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Hitachi develops automation technology of 3D culture

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The technology will expand regenerative medicine business

Hitachi, Ltd. headquartered in Tokyo, Japan, is focusing on Social Innovation Business combining its operational technology, information technology and products, has developed a new automation technology of 3D culture, solving problems of the previous 3D culture using Hitachi's Automated Cell Culture Equipment for iPS cells.

Automation of both 2D culture and 3D culture using this equipment makes it possible to automatic massive manufacture a variety of cell types such as cardiomyocytes, meeting customer needs. The automation technology was developed by collaborative research with Myoridge Co. Ltd. which has culture technology of iPS cell-derived cardiomyocytes by the protein-free method.

Furthermore the support service to establish an automatic manufacturing process for customers who are considering automation of manufacturing regenerative medicine products will be started on December 1st, 2019. As for the service, Hitachi will examine customers' manual manufacturing process to find out the important parameters, and suggest how to optimize them by the development knowledge of automation technology of 3D culture.

Expanding the market of regenerative medicine to recover the functions of tissues and organs is expected in recent years. A large number of cells are required for regenerative medicine but it is difficult to manufacture an enough amount of cells manually. So the automation technology of mass cell culture is necessary to expand the market of regenerative medicine.

Hitachi had been developing automation technology of mass iPS cell culture, and developed the automated cell culture equipment for iPS cells for research use in June 2017. Adopting the closed flow channel for the connection of the culture vessels and the medium bottles, the equipment is capable of cell seeding, culturing, and monitoring in sterile environment and offers stable supply of high-quality mass cells. Hitachi commercialized the automated cell mass culture equipment which has the necessary functions to comply with the Japanese regulation, GCTP for the first time in Japan in March 2019.

Hitachi automated the new 3D culture (low medium cost, low shear stress, and simple medium change process) by collaborating with Myoridge, solving problems of the previous 3D culture. The previous 3D culture has problems such as using a large amount of medium because of the height of the culture reactor, the shear stress to cells from the agitating medium, and the complex process of medium change. Hitachi started the collaborative research with Myoridge in October

2018 and developed the automation technology of the new 3D culture by distributing spheroids both uniformly and densely on the cell culture vessel for 2D culture. Furthermore, Hitachi manufactured cardiomyocytes by the automation technology more effectively than by manual. The technology is probably able to be applied to a variety of cell types and make them be manufactured automatically.