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Pilot Study of Chimerism Kinetics and Dominance in Double Cord Blood Stem Cell Transplantation Using qPCR

Double cord blood transplantation (DCBT) had successfully circumvented the problem of a limited cell dose in a cord blood graft and has become a standard of care approach in the United States for adult patients. Despite significant reduction in graft failure with DCBT compared to that of a single unit, a delayed engraftment and primary engraftment failure do occur. Patients who fail to engraft or develop life-threatening infectious complications due to profound and prolong neutropenia may be salvaged by the infusion of additional stem cells. Ability to early, confidently, and accurately predict engraftment would be an invaluable tool, allowing to adequately prepare for the additional unit re-infusion in appropriate time frame. Technical limitations of the currently available semi-quantitative PCR assays of informative polymorphic STRs, typically do not allow for chimerism (the most significant predictor of engraftment) assessment prior to day 21 after the stem cell transplantation. We intend to utilize a novel technology - the qPCR engraftment monitoring assay that uses 34 oligonucleotide probe sets that allows for monitoring of amplification of the target sequence in real time – to determine if engraftment could be predicted earlier than day 21. Additionally, this technology may allow for the detail understanding of engraftment kinetics of both cords, shedding some light on their interactions and providing better insight into the factors that determined successful engraftment. This project is being conducted in close collaboration with the Histocompatibility and Chimerism Core Laboratory.

In the last year 8 patients underwent a DCBT at Northwestern University, Robert H. Lurie Comprehensive Cancer Center. All of them chose to participate in the study. Samples were collected on all the patients throughout the course of their therapy, as specified by the IRB –approved protocol. We intend to begin the sample analysis in the next several months.