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

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# Cancer-Related Fatigue Trajectory and Biological Correlates Of Acute Lymphoblastic Leukemia

## Patients During Chemotherapy

Timothy D. Ogburn, Nada Lukkahatai

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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 fatigue. 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.

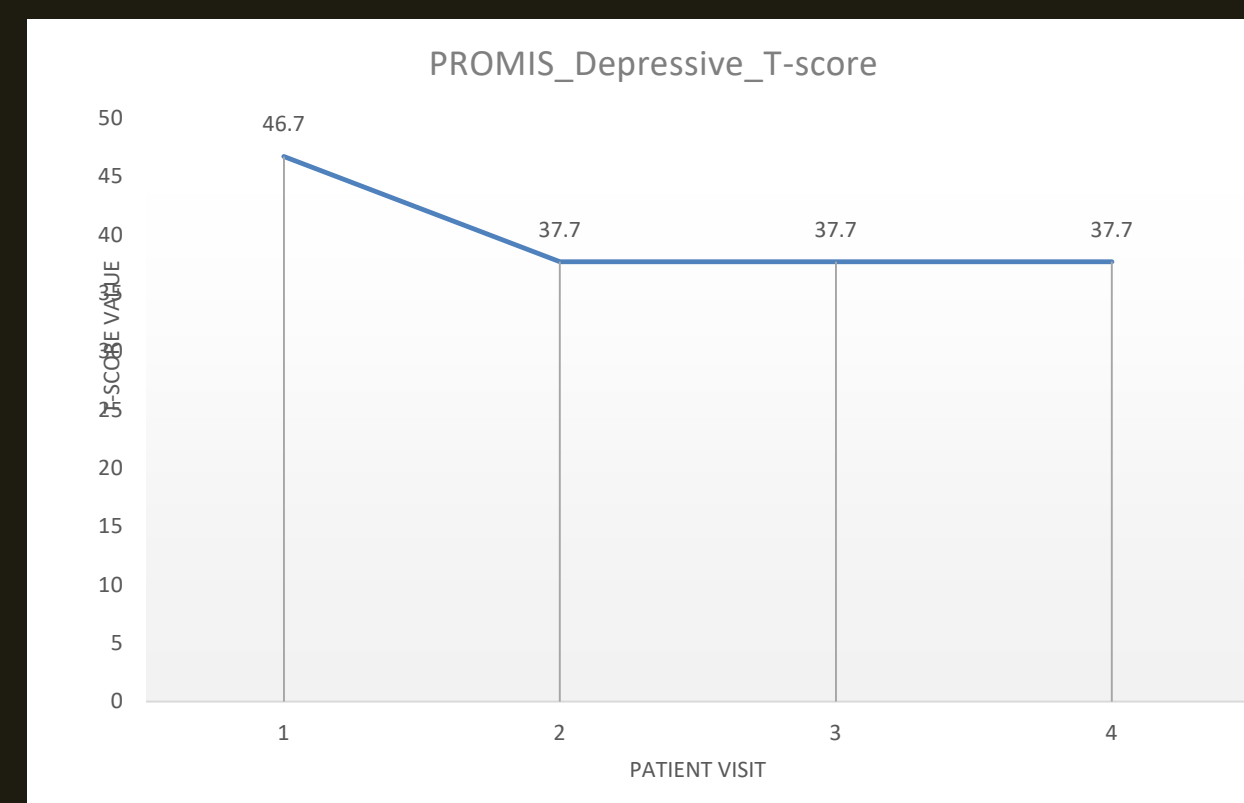
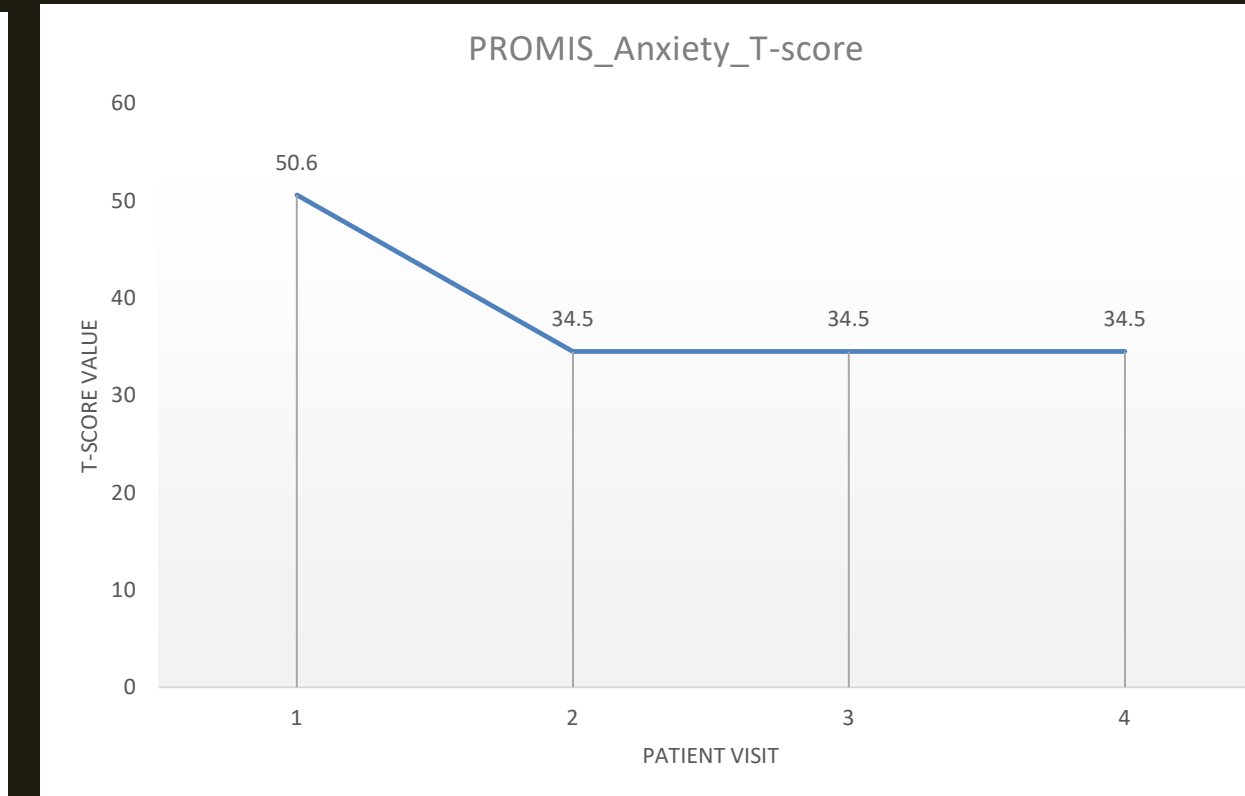
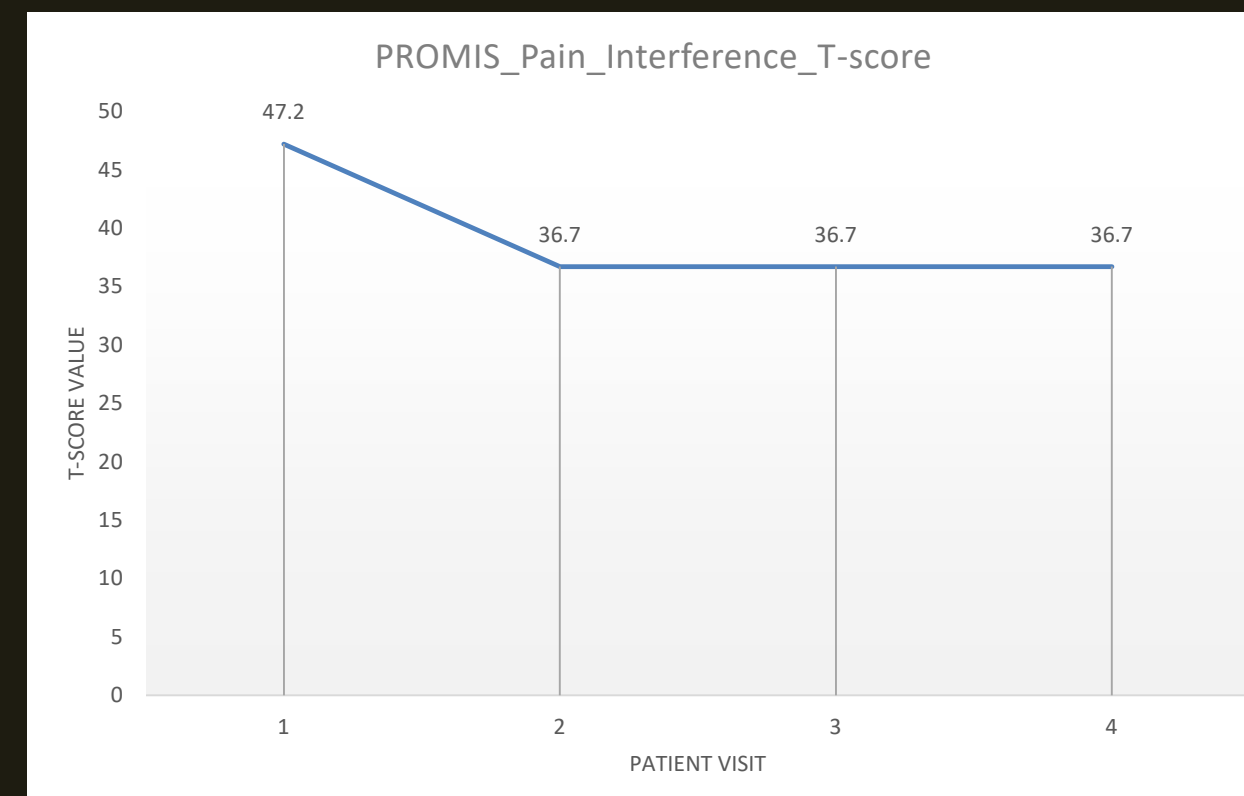
### Methods & Materials

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.

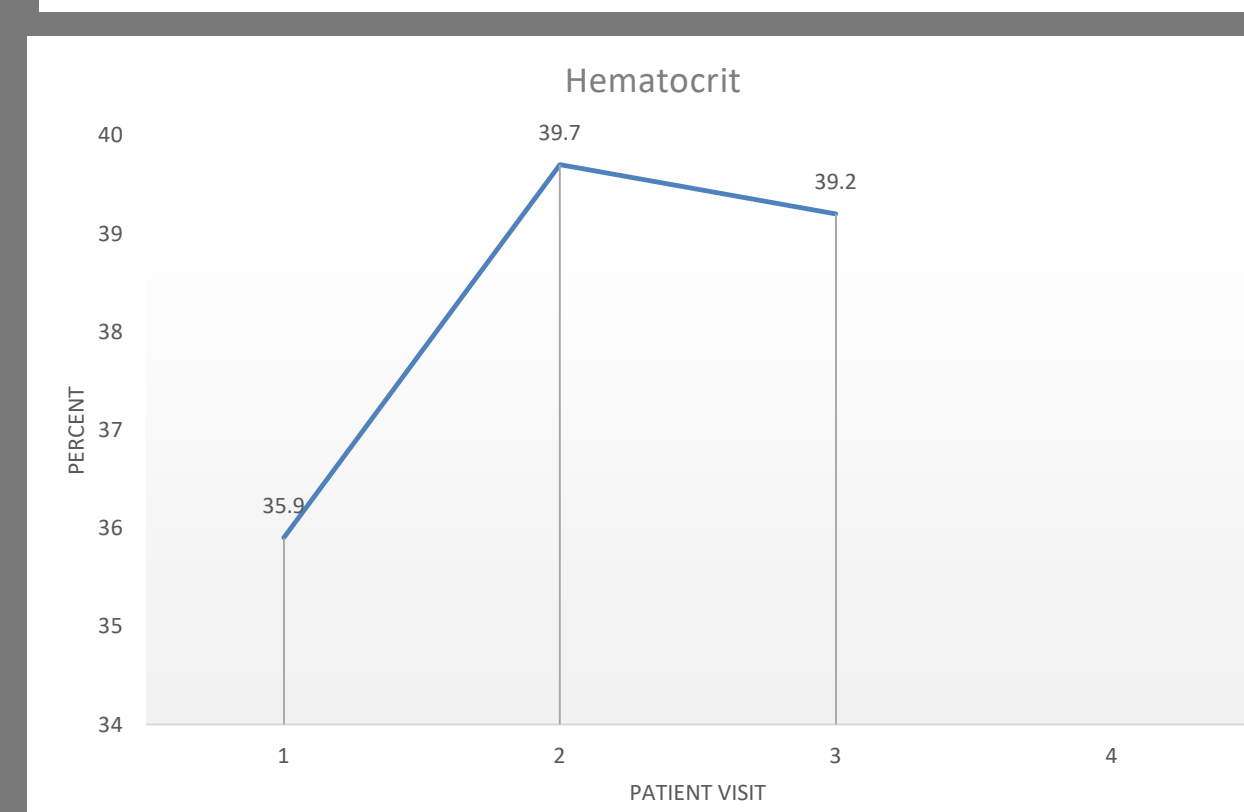
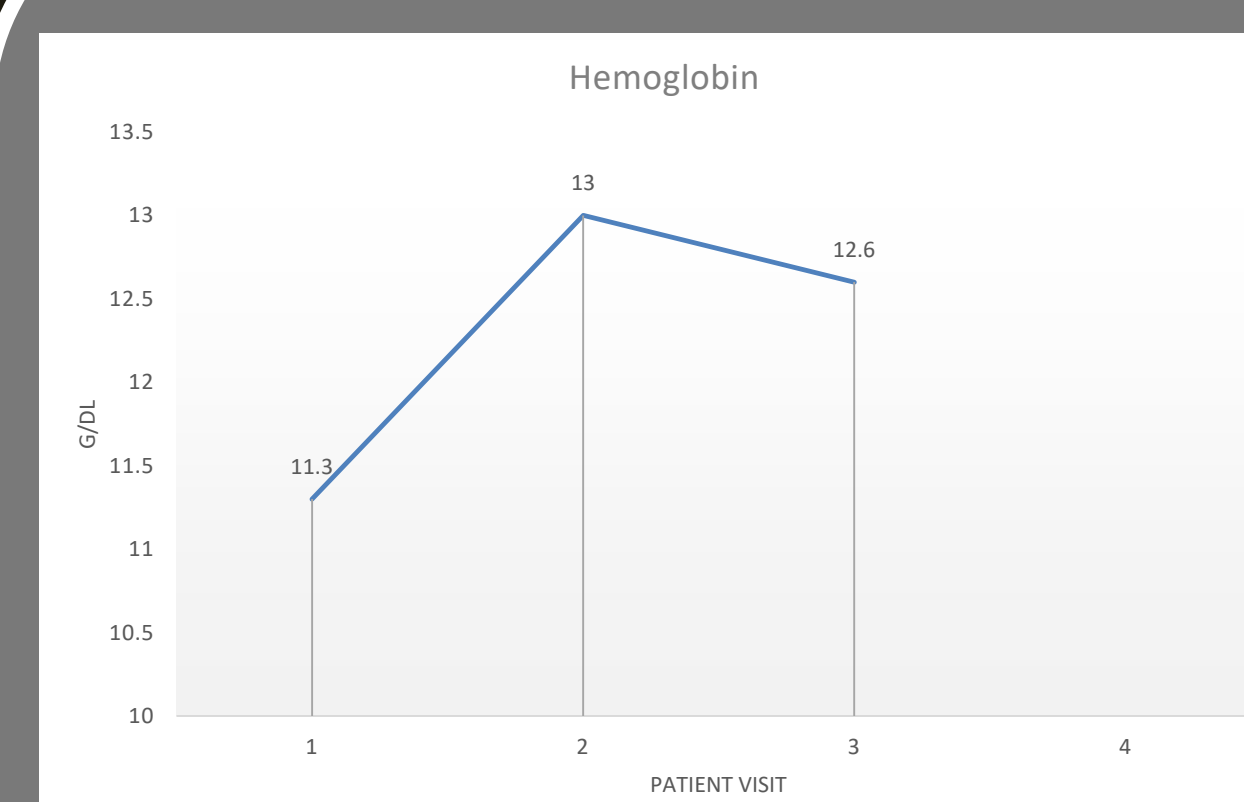
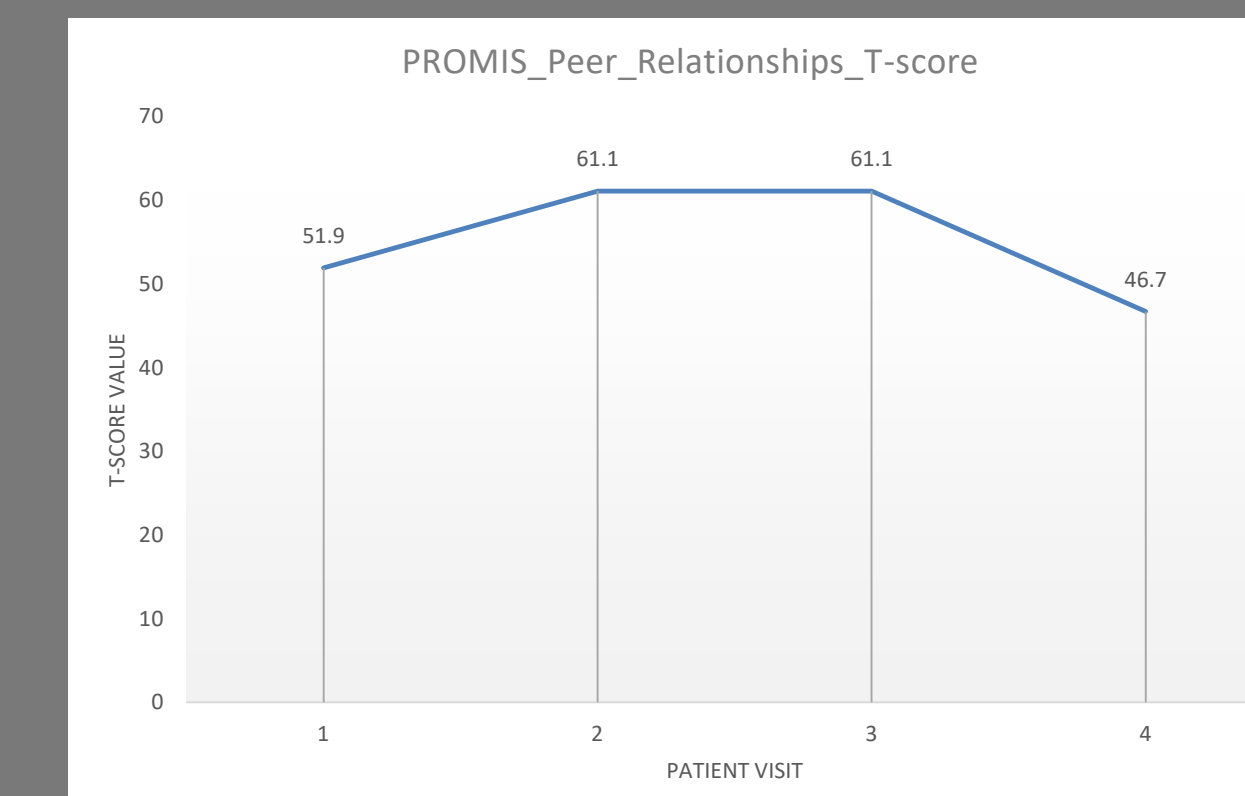
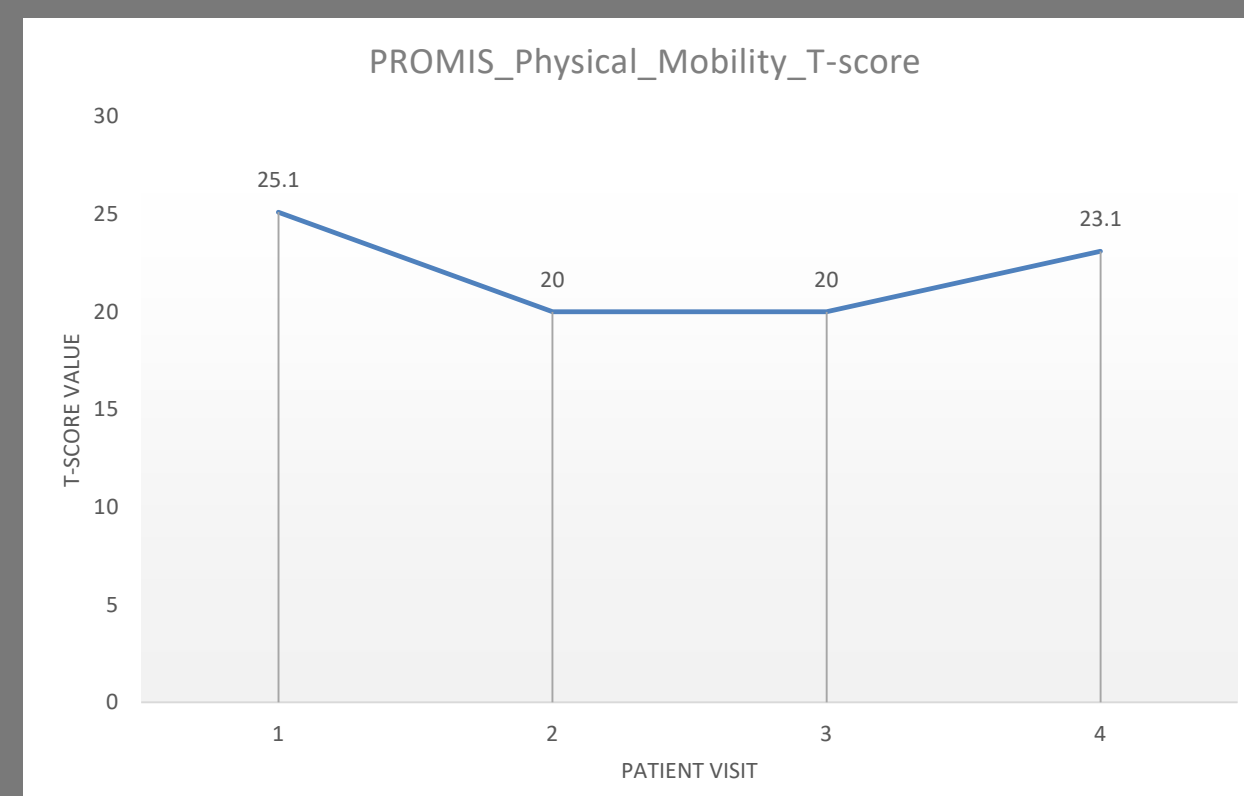
### Results

#### 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.



- Self-reported fatigue T-scores and lab report of hemoglobin and hematocrit levels in patient. The first week experienced a 47.5% increase in fatigue. The second week, fatigue levels dropped. On the third week, fatigue levels increased to about the same as the second week.
- Hemoglobin levels increased the first week by 15.0% and decreased on the second week.
- Hematocrit ratios increased on the first week by 3.8% and decreased slightly on the second week.
- Triglyceride levels decreased the second week and increased back to baseline the third week.
- Cholesterol levels increased the second week and returned to baseline the fourth week.

### 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, Methatrexate, 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 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

- Ahles, T., Saykin, A., Noll, W., Furstenberg, C., Guerin, S., Cole, B., & Mott, L. (2003). The relationship of APOE genotype to neuropsychological performance in long-term cancer survivors treated with standard dose chemotherapy. *Psychosomatics*, 44(6), 612-619.
- Bower, J., & Lamkin, D. (2012). Inflammation and cancer-related fatigue: Mechanisms, contributing factors, and treatments. *Nat Rev Clin Oncol*, 11(10), 597-609.
- Cella, D., Eton, D., Lai, J., Peterman, A., & Merkel, D. (2002). Combining anchor and distribution-based methods to derive minimal clinically important differences on the Functional Assessment of Cancer Therapy (FACT) anemia and fatigue scales. *J Pain Symptom Manage*, 24(6), 547-561.
- Chiaretti, S., Zini, G., & Bassan, R. (2014). Diagnosis and subclassification of acute lymphoblastic leukemia. *Mediterr J Hematol Infect Dis*, 6(1), e2014073.
- Currier, J., Jobe-Shields, L., & Phipps, S. (2010). Stressful life events and posttraumatic stress symptoms in children with cancer. *J Trauma Stress*, 22(1), 28-35.
- Gordijn, M., van Litsenburg, R., Gemke, R., Bierings, M., Hoogerbrugge, P., van de Ven, P., Heiknen, C., & Kasper, G. (2012). Hypothalamic-pituitary-adrenal axis function in survivors of childhood acute lymphoblastic leukemia and healthy controls. *Psychoneuroendocrinology*, 37(9), 1448-1456.
- Hasle, H. (2001). Pattern of malignant disorders in individuals with Down's syndrome. *Lancet Oncol*, 2(7), 429-436.
- Jensen, K., Goo, Y., Yahiaoui, A., Bajwa, S., Goodlett, D., Russo, J., & Voss, J. (2014). Identification of fatigue biomarkers in treated and treatment-naïve HIV patients: Preliminary results. *Biol Res Nurs*, 16(3), 278-287.
- Kiss, N., Isenring, E., Gough, K., Wheeler, G., Wirth, A., Campbell, B., & Krishnasamy, M. (2016). Early and intensive dietary counseling in lung cancer patients receiving (chemo)radiotherapy-A pilot randomized controlled trial. *Nutr Cancer*, 68(6), 958-967.
- Lovibond, P., & Lovibond, S. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Mayo Clinic*. (2016a). Vincristine (Intravenous Route). Retrieved from <http://www.mayoclinic.org/drugs-supplements/vincristine-intravenous-route/side-effects/drug-20066703>
- Mayo Clinic. (2016b). Doxorubicin (Intravenous Route). Retrieved from <http://www.mayoclinic.org/drugs-supplements/doxorubicin-intravenous-route/side-effects/drug-20063553>
- Mayo Clinic. (2016c). Methotrexate (Injection Route, Subcutaneous Route). Retrieved from <http://www.mayoclinic.org/drugs-supplements/methotrexate-injection-route-subcutaneous-route/side-effects/drug-20064776>
- Mayo Clinic. (2016d). Dexamethasone (Oral Route). Retrieved from <http://www.mayoclinic.org/drugs-supplements/dexamethasone-oral-route/side-effects/drug-20075207>
- Mayo Clinic. (2016e). Pegaspargase (Intramuscular Route, Intravenous Route). Retrieved from <http://www.mayoclinic.org/drugs-supplements/pegaspargase-intramuscular-route-intravenous-route/side-effects/drug-20067837>
- National Cancer Institute. (2016). Childhood acute lymphoblastic leukemia treatment (PDQ®)-Health professional version. Retrieved from [http://www.cancer.gov/types/leukemia/hp/child-all-treatment-pdq#section/\\_565](http://www.cancer.gov/types/leukemia/hp/child-all-treatment-pdq#section/_565)
- National Comprehensive Cancer Network. (2016). Fatigue. Retrieved from [https://www.nccn.org/patients/resources/life\\_with\\_cancer/managing\\_symptoms/fatigue.aspx](https://www.nccn.org/patients/resources/life_with_cancer/managing_symptoms/fatigue.aspx)
- National Institutes of Health. (2012). What causes anemia. Retrieved from <http://www.nhlbi.nih.gov/health/health-topics/topics/anemia>
- Newington, L., & Metcalfe, A. (2014). Factors influencing recruitment to research: Qualitative study of the experiences and perceptions of research teams. *BMC Med Res Methodol*, 14(10).
- Roxburgh, C., & McMillan, D. (2014). Cancer and systemic inflammation: Treat the tumor and treat the host. *Br J Cancer*, 110(6), 1409-1412.
- Seegal, D., Krug, J., Buchanan, N., Ajani, U., & Li, J. (2014). Cancer incidence rates and trends among children and adolescents in the United States, 2001-2009. *Pediatrics*, 134(4), 945-955.
- Stein, E., Stein, A., Walter, R., Fathi, A., Lancet, J., Kovacs, T., ... Erba, H. (2014). Interim analysis of a phase 1 trial of SGN-CD33A in patients with CD33-positive acute myeloid leukemia (AML). *Blood*, 124(4), 623-627.
- Sundström, A., Nilsson, L., Cruts, M., Adolfsson, R., Broekhoven, C., & Nyberg, L. (2007). Fatigue before and after mild traumatic brain injury: Pre-post-injury comparisons in relation to Apolipoprotein E. *Brain Inj*, 21(10), 1049-1054.
- Suski, M., Olsanec, R., Ohmura, L., Stachowicz, A., Medel, J., Okon, K., ... Korbut, R. (2016). Influence of metformin on mitochondrial subproteome in the brain of apoE knockout mice. *Eur J Pharmacol*, 772, 99-107.
- Teasdale, G., Nicoll, J., Murray, G., & Fiddes, M. (1997). Association of apolipoprotein E polymorphism with outcome after head injury. *Lancet*, 350(9084), 1069-1074.
- Vallance, K., Liu, W., Mandrell, B., Panetta, J., Gattuso, J., Hockenberry, M., ... Hinds, P. (2010). Mechanisms of dexamethasone-induced disturbed sleep and fatigue in paediatric patients receiving treatment for ALL. *Eur J Cancer*, 46(10), 1848-1855.

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