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Choosing Safer Single-use Materials to Enhance Advanced Therapy Manufacturing

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Advanced therapies are a crucial component of an emerging pharmaceutical toolbox. These new and novel drugs are often the last line of treatment for patients with rare and intractable diseases. As such, they require complex production processes to ensure they can address patient needs at the right time. As key players in enabling the design and development of these fragile, potentially life-saving biologic drugs, single-use technology (SUT) suppliers must align with advanced therapy manufacturers to de-risk single-use manufacturing processes and chemical composition requirements to maintain the safety and efficacy of new treatment innovations.

The Additives that Impact Therapeutic Manufacturing

Historically, SUTs used in the manufacture of advanced therapies and other medical innovations utilized chemicals that have been recently identified as potentially impactful to human and environmental health. Phthalates (THAL-ates), a family of chemicals that have commonly been incorporated into plastics and polymer-based materials to increase flexibility and durability, are known to negatively impact human health. These endocrine-disrupting chemicals are also slow to naturally biodegrade.[1] Due to these concerns, many industries (e.g., children's toys, food packaging)[2, 3] are gradually replacing phthalates—also known as "plasticizers"—with alternative chemicals in their manufacturing processes, if not outright banning them. To reduce and ultimately eliminate the use of these materials, the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulation in the European Union (EU) "aims to protect human health and the environment by restricting dangerous substances and articles made of those substances,"[4] including phthalates. In March of 2018, the EU announced the restriction of three phthalates: di(2-ethylhexyl) phthalate (DEHP), di-n-butyl phthalate (DBP), and butylbenzyl phthalate (BBP), and added a fourth, diisobutyl phthalate (DIBP), within Annex XVII of REACH. While the U.S. Food and Drug Administration (FDA) has issued guidance cautioning against their use, phthalates such as DEHP can still be found in many SUTs that support the manufacture and delivery of therapeutic drugs.

Evidence that patients are routinely exposed to phthalates like DEHP in the course of their medical care is well-established.[5, 6] In 2017, the EU adopted regulations requiring a benefit-risk assessment be conducted before certain phthalates (including DEHP) can be incorporated into medical devices; the FDA likewise issued guidance in 2002 recommending that healthcare providers "consider alternatives" to DEHP, though more stringent requirements have yet to be required for products manufactured and distributed in the United States market. That reality is likely to change in the future as more calls to shift regulation emerge. For example, in 2021, several members of the U.S. House of Representatives issued a letter to the FDA urging the agency to review its 2002 guidance and adopt more stringent requirements around the use of phthalates.[7] In California, DEHP has been designated as a reproductive and developmental toxicant and a carcinogen; the state advises consumers to request DEHP-free devices when undergoing medical treatment.[8]

Redesigning Single-use Solutions for the Future

Charter Medical, an innovative single-use solutions developer and supplier for cell therapy manufacturers, continues to prioritize DEHP-free materials selection in the design and development of its standard and custom polymer-based processing solutions such as bags, tubing, transfer sets, overmolds, and manifolds used in cryogenic and cell expansion applications in accordance with global regulatory directives intended to protect the environment and human health. The removal of DEHP and other additives from these cell therapy processing components will contribute to a safer future for single-use solutions.

By partnering with customers to meet their standards for materials development—especially in the absence of current industry-wide standards—Charter Medical is committed

to addressing the ever-evolving needs of an increasingly complex advanced therapies market. Eliminating additives like DEHP is a critical step to helping cell and gene therapy innovators take a forward-thinking approach to meeting emerging patient health and safety requirements.

Resources

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Additional Resources

- Regulation MDR 2017/745: Melvin, T. (2022). The European Medical Device Regulation–What Biomedical Engineers Need to Know. IEEE Journal of Translational Engineering in Health and Medicine. Retrieved May 31, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9395138/

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About The Authors

Ian Burdick is Director of Product Management at Charter Medical, a subsidiary of Solesis, in Winston-Salem, North Carolina. Ian manages Charter's product portfolio and provides cross functional leadership to strategically develop new single-use solutions for the various markets that Charter Medical serves. Ian leverages his 11 years of experience in global sourcing, distribution, and contract manufacturing to bring unique insights into meeting the needs of the biopharmaceutical market and many others. Ian has a B.S. from Western Michigan University and an MBA from the University of North Carolina.

Jay Collins is Product Manager, Single-use, at Charter Medical in Winston-Salem, North Carolina. Jay is responsible for managing Charter's single-use portfolio, introducing new products, and providing cross-functional project leadership. Jay leverages his 16 years of experience in market research, product operations, and product management in the medical device and single-use industry to drive product-led growth in global markets. Jay has a B.S.B.A. from the University of North Carolina at Charlotte and is currently pursuing an MBA from Appalachian State University in Boone, NC.

About Charter Medical, LLC

Charter Medical, LLC has more than 30 years' experience developing and providing specialty single-use products for bioprocessing, advanced therapies, and blood management applications, delivering solutions to the biotechnology and pharmaceutical markets.

Our 16,000 square feet of cleanroom space located in Winston-Salem, NC, is ISO 13485:2016 certified and FDA registered, with a focus on designing and supplying single-use solutions for cell growth, frozen storage, and biological fluid handling. Custom product design services are available for clients who need specialized single-use products for biomanufacturing. Our team of engineers will work with you to develop the best solution for your specific requirements.

Charter Medical is committed to providing quality products and services with an experienced staff dedicated to exceeding customer expectations from product development to delivery and implementation.

At Charter Medical, we work closely with our sister companies, Polyzen, SanaVita Medical, and Secant Group, to provide essential products and services to life science companies. Through integrated research and development activities, we are helping to bring new technologies and therapies to market. Visit www.chartermedical.com.

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