Gene Therapy: A Novel Approach to Leukemia Treatment

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Purpose
- Lay out current methods of leukemia treatment
- Examine gene therapy as a treatment method
- Discuss the nursing role in gene therapy for leukemia

Background
- Leukemia is the 10th leading cause of death worldwide.
- Leukemia has been traditionally treated with chemotherapy.
- Gene therapy uses genetic vectors to correct gene mutations.
- Nurses are at the front line of integrating genetics and genomics patient response research.

Methods
The CINAHL and OVID Medline databases were utilized to determine the relations between leukemia diagnosis/prognosis, chemotherapeutic treatments, and genetic therapy in nursing care of patients.

Findings
Leukemia Types
- Most common types: Acute Myeloid (AML), Chronic Myeloid (CML), Acute Lymphocytic (ALL), Chronic Lymphocytic (CLL)
- Leukemia involves un-proliferated cell growth and bone marrow disruption.

Current Leukemia Treatments
- Current treatment: two-step chemotherapy
  - Induction: target malignant cells
  - Consolidation: prolong remission
- Chemotherapeutic cure rates in AML
  - 20% – 75%
  - 60+: <10%
- Chemotherapeutic cure rates in ALL
  - Children: 70% - 80%
  - Adults: 40%
  - Also have acute and long-term side effects

Gene Therapy
- Gene therapy targets genetic abnormalities to control malignant cell growth.
- Includes enzymatic inhibitors targeting genetic mutations in specific T-cells.
- The major agent for CML is imatinib mesylate.
- AML is currently being treated with a regimen of cytarabine, anthracycline, vorinostat, and a histone decetylase inhibitor.
- FLT3 gene also being targeted
  - Initial results are promising, but further research is needed.

Discussion
Limitations of Gene Therapy
- Potential for discrimination based on genetic tendencies toward leukemia.
- Other issues
  - Methods of acquiring genetic information
  - Privacy of genetic test results
  - Knowledge of healthcare professionals in regards to gene therapy
  - Psychosocial impact of knowing genetic test results.

Nursing Role
- Nurses are to educate themselves on gene therapy and delivering information to their patients.
- Nurses have responsibilities to their patients at each stage.
  - Pre-diagnostic stage: limit modifiable risk factors
  - Diagnostic stage: educate patients about leukemia and answer questions
  - Treatment stage: explain treatment plans and offer coping resources
  - Terminal stage: provide palliative care

Conclusion
While chemotherapy has been a fairly consistent leukemiaic treatment, gene therapy has the potential to tailor treatment based on individual genetic makeup and thus meet with higher cure rates overall than chemotherapy.

Future Directions
- Nurses to educate themselves on genetic therapies and incorporating these into patient care.
- Nurse scientists and advance practice nurses to undergo education on molecular genetics.
- Future studies
  - Alteration of genes in utero in order to decrease cancer risk prevention techniques
  - Genetic screening for vulnerable individuals
  - Longer-term results of genetic therapy

Key Resources


Acknowledgements
Advisor: Patrick Dean, EDD, RN, OSTJ