September 16, 2022

TOYOBO
Beyond Horizons

Online Meeting with Investors: Life Science Business

TOYOBO CO., LTD.
Director & Managing Executive Officer
Head, Life Science Solutions Division
Yutaka Ouchi

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TOYOBO

Corporate Philosophy System TOYOBO PVVs

Ⅰ. Positioning of the Life Science Business

Positioning of the Life Science Business within the Toyobo Group

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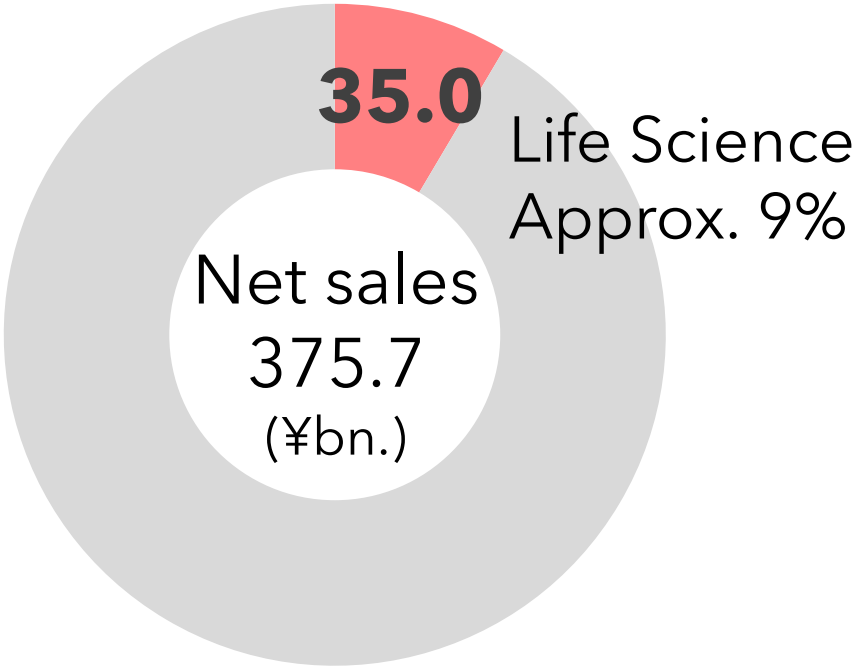
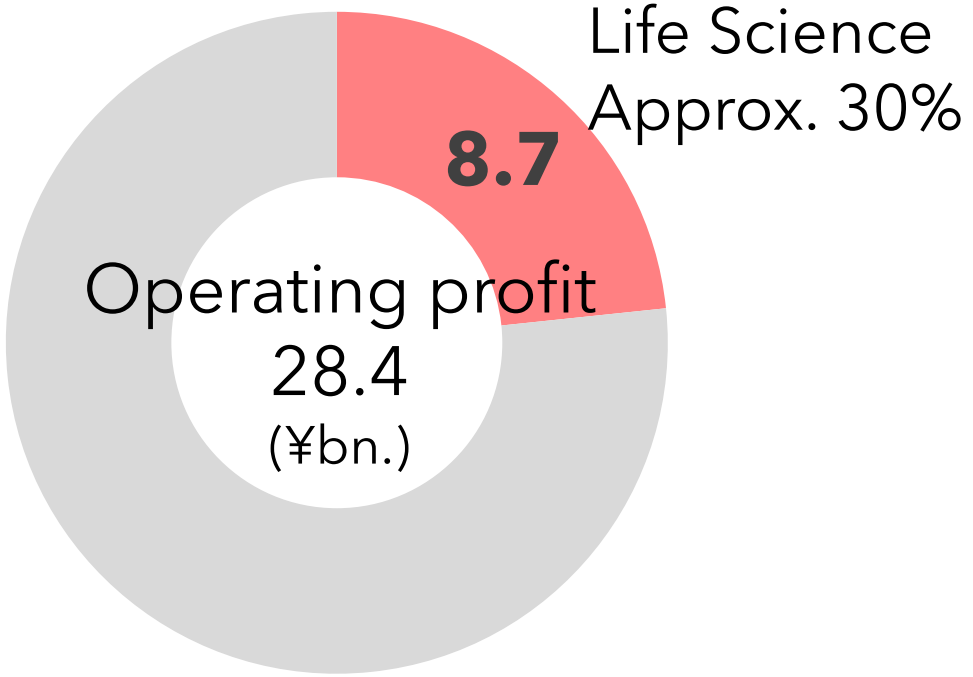
FY 3/22 Results





Biotechnology

Medical materials

Contract manufacturing of pharmaceuticals

Change in Net Sales and Operating Profit Margin of the Life Science Business

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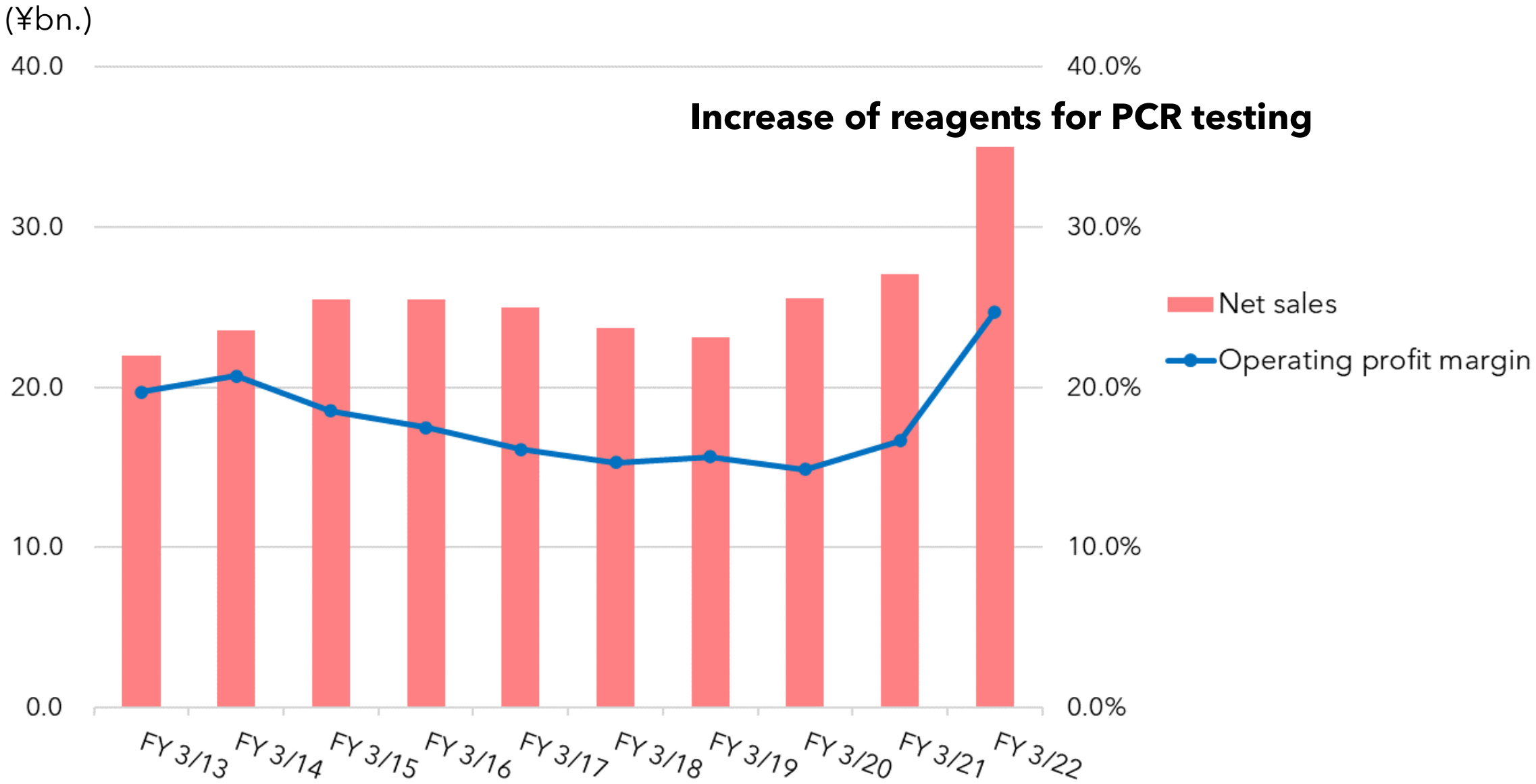

Life Science Business Bases

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Bases in Japan

Tsuruga Research and Production Center
(Biotechnology)

Research Center
(Biotechnology,
Medical materials)

Otsu Pharmaceuticals Plant

Iwakuni Production Center
(Medical materials)

Tokyo Branch

Head office (Osaka)

- Production, R&D
- Sales

Overseas Bases

- TOYOBO (SHANGHAI) BIOTECH CO., LTD.
- TOYOBO (TAIWAN) CO., LTD.
- TOYOBO Korea Co., Ltd.
- TOYOBO U.S.A., INC.
- TOYOBO DO BRASIL PARTICIPACOES LTDA.
- TOYOBO Chemicals Europe GmbH
- Spinreact, S.A.U.

Contributing to Solving Social Issues through the Life Science Business (from Sustainable Vision 2030)

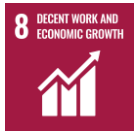
TOYOBO

Vision : We will continue to create the solutions needed by people and the earth with our materials and science

Relations between five social issues and SDGs

People

Employees' well-being and human rights in the supply chains



- People First: employees' safety, pride, rewarding work
- Respecting human rights in the entire supply chain

Healthy lifestyle and health care

- Contributing to the field of infectious diseases
- Improving QOL with medical membranes, etc.

⇒ **Life Science Business**

Smart community and comfortable space

- Creating a humancentric, digital society with highly functional films and advanced materials
- Dealing with new technologies such as CASE and MaaS and creating safe and comfortable mobility space

Planet

Decarbonized society and circulating society

- Achieving carbon neutrality in Scope 1,2 by FY 3/51
- Establishing and joining an ecosystem for circulating resources used in products

Good condition of water area, atmosphere and soils, and biodiversity

- Reducing the impact on and bettering the environment with functional membranes and equipment to recover solvents
- Reducing food loss with highly functional packaging films
- Sustainable food

Reorganization of the Business Portfolio
(from 2025 Medium-Term Management Plan)

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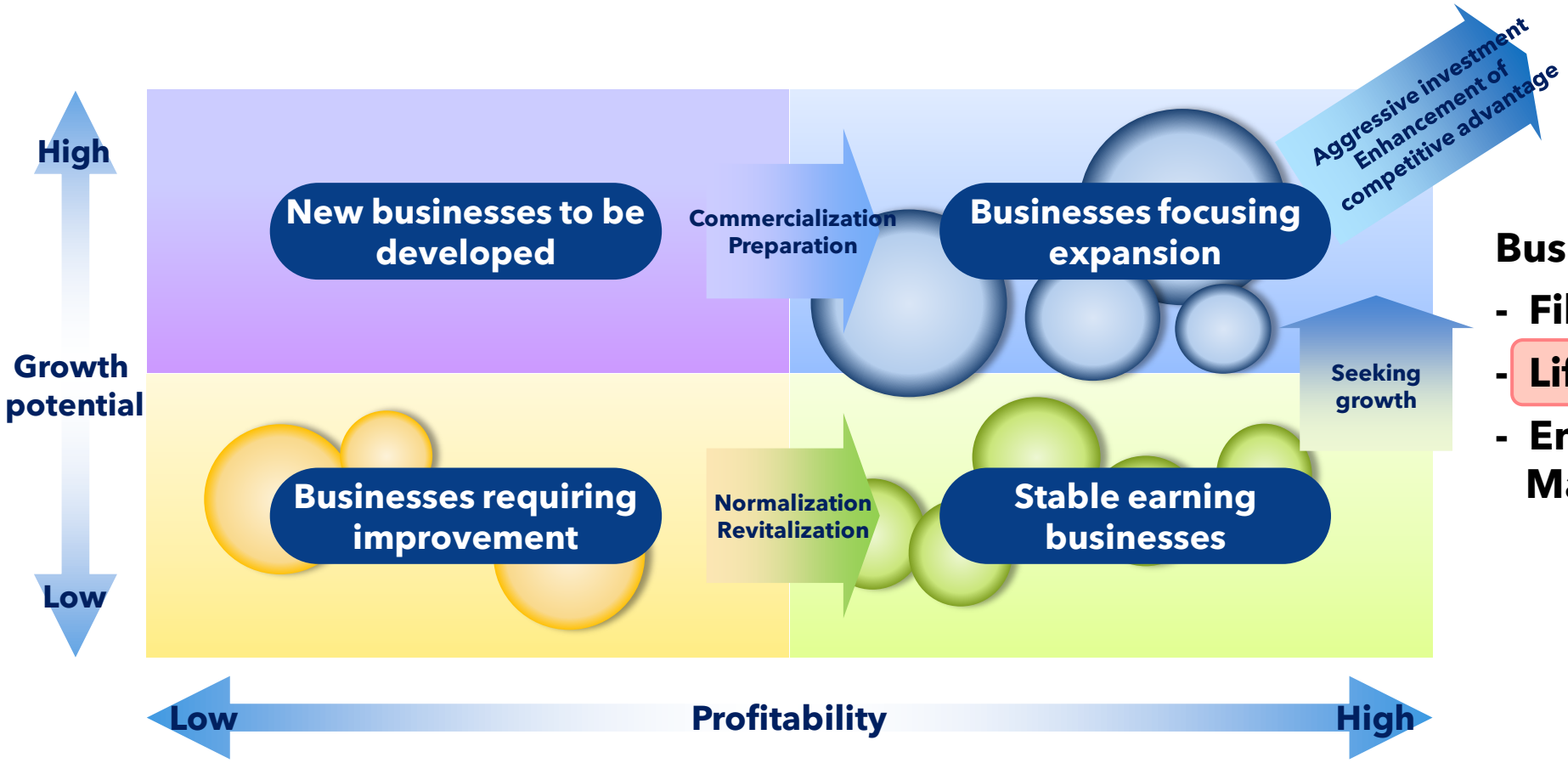
Assess and stratify each business into 4 quadrants with 2 axes: “Profitability” and “Growth potential”



Businesses focusing expansion

- **Films**
- **Life Science**
- **Environment, Functional Materials**

Today

Biotechnology business

Medical materials business

Key Products of the Life Science Business

TOYOBO

- Life Science Solutions
  - Biotechnology
    - Enzymes
    - Research reagents, diagnostic reagents
    - Diagnostic systems
  - Medical materials
    - Dialysis membrane (Chronic blood purification membrane)
    - Acute blood purification membrane
    - Process membranes
    - Biomaterials





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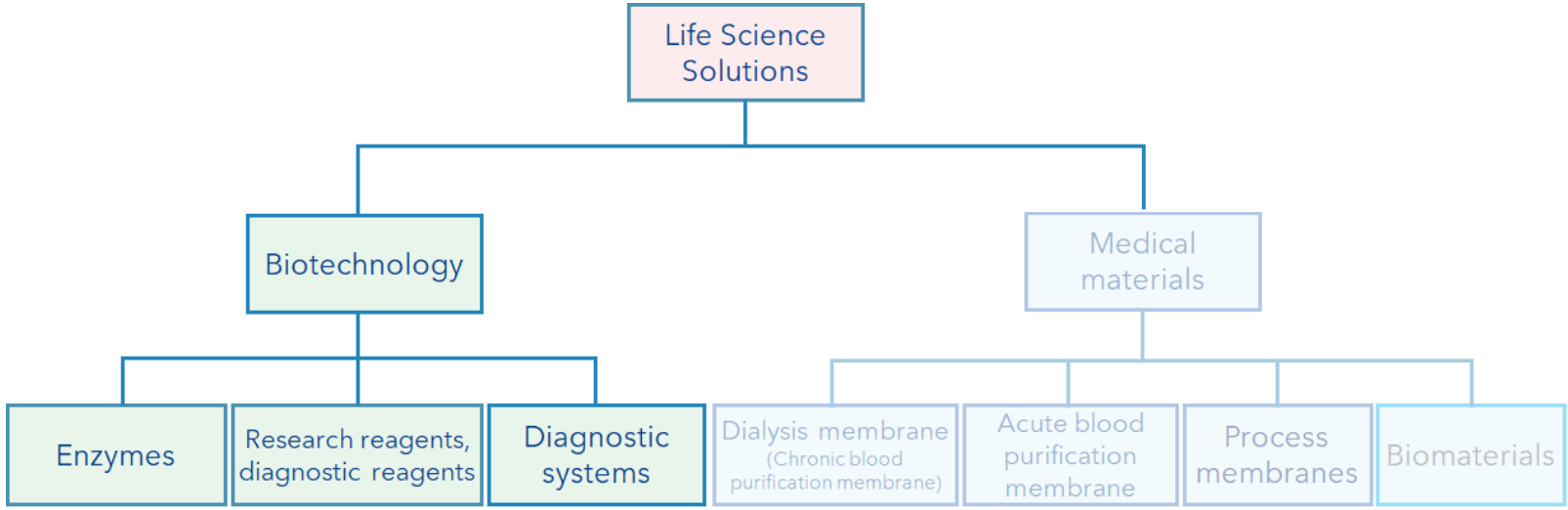
Ⅱ. Biotechnology Business



History of the Biotechnology Business

TOYOBO

1948 Biotechnology business derived from pulp business

- Began research on yeast cultivation for **the treatment of pulp effluent**, the raw material for rayon fiber

1972 Entered the enzymes & diagnostic reagent market as a biochemistry business (current biotechnology business)

- Launched **uric acid measurement testing chemical**

1982 Entered the life science reagent field as a biochemistry business

- Began sales of reagents for genetic engineering

1986 Completed construction of a new research building at the Tsuruga Enzyme Plant, and further enhanced the R&D system

1990 Launched **enzymes for blood glucose monitoring**

1995 Began sales of **PCR enzymes "KOD" DNA polymerase**

2003 Established TOYOBO (SHANGHAI) BIOTECH CO., LTD. as a Chinese base for the biotechnology business

2013 Acquired Spain's Spinreact, S.A.U., a global manufacturer and marketer of diagnostic reagents and instruments

2015 Constructed a new facility for enzyme purification in Tsuruga Research and Production Center to increase refining capacity by 50%

Outline of the Biotechnology Business

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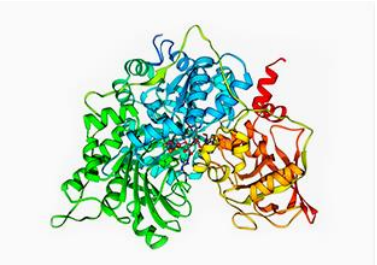
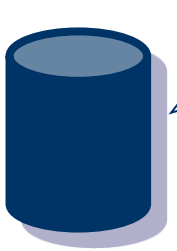
Enzymes → **Research reagents, diagnostic reagents** → **Diagnostic systems**

Developed enzymes with superior functionality and stability through gene modification



(Image of enzymes)

Developing enzymes and substances that assist enzyme function to make reagents and diagnostic reagents



Main enzyme
Buffer agent
Various ions
Surface-active agent

Several to dozens of types

(Image of reagents)

Devices and systems that use specimens (urine, saliva, etc.) to examine abnormalities in the human body

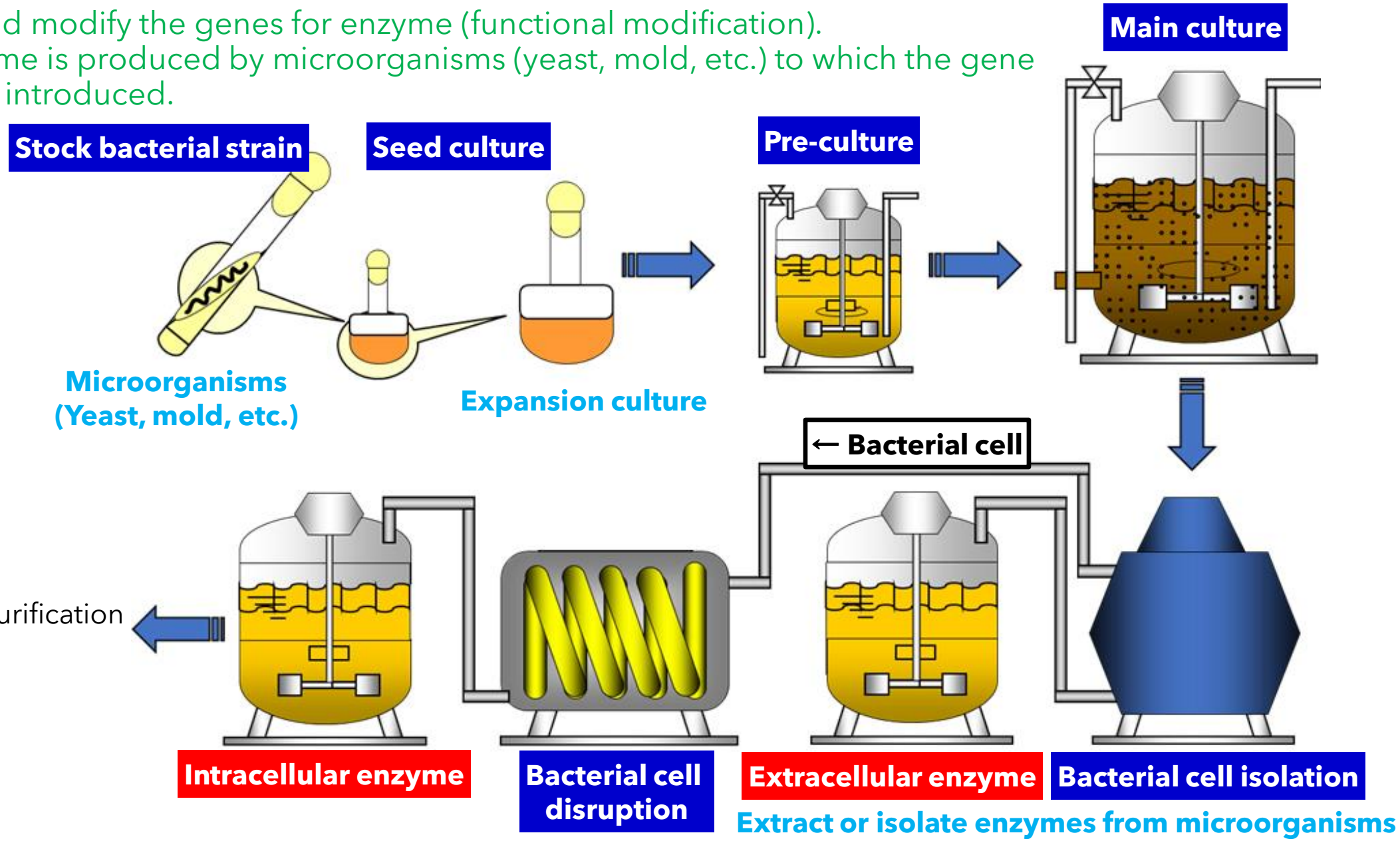
[Our strengths] **Technology for making high-functionality proteins**

Enzymes and substances that assist enzyme function are both proteins

Process of Enzyme Production | Cultivation

TOYOBO

Isolate and modify the genes for enzyme (functional modification).
The enzyme is produced by microorganisms (yeast, mold, etc.) to which the gene has been introduced.



Products | Enzymes for Biochemical Diagnosis

TOYOBO

- Microorganism culture → Enzyme purification → Pulverization to produce enzymes for biochemical diagnostic reagents

  - Blood glucose (Diabetes)
  - Cholesterol (Arteriosclerosis)
  - Creatinine (Renal function)
  - GOT / GPT (Liver function) etc.

- Market: Enzyme market ¥20.0 bn. (Chinese market ¥6.0 bn.)
  Growth rate 1~3% / year (Chinese market 5% /year)
- Share: Approx. 25% (TOYOBO's estimate) (2nd in the world)
- Overseas sales ratio: Approx. 70%
- Future: Expand sales to emerging countries

[Our strengths]
- Genetic recombination technology for microorganisms
→ Realization of functional modification and mass production of enzymes
- Large product lineup

Products | Enzymes, Research Reagents, Diagnostic Systems for Genetic Testing

TOYOBO

Enzymes for genetic testing (PCR enzymes)

- "KOD" DNA polymerase: amplify rapidly, copy accurately
- "TTx" DNA polymerase: highly resistant to contaminants
- **Share of PCR enzymes:**
  Domestic approx. 15% ← Pre-Corona approx. 5% (TOYOBO's estimate) Top 3 in Japan

Research reagents (Reagents for PCR testing)

(e.g.) Detection kit for COVID-19

Eliminates work to remove impurities in samples (throat swab, saliva) with unique enzymes, etc., and reduces the processes for gene extraction.

Able to test for COVID-19 within a minimum of 60 minutes.

◆Also possess reagents for norovirus testing.

Detection kit for COVID-19

Diagnostic systems

Fully automated gene analysis system "GENECUBE"

Able to test within as quickly as 30 minutes from reagent mixing to gene amplification and detection.

◆**Multiple items can be measured simultaneously**
(4 items×6 specimens maximum)
(e.g.) - COVID-19 & Influenza virus - COVID-19 & RS virus
- Whooping cough & Mycoplasma pneumoniae - Whooping cough & Para-pertussis

"GENECUBE" (model C)

Diagnostic reagents

[Our strengths] **Possess enzymes, reagents, diagnostic reagents and diagnostic devices for genetic testing**

Detection Kit for COVID-19 | Points

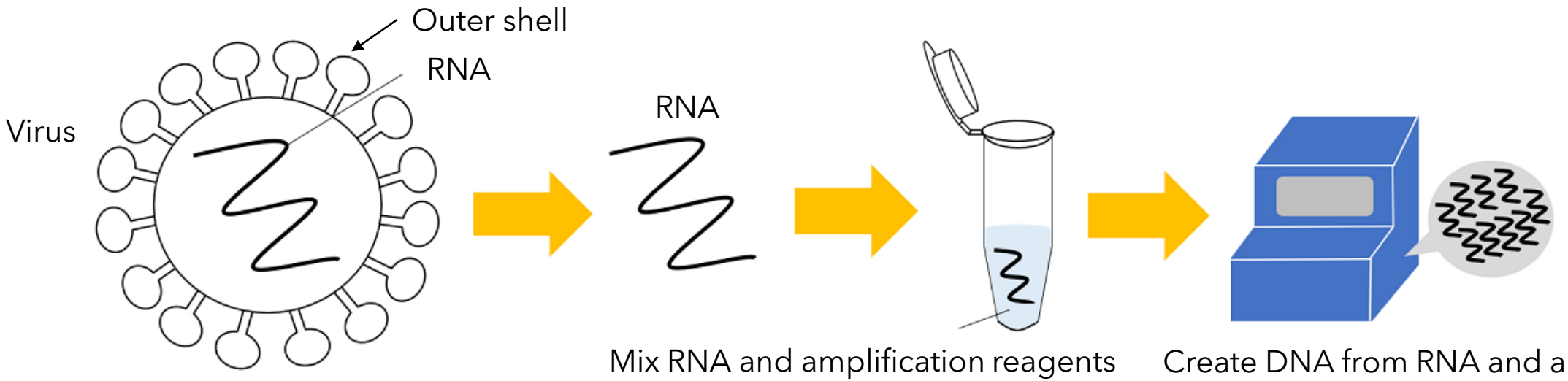
TOYOBO

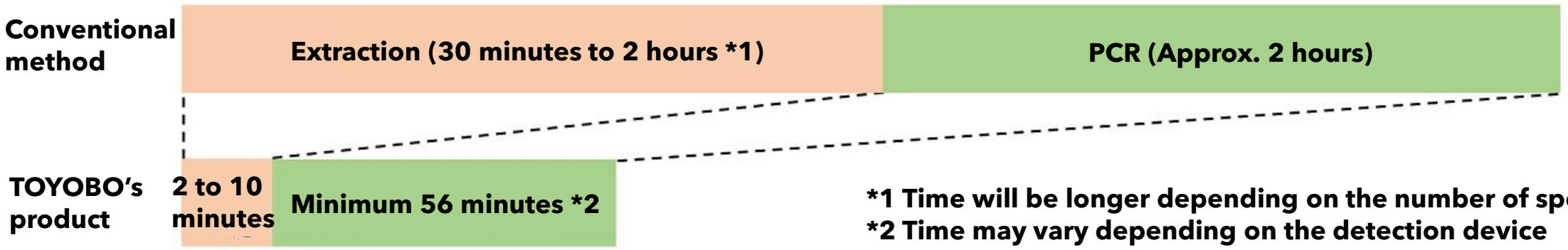
Highly efficient reagent that destroys the structure of viral particles and exposes RNA

RNA extraction process and time reduction

※Deployment of know-how concerning norovirus test reagents

RNA extraction by crushing the outer shell of the virus





***1 Time will be longer depending on the number of specimens**
***2 Time may vary depending on the detection device**

Future Development | Solutions Business for Infectious Diseases

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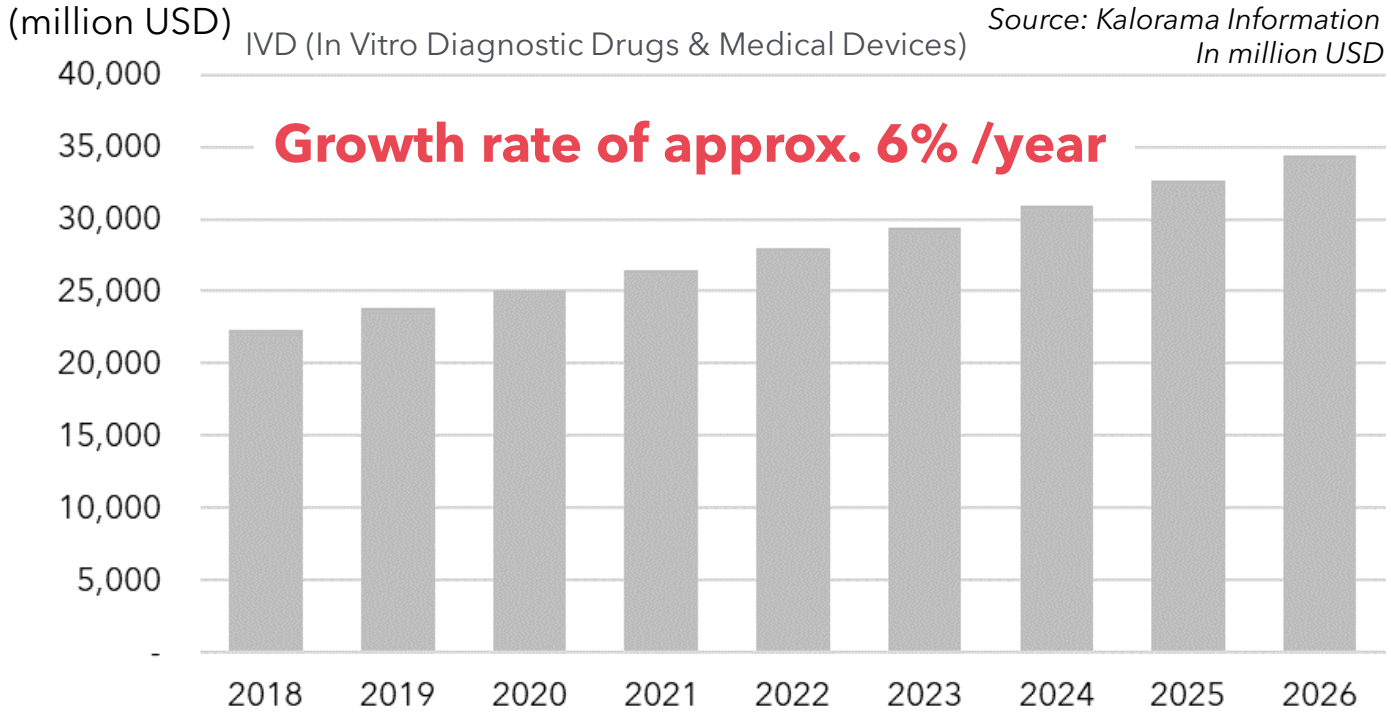
Focus on the area of infectious diseases, which is a growing market and an area in which pandemics are expected to return

Market of IVD for Infectious Diseases



Genetic testing

- COVID-19
- Influenza virus
- RS virus
- Whooping cough
- Para-pertussis
- Tuberculosis

Antigen testing

- COVID-19

➢ Aiming to be the industry's number one player in the growing market of infectious diseases, providing integrated solutions from raw materials to testing and diagnosis

Raw materials → Reagents → Testing and diagnosis

Future Development
Global Expansion of the Biotechnology Business

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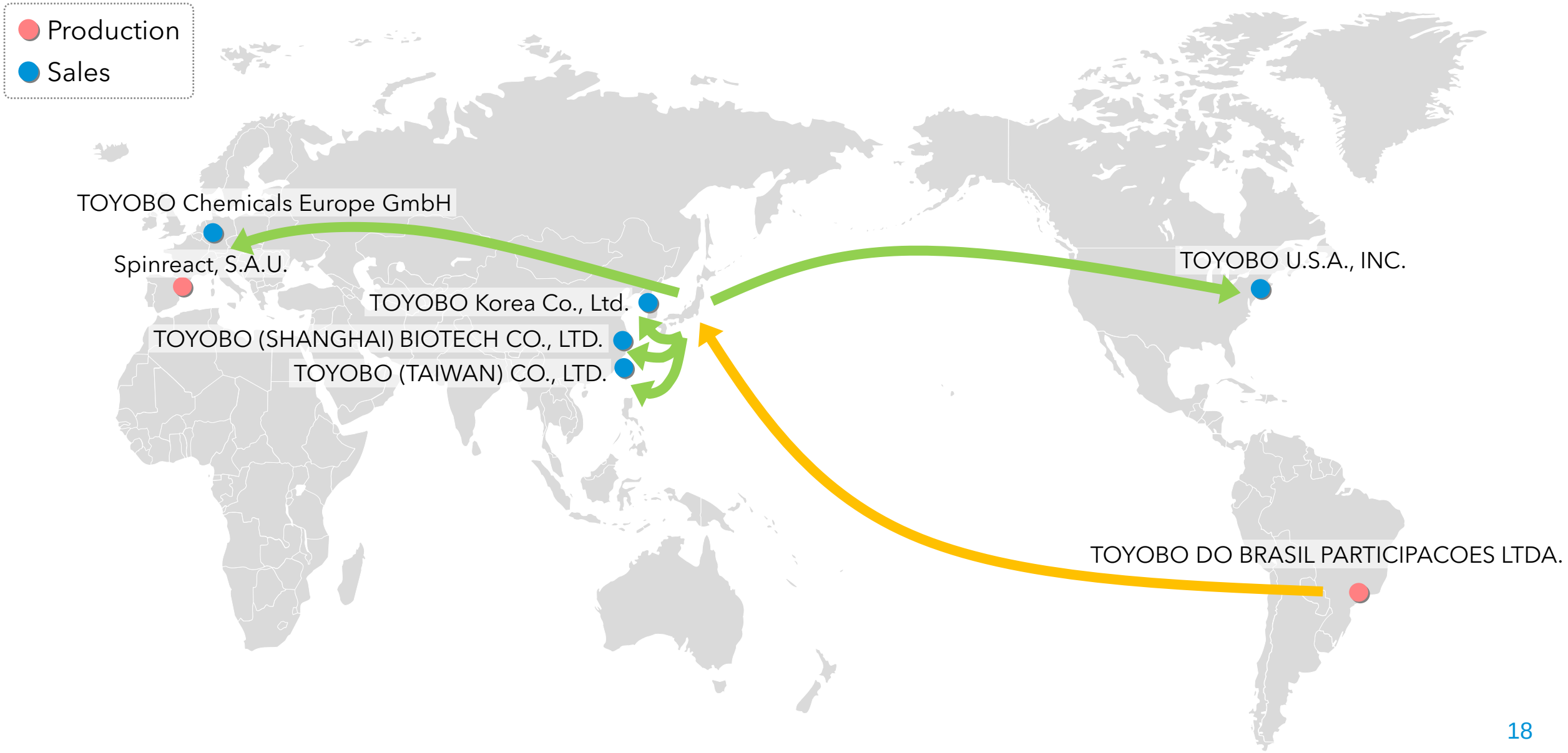
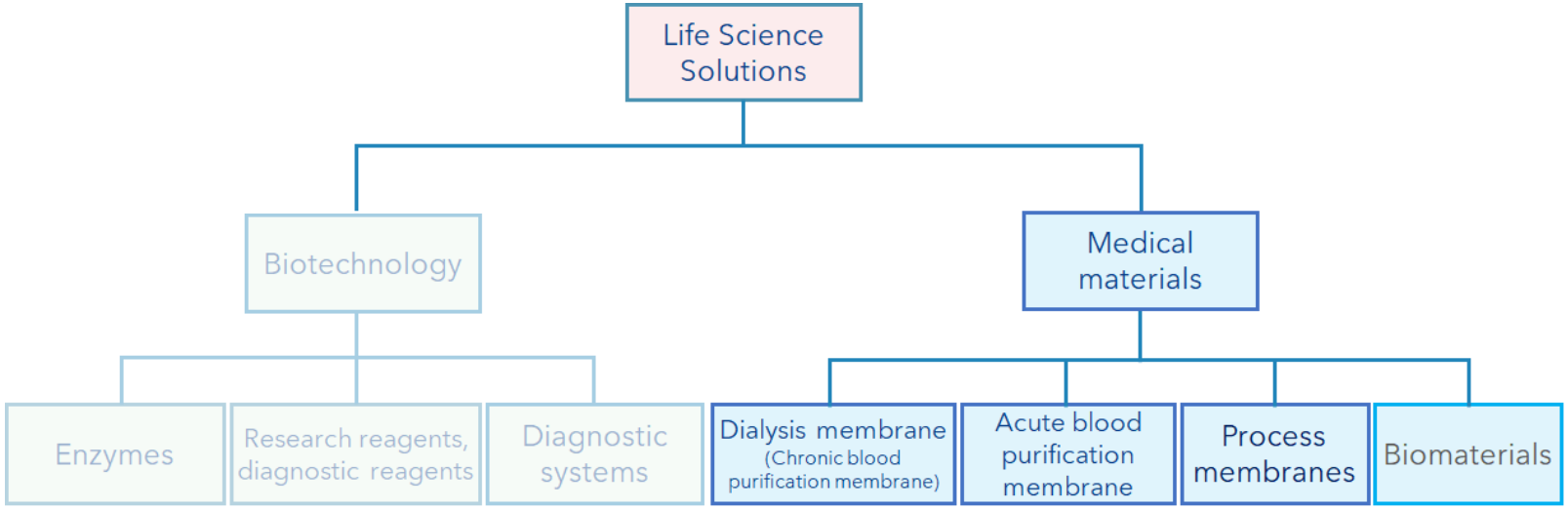


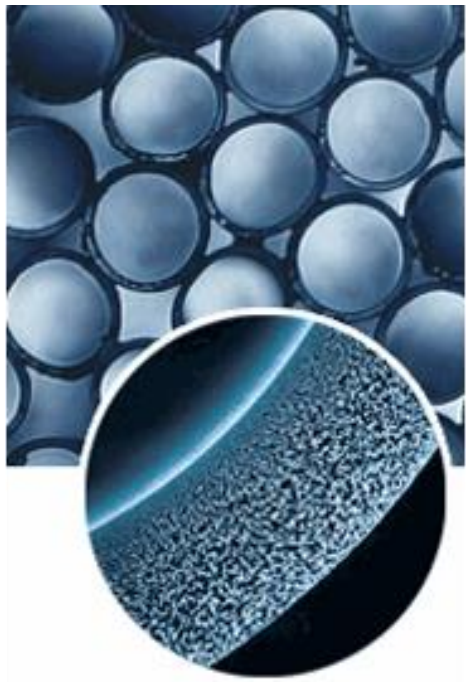
Ⅲ. Medical Materials Business



History and Outline of the Medical Materials Business

TOYOBO

1980 Began production of reverse osmosis membranes for seawater desalination “HOLLOSEP”
1984 Began full-scale production of **artificial kidney hollow fiber**
2012 Began production of virus removing membrane
Entered the biomaterials market
2020 Entered the acute blood purification market



Enlarged cross-sectional view of hollow fiber membranes

Hollow-type separation membranes

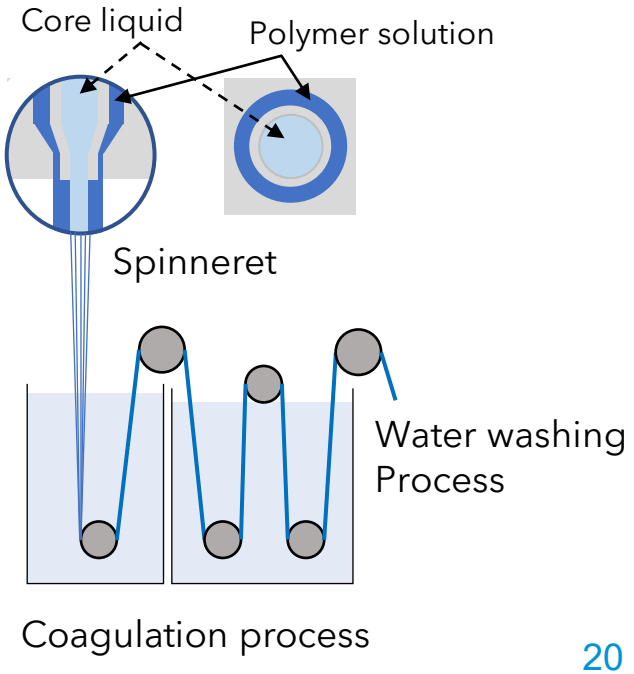
Separation membranes with microscopic pores in the cross section of the hollow fiber

- Blood purification membrane (removes toxic substances from the blood)
- Separation membranes for the antibody drug manufacturing process

[Our strengths]

Membrane production technology

- Technology that controls pore size
- Technology that designs the cross-sectional structure of hollow fibers



Outline of Artificial Kidney Hollow Fiber (Chronic Blood Purification Membrane)

TOYOBO

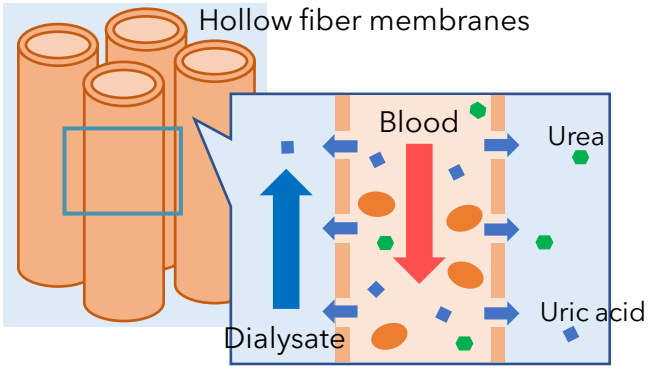
Dialysis: Prevents renal failure patients from becoming uremic by “removing waste products,” “maintaining electrolytes,” and “maintaining fluid volume” in the blood

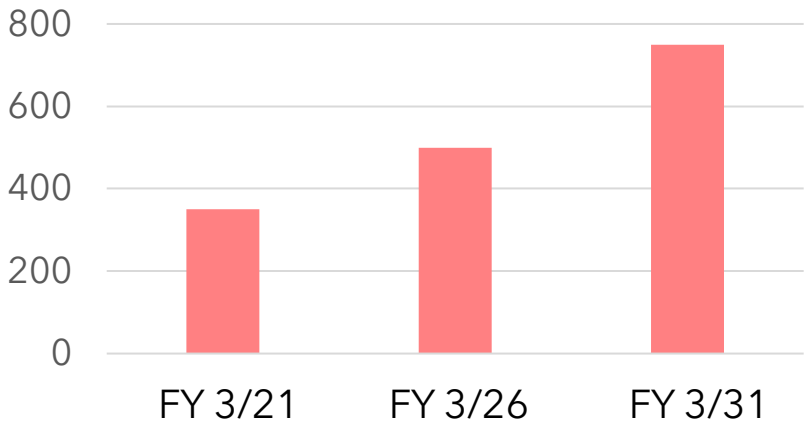
- Composition/Function: Hollow fiber membranes made up of micropores. Filters blood and removes waste products (urea, uric acid, etc.)

  ■ Hemodialysis:
  - Utilizes the principle of diffusion.
    Moves waste products from highly dense blood to the dialysate side.
  - Removes small toxins (urea, creatinine, etc.)

  ■ Hemodiafiltration:
  - The dialysate side is depressurized, and the pressure difference causes waste products to move to the dialysate side.
  - Removes large toxins (proteins with low to medium molecular weight).
  - Improved quality of life for long-term dialysis patients

- The number of dialysis patients: 7% increase per year
  (Rate of increase: Domestic 2% /year, China 15% /year)





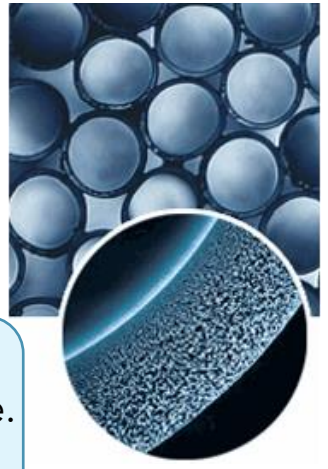
Forecast of number of dialysis patients (tens of thousands)

Dialyzer

Products | Artificial Kidney Hollow Fiber (Chronic Blood Purification Membrane)

TOYOBO

[Our strengths]
- Excellent biocompatibility due to cellulose triacetate membranes (PVP free)
- Possible up to filtration with cellulose triacetate membranes



Enlarged cross-sectional view of hollow fiber membranes

- Share: Global 6%

(domestic approx. 20%, China 13%, other countries 1-2%)

→ Extremely low incidence of allergy.
→ Less clogging and stable performance. Less blood pressure fluctuation and improved QOL.

Plan to build an integrated production plant jointly with Nipro Corporation (FY 3/25)

- Objective: To strengthen the production system and meet growing global demand
- Integrated production system from hollow fiber production to processing and commercialization of dialyzers

  Front-end process: Make hollow fibers from raw materials (TOYOBO)

  Back-end process: Make finished products (Nipro)
- Commercial distribution: TOYOBO (Membrane production)

  ⇒ Nipro (Modularization and commercialization)

  ⇒ Hospitals in Japan and overseas

Integrated production plant for CTA dialyzer
- Inside Nipro's Odate factory site (Odate City, Akita Prefecture)
- Capital investment: About ¥5.0 billion (equipment for making hollow fiber membranes)

Products | Acute Blood Purification Membrane

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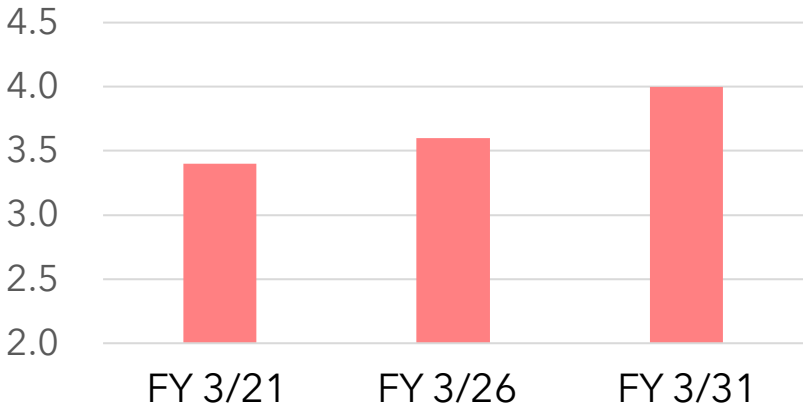
Ascites filtration and concentration membrane (CART)

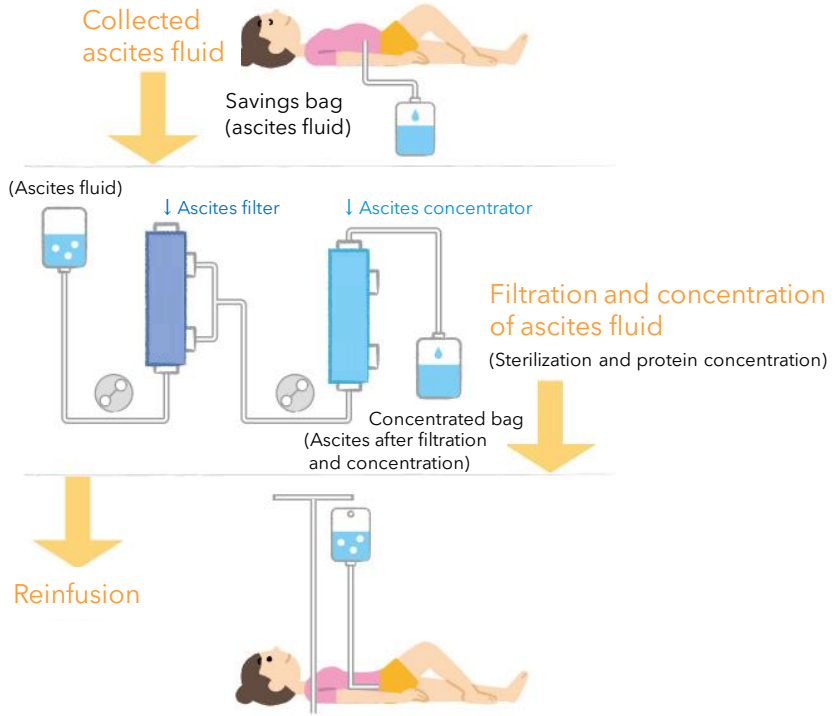
On sale since 2020

Treatment of ascitic fluid that has accumulated due to cancer or cirrhosis, using a filter and concentrator to concentrate useful protein components (e.g. albumin) and return them to the body via intravenous infusion.



Market of blood purification membrane (number) (ten thousand)

Image of Cell-free and Concentrated Ascites Reinfusion Therapy (CART) treatment



CART | About Kidney Disease | Tokyo Medical University Hachioji Medical Center - Kidney Disease Center (hachioji-kidney.jp)
* Translate Japanese website into English

◆Potential for expansion in the field of blood purification

- Septicemia treatment membranes (cytokine adsorption membranes), etc.
  When the immune system goes haywire due to infection and cytokine levels become uncontrollable, symptoms are alleviated through the adsorption of cytokines

- ➢ Hollow-type separation membrane technology is applied to niche, high value-added fields
- ➢ From sales of hollow fibers to adding sales of modules into the scope

Products | Separation Membranes for the Antibody Drug Manufacturing Process

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Virus removing membranes

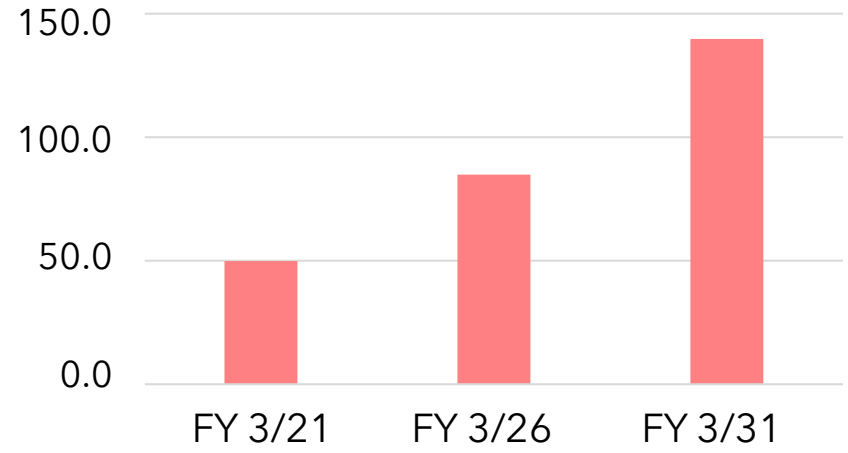
- Membrane that separates antibodies and viruses for use in the final manufacturing process for antibody drugs
- Antibody drugs bind to disease-causing antigens and target them with pinpoint accuracy, resulting in high therapeutic efficacy and reduced side effects
- Market: **Growing market tripling in size over the ten year period**

Filtration membrane for culture media

- The virus is filtered out of the culture medium at the beginning of the antibody drug production process

◆ Potential in the field of the antibody drug manufacturing process

- Impurity removal membranes that utilize new removal mechanisms



Market of separation membranes for the antibody drug process (module) (¥bn.)

[Our strengths]
Combines reliable virus blocking performance with high-speed processing capabilities (Membrane production technology)
Hollow-fiber structure allows for a large treatment area and large treatment volume

Antibody Drug Manufacturing Process

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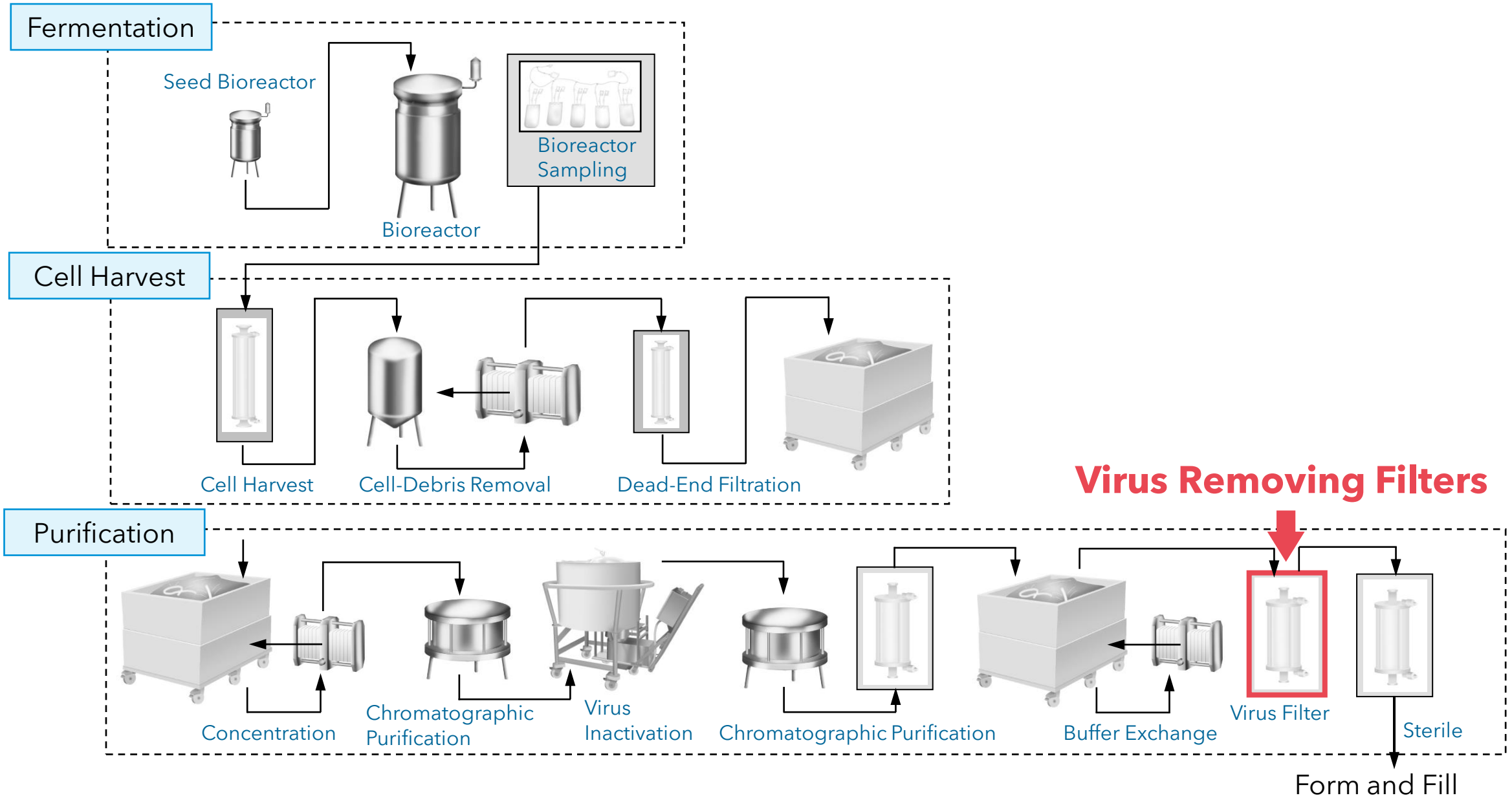

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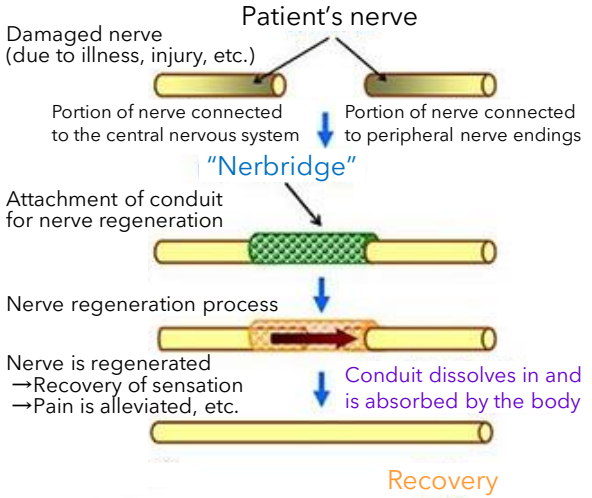
Nerve regeneration conduit “Nerbridge”

- Function: Promotes regeneration of peripheral nerves that are torn or missing due to trauma etc. Absorbed into the body in about three months
- **Our strengths: Nerve regeneration devices that reduce the burden on patients for autogenous nerve grafts**
- Composition: PGA (polyglycolic acid) tubes are filled with collagen. Tubes are knitted
  (Japan) length 55mm, inner diameter 7types
  (U.S.) length 1inch (25mm), inner diameter 4types
- Market：23,000 nerve regeneration tubes/year
- **Full-scale sales promotion in the United States starting** from FY 3/22. The United States is the world’s largest market



Bone regeneration inducing materials “Bonarc”

- Function: Used for bone regeneration therapy by filling bone defects or cavities in the upper and lower jaw and alveolar bone
- Composition: Octacalcium phosphate (OCP) in powder form and collagen as raw materials, processed **into sponge-like discs and rods**
  (Size) disc: diameter 9mm x thickness 1.5mm, rods: diameter 9mm x thickness 10mm
- Market: Artificial bone ¥1.7 bn. (domestic), ¥60.0 bn. (overseas)
- Applications: Implant placement, bone regeneration in cleft jaws and cyst cavities

Future Development | Expansion of Applications and Technological Evolution of the Medical Materials Business

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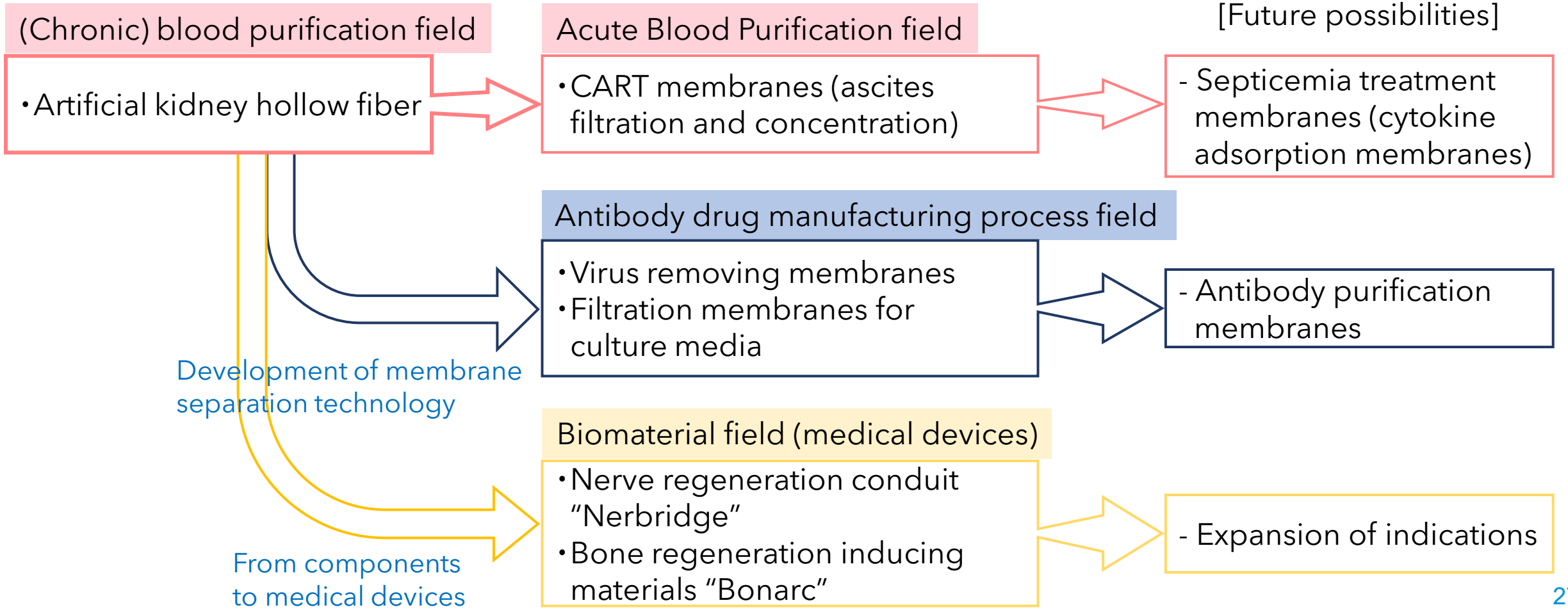
➢ Development of hollow-type separation membranes

Expansion of value chain for blood purification by entering into module manufacturing and medical device sales



Ⅳ. Future Development

Expansion of the Life Science Business

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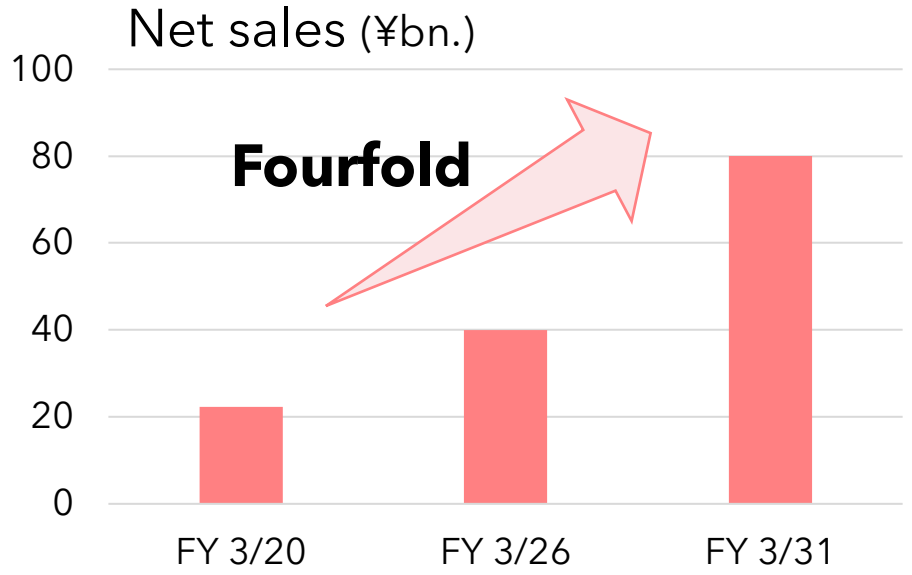
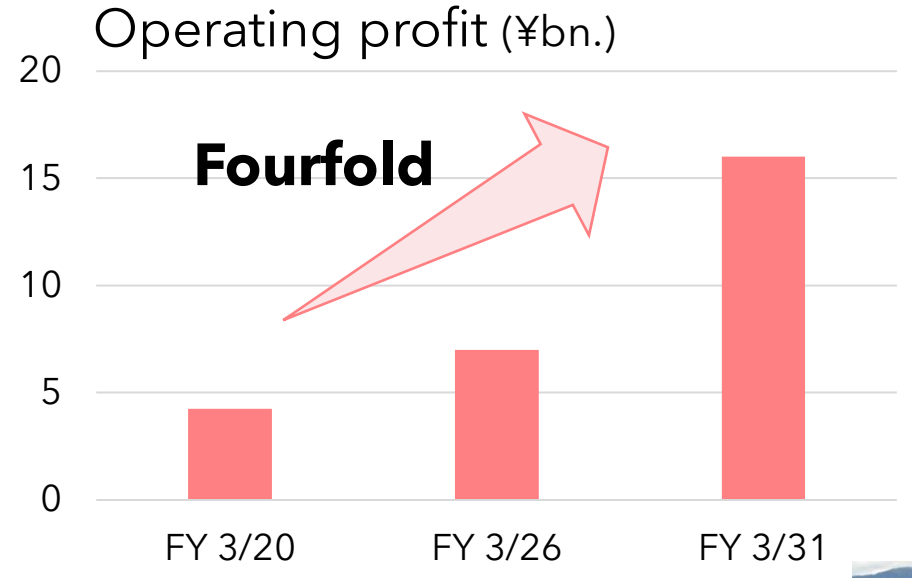
~ Global Niche Category Leader Strategy ~

Aiming to be the top global niche company !





Biotechnology	- Expansion of solutions business for infectious diseases - Expansion of overseas development, such as enzymes
Medical materials	- Expanding overseas development of artificial kidney hollow fiber - Expansion of applications for blood purification membranes and process membranes - Expansion of biomaterials business

CAPEX approx. ¥20.0 bn. in 4 years

- New biotechnology building (2024)
- Medical Research Laboratory (2024)
- Construction of a plant for dialysis membranes for artificial kidneys (2024)

(2025 Medium-Term Management Plan)

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V . Terms

Terms

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- Enzymes
  Substances (biocatalysts) that speed up chemical reactions (protein breakdown, fat breakdown, etc.) that occur inside and outside the body. A type of protein. The property of selectively allowing only the desired reaction to proceed

- Test reagents
  Reagents used to diagnose diseases and examine abnormalities or changes in the body by mixing it with a specimen (blood, urine, etc.) collected from a human being

- Diagnostic reagents
  Drugs intended to be used exclusively for the diagnosis of diseases

- Dialysis
  Moves waste products from highly dense blood to the dialysate side (diffusion).
  Mainly removes small toxins (urea, creatinine).

- Filtration
  The dialysate side is depressurized, and the pressure difference causes waste products to move to the dialysate side. Highly efficient removes large toxins (proteins with low to medium molecular weight).

Please Note

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The business performance forecasts and targets included in the business plans contained in this presentation are based on information known to the Company's management as of the day of presentation. Please be aware that the content of the future forecasts may differ significantly from actual results, due to a number of unforeseeable factors.

Although this presentation contains information about products, it is not intended for promotional or advertisement purposes.

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