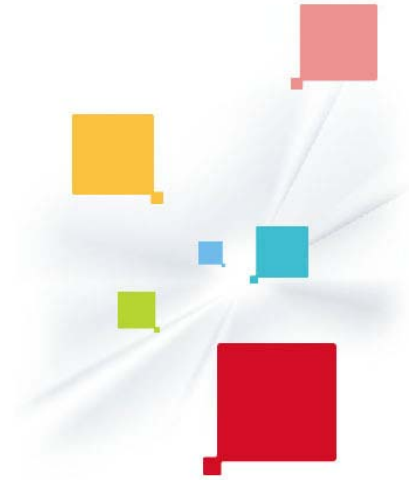
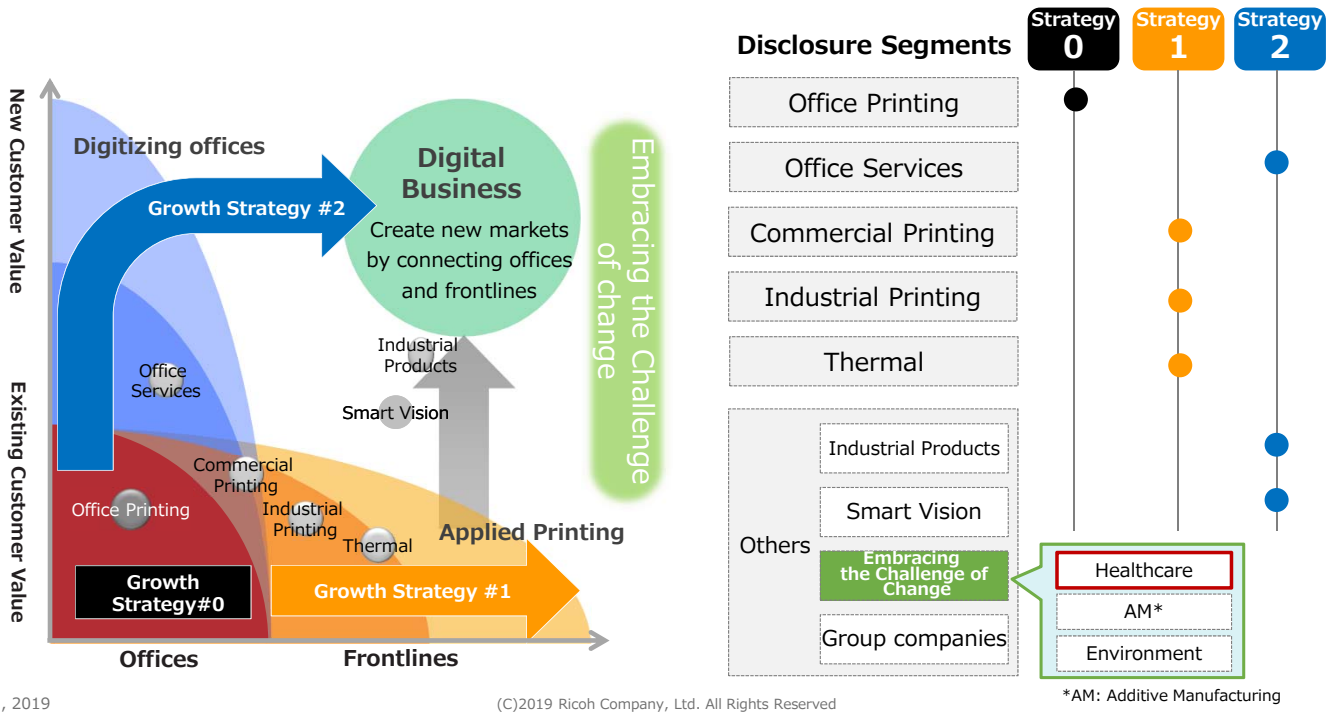


Healthcare Business Strategy

Nobihito Genma
General Manager of
Healthcare Business Group
July 31, 2019



RICOH Ignite Growth Strategy



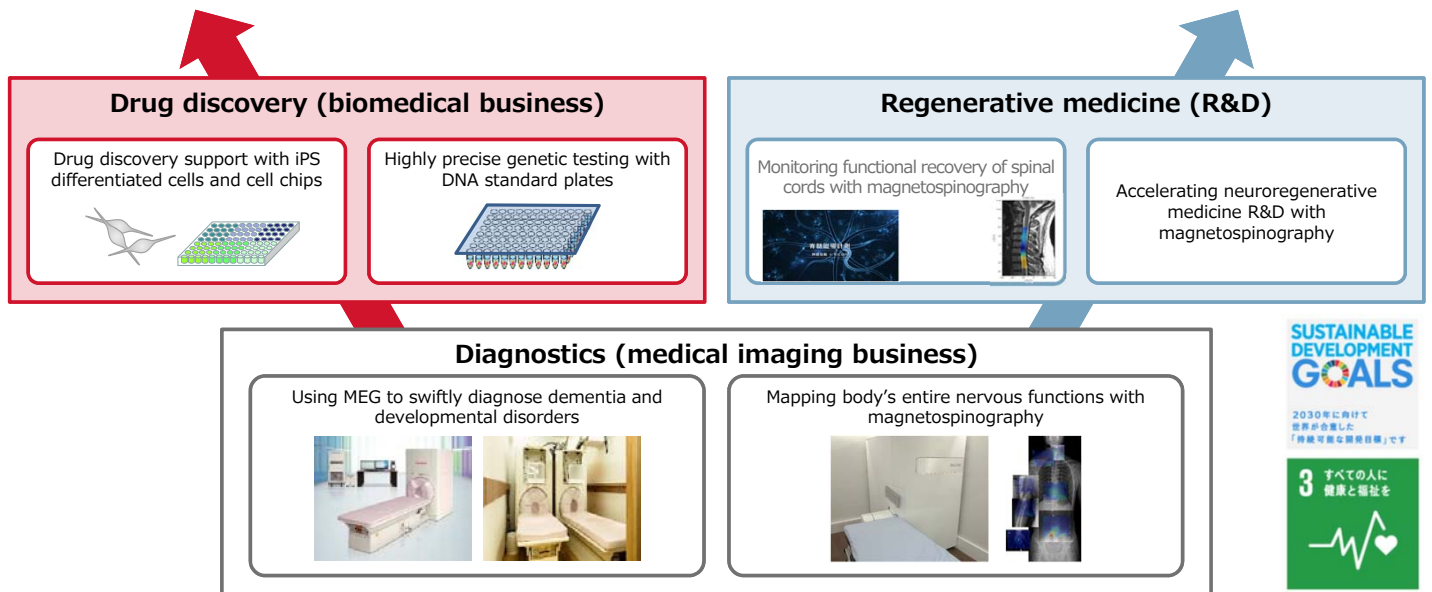
July 31, 2019

(C)2019 Ricoh Company, Ltd. All Rights Reserved

- CEO Yoshinori Yamashita shared a snapshot of our Healthcare business on IR Day. I will present the full picture today.

Healthcare Business Vision

Help diagnose and swiftly detect and treat spinal cord, brain, and nervous system disorders to enhance health and longevity in aging societies



July 31, 2019

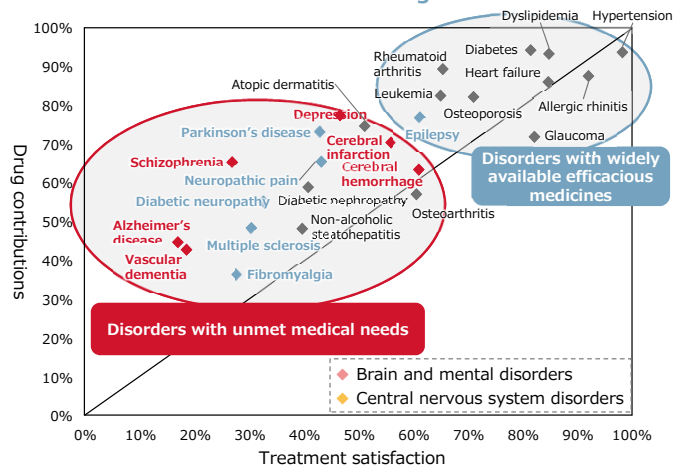
(C)2019 Ricoh Company, Ltd. All Rights Reserved

2

- As you can see here, Ricoh's Healthcare Business vision is to diagnose and swiftly detect and treat spinal cord, brain, and nervous system disorders to enhance health and longevity in aging societies.
- Medical imaging is central to our business, core focuses being magnetoencephalographs, or MEG, and spinographs.
- Our goal with MEG is to swiftly diagnose dementia and developmental disorders. We also seek to map the body's entire nervous functions. We want these capabilities to be our strengths.
- We will leverage proprietary diagnostics to drive progress in two areas.
- The first is the biomedical business, shown in the top left of the slide. Here, we will cultivate drug discovery and diagnostics using bioprinting technology. Efforts will encompass such fields as highly precise genetic testing with DNA standard plates and drug discovery support with iPS differentiated cells and cell chips.
- The other area is regenerative medicine, on the top right. We will strive to accelerate neuroregenerative medicine R&D with magnetospinography.
- We thus seek to contribute to social progress with new technologies treating brain and nerve disorders.

Significant unmet needs remain for central nervous system disorders

Satisfaction with treatments and drug contributions



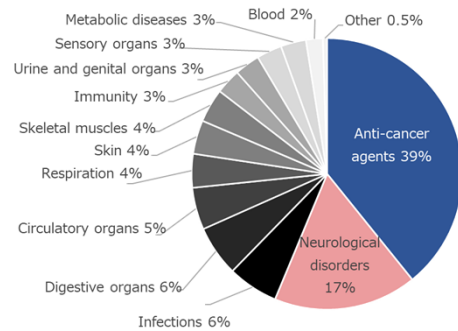
Source: 2014 Japan Basic Technology Survey Report by Japan Health Sciences Foundation

Disorders that elude new drug targets

Unmet medical needs

- Cancer and neurological diseases in particular
- Where improvements with efficacious drugs have run their course

Pipeline percentages by disease worldwide



Ricoh seeks to save countless millions of people with brain and neurological disorders by leveraging medical imaging technology mapping neural activity and biomedical technology employing iPS cells

- The graph on the left plots treatment satisfaction and drug contributions for a range of disorders. In red are brain and mental disorders. In blue are central nervous system disorders.
- As the graph shows, brain and nervous system disorders have unmet medical needs for which effective diagnoses and treatment are urgently desired. We want to use our proprietary technology to save countless millions of people with brain and neurological disorders.
- I will now profile our core medical imaging and biomedical businesses.

- **Products and services**

- Brain and central and peripheral nervous system imaging equipment

- **Features**

- Functional diagnostics:
- Unlike magnetic resonance imaging (MRI) and other systems that map shapes, measures human body's weak magnetic field (a billionth of Earth's)
- Ultraprecision magnetic sensor: Harnesses SQUID (superconducting quantum interference device)



MEG

- For epilepsy and examinations prior to neurosurgery
- Detecting early signs of dementia and children's developmental disorders



MEG measurement system: PQA160C
Medical device approval number: 22100BZX00914000

Magnetospinography (not clinically approved)

- Supporting orthopedic surgical procedures for which MRI diagnostics have been difficult, notably for spinal collapses



Joint research entities: Tokyo Medical and Dental University Kanazawa Institute of Technology

- This business focuses on MEG and magnetospinography, which map the nervous activity of the brain and central and peripheral nerves.
- Unlike magnetic resonance imaging, which maps structures and shapes, MEG and magnetospinographs provide functional measurements of the body's nerve activity. They measure weak magnetic fields from such activity.
- We therefore use an ultraprecision magnetic sensor that harnesses a superconducting quantum interference device.

Developments to Date

Bioprinting Technology

R&D

Medical Imaging Business

RICOH
imagine. change.

Product development through joint research

- Have conducted joint magnetospinography R&D since fiscal 2014 with Tokyo Medical and Dental University and Kanazawa Institute of Technology



Magnetoencephalograph business approach

- Acquired Yokogawa Electric's magnetoencephalography business on April 1, 2016



MEG measurement system: PQA160C
Medical device approval number: 22100BZX00914000

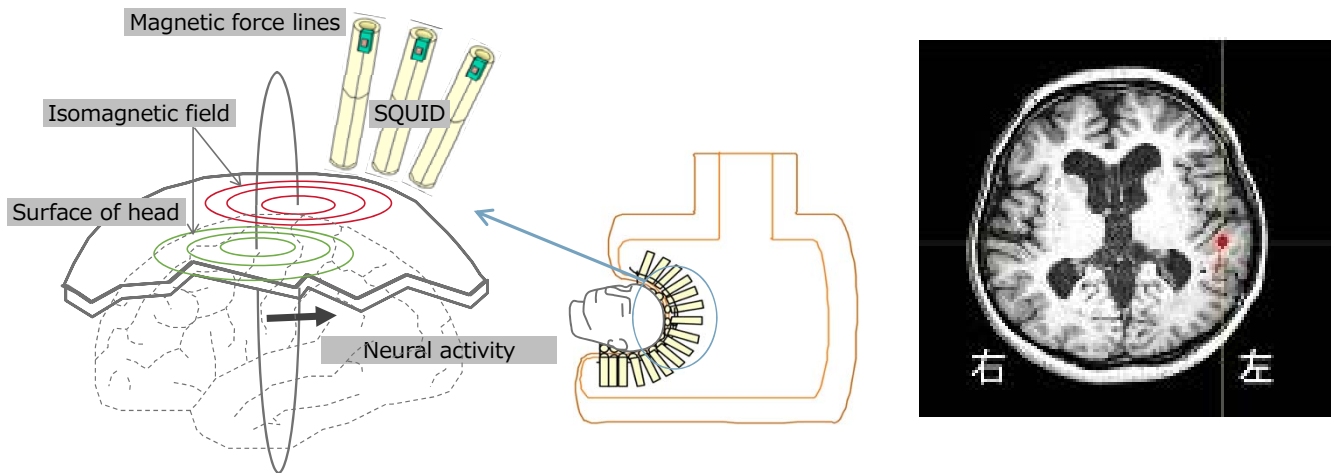


Fully entering healthcare arena

- December 2017: Commercialized RICOH MEG in United States
- July 2017: Commercialized RICOH MEG in Japan

- Page 5 highlights developments to date in our medical imaging business.
- We have conducted joint magnetospinography R&D since 2014 with Tokyo Medical and Dental University, and Kanazawa Institute of Technology. We started this work in view of the potential for mapping nervous activity in spinal cords.
- In April 2016, we fully entered the healthcare business in acquiring Yokogawa Electric's MEG business. We obtained medical device approval in Japan and overseas, launching sales in the United States in December 2017 and in Japan in July 2018.

- Employed in clinical trials, notably to identify epilepsy and brain tumors
- R&D to swiftly diagnose developmental disorders and dementia



Using both MEG and MRI makes it possible to accurately identify sources of abnormalities and thereby determine surgical locations, such as for people with epilepsy

- I will now overview MEG.
- MEG is used in preoperative epilepsy diagnostics. Using both MEG and MRI makes it possible to accurately identify sources of epilepsy abnormalities and determine surgical locations.

New MEG Approaches

Bioprinting Technology

R&D

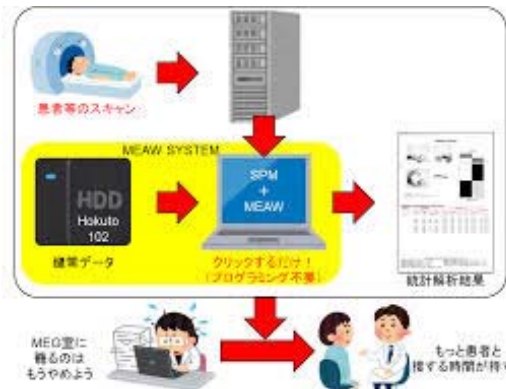
Medical Imaging Business

RICOH
imagine. change.

- Launching brain function dock initiative with Hokuto Hospital
- Beginning joint research with Kanazawa University to swiftly diagnose developmental disorders

Joint research with Hokuto Hospital

- Project to create free and open neural function Big Data and analysis support tools



Joint research with Kanazawa University

- Using world's only three children's MEGs in joint research with Kanazawa University to swiftly diagnose developmental disorders



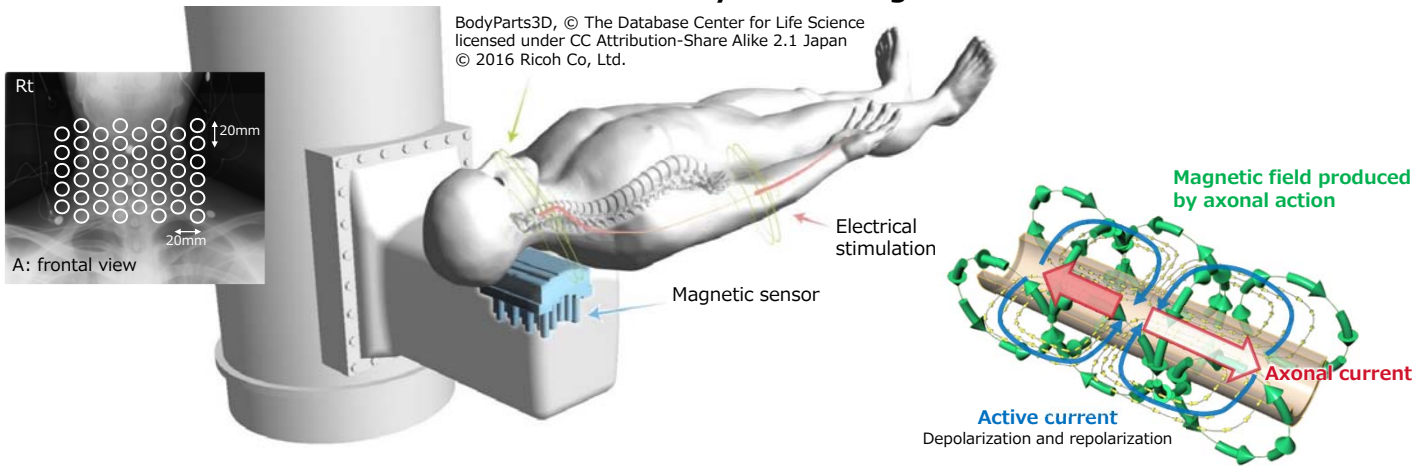
July 31, 2019

(C)2019 Ricoh Company, Ltd. All Rights Reserved

7

- Our new MEG approaches have included launching a brain function dock initiative with Hokuto Hospital in Hokkaido. We announced this in a press release in January 2019.
- In 2018, we started joint research with Kanazawa University to swiftly diagnose developmental disorders. This is part of Osaka University's Center of Innovation national research project.

Detecting neural activity (in milliseconds, for one-tenth to one hundredth of brain magnetic field after electrically stimulating limbs)

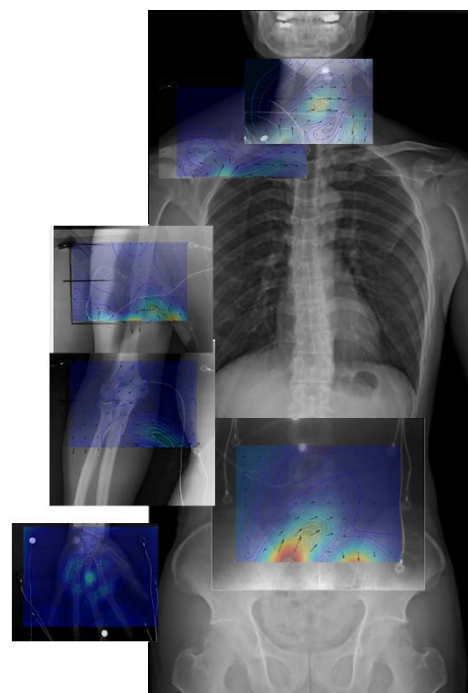


The only system that can provide **minimally invasive** imaging of central and peripheral nerve activity, materializing safe and comfortable medical measurement services

- I will now turn to the spinograph.
- This is the world's only system that can provide minimally invasive imaging of central and peripheral nerve activity.
- The graphic shows a magnetic sensor under the neck that electrically stimulates the limbs, with nerve signals being transmitted to the brain and mapped.

Mapping Neural Activity by Measuring Neuromagnetic Fields

- I. Magnetospinography
 1. Neck
 2. Waist
- II. Magnetoneurography
 1. Hands
 2. Brachial plexus



- The image on the right shows a combination of several measurement results.
- Red shows stimulated nerves, and the path heading toward the brain is very clear. R&D has progressed since 2018, and we can now map neural activity for the whole body, notably the neck, waist, hands, elbows, and upper arms.
- We know that nerve conduction stops when a disorder is identified, this conduction stops, and our device pinpoints disorder locations.

- **Advanced** system developed to map neural activity of spinal cord and peripheral nerves
 - Enabling noninvasive assessments
 - Enabling functional rather than shape evaluations
- Conducting surveys in Japan and abroad through academic and other activities, **confirming spread of ailments that can be researched** and validating **great potential of practical applications** for system

Key areas of research potential

- Spine and spinal cord diseases
- Brachial plexus disorder
- Diabetic neuropathy
- Guillain-Barre syndrome
- Multiple sclerosis
- Amyotrophic lateral sclerosis

Patient universe



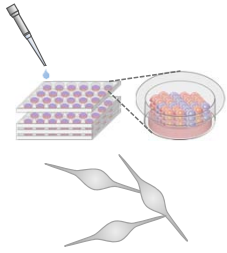
- Magnetospinography makes nervous activity extremely easy to understand. It is minimally invasive, causing no bodily harm, and enables functional rather than shape evaluations.
- As a diagnostic tool, our magnetospinograph offers considerable diagnostic potential for a range of disorders. These include spinal and spinal cord diseases, brachial plexus disorders, and diabetic neuropathy.
- Ours is the world's only magnetospinograph, and it offers outstanding practical potential.
- In fiscal 2020, we will apply for medical device certification from the U.S. Food & Drug Administration and from Japan's Pharmaceuticals and Medical Devices Agency), and look to commercialize our system as soon as possible.

● **Vision**

- Leveraging Ricoh’s bioprinting technologies and Elixergen Scientific’s iPS cell technologies to tackle new challenges in drug discovery and diagnostics

Biomedical business

**Personalized and stratified medicine
Companion diagnostics**



- **In Vitro screening services**
 - Pharmaceutical test assay service
 - Safety test assay service
- **Drug discovery support tool sales**
 - iPS differentiated cell and tissue chip
 - Disorder model chip
- **Cell and differentiation reagent sales**
 - iPS cell-derived neurons

Drug discovery business **Diagnostic agent business**

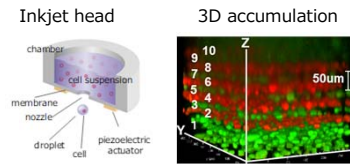
- **Diagnostic reagent sales**
 - Multiplex diagnostic agents
 - Micro-quantification genetic diagnostic agents
- **Clinical laboratory standardization reagent sales**
 - DNA standard plates
 - Positive control



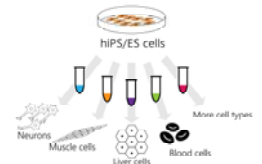
Core technologies

1. Precision inkjet deposition of live cells (precise control of cell numbers and positions)
2. 3D accumulation of hydrogel and live cells
3. Rapid iPS cell differentiation technology

Bioprinting technologies



Rapid iPS cell differentiation technologies



- I will now discuss our biomedical business.
- We have two core technologies in this area. The first is our bioprinting technology. The second is the iPS cell technologies of Elixergen Scientific, in which we acquired a stake in July. Our goal in the biomedical business is harness these two technologies to pursue drug discovery and diagnostics for personalized medicine.

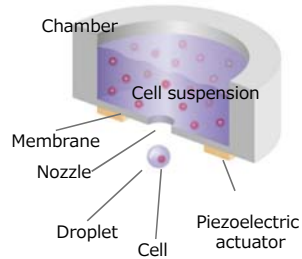
Bioprinters

- Developing new inkjet heads with simple structures that can discharge cells

Instrument



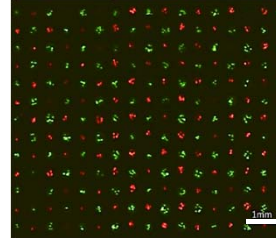
Inkjet head



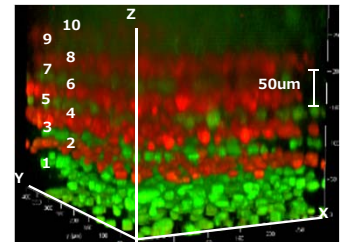
Cell patterning

- Combining human cells and hydrogels to create various shapes and reproduce functionality of human organs

2D patterning



3D accumulation

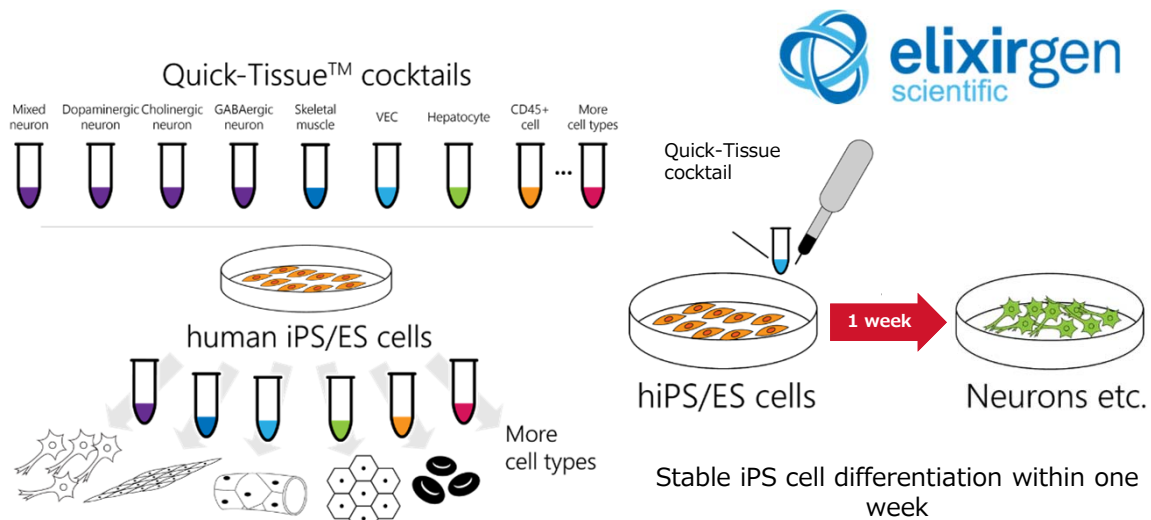


Developing unique inkjet technology that can precisely dispense living cells
(precisely controlling cell numbers and positions)

- I will now explain our bioprinting technology. We developed a unique inkjet technology that can accurately dispense living cells, precisely controlling the number and positions of cells. As you see on the right, we will produce a range of patterns by combining human cells and hydrogels to reproduce the functionality of human organs.

Elixirgen Scientific Quick-Tissue™ technology

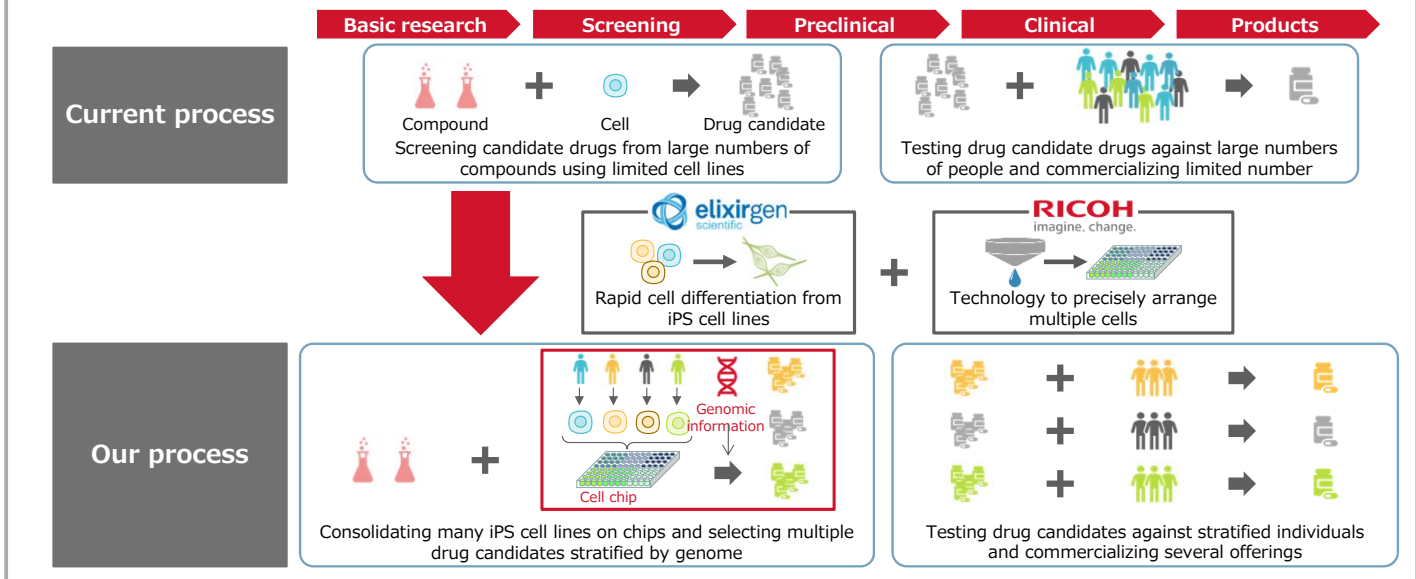
- Fast differentiation through simple process of applying transcription factor-derived cocktails to human iPS cells



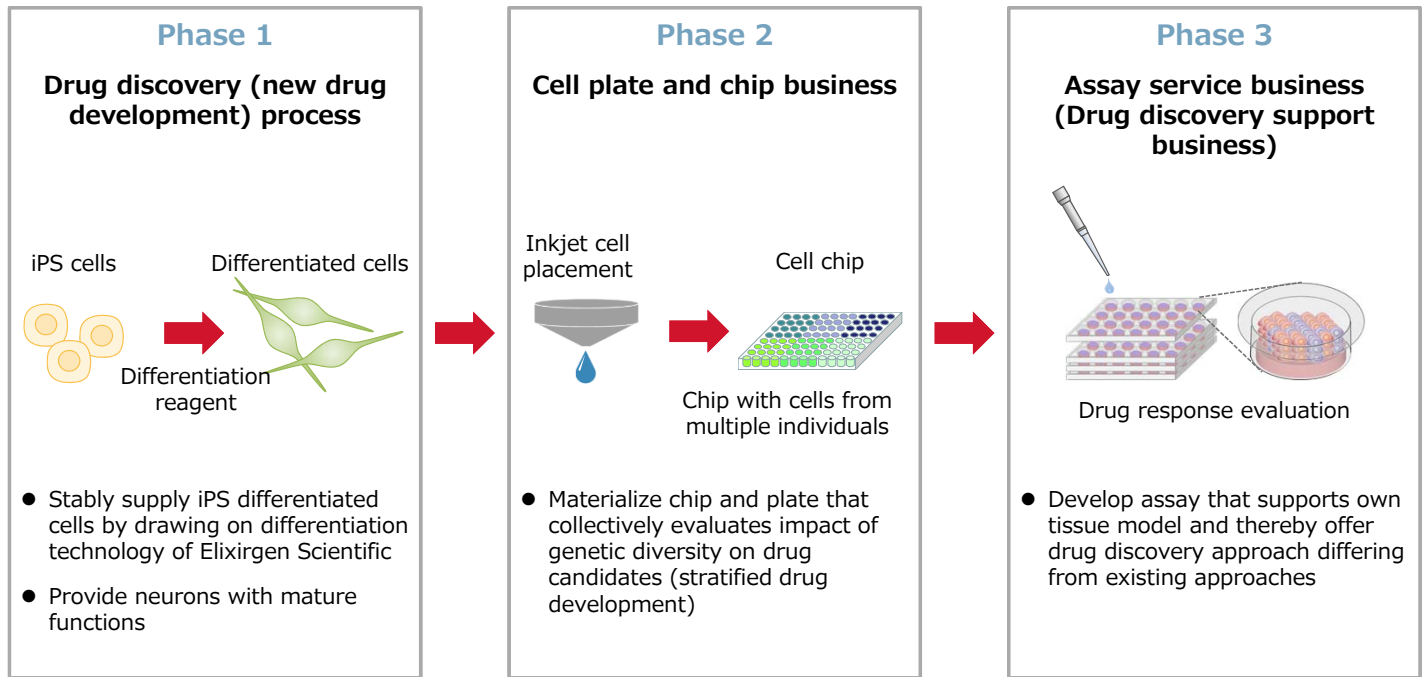
- The other technology is rapid iPS cell differentiation, which is Elixirgen Scientific's Quick-Tissue technology, which uses nucleic acid-derived reagent cocktails of transcription factors on human iPS cells.
- This simple process makes it possible to rapidly transform stem cells into organ tissue cells. Differentiation conventionally takes one or two months. The Quick-Tissue technology leads to functionally mature neurons in just a week.

Toward drug discovery process innovation and personalized medicine

- Drug discovery process (new drug development)



- We aim to use these two technologies to drive drug discovery process innovation and personalized medicine.
- The current drug discovery process uses limited cell lines to quite inefficiently screen candidate drugs from large numbers of compounds.
- Technologies from Ricoh and Elixigen Scientific can drive innovations and process improvements. We can consolidate many iPS cell lines on chips and select multiple drug candidates stratified by genome. We can develop optimal therapeutic medications according to gene sequences in our quest to materialize stratified medicine.

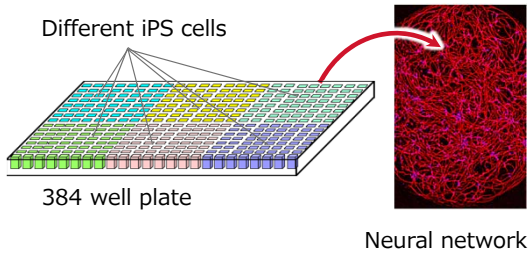


- I will now go through our drug discovery business steps.
- In Phase 1, Elixergen Scientific is pushing forward with cell and reagent operations. It will expand this area and supply iPS differentiated cells or reagents. For neurons in particular, we look to expand by offering cells with mature functions.
- In Phase 2, we will develop the cell plate and chip business. We aim to contribute to the development of stratified drugs by selling chip plates that can evaluate the impact of genetic diversity on drug candidates.
- For Phase 3, we will develop an assay service business supporting drug discovery and assays that support our own tissue model.

- Nerve tissue chip to evaluate efficacy and neurotoxicity with cranial nervous system diseases
- Efficacy and toxicity evaluation services using this chip

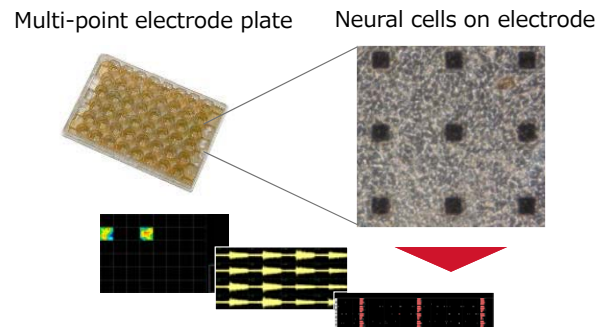
Nerve cell chip

- Evaluating diversity by using iPS cells derived from multiple people



Electrode chip for evaluating neural functions

- Measuring nerve cell firing electrophysiologically
- Evaluating spasms and other neurotoxicity
- Epilepsy and other efficacy evaluations



- We are looking into synergies between neurons and MEG and magnetospinographs, focusing on drug discovery that targets neurological disorders.
- We will evaluate diversity by using iPS cells derived from multiple people and assess drug efficacy and side effects.
- We also aim to work on an electrode chip with nerve cells deposited on electrodes, measuring nerve cell firing electrophysiologically, evaluating spasms and other neurotoxicity, and undertaking epilepsy and other efficacy evaluations.

- **Vision**

- Supply diagnostic agents for personalized medicine, centered on companion diagnostic drugs

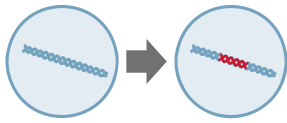
- **Products and services**

- DNA standard plates to calibrate genetic testing equipment and control test precision
- Looking to offer companion diagnostic agents to determine efficacy of stratified drugs for cranial nerve disorders

- Finally, I would like to overview our diagnostic agent business.
- Our vision is to supply diagnostic agents for personalized medicine, centered on companion diagnostic drugs. We will first commercialize DNA standard plates to calibrate genetic testing equipment and control test precision.
- Down the track, we look to develop a business in which we offer companion diagnostic agents to determine the efficacy of stratified drugs for cranial nerve disorders.

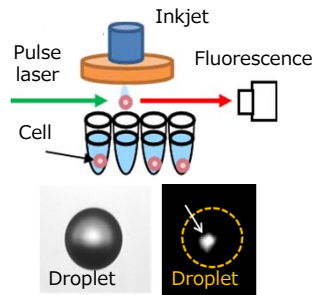
Toward drug discovery process innovation and advanced personalized medicine

Genetic recombination



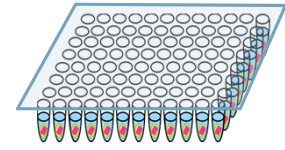
- Introduce desired DNA sequence into cells through genetic recombination

Precise cell dispensing



- Dispensing through inkjet while counting number of discharged cells

DNA standard plate

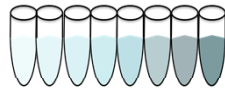


- Plate specifying number of arbitrarily sequenced DNA copies
- Specifying 1 to 1,000 copies

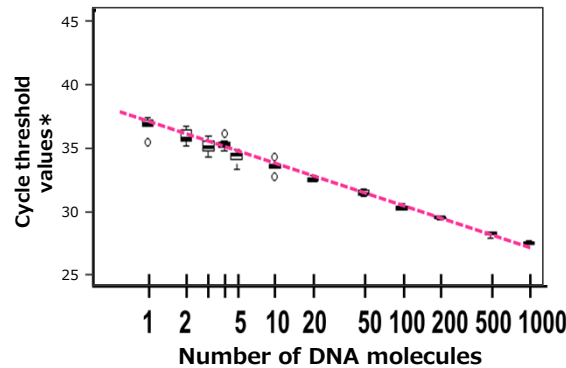
Joint studies with National Agricultural and Food Research Organization and FASMAC, which is part of Nippon Flour Mills Group

- Now, I will talk about DNA standard plates.
- We are introducing desired DNA sequences into cells through genetic recombination. We are using our inkjet technology to count the number of cells and put them in plate wells. This result is plates with arbitrary numbers of DNA molecules in arbitrary sequences, as on the far right of this slide. This is a DNA standard plate. The number of DNA copies can be specified from 1 to 1,000.

- Inspection equipment and reagent quality control
- Guaranteed detection accuracy for low number of molecules



1 to 1,000 molecules



Linearity ensured for 1 to 1,000 molecules

*Cycle threshold value = number of amplification cycles required for detection

- Here is an example of actual DNA standard plate usage. We have obtained favorable linearity results for 1 to 1,000 DNA molecules. This shows that it is possible to perform reliable DNA testing from a single molecule.
- At the same time, if linearity is disrupted when using a standard plate with various devices and reagents, one can conclude that device precision is poor. So, we look to use our technology to control precision or ensure detection accuracy for low numbers of molecules.

- We plan to launch DNA standard plates



96 well plate

Plans

- ✓ Expand lineup of accuracy control and positive control plates
- ✓ Internationally standardize genetic testing

- We have already completed DNA standard plate development, and are set for commercialization.
- We plan to expand our lineup of accuracy control and positive control plates. We also look to internationally standardize genetic testing.
- That ends my overview of our medical imaging and biomedical businesses. Thank you very much for listening.

RICOH
imagine. change.

The plans, prospects, strategies and other statements, except for the historical events, mentioned in this material are forward-looking statements with respect to future events and business results. Those statements were made based on the judgment of Ricoh's Directors from the information that is now obtainable. Actual results may differ materially from those projected or implied in such forward-looking statements and from any historical trends. Please refrain from judging only from these forward-looking statements with respect to future events and business results. The following important factors, without limiting the generality of the foregoing, could affect future results and could cause those results to differ materially from those expressed in the forward-looking statements:

- a. General economic conditions and business trend
- b. Exchange rates and their fluctuations
- c. Rapid technological innovation
- d. Uncertainty as to Ricoh's ability to continue to design, develop, produce and market products and services that achieve market acceptance in hot competitive market

No company's name and/or organization's name used, quoted and/or referenced in this material shall be interpreted as a recommendation and/or endorsement by Ricoh.

This material is not an offer or a solicitation to make investments. Please do not rely on this material as your sole source of information for your actual investments, and be aware that decisions regarding investments are the responsibility of themselves.