating platform are currently in pre-clinical trials.

Therapeutic Vaccines

- PIKA® Recombinant COVID-19 Vaccine: This vaccine is being developed as a treatment for SARS-Cov-2 Infection
- PIKA® YS-HBV-002: This vaccine is being developed as an immunotherapy to treat chronic HBV infection

Non-Therapeutic/Preventative Vaccines

- PIKA® Recombinant COVID-19 Vaccine (nebulized): This vaccine aims to establish mucosal immune protection against SARS-CoV-2 Infection.
- PIKA® influenza Vaccine: This is a preventative vaccine designed for annual immunization against the flu.
- PIKA® Rabies Vaccine (Human diploid cell): Deriving inactive rabies virus antigen from the human diploid cell line instead of the vero cell line.

Advancing Immunotherapy with PIKA® Immunomodulating Platform

Besides vaccines, YS Biopharma is also developing immuno-oncology therapeutics PIKA YS-ON-001 and PIKA YS-ON-002, leveraging their PIKA technology to target various solid tumors

In addition to its extensive vaccine indications, YS Biopharma has also engaged in the development of immuno-oncology therapeutics PIKA® YS-ON-001 and PIKA® YS-ON-002. Both these pipeline candidates leverage the company's PIKA® immunomodulating technology platform to target various types of solid tumors.

PIKA® YS-ON-001: Harnessing Immunity Against Pancreatic and Liver Cancer

The lead Immuno-therapeutic biologic is a multi-component complex of proteins and PIKA® adjuvant designed to mitigate the immunosuppressive properties of the tumor microenvironment and boost the immune system's ability to fight tumor cells. PIKA® YS ON-001 has shown significant potential in several animal studies and has also been granted an Orphan Drug Designation (ODDs) from the U.S. FDA for the management of pancreatic and liver cancer.

Mechanism of Action

PIKA® YS-ON-001 functions by influencing the TLR3/RIG-I/MDA5 signalling pathway, a crucial part of PIKA® immunomodulating technology. The novel immunotherapy follows a multifaceted mechanism that involves several key components of the immune system.

- **Enhancing Phagocytosis:** PIKA® YS-ON-001 increases the ability of macrophages to engulf and destroy harmful particles or cells.
- **Activating Immune Cells:** The agent stimulates immune cells to better detect and fight cancer cells.
- **Inducing Cytokines and Apoptosis:** It prompts the production of tumor-inhibitory proteins (cytokines) and promotes apoptosis in tumor cells.
- **Reprogramming Macrophages:** The compound transforms tumor-supporting macrophages (M2 phenotype) into tumor-fighting macrophages (M1 phenotype)
- **Modifying the Tumor Microenvironment:** PIKA® YS-ON-001 alters the tumor environment to promote the presence of beneficial immune cells and decrease suppressive cells, fostering better anti-tumor responses.

These multi-modal mechanisms of action promote the broad applicability of this novel immunotherapy irrespective of expression on tumor cells, potentially creating a multi-target immuno-oncology drug. Additionally, the drug has the potential to be used in combination with other forms of cancer therapies, including radiotherapy, targeted therapies, checkpoint inhibitors, oncolytic viruses, and chemotherapies.

Inferring Safety and Efficacy from Clinical and Pre-Clinical Trial Outcomes

YS Biopharma has successfully finished various preclinical studies in animal models of advanced solid tumors. These models demonstrated promising results for PIKA® YS-ON-001 as an effective

immunotherapy, either as a standalone or in combination with standard-of-care cancer treatments. Effectiveness is measured by the tumor inhibition rate (IR) and ratio comparing tumor size in treated animals (Treatment) to that in untreated animals (Control) (T/C).

Animal Model	Agent	T/C (%)	IR (%)
Breast cancer 4T1in-situ model	PIKA YS-ON-001	45.87	42.26
	Docetaxel	50.12	35.55
Lewis lung cancer LL/2 transplanted tumor model	PIKA YS-ON-001	37.02	60.88
	Cisplatin PIKA	47.46	42.38
	YS-ON-001+Cisplatin	28.38	75.44
Liver cancer H22 transplanted tumor model	PIKA YS-ON-001	18.84	73.40
	Sorafenib PIKA	36.79	53.73
	YS-ON-001+Sorafenib	12.56	88.19
Colon cancer CT-26 transplanted tumor model	PIKA YS-ON-001	5.38	97.71
	PD-1	53.66	47.05
Prostate cancer RM-1 transplanted tumor model	PIKA YS-ON-001	1.39	98.56
	PD-1	57.62	38.12
Melanoma B16-F10 Metastatic tumor model			

Exhibit 13: Pre-Clinical Study Findings. Source: Company Filings

From the results, it is evident that the novel agent has exhibited a significantly higher tumor inhibition rate with a lower T/C ratio across all of the in-vivo studies in multiple forms of solid tumors. Building on this promising preclinical data, the company is now moving forward into the clinical phase of drug development. A Phase 1 trial (NCT03131765) is currently in progress, which aims to assess the safety, dosage, and initial efficacy of PIKA® YS-ON-001 in patients with advanced solid tumors who have not responded well to previous treatments. The study will be conducted in two parts: dose escalation and cohort expansion. Taking place in China and enrolling approximately 41 patients, the study is expected to be complete by December 2023.

PIKA® YS-ON-002

PIKA® YS-ON-002 is another immunotherapy candidate being developed by the YS Biopharma based on their proprietary PIKA® immunomodulating technology platform. Unlike PIKA® YS-ON-001, which consists of a PIKA® agent along with protein-based antigens and other additives, PIKA® YS-ON-002 comprises a PIKA® agent, a stabilization agent, and other additives. This novel formulation demonstrates broad-spectrum anti-tumor activity against various cancer types.

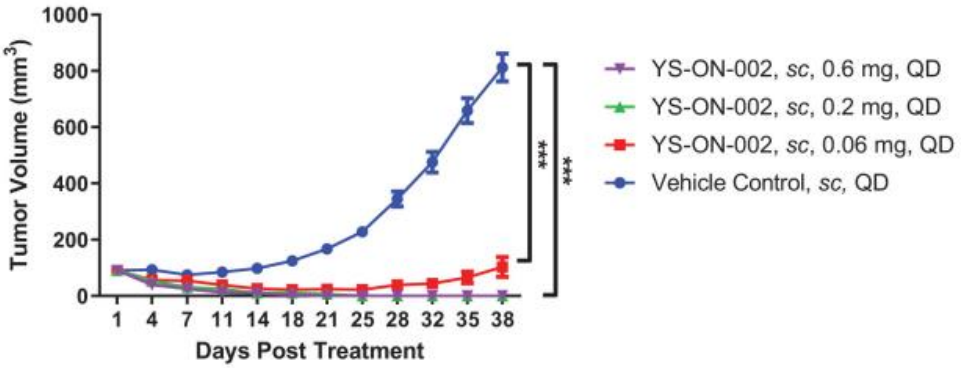

Exhibit 14: Anti-tumor effects of YS-ON-002 in Pan02 Murine Pancreatic Cancer Model. Source: Company Filings

In preclinical studies on mice with pancreatic cancer, PIKA® YS-ON-002 inhibited tumor growth by 76.42%. Higher doses completely eradicated tumors, and even at lower doses, a 40% tumor-free rate was achieved.

China's Vaccine Market Overview

With the world's second-largest population, China has a vast and rapidly expanding domestic vaccine market

With the world's second-largest population, China has a vast and rapidly expanding domestic vaccine market, with vaccines ranging from Rabies, Hepatitis B, Meningitis, and Measles, to name a few. As per an F&S report, the production value of China's vaccine market has seen a general rise from RMB 31.2 billion in 2017 to RMB 92.6 billion in 2021, reflecting a CAGR of 31.3%. It is projected to grow further to RMB 338.6 billion in 2030, with a CAGR of 15.5% from 2021 to 2030. Vaccines in China are classified into Category I and Category II. Category I vaccines are mandatory, procured through government-led tenders by provincial Centers for Disease Control and Prevention (CDCs), and provided free of charge to end users. On the other hand, Category II vaccines are paid for by the consumers or their insurance, serving a market consisting of an increasing number of health-conscious customers willing and able to afford premium, high-quality vaccines. The Chinese vaccine market is primarily ruled by Category II vaccines. Certain vaccines, like the human rabies vaccine, are solely available as Category II vaccines. In 2021, Category II vaccines represented 94.7% of the overall market production value. By 2030, this category is anticipated to constitute 97.9% of the total market production value, as per the same report.

Major Factors Driving Growth

China's vaccine market, specifically Category II vaccines, is growing due to increased health awareness and improved affordability. Economic growth and higher disposable incomes have resulted in a greater demand for these vaccines. The supply of vaccines has struggled to meet this demand, further driven by the advent of innovative vaccines for diseases lacking effective treatments. Additionally, the Chinese government's supportive policies aimed at enhancing domestic vaccine development and promoting immunization programs have stimulated the market.

Human Rabies Vaccine Market & Competitive Overview

Rabies is estimated to cause approximately 59,000 deaths each year

Rabies is a fatal viral infection primarily transmitted to humans through bites, scratches, or saliva from infected animals, including primarily dogs. The virus affects the central nervous system, ultimately causing disease in the brain and death if left untreated. When clinical signs manifest, the fatality rate of rabies is essentially 100%.[6] Rabies presents a significant public health concern, manifesting in over 150 nations and territories worldwide.[6] Annually, it is estimated to be responsible for approximately 59,000 fatalities.[7] A disproportionate majority of these deaths, exceeding 95%, occur in developing regions of Asia and Africa, underscoring the disproportionate burden of this disease on these areas.[6]

[6] https://www.who.int/news-room/fact-sheets/detail/rabies
[7] Centers for Disease Control and Prevention

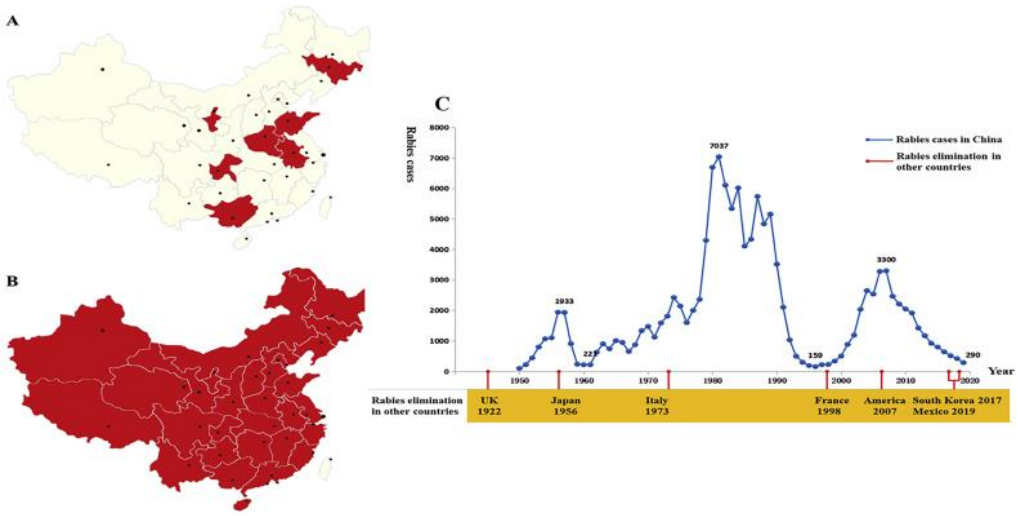

Exhibit 15: Spatial-temporal dynamics of human rabies in China. A) distribution of human rabies 1990–2000; B) distribution of human rabies 2010–2019; C) human rabies cases followed by chronological summation. Source: Miao F et al.

The Rabies Vaccine Market is divided into several segments based on the product type. These include Baby Hamster Kidney (BHK) vaccines, Purified Chick Embryo Cell Rabies vaccines, and Vero Cell Rabies vaccines, among other product types. According to a report by Mordor Intelligence, the global rabies vaccine market is forecasted to register a CAGR of 5.1% during the period 2023 to 2028.

China, for instance, has seen the median bidding price of rabies vaccine under the Vero cell line per dose increase steadily in recent past years, growing from RMB 53.0 billion in 2017 to RMB 87.0 billion in 2021, with rabies vaccine production increasing from RMB 4.5 billion in 2017 to RMB 9.4 billion in 2021. China's rabies vaccine market is expected to further reach RMB 22.1 billion in 2025, clocking a CAGR of 23.8% between 2021 and 2025, and further expected to reach RMB 33.3 billion in 2030, growing at a CAGR of 8.5% from 2025 to 2030, according to a F&S report. In 2021, around 49 million people in China were bitten by dogs or other animals potentially carrying rabies—a number anticipated to rise to 52 million by 2025, and 55 million by 2030. As of 2021, the uptake of the rabies vaccine stood at 40.6%, but projections suggest this could elevate to 65.7% by 2025, and further to 75.5% by 2030.

In 2021, approximately 49 million people in China risked rabies from animal bites, expected to rise to 55 million by 2030. Vaccine uptake was at 40.6% in 2021, with projections of reaching 75.5% by 2030

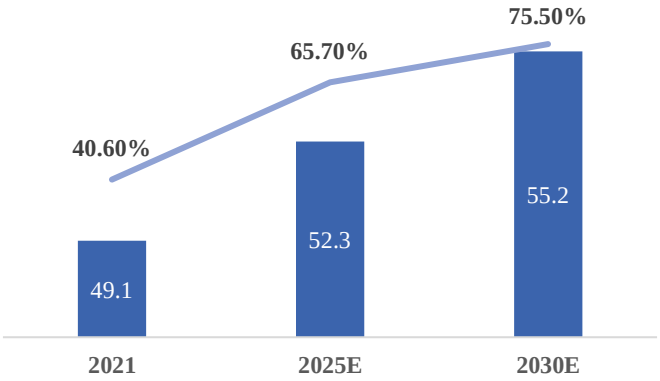

Exhibit 16: China's Number of New Bites and Penetration Rate of Rabies Vaccine. Source: NIFDC, Frost and Sullivan Analysis, Diamond Equity Research

Dog bite incidents are frequent occurrences in Southeast Asia, too, leading to significant annual expenditures on rabies biologics within these countries. In the Philippines, the year 2018 saw the reportage of 815,902 incidents involving dog bites, leading to 276 fatalities due to rabies infection. Similarly, in Vietnam, over 350,000 individuals were reported to have been bitten by dogs and cats, resulting in more than 80 deaths from rabies in the same year. Despite Singapore being acknowledged as rabies-free and Malaysia being on the verge of achieving the same status, the market for rabies vaccines continues to hold relevance even in these countries. Incidentally, based on the F&S report and expert assessments, the collective sales revenue from the rabies vaccine market in the Philippines, Vietnam, Malaysia, and Singapore has risen from $6.4 million in 2017 to $18.1 million in 2021, with a CAGR of 29.5%. This upward trend is predicted to continue, reaching $45.0 million in 2025 (with a CAGR of 25.6% from 2021 to 2025) and further expanding to $89.9 million in 2030 (with a CAGR of 14.8% from 2025 to 2030). China's rabies vaccine market growth is propelled by the increasing pet and stray dog populations, insufficient vaccine supplies due to stringent regulations, and lack of animal vaccination programs. Opportunities for expansion lie in overseas markets and the development of user-friendly, efficient vaccines for immunocompromised individuals.

YS Biopharma's PIKA rabies vaccine, utilizing its PIKA immuno-modulating platform, offers several benefits over currently marketed third-generation vaccines

The market for rabies vaccines remains fragmented, with the presence of many players in China and Southeast Asian countries such as Vietnam and the Philippines. Most of the marketed vaccines use a conventional third-gen approach with little to no differentiation among them. While the YS Biopharma's YSJA™ vaccine being the first-of-its-kind aluminium-free vaccine, is comparatively better than others in the market, it still holds high similarity and uses the same conventional approach. YS Biopharma's PIKA® rabies vaccine leverages its PIKA® immuno-modulating platform resulting in multiple advantages over current/third-gen marketed vaccines. Additionally, given the fact that the current supply of human rabies immunoglobulin can only meet less than 10% of the overall demand, there is an urgent need for a more effective vaccine with an enhanced protection level. This will potentially allow the company's PIKA® rabies vaccine to become the next generation of rabies vaccine with the potential to capture significant market share in China and South-East Asian Countries.

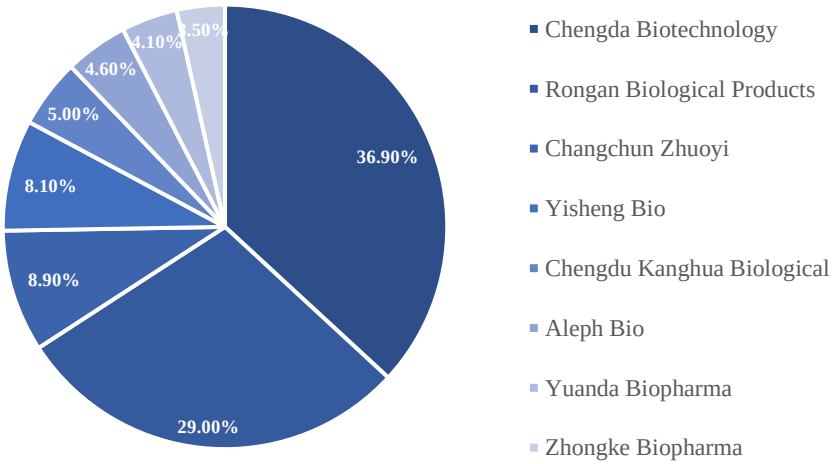

Exhibit 17: Market Share of Chinese Vaccine Companies in Terms of Lot Release. Source: F&S, Diamond Equity Research

Hepatitis B Vaccines Market & Competitive Overview

The global Hepatitis B vaccine market is expected to grow to $10.62 billion market by 2029

Hepatitis B is a communicable illness resulting from the hepatitis B virus (HBV), leading to liver inflammation. HBV infections can manifest as acute, short-lived illnesses or as chronic conditions, particularly in children. Chronic HBV can lead to severe health complications like cirrhosis, liver failure, liver cancer, or hepatocellular carcinoma. In China, the main categories of antiviral drugs used to treat HBV include recombinant cytokine gene-derived protein, polypeptide, nucleoside analogues, and interferon. However, none of these categories alone is sufficient to accomplish a functional cure for HBV, indicating that the current medical needs for HBV therapies are not being fully met. As per a Fortune Business Insights report on the Hepatitis B vaccine market, the global hepatitis B vaccine market is forecasted to grow at a CAGR of 4.5% between 2022 and 2029 to reach $10.62 billion from the current $7.8 billion. Per the F&S report, the rates of diagnosis and treatment for Hepatitis B in China were relatively low in 2019, standing at 32.1% and 21.1%, respectively. This is primarily attributed to inadequate public knowledge about the disease, a vast patient pool, and limited diagnostic capabilities in remote regions. The lot release of Hepatitis B preventive vaccines hit 70.7 million in 2021, registering a CAGR of -3.3%. This is projected to rise to 85.4 million by 2025 (with a CAGR of 4.9% from 2021 to 2025) and further to 90.8 million by 2030 (with a CAGR of 1.2% from 2025 to 2030).

Scope of Hepatitis B Vaccine and Treatment in China's Market

The growth of the Hepatitis B prophylactic vaccine and HBV treatment markets in China is fueled by various significant factors. Government policies favoring the spread of vaccination among newborns are driving the vaccine market due to the country's large population base, numerous existing infected patients, and low diagnosis and treatment rates. Additionally, the vaccine market benefits from a growing need for vaccines that address non-responders—those who do not develop protective antibodies after two full vaccine series—and from the introduction of a simplified two-dose regimen that enhances adherence and efficacy. Concurrently, the HBV treatment market is expanding due to improved diagnosis and treatment rates, government support—evidenced by the inclusion of all commercially available Hepatitis B antiviral drugs in the National Reimbursement Drug List—and a substantial unmet demand for treatments providing a functional cure. These factors, combined with China's efforts to meet WHO's 2030 target for viral hepatitis elimination, indicate the potential for continued growth in these healthcare sectors.

The HBV Prophylactic vaccine market in China is characterized by the presence of multiple players, with the majority of the market share being held by two players. While there are nine companies in China approved to market recombinant Hepatitis B vaccine, North China Pharmaceutical Group and Shenzhen Kangtai Biological Products together control 56.5% of the market in terms of lot release. Additionally, there were five vaccine pipeline candidates in China as of July 2022. The presence of multiple players and an increasing number of new companies in developing HBV indicate intensifying competition within the industry.

There are 87 million people who are chronic carriers of the Hepatitis B virus in China, accounting for about one-third of all Hepatitis B virus chronic carriers in the world.[8] Being a serious health issue in China, the Chinese government's continuing efforts and policies implemented in controlling the Hepatitis B epidemic likely indicate a resistant demand going forward for the HBV vaccine.[9] Additionally, while the majority of persons vaccinated against Hepatitis B successfully respond to vaccination, an estimated 5-15% of persons may not respond due to older age, obesity, smoking, and other chronic illness.[10]

China hosts 87 million chronic Hepatitis B carriers, comprising about one-third of the global total

YS Biopharma's HBV candidate, currently undergoing human clinical trials, holds multiple advantages, such as easier administration and improved adherence, accelerated seroconversion, and potentially lower costs when compared to available vaccines in the market. This potential superiority, in addition to continued stable demand for the Hepatitis B Vaccine, will likely allow YS Biopharma to establish a strong competitive position in the market.

COVID-19 Vaccine Market and Competitive Overview

While COVID-19 is being controlled globally, its impact continues to shape various sectors of the global economy. For vaccine manufacturers, the global management of COVID-19 presents both opportunities and challenges. According to an analysis conducted by John Hopkins University and data reported in the F&S document, it is estimated that herd immunity to COVID-19 can be attained when approximately 70% to 90% of the global population is immune to the virus. This calculation assumes an average necessity of two vaccine doses per individual for effective immunity. As a result, to accomplish global herd immunity, an aggregate of 10.5 to 13.5 billion vaccine doses would be necessitated. In the case of China specifically, between 2.0 to 2.5 billion doses would be required to reach the same immunity threshold.

The emergence of new COVID-19 variants may necessitate the development of new or updated vaccines

COVID-19 may persist in the human population for an extended duration due to its heightened adaptability to host organisms and lower virulence when compared to other viruses, such as severe acute respiratory syndrome (SARS). Even though the virus is largely under control, booster shots may be necessary to maintain immunity, especially considering emerging variants. The emergence of new COVID-19 variants may necessitate the development of new or updated vaccines. There remain lingering uncertainties regarding the current vaccines' capabilities. It is yet to be conclusively determined whether these vaccines can prevent individuals from contracting mild forms of COVID-19 that could potentially be transmitted to others. Additionally, the duration of the immunity provided by these vaccines against COVID-19 is still not definitively known. Further, the vaccine rollout can continue to be supported by China's existing public health infrastructure, which includes a strong network for vaccine distribution and administration. This could represent a continuing market for vaccine manufacturers. The Chinese government has also strongly supported COVID-19 vaccine development and distribution, which can provide opportunities for public-private partnerships.

[8] https://www.who.int/china/health-topics/hepatitis
[9] Liu Z, Li M, Hutton DW, et al. Impact of the national hepatitis B immunization program in China: a modeling study. Infect Dis Poverty. 2022;11(1):106. Published 2022 Oct 11. doi:10.1186/s40249-022-01032-5
[10] https://www.hepb.org/prevention-and-diagnosis/vaccination/vaccine-non-responders/

Approximately 90% of the Chinese population has been fully vaccinated, with more than 3.5 billion doses administered.[11] A significant percentage of the population has also been inoculated with booster doses. The competition within the Chinese market is fierce, with the presence of multiple players. Sinopharm, Sinovac, and CanSino be a few of the early entrants and prominent COVID vaccine manufacturers in mainland China. CSPC Pharmaceuticals is one of the recent entrants in the Chinese COVID vaccine market with the approval of the first domestically developed mRNA vaccine.[12] These COVID-19 vaccines have greatly reduced hospitalization and death, but there is still a need to continually vaccinate at-risk populations, particularly given the emergence of a new dominant and vaccine-resistant variant approximately every 3-4 months. There have even been talks in the United States of COVID Vaccines to be administered once a year like a flu shot.[13] While a significant percentage of the population across major developed and developing have been fully vaccinated, the market for booster doses, especially for high risk-individuals, still presents a significant opportunity for disruptive COVID vaccine developers and innovators. The market will most likely be captured by those vaccine manufacturers in the coming years whose prophylactic will be the most effective and safe, providing a broad range of protection against mutant COVID variants.

COVID-19 Vaccine	Vaccine Platform	Type of Candidate	Doses
Moderna/NIAID	RNA	LNP-encapsulated mRNA	2
BioNTech/Fosun Pharma/Pfizer	RNA	3 LNP -mRNAs	2
Beijing Institute of Biological Products/Sinopharm	Inactivated	Inactivated	2
University of Oxford/AstraZeneca	Non-Replicating Viral Vector	ChAdOx1-S	2
Sinovac	Inactivated	Inactivated	2
CanSino/Beijing Institute of Biotechnology	Non-Replicating Viral Vector	Adenovirus Type 5 Vector	1
Wuhan Institute of Biological Products/Sinopharm	Inactivated	Inactivated	2
Janssen Pharmaceutical	Non-Replicating Viral Vector	Ad26.COV2.S	1
Anhui Zhifei Longcom	Protein Subunit	Protein Subunit	3
Shenzhen Kangtai Biological	Inactivated	Inactivated	3
Serum Institute of India (Novavax formulation)	Protein Subunit	Protein Subunit	2
Novavax	Protein Subunit	Protein Subunit	2
Serum Institute of India (Oxford/AstraZeneca formulation)	Non-Replicating Viral Vector	ChAdOx1-S	2
Bharat Biotech	Inactivated	Inactivated	2

Exhibit 18: FDA, NMPA, and WHO issued vaccine approval as of July 2022. Source: Company Filings

Immuno-Oncology Market

Immuno-oncology refers to the study and development of treatments that take advantage of the body's own immune system to fight cancer. These treatments are designed to stimulate or restore the immune system's ability to recognize and destroy cancer cells effectively. Therapies in immuno-oncology include various strategies such as monoclonal antibodies (mAbs) that target immune checkpoints, cancer vaccines, adoptive cell transfers (including CAR-T cell therapies),

[11] https://covid19.who.int/region/wpro/country/cn
[12] https://www.reuters.com/business/healthcare-pharmaceuticals/china-approves-its-first-mrna-vaccine-domestic-drugmaker-cspc-2023-03-22/
[13] https://www.nature.com/articles/d41586-023-00234-7

cytokines, and other treatments designed to boost the immune response against cancer. It has emerged as an exciting and innovative area of cancer research with significant potential to improve cancer patient outcomes. Some of these therapies have already made a significant impact on patient outcomes, such as the checkpoint inhibitors PD-1/PD-L1 and CTLA-4, which have revolutionized treatment for cancers like melanoma and non-small cell lung cancer (NSCLC). According to an analysis by Data Bridge, the immuno-oncology (IO) market is projected to grow from USD 28.10 billion in 2022 to an estimated USD 156.05 billion by 2030. This represents a compound annual growth rate (CAGR) of 23.9% during the forecast period from 2023 to 2030. The Asia-Pacific region is predicted to experience the fastest growth rate in the immuno-oncology (IO) market. This is primarily attributed to the region's notable acceleration in adopting cancer immunotherapy. Particularly in China, the immuno-oncology therapies market has seen substantial growth in recent years, with the market growing from RMB 0.9 billion in 2017 to RMB 16.3 billion in 2021, at a CAGR of 108.2%. This surge is projected to continue in the foreseeable future, reaching RMB 63.8 billion (CAGR 40.6%) in 2025, and further to RMB 256.4 billion (CAGR 32.1%) until 2030, per an F&S report.

The immuno-oncology therapies market in China expanded from RMB 0.9 billion in 2017 to RMB 16.3 billion in 2021, a CAGR of 108.2%. It's projected to reach RMB 256.4 billion by 2030, with a CAGR of 32.1% from 2025 to 2030

The significant drivers promoting the growth of China's Immuno-Oncology market include unmet cancer patient needs, the potential for expanding therapeutic indications, and the rapid development of next-generation therapies. The limitations of existing treatments highlight the need for safer, more effective options. While six PD-1 monoclonal antibodies are approved in China for eight indications, the U.S. FDA has approved 19, indicating room for growth. Additionally, new therapies have surged since the 2011 approval of the CTLA-4 inhibitor. This progress is bolstered by favorable government policies, such as special review channels and cost reduction measures, further driving market expansion. Concurrently, the rising incidence of solid tumors such as hepatocellular carcinoma and pancreatic cancer has fueled market growth for corresponding drugs. As reported by F&S, hepatocellular carcinoma cases increased from roughly 351,100 in 2017 to 388,000 in 2021, a trend projected to continue through 2030. This surge has expanded the hepatocellular drug market from RMB 3.6 billion in 2017 to RMB 8.9 billion in 2021, with predictions of reaching RMB 43.1 billion by 2030. Similarly, pancreatic cancer cases in China grew from about 101,500 in 2017 to approximately 115,900 in 2021. Correspondingly, the pancreatic cancer drug market has expanded from RMB 2.4 billion in 2017 to RMB 3.0 billion in 2021 and is projected to reach RMB 11.8 billion by 2030. This growth can be attributed to factors such as alcohol abuse and infections from hepatitis B and C viruses.

Product	Drug Type	Company	Phase	Target
Hiltonol/Poly-ICLC	Double-stranded RNA complex	Oncovir	II	TLR3/MD5
Ampligen/Rintatolimod	RNA	Aim ImmunoTech	II	TLR-3
BO-112	Synthetic dsRNA complex	Highlight Therapeutics	II	TLR-3/MDA5/RIG-I
CV-8102	RNA-based adjuvant	CureVac	I/II	TLR-7/8/RIG-I
EG-70	Non-viral gene therapy encoding RIG-1 agonists	enGene	I/II	RIG-I
YS-ON-001	Multiple component complexes of proteins	YS Biopharma	I	TLR3/MDA5/RIG-I

Exhibit 19: Immune-oncology therapeutics targeting TLR3/MDA5/RIG-I under development globally as of July 31, 2022. Source: Company Filings

Management Overview

YS Biopharma's leadership is comprised of individuals with a range of industry-relevant experiences. The team encompasses expertise in areas such as research, drug development, clinical operations, finance, and marketing. Their collective backgrounds, spanning both public and private sectors across various geographies, support the company's strategic positioning and growth objectives in the global healthcare sector.

Yi Zhang - Founder and Chairman

Mr. Yi Zhang, founder, and chairman of YS Biopharma, boasts over 35 years of experience in China's biopharmaceutical industry, leading key national research projects such as the National 863 Scientific Project "SARS Immunoglobulin" and the company's National Key New Medical Innovation projects on the PIKA® rabies vaccine. Having gained hands-on experience in epidemiology, infectious disease control, and vaccination campaigns from his tenure in local CDC offices in China, Mr. Zhang also holds multiple credits as the lead author of research publications and co-inventor of several patents and technologies. A clinical medicine graduate from Kaifeng Health Science School (1981), he also serves as a director in the Henan Red Cross Society.

David (Hui) Shao, Ph.D., MBA, CFA - President & CEO

Dr. Hui Shao, serving as the president and chief executive officer of YS Biopharma, brings over 25 years of extensive scientific and industrial experience in the biotechnology and pharmaceutical sectors. His expertise spans diverse areas, including drug discovery, business strategy, product commercialization, and capital markets across the United States, Europe, and Asia. Dr. Shao received his bachelor's degree in chemistry from the University of Science & Technology of China in 1991, his Ph.D. degree in bioorganic chemistry from the University of California, San Diego in 1996, and an M.B.A. degree in finance and accounting from Stern School of Business, New York University in 2003. Dr. Shao also holds the CFA Charter and is an AICPA holder in the State of Washington, the United States.

Dr. Zenaida Mojares, M.D. - Chief Medical Officer

Dr. Mojares serves as the Chief Medical Officer of YS Biopharma, overseeing the strategic direction and execution of R&D and global clinical development. Her extensive experience spans multiple roles in medical, clinical research, and public health, with notable positions at the International Vaccine Institute, Takeda Pharmaceuticals, and GSK Vaccines. She holds a Bachelor of Science, a Doctor of Medicine, a Master of Science in Vaccinology and Pharmaceutical Clinical Development, and a Master's degree in Public Health. Dr. Mojares' diverse experience and academic background provide valuable insights into YS Biopharma's clinical strategies and operations.

Chunyuan (Brenda) Wu - Chief Financial Officer

Ms. Chunyuan Wu, serving as the Chief Financial Officer for YS Biopharma, is tasked with comprehensive financial management for the group. This encompasses tax planning, bank loan structuring, overseeing the financial team's daily operations, and coordinating with external advisors for business expansion. Ms. Wu's prior experience includes the role of CFO and Financial Controller at Yisheng Biopharma, Financial Controller at Jilin Milk Ground Group, and senior auditor positions at Ernst & Young and Shine Wing. With double majors in accounting and finance and a minor in economics from the Business School of Washington State University, coupled with her FCCA and CGA qualifications, Ms. Wu brings a depth of financial knowledge to the YS Biopharma team.

Dr. Yuan Liu, Ph.D. - Head of Vaccine Research

Dr. Yuan Liu, as the Head of Vaccine Research at YS Biopharma, is charged with the research and development of vaccine adjuvants. This includes the PIKA® hepatitis B vaccine, the human PIKA® rabies vaccine, and new adjuvant-based tumor vaccines under development. Prior to her current role, Dr. Liu served as the Project Leader in the R&D department and then as Vice President of the Research department of Yisheng Xingye. With over a decade focused on vaccine adjuvant research and recognition, such as the 2016 sponsorship from the Beijing Outstanding Talent Training Fund, Dr. Liu brings deep expertise to YS Biopharma's research efforts. She received her Ph.D. from the University of Chinese Academy of Sciences and her bachelor’s degree from Sun Yat-sen University.

Gang Li, MBA - Head of Sales and Marketing

Mr. Gang Li, the Head of Sales and Marketing at YS Biopharma, has been managing the overall marketing system since March 2019. He brings with him a wealth of experience from various roles in notable organizations such as GlaxoSmithKline (China) Investment Co., Ltd, Pfizer Investment Co., Ltd, and Shenwei Pharmaceutical Ltd, where he developed skills in business management and pharmaceutical sales. Mr. Li's education, a bachelor’s degree from Hebei Medical University and an MBA from Sorbonne Business School complements his extensive experience and provides him with a comprehensive perspective on the pharmaceutical sales and marketing landscape.

Financial Highlights: Steady Growth, Financial Resilience, and Future Expansion

- **Revenue, Market Share, and Forecasts:** YS Biopharma generates revenue from its only marketed product, YSJA™ rabies vaccine. With an annual production capacity of 15 million doses, YS Biopharma has manufactured more than 26.5 million doses since the company started manufacturing in February 2020. Having started selling the drug in October 2020, the company generated revenue of RMB 257.0 million for the year ended March 2021 and RMB 502.9 million for March 2022. The company reported a revenue of RMB 687.2 million for the year ended March 2023. Based on the actual revenue figures and a median bidding price of RMB 89, we estimate YS Biopharma to have sold approximately 6-7 million doses in 2021, indicating a market share of 7%-8%. We expect the company to widen its selling and marketing efforts. Furthermore, YSJA™ is likely to be the only revenue-generating product for 2024, post which we expect the sequential commercialization of its PIKA® rabies vaccine and PIKA® COVID-19 vaccine currently in end-stage clinical trials. During the end of fiscal year 2023, COVID-19-led disruptions affected the company's manufacturing operations and production output relating YSJA™ rabies vaccine production facility. This has restricted the company's ability to meet the growing demand for rabies vaccines resulting in estimated revenue for 2024 coming in at RMB 627.3 million. The weakness in the top line is evident in the first quarter results, with the company reporting revenue of RMB 176.3 million compared to RMB 205.5 million for the same quarter in the previous year. Assuming commercialization of the PIKA® rabies vaccine across south-east Asian nations by the end of 2024 and normalization of manufacturing operations relating to the YSJA™ rabies vaccine, we expect a significant rebound in 2025 with revenue expected at RMB 798.3 million.

- **Margin Analysis:** YS Biopharma generated a gross profit of RMB 385.88 million and RMB 533.84 million for the year ended March 2022 and 2023. This translates to 76.7% and 77.7% gross margins for the respective years. We expect the gross margins to remain stable and on similar lines for 2024 and 2025, respectively. The EBITDA margins remain in the negative territory owing to multiple candidates progressing through clinical trials resulting in significant research and development expenditure. As a percentage of revenue, research, and development contributed 46.4% of the total revenue, while selling expenses accounted for 39.7% of the revenue for the year ended March 2023.

- **Balance Sheet Strength:** The company concluded the fiscal year 2023 with cash reserves of RMB 370.36 million compared to RMB 271.06 million as of March 2022. At the end of the first quarter, the cash reserves amounted to RMB 311.78 million. The latest financials as of June 2023 indicate an outstanding bank loan and other borrowing of RMB 514.89 million. We believe the current debt balance and the resulting interest payments to be manageable for the foreseeable period, given the robust cash balance and revenue-generating capabilities of the company.

Year-end 31 Mar. (in RMB mm)	2022A	2023A	2024E	2025E	2026E
INCOME STATEMENT					
Revenue	$502.95	$687.20	$627.28	$798.29	$1,472.30
Gross Profit	$385.88	$533.84	$492.42	$622.67	$1,148.39
EBITDA	($87.80)	($102.69)	($160.93)	($9.57)	$114.00
Depreciation & Amortization	($31.15)	($36.69)	($36.67)	($38.33)	($40.39)
EBIT	($118.96)	($139.38)	($197.59)	($47.90)	$73.61
Interest Income/Expense	($2.72)	($30.86)	($26.81)	($26.81)	($26.81)
Profit Before Tax (PBT)	($101.07)	($144.35)	($224.41)	($74.71)	$46.80
Profit After Tax (PAT)	($106.00)	($145.48)	($224.41)	($74.71)	$35.10
Basic Shares Outstanding (M)	61.83	93.06	93.99	94.93	132.90
EPS - basic	($1.71)	($1.56)	($2.39)	($0.79)	$0.26
BALANCE SHEET					
Cash and cash equivalents	271.07	370.37	205.32	46.88	31.27
Other current assets	493.70	665.61	565.33	723.61	1,333.46
Total current assets	764.76	1,035.98	770.65	770.49	1,364.74
Non-current assets	676.99	683.77	685.37	695.74	715.72
Total Assets	**1,441.75**	**1,719.75**	**1,456.02**	**1,466.23**	**2,080.45**
Short-term borrowing	111.73	193.74	193.74	193.74	193.74
Other current liabilities	364.18	465.03	421.62	500.55	868.64
Total current liabilities	475.91	658.76	615.36	694.29	1,062.37
Long-term borrowing	253.93	293.79	293.79	293.79	293.79
Other non-current liabilities	40.66	38.75	38.75	38.75	38.75
Total liabilities	770.50	991.30	947.89	1,026.83	1,394.91
Total Equity	671.25	728.45	508.12	439.40	685.54
Total Liabilities & Equity	**1,441.75**	**1,719.75**	**1,456.02**	**1,466.23**	**2,080.45**

Exhibit 20: Income Statement Snapshot. Source: Diamond Equity Research

Valuation

We expect multiple approvals in the next few years across various geographies, including China and Southeast Asian countries. The below exhibit provides a detailed overview of our estimations of future approvals and the probability of success for different vaccine candidates.

Vaccine/Therapy	Indication	Probability	Stage	Commercialization Year
YSJA™ Rabies Vaccine	Rabies	100%	Commercialized	Commercialized
PIKA® Rabies Vaccine	Rabies	50%	Phase 3	2024 - ex-China, 2026 China
PIKA® COVID-19 Vaccine	COVID-19	40%	Phase 2/3	2026 - China and ex-China
PIKA® YS-HBV-001	Hepatitis B	10%	Phase 2	2028 – China
PIKA® YS-ON-001	Hepatocellular Cancer	5%	Phase 1	2029 - China

Exhibit 21: Financial Model Assumptions Source: Diamond Equity Research

YS Biopharma has two notable products in its rabies vaccine portfolio that continue to remain the primary drivers of the company's valuation, an approved vaccine named YSJA™ and a potentially superior candidate, PIKA® rabies vaccine, currently in the final stages of its clinical trials. The firm anticipates pricing PIKA® at a premium - 4x the current price of YSJA™. A significant advantage of PIKA is its dosage efficiency, potentially tripling YS Biopharma's production capacity with an increasing shift from YSJA™ to PIKA® rabies vaccine. Both these factors are likely to contribute to a revenue multiplier that is 4 to 5 times that of YSJA™, mitigating concerns of cannibalizing sales. Additionally, given the existing constraints on market capacity, this increased production could not only meet domestic demand but also create opportunities for exporting, particularly to emerging markets like the Philippines. To elucidate further, if YSJA™'s market share were to be transitioned to PIKA® by 25%, 33%, and 50% with zero net gains in the overall market share of YS BioPharma, the implication for YS's revenue could be a growth of 75%, 100%, and 150% respectively. This exponential growth in revenue is likely to occur while maintaining a relatively stable cost of goods sold (COGS). Notably, these estimates are highly conservative, not accounting for potential market share gains, which seem highly probable given PIKA®'s promising attributes.

	% Market Share Shift from YSJA to PIKA					
Price of PIKA rabies vaccine as a multiple of YSJA	150%	25.00%	33%	50.00%	67%	75.00%
	3.00x	50.00%	66.00%	100.00%	134.00%	150.00%
	3.50x	62.50%	82.50%	125.00%	167.50%	187.50%
	4.00x	75.00%	99.00%	150.00%	201.00%	225.00%
	4.50x	87.50%	115.50%	175.00%	234.50%	262.50%
	5.00x	100.00%	132.00%	200.00%	268.00%	300.00%

Exhibit 22: Revenue Growth Sensitivity Analysis. Source: Diamond Equity Research

We have valued YS Biopharma using risk-adjusted discounted cash flow (DCF) as our preferred methodology. Based on the stated assumptions, we have forecasted the future cash flows of the company. Discounting the free cash flow using a discount rate of 10.00% yields a value of $475.52 million. In addition, our valuation approach also incorporates comparable company analysis based on EV/Sales valuation metric. A blended valuation of the two methodologies yielded a value of $474.29 million or $5.10, contingent on successful execution by the company.

Calculated Equity Value ($mm)	
Enterprise Value	503.63
- Debt and Preferred Stock	71.26
+ Cash	43.15
Net Debt	(28.11)
Equity Value	**475.52**

Approaches (in $ mm)	Value (USD)	Weight	Wtd. Value (USD)
DCF	475.52	90%	427.97
GPCM	463.28	10%	46.33
GTM	-	0%	-
Wtd. Avg. Equity Value (USD)			**474.29**
No of Shares Outstanding			**93.06**
Intrinsic Value Per Share			**5.10**

Company Name	Ticker	Price	Currency	Country	Mkt Cap.	LTM EV/Sales
Shenzhen Kangtai Biological Products	300601	28.48	CNY	CN	31,809	10.40x
Biocytogen Pharmaceuticals (Beijing)	2315	16.56	HKD	CN	6,614	10.50x
Genetron Holdings	GTH	0.92	USD	CN	84	0.6x
Chongqing Zhifei Biological Products	300122	44.75	CNY	CN	107,400	2.50x
JW (Cayman) Therapeutics	JWCTF	0.32	USD	CN	133	n.a.
Beijing Wantai Biological Pharmacy Enterprise	603392	64.10	CNY	CN	81,292	6.60x
CANbridge Pharmaceuticals.	1228	1.69	HKD	CN	717	4.1x
Walvax Biotechnology	300142	27.03	CNY	CN	43,284	7.6x
Kintor Pharmaceutical	KNTPF	0.52	USD	CN	201	n.a.
Clover Biopharmaceuticals.	2197	1.00	CNY	CN	1,294	n.a.
HBM Holdings	HBMHF	0.48	USD	CN	161	2.0x
Genor Biopharma Holdings	6998	1.55	CNY	CN	778	n.a
Median						**5.35x**
Mean						**5.54x**

Exhibit 23: Valuation Snapshot (values millions). Source: Diamond Equity Research

Risks Profile

- **Regulatory Risks and Governmental Influence in China's Market:** YS Biopharma's considerable presence in China subjects it to certain legal and operational risks. The Chinese government's ability to significantly influence businesses, coupled with potential changes in the country's economic, political, or social conditions, could adversely affect the company's performance. Further, the company is domiciled in Cayman Islands; the perception of the Cayman Islands as a tax haven may lead to reputational risk, scrutiny from international regulators, and potential changes in tax treatment.

- **Dependence on a Single Product for Revenue:** YS Biopharma relies heavily on its rabies vaccine, YSJA™, which constituted nearly all of its total revenue in recent fiscal periods. The sustained success and sales expansion of YSJA™ hinge on factors like manufacturing standards, marketing effectiveness, and regulatory compliance. A failure to expand YSJA™'s sales could critically impact YS Biopharma's operations.

- **Significant Market Competition:** YS Biopharma operates within a highly competitive landscape, which could hinder its ability to market or commercialize its products effectively. The competition spans from global pharmaceutical giants to specialty biotechnology firms, along with academic institutions. If YS Biopharma cannot sustain its competitive standing, it may experience a reduction in market share, diminished pricing power, and a subsequent downturn in financial performance.

- **Market Acceptance Risk:** The commercial success of YS Biopharma's products is contingent upon market acceptance by end-users, CDCs, Key Opinion Leaders (KOLs), and others in the vaccine or disease prevention industry. Failure to secure and sustain such acceptance could have a materially adverse effect on YS Biopharma's business, financial condition, and operational results.

- **Adverse Event Risk:** The success of YS Biopharma's marketed product and product candidates could be hindered by undesirable adverse events or other properties that could delay or prevent their regulatory approval, limit the approved label's commercial profile, or result in significant negative consequences post-approval. These adverse events could cause interruptions, delays, or halts in clinical trials and could lead to more restrictive labels or denial of regulatory approval.

- **Success of Product Candidates Hinges on Preclinical and Clinical Trial Outcomes:** The success of YS Biopharma is highly contingent on the successful completion of preclinical and clinical trials for its product candidates, which involve complex, time-consuming, and expensive processes with uncertain results.

This list of risk factors is not comprehensive. For a full list, please refer to YS Biopharma's latest prospectus and/or annual filings.

Disclosures

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