

JPMA Industry Vision 2025

Bringing Innovation in Drug Discovery to the World



Introduction

The Japan Pharmaceutical Manufacturers Association (JPMA) is an organization of R&D-based pharmaceutical companies. We are constantly undertaking activities to realize the life-related industry's mission of "Contributing to improving the health and welfare of people around the world" through the development of innovative new drugs.

Looking back at the history of pharmaceutical development, advances in science and technology have led to the discovery of pharmaceuticals that effectively treat all manner of diseases from infections to lifestyle diseases and have contributed significantly to medical care. In the past decade alone, a large number of innovative new drugs for previously untreatable diseases such as cancer have been developed, and innovation through drug development has been achieved.

In recent years, chronic age-related diseases have become more widespread due to the rapid aging of society in advanced and emerging countries. In developing countries, infectious diseases used to be the leading cause of death. However, due to global health advancements, non-communicable diseases such as lifestyle diseases have replaced infectious diseases as the leading cause of death, and the disease structure of developing countries is starting to resemble that of advanced countries. As a result, demand for new drugs to treat diseases such as circulatory disease and cancer is expected to grow in the future. In addition, unmet medical needs associated with intractable and rare diseases still remain. The focus of drug discovery research is therefore shifting to diseases whose cause and pathology are more difficult to understand, and the development of innovative new drugs is becoming increasingly difficult year by year, leading to rising R&D costs.

In Japan, which aims to become a healthy, long-life society, the social security cost is expected to increase further in the years to 2025 when the baby boomers will become late-stage elderly. To pass on Japan's universal health insurance system, which has been the driving force behind the world's longest life expectancy, to the next generation, national policies strengthening measures to reduce costs and promoting innovation in the medical care sector were introduced in the "Basic Policy on Economic and Fiscal Management and Reform 2015" and the "Comprehensive Strategy to Strengthen the Pharmaceutical Industry," and these solutions have attracted worldwide attention. R&D-based pharmaceutical companies will not only continue to achieve drug discovery innovation on an ongoing basis, but will also contribute to the realization of a healthy, long-life society.

In "JPMA Industry Vision 2025," we look 10 years into the future under accelerating environmental changes and envision that, by 2025, we will provide drug discovery innovation resulting from our untiring efforts to people around the world, and also indicate a course of action for realizing this vision. With this Vision, I firmly believe that our mission will be realized only when many more stakeholders understand how R&D-based pharmaceutical companies seek to contribute to society in the future and provide their cooperation.

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JPMA Industry Vision 2025

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JPMA Industry Vision 2025

“Bringing Innovation in Drug Discovery to the World”

1. Background and purpose of the formulation of the vision

(1) The importance of the pharmaceutical industry^{*1}

The mission of Japanese R&D-based pharmaceutical companies^{*1} is to contribute to improving the health and welfare of people around the world through continuous R&D and the stable supply of innovative drugs. Thus far, drug discovery innovation or the creation of innovative drugs has helped to achieve a high level of satisfaction with therapies for lifestyle diseases. During the last decade, the contribution of drugs has increased significantly in the treatment of diseases such as various kinds of cancer, AIDS, rheumatoid arthritis, and osteoporosis^{*2}.

Few countries in the world have the complete drug discovery infrastructure covering every aspect from basic research to marketing that is needed for the creation of innovative drugs. These countries have positioned the pharmaceutical industry as a key industry and have been implementing initiatives to strengthen drug discovery capabilities. In the US, the National Institutes of Health (NIH) has the leading role in the health and medical area, while in Europe, the European Commission promotes the life science area in an integrated manner. In addition, some emerging countries are also starting to establish their own drug-discovery environment as part of their national policy in the interests of promoting people’s health and developing technology and economics, and to enhance international competitiveness.

In Japan, a discussion between the government and the pharmaceutical industry was held in 2007, resulting in the formulation of a “5-year strategy for the discovery of innovative drugs and medical devices.” In accordance with the policy outlined in the strategy, a number of measures for promoting the creation and dissemination of innovative drugs have been implemented, such as the formulation of the Healthcare Policy, the foundation of the Japan Agency for Medical Research and Development (AMED), improvement of the R&D tax system, a considerable increase in the number of Pharmaceuticals and Medical Devices Agency (PMDA) reviewers involved in the examination process, and the trial introduction of Premium for Promotion of New Drug Creation and Resolution of Unapproved Drugs/Indications.

In addition, the “Basic Policy on Economic and Fiscal Management and Reform 2015” (“the Basic Policy”)^{*3}, which was published in June 2015, includes “reforms relating to medical service fees including drug prices and dispensing costs as well as pharmaceuticals” and states that they will “consider measures to achieve innovation for the development of new drugs that will contribute to Japan’s national growth strategy

and strengthen the international competitiveness of the Japanese pharmaceutical industry by adequately evaluating truly effective new drugs.” The “Comprehensive Strategy to Strengthen the Pharmaceutical Industry,”^{*4} developed in September 2015 with a view to strengthening the competitiveness of the pharmaceutical industry, underlines strong expectations of Japan’s ability to realize innovative new drug discovery on a global scale. It reminds us that for Japan, a country with only limited resources that is simultaneously experiencing an aging and shrinking population, it is an important national strategy to build a nation based on science and technology and intellectual property in order to win a place in the increasingly intense global competition and to sustain and improve the current level of prosperity.

Japan’s pharmaceutical industry must continue to create innovative drugs to fulfill its mission of contributing to improvement in the health and welfare of people around the world as well as to respond to expectations for economic growth as a prime example of a high value-added industry.

(2) Changes in the environment surrounding the pharmaceutical industry and issues to be addressed

1) Reduction in the increasing cost of social security benefits

The environment surrounding the pharmaceutical industry has been undergoing dramatic changes. The cost of social security benefits has surged significantly on a global scale due to different primary causes depending on the area: the concurrence of rapid society aging and a declining birthrate in advanced countries, the population growth in emerging countries, and an increase in life expectancy in developing countries. Thus, each country has taken actions to reduce the cost in various ways.

It is estimated that the cost of social security benefits in Japan will reach 148.9 trillion yen by fiscal year 2025, when the baby boomers will become late-stage elderly^{*5}. Therefore, the social security system is being reformed by promoting the development of a regional comprehensive care system, and it is assumed that these structural changes will reach a peak in 2025. It is impossible to do without even bolder systemic reforms than those implemented to date in order to pass on Japan’s universal health insurance system, which has been the driving force behind the world’s longest life expectancy. It is no wonder that this will have an immeasurable impact on the pharmaceutical industry as well.

The Basic Policy described above includes a lot of cost containment efforts for annual government expenditures on medical care, among other things, and the target was set to raise the share of generic drugs from the current level of 55% to at least 80% by the period between fiscal year 2018 and the early stage of fiscal year 2020. The

stronger-than-expected promotion of the use of generic drugs will accelerate the reduction in revenues from long-listed products, and it is obvious to everyone that R&D-based pharmaceutical companies will not be able to survive without successful drug discovery innovation.

2) Changes in the business environment

In the environment surrounding R&D, business risks have increased due to factors such as the increasing difficulty of new drug development, spiraling R&D costs, and the intensification of international competition. The focus of drug discovery has shifted from low-molecular-weight compounds to biopharmaceuticals, however the industrial infrastructure for producing biopharmaceuticals has progressed slowly in Japan.

And the shift away from the in-house drug discovery model, in which the entire process from the discovery of drug seeds to clinical development is conducted internally, towards open innovation, including the introduction of drug discovery seeds from universities and other academia or venture companies, is beginning to pick up the pace. In addition, new technologies such as regenerative medicine, gene therapy, and application of “big data” to drug discovery are emerging. In response to these developments, the R&D cost to sales ratio has increased while the pharmaceutical industry’s earnings environment has deteriorated and its operating margins have gradually decreased in recent years. It can hardly be said that a sufficient return on investment has been achieved.

With regard to the sales market, the focus has shifted away from domestic demand, and there are several companies whose overseas sales exceed domestic sales. Given that the market growth rates of advanced countries have slowed down, a more solid operating base will need to be built in emerging countries where the market is expanding as the economy grows. As part of this process, the Japan Pharmaceutical Manufacturers Association (JPMA) has, since 2012, organized the Asia Partnership Conference of Pharmaceutical Associations (APAC) in cooperation with pharmaceutical organizations in Asia to address issues including the harmonization of pharmaceutical legislation, approval and licensing as well as collaboration regarding drug discovery among countries in Asia, in line with its mission “To expedite the launch of innovative medicines for the peoples in Asia”

In a situation where the concept of global health with the principle of “Disease is borderless” is becoming widespread in countries with insufficient access to medical care as well, the expectations for the pharmaceutical industry have exceeded those for other commercial businesses. It is even assumed that, in five years, these expectations will turn into our mission, and that in ten years, the idea that global health should be part of

our business activities will become common.

3) Increased strengthening of corporate governance

The required level and quality of corporate governance has risen year by year. JPMA established a charter of corporate behavior, the JPMA Promotion Code for Prescription Drugs, the JPMA Code of Practice and various guidelines, and has recently been working to enhance regulations to meet the demands of the times, such as the requirement for the independence of internal systems for reviewing promotional materials and advertising. We have also established voluntary rules for the industry and disclosed information to demonstrate transparency in our business activities. Furthermore, we have started working with the government on the fostering of biostatisticians in order to improve the reliability of clinical research data.

However, corporate ethics have often been called into question. It is therefore necessary to further enhance compliance and strengthen governance systems. Based on the awareness and responsibility as an industry that is involved with human lives through pharmaceuticals, we not only have to promote compliance but also need to be trustworthy for all our stakeholders, including patients, consumers, healthcare professionals, government, politicians and investors, with regard to the quality assurance and the stable supply of pharmaceuticals, and we must become an industry to which patients can entrust their health without worry.

(3) Formulation of JPMA Industry Vision 2025

To overcome these challenges, the pharmaceutical industry must take full advantage of the accelerating changes in the environment and fulfill its mission of continuing to create drug discovery innovation, thereby further enhancing the industry's presence in society, the economy, and the healthcare and medical sectors, both in Japan and the world as a whole. To this end, industry-wide proactive measures should be taken in addition to the independent initiatives of individual companies.

On this basis, we have prepared “JPMA Industry Vision 2025” with the aim of indicating the direction in which the pharmaceutical industry aims to evolve, reminding all stakeholders of the value of innovation and the importance of our commitment to it, and gaining their understanding of the problems we are facing and the necessary paradigm shifts.

The vision projects a future image which is expected to be realized no later than 2025 by R&D-based pharmaceutical companies that are undertaking their business activities in Japan on the basis of the principles of JPMA.

Prior to the formulation of the vision, JPMA established a vision study group under

the Industrial Development Subcommittee of the Pharmaceutical Industrial Policy Committee in May 2014, and the group held repeated discussions for one and a half years. The new vision was finalized after seriously evaluating the issues of the pharmaceutical industry stated in the Basic Policy as well as the Comprehensive Strategy to Strengthen the Pharmaceutical Industry, and after holding repeated discussions in collaboration with each committee of JPMA.

Towards the realization of the vision, it is required that JPMA be actively engaged in the activities of each committee, and that JPMA member companies remind themselves of their respective current situation and future direction and take the necessary actions. In addition, we strongly encourage all stakeholders and related parties to better understand the pharmaceutical industry and provide support to realize the vision.

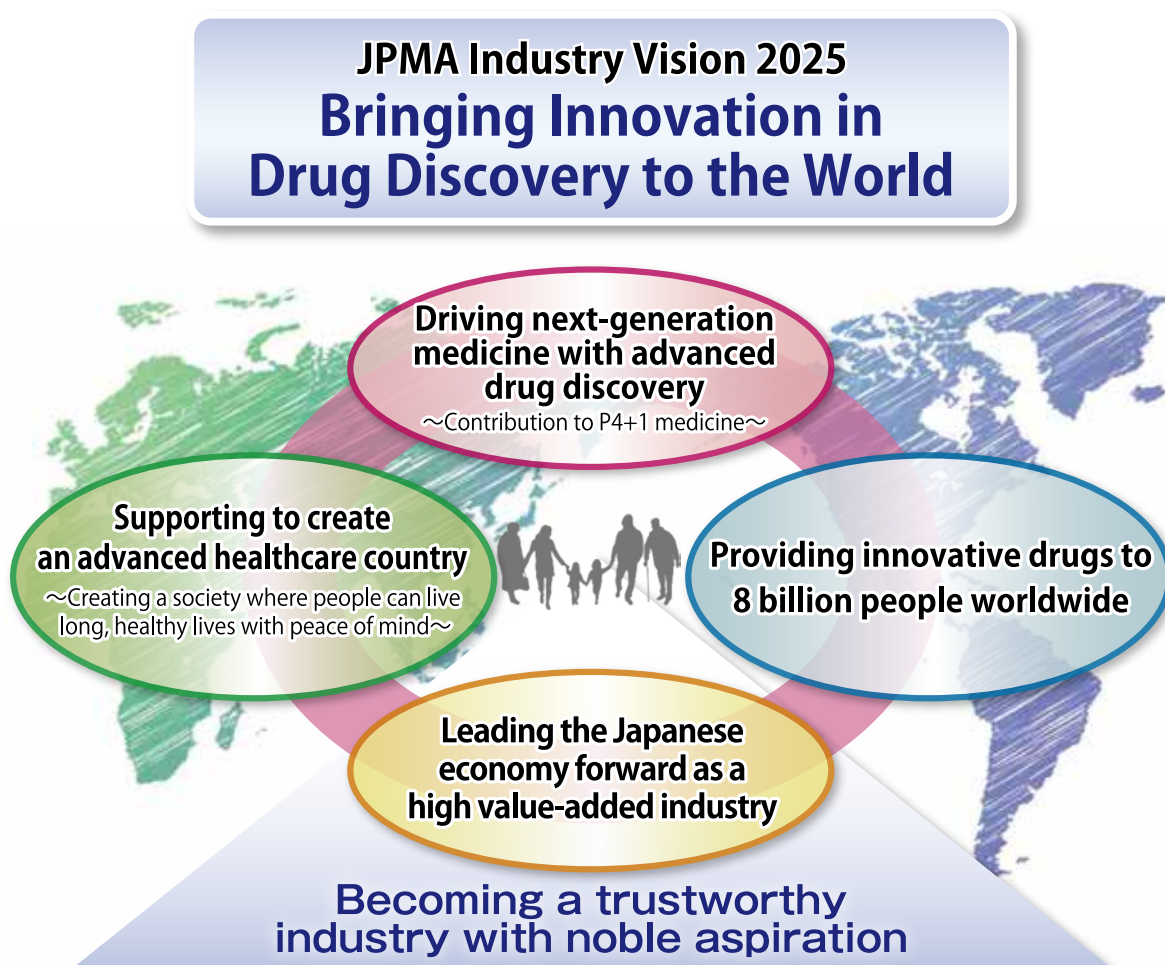
[Notes]

- *1 The pharmaceutical industry refers to JPMA and its member companies, while R&D-based pharmaceutical companies denotes member companies of JPMA.
- *2 Japan Health Sciences Foundation. “FY2014 Domestic Basic Technology Survey Report: Report on medical needs in 60 diseases and new medical needs” (March 2015)
- *3 Cabinet Office (CAO). “Basic Policy on Economic and Fiscal Management and Reform 2015 - Without economic revitalization, there can be no fiscal consolidation -” (“Basic Policy”) (June 2015)
- *4 Ministry of Health, Labour and Welfare (MHLW). “Comprehensive Strategy to Strengthen the Pharmaceutical Industry - Drug Discovery with a View to Global Expansion -” (September 2015)
- *5 Ministry of Health, Labour and Welfare (MHLW). “Revised Future Estimation of Social Security Cost” (March 2012)

2. JPMA Industry Vision 2025

Against the background of the changing environment surrounding the pharmaceutical industry and the future predictions^{*1}, we prepared JPMA Industry Vision 2025 “Bringing Innovation in Drug Discovery to the World” as the vision that JPMA and its member companies should be aiming for during the next decade until 2025.

(Fig.) JPMA Industry Vision 2025



To give shape to this vision, we classified the challenges to be addressed into five categories and established a vision ten years from now for each category.

Vision 1: “Driving next-generation medicine with advanced drug discovery
–Contribution to P4+1 medicine –”

Vision 2: “Providing innovative drugs to 8 billion people worldwide”

Vision 3: “Leading the Japanese economy forward as a high value-added industry”

Vision 4: “Supporting to create an advanced healthcare country – Creating a society where people can live long, healthy lives with peace of mind –”

Vision 5: “Becoming a trustworthy industry with noble aspiration”

To meet the expectations of the pharmaceutical industry, JPMA and its member companies will pursue advanced drug discovery and drive next-generation medicine by achieving drug discovery innovation (Vision 1). We will then make these products available to patients and their families as well as ordinary citizens around the world, including Japan (Vision 2).

As a result of the realization of the visions, the pharmaceutical industry will lead the Japanese economy as a high value-added industry and increase its presence as an industry that deserves to play a leading role in Japan's future (Vision 3). At the same time, we intend to provide support to help Japan become the advanced healthcare country it is aiming to be (Vision 4).

In this process, we will constantly aim high and spare no effort to win the trust of our stakeholders as well as respond to their trust and live up to their expectations (Vision 5).

The aspiration of JPMA Industry Vision 2025 in terms of "Bringing Innovation in Drug Discovery to the World" is that we will generate a virtuous cycle that will contribute to drug discovery by achieving these challenges, and that JPMA and its member companies will channel all their comprehensive strengths into drug discovery innovation.

Vision 1: "Driving next-generation medicine with advanced drug discovery

– Contribution to P4+1 medicine –"

Through the advancement and promotion of science and technology, it is expected that medical care ten years from now will make it possible to predict therapeutic efficacy and safety on the basis of individual and epidemiological data, and greater importance will be placed on pre-symptomatic treatment in a case with higher risk factors as well as preventive medicine including vaccinations. These healthcare concepts are being proposed as P4 medicine.

It is believed that P4 medicine will make dramatic progress during the next decade, so it will be of great importance to generate numerous world-leading innovative drugs that contribute to P4 medicine both for the benefit of the medical care sector and for Japan's survival in the global competition.

(Reference) P4 medicine is a concept in advanced medicine developed in the US. P4 stands for predictive, preventive, personalized and participatory medicine. Its aim is to provide preventive medical intervention by using predictions based on personalized genetic information and biomarkers, and to promote patient understanding of information and participation in medicine*2.

On the other hand, we believe that the advancement and integration of existing technologies is also important for bringing about innovations that improve the quality and efficiency of medical care, and that it is necessary to step up ongoing efforts in technical fields where we have a competitive edge. We refer to this idea as “progressive medicine,” and have established the unique concept of “P4+1 medicine,” which includes “progressive medicine” as +1 in addition to P4 medicine. P4+1 medicine is medical care where each patient can be provided with the optimal drugs at the appropriate time through early diagnosis and prediction upon obtaining the patient’s understanding. This is the next-generation medicine that we envision.

JPMA hopes to achieve innovation in drug discovery that contributes to both “P4 medicine” and “progressive medicine” by making full use of our country’s strengths, including the possibility of accumulating comprehensive and high quality big data from our universal health insurance system, and we have therefore adopted “Driving next-generation medicine with advanced drug discovery - Contribution to P4+1 medicine -” as our vision.

Vision 2: “Providing innovative drugs to 8 billion people worldwide”

Pharmaceuticals have a universal value, regardless of national borders. Against a backdrop of changing demographics, increasing social and economic globalization, and improved global health standards, demand for innovative drugs will have increased all over the world by 2025, and the pharmaceutical industry has an obligation to meet these expectations. Most Japanese companies that have operated globally are large businesses with a tendency to focus on advanced countries. We examined how innovative drugs generated through drug-discovery innovation could be made available in ways that match the conditions in each country, and what actions must be taken for this purpose.

JPMA is becoming increasingly aware of the environmental differences surrounding pharmaceuticals depending on the country, such as the economic situation, the healthcare system, and sociocultural aspects. We have therefore decided to provide the innovative drugs that we have created to people literally all over the world, in order to live up to the expectations of patients around the globe who desire treatment, which led us to adopt “Providing innovative drugs to 8 billion people worldwide” as our vision. In the addendum, we also explain our mission and contribution with regard to global health. In 2025, when the vision will be achieved, the world population is predicted to be approximately 8 billion people. In light of this situation, we have encapsulated our aspiration to deliver innovative drugs to all corners of the world in the phrase “to 8 billion people worldwide.”

Vision 3: “Leading the Japanese economy forward as a high value-added industry”

For Japan, with its limited resources and shrinking population, it is important to build a nation that is based on science and technology and intellectual property. During this process, the pharmaceutical industry is expected to be an even stronger driving force behind the Japanese economy as a prime example of a high value-added industry. Moreover, by further increasing our presence as a high value-added industry and making important contributions to our country and society, we are likely to become an attractive industry that can draw in talent, technology and funds and create a virtuous growth cycle.

JPMA member companies should improve productivity by streamlining research and development, collaborating with different industries, and improving management efficiency; they should create the innovative drugs described in Vision 1 and achieve the further global expansion explained in Vision 2, thereby turning the pharmaceutical industry into a high value-added industry that contributes to Japan’s economic growth and plays an important role in next-generation Japan. To this end, JPMA adopted the phrase “Leading the Japanese economy forward as a high value-added industry” as our vision. In the addendum, we explain our point of view with regard to corporate scale and reorganization.

Vision 4: “Supporting to create an advanced healthcare country

– Creating a society where people can live long, healthy lives with peace of mind –”

The average life expectancy in countries around the world continues to rise. The world’s attention is particularly drawn to the future of Japan, which has the longest life expectancy. An advanced healthcare country is “a country that caters to various styles of life, work and life design, and enables everyone to continue to live active and successful lives in security and with peace of mind.”^{*3} In other words, an advanced healthcare country is considered to be not simply a society in which people’s healthy life span is extended, but also a society with greater active social involvement by people who have benefited from it. It is also a community where people can make satisfactory choices regarding medicine, nursing care and the like, thus enabling them to live high quality lives.

To support an advanced healthcare country, it is vital to sustain the social security system. To this end, it is expected that proactive initiatives should be implemented with social security positioned as an investment in the people of Japan rather than as a cost, and these concepts and initiatives will set an example for the rest of the world to follow.

Consequently, JPMA hopes to contribute to the realization of an advanced healthcare country from the standpoint of the pharmaceutical industry, and adopted the

phrase “Supporting to create an advanced healthcare country – Creating a society where people can live long, healthy lives with peace of mind –” as the vision.

Vision 5: “Becoming a trustworthy industry with noble aspiration”

It is expected that in 2025, greater emphasis will be placed on Corporate Social Responsibility (CSR) and the concept will be incorporated into management and business. Pharmaceutical companies will be required to develop a governance framework for conducting sound, transparent business activities and to fulfill their responsibilities as life-related companies including the quality assurance and stable supply of pharmaceuticals. JPMA member companies and their individual employees will be required to increase their awareness of and commitment to transparency, ethics and compliance in a series of their activities, including the creation of innovative drugs, the marketing of these pharmaceuticals on a global scale, and their contribution to society, the economy and social security.

Through such efforts, JPMA aims to turn Japan’s pharmaceutical industry into an industry that is highly appraised and trusted by all its stakeholders, and whose initiatives and codes of practice are respected both domestically and internationally. We also aim to increase the number of people placing their hopes on, aspiring to a career in, or otherwise wishing to participate in drug discovery. JPMA thus adopted the phrase “Becoming a trustworthy industry with noble aspiration” as the vision.

[Notes]

*1 See “10. Reference.”

*2 Office of Pharmaceutical Industry Research. Industry Report No. 5 “Current Situation and Issues Surrounding the Pharmaceutical Industry – Delivering Better Pharmaceuticals to the World – Part 1: Innovation and New Drug Discovery” (December 2014)

*3 Ministry of Health, Labour and Welfare (MHLW). “Japan Vision: Health Care 2035 Report” (June 2015)

3. Vision 1: “Driving next-generation medicine with advanced drug discovery – Contribution to P4+1 medicine –”

Strategic points for realizing the vision

Cooperation and lobbying for medical database development and application to drug discovery

- Development and harnessing of medical “big data”
- Promotion of elucidation of disease onset mechanisms and search for biomarkers

Steps taken to enable P4+1 medicine

- Establishing the environment and providing information for the realization of “P4+1 medicine”
- Promoting post-marketing development for the realization of patient participatory medicine

Commitment to the creation of personalized pharmaceuticals

- Promoting the development of advanced medical technologies, including biopharmaceuticals, regenerative medicine, and nucleic acid pharmaceuticals

Combining existing drug-discovery technology and expertise through industry and cross-industry collaboration

- Improving productivity through increased public-private-academic collaboration
- Stepping up industry-industry collaboration to enable more advanced drug discovery
- Recommendations and support for the active formation of cross-industry collaborative research centers both at home and abroad

Actions for the establishment of a world-leading clinical trial framework

- Recommendations and support for a medical institution network with access to patient data
- Development of diagnostics for the creation of personalized pharmaceuticals and promotion of efficient clinical trials using PGx

Initiatives related to systems for the realization of P4+1 medicine

- Recommendation and establishment of the corporate framework for the implementation and expansion of the strategy of SAKIGAKE as a package
- Recommendations for the enhancement of the approval system in areas with serious unmet medical needs
- Recommendations and lobbying for a tax system that promotes research and development activities (R&D tax system)

(1) Approach of the vision

Against the backdrop of recent remarkable advances in fields such as next-generation sequencer^{*1} analysis, individual genome information^{*2} and other

biomolecular information is now being analyzed precisely and rapidly, and the cause of diseases and the onset process can be understood in more detail at a molecular level. Personalized medicine, which determines the best possible therapy for each patient based on the patient's genome information, physical condition and disease status through diagnosis using the genome information and biomarkers^{*3}, is becoming more widespread. It is expected to improve the therapeutic efficacy of drugs in an individual patient and to reduce side effects.

It is also expected that these advances in genome- and omics-based research^{*4} and diagnostic technology will contribute to enable not only the diagnosis of diseases after their onset but also the predictive and early diagnosis with a high degree of accuracy before the onset of disease. It will enable preventive medicine^{*5} prior to the onset of disease or during the asymptomatic stage in the early phase of disease, even for conventionally difficult-to-treat diseases, so we expect that it can prevent or delay the onset of disease.

With these next-generation medicines, there will be increasing opportunities for patient participation, namely participatory medical care in which patients think and make decisions themselves when choosing preventive treatment, providing genetic information, and participating in clinical trials.

We must therefore make efforts to increase patients' satisfaction with treatment; in other words, maximize therapeutic efficacy and minimize side effects more than ever before. To this end, we must contribute to the realization of next-generation medicine not only by providing conventional pharmaceuticals prescribed after the onset of disease, but also by providing each patient with the optimal pharmaceuticals upon obtaining the patient's understanding, including preemptive medicine at the right time. In addition, we must boldly rise to the challenge of being a driving force in advanced drug discovery.

Although JPMA and its member companies have developed many innovative drugs to address serious unmet medical needs (UMN)^{*6}, UMN, including intractable and rare diseases, still remain. In light of this situation, we must aim to address UMN by continuing to actively take on challenges at each stage from the elucidation of the disease mechanism to drug discovery research, clinical development and approval reviews. New drug creation has become less productive on a global scale, and the development cost per pharmaceutical item has increased year by year. Against this background, we intend to progressively promote initiatives in the technological fields in which we can be competitive by advancing and combining existing technologies, and to contribute to the establishment of a healthy long-life society by promoting the quality and efficacy of medical care and providing patients with safe and effective innovative new drugs.

(2) Contribution to next-generation medicine “P4+1 medicine”

We coined the term “P4+1 medicine,” defining it as next-generation medicine that realizes advanced medicine and achieves improvement in the quality and efficiency of conventional medicine. P4+1 medicine is a concept in which each individual patient is provided with the early diagnosis and prediction of disease and the best possible drugs at just the right time upon obtaining the patient’s consent.

P4	Personalized	: Personalization based on genetic and environmental factors
	Predictive	: Precise prediction through the use of genetic information and biomarkers
	Preventive	: Preventive intervention based on precise predictions
	Participatory	: Patients’ understanding of information and participation in medical care
+1	Progressive	: Improvement in the quality and efficiency of medical treatment through advancement and combination of existing technologies

“P4 medicine” means personalized, predictive, preventive and participatory medicine. It is an advanced concept developed in the US, which represents preventive medical care using predictions based on personalized genetic data and biomarkers, and patient understanding and participation in the medical care. No one would deny the importance of the progressive development and advancement of existing technologies for improving the quality and efficiency of conventional medicine that has significantly helped address UMN. JPMA aims to realize drug discovery innovation that contributes to both P4 medicine and progressive medicine, and consequently adopted the vision of contributing to P4+1 medicine, which combines P4 medicine with progressive medicine, and driving next-generation medicine with advanced drug discovery.

(3) Specific details of the vision in the future

- Effectively using medical “big data” for drug discovery in order to contribute to the establishment of medical care, whereby individual patients are provided with the best possible drugs at just the right time
- Bringing in drug discovery resources and knowledge from all over the world in order to establish world-leading drug discovery capabilities in advanced and growth sectors, such as personalized medicine, preemptive medicine, and regenerative medicine
- Creating innovative drugs for patients with intractable diseases and serious unmet needs (UMN)

JPMA has made active efforts and provided support to establish the systems required to achieve the above three objectives as well as to develop and gather human resources.

Consequently, Japan has shown a strong presence in the world; more specifically, the number of Japanese-origin innovative drugs accounts for more than 13% of the global market and more than 20% of those drugs are intended for personalized and preemptive medicine^{*7}. Moreover, the number of new drugs for treating intractable and rare diseases approved in Japan has doubled compared to five years ago^{*8}.

(4) Current situation of R&D in the pharmaceutical industry

1) The US is ahead of Japan in terms of database development and medical information

Tremendous efforts have been made on a global scale in genome and cohort research^{*9}, and the medical “big data”^{*10} integrating such research results is attracting attention. The “big data” is expected to be harnessed for personalized and preemptive medicine. In Japan, a committee for the advancement of genomic medicine was established in January 2015, and efforts have been made for the realization of genomic medicine. However, we fall behind the Western nations, in particular the US, in terms of the development of the environment for the actual use of genomic medicine in disease-oriented research and clinical practice.

2) The share of the number of Japanese origin pharmaceuticals has increased slightly, and Japan is attempting to catch up with the West, which is more advanced in the biopharmaceutical field

The sales share of Japanese origin pharmaceuticals with global sales of \$300 million or more is trending downward. On the other hand, the share in terms of their numbers increased from 9.6% in 2008 to 10.9% in 2014^{*11}.

Above all, the sales ratio of Japanese products among the world’s top 50 ranked biopharmaceuticals has risen from 21% in 2006 to 45% in 2013^{*12}, which shows that our presence in biopharmaceuticals has been increasing rapidly. In the R&D of biopharmaceuticals, Europe and the US have been more advanced. However, the number of newly initiated clinical trials of biopharmaceuticals developed by JPMA member companies has increased over the past 10 years, from 15 products (2000-2004) to 30 products (2010-2014)^{*13} and the number of developers has also increased from 9 (2000-2004) to 24 (2010-2014), suggesting that initiatives in this area have been somewhat more active.

3) R&D focus has shifted towards conditions with serious UMN

R&D for serious unmet medical needs, including rare diseases affecting fewer

patients and intractable diseases, is becoming more widespread. The number of approved treatments for rare diseases has increased continuously in Japan, specifically from 29 products (2000-2004) to 52 products (2005-2009) to 79 products (2010-2014)^{*14}. JPMA member companies are currently developing more drugs than before in areas with serious UMN, such as cancers and diseases of the central nervous system (CNS)^{*15}.

4) Shortening of clinical development period and initiatives to further activate and improve the quality of clinical trials

In the decade since 2005, the duration of clinical development (from initial clinical trial notification until application filing) of all the domestically approved drugs with new active ingredients (new molecular entities; NMEs) has been shortened by 21 months (from 69.2 months in 2005 to 48.2 months in 2014). A comparison shows that in 2014, the number of NME applications filed in Japan was almost double that in the US (60 items in Japan and 31 items in the US)^{*14}.

To activate clinical research and studies and improve the quality, it is essential to increase the number of specialists with high levels of knowledge in the field of regulatory science^{*16} and biostatisticians. In particular, in order to foster biostatisticians, who are increasingly in demand, JPMA has repeatedly consulted with the MHLW and AMED and cooperated in setting up training courses and endowed courses at universities and hospitals.

5) Establishment of AMED and major advances in pharmaceutical legislation and systems

In April 2015, AMED was established. Now that we have a research management system covering the entire process from basic research to product development and practical application, we expect that public-private-academic collaboration will be further strengthened. In terms of pharmaceutical legislation and systems, the review period for new drug approval has shortened significantly over the last decade, and has reached a level comparable to that in Europe and the US^{*14}. Moreover, a system for accelerating the practical use of innovative drugs, such as the strategy of SAKIGAKE as a package, has been introduced.

(5) Issues and strategies for realizing the vision

1) Cooperation and lobbying for medical database development and application to drug discovery

Thanks to the universal health insurance system, which has more than 50 years'

history, health and medical data on almost all the people of Japan has been acquired and accumulated in the form of medical insurance claims^{*17}, medical records, and medical examination data.

The digitalization and standardization of these valuable resources make it possible to build a world-class medical health database of the entire population, however there are a host of issues regarding the preparation of the environment for its actual use in medical practice. In terms of the collection of genome- and omics-based information and database development as well, Japan is behind Europe and the U.S., where research has been promoted for the realization of advanced medicine as national projects.

The important key for realizing P4+1 medicine is to actually harness medical “big data” for drug discovery at the stage such as searching for new disease targets and biomarkers. The medical databases in Japan, however, have not yet been fully established so that they can actually be used for drug discovery.

(i) Development and harnessing of medical “big data”

To address the challenges involved in the build-up of medical “big data,” including the appropriate accumulation, digitalization and standardization of medical information, such as clinical test data, medical insurance claims and cohort research data, as well as new forms of medical data, such as genome and omics data, and to handle the issue of making such information available to the industry, close collaboration will be required not only within the pharmaceutical industry but also among related parties, such as healthcare professionals, IT vendors, insurers, patient groups, regulatory authorities and the National Institute of Research and Development. JPMA will actively cooperate and lobby the government by unifying opinions within the industry and making recommendations regarding the establishment of medical “big data” for drug discovery.

(ii) Promotion of elucidation of disease onset mechanisms and search for biomarkers

We will facilitate the use of medical “big data” for drug discovery and encourage the elucidation of disease onset mechanisms and the search for biomarkers through joint initiatives with multiples companies led by JPMA in non-competitive fields. Through the reinforcement of collaboration with academic and medical institutions, including other industries and ventures with original technologies, and various other industries, we will introduce image analysis technologies and advanced diagnostic technologies using DNA or blood samples and contribute to the early discovery of disease factors.

2) Steps taken to enable P4+1 medicine

P4+1 medicine, namely personalized and preemptive medicine based on diagnosis

and predictions using each patient's personalized data, means that a shift occurs from conventional collective medicine to personalized medicine. Under these circumstances, we face a number of issues to be resolved, such as technical issues regarding the prediction accuracy of disease risk and preparations to increase public awareness of P4+1 medicine. With P4+1 medicine, there are likely to be more situations in which patients think and make decisions for themselves when choosing preventive medicine, providing genetic information, or participating in studies.

Although more medical knowledge has been accumulated through interactive communication, including the promotion of self-medication, the initiation of pharmaceutical education, the expansion of support materials, improvement in the knowledge level of the general public thanks to the penetration of the internet, and the common usage of informed consent, healthcare professionals and patients cannot yet sufficiently exchange opinions about the treatment.

(i) Establishing the environment and providing information for the realization of P4+1 medicine

When it comes to medical information database development, we will establish a framework which also enables feedback to patients and share information on international trends, discuss and formulate opinions, and provide information to promote P4+1 medicine via JPMA expert committees with the aim of establishing the environment necessary for the realization of personalized and preemptive medicine based on diagnosis and predictions using each patient's personalized data.

(ii) Promoting post-marketing development for the realization of patient participatory medicine

We collaborate with patient groups, AMED, and others to establish systems that effectively reflect patient needs in drug discovery R&D. We also proactively provide appropriate information so that patients are more accurately informed, as well as support patients so they can participate actively in their own medical care.

3) Commitment to the creation of personalized pharmaceuticals

There are still many diseases with high unmet medical needs, such as intractable and rare diseases, and it is an urgent need to understand the mechanism that underlies these diseases and to search for biomarkers. At the same time, another challenge is strengthening global competitiveness in the creation of biopharmaceuticals, regenerative medicine, and nucleic acid pharmaceuticals, which are important modalities^{*18} in advanced drug discovery. In the biopharmaceuticals field, in particular, only a limited

number of companies have the human resources and manufacturing facilities required to produce products, and consequently Japan is lagging behind internationally.

(i) Promoting the development of advanced medical technologies, including biopharmaceuticals, regenerative medicine, and nucleic acid pharmaceuticals

It is expected that needs for biopharmaceuticals will increase further in the future. To ensure that domestic companies are internationally competitive with regard to the development of biopharmaceuticals, it is necessary to develop the framework for public-private-academic industry collaboration that is required to commercialize the seeds from academia and others, to upgrade and expand manufacturing facilities that can domestically produce biopharmaceuticals (including investigational drugs), and to secure sufficient human resources with expertise and experience in biology and biotechnology. JPMA therefore works to promote the R&D of biopharmaceuticals, and provides support and reinforces the collaboration with the government for the promotion and expansion of human resource development programs related to the manufacturing technology of biopharmaceuticals.

To enable its member companies to show a global presence and become world leaders in advanced technical fields, such as regenerative medicine and nucleic acid pharmaceuticals, JPMA will promote public-private-academic cooperation and cooperate proactively in the resolution of issues related to regulatory affairs, activities for international cooperation, and the development of an environment for the practical application of advanced technologies.

4) Combining existing drug-discovery technology and expertise through industry and cross-industry collaboration

Against the background of a lack of R&D pipelines and the spiraling costs of R&D, commitment to open innovation by pharmaceutical companies is increasing. While public-private partnerships, such as the foundation of AMED, and relationships between academia and industry are developing, stronger government-academia cooperation and inter-industry collaboration with a wide range of partners is required to develop world-class innovative drugs. In terms of industry-industry cooperation between companies, there have been some unconventional initiatives —such as the sharing of compound libraries^{*19} — although still on a limited scale.

(i) Improving productivity through increased public-private-academic collaboration

We aim to further improve drug discovery productivity by increasingly promoting R&D models whereby companies make effective use of other resources besides their

own. We are promoting public-private-academic collaboration, including AMED, and combining the standalone technologies of pharmaceutical companies, the seeds of academic institutions and drug discovery venture companies, and advanced technologies through multiple companies' joint projects led by JPMA in non-competitive fields.

(ii) Promoting industry-industry collaboration to enable more advanced drug discovery

Industry-industry collaboration, including the unprecedented initiative to share knowhow through the mutual use of compound libraries, is advancing. To further strengthen the drug discovery capabilities and international competitiveness of pharmaceutical companies, we are supporting the flexible industry-industry collaboration among JPMA member companies in the following ways: the establishment of JPMA-centered facilities for collaboration, the promotion of exchanges between the senior management of the R&D divisions of member companies, the proactive exchange of information more than the sharing of compound libraries, and the proactive exchange of items for the purpose of drug repositioning^{*20}.

(iii) Recommendations and support for the active formation of cross-industry collaborative research centers both at home and abroad

To further strengthen international competitiveness, we seek to attract foreign drug discovery resources and expertise, and activate the domestic drug discovery innovation environment. We therefore make recommendations and provide support for industrial agglomeration, including special medical zones and clusters, as bases for corporate and institutional collaboration between various industries and drug discovery ventures both at home and abroad. JPMA also works on fostering drug discovery ventures in an increasingly proactive manner and considers what appropriate platforms should be like. Furthermore, with the establishment of AMED, we make recommendations and provide support from the industry side to ensure that public support for ventures and the development of an environment for matching needs and seeds in the medical area can be promoted effectively and efficiently across government offices and agencies.

5) Actions for the establishment of a world-leading clinical trial framework

Towards the realization of P4+1 medicine, it is important both to domestically develop innovative drugs and to improve access to new drugs developed in other countries, and a world-leading clinical trial framework is expected to be built. Thinking from an international perspective, however, the clinical trial framework of Japan has room for improvement, such as the limited number of case series and the high per subject costs. Regarding the development of drugs for intractable and rare diseases,

there is a problem with the evaluation of the effectiveness of a therapeutic agent in only small numbers of patients.

(i) Recommendations and support for a medical institution network with access to patient data

JPMA actively supports the concept of the Clinical Innovation Network (CIN) being promoted by the government, makes recommendations and cooperates for the establishment of the clinical development environment—including clinical research and clinical studies—and seeks to improve the efficiency of clinical trials through the following means: using registration information on diseases, expediting the selection process of trial sites, accelerating the subject enrollment process, and increasing the number of case series. We also recommend the use of CIN to create and expand a registry^{*21} that aggregates patient information, including their treatment history, for the development of drugs to treat intractable and rare diseases that affect only small numbers of patients.

We also consult and cooperate with related stakeholders for the realization of a one-stop service that enables the completion of the necessary procedures for clinical trials at multiple medical institutions (such as requests, agreements, and screenings) via a single point of contact.

(ii) Development of diagnostics for the creation of personalized pharmaceuticals and promotion of efficient clinical trials using PGx

In order to develop personalized pharmaceuticals, the challenges associated with the development of companion diagnostics^{*22} must be addressed, and there is also a need to advance research that uses pharmacogenomics^{*23} (PGx) as markers for patient stratification^{*24}. JPMA promotes the development of diagnostics and the use of biomarkers in trials, strengthens cooperation with related industries and government bodies, and holds consultations and makes recommendations on regulatory affairs.

6) Initiatives related to systems for the realization of P4+1 medicine

In terms of drug legislation, therapies for serious unmet needs, non-communicable diseases (NCDs)^{*25}, intractable and rare diseases are not accessible enough compared to the situations in various countries (such as Breakthrough Therapy in the U.S., the Early Access to Medicines Scheme of the UK's Medicines and Healthcare products Regulatory Agency, and the Adaptive Pathways Scheme of the European Medicines Agency), and the pharmaceutical jurisprudence for preemptive medicine is still being established. To increase access to foreign pharmaceuticals in Japan, there is room for

improvement such as corrections of inconsistencies in regulatory systems between countries and the preparation of application documents written in Japanese.

From the perspective of tax system, Japan's tax credit for experimental and research expenses (R&D tax credit) plays an important role as a measure to support research and development investments in a private-sector and it should be maintained and expanded in the future as well. This R&D tax credit should not be discussed in a way as if cuts in the tax credit for experimental and research expenses were needed to compensate deficiency from the reduction in corporate income tax rate because the R&D tax credit was introduced for the unique purposes not just to reduce tax burdens in a private sector broadly. It should rather be discussed by reference to the UK which pursues both the reduction in corporate income tax rate and the enhancement of the tax system to promote research and development activities.

(i) Recommendations for the implementation and expansion of the strategy of SAKIGAKE as a package and establishment of a corporate framework

To effectively implement the strategy of SAKIGAKE as a package, JPMA will recommend that the authorities ensure that the personnel necessary for shortening the period of priority consultations and priority review are in place, and further enhance the education system for application reviewers. Moreover, in order to facilitate and increase the efficiency of the application and review procedures, we will summarize each company's opinion and make recommendations for improvements on issues such as increasing the level of acceptance of English for the regulatory dossier, unifying the submission packages of various countries, and accepting more data of Asian subjects who are enrolled in the global phase 3 studies in order to make up for Japanese subjects. JPMA member companies should establish internal systems for the future international standardization of local regulations by, for example, preparing an application supported by the review report in foreign countries, and securing/training in-house human resources to cope with the speedy approval and review system, such as Sakigake review.

(ii) Recommendations for the enhancement of the approval system in areas with serious unmet medical needs

As a measure to promote the development of drugs for rare diseases, there is an existing system where therapies can be approved based on clinical trials with a small number of subjects provided that additional clinical trials will be conducted or the medical institutions being applied will be limited. Given that there is likely to be increasing demand for the development of pharmaceuticals to treat serious diseases with high unmet medical needs in the future, we recommend expanding the scope of

application of the system and including designated intractable diseases and serious infections as those covered by the system. We will secure the appropriate human resources to ensure safety and efficacy and provide them with high quality training, and additionally, request that the authorities responsible for reviews secure and train human resources for approval reviews.

(iii) Recommendations and lobbying for a tax system that promotes research and development activities (R&D tax system)

JPMA will make recommendations and take lobbying actions for establishment of a R&D tax system that is more attractive than that of any other country and the introduction of a tax system for enhancement of intellectual properties in order to accelerate development of innovative drugs aiming to provide patients with better drugs more quickly and to sharpen the competitive edge of the Japanese pharmaceutical industry.

[Notes]

- *1 Sequencer: Device used to analyze DNA base sequences
- *2 Genome information: All genetic information stored in DNA
- *3 Biomarkers: A characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacological responses to a therapeutic intervention. An even broader definition includes vital signs used in routine medical care, measurements obtained in various clinical tests such as biochemical tests, blood tests and tumor markers, and image diagnosis data.
- *4 Genome- and omics-based research: Researching genetic information and biological molecules such as gene transcripts, proteins and metabolites
- *5 Preemptive medicine: Using the genetic information and biomarkers of individuals to accurately predict the onset of disease, performing therapeutic interventions at the right time before the occurrence of symptoms or serious tissue damage, and preventing or delaying the onset
- *6 Unmet medical needs: Medical needs in the areas where there is still no effective treatment or medicine
- *7 Japanese origin pharmaceuticals account for a 13% share in terms of number (1.2 times compared to 2014) among all the pharmaceuticals with global sales of \$300 million or more.
- *8 Twice as many drugs to treat intractable and rare diseases are expected to be approved in the period from 2020 to 2024 as those approved in the period from 2009 to 2014 (79 items).
- *9 Cohort research: Research method for epidemiology by which a specific group is followed up and the incidence of disease and other factors (severity, use of medication, age, etc.) that might affect

- the outcome (death, etc.) are analyzed
- *10 Medical big data : Vast quantities of medical data including medical insurance claims, electronic medical records, clinical testing and other medical examination data, and genome and omics data. It is a term used to refer collectively to various types of large data sets that are being produced on a daily basis.
 - *11 Utobrain. The May 2015 issue of *Pharma Future*
 - *12 Office of Pharmaceutical Industry Research. Industry Report No. 5 “Current Situation and Issues Surrounding the Pharmaceutical Industry – Delivering Better Pharmaceuticals to the World – Part 1: Innovation and New Drug Discovery” (December 2014) (produced based on Utobrain. The May 2015 issue of *Pharma Future*)
 - *13 Pharmaprojects, EvaluatePharma
 - *14 Office of Pharmaceutical Industry Research. Research Paper Series No. 68 “Clinical Development of New Drugs and Approval Reviews in Japan: Approved Items during 2000-2014” (November 2015)
 - *15 Materials published by each company
 - *16 Regulatory science: Science that brings the fruits of science and technology into the most desirable form for harmony between people and society by means of making accurate predictions, evaluations and decisions based on evidence
 - *17 Medical insurance claims: Medical service fee statements
 - *18 Modality: The class or physical classification of drug substances; for example, low molecular compound, biological pharmaceutical or nucleic acid pharmaceutical
 - *19 Compound libraries: Library consisting of compounds for use in drug discovery research
 - *20 Drug repositioning: Identifying unknown actions or indications for existing drugs or drugs whose development was discontinued
 - *21 Registry: Registry of patient information to facilitate clinical research and clinical studies
 - *22 Companion diagnostics: Extracorporeal diagnostic agents used to optimize medication use by predicting drug efficacy and individual differences in adverse drug reactions at the time of the drug use.
 - *23 Pharmacogenomics (PGx): Approach that uses the analysis of patients’ genome information to search for and develop safe and effective pharmaceuticals for specific patient groups
 - *24 Markers for patient stratification: Biomarkers used to screen patients with specific drug-related genes
 - *25 Non-communicable diseases (NCDs): Lifestyle diseases and chronic diseases such as circulatory diseases, cancers, diabetes and chronic respiratory diseases

4. Vision 2: “Providing innovative drugs to 8 billion people worldwide”

Strategic points for realizing the vision

Responding to diverse needs and issues

[Advanced countries]

- Promoting understanding of the economic value that innovative drugs bring to the entire society
- Establishing (drug pricing) systems that adequately recognize innovation
- Ensuring pharmaceutical benefits in line with the actual medical setting and healthcare policies

[Emerging countries]

- Establishing a shared platform including harmonization between each pharmaceutical legislation and systems
- Helping to establish foundations (infrastructure) for pharmaceutical manufacturing

[Developing countries]

- Helping to establish foundations for medical care
- Establishing supply chains required in order to deliver pharmaceuticals

Building JPMA’s capabilities to achieve the vision

(1) Approach of the vision

The life sciences and medical technologies have made great advances in recent years. These advancements have made new medical needs visible, and there are endless demands for the development of innovative drugs. On the other hand, in many regions of the world, people are still unable to gain sufficient access to medical care and benefit from pharmaceuticals. Under the circumstances where the presence of emerging and developing countries is increasing through further advances in medicine and medical care as well as social and economic globalization, while the availability and exchange of medicine is promoted transnationally, health and life consciousness is expected to increase further worldwide and there are likely to be greater needs and expectations for excellent pharmaceuticals on a global scale.

JPMA’s mission is to “Contribute to improving the health and welfare of people around the world through the development of innovative drugs.” To fulfill this mission, innovative drugs need to be developed continuously, and in conjunction with this, such pharmaceuticals must be reliably delivered to those who need them. Unfortunately, the current global activities of JPMA and its member companies are only limited, and it can hardly be said that excellent Japanese pharmaceuticals have been accessible to people

around the world. In that sense, there is a long way to go before we accomplish our mission.

Given the ever-increasing expectations for excellent pharmaceuticals worldwide, JPMA has adopted the phrase “providing innovative drugs that we have developed ourselves to people all over the world” as the vision to be achieved by 2025. We aim to accomplish the vision to truly fulfil our mission as an association of R&D-based pharmaceutical companies that is based in an advanced drug discovery country.

(2) Specific details of the vision in the future

Ten years from now, the demand for excellent pharmaceuticals is expected to increase on a worldwide scale, and R&D oriented global pharmaceutical companies will be competing in order to meet the expectations. Against this backdrop, JPMA mobilizes all of its available resources to provide information on innovative drugs developed by its member companies and promote their use in countries all over the world in line with conditions in advanced, emerging and developing countries.

(3) Current situation

Based on their strong drug discovery capabilities, JPMA member companies are continuously creating innovative drugs. Global operations by Japanese companies, however, have been conducted by relatively large businesses, which have a tendency to focus on advanced countries. Although Japanese pharmaceuticals have established a presence in the global market through licensing-out to overseas companies or sales tie-ups, the industry is still a long way from “providing innovative drugs to 8 billion people worldwide.”

• 14.4% of the world’s newly discovered drugs originate in Japan

According to the European Federation of Pharmaceutical Industries and Associations (EFPIA), 14.4% of the new drugs (New Chemical and Biological Entities) launched worldwide between 1998 and 2012 were developed by Japanese companies^{*1}. The new drug discovery capabilities of Japanese companies remain at a high level, supported by basic research and technical capabilities, as illustrated by Japan’s share of the total number of research papers in the field of world’s basic life science (7%^{*2}), and Japan’s share of the total number of drug-related PCT patent publications^{*3} (8%^{*2}).

• Japanese companies account for 7% to 9% of the global market

The share of Japanese companies in the global pharmaceutical market has been between 7% and 9%. Japanese companies account for 57% to 61% of Japan’s

pharmaceutical market, while its share of the overseas market is less than 3%^{*4 *5}.

In light of the fact that new drugs originating in Japan account for around 14.4% of all the new drugs worldwide, it has to be said that Japanese pharmaceutical companies have still not made their strong drug discovery capabilities fully available to the rest of the world.

• **Japanese companies still have a long way to go to expand their global presence**

In 2012, the overseas sales ratio of JPMA member pharmaceutical companies was 37.4%. The overseas sales ratio of those with a sales volume of 500 billion yen or more (five companies) is 49.1%, that of those with sales of between 100 billion yen and 500 billion yen (11 companies) is 22.7%, and that of those with less than 100 billion yen (11 companies) is 4.0%^{*6}.

Companies with high overseas sales ratios (a sales volume of 500 billion yen or more) have generally expanded to more than 50 countries, including collaborations with overseas companies, however more than half of their sales volume comes from those in the domestic pharmaceutical market, which only accounts for 10% of the global market.

It is estimated that Japanese companies will earn 73% of their sales from the international market when they achieve the same level of global expansion as the global pharmaceutical companies overseas, which means that even Japanese companies that are proactively advancing into the foreign market are highly dependent on the domestic market^{*7}.

Only 12% of the global sales of Japanese companies come from Asia (excluding Japan), Africa, Latin America, and other areas^{*8}. They still have a long way to go to expand their global presence compared to the global pharmaceutical companies that operate in well over 100 countries worldwide and earn over 20% of sales in emerging and developing countries (Pfizer 22%, Sanofi 33%, GlaxoSmithKline 32%, Novartis 25%, etc.^{*9})^{*10}.

(4) Issues to be addressed towards realizing the vision

In 2007, when we formulated the “Future vision of the pharmaceutical industry in 2015”^{*11}, the Japanese companies’ main target was the huge market in the field of lifestyle diseases, and it was considered a necessary process for advancing globalization to “expand overseas sales through the active launch of blockbusters with a focus on the European and U.S. markets.” In recent years, however, the environment surrounding the pharmaceutical industry has experienced structural changes: changes in healthcare and drug discovery, a change of consciousness and values regarding healthcare and patients, and social and economic changes on a worldwide scale. A paradigm shift is likely to

occur regarding the activities of pharmaceutical companies^{*12}. Hence, to accomplish the vision of “Providing innovative drugs to 8 billion people worldwide” by 2025, it is indispensable to develop a strategy that takes account of the expected structural changes in the future environment and has a different degree of impact.

The following section describes the issues to be addressed towards realizing the vision by considering future environmental changes that are expected to have a major impact on the global activities of the pharmaceutical industry.

1) Expected changes in the environment

There are two possible future changes in the environment that are expected to have a major impact on the global activities of the pharmaceutical industry: a paradigm shift in drug discovery and growing demand for pharmaceuticals on a global scale.

Firstly, a paradigm shift in drug discovery is likely to occur against a background of significant advances in the life sciences and medical technologies. The life sciences and medical technologies have made remarkable progress in recent years, which has also resulted in major changes in medical needs. In areas where a large market exists, such as that of lifestyle diseases, healthcare standards and patients’ satisfaction with treatment have improved further, while there are unmet medical needs coming to the surface, including the field of intractable and rare diseases.

Up until now, the drug discovery of Japanese companies has mainly focused on the field of lifestyle diseases with a large market in advanced countries, however a large portion of this market will be replaced by generic drugs in the future. Therefore, the companies that are oriented to the development of innovative drugs are shifting their target of drug discovery to diseases in the fields with emerging unmet medical needs^{*13}. Such fields cover diseases with only a few patients scattered around the world. Besides responding to the expectations of patients who are desperately seeking treatment, Japanese companies also need to approach the global market for the continuous development of innovative drugs that require huge investments in R&D.

Secondly, the increasing demand for pharmaceuticals on a worldwide scale is expected to occur due to structural changes in the international community and changes in health consciousness.

The structure of the international community is undergoing major changes. Advanced countries, which have played a leading role in international politics and economy, face stagnation due to economic maturity as well as the aging of society and the declining population. Instead, the economic potential of emerging countries with relatively inexpensive manpower and plenty of room for growth is increasing rapidly, and serves as a new driving force for growth. With international frameworks led by

advanced countries becoming dysfunctional and the economies of emerging countries becoming more independent, along with a growing sense of national sovereignty, developing countries are showing an increasing presence in the international community.

In advanced countries, advanced medical treatments are already being provided and there is still a large pharmaceutical market despite the downturn in economic growth (the estimates by IMS show that advanced countries' pharmaceutical market will account for 57% of the global market in 2016^{*14}). In emerging countries, along with the expansion of the economic scale, people's income levels are rising, the improvement of social security systems and medical infrastructure is being promoted, and the pharmaceutical market is expanding rapidly (the same source shows that emerging markets account for 70% of the global increase in the use of pharmaceuticals since 2011, and will account for 30% of the global market in 2016^{*14}).

On the other hand, in most developing countries, people have less access to necessary medical services because of their low incomes and a lack of established national systems, and the pharmaceutical market is quite small. (The same source shows that developing countries accounted for 7% of the global pharmaceutical market in 2011, and will account for only 8% of the global market even in 2016^{*14}.) Against the backdrop of advances in medical treatment and progress in international exchanges, people in developing countries are also raising awareness about access to medical care, and it is believed that the demand for pharmaceuticals will rapidly become apparent and expand.

Along with environmental, resource, energy, food and poverty issues, the elimination of global inequalities regarding access to necessary medical care is already considered to be an important global health issue that is difficult for a single country to solve and requires commitment on a worldwide scale. With the presence of developing countries increasing in the international community, pharmaceutical companies that have foundations in advanced drug discovery countries will need to contribute to resolving issues relating to global health in a manner that goes beyond an individual company's scale and marketing strategies^{**15}.

(Reference) The entire picture of global health is described in the addendum in the next chapter.

Against this background of a paradigm shift in drug discovery and growing demand for pharmaceuticals on a global scale, JPMA and its member companies are, as the pharmaceutical industry of an advanced drug discovery country, required to provide pharmaceuticals to the world to contribute to the health of many more people.

2) Issues relating to the realization of the vision considering changes in the environment

At a time of the ongoing global expansion of the pharmaceutical market against the backdrop of advances in the life sciences and medical technologies, structural changes in the international community, and changes in people's awareness regarding medical care, we are facing different challenges from those in the past regarding the accomplishment of the vision of providing pharmaceuticals to the world.

(i) Increasingly diverse range of needs and issues to be addressed for the realization of this vision

In the medical pharmaceutical market of advanced countries such as Japan, the U.S. and Europe that JPMA member companies have mainly targeted, pharmaceuticals were relatively easily accessible due to higher economic growth, a solid fiscal foundation and social security systems. Under these circumstances, the major issue was the development of innovative drugs itself.

However, amid major social and economic changes even in these advanced countries in recent years, the environment for access to medicines is in the process of undergoing change. Moreover, the environment surrounding medical care and pharmaceuticals — such as the economic environment, financial situation, disease structure, medical care-related systems, and supply infrastructure — differ greatly from country to country. In particular, needs and issues regarding pharmaceuticals in emerging and developing countries are substantially different from those in advanced countries.

To provide innovative drugs to people around the world, we must provide the necessary pharmaceuticals depending on the disease structure and regulations of each country. Besides, there is a need to contribute to the resolution of healthcare and pharmaceutical issues facing advanced, emerging, and developing countries.

[Issues in advanced countries]

• Striking a balance between access to innovative drugs and sustainable social security

In advanced countries, along with the increasing number of elderly people due to declining birth rates and the aging population, there is a decline in the working-age population. This applies downward pressure on the rate of economic growth in terms of both supply and demand, and leads to a decrease in revenues from health insurance. Coupled with an increase in medical costs due to the aging of society and technological innovation, this situation is causing a structural deterioration of fiscal revenue and expenditure, and therefore concerns regarding the sustainability of the social security system are rapidly increasing. Amid the politically difficult issues of reducing medical

benefits and increasing the burden on the patient, the focus is placed on relatively manageable issues, such as providing pharmaceutical services and price control, while the following policies are advancing or being examined: the price control of new drugs, high target setting for the increased use of generic drugs, limitations on the prescription of expensive pharmaceuticals, and payment depending on the treatment outcome.

In many countries, pharmaceuticals are provided under the coverage of insurance. The cost for such pharmaceuticals is financed by insurance premiums or taxes, and amid increasing concerns regarding the sustainability of the social security system, it is indispensable to promote the efficiency of benefits and reimbursements for pharmaceuticals. On the other hand, the introduction of new drugs promotes quality of life by improving people's health, and in addition, contributes to economic growth by increasing labor productivity and the labor force participation rate. The introduction of a new drug results in higher medical costs, however it can help to increase the sustainability of social security by reducing hospitalization expenses, and in turn, overall medical expenses, with help from increased income^{*16}. It is therefore important that the society appropriately recognizes the value of such pharmaceuticals as a whole and establishes an environment through which access to such pharmaceuticals can be facilitated.

[Issues in emerging countries]

- **Growing demand for resolution of drug lag and provision of pharmaceuticals by local companies**

Against the backdrop of increased economic strength and the maturation of society, people's awareness regarding health and the addition of value to the local economy is further increasing in emerging countries. As a result, regarding access to medicines, there is demand to resolve the drug lag and provide timely access to innovative drugs on an equal footing with advanced countries. Concurrently, there are increasing demands to internally discover, develop and provide new drugs, most of which are currently imported under conditions where emerging countries are highly dependent on other countries (advanced drug discovery countries). It is difficult for each emerging country to establish the environment such as a pharmaceutical jurisprudence and to construct the infrastructure for the pharmaceutical and peripheral industries that enables access to and the supply of new drugs, therefore support must be provided by advanced drug discovery countries and globally active pharmaceutical companies.

Regarding the industrial foundations, the goals of emerging countries differ depending on their degree of development and strategy: some aim to become self-sufficient in basic pharmaceuticals at the minimum level, and others aim to become

a pharmaceutical manufacturing hub or an advanced drug discovery country that can self-develop innovative drugs.

[Issues in developing countries]

• Diverse factors impeding access to medicines

Many developing countries lack the infrastructure for the supply of pharmaceuticals, public health insurance, an intellectual property system, and the financial resources for public health insurance. Besides, they neither provide sufficient education on how to continuously manage social security services nor do they have adequate national management and governance systems. To deal with these issues, it is necessary for government bodies, governmental supporting institutions, UN agencies, NGOs, companies and other related parties to collaborate and cooperate, and provide comprehensive support according to the situation in each country. Pharmaceutical companies are also required to participate in the resolution of the issues in their related fields independently and proactively.

In terms of the delivery of pharmaceuticals, an even more immediate issue is that developing countries lack the infrastructure for establishing supply chains (procurement, manufacturing, quality control, marketing, and distribution). Pharmaceutical companies are required to take the initiative in resolving these issues. It is essential for pharmaceutical companies to assist in the development of local supply chains in developing countries by providing support to establish systems, foster human resources, transfer technologies and establish the facilities required for pharmaceutical supply chains, in combination with the establishment and development of global supply chains, including pharmaceutical companies' own supply routes to developing countries. With these factors combined, Japanese innovative drugs will become available in medical practice in developing countries.

(ii) Lack of capacity to respond to these needs and issues

Looking at the situation of JPMA member companies, even large companies are far from having built up global business models, and the majority of Japanese pharmaceutical companies do not have the capacity to establish the necessary schemes (e.g. management resources such as human resources and funds, systems, knowhow, and management) for delivering pharmaceuticals all over the world.

Against this backdrop, in order to accomplish the vision of “Providing innovative drugs to 8 billion people worldwide,” it is necessary for individual companies to have an increasingly global perspective and combine their own strengths to establish an overall business model based on collaboration with government bodies and various

external organizations. For establishing these business models, aside from integrating the functions of member companies into JPMA committees and others, there is a need to establish an overall system where the member companies can make a significant contribution as a whole, such as outsourcing and sub-contracting as well as tie-ups between member companies, and functional organization through the establishment of associations and corporations by member companies.

JPMA will need to play a supporting, complementing, coordinating and integrating role in the establishment of these business models and the capacity building of each company. JPMA has already established internal international committees that deal with multinational and global matters and various expert committees for all kinds of value chain functions. In order to accomplish the vision of providing innovative drugs to 8 billion people worldwide, however, these functions must be revised and strengthened.

(5) Strategies for achieving the vision

1) Responding to diverse needs and issues

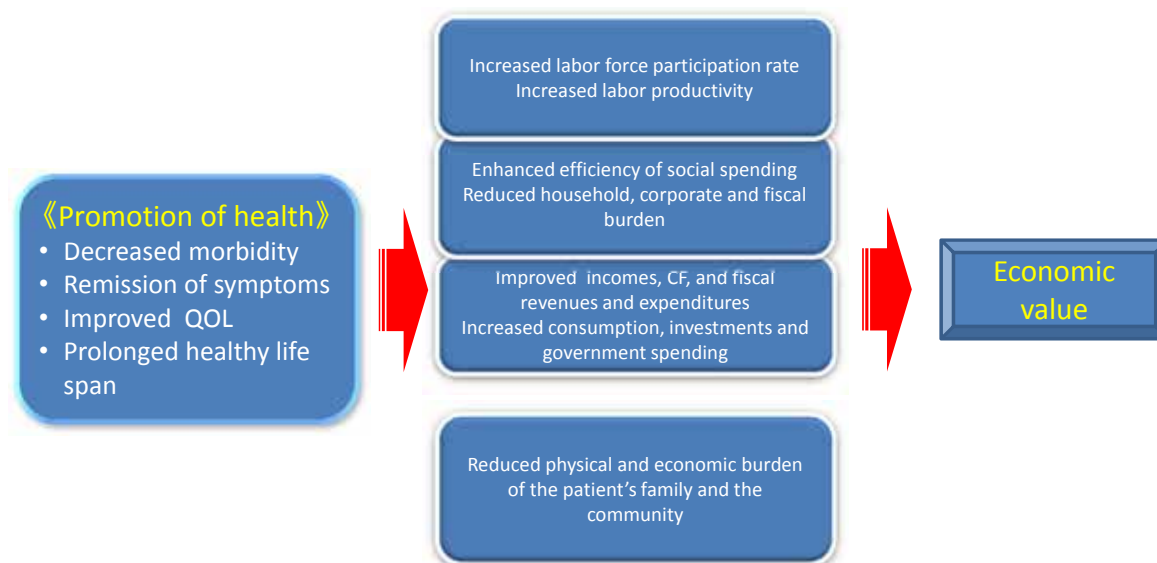
[Advanced countries]

Communicating the benefits of innovative drugs to the world to gain an understanding of their value and advancing the establishment of mechanisms for maximizing their value, aiming at both improved access to innovative pharmaceuticals and sustainable social security.

- **Promoting understanding of the economic value that innovative drugs bring to the society as a whole**

Assessing the economic value that innovative drugs bring to the society as a whole: enhanced labor productivity and labor force participation rates, enhanced efficiency and the reduced burden of social spending, and increased incomes and consumption by improving people's health, prolonging healthy life spans and promoting the rehabilitation of patients. Disseminating findings worldwide to raise awareness of the benefits of the development and availability of innovative drugs. (See the following page.)

(Fig.) Economic value that improvements in people’s health provide to the entire society



(Note) CF: Cash flow

(Source) Office of Pharmaceutical Industry Research. “Future of the Pharmaceutical Industry in Japan”
 - Pharmaceutical and Medical Device Regulatory Science Society of Japan, Regulatory Science
 Expert Special Training Course (September 2014)

• **Establishing systems that adequately recognize innovation**

Calling on each national government to adequately recognize the value of innovation and to introduce mechanisms such as pricing systems that serve as an incentive for the development of new innovative drugs.

• **Ensuring pharmaceutical benefits in line with the actual medical setting and healthcare policies**

Considering what benefits for pharmaceuticals should be like in the areas of next-generation medicine—such as personalized, preemptive, and regenerative medicine—and exploring the establishment of funds that provide support only for specified intractable and rare diseases with high unmet medical needs.

[Emerging countries]

Supporting rapid access to innovative drugs, and development of the environment and establishment of foundations for improving the capacity to domestically produce pharmaceuticals.

- **Establishing a shared platform including harmonization between each pharmaceutical legislation and systems**

Promoting to harmonize local pharmaceutical legislation and systems and to develop capacity in Asia under the APAC Regulations and Approvals Expert Working Group. Expanding activities into other areas, such as the Middle East and Latin America, by harnessing the experience of infrastructure development in Asia.

- **Helping to establish foundations (infrastructure) for pharmaceutical manufacturing**

Harmonizing GMP(Good Manufacturing Practice)^{*17} and GDP(Good Distribution Practice)^{*18} regulations and providing support for the development and training of human resources (dispatch of instructors, provision of manufacturing facilities for mock inspection), licensing-out and technical support (dispatch of engineers, provision of manufacturing facilities on-the-job training) when developing the environment, including infrastructure and regulations, related to the manufacturing and quality control of pharmaceuticals in emerging countries.

[Developing countries]

Helping to establish foundations for medical care and advancing the establishment of a supply chain to eliminate factors impeding access to medicines in developing countries.

- **Helping to establish foundations for medical care**

Proactively becoming involved in the following actions: the formulation of international rules, including shared rules on global intellectual property rights that will support the creation and widespread use of innovative drugs at a global level, access programs in line with economic resources and ability to pay, measures to combat counterfeit drugs, and developing the local human resources required for access to medicines.

- **Establishing supply chains required in order to deliver pharmaceuticals**

Establishing supply chains, the greatest deficiency, through the following methods: pooling and sharing resources by JPMA member companies, cooperating with external organizations including public-private partnerships, and pursuing localization through cooperation with local companies.

(i) Pooling and sharing resources

Mutual tie-ups between JPMA member companies, outsourcing and sub-contracting, and establishing associations and corporations by member companies

(ii) Collaborating with external organizations

Expanding public-private partnerships such as the Global Health Innovative Technology Fund (GHIT Fund)

(iii) Pursuing localization

Tie-ups with local companies and local branches of multinational companies

2) Building JPMA's capabilities to achieve the vision or respond to needs and issues

Promoting to strengthen the following supporting and coordinating functions of JPMA required for the implementation of the recommendations and actions described above:

-research and policy advisory;

-global response capabilities; and

-external relations and liaison with local government, international organizations, nonprofit organizations, and others.

[Notes]

*1 EFPIA. "The Pharmaceutical Industry in Figures, Key Data 2013" (Source) SCRIP-EFPIA calculation

*2 Office of Pharmaceutical Industry Research. Industry Report No. 5 "Current Situation and Issues Surrounding the Pharmaceutical Industry – Delivering Better Pharmaceuticals to the World – Part 1: Innovation and New Drug Discovery" (December 2014)

*3 Patents for which international patent applications are filed under the Patent Cooperation Treaty (PCT). A single application filed with the patent office of a PCT contracting country in accordance with an internationally unified procedure has the same effect as filing applications simultaneously in all PCT contracting states.

*4 Office of Pharmaceutical Industry Research. OPIR News No. 37 "Presence of Japanese pharmaceutical companies in the pharmaceutical market" (November 2012) (Prepared based on ©2015 IMS Health, "IMS World Review". (All rights reserved.))

*5 Office of Pharmaceutical Industry Research. OPIR News No. 40 "Export-driven industrialization of pharmaceuticals" (November 2013) (Prepared based on ©2015 IMS Health, "IMS World Review". (All rights reserved.))

*6 Twenty-seven companies listed on the first section of the Tokyo Stock Exchange whose main field of business is pharmaceuticals (Source) JPMA website

*7 Office of Pharmaceutical Industry Research. Research paper series No. 58 "Issues relating to the excess import of Japanese pharmaceuticals and the establishment of foundations for drug discovery" (April 2013) (Prepared based on ©2015 IMS Health, "IMS World Review". (All rights reserved.))

reserved.))

- *8 FY2013 figures. Those of Otsuka Holdings also include the sales volume achieved in Europe. (Source) Securities filings of each company
- *9 2013 figures (Source) Annual Report of each company, Form-10K, Form-20F, website
- *10 In the “Access to Medicine Index”, a survey implemented by the Access to Medicine Foundation, most Japanese companies still rank low (ATM index: Ranking of the world’s 20 leading multinational pharmaceutical companies based on their efforts to improve access to medicines in the least developed among developing countries). (Source) <http://www.accesstomedicineindex.org/>
- *11 Office of Pharmaceutical Industry Research. Industry Report “Future Vision of the Pharmaceutical Industry – Industry’s Mission and Issues for 2015” (May 2007)
- *12 Office of Pharmaceutical Industry Research. Industry Report No. 5 “Current Situation and Issues Surrounding the Pharmaceutical Industry – Delivering Better Pharmaceuticals to the World” (December 2014, April 2015)
- *13 According to future estimates by the Institute for Healthcare Informatics (IMS) regarding the brand-name pharmaceutical market, the use of biopharmaceuticals will increase significantly, while that of low molecular compounds, etc. will decrease. Looking at the data by disease category, the use of pharmaceuticals in specialty fields is expected to expand, while that in many traditional fields is expected to shrink. (Source) ©2015 IMS Health. "The Global Use of Medicines: Outlook Through 2016" (the IMS Institute for Healthcare Informatics)
- *14 Prepared based on ©2015 IMS Health, "The Global Use of Medicines: Outlook Through 2016" (the IMS Institute for Healthcare Informatics). In these materials, we use the terms advanced countries (Developed), emerging countries (Pharmerging) and developing countries (Rest of World excluding Developed, Pharmerging and Rest of Europe).
- *15 In these materials, to summarize the issues faced in making innovative drugs globally available, we assume advanced countries, emerging countries and developing countries to be as follows.

Advanced countries: Countries that have achieved a significant degree of industrialization, have a highly developed economy, are technologically advanced and have high standards of living. Examples of advanced countries include the US, the UK, France, Germany, Japan, Italy, Canada, Australia, South Korea and Spain.

Emerging countries: Countries other than advanced countries that have benefited from high levels of investment and trade since the end of the Cold War and are experiencing rapid economic growth. Although their per capita gross domestic product (GDP) is lower than that of advanced countries, their growth rate is higher than the global average, and the pharmaceutical market is expected to expand in the future.

Developing countries: Countries other than advanced countries and emerging countries. These include the least developed countries as defined by the UN.

- *16 Office of Pharmaceutical Industry Research. OPIR News No. 36 “The Contribution of New Drugs – From the Perspectives of Life Expectancy, Medical Costs and Economic Value –” (July 2012)
- *17 Good Manufacturing Practice Standards for manufacturing control and quality control established to ensure that products are made “safely” while maintaining “certain quality standards” across all processes, from the acceptance (receipt) of raw materials to shipment.
- *18 Good Distribution Practice Standards for assuring that quality at the time of production is consistently maintained throughout the distribution process, as well as for avoiding theft and accidents and for preventing counterfeit drugs and falsified products from becoming mixed up with genuine products in the supply route.

5. Addendum 1: “To fulfill our mission and contribute to global health”

(1) Current situation and trends in global health initiatives

Regarding the global disease structure, more cases are observed mainly in non-communicable diseases (NCDs), including cancer, dementia, and lifestyle diseases, due to economic growth and the advancement of aging in emerging and developing countries that show a similar trend to advanced countries. On the other hand, through the threat of emerging infectious diseases that spread instantly across borders because of the advances in globalization, such as the Ebola hemorrhagic fever epidemic, the importance of public health and primary care is again being challenged. We are facing common health challenges regarding a variety of events that are occurring on a global scale. In this era where diseases do not respect national borders, the concept of global health, by which medical measures are taken from various viewpoints, has become more common in international society.

To address such health issues, JPMA member companies are currently collaborating with all kinds of stakeholders—such as government bodies and international organizations—and contribute to the promotion of global healthcare by making efforts to resolve these health issues by making use of their accumulated technical capabilities and experience regarding new drug development. Specifically, the GHIT Fund, which is a public-private partnership that originated in Japan, and all kinds of initiatives and partnerships have worked in this field.

On the other hand, it cannot be denied that there are enormous differences between the efforts of Japanese companies and the activities of multinational pharmaceutical companies that have expanded to more than 100 countries around the globe. European and U.S. multinational pharmaceutical companies already have a long history of expanding their businesses to developing countries, and have a background of dealing with challenges related to providing access to medicines. In contrast, the global activities of Japanese companies have only just begun, and along with the future expansion of business target areas, efforts will be made to establish cooperative relationships with the government of the partner country and to enhance corporate philanthropy on the individual company level.

(2) Policy trends for 2025

Regarding policy trends for 2025, the Millennium Development Goals (MDGs) reached the deadline in 2015, and the Sustainable Development Goals (SDGs), which should be achieved by 2030, were formulated as the next developmental goals by the UN General Assembly in September 2015. Another movement is a new strategy that

was formulated by the WHO to address neglected tropical diseases (NTDs) as a goal to be achieved by 2020^{*1}, for which efforts are being made to eradicate and suppress NTDs by 2020. JPMA and its member companies will respond to this trend and implement their own original plan regarding contributions from three perspectives: R&D, access to medicines, and human resource development.

1) Partnerships to revitalize new drug discovery

Through the provision of pharmaceuticals and vaccines produced by taking advantage of state-of-the-art science and technology, JPMA and its member companies, based on the world's third-biggest drug discovery country, have contributed not only to the treatment and prevention of diseases, but also to the improvement of the health and welfare of people worldwide in the following ways: prolonging the average life span, reducing infant mortality rates, reducing the burden of expensive hospitalization costs, and helping patients become reintegrated into society.

Especially in the field of vaccination, more attention is being paid to the development of next-generation vaccines and treatment vaccines that make use of the immune system, as well as the creation of vaccines for infectious diseases. It is expected that vaccines and adjuvants will be applied to the prevention and treatment of many different diseases through promoting industry-academia collaborative research and expanding the target diseases.

In addition, newer drug development against diseases that are prevalent in developing countries requires activities such as participating in partnerships for establishing the necessary environment for new drug discovery and for developing new drugs in this field.

To be specific, these include the further expansion of public-private partnerships entwined with Product Development Partnerships (PDPs), such as the GHIT Fund, and the international community's combined efforts to create pharmaceuticals that are needed in developing countries. Therefore, it is important for more companies to participate in such programs and to be involved not only in R&D but also in the entire process until the launch of these new pharmaceuticals. On the other hand, for the purpose of making the contribution to global health sustainable, it is necessary that government bodies, in particular those of advanced countries, provide support for platforms such as companies and partnerships that contribute to global health. This support may take many different forms as follows: continuous participation in the partnerships, the establishment of effective funding schemes, and considerations regarding the tax system.

2) Establishing a system for delivering pharmaceuticals to the world

To improve access to medicines, it is necessary to understand the current situation from diverse perspectives, including the supply of pharmaceuticals but also the degree of improvement of the healthcare environment and medical care systems, and all parties involved must implement measures cooperatively. Good quality pharmaceuticals should be accessed by patients in each region and provided sufficiently and stably, and medical care should be continuously provided from a medium- to long-term perspective.

In addition to NTDs, another disease-related major issue is the expansion of NCDs in emerging and developing countries. Under these conditions, each company should attempt to solve the various problems through public-private partnerships with WHO or NPOs/NGOs, etc. In addition, it is necessary to work on establishing sustainable business models for access to medicines in developing countries where social security systems have not been established and that currently lack the infrastructure for business activities.

In detail, the important measures for tackling these issues are as follows: pooling and sharing resources (mutual tie-ups between JPMA member companies, outsourcing and sub-contracting, establishing associations and corporations by member companies), and pursuing localization (tie-ups with local companies and local branches of multinational companies). For cooperating with local government bodies, etc., JPMA and its member companies should strive further to enhance these measures for pooling and sharing resources and pursuing localization by gaining widespread support from the Ministry of Foreign Affairs and the Japan International Cooperation Agency (JICA), among others.

3) Transfer of skills and knowhow

Regarding business expansion to developing countries and other markets, it is said that the strength of Japanese companies is human resource development. In terms of making a contribution to the sustained development of the country to which business is expanded, a real need is to transfer skills and knowhow to local people. In developing countries, there are various factors impeding access to medicines: inadequate public health insurance systems and medical infrastructure, lack of human resources for pharmaceutical manufacturing and quality control, and widespread counterfeit drugs. The contribution of JPMA and its member companies to practical guidance on capacity building, as well as local education and training, is considered to be a key issue for improving access to medicines.

Specifically, we provide technical guidance on pharmaceutical manufacturing and quality control at the sites in cooperation with stakeholders. We also cooperate with local and Japanese government bodies in making efforts to improve healthcare

professionals' abilities in terms of prevention, diagnosis and treatment. Furthermore, we will contribute to the improvement of the level of global healthcare by attempting to improve local people's understanding of hygiene and medical care, and improve access to medical care.

(3) Overall message – To fulfill our mission and contribute to global health –

The efforts of Japanese companies to contribute to global health must be promoted not only by fostering the awareness that each company should have, but also by ensuring that JPMA's support systems reinforce and enhance research capabilities, policy advisory capabilities, liaison capabilities with government agencies, international organizations and nongovernmental organizations (NGOs) and inter-company network construction capabilities through cooperation between expert committees and other means. We will also consider expanding the JPMA secretariat's capabilities in order to facilitate cooperation with Japanese government agencies and major international pharmaceutical organizations, such as the International Federation of Pharmaceutical Manufacturers & Associations (IFPMA), Pharmaceutical Research and Manufacturers of America (PhRMA) and EFPIA. Each company's primary task is to strengthen its information dissemination capabilities, which include raising society's awareness of this matter in an appropriate manner and making recommendations to stakeholders, and efforts need to be made based on the concept of global health by linking corporate planning and CSR capabilities, and incorporating this concept into the business portfolio.

Under these circumstances, the G7 Ise-Shima Summit and the G7 Kobe Health Ministers' Meeting will be held in 2016. As the host country, Japan is expected to take an active role in discussions on global health in all countries around the world. JPMA and its member companies will actively take advantage of this excellent opportunity to advance our activities for global health.

[Notes]

*1 WHO. "Roadmap for overcoming the global impact of Neglected Tropical Diseases (NTDs)" (January 2012)

6. Vision 3: “Leading the Japanese economy forward as a high value-added industry”

Strategic points for realizing the vision

Streamlining and rationalization R&D to create innovative drugs

- Proactively introducing advanced technologies for drug discovery

Creating new value through cross-industry collaboration

- Creating innovative drugs and expanding the market through cross-industry collaboration, etc.

Accelerating the growth of markets and investment through global expansion

Efforts to streamline business management to secure funds for investment

- Efforts to reduce the cost ratio
- Efforts to reduce selling, general and admin expenses

(1) Approach of the vision

One of the missions of the pharmaceutical industry is to contribute to the growth of the Japanese economy as a highly value-added industry. The Japanese government expects the pharmaceutical industry to achieve this mission and clearly mentions it in the government recommendations and other official documents.

According to the Japan Revitalization Strategy (June 2013), the market scale for medical health-related industries, such as pharmaceuticals, medical devices, and regenerative medicine, is expected to reach 16 trillion yen in 2020 and 20 trillion yen in 2025 (it was 12 trillion yen in 2013). The Healthcare Policy (July 2014) states that revitalizing the healthcare-related industries will contribute to the growth of the Japanese economy.

On the other hand, specific measures that could potentially contribute to economic growth include the following: increasing the production value of pharmaceuticals targeting the global market, developing unique and original products, and creating high added value and high-level tax-paying capacity resulting from increased management efficiency.

The pharmaceutical industry, as a high value-added industry, will lead the Japanese economy until 2025 through these activities.

(2) Specific details of the vision in the future

The mission of the pharmaceutical industry is to create innovative drugs for people around the world through global expansion and to contribute to improving their health, as well as to contribute to the growth of the Japanese economy and become a high

value-added industry that can play an important role in next-generation Japan.

The creation of innovative drugs can be made possible by streamlining R&D more than ever, as well as by undertaking drug discovery innovation through wide-ranging collaborations with a variety of domestic and international companies and organizations engaged in improving health, without being bounded by the framework limited to the pharmaceutical industry. It is expected that these collaborations will result in the further enlargement of the R&D scale for drug discovery. Meanwhile, business management will be continuously streamlined and the resources for investment in R&D will be secured.

Regarding global expansion, pharmaceutical companies will accelerate global availability through their existing pharmaceuticals and innovative drugs that are developed in the future, and return the resulting revenues to further domestic and international investments. Overseas companies will also attach importance to the Japanese market, and expand their sales in the Japanese market and contribute to promoting access to medicines by readily launching the world's innovative drugs.

Based on the above, the pharmaceutical industry will contribute to improving the health of many people and to Japan's economic growth, and become a high value-added industry that plays an important role in next-generation Japan. More specifically, we aim to use the added value to achieve growth that exceeds the expected growth rate of the Japanese economy.

(3) Current situation

The Japanese pharmaceutical industry used to grow mainly based on the domestic market, but it is currently expanding globally with innovative drugs. Furthermore, it cooperates with overseas companies and proactively launches the world's innovative drugs in Japan. Although pharmaceutical prices are increasingly curtailed both domestically and internationally, the Japanese pharmaceutical industry has secured revenues through the expansion of its overseas market and pursues continued research and development for drug discovery while establishing an advantageous position in terms of the rate of added value.

1) Expansion of the pharmaceutical market

In Japan, the production of pharmaceuticals increased by around 13% over the last decade (from 2004 through 2013), with an average annual growth rate of around 1.3%. Of this, medical pharmaceuticals increased by around 14%^{*1}.

The market of pharmaceuticals in Japan has grown nearly 22% over the last eight years (from 2005 through 2012), with an average annual growth rate of around 2.9%. Of

this, medical pharmaceuticals increased by around 25%^{*2}. During the same period, sales of overseas companies in the Japanese market increased by about 30%^{*3}. The global pharmaceutical market has increased by around 19% over the last five years (from 2010 through 2014), with an average annual growth rate of around 4.5%^{*4}.

2) Expansion into overseas markets by 27 JPMA member companies

Overseas sales increased 2.3-fold over the last decade (from 2004 through 2013), and 27 JPMA member companies of Japan had expanded into overseas markets by FY2013^{*5}. Against the backdrop of a sluggish Japanese market, the pharmaceutical industry has expanded its business activities overseas through innovative drugs and further increased investments in research and development, which has led to new drug discovery.

3) R&D spending increased by 59% over the last decade

R&D spending increased by around 59% over the last decade (from 2004 through 2013), with an average annual growth rate of around 5.3%. The ratio of R&D spending to sales increased by 3 points. The pharmaceutical industry retains the top position in terms of R&D spending ratios^{*6}.

The R&D of a new drug requires a substantial amount of time, approximately 9 to 17 years^{*7}. In recent years, new drug discovery has become increasingly difficult, and in particular, the cost of clinical trials in the developmental stage has placed a significant burden on pharmaceutical companies. As the drug discovery technologies diversify, the cost of obtaining patent licensing is also increasing.

(Reference) Science and technology budget of the Japanese government: According to Cabinet Office data, the “investment scale and actual budget” of the science and technology budget from 2006 through 2010 was “25 and 21.7 trillion yen, respectively,” and the “investment scale” from 2011 through 2015 was “25 trillion yen,” thus remaining unchanged.

4) Remaining at the top level as a high value-added industry

As one of Japan’s main industries, like the automobile, electric appliances, and iron & steel industries, the pharmaceutical industry has consistently paid high levels of tax for some time. In 2008, when the global financial crisis hit, the pharmaceutical industry, as an industry resistant to downturns, overtook the automobile industry to become the industry that paid the most taxes in the period from 2008 to 2011^{*8}. Additionally, the pharmaceutical industry has consistently been one of the top industries in the last five

years (from 2009 to 2013) in terms of the rate of added value and the added value per employee^{*9}.

(4) Issues and strategies for realizing the vision

1) Streamlining and rationalization of R&D to create innovative drugs

To streamline and rationalize R&D, it is necessary to utilize domestic and international resources (e.g. human resources, seeds, technology and funds) to shorten the required period, as mentioned in Vision 1: “Driving next-generation medicine with advanced drug discovery.” This requires the establishment of schemes for amicably sharing seeds and knowledge that are available within the pharmaceutical industry as well as in a wide range of industries.

(i) Proactively introducing advanced technologies for drug discovery

To streamline R&D, the pharmaceutical industry undertakes translational research for applying information obtained from basic research to human healthcare and drug discovery; reverse translational research for feeding back the information obtained in human clinical settings and clinical trials to basic research; drug repositioning for exploring possible additional indications of marketed products and existing compounds whose development has been interrupted; the utilization of Big Data including human clinical data; and the utilization of genome editing technology and regenerative medicine technology, among many others.

2) Creating new value through cross-industry collaboration

The effective use of outside resources (human resources, seeds, technologies and funds) is required more than ever. Combining the technologies of many different industries will hopefully lead to new drug discovery and to the expansion of the healthcare market overall.

(i) Creating innovative drugs and expanding the market through cross-industry collaboration, etc.

Diseases with high unmet medical needs, on which drug discovery focuses, entail difficulties in the understanding of disease mechanisms and conducting R&D of pharmaceuticals because of their severity and rarity. The probability of commercialization is therefore low. To reduce the risk of R&D and improve its productivity, we will effectively make use of outside resources, such as those from other pharmaceutical companies and other sectors, including the information systems, medical devices and bioengineering industries, as well as venture companies, academia,

government and nonprofit organizations.

We already have public-private partnerships such as the GHIT fund in Japan and the Innovative Medicines Initiative (IMI) overseas. In the future, further improvements in R&D productivity will be achieved through developing partnerships and cooperation with international institutions, financial institutions and overseas organizations.

The cross-industry partnerships will also help to expand the entire healthcare market size and facilitate integration through the utilization of domestic and international resources under a value chain. Inviting professionals from domestic and international research agencies to improve the drug-discovery environment and accelerating the horizontal division of labor will help create new values and streamline R&D.

3) Accelerating growth of markets and investment through global expansion

Japanese pharmaceutical companies will take the lead in supplying quality, Japanese-origin innovative drugs to many patients around the world, focusing on the overseas markets that make up approximately 90% of the entire pharmaceutical market. On such an occasion, we will expand and review the domestic and international value chain, which will result in increased and expanded investment.

4) Initiatives to increase management efficiency to secure funds for investment

Increasing management efficiency includes reviewing the entire process from R&D to manufacturing and sales and taking action in response to changing circumstances. For R&D-oriented pharmaceutical companies, an increase in drug development costs is a significant issue, and various initiatives need to be introduced to secure resources for investment.

(i) Efforts to reduce the cost ratio

To establish a new manufacturing process, we will achieve technological innovations, such as continuous production. At the same time, we will reduce manufacturing costs by standardizing product packages, blister sheets and other package materials and outsourcing the manufacturing of the standardized materials. To reduce personnel expenses and increase the efficiency of equipment investment, recommendations will be made among countries and companies for the unification of implementation process of GMP/ GDP (Good Distribution Practice).

(ii) Efforts to reduce selling, general and admin expenses

The widespread utilization of unmanned bidirectional information exchange and other ICT technologies will enable pharmaceutical companies to promote information

provision more efficiently, for which they have hitherto depended mainly on MR activities. This will contribute to optimizing human resources, promoting the diversification of working forms, such as teleworking, and optimizing facilities, such as offices.

Lower cost rates and lower SGA expenses will be pursued to streamline business management, which will help to obtain funds, continue R&D and create innovative drugs. Through these efforts, the pharmaceutical industry will boost its added value and lead the Japanese economy.

[Notes]

- *1 Ministry of Health, Labour and Welfare (MHLW). “Statistics Annual Report on Production in the Pharmaceutical Industry 2013” and JPMA. “DATA BOOK 2015”
- *2 Ministry of Health, Labour and Welfare (MHLW). “Survey of Medical Drugs and Appliances Industries 2012” and JPMA. “DATA BOOK 2015”
- *3 JPMA. “DATA BOOK 2015”
- *4 Prepared based on ©2015 IMS Health, “IMS World Review 2015”. (All rights reserved.)
- *5 JPMA. “DATA BOOK 2015”
- *6 Ministry of Internal Affairs and Communications (MIC). “Report on the Survey of Research and Development” and JPMA. “DATA BOOK 2015”
- *7 JPMA. “Textbook of Pharmaceutical Industry 2014-2015”
- *8 Ministry of Health, Labour and Welfare (MHLW). “Vision for the Pharmaceutical Industry 2013, Documents” and documents from the Office of Pharmaceutical Industry Research, JPMA
- *9 Survey and Statistics Division, Economic and Industrial Policy Bureau, Ministry of Economy, Trade and Industry (METI). “Census of Manufacturers” (2013)

7. Addendum 2: Point of view with regard to corporate scale and reorganization

(1) Background to the industrial reorganization expected in the pharmaceutical industry:

From the latter half of the 1990s into the early 2000s, beginning with the industrial reorganization by the global companies, Japan also witnessed frequent mergers and consolidations amongst its pharmaceutical companies. The late 2000s saw numerous corporate takeovers of Western venture companies by Japanese companies. Behind these events lay the intent of the various companies to streamline and rationalize their management structures in view of the impending expiry of patents on their main products (primarily low-molecular-weight compounds.) There was also a new development in the industry with the rise of biopharmaceuticals, which required the bolstering of product pipelines for this new area of business. It is also conceivable that the sustained appreciation of the yen gave a boost to the spate of corporate buyouts. As a reflection of these developments, the proportion of products originating from drug discovery ventures has increased over time in recent years (Ministry of Health, Labour and Welfare's *Vision for the Pharmaceutical Industry 2013*). Pharmaceutical development is beginning to shift to a new style, as can be seen from the fact that a self-contained, single-company model has decreased while open innovations have increased.

Now, at the time of writing in 2015, many of the low-molecular-weight compounds that used to be an important source of revenue for R&D-based pharmaceutical companies have become long-listed drugs, and their market share is being significantly decreased due to the impact of the Japanese government's drastic policy promoting the use of generic drugs. Furthermore, the patents on early stage biopharmaceuticals are finally beginning to expire and, in the future, biosimilar products will be launched in rapid succession and will replace the original pioneer drugs in the marketplace.

Amid this drastic change in the market environment, R&D-based pharmaceutical companies are facing the need to make the choice of either continuing with a drug discovery business model or changing course and shifting into other business areas. Even if companies decide to continue with a drug discovery business model, it is expected that many of the new drugs developed in the future will be required to have advantages, such as far greater clinical benefits than existing drugs and indications in areas where satisfaction with treatment is still low. Competition is intensifying over the limited drug discovery seeds, and a rapid increase in development costs is expected.

(2) Issues to be addressed moving forward

As indicated in the previous paragraph, the change in product characteristics and soaring development costs represent a major threat to R&D-based pharmaceutical companies.

The demands placed on pharmaceuticals are continually becoming more advanced, and there is a need for innovative products that are superior to existing drugs in terms of efficacy and safety. Creating these kinds of products requires considerable expense. Even now, the creation of innovative drugs is said to require development costs in the region of several hundred billion yen. It is expected to soar even higher in the future.

To take the abovementioned risk of development and shoulder a large amount of development costs, it is essential to bolster capital strength and increase management efficiency. One of the possible approaches to this may be to discuss the expansion of the scale of businesses through M&A, etc., as touched upon in the Comprehensive Strategy to Strengthen the Pharmaceutical Industry. Here, M&A is not necessarily limited to mergers between companies within the same industry. It is expected that pharmaceutical companies will also merge with those from different industries.

On the other hand, it may also be considered that expanding the scale of a business is not everything, and that what is really important in new drug development is the quantity and quality of a company's development pipelines. Partnerships in certain therapeutic fields often seen in medium-sized Japanese pharmaceutical companies (such as the delegation of overseas development to global companies), for example, are also an option. This is because there is demand for companies that will take the role of uncovering and nurturing the drug discovery seeds originating not only from within their own organizations, but also from other routes, such as through academia and new business ventures. Among some medium-sized pharmaceutical companies, there is also a trend towards specializing in specialty areas, which can also be considered as one means of securing development pipelines.

As shown above, R&D-based pharmaceutical companies have many different possibilities for making management decisions. Regardless of which choices a company makes or whether a company expands into other areas of business, the company should seek the best answer and make decisions accordingly, giving consideration to the interests of stakeholders.

8. Vision 4: Supporting to create an advanced healthcare country

– Creating a society where people can live long, healthy lives with peace of mind –

Strategic points for realizing the vision

Creating a society where patients participate in their own medical treatments:

- Lobbying public institutions to become sources of medical information
- Endeavoring to improve the provision of information mainly for clinical trials relating to rare or intractable diseases and pediatrics

Research and policy advisory on social security, the provision of pharmaceuticals and other mechanisms that support a healthy, long-life society:

- Ensuring that the evaluations meet the value of pharmaceuticals, etc. provided in advanced medicine
- Prioritizing and increasing the efficiency of drug benefits through foreseeing future healthcare policy
- Enhancing JPMA's advisory capabilities with regard to research and policy on social security, drug benefits, drug prices and other specifics

(1) Approach with regard to the vision for achieving the realization of a healthy, long-life society

Pharmaceuticals are deeply connected to people's lives and day-to-day lifestyles, helping to reduce the prevalence of disease, and extending healthy life spans. In Japan's rapidly and progressively aging society, there are high expectations for the pharmaceutical industry—which is different from other industries in terms of both its nature and its mission—to make an even more direct and proactive contribution to the realization of a healthy, long-life society. Given these facts, JPMA has put forth the aspiring vision of contributing to the creation of a healthy, long-life society, and supporting Japan's journey towards becoming an advanced healthcare country^{*1}. As Japan faces up to major social and economic changes, in order to make a real contribution as pharmaceutical companies towards the achievement of this vision, there is a need to continue to create new drugs, to deliver them to the people who need them, and to work on building and developing the proper environment to make these new drugs appropriately accessible.

(2) Specific details of the vision in the future

- Creating an environment in which essential information on pharmaceuticals is provided to patients and healthcare professionals all over the world as quickly as possible, and helping to create a society in which patients can take part in medical

treatments for themselves.

- Establishing mechanisms for the provision and reimbursement of pharmaceuticals that will support a healthy, long-life society, so as to strike a balance between sustainable social security systems and the creation of/access to innovative drugs.

(3) Creating a society where patients participate in their own medical treatments

1) Current situation

Some time has passed since patient participatory medicine began to attract attention, amidst the movement to reconsider the original starting point of healthcare, that is, the question of for whom healthcare should be designed. The awareness of people receiving medical treatment is beginning to shift away from the conventional model of entrusting their treatment solely to healthcare professionals, and becoming such that patients aim to become proactively involved in their treatment, participating in the determination of the content of their treatment, and committing to the development processes of new drugs from a patient standpoint. As a natural consequence of this development, even greater emphasis is being placed on the information collection that forms the basis for action and decision-making, with greater demand being placed on healthcare professionals to provide easy-to-understand explanations of information regarding diseases and treatment methods, and pharmaceutical companies are expected to provide more detailed information regarding the efficacy and safety of their products in order to facilitate the appropriate use of pharmaceuticals.

In aiming to become an advanced healthcare country, while at the same time considering what the framework for the provision of medical information should look like, there is also a need for patients and others receiving treatment to learn for themselves, and to build a foundation that will enable them to communicate smoothly with healthcare professionals and others involved in the provision of medical treatment. One necessary skill that is being identified as important for this is that of health literacy. The phrase “health literacy” is a comparatively new term that has appeared along with changes in the times and in society, and was also touched upon by the MHLW in its Japan Vision: Health Care 2035 Report. The term has not necessarily been clearly defined, but according to various sources, the general meaning is largely consistent as being “the ability to research, understand, assess and utilize the information and services necessary to make informed decisions with regard to health issues.”*2

As touched upon in Vision 1 “Driving next-generation medicine with advanced drug discovery,” with the upcoming advancement of personalized medicine and the popularization and spread of new concepts, such as preventive and preemptive medicine, the interest and concern of citizens should increase with regard to pre-symptomatic

healthcare and, by extension, proper care and attention to health in their everyday lives.

The concept of health management has spread in recent years. This is solely attributable to companies' growing awareness that employees' health is an important asset for business management and that investing in health management will help improve quality of life and productivity in labor. Considering secondary effects such as the reduction of medical costs and the enhancement of corporate image, an investment of one dollar reportedly results in a return of three dollars^{*3}. The Japanese government also positions "prolongation of people's healthy life expectancy" as its Japan Revitalization Strategy, and has introduced numerous measures for supporting companies' efforts. These measures include the facilitation of the data health plan and the introduction of health management brands to the stock market, among many others.

Combined with these facts, it is easy to imagine that the number of participatory situations in which each and every citizen is required to make important decisions in the healthcare process will increase; from prevention to treatment, and in the progression to the terminal phases of illness. However, making appropriate decisions amidst the vast amount of information available is sometimes difficult. We believe that the importance of health literacy and initiatives to improve it will become even greater in the future, as we work towards the realization of a society in which patients take an active role in their own medical treatment.

2) Issues to be addressed towards realizing the vision

With the rapid advancement of ICT, it has become easy for citizens and patients to gather all manner of information, including that relating to medical information^{*4}. On the other hand, there are essentially no standard criteria for determining which information is trustworthy, and in reality, it must be said that actually utilizing the information obtained to make informed decisions is extremely difficult. In order to improve this situation, the Pharmaceuticals and Medical Devices Agency (PMDA) is distributing a variety of medical information, including information on the assessment of new drugs, adverse reactions and patient package inserts. In the future, as well, we believe that from the perspective of promoting health literacy, it will be important for public institutions to play a central role in the proactive dissemination of information.

In Japan, various restrictions are placed on the advertising of pharmaceuticals (and other such products) under Articles 66, 67 and 68 of the Drugs and Medical Devices Law and Article 228, Paragraph 10 of the regulations for its enforcement, including the prohibition of misleading or excessive advertising, restrictions on the advertising of ethical drugs that target specific diseases, and the prohibition of advertisements for pre-approval drugs. The kind of direct-to-consumer (DTC) advertising through which

U.S. companies advertise ethical drugs under their individual product names is restricted. Under these conditions, JPMA is committed to PR activities to gain society's understanding in the pharmaceutical industry. The question of how and in what form we should provide information from our member companies is a major issue to address in facilitating improvements in health literacy in the future as well.

In March 2014, JPMA compiled the results of a questionnaire survey conducted across various patient groups nationwide. Among the results, in response to a question asking about expectations and demands with regard to pharmaceutical companies (191 valid answers), the most common response was “financial aid and support for the activities of patients’ associations.” The next most common responses were “provision of information,” “development of new drugs and new treatment methods,” and “development of drugs/support for rare and intractable diseases.”^{*5} It can be considered that the greatest needs are from patients and patient groups for the improved provision of information relating to new drugs and drugs to treat intractable and rare diseases, and there are some pharmaceutical companies that are already implementing initiatives to provide prompt feedback regarding the results of drug trials to subjects/participants after trials are completed.

Gathering information regarding the philosophies and goals of the many patient organizations that exist throughout Japan and the issues they are facing will lead to the voices of patients being utilized more in new drug development. Based on exchanges of opinions by the advisory board, JPMA has resolved to seek solutions to the issues faced by patients’ groups with the cooperation of government and administrative agencies, other organizations, and JPMA committee members, and to continue our efforts to grasp and understand the actual conditions through carrying out questionnaires, exchanges of opinion and seminars, such as those mentioned above.

3) Strategies to achieve objectives in realizing the vision

Demand for proper medical information is increasing among people, mainly including patients and patient groups. The relaxation of regulations and restrictions on the pharmaceutical industry is also expected concerning the provision of healthcare information, including pharmaceuticals.

Under these changes, JPMA member companies are considering lobbying public institutions such as the PMDA and AMED to take a central role in the distribution of medical information, and are also considering other specifics such as companies’ development strategies and intellectual property rights. These companies independently pursue the provision of trial information on intractable and rare diseases and pediatrics. In this way, they provide information to the extent that will contribute to the

improvement of health literacy with the aim of satisfying the needs of people and patients.

The widespread popularization of patient participatory medicine has made treatment more convincing. Moreover, due to advances in the field of ICT, we have reached an era where each and every citizen is able to carry around information on their own healthcare and treatment. With the coming of this era, it is predicted that the relationships between patients and citizens and healthcare professionals will change drastically.

The increase in the health literacy of the general public will lead to sufficient exchanges of information with healthcare professionals, and their attitude of working towards the treatment of their own choice will also lead to increased therapeutic efficacy in clinical settings and the improved compliance of medication. There will surely also be calls for rapid and appropriate feedback concerning new drugs for which there is an inadequate store of information regarding their efficacy and safety. Pharmaceutical companies will have to lend an ear to the voices of patients and the general public, and work sincerely towards the research and development of new drugs and the creation of mechanisms for their appropriate use and utilization.

(4) Discussing mechanisms for the provision and reimbursement of pharmaceuticals that will support a healthy, long-life society – To establish a balance between sustainable social security systems and the creation of and access to innovative drugs –

1) Current situation

(i) The cyclical decline in NHI drug prices and the experimental introduction of the Premium for Promotion of New Drug Creation, etc.

One of the most salient features of the Japanese pharmaceutical market is the cyclical decline in NHI drug prices, the official market prices of pharmaceuticals, resulting from a revision of drug prices that is basically undertaken every two years. This has given rise to a unique market structure in the Japanese market. More specifically, the market structure is such that, despite the fact that the Japanese pharmaceutical market itself is experiencing sustained growth and expansion in scale due to the sustained increases in the use of pharmaceuticals under health insurance, it is difficult to secure R&D funding for the creation of innovative drugs for the future due to regular reductions of NHI drug prices^{*6}.

In the debate over the drug pricing system reforms of FY2008 and FY2010, the industry demanded the introduction of a special system for maintaining the level of NHI drug prices for the evaluation of patented pharmaceuticals and new drugs during the patent term. As a result of this, in the NHI drug price revision of FY2010, a system

called Premium for Promotion of New Drug Creation and Resolution of Unapproved Drugs/Indications (Premium for Promotion of New Drug Creation, etc.) was experimentally introduced, and is still in place today.

(ii) Facilitating the penetration of generic drugs

In the first quarter of FY2015, generic drugs accounted for 54.4% of the Japanese pharmaceutical market. While the industry is progressing steadily towards the government's target of reaching 60% by the end of FY2017, there is still a wide gap between Japan and other countries such as the UK (73%), Germany (82%) and the United States (91%)^{*7}.

In working towards the further promotion of generic drugs, the Japanese government has set a new target: the quantitative share of generic drugs should be 70% or more by mid-2017, and should reach 80% and more at the earliest time possible between FY2018 and the end of FY2020.

2) Issues to be addressed towards realizing the vision

The cost of social security benefits for FY2015 (budget base) is 116.8 trillion yen, and it has already reached a scale well above the government's general account budget (96.3 trillion yen), with the cost of social security-related expenditures borne by the government accounting for 55% of all general expenditures, at 31.5 trillion yen. The increase in the burden of social security-related costs coupled with a decrease in tax revenues has prompted the government to increase and expand its issuance of government bonds. The total debt balance for ordinary government bonds at the end of FY2015 is predicted to be 807 trillion yen; equivalent to 159% of Japan's gross domestic product (GDP), or 15 years' worth of tax revenues. Looking to the future, 2025 will see the coming of a so-called super-aging society; with Japan's "baby boomers" aged 75 or above, one person in three being 65 or older, and one in five being 75 or older. Preliminary estimates predict the cost of social security benefits in 2025 to be 148.9 trillion yen, an increase of 39 trillion from 2012. Medical and nursing care costs will account for 77% of this increase (30 trillion yen)^{*8}.

It is already becoming difficult for Japan to maintain a system that gives patients equal access to healthcare services for a low financial burden. Without sweeping fundamental reforms, including reviews of the scope of NHI benefits and the rationalization of benefits, the sustainability of Japan's social security system itself—a system that Japan should be proud of—will grind to a halt. As long as the drug benefits in Japan are being financed mainly by insurance premiums and taxes, then drug costs are no exception. Japan must also rethink the state of its benefits with regard to

continually escalating drug costs, in accordance with the principles of prioritization and streamlining, from the perspective of achieving the more effective utilization of limited resources and increasing the sustainability of its social security systems.

The medical world is shifting from an era of cure-centric healthcare, in which the main objective is to sustain life and keep patients alive, into a care-centric era, in which the aim is to maintain and improve quality of life, and to preserve not only physical health but also mental and societal health, even in the case of patients suffering from chronic diseases or constant impairments. With this change, as well as other developments such as the progressive improvement of conditions to enable members of the public to self-medicate—through methods such as self-medication using over-the-counter (OCT) drugs—it can be considered that there will also be strong demand in the future to recognize the fact that medical treatment services are a scarce and limited resource, and to be aware of the costs in both using and providing them, in addition to the re-examination of the state of drug benefits and reimbursements^{*1}.

However, here there is also a need to consider the roles that pharmaceuticals fulfill. Innovative drugs will not only improve quality of life by promoting health and extending healthy lifespans, but will also make a significant contribution to Japan's economic growth by stimulating improvements in worker productivity and labor participation rates. Additionally, although drug costs will rise temporarily due to the use of new drugs, coupled with increased incomes, these new pharmaceuticals will also help to increase the sustainability of social security by contributing to lowering overall medical costs through the reduction of medical expenses for hospitalization^{*9}.

Schemes concerning drug benefits and reimbursements have a major influence on Japanese consumers' access to these excellent pharmaceuticals, and there will be a need for the creation and development of mechanisms for suitably assessing these innovative drugs, which contribute to a healthy, long-life society. In particular, the assessment of the innovative new drugs that will be offered under advanced medicine, such as the P4+1 medicine described in Vision 1, poses difficulties under the current system, and the construction of a new assessment framework will be necessary in the future. There will be a need for JPMA to take a leading role in the creation of this new framework from the standpoint of those working to create these new drugs.

3) Strategies to achieve objectives in realizing the vision

Now, with the state of social security and healthcare in Japan poised to undergo major changes, and as one of the major players involved in supporting medical care, the pharmaceutical industry will be expected to deliver the message of taking a leading and proactive role in protecting and nurturing the health and wellbeing of Japanese

consumers and Japan’s healthcare industry; and to take appropriate action towards achieving the realization of that message. With an eye to our vision of medical treatment in 2025, JPMA will work to examine the state of drug benefits and NHI drug prices that will enable a balance to be struck between the sustainability of Japan’s social security systems and the creation of (and access to) innovative drugs; and implement various initiatives for the realization of our vision.

(i) Ensuring that the evaluations meet the value of pharmaceuticals, etc. provided in advanced medicine

We will research and consider mechanisms for ensuring that the innovative drugs (or other products that transcend the bounds of conventional pharmaceuticals) provided as part of advanced medicine—including those used in personalized, preemptive, and regenerative medicine—are provided swiftly and surely, and evaluated adequately, in a manner that properly reflects their value.

(ii) Foreseeing future healthcare policy in prioritizing and increasing the efficiency of drug benefits

With an eye to advances in home treatment and preventive medicine, improvements in self-medication and other future healthcare policies amid the shift from a self-sufficient hospital-based model to a wider area-based model, JPMA will research and discuss the ideal of prioritizing and increasing the efficiency of benefits and reimbursements for pharmaceuticals in these fields.

(iii) Enhancing JPMA’s advisory capabilities with regard to research and policy on social security, drug benefits, drug prices and other specifics

To carry out the recommendations and actions outlined above, we will consider the establishment of new organization(s) within JPMA and work to enhance our research and policy advisory capabilities.

[Notes]

*1 Ministry of Health, Labour and Welfare (MHLW). “Japan Vision: Health Care 2035 Report” (June 2015)

*2 Office of Pharmaceutical Industry Research. Industry Report No. 5 “Current Situation and Issues Surrounding the Pharmaceutical Industry – To Deliver Better Pharmaceuticals Around the World, Part II: Environment Surrounding Patients” (December 2014)

*3 Ministry of Economy, Trade and Industry (METI). “Procedure for Selecting Health Management

Brand 2016 (tentative name) and Perspective for Evaluation” (October 2015)

- *4 JPMA. “Report on Results of 9th Consumer Attitude Survey Regarding Medicines and the Pharmaceutical Industry” (July 2015)
- *5 JPMA. “Report on Results of 1st Survey of the Attitudes and Activities of Patient Groups” (March 2014)
- *6 Office of Pharmaceutical Industry Research. OPIR News No. 38 “Drug Costs and Pharmaceutical Company Business Results” (March 2013) and OPIR News No. 39 “Market Structure of the Ethical Drugs Market & Pharmaceutical Company Business Results” (July 2013)
- *7 Data on market shares of generic drugs in overseas markets are provided by the Japan Generic Medicines Association (JGA) (Prepared based on ©2015 IMS Health, “MIDAS Market Segmentation” (2010 SU data). (All rights reserved.))
- *8 Ministry of Finance (MOF). “Japan’s Fiscal Condition – Related Data” (March 2015)
- *9 Office of Pharmaceutical Industry Research. OPIR News No. 36 “The Contribution of New Drugs – From the Perspectives of Life Expectancy, Medical Costs and Economic Value” (July 2012)

9. Vision 5: “Becoming a trustworthy industry with noble aspiration”

Strategic points for realizing the vision

Initiatives to strengthen compliance

- Strengthening the influence in the creation of global compliance rules
- Specialized information provision activities and exchanges with healthcare professionals
- Activities for obtaining trust, focusing on improvements in transparency

Initiatives to promote EHS (Environment, Health and Safety)

- Stepping up environmental health and safety initiatives for the establishment of a sustainable society
- Achieving growth through the enhanced disclosure of information about environmental activities and exchanges with different industries
- Support for human resource development to promote health and safety activities

PR and negotiation activities for achieving policy goals

- Optimizing communication
- Strengthening external communication capabilities

(1) Approach of the vision

The primary mission of the pharmaceutical industry is to unfailingly perform their business operations including drug discovery, quality assurance, and stable supply of pharmaceuticals even during times of disaster or emergency. The industry therefore carries a responsibility towards society with regard to its own sustainability. In order for the pharmaceutical industry to continue to exist as a trustworthy industry, it needs to develop a framework for carrying out sound and highly transparent business operations, and enhance internal control, including the implementation of thorough compliance and risk management. Through these efforts, the industry must maximize corporate value with the aim of continuing the improvement of corporate governance.

The pharmaceutical industry is a life-related industry and thus is always required to live up to a high level of ethics. It is important for us to constantly verify our roles and our vision of how the industry should be, and to keep changing.

The vision raised in this chapter of “developing into a highly-principled, trustworthy industry” describes a vision of a pharmaceutical industry in which each company and each and every employee has a high level of awareness towards transparency, ethicality and the facilitation of compliance in all business activities; in which that attitude is highly appraised and trusted by all its stakeholders; and in which its initiatives and codes of practice are respected both domestically and internationally.

In order to achieve the realization of this vision—in addition to improving our initiatives themselves—it is also necessary for us to ensure the proper distribution and accurate explanation of information relating to our various initiatives and activities in interacting with all stakeholders, and to gain wide recognition as an industry that makes a genuine contribution to national health and medical treatment. Described below is a vision for ten years beyond regarding the activities that contribute to improving trustworthiness and concern the following three points: compliance, environmental preservation/safety and health and PR/negotiation.

(2) Initiatives to strengthen compliance

1) Current situation

JPMA established a code of practice in 2013. However, improvements of the related rules have failed to keep pace with changes in reality and have undeniably ended up as nothing more than a patchwork of past rules and regulations.

Inappropriate involvements of pharmaceutical companies with healthcare professionals can be recognized in industry-academia collaborative research. There are still some unaccountable cases left among the types of information to be disclosed based on the transparency guidelines, although they have grown smaller in number. Meanwhile, companies' being too careful to continue with collaboration and support in research has led some people to express concern about the growing difficulty in conducting industry-academia collaborative research that is really needed, which may discourage the development of healthcare.

2) Specific details of the vision in the future

(i) Propagation of rules

JPMA member companies voluntarily and thoroughly observe the rules of JPMA (the current Code of Practice) and regard them as basic rules and discipline even if JPMA does not encourage them to do so. JPMA disseminates a Japanese-origin global standard worldwide. In particular, the standard has taken root in Asia as the basis of common rules for Asian nations, where JPMA is expected to play a leading role.

(ii) Further nurturing of a relationship of mutual trust with healthcare professionals

JPMA facilitates the proper penetration of pharmaceuticals in order to function as a good partner of healthcare professionals selecting drugs and deciding on treatment plans. In terms of giving priority to contributing to patients' benefits through the support of clinical research and exploring new treatment approaches, JPMA serves as a reliable partner and contributes to improving the value of pharmaceuticals by, for example,

taking into consideration both the securement of transparency and information security.

3) Issues to be addressed towards realizing the vision

(i) Developing a compliance mindset and a system for facilitating compliance

A compliance mindset has not yet been satisfactorily propagated among JPMA member companies. From a global viewpoint, JPMA continues to pursue the development of the mindset and the establishment of the companies' compliance systems. Developing a compliance mindset requires the accurate understanding and strong will of business managers and executives. The thorough practice of compliance needs to be consistently incorporated into management decisions.

(ii) Formulating and operating rules of information provision for healthcare professionals

Sales divisions' rules of information provision have gradually been formulated. In contrast, those in medical divisions are still being discussed and are not satisfactorily established. Interdivisional differences in the rules of information provision and compliance standards may confuse healthcare professionals and compromise the propagation of the rules. The lack of clarity in the criteria for information provision may even discourage the dissemination of information that is actually needed. This could put patients at a disadvantage.

4) Strategies to achieve objectives in realizing the vision

(i) Strengthening the influence in the creation of global compliance rules

JPMA will try to ensure consistency between its own code and the IFPMA code and will be proactively involved in the revision of the IFPMA code. In addition, JPMA will proactively disseminate information about its compliance-related efforts to stakeholders, including healthcare professionals. Opinions will be exchanged more closely in this way.

JPMA member companies that operate on a global scale are encouraged to appoint an internal compliance officer as part of the initiative to build a compliance system that is globally standardized. In combination with specifying a compliance officer's roles, JPMA supports human resources development. JPMA will provide advice and support for the formulation of rules to Asian nations that have not yet established them.

(ii) Specialized information provision activities and exchanges with healthcare professionals

New JPMA rules will be formulated and established, and will apply to all activities

of all divisions of pharmaceutical companies. JPMA member companies will, under the leadership of their management teams, shift to an organization system that ensures the observance of the rules. In interacting with healthcare professionals, sales divisions and medical divisions follow the new rules in accordance with their respective specialties: the former mainly offers stylized information while the latter offers advanced and latest scientific knowledge.

(iii) Activities for gaining trust, focusing on improvements in transparency

We will properly handle issues when they need to be handled. These issues may include the establishment of transparency in the disclosure of information about clinical trials and the securement of traceability after the innovation of a distribution network, among many others. In particular, information about clinical trials can be considered as a public asset and its disclosure may concern two different aspects, namely the facilitation of innovation and the protection of patients' privacy. We will disclose each patient's anonymized data while keeping the data under tight security in an effort to build a system that is available to researchers.

(3) Initiatives to promote environmental preservation and health and safety

1) Current situation

(i) Environmental preservation activities

In the context of environmental preservation, the development and implementation of global warming countermeasure is an issue that the whole world should be working towards together, at the same time. As the core subordinate organization under the Federation of Pharmaceutical Manufacturers' Associations of Japan (FPMAJ), JPMA is participating in the Japan Business Federation (Keidanren)'s Commitment to a Low-Carbon Society and is working to promote measures for energy saving and CO₂ emissions reduction at member companies with the aim of achieving the reduction target for CO₂ emissions in FY2020 as laid down by FPMAJ. However, CO₂ emissions have been increasing since the occurrence of the Great East Japan Earthquake (in comparison to pre-earthquake levels) due to the shutdown of Japan's nuclear power plants in the wake of the disaster; and related organizations are under increasing pressure to undertake further efforts to reduce these emissions. While achieving remarkable economic growth in recent years, Asian countries have also carried over various issues such as global environmental issues. Consequently, the combined CO₂ emissions of the big four developed nations in Asia (China, India, Japan and Korea) account for 39% of all global CO₂ emissions^{*1}. It is now necessary for not only Japan, but also Asian countries as a whole, to contribute to the reduction of these emissions.

Additionally, with regard to measures for resource conservation and waste management as a core subordinate organization under FPMAJ, JPMA is also participating in Keidanren's Voluntary Action Plan on the Environment – Creating a Sound Material-Cycle Society, and is working to promote the establishment of measures for reducing volume of waste generation at JPMA member companies with the aim of achieving the targets set by FPMAJ. Up until now, the central focus of such initiatives has been to encourage waste recycling activities with the objective of reducing the final disposal volume; but in the future there will be greater calls for initiatives that curb the consumption of natural resources and improve the quality of the resource cycle, which helps to reduce the environmental impact.

(ii) Health and safety activities

The ultimate goal of our health and safety activities is to achieve an incidence rate of zero for occupational accidents in all business activities. We are continuing to conduct awareness-raising activities to enable the reduction of occurrences and the maintenance of low incidence rates for occupational accidents at factories and laboratories as well as liable accident rate (number of liable accidents divided by the total number of vehicles) of business vehicles, and we are constantly endeavoring to find fresh perspectives to help prevent further incidents by sharing real-life examples of efforts against occupational accidents through training workshops and seminars.

The opportunities for driving vehicles in the course of carrying out sales and other business-related activities in the pharmaceutical industry are relatively high in comparison with other industries, and traffic accidents are one major cause of occupational accidents. JPMA therefore organizes research groups with the aim of reducing occurrences of vehicle-related accidents, and is endeavoring to gather accident-related information and create preventive measures against such accidents. These activities are gradually beginning to produce visible results.

2) Specific details of the vision in the future

- JPMA member companies will work proactively to establish measures for reducing the environmental impact —such as by reducing CO₂ emissions and waste output—towards creation of a low-carbon and recycling-oriented society; and the entire industry will make a sufficient contribution to the creation of a sustainable society that strikes a balance between economic development and environmental conservation.
- With regard to the reduction of CO₂ emissions, by working not only to implement hardware-based aspects such as in installation of the latest energy-saving equipment

and facilities, but also to implement various “soft” measures that are applicable to the pharmaceutical industry, we will serve as a model for pharmaceutical companies not only in Japan but throughout the whole of Asia.

- Through our initiatives aiming to achieve zero occupational accidents and zero business vehicle-related accidents across all business activities, we will create a safe working environment that offers security and peace of mind for all.

3) Issues to be addressed towards realizing the vision

Working to solve environmental issues is an essential aspect of the corporate social responsibilities that companies must uphold, and almost every company is engaged in some form of environmental initiative. However, it is acknowledged that there is a significant difference in the level of enthusiasm with regard to such initiatives between member companies. In comparison with other industries such as the automotive and electronics industries, environmental activities (such as global warming countermeasures) do not lead directly to short-term profit increases or business opportunities for many pharmaceutical companies, which is one factor contributing to such initiatives not being regarded as high-priority activities. Another issue is that, although various measures for reducing CO₂ emissions—such as the replacement of equipment and facilities with new energy-saving equipment, and energy conversion—have been implemented at member companies and have produced some positive results, there are now fewer such measures that are highly cost-effective. In addition, the various restrictions relating to pharmaceutical manufacturing also represent one factor acting as a challenge to the further advancement of CO₂ emission-reducing measures. Furthermore, in order to reduce the volume of industrial waste generated, demands are also being placed on industry for the provision of products and services that employ environmentally conscious design. However, in the case of pharmaceuticals, it is not easy to implement such initiatives from a quality assurance standpoint due to the inherent nature of the products themselves, which is one factor that makes it difficult to advance initiatives relating to aspects such as promoting the effective use of resources and reducing the environmental impact.

There will also be a need for us to continue to pass down knowledge and create new innovations with regard to health and safety activities towards our goal of achieving and maintaining a zero incidence rate for occupational accidents. In a constantly changing workplace environment, we must pass on our knowhow regarding the discovery and visualization of sources of danger and preemptive, forward-thinking health and safety measures, and work to prevent our health and safety activities from becoming outdated and obsolete. It is also necessary for us to promptly train and educate the many new

employees who are recruited into the industry each year, and to quickly raise their health and safety capabilities from the initial (i.e. zero) level to a higher level of ability.

4) Strategies to achieve objectives in realizing the vision

(i) Promoting EHS initiatives for the establishment of a sustainable society

In addition to raising the awareness of employees at member companies with regard to EHS, we will define clear medium- and long-term policies and plans and build high-quality EHS management systems. At the same time, we will also act as a driving force in leading other organizations and contribute to bottom-up efforts as a representative of the pharmaceutical industry.

(ii) Achieving growth through the enhanced disclosure of information about environmental activities and exchanges with different industries

In addition to communicating the state of various initiatives for reducing environmental impact towards the creation of a low-carbon and recycling-oriented society to our many stakeholders, we will also lead the way towards the resolution of issues being tackled by exchanging with other industries through seminars and other such events.

(iii) Human resource development to promote the facilitation of health and safety activities

Through the provision of support programs to member companies with the objective of improving the health and safety skills of new recruits and step-up training designed to take the health and safety capabilities of leaders and management-level employees to the next level, we will seek to create a safe working environment that offers security and peace of mind for all.

(4) PR and negotiation activities for achieving policy goals

1) Current situation

The spread of social media and the development of related technologies have enabled the rapid dissemination of information about business activities to patient groups, media, government, politicians and many other parties. This has expanded the scope of negotiation activities. Concerning public relations, we organize an education campaign and citizen symposiums with the aim of facilitating understanding about pharmaceuticals and pharmaceutical industries. PR seminars are organized to provide member companies with opportunities to share and exchange information about issues relating to the pharmaceutical industry.

In July 2015, JPMA published the Consumer Attitude Survey Regarding Medicines and the Pharmaceutical Industry. The survey revealed that 84.2% of respondents trusted the pharmaceutical industry, suggesting that the industry has gained a high level of trust from society.

2) Specific details of the vision in the future

- We will have achieved a deep and widespread understanding of the initiatives and social mission of the pharmaceutical industry amongst our various stakeholders, which will lead to trust and support for the pharmaceutical industry from the entire society.
- We will communicate with the relevant government agencies and organizations in a suitable and well-timed manner, with consideration of the standpoints of JPMA and the pharmaceutical industry. Accordingly, policies for stimulating the development of the pharmaceutical industry will be implemented as part of the measures to catalyze economic growth.
- We will utilize the information and opinions obtained through the abovementioned communication in our efforts to improve our activities, organizational structure and rules and regulations. By promptly publishing the results of these improvements, we will gain more trust.

3) Issues to be addressed towards realizing the vision

We provide information through educational campaigns, seminars, and other meetings. In the abovementioned Consumer Attitude Survey Regarding Medicines and the Pharmaceutical Industry, the proportion of respondents who said that the pharmaceutical industry is “an industry that proactively provides information” was relatively low, at 53.2%. The industry’s efforts to provide information are not yet sufficient. The spread of the Internet has given us a flood of information. However, information about medical treatment and pharmaceuticals involves a high level of specialization and is really needed by patients, and must therefore be disseminated more carefully and reliably.

To make effective decisions, it is essential for the pharmaceutical industry to gather information from stakeholders such as patients, healthcare professionals and other people involved in medical practice. JPMA still leaves some room for improvement in terms of building a system to understand the stakeholders’ diverse situations and their respective needs in a timely and accurate manner, and to satisfy these needs.

4) Strategies to achieve objectives in realizing the vision

(i) Optimizing communication

We will pursue effective ways of gathering information, such as the exchange of opinions with stakeholders, and will identify stakeholders' needs in a sufficient and timely manner. In addition to the utilization of existing communication tools, we will explore new communication tools by using ICT and similar, and will select optimal tools and procedures that agree with the objective and target of information transmission. Doing so will properly satisfy the stakeholders' needs.

(ii) Strengthening external communication capabilities

We will formulate strategies for information transmission, taking into consideration the priority and importance of information that is needed by the stakeholders, issues about which JPMA wants to gain an extensive understanding, and policy recommendations from JPMA, among other specifics. We will perform the necessary human resource development for the successful implementation of the strategies and facilitate the linking of functions in an effort to strengthen JPMA's external communication capabilities. The information that JPMA communicates will help develop people's trust via the media. Therefore, we will also try to improve our media approach. Furthermore, we will engage in negotiations with the government with the aim of obtaining greater understanding and support for the pharmaceutical industry.

[Note]

*1 The Institute of Energy Economics, Japan / The Energy Data and Modelling Center. "EDMC Handbook of Japan's & World Energy & Economic Statistics 2015"

10. Reference: Future Predictions for the Year 2025

To ascertain and understand the future state of the environment surrounding the R&D-based pharmaceutical industry 10 years from now in 2025 (the endpoint of JPMA's 10-year vision), JPMA has made predictions for the future, based primarily on an investigation of external literature relating to future predictions.

1) Science and technology

In the future world of 2025, it is predicted that revolutionary technological innovation will be taking place that will drastically alter the state of medical treatment and diagnosis due to the advancement and fusion of the latest cutting-edge fields of science and technology; including the life sciences, ICT, sensor technology and nanotechnology. Taking full advantage of advanced technologies in many different fields such as genome and omics research, wearable devices (smart contact lenses, etc.) and Big Data analysis (of information such as medical records and health check data) may lead to dramatic leaps forward in personalized, preventive, and preemptive medicine. Taking personalized medicine as an example, it is estimated that the value of its global market will grow to in excess of 45 billion dollars by 2025^{*1}.

With the onset of this technological innovation, it is thought that open innovation will develop even further in order to incorporate the latest technological advances, and it is also predicted that companies in other industrial sectors with strong skills and expertise in these kinds of cutting-edge technologies will also begin to venture proactively into the establishment of business operations in the pharmaceutical industry and its peripheral fields.

Unmet medical needs in the treatment of intractable and rare diseases and other areas will still exist, and it is expected that research will be conducted more actively in order to elucidate the causes of these diseases and develop new treatment methods—not limited only to low-molecular-weight compounds, but also treatments utilizing biopharmaceuticals, gene therapy and regenerative medicine. In the future, biopharmaceuticals are expected to account for over 50% of total sales turnover (among the world's top 100 ranked products)^{*2}. There are also estimates that the scale of the future regenerative medicine market will grow to around 1 trillion yen domestically and 12 trillion yen worldwide by the year 2030^{*3}. It is also predicted that global pharmaceutical R&D costs will grow by an average rate of 2.4% per annum between 2013 and 2020, reaching a sum of 162 billion U.S. dollars^{*2}.

2) The social environment and the global pharmaceutical market

We have predicted the various changes that are likely to occur over the course of the next ten years in the social environment and in the pharmaceutical market in developed, newly advanced, emerging and developing countries, respectively.

[Advanced countries]

While on the one hand experiencing a slowdown in economic growth, developed countries will see progressively declining birth rates and aging populations. Under these conditions, it is anticipated that there will be growing concerns over the sustainability of social security systems, and that the pressure to suppress medical expenditure will become more intense than ever before. With the increase in social security benefits and medical expenditure, the functions and positions of insurers are likely to be elevated, the concept of cost-effectiveness will become more widely and deeply ingrained amongst the public, and people will raise awareness of preventive medicine. Meanwhile, advances in information technology and the maturation of society will lead to the widespread popularization of patient participatory medicine and the practice of allowing patients to make choices by themselves.

Turning an eye to the pharmaceutical market, it is considered that pricing control, encouragement of the use of low-priced drugs, and the implementation of benefit restrictions and other policy measures to curb drug costs will be carried out even more forcefully in every country. Meanwhile, it is expected that highly innovative drugs will be recognized, and the market will gradually grow and expand against the aging of society^{*1}.

[Emerging countries]

It is predicted that populations in emerging countries and developing countries will increase, contributing to the growth of global population from the current figure of 7.2 billion to over 8 billion in 2025^{*4}. Growth will be sustained in the economies of emerging countries, and it is predicted that the number of people with mid-level incomes will more than double, from the current figure of 500 million to 1.1 billion worldwide^{*5}.

In addition to population growth and economic development, the progressive improvement of social security systems in these countries will result in rapid growth and expansion in the pharmaceutical market (including new drugs), with an expected annual growth rate of between 8% and 11%^{*4}. In terms of disease structure, a shift is expected to occur from infectious diseases towards non-communicable diseases. There are also some countries, such as China, in which the birth rate decline and population

aging has already begun, and it is predicted that the rate of global population aging will rise from the current rate of 8% to around 10%^{*4}.

[Developing countries]

Populations in developing countries will increase rapidly, but a wide gap will still remain between per-person income levels in these countries and those in advanced countries. The financial infrastructures of these countries are fragile, and their social security systems and other systems remain underdeveloped, which will require more time for improvement. While on the one hand, these countries represent potential areas of investment as prospective new markets, the pharmaceutical industry is also expected to make a contribution towards resolving global health issues. It is predicted that major achievements will have been made in global health initiatives by 2025, such as a 50% reduction in infant mortality rates.

3) The Japanese economy

Looking at the Japanese economy leading up to 2025, Japan is expected to see an average real GDP growth rate of +1.1% per annum between 2016 and 2020 due to the rise in demand during the run-up towards the hosting of the Tokyo Olympic Games in 2020. However, between 2021 and 2025 it is predicted that annual growth will fall as low as +0.7% due to the population decline and efforts towards fiscal reconstruction^{*7-9}. (The annual growth rates above are the median of the referenced economic forecasts of each think tank.)

As domestic demand decreases in conjunction with the declining population, it is expected that foreign demand will become the driving force for growth, and in order to survive and succeed globally, it will be necessary to increase non-price competitiveness and expand added value through technological innovation and R&D. Against the backdrop of international competition, it is predicted that the growing consolidation and streamlining of companies will help increase productivity, which will be a trend that will be markedly observed in the manufacturing industry.

A definite increase in domestic demand is expected in the fields of medical treatment and nursing care. The growth in demand in these fields will stimulate the development and manufacture of new pharmaceuticals, cutting-edge medical devices, nursing care robots and various other products.

As for the overall industry structure, the share of industry accounted for by manufacturing dwindled until around the mid-1990s, but has recently been experiencing an upward trend, so it is considered that the contribution of manufacturing to raising Japan's GDP will increase as we move towards 2025. By taking on both foreign and

domestic demand generated by the expansion of the growth industries of medical treatment and nursing care, it is anticipated that the pharmaceutical industry will achieve further growth and make a greater contribution to the Japanese economy.

4) Social security and healthcare

In Japan, public costs will continue to rise as social security benefits increase. Expenditures in the medical area of 15.0 trillion yen (37.0% of total spending) account for the largest part of public costs in social security benefits (40.6 trillion yen in FY2012). This burden is predicted to increase further, reaching 25.5 trillion yen (42.1% of total spending) by 2025. There is therefore an expectation that increasing pressure will be placed on the medical area to reduce costs towards improving the sustainability of the universal health insurance system and achieving a positive primary budget balance.

Turning an eye to the environment surrounding patients, it is thought that in the future, we will see a progression of medical treatment that places greater emphasis on the voices of patients^{*10}, as indicated by the term “patient participatory medicine.” It is also predicted that the importance of health literacy will increase due to the increase in the amount of information available as a result of advances in ICT and the shift towards an ICT-based society. Such developments were also raised in the Japan Vision: Health Care 2035 Report, published by MHLW in June 2015, using the phrase “life design.” In Japan, there is a possibility that the realization of this will be accelerated even further^{*11}. In addition to the aforementioned “life design,” the Japan Vision: Health Care 2035 Report also raises the vision of “lean healthcare,” which will seek to raise the value of medical care, and depicts a future in which Japan will lead the world in healthcare as a “global health leader” with the aim of becoming an advanced healthcare country by 2035—able to cater to various styles of life, work and life design, enabling everyone to continue to live active and successful lives in security and with peace of mind. It is conceivable that the progression of the “lean healthcare” initiative will result in increased interest in the value of health and medical care and will lead to more active discussion and debate.

5) Corporate social responsibility (CSR)

With some companies having a budget comparable to or even surpassing the national budgets of some small countries, the responsibilities of corporations towards society continue to increase. With developments towards socially responsible investing (SRI) and investment with due consideration for environmental, social and governance (ESG) issues, coupled with changes in the awareness of consumers towards the social nature of

corporations, it is thought that CSR initiatives will become even more important^{*12}.

In order to promote and facilitate CSR activities, and to suitably disclose the details of such activities, it is thought that the number of companies referring to international frameworks and guidance in relation to social responsibility, such as the UN Global Compact and ISO26000, will also continue to increase in the future. There is also the additional possibility that Japanese companies will make a shift towards the fusion of CSR with management and business operations, such as in the unification of annual business results with CSR reports to disclose information to the public^{*12}.

To also secure the trust of stakeholders, the promotion and thorough implementation of compliance will remain an important issue for the pharmaceutical industry. Compliance-related budgets and personnel requirements are increasing across all areas of industry, but this trend is particularly prominent in industries with strict controls and regulations such as the pharmaceutical industry^{*13}.

With the popularization of social media and developments in related technology, changes are predicted in the state of communication between companies and society. While on the one hand, information relating to business operations will be communicated more swiftly and with a higher degree of transparency, it is also thought that the range of methods used by companies for managing and handling such information will broaden due to the popularization of Big Data analysis. The reputation of the industry as a whole has an impact on each and every company within the industry, and it is predicted that this trend will become even more strongly pronounced^{*14}.

[Notes]

- *1 Office of Pharmaceutical Industry Research. Industry Report No. 5 “Current Situation and Issues Surrounding the Pharmaceutical Industry – Delivering Better Pharmaceuticals to the World – Part 1: Innovation and New Drug Discovery” (December 2014)
- *2 Evaluate Pharma. “World Preview 2014, Outlook to 2020” (June 2014)
- *3 Ministry of Economy, Trade and Industry (METI), Study Group on Commercialization and Industrialization of Regenerative Medicine. “Report Regarding the Commercialization and Industrialization of Regenerative Medicine” (February 2013)
- *4 UN Department of Economic and Social Affairs. “World Population Prospects: The 2012 Revision” (2013)
- *5 The Economist (United Kingdom). *The Economist: Megachange: The World in 2050* (2012)
- *6 ©2015 IMS Health. "The Global Use of Medicines: Outlook Through 2018" (the IMS Institute for Healthcare Informatics)
- *7 Mitsubishi UFJ Research and Consulting Co., Ltd.. “Medium-term Forecast for the Japanese

Economy (2014–2025)” (February 2015)

- *8 Daiwa Institute of Research Ltd.. “Japan's Medium-term Economic Outlook - February 2015 - Shaking off deflation and achieving financial reform – a race against time” (February 2015)
- *9 Mitsubishi Research Institute, Inc.. “Mid- to Long-term Economic Outlook - Forecast of the global economy up to 2020 based on a long-term perspective -” (July 2015)
- *10 Office of Pharmaceutical Industry Research. Industry Report No. 5 “Current Situation and Issues Surrounding the Pharmaceutical Industry – Delivering Better Pharmaceuticals to the World – Part 3: Social Environment and Business Structure” (April 2015)
- *11 Ministry of Health, Labour and Welfare (MHLW). “Japan Vision: Health Care 2035 Report” (June 2015)
- *12 Eiko Ibuki. “CSR for Strategic Management – New Edition” (August 2014)
- *13 PwC. “FY 2014 Compliance Survey” (June 2014)
- *14 Reputation Institute. “Reputation 2020 – Ten Trends Driving Reputation Management” (May 2015)

Afterword

The pharmaceutical industry has unique characteristics: as a life-related industry with strict ethics, it develops innovative pharmaceutical products by accumulating the outstanding outcomes of advanced science and technology and conducting long-term R&D with investment risk; and based on intellectual property rights, it provides products both domestically and internationally in accordance with the social security system and pharmaceutical regulations of each country.

In the midst of the recent drastic change in the business environment, we developed a vision that reflects the ideal future image of the pharmaceutical industry and held repeated discussions on the strategy in order not to make the vision just an idealistic theory but to make it a reality, with a sense of impending crisis that there is concern that no domestic pharmaceutical companies could develop and provide new world-class drugs to patients all over the world in the future, and that the industry must therefore voluntarily create its own vision and take a step forward to improve its international competitiveness.

The contents of JPMA Industry Vision 2025 describe our vision for 2025 and the pathways for achieving it. I would appreciate it if it could serve as a useful reference not only for JPMA's activities but also for each of its member companies when preparing the management policy and strategy.

Furthermore, I hope that the vision will promote the improved understanding of a large number of people about the pharmaceutical industry's role in society.

Finally, I would like to express my deep gratitude and appreciation for the efforts of the Standing Directors of JPMA and the members of the Council on Planning & Policy who carefully perused the draft of the vision before completing it, the administrative members of the Pharmaceutical Industrial Policy Committee who repeatedly participated in the preparatory meetings, the members of each committee who provided incisive comments from the perspective of experts, and among others, the members of the Vision Study Group who spent enormous time and energy to bring the vision to completion and the staff of the secretariat who supported our activity.

Hiroshi Nomura

Chair of the Pharmaceutical Industrial Policy Committee
Japan Pharmaceutical Manufacturers Association (JPMA)

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