A tiny amount of blood can have a big impact on future health

Blood Test Innovation & Next-Generation Healthcare System

micro Blood Science Inc.
## Contents

Aims ......................................................................................... 4  
Healthcare ecosystem ............................................................... 5  
Summary .................................................................................. 6  
Significance of implementing this project ................................. 9  
Sustainable development of healthcare based on micro blood tests ........................................... 10  
Issues to be solved .................................................................... 11  
Unavoidable increase in medical expenses ............................... 11  
The largest new platform business yet to be built ...................... 13  
Next-generation healthcare system ........................................ 15  
Service structure .................................................................... 15  
Values brought by test results ................................................ 16  
Development of micro testing service ...................................... 17  
Micro blood testing system in operation ................................ 18  
Business goal ........................................................................... 18  
Blood test innovation ............................................................... 18  
Existing products and operation services ................................. 20  
  Micro blood sampling device and micro blood sampling kit .......... 20  
  Specifications of micro blood sampling devices ....................... 21  
  Micro blood testing laboratories ............................................ 22  
  Micro blood collection facility ............................................... 25  
  Micro blood test management system ................................... 27  
  Test accuracy management .................................................. 28  
Use of micro blood testing in medical treatment ....................... 30  
Expansion of test locations and linking with other services ....... 31  
  Expansion of micro blood test laboratories (Compact Labo) ...... 31  
Development of innovative technology .................................... 32  
  Blockchain data management system “Lifee-Chain” .................. 32  
  AI system for data analysis “Lifee-Talk” ................................ 36  
  Portable smart analyzer “Lifee-Home” & smart reagent card “Lifee-Card” .................................. 38  
Expansion of new healthcare service ....................................... 40  
  Changes in healthcare activities ............................................ 40  
  Links with other services .................................................... 41  
  Marketing strategies ............................................................ 41  
  Market scale .......................................................................... 43
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business plan</td>
<td>45</td>
</tr>
<tr>
<td>Development plan</td>
<td>46</td>
</tr>
<tr>
<td>Fig. 20 Healthcare platform components</td>
<td>46</td>
</tr>
<tr>
<td>Expansion plan</td>
<td>47</td>
</tr>
<tr>
<td>Overview of Annual Plan</td>
<td>49</td>
</tr>
<tr>
<td>Utilizing Raised Capital</td>
<td>50</td>
</tr>
<tr>
<td>Tokenization</td>
<td>51</td>
</tr>
<tr>
<td>About MBS Coins</td>
<td>52</td>
</tr>
<tr>
<td>Token Economy</td>
<td>52</td>
</tr>
<tr>
<td>MBS Coin Design</td>
<td>52</td>
</tr>
<tr>
<td>Business history of Micro Blood Science Inc.</td>
<td>53</td>
</tr>
<tr>
<td>Operational organization</td>
<td>56</td>
</tr>
<tr>
<td>Team members</td>
<td>56</td>
</tr>
<tr>
<td>Advisers</td>
<td>59</td>
</tr>
<tr>
<td>Legal advice</td>
<td>60</td>
</tr>
<tr>
<td>Company overview</td>
<td>61</td>
</tr>
<tr>
<td>About MBS</td>
<td>61</td>
</tr>
<tr>
<td>About MBS Coin issuing company</td>
<td>62</td>
</tr>
<tr>
<td>Important items</td>
<td>62</td>
</tr>
<tr>
<td>Overview</td>
<td>62</td>
</tr>
<tr>
<td>MBS Coin purchasers</td>
<td>62</td>
</tr>
<tr>
<td>Risks</td>
<td>63</td>
</tr>
<tr>
<td>Disclaimer, etc.</td>
<td>64</td>
</tr>
<tr>
<td>Purchasers’ reps and warranties</td>
<td>65</td>
</tr>
<tr>
<td>Update regarding details of token sale</td>
<td>66</td>
</tr>
<tr>
<td>Market information/industry information</td>
<td>66</td>
</tr>
</tbody>
</table>
Aims

Our aims are to improve and develop the micro blood test services that we are already commencing, and thereby complete a next-generation healthcare system with the aim of solving the world’s health problems.

We will migrate data management of the “Lifee” micro blood testing system, which we are already operating, from cloud data management to a form of data management using blockchain technology, in turn constructing a healthcare platform that is useful and practical to people around the world, not only enabling users to personally manage their own test results and health information, but also quickly and accurately showing the health maintenance actions that need to be taken right now.

To achieve these aims, we will issue “MBS Coin (MBSC)” proprietary tokens that we intend to have used in the relevant platforms and which we will aim to make into the de facto standard in the healthcare economy going forwards.
Healthcare ecosystem

1. We will construct a next-generation healthcare platform as the area for the MBS Coin economy.

2. We will actively develop and construct this next-generation healthcare platform on blockchain, inviting diverse services based on opening test results data to the public to allow for use not only by medical institutions but also by individual users. In particular, we will aim to grow the market by means of various technologies supporting blockchain, with excellent safety combining transparency of dealings and protection of privacy, and ensuring convenience and efficiency through smart contracts, etc.

3. We will aim to construct an infrastructure system to produce value by turning the test results and health information of people around the world into the users’ own assets as Personal Health Records (PHR) data, as well an open platform in which all related businesses will participate.

4. By having the services on this platform used by people around the world, a new large-scale healthcare service market will be established with the aim of creating a superior service market offering better value than related existing service markets and of increasing the value of test results data.

5. With a next-generation healthcare platform constructed as an MBS Coin economy, we will aim to generate rewards not only for MBS Coin owners, but also for all participants including users who accumulate test results data.

6. PHR data on the existing “Lifee” micro blood testing system constructed on a cloud system is inherited as PHR data on the newly constructed blockchain.

7. By establishing a healthcare economy on a global scale with MBS Coin as the de facto standard, we will aim to develop a “next-generation healthcare system with innovative structure” in which all participants can continuously enjoy market revenue with users personally managing their own body & health information to be healthy.
Summary

We will build a worldwide data management platform for micro blood testing results that crosses national borders, and we will aim to resolve the challenges of existing systems by developing a “Lifee-Chain” system using blockchain technology in order to provide useful information and services with enormous data safely accumulated over a long time.

From 2017, we have been operating the “Lifee” micro blood testing service in Japan.

Not only in micro blood testing, but also in blood testing in general, the quality of blood test samples has a major influence on the accuracy of testing. If sample quality is poor, correct results cannot be obtained no matter how precise the measuring instrument. We have successfully developed a patented micro blood sampling device and blood sampling method that enables self-collection of good-quality blood samples. With this micro blood sampling technology, good-quality blood is sampled quickly and efficiently (neither taking too much nor too little) and without waste, and is stored within the airtight micro blood sampling device without dispensing, allowing a set amount to be diluted and tested.

We published the test accuracy verification results of this micro blood sampling technology together with technical contents as a paper in “Clinical Pathology” – the official journal of the Japanese Society of Laboratory Medicine, which is regarded as Japan’s leading authority in the field of clinical examinations – entitled “Correlation of the Blood Test Results Obtained Between Assays Using Microliter-Scale Fingertip Blood Samples Collected with a Novel Blood Collection Device and Conventional Venous Blood Assays”, and the English-language version of this paper was subsequently published in “Keio Journal of Medicine”.

We are operating the “Lifee” micro blood testing information system by means of cloud-based centralized database management. With this system, we are providing all of the functions demanded of a micro blood testing system, including acceptance of test applications, issuance of IDs, issuance of test requests and request forms, observation of test status, notification of test results, browsing of test logs, printing of results sheets, data sharing with medical organizations, and use of doctors’ comments, etc. In the interface with users, specialist applications can be used by downloading to users’ individual devices (smartphone or iPad). Users can then browse their entire test history on their own devices. Test results data is not only displayed with numerical values, but also with a line graph enabling visual reference of numerical value changes over time, so data movement can be checked visually in a way that is easy to understand. It is also possible to refer to explanations of test items with a single touch. Test results data is stored not only within the
browser, but also in users' individual device apps, so test result logs can be browsed even in places where it is impossible to connect to the Internet.

Micro blood collection facilities can be established in various places such as one's home, drugstores, pharmacies and business offices, etc. In office use, blood sampling can be carried out by oneself in just 1-2 minutes while working, so there is no need to take a break in order to test one's blood. Also, a 2D barcode is printed on the micro blood sampling device, which automatically ties a personal ID and sample to the test results, so the system is completely paperless and can be operated by anyone without error.

Micro blood testing laboratories publish micro blood testing protocol relating to sample measurement, and we are providing consultancy and consignment services for their establishment/operation. Existing measuring instruments and reagents can be used for the measurement of micro blood samples. Even for businesses lacking specialist technology, by purchasing a micro blood sampling device (kit), using the “Lifee” micro blood testing information system, and operating micro blood testing laboratories, businesses without special technology can enter the micro blood testing business anywhere in the world. Of course, existing clinical examination centers can also carry out micro blood sample measurement.

We have prepared a business plan for expansion of this world-first micro blood testing business model from Japan to the rest of the world.

Soon thereafter, when expanding the micro blood testing business, we happily came across blockchain technology. Our business model has been greatly improved by migrating the current centralized cloud system to the “Lifee-Chain” distributed blockchain system.

Migration to the blockchain system of “Lifee” can be implemented easily in a single movement by uploading data registered on the current test results database to the new system as a transaction record. By our provision of a new version with a revised “Lifee-Chain” micro blood testing information system and smartphone app interface, current users can use the present service continuously with the same operating environment.

We are currently developing the “Lifee-Home” ultra-small smart analyzer, which can be used at home or at micro blood collection facilities, and we are also currently planning to commercialize an ultra-small IOT test device & reagent card that will enable measurement of a wide range of items – from hormones and allergies to influenza, infectious diseases and tumor markers – in as little as 5 minutes with a tiny amount of blood. If this device is turned into a product, users will be able to purchase “Lifee-Card” smart reagent cards for the items they want to test, place a single drop of blood (collected from the micro blood sampling device) onto the card, and then store test results data in their smartphone simply by inserting into the nearest “Lifee-Home”.
Together with this, we are also developing the “Lifee-Talk” system for automatic analysis of test results data. This system provides constant surveillance of users’ test results data in the place of doctors/specialists, exposing various disease risks from test results data, and providing users with the latest relevant and helpful information without waiting for instructions from users.

The test results data in “Lifee-Home” and “Lifee-Talk” is safely accumulated by being separated from personal information. This data can then be used in analysis of diverse test results data from many perspectives through management under the “Lifee-Chain” system, which uses a proprietary blockchain structure in which this data can be browsed freely by anyone, which in turn will bring about a complete system fed back to users as useful information and services.

The test service after operation of the “Lifee-Chain” system will be applied as a healthcare ecosystem based on the MBS Coin economy, and a next-generation healthcare platform built with blockchain will increase the utility value of this service through participation of diverse external services (Dapps) providing added value using test results data.

Through the next-generation healthcare platform, test results data personally managed by individuals can be expected to convert into information with useful and practical value for people worldwide, accurately showing what kind of health maintenance action needs to be taken now.

Fig. 1 “Lifee” service in new healthcare platform
Significance of implementing this project

The continuous increase of medical expenses is becoming a major social problem. The health maintenance strategies to overcome this issue have failed to escape from previous schemes and it is predicted that they will soon run into a brick wall. The “next-generation healthcare system with innovative service structure” that we will build will function also as an economic platform to overcome this social issue, and will be implemented with tokens.

We have decided on a business plan aimed at building an autonomous system through which the users and all participants can benefit, by having a wide range of business related to healthcare services around the world actively participate in the next-generation healthcare service that we will build as an open platform.

We will carry out all kinds of development to build a testing system in which people can quickly and easily perform micro blood testing anywhere, at any time. We will give priority to broad expansion of micro blood testing laboratories and micro blood collection facilities, development of products to make it simpler to carry out all kinds of tests, and development of a system that enables users to make more effective use of test result information, etc.

We are currently aiming to build a platform system in which all test results data can be used freely and extensively while at the same time being managed safely and continuously, by migrating to a blockchain system the micro blood testing results data managed centrally on a cloud database. The information value and usefulness of test results data is increased by means of an AI-based analysis system with stored test results data in particular used as evidence.

This platform is built as a healthcare ecosystem with a common currency, which makes it easy to cooperate with various medical care and health-related service applications around the world, synergizing to distribute healthcare information and services around the world, and we believe that this will increase the added value of test results data. In other words, we will aim to create a service market that is superior to existing service markets and increase the value of test results data through accumulation of a large amount of test results data by having many users of diverse services on this platform around the world.

The aim is for service expansion of the next-generation healthcare system to reach a worldwide scale by gradually progressing to OECD member-nations, etc. with Japan as a base model. In advanced and developing nations alike, reduction of medical expenses by means of early detection of disease conditions and extension of healthy life span, etc. will be an important strategy going forwards. Our aim is to quickly build a global scale next-generation healthcare system to this end with new ideas and private leadership, producing an autonomous service system reflecting the respective needs of different regions and thereby achieving optimization of medical care.
Sustainable development of healthcare based on micro blood tests

Our business is based on the “Micro Blood Science-Innovative health system produced by tiny amount of blood” as our company name shows. New technology produced by Micro Blood Science has the potential to radically change the future of human health. From now on, micro blood tests will be applied to various products and services, providing a simple system to collect and use various physical data related to people’s daily life. Physical data will be analyzed professionally and fed back to users and used as healthcare evidence in diverse ways for each user. Users will be able to take the best actions for improvement because it enables them to dynamically grasp body and mind conditions in a timely manner know disease risk and choose diverse services related to medication and health appropriately. We call these people “positive healthy people”. Our idea is to evolve the era of forestalled health management and medication into “the era of forestalling healthcare” by information feedback and analysis.

The name of the micro blood test service “Lifee” is a word made up of “Life” and “Fee”. The purpose of this project is “price of life - realization of the best cost to live healthily”. The phrase “sparing no expense” is commonly heard, but we believe that life (health) should be maintained with efficiency and at a reasonable price for all people. To achieve this goal, users need to know exactly what is really needed for themselves and what is not and what is lacking and excessive etc., and choose the right service accordingly.

We collect diverse and accurate evidence data as much as possible simply and quickly for the area of service, micro blood test, managed with excellent reliability, and build systems to use this according to the user’s purpose. Although it is certain that health maintenance action options could change variously not only by internal body conditions but also by each individual's lifestyle and social factors, having data which could provide solid evidence of these as a foundation is essential for better choices.

We precisely combine new products, technologies, systems, services and each function produced by micro blood science as this business progresses, and provide a next-generation healthcare service that is highly convenient for users. Also, this new healthcare system will be operated as an infrastructure system in which all the people of the world can join. The owners of the accumulated test data will be all of the users. The new healthcare service will be provided as an ecosystem on a worldwide scale all will cooperate with medical care, but it will be independent from medical care and it will have an original service system. This next-generation paradigm will guide people to become “positive healthy people” and clarify the background of reduction of medical expenses, which has become a social issue.
Issues to be solved

Unavoidable increase in medical expenses

At the moment, each developed country faces the issue of tremendous increase of medical expenses. The scale of this (in relation to GDP in 2016) is at a high level in all developed countries, such as 17.21% in the United States and 12.38% in Switzerland. Japan’s health and medical expenditure in 2014 (in relation to GDP) was 10.1%, ranking at number 10 among the 35 OECD member-nations, but in 2016 it rose by 1.1 points to make Japan the third-highest OECD member nation with expenditure of 11.2%. The total amount of Japan’s medical/nursing expenses in 2015 was approximately 50 trillion yen, and is expected to increase to 74 trillion yen 10 years later. In 30 of the 35 OECD member-nations, overall medical expenditure (in relation to GDP in 2015) exceeded 7%, averaging at approximately 8.5%. The worldwide level of medical expenses can be calculated as being at least 7% (of GDP), mainly in developed countries. By applying this 7% rate to the total GDP of the world, which is approximately 8,794 trillion yen (79,281 billion US$, based on IMF statistics for 2017, converted at a rate of 111 yen to the dollar), the world’s medical expenses come to 615 trillion yen. Also, it is predicted that future medical expenses will have an annual average increase rate of 0.1% (in relation to GDP), which means an annual global increase of medical expenses totaling more than 8.7 trillion yen.

The causes of this include increased expenses due to aging populations in developed countries, increase of lifestyle diseases such as diabetes due to lifestyle changes in developing countries, and increase of infectious diseases such as hepatitis and STDs (sexually transmitted diseases) in less developed countries, in addition to causes related to GDP growth rate. The majority of medical expenses are spent by developed countries, but it is also predicted that there will be significant growth in China and developing countries. With recent systems, all other countries will also face the same issues in the future, so radical solutions are required.

Of the world’s population of about 7.4 billion, the population aged between 40 and 90 is about 2.6 billion, which accounts for about 35% of the total population. In Japan, of the total population of 127 million, the population aged between 40 and 74 years, eligible for a specific physical examination, is 53.96 million, accounting for 42.5% of the total population. Among them, 27.06 million people have actually had a Specific Health Checkup with the execution rate being 50.1% (Ministry of Health, Labor and Welfare, 2016). From now on, with the penetration of medical and nursing care services, the shifting trend toward aging of society is expected to further accelerate in advanced countries.
As a countermeasure against increasing medical expenses, many countries are looking at the extension of healthy life expectancy as their first priority, working on the improvement of physical examinations (checkups). However, such efforts have not necessarily led to effective reduction of medical expenses. Take the present situation of Japan, a country advanced in terms of physical examinations, as an example, if the present system for physical examinations continues, it is considered to be difficult to achieve the expected goal of reducing medical expenses in the future, in which the trend toward aging of society will further accelerate. In addition, there are limitations to the expansion of physical examinations by public spending, and there remains a problem that the effect of medical cost reduction and the cost of physical examinations could become factors offsetting each other.

We believe that it is not necessarily the best strategy to try to pursue the public health maintenance within the existing medical area. In the existing system, it is common to replace healthcare services with checkup services and have people take a regular test once a year or so; however, such present measures of physical examinations have not necessarily produced desired results. A regular test conducted once a year or so is effective at detecting diseases to some degree, but it does not seem to make a positive contribution to the improvement of daily lifestyle habits. A healthcare system should be utilized on a voluntary basis by users in their daily lives so as to realize health maintenance behaviors taken by the will of individuals. Under the existing system, unfortunately, users are utilizing the service in a "passive" manner, not fully displaying their initiative. Also, it is difficult to say that proper selections have been made in health maintenance actions including eating habits. Based on such circumstances, we will give first priority to the accumulation of test results data by preparing the environment where micro blood testing can be conducted easily at low cost anytime. The basic scheme for the service involves collecting information with the accumulated data viewed as evidence, identifying disease risks on a real-time basis and delivering clear proposals for improvement of living conditions.
The largest new platform business yet to be built

We believe that healthcare is the largest platform business area that is yet to be cultivated. With the spread of the Internet, the area for IT business has instantly expanded to global scale beyond the borders. The information platform was built by Google and was expanded by Amazon to the information plus logistics platform. With this, various traditional business models have been forced to undergo major reforms. Consumers have gained release from information and logistics that were available in a limited area, which enables them to have easy access to a variety of products and services more than before, and at the same time, suppliers of products and information are being subdivided to meet the diverse needs of consumers.

Based on such an environment, the healthcare platform will become an integrated platform for information, logistics and services that has test data as its information infrastructure. Comparing test data, for example, to purchase history data in Amazon and comparing AI analysis data to purchase recommendation data might help you understand what they are like. The only difference is that the test data is not monopolized by a specific platform operator. The test data is managed by using a blockchain, and it is open to public inspection and available to anyone. That is, anyone with expert knowledge and specialized information can analyze the test data and provide value-added information to consumers. In addition, Amazon handles not only items in the company-own warehouse but also items from external suppliers. On the healthcare platform, in the same manner, commonly used tests are quickly analyzed in Compact Labo, and other various new test services are provided as external services. Since the test results notification for consumers, application, settlement, blood sampling and the management and

![Roles of platform](image-url)
transportation of samples are shared as platform functions, business operators that have developed a useful test technology can enter the test business gain users regardless of the scale of their business. The subdivision of services to be provided and the division of roles lead the creation of healthcare service market that matches the individual needs of customers.
Next-generation healthcare system

Service structure

Figure 3 shows the service structure of the next-generation healthcare system known as “Lifee”, which we are promoting.

The “Examination system that quickly and accurately computerizes a person’s health situation” is set at the most basic layer (the 1st layer). It is very important for future healthcare systems that this service will separate from medical care and form an independent services layer. In this first layer, the convenience of micro blood testing, reliability of data, safety of data management and freedom of data use must be guaranteed. In order to make micro blood testing convenient, we are currently promoting expansion of specialist micro blood testing laboratories as well as blood collection facilities, etc. in the sphere of daily life. Going forwards, we will develop systems and testing devices for easier implementation of micro blood testing. In order to guarantee data reliability, we are proceeding with standardization of examination accuracy tests and micro blood testing laboratories, and from now on we are planning to develop a proprietary evaluation system for test results data. Safety of data management and freedom of data use will be realized using blockchain technology.

The middle layer (the 2nd layer) is “Personally selected medical care and healthcare services”. Here, medical care is positioned as one of the healthcare service functions. The current physical examinations as an extension of medical care services are reversed by purpose and methods in the “Lifee” system. The purpose is not to “make examinations to detect diseases” but to “understand diseases with examination data management” in this system. It is proactive healthcare, so to speak. In this paradigm, the examination system to manage health conditions and the system to diagnose occurring diseases have different
operational structures. Also, the system to provide beneficial services and various information to realize healthcare will be maintained in this second layer. An extensive information base will be constructed by linking with various healthcare-related services and applications in the market, and by supplying a great variety of evidence.

The top layer (the 3rd layer) - “Health maintenance actions best suited to the user” - provides a system to coordinate various healthcare services in the middle layer and improvement activities that individuals should perform. Artificial Intelligence (AI) provided in this third layer will monitor and analyze examination data accumulated by users and navigate to optimum services and beneficial information. By means of this, users will be able to grasp their own health conditions and future risk daily, and perform their own health management. For service and information providers, we will also develop and provide customized menus suitable for users’ needs through subdivision of recent products, services and provided information.

Values brought by test results

We are promoting our business with the goal to construct a “Self-sustaining healthcare system of users, for users and by users” for people using the micro blood testing system as a means of blood testing in medical care and diagnosis. The first step to form this new healthcare paradigm is realizing “Value brought by test results”. We define the following three items as critical factors to produce the values brought by examination results.

1. Pursuit of convenience:
   Blood tests should be performed simply and easily with a tiny drop of blood everywhere around the world and whenever users want to know certain aspects, and all of the checkup data should be delivered to users quickly and be managed by them.

2. Guaranteed examination accuracy
   The whole process from blood collection to testing should be strictly managed, and also for micro blood testing, testing technology and quality management systems that guarantee examination accuracy equal to current medical examinations should be developed, and its contents have to be managed with accuracy evaluations carried out by third parties.

3. Diversity of data utilization
   All examination results and examination history should be managed 100% safely by means of the Personal Health Record (PHR) management system, and a service platform must be provided for users to analyze and utilize data quickly and precisely.
Development of micro testing service

We started full-scale services for the market in the fall of 2017, after service trials. A lot of inquiries were received already from various agencies, companies and users in Japan and overseas. We have been seriously and sincerely examining each question, providing suggestions for use in each market and installation support. The micro blood testing system, which has been in operation since last year, has been providing all products and services needed for micro testing and maintaining many advantages also in the current market. Furthermore, the healthcare system we aim for will continue to progress. The system will be expanded to the whole world. To achieve this goal, we would like to share our future vision of services with cooperative people and maintain our steady efforts.

Our domestic business is already operational, and various related businesses have plans under way. Strong experimental implications still remain, but we have compiled the situations regarding operation in 2017 in Table 1.

<table>
<thead>
<tr>
<th>Client</th>
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<tr>
<td>Group clinics</td>
<td>Compact Labo constructed in cooperation with group clinics, implementing micro blood testing for medical care and diagnosis (online connection with electronic clinical records system). Also promoted periodic physical examination service expansion to nursing homes for elderly people, etc.</td>
</tr>
<tr>
<td>Pharmacies</td>
<td>Implemented micro blood testing at pharmacies, and added health management services for citizens as new business by sharing data with neighborhood clinics. Also planning to take on employee health management services targeting neighborhood offices, etc.</td>
</tr>
<tr>
<td>Inbound physical examination businesses</td>
<td>Carrying out micro blood testing for inbound travelers from China, etc. in cooperation with local travel agencies, etc. Also managing specialist blood collection facilities and developing proprietary information services linked with “Lifee”.</td>
</tr>
<tr>
<td>Sports clubs</td>
<td>Including micro blood testing in guidance programs at fitness clubs as health indicator. Also ascertaining customers’ health improvement and using this in guidance for customers.</td>
</tr>
<tr>
<td>General business corporations</td>
<td>Using test results data from blood sampling within offices and giving health guidance for purpose of employee health management. Companies introducing this service bear some or all of these expenses, with periodic testing coordinated with medical institutions, aiming to quickly ascertain employees’ disease risk.</td>
</tr>
<tr>
<td>Physical examination &amp; health maintenance guidance organizations</td>
<td>In special physical examinations directed by administrations, micro blood testing is used to measure effects of lifestyle improvement after examination. Also planning to improve guidance efficiency by means of remote health maintenance guidance and provide remote medical services.</td>
</tr>
<tr>
<td>Health service providers</td>
<td>Considering provision of specialist services based on test results data evidence as a link in personally provided health services. Envisaging several methods, such as receiving test results data from other providers, analyzing said data, and approaching their staff in charge of service provision, etc.</td>
</tr>
<tr>
<td>Test centers</td>
<td>Considering making business with commissioned testing in current health insurance as well as physical examination testing for users. Aiming for coexistence and mutual prosperity with current medical testing market while securing new sources of income with large profit by providing micro blood testing service directly to users.</td>
</tr>
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Table 1 Micro blood testing service operational situation (FY2017)
Micro blood testing system in operation

Business goal

Micro Blood Science Inc. (MBS) is a manufacturer of testing products and healthcare systems. The ultimate goal of our business is to expand next-generation healthcare services based on micro blood test technology worldwide. Participation of various companies and many supporters are necessary to spread micro blood tests and realize new and ahead-of-the-curve healthcare services on a wide scale. We are developing and providing without delay the things needed for the spread of micro blood tests services, such as know-how, products, systems and working models, to players involved in the relevant markets. As a testing business model, this is the first challenge of its kind in the world. Blood collection devices for micro blood tests and blood collection tape are already on sale, and the products such as testing devices and reagent cards that are under development will be on sale as soon as patents are acquired. Also, the “Lifee” system could be used freely by business cooperators at a reasonable price. Compact Labo and blood collection facilities are operating as model facilities enabling business cooperators to check the service situations. This will make it possible to implement all functions necessary for micro test services.

Blood test innovation

We believe changing blood testing is the first step to innovation in healthcare service. There are some problems in the current status of blood testing.

1. Despite rapid progress in blood testing technology, the method of blood sampling remains the same. Due to the rapid progress in the blood testing technology made in recent years, it has become possible to perform many tests with a small amount of blood; the latest test equipment allows many test items to be measured with the blood sample with the amount level of only 0.001 milliliter. Despite that, there is no test service dedicated to micro blood testing.

2. Blood testing can be performed only at a specific place and time. In principle, it is only medical doctors (qualified persons under the supervision of a medical doctor) that can handle syringes for blood sampling; therefore, you have to go to a medical institution (specialized institution) for blood testing. Since it takes time to produce results after blood sampling, you may have to wait for
hours until you consult a doctor, visit a medical institution again to consult a doctor, or wait for a long time until the result of physical examination is notified, which pose problems in terms of convenience.

3. In case of emergency, the most important health information always becomes available one step behind, which leads to delay in implementation of countermeasures. There is no system that allows you to personally manage the test results data, despite it being the test results data of your own, which makes it difficult to manage your own health condition by yourself. Even when you want to know about the current change in your health condition from your blood testing results data, you cannot get accurate analytical information unless you go to a medical institution, due to which you might procrastinate going to a medical institution until you get very sick.

The current blood testing has these problems to be improved. By creating a system that allows blood testing to be performed by anyone, anywhere and anytime with a very small amount of blood, and that enables test results data to be managed, analyzed and utilized by a user himself or herself, in addition to enabling the test results data to be shared by a user and a medical institute, it will become possible for the user to quickly obtain accurate physical information and take the initiative in maintaining his or her health. We call such a series of changes in blood testing by means of micro blood testing "blood testing innovation." Then, how will healthcare systems, including medical treatment, be changed by future innovations in blood testing? Our project will present this new system and solutions.
Existing products and operation services

Micro blood sampling device and micro blood sampling kit

Fig. 4 Micro blood sampling device and combined micro blood sampling kit

This micro blood sampling device provides integrated functions such as qualitative and quantitative performance, diversity, storage and operability, which are necessary for micro blood testing.

This makes it possible to easily collect good-quality blood from one’s own fingertip even without the assistance of a specialist. This patented product is a simple and convenient invention that forms the basic seed of the business (see photo, left). Special internal chip processing enables quick collection of good-quality blood, visualization of the amount of blood collected during sampling, and adequate blood collection. Additionally, the development of blood collection tape to prevent the run-off of blood from the fingertip has enabled collection of a tiny amount of blood without waste. Also, the development of a new coating technique that can control the concentration of additives according to the amount of blood collection at microliter level enables blood collection corresponding to medical test standards. The micro blood sampling device integrates the blood collection chip and storage container, and the whole treatment process - from blood collection to storing, transporting and testing – is handled without dispensing the sample, thus eliminating the risk of hemolysis during dispensing and also prevents contamination. Also, the micro blood sampling device is managed with a DataMatrix 2D barcode linked to personal information and it forms a system with paperless transport of samples that does not permit leakage of personal information or mixing up of samples.

The lancet for fingertip puncture and self blood collection kits combined with disinfecting cloth has obtained authorization from the Ministry of Health, Labor and Welfare (Authentication number: 229ABBZX00046000) as a combined medical device (see photo, right). Applications to register this device with FDA in the U.S. and China are under way.
Specifications of micro blood sampling devices

- (Fig. 1-a) Micro blood sampling chip
  - Blood sampling device for taking blood from fingertip
  - Gridline printing on collected parts of blood
  - Plain blood sampling chip, EDTA-2K blood sampling chip, heparin lithium blood sampling chip, etc. (Fixed-quantity application of other additives is also possible)
- (Fig. 1-b, Fig. 1-c, Fig. 1-d) Micro blood sampling storage container
  - Storage container enclosing blood sampling chip. Container colors are separated for each blood sampling chip additive.
    - Fig. 1-b: Plain (red), Fig. 1-c: EDTA-2K (purple), Fig. 1-d: Heparin (green)
- (Fig. 1-e) Micro blood centrifugal container
  - After blood sampling, fill chip with separating agent and separate into 3 layers
- (Fig. 2) Micro blood sampling tape
  - Donut-shaped water-repelling tape to prevent fingertip blood run-off

Configuration of combined blood sampling kit

- Purpose-specific micro blood sampling device (micro blood sampling chip and storage container), lancet, micro blood sampling tape, disinfectant cloth, adhesive plaster, user’s manual, product instructions
This is a specialized clinical laboratory center (a facility registered by hygiene inspection center) called “Compact Labo”, which has testing technologies that enable testing of various items accurately from micro blood collection. Compact Labo is specially designed for micro blood tests, providing quality management specialized for micro samples. After reading a barcode from the delivered sample container, test request information from the “Lifee” system is downloaded to the Labo system and the information and sample are automatically linked. The sample is diluted quantitatively in the same container and then tested. Test results will be uploaded to the “Lifee” system simultaneously with results and authentication, and notification will be sent to the user’s smartphone promptly. Also, Compact Labo is designed with the aim of opening model laboratories in each area. Micro blood tests will be extended widely on the market, even abroad, by adding business commission services from establishment of laboratories to operation through to menus and standardizing micro test systems. For those who hope to operate a micro test laboratory business, we promote area expansion by encouraging such prospective partners to have a full share as micro test market player.

The “Lifee” system provides a comprehensive data management system connected to Compact Labo. Previously registered managers can use a management computer to perform all functions of the micro blood testing system (receipt of test applications, issuance of IDs, test requests and publication of written requests, surveillance of sample status, browsing test results, printing results sheets, etc.). Also, when cooperative facilities are registered, comments can be exchanged between facilities and users can be followed by cooperation between doctors, nurses, pharmacists, nutritionists and exercise instructors, etc.

Below are examples of the test information screens provided by the “Lifee” system. Managers of test information can see a list of all the test subjects they are personally responsible for in the “List of test subjects” screen shown in Fig. 6-1. Test status after blood...
sampling (under request, testing, test completed) can be confirmed in the “Test status confirmation” screen shown in Fig. 6-2 for each test request. When selecting one test subject, the test logs of said subject can be browsed chronologically in the “Test log list” screen shown in Fig. 6-3. When the test item that the manager wants to browse is selected, the test values history of the test subject can be seen in numerical and graph formats in the “Display test results” screen shown in Fig. 6-4. As necessary, an individual’s test value results can be printed from the “Print test results” screen shown in Fig. 6-5.
Fig. 6-3  Test log list

Fig. 6-4  Test results display

Fig. 6-5  Print test results
Micro blood collection facility

This is a small specialized facility where people can stop by when they have errands in the city and get a self blood test quickly. A model facility for test marketing (see Fig. 7-1) was opened in Ginza (Tokyo). Tests are provided here not only for Japanese citizens, but also for tourists and foreign residents. Our services include blood collection with the help of professional instructors, a multilingual paperless reception system, printing out/mailing the results according to requests, and a call center for inquiries. Users can even make reservation in advance. For users who choose blood collection at home, instructions on how to carry out blood collection and send result data are given after ID registration, and then the sample condition is checked at the deposit of the blood sample.

Such micro blood collection facilities are established in the places where people live, ensuring convenience of blood testing services. Micro blood collection facilities not only provide services to people who visit, but will also expand regional demand for blood testing by going out to local apartment buildings and business offices, etc. to provide micro blood testing services there. Also, these facilities will provide medical treatment and healthcare services in cooperation with local clinics and medical institutions. This will enable establishment of cooperation with medical examination services such as encouragement of checkups, etc. together with consignment of examinations of patients requiring continuous observation, etc. In this way, micro blood collection facilities will adopt diverse related services in addition to blood collection, and function as regional healthcare service bases.

Micro blood collection facilities need to obtain only the registration for the sale of medical devices, and are not required to obtain permission or registration for the establishment of blood testing facilities, but such facilities enter into contracts with Compact Labo as their supervised facility for the management of implemented business contents. Micro blood collection facilities do not need to be a specialized facility like above (see Fig. 7-1); they can be installed at drugstores (see Fig. 7-2), dispensing pharmacies, sports facilities, business
offices and so on. At business offices, workers can perform self-blood sampling within one to two minutes during work hours, which can greatly improve the convenience of blood testing. Also, with the aim of providing health management for employees’ family members, it is also possible to bring family members’ blood samples taken in the morning and collect them at the office, etc. Furthermore, we are positively considering the installation of sample deposit facilities for refrigerated transportation of blood samples collected at home to a laboratory. In the future, we will introduce new rapid testing equipment (currently under development) to blood sampling facilities, develop on-site laboratories enabling self-blood sampling and testing, and offer real-time testing services.

Below is an iPad reception system used at blood collection facilities. At an initial test, after confirming agreement to test stipulation, you enter personal information. From the second time, you enter only the personal ID. After confirming the entry, you select a test item you want to take. It is possible to select more than one test at one time. When completing the entry, you hand your iPad to a person in charge. A person in charge links a subject and the sample by making the iPad read a bar code on the micro blood sampling device and issues a test request. A user performs blood sampling by using the registered micro blood sampling device. After blood sampling, samples are sealed and stored under refrigeration, collected every evening, and arrive at a laboratory the next day.

![iPad reception system](image)

Fig. 8 Micro blood sampling reception system
Micro blood test management system

This is the cloud information system called “Lifee” that manages the whole process related to micro blood tests, such as acceptance of tests, management of sample and test data, and notification of results. When a sample barcode is sent from the Labo system, the “Lifee” system sends test request information tied to the sample to the Labo system, and after testing, the test results data is received from the Labo system. Test results data is promptly notified to the user’s smartphone. Notification is usually made via the Internet in about 2 business days after reception of the sample. When the user downloads the “Lifee” app to a smartphone from the Apple Store or Google Play and sets an ID, test results data is automatically sent and stored within the app. Users can see all test histories on the “Lifee” app. Results data will not only be displayed with numerical values, but also with a line graph enabling visual reference of numerical value changes over time, so data movement can be checked visually in a way that is easy to understand. It is also possible to refer to explanations of test items with a single touch. Test results data is stored in the user’s smartphone, so test result logs can be browsed even in places where it is impossible to connect to the Internet.

Verification of the accuracy of this micro blood testing system has been implemented since the development stage with cooperation from medical institutions such as university hospitals, etc., so there is excellent reliability in terms of test accuracy, and if consent is obtained from an attending doctor, it is also possible that test results data stored in
smartphones will be used as reference in medical examinations. A function for switching to English-language display is also included, so test results can also be used when travelling overseas.

Test accuracy management

In the micro blood testing system, unlike the conventional system in which the process for the confirmation of test results data by a medical doctor is needed, Compact Labo and a user directly exchange test results data; therefore, the responsible person for accuracy control at Compact Labo bears extremely heavy responsibilities.

In blood testing, not limited to micro blood testing, the quality of a sample serving as a test specimen has a great impact on test accuracy. If sample quality is low, the right result cannot be obtained even when measurement is done with a highly precise instrument. With that, we began the development of a micro blood sampling device that can collect high quality blood samples. After spending a whole year for this project, we successfully developed a micro blood sampling device and a blood sampling method as intended. They have made it possible to quickly collect the right amount of good-quality blood without any waste, put it in a sealed device and to conduct measurement with the existing measuring instrument after quantitatively diluting it instead of dispensing it as it is.

In the implementation of test items, basically, correlation data of test results from an arm vein is acquired, and those meeting certain criteria are commercialized. The final confirmation of accuracy verification is also checked by a third party. The verification results are published in academic papers along with the technical contents. Last year, we published a paper entitled "Correlation of the Blood Test Results Obtained Between Assays Using
Microliter-Scale Fingertip Blood Samples Collected with a Novel Blood Collection Device and Conventional Venous Blood Assays" as well as the verification results of test accuracy and the technical contents in “Clinical Pathology”, the official journal of Japanese Society of Laboratory Medicine, which is considered to be the most authoritative bulletin in the field of clinical test in Japan, and also, the English translation of this paper was published in the Keio Journal of Medicine\textsuperscript{Note 1} as the second publication. Having entered the joint research agreement with the Okayama University Hospital, we are now proceeding with the research on new items. Since this micro blood sampling device collects fresh blood from a fingertip and separates blood serum (blood plasma) and blood cells in a chip, prepared samples can be used as specimens for various test items. With regard to important items of biochemistry, immunology and hematology, we have already completed the verification of test accuracy, and we also confirmed good correlation in other items. However, some items which were found to be sensitive to tissue fluid and some other items that have such a low component concentration that it was difficult to apply sufficient dilution ratio are excluded from objects for micro blood testing.

On the other hand, physical examinations may possibly include test items that are not covered by health insurance, such as a test for oxidant stress and anti-oxidative potency, which can cause various lifestyle-related diseases, as well as Alzheimer\'s disease markers and tumor markers, etc., which are planned to be developed in the future. In addition, the combination of test items, including alternation of additive agents and change in sample amount, can be set relatively freely. Since the combination of test items used in physical examinations are not always the same as the items used for medical diagnosis; therefore, it is possible to make the combination of items that allows tests for hepatitis and diabetes to be conducted simultaneously according to the purpose of physical examinations.

Note 1: Refer to the following website for the Keio Journal of Medicine paper on “Correlation of the Blood Test Results Obtained between Assays Using Microliter-scale Fingertip Blood Samples Collected with a Novel Blood Collection Device and Conventional Venous Blood Assays: a Secondary Publication in English” relating to accuracy verification of 14 biochemical items and 5 hematological items (TP, ALB, AST, ALT, \(\gamma\)-GTP, TG, T-CHO, HDL-C, LDL-C, UA, BUN CRE, GLU, and HbA1c, WBC, RBC, Hgb, and Hct. PLT).

https://www.jstage.jst.go.jp/article/kjm/advpub/0/advpub_2017-0009-OA/_html
Use of micro blood testing in medical treatment

The Development of technology for micro blood testing started with the subject of how blood sampling can be carried out for patients under anticancer drug treatment, elderly people, children and women from whom it is difficult to collect blood from their arm vein, by collecting a very small amount of blood from their fingertip. At first, we evaluated the technical contents of two types of micro blood testing developed by other companies that had been utilized as services in the market on the basis of the following four indicators: 1. Amount of blood sampling, 2. Ease of use, 3. Quality of test and 4. Test accuracy. Unfortunately, both of them were found not to meet our requirements.

Accordingly, we decided to develop a micro blood sampling device that would satisfy all of the above indicators, and as a result, we succeeded in developing a micro blood sampling device and a blood sampling method as intended. Toward commercialization, we obtained a patent of a micro blood sampling device, and at the same time, we created a kit including all the tools needed for micro blood sampling, which obtained an approval as a combined medical instrument from the Ministry of Health, Labor and Welfare.

Between the medical field and the healthcare area, there are some differences in the use and application method of micro blood testing carried out by collecting blood from fingertips. For example, blood sampling is generally carried out not by a patient but by a nurse. This enables the quality of samples to be maintained high, contributing to ensuring the stability of test accuracy. Since wider range of test items used in the medical field more than in the area of physical examination, we will make efforts to steadily expand the scope of the targets for these items.

We plan to apply micro blood testing in the medical field not only for people from whom it is difficult to collect blood samples, but also for remote medical diagnosis and treatment, the NICU (neonatal intensive care unit), emergency tests; thus, it is expected to be widely utilized. For example, in blood testing in the pediatric department, it is possible to lessen burden on patients by collecting a small amount of blood from newborn babies or small children to a minimum. Additionally, by incorporating self-blood sampling tests for patients such as those with lifestyle-related diseases who need continuous monitoring, it will become possible not only to lessen patients' burden resulting from blood sampling, but also to shorten and efficiently use consultation hours.

In global terms, we believe that an important approach we should take is to promote the utilization of micro blood testing in the entire medical field, not only for physical examination services. After that, we will promote its use widely in the healthcare area such as for the
daily health management of as many as ordinary people with a view to ensuring early case detection.

At the same time, in order to use micro blood testing in medical institutes, in addition to enhancing the convenience and usefulness of a test itself, we are operating an experimental system for solving problems such as the coverage of insurance and cooperation with electronic medical records. With regard to the implementation of micro blood testing and the utilization of test results, there is no clear boundary between the healthcare area and the medical area. The most important thing is to build a system that enables the two functional areas to fulfill their crucial roles by constantly sharing test results data and related information. We believe the health care system to be aimed is a system that allows these two areas of healthcare and medical treatment to play their respective roles independently, naturally becoming integrated and providing optimal healthcare services to users by sharing test data.

Expansion of test locations and linking with other services

Expansion of micro blood test laboratories (Compact Labo)

First of all, Compact Labo is established when micro test services are expanded abroad with business operators in each country and area as operating entities. This is a specialized physical examination center (clinical laboratory) that provides high-quality tests with a tiny drop of blood taken by a micro blood sampling device, and it is the core of the test services. Operation begins after establishing market cooperation with blood collection facilities at the same time. The main equipment such as testing devices is operated using products that are patented in the relevant country after double-checking the test contents. Prioritizing local supply makes it easy to use applied services such as maintenance; etc. This makes it possible not only to start operation quickly, but also to provide service contents suitable for business schemes in each country and region. Micro blood testing laboratories are originally operated with compact facilities in each region, enabling efficient operation with small samples. This ensures reduction of initial investment, optimization of sample transportation, thorough accuracy management, reduction of test expenses, support for diversification of test items, and so on. Another goal is to optimize operation by means of subject test specialization and adjustment of sample quantities through inter-regional Compact Labo links. We are providing consultancy for establishment, operation and application of Compact Labo, as well as a business consignment service. On the other hand, there are also increasing opportunities to receive inquiries from current medical examination centers.
In such cases, we are promoting the introduction of micro blood testing, dealing with particular cases including solutions for issues such as integration with existing facilities or systems.

**Development of innovative technology**

Although we have already started developing a next-generation healthcare system based on blood test innovation, we will now take a next big step forward toward the completion of this business.

**Blockchain data management system “Lifee-Chain”**
We will develop the "Lifee-Chain" system by using blockchain technology with the aim of integrating vast micro blood testing data across national borders, safely managing said data for a long period of time, and using the accumulated data to provide information and services that are useful to healthcare.

The currently operating "Lifee" system separates a personal information database and a test information database, and then manages each of them with a centralized database. With regard to data management, a system operation method that acquired a third-party security-authentication is employed. However, it cannot be said that the vulnerability of the system to problems such as hacking and tampering from the Internet has been completely eliminated. Test results data must be kept safely at all times with high reliability, and it is also necessary to consider how to use extremely long-term data across parents and children and other families.

In contrast, if test results data is safely accumulated while being separated from the personal information by means of blockchain, it will be possible for all of the data to be freely browsed by anyone. Since this new mechanism allows test results data to be analyzed from multiple viewpoints and in different ways, it is expected that the results will be fed back to users as information or a service. In order to make it possible to completely separate the personal information management and the test results data management function and to openly use the vast amount of data spreading around, the new platform for the management of micro blood testing results data does not manage personal information including names and addresses. However, a user, of course, can extract, refer to and store individual data by using a specific key ("ID"), and a business operator managing personal information of clients outside the platform can link test results data with personal information by ID-Link with the consent of the user and provide original service.

In the blockchain system, by means of chaining technology that chains the distributed data management technology and the data set, the safety, usability, public nature and streamlining of system operation (which could not be realized by a central processing-type database) are realized, and we believe that these technologies are indispensable for the next generation healthcare platform.

We already started to run and operate the "Lifee" system managed by the centralized database on the cloud. Migration to the blockchain system of “Lifee” can be easily implemented in a single movement by uploading data registered on the current test results database to the new system as a transaction record. By our providing new versions of the test laboratory system, test results management system and smartphone app each with revised interfaces, users can use the service continuously with the same operating environment.
The utilization value of this service is expected to expand further with utilization by many people and the participation of diverse external services (Dapps) providing added value by using test results data.

Figures 13-1 to 13-3 show the process of system migration. Figure 13-1 shows the current "Lifee" system, in which test results data are managed by the centralized database on the cloud. Purchase of micro blood testing service is made using actual currencies such as yen or dollars. As shown in Figure 13-2, the current “Lifee” system and the new “Lifee-Chain” system coexist and are operating, and there is a bridge between the new and old systems. When using the new system, you need to purchase the test service with “MBS Coin”. Users can transfer test results data managed by the current system to the new system at any time. When transferring the data to the new system, they can receive reward in MBS Coin. Basically, we are going to continue the system service in which the new and old systems coexist, but ultimately, we will get everything up and running in the new system as described in Figure 13-3. On the platform with the new system, various healthcare services such as “Lifee-Talk” AI service are provided, and all these new system services will be available for “MBS Coin”. In addition, after using the new service, users will receive various levels of rewards in “MBS Coin” in appreciation for their healthcare behaviors.

Fig. 13-1 Existing concentrated-type test results data management system
Fig. 13-2 Side-by-side new-old operating system at time of system migration

Fig. 13-3 Intended next-generation healthcare system
AI system for data analysis “Lifee-Talk”

Currently, blood testing is basically conducted at medical institutions or medical agencies conducting physical examinations. For that reason, test results data are normally read, interpreted and explained by medical doctors. Also, even when a user who took self-blood sampling test has a lot of test history data, in order to read the data and understand what they mean, the user has no choice but to depend on an expert like a doctor. In order to solve this problem, the current “Lifee” system is originally provided with a function that enables the data to be shared between a medical doctor and a user, so that the user can seek comment from the doctor when feeling uneasy about the test results data. In addition, this system is provided with a function linking a user not only with a medical doctor but also with experts on nutrition and exercise for interactively exchanging comments in case the user needs instructions for the improvement of lifestyle habits. Also, in an upgrade plan, we are going to add a video chat function that a user can use for consultation with a medical doctor.

For the new system, in addition to upgrading the current service functions, we will develop a system to automatically monitor test results data called “Lifee-Talk”, with the aim of further pursuing convenience for users and providing relevant information in real-time based on appropriate test results data. On behalf of medical doctors and experts, this system constantly monitors the test results data of users, identifies various disease risks and provide the latest relevant information that appears to be useful to the users without waiting for their directions. Also, when improvement actions of a user are needed, this system guides the user to more extensive information or to an optimal service. This AI system does not give directions or provide guidance to a user. It simply provides information that will encourage a user to make improvident actions actively. Taking into account the rise in the number of elderly people using the system, we are also planning to provide voice
guidance for the user interface. With regard to health-related information, we will cooperate with many other external information services retaining academic information, instead of depending only on our own information source.

By promoting the participation of various external services and cooperation with them, we will build an extensive healthcare ecosystem. As services for users, we will provide a navigation function to cooperate with various healthcare-related services/applications including external services by keywords derived by the AI system. On the other hand, a service to provide related information obtained by analyzing test results data selectively guides a user to the information customized according to the purpose. In addition, in the healthcare ecosystem, we will record and utilize not only test results data but also additional information such as behavior history and lifestyle habits. We are also considering setting up a system in which free MBS Coin is awarded to users and external service providers for the recording of such additional data.

The AI system that performs quality control provides a function to continuously monitor test accuracy. It collects and analyzes test information and evaluates the accuracy of test results based on the control of a test center or each testing equipment, the statistics of item-by-item test values on actual samples or the like. In micro blood testing, since unique test protocols are partly applied, adoption of new screening test items is planned, and also, test equipment, reagents and operation environment vary from country to country, we think it is necessary to set up a system that enables to accuracy control to be conducted individually on an ongoing basis, in addition to the existing external system for accuracy control. Even in the existing blood testing services, variation in test results between test centers is not small, which indicates that accuracy control is not so easy. However, our blockchain system will provide a system infrastructure capable of performing the unified management of all test results data in the world; therefore, it becomes possible to build an automatic monitoring system for controlling test accuracy.
Portable smart analyzer “Lifee-Home” & smart reagent card “Lifee-Card”

We are developing an ultra-small IOT test device & reagent card which enables a person who has collected blood to individually measure wide range of items including hormones, allergies, influenza, infectious diseases and tumor markers with a smaller amount of blood than currently collected in 5 minutes at the shortest. In the current system, after micro blood collection, a sample is sent to Compact Labo for measurement, which normally results up to 2 business days of waiting time. In comparison with general blood testing, we have already greatly shortened the time for testing; however, in order to more people to benefit from micro blood testing by making the service readily available to more people, we will address the following steps.

We plan to spend about 2-3 years for the commercialization of the new system including the acquisition of approval and license. We are planning to first install smart analyzers at micro blood collection facilities. As test items expand, we plan to add smart analyzers for medical institutions and smart analyzers that can be used at home. Simply by purchasing a smart reagent card for intended items, dripping a small amount of blood onto the card and inserting it into a smart analyzer, a user can see test results on a smartphone screen then and there. In addition to providing products and systems that allow quick testing at home and at micro blood collection facilities, we plan to realize application to remote medical care, home medical care and emergency tests, etc. at medical institutions. The handling of test results data after rapid testing is carried out according to the test protocol at clinical examination centers, so it is possible to greatly improve convenience for users, while ensuring test accuracy.
With regard to the provision of smart regent cards, we plan to promptly provide various test items by supplying prefilled cards for common reagents to each reagent manufacturer, in addition to providing self-developed cards, and also, we will gradually increase test items responding to market needs. Of course, we will promote the activation of this healthcare ecosystem by proactively incorporating and using not only external services utilizing test results data but also various externally developed testing instruments.

Basic specifications of test equipment
1. Micro sample measurement
   Various tests can be conducted with a sample with micro blood sample of 5 μL to 10μL.
2. Easy operation
   Just set the reagent card with a blood sample inserted in the measuring instrument and press the start button.
3. Quick measurement
   Measurement will take about five minutes; upload test results when measurement is completed, and notification will be sent to your smartphone in real-time.
4. Portability
   Being rechargeable, you will be able to carry it around with you.
5. Quantitative measurement
   High-precision quantitative measurement by amount of light reflected and absorbance, etc.
6. Response to biohazard
   Sample, reagent and waste liquid are sealed in the card and disposed of in airtight manner.

Basic specifications of test card
1. Dedicated shape
   A dedicated specially-shaped plastic card in which reagents for intended items are sealed.
2. Automated identification
   Test items assigned in each card are determined and samples are automatically identified by barcodes.
3. Sample treatment
   Measurement after automatic separation of serum and plasma.
Expansion of new healthcare service

The diagram below shows structures of currently operating services and service functions that will be developed in this project. We will aim to complete our original purpose of “new healthcare services of users, by users and for users” by equipping these new functions.

Changes in healthcare activities

The completion of such a healthcare system will bring about changes in the daily activities of users as shown below. This new healthcare system will allow users to visualize their health conditions by data, choose the best services/applications for them, recognize the right improvement activities to take, and measure effectiveness of improvement activities precisely, and it can be expected that based on this information there will be promotion of activities for health improvement of early detection. As a result, it will not only extend lifespan and enrich our life more, but is also expected to lead to reduction of medical expenses across whole societies.

1. When people in everyday life
2. always repeatedly
3. take blood tests
4. and manage the data themselves,
5. artificial intelligence observing this,
6. quickly teaches
7. about occurrence of risk and means of coping,
8. leading to an effective service.
Links with other services

We will actively develop cooperation with healthcare services and applications in the market or those being planned. For example, we will realize cooperation services such as the one that will navigate appropriate eating habits by compiling the results of health maintenance actions into a database through cooperation with an automatic nutrition analysis system for food materials purchased by consumers, restaurant menus, recipe services provided by SNS, etc., or the one that will support the creation of appropriate exercise plans by compiling the results of implementation of fitness exercise into database. An insurance company may, for the purpose of the health management of insurance policyholder, set preferential premiums for users who continuously use “Lifee”. In addition, test results data will be utilized in various healthcare services, by administrative agencies for the purpose of reducing spending for medical expenses, by health food companies for the purpose of promoting the sale of supplements, by developers as an optional service for tenants, by pharmaceutical companies for the purpose of developing new medicines and expanding their application; thus, various cooperation between external services and platform service data managed by the blockchain will be realized. In this way, we aim to improve each other’s service level by creating a guide path from various services to test services, while feeding back evidence data.

Fig. 17  Service participation in open platform
**Marketing strategies**

The next-generation healthcare system has the following 2 operational strategy goals to realize steady changes in the new healthcare market: (1) Make actual test price paid by users of micro blood sampling ultimately as low price as possible, and (2) Integrate accurate and useful test results data and related information & services quickly to the platform.

![Diagram](image1)

**Fig. 18** Implementation of test results data added value

To realize the first value strategy, we will build a system to cover a part of the examination expenses with “various medical and healthcare services” in addition to a strategy of drastic cost reduction from the “Examination service quickly and accurately computerizes a person’s health data” in Fig. 3 (page 14). The service provider benefits from strengthening continuous connections with users by accepting examination data, and there is also the possibility of differentiating products and services by personal customization. We aim to reduce the test price by converting and including as part of the test price the added value for service providers.

With the second information and service strategy, we will use SNS, etc. to positively support influential local information providers and unique service providers, and will build a system for their participation. Also, by positively supporting various events such as local healthcare events by volunteers, a free health examination program for children and operation of infection screening program, etc., we will aim to heighten awareness in the market and increase the number of registered users. We will also positively accept and provide not only conventional physical examination items, but also stress markers, stroke/heart attack markers and other new reagents for examination developed by specialist businesses. In this way, demand will be generated for test results data with micro blood.
testing as the core by responding to regional healthcare and healthcare market needs in a timely manner. We will help people to understand that in their daily actions, it is possible to take steps toward not being sick and continuing to be healthy, and we will produce “positive health people” making independent use of test results data. Accumulation of personal internal body information will be an asset that produces value of new test results data with clear goals and continuity.

**Market scale**

The total world population is approximately 7.4 billion, of whom the people aged 40-90 subject to medical examinations account for approximately 35% (approximately 2.6 billion people). Also, the population for whom it is desirable to have regular physical examinations, namely people aged 10-39, is approximately 3.5 billion people, or 47% of the entire population. If people aged 40-90 have blood tests once a year, and people aged 10-39 have physical examinations once every 5 years, the annual number of prospective physical examination subjects will be 2.6 billion tests + (3.5 billion tests/5 years) = 3.3 billion. Of course, circumstances vary from country to country, but if micro blood tests of 3.3 billion people worldwide per year on average would be provided in a next-generation healthcare service that is a private service platform, and it is assumed that health maintenance is connected with many healthcare-related businesses, the structure of the next-generation healthcare market would become totally different from now, and an enormous and effective healthcare market will be newly created.

To begin with, having taken an overview of the micro blood testing market scale by focusing on various advanced OECD member-nations, the business plan for this project will include all fields and aim to implement 100 million tests per year after 5 years. This micro blood testing market also includes clinical examinations in medical care and items that are implemented independently by physical examination service providers, which will be factors in expansion of market scale. For example, the worldwide clinical examination market scale is approximately 7 trillion yen, of which almost half is estimated to be connected to blood-related tests. In tests carried out at medical institutions, there are many cases where micro blood tests using fingertip blood are useful, such as for continuous observation, remote diagnosis, emergency examinations, and blood sampling for infants and persons for whom blood collection is difficult, etc.

Overseas, it is said to be common for clinics to provide diagnoses only, meaning that people have to go to specialist facilities for blood collection/tests, but it is possible to carry
out micro blood testing simply and easily at clinics or at local drug stores, etc. without having to go to specialist facilities, which will lead to improved patient services. By adopting micro blood tests, medical institutions will expand user awareness of the market, so we believe we will be able to proactively tackle this even in the clinical field, where the barriers are said to be high. When promoting expansion of micro blood testing services to the clinical examination market, business cooperation with existing clinical examination centers is generally taken as a prerequisite, and micro blood testing product will be sold to existing clinical examination centers or examinations will be requested.

In addition, many healthcare service businesses participate in new markets, and it is expected that among these there will be businesses providing value-added services using proprietary tests not limited to micro blood testing, such as urine or skin cell tests, and related data.

Since the predicted annual growth ratio of medical expenses is approximately 0.1% of GDP, global medical expenses, which are in excess of 700 trillion yen, are calculated to increase at a rate of about 8 trillion yen per year, and it is possible that after 10 years there will be an additional 80 trillion yen or more. If this increase of medical expenses can be limited even to some extent, we believe that stable demand for our services can be expected.

With the rapid progress of medical technology, human life spans are extending year on year, and the increase of medical expenses for old people is following this line. In the long term, the increase of medical expenses due to ageing populations in advanced nations is expected to level off, but there is still yet to be presented a fundamental solution strategy. Looking at the world as a whole, there are still many regions where heavy investment in medical treatment is continuing in an attempt to stem treatment delays. In any case, health maintenance countermeasures relying on treatment are expected to fail in the near future. The next-generation healthcare system with innovative service structure that we will construct will build an economic platform to challenge this social issue.

![Fig. 19 Composition of world population by age](image-url)
We will realize "healthcare service optimized for each individual user that is realized by user's self-management of internal information." Our goal is to create a new healthcare market based on micro blood testing service. All the technologies, products, systems and know-how necessary for that are provided to business operators participating in the open platform, in which such operators share intended business plans, in addition to being assigned their roles to play. This platform service being used by users will produce business profits not only for us, but also for participating business operators. The aim is for 90% of MBS Inc.’s future profit in this project to be based on the sale of products for micro blood testing and the operation of the platform system.

The healthcare platform business can possibly become the largest one in scale among currently possible platform businesses. Based on current population movement, as long as all the people in the world are seen as market members, the market is expected to continue expanding in the medium to long-term.
**Development plan**

For the creation of a new healthcare platform, we will actively promote cooperation with business operators possessing know-how in respective technical fields, without limiting to in-house development. We will actively and widely incorporate results from existing research and development fields, such as blockchain technology and test data analysis technology from the system development field, and testing equipment and reagents from the bio-related field. We have already nominated several business operators by various ways including searching patent information, but we will continue to consider the possibility of joint schemes with more business operators by officially announcing this project plan. For the advancement of this business, we will build a budget for joint development, provide needed development support and propose business collaboration. By integrating these technologies and products into a micro blood testing and the information service platform based on this, we can extend opportunities to business operators for expanding their markets of various products and services they provide, in addition to expanding our market.

By sharing the common vision of the worldwide new healthcare platform based on the micro blood testing service and playing respective roles, it will become possible to promptly start the service. By sequentially commercializing useful development products and services for micro blood testing, in parallel with market expansion through the development of laboratories and blood collection facilities, construction of a transportation system and the management of test results data, it will become possible to continue improving service quality.

![Fig. 20 Healthcare platform components](image-url)
Expansion plan

Domestic expansion includes the construction of an experimental new healthcare platform model after determining specific areas. We will locally develop an infrastructure for micro blood testing by means of micro blood collection facilities (dedicated facilities and joint facilities such as a partnership facility and an office), Compact Labo, cooperative business operators (medical institutions, commercial facilities, fitness facilities, etc.), and proceed with the implementation of free blood testing service, and the consideration of other services for users with membership. On the basis of the operation of this model, we want to establish improved model design in order to successfully achieve our goals.

For overseas expansion, after construing a model for leading developing market in Japan, we plan to work on market development in the U.S., a country with a large share, and in China, a country with a high growth rate, ahead of other countries. Meanwhile, we will solve various problems associated with the implementation of new services, and based on experience and results obtained there; we will consider sequentially introducing development products. Next, we will aim to proceed with the global development of our new healthcare system in European countries, then in Asian countries, and finally to the Middle East, South America and Africa. As necessary, we will consider establishing business corporations providing impetus to business advancement in those countries, and establishing cooperative relationships with local business operators. We will provide to local business operators know-how on the operation of new healthcare business on the bases of instruments (laboratory equipment, compact rapid testing equipment, etc.), consumables.
supplies (micro blood sampling device, blood sampling tape, test reagent card, etc.),
technologies (micro blood testing method, proprietary assay method, etc.),
systems (test results data management system, result-comment system, etc.),
services (provision of SNS information, event support, etc.) and micro blood testing,
and advance collaboration with those business operators. Furthermore, we plan to customize
products and services so that they will meet the needs of those countries and regions.
Through these measures, we will make efforts to reduce the burden on participating
operators, promoting swift business development. Also, through actively attracting a variety of
business operators involved in healthcare service, we will provide total healthcare service to users.
Overview of Annual Plan

This year, we are setting up compact labs for quick micro blood testing at new and existing test centers in clinics. We will also be launching the “Lifee” testing information system for micro blood test patients, and working to incorporate micro blood testing into existing medical services. Following that, we will be opening blood sampling facilities in specific regions. These facilities will be equipped to provide micro sampling and basic healthcare services. With the start of this new healthcare service, we plan to offer micro blood testing free of charge. This service will showcase the convenience of micro blood testing, increase registered users, and encourage regional health service providers to participate.

1. Launching Testing Centers
   In 2018, we continued to develop our testing service model in blood sampling facilities within the city. We plan to launch 300 domestic facilities within 2019, expanding to a total of 1,000 facilities by 2022. To do this, we will partner with leading companies to grow our operations and locations on a national scale.

2. System Development
   We are working to develop additional services for the Lifee App, a smartphone app launched in April 2017. This includes adding new test fields and a consultation service for test results. After completing development of Lifee Chain in September 2018, we launched the beta version of blockchain in December. We are now conducting proof-of-concept testing using actual blood data, and are working towards an official release in the fourth quarter of 2019. Initial development of Lifee Home and Lifee Card began in October 2018. In the third quarter of 2019, we will begin developing Lifee Talk, an AI data analytics tool integrated across all systems.

3. Overseas Expansion
   In July 2018 we acquired permission to sell Lifee Tube in Korea. In October, we entered into an MOU with Korean company Medizen Humancare Inc., a genetic testing company. We will be partnering with the company to promote micro blood testing. Lifee Tube is pending approval in China. Upon receiving approval in the first quarter of 2019, we will promote micro blood testing at major medical centers. Furthermore, we are preparing to apply for permissions in Singapore and the U.S. in the first quarter of 2019, and are simultaneously developing partnerships with related enterprises. We are preparing to expand our micro blood testing services into ASEAN countries during the first quarter of 2020. We intend to expand into the EU by the second quarter of the same year.
Utilizing Raised Capital

We will be using raised capital in the following ways.

![Pie chart showing the utilization of raised capital]

Our first priority is developing micro blood testing services and growing the Lifee App user base. We are attracting expert knowledge to develop our core products, Lifee Chain and Lifee App, and are continuing development of a stable base design. We began developing Lifee Chain—the central component to the project—in September 2018. The beta version launched in November 2018, and we are now conducting proof-of-concept testing. We will use 30% of raised capital to develop devices for Lifee Home, Lifee Card, and peripheral products and systems. An additional 30% will be allocated to overseas expansion of our micro testing services. 10% of raised capital will be used for marketing and legal advisory services, and 30% will be used for operations across each country.
**Tokenization**

The token to be issued is MBS Coin. MBS Coin will be issued by Micro Blood Science Inc. or its subsidiary companies.

Customers can purchase tests not only in legal currency but also in MBS Coin.

After downloading a smartphone app ("Lifee"), register the QR code and personal information described in the test kit and deliver them to the test center. At the test center, blood analysis results are registered in the data center on the cloud.

After confirming the blood analysis results with "Lifee", if a customer agree to publish the results of blood testing excluding personal information, the customer write the results to "Lifee-Chain". When this happens, we are considering rewarding the customer who has written results with free MBS Coin. MBS or other companies that collect blood data or need the collection of blood data for future medical development will serve as an authorizer. These participants in the MBS platform will support the fund for rewards.

Other details of MBS Coin will be provided separately.
About MBS Coins

A total of one billion MBS coins have been created, with 400 million made available in the initial coin offering.

These coins will be used for product and system development, overseas expansion of blood testing services, marketing, advisory services, and management. An additional 300 million MBS Coins will be distributed to partners (exchanges, communities, advisors, teams), with the remaining 300 million MBS Coins planned for strategic use to grow micro blood testing services over the long term.

*25% of MBS Coins distributed to partners will be locked for three months, with another 25% locked for six months.

*MBS Coins retained in-house will be locked for six months.

Token Economy

MBS Coins function as utility tokens, and can be used for various payments within the MBS economy. We aim to create a token economy that will return the value of gathered data to the users. Necessary returns and distributions from MBS Coins will be paid using its value in the marketplace. Starting in 2020, we intend to use 20% of quarterly operating profits to purchase coins retained in-house. This will serve as capital for returns and distributions.

MBS Coin Design

The M from MBS is arranged in the center of an octagonal base. The octagon is used to represent the various places in the world from which energy is derived. The shape is not just aesthetically pleasing, but also represents scientific stability. In addition, the number eight has long been associated with prosperity, representing the growth and development of the MBS Coin as a stable financial tool.
Business history of Micro Blood Science Inc.

After its establishment, MBS Inc. entered into a joint research agreement with Tokyo Medical and Dental University, with its headquarters located on the 25th floor of the on-site M&D Tower, where joint research was carried out for 5 years. During that time, the “Fst-GAAD” rapid examination equipment for food bacteria and “γ-TECH” rapid examination equipment for food radioactivity were developed and commercialized, but a decision was made to give undivided attention to the micro blood test business once the aim of developing and implementing micro blood test technology with fingertip blood as samples had been established. Thus, the 5-year joint research agreement with Tokyo Medical and Dental University came to an end, with the company headquarters were moved to Chiyoda-ku, Tokyo, and in April 2015 a business partnership was established with MRT Inc. (TSE Mothers Index) in the medical service business, undertaking development of next-generation health services based on micro blood test services. Together with this, MBS Laboratory (licensed as a clinical examination site in October 2016) was established as a base for micro blood test technology research and development.

The micro blood collection device that resulted from this research received a patent within Japan, and applications for overseas patents were completed in various countries (the U.S., China, the EU, and Singapore). At the time of production, product sales were commenced from April 2017. Also, production of the self blood collection kit (a kit combining blood collection device, lancet, blood collection tape, sterilization cloth, and adhesive plaster) was consigned to Jokoh Inc. (Bunkyo-ku, Tokyo), a controlled medical device sales and manufacturing business, and in July 2017 it was officially approved as a controlled medical device (authentication no. 229ABBZX00046000), and sales started the following month. Overseas, the FDA pre-submission process has been entered in the United States and an application is being prepared in China, and sales will commence as soon as results are obtained.

MBS Laboratory (newly established in October 2016) used its advanced examination technology specialized in micro blood tests to proceed with development of all kinds of examination items, and with the initial release an examination service was commoditized to measure with a single drop of blood (0.06 ml) the examination of 13 lifestyle disease items, 4 male and female cancer markets, and 2 hepatitis virus items, all of which are subject to great needs in the market. Before turning this into a commodity, guidance was received from Keio University emeritus professors Naoki Aikawa and Kioaki Watanabe, and test accuracy was verified in relation to biochemistry and hematology. The results were
published in a paper in the March 2017 issue of Japanese Society of Laboratory Medicine magazine \textit{Clinical Pathology}, and it was proved at medical institutions that the test accuracy compared favorably with that of arm vein tests. Also, taking into view overseas expansion, a second application given English translation of this paper was adopted by the Keio Journal of Medicine and published on its website (\texttt{www.kjm.keio.ac.jp}) in November 2017. Additionally, accuracy verification relating to hepatitis virus was implemented at Okayama University Hospital, and favorable results were obtained with a paper published in the journal of Okayama University. Following on from that, in September 2017, a joint research agreement was established with Okayama University Hospital on the theme of “Verification of test accuracy and implementation method targeting patients positive with infectious diseases (such as hepatitis) and lifestyle diseases using new micro blood collection devices”, and development is continuing towards broader application of micro test technology, such as expansion of test items applying this micro blood test method and accuracy verification in abnormal value groups, etc.

When commencing sales of the micro blood test service, the total healthcare service system “Lifee” was developed and released with the aim of improving convenience of micro blood tests and ensuring extensive application of test results data. This system expands on the cloud (Amazon Web Services) the big data base that will form the core of the PHR (Personal Health Record) service, ensuring a completely paperless system by means of an information system based on third-party security certification of all processes from examination requests and sample measurement to notification of results, making for rapid, optimized tests.

Users can receive test results with the simultaneously provided dedicated smartphone app, and all test history can be managed on a smartphone. Also, this test result data can be shared with cooperative workers such as doctors, and used as health care evidence.

In June 2017, as an implementation model for this micro blood test service, Ginza Blood Labo (7-8-8 Ginza, Chuo-ku, Tokyo) - Japan’s first self blood examination facility - was opened as a model laboratory facility for test marketing. This facility does not have doctors like a supervised clinical examination facility (though there is cooperation with managing doctors), and self blood collection and sample management are carried out based on guidance from managers with practical training, guaranteeing test accuracy. Also, through sample management using information systems and barcodes, manual work is totally abolished, and there is appropriate personal information protection and prevention of taking the wrong samples.

Based on the experience of operating this model laboratory, an individual-oriented micro blood test implementation program has been prepared, blood collection and testing
service during work has been started at offices and factories, and healthcare is being provided based on continuous testing 2-4 times a year together with analysis of results history. There are other examples of implementation at dispensing pharmacies and sports facilities, etc., and we are now considering provision of healthcare services on a regional level based on micro blood test data in cooperation with major developers.

In this business plan, we are providing a consignment-type service in which businesses in each country and region can participate in relation to the establishment of micro test laboratories, which are essential to the implementation of micro blood test services. The new micro blood test laboratories standardize design, machinery, reagents, systems, and application, etc., and enable operation within a short period of time of around 3 months. Management is carried out under supervised guidance from MBS Laboratory, and data is managed centrally on the cloud. This has made it possible to guarantee test accuracy at micro blood test laboratories used by general businesses, and has enabled integrated use of results data from tests conducted at regional laboratories. The Deft Labo (Takamatsu-shi, Kagawa Prefecture; Nishitakamatsu Clinic Group) was operated in April 2017 as an implementation model of this Compact Labo.
Operational organization

Team members

**Mai Shimada (Project Leader)**
Doctor
Director, Micro Blood Science Inc.

Graduated from Faculty of Medicine, The University of Tokyo, and completed MBA at INSEAD. While enrolled, she received International Clinical Training at the University of California, San Diego as well as New York Poison Center, NYU, Rady Children’s Hospital, San Diego, U.S. Naval Hospital, Yokosuka, and Naval Medical Center San Diego, California. From 2012, she worked as Clinical Research Associate, Department of Emergency Medicine, Emergency Medicine Resident Physician at Maimonides Medical Center, Brooklyn, New York. In 2016, she joined Medical Logue Inc. as Medical Adviser. Since 2017, she was being working as Attending Physician, Department of Emergency Medicine at Chinese Hospital, San Francisco.

**Hajime Iwasawa**
CEO, Micro Blood Science Inc.

After graduating from Faculty of Economics, Keio University, he joined Kyowa Hakko Kirin Co., Ltd., where he worked as Head of Systems Department, etc. Went on to work as Information-technology Promotion Agency (IPA) Test Committee Member, FIFA Japan-Korea World Cup Information Systems Committee Member, and Nikkei Computer Book Review Committee Member, etc. After leaving Kyowa Hakko Kirin Co., Ltd., he became Director of Leisure Co., Ltd., where he carried out development and commercialization of fingertip micro blood collection devices. After retiring from Leisure Co., Ltd., established Micro Blood Science Inc., and assumed role as Director. Established laboratory at Tokyo Medical and Dental University, and also carries out joint research there.
Hiroshi Wakutsu
Partner & CEO, Enzo Co., Ltd.

From 1999, he worked as Director and Joint Head of Stock Derivatives at Nikko Salomon Smith Barney Securities Company and from 2000 worked as Managing Director and Joint Head of Stock Derivatives at Nikko Citi Group Securities Company. From 2005, he worked as Managing Director of Carillon Securities and General Manager of Stock Derivative Commodities and Fund Derivative Commodities. From 2008, worked as Managing Director and Japanese Supervisor for the Investment Banking Headquarters Capital Market Division at Lehman Brothers Holdings Inc., carrying out management of stock capital market, bond capital market, leveraged finance, risk solutions and corporate derivatives. Subsequently worked at Nomura Holdings Inc. and as CEO of China’s Union Developing Group. In 2010 he established Enzo Co., Ltd., working as Partner & CEO.

Takehiko Shima
CEO, Micro Inc.

Graduated in Natural Environment Studies from Tokyo Gakugei University. After graduating in Physics from The State of New York Binghamton University, joined Miura Printing Corporation. Was transferred to Calsonic Miura Graphics (CA, USA) and successively cultivated new customers there. Subsequently joined Micro Inc., acquiring many new patents, successively proposing new mechanisms to major stationery manufacturers, expanding various new products worldwide. Started working on development of micro blood sampling devices together with Micro Blood Science Inc., successfully turning many prototypes into products. In 2003 took up role as CEO of Micro Inc., down to present.

Tetsuro Kimura
CEO, Try-Hard Inc.

After graduating from Tokyo Engineering College, worked as IT Company Senior Manager at High-Tech Division of Sorimachi Inc. After leaving Sorimachi, established Try-Hard Inc. in 2003, taking up role as CEO and carrying out a wide range of IoT-related work including embedded development with major manufacturers, application development with end users, and business system development/construction. Involved as central figure in Lifee system from development to management, down to present.
Keisuke Ishiyama
CEO, Wealth Brothers Inc.

After graduating from Hokkaido University Faculty of Economics and Business, joined Nomura Securities in 2001. After branch work, was put in charge of leading Japanese listed company owners at Head Office Wealth Management Division, and was involved in various deals. From 2015 worked as Director of BIGFACE Inc. Established Wealth Brothers Inc. in 2017, taking up role as CEO.
Advisers

Naoki Aikawa
Physician / M.D.
Professor Emeritus at Keio University
Graduate of Keio University School of Medicine (First in Class). Passed the ECFMG exam in the U.S. Worked as a Research Fellow at Harvard Medical School and a Clinical Fellow in Surgery at Massachusetts General Hospital.
Upon returning to Japan, Aikawa served as a Professor at Keio University (Emergency Medicine), Keio University Medical Library Director, Keio University Hospital Director, Chairman of Keio Medical Association, Medical Practice Chairman / National Exam Chairman / Clinical Training Chairman of Ministry of Health, Labor and Welfare’s Medical Council, President of the International Medical Information Center, CEO of Astellas Pharma Inc., and Medical Advisor of the US Embassy and Canadian Embassy.
Aikawa presently serves as a Special Advisor to Tokyo Saisekai Central Hospital, Director and Councilor at St. Luke’s International University, and Councilor to the Japan Emergency Medical Foundation. He is an Honorary Member of the Japanese Society of Chemotherapy and the Japanese Association for Acute Medicine, a special member of the Japan Surgical Society, a Senior Fellow of the American College of Surgeons, and an Honorary Member of the American Surgical Association. He has received the Harvard Prize, the Whitaker Prize, and the TVB-Burn Prize.

Tsunekazu Haraguchi
Aisin Seiki Co., Ltd. / Outside Director
Hiroshi Tsurisaki
CEO, Tecotec Inc.

After completing Bio-systems Applied Science Research course at Tokyo University of Agriculture and Technology, engaged in the world’s first online project for business machines at SEGA Co., Ltd. Now has many achievements in Fintech-related development/management such as securities settlement systems based on PtoP and net services for investment management, etc. Is putting effort into blockchain technology development, and is working on establishment/management of virtual currency exchange, as well as implementation of blockchain wallet. Has also been involved in this project since the initial stages, working on all steps from ICO process advice to technical support.

- Blockchain Collaborative Consortium (BCCC) member company
- Supporter of Japan Blockchain Association (JBA)

Hirohisa Chiwaki
CEO, Mifune Sogyo Ltd.

After graduating from Meiji University Graduate School of Political Science and Economics, joined Hazama Corporation in 1981. Mainly worked in redevelopment business, and thereafter took up role as CEO of Mifune Sogyo in 1998. In 2013 took up role as Chairperson of Shibuya Kanzeikai within jurisdiction of Shibuya Taxation Office at Tokyo Regional Taxation Bureau, down to present.

Legal advice

In order to ensure the legal conformity of this project, we are receiving advice regarding Japanese Law from Anderson Mori & Tomotsune LPC.
Company overview

About MBS

Company name: Micro Blood Science Inc.
Headquarters
Address: 2F Yamamoto II Building 2-14-8 Iwamoto-cho, Chiyoda-ku, Tokyo 101-0032
Established: June 17, 2006
Capital: 30,000,000 yen
President: Hajime Iwasawa
Graduated from Keio University Faculty of Economics, and joined Kyowa Hakko Kirin Co., Ltd. Worked there as Head of Systems Department, etc. Also worked as Information-technology Promotion Agency (IPA) Test Committee Member, FIFA Japan-Korea World Cup Information Systems Committee Member, Nikkei Computer Book Review Committee Member and Representative Director of Leisure Co., Ltd. before becoming Representative Director of MBS Co., Ltd.

Directors: Mai Shimada, Tetsuya Nishioka, Masayoshi Nakai
Corporate auditor: Tatsumi Yoshihisa
Medical adviser: Naoki Aikawa
Doctor/MD
Graduated from Keio University School of Medicine, and worked as a Research Fellow in Surgery at Harvard Medical School, Professor at Keio University School of Medicine, Head of Keio University Hospital, Chair of the National Medical Licensure Examination Committee and serves on the advisory board of the International Medical Information Center, etc., before working as Professor Emeritus at Keio University and Medical Adviser to MBS Co., Ltd.

MBS Laboratory (Clinical Examination Center)
Address: 1F Yamamoto II Building, 2-14-8 Iwamoto-cho, Chiyoda-ku, Tokyo 101-0032
About MBS Coin issuing company

MBS Coin will be issued by a subsidiary company of Micro Blood Science Inc. that is to be established soon hereafter.

Important items

Overview

We do not assume that MBS Coin will be handled as marketable securities in any country or region. Further, this white paper is not soliciting investment, nor is it equivalent to us receiving applications for marketable securities by any method, in any country or region.

Individuals, companies, organizations, and other entities that are considering purchasing MBS Coin should adequately consider the risks, cost, demerits or benefits, etc., related to purchasing MBS Coin and are responsible for, as necessary, receiving expert advice on these points. Please refrain from purchasing MBS Coin if you do not take or understand the associated risks to purchase MBS Coin as stated in this white paper.

Please also be aware that once purchased, the equivalent value of the purchased MBS Coin cannot be returned to purchasers.

MBS Coin purchasers

MBS Coin cannot be purchased by nationals or residents of countries or states that deem the purchase of MBS Coin or similar crypto-tokens to be illegal. In particular, nationals or residents of either the USA or the People’s Republic of China cannot purchase MBS Coin in token sales.

With regards to token sales, MBS Coin can only be purchased by people who have adequate experience in, and understanding of, how to use crypto-tokens, their complex properties, and software systems based on blockchain technology, etc. MBS and the MBS Coin issuing company, as well as their executives, employees, and external advisers, do not bear any liability for any kind of loss relating to MBS Coin, other crypto-tokens, virtual currency or legal currency that has arisen from the acts of MBS Coin purchasers in relation to token sales, etc. People who lack adequate experience in, or knowledge of, these fields should refrain from purchasing MBS Coin or participating in token sales.
Risks

There are risks associated with the purchase of MBS Coin. Prior to purchase, prospective MBS Coin purchasers are responsible for adequately considering (including by consulting with experts, etc. if necessary) the following risks, and personally determining whether or not to purchase MBS Coin.

1. Project development-related risk

Programs related to “Lifee-Chain” are under development. For this reason, there is the possibility of there being mistakes in development, as well as the possibility that items for which development is complete may not reach the anticipated level of accuracy.

2. Risk of bankruptcy

MBS and the MBS Coin issuing company could possibly fail and enter liquidation in future due to the deterioration of management conditions. MBS Coin is not stock or another marketable security, and in the event that the MBS Coin issuing company faces bankruptcy or liquidation, etc., none of the remaining assets will be shared with MBS Coin owners.

3. Service continuation-related risk

If MBS and the MBS Coin issuing company is liquidated, businesses related to the provision of services using MBS Coin may be sold to a third party. In that case, there is a risk that it may become impossible to use programs relating to “Lifee-Chain” with issued MBS Coin.

4. Risk from outbreak of bugs

Bugs may occur in MBS Coin. If any damage occurs due to the occurrence of such bugs, unless based on an intentional or serious error by the MBS Coin issuing company, MBS and the MBS Coin issuing company as well as their executives, employees, and external advisers do not bear any liability. It is assumed that bugs can be detected in this token in the future, and it is built to enable overwriting of smart contracts. However, in the event that the appropriate handling of MBS Coin is deemed in future to be difficult due to any acts of hacking, etc., it is possible that the MBS Coin issuing company may decide to carry out a hard-fork.

5. Risk of malfunction of Ethereum blockchain
MBS Coin will be sold by means of the Ethereum blockchain. For that reason, any malfunction or unforeseen operation of the Ethereum Protocol could affect the transfer or possession of MBS Coin and have a negative influence on MBS Coin.

Disclaimer, etc.

Neither MBS nor the MBS Coin issuing company, nor any of their executives, employees, or external advisers, will bear any liability for any kind of indirect damage, special damage, auxiliary damage, resultant damage or other damage (regardless of liability for illegal acts, contractual liability and other legal requirements) resulting from reliance upon the statements in this white paper or other related material.

Purchasers of MBS Coin acknowledge that MBS and the MBS Coin issuing company make no guarantees regarding the completion of “Lifee-Chain”, which is under development. MBS Coin purchasers recognize that MBS and the MBS Coin issuing company, as well as their executives, employees, and external advisers, do not bear any liability for any loss or damage suffered by a purchaser resulting from the failure to complete “Lifee-Chain” or offer it for use.

Upon completion of “Lifee-Chain”, MBS and the MBS Coin issuing company, as well as their executives, employees, and external advisers, do not guarantee that it will be superior to other systems.

In countries around the world, regulatory authorities are closely monitoring crypto-token-related businesses. MBS Coin purchasers recognize that there is the possibility of MBS and the MBS Coin issuing company changing their business model or system, etc., based on the laws and ordinances in particular countries or regions, and acknowledge that MBS and the MBS Coin issuing company, and their executives, employees, and external advisers, do not bear any liability for any loss or damage resulting from related changes.

MBS and the MBS Coin issuing company do not provide representations and warranties for the veracity or completeness of information stated in this white paper, and do not provide any representations, warranties or disclaimers to any other party.
Purchasers’ reps and warranties

By participating in the purchase of MBS Coin, purchasers represent and warrant that they:

(1) have the complete ability to purchase MBS Coin based on the laws and ordinances of their country or region of residence;

(2) bear the responsibility for determining that the purchase of MBS Coin is appropriate for them;

(3) are not representatives of another party hoping to participate in the purchase of MBS Coin or token sales;

(4) have adequately considered the risk, cost and other demerits, etc. relating to the purchase of MBS Coin, and appreciate these factors in relation to token sales;

(5) are not acting with speculative purposes in relation to the purchase of MBS Coin;

(6) agree and understand that MBS Coin is not in any form equivalent to marketable securities in any country or region;

(7) agree and understand that this white paper is not equivalent to any type of prospectus or offering material, nor is it equivalent to receiving an application for marketable securities in the purchaser's country or region of residence, nor does it solicit investment in marketable securities;

(8) agree and understand that MBS Coin in relation to token sales is not equivalent to any of the following, and neither is it interpreted, categorized or handled as such:

(i) Legal currency;

(ii) Stock or bonds;

(iii) Rights, options or derivatives connected to the above-mentioned stock or bonds;

(iv) Investment scheme equity;

(v) Trust equity; or

(vi) Derivatives connected to the above-mentioned trust equity;

(9) must have an adequate understanding of virtual currency applications, functions, usage methods, savings, transfer mechanisms and other important features, software systems based on blockchain, virtual currency wallets, or other token savings mechanisms, blockchain technology and smart contract technology;

(10) when purchasing MBS Coin, fully recognize and understand the risks of MBS and the MBS Coin issuing company as well as their business and management-related risks;

(11) agree and understand that neither MBS nor the MBS Coin issuing company, nor any of their executives, employees, or external advisers, will bear any liability for any kind of indirect damage, special damage, auxiliary damage, resultant damage or other damage (regardless of liability for illegal acts, contractual liability and other legal responsibilities).
requirements) resulting from the purchaser's reliance upon the statements in this white paper or other related material;

(12) acknowledge that all representations and warranties from the above-mentioned (1) to (11) are true, complete and accurate from the time that the purchaser received the information stated in the white paper, and are not incorrect.

**Update regarding details of token sale**

During the period of token sales, MBS and the MBS Coin issuing company may change, revise, add to or delete parts and terms of this white paper completely at their own discretion. Purchasers permit such changes to be made when purchasing MBS Coin. If you have any objection to any parts or terms of this white paper, please refrain from purchasing MBS Coin.

**Market information/industry information**

This white paper contains projections obtained through market information, industry information, and surveys, reports, and research by MBS and the MBS Coin issuing company, as well as market research and published information. The accuracy and completeness of the information contained in these surveys, reports, and research is not guaranteed, and MBS and the MBS Coin issuing company, as well as their executives, employees, and external advisers, have not made their own surveys or verifications of the accuracy and completeness of said information. MBS and the MBS Coin issuing company, as well as their executives, employees, and external advisers, do not make any representation or warranty regarding the accuracy or completeness of the information.