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Editorial

Editorial: Basic and Advanced Artificial Organ Manufacturing

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EDITORIAL

The most important catalyst for truly translating regenerative medicine products into the marketplace is manufacturing, thereby maintaining patient access. However, designing production solutions is not an easy job. The Regenerative Medicine Manufacturing Society (RMMS) is poised through mutual expertise and partnership to help shift the needle and establish these manufacturing solutions for the industry. In the medical field, AM technology is a revolutionary approach used for the development of tissues and human organs. Additive Manufacturing (AM) has wide utility. It refers to extremely complex native organs that can be transplanted into the operating room of the human body. New biomaterials are used to manufacture scaffolds, tissues and organs, and they demonstrate improved biocompatibility, but before making patient-specific applications, we need to thoroughly analyze them. Because of its patient-specific implants, tissue, scaffolds and organs, AM is readily adopted in the medical sector.

Basis of Organ Manufacturing

In the universe, all complex living phenomena, including tissues, are the result of physical, chemical or biophysical changes in biochemistry. In order to form large polymers or chemicals, small organic and inorganic molecules polymerize or mix. In the cell membrane, large polymers and compounds then aggregate to create cells with organelles. The fundamental unit of life is the cell. It is also the human body's central structural and functional unit. Homogeneous cells or ECMs are made of tissues, whereas heterogeneous cell or ECM forms are made of muscles. The various types (degrees or levels) of materials found in the human body are cells, tissues, and organs.

Advanced Organ Manufacturing

A wide range of organ processing methods have been exploited over the past few years. These innovations include fully automated MNRP, partially automated combined additive molding, porous scaffold manual co-culture cells (i.e. conventional tissue engineering) and decellularized regeneration of the matrix. For spatially and temporally regulating heterogeneous cell structure, several other technologies, such as electrophoresis and magnetic adsorption of cells or Nano composite cell-laden hydrogels, have been used.

Nevertheless, in my own laboratory of strong theoretical and industrial backgrounds, groundbreaking works, and seminal breakthroughs, all the technical bottleneck problems faced in biomaterials, cell therapy, tissue engineering, drug screening, and other regenerative medicine fields for more than several decades have been progressively overcome. For example, the first real 3D cell-laden latticed structure was created by our home-made one-nozzle 3D bioprinter. 3D bioprinting is a platform technology for advancing the development of regenerative medicine. In order to manufacture multifunctional drug delivery systems, scaffolds, prosthetics (e.g. dental and orthopedic), organoids, tissues, and organs, 3D bioprinting is anticipated. Over the past 5 years, the use of this technology has increased immensely, especially as the cost of devices has dropped dramatically, paving the way for more widespread use. Furthermore, key market players have developed software solutions that, due to easier-to-use interfaces, often help to democratize the use of this technology.

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