Keys to Successful Cell Therapy Facilities of the Future

By STEQ America. June 23, 2017

The cell therapy industry is experiencing noteworthy development and acceleration thanks to novel and cutting-edge therapies. These treatments offer hope for curing disease and disorders that were previously problematic or even impossible to treat. The 21st Century Cures Act, which includes $30 million in funding over three years for regenerative medicine research, was approved by the US Congress in December 2016, and aims to accelerate the R&D and support of cell therapies in particular. Over 500 cell therapy clinical trials for oncology and cardiovascular indications are currently operational or in late-stage development.

From treating brain cells inside and changing their function in a way that improves neurological symptoms to treat Parkinson's disease, to reprogramming blood cells in order to heal challenging wounds in burn victims and diabetes patients, the cell therapy field is emerging as one of the most important biomanufacturing trends. The Healthcare industry is also seeing a rise in personalized cell therapies (CTL 119) that can yield complete remission in patients with chronic lymphocytic leukemia. CAR T-Cell Therapy has already shown the impact it's likely to have on the regression of lesions associated with Glioblastoma – the most prevalent and destructive brain cancer amongst adults in the U.S. A number of cell/gene therapies have already been approved by the FDA, including GSK's Strimvelis, which uses genetically modified T-Cells to help the body ward off infection associated with the fatal immune disorder Adenosine Deaminase deficiency.

The Rigorous Conditions of Cell Therapy Manufacturing

Cell therapy manufacturing is a delicate process that involves high cell purity and feasibility to ensure it meets FDA standards and leads to successful patient outcomes. Additionally, the segregation and containment of these products is crucial, in order to prevent cross-contamination and minimize physical manipulation. It's because of these issues that their manufacturing facilities must have such stringent requirements. An adequate facility may work for preclinical research and development, but later-stage manufacturing may require more in order to comply with regulations particularly those related to utilizing single-use closed system technology, fill and finish, sterilization, quality control and monitoring

for cellular aseptic processing and patient-specific products. Consequently, the manufacturing of cell therapy products is inherently complex and often more difficult to manufacture than bulk products that are easy to scale-up/scale-out.

Cell and gene therapy production presently totals more than 10,000 patients per year, and is rapidly increasing. Despite this, it remains an innovative new sector and so there's a shortsightedness to how companies will commercially develop and manufacture cellular therapy products. Cell-based drug products are more challenging than their small-molecule counterparts being living organisms that have a higher risk associated with product efficacy, the results of which may only be determined by undergoing more clinical research even after their manufacture. A focus on high-quality products that will achieve commercial success along with the numerous new technologies continually emerging in process automation and formulation and analytical testing, will require the implementation of facilities that will be able to scale over the lifetime of the product. As such, flexibility will be key, and partnership with an esteemed facility provider that offers comprehensive planning, design and implementation will help to avoid considerable processing delays and subsequent added costs.

Answers for Favorable Outcomes

Developers will require long-term solutions that will easily evolve with their transitional needs, such as turnkey systems that transform a facility from something linear to one that is agile. Existing facility cleanrooms can require extensive and expensive modifications related to HVAC systems and utilities. New flexible, modular designs can quickly and seamlessly add capacity to respond to processing and manufacturing demands. There are also tax benefits associated with capital equipment acquisition versus capital improvements, and reduced operating costs thanks to their lessened energy consumption. Traditional facilities can take 3-7 years for completion, whereas modular systems can be deployed in 12 months or less, and can also be resold or relocated. These improved structural alternatives are being developed as an answer to traditional stick-built cleanroom infrastructures and allow for the free movement of equipment, and will be an integral part of manufacturing operational excellence in the future.

US-based G-CON Manufacturing, from College Station, TX, have recently launched their enhanced Cell Therapy Cleanroom POD®, featuring a unidirectional flow and corridor system included within 9' and 12' wide configurations. These PODs are sanitized with either vaporized hydrogen peroxide (VHP) or other means, to support the aseptic processing standards of cell therapy where containment and sterility are of the utmost importance. These new features are designed to deliver optimal containment options for an even wider range of their cell and gene therapy client base. Like all G-CON PODs, their Cell Therapy Cleanroom POD is prefabricated, mobile and flexible, and is an ideal containment system for process or manufacturing equipment used in cell or gene therapy, and are even adaptable to the pharmaceutical, biopharmaceutical and medical device industries.

Cell Therapy POD features:

- Scalable by docking PODS against each other
- Road transportation to site and easily mobile once on site
- Prompt deployment and re-purposable
- Compact epoxy coated, aluminum structure, which can be sterilized

- Innovative aseptic fill line systems, fully integrated into the POD structure
- Plug-and-play operation – your processes slide right into a clean space or whole cleanroom depending on your needs
- Dimensions may be customized to suit your needs

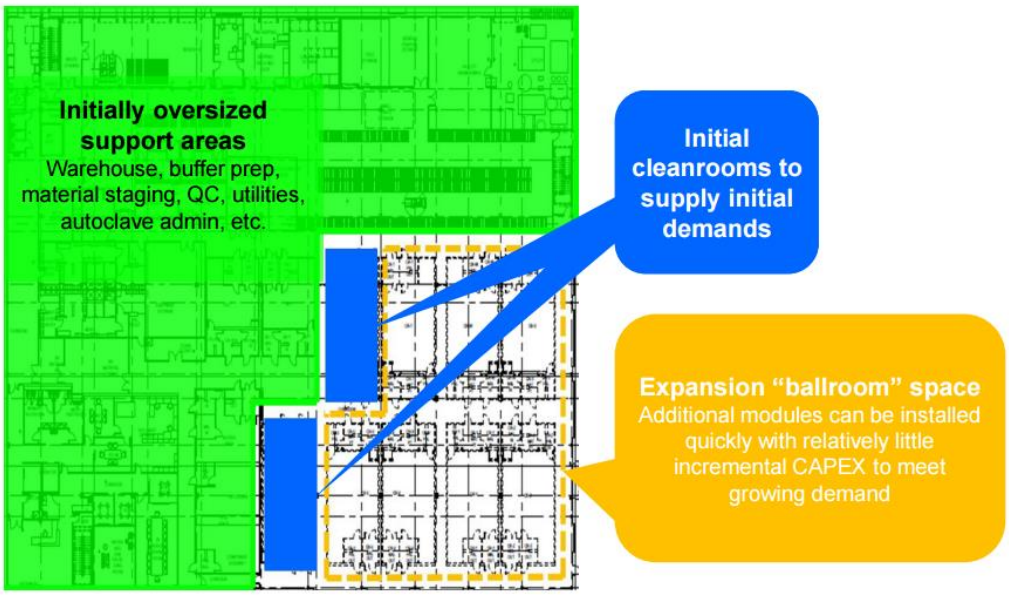
Applications for Cell Therapy miniPODs include:

- Autologous Cell Therapy (patient based cell expansion, e.g. CAR-T)
- Allogeneic Cell Therapy (Cell expansion to multiple patients)
- Tissue Cell Therapy (Cell expansion to multiple patients and multiple applications)

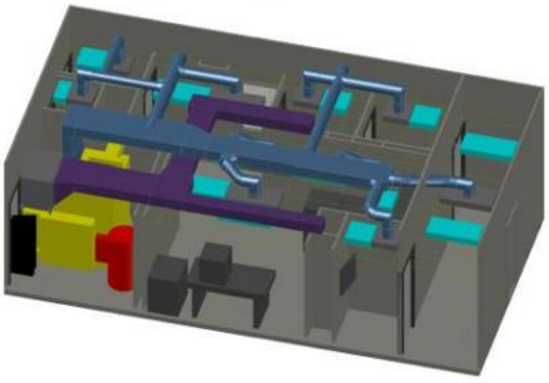
Example of G-CON Cell POD interior:

In December of 2016, G-CON delivered a custom built cleanroom POD system to Lonza, a global leader in viral gene and cell therapy manufacturing. Lonza is building the world's largest (anticipated) viral vector facility at their Houston, TX location. This G-CON POD was implemented to supply their initial demands, and is providing them with the flexibility needed for their pre-existent clinical manufacturing facility. G-CON worked closely with Lonza on all aspects of the project, throughout each phase, including design, engineering, construction and operation of the POD system. It was highly cost efficient and reduced facility constraints by providing a prefabricated and prequalified cleanroom and containment system, without interfering with ongoing processing.

Lonza's concept for commercial capacity expansion, Texas:



POD installed at Lonza site, Houston, TX:



How will cell therapy developers and manufacturers succeed in this new era?

Cell therapies of the future are already showing promising results for treating cancer and other prevalent diseases. Facilities of the future will need irrefutable quality control standards in anticipation of the evolving regulatory guidelines being established. In order to succeed, developers and manufacturers will need to implement sustainable facilities that will answer to evolving commercial challenges and flexible systems that can scale across the lifetime of the product and evolve alongside existing legacy processes.

G-CON's modular PODs support all phases of cell therapy manufacturing – from process characterization and validation through to sustainability, all while safeguarding product quality. These units offer shorter time to market and cost predictability thanks to the ability to engage in early planning and build and qualify units offsite. Traditional structures are ill-spent assets due to property maintenance, upkeep renovation and taxation, and delays (great or small) translates to millions of dollars in lost revenue. Implementing flexible cell bioprocessing facilities will be the way of the future and will aid in streamlining the validation process for their producers.

https://www.steqamerica.com/products/autonomous-cleanroom-pods/

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What we can offer
European engineered and manufactured solutions for dissolution, disintegration, hardness, friability, blister density, granulate and powder flow testing for the pharmaceutical, veterinary, chemical, food and biotechnology industries, with a focus on laboratory needs and research and development. We also offer solutions for the storage of hazardous and flammable materials, cleaning and drying in pharmaceutical manufacturing environments, and bio-medical freezers and refrigerators. Ask us about our mobile, autonomous cleanroom containment options.

References:

- Koberstein, Wayne, “Noveome Biotherapeutics” Life Science Leader Magazine, May 2017, Volume 9, No. 5
- By University of Montreal Hospital Research Centre, “Healing Wounds with Cell Therapy”, May 30 2017, appeared in Lab Manager magazine (link to article: http://www.labmanager.com/news/2017/05/healing-wounds-with-cell-therapy?utm_campaign=NEWSLETTER_LM_Clinical-Science-Tools-and-Techniques_2016&utm_source=hs_email&utm_medium=email&utm_content=53186590&_hsenc=p2ANqtz-9F7ZImdLgHKCoNzLJ2gNNmpA-qbyCU8TG-JA5bXheaJNSqqDUPugjd_FysEyxxCvYYJUTfw55jepNgf0Nz1vlvwKZJXg&_hsmi=53186590#.WULWiWjyuUk)
- Langer, Eric, “Continuous Bioprocessing Overtakes Single-Use On List Of Top Technology Trends”, Bioprocess Online, October 2016. Link to article: https://www.bioprocessonline.com/doc/continuous-bioprocessing-overtakes-single-use-on-list-of-top-technology-trends-0001
- Forster, Katie, “New neuron reprogramming technique could hold key to curing Parkinson's disease, say scientists”, April 10, 2017, www.independent.co.uk.
- Wilkinson, Beata and Crispin, Bennett, “Trends in Gene Therapy”, July 22, 2016, Data Monitor Healthcare.
- Wonnacott, Keith PhD, “Cellular Therapy Products”, FDA presentation (can be downloaded here: https://www.fda.gov/downloads/BiologicsBloodVaccines/.../UCM251338.ppt)
- Katsis, Mike and Backstrom, Sidney, “Managing Mobility, Flexibility & Risk with Modular Design”, June 16, 2017, appeared on pharmasalmanac.com (link to article: https://www.pharmasalmanac.com/blog/managing-mobility-flexibility-risk-with-modular-design?utm_content=56075020&utm_medium=social&utm_source=linkedin)