Amidst issues such as global population growth and aging populations not only in the developed world but also in certain emerging countries, the pharmaceutical and food industries are playing increasingly crucial roles in ensuring quality of life. A key concern in this area has been the difficulty in ensuring the stable provision of necessary medical treatments and safe food supplies to large numbers of people.

With its aspiration to contribute to society, Yokogawa established a Life Innovation Business Headquarters to serve as a source of innovation for the resolution of issues. Starting with our existing businesses serving the pharmaceutical and food industries, the Life Innovation Business Headquarters intends to extend its business by making use of new technologies and products that are under development, while also enriching its business portfolio by means such as the vigorous utilization of external resources and the pursuit of mergers and acquisitions.

1 Solution for single-cell analysis

Single-cell analysis enables the measurement of the changes and interactions of the molecules within cells, which are the basic building blocks of all organisms. This can provide insights into the mechanisms of diseases and lead to a better understanding of the efficacy of and adverse reactions to new drugs. However, present methods are not able to pinpoint the location of the individual cells as the cells must first be handled in clusters. When these clusters are broken down into individual cells, the original location of the cells cannot be determined. Thus, it is not possible to obtain an analytical result for a particular cell and its molecular contents that corresponds to a specific location in the organ tissue.

Yokogawa has developed a single-cell analysis solution that uses a confocal scanner unit to capture images of cells. This system can automatically extract components from target cells without losing their positional information, and analyzes the components by means of high-resolution mass spectrometry. It is hoped that further refinements will give the system the ability to identify detailed molecular mechanisms within or between cells. It is expected that such sophisticated systems will be a great help in understanding individual differences in drug efficacy and disease risk.

2 Solutions for cell-based manufacturing

Interest is growing around the world in the use of living organisms (microbes and cells) to produce advanced substances. This includes the development of biological products for the treatment of diseases that are resistant to conventional drugs, the development of foods, and the development of lightweight and highly rigid materials. Bioprocessing, the creation of advanced molecular structures from biological materials, is expected to play a crucial role in industry and become an integral part of production.

Through the application of the measurement and control technologies that it has developed over the years, Yokogawa aims to develop solutions for the realization of these new biological production systems.