

Japan to lead way in global healthcare challenges

On January 2nd, 2022, Kane Tanaka celebrated her 119th birthday in the Fukuoka nursing home where she lives. The oldest living person in the world, Tanaka's longevity encapsulates Japan's demographic marvel, as the country with the longest life expectancy in the world, at an average of 85 years.

Underpinning this extraordinary achievement are many factors, one of the most prominent being the excellence of the nation's universal healthcare, a system that owes its success to the strong foundations built through decades of government policy and a flourishing private sector that has enabled Japan to cement its place as the third largest pharmaceutical market and fourth largest medical technology market in the world. Moving forward, Japan's pharmaceutical and healthcare companies aim to place themselves at the forefront of global health challenges, from developing treatments for rare diseases, prevalent illnesses and cancer, to addressing the healthcare issue brought about by an aging population.

"With regards to the next ten years in healthcare, I think it will change a lot because of the aging demographic of Japan. This is a crucial factor as the needs of public health will change and caregivers will become more important," says Keiko Oishi, president of CMIC, a leading innovator in the healthcare industry which pioneered the CRO business in Japan over 28 years ago and now aids foreign companies looking to enter the Japanese market.

"There will also be a stronger focus on prevention, which has already begun. Simply put, if fewer people get admitted to the hospital, public health costs can be reduced. This is particularly important in aging societies. We believe that personal healthcare focusing on both prevention and treatment will become the standard, which is why we are shifting our business model from PVC (pharmaceutical value creator) to PHVC (personal health value creator)."

Sano Yoshihiko, president of global healthcare leader Nipro, also highlights the shift towards preventative treatment in developed nations with aging populations like Japan. "In advanced countries the awareness of

preventive treatment is spreading, and the money allocated for this is increasing. One of the examples is supplements; there are many people spending a huge amount of money each month for supplements. We do not have a plan to produce supplements, however, we are going to keep producing products for preventive treatments."

As Nipro looks to strengthen its already large global presence, dialysis treatment in the U.S. is a target focus for the company, whose dialyzer machines have been a key product in the U.S. market. "The U.S. has the highest number of people undergoing dialysis and one of our core products for dialysis has a large share in the U.S. market because we have developed that product with the highest level of quality monitoring here in Japan," explains Mr. Yoshihiko. "That is why we were able to be competitive there. We have about a 15% market share there and I think it will continue to grow."

Established in 1678, Mitsubishi Tanabe Pharma Corporation (MTPC) is the oldest pharmaceutical company in Japan. Having been at the forefront of medical innovations for over 300 years, today the company is focusing on developing treatments for illnesses such as amyotrophic lateral sclerosis (ALS) and Parkinson's disease, as well as coronavirus, for which it has developed a world-first plant-based vaccine.

"We are a Japanese-based pharmaceutical company with a very long history, and we want to expand globally. The U.S. is our highest priority country or area, so that's why we have invested heavily in our U.S. business. We've had a long history of subsidiary companies in Europe which have been developing drugs as well," says company president Dr. Ueno Hiroaki when discussing MTPC's global strategy.

"On the other hand, in Asia, and especially in China, there are more promising opportunities, and we are now seeking business engagement in the area. We will advance the development of new drugs in collaboration with the drug discovery in the U.S. operational bases, obtain approval in the U.S., and then develop products in Europe, Japan, and Asia, including



Keiko Oishi, President, CMIC HOLDINGS CO., LTD.

China. We will be looking at very high-efficacy drugs."

Antibiotic-resistant bacteria (ARB) has become a major issue globally which today is responsible for more than 700,000 deaths worldwide. And that figure could grow to 10 million according to WHO estimates. Tackling ARB is one of three major focus points for Miyarisan Pharmaceutical, along with cancer and digestive diseases. A champion of co-creation, Miyarisan works with a number of global partners including BASF, Huvépharma in Bulgaria, and OSEL in the U.S.

"One reason for the rise of ARB has been the widespread use of antibiotics in livestock as a growth promoter. Antibiotics targeted at livestock are most prevalent in China, the United States, and Brazil," says Miyarisan president, Masayuki Uchida. "We've developed our new partnership with BASF for exactly that reason – to be able to expand into these areas and address this issue. We have researched and discovered a substance that does not produce ARB based on a new way of thinking and we have filed a worldwide patent for this substance."

Zacros (Fujimori Kogyo) has also been expanding business through co-creation with other companies both in Japan and overseas. "We are developing technologies for culturing large numbers of artificial cells, such as iPS cells, and are actively collaborating with other companies," says president Eishi Fuyama, who also highlights the company's development of the world's first medical device that measures and analyzes blood flow in blood vessels to prevent thrombosis. "The device was approved by the U.S. Food and Drug Administration in February 2020 and is already being used by universities



Sano Yoshihiko, President, Nipro Corporation

in Sweden and hospitals in Italy and California."

Established in 1913, Dojindo Laboratories has been a pioneer in the field of reagents for decades and continues to seek partners worldwide to expand its global reach. The company is well known for CCK-8, a cell counting kit on which over 5,000 academic papers have been written about its practical uses. "CCK-8 is a combination of not only our research and development work, but also of critical thinking to find an excellent use for a compound that was originally developed for a different purpose," explains president, Dr. Yuichiro Ueno. "CCK-8 became an almost essential reagent for many researchers as it measures cell proliferation, cellular vitality, and cytotoxicity, making it an indispensable tool for determining cellular vitality in many fields of research."

A lot of attention has been put on PCR testing over the past two years due to the COVID-19 pandemic, and it is an area in which Precision System Science (PSS) is pioneering innovation. The company has developed a fully automated PCR testing system that reduces testing time from six to two hours and removes the possibility of human error, while its partnership with a European company prompted its recent move into the field of PCR reagents.

"While we didn't have PCR reagents before establishing the partnership, we did have the machinery and extraction reagent," says president Hideji Tajima. "Currently, we are looking into new technologies and reagents, especially for cancer and Alzheimer's. There is a unique particle present in the blood and we are looking to create a reagent that can extract it, and which can be used to provide an accurate diagnosis using our machinery."

Automation is increasingly empowering health providers to offer better services, including increased efficiency and better patient management. "More and more Japanese healthcare services are now using automation for dispensing medicine so that pharmacists, nurses, and other healthcare professionals have more time for patient care," says Yoshihito Omura, president of Tosho Inc., a leading manufacturer of medicine dispensing machines and pharmacy equipment that is looking to expand its international operations. "As of now, we offer only pouch dispensing machines for our international business but have other products such as our injection dispensers for hospitals that we are looking into launching in the future. In Japan and Asia, we also cater to hospitals. We are looking to target more hospitals internationally, basically targeting healthcare in general for everyone across all ages."

In an increasingly health-conscious world, the market for functional foods continues to grow and Taiyo Kagaku aims to leverage that growth with its range of high-quality products. "We have seen a huge increase in the demand for healthy

and functional foods and supplements worldwide," highlights president, Nagahiro Yamazaki. "Our company is also seeing an increase in global sales of soluble plant fibers that improve intestinal health and the microbiome. As consumers become more knowledgeable about health, the market for functional health foods will continue to grow. We are committed to educating the public about the importance of good health."

Beyond human health, Japan is also leading the way in animal healthcare thanks to companies like Kyoto Biken, which produces 34 vaccines, including bovine, poultry, porcine, fish and plant variations. The company aims to put more focus on the pet market, which has offered the company the biggest growth of late, while also maintaining its large market share for bovine vaccines and developing new projects in the areas of porcine and poultry vaccines.

"In order to achieve this goal, we are collaborating and partnering with other companies as well and we will boost those efforts. There is also potential for growth in the plant vaccine market, where we

have a product line-up that is unique not only in Japan but also globally," says president, Dr. Yasutaka Igari.

With companies like Sangi and Yamahachi Dental, Japan is also pioneering innovation in dental healthcare. Selected as a Global Top 100 Niche Company by Japan's Ministry of Economy, Trade and Industry in 2020, Yamahachi Dental has the second largest production capacity for artificial teeth in the world, boasting a lineup of about 30 main different types of artificial teeth with numerous variations. Already with a presence in 80 countries, the company is eyeing further global expansion, particularly in fast-growing Asia. "We would like to target Asia and Southeast Asia where there is rapid economic development. Artificial teeth are a necessary commodity. We would like to be able to meet market demands as they grow," says president, Masashi Toyama. "Of course, we are also turning our focus to America, Europe and beyond. We have some very hard-working distributors all over the world trying to get Yamahachi products out there."

Sangi, meanwhile, has been at the forefront of dental care with

its range of enamel-restorative toothpastes that harness the power of hydroxyapatite. "Hydroxyapatite is a material with unlimited possibilities," highlights chairman Shuji Sakuma. "At the very least, I would like to have expanded it to other applications such as catalysts and medical devices, and to have built a firm market in those new fields. It seems too limited to see it restricted to a market solely for toothpaste products."

From CMIC to Sangi, with ambitious and innovative companies across the board in healthcare, it is no wonder that Japan is ready to lead the world in global healthcare challenges that will define the 21st century.

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Kyoto Biken: A wide-ranging approach to animal health problems



"Our bovine vaccine line-up includes unique toxoid vaccines to prevent Clostridium and Botulism."

Dr. Yasutaka Igari,
President,
Kyoto Biken Laboratories, Inc.

Kyoto Biken is an all-in-one manufacturing business when it comes to the field of animal health. The Japanese firm's corporate philosophy, "Animal Well-being Matters", originates from the active role it played in securing public hygiene and a stable food supply thanks to its

Founded in 1948, Kyoto Biken has contributed to animal health through its holistic approach, comprising R&D, manufacturing and marketing of veterinary vaccines and diagnostics.



Headquarters in Kyoto

various products at a time when Japan was facing a food crisis.

The company proudly boasts 34 vaccines currently on the market, including poultry, porcine, fish and plant versions, with its bovine vaccine serving as the largest source of pride. The vaccine holds 100% share of the market for Japan's world renowned and top-quality Kobe beef. These particular animal jobs are helping the company reap a lot of success in overseas markets, such as Egypt and the UAE.

In line with its goals for further expansion and increased collaboration overseas, Kyoto

Biken aims to make use of its wealth of experience and expertise to help livestock farmers in developing countries. This will be achieved by working with local wholesalers and governments in order to determine the diseases that are of most concern in local areas and then helping to tackle those diseases with the company's current vaccines - or, if necessary, through the development of vaccines tailored to local needs.



Vaccine for bovine

Kyoto Biken's outward-looking approach in tandem with current market trends will provide the company with exciting possibili-

ties in both the near and distant future. Kyoto Biken is planning to expand its R&D for the develop-



Factory in Kyoto

ment of new types of vaccines, while also pushing ahead with collaboration with the academic sector and emerging venture companies. Furthermore, the company's newly built facility in Kyoto is set to start operation in 2024. In an increasingly interconnected world, more questions will be raised in the animal health industry, and thankfully Kyoto Biken is in possession of the answers.

KYOTOBIKEN
www.kyotobiken.co.jp/en

Tackling an issue of our age: drug-resistant bacteria

Antibiotic-resistant bacteria (ARB) has become a global healthcare crisis, with as many as 700,000 people worldwide dying annually due to the growing problem. Japanese firm Miyarisan Pharmaceutical is leading the pack in the research and development of probiotics to treat the issue.

Antibiotic resistance is today rising to dangerously high levels in all parts of the world. New gut resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases. A growing list of infections – such as pneumonia, tuberculosis, blood poisoning, gonorrhoea, and food-borne diseases – are becoming harder, and sometimes impossible, to treat as antibiotics become less effective. However, leading drug companies such as Miyarisan Pharmaceutical are among those pioneering research into probiotic treatments to address the worldwide healthcare issue.

According to scientific studies, the live strains of yeast and bacteria found in probiotics can help rebalance the bacterial flora naturally found in our gut, imparting a wealth of health benefits. And whilst research into the benefits and risks of probiotics is still in its infancy, it now seems likely that they will one day be medically useful and widely used – especially if Miyarisan Pharmaceutical has anything to do with it.

“There has been a huge rise in antibiotic-resistant bacteria (ARB), but the development of antibiotics simply can't keep up,” says Masayuki Uchida, President of Miyarisan Pharmaceutical, outlining the great challenge facing healthcare worldwide. “I think this is a huge issue, and the ARB issue is an even larger issue than the COVID-19 pandemic we're in right now. According to the World Health Organisation (WHO), currently, more than 700,000 people worldwide die annually because of ARBs. If we continue at this pace, by 2050, approximately 10 million people will die each year. The WHO has already raised a global alert in regard to this and called out for different private and public institutions to conduct research and manufacturing, but it's simply not enough and they are



Culture tank

encouraging global partnerships to tackle this issue.”

The widespread use of antibiotics in livestock as a growth promoter has proved to be one of the main culprits in the spread of ARB. Only 33% of all antibiotics



Miyarisan's awarded patents in Japan, U.S. and U.K.

are used for people, whilst the largest majority is used for animals. Administering antibiotics to livestock disrupts the intestinal flora, allowing them to absorb more nutrients from the feed they eat and increase growth performance easily; a practice that has already been banned in Europe since 2006 in the hope of reducing the risk of ARB strains in animal feed and the subsequent risk of contamination into humans. In America, regulations have been set up only recently.

“In Europe they are looking for something to replace antibiotics in animal feed in a way that is much gentler and more ethical. That's when they discovered our product, which doesn't disrupt intestinal flora but actually helps to stabilize and normalize it, while still helping livestock growth performance. Antibiotics targeted at livestock are most prevalent in China, the United States, and Brazil,” says Mr. Uchida. “Thankfully, we have researched and discovered a substance that does not produce ARB based on a new way of thinking, and we have filed a worldwide patent for this substance.”

Indeed, the company's new Miya Gold animal feed represents a significant breakthrough in global probiotic R&D efforts, allowing the volume of the bacteria in the feed to be doubled whilst at the same time reducing the cost by one-third from what it used to be. This high-volume, low-cost product went to market at the beginning of July 2021.

In terms of research in the field of digestive diseases – another



“There are three different areas in which we are doing research now: infectious diseases, digestive illnesses, and cancer.”

Masayuki Uchida,
President,
MIYARISAN
PHARMACEUTICAL CO., LTD.

key area of focus for Miyarisan Pharmaceutical – the number of new drugs made to address this has been decreasing year on year, with the market saturated for gastrointestinal medication meaning it's difficult for new discoveries to take place.



Testing in the Quality Control lab

“Recently, the number of patients with inflammatory bowel disease (IBD) such as Crohn's disease and/or ulcerative colitis has been increasing year on year around the world, and we still don't understand why,” says Mr. Uchida. “The number of medical and research related papers that have been published to address this issue is increasing with each passing year. We're really putting a lot of R&D effort into this field.”

Miyarisan

www.miyarisan.com

Pioneering treatments: From ALS to plant-based COVID-19 vaccines

Mitsubishi Tanabe Pharma Corporation can trace its origins to 1678 and the Osaka-headquartered company is now leading the charge among pharma giants to develop drugs for rare hard-to-treat diseases such as ALS.



"Ours is the world's first plant-based vaccine for humans and is a new type of COVID-19 vaccine that uses VLP technology."

Ueno Hiroaki,
President &
Representative Director,
Mitsubishi Tanabe Pharma
Corporation

Mitsubishi Tanabe Pharma Corporation (MTPC), a wholly owned subsidiary of Mitsubishi Chemical Holdings Group, has proudly pursued medical breakthroughs for more than 300 years. In that time, the company has discovered several distinctive treatments for serious diseases including diabetes and multiple sclerosis. While these successes represent a strong part of its corporate identity, MTPC continues to build on its legacy by seeking new solutions to the pressing needs of patients worldwide. Today, MTPC is focused on driving scientific discovery in areas including amyotrophic lateral sclerosis (ALS), Parkinson's disease, and – most recently – a novel vaccine for COVID-19.

"Our COVIFENZ® is the world's first plant-based vaccine for humans and as it is a new type of COVID-19 vaccine that uses VLP technology. It can be stored at regular re-

frigeration temperatures and manufactured in a shorter period of time compared to the other vaccines. It will be a real alternative in the fight against COVID-19," says Dr. Ueno Hiroaki, President and Representative Director of MTPC.



Mitsubishi Tanabe Pharma
Historical Museum

"Nobody knows the future of this pandemic, but I think it's very important to provide several types of vaccines because alternatives may be more effective for different variants of the virus."

In developing its novel vaccine, MTPC's affiliated company, Medicago has now completed phase three clinical trials globally. The overall efficacy of the vaccine against all variants at the time of the trial was 71%. The vaccine's efficacy was 75.3% against the Delta variant and 88.6% against the Gamma variant.



Production of plant-based vaccines

"COVIFENZ® was approved in Canada on February 24 and we plan to commercialize the vaccine as soon as possible," says Dr. Ueno. "We have an agreement with the Canadian government to provide our vaccine there first, but after that we'll try to bring the vaccine worldwide as well."

MTPC hopes that its plant-based COVID-19 vaccine will have the same success in penetrating the North American market as its breakthrough RADICAVA® (a cerebral neuroprotectant for the treatment of ALS) has had following its launch in the U.S. in 2017. Since then, the company has launched or developed two other treatments for ALS, EXSERVAN™ – which provides a new drug delivery method – and MT-1186 (oral RADICAVA®).

"EXSERVAN™ is an oral film formulation of riluzole which has a different mechanism of action from RADICAVA®," says Dr. Ueno. "It dissolves quickly on the tongue and so is very easy to administer. This formulation is beneficial to ALS patients because most have difficulty swallowing."

MT-1186, meanwhile, is an oral suspension formulation that contains the same active ingre-

dient as RADICAVA® but eliminates the need for intravenous infusion. It therefore reduces the burden on ALS patients by improving dosing compliance.

"We are now working to expand our business in the U.S. and to strengthen our core technologies for future growth," explains



RADICAVA® Injection

Dr. Ueno. "In our U.S. business, RADICAVA®, EXSERVAN™, followed by MT-1186, will be launched in the field of neurology, catering to the field of ALS treatment as options for treatment to expand beyond the hospital and into the home, which is in sync with our goal of providing optimal therapy to each individual."

He continues: "In addition, we established NeuroDiscovery Lab, a new satellite research base in the Boston area of the U.S., and it will play a central role in drug discovery research focused on precision medicine in the field of neurology, particularly in ALS. Furthermore, we will continue to advance our 'around-the-pill solutions' such as early diagnosis and medication support using digital technology to provide comprehensive solutions for ALS patients. Besides ALS, the launch of NDO612, a drug for the treatment of Parkinson's disease, is expected to open up new markets. In addition, with our launch of MT-7117, a candidate for photo-sensitivities, we'll also enter into the new therapeutic area of immuno-inflammation in the U.S. Once our business capabilities are established in the U.S., we will supply products to these markets one after another, leading to future growth."



Mitsubishi Tanabe Pharma
www.mt-pharma.co.jp/e/

PSS: Providing quick and effective solutions



"Our design concept is to develop devices that are small, compact, efficient, easy to use, and that give highly accurate and precise diagnostic results, features that large companies don't normally provide."

Hideji Tajima,
President,
Precision System Science Co., Ltd.

As the world continues to deal with the impact of the COVID-19 pandemic, the need for efficient testing processes remains key. This is where molecular diag-



PSS Matsudo Head Office

agnostics companies have been called upon to deliver solutions, and while the behemoths of the industry have played a significant role, more dynamic contributors have stepped up.

Founded in 1985, Precision System Science (PSS) has been one of those SMEs that has been able to deliver where established companies have "lacked the inspiration to produce compact and easy-to-use products," as Hideji Tajima, President of PSS, explains.

"PSS has received praise from larger companies for providing compact technology quickly and efficiently with highly accurate and precise diagnostic results," highlighting that this is part of its ongoing business strategy.

"We have developed automated sample-to-result technologies taking nucleic acid extraction to

In an industry of giant molecular diagnostics companies lies a need for agile SMEs like PSS to deliver accurate results in a short time span.



Saliva collection soak stick kit

A fully automated PCR test system
from saliva sample collection to test results

Saliva collection soak stick



Saliva sampling pad



Put the soak stick in your mouth and collect saliva

Saliva collection tube



Insert the soak stick in the collection tube

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Inactivated solution

Close the cap

Load into the device

amplification and detection," he states, adding that their unique equipment can conduct PCR testing in just two hours, unlike larger companies.

"PCR testing offers a high possibility of detection right after infection compared to protein-based antigen testing," continues Mr. Tajima, who is keen for middle and low-income



geneLEAD VIII

countries to adopt it to detect future infectious diseases. PSS has a history of collaborating in this way, he reminds us, including helping to reduce hepatitis, HIV and other blood-transmitted diseases over the years.



PSS Shinjuku Laboratory

A core element to PSS's business is its magnetic filtration technology (Magtration®) and

the first successful automated sample preparation system has impressed the likes of Roche and QIAGEN who were quick to place orders, says Mr. Tajima. But as well as this, it has created a simple print-made cartridge to identify new contaminants.

"We have developed a soak stick kit," the president explains, "where a saliva sample is taken and combined with an inactive virus infection like COVID-19 solution, meaning the person conducting the test won't be infected."

Innovation is key to PSS, as seen with their ELITe Be-Genius product for ELI-Tech and a desire to reduce the automated PCR test results to less than an hour. The latter objective would be especially positive news for airports, as a recent collaboration with Kyoto University successfully demonstrated, providing immediate and precise detection following simultaneous group testing.

With ambition, of course, comes investment and PSS is showing this in its two new facilities.

"The main purpose of the recently opened PSS Shinjuku Laboratory in Tokyo is to evaluate the effectiveness of our automation technology by conducting genetic tests using various field samples in collaboration with medical institutions and academia," explains Mr. Tajima. "We will conduct COVID-19 PCR tests and estab-

lish a corporate system for fast and accurate results anytime, anywhere, by anyone, both in Japan and abroad."

The imminent construction of a second plant at the Odate Reagent Center is "to take advantage of our strengths of sample preparation and diagnosis in a mass production supply chain of our Prefilled Reagent Cartridge for Magnetic Bead Based Nucleic Acid Extractions," Mr. Tajima explains.

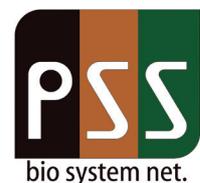


NPS & Odate Reagent Center

"The reagent manufacturing annual capacity will be increased from approximately 6 to 36 million tests for many types of PCRs."

As the company looks into new technologies and reagents for cancer and Alzheimer's, as well as more niche fields, Mr. Tajima emits the growing aspirations of PSS.

"We want to provide technology that caters to and provides solutions for such frontier areas."



www.pss.co.jp/english

Automation to ensure the correct medication

Automation is increasingly empowering health providers to offer better services, including increased efficiency and better patient management. Japanese manufacturer Tosho is leading the way in Japan with its range of automated solutions and is now looking to break into international markets.

Today, healthcare providers the world over are using automation to meet goals such as reducing medical errors and improving diagnostic capabilities. They are even using it to help improve patient compliance, driven by massive amounts of patient data. The benefits of robotic process automation (RPA) to the health sector were made particularly clear during the COVID-19 outbreak, as the global healthcare workforce became stretched to cope with the demands of the pandemic. As a result, technological research and consulting firm Gartner estimates that around 50% of healthcare providers plan to invest in RPA in the near future.

In Japan, Tosho Inc. – which has been involved with facilities and equipment for hospitals ever since its foundation in 1971 – is one such company proving an indispensable partner for healthcare professionals with its range of customized automated medicine dispensing solutions. A perfect example of Tosho's automated solutions can be found in the field of oncology, explains Yoshihito Omura, the company president.

"When pharmacists are preparing for the medicine to be administered to the patient, if they put a higher dosage than what is required, it could pose a serious or even fatal risk to the patient. In this respect, pharmacists have to consider the age and weight of the patient in their assessment and adhere to the schedule of medications in administering

the appropriate dosage," he says. "Our company has a number of automated machines and we have developed software to monitor and check all schedules and procedures. We have a system that could be customized for every patient's needs. In other words, we offer a total pharmacy solution with the machines that we provide."

A company that provides both hardware and software solutions, Tosho's core business is a dose dispensing machine called Xana, which automatically prints out the name of the patient, QR code,



Dose center



Dose dispensing pouch

and the medicine to be administered, providing a convenient way of dispensing as well as safely catering to older people and patients with disabilities.

"We are developing new machines in the Xana product line, on



"The big difference between an IPO company and a family company is that you can formulate a strategy from a long-term perspective without worrying about immediate profits."

Yoshihito Omura, President, Tosho Inc.

which we are currently conducting market research to assess how much potential there is for this product internationally," says Mr. Omura. "Due to the COVID-19 pandemic, healthcare professionals now need to do their medicine preparation in a shorter period of time because they need to provide more care to the patients. More and more Japanese healthcare services are now using automation for dispensing medicine so that pharmacists, nurses, and other healthcare professionals have more time for patient care."

Currently, Tosho only offers its pouch dispensing machines in international markets but has other products such as IV drug dispensers which it is hoping to launch in the future. In Japan and other parts of Asia, Tosho caters predominantly to hospitals. However, it is currently looking to target more hospitals internationally despite each country having its own regulations, which inevitably poses challenges for expansion. In order to cater to these country specific regulations, collaboration with local companies is often pursued. "We need to be flexible enough in terms of our software, products, handling negotiations, and cooperation – and that is what we try to do within our industry," says Mr. Omura.

Having already expanded to parts of Europe and Asia, Tosho is now targeting the United States market. "We started penetrating the U.S. market five years ago and it would be beneficial for us if we could expand even further. We must promote that our machines have a better way of dispensing drugs. We already have distributors as well as OEM partner companies and we are now growing and establishing our facilities there."



Universal Feeder

The Tosho president concludes: "Through our solutions we want to provide value to our customers and improve people's health. The big difference between an IPO company and a family company is that you can formulate a strategy from a long-term perspective without worrying about immediate profits, and you can make employees, cooperating companies, and society happy. Our focus as a family business is the happiness of our workers as well as the happiness of our partners. We would like to contribute more to the end-users such as the patients, hospitals, and pharmacies. The meaning of the companies' existence is not based on profits."



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Sangi: The global pioneer of remineralizing toothpastes

In 1980, Sangi became the world's first company to create a toothpaste that harnessed the enamel-restorative properties of hydroxyapatite. Since then, the firm's technology has branched out into a range of other areas.

Sangi is a trailblazer in dental care, having harnessed the key component of teeth, hydroxyapatite, to develop ground-breaking, enamel-restorative toothpastes.

Founded in 1974 by Chairman Shuji Sakuma, Tokyo-based Sangi began life as a trading company which, according to president Roslyn Hayman, "sold all kinds of things, such as wine, Australian surfboards, even French lingerie". However, a game-changing moment came when the firm acquired a patent for remineralizing teeth from the U.S. National Aeronautics and Space Administration (NASA).

"NASA's idea was to use a precursor to hydroxyapatite, brushite, as a poultice for the teeth, to create new hydroxyapatite and restore density to tooth enamel, particularly for astronauts who can be susceptible to mineral loss in zero gravity," Ms. Hayman says. "But Sangi went one step further. If hydroxyapatite is the same substance as tooth enamel, why not use hydroxyapatite itself as an ingredient in toothpaste, to remineralize and protect people's teeth during everyday brushing? That was our original idea."

In 1980, Sangi released APADENT, the world's first toothpaste containing hydroxyapatite. This was followed by APAGARD in 1985, but it was not until 1993 that the company's proprietary form of hydroxyapatite for enamel-restorative toothpastes gained approval from the Japanese government as an anti-caries agent, and was officially designated as 'medical hydroxyapatite' (<mHAP>).

"When it first went on the market, we couldn't make any claims for it; we couldn't say 'anti-caries' or 'remineralizes tooth enamel' under Japanese law," Ms. Hayman says. "All of that had to be substantiated. Shuji put a lot of effort into research and had groups from two universities carry out anti-caries field trials in Japanese primary schools. Based on their



"We're perceived as a toothpaste company, but we prefer to be referred to as a 'hydroxyapatite company'. We've specialized in hydroxyapatite in a number of areas which we want to develop further."

Shuji Sakuma, Chairman and Roslyn Hayman, President, Sangi Co., Ltd.



Hydroxyapatite



Innovative research



APAGARD enamel-restorative toothpastes & dental lotion

results, Sangi's hydroxyapatite was finally approved as an anti-caries ingredient, which was a huge step forward."

As of 2021, over 150 million tubes of Sangi's toothpaste had been sold in Japan and overseas. "By far the most popular and strongest selling toothpaste in our line-up today is APAGARD PREMIO, which was awarded Hall of Fame status – an oral care industry first – after

being the most popular toothpaste three years running on Japan's largest beauty products consumer opinion site," Ms. Hayman says.

Among the new dental products under development at Sangi is the Powder Jet Deposition system, a device that sprays a coating of hydroxyapatite onto people's teeth. "It's a technology that shows great promise, because it will strengthen teeth, especially



International Dental Show 2019

children's, to protect them from decay," Ms. Hayman says.

The device will also be used for teeth-whitening. "If you put a tiny portion of pigment into the hydroxyapatite, you can adjust the color of the teeth," Ms. Hayman explains. "You'll be able to choose your color, have a new layer of hydroxyapatite sprayed onto your teeth, it will be totally painless, and it won't come off; it's a permanent solution that will both whiten and strengthen your teeth."

However, dental care is not the only application Sangi has found for hydroxyapatite – a material Mr. Sakuma describes as having "unlimited possibilities".

For example, Sangi is developing technology aimed at allowing poorly soluble, poorly absorbable drugs to be administered orally, rather than requiring an injection or intravenous infusion, methods that usually involve a hospital visit. "70% of existing drugs, including many cancer drugs, can't be absorbed if they're taken orally," Mr. Sakuma says. "But when we coat some of these drugs with hydroxyapatite, and test it in mice, we see improvement in the absorption."

Sangi has also created a line of skin care products that contain hydroxyapatite. "We developed a specific type of hydroxyapatite which we found would pick up and remove certain excess and oxidized skin oils, as well as dead skin cells and so on, while leaving some of the oils you need for lubricating your skin," Ms. Hayman says.

Meanwhile, as Japan targets carbon neutrality by 2050, Sangi's hydroxyapatite may have a part to play in reducing greenhouse gas emissions: the company is conducting research into the material's use as a catalyst for producing plant-based fuels. "The project was my idea," Mr. Sakuma says. "I thought it was especially meaningful in terms of social contribution."



Yamahachi Dental: The artificial teeth specialists

With the second largest production capacity of artificial teeth in the world, Yamahachi Dental is supplying smiles across continents and isles.



Kimio Toyama,
Founder

"We have a 30% share of the artificial teeth sales market in Japan and are proud to say we enjoy an excellent reputation among our customers."

Masashi Toyama,
President,
Yamahachi Dental MFG., Co.

Missing teeth can affect one's self-confidence to a surprising degree, preventing people from laughing, smiling, or even speaking when they want to. Modern technology has enabled the development of truly accurate replacements, and the world of artificial teeth is being pushed forward by a demand for hardness and stain resistance.

Japanese manufacturer Yamahachi Dental is one of the companies driving this improvement. Since its founding in 1963, the company has focused on creating high-per-



Soluut PX. Composite Resin Teeth

formance but affordable artificial teeth, gaining an international reputation and being named in 2020 as a Global Top 100 Niche Company by METI (Japan's Ministry of Economy, Trade and Industry). Based in the fishing town of Nishiura, the company's late founder Kimio Toyama, who sadly passed away in December 2019, built

up an expertise in dental material before establishing Yamahachi Dental.

His son, and current company president, Masashi Toyama, explains that the company now has a lineup of around 30 different ranges of artificial teeth. Yamahachi created its own criteria of 45 Vickers hardness for its products, and this allowed it to patent the technology for the world's hardest artificial teeth with stain resistance. This innova-



Complete denture containing Yamahachi Dental products

tion is a nod to the founder's principle of even failure being a lesson learned, and this approach saw Yamahachi come up with new technology which involves inserting nanosilica composites into its mixture to create a balance between acrylic and composite materials.

As Mr. Toyama explains: "Currently, we have three types which are pure acrylic (New Ace, etc.), composite (Crown PX, Soluut PX, etc.) and a hybrid form, our NS series. What we want and what we work very hard to achieve is exceptional quality in all our products, from the more expensive lines to the cheaper ones. We don't believe that by choosing a less expensive product that you should be getting an inferior product."

The company uses CAD/CAM cutting technology to shape and design its teeth in 3D, and the technology's adaptability allows Yamahachi's sales team to work closely with clients to

ensure their demands are met. As an SME, the company understands the need for creativity and innovation in its products, and its R&D team constantly works to create and develop new materials with an eye on quality and affordability.

Yamahachi's high-performance products, which also include CAD/CAM milling materials, dental waxes, separating and cleansing agents, have allowed it to achieve a 30% market share in Japan and a total production of 120 million teeth annually. This impressive production is born from the company's expansion into China, where it is working to expand across the Asian and Southeast Asian markets. The company is always open to cooperation with both domestic and foreign partners, offering the personal touch of a family company but the international presence of a much larger firm.

Indeed, this feeling of a family company is shown through Yamahachi's staff, many of whom are local to the town of Nishiura and the surrounding city of Gamagori. The Chi-



CAD/CAM PMMA disks

nese manufacturing plant was established nearly 30 years ago, followed by numerous local sales offices and now there are a total of almost 400 employees in China. "So we have a lot of people working very hard both in Japan and China on getting the Yama-



Various Yamahachi products

hachi name out there," adds Mr. Toyama. A focus on quality and affordable products along with an ever growing group of sales staff in China has helped Yamahachi become one of the top artificial teeth brand names in China.

This positive experience has reinforced the company's desire to expand, as Mr. Toyama reveals: "We have established markets in over 80 countries and it is very satisfying watching these grow. In the future, we will need a new manufacturing plant if the global demand increases and especially if the development in Asia grows rapidly."

Through this expansion, Yamahachi would seek to become an integral part of a new community, as it has done in Nishiura and Jiangsu through training local staff and working to ensure they become long-term employees.

It is the combination of family-company values and the spirit of innovation that has allowed Yamahachi to become a global leader in the production of strong, stain-resistant artificial teeth, and the company plans to keep its customers smiling for many years to come.



YAMAHACHI DENTAL

www.yamahachi-dental.co.jp/en

Taiyo Kagaku is a research and R&D-oriented company with a mission to “constantly create new technology to make a better world”

Safe and secure ingredients with high performance

Taiyo Kagaku has been creating products for the cosmetics field with the keywords “safety” and “security” by utilizing the interface control technology it previously developed in the food industry. It has developed Sunsoft, a highly functional polyglycerol fatty acid ester that is used in various cosmetic formulations such as facial cleansing and basic skin care for emulsification, solubilization, cleansing, and antibacterial applications.

Polyglycerol fatty acid esters have unique characteristics not only in terms of being non-ionic surfactants with low irritation, but also in terms of controlling the texture such as a moist sensation on the skin with a pleasant feeling.



A natural and sustainable choice for the development of next-generation cosmetics

Recently, Taiyo Kagaku has also focused on developing eco-friendly materials and technology. It announced a new technology called “dilute bicontinuous micro-emulsion” in the International Federation of Societies of Cosmetic Chemists’ journal. This technology achieves high functionality with a small amount of surfactant for cleansing lotions. Taiyo Kagaku has also developed a new natural and COSMOS-certified polyglycerin solubilizer called “SunSoft SCP10-C”. Additionally, Taiyo Kagaku is a member of RSPO and provides certified raw materials to reduce environmental impact and to procure sustainable raw materials.



Taiyo Kagaku will continue to offer high value-added concepts for cosmetics and contribute to reduced environmental impact by leveraging the advantage of materials and its knowledge in surface chemistry and dermatology.



Dedication to improving health

For many years, Taiyo Kagaku has been researching and accumulating “the knowledge of food’s functionality” and “its absorption/digestion in the body” in order to contribute to human health and a better quality of life. One example is Taiyo’s SunActive® Iron. Iron deficiency is known as one of the three major micronutrient deficiencies in the world, along with vitamin A and iodine, and is particularly prevalent in developing countries. Moreover, iron is an essential nutrient often lacking in the diet, especially for infants and pregnant women. The Philippines has faced iron deficiency in children in the past but continuous intake of SunActive® iron-fortified rice has led to reduction in anemia. SunActive® Fe is mild on the gastrointestinal system, providing nonirritating iron fortification with superior properties and bioavailability. This unique Nutrition Delivery System can accomplish these functions using Taiyo’s interface science.



Truly comfortable dietary fiber

Irritable bowel syndrome (IBS) is a disorder characterized by abdominal pain or discomfort, and altered bowel habits (chronic or recurrent diarrhea, constipation, or both). Worldwide, it’s estimated that 10-15% of the population has symptoms of IBS.

Sunfiber® is one of the most studied prebiotic fibers which has been shown to improve both occasional constipation and diarrhea with less gas and bloating. Sunfiber provides gut regularity and reduced symptoms of IBS.



Global Awards

We have devoted ourselves to development for the sake of humanity’s health, food, and lifestyles. The SunActive® and Sunfiber® brands are appreciated by consumers all over the world and have received numerous international awards for the development of Functional Food Ingredients.

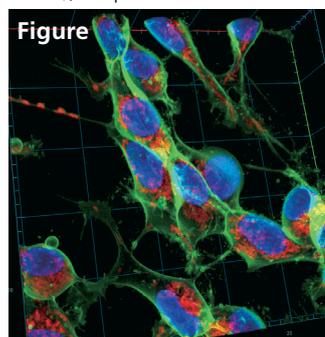


Leveraging decades of experience in the chemical reagents sector

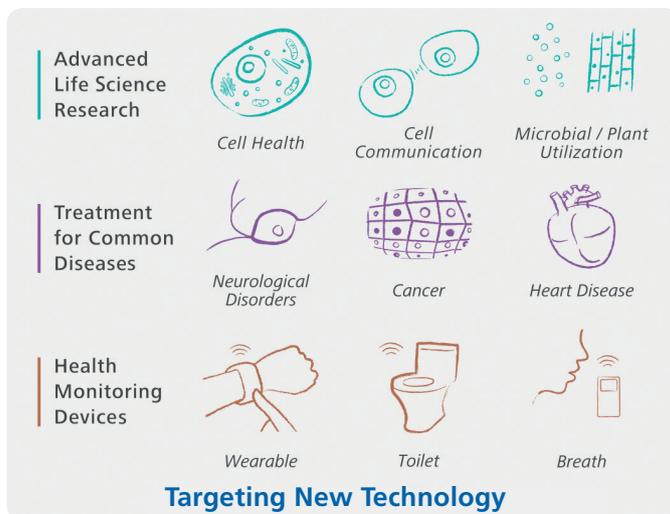
Dojindo has been producing well-reputed chemical reagents used by research organizations all over the world for over 100 years.

Who is Dojindo Laboratories?

We at Dojindo are a team of Japanese researchers with a vision to improve science. With Dr. Yuichiro Ueno as our president, the company philosophy is carried by a strong team spirit. We always believe in providing solutions. Our core mindset is the combination of innovation and experience behind all of our projects. In 1913, Dojindo started business as a pharmacy. After 33 years, Dojin Pharmaceutical Chemical Research Institute (Dojin Pharm Chem), the predecessor of the cur-



rent company, was established and started manufacturing and distributing "chelate reagents," which trap metal ions for analytical purposes. Located in the southwest of Japan in Kumamoto Prefecture, the company changed its name to Dojindo Laboratories in 1978. A sales office in Tokyo was later opened in 1990 to allow the company to reach a greater number of customers. Having experience in the analytical research field, an affiliation company, Dojin Global was also founded in 1990. Since 1996, Dojindo has been expanding its activity worldwide. Dojindo currently has four inter-



national subsidiaries in the USA, Germany, and China (Beijing and Shanghai), which provide products and technical support for customers around the world. To access more advanced technology, another research center in Kawasaki, Japan was opened in 2017.

History and Unique Technology

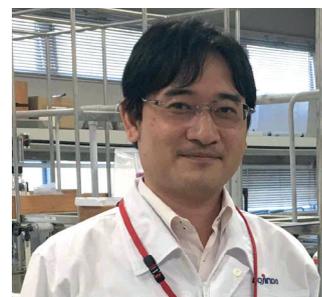
Dojindo has been growing along with the development of scientific technology. In the 1950s, the requirement for metal content analyses increased, owing to the rise in awareness of environmental pollution. Dojindo was the first to introduce chelate reagents for metal ion analysis in the Japanese market. In the 1960s, when biotechnological research became popular in the medical research field, Dojindo began to manufacture pH buffers and surfactants, which are indispensable for cell culture and protein analyses.

After changing its name to Dojindo Laboratories in 1978, the company started to manufacture organic synthesis-based chemical reagents for the life science research field. WST (Water-Soluble Tetrazolium) dyes, novel chemicals with unique properties, were originally synthesized in the 1990s. WST dyes are used in many diagnostics companies as raw materials for clinical tests and as application kits for research purposes. Cell Counting Kit-8, the leading product at Dojindo that uses WST dye, has become popular for drug screening tests by researchers and pharmaceutical companies.

In 1996, Dojindo Molecular Technologies, Inc. was established as a subsidiary with a research laboratory near the National Institute of Health (NIH) in Maryland, USA, engaging in application development in biochemistry and molecular biology to make use of the newest research. In the past five years, Dojindo has targeted cellular function analyses and developed novel fluorescent dyes for organelle imaging (Figure) and cellular metabolic assay kits. In this way, Dojindo has developed materials that can be applied in the medical and life science fields using its unique synthesis technology and has created applications that meet customer needs.

Vision and Latest Initiatives

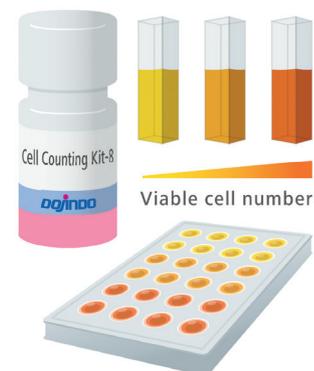
Dojindo has been improving its proprietary technologies in response



"Dojindo's challenge is to advance science and technology by developing reagents based on organic synthesis and proposing what customers want."

Dr. Yuichiro Ueno, President, DOJINDO LABORATORIES

to customer demands. Looking at global society, more challenges linked to improving medical technologies are required. In this remarkable field, Dojindo aims to advance in life science research, with finding new disease treatments and the development of health monitoring devices among the important tasks ahead



Cell Counting Kit-8

for the company. For all challenges, Dojindo will strive to create value in health, life and science always based on our core mission.

Seeking Collaborators

We are looking for sales and development partners in the USA, Europe, and Asia. If you operate in life science, other related fields or are a company that is considering entering the market, contact us. We are looking forward to connecting with you.



ATAGO: Creating technology that measures up

A specialist in devices that measure the sugar content of food and drink, ATAGO listens to what its customers want as it creates well-designed, easy-to-use products.

A company best known for its PAL series of handheld measuring instruments, ATAGO specializes in refractometers designed to determine the Brix, or sugar content, of substances. "The number-one usage of our refractometers is for anything that people put in their mouth, like food, beverages and agricultural products," the firm's president, Hideyuki Amamiya, says. "This is the biggest segment we operate in."

ATAGO's most popular refractometer is the PAL-1, a device typically used to gauge the Brix of fruit, vegetables, jams, sauces, condiments, soups and drinks.

"The issue of diets is a sensitive one for anyone concerned with their health and well-being and, in this sense, understanding the sugar content of foods is very important," Mr. Amamiya says. "Our contribution is to accurately measure such content so that there can be more transparency, and people can gain a better understanding of the Brix levels in the products they consume daily."

In addition to instruments that test for sugar content, ATAGO boasts a range of refractometers capable of performing other measurements on things we eat and drink. This includes devices that can gauge the water content of honey, the concentration of tea and coffee, and the concentration of soy milk.

Although ATAGO's refractometers are chiefly targeted at food and drink, the Tokyo-based company, which was founded in 1940, also offers devices designed for other uses. Its refractometers can test the specific gravity of urine and the make-up of vehicle coolants, for example. Amid the coronavirus pandemic, meanwhile, the PAL-COVID-19 refractometer has been created to measure the concentration of hand sanitizers.

ATAGO's growing portfolio of products also includes pH meters, salt meters and viscometers, as well as hybrid devices capable of multiple functions.

According to Mr. Amamiya, ATAGO's well-designed devices are the result of a creative process in which attention to detail and customer input are key. "In Japan, people are very precise about details, which are what distinguishes a product from others," he says. "These kinds of details define our marketing. We get a lot of feedback from customers, which results in better and more



"We are selling freedom to customers by making the measuring process easier and more efficient, allowing them to spend more time on other things."

Hideyuki Amamiya,
President, ATAGO CO., LTD.

attractive designs on our part, therefore satisfying not only functional aspects, but aesthetic ones too.

"All the products we release are based on the basic philosophy of measurement as an exciting experience. Introducing this good, creative, authentic design is the company's flagship approach. We truly believe these are our best features, and that these bring out the excitement in the measuring process, which can sometimes be perceived as just routine. We can develop the specifications customers require, and the result adds up to a joyful and exciting process."

ATAGO's portable, easy-to-use VISCO viscometer, which measures the thickness of fluids, is a prime example of the firm's dedication to working with its customers to deliver the best possible design. "We introduced the viscosity meter, which can be operated with one hand, after visiting

customers onsite and seeing the issues they were having with previously existing viscosity meters," Mr. Amamiya says.

"For example, women could not operate them well because they were too heavy, and they could not control them properly. This is a good example of how ATAGO was quick to introduce a better design to solve customers' problems.

"Furthermore, disposable containers were introduced for the VISCO viscometer because beforehand, the beaker, the part where materials are inserted, was very hard to handle. You had to take it out, wash it and replace it with a new or existing one, and this was not convenient. As a result, disposable beakers were introduced."

By creating instruments that are not only effective but also easy to operate, ATAGO aims to lighten its customers' busy schedules, Mr. Amamiya says: "We are selling freedom to customers by making the measuring process easier and more efficient, allowing them to spend more time on other things. This is ATAGO's philosophy."

ATAGO's burgeoning selection of multi-functional measuring instruments is further evidence of the company's commitment to making customer feedback an integral part of its design process. "Through our R&D, we are trying to introduce different variations of already existing products by listening to our customers' needs," Mr. Amamiya explains. "For example, we have developed the piccolo product that combines different features – pH, Brix, salt and temperature measurements – into one."

With subsidiaries in Brazil, China, India, Italy, Kazakhstan, Russia, Thailand and the United States, ATAGO has a significant global presence – and has its sights set on further international growth. "The foreign markets where we sell the most are China, the U.S., South Korea and India, as well as Germany," Mr. Amamiya says. "We have also discussed the possibility of returning to Africa, as we had established a company in Lagos, Nigeria, but had to stop operating there because of the outbreak of the Ebola epidemic. While we have still not recruited personnel, we have an office and a car there, so we are already prepared for when the right time to return comes."



reddot award 2019
best of the best



www.atago.net/en

