The Effect of Telomere Length on Stem Cell Transplant in Rare Case of Acute Myeloid Leukemia: A Case Study

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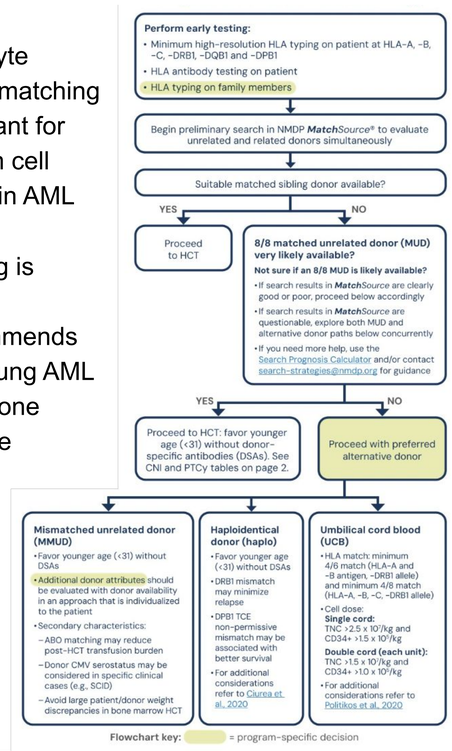
Introduction

Acute Myeloid Leukemia (AML) is a cancer of the blood and bone marrow with excess abnormal white blood cells

Human Leukocyte Antigen (HLA) matching is highly important for successful stem cell transplantation in AML

- HLA matching is **critical**
- NCCN recommends screening young AML patients for bone marrow failure syndromes



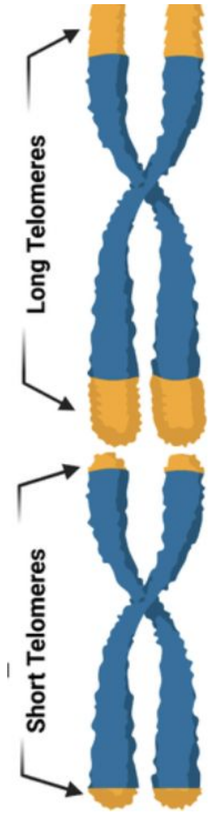
Methodology

Patient Background:

- A 25-year-old woman with **intermediate-risk** AML
- **Remission** after **induction chemo**
- Short telomeres (**<1st percentile**),
  - Telomere Biology Disorder **(TBD)**.

Donor Evaluation:

- Telomere testing showed her **HLA-matched siblings** had **short** telomeres (1st–10th percentile), suggesting a **familial TBD** and making them **poor donors**



Conclusion

- Patient is a **1-year survivor** and in remission
- HLA-matched siblings had **short telomeres**
- Chose **7/8 mismatched unrelated donor with normal telomeres**
  - Recent data show 7/8 mismatches have fewer complications than previously thought

Next Steps

- **Routine telomere** testing in young AML patients and related donors if BMF suspected
- TBD in patient raises risk for **lung and liver complications**
  - **Monitoring** planned for her health in future
- **Known mutations** are associated with TBD
  - **Gene sequencing of siblings** may reveal a **novel** TBD-related gene as patient did not have any of the known ones

Results

- The patient underwent HSCT with a 7/8 mismatched unrelated donor
- The unrelated selected donor had **normal telomere length**, reducing the risk of post-transplant complications
- One year post-transplant, the patient remains **in complete remission** so far with successful engraftment and no signs of graft failure or graft versus host disease

Comparison of Telomere Lengths

	Lymphocytes	CD48RA pos (Naive T cell)	CD48RA neg (Memory T cell)	Granulocytes
Patient Before Chemo	< 1%	< 1%	< 1%	N/a
Patient During Remission	< 1%	< 1%	< 1%	< 1%
Sister	1 - 10 %	1 - 10 %	1 - 10 %	< 1%
Brother	1 - 10 %	1 - 10 %	1 - 10 %	1 - 10 %

Excluded full-match siblings due to **low** (1–10%) telomere length, raising concern for TBD

References

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