NH Health (6606 HK)

Pioneer in China's cancer screening market

- **Large unmet demand for cancer screening in China.** China is one of the countries with the heaviest cancer burden worldwide and a poorer prognosis. Early screening is an effective way to improve the cancer survival rate. We see the Chinese government introduce various policies to support the development of cancer screening and prevention. By 2030, the regular cancer screening coverage goal is to include the whole high-risk population nationwide. The early detection rate for primary cancers in high-risk areas is expected to exceed 55%, according to the Healthy China Action Plan (2019-2030). Therefore, we expect a rapid increase in the penetration rate of early screening and the early screening market to unleash its growth potential. For example, China's estimated market of colorectal cancer and gastric cancer screening will increase at a CAGR of 20%, from RMB5bn and RMB4bn in 2022 to RMB20bn and RMB16bn in 2030E, respectively, according to F&S.
- **Proven commercialization capabilities and moving towards profitability.** NH Health successfully built a strong sales and marketing team of over 450 staff to cover three commercial channels, including hospital, direct-to-consumer (DTC) and health checkup centers. Since 2020 when ColoClear IVD received the registration certificate for Class III medical device, NH Health has achieved fast sales ramp-up. From 2020 to 2022, NH Health's revenue rallied at a CAGR of 229.2%, reaching RMB765mn in 2022. Moreover, NH Health's profitability kept improving, with GPM climbing from 20.4% in 2018 to 84.5% in 2022 and attributable net loss narrowing to RMB79mn in 2022. NH Health expects its total 1H23 revenue to range from RMB800mn to RMB837mn (+254% - 271% YoY), beating the consensus expectation. We expect NH Health to maintain strong revenue growth momentum in coming years thanks to the growing awareness of early cancer screening and increasing Coloclear and UU Tube penetration rate. We expect NH Health to turn profitable from 2024E.
- **First-mover advantages with comprehensive product portfolios and strong brand awareness.** NH Health has a diversified portfolio with three approved products and four candidates under development. ColoClear, the first NMPA-approved molecular cancer screening test in China, has favorable prospective clinical trial results and multiple national guidelines' recommendations, establishing a high entry barrier and building the foundation of user trust. NH Health has four pipeline products, covering three high-incidence cancers and pan-cancer screening. We expect CerviClear, the innovative cervical cancer screening product, to be the next growth driver of NH Health.
- **Initiate at BUY with TP of HK$57.46.** We expect ColoClear and UU Tube to be major revenue drivers in 23E-25E. We derive our target price of HK$57.46 based on DCF valuation (WACC: 11.1%, terminal growth rate: 3.0%).

Earnings Summary

(YE 31 Dec)	FY21A	FY22A	FY23E	FY24E	FY25E
Revenue (RMB mn)	213	765	1,781	3,173	4,588
YoY growth (%)	201.5	259.5	132.9	78.2	44.6
Gross margin (%)	72.7	84.5	88.1	88.5	88.6
Net profit (RMB mn)	(3,085)	(79)	(181)	66	623
Adjusted net profit (RMB mn)	(285)	(105)	(21)	350	1,035
EPS (Reported) (RMB cents)	(815.2)	(18.7)	(39.5)	14.4	136.2
P/E (x)	na	na	na	185.2	19.6
Adjusted P/E (x)	na	na	na	34.8	11.8
Net gearing (%)	(80.8)	(51.6)	(55.8)	(47.5)	(54.2)

Source: Company data, Bloomberg, CMBIGM estimates

BUY

Target Price	**HK$57.46**
Up/Downside	**94.1%**
Current Price	**HK$29.6**

China Healthcare

Jill WU, CFA
(852) 3900 0842
jillwu@cmbi.com.hk

Cathy WANG
(852) 3916 1729
cathywang@cmbi.com.hk

Stock Data

Mkt Cap (HK$ mn)	13,545
Avg 3 mths t/o (HK$ mn)	57.5
52w High/Low (HK$)	38.95/12.70
Total Issued Shares (mn)	457.6

Source: Bloomberg

Shareholding Structure

Yiyou Chen	9.5%
Naxin Yao	8.3%
Yeqing Zhu	6.2%

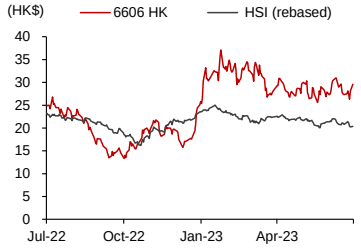
Source: Company data
(as of 27 Apr, 2023)

Share Performance

	Absolute	Relative
1-mth	0.9%	6.5%
3-mth	0.4%	11.1%
6-mth	11.9%	30.3%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Contents

Investment Thesis

Founded in 2015, NH Health pioneered China's cancer screening market, with three certified and commercialized cancer screening products. The Company successfully listed on the Hong Kong Stock Exchange in 2021.

Cancer screening market to see booming growth in China

China has large potential demand for cancer screening. China is one of the countries with the heaviest cancer burden worldwide. According to GLOBOCAN, there were 4,568,754 new cancer cases and 3,002,899 cancer deaths in China in 2020, representing 23.7% of new cases and 30.2% of cancer deaths globally. Compared to 2015, new cancer cases and deaths in China increased by 16.3% and 28.4% in 2020, respectively, and the growth momentum continues. Research from the National Cancer Center (NCC) of China estimated the new cancer cases in China to reach 4,820,000 and the cancer deaths in China to reach 3,210,000 in 2022. Growing cancer incidence leads to a heavy economic burden. The nationwide annual cost for cancer treatment was over RMB220bn, which has become one of the major expenses of families and the health insurance system. Moreover, the overall survival rate of cancer in China (40.5%, according to NCC) is still much lower than that of developed countries (68% in the US, according to the American Cancer Society), mainly due to the low rate of early diagnosis and the gap of therapies between China and the developed countries, according to the National Cancer Report 2022.

For several types of cancers, such as colorectal cancer and cervical cancer et al., early screening and diagnosis can improve treatment outcomes, increase the chances of survival, and even prevent cancers. According to the WHO, approximately 1/3 types of cancer can be treated at the early stage. However, most cancer patients in China are diagnosed at a clinically advanced stage. Once metastasis occurs, treatment becomes tough and expensive. Therefore, early cancer screening among certain populations is one of the most crucial ways to improve cancer prognosis and ease the substantial economic burden on China's healthcare system. Compared to the US, current cancer screening rate in China is still much lower, suggesting huge market growth potential. For example, the estimated market of colorectal cancer, gastric cancer and cervical cancer screening in China is estimated to reach RMB19.8bn, RMB15.7bn and RMB13.3bn, respectively, in 2030E, according to F&S. The total potential market for early pan-cancer screening is expected to reach US$28.9bn in 2030E, according to CIC.

Figure 1: Major cancers with screening methods

Cancer types	High-risk population	Screening method	Screening rate in the US	Screening rate in China
Breast Cancer	Women aged 40+	Mammography	~ 64%	~ 16%
Cervical Cancer	• Women aged 21-29 • Women aged 30-65	• Pap test • Pap test and HPV DNA test	~ 83%	~ 21%
Colorectal Cancer	People aged 50-75	• gFOBT or FIT • Multitarget stool DNA test • Flexible sigmoidoscopy • Colonoscopy • CT Colonography	~ 63%	~ 20%
Lung Cancer	Smokers aged 55-75 with over 30 pack-year history	Low-dose helical CT scan	~ 3.9%	~ 0.4%
Prostate Cancer	Men aged 50+	Prostate-specific antigen test	~ 34%	~ 8%

Source: Burning Rock prospectus, CMBIGM

Government supports the development of cancer screening. As cancer has become China's major public health problem with the leading cause of death, the government introduced a series of policies to support cancer prevention and improve cancer survival. In 2019, the Healthy China Action Plan (2019-2030) emphasized the full coverage of regular cancer screening among the high-risk population by 2030. The Plan also targeted to improve the overall five-year survival rate of cancer to 46.6% and the early detection rate for primary cancers in high-risk areas to reach over 55% by 2030. Moreover, the 14th Five-year Plans for National Health also focused on expanded coverage of early diagnosis and treatment of cancer and promoted cancer screening for primary types of cancer. We believe that favorable policies would drive the popularization of cancer screening and lead to the fast growth of the cancer screening market.

COVID-19 promoted the self-test market

Self-test products usually refer to the in vitro diagnostic reagents that consumers can use by themselves. According to the Measure of In Vitro Diagnostic Reagent Registration (《体外诊断试剂注册管理办法（修订草案征求意见稿）》), IVD reagent used by consumers themselves needs to evaluate its the cognitive capability on product instructions for consumers without a medical background.

Before the COVID-19 epidemic, widely-used self-test products are conventional testing with low risk, such as blood glucose test, early pregnancy test, etc. Few items for infectious disease and cancer screening were approved and popularized. However, the superiority of self-test products has been of great concern amid COVID-19. Compared to the traditional tests conducted in the hospitals or professional laboratory, self-test products have no limitation on testing scenarios or operator requirements. Thus, the self-conducted COVID-19 antibody test soon demonstrated its superiority over the conventional COVID-19 test since it enables patients to avoid gathering in hospitals and complete self-detection at any time. The outbreak of COVID-19 in late 2022 and wide use of COVID-19 antibody test largely accelerates public education on home screening. We expect it to impact public's consumption habits of screening products. The home-based screening test will be a future trend for regular cancer screening as its convenience helps users save time and improve compliance.

Strong revenue growth with improving gross profit margin

NH Health has three commercialized screening products including ColoClear, Pupu Tube and UU Tube. With a growing sales and marketing team of over 450 staff, NH Health has built a multi-pronged commercial infrastructure including (1) hospital channel, the key channel for market education and brand image establishment, (2) direct-to-consumer (DTC) channel, the major channel for the promotion of home-based self-test products, and (3) health checkup centers, one of the traditional scenarios of cancer screening.

With the approval and commercialization of three products, NH Health achieved outstanding financial performance, with revenue rallied at a CAGR of 152.5% from RMB18.8mn in 2018 to RMB765.0mn in 2022. We expect NH Health to maintain strong revenue growth momentum in coming years. First of all, the number of the covered hospitals continues to increase. Sales in the covered hospitals are expected to expand horizontally to more departments, such as the Physical Examination Centers in the hospitals, driving the revenue growth of ColoClear. Secondly, we expect rapid recovery in sales in the health checkup center as the impact of COVID-19 gradually subsides. Thirdly, UU Tube, as a new product with huge potential market, just passed a market introduction stage and entered the stage with growing demands.

NH Health's gross profit margin also kept improving. It rose from 20.4% in 2018 to 84.5% in 2022 due to the ASP rise of products and the launch of UU Tube. The rising proportion of revenue from the hospital and DTC channels with higher ex-factory prices contributed to the increase of ASP. The cost of sales also declines thanks to the economies of scale.

Additionally, although NH Health continuously increased its investment in R&D and sales to expand its product portfolio and enhance market education; its revenue growth outpaced that of its total expenses (revenue CAGR of 152.5% vs. selling and marketing expense CAGR of 115.0% vs. R&D expense CAGR of 59.1% from 2018 to 2022), indicating the Company's improving operational efficiency. In 2022, the attributable net loss has narrowed to RMB79.2mn. We expect NH Health to turn profitable in 2024E.

Rich pipelines to build a comprehensive cancer screening platform

NH Health has strategically developed a diversified portfolio with three approved products and four candidates, covering five types of cancer with high incidence in China and pan-cancer screening. Colorectal cancer (CRC) and gastric cancer (GC) were two of the top three cancers with the highest incidence in 2020, according to GLOBOCAN. In 2020, ColoClear IVD obtained the approval from NMPA as a Class III medical device for CRC screening among the high-risk population. Its favorable prospective clinical trial results and the recommendations by multiple national colorectal cancer screening guidelines in China has established a high barrier to entry. Pupu Tube, approved by NMPA in 2018, is the first home-based self-conducted FIT test for CRC screening. It is a product for general CRC screening among the population over 40 years, synergistically meeting the demand of the entire CRC screening market. UU Tube, approved in 2022, is a self-test product for gastric cancer screening which is highly consistent with SAT in *H. pylori* detection.

Fueled by its in-house R&D platform and external collaborations, NH Health continues to expand its product portfolio to other cancers with unmet screening demands. CerviClear, a non-invasive urine-based screening test for cervical cancer, is under the large-scale registration trial, with expected registration submission in 2026E. LiverClear, NH Health's first screening product based on NGS technology, has shown positive preclinical results. NH Health plans to submit the registration trial application and to initiate the trial by 2024E. NPClear, a nasopharynx carcinoma screening product, is under development in collaboration with the Affiliated Cancer Hospital of Sun Yat Sen University, with expected registration trial initiation in 2024E. To further punch through the growth ceiling, NH Health expanded into the pan-cancer screening field. In 2022, the Company initiated a 6-year study for pan-cancer screening, known as the PANDA study, with PKUHSC.

Initiate at BUY with TP of HK$57.46

We expect ColoClear and UU Tube will continue to drive rapid revenue growth in the coming years. We estimate NH Health's revenue of RMB1,781mn/ RMB3,173mn in FY23E/ 24E. We expect the Company to continue to incur attributable net losses of RMB59mn in FY23E and to turn profitable in FY24E. We derive our target price of HK$57.46 based on a 10-year DCF valuation (WACC: 11.1%, terminal growth rate: 3.0%).

Investment risks

1) Failure of perspective registration trials or regulatory approvals of screening product candidates.

2) Intense competition in cancer screening markets.

3) Persistent loss risk.

NH Health, Pioneer in China's cancer screening market

Founded in 2015, NH Health is the pioneer in China's cancer screening market and is committed to establishing a comprehensive cancer screening platform. The Company was successfully listed on the Hong Kong Stock Exchange in Feb 2021. NH Health has commercialized three screening products targeting two common cancers in China and has four candidates targeting multiple cancers. Currently, NH Health has three laboratories in Beijing, Hangzhou and Guangzhou, China, with a total gross floor area of approximately 7,000 sq.m. and a principal manufacturing facility with an aggregate GFA of approximately 11,300 sq.m. in Hangzhou. The Company has two research and development teams primarily based in Beijing and Hangzhou and an international R&D center in Hong Kong.

Figure 2: Major milestones of NH Health

Year	Event
2015.11	Established in Hangzhou, China.
2016.08	Hangzhou Nuohui built a commercial partnership with iKang to promote ColoClear LDT service.
2018.03	Pupu Tube was approved by NMPA as a Class II medical device.
2020.11	ColoClear IVD was approved by NMPA as a Class III medical device.
2021.02	NH Health (6606.HK) was launched on the Hong Kong Stock Exchange.
2021.12	NH Health announced the completion of the transfer of two patents related to nasopharyngeal carcinoma screening and will cooperate with the Affiliated Cancer Hospital of Sun Yat Sen University to develop screening products for nasopharyngeal carcinoma. The transfer cost of the two patents totaled RMB10mn.
2022.01	UU Tube was approved by NMPA as a Class III medical device and commercialized.
2022.06	ColoClear was launched in Hong Kong by partnering with Prenetics (stock code: PRE US).
2022.11	NH Health cooperated with PKUHSC and launched a 6-year study for pan-cancer screening methods.
2022.12	NH Health announced that Dr. Shih, the Vice President of R&D, will be responsible for the operations and development of the International R&D Center in Hong Kong.
2023.01	NH Health built a deep strategic partnership with Phase Scientific to promote UU Tube in Hong Kong. NH Health completed (1) 27,543,000 Placing Shares at the price of HK$28.38 per Placing Share and (2) 2,543,000 new Subscription Shares at the price of HK$28.38 PER Subscription Share. The total net proceeds were HK$775,116,033.63.
2023.03	NH Health became the seventh biotech stock listed on the HKSE being granted "B" Marker Removal.
2023.05	NH Health built an exclusive strategic partnership with EC Health to launch and promote CerviClear in Hong Kong.

Source: Company data, CMBIGM

The Company's core product, ColoClear, was approved by NMPA in 2020 for colorectal cancer screening among high-risk population. It was the first molecular cancer-screening test in China, according to F&S. Pupu Tube and UU Tube are home-based screening tests for colorectal and gastric cancer, which were approved by the NMPA in 2018 and 2022, respectively. NH Health also has three single-cancer screening candidates in its pipeline, including: (1) CerviClear, based on the molecular detection of HPV in urine, for cervical cancer. In Nov 2022, NH Health initiated the large-scale registration trial of CerviClear and has enrolled the first subject. In Mar 2023, NH Health built an exclusive strategic partnership with EC Healthcare to launch and promote CerviClear in Hong Kong as CerviClear has obtained the CE Mark; (2) LiverClear, based on the Company's internal multi-omics technology platform STAR-seq, for liver cancer. It is NH Health's first screening test that uses multi-omics technology and NGS (Next Generation Sequencing); and (3) NPClear, a nasopharynx carcinoma screening product that is under development in collaboration with the Affiliated Cancer Hospital of Sun Yat Sen University.

In 2022, the Company launched a 6-year study for pan-cancer screening, known as the PANDA (Pan-cancer Early Detection in China) study, cooperated with PKUHSC through its STAR-seq technology platform. The study will enroll 50 thousand subjects to verify the effectiveness of multi-omics molecular markers obtained through liquid biopsy in pan-cancer early detection instead of conventional methods based on plasma cell-free DNA methylation. The study will include over 20 prevalent types of cancer in China, 15 of which currently have no guideline-recommended screening methods.

Figure 3: Products and pipelines of NH Health

Product	Indication	Sample Type	Technology	Global Rights	Development Stage
					Early Stage Development / Late Stage Development / Registrational Trial / NMPA Approval
ColoClear	Colorectal Cancer	Stool	FIT-DNA	✓	→ NMPA Approval
Pupu Tube	Colorectal Cancer	Stool	FIT	✓	→ NMPA Approval
UU Tube	Gastric Cancer	Stool	Immuno-based	✓	→ NMPA Approval
CerviClear	Cervical Cancer	Urine	qPCR	✓	→ Registrational Trial
LiverClear	Liver Cancer	Blood	Multi-omics	✓	→ Registrational Trial
NPClear	Nasopharyngeal Cancer	Nasal Swab	qPCR	✓	→ Late Stage Development
MCED	Pan Cancer	Blood	Multi-omics	✓	→ Early Stage Development
Other Undisclosed	Other Undisclosed Cancer Types	Undisclosed	Multi-omics	✓	→ Early Stage Development

Source: Company data, CMBIGM
Note: 1. Prospective registration trial (n=5,881) achieved colorectal cancer sensitivity of 95.5% and specificity of 87.1%, and advanced adenoma sensitivity of 63.5%; NMPA approval (Class III medical device) obtained in November 2020
2. NMPA approval (Class II medical device) obtained in March 2018 and CE Mark obtained in June 2018
3. NMPA approval (Class III medical device) obtained in January 2022
4. Early stage development refers to technical feasibility, product optimization and finalization of product prototype, and pilot production
5. Late stage development refers to efficacy testing and large-scale manufacturing and completion of a proof-of-concept clinical study, and is ready for registration trial

Product portfolio targeting high-incidence cancers in China

NH Health strategically developed a commercialized product portfolio focusing on cancer screening with vast market demand and cost-effectiveness in China, such as colorectal cancer and gastric cancer screening etc.

With a comprehensive CRC screening products portfolio, NH Health targets population with different risk levels and captures the entire colorectal cancer screening market. The Company currently has two CRC screening products, ColoClear and Pupu Tube. ColoClear is designed for the population with high risk of CRC in China. The high-risk population is estimated to reach 162.2mn in China in 2030E, according to the F&S. Pupu Tube is a general CRC screening test for the population aged between 40 and 74 years old. The population is estimated to reach 757.8mn in China in 2030E. Compared to traditional CRC screening methods such as colonoscopy and FIT that can only be conducted in medical institutions, both ColoClear and Pupu Tube are non-invasive and home-based tests that provide better user convenience and higher user compliance. We expect ColoClear and Pupu Tube to meet the potential demand of those reluctant to go to the hospitals for regular CRC screening thanks to the product advantages of convenience of use and high test accuracy.

Since the progression from adenoma to carcinoma usually takes 5-10 years, there is a window period for early detection and therapeutic action. Chinese authorities have published a series of guidelines to promote CRC early detection and early treatment.

Figure 4: NH Health's screening products for colorectal cancer screening

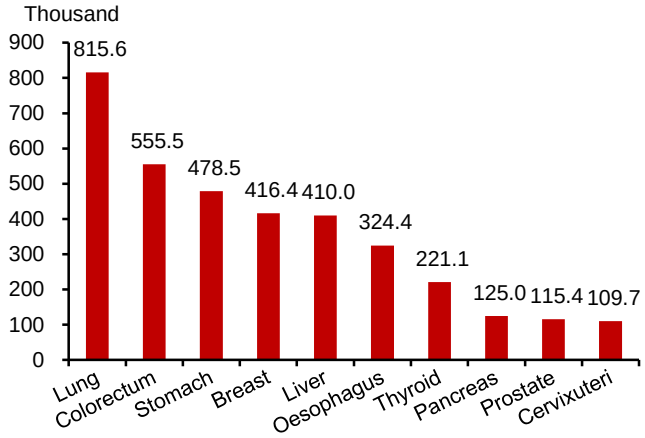
China's first approved IVD product for cancer screening - ColoClear

China's first approved self-conducted FIT test for colorectal cancer screening - Pupu Tube

Source: Company data, CMBIGM

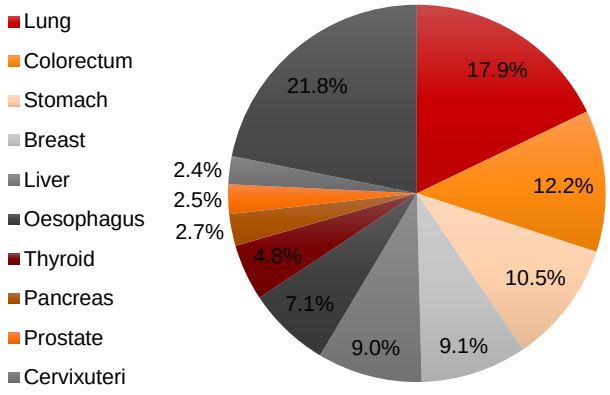
The CRC burden kept increasing over the past 30 years in China. In 2020, colorectal cancer (CRC) was the second most common cancer and the fifth most common cause of cancer death in China with 555,477 new CRC cases and 286,162 deaths occurring in China, representing 12.2% of new cancer cases and 9.5% of cancer deaths nationwide, according to GLOBOCAN. According to the National Cancer Center, the CRC incidence and mortality rates were increasing in China since 1990 while the US exhibited decreasing trends. China's CRC incidence rate showed an average annual percent change (AAPC) of 3.11 (95% CI: 2.89−3.33, P<0.001) from 1990 to 2019, and the AAPC of the mortality rate was 1.05 (95% CI: 0.83−1.27, P<0.001) from 1990 to 2019.

Figure 5: Top 10 leading cancer types for new cases in China in 2020



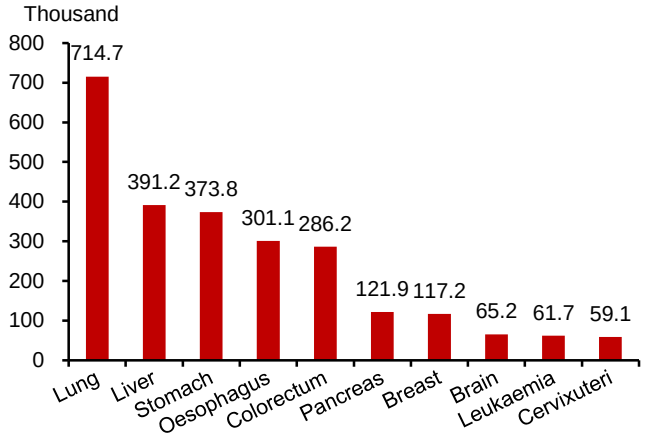
Source: GLOBOCAN, CMBIGM

Figure 6: Percentage of new cancer cases in China in 2020 (by type of cancer)



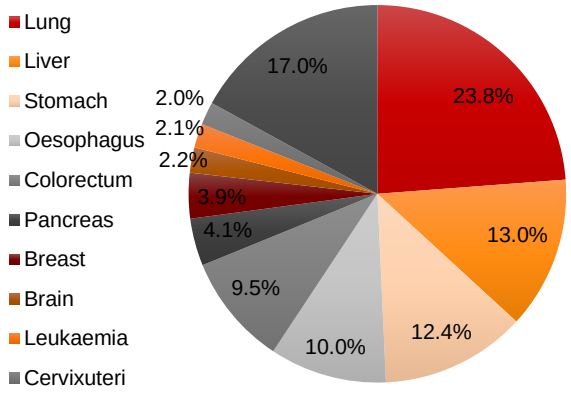
Source: GLOBOCAN, CMBIGM

Figure 7: Top 10 leading causes of cancer deaths in China in 2020



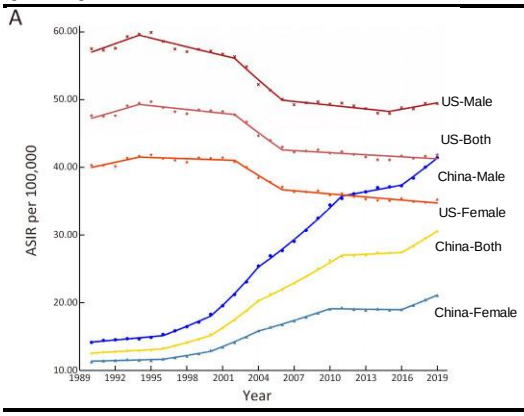
Source: GLOBOCAN, CMBIGM

Figure 8: Percentage of cancer deaths in China in 2020 (by type of cancer)



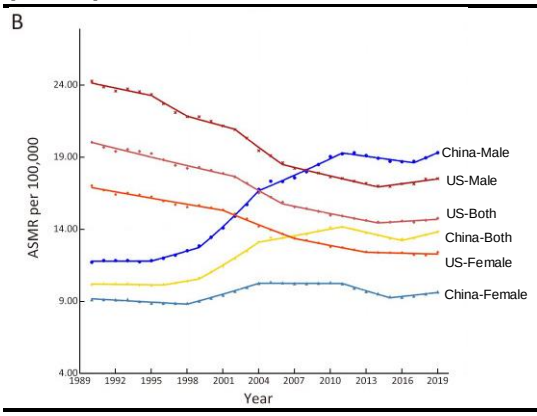
Source: GLOBOCAN, CMBIGM

Figure 9: Trend in age-standardized incidence rate (ASIR) of colorectal cancer in China and the US



Source: Qianru Li et al., Chin J Cancer Res. 2022, CMBIGM

Figure 10: Trend in age-standardized mortality rate (ASMR) of colorectal cancer in China and the US



Source: Qianru Li et al., Chin J Cancer Res. 2022, CMBIGM

Gastric cancer is another leading common cancer in China, which has become the third most prevalent cancer and the third most common cause of cancer death. In 2020, China ranked fourth in the world in the incidences of gastric cancer (20.6 per 100,000 persons) and had the largest number of patients with gastric cancer worldwide (478,508 new cases in 2020), accounting for 43.9% of patients worldwide due to its large population base, according to GLOBOCAN.

Helicobacter pylori (*H. pylori*), a spiral-shaped bacterium, is well recognized as a Class I carcinogen for gastric cancer. *H. pylori* usually transmit from person to person. Infection with *H. pylori* causes an increasing risk of developing gastric cancer. Thus, screen-and-treat for *H. pylori* infection is a cost-effective way to prevent and early detect gastric cancer. In China, the food culture of sharing food rather than having individual meals results in a common family cluster of *H. pylori* infection. According to the national survey of *H. pylori* infection (2001-2014), the average infection rate in China was 59%, indicating a considerable demand for the *H. pylori* test. Thanks to the public education of *H. pylori* through social media over the years, public awareness of *H. pylori* significantly increased. As a stool-based self-conducted testing product for gastric cancer by detecting *H. pylori* infection, UU Tube's advantage in convenience and radiation free helps it to expand the GC screening market.

Figure 11: NH Health's screening product for gastric cancer screening

UU Tube - *Helicobacter pylori* self-test products

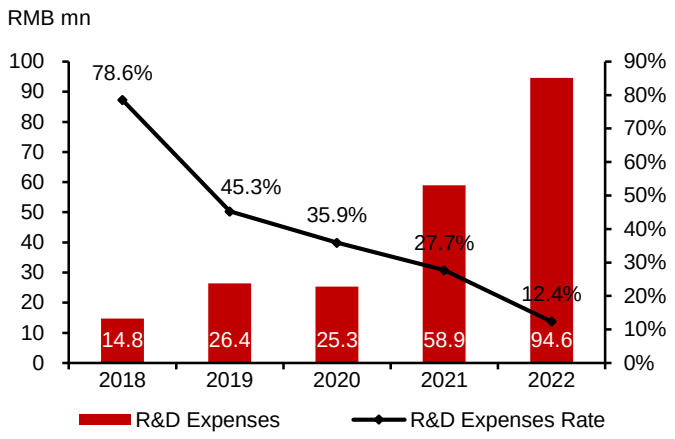
Source: Company data, CMBIGM.

Additionally, NH Health continuously explores the screening market of prevalent types of cancer in China such as liver cancer and cancers that are preventable and treatable at the early stage such as cervical cancer and nasopharynx cancer. Pan-cancer screening product is also under development.

Continous R&D spending and solid R&D platforms support broadening pipelines

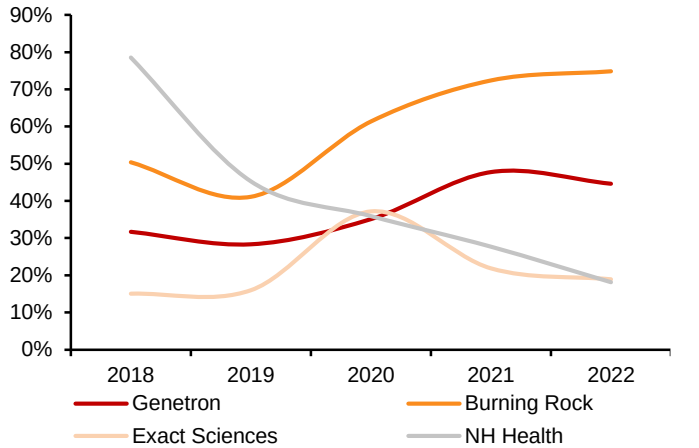
In aiming to build a diversified platform for cancer screening and to further explore the cancer screening market in China, NH Health consistently increased its R&D spending in the past years. Although the Company's R&D expenses rate decreased due to the rapid sales growth since 2020, its R&D expense to sales ratio is largely in line with Exact Sciences (EXAS US), a global company with a similar commercialized CRC screening product as NH Health.

Figure 12: R&D expenses of NH Health (2018-2022)



Source: Company data, CMBIGM
Note: The R&D expense ratio excluding share-based payment expenses was 11.5% in 2022.

Figure 13: Comparison of R&D expense ratio (2018-2022)



Source: Wind, CMBIGM

NH Health continuously explores unmet market demands with growth potential in cancer screening. Powered by solid R&D capabilities, NH Health has built a pipeline that includes three screening candidates for single cancers and a pan-cancer screening product candidate.

Leveraging on the Company's existing technology platform such as sample stabilization and multiplex qPCR diagnostic technology, NH Health is developing a non-invasive urine-based home-use screening test for cervical cancer, CerviClear. The State Council of PRC proposed a three-level prevention goal to eliminate cervical cancer in Jan 2023, aiming to lift the cervical cancer screening rate in China to over 70% by 2030, which indicates China's great unmet demand for cervical screening. The F&S estimated that China's cervical cancer screening market would grow to RMB13.3bn in 2030E.

In order to cover more types of cancer, NH Health developed STAR-seq technology, a proprietary multi-omics technology platform, which was an innovation and breakthrough in the technologies of molecular cancer screening. Based on this technology platform, NH Health developed the LiverClear, a multi-omics liquid biopsy screening test for liver cancer, and initiated a 6-year study for pan-cancer screening, known as the PANDA study, with PKUHSC. In 2021, NH Health purchased two patents related to nasopharyngeal carcinoma screening from Professor Jia Weihua and his team at the Affiliated Cancer Hospital of Sun Yat-Sen University. NH Health now has NPClear, a screening product for nasopharynx cancer, under development.

More importantly, NH Health has successfully commercialized three cancer screening products. Hence, other product candidates based on the same technology platform are also likely to succeed. Since ColoClear IVD was approved as a screening product based on the success of its large-scale and prospective registration trial, NH Health accumulates extensive experiences in cancer screening prospective registration in China, realizing each stage from R&D to commercialization. We expect NH Health to initiate the registration trials of three products candidates for single cancer screening by 2024E and to complete the registration trials of LiverClear and NPClear by 2025E.

Figure 14: Potential milestones of NH Health's major product candidates by 2025E

	2023.6	2023.12	2024.6	2024.12	2025.6	2025.12
CerviClear	Registration trial > 90% enrollment	Baseline data readout		1st Annual follow-up		2nd Annual follow-up
LiverClear			Registration trial initiation	Enrollment completion	Follow-up	Trial completion/ Data readout
NPClear	Product design lock		Registration trial initiation		NMPA NDA submission	
Pan Cancer		2,500 cases	5,000 cases	7,500 cases	Algorithm completion 10,000 cases	Algorithm validation 12,500 cases

Source: Company data, CMBIGM

In Feb 2023, NH Health established its international R&D Center in HK. The first phase of the international R&D center is 10,000 square feet with an estimated total investment of approximately HK$100mn in five years. The international R&D Center primarily focuses on technology innovation and product development of cancer screening based on NGS and multi-omics. It aims to conduct global clinical trials and to promote overseas commercialization.

Proven multi-channel commercialization capability

NH Health has built a strong sales and marketing team of over 450 staffs, covering three major commercial channels including, (1) hospital channel, (2) direct-to-consumer (DTC) channel, and (3) health checkup centers. Besides, in 2021, NH Health and AstraZeneca

entered the Co-promotion Agreement to jointly promote ColoClear in public hospitals, pharmacies and internet hospitals in mainland China.

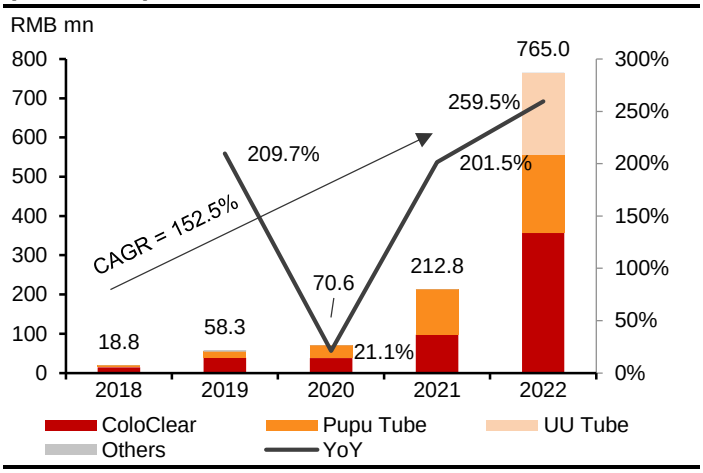
The hospital channel mainly refers to the clinical use of ColoClear. Approved for CRC screening of high-risk population, ColoClear is recommended by three medical guidelines for colorectal cancer screening, including 1) China Guideline for the Screening, Early Detection and Early Treatment of Colorectal Cancer (2020, Beijing) (《中国结直肠癌筛查与早诊早治指南》(2020，北京)), 2) Chinese Society of Clinical Oncology (CSCO) Diagnosis and Treatment Guidelines for Colorectal Cancer 2021 (《2021 CSCO 结直肠癌诊疗指南》), and 3) Chinese Anti-Cancer Association (CACA) Guideline for Holistic Integrative Management of Cancer (《中国肿瘤整合诊治指南》)). Thus, the awareness of ColoClear as a new CRC screening test has been significantly raised among clinicians. The solid results of ColoClear's prospective registration trial and the accumulated real-world evidence enabled the product to penetrate into the hospital market. With its proven accuracy and advantages in compliance, ColoClear quickly expanded its coverage of medical institutions, which has increased to over 1,000 by 2022 (vs. 400 by 2021). In 2022, the hospital channel has become the largest and the fastest-growing sales channel of ColoClear. In 2022, the COVID-19 pandemic negatively impacted the progress of ColoClear obtaining Provincial Pricing Guidance. Since 2023, ColoClear has been allowed to adopt the existing pricing guidance for gene mutation detection and gene methylation detection, etc. when acquiring hospital access, according to the management. Therefore, we expect the ColoClear's progress of obtaining hospital access to accelerate and sales in the hospital channel to maintain rapid growth. More importantly, it is the clinicians and professionals who directly interact with potential customers. Therefore, the hospital channel is one of the most effective ways to raise customers' recognition on ColoClear and drive their purchase decision. Promotion in the hospital channel shapes the professional image of NH Health, which will benefit the brand awareness of NH Health among the public.

The direct-to-consumer (DTC) channel is also referred as consumer healthcare, mainly including non-medical application scenarios such as online sales and sales via the Company's business partners such as insurance clients. Since NH Health's products are home-based sampling or testing, DTC is a significant channel for sales, which has ranked the second in terms of channel revenue contribution in 2022. NH Health also established strategic partnerships with JD Health (6618 HK), PA Doctor (1833 HK), Picahealth (云鹊医) and China Post (中国邮政) etc., to accelerate the penetration of NH Health's screening products in different channels. In the Double 11 (双十一) of 2022, the biggest online shopping festival in China, NH Health's total GMV of all online platforms exceeded RMB60mn, representing 129% YoY growth. In the 618 Festival (618 活动) of 2023, NH Health continued to be the sales champion in categories of IVD, consumer medical and genetic testing, and test kit in JD and Tmall. With enhancing market recognition on NH Health as a cancer screening brand and increasing health consciousness of the population, we expect the DTC channel to become the fastest revenue growth driver for NH Health in the long term.

The health checkup center channel was previously the main sales channel of NH Health, especially before the approval of ColoClear IVD. The COVID-19 pandemic negatively impacted the operation of health checkup centers. After China's reopening post COVID-19 pandemic, we expect NH Health's product sales in health checkup centers to recover in 2023E.

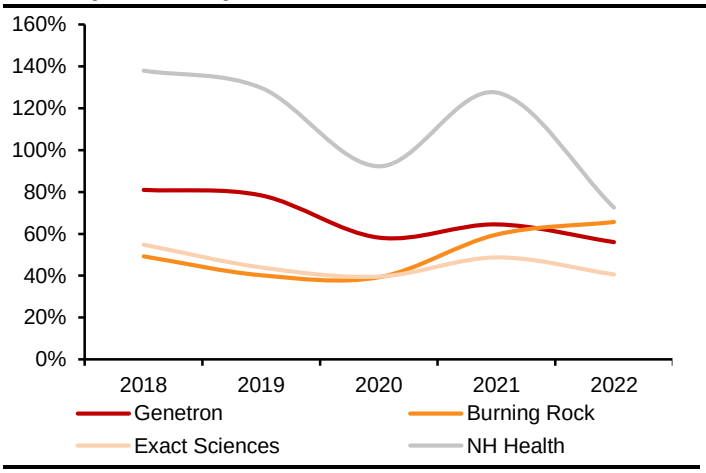
Thanks to NH Health's efforts on market education over the years and its sales strategy with omni-channel coverage, the Company has achieved outstanding financial performance, with revenue increased at a CAGR of 152.5% from 2018 to 2022. In 2022, NH Health's revenue reached RMB765.0mn, up 259.5% YoY, which was mainly driven by the strong sales of UU Tube and ColoClear. The Company's selling and marketing expense ratio shrank from 127.6% in 2021 to 72.6% in 2022 and we expect the selling expense to continue to fall in 2023E-2025E.

Figure 15: NH Health's revenue breakdown by product (2018-2022)



Source: Company data, CMBIGM

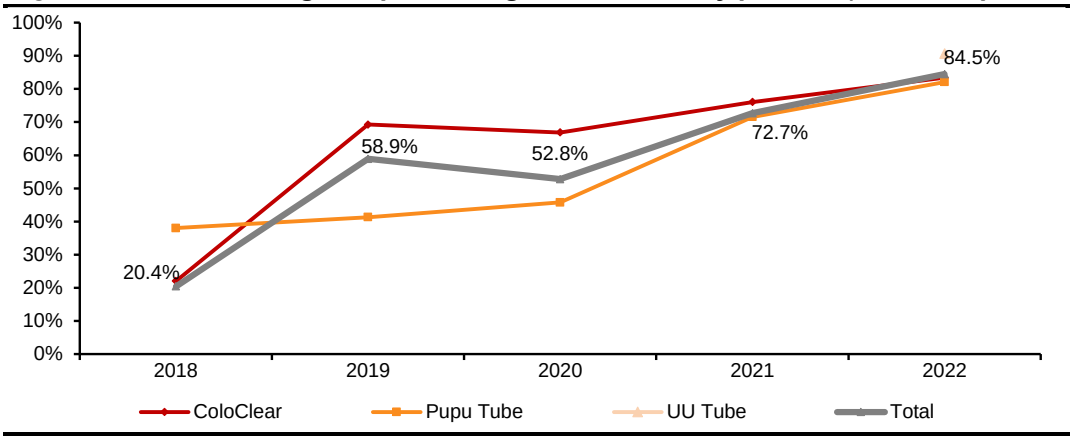
Figure 16: Comparison of selling and marketing expense ratios (2018-2022)



Source: Wind, CMBIGM

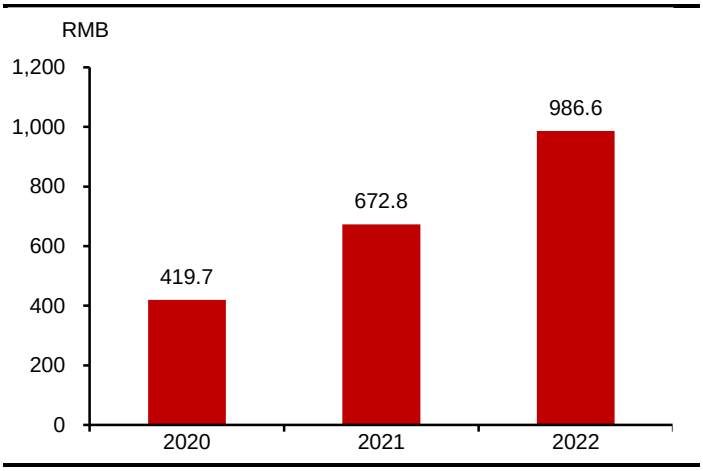
In particular, NH Health's gross profit margin continuously improved primarily driven by the change of channel mix of ColoClear and Pupu Tube as well as the launch of UU Tube. The ex-factory price of products in different channels varies. Generally, the ex-factory price of the hospital channel is the highest while the price of the health checkup center channel is the lowest. As the proportion of revenue from the hospital and DTC channels rose, the ASP of ColoClear and Pupu Tube increased. Besides, the unit product cost decreased thanks to the economies of scale. We estimate the gross profit margin of ColoClear to rise to 85-90% while the gross profit margin of Pupu Tube and UU Tube to remain largely stable in the future.

Figure 17: NH Health's gross profit margin breakdown by product (2018-2022)



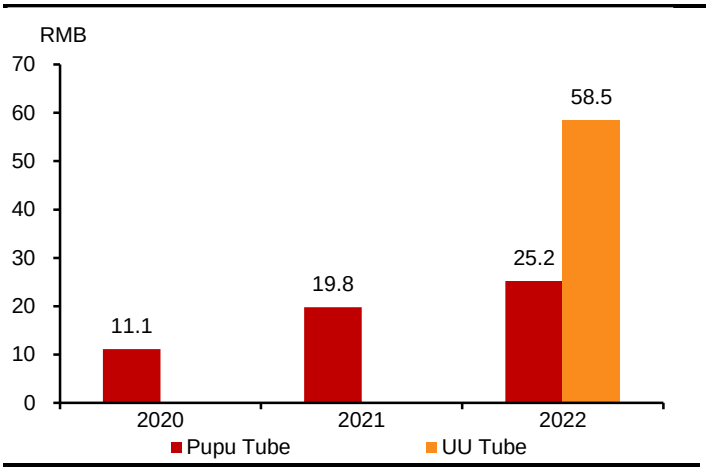
Source: Company data, CMBIGM.

Figure 18: ASP of ColoClear (2020-2022)



Source: Company Data, CMBIGM

Figure 19: ASP of Pupu Tube and UU Tube (2020-2022)



Source: Company Data, CMBIGM

NH Health also began to explore the overseas market through cooperation with leading local healthcare services providers. In Jun 2022, ColoClear was launched in Hong Kong through the partnership with Prenetics (PRE US). In 2023, NH Health built a strategic partnership with Phase Scientific and EC Health (2138 HK) to launch and promote UU Tube and CerviClear, respectively, in Hong Kong.

Global cooperation efforts to expand R&D capabilities

NH Health seeks global investment and cooperation opportunities to further enhance its R&D capabilities. The Company built a collaborative R&D partnership with Proteomedix in prostate cancer biomarker discovery, invested CHF3mn in its convertible debt and purchased the Biobank asset from Epigenomics AG at a cost of US$6.7mn in 2021. The Company also subscribed for a limited partnership interest of US$30mn in NHH Ventures. Through NHH Ventures, NH Health invested in several companies, including Mirxes Holding Company Limited, a company with early detection tests for RNA-powered diseases, Arion Bio, Inc, a company developing a COVID-19 home testing kit, and Orbit Genomics, a company with molecular diagnostic and testing products for lung cancer. Additionally, NH Health made minority equity investment through the wholly-owned subsidiary NHH Ventures Holding Limited in Arion Bio, Inc and Orbit Genomics in 2021 and signed an exclusive licensing agreement with Orbit Genomics regarding their technology in the Greater China region.

Figure 20: NH Health's overseas BD efforts

Year	Event
2021.7	Built R&D partnership with Proteomedix in prostate cancer biomarker discovery
2021.8	Purchase Biobank asset from Epigenomics AG
2021.8	Commitment of US$30mn in NHH Ventures.
2021.9	Minority equity investment in Arion Bio, Inc.
2021.12	Minority equity investment in Orbit Genomics. Achieved exclusive licensing agreement with Orbit Genomics regarding their technology in the Greater China region.

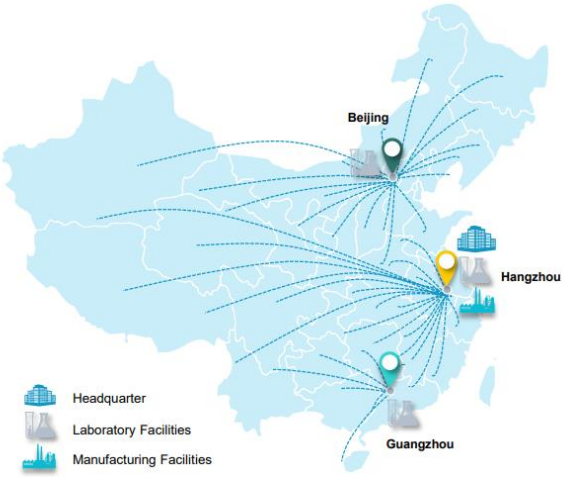
Source: Company data, CMBIGM

Sufficient production capacity to address the growing demand

NH Health has an ISO13485 Certified manufacturing site with an aggregate GFA of approximately 11,300 sq.m in Hangzhou, Zhejiang for ColoClear, Pupu Clear and UU Clear production. Pupu Tube and UU Tube share the same production line, which now guarantees the annual production capacity of 30mn units and is sufficient to meet the demand in the near future.

NH Health has three licensed laboratories located in Beijing, Hangzhou and Guangzhou with a total GFA of approximately 7,000 sq.m with a total of 2,000,000 testing capacity annually. The laboratories are set up for the testing services of ColoClear and CerviClear. Powerful testing capabilities guarantee timely testing reports and enhance user satisfaction.

Figure 21: NH Health's manufacturing and testing facilities



Source: Company data, CMBIGM.

Comprehensive colorectal cancer screening portfolio

Regular screening is essential for CRC prevention

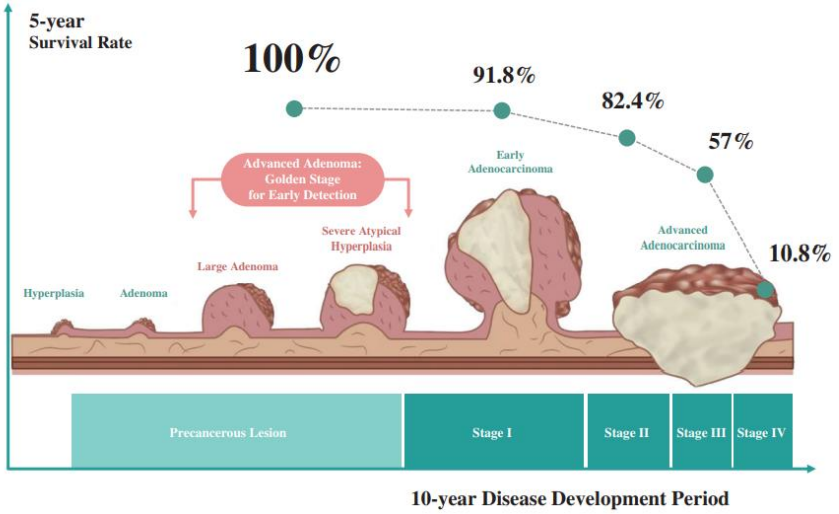
Colorectal cancer (CRC), cancer developed in the colon and rectum, is a global public health challenge since it has become the world's third most common cancer and second most fatal cancer, according to the WHO. There were approximately 1.93mn new cases and 0.92mn deaths of colorectal cancer worldwide in 2020, accounting for 10.7% of global cancer incidence and 9.4% of cancer deaths.

CRC is one of the most preventable and treatable cancers since it has a long screening window. The majority of CRC begins as benign and precancerous polyps in the tissue that lines in the inner surface of the colon or rectum. Usually, most polyps remain small and harmless, and only a small percentage acquire malignant features, which generally require 10-15 years. Although CRC development takes years, no apparent symptom appears until the tumor reaches a considerable size, leading to pain or bleeding. According to the *Journal of Cancer,* more than 85% of the CRCs are found to be advanced and the 5-year survival rate is down to 57%. The diagnosis rate of early CRC in China is less than 10%.[1] Therefore,

[1] Zhang J, Chen G, Li Z, Zhang P, Li X, Gan D, Cao X, Du H, Zhang J, Zhang L, Ye Y. Colonoscopic screening is associated with reduced Colorectal Cancer incidence and mortality: a systematic review and meta-analysis. J Cancer. 2020 Aug 15;11(20):5953-5970. doi: 10.7150/jca.46661. PMID: 32922537; PMCID: PMC7477408.

regular screening to detect and remove the polyps and advanced adenoma at an earlier stage is essential for CRC prevention.

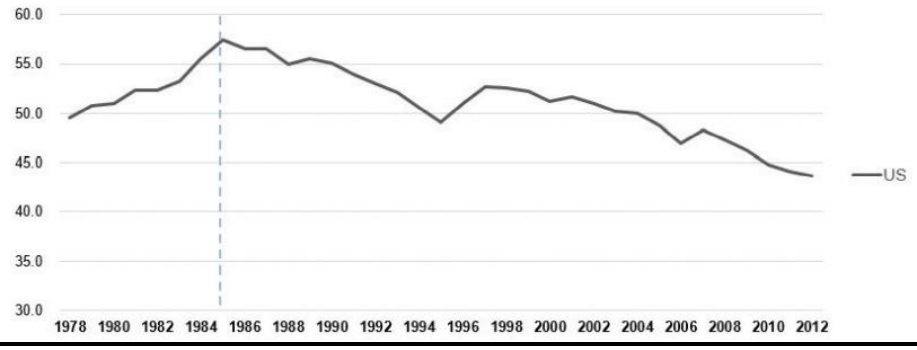
Figure 22: Colorectal cancer stages and development



Source: Company data, CMBIGM.

According to the studies, CRC screening programs increased the incidence in the short term since it helped the diagnosis of asymptomatic CRC patients at early stage. However, both of the incidence and mortality decreased over the subsequent years. In the US, thanks to the wide adoption of CRC screening since the mid-1980s, the incidence rate of CRC has declined since 1985.

Figure 23: Colorectal cancer incidence rate per 100,000 male population in the US, 1978-2012



Source: Globocan, Literature Research, F&S, Company data, CMBIGM.

Many countries have implemented nationwide CRC screening. According to the WHO, in the Americas, 12 countries have national guidelines for CRC screening and 14 countries have either a population-based CRC screening program or opportunistic screening. As of 2018, 68.8% of people aged 50–75 with health insurance received colorectal cancer screening in the US.[2] In Europe, approximately 11 countries have implemented national screening programs and several countries have developed an ongoing or planned national/regional or opportunistic screening program. For Asian countries (Australia, China,

[2] Ferlizza E, Solmi R, Sgarzi M, Ricciardiello L, Lauriola M. The Roadmap of Colorectal Cancer Screening. Cancers (Basel). 2021 Mar 4;13(5):1101. doi: 10.3390/cancers13051101. PMID: 33806465; PMCID: PMC7961708

Japan, New Zealand, South Korea, Thailand and Taiwan), the national participation rates of CRC screening programs were relatively low (13-41.3%).[2]

There are several screening methods for CRC, including traditional methods such as stool-based FIT tests, imaging tests and endoscopic tests, and new techniques such as stool-based DNA tests and blood-based mRNA/DNA tests.

Figure 24: Colorectal cancer screening tests

Method	Test	Sensitivity[1]	Specificity[1]	Screening interval	Description	Advantages	Limitations
Stool-based	FIT (10μg/g)	77-88	80-95	Annually	- Immunochemical detection of hemoglobin in the stool sample. - People with positive FIT tests are referred for a colonoscopy.	Non-invasive; Economical; Accessibility	Poor detection of precancerous lesions; cannot remove lesions
	FIT (20μg/g) (most commonly use	69-93	93-96				
	FIT (>20μg/g)	66-86	94-98				
	gFOBT	25-38	91-98	Annually	Enzymatic detection of hemoglobin in the stool sample		
Imaging	CT colonography	90 (⩾10 mm adenomas or colorectal cancer)	86	Every 5 year	Radiologic visualization of the colon, aka virtual colonoscopy	Visualization of the full colon; no sedation needed	Semi-invasive; special facilities requirement; cannot remove lesions
Endoscopic	flexible sigmoidoscopy	90-92[5]	NA	Every 5 year	Endoscopic examination of the distal colon	High sensitivity; simultaneous biopsies excision; Visualization of the full colon; diagnostic gold standard	Invasive; special facilities and sedation required; anesthesia; low patient compliance; potential complications
	colonoscopy	97-98	97-98	Every 5/10 years	Endoscopic examination of the entire colon		
FIT-DNA	ColoGuard	92.3	86.6	Every 3 year	Combines the FIT with the detection of altered DNA in the stool sample	High sensitivity (compared to FIT); non-invasive	Expensive; cannot remove lesions
	ColoClear	95.5[2]	87.1[2]	Every 3 year			
Blood-based mRNA	CELTiC	83-90[3]	76-81[3]		Test mRNA panels in the blood sample	Non-invasive	Further validation needed
	ColonSentry	72	70				
	COLOX	79.5	90				
Blood-based DNA	EpiproColon 2.0	61.2-82.2	83.6-95.1		Detect circulating methylation statutes, proteins or mutations of cf DNA/ctDNA		
	CancerSEEK	70[4]	99[4]				
	colonoscopy	97-98	97-98	Every 10 years	Endoscopic examination of the entire colon		

Source: Ferlizza E et al, Cancers 2021, C. Daniel Johnson et al, N Engl J Med 2008, Company Data, CMBIGM

Guaiac fecal occult blood test (gFOBT), fecal immunochemical test (FIT), double-contrast barium enema (DCBE), colon capsule endoscopy (CCE), not available (NA), false positive (FP). 1 The reported percentages of sensitivity and specificity refer to colorectal cancer. 2 Refers to colorectal cancer. 3 Refers to advanced neoplasia. 4 Refers to the average value among eight cancer types. 5 Refers only to distal colorectal cancer.

Both colonoscopy and FIT are global mainstream detecting methods. Colonoscopy is generally considered as the gold standard for CRC detection since it can directly find precancerous polyps and remove them entirely simultaneously. However, as an invasive screening method that requires professionals and anesthesia and may cause potential complications, colonoscopy compliance is relatively low and many people are reluctant to have colonoscopy regularly. According to a study conducted in 2012, when patients have the option to be screened by either colonoscopy or with a non-invasive screening test rather than only being advised to get a colonoscopy, the percentage of patients screened within one year increased from 38% to 69%. As such, CRC screening programs in several countries use colonoscopy as a two-step approach for those who have a positive result of other non-invasive screening tests such as FIT. FIT is a non-invasive fecal test and is

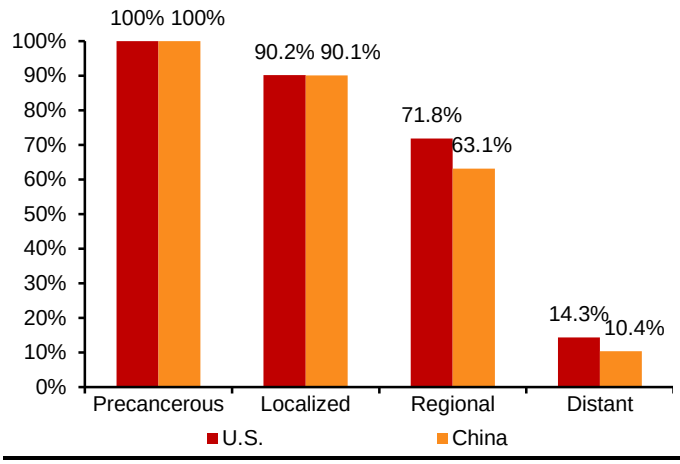
widely adopted in most CRC screening programs worldwide since it is economical and has low requirements for medical devices and professionals. However, due to the low sensitivity of the FIT test, it may fail to detect early CRC and delay CRC diagnosis. Thus, a non-invasive screening method with higher sensitivity is necessary.

FIT-DNA test is a new stool-based screening method that combines FIT with other stool markers such as DNA methylation, mutation or integrity markers (PHACTR3, APC, p53, KRAS and BRAF), proteins (transferrin, calprotectin and calgranulin) and microRNA (miR-106a). Two major FIT-DNA tests have already been approved and commercialized worldwide. ColoGuard, developed by Exact Science (EXAS US), was approved by FDA and launched in 2014. ColoClear, developed by NH Health, was approved by NMPA in 2020 as the first certified molecular cancer screening test in China. According to the two products' clinical trial results, the performance of FIT-DNA test is better than the traditional FIT test, indicating that it has the potential to be a powerful supplement to colonoscopy for the regular screening of high-risk population.

Heavy burden of CRC in China

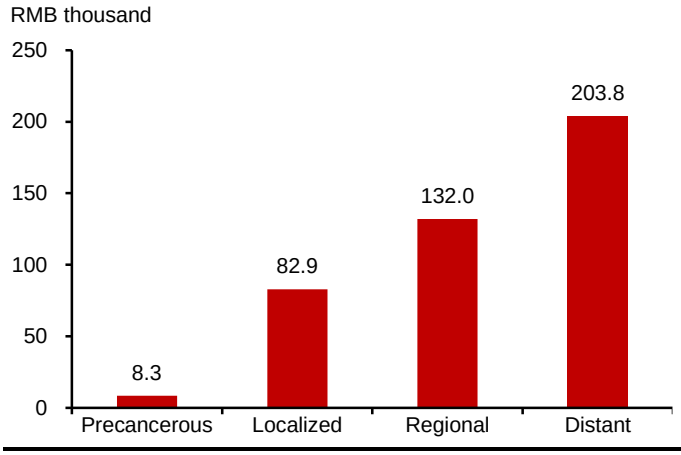
In China, colorectal cancer (CRC) was the second most common cancer, with 555,477 new CRC cases in 2020 and the age-standardized incidence rate was 23.9 per 100,000 persons, according to GLOBOCAN. In 2020, CRC caused 286,162 deaths, which was the fifth most common cause of cancer death in China. The age-standardized mortality rate of CRC was 12.0 per 100,000 persons in China, which was higher than the global mortality rate (9.0 per 100,000 persons). According to the F&S, the overall five-year survival rate in China was 56.9%, which was lower than that in the US (64.6%). However, the five-year survival rate of the patient at early stage (precancerous & localized) in China was similar to that in the US, indicating that early detection and treatment can effectively narrow the gap between China and the US in terms of overall survival rate. Besides, according to the F&S, it is cost-saving for CRC patients if they can be treated at an earlier stage since CRC treatment cost increases sharply with tumor progression.

Figure 25: Five-year survival rate in different stages of colorectal cancer in the US and China



Source: WHO, F&S, CMBIGM
Note: Localized: There is no sign that cancer has spread outside the colon or rectum. Regional: Cancer has spread outside the colon or rectum to nearby structures or lymph nodes. Distant: Cancer has spread to distant parts of the body such as the liver, lungs, or distant lymph nodes.

Figure 26: Lifetime colorectal cancer treatment cost by stage (at Diagnosis) in China, 2019



Source: F&S, CMBIGM

Chinese authorities have published guidelines on CRC screening to standardize the regular screening process. The most common screening tests recommended by the guidelines are

colonoscopy and FIT. In China, colonoscopy is the gold standard for CRC detection. However, due to its low compliance rate and lack of supply, only 9.5mn people in China underwent colonoscopy in 2019, accounting for 1.5% of the total population recommended for CRC screening. The average volume of colonoscopy in China was 677 tests per 100,000 people in 2019, much lower than the rate in the US (14,569 tests per 100,000 population). FIT is more convenient and has higher compliance. The 2021 CSCO guideline for the detection and treatment of colorectal (2021 CSCO 结直肠癌诊疗指南) recommends population aged 50-74 to receive FIT first and then to undergo colonoscopy if the FIT result is positive (Level I).

Compared to FIT, FIT-DNA increased the sensitivity to above 92% and has been recommended by several guidelines such as China guideline for cancer detection and treatment (中国肿瘤整合诊治指南), 2021 CSCO guideline for the detection and treatment of colorectal (2021 CSCO 结直肠癌诊疗指南) and China guideline for the screening, early detection and early treatment of colorectal cancer (中国结直肠癌筛查与早诊早治指南). A number of authoritative guidelines also recommend population aged over 50 to take FIT-DNA test every three years, such as the CRC screening recommendations of the US Multi-Society Task Force of Colorectal Cancer (MSTF), the American Cancer Society guideline for colorectal cancer screening, the 2021 CRC screening recommendation of the US Preventive Services Task Force (USPSTF) and the ACG clinical guidelines of colorectal cancer screening 2021.

Figure 27: Summary of current China colorectal cancer screening guidelines

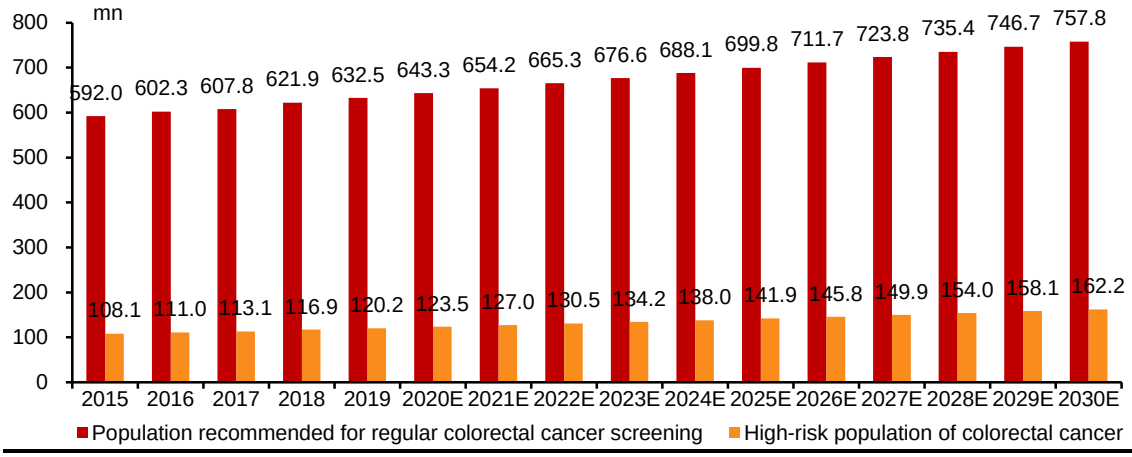
Guideline	Year	Age range	Endorsed screening tests	Preferred screening test
China guideline for cancer detection and treatment (中国肿瘤整合诊治指南) by CACA	2022	50 – 74	FIT, questionnaire, colonoscopy, **mtFIT-DNA**	FIT, questionnaire, colonoscopy, mtFIT-DNA
2021 CSCO guideline for the detection and treatment of CRC (2021 CSCO 结直肠癌诊疗指南) by CSCO	2021	40(high risk)/ 50 (low and medium risk) – 75	FIT, questionnaire, colonoscopy, **mtFIT-DNA**, CTC	FIT, questionnaire, colonoscopy
China guideline for the screening, early detection and early treatment of CRC (中国结直肠癌筛查与早诊早治指南) by NCC	2020	40(high risk)/ 50 (low and medium risk) – 75	FIT, **mtFIT-DNA**, colonoscopy, CTC, FS	Colonoscopy
Expert consensus on early diagnosis and treatment of CRC in China (中国结直肠癌早诊早治专家共识) by CMO	2020	40 – 74	FIT, mtDNA, colonoscopy	Colonoscopy
Chinese consensus of early CRC screening (中国早期结直肠癌筛查流程专家共识意见) by NCRCDD	2019	50 – 75	FIT, gFOBT, mtFIT-DNA, colonoscopy, CTC, FS, CCE, mSEPT9 test, M2-PK test	FIT, mtFIT-DNA, colonoscopy
Expert consensus on early diagnosis and screening strategies for CRC in China (中国结直肠肿瘤早诊筛查策略专家共识) by Colon Cancer Society of CACA	2018	40 – 74	FOBT, mtDNA, colonoscopy, CTC, FS, questionnaire assessment, M2-PK test, mSEPT9 test	FIT, mtDNA, colonoscopy, questionnaire assessment
Consensus on screening, diagnosis and treatment of early CRC and precancerous lesions in China (中国早期结直肠癌及癌前病变筛查与诊治共识) by Multi-Collaborative Group of CMA	2014	50 – 74	FIT, colonoscopy, questionnaire assessment, DRE, chromoendoscopy, electronic chromoendoscopy	-
Chinese guidelines for early CRC screening and endoscopic diagnosis and treatment (中国早期结直肠癌筛查及内镜诊治指南) by CSDE, Oncology Endoscopy Society of CACA	2014	50 – 75	FIT, gFOBT, mtDNA, colonoscopy, FS, CCE, mSEPT9 test, VC	Three-tier: gFOBT, FIT, colonoscopy

Source: China CDC Weekly[3], CMBIGM
Abbreviations: CACAChina Anti-Cancer Association. CCE=colon capsule endoscopy. CMA=Chinese Medical Association. CSDE=Chinese Society of Digestive Endoscopology. CSGE=Chinese Society of Gastroenterology. CSO=Chinese Society of Oncology. CTC=computed tomography colonography. DRE=digital rectal examination. FIT=fecal immunochemical test. FS=flexible sigmoidoscopy. gFOBT=guaiacbased fecal occult blood test. mtDNA=multi-target DNA. NCC=National Cancer Center of China. NCRCDD=National Clinical Research Center for Digestive Diseases. VC=visual colonoscopy.

[3] Colorectal Cancer Screening in China: Status, Challenges, and Prospects — China, 2022, Hongda Chen; Bin Lu; Min Dai

Population recommended to receive regular CRC screening by the Colon Cancer Society of CACA are those aged between 40 and 74, which increased from 592mn in 2015 to 633mn in 2019, representing a CAGR of 1.7% and is expected to further increase to 758mn in 2030 at a CAGR of 1.7%, according to the F&S.

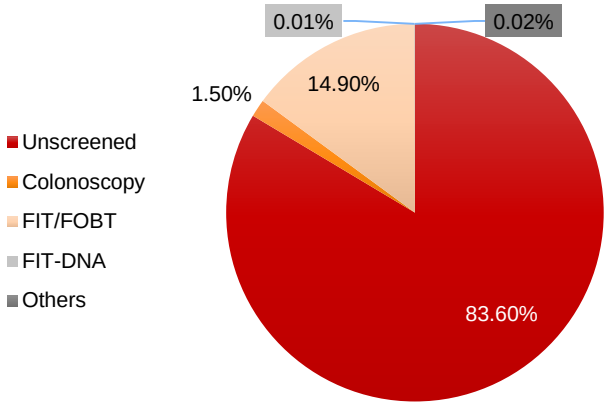
Figure 28: Population recommended for regular colorectal cancer screening in China, 2015-2030E



Source: National Bureau of Statistics, F&S, CMBIGM. Note: high-risk population refers to people that have (1) a history of positive FOBT result, or (2) a family history of colorectal cancer, or (3) at least two of the relevant symptoms such as chronic diarrhea, constipation, mucous stool, chronic appendicitis/gall bladder disease, chronic psychological stress.

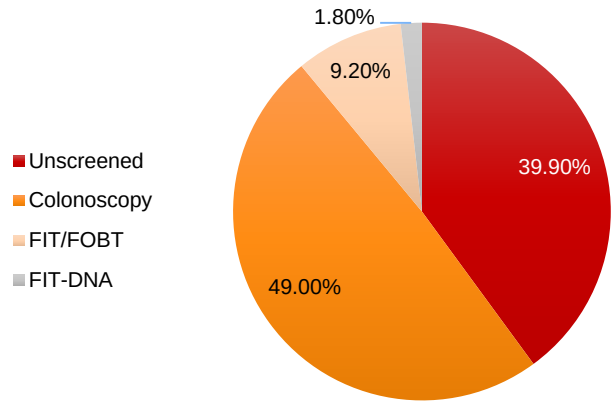
CRC screening is still at an early development stage in China. The overall penetration rate among the population recommended for CRC screening (people aged 40-74) increased from 13.5% in 2015 to 16.4% in 2019 but was still much lower than that in the US (60.1%). Therefore, with the increased awareness of early screening and the popularization of multiple screening tests, there is large potential for the improvement in penetration rate of CRC screening. According to the F&S, the penetration rate in China would reach 39.8% in 2030E.

Figure 29: Colorectal Cancer Screening Market in China, 2019 (by population)



Source: F&S, CMBIGM
*Note: Other colorectal cancer screening technologies in China include off-label use of gene detection products and services.

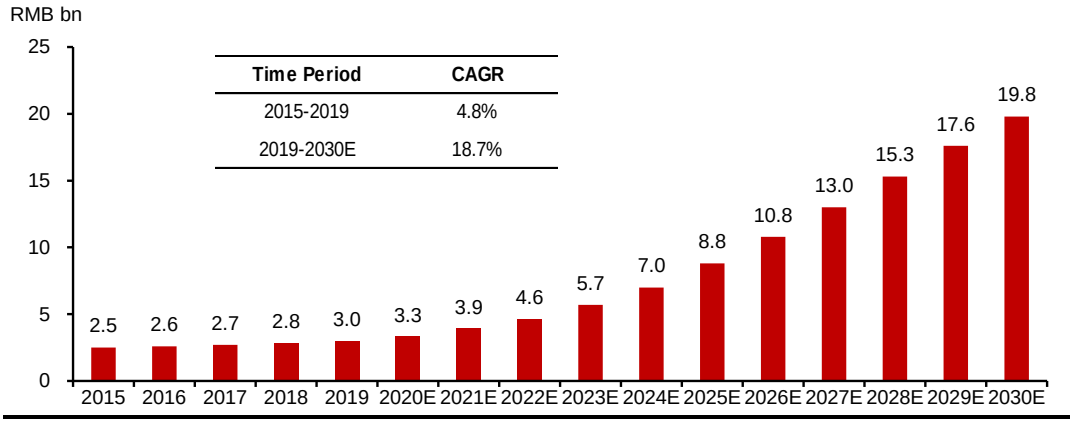
Figure 30: Colorectal Cancer Screening Market in the US, 2019 (by population)



Source: F&S, CMBIGM

According to the F&S, the CRC screening market in China grew at a CAGR of 4.8% from 2015 to 2019. As the penetration rate climbs, CRC screening market in China will rise to RMB19.8bn in 2030E at a CAGR of 18.7%.

Figure 31: Colorectal cancer screening market in China, 2015-2030E



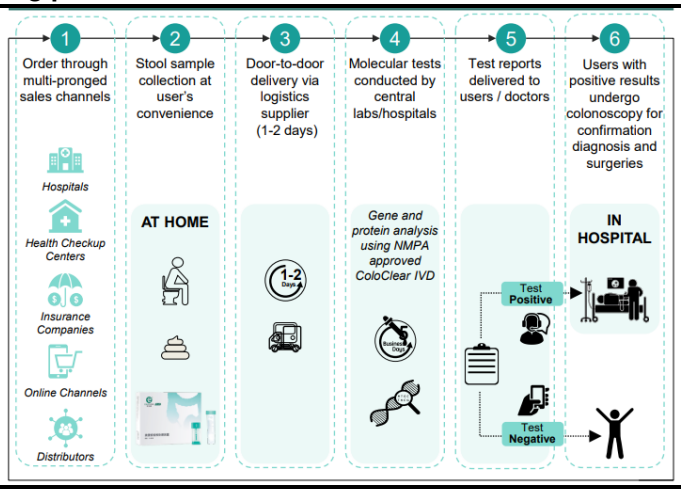
Source: F&S, CMBIGM. Note: The calculation of colorectal cancer screening market includes the revenue of FOBT/FIT products and gene detection, such as FIT-DNA test, for cancer screening at ex-factory level.

ColoClear, the first stool-based FIT-DNA test approved in China

ColoClear is a non-invasive stool-based FIT-DNA test that combines FIT test with the detection of the KRAS gene mutation, NDRG4 and BMP3 methylation. ColoClear consists of four integrated components, including (1) ColoClear IVD, the core component, (2) NH Health's risk assessment algorithm, (3) ColoClear sample collection kit and (4) DNA extraction and purification technologies. ColoClear IVD obtained the IVD registration certificate for Class III medical device in Nov 2020 and is indicated for the high-risk population aged 40-74 screening upon a large-scale prospective registration trial with 5,881 subjects enrolled. It is the first molecular cancer screening test approved by the NMPA while others were all approved as an aid in the diagnosis, according to the F&S. China guideline for the screening, early detection and early treatment of colorectal cancer (中国结直肠癌筛查与早诊早治指南) recommended population aged at 50-75 or high-risk population aged at 40-75 to conduct FIT-DNA test every three years.

The testing process of ColoClear is user-friendly. Users can collect a stool sample at home and then send it to NH Health's central laboratory or hospitals. Generally, users or doctors will receive the test reports within five business days.

Figure 32: Testing process of ColoClear



Source: Company Data, CMBIGM

Comparable clinical performance of ColoClear and ColoGuard

Colorectal cancer is developed from accumulated genetic and epigenetic alterations such as gene mutations and methylation. Colonocytes continuously shed from colonic mucosa into the lumen of the colon and are excreted as a component of stool at a rate of at least 10^{10} cells per day and the number of colonocytes exfoliated from malignant lesions is 4-5-fold greater than from normal tissue[4]. Hence stool DNA can be isolated and tested CRC-related mutations and epigenetic changes. ColoClear detects the hemoglobin, seven distinct KRAS gene mutations and the DNA methylation of NDRG4 and BMP3, and interprets the results based on NH Health's advanced risk assessment algorithm.

NH Health completed the first large-scale, prospective, multi-center, head-to-head registration trial in China, named Clear-C, to evaluate and compare the performance of ColoClear with FIT. The Company announced the trial results in 2020 CSCO meeting. 5,881 high-risk people aged between 40-70 were enrolled and took both ColoClear test and colonoscopy. 4,758 individuals are evaluable. The overall sensitivity of ColoClear for CRC was 95.5% and the specificity was 87.1%. Notably, the sensitivity was highly consistent in patients with different stages of CRC.

Figure 33: Trial results summary of ColoClear

	Advanced Adenoma	Colorectal Cancer				
		Stage 1	Stage 2	Stage 3	Stage 4	Unknown
Sensitivity	63.5%	96.8%	97.5%	96.2%	96.4%	86.3%
Specificity	87.1%					
NPV	95.9%	99.6%				
PPV	46.2%					

Source: Company Data, CMBIGM

ColoClear and ColoGuard have similar testing methods but differ in the indicated population. ColoClear is for the high-risk population who have at least one of the following risk factors: (1) a history of positive FOBT result, or (2) a family history of colorectal cancer, or (3) at least two of the following symptoms: chronic diarrhea/constipation, mucous stool, chronic appendicitis/gall bladder disease, chronic psychological stress. ColoGuard is used for regular CRC screening among population aged over 45.

Compared to ColoGuard and FIT, ColoClear has higher sensitivity. As sensitivity indicates the ability to identify patients among the testing population, ColoClear reduces the incidence of false negative among patients who have developed CRC and is less likely to delay the next-step detection or treatment for patients.

Another two critical metrics for cancer screening tests are Positive Prediction Value ("PPV") and Negative Prediction Value ("NPV"). PPV refers to the proportion of all positive tests that are genuinely cancerous while NPV refers to the ratio of people who are healthy among all those who tested negative. In general, screening tests aim at ruling out healthy individuals. Therefore, NPV is more important than PPV, in our view. Low NPV results in more false negatives which may cause delayed treatment for cancer patients. The NPV of ColoClear was 99.6%, indicating only 1 in 250 individuals who tested negative will be diagnosed with colorectal cancer. Therefore, ColoClear is a highly effective and convenient screening option that helps high-risk population rule out CRC.

[4] Kanthan R, Senger JL, Kanthan SC. Fecal molecular markers for colorectal cancer screening. Gastroenterol Res Pract. 2012;2012:184343. doi: 10.1155/2012/184343. Epub 2011 Nov 17. PMID: 22969796; PMCID: PMC3226355.

Figure 34: Comparison of ColoClear, ColoGuard and FIT products

	ColoClear	ColoGuard	FIT
Company	NH Health	Exact Science	
Approval Date	2020	2014	
Method	Detect a protein biomarker (hemoglobin), 7 distinct DNA point mutation biomarkers (KRAS gene), and 2 different DNA methylation biomarkers (NDRG4 and BMP3)	Detect a protein biomarker (hemoglobin), 7 distinct DNA point mutation biomarkers (KRAS gene), and 2 different DNA methylation biomarkers (NDRG4 and BMP3)	Detect a protein biomarker (hemoglobin)
Age range	40-74 (high-risk)	⩾45 (average risk)	
Subjects enrolled in the trial	5,881 and 4,758 been evaluated (about 90% are enrolled in the prospective trial)	12,776 and 9,989 been evaluated	
Sensitivity for CRC	95.5%	92.3%	69.8% - 73.8%
Specificity for CRC	87.1%	86.6%	94.9%
NPV for CRC	99.6%	99.9%	99.8%
PPV for CRC	46.2%	3.72%	6.9%
Sensitivity for AA	63.5%	42.4%	23.8% - 30.9%
NPV for AA	95.9%	94.7%	93.6%
Price	RMB 1,996 / HK$ 3,000	US$ 649	RMB 10-100
Medical Insurance Coverage	NA	Medicare Part B	

Source: Thomas F Imperiale et al, N Engl J Med 2014 (Clinical trial of ColoGuard), Company Data, CMBIGM
Note: The results of the FIT test was from the clinical trial of ColoClear and ColoGuard.

According to the *Current Status and Clinical Evaluation Requirements of Colorectal Cancer Screening Products (结直肠癌筛查产品国内外现状及临床评价要求)* published by the Center for Medical Device Evaluation of NMPA (CMDE), clinical trials of screening products should be prospective and use the clinical standard for diagnosis as reference. Sensitivity and NPV are two key indicators when evaluating the performance of screening products, which must reach a high level before the candidates being approved. Moreover, since retrospective trials are often subject to design flaws such as subject enrolled are usually from cancer-enriched population with higher cancer incidence rate, the retrospective trial data are not comparable to prospective trial data. For example, the sensitivity of CancerSEEK, a pan-cancer product from Thrive, obtained from its retrospective trial is 70%. However, its sensitivity obtained from the prospective trial is only 27.1%. Therefore, a large-scale prospective trial is a crucial entry barrier for screening products. Most of the current CRC detection products in China were approved as an aid tool for CRC diagnosis due to the lack of prospective studies. ColoClear was the only approved screening product for the high-risk population thanks to its convincing results from the prospective trial. ColoClear also has the highest sensitivity for both CRC and AA among all the competing products in China.

Figure 35: Comparison of ColoClear and other approved products for CRC detecting in China

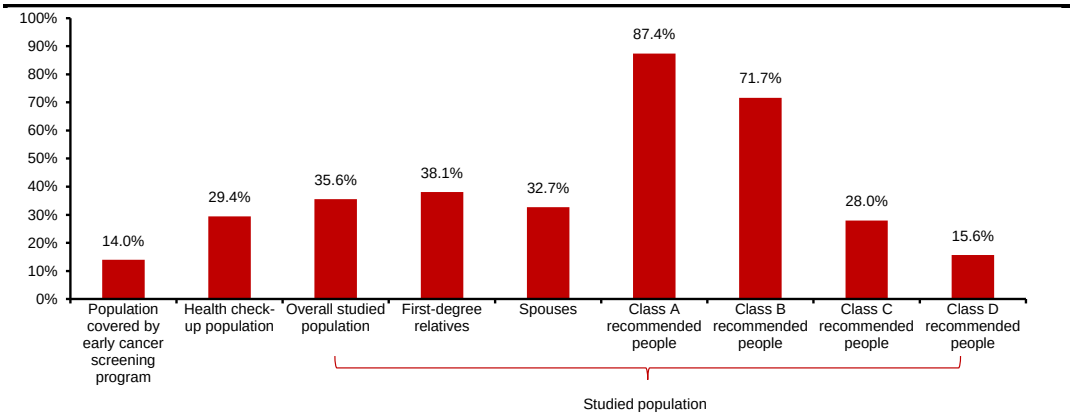
Product	Company	Method	Prospective trial	Sensitivity	Specificity	NPV	Indications	Approval Date
ColoClear (常卫清)	NH Health	FIT-DNA	Yes (Completed in 2020)	CRC: 95.5% AA: 63.5%	87.1%	99.6%	CRC screening among high-risk population	2020
思博定	Biochain	DNA methylation of Septin9	No	76.6%	95.9%		Aid in the diagnosis of CRC	2015
REColon (睿长太)	Gene Biohealth	miRNA-92a	No	94.7%	91.9%	99.96%	Aid in the diagnosis of CRC	2018
Colosafe (长安心)	Creative Biosciences	DNA methylation of SDC2	No	Stage I-II:86.7% Stage III-IV: 84.2%	97.9%	99.9%*	Aid in the diagnosis of CRC	2018
畅青松	杭州艾维克生物	DNA methylation of SDC2	No	-	-		Aid in the diagnosis of CRC	2021
艾米森	Life Technology	DNA methylation of SDC2 and TFPI2	No	CRC: 95.3% AA: 63.4%	90.3%		Aid in the diagnosis of CRC	2022
ColoWell (常易舒)	Realbio Technology	DNA methylation of SDC2 and SFRP2	No	CRC: 92.2% AA: 62.9%	91.9%		Aid in the diagnosis of CRC	2022

Source: Public news, Companies Data, JD.com, CMBIGM
Note: Colosafe's data is from real world study (RWS) that did not require all patients to take colonoscopy, the golden standard for CRC detection. Therefore, we did not regard the trials as prospective trials. * stands for real-world data instead of data from prospective trial. REColon has finished its prospective trial but not all enrolled individuals were required to take colonoscopy.

NH Health kept conducting real-world studies of ColoClear. In 2022 CCO meeting, the Cancer Hospital Chinese Academy of Medical Sciences (中国医学科学院肿瘤医院) reported ColoClear's first prospective multi-center study results on screening first-degree relatives and spouses of colorectal cancer patients. The study was conducted in 11 large Grade 3A hospitals across China. As of 2 Nov 2022, 4,248 immediate first-degree relatives and spouses of colorectal cancer patients who have been married for more than 15 years were enrolled and 2,571 cases were analyzed. The study graded all the relatives and spouses into four classes based on their APCS scores, FIT and ColoClear results. Researchers analyzed their compliance with colonoscopy and CRC detection rates.

The results showed that a combination of APCS questionnaire, FIT, and multi-target FIT-DNA test (ColoClear) could improve early screening participation, especially among those with all three positive results. The average colonoscopy compliance rate of this study was 35.55%. The colonoscopy compliance rate among those with all three positive results was as high as 87.36%, which was much higher than that of the urban cancer early diagnosis and treatment program (14.00%) conducted by the National Cancer Center in 22 cities of 16 provinces. Besides, people who tested positive on multi-target FIT-DNA test have a higher probability of positive colonoscopy findings. In the middle-risk group of APCS evaluation, the detection rate of advanced polyps at colonoscopy among the population with positive ColoClear results was two times higher than that of population with negative ColoClear results. Therefore, ColoClear has a great clinical value in CRC screening.

Figure 36: Improving compliances of colonoscopy after hierarchical screening



Source: 2022 CCO, Company Data, CMBIGM.
Note: Population covered by early cancer screening program: National Cancer Center carried out the urban cancer early diagnosis and treatment program in 22 cities of 16 provinces nationwide. Health checkup population: Data from the 2020 white paper of CRC and AA among population having health checkup. Class A: positive in all of APCS scores, FIT results and ColoClear results, super highly recommended for colonoscopy; Class B: positive in two of APCS scores, FIT results and ColoClear results, highly recommended for colonoscopy; Class C: positive in one of APCS scores, FIT results and ColoClear results, recommended for colonoscopy; Class D: negative in APCS scores, FIT results and ColoClear results, have colonoscopy upon individual's decision.

Strong growth momentum of ColoClear to continue

Since 2020 when ColoClear IVD received approval from the NMPA, NH Health has achieved strong revenue growth at a CAGR of 208.1% from 2020 to 2022. In June 2022, NH Health also launched ColoClear in Hong Kong with an official price of HK$3,000 through the partnership with Prenetics (PRE US). The sales of ColoClear totaled RMB356.6mn in 2022, including RMB356.0mn contributed by the mainland China market and RMB0.6mn from the international market.

Hospital is the most essential sales channel to ColoClear. As the first approved molecular cancer screening test, the significant advantages of ColoClear were its solid results of the prospective registration trial and accumulated real-world evidence for CRC screening, which primarily support its promotion in the hospital. With its proven accuracy and advantages in compliance as an approved screening test for high-risk individuals, NH Health rapidly expanded ColoClear's coverage of medical institutions. As of 2022, ColoClear has obtained the Provincial Pricing Guidance in four provinces and access to over 1,000 hospitals. Since 2023, ColoClear has been allowed to use existing pricing guidance for gene mutation detection and gene methylation detection, etc., when acquiring the hospital access, according to the Company. We expect an acceleration in the expansion of hospital coverage in 2023E, which would continuously drive the strong growth of ColoClear in the hospital channel.

In 2022, though COVID-19 brought uncertainty to the business, especially the health checkup channel, NH Health proactively promoted the DTC channel. We think the DTC channel would become the major channel of product repurchase in the long team. Moreover, health checkup center is a traditional channel with strong recovery momentum in 2023E since it was hit hard in 2022 due to COVID-19.

ColoClear's gross profit margin improved as well. Thanks to the increasing proportion of revenue from hospital and DTC channel with higher ex-factory price, the ASP of ColoClear rose by 46.7% YoY to RMB986.6 per unit in 2022. As a result, ColoClear's gross profit margin improved to 83.4% (+7.4 ppt) in 2022.

Benchmarking ColoGuard, ColoClear still has considerable growth potential. The recognized sales volume of ColoClear reached 361,400 units in 2022, up 266.8% YoY. Based on F&S's estimates that 130.5mn people were at high risk and the assumption that high-risk individuals take the ColoClear test every two years, we calculated that the penetration rate of ColoClear in 2022 was 0.55%.

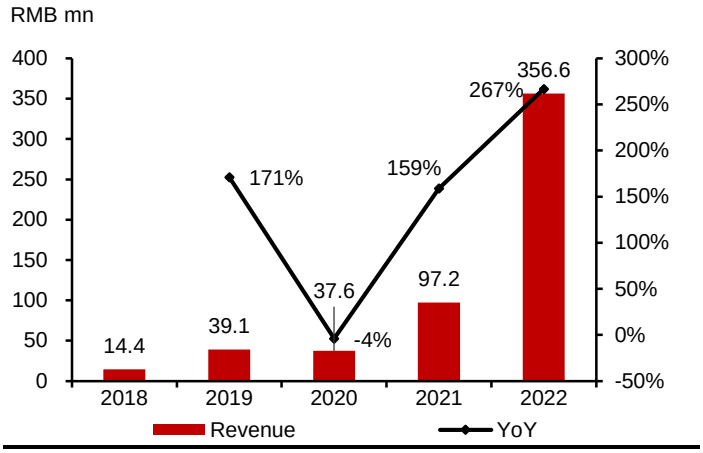
Figure 37: Penetration rate of ColoClear

Estimated high-risk population in 2022	130,500,000
Recognized volume of ColoClear in 2022	361,400
Screening interval	Every 1-3 year
Assumptions	High-risk individuals conduct the ColoClear test every two years
Penetration rate of ColoClear	361,400/(130,500,000/2)=**0.55%**

Source: F&S, Company Data, CMBIGM

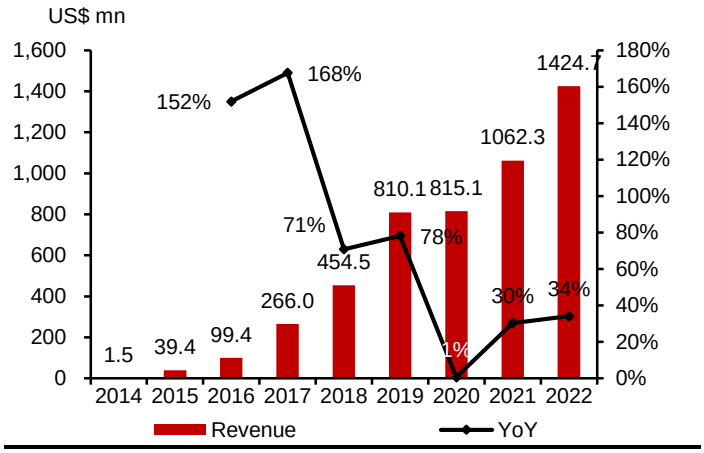
ColoGuard had captured about 5% of the addressable market (total available patients per physician) in the US in 2019, according to Exact Sciences. Since its launch in 2015, revenue of ColoGuard grew at an 83% CAGR from 2015 to 2019. At the early stage of commercialization, ColoClear had faster revenue growth rates than ColoGuard (152% YoY for ColoGuard in 2016 vs. 267% YoY for ColoClear in 2022) as well as faster growth rate of sales volume (135% YoY for ColoGuard in 2016 vs. 150% YoY for ColoClear in 2022).

Figure 38: Revenue of ColoClear (2018-2022)



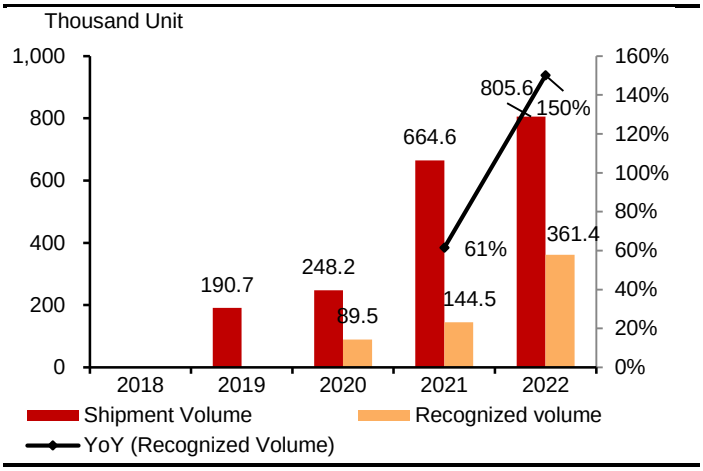
Source: Company Data, CMBIGM.
Note: Revenue of ColoClear in 2022 includes sales in Mainland China and international sales.

Figure 39: Revenue of ColoGuard (2014-2022)



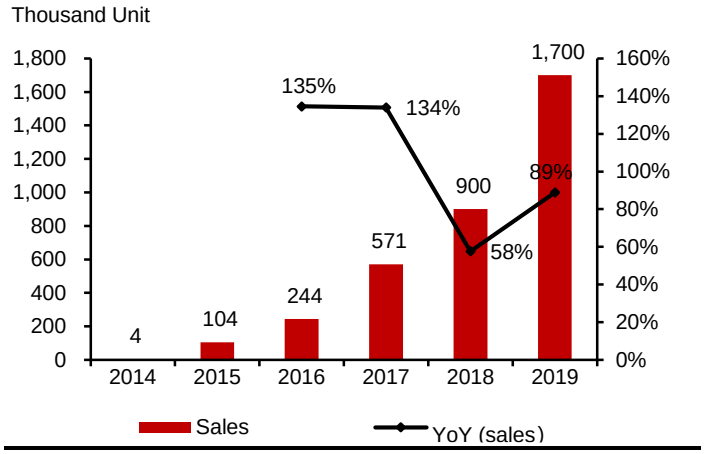
Source: Exact Sciences, CMBIGM

Figure 40: Sales volume of ColoClear (2019-2022)



Source: Company Data, CMBIGM.

Figure 41: Sales volume of ColoGuard (2014-2019)



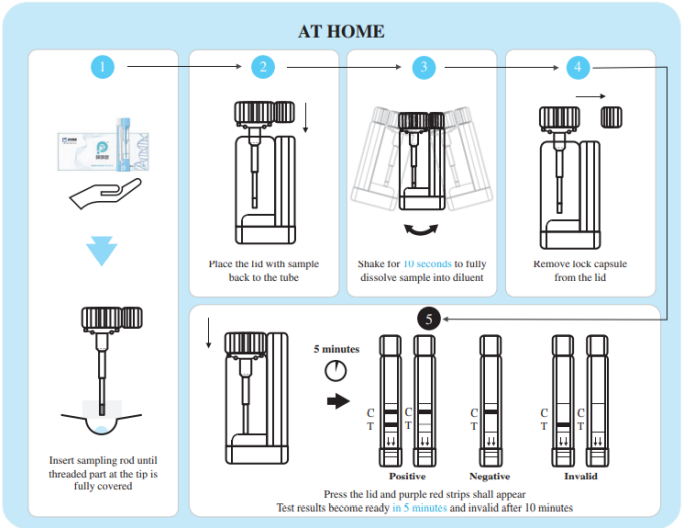
Source: Exact Sciences, CMBIGM

There are several differences in the CRC molecular screening market between the US and China. First of all, ColoGuard has been covered by Medicare for all asymptomatic and medium-risk population aged 50-85 years since 2014 and also covered by most of the major insurers in the US. According to the Exact Sciences, more than 94% of patients receiving ColoGuard screening have zero out-of-pocket cost while ColoClear is self-paid in China. Secondly, the cost of the ColoGuard test is much lower than the average cost of a colonoscopy in the US ($649 of ColoGuard vs. $2,750 of colonoscopy), according to New Choice Health. In the US, people switch to ColoGuard test from colonoscopy because it is more cost-effective and non-invasive. However, in China, the cost of a colonoscopy is only RMB 600-800 (including RMB400 for colonoscopy and other expenses for anesthesia, etc.) and colonoscopy is covered by China's basic health insurance while ColoClear needs to be paid out-of-pocket. Thirdly, ColoGuard is a prescription CRC screening product in the US that patients need to get prescription from their doctors before ordering the ColoGuard. But patients in China can either visit the hospital and get the ColoClear test or purchase the ColoClear online by themselves without prescription. Therefore, we believe ColoClear has higher accessibility than ColoGuard.

Pupu Tube, a home-based FIT test for CRC mass screening

Pupu Tube is the first and only self-conducted FIT test for colorectal cancer screening, according to the F&S. It obtained the NMPA registration certificate of Class II medical device in Mar 2018 and CE Mark in Jun 2018. Pupu Tube utilizes a FIT double-antibody sandwich technique to detect hemoglobin in the stool. One of the most significant advantages of Pupu Tube is its convenience as users can easily complete sample collection, dilution and hemoglobin detection through an integrated device, and read the result in five minutes at home.

Figure 42: Testing process of Pupu Tube



Source: Company Data, CMBIGM

Pupu Tube targets the general CRC screening market in China, which includes the population aged 40-74. It identifies the high CRC risk population that may need further detection, such as ColoClear or colonoscopy. Based on a comparison study of Pupu Tube with an approved lab-based FIT product, Pupu Tube was clinically equivalent to the approved ones. Its total concordance rate was 98.35%, indicating that Pupu Tube can deliver reliable performance compared to traditional FIT test.

Figure 43: Comparison study results of Pupu Tube vs an approved lab-based FIT product

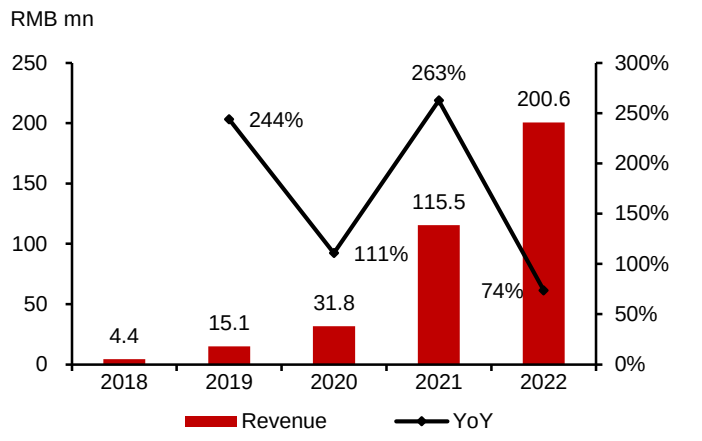
Test	Result
Positive concordance rate	96.7%
Negative concordance rate	99.34%
Total concordance rate	98.35%
95% confidence interval of total concordance rate	95.8%-99.5%

Source: Company Data, CMBIGM

As ColoClear targets the population with a high risk of CRC, NH Health has built a complete product portfolio for CRC early screening that meets the demands of different testing scenarios, including mass screening for ordinary people at certain age group and regular screening for high-risk groups. They are also complementary to traditional colonoscopy. According to a survey jointly conducted by the National Cancer Centre, the National Cancer Clinical Medical Research Centre and the Chinese Academy of Medical Sciences, the compliance rate of FIT test using Pupu Tube increased by 33.7 percentage points compared to that of colonoscopy.

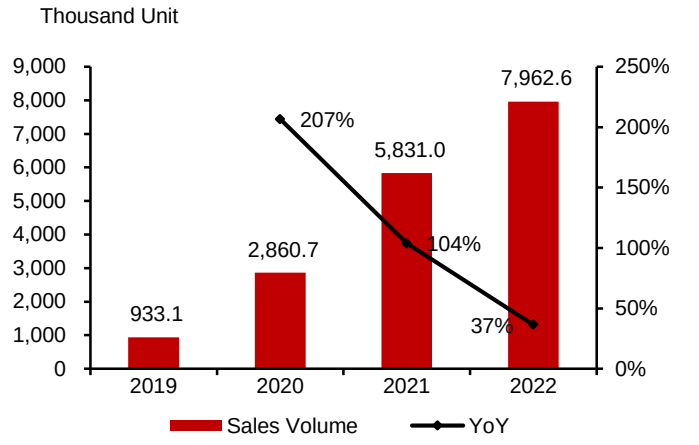
Since the launch of Pupu Tube, it has maintained robust revenue growth at a 160% CAGR from 2018 to 2022. Moreover, the gross profit margin of Pupu Tube improved from 71.5% in 2021 to 82.1% in 2022 mainly due to the rise in ASP driven by the increasing proportion of revenue from the DTC channel. We expect the ASP of Pupu Tube to be plateaued and the Pupu Tube's gross profit margin to maintain at around 80%.

Figure 44: Revenue of Pupu Tube (2018-2022)



Source: Company Data, CMBIGM

Figure 45: Sales volume of Pupu Tube (2019-2022)



Source: Exact Sciences, CMBIGM

UU Tube, meeting the needs of family-based *H. pylori* screening

Increasing public awareness of *H. pylori* infection detection and gastric cancer screening

China was one of the countries with the heaviest burden of gastric cancer (GC) as gastric cancer has become the third most prevalent cancer in China. In 2020, the worldwide incidences of gastric cancer were 11.3 per 100,000 persons, yielding 1,089,103 new cases with 1/3 occurring in developing countries, according to GLOBOCAN. As the largest developing country in the world, China ranked fourth in the world in the incidences of gastric cancer (20.6 per 100,000 persons) and had the largest number of patients with gastric

cancer in the world (478,508 new cases in 2020), accounting for 43.94% of patients worldwide due to its large population base, according to GLOBOCAN.

The prognosis of gastric cancer in China is poor. In 2020, gastric cancer caused 373,789 deaths, ranking third in terms of cancer mortality in China. The age-standardized mortality rate of gastric cancer in China was 15.8 per 100,000 persons, more than twice as high as the mortality rate of global gastric cancer (7.7 per 100,000 persons). Gastric cancer is usually asymptomatic or minor symptoms at an early stage, resulting in delayed diagnosis and poorer survival for most patients as its overall five-year survival rate was only 36% in China. According to the *2022 Guideline of Gastric Cancer Diagnosis and Treatment* (胃癌诊疗指南 2022 年版) published by the National Health Commission (国家卫健委), approximately 80% of patients were diagnosed gastric cancer at the advanced stage while only 20% of the GC patients could be diagnosed at early stage. The five-year survival rates at the late stage (regional & distant) were merely 29.0% and 4.8%, respectively. In contrast, early gastric cancer (precancerous & localized) has a much better prognosis, with five-year survival rates as high as 100% and 78.5%, respectively. Therefore, early screening and detection should be effective for gastric cancer prevention and prognosis improvement.

GC screening market

Endoscopy with biopsy is the primary screening and diagnostic tool for gastric cancer. Japan and Korea has implemented the traditional policies for gastric cancer prevention that are based on endoscopy for several years. Chinese government also paid great attention to cancer screening in the last two decades. In 2003, the former Ministry of Health (the Current National Health Commission) issued the Outline of Chinese Cancer Program (2004−2010), stressing the importance of early detection, diagnosis, and treatment in improving cancer prognosis and reducing cancer-specific mortality. Since 2012, the GC and esophageal cancer screening program has been merged as the national UGCED program, targeting eligible populations of selected high-risk rural areas. By the end of 2018, more than 2.16mn people had undergone upper gastrointestinal (UGI) endoscopy in 194 sites, reaching a UGI cancer detection rate of 2.05%, with 70% detected at an early stage. However, high dependence on the endoscopist and low compliance since endoscopy is invasive constrained endoscopy screening strategy.

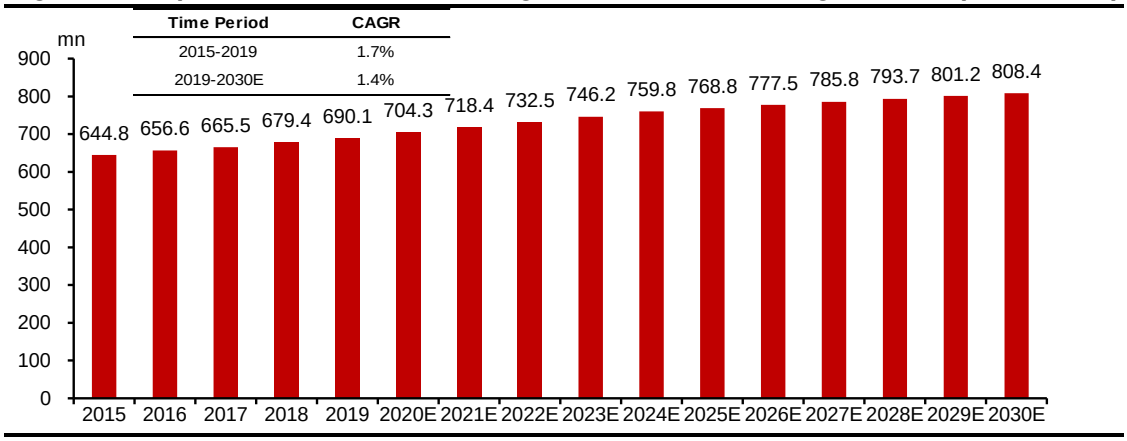
Figure 46: Gastric cancer screening strategies in East Asia

Country	Program	Start Time	Age Range	Method	Screening Interval	Cost
Japan	GC Screening	1983	⩾40 (Nationwide)	UGIS	Repeated UGIS within 1 year	Government subsidies, copayment rate is 30% personally
	GC Screening	2018	⩾50 (Nationwide)	Endoscopy	Repeated endoscopy within 2−3 years	Government subsidies, copayment rate is 30% personally
Korea	National Cancer Screening Program	2002	40-74 (Nationwide)	Endoscopy	Repeated endoscopy within 2 years	10% test fee for high-income
China	Early diagnosis and early treatment program in rural areas (UGCED program since 2012)	2008	40-69 (Individuals in selected high-risk rural areas)	(1) PG test and endoscopy (2) Endoscopy	(1) Individuals of PG (−): repeated PG test within 3 years; Individuals of PG (+) and endoscopy (−): repeated PG test within 1 year (2) Individuals diagnosed with severe CAG, severe IM and LGIN: repeated endoscopy within 1 year	Free of charge
	UGCED program	2020	40-69 (Individuals in selected high-risk rural areas)	Endoscopy	Individuals diagnosed with severe CAG, severe IM and LGIN: repeated endoscopy within 3 year	Free of charge
	The Cancer Screening Program in Urban China (CanSPUC)	2012	45-74 (Individuals in selected high-risk rural areas)	Questionnaire surveys, *H. pylori* serological test, then endoscopy and biopsy for high-risk individuals	Individuals with moderate or severe IM or gastric polyps: repeated endoscopy within 12 months; Individuals with moderate or severe CAG: repeated endoscopy within 6−12 months; Individuals with LGIN: repeated endoscopy within 3−6 months	Free of charge

Source: Xiaohan Fan et al, Chin J Cancer Res 2021, CMBIGM

China Anti-Cancer Association published Expert Consensus on Early Gastric Cancer Screening Process in China (Draft) (2017, Shanghai) (中国早期胃癌筛查流程专家共识意见) recommended populations aged over 40 to take routine gastric cancer screening. According to the F&S, the population recommended for regular gastric screening in China increased from 644.8mn in 2015 to 690.1mn in 2019 at a CAGR of 1.7% and will further increase to 808.4mn in 2030 at a CAGR of 1.4%.

Figure 47: Population recommended for gastric cancer screening in China (2015-2030E)



Source: National Bureau of Statistics, F&S, CMBIGM

Helicobacter pylori (*H. pylori*) is a spiral-shaped bacterium that grows in the mucus layer, coating the human stomach. Helicobacter pylori has been confirmed to have an essential role in gastric carcinogenesis and is well recognized as a Class I carcinogen for gastric cancer by the FDA. Infection with *H. pylori* may cause chronic inflammation and significantly increase the risk of developing gastric cancer. Studies demonstrated that *H. pylori* eradication could effectively reduce the incidence of gastric cancer. Besides, Chinese food culture of sharing food rather than having individual meals results in common family cluster *H. pylori* infection. Once a family member is infected, the infection rate for other family members could reach 63%, according to the F&S. Thus, at the general population level, the screen-and-treat strategy for *H. pylori* infection is necessary in China.

Testing methods for *H. pylori* includes the stool test, serological test and Urea breath test (UBT), which are all non-invasive. UBT is the gold standard for assessing H pylori status in China. Since the ^{14}C UBT uses a trace of radioactive carbon, it is not suitable for pregnant or breast breeding women. Other testing methods such as Stool antigen test (SAT), Antibody-based test and ^{13}C UBT, which are nonradioactive, can be administered safely to children and pregnant women.

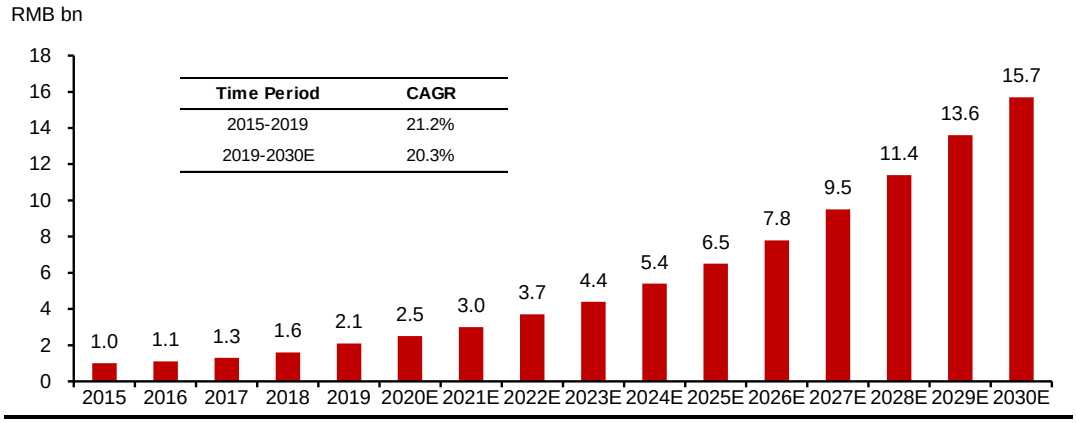
Figure 48: Comparison of *H. pylori* tests for gastric cancer screening

Method	Test	Advantages	Disadvantages
Stool Test	Stool Antigen Test (SAT)	• Non-invasive • More reliable than immunochromatography assay • Low price • Less need for equipment than UBT	• Influenced by many factors • Influenced by reservation of the specimen
Serological Test	Antibody-based Test	• Non-invasive • Accuracy is not affected by ulcer bleeding, gastric atrophy as well as the use of proton pump inhibitors or antibiotics • Less false-negative results	• Higher price than SAT or UBT • Longer duration to give test results
Urea Breath Test (UBT)	^{14}C	• **Gold Standard** • Non-invasive • Highly accurate and reproducible • Less expensive than ^{13}C	• Influenced by many factors • Exposure to radiation, though the radiation is relatively low • Not suitable for women who are pregnant or breast breeding
	^{13}C	• **Gold Standard** • Non-invasive • Highly accurate and reproducible • Free of radiation	• Influenced by many factors • Higher price than ^{14}C • More needs for equipment than ^{14}C

Source: Literature research, F&S, CMBIGM

In recent years, thanks to increasing government support and wide promotion across social media, the awareness of *H. pylori* infection and its risk associated with gastric cancer has been raised, which drove the development of the gastric cancer screening market in China. According to F&S, the screening penetration rate of the population recommended for GC screening in China grew from 14.5% in 2015 to 21.6% in 2019. F&S estimated that screening penetration rate would rise to 56.5% in 2030. Based on the growth of China's population (aged over 40) and screening penetration rate, the gastric cancer screening market in China increased from RMB1.0bn in 2015 to RMB2.1bn in 2019 at a CAGR of 21.2%. In 2030E, China's GC screening market is expected to reach RMB15.7bn.

Figure 49: Gastric cancer screening market in China (2015-2030E)



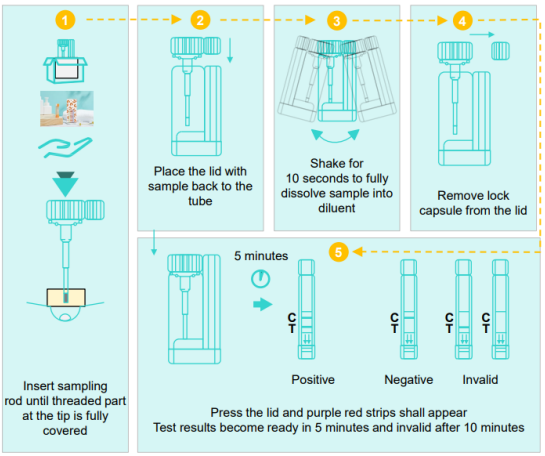
Source: F&S, CMBIGM
Note: The calculation of the gastric cancer screening market includes only the revenue of IVD products for cancer screening at ex-factory level.

UU Tube achieved great market success in its first year of commercialization

UU Tube is a stool-based self-conducted testing product for *H. pylori* detection. It received NMPA approval as a Class III medical device in Jan 2022.

The basic technology of UU Tube is a stool antigen test that is a common testing method for *H. pylori* infection and has been widely adopted globally. However, the traditional stool antigen test requires a professional technician to conduct it in a certified laboratory. Similar to Pupu Tube, UU Tube utilizes a double-antibody sandwich technique to integrate sample collection, dilution and *H. pylori* detection in one device so that users can complete the screening test by themselves.

Figure 50: Testing process of UU Tube



Source: Company Data, CMBIGM

According to the *IVD product registration technical review report* of UU Tube released by the Center for Medical Device Evaluation of NMPA, NMPA approved UU Tube based on a registration trial. The trial enrolled 1,644 individuals and compared UU Tube with an NMPA-approved stool antigen test in terms of concordance. Besides, 744 individuals were enrolled to evaluate the sensitivity and specificity of UU Tube by comparing it with UBT, the gold standard. 710 individuals were enrolled to compare the results from samples collected by users and professionals. UU Tube has been verified to be a self-test product

as the success rate of users without any medical knowledge completing UU Tube test was 100%. The positive percentage agreement ("PPA"), negative percentage agreement ("NPA") and overall percentage agreement ("OPA") between UU Tube and the NMPA-approved SAT was 98.97%, 99.53% and 99.33%, respectively, demonstrating its high consistency with traditional SAT. The sensitivity and specificity of UU Tube were 96.53% and 99.12%, respectively. The trial results indicated that UU Tube meets the requirement as a detection tool for *H. pylori.*

Figure 51: Comparison study result of UU Tube and an NMPA-approved SAT

Test	Result
Positive percentage agreement between UU Tube and the comparator	98.97%
Negative percentage agreement between UU Tube and the comparator	99.53%
Overall percentage agreement between UU Tube and the comparator	99.33%

Source: Center for Medical Device Evaluation of NMPA, CMBIGM

Figure 52: Comparison of study result between UU Tube and UBT

Test	Result
Sensitivity against the urea breath test	96.53%
Specificity against the urea breath test	99.12%

Source: Center for Medical Device Evaluation of NMPA, CMBIGM

Figure 53: Comparison of study result between self-test and professional-test

Test	Result
Positive percentage agreement between tests conducted by non-professionals and professionals	100%
Negative percentage agreement between tests conducted by non-professionals and professionals	100%
Overall percentage agreement between tests conducted by non-professionals and professionals	100%

Source: Center for Medical Device Evaluation of NMPA, CMBIGM

Compared to the $^{13}C/^{14}C$ breath test, which is the gold standard of gastric cancer screening, UU Tube detects the pathogen excreted with stool directly rather than the metabolite emitted by the pathogen; hence, it does not require fasting. Though UU Tube and the ^{13}C breath test are both non-invasive and radiation free, UU Tube has a more competitive price than the ^{13}C breath test (RMB149 vs ~ RMB200). Moreover, China has a common family cluster *H. pylori* infection; hence, family-based screening is a market with high growth potential. UU Tube, as a self-test product, has higher user convenience to better meet the demand for family-based screening.

Therefore, UU Tube quickly opened the market and gave a strong market performance in the first year of launching. In 2022, revenue generated from UU Tube reached RMB207.8mn, surpassing Pupu Tube to become NH Health's second largest product in terms of revenue. Its gross profit margin reached 90.7% which is the highest among the three commercialized products. We expect UU Tube to be a strong driver of NH Health's revenue growth in coming years thanks to the large unmet demands of *H. pylori* test. Besides, NH Health and PHASE Scientific jointly launched UU Tube in Hong Kong in Jan 2023.

Comprehensive pipelines with large market potential

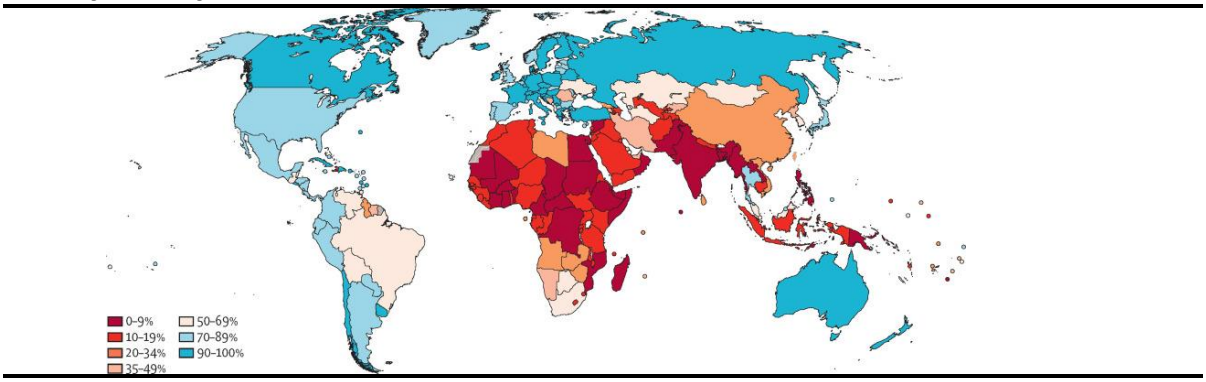
CerviClear, a non-invasive urine-based screening test for cervical cancer

Cervical cancer is the fourth most common cancer in women, according to GLOBOCAN. In 2020, an estimated 604,127 women were diagnosed with cervical cancer worldwide and about 341,831 women died from the disease. In China, cervical cancer caused 59,060 deaths in 2020. According to the World Health Organization (WHO), 99% of cervical cancer

cases are related to infection with human papillomaviruses (HPV), an extremely common virus transmitted through sexual contact. Most infections with HPV resolve spontaneously and cause no symptoms but persistent infection can cause cervical cancer in women. Therefore, effective primary (HPV vaccination) and secondary prevention (screening and treating precancerous lesions) are effective to prevent most cervical cancer cases. According to the WHO, cervical cancer can be eliminated as a public health problem within a generation as long as comprehensive prevention measures are implemented. In Jan 2019, the WHO developed *A Global Strategy towards the Elimination of Cervical Cancer as Public Health Problem,* targeting that 70% of women to be screened with a high-performance test by ages 35 and 45 years by 2030.

Nowadays, the coverage of cervical cancer screening varies globally. High-income countries had two to three times higher coverages for testing women (women aged 30-49 years which was the prioritized screening population recommended by the WHO) than low- and middle-income countries (LMICs). As the figure below shows, the cervical cancer screening coverage in China was still much lower than that in the US.

Figure 54: Ever in lifetime cervical cancer screening coverage in women aged 30-49 years in 2019 by country



Source: Laia Bruni, MD et al, The Lancet 2022, CMBIGM.

In 2021, the National Working Committee on Children and Women under State Council published the *Outline of Women's Development in China (2021-2030)* and proposed a three-level prevention goal to eliminate cervical cancer: By 2030, (1) 90% of young women will get HPV vaccination at 18 years old; (2) screening rate among population recommended for cervical cancer screening will reach over 70%; (3) the treatment rate of cervical cancer will be above 90%. In 2023, the National Health Commission of the PRC published the Accelerating the Elimination of Cervical Cancer Action Plan (2023-2030), emphasizing the improvement of the promotion and implementation of cancer screening. Huge gaps exist between China's current status and its target to eliminate cervical cancer in 2030. Therefore, China has great and pressing unmet medical needs for cervical screening and prevention.

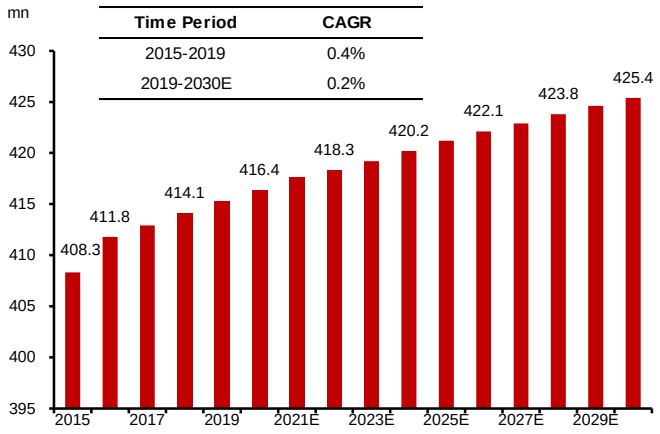
Figure 55: Comparison between status quo in China and China's target to eliminate cervical cancer in 2030

	Incidence	Rate of vaccination	Screening Coverage
Goal in 2030	<4 per 100K*	90%	70%
Goal in 2025			50%
Current status*	15.6 per 100K	< 3%	26% (in 2015)

Source: WHO, GLOBOCAN, Outline of Women's Development in China (2021-2030), Accelerating the Elimination of Cervical Cancer Action Plan (2023-2030), ICO HPV Information Centre, Zhang M et al. China CDC Weekly, 2020, CMBIGM.
*Note: The incidence goal in 2030 was set by WHO.

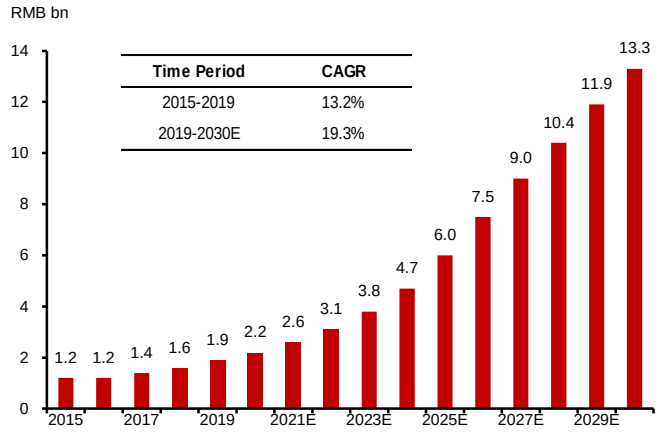
Chinese Preventive Medicine Association recommends women aged between 25 and 65 to conduct cervical cancer screening. According to National Bureau and the F&S, the population recommended for cervical cancer increased from 408.3mn in 2015 to 415.3mn in 2019, and is expected to reach 425.4mn in 2030. With increasing government support and public awareness towards cervical cancer prevention, the cervical cancer screening market in China is expected to grow rapidly in a decade. The F&S expected China's cervical cancer screening market to reach RMB13.3bn in 2030E.

Figure 56: Population recommended for cervical cancer screening in China, 2015-2030E



Source: National Bureau of Statistics, F&S, CMBIGM

Figure 57: Cervical cancer screening market in China, 2015-2030E



Source: F&S, CMBIGM
Note: Only includes the revenue of IVD products for cancer screening at ex-factory level.

Papanicolaou smear, a cytology test, is the primary screening tool for cervical cancer, with approximately 98% specificity and 55-80% sensitivity. In countries women take routine screening, cytology-based programs have proven success for cancer prevention. Recent updates in cervical cancer screening guidelines added HPV testing. Several studies indicated that the utility of HPV testing as a primary screening had equivalent or superior effectiveness for cervical cancer screening compared to cytology alone. HPV-DNA testing can be performed on cervical specimens using signal amplification techniques or nucleic acid amplification with polymerase chain reaction. The combination of high-risk HPV testing with cytology can increase the sensitivity of a single Papanicolaou test for high-grade neoplasia to nearly 100%[5]. Accordingly, in the *WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention (second edition),* the HPV test is recommended for primary cervical cancer screening and followed by cytology, VIA or colposcopy. If the HPV test is negative, women are suggested to take follow-up screening in 5 to 10 years.

[5] Sarah L.Bedell MD, Lena S.Goldstein, Amelia R.Goldstein, Andrew T.Goldstein MD. Cervical Cancer Screening: Past, Present, and Future. Sex Med Rev. 2020 Jan; 8(1):28-37. http://doi.org/10.1016/j.sxmr.2019.09.005.

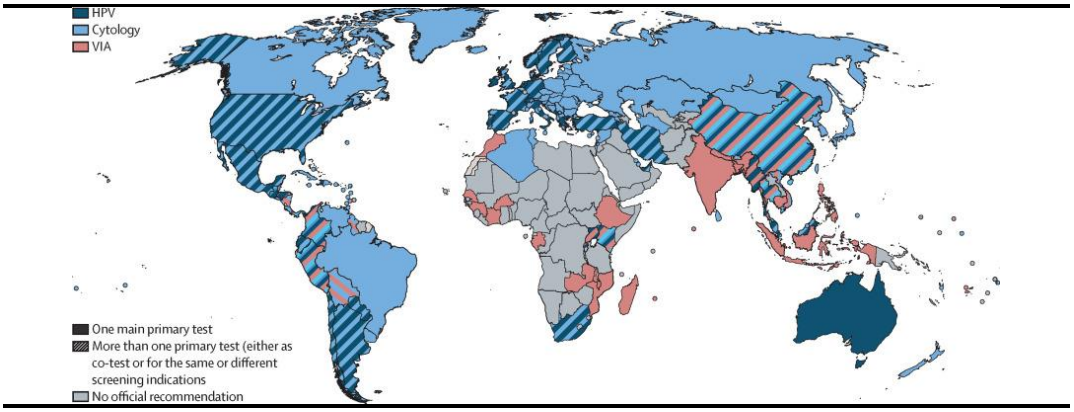
Figure 58: Cervical cancer screening methods

Method	Description	Advantages	Disadvantages
Cytology	Cytology tests (including the Papanicolaou smear test and liquid-based cytology [LBC]) identify atypical cells on the cervix through the preparation and interpretation of slides using microscopy by a trained expert.	• Gold standard • Cost-effective	• Invasive • May lead to unnecessary follow-up tests and possibly treatment • Require professional manual operation and lack quality control • Lack of privacy
HPV testing	These tests identify a group of high-risk carcinogenic HPV genotypes, typically including up to 14 types (HPV16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58 and 59, which are Group 1 carcinogens, and HPV66 and 68)	• Better compliance than cytology test	• May lead to unnecessary follow-up tests and possibly treatment • Cost • Space to improve
Visual inspection with acetic acid (VIA)	VIA testing uses dilute acetic acid (vinegar) on the cervix without magnification to identify aceto-white lesions that need treatment (e.g. ablation or excision) or further evaluation.	• Cost-effective • Accurate • No need for professional devices	• Lack of privacy • Not appropriate for women when the transformation zone is no longer visible or after menopause

Source: Literature research, F&S, CMBIGM.

According to the Lancet, resource-constrained countries widely adopted visual inspection with acetic acid (VIA), although cytology was still the most common screening test with 78% of 139 countries recommending it. Increasing countries recommended or planned to introduce HPV-based screening and some were transitioning from cytology to HPV as the primary test.

Figure 59: Officially recommended tests for primary cervical cancer screening



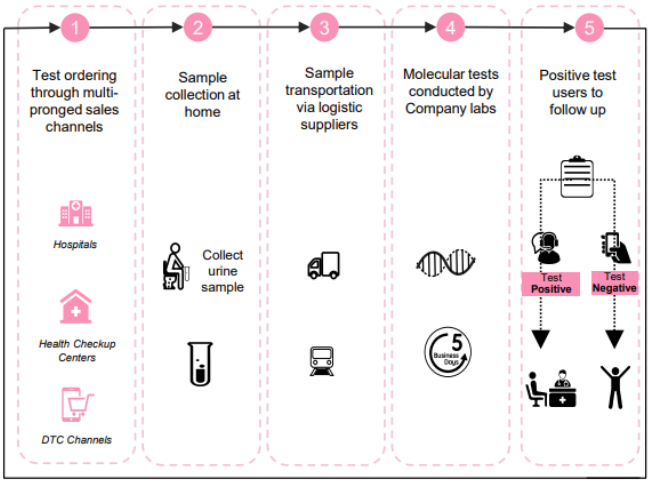
Source: Laia Bruni, MD et al, The Lancet 2022, CMBIGM.
Note: The solid pattern indicates the recommendation of one of the tests (either cytology, HPV, or VIA). The striped pattern indicates the coexistence of more than one test, which can have the same indication or be used for different indications (eg, different tests are indicated at different ages or in different settings or outreach). HPV=human papillomaviruses. VIA=visual inspection with acetic acid.

There are currently approximately 90 HPV tests in the China market, and all the approved products use vaginal cervical cells as samples with poor privacy. In June 2023, the 14 High-risk HPV with 16/18 Genotyping Real-time PCR Kit (HBRT-H14), developed by Hybribio (300639 CH), was approved by NMPA for cervical cancer screening after a three-year prospective registration trial, becoming the first approved cervical cancer screening product in China. There was no approved urine-based cervical cancer screening test in China as of June 2023.

CerviClear is a non-invasive urine-based screening test for cervical cancer that allows users to easily collect their samples at home. According to the National Institute for Health Research (NIHR) Manchester Biomedical Research Center, a gradual decline has occurred in the volume of cervical screening in England, particularly among women aged

25-49 years. Major barriers to cervical screening include embarrassment, fear and inconvenience. Therefore, a home-use screening product that can protect user privacy and provide a better user experience will be the future trend for HPV testing with higher compliance and increase the penetration rate of cervical screening. Besides, compared to the cervical swab, which is invasive and inconvenient, urine sample is more accessible for users to collect at home.

Figure 60: Testing process of CerviClear



Source: Company Data, CMBIGM

Research indicated that patients with HPV infections are more likely to shed HPV-infected cervical cells that would be excreted through urine. Thus, HPV could be detected in the urine. NH Health used a magnetic bead-based DNA extraction technology to extract HPV DNA and human β-actin DNA from urine samples. By utilizing the single-tube multiplex qPCR technique, CerviClear can simultaneously detect 14 high-risk HPV genotypes and identify HPV-16 and HPV-18, the two strains that cause about 71% of all cases of invasive cervical cancer, in urine samples. CerviClear uses human β-actin DNA as an endogenous reference gene for monitoring the testing process.

According to NH Health's report presented on 2022CSCO, based on 732 urine samples, the sensitivity of CerviClear for CIN2+ and CIN3+ was 87.69% and 85.45%, respectively. The total concordance rate of urine sampling compared with the present cervical sampling was 80.74% while the concordance rate for HPV16 and HPV18 reached 91.67% and 96.58%, respectively.

In Mar 2023, NH Health built an exclusive strategic partnership with EC Healthcare to launch and promote CerviClear in Hong Kong with an official price of HK$1,800 as CerviClear has obtained the CE Mark.

In Mainland China, NH Health initiated the large-scale prospective registration trial of CerviClear in Nov 2022 and planned to enroll 20,000 individuals in this trial. We expect the Company to complete 90% of the enrollment by Jun 2023 and submit the application for registration certificate of medical device after the three-year follow-up in 2026E.

LiverClear, a multi-omics liquid biopsy screening test for liver cancer

The incidence and mortality of liver cancer in China are severe. Liver cancer was China's fifth most common cancer with the second highest mortality rate. In 2020, China's new

cases of liver cancer were 410,038, accounted for over 45% of all new cases worldwide, according to GLOBOCAN. In China, the overall five-year survival rate of liver cancer patients was only 14.1%, while 70% to 80% of patients in China were diagnosed at advanced stages. However, the 5-year survival rate of liver cancer is as high as 80%-90% if detected and treated surgically at an early stage. Hence, accurate and early diagnosis of liver cancer is highly important.

Studies indicated that chronic infection with the hepatitis B virus (HBV) and hepatitis C virus (HCV) may lead to cirrhosis and increase the risk of liver cancer. However, since the progression of chronic hepatitis over cirrhosis to cancer usually takes several decades, a time window is available for hepatitis and cirrhosis patients screening and detecting liver cancer at an early stage. China is experiencing a surge in liver disease burden. An estimated over one-fifth of the population in China are affected by liver disease, including HBV and HCV infections, liver cirrhosis, non-alcoholic fatty liver disease (NAFLD), alcohol-related liver disease (ALD), drug-induced liver injury (DILI) and liver cancer.

Figure 61: Etiologies of liver diseases in China, US, Europe, and Japan

Disease Category (mn)	China (%)	US (%)	Europe (%)	Japan (%)
HBV	90 (6.5)	2.2 (0.7)	4.5 (0.9)	1.5 (1.2)
HCV	10 (0.7)	3.5 (1.1)	6.0 (1.1)	2.0 (1.6)
Cirrhosis	7.0 (0.5)	0.6 (0.3)	0.5 (0.1)	0.4-0.5 (0.3)
NAFLD	173-310 (12.5-22.4)	76 (24.1)	120 (23.7)	32 (25)
ALD	62 (4.5)	19 (6.2)	31 (6.0)	2-3 (1.6-2.3)
Cancer*	0.46 (0.03)	0.04 (0.01)	0.03 (<0.01)	0.04 (<0.01)

Source: Jia Xiao et al, Journal of Hepatology, 2019, CMBIGM

According to the *Journal of Hepatology*, 90mn people in China are chronic carriers of HBV, accounting for about one-third of all HBV chronic carriers worldwide and approximately 10mn people in China are HCV carriers. Besides, there are nearly 62mn patients with alcoholic liver, and as many as 100-300mn patients with non-alcoholic fatty liver in China. In another word, there are approximately 260-460mn high-risk liver cancer population in China. Since early detection and diagnosis of liver cancer is essential in improving the cure and long-term survival rate for these patients, China has a large demand for early liver cancer screening. However, standard clinical detection methods such as abdominal ultrasound and AFP (alpha-fetoprotein) are far from ideal because they are challenging to show <1 cm liver tumor. Therefore, a more effective screening test for liver cancer is urgently needed.

Figure 62: Current liver cancer screening method

Method	Description	Advantages	Disadvantages
Ultrasound	An imaging test that captures live, detailed images of liver using high frequency sound waves.	• Non-invasive • Moderate cost • No associated risks	• Poor sensitivity (84% in detecting hepatocellular carcinoma (HCC) among the asymptomatic population and 47% in detecting early-stage HCC) • Influenced by the expertise of the operator and the quality of equipment
Alpha-fetoprotein (AFP)	A tumor marker that elevated in liver cancer and several states of liver injury.	• Inexpensive • Easy to perform	• Poor sensitivity and specificity (guidelines from the American Association for the Study of Liver Diseases (AASLD) no longer recommend using AFP, citing poor sensitivity and specificity of AFP for early stage HCC)

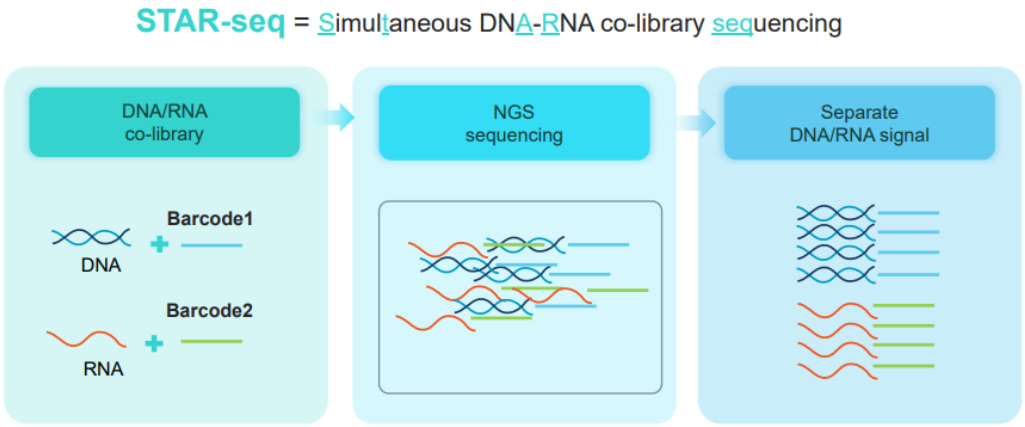
Source: Colli A et al, Cochrane Database Syst Rev, 2019, AASLD, CMBIGM

NH health developed the LiverClear, a multi-omics liquid biopsy screening test for liver cancer based on the Company's technology platform STAR-seq. It leverages the Company's multi-omics platform and utilizes blood samples for next-generation sequencing

(NGS) and protein detection. NH Health aims to initiate a registration prospective multi-center clinical trial of LiverClear in 2024E.

STAR-seq adopts the concept of "Central Dogma" of modern molecular biology, and systematically profiles cell-free RNA (cfRNA), circulating tumor DNA (ctDNA) and protein from patients. ctDNA derives exclusively from tumor cells. Then the tumor cells are secreted into the extracellular milieu either during the process of cellular death. Although ctDNA is biologically informative, its low abundance presents significant limitations for early detection at earlier cancer stages. cfRNA is released from cancerous and non-cancerous cells. It can derive from non-transformed tissues such as stroma or the immune system responding to tumors. Therefore, STAR-seq, which includes both ctDNA and cfRNA, has both advantages in dimensionality and abundance over other multi-omics technology platform such as methylated ctDNA detecting and can be highly informative for the early screening and diagnosis for liver cancer.

Figure 63: STAR-seq technology



Source: Company data, CMBIGM

At the Chinese Society of Clinical Oncology ("CSCO") 2021 Annual Meeting, NH Health reported the preclinical data for LiverClear. Rather than focusing on patients with advanced liver cancer, the study population is closely mimics the real-world high-risk target screening population. 645 individuals were enrolled in the study while 264 of which were liver cancer patients. LiverClear achieved 97.9% detection sensitivity and 97.9% specificity, one of the best performances reported. This further validates the multi-omics technology platform and provides an exciting new opportunity for the early detection of liver cancer.

Other product pipelines

Nasopharyngeal Carcinoma screening

Nasopharyngeal carcinoma (NPC) is a malignant tumor with remarkable epidemiologic features as its incidence shows specific spatial patterns. Southern China is one of the areas with the highest NPC burden in the world. According to GLOBOCAN, patients with nasopharyngeal carcinoma in China account for nearly 50% of patients worldwide and southern China has higher incidence. According to *BMC Public Health*, the NPC age-standardized incidence rate in China has increased by 72.17% from 1990 to 2019, from 3.3 per 100,000 in 1990 to 5.7 per 100,000 in 2019. Since EBV infection is a high-risk factor

for NPC, one common screening test for NPC is the Epstein-Barr virus (EBV) blood test. Nasopharyngoscopy is another traditional tool for NPC detection.

In 2021, NH Health purchased two patents related to nasopharyngeal carcinoma screening from Professor Jia Weihua and his team at the Affiliated Cancer Hospital of Sun Yat Sen University. NPClear, a screening product for nasopharynx cancer is now under development.

Pan-Cancer

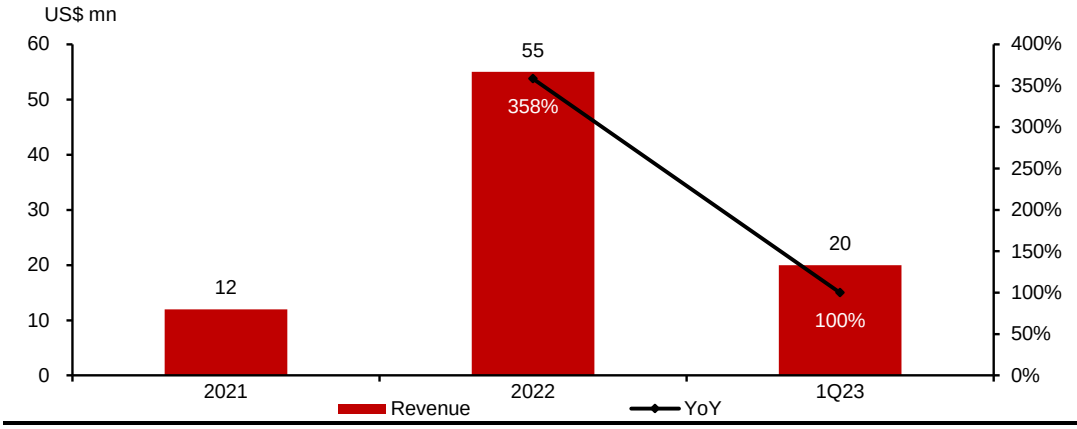
Pan-cancer screening aims to detect diverse tumor types using one sample. It needs to test multiple indicators such as DNA mutations or methylations, proteins and metabolites, etc. At the same time, pan-cancer screening requires high throughput, sensitivity and tissue traceability. Currently, NGS is a common technical tool used for pan-cancer screening product development due to its advantages in throughput and ctDNA/cfDNA detection, etc. There are various types of biomarkers that can be utilized for pan-cancer screening, such as mutation or methylation of ctDNA/cfDNA, copy number variation (CNV), RNA, proteins, etc., while the ctDNA/cfDNA methylation is the most widely studied indicator. At the early stage of cancer, the number of tumor cells is small the signal abundance of DNA is low, which results in the difficulty to detect. Moreover, the large-scale prospective study, which is regarded as a significant evidence for the screening accuracy, is also a threshold of pan-cancer screening due to its high cost and time-consuming.

Figure 64: Major current pan-screening products

Company	Product	Technology	#Cancer Types	Sensitivity	Specificity	Others
Burning Rock (燃石医学)	OverC™ (FDA Breakthrough Device Designation in 2023)	cfDNA methylation ELSA-seq	6	69.1%	98.9%	A four-year clinical trial named THUNDER (N=2,385) has been completed and the results were published on *Annals of Oncology* in March, 2023. An intend-to-use validation study named PREVENT (n=12,500) is ongoing in China and the first interim read-out is expected in 2H23. PREDICT and PRESCIENT studies (N=17,000) is ongoing in China for 22-cancer test development.
Singlera (鹍远基因)	PanSeer	ctDNA methylation	5	95% (retrospective study)	96% (retrospective study)	A prospective study was initiated in 2021 and 60,000 individuals are estimated to be recruited.
Geneseed (世和基因)	Mercury	cfDNA multi-omics	3	95.5% (retrospective study)	95% (retrospective study)	
Grail	Galleri (Breakthrough Device Designation in 2019, commercially launched in 2021)	CpG-cfDNA NGS	> 50	39% for Stage I, 69% for Stage II, 83% for Stage III and 92% for Stage IV. Overall 51.5% (retrospective study)	99.5% (retrospective study)	A prospective study named NHS-Galleri was initiated in 2021 and 140,000 individuals are estimated to be recruited.
Exact Sciences	CancerSEEK (Breakthrough Device Designation in 2018)	cfDNA NGS and biomarkers	8	27.1% (prospective study)	98.9% (prospective study)	A prospective study named DETECT-A was completed and the results were published in 2020.

Source: Company websites, CMBIGM

Figure 65: Revenue of Galleri (2021-1Q23)



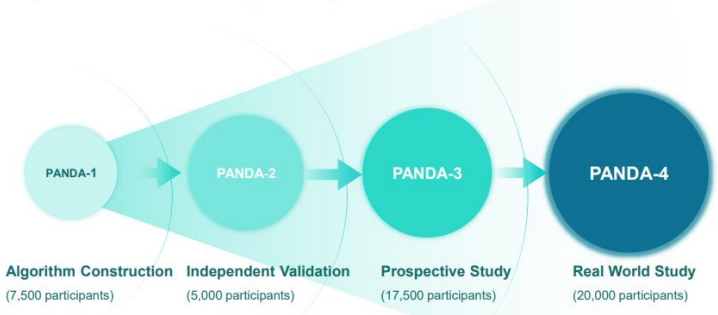
Source: Company data, CMBIGM.

NH Health applied its in-house developed technology STAR-seq to the development of pan-cancer screening products. STAR-Seq has shown superior performance in liver cancer screening, indicating the feasibility as a cancer early screening method.

NH Health initiated a new cohort study to explore the screening methods for multiple types of cancer in Nov 2022 named PANDA (Pan-cancer Early Detection in China), which will be jointly undertaken by Peking University Health Science Center (PKUHSC) and NH Health. Prof. Jie Qiao, an Academician of Chinese academy of engineering, led the PANDA study. The study will be conducted in collaboration with ten Level III hospitals affiliated with Peking University. Through a large cohort study, the Company will validate its early screening and diagnosis technology of liquid biopsy based on multi-omics molecular markers, covering more than 20 types of cancers with high prevalence in China, including lung, colorectal, gastric, liver, cervical, breast, esophageal and prostate cancers. Among them, the screening market for 15 types of cancers is still blank without any clear and effective screening methods recommended by global or domestic clinical guidelines.

NH Health plans to complete the PANDA project in 6 years, with a total investment expected to exceed RMB200mn and includes 50,000 subjects. The study is divided into 4 phases: 7,500 retrospective enrollments in the first Algorithm Construction phase (PANDA-1) to build and train its screening model; 5,000 retrospective enrollments in the Independent Validation phase (PANDA-2); 17,500 enrollments in the prospective study (PANDA-3); and 20,000 enrollments in the real-world study (PANDA-4). We believe the PANDA project would be an important step to the Company toward pan-cancer screening which helps polish its NGS technology platform and contributes to the future development, though it would not contribute to the Company's growth in a short time.

Figure 66: The plan of PANDA Program



Source: Company data, CMBIGM.

Financial Analysis

Expect strong growth in 2023E-2025E

We expect ColoClear and UU Tube would be the major drivers for NH Health's revenue growth in 2023E-2025E driving by the increase in penetration rate among high-risk population for routine cancer screening.

ColoClear

For ColoClear, the high-risk population of CRC who are recommended to take the ColoClear test every 1-3 years in China will increase at a CAGR of 2.8% from 2023E to 2025E, according to the F&S. With increased health awareness and recognition of the value of cancer screening, the penetration rate of ColoClear, as a convenient home-used screening product with high sensitivity, would rapidly grow from 1.6% in 2023E to 4.5% in 2025E. Based on the assumption that users would take the ColoClear test every 2 years, we forecast revenue of ColoClear to reach RMB1,063mn/ 2,128mn/ 3,193mn in 2023E/ 24E/ 25E, representing YoY growth of 198.1%/ 100.2%/ 50.0% YoY, respectively.

Figure 67: Revenue forecasts of ColoClear (2023E-2025E)

	2023E	2024E	2025E
High-risk population of CRC in China (mn)*	134.2	138.0	141.9
Penetration rate of ColoClear	1.6%	3.1%	4.5%
Recognized volume of ColoClear (mn units)	1.1	2.1	3.2
ASP (RMB)	990	995	1000
Revenue (RMB mn)	**1,062.9**	**2,128.3**	**3,192.8**
YoY	198.1%	100.2%	50.0%

Source: Company data, CMBIGM estimates. Notes: F&S

Pupu Tube

For Pupu Tube, as a regular CRC screening product used by the general public aged 40-74, we expect it to maintain solid growth in coming years thanks to its advantages in convenience compared to the traditional FIT test conducted in hospitals. We forecast revenue of Pupu Tube to reach RMB271mn/ 361mn/ 472mn in 2023E/ 24E/ 25E, representing YoY growth of 34.9%/ 33.5%/ 30.8%, respectively, assuming that its penetration rate would increase from 1.6% in 2023E to 2.7% in 2025E with stable ASP.

Figure 68: Revenue forecast of Pupu Tube (2023E-2025E)

	2023E	2024E	2025E
Population recommended for regular CRC screening in China (mn)*	676.6	688.1	699.8
Penetration rate of Pupu Tube	1.6%	2.1%	2.7%
Recognized volume of Pupu Tube (mn units)	10.8	14.5	18.9
ASP (RMB)	25	25	25
Revenue (RMB mn)	**270.6**	**361.3**	**472.4**
YoY	34.9%	33.5%	30.8%

Source: Company data, CMBIGM estimates. Notes: F&S

UU Tube

For UU Tube, according to F&S, high-risk population of GC in China will reach 768.8mn in 2025E. Since intra-familial spreading is a main form of *H. pylori* infection in China, compared to traditional $^{13}C/^{14}C$ breath test, UU Tube, a self-test product, better meets the needs of family-based screening. Therefore, we expect UU Tube to continuously seize the blank market and increase its penetration rate in the coming years. We forecast revenue of RMB448mn/ 684mn/ 923mn in 2023E/ 24E/ 25E, representing YoY growth of 115.5%/

52.7%/ 34.9%, respectively, assuming that its penetration rate would increase from 1.0% in 2023E to 2.5% in 2025E with stable ASP.

Figure 69: Revenue forecast of UU Tube (2023E-2025E)

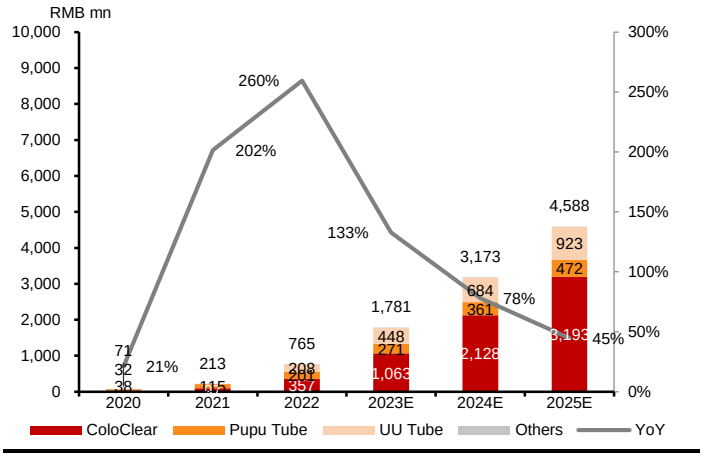
	2023E	2024E	2025E
High-risk population of GC in China (mn)*	746.2	759.8	768.8
Penetration rate of UU Tube	1.0%	1.5%	2.0%
Recognized volume of UU Tube (mn units)	7.5	11.4	15.4
ASP (RMB)	60	60	60
Revenue (RMB mn)	**447.7**	**683.8**	**922.6**
YoY	115.5%	52.7%	34.9%

Source: Company data, CMBIGM estimates. Notes: F&S.

To summarize, we forecast NH Health's revenue to reach revenue of RMB1,781mn/ RMB3,173mn/ RMB4,588mn in 2023E/ 24E/ 25E, representing 132.9%/ 78.2%/ 44.6% YoY growth for respective years.

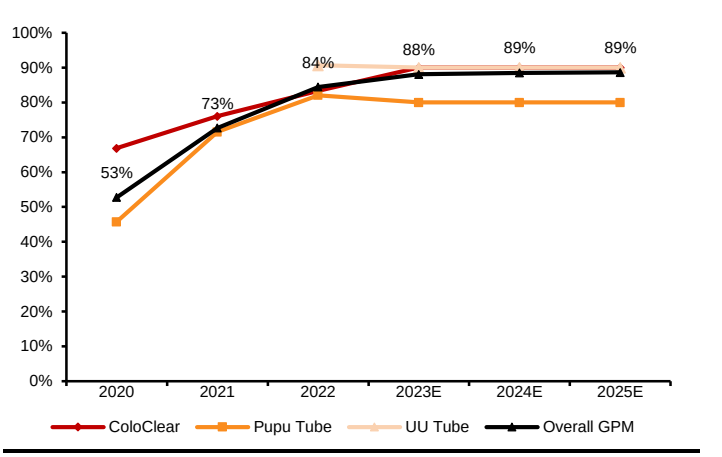
The risen proportion of ColoClear's revenue from the hospital and DTC channel will improve the GPM of ColoClear to 90% in 2025E. We expect the ASP of Pupu Tube andUU Tube to be plateaued and their gross profit margins to maintain stable.

Figure 70: Revenue forecast (2020-2025E)



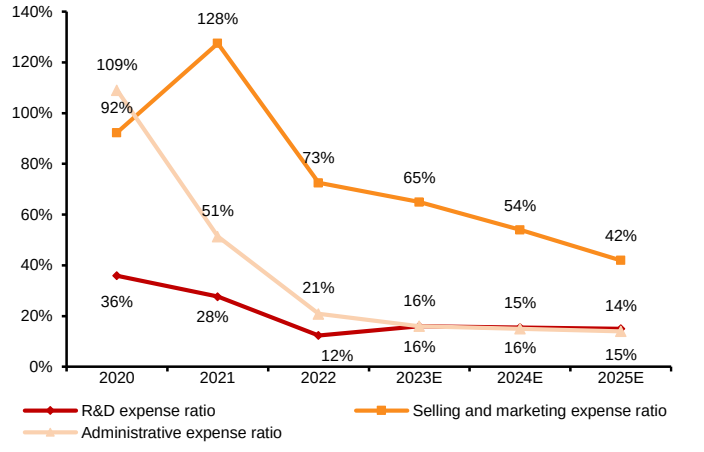
Source: Company, CMBIGM estimates

Figure 71: GPM forecast by products (2020-2025E)



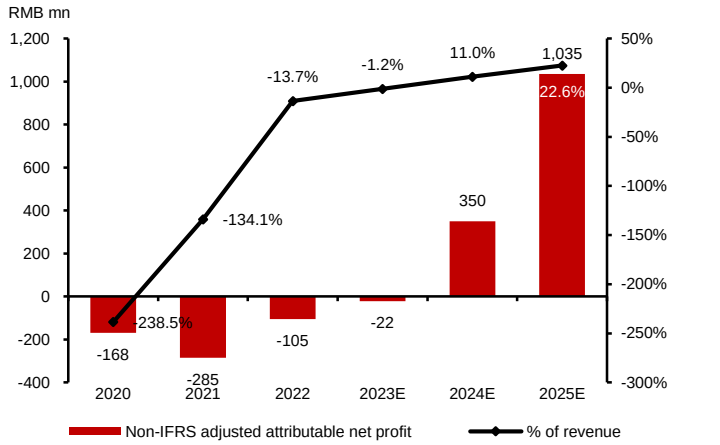
Source: Company, CMBIGM estimates

Figure 72: Operating expense ratio forecast (2020-2025E)



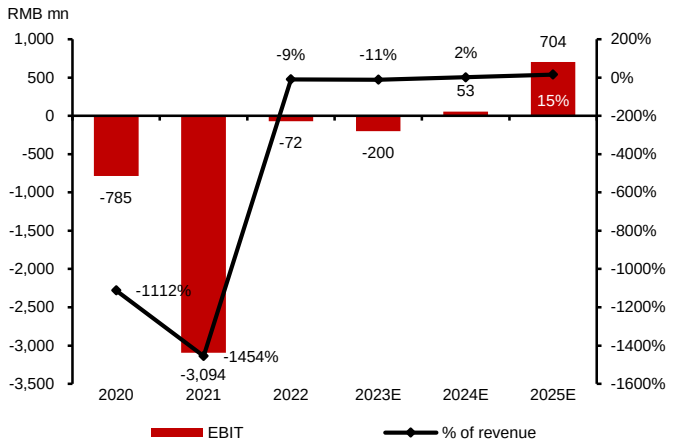
Source: Company, CMBIGM estimates
Note: The estimated R&D expense, selling and marketing expense, and administrative expense ratio excluding share-based payment expenses in 2023E/24E/25E are 15%/14.5%/14%, 63%/50%/40% and 10%/9%/8%, respectively.

Figure 73: Adjusted attributable net profit forecast (2020-2025E)



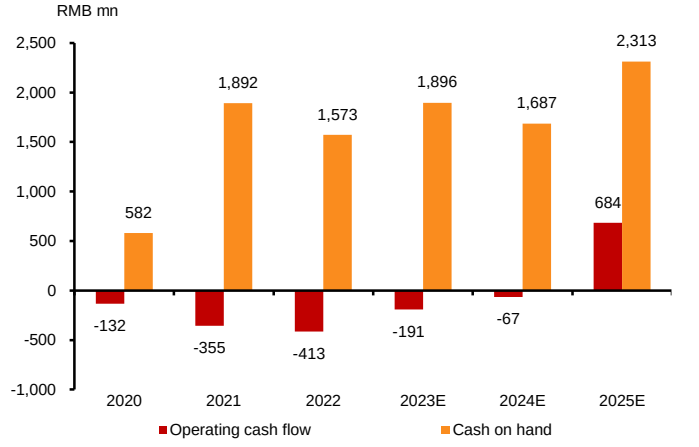
Source: Company, CMBIGM estimates

Figure 74: EBIT and EBIT margin (2020-2025E)



Source: Company, CMBIGM estimates

Figure 75: Cash on hand and operating cash flows (2020-2025E)



Source: Company, CMBIGM estimates
Note: cash and cash equivalents, time deposits over three months, structured deposits and pledged bank deposits in financial statement.

Figure 76: P&L forecasts (2020-2025E)

(RMB mn)	2020	2021	2022	2023E	2024E	2025E
Revenue	**71**	**213**	**765**	**1,781**	**3,173**	**4,588**
YoY	*21.1%*	*201.5%*	*259.5%*	*132.9%*	*78.2%*	*44.6%*
Cost of sales	-33	-58	-119	-212	-365	-521
% of revenue	*-47.2%*	*-27.3%*	*-15.5%*	*-11.9%*	*-11.5%*	*-11.4%*
Gross profit	**37**	**155**	**646**	**1,569**	**2,809**	**4,066**
GPM	*52.8%*	*72.7%*	*84.5%*	*88.1%*	*88.5%*	*88.6%*
Selling & marketing expenses	-65	-271	-555	-1,158	-1,714	-1,927
% of revenue	*-92.3%*	*-127.6%*	*-72.6%*	*-65.0%*	*-54.0%*	*-42.0%*
Administrative expenses	-77	-109	-160	-285	-476	-642
% of revenue	*-109.0%*	*-51.4%*	*-20.9%*	*-16.0%*	*-15.0%*	*-14.0%*
Research and development expenses	-25	-59	-95	-285	-492	-688
% of revenue	*-36%*	*-28%*	*-12%*	*-16%*	*-16%*	*-15%*
Other Income	9	23	16	32	33	36
% of revenue	*13.3%*	*10.7%*	*2.1%*	*1.8%*	*1.0%*	*0.8%*
Other gains and losses	-618	-2,790	96	0	0	0
% of revenue	*1853.6%*	*4799.9%*	*-81.0%*	*0.0%*	*0.0%*	*0.0%*
Impairmnet losses on trade receivables	-3	-7	-21	-46	-79	-110
% of revenue	*-6.9%*	*-4.3%*	*-3.3%*	*-3.0%*	*-2.8%*	*-2.7%*
Listing expenses	-27	-19	0	0	0	0
% of revenue	*41.3%*	*7.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Other expenses	-13	0	0	0	0	0
% of revenue	*16.7%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Operating profit	**-781**	**-3,078**	**-72**	**-173**	**81**	**735**
% of revenue	*-1106.3%*	*-1446.5%*	*-9.5%*	*-9.7%*	*2.5%*	*16.0%*
Finance costs	-8	-8	-7	-9	-5	-3
% of revenue	*-11.0%*	*-3.6%*	*-1.0%*	*-0.5%*	*-0.1%*	*-0.1%*
Profit before tax	**-788**	**-3,085**	**-80**	**-182**	**76**	**732**
PBT margin	*-1117.3%*	*-1450.1%*	*-10.4%*	*-10.2%*	*2.4%*	*16.0%*
Income tax expense	-0	0	-1	0	-11	-110
% tax rate	*0.0%*	*0.0%*	*-0.8%*	*0.0%*	*15.0%*	*15.0%*
Total net profit	**-789**	**-3,085**	**-80**	**-182**	**65**	**622**
Minority Interests	0	0	-1	-1	-1	-1
Net profit attributable to shareholders	**-789**	**-3,085**	**-79**	**-181**	**66**	**623**
NMP	*-1117.7%*	*-1450.1%*	*-10.4%*	*-10.2%*	*2.1%*	*13.6%*
Non-IFRS adjusted attributable net profit	**-168**	**-285**	**-105**	**-22**	**350**	**1,035**
Adjusted NMP	*-238.5%*	*-134.1%*	*-13.7%*	*-1.2%*	*11.0%*	*22.6%*

Source: Company data, CMBIGM estimates

Valuation

Initiate at BUY with TP of HK$57.46

We derive our target price of HK$57.46 based on a 10-year DCF valuation (WACC: 11.1%, terminal growth rate: 3.0%).

Figure 77: DCF valuation

DCF Valuation (in RMB mn)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
EBIT	-200	53	704	1,149	1,563	2,095	2,765	3,595	4,601	5,798
Tax rate	0.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
EBIT*(1-tax rate)	-200	45	598	977	1,329	1,781	2,350	3,056	3,911	4,928
+ D&A	75	79	82	84	96	109	122	135	149	162
- Change in working capital	-281	-565	-532	-567	-646	-730	-818	-908	-998	-1,088
- Capx	-55	-55	-55	-55	-63	-71	-79	-88	-97	-106
FCFF	**-461**	**-496**	**94**	**440**	**716**	**1,088**	**1,575**	**2,195**	**2,964**	**3,896**
Terminal value										**49,696**

Terminal growth rate	**3.0%**
WACC	**11.1%**
Cost of Equity	14.0%
Cost of Debt	5.0%
Equity Beta	1.1
Risk Free Rate	3.0%
Market Risk Premium	10.0%
Target Debt to Asset ratio	30.0%
Effective Corporate Tax Rate	15.0%
Terminal value (RMB mn)	17,384
Total PV (RMB mn)	**22,145**
Net debt (RMB mn)	-1,519
Minority interest (RMB mn)	-1
Equity value (RMB mn)	**23,664**
Equity value (HK$ mn)	**26,294**
# of shares (mn)	458
Price per share (HK$)	**57.46**

Source: CMBIGM estimates

Figure 78: Sensitivity analysis of DCF model

	WACC				
Terminal growth rate	**10.1%**	**10.6%**	**11.1%**	**11.6%**	**12.1%**
4.0%	78.24	70.49	63.90	58.24	53.33
3.5%	73.25	66.38	60.47	55.35	50.88
3.0%	68.96	62.80	**57.46**	52.80	48.70
2.5%	65.24	59.67	54.81	50.53	46.75
2.0%	61.98	56.91	52.45	48.50	44.99

Source: CMBIGM estimates

Figure 79: CMBIGM estimates vs consensus

	CMBIGM			Consensus			Diff (%)		
RMB mn	**FY23E**	**FY24E**	**FY25E**	**FY23E**	**FY24E**	**FY25E**	**FY23E**	**FY24E**	**FY25E**
Revenue	1,781	3,173	4,588	1,455	2,326	3,512	22.4%	36.4%	30.6%
Gross Profit	1,569	2,809	4,066	1,254	2,031	3,083	25.1%	38.3%	31.9%
Operating Profit	-173	81	735	-68	241	782	N/A	-66.4%	-6.0%
Net profit	-181	66	623	-62	224	684	N/A	-70.6%	-8.8%
EPS (RMB)	-0.40	0.14	1.36	-0.14	0.50	1.53	N/A	-71.1%	-10.9%
Gross Margin	88.08%	88.51%	88.64%	86.22%	87.31%	87.78%	+1.87 ppt	+1.20 ppt	+0.86 ppt
Operating Margin	-9.72%	2.55%	16.02%	-4.65%	10.35%	22.25%	NA	-7.81 ppt	-6.23 ppt
Net Margin	-10.15%	2.07%	13.59%	-4.24%	9.62%	19.47%	NA	-7.54 ppt	-5.88 ppt

Source: Company data, Bloomberg, CMBIGM estimates

Investment Risks

1) Failure of perspective registration trials or regulatory approvals of screening product candidates.

2) Intense competition in cancer screening markets.

3) Persistent loss risk.

Appendix: Company Profile

Figure 80: Major shareholders (as of 27 Apr 2023)

Shareholder	% of stake
Yiyou Chen	9.45
Naxin Yao	8.27
Qiming Corporate GP V,Ltd.	7.84
Yeqing Zhu	6.15

Source: Company data, HKEx, CMBIGM

Figure 81: Management profile

Name	Age	Position
Yeqing Zhu	51	CEO, Chairman
Yiyou Chen	51	Executive director, CSO
Yu Gao	40	CFO
Ning Lu	52	CTO

Source: Company data, CMBIGM

Financial Summary

INCOME STATEMENT	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec (RMB mn)						
Revenue	**71**	**213**	**765**	**1,781**	**3,173**	**4,588**
Cost of goods sold	(33)	(58)	(119)	(212)	(365)	(521)
Gross profit	**37**	**155**	**646**	**1,569**	**2,809**	**4,066**
Selling expense	(65)	(271)	(555)	(1,158)	(1,714)	(1,927)
Admin expense	(77)	(109)	(160)	(285)	(476)	(642)
R&D expense	(25)	(59)	(95)	(285)	(492)	(688)
Others	(651)	(2,793)	91	(14)	(46)	(74)
Operating profit	**(781)**	**(3,078)**	**(72)**	**(173)**	**81**	**735**
Interest expense	(8)	(8)	(7)	(9)	(5)	(3)
Pre-tax profit	**(788)**	**(3,085)**	**(80)**	**(182)**	**76**	**732**
Income tax	(0)	0	(1)	0	(11)	(110)
After tax profit	**(789)**	**(3,085)**	**(80)**	**(182)**	**65**	**622**
Minority interest	0	0	(1)	(1)	(1)	(1)
Attributable Net profit	**(789)**	**(3,085)**	**(79)**	**(181)**	**66**	**623**
Adjusted net profit	**(168)**	**(285)**	**(105)**	**(22)**	**350**	**1,035**

BALANCE SHEET	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec (RMB mn)						
Current assets	**700**	**2,059**	**2,001**	**2,648**	**3,152**	**4,462**
Cash & equivalents	452	687	1,131	1,455	1,245	1,872
Account receivables	57	134	584	854	1,478	2,074
Inventories	6	59	71	113	190	264
Financial assets at FVTPL	0	10	0	0	0	0
Other current assets	185	1,170	215	226	239	252
Non-current assets	**119**	**295**	**574**	**629**	**681**	**730**
PP&E	40	61	82	112	137	158
Intangibles	20	18	22	26	30	35
Financial assets at FVTPL	0	65	90	120	150	180
Other non-current assets	58	151	380	370	363	357
Total assets	**818**	**2,354**	**2,575**	**3,278**	**3,833**	**5,191**
Current liabilities	**157**	**193**	**227**	**431**	**865**	**1,429**
Short-term borrowings	70	79	0	0	0	0
Account payables	48	39	109	116	200	286
Tax payable	0	0	0	0	0	0
Other current liabilities	18	42	57	221	513	933
Lease liabilities	9	11	20	20	20	20
Contract liabilities	11	22	42	74	132	190
Non-current liabilities	**1,751**	**34**	**226**	**126**	**46**	**46**
Long-term borrowings	46	0	180	80	0	0
Other non-current liabilities	1,705	34	46	46	46	46
Total liabilities	**1,908**	**227**	**453**	**557**	**910**	**1,475**
Share capital	0	0	0	0	0	0
Treasury shares	(0)	(0)	(0)	(0)	(0)	(0)
Share premium	119	6,412	6,420	6,420	6,420	6,420
Reserves	(1,209(	(4,286)	(4,298)	(3,697)	(3,495)	(2,700)
Non-controlling interests				(1)	(2)	(3)
Total shareholders equity	**(1,090)**	**2,127**	**2,122**	**2,721**	**2,922**	**3,716**
Minority interest	0	0	0	(1)	(2)	(3)
Total equity and liabilities	**818**	**2,354**	**2,575**	**3,278**	**3,833**	**5,191**

CASH FLOW	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec (RMB mn)						
Operating						
Profit before taxation	**(788)**	**(3,085)**	**(80)**	**(182)**	**76**	**732**
Depreciation & amortization	25	43	71	75	79	82
Tax paid	(1)	0	0	0	(11)	(110)
Change in working capital	(26)	(137)	(417)	(281)	(565)	(532)
Others	658	2,825	13	197	354	512
Net cash from operations	**(132)**	**(355)**	**(413)**	**(191)**	**(67)**	**684**
Investing						
Capital expenditure	(24)	(37)	(54)	(55)	(55)	(55)
Others	(146)	(1,150)	746	(4)	(3)	(0)
Net cash from investing	**(170)**	**(1,187)**	**692**	**(59)**	**(58)**	**(55)**
Financing						
Dividend paid	(7)	(8)	(4)	(9)	(5)	(3)
Net borrowings	66	(37)	101	(100)	(80)	0
Proceeds from share issues	0	1,956	0	682	0	0
Others	374	(127)	(21)	0	0	na
Net cash from financing	**432**	**1,784**	**75**	**573**	**(85)**	**(3)**
Net change in cash						
Cash at the beginning of the year	346	452	687	1,131	1,455	1,245
Exchange difference	(25)	(7)	90	0	0	0
Cash at the end of the year	**452**	**687**	**1,131**	**1,455**	**1,245**	**1,872**

GROWTH	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec						
Revenue	21.1%	201.5%	259.5%	132.9%	78.2%	44.6%
Gross profit	8.5%	315.2%	317.8%	142.8%	79.0%	44.8%
Operating profit	na	na	na	na	na	808.7%
Net profit	na	na	na	na	na	847.2%
Adj. net profit	na	na	na	na	na	195.5%

PROFITABILITY	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec						
Gross profit margin	52.8%	72.7%	84.5%	88.1%	88.5%	88.6%
Adj. net profit margin	(238.5%)	(134.1%)	(13.7%)	(1.2%)	11.0%	22.6%
Return on equity (ROE)	na	(145.1%)	(3.8%)	(6.7%)	2.2%	16.8%

GEARING/LIQUIDITY/ACTIVITIES	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec						
Net debt to equity (x)	na	(0.8)	(0.5)	(0.6)	(0.5)	(0.5)
Current ratio (x)	4.5	10.6	8.8	6.1	3.6	3.1

VALUATION	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec						
P/E	na	na	na	na	185.2	19.6
P/E (adjusted)	na	na	na	na	34.8	11.8
P/B	na	4.7	5.3	4.5	4.2	3.3
Div yield (%)	na	0	0	0	0	0

Source: Company data, CMBIGM estimates. Note: The calculation of net cash includes financial assets.

Disclosures & Disclaimers

Analyst Certification

The research analyst who is primary responsible for the content of this research report, in whole or in part, certifies that with respect to the securities or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about the subject securities or issuer; and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific views expressed by that analyst in this report.

Besides, the analyst confirms that neither the analyst nor his/her associates (as defined in the code of conduct issued by The Hong Kong Securities and Futures Commission) (1) have dealt in or traded in the stock(s) covered in this research report within 30 calendar days prior to the date of issue of this report; (2) will deal in or trade in the stock(s) covered in this research report 3 business days after the date of issue of this report; (3) serve as an officer of any of the Hong Kong listed companies covered in this report; and (4) have any financial interests in the Hong Kong listed companies covered in this report.

CMBIGM Ratings

BUY	: Stock with potential return of over 15% over next 12 months
HOLD	: Stock with potential return of +15% to -10% over next 12 months
SELL	: Stock with potential loss of over 10% over next 12 months
NOT RATED	: Stock is not rated by CMBIGM
OUTPERFORM	: Industry expected to outperform the relevant broad market benchmark over next 12 months
MARKET-PERFORM	: Industry expected to perform in-line with the relevant broad market benchmark over next 12 months
UNDERPERFORM	: Industry expected to underperform the relevant broad market benchmark over next 12 months

CMB International Global Markets Limited

Address: 45/F, Champion Tower, 3 Garden Road, Hong Kong, Tel: (852) 3900 0888 Fax: (852) 3900 0800

CMB International Global Markets Limited ("CMBIGM") is a wholly owned subsidiary of CMB International Capital Corporation Limited (a wholly owned subsidiary of China Merchants Bank)

Important Disclosures

There are risks involved in transacting in any securities. The information contained in this report may not be suitable for the purposes of all investors. CMBIGM does not provide individually tailored investment advice. This report has been prepared without regard to the individual investment objectives, financial position or special requirements. Past performance has no indication of future performance, and actual events may differ materially from that which is contained in the report. The value of, and returns from, any investments are uncertain and are not guaranteed and may fluctuate as a result of their dependence on the performance of underlying assets or other variable market factors. CMBIGM recommends that investors should independently evaluate particular investments and strategies, and encourages investors to consult with a professional financial advisor in order to make their own investment decisions.

This report or any information contained herein, have been prepared by the CMBIGM, solely for the purpose of supplying information to the clients of CMBIGM or its affiliate(s) to whom it is distributed. This report is not and should not be construed as an offer or solicitation to buy or sell any security or any interest in securities or enter into any transaction. Neither CMBIGM nor any of its affiliates, shareholders, agents, consultants, directors, officers or employees shall be liable for any loss, damage or expense whatsoever, whether direct or consequential, incurred in relying on the information contained in this report. Anyone making use of the information contained in this report does so entirely at their own risk.

The information and contents contained in this report are based on the analyses and interpretations of information believed to be publicly available and reliable. CMBIGM has exerted every effort in its capacity to ensure, but not to guarantee, their accuracy, completeness, timeliness or correctness. CMBIGM provides the information, advices and forecasts on an "AS IS" basis. The information and contents are subject to change without notice. CMBIGM may issue other publications having information and/ or conclusions different from this report. These publications reflect different assumption, point-of-view and analytical methods when compiling. CMBIGM may make investment decisions or take proprietary positions that are inconsistent with the recommendations or views in this report.

CMBIGM may have a position, make markets or act as principal or engage in transactions in securities of companies referred to in this report for itself and/or on behalf of its clients from time to time. Investors should assume that CMBIGM does or seeks to have investment banking or other business relationships with the companies in this report. As a result, recipients should be aware that CMBIGM may have a conflict of interest that could affect the objectivity of this report and CMBIS will not assume any responsibility in respect thereof. This report is for the use of intended recipients only and this publication, may not be reproduced, reprinted, sold, redistributed or published in whole or in part for any purpose without prior written consent of CMBIGM.

Additional information on recommended securities is available upon request.

For recipients of this document in the United Kingdom

This report has been provided only to persons (I)falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended from time to time)("The Order") or (II) are persons falling within Article 49(2) (a) to (d) ("High Net Worth Companies, Unincorporated Associations, etc.,) of the Order, and may not be provided to any other person without the prior written consent of CMBIGM.

For recipients of this document in the United States

CMBIGM is not a registered broker-dealer in the United States. As a result, CMBIGM is not subject to U.S. rules regarding the preparation of research reports and the independence of research analysts. The research analyst who is primary responsible for the content of this research report is not registered or qualified as a research analyst with the Financial Industry Regulatory Authority ("FINRA"). The analyst is not subject to applicable restrictions under FINRA Rules intended to ensure that the analyst is not affected by potential conflicts of interest that could bear upon the reliability of the research report. This report is intended for distribution in the United States solely to "major US institutional investors", as defined in Rule 15a-6 under the US, Securities Exchange Act of 1934, as amended, and may not be furnished to any other person in the United States. Each major US institutional investor that receives a copy of this report by its acceptance hereof represents and agrees that it shall not distribute or provide this report to any other person. Any U.S. recipient of this report wishing to effect any transaction to buy or sell securities based on the information provided in this report should do so only through a U.S.-registered broker-dealer.

For recipients of this document in Singapore

This report is distributed in Singapore by CMBI (Singapore) Pte. Limited (CMBISG) (Company Regn. No. 201731928D), an Exempt Financial Adviser as defined in the Financial Advisers Act (Cap. 110) of Singapore and regulated by the Monetary Authority of Singapore. CMBISG may distribute reports produced by its respective foreign entities, affiliates or other foreign research houses pursuant to an arrangement under Regulation 32C of the Financial Advisers Regulations. Where the report is distributed in Singapore to a person who is not an Accredited Investor, Expert Investor or an Institutional Investor, as defined in the Securities and Futures Act (Cap. 289) of Singapore, CMBISG accepts legal responsibility for the contents of the report to such persons only to the extent required by law. Singapore recipients should contact CMBISG at +65 6350 4400 for matters arising from, or in connection with the report.