5

Product Quality and Safety

Summary of 2022

PharmaEssentia, with Taiwan as its base, has established a comprehensive operating model that covers everything from innovative inventions, experimental development, production and manufacturing, to obtaining drug licenses, marketing in international markets, and providing innovative and reliable medication to improve patient health and contribute to drug safety. For upstream suppliers of raw materials, such as our external or channel partners, as well as downstream agencies and patients, we rigorously follow external regulations and internal quality system management to maintain a high-quality and stable supply to meet the needs of patients so as to give them access to medicine.

Material Topic

- New Drug Development and Innovation
- Sustainable Supply Chain Management
- Good Manufacturing Practices and Product Safety

Highlights Performance

NT$1.43 billion
R&D spending grew by 12.6% and accounted for 49.6% of sales revenue

95.7%
Over 90% of local procurement suppliers for 3 consecutive years

100%
Completion of signing quality agreements for 4 consecutive years
Completion of supplier internal assessments for 4 consecutive years

NT$32.91 million
ET clinical trial received a subsidy from the Ministry of Economic Affairs

83.3%
Proportion of New Local suppliers in 2022

100%
Completion rate of pharmacovigilance training for new employees

PIRC
Establishing an innovative research center in the US

3rd
The third PSUR for BESREMi® has launched

0 Case
No incidents of adverse drug recall in 2022

PMDA
Passed the Japan PMDA inspection (new)

289 New Patients
New P1101 clinical trial participants added in 2022, accumulated to over 850 beneficiaries

135,179 training hours
Conducted a total of 265 GMP/GDP-related training sessions

5.1 New Drug Development and Innovation

Material Topic

Since its establishment, PharmaEssentia has been dedicated to the research and development of new drugs and drug improvement, with the goal of addressing unmet medical needs. We have independently developed the PEGylation technology platform to improve existing drugs and successfully developed a new generation of the PEGylated interferon alpha drug, Ropeg, which has the characteristic of being applicable to multiple indications. It can not only be used to treat indications related to blood diseases, but also tumors and viral infections, creating significant value for patients with solid results.

NT$1.43 billion

R&D spending grew by 12.6% and accounted for 49.6% of sales revenue

GRI 3-3

Management Policy

Internal Policies

- Our company follows internal control research and development cycle regulations, which cover intellectual property patent applications and related measures from early-stage basic research, product technology research, pre-clinical experiments, medium-term drug trial production and phase 1 and 2 human clinical trials, to mature product development and phase 3 human clinical trials. Our goal is to seek new technologies and products with market competitiveness, and explore the development of new drugs for needs that have not yet been met using our own technology
- Internal R&D Control Cycle Regulations and related Management Measures

External Guidelines

- Helsinki Declaration
- Good Clinical Practice Guidelines for clinical trials (ICH-E6-GCP)
- Good Laboratory Practice (GLP) and Good Manufacturing Practice (GMP) guidelines for clinical trials, among other international standards

Management Commitment

We are committed to complying with relevant applicable regulations and focusing on four major disease areas. We aim to innovate new biopharmaceuticals with the most refined technology and of the highest quality, and contribute to improving the health of people worldwide by providing innovative and reliable medications

Accountable Units

- New drug exploration is mainly coordinated by the New Drug R&D Department. The Project Evaluation Taskforce, which includes representatives from funtional teams and senior management executives, is the decision-maker for new drug research. The decisions made in the project review meetings are done so jointly. After establishing the R&D project, the project leader will coordinate the project's progress and complete reports on a regular basis.
- The clinical trial part is managed by the Clinical Operations Department
- ECCS - Access to Medicine team

Input Resource

- In 2022, there were 123 R&D clinical personnel in the global network of PharmaEssentia, with a total R&D expenditure of NT$1.43 billion, a growth of 12.6% compared to last year.
- In the early stages of new projects, in-depth data collection is carried out to understand the clinical progress of competing drugs, evaluate unmet needs and commercial development opportunities in the market, and incorporate the development platform to guide drug development processes
- Rolling summarization and feedback of market dynamics of each project are regularly reported to the management task force in biweekly R&D meetings, enhancing the project task force and management task force's understanding of the market and risk assessment capabilities related to R&D projects. The R&D department actively evaluates the possibility of introducing a drug market database for new cases and encourages colleagues to participate in market evaluation-related education and training.

Targets

Short-term Targets for 2023

- Stabilize the development of ongoing projects or technologies, including Anti-PD-1, PEG-GSF, and TCRT, and gradually enter the application for clinical trial permission stage in 2023
- Collaborate on projects related to cell therapy technology and use imported technology to construct a cell factory. Continuously evaluate new drug development directions and apply for clinical trials of a cell therapy product
- Conduct a multinational, multicenter phase III clinical trial for essential thrombocythemia (ET), which is expected to be completed in the first quarter
- Launch various R&D activities of the PharmaEssentia Innovation Research Center Corporation in the United States

Medium-term Targets for 2024-2026

- Continuously promote the multi-center Ropeg (P1101) phase III clinical trial for essential thrombocythemia (ET) and apply for drug license registration
- Actively carry out the PEGylation project of new target proteins, and apply for clinical trial approval
- Develop a new process technology platform to improve production efficiency, reduce costs, and shorten development time; apply the new process technology platform to a new drug product and apply for a clinical trial

Long-term Targets (2026 and beyond)

- Continuously seek licensing collaboration or permission, and jointly develop or introduce new drug candidates with strategic alliance partners to expand the company's product line
- Accelerate the progress of key clinical trials and product drug license registration in various countries to maximize product benefits
- Establish a platform and procedures for R&D and marketing collaborations to promote cross-departmental communication and enhance the market evaluation capabilities of research and development task forces

Evaluation of Management Policy

Management Evaluation Mechanism

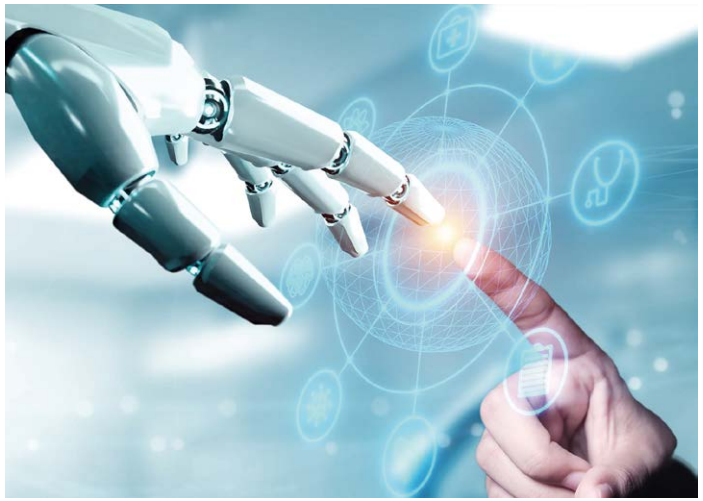
- All R&D projects follow the internal control R&D operation cycle. Every quarter, project progress and execution efficiency management are conducted based on the financial data compiled by the finance department, and project cost control evaluations are conducted every six months. When there are significant R&D achievements or milestones in the project plan, the project task force members will jointly decide whether to continue the project.
- Large-scale projects and annual R&D budgets must be submitted to the board of directors for approval before proceeding with related research and development.
- The auditing unit conducts audits of the R&D cycle management mechanism according to the annual audit plan.
- The Clinical Operations Department reviews the company's clinical trial progress every two weeks at the medical research bi-weekly meeting.

2022 Evaluation Results

- The project task force has regularly evaluated and made decisions regarding various ongoing R&D projects, and the overall management and evaluation has been well-done.
- Results related to Ropeg (P1101)
  - Phase 1 clinical trial recruitment: Clinical trials using this drug followed by anti-PD1 treatment for B or D-type hepatitis have started recruiting subjects
  - Clinical trials at different stages: Clinical trials for the application of this drug in primary thrombocytosis (ET), hepatitis virus infection and tumors are being conducted in 8 countries. The design of phase 3 clinical trials for the treatment of COVID-19 patients using this drug has been significantly modified and approved by the Ministry of Health and Welfare. Preliminary clinical data from the second-phase bridging clinical trial in China for the treatment of polycythemia vera (PV) are available
  - "A+ Enterprise Innovation R&D Program" grant: The "Ropeg (P1101) Treatment of Primary Thrombocythemia (ET) Multinational and Multicenter Phase 3 Clinical Trial Plan" has been fully supported and granted NT$32,918,000 by the Ministry of Economic Affairs
  - Drug Licenses application: An application for market approval for the treatment of PV in Japan has been submitted to the PMDA
- Introducing and developing new drug KX 01 for the treatment of actinic keratosis under authorization from Athenex in the United States
  - Clinical trial: A phase 3 clinical trial has been launched in Japan to meet regulatory requirements for applying for a drug license in Japan
  - Drug licenses application: The drug licenses has obtained marketing authorization in Taiwan
- Establishing the PharmaEssentia Innovation Research Center in the United States

Process Innovation: Creating Value through Innovation - the PEGylation Technology Platform

SASB HC-BP-240a.1



The PEGylation technology platform has been a powerful and core part of R&D at PharmaEssentia since its inception. It is a technology that combines protein drugs with long-chain high molecular weight PEG (polyethylene glycol) to extend the effective concentration time of protein drugs in the human bloodstream. Using this platform technology can significantly reduce R&D costs while improving the tolerability and convenience of the medication. To further expand its R&D innovation capabilities, PharmaEssentia has officially launched various R&D projects through the PharmaEssentia Innovation Research Center (PRIC) in the United States. The projects are expected to combine AI artificial intelligence and machine learning platforms to identify research targets in the early stages of research and reduce development time and costs, accelerating the process of new drug development from research to market.

Myeloproliferative neoplasms (MPNs) are rare chronic blood cancers, and patients with such diseases have significant and unmet medical needs. In the same field of true polycythemia vera (PV), we have used the PEGylation technology platform as a basis for the improvement of existing drugs and have successfully developed a new generation of the PEG long-acting interferon alpha drug, Ropeg, which has shown significant results in the treatment of this disease. Our partner, AOP Orphan, conducted a 7.5-year clinical study using Ropeg to treat PV, and found that more than 60% of patients achieved a complete hematological response, confirming the potential of innovative interferon drugs to benefit patient populations.

The near-term value of the "PEGylation technology platform" for the development of original protein drugs.

Improvement of existing drugs - reducing the risk of developing new drugs

By using the **PEGylation** platform to improve existing drugs, a new generation of PEGylated interferon α drugs has been successfully developed, significantly reducing the risk of new drug development failure. The side effects of the new drug are reduced, enabling doctors to provide better treatment options for patients, and creating shared value through drug therapy.

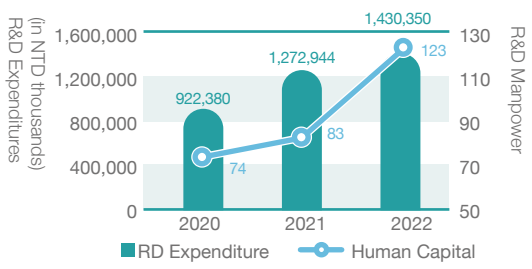
Using the technology platform - effectively developing diverse products

By continuously developing innovative drugs using the technology platform, it can be used in four major areas, including blood-related diseases, with the characteristic of one drug for multiple indications. If the indication is a rare disease, the positive impact of providing patients with the drug after it has been launched is immeasurable.

5 major professional fields

- Analytical Science
- Chemistry
- Cell Engineering
- Pharmaceutical Science
- Process Development

Ongoing growth in research and development (R&D) spending



Competitive advantage in developing new drugs

Ropeginterferon alfa-2b (P1101)
Next-generation PEGylated long-acting interferon alpha drug

- High purity
- High tolerability
- Low side effects
- Stable and single component
- Can treat multiple indications
- Dosing frequency will be reduced to once every 2 weeks

4 major disease areas of focus

- Rare blood diseases
- Viral infection diseases
- Tumor diseases
- Skin diseases

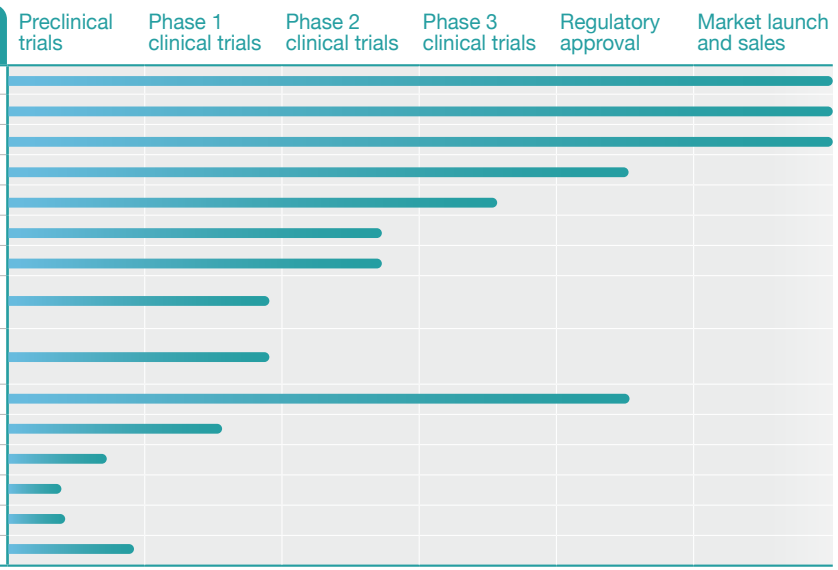
4 R&D products

- Ropeginterferon alfa-2b，Code P1101
- Ropeginterferon alfa-2b (P1101)+ Immune checkpoint inhibitor anti-PD-1 antibody
- Oral paclitaxel Oraxol®
- Kinase inhibitor Tirbanibulin (code name KX01)

Product Innovations PharmaEssentia's R&D Pipeline

SASB HC-BP-000.B

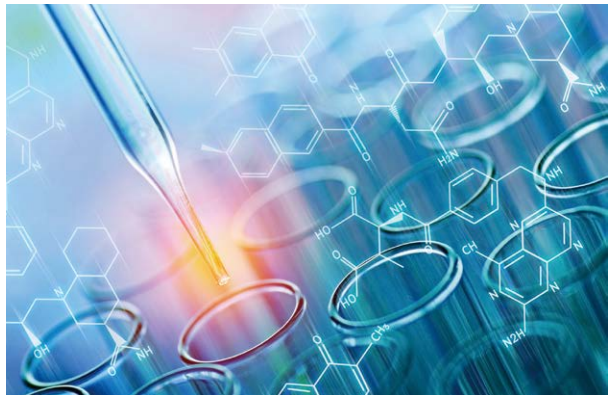
Disease classification	Technology / product	Indications	Market
Blood disorders	Ropeginterferon alfa-2b（P1101）	Polycythemia vera	Europe, Switzerland, Israel
			Taiwan, Korea
			United State
			Japan, China
		Primary thrombocytosis	Global
		Pre-fibrotic myelofibrosis	Global
		Adult T-cell leukemia/lymphoma	Japan, Taiwan、China
Infectious diseases	P1101 + Entry inhibitor	Hepatitis D	United State, Europe, Taiwan
Skin diseases	Tirbanibulin（KX01）	Psoriasis	Taiwan, China, Macau, Singapore, Japan, Korea
		Actinic keratosis	Taiwan, Japan, Korea
Solid tumors	P1101 + anti PD-1	Hepatocellular carcinoma	Global
	PEG-GCSF	Neutropenia	Global
	PEG-IL2	Solid tumors	Global
	PEG-IFN-Gamma	Solid tumors	Global
	TCR-T	Solid tumors	United State, Taiwan



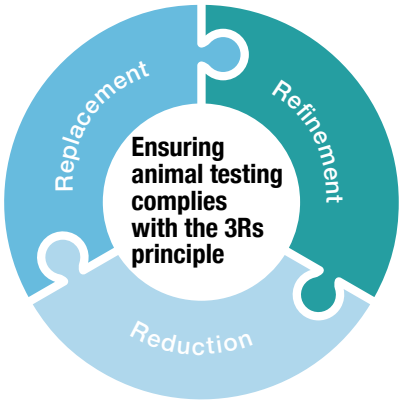
Note: For the latest updates on the R&D product pipeline, please refer to the company website.

Data source : https://hq.pharmaessentia.com/tw/pipeline

Persuit of Animal Welfare of Preclinical Animal Experiments



In order to ensure animal welfare in preclinical animal experiments, our company selects and outsources relevant matters to domestic and foreign research institutions with GLP certification and follow the relevant regulatory requirements of the Institutional Animal Care and Use Committee (IACUC) for animal care and use in experiments. We have commissioned three qualified domestic and foreign institutions to conduct preclinical animal experiments in a humane manner.



A Rigorous Process of Human Clinical Trials

SASB HC-BP-210a.1

To ensure the quality of human clinical trials, PharmaEssentia has established more than 20 standard operating procedures (SOPs) for clinical operations, as well as for selecting and managing contract research organizations (CROs). There are audit and review mechanisms at each stage of clinical development, and clinical trials are conducted in accordance with approved trial protocols and local regulations for Phases 1, 2, and 3.

Phase 1 clinical trial
Safety exploration

Phase 2 clinical trial
Preliminary efficacy study

Phase 3 clinical trial
Large-scale confirmatory efficacy study

Study planning

- Evaluate the trial risk based on the clinical trial services and characteristics provided by the CRO.
- Develop a monitoring plan, audit plan, and clinical trial quality management and quality assurance plan according to the level of risk.

Pre-trial

- The trial plan and related documents are subject to review and approval by the health authority and the human subjects committee.
- Hold a coordinator meeting to conduct relevant training.
- Obtain written informed consent from the subjects: They must be fully informed and have carefully considered the agreement before signing the consent form to participate in the clinical trial.
- Strictly screen suitable subjects based on the inclusion and exclusion criteria in the trial plan.

During the trial

- The clinical operation department performs collaborative monitoring with the CRO that undertakes the monitoring business.
- The clinical quality assurance department performs audits according to the relevant audit plan to ensure that the CRO's services meet quality requirements.

After the trial

- Compile the efficacy and safety data of the clinical trial.
- Approval for marketing is granted after the health authority's written review and on-site inspection and a risk-benefit assessment.

Assessment of Risk to Ensure the Quality of Clinical Trials

The quality risk assessment and maintenance of clinical trials are conducted by external research institutions. They follow our standard operating procedures and assess the clinical trial risks before and during the trial. Relevant safety education and training on clinical trial products are conducted both internally and externally before conducting the trial. Quality assurance and management activities are also implemented during the clinical trial.

Before clinical trials
Evaluate the potential risks that may be encountered during the trial based on the characteristics of the test drug and the trial design.

Focus of evaluation

Based on the level of risk, develop a case-specific "monitoring plan" and "audit plan" to execute QA and QC items. Ensure that the rights and welfare of subjects are protected, and that the conduct of the clinical trial, data generation, recording, and reporting comply with the trial plan, GCP, and relevant regulations.

Execution process

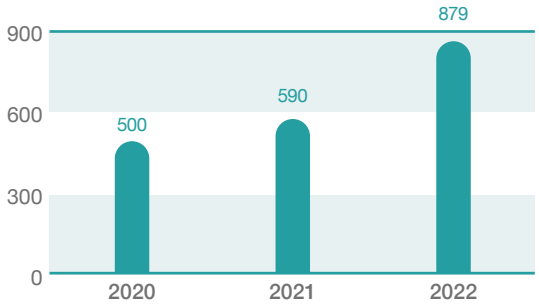
Quality Assurance (QA)
Includes an independent audit system, where any issues found will be appropriately evaluated and tracked, and relevant corrective and preventive measures (CAPA) will be proposed.

Quality Control (QC)
Includes monitoring and collaborative monitoring.

Multinational and Multicenter Clinical Trials Validate the International Competitiveness of Drugs

As of the end of 2022, our company has conducted more than 20 clinical trials worldwide using Ropeginterferon alfa-2b (P1101), benefiting patients from Taiwan, Europe, the United States, Japan, China, Hong Kong, and other regions. The clinical trials covered various indications including PV, ET, hepatitis B and C, as well as mild-to-moderate COVID-19 cases. In 2022, nearly 290 new patients were enrolled, bringing the total number of beneficiaries to more than 850. These multinational and multicenter clinical trials aim to validate the international competitiveness of our drug products.

Number of Benefited Patients in Clinical Trials Phases 1-3



289 New Patients

New P1101 clinical trial participants added in 2022, accumulated to over 850 beneficiaries

Cross-National Industry-Academia Collaboration - Establish Local Research and Clinical Trial Capabilities

In addition, we also collaborated with universities and research institutions in and outside of Taiwan to gain a deeper understanding of global market demand for disease treatment. Through clinical collaboration, we studied relevant diseases and updated our knowledge of the latest technology and techniques in order to jointly develop access to medicine programs that meet the needs of people with different diseases around the world.

2018
Completed a research project in collaboration with a domestic university to develop and apply new drugs in the field of nephrology, with a total investment of nearly NT$2.7 million in Q2 2020.

2019
Sponsored a research project on viral hepatitis in collaboration with domestic medical centers and Japanese academic institutions, with an investment of over NT$1 million, which was completed in Q2 2020.

2020
Collaborated with domestic universities to research hepatitis and anti-PD-1 immunotherapy, investing nearly NT$3 million. Due to the impact of the pandemic, the project was extended to the end of July 2021.

2021
Collaborated with 6 top domestic and international universities on various research projects, with a total investment of over NT$5 million, and all projects are currently ongoing.

2022
Invested about NT$300,000 with a domestic medical university to improve production yield, and the project is still ongoing.

5.2 Sustainable Supply Chain Management

Material Topic

PharmaEssentia adheres to the PIC/S GDP (Good Distribution Practice) regulations to establish a legal and comprehensive global marketing management mechanism. There are over 4,000 quality and safety management procedures, standard operating procedures, and various plans and reports within the company to ensure compliance with operating procedures, accuracy and completeness of records, and to ensure the quality and safety of drugs from the production factory to patient use, safeguarding the medication safety of every patient.

GRI 3-3

Management Policy

Internal Policies

- Raw Material Management Policy, Storage and Distribution Policy and Product Packaging and Labeling Policy
- Supplier Management Policy (Supplier Management Standards Operating Procedures, Supplier Management Procedures, Procurement Management Standard Operating Procedures and Supplier Audit Procedures).
- Quality Management Policy, Risk Management Policy and Outsourced Activities Policy

External Guidelines

- WHO Good Storage and Distribution Practices for Medical Products
- Strict adherence to laws and related external GxP regulations at all stages of the product life cycle, from research and development to production and sales
- Practical Guidelines for Sustainable Development of Corporate

Management Commitment

- PharmaEssentia is committed to building a stable, safe and high-quality drug supply chain, and strives to improve the accessibility, affordability, and availability of drugs. We continuously strengthen the safety and stability of the overall supply chain and reduce the impact of COVID-19 on the supply chain.

Accountable Units

- The Supply Chain Management (SCM) department of PharmaEssentia Headquarters includes business units, procurement units, production units, logistics units, manufacturing units, QA units, and SCM units of each subsidiary
- ECCS - Product Quality and Patient Safety Taskforce

Input Resource

- Professional division of labor and task execution among responsible personnel, with continuous on-the-job training
- Regular quarterly assessments for commercial and clinical development needs
- Transportation planning: Establishment of large cold-chain spaces to increase product storage capacity and turnover flexibility
- Supplier management: Increased communication frequency to ensure stable supply sources in response to COVID-19, cross-departmental collaboration for stocking, signing of supply or quality contracts, and completion of audits for commissioned transporters/storage facilities
- Outsourcing partner management: Establishment of communication channels to review quality management, provide demand estimation plans, and update them in a timely manner
- Tracking actions: Drug traceability management software, self-established drug complaint system, drug safety notification system, and supply shortage notification system for regulatory authorities in various countries
- System implementation, enterprise resource planning system (ERP), business process management system (BPM)

Targets

Short-term Targets for 2023

- Continuously expanding emerging markets and fields for BESREMi®: Launching in Japan in 2023
- Continuously expanding and strategically allocating production capacity: Construction of manufacturing center
- Upgrading and implementing ERP system to accurately plan raw materials and product inventory and production control
- Establishing good working relationships with suppliers: Mastering upstream original factory supply and rapid response stocking strategies
- Continuously developing and implementing secondary source of raw materials
- Continuously developing Supplier Behavior Code of conduct
- Managing long-term demand and other requirements requested by customers

Medium-term Targets for 2024-2026

- Continuously expanding emerging markets and fields for BESREMi®: Launching in new markets and regions, or clinical research projects for different indications
- Continuously expanding and strategically allocating production capacity: Optimizing the connection between front-end and back-end processes
- Establishing good working relationships with suppliers: Improving delivery reliability and flexibility
- Improving customer satisfaction: Planning for potential market demands to create maximum benefits for both the group and patients
- Forecasting demand from various countries: Planning and preparing production lines and raw materials to ensure timely and stable supply to potential markets
- Continuously optimizing internal operational processes and communication: Benefiting multiple parties and effectively reducing costs
- Optimizing internal processes within the group: Integrating the demands of various subsidiaries/countries and managing and allocating resources in a rational manner
- Integrating various country regulations and market requirements: Coordinating the launch of drugs in different countries to make the best use of group resources

Long-term Targets (2026 and beyond)

- Optimizing internal processes within the group: Integrating the demands of various subsidiaries/countries and managing and allocating resources in a rational manner
- Integrating various country regulations and market requirements: Coordinating the launch of drugs in different countries to make the best use of group resources

Evaluation of Management Policy

Management Evaluation Mechanism

- Establishment of supplier evaluation mechanism
- Implementation of internal audit and control guidelines at PharmaEssentia
- National drug safety reporting systems in different countries
- National drug supply shortage reporting systems in different countries
- Establishment of a drug complaint system at PharmaEssentia
- Regular management meetings and product quality reviews at PharmaEssentia
- SAP-related document operations

2022 Evaluation Results

- BESREMi® has been supplied to patients at a steady paceafter being approved for marketing in various countries
- COVID-19 still had a significant impact on the supply chain in 2022, but the introduction of a second source of materials and the search for alternative materials in the market ensured the supply of goods and reduced costs
- No complaints were received from hospitals or patients
- Sufficient stock was ensured based on the number of users
- No products were found to be ineffective or unsafe due to transportation and storage activities

Establishing a Stable and Reliable Supply Chain

SASB HC-BP-260a.1

Building a robust cross-border supply chain to provide high-quality and safe medicines that meet the urgent needs of patients with rare diseases worldwide is an important mission that PharmaEssentia and its upstream and downstream supply chain partners are committed to.

Integrated planning and management of drug demand

- **Cross-departmental coordination of production and sales:**
  Integration of clinical and external pharmaceutical business demands between headquarters and subsidiary companies
- **Manufacturing and production scheduling:**
  Confirming requirements coordination and supply with supply and production sides

PharmaEssentia

- Taiwan Headquarters
- US
- Malaysia
- Japan
- Singapore
- Hong Kong
- Korea
- Macau
- China
- Vietnam

Responsible procurement and supplier management

- **Supplier management:**
  Screening, evaluating, and approving suppliers in strict procedures, with priority given to local vendors as cooperative partners
- **Establishing safety stocks:**
  Timely grasp of raw material delivery times
- **Establishing alternative material sources:**
  Reducing the risk of material shortages
- **3 major supplier management points:**
  Conveying sustainable values to partners and jointly establishing a sustainable supply chain

- Procurement of raw materials, supplies, and equipment
- Supplier sustainability declaration

High-quality production and manufacturing

- **Complying with international normative standards:**
  Following Good Manufacturing Practices (GMP), ICH, EMA, FDA, and more than 4,000 internal standard operating procedures and other related regulations
- **Strict safety control:**
  Quality assurance and quality control departments managing and supervising quality safety and product release
- **Outsourcing filling and contract manufacturing:**
  Injection filling for the US market is done by qualified contractor Pyramid Laboratories Inc.

Biopharmaceutical manufacturing plant

PYRAMID Laboratories, Inc.

Fill and finish for injectable products

Drug storage and international logistics transportation

- **Stable marketing and distribution:**
  Strict control of packaging, transportation, and cold chain maintenance
- **Domestic marketing and distribution:**
  In-house sales and logistics teams responsible for supply and marketing
- **International marketing and distribution:**
  After injection filling is completed in the US, it is sent to a third-party logistics warehouse by contractor Pyramid Laboratories Inc., and ultimately delivered to patients through specialty distributors and pharmacies.

Warehouse and logistics center

CardinalHealth™
Third-party logistics

Specialty pharmacies and distributors

Effective Pharmacovigilance and Recall

- **Dedicated Pharmacovigilance team:**
  Composed of Pharmacovigilance personnel from headquarters and subsidiary companies and quality assurance personnel for Pharmacovigilance
- **Assistance from outsourcing research institutions:**
  Managing and maintaining safety data databases, collecting/exchanging drug safety information, and reporting to regulatory agencies
- **Safety monitoring reports:**
  Quarterly submission of regular safety reports and safety signal detection reports
- **Product traceability mechanism:**
  When quality problems arise, products can be recalled and related inventory can be processed within regulatory deadlines.

PharmaEssentia Headquarters Adverse Drug Reaction Reporting Email: Safety@pharmaessentia.com

Global Adverse Drug Reaction Reporting Email established by outsourcing research institutions:
PharmaEssentia.drugsafety@labcorp.com

Taiwan Adverse Drug Reaction Reporting Center Phone: 0800-818-886

PEC U.S. Call Center (800) 999-2449, a reporting management center specializing in serving the U.S. market. (800) 999-2449

Strengthening Sustainable Supplier Management with 3 Key Points

Adhering to the belief of mutual benefit and sustainable practices with suppliers and contractors remain a top priority for PharmaEssentia in the face of the global impact of COVID-19 on upstream supply chains. Together with our partners, we will continue to work towards these three key points to create long-term and sustainable value for the biopharmaceutical industry and patients.

Sustainability Declaration and Supplier Partnership

We strive for mutual benefits and sustainable development with our supplier partners. Our plan is as follows:

- **Declaration:** Communicate PharmaEssentia's sustainable philosophy and practices to our stakeholders.
- **Action 1:** Promote the Supplier Code of Conduct.
- **Action 2:** Sign the Supplier Code of Conduct.

Enhancement of Management Capabilities

To cope with the ever-changing world, our strategies for enhancing management and contingency capabilities are:

- Acquisition of information
- Strengthening supplier management capabilities
- Enhancing interaction with suppliers

Establishment of Alternative Material Sources

To ensure a stable supply, we take the following steps:

- Identify critical materials
- Screen candidate raw materials
- Confirm quality and conduct experiments
- Produce trial batches
- Monitor quality assurance to ensure compliance with regulations

Sustainability Declaration: Building Sustainable Supply Chain

We continuously communicate with our supply partners through formal and informal sustainability declarations to create positive and long-lasting impact. Our procurement and other related units have initiated the development of a Supplier Code of conduct and will roll out its promotion and signing in phases. In 2022, we promoted our PEC Corporate Sustainability Report to 177 suppliers. Currently, we are working on revising the Supplier Code of conduct and the Supplier Management Operation Guidelines, and plan to complete the signing by the suppliers in the third quarter of 2023. We hope to work together with each of our supply partners to grow, prosper, and prioritize corporate sustainability responsibilities.

Establishing Alternative Sources of Materials

To prevent interruptions in the supply of critical raw materials due to various factors such as suppliers not passing evaluations or the COVID-19 pandemic, we have conducted a comprehensive investigation of raw materials and established an internal standard operating procedure to determine the priority for introducing alternative sources for these materials.

Inventory of raw materials that require alternative sources to be established

The following criteria are used to determine whether alternative sources are needed:

- Notification from the supplier that they will stop production
- Regulatory agency requirements
- Key Material Assessment program to evaluate material risks

Quality confirmation

For materials with an immediate risk of shortage, quality confirmation will be carried out.

Process development and testing

Trial production will be carried out to test the quality of the materials. Qualified raw materials will then be entered into the GMP control process (supplier evaluation, specification inspection, and method establishment, etc.). After completing the relevant procedures, they will be added to the backup list.

Continuous monitoring of quality assurance

The quality assurance department will continuously monitor the test data and documents at each stage of material development to ensure that the entire process fully complies with regulatory standards.

Supply Chain Management and Resilience Enhancement

To mitigate the impact of the COVID-19 pandemic on the supply chain, PharmaEssentia is continuously enhancing its supply chain management and resilience. This includes maintaining safe inventory levels, establishing alternative sources of materials, balancing cost and long-term stockpiling, and actively reducing the risk of stockouts that could result in delayed or unstable supply.

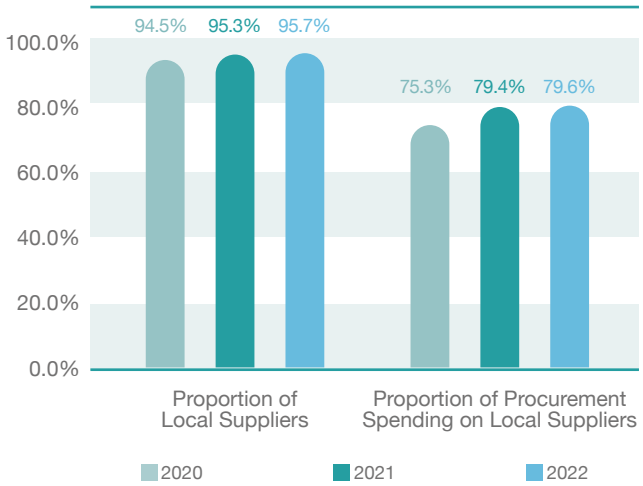
- Real-time monitoring of potential factors that may affect the supply chain, such as diseases, climate change, natural disasters, etc.
- Strengthening supplier management, adjustment, and contingency capabilities.
- Deepening communication with suppliers, monitoring the transportation and logistics status of materials in real-time, and obtaining complete information on transportation and logistics.
- Updating the lead time for the arrival of purchased materials from suppliers.
- Improving safety stock and monitoring changes in demand from healthcare institutions and patients.
- Paying attention to the epidemic situation in countries where raw materials are produced, evaluating the risk of material shortages, and proactively preparing for such risks.
- Actively establishing alternative sources of materials to reduce the risk of material shortages.

Management Process of Suppliers/Contractors

GRI 2-6 / 204-1 SASB HC-BP-430a.1

To ensure that the raw materials and equipment provided by our suppliers meet our company's standards for quality and delivery as well as Good Manufacturing Practice (GMP) regulations, our Quality Assurance department has formulated the Supplier Management Standards Operating Procedures and the Supplier Management Procedures as its approval procedures and operating standards for suppliers and contract service providers. We strictly monitor the screening, evaluation, and approval of raw material, material, and instrument/equipment suppliers. We also require suppliers to sign a Quality Agreement to ensure that both parties have a shared understanding of product and quality requirements. All vendors who should have signed the Quality Agreement have done so, with the proportion of local suppliers increasing to 95.7% in 2022, and the procurement amount from local suppliers increasing by 79.6%.

Proportion of Local Suppliers and Procurement Spending on Local Suppliers



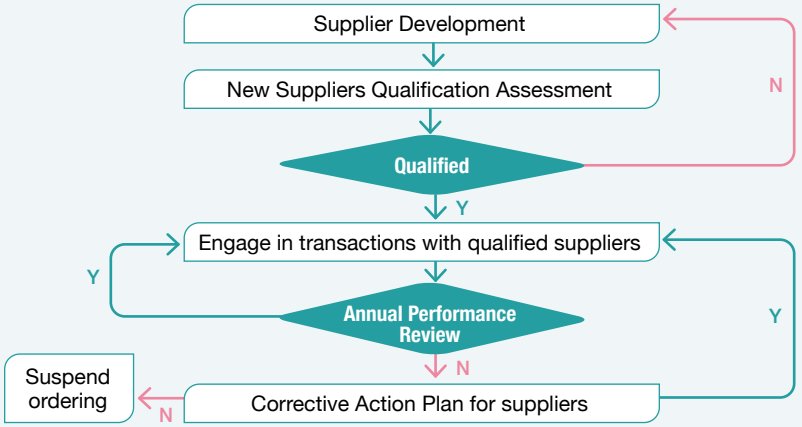
95.7%

Over 90% of local procurement suppliers for 3 consecutive years

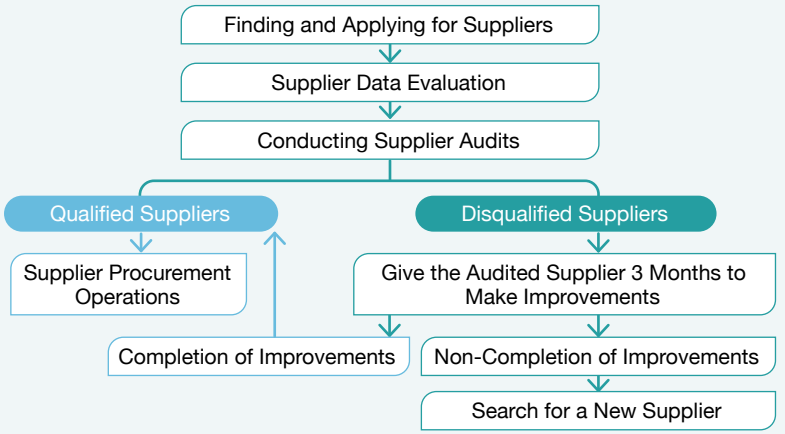
Note 1: The data range includes figures for both PharmaEssentia Headquarters and Panco Healthcare; the supplier number for 2021 and 2022, as well as the local procurement amount for 2021 are shown.

Note 2: Local suppliers refer to manufacturers, producers, and agents that provide products and services domestically. This includes those based in Taiwan.

Supplier Management Process at PharmaEssentia Headquarters



Supplier Management Process at Panco Healthcare

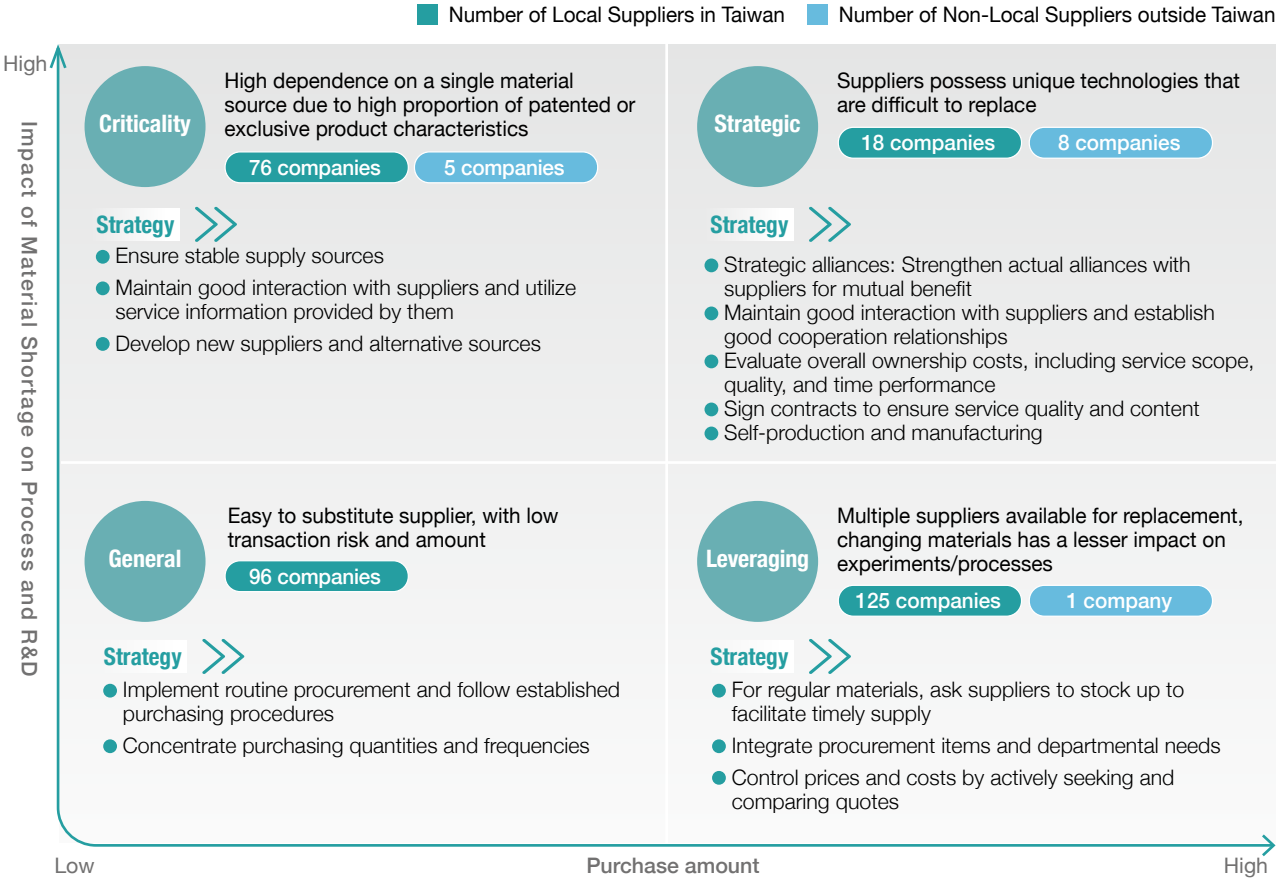


Suppliers/Contractors Management Strategy

Both PharmaEssentia and Panco Healthcare divide suppliers into four categories based on risk and procurement amount: strategic, critical, leverage, and general. Corresponding supplier management strategies are then formulated based on market characteristics and the attributes of each category's materials or services.

PharmaEssentia's US subsidiary categorizes suppliers into two categories, critical and non-critical, and conducts rigorous supplier risk assessments for critical-level suppliers, with a safe amount of stock as a main KPI to ensure the reliability of supplier delivery.

Supplier Management Process at PharmaEssentia Headquarters and Panco Healthcare



Supplier Management Process at PharmaEssentia's US subsidiary

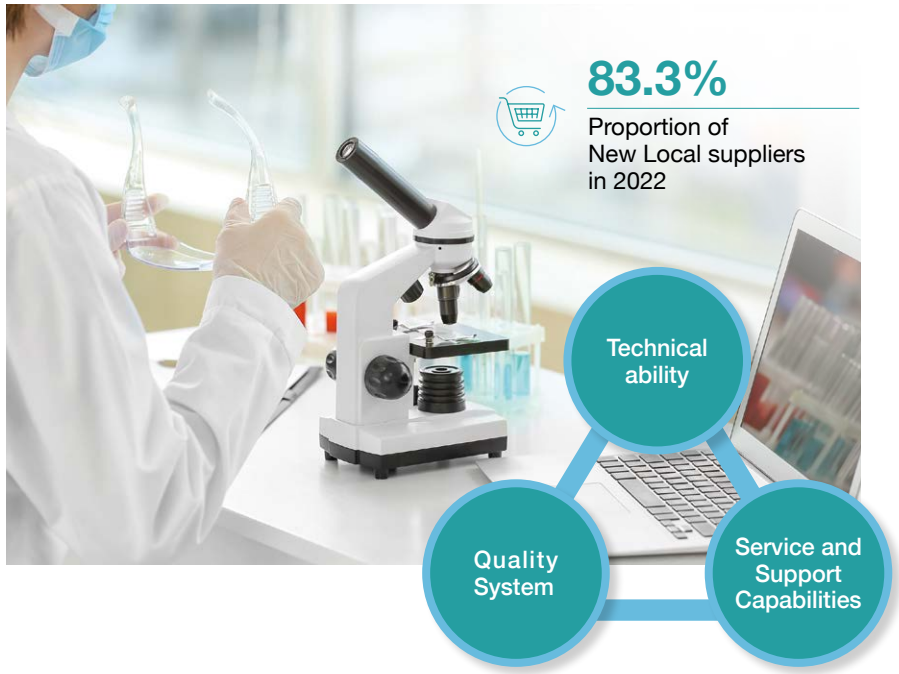
Level 1 Critical Suppliers

Suppliers that must pass GMP certification, are supervised by US quality management processes, and are difficult to replace

6 suppliers

Strategy

- Supplier risk assessment: Suppliers must comply with regulations and GMP requirements, and safety inventory levels will be evaluated as a key KPI
- Evaluation of 5 key points: Ensuring supply continuity, regulatory compliance, quality requirements, delivery time, and cost price



3 Key Indicators for Evaluating New Suppliers/Contractors

Screening and Evaluation of New Suppliers/Contractors

GRI 308-1 / 308-2 / 414-1 / 414-2

In the screening and evaluation of new suppliers/contractors by PharmaEssentia, there are three main indicators: quality system, technical capability, and service and support capability, covering aspects such as quality, cost, delivery, service, and management. The evaluation is carried out in accordance with the Procurement Management Standard Operating Procedures and the Supplier Management Operation Procedure Manual before transactions take place by the User department, Quality Assurance department, and Procurement department. The company attaches great importance to the impact of the supply chain on the environment and society. Currently, it plans to evaluate and introduce environmental and social standards into the supplier screening mechanism in the third quarter of 2023 and regularly conduct supplier performance assessments. In 2022, a total of 12 new suppliers/contractors were added, of which 10 were local suppliers, accounting for 83.3% of the total.

Annual Assessment of Suppliers/Contractors

100%
Completion of supplier internal assessments for 4 consecutive years

175
Suppliers/contractors completed internal assessments and reviews

72%
on-site audit rate

47
Suppliers/contractors conducted on-site audits

Each year, we conduct supplier/contractor assessments in accordance with our Supplier Audit Procedures, which includes both internal assessments and on-site audits. In the case of high-risk suppliers, we will shorten the reassessment frequency and take corrective action. If there are significant deficiencies, we will immediately cease procurement activities. In 2022, all 175 suppliers who were due for internal assessment had their assessments completed. Due to the impact of the COVID-19 pandemic, on-site audits were unable to be completed for 18 suppliers. One local supplier and two foreign suppliers had completed on-site audits by the end of February 2023, and they passed all items in the audit checklist. The remaining suppliers have scheduled their audits for 2023. We will evaluate whether to use alternative solutions, such as the Rx-360 audit report, to replace on-site audits to ensure the completion of our supply chain management even during the pandemic.

Assessment List of Suppliers/Contractors for PharmaEssentia and Panco Healthcare in 2022

	Internal assessment review (Note1)		On-site audit	
	Number of suppliers/contract		Number of suppliers/contract	
Value chain stages	to be assessed	actually assessed	to be audited on-site	actually audited on-site
New Drug Development	65	65	41	41
Clinical Trials	0	0	0	0
Production Manufacturing	126	126	24	6
Pharmaceutical Application	0	0	0	0
Marketing and Sales	5	5	0	0
Total (Note2)	175	175	65	47

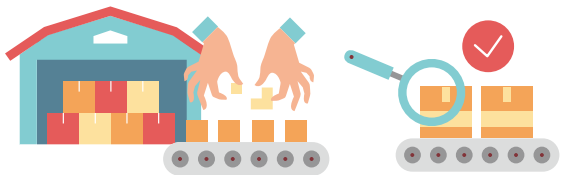
Note 1: The suppliers assessed are those who have transactions from July 1, 2021 to June 30, 2022. If the internal assessment reaches grades A and B in the previous year, it will be exempted from assessment in the current year.
Note 2: There are 21 manufacturers that span both the new drug development and production manufacturing stages. Therefore, the total number is deducted to avoid double counting.
Note 3: For the suppliers in the production manufacturing stage, due to the impact of the epidemic, 2 are local suppliers and 16 are foreign suppliers who have not yet completed on-site audits in 2022.

Safe and Stable Cross-Border Logistics and Transportation

Inventory transportation and sales operation system

We have established the Storage and Distribution Policy and established storage and transportation procedures to ensure that all raw materials, intermediate products and products can be stored and managed well. We have also established a Product Distribution Management Procedure Manual to establish a distribution procedure and tracking mechanism that meets the PIC/S Good Distribution Practice (GDP) requirements. We have established an Import and Export and Transportation Management Procedure Manual to establish import/export and transportation procedures to ensure that all transported goods are delivered to the designated destination in accordance with regulations, quickly and safely, and to maintain the safety of the medication. In response to the immediate risk of climate change-induced disasters in the United States, we maintain a safe level of stock of more than 4 months in the United States to ensure that patients there can obtain their medication in a timely manner.

Panco Healthcare Logistics Center also complies with Taiwan's Good Distribution Practice (GDP) for pharmaceuticals, and assists in the supply of the group's listed products and clinical drugs. From logistics management, warehouse management, processing and labeling to quality management in various operational processes, we have established an Emergency Response Handling Procedure to prevent or reduce the negative impact of natural disasters on our transportation processes.



Warehouse Management

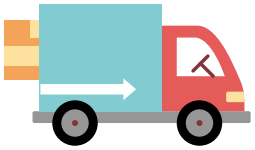
We have established the Standard Operating Procedure for Product Storage Management and the Storage and Distribution Policy to ensure that the quality of products is not affected by any activity or location. Panco Healthcare's Logistics Center has also established the Temperature Verification Plan for Storage Areas, and conducts temperature verification twice every three years to ensure the quality of the storage environment.

Product receiving and storage process

Receiving Application	Physical Verification	Compliance Confirmation	Confirmation of Receipt	Drug Storage
Submit the "Product Receiving Application Form" to the warehouse management personnel for product storage.	Warehouse management personnel, together with quality assurance personnel, confirm and perform physical verification based on the information in the application form.	The product name, code, batch number, required temperature, quantity, and container information on the product label must match the information in the application form.	Confirm that the product is properly sealed and packaged, and store it in the appropriate location according to the storage conditions.	Monitor the storage environment during storage to ensure optimal drug storage.

Quality monitoring of shipping and transportation

We have a Product Shipping Operations Standard to ensure that products from the Taichung Plant are shipped to contract manufacturing plants and storage facilities through a comprehensive transportation procedure before shipment to ensure the effectiveness of transportation. Medicines are transported in designated temperatures, ensuring the safety of our products as they are being transported worldwide.



Quality monitoring

Packing operation

- Check the cleanliness and temperature of the transport box, and place a temperature recorder inside the box for temperature monitoring
- Taking Ropeginterferon alfa-2b (P1101) as an example, it is necessary to ensure that the product is stored between 2°C and 8°C.

Transportation process

- Establish appropriate storage and transportation procedures based on the "Storage and Transportation Policy" as the quality objective.
- Pre-scenario analysis: Confirm that the cold storage status and equipment specifications meet the requirements.
- Regular verification: Ensure that raw materials, intermediate products, and products can be stored properly.

5.3 Good Manufacturing Practices and Product Safety

Material Topic

Throughout the value chain, from R&D and clinical trials to commercial production and distribution for patient use after launch, PharmaEssentia adheres to standardized operating procedures, quality management systems, and product traceability systems. We examine potential factors that may affect the stable supply of medication to patients and seek solutions to ensure safe, stable and timely delivery of our products in order to meet the needs of patients.

Early Stage	Medium Stage	Late Stage
Demand Integration and Planning	**High-Quality Production**	**Safe Product Transportation**
Periodic cross-functional meetings to integrate clinical and commercial demands and establish safety stock and second source.	Approved and inspected to comply with GMP certifications from the US FDA, EU EMA, Taiwan TFDA, etc., and strictly supervised by the quality control unit to ensure quality, safety, and product release standards.	The warehouse management unit arranges the shipment operation according to the shipment instructions, coordinating and arranging transportation operations in compliance with the temperature requirements of the drugs and GDP regulations.

GRI 3-3 / 416-2 SASB HC-BP-250a.1 / a.2 / a.3 / a.4 / a.5

Management Policy

Internal Policies

- Developed more than 20 quality Management Policy that comply with international standards such as those in Europe and the United States
  - Examples of these policies include Quality Management Policy, Raw Material Management Policy, Production and Process Control Policy, Validation Policy, and Complaints and Recalls Policy
- Regarding pharmacovigilance
  - Pharmacovigilance Policy
  - Post-Marketing Adverse Event Reporting Standard Operating Procedures
  - Product Quality Complaint Reporting Standard Operating Procedures
  - Global Post-Marketing Safety Data Collection Standard Operating Procedures
  - Global Product Safety and Risk Management Mechanism Standard Operating Procedures

External Guidelines

- Regulations issued by local regulatory authorities in various countries, such as European Pharmacopoeia, US Pharmacopeia, and guidelines issued by the US FDA
- "Medical Law," "Pharmaceutical Affairs Law," "Pharmaceutical Affairs Law Enforcement Regulations," "Pharmaceutical Good Manufacturing Practice Regulations," "Drug Safety Surveillance Regulations," and "Serious Adverse Drug Reaction Reporting Regulations"

Management Commitment

We are committed to following the relevant regulations of the regulatory authorities in various countries for quality management at each stage, complying with the local standards for drug application and strictly controlling the packing process and transportation. We will carefully track adverse drug events and reporting channels, instill the concept of "quality first, keep patients safe" in our daily operations and the minds of every employee, and implement drug risk management to ensure the safety of the medication we produce.

Accountable Units

- The Product Safety & Risk Management (PSRM) Team composed of pharmacovigilance personnel from PharmaEssentia Headquarters and subsidiary companies in various countries, as well as pharmacovigilance quality assurance personnel
- The quality assurance department and quality control department of the Headquarters are responsible for the quality of marketed drugs and clinical drugs, and cooperate with the clinical trial quality assurance and Pharmacovigilance Taskforce
- ECCS - Product Quality and Patient Safety Taskforce
- The Product Safety & Risk Management (PSRM) team composed of pharmacovigilance personnel from PharmaEssentia Headquarters and subsidiary companies in various countries, as well as personnel responsible for pharmacovigilance and quality assurance
- The Quality Assurance department and Quality Control department at PharmaEssentia Headquarters are responsible for the quality of marketed drugs and clinical drugs, and collaborate with the teams responsible for clinical trial quality assurance and pharmacovigilance
- ECCS - Product Quality and Patient Safety Taskforce

Input Resource

- Invested more than NT$15 million in global pharmacovigilance
- Hired a Global Vice President of Pharmacovigilance and an Global Executive Director of Pharmacovigilance to oversee the work
- Established an independent pharmacovigilance department at Headquarters of PharmaEssentia, and set up dedicated pharmacovigilance personnel in each subsidiary or office
- Commissioned a pharmacovigilance CRO company to form a project taskforce to manage and maintain the BESREMi® drug safety database, assist in drug safety information collection/processing/exchange, and report to regulatory authorities in each country
- Held 11 education and training sessions for new employees on pharmacovigilance throughout the year
- Regularly confirmed and tracked the notification items and quantities of safety incidents from external research institutions and subsidiaries
- Regularly evaluated drug safety cases, submited periodic safety reports in accordance with regulatory authorities' requirements, and produced quarterly safety reports

Targets

Short-term Targets for 2023

- Update and revise standard operating procedures related to pharmacovigilance in accordance with regulations, and revise quality assurance-related clinical operation SOPs and pharmacovigilance SOPs
- Develop a pharmacovigilance plan in accordance with regulatory requirements
- Achieve a 100% completion rate for new employee's pharmacovigilance training
- Implement all required items of the pharmacovigilance plan in accordance with legal compliance requirements
- Achieve a 100% execution rate for the reporting of drug safety information by PharmaEssentia's Headquarters and subsidiaries within the designated timeframe
- Conduct a demonstration drug safety inspection under the TFDA program
- Continuously retrieve and analyze academic literature on drug safety, continuously perform drug and adverse reaction identification and analysis, and regularly produce safety reports
- Establish independent personnel dedicated to pharmacovigilance quality assurance, develop a pharmacovigilance quality assurance annual plan, and conduct quality assurance activities
- Complete the response procedure to PMDA plant inspections in Japan, pass FDA follow-up plant inspections for raw materials and injection plants, and pass follow-up plant inspections by Taiwan's FDA
- Introduce an electronic equipment management system to optimize the quality management system process

Medium-term Targets for 2024-2026

- Maintain or update the PharmaEssentia's global pharmacovigilance standard operating procedures, and assist subsidiary companies in developing standard operating procedures that comply with local regulations
- Continuously revise and implement the pharmacovigilance plan so as to comply with various legal requirements
- To have the execution rate of drug safety information notification by PharmaEssentia Headquarters and subsidiary companies within the prescribed timeframe reach 100%
- To continuously search global academic literature for information related to the safety of PharmaEssentia products, and to have the execution rate of adverse drug reaction identification and analysis reach 100%
- Expand the PharmaEssentia Headquarters pharmacovigilance department by 1-2 staff members, and continuously provide the pharmacovigilance training to new employees
- Establish the responsibilities and information sharing of quality assurance for PharmaEssentia's subsidiaries/branches in various countries, and hold global meetings on quality

Long-term Targets (2026 and beyond)

- Continuously review, update, or revise pharmacovigilance management regulations and pharmacovigilance standard operating procedures
- Develop and construct a self-managed drug safety database for PharmaEssentia
- Increase the number of employees on the PharmaEssentia Headquarters' pharmacovigilance department, and continuously train new pharmacovigilance personnel so that the department can independently manage the collection, analysis, and notification of drug safety around the world in the future
- Pass the periodic Good Clinical Practice (GCP) and pharmacovigilance audits by regulatory agencies in countries where PharmaEssentia has obtained drug licenses
- Continuously improve the level of drug quality management

Evaluation of Management Policy

Management Evaluation Mechanism

- Post-market safety monitoring: Timely notification according to regulatory requirements of various countries and maintaining normal operation of real-time reporting mechanism
- Regular safety reports: Regular submission of drug development safety reports and periodic safety reports to regulatory authorities in various countries
- Internal auditing: Auditing conducted by the Quality Assurance department or an independent third-party unit commissioned for this purpose
- External inspections: Inspections by international and domestic drug safety regulatory authorities
- Assessment of the operation status of the real-time reporting mechanism
- Assessment of the operation of drug safety reporting hotlines (Taiwan, USA, South Korea, Japan)
- GMP certificate renewal or extension according to plan

2022 Evaluation Results

- Compliance with regulations to report the third PSUR after the launch of BESREMi®
- 100% completion rate of new staff training in pharmacovigilance. No drug safety regulatory authority conducted inspections related to pharmacovigilance in 2022
- The Taichung Plant successfully completed the GMP inspection by the PMDA of Japan
- No occurrence of serious violations of relevant drug quality regulations or health and safety laws and regulations in official inspections conducted by external organizations
- No incidents related to product quality requiring official reporting occurred in 2022; a total of 103 customer complaints were received, with a complaint rate of 0.86%

High-Standard Production Certification

We are committed to providing high-quality pharmaceuticals to patients, and in 2022 we invested over NT$30 million on maintenance, calibration, verification, and new equipment purchases. Considering the physical risks caused by climate change, we also insured our plants to reduce possible property losses and added preventive measures to prevent flooding. Our Taichung Plant is Taiwan's first biologics plant to pass the European Medicines Agency (EMA) audit and receive Good Manufacturing Practice (GMP) certification. Since 2020, we have also obtained GMP certification from Taiwan's TFDA, South Korea's MFDS, and the FDA of the United States. In addition to passing external inspections by the EMA and Japan's PMDA in 2022, we also completed 12 internal audits, during which no serious deficiencies were found, and improvement plans were submitted within the deadlines.

During the 2022 internal quality audit at the Panco Healthcare Logistics Center, only non-critical quality assurance system deviations were identified, and all were properly handled. With these actions, PharmaEssentia vertically integrates its supply chain from production to quality control, filling and shipping, and global market layout in steps to realize its blueprint for international pharmaceutical production certification.

PharmaEssentia's Taichung Biopharmaceutical Plant is the first protein drug plant in Taiwan to pass the European Medicines Agency (EMA) inspection and obtain GMP certification

2022 No major deficiencies were confirmed after a PMDA plant inspection in Japan.

2021 Passed GMP audit by Korea MFDS and FDA plant inspection in the United States and obtained drug licenses

2020 Newly established injection plant obtained TFDA evaluation approval for GMP and "Good Distribution Practice (GDP)" certification in Taiwan

2018 Became the first protein drug manufacturer in Taiwan to pass the EMA audit and obtain GMP certification

2013 GMP certification obtained for the Taichung Biotech Manufacturing Plant

2012 Completion of the construction of the Taichung Biotech Manufacturing Plant

3 Main Facilities of PharmaEssentia

- DS Manufacturing Plant
- PEG Production Factory
- Sterile Agent Filling Plant

Internal Audit

- Conduct at least 1 internal audit per month
- Each department should receive at least 1 internal audit per year
- For any non-conformities found during the audit, corrective and preventive action (CAPA) plans must be submitted and completed within the specified time frame based on the severity level.

External Audit

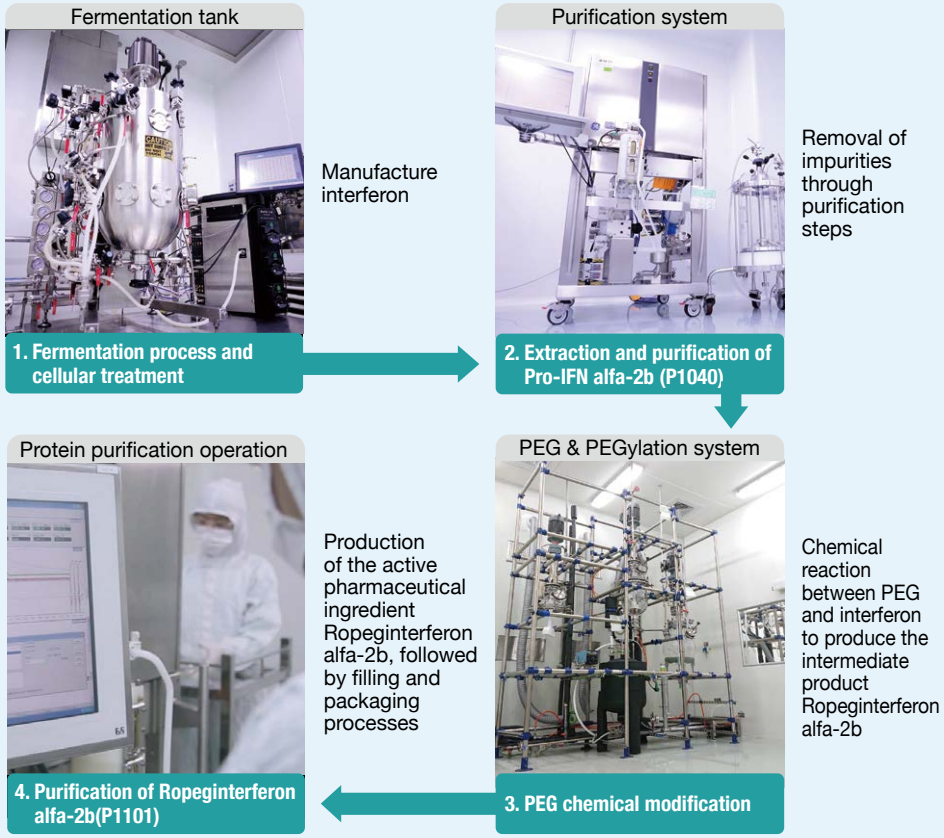
- Receive official GMP inspections every 2 to 3 years
- The first protein Biopharmaceutical factory in Taiwan to obtain GMP certification from the European Medicines Agency (EMA)
- Short, medium, and long-term goals include passing official GMP inspections on a regular basis.

Quality audit/Factory inspection/Verification record passing in 2022

Execution Date	Executing Unit	Process and Key Observation Items	Conclusion
2022/09/19-2022/09/23	European Medicines Agency (EMA)	Routine GMP Inspection for API	GMP certification successfully extended
2022/12/19-2022/12/23	Pharmaceuticals and Medical Devices Agency of Japan (PMDA)	Pre-Approval Inspection for API and Biological medical product (Injection)	No material deficiencies were found
2022/01-2022/12	Internal Audit	12 internal audits were conducted	All audits were completed without any major deficiencies

International Standard Manufacturing Process

Our company's product, Ropeginterferon alfa-2b (P1101), undergoes four main processes in its production. The first step involves the manufacturing of raw materials, followed by the filling and packaging process. Each stage strictly adheres to the Good Manufacturing Practice (GMP) for pharmaceutical products, ensuring quality management and standard operating procedures that meet international standards.



Sterile Filling and Packaging of the Highest Quality

Ropeginterferon alfa-2b (P1101) undergoes four primary processes before it goes through the filling and packaging stage based on market demands. The filling and packaging operations involve compounding, sterile filtration, aseptic filling, labeling, and packaging. Each step is performed with strict standards using aseptic techniques to ensure the highest level of medication safety for patients.

Dispensing and Aseptic Filtration

Dilution and adjustment of high-concentration raw material Ropeginterferon alfa-2b (P1101) and aseptic filtration before filling.

Aseptic Filling

Fully automatic pre-filled syringe filling method. After 100% visual inspection for foreign particles, the filled product will be stored in a high-quality environment throughout the process.

Labeling and Packaging

Labeling of pre-filled syringes according to the label, and placing relevant inserts, plunger rods, push rods, safety needles into the packaging box.

Next Generation Process Optimization

In addition to having high-quality equipment, professional staff, and internal and external audit mechanisms to maintain process and product quality, we also continuously optimize each stage of the process every year. In recent years, we have also enhanced our overall production capacity to meet commercial production demands, reduce production supply chain risks, and ensure stability in supply.

Process Stage

Improving overall production capacity

Improvement Objective

Increase overall production capacity by introducing second and third sources of raw materials to reduce supply chain risks and ensure stability in supply

Results and Benefits

In 2022, five new secondary sources for materials were added, and 3 more are still in testing. Due to the significant changes in the global supply chain caused by the COVID-19 pandemic, implementing this plan can significantly reduce production risks and ensure drug supply

Outsourcing Manufacturing Management

In addition to carrying out filling and packaging operations at our sterile pharmaceutical filling plant in Taichung, our company also outsources filling and packaging operations to internationally-certified contract manufacturers in the United States and Germany. This allows us to supply products to local patients in a timely manner. Our current partners, a US syringe filling contract manufacturer and a German syringe filling contract manufacturer, are both quality partners who have official GMP certification.

Stable and Safe Marketing in the US Market

User manual and packaging printing → Release after completing drug filling, packaging, serialization, quality assurance, and other operating procedures → Transporting products to third-party logistics → Transporting products to specialty pharmacies/ distributors

Process Quality and Safety

135,179 training hours

Conducted a total of 265 GMP/GDP-related training sessions

Our Taichung Manufacturing Plant has a Quality Manual, standard operating procedures for quality-related processes, and over 4,000 plans and reports that detail the organization's operational processes. Our quality assurance and quality control departments are responsible for managing and supervising the processes to maintain product quality, monitor environmental quality, and provide comprehensive personnel training to ensure product safety. We have also established an Emergency Response Management Standard for Plant Facilities to implement emergency response mechanisms. In the event of a natural disaster or equipment malfunction, we can ensure that equipment continues to operate normally and that all personnel perform process operations in a safe environment. In 2022, we conducted a total of 265 GMP/GDP-related training sessions, with a total training time of up to 135,000 hours.

Production Quality Maintenance

We have established the Production and Process Control Procedures and the Prevention of Cross Contamination Management Procedures to regulate process control, monitoring, labeling, and inspection procedures, reducing the risk of cross-contamination.

Environmental Quality Monitoring

We have established standards such as the Environmental Monitoring Plan Standards, the Water System Monitoring Standards, and the Microbial Identification and Statistics Standards to ensure effective monitoring of environmental microorganisms and reduce the risk of product contamination. According to the 2022 report on monitoring of production environment (air conditioning), water systems, compressed air and biological safety cabinets, all systems complied with design requirements and regulatory standards.

Good Manufacturing Practice (GMP) / Good Distribution Practice (GDP) Quality Education and Training

Through continuous annual education and training, we instill the spirit of quality management into daily operations, including training and updating knowledge of GMP regulations for employees. Panco Healthcare also prioritize GDP training for all employees involved in production, distribution and sales, ensuring quality management throughout the supply chain.

2022 GMP/GDP Training Statistics

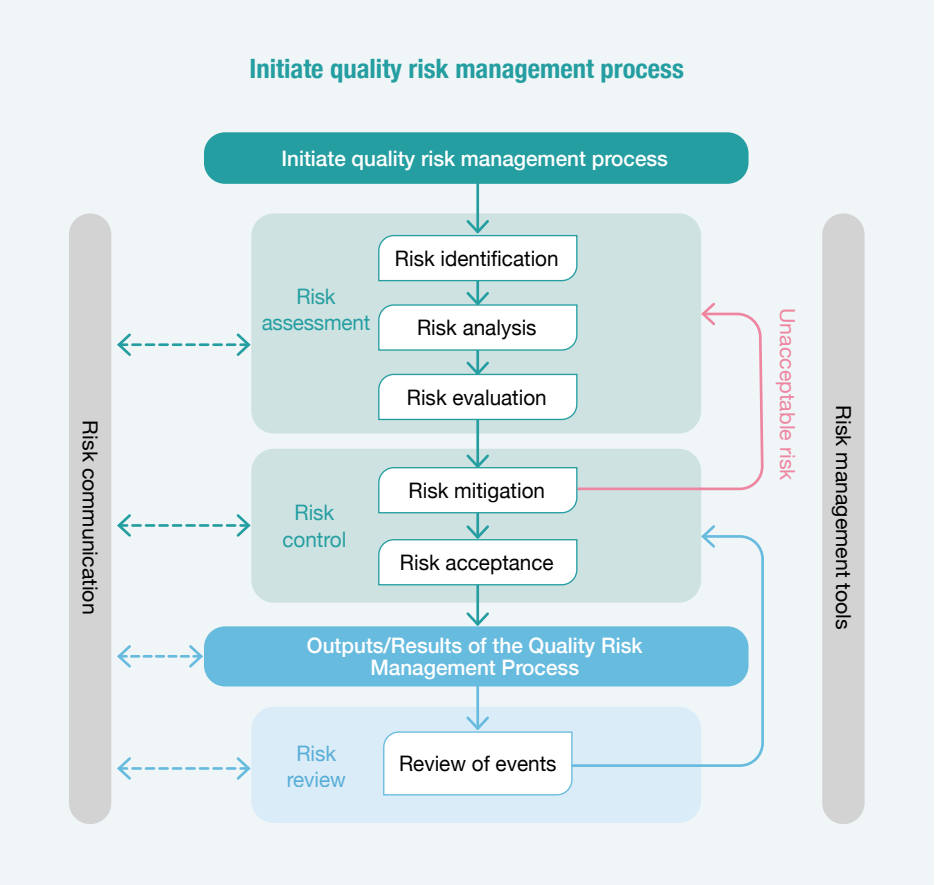
Training Units	Training Topics	Number of Sessions	Total Training (Hours)
PharmaEssentia Taichung Plant	Good Manufacturing Practice (GMP) training	13	12,350.0
	Regulatory, process, or quality-related GMP training for new employees	37	23,828.0
	Corrective and preventive action (CAPA) related training	107	97,851.5
	External training	12	1,008.0
Panco Healthcare Logistics Center	External Training on GMP/GDP Regulations and Processes	6	52.0
	Pre-job Training on GMP/GDP Quality Management System and Related Regulations for New Employees	90	90.0
Total		265	135,179.5

Risk Management for Production Quality

11 meetings

Involving participants from Headquarters and 7 subsidiary companies, with a total of 271 attendees

The Taichung Plant implements risk management to control production processes, environmental control, material supply, and annual quality review. Strict adherence to the Quality Risk Management Procedure Manual, Equipment Risk Assessment Procedure Manual, Change Control Procedure Manual and other regulations reduces hazards to quality to a minimum. In 2022, a total of 11 global cross-departmental risk assessment task force meetings were held with 271 participants to jointly review risk issues within the facilities.



Product Quality Evaluation and Continuous Improvement

Based on the Product Quality Review Procedures, regular internal and external audits are conducted to evaluate product quality and ensure stable production processes and use of materials. Product quality review meetings are held every quarter to address quality issues and implement corrective and preventive actions so as to ensure the stability and uniformity of production processes and product quality.

5.4 Patient Safety Management

GRI 417-1/417-2

To fulfill strict requirements for drug quality, our company adheres to the highest standards for product services and labeling, which comply with international and domestic government regulations (such as the European Medicines Agency and the US Food and Drug Administration). After a product is launched, a series of safety tracking actions are initiated. Since 2021, PharmaEssentia has established a thorough global pharmacovigilance mechanism and continues to conduct safety monitoring and risk control for new drugs after they are launched. In 2022, we did not violate any related regulations on product service labeling, and complied with pharmacovigilance and compliance requirements worldwide. We continue to optimize drug safety policies and internal standard operating procedures to help maintain the health and safety of patients.

Global Drug Safety Monitering Mechanism for Ropeginterferon alfa-2b (P1101)

AOP Orphan GmbH
European authorized partner
Health Regulatory Authority:
European Medicines Agency (EMA)

PharmaEssentia Biosciences (Beijing) Co., Ltd.
Chinese subsidiary
Health Regulatory Authority:
National Medical Products Administration (NMPA)

PharmaEssentia Asia Limited
Hong Kong subsidiary
Health Regulatory Authority: Drug Office of the Department of Health (DOH)

PharmaEssentia Korea Corporation
Korean subsidiary
Regulatory authority: Ministry of Food and Drug Safety (MFDS) in South Korea.

PharmaEssentia Japan KK
Japanese subsidiary
Health authority: Pharmaceuticals and Medical Devices Agency (PMDA)

PharmaEssentia USA Corporation
US subsidiary
Health authority:
US Food and Drug Administration (FDA)

Taiwan
PharmaEssentia
PharmaEssentia Corporation Headquarter
Commissioned agency by Taiwan Food and Drug Administration (TFDA)
National Adverse Drug Reaction Reporting System (ADR center)

Global Pharmacovigilance and Reporting Procedure

SASB HC-BP-250a.1 / a.2 / a.3 / a.4 / a.5

The company's pharmacovigilance department is under the jurisdiction of the Medical Research Department, and works in conjunction with relevant departments according to the Pharmacovigilance Policy, the Drug Safety Training Standard Operating Procedures, and the Post-Marketing Safety Data Collection Standard Operating Procedures. In addition to PharmaEssentia Headquarters, each subsidiary or region also has personnel dedicated to pharmacovigilance. Since 2022, a Global Vice President of Pharmacovigilance and an Global Executive Director of Pharmacovigilance have been appointed to be responsible for global pharmacovigilance. At the same time, an external pharmacovigilance CRO company has been commissioned to form a project task force to manage and maintain the BESREMi® drug safety data database, assist in drug safety information collection/processing/exchange, and handle notifications to regulatory authorities in various countries.

The personnel dedicated to pharmacovigilance at PharmaEssentia Headquarters and each subsidiary or region hold regular meetings every other week with commissioned research institutions to ensure the proper implementation of the drug safety information collected from around the world and the reporting system. In 2022, a total of 22 meetings were held to track and manage the pharmacovigilance mechanism. In March 2022, we submitted the third periodic safety update report (PSUR) for BESREMi® after its launch to Taiwan's FDA, and there were no adverse drug events reported for the marketed drug. In addition, Tirbanibulin, authorized by Athenex, was granted a drug license by PharmaEssentia in 2022, and we will submit PSURs annually until 2028 in accordance with regulations.

Taiwan's Adverse Drug Reaction Reporting Mechanism

In the event of a serious adverse reaction to a marketed drug under normal use, the following channels can be used to report it:

- Healthcare professionals and the public can fill out the "Marketed Drug Adverse Reaction Reporting Form" and report it online after applying for an account or report it via email (adr@tdrf.org.tw)
- Pharmaceutical companies can report it online through the system by selecting the "Marketed Drug Adverse Reaction Reporting Form" and submitting it when completed
- Upon receiving relevant reports, PharmaEssentia will follow the "Guidelines for Completing Marketed Drug Adverse Reaction Reporting Forms" and report it through the online reporting system (https://adr.fda.gov.tw) or by sending the completed reporting form to the ADR center's email (adr@tdrf.org.tw)

BESREMi® Safety Monitoring in the United States

The US subsidiary uses a third-party logistics provider that meets quality requirements to submit transaction history records (TH), transaction information (TI), and transaction statements (TS) in accordance with the Drug Supply Chain Security Act (DSCSA) and related regulations for drug tracing. It also has a dedicated reporting management center, the PEC U.S. Call Center, which is managed by the US subsidiary's medical affairs team and is responsible for handling drug quality and safety-related demands and reporting messages from all sectors. In terms of product traceability, drug serialization was completed in 2020, and there were no drug recalls due to adverse events in 2022

Pharmacovigilance Training

100%

Completion rate of pharmacovigilance training for new employees

In accordance with pharmacovigilance regulations, PharmaEssentia's commissions external research organizations to develop and implement pharmacovigilance management and regulatory reporting plans. The company also regularly conducts pharmacovigilance training for all employees and keeps records of all training. In 2022, 11 company-wide annual pharmacovigilance training sessions were held, and new employees received pharmacovigilance training within one month of their start date, with a completion rate of 100%.

Training Types		Description
Outsourced	Domestic Training	Employees can choose to participate in drug safety training courses/seminars organized by domestic training institutions or regulatory agencies, with the education and training budget prepared by the department
	Overseas Training	To learn about the latest developments in our field and skills concerning drug safety as well as cultivate talents, the company sends personnel to participate in education and training courses organized by overseas institutions according to the company's needs
Internal	Pre-job Training	When new employees start their jobs, training related to drug safety reporting is conducted, and the training hours and course information are recorded
	Other Internal Training	To enhance employees' professional knowledge and skills in drug safety, drug safety reporting related training is conducted every year

Drug Safety Risk Management

In order to assess the safety risks of drugs after they are marketed, PharmaEssentia has adopted a standard operating procedure for drug safety risk assessment developed by an outsourced research institution, and commissioned the development of a risk management plan. Depending on the requirements of each country's regulations on pharmacovigilance management, a Drug Risk Management Plan is developed to comply with the country's regulations. After the product is launched, clinical data is collected to assess whether long-term use of the drug by patients will result in chronic side effects, which serves as the basis for the drug risk-benefit assessment. The results of the 2022 periodic safety report showed that no new safety information would affect the safety of BESREMi®. In 2023, PharmaEssentia will continue to collect safety information from all countries where BESREMi® is marketed to update the periodic safety report and evaluate the risk-benefit of BESREMi®.

Product Traceability Mechanism

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PharmaEssentia has established a product traceability mechanism for its global supply chain, in which the batch number, lot number and factory activity records of each batch of drugs are kept to keep track of batch flow and ensure traceability. Currently, drug serialization has been implemented to regulate the packaging and serialization at processing plants to which we have outsourced work, achieving our purpose of having fully traceable individual product flows and usage records. BESREMi® sold in the United States has also been fully serialized, and qualified US filling contractors follow relevant regulations of the FDA's Drug Supply Chain Security Act (DSCSA) to carry out drug packaging and serialization, ensuring drug quality and safety.

Drug Recall Mechanism

SASB HC-BP-260a.2

0 Case

No incidents of adverse drug recall in 2022

PharmaEssentia has established a Return and Recall Procedure Manual to clearly define the product traceability system and improve the drug recall mechanism. In the event of product quality concerns, the drug recall can be completed quickly and effectively, providing an added level of safety for patients. The company also conducts annual recall simulation training to ensure accuracy and proficiency in the recall process. There were no incidents of drug recalls due to adverse drug events in 2022.