Development of Automated cell processing system R-CPX for regenerative medicine

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Abstract

It is important for the industrialization of the regenerative medicine to develop automated cell processing technologies. Especially, it is necessary not only to culture high-quality cells, but also to avoid the contamination of cells. In the research field, the skilled human technician has operated the cell processing in the clean environment. However, the human operation costs a great deal. The automated system will reduce the cost and provide high quality cells stably without contamination. We have developed the Robotized- Cell Processing eXpert system: R-CPX using our clean robot system. In R-CPX, the operation area can be cleaned by V-PHP (Vapor-Phase Hydrogen Peroxide), and cells from plural donors can be cultivated in parallel. Using the cleaning process after the donor’s cell process, another donor’s cell can be operated without contamination. R-CPX operates some devices automatically according to the same procedure that the skilled technician do. We have developed the automated protocol for several kinds of cell processes. And, we realized the automated process for mesenchymal stem cell and the corneal epithelial cell sheet. The culture of mesenchymal stem cell by the automatic process shows the same result of the manual operation. The corneal regeneration process needs such a delicate operation that a small amount of medium liquid is supplied to the small cell dish slowly. This research has been supported by New Energy and Industrial Technology Development Organization (NEDO).