Cancer-Related Fatigue Trajectory and Biological Correlates of Acute Lymphoblastic Leukemia Patients During Chemotherapy

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Abstract
Pediatric recruitment included a patient with acute lymphocytic leukemia. Blood chemistry and blood indices were analyzed and the patient reported physical, mental, and emotional statuses in a PROMIS questionnaire. At baseline, week 1, week 2, and week 3, fatigue fluctuated over time while there was a decrease in anxiety, pain, and depression. Suspected fatigue biomarkers were not quantified.

Introduction
Acute Lymphoblastic Leukemia is a blood cancer in which the bone marrow produces too much lymphocytes (B or T cells). This can affect the production of red blood cells, platelets, and other bone marrow derivatives. Patients undergoing chemotherapy typically report feeling tired or fatigued. There is no known cause of fatigue. However, we suspect that Apolipoprotein E may be a biomarker candidate.

Background
• Apolipoprotein E is a lipid carrier molecule that helps transport lipids through the bloodstream. Certain alleles have been linked to Alzheimer’s disease and more recently inflammation in trauma.
• Cancer- and cancer-treatment-related fatigue is the ongoing exhaustion that limits a person to perform daily activities that were previously enjoyed before.

Methods & Materials
This study is a preliminary report of an active IRB approved research protocol. Children diagnosed with ALL were recruited into the study. Participants were asked to complete a Patient Reported Outcome Measurement Information System (PROMIS) questionnaire before starting chemotherapy and 1, 2, and 3 weeks after chemotherapy. Blood samples on each visit were collected and sent to the laboratory for analysis.

Results
Correlation In Pain, Depression, and Anxiety
- In four weeks, the patient’s anxiety, pain, and depression decreased and remained thereafter.

Patient-Reported Outcomes Measurement Information System (PROMIS) scores for baseline (designated visit=1), week 1 (visit=2), week 2 (visit=3), and week 3 (visit=4). Raw data was converted into T-scores provided by PROMIS statistical measurements.

Patient Recruitment
Some of the limitations of the limitations encountered in this project was patient recruitment. Only one patient was recruited throughout the entirety of the given timeline. The patient is ten (10) years old and was diagnosed with ALL previous to recruitment. Sole patient recruitment into the study changed original plans for study into case study.

The patient received chemotherapy. Medication included Vincristine, Doxorubicin, Methotrexate, Dexamethasone, and Pegaspargase.

General Results
• Blood chemistry levels were reported to be within normal ranges. This includes sodium, potassium, calcium, carbon dioxide concentrations, urea, liver enzymes, and glucose.
• Blood chemistry panel indicates that there is a positive trend with all tested substances. All substances increased from baseline to week 1 and decreased from week 2 to week 3.
• Self-reported physical mobility and peer-relationship scores had a negative correlation.

Fatigue & Anemia and Fatigue & Blood Lipid Levels
Fatigue levels fluctuated over four weeks. The graphs indicate there is a correlation between increase/decrease in fatigue and Hb and Hct levels. Blood chemistry indicators indicates that there is no anemia in the patient, though. Triglycerides and cholesterol levels also had correlations with fatigue levels. Triglycerides had a positive correlation while cholesterol had a negative correlation. Inflammation marker, Apolipoprotein E, was not analyzed for.

Conclusions
• Cannot link ApoE to CRF
• Chemotherapy medications may have influenced data collected
• Anemia and blood chemistry are not likely to cause fatigue in patient
• Links between fatigue, blood lipids, and hemoglobin/hematocrit were observed
• No hard conclusions because of case study
• Further investigation required

References
[References provided in the document]

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