CONTROL OF STARTING MATERIAL AND FINAL PRODUCT ADMINISTRATION OF CELLULAR THERAPIES

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The manufacture of cellular therapies involves the challenge of maintaining critical characteristics of starting materials and the final product which contain living cells. In order to ensure that the cellular product administered is viable and therapeutically active, there is a need to define and control the starting cell collection and final product administration processes that take place outside of the manufacturing facility.

First, it is necessary to understand and define the characteristics of suitable cellular starting materials, such as patient's autologous leukapheresis or blood draw collection or allogeneic placental tissue. In order to do so, collection parameters have been set based on industry known standards for these starting materials and data are being continually collected and analyzed to further drive controls that need to be established. An understanding of the collection parameters that affect the critical attributes of the starting material will further drive the development of a manufacturing process that is robust to the variability inherent in a biological starting material.

Additionally, it is necessary to control the manipulations such as thawing and dilution of the final cellular product at the patient interface. In order to establish a design space for the thawing and dilution at clinical site of our cellular products, studies were executed to establish limits for the time and temperature of the product thaw, stability of the thawed and diluted product prior to administration, and infusion rates and procedures that are tolerable for the living product and the patient. The characterization of failure limits for each processing step has further motivated the simplification of a number of steps in the preparation procedure to reduce the risk of working outside the design space. Once such simplification is the design and implementation of a thaw device that is simpler, lower risk, and more user-friendly than a water bath.
The characterization of and requirement to control both the collection parameters for our starting material and the cellular product preparation and administration procedure has broadened our scope of responsibilities. These responsibilities include identifying a design space for steps in the starting material collection and product preparation procedures, creating simplified and user-friendly cellular preparation procedures, providing training and technical support for our clinical counterparts, and creating systems that allow traceability from collection to administration. This collaboration of engineers and the clinical research groups will be crucial in the cellular therapeutic industry moving forward.