

Pharmacologic Predictors of Engraftment and Survival in Hematopoietic Stem Cell Transplantation

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Background and Hypothesis:

For many aggressive hematologic disorders, hematopoietic stem cell (HSC) transplantation is the only curative therapy. This treatment involves collection of stem cells from healthy donors or patients themselves before pre-transplantation chemoablation, and donor cell infusion to reconstitute a healthy blood system. While HSC transplantation can be effective in treating blood diseases with poor prognoses, patient outcomes of HSC transplantation are variable, with overall 5-year survival rates of 40-60%. At early timepoints after transplantation, poor or delayed engraftment can lead to infections, hemorrhage, disease relapse, and increased mortality; however, the complex factors that lead to variable outcomes are yet to be fully understood. A recent study has shed light on a class of anti-hypertension medications that may delay engraftment (PMID: 39786370). Here we aim to more broadly understand common drugs that may impact engraftment rates and overall survival in HSC transplantation patients.

Experimental Design or Project Methods:

We conducted a retrospective analysis of 500 IU Health allogeneic transplantation patients from 2019-2025. Demographic data, transplant parameters, and blood count recovery from 1 week pre- to 3 months post-transplant were collected. Data was stored securely in REDCap and analyzed using Excel, OpenRefine, and GraphPad Prism.

Results:

Patients receiving acyclovir, fluconazole, ondansetron, and tacrolimus post-transplant exhibited significantly faster platelet recovery within one month and higher 3-year survival rates compared to patients who were not on these medications. In adult patients, higher CD34+ cell doses modulated medication-dependent platelet recovery and survival.

Potential Impact:

Our findings suggest that certain medications taken in the peri-transplantation period may enhance platelet recovery and long-term survival, and that early platelet recovery could serve as a surrogate marker for survival. Future work will involve multivariate and machine learning approaches to explore additional variables, including disease type and comorbidities, to better optimize clinical decision making for HSC transplant outcomes.