Exploring the Relationship Between Trauma, Smoking, and Leukocyte Telomere Length (LTL) in Minority and Caucasian Non-small Cell Lung Cancer Patients

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ABSTRACT

Background: Lung Cancer is the one of the deadliest, and most common cancers in the United States. Non-small cell Lung Cancer accounts for approximately 13% of all new cancers in the United States according to the American Cancer Association. Lung Cancer is also the leading cause of cancer deaths in the United States among both men and women. More people in America will die from Lung cancer than prostate, colon, and breast cancer combined.[1] Many factors contribute to the likelihood of developing Lung cancer, including smoking habits, levels of stress, ethnicity, and instances of trauma in one's life. Leukocyte telomere length is a marker of cellular aging that has been associated with both chronic stress and disease mortality.[2]

Methods: This study explores the potential relationships between stress and instances of trauma, and telomere length in minority versus white non-small cell lung cancer patients (n=65). The 65 Participants of this study were recruited from the James Brown Cancer Center on University of Louisville's Health Science Center Campus in Louisville, Kentucky. All of the participants were diagnosed with non-small cell lung cancer. Participants were sent home with Questionnaires to assess trauma, smoking behavior, and the potential links between these factors and leukocyte telomere shortening.

RESULTS:

- Telomere length was found to be shorter in Caucasians than from Minority patients. The focus of this study is to explore the associations between minority status, instances of trauma, smoking behavior, and the potential links between these factors and leukocyte telomere shortening.

HYPOTHESIS

- Instancies of trauma, as determined by the Traumatic History Questionnaire (THQ), will occur more frequently in individuals that identify as a minority.
- Instancies of trauma, as determined by the Traumatic History Questionnaire (THQ), will be associated with telomere shortening in lung cancer patients
- Smoking history will be associated with shorter Telomeres in both minority and non-minorities.
- Minority Patients, as determined by the Multigroup Ethnic Identity Measure (MEIM), will have shorter telomeres, predisposing them to faster tumor progression

METHODS

Participants: Participants were recruited from the James Brown Cancer Center and met the following criteria: diagnosed with non-small cell lung cancer within 5 years of the study entry, between the ages of 18-85, lived within 120-mile radius, had no medical diagnoses that could influence a six-month survival, no psychiatric history. In this sample, Caucasians had significantly higher smoking history. In this sample, Caucasians had significantly higher smoking history. In this sample, Caucasians had significantly higher smoking history.

Procedure: Participants were given questionnaire packets to assess psychological state; one to be completed in one sitting, and one to be completed each morning and night for 10 days. Participants had their blood drawn to assess telomere length. Blood samples were collected in K2 EDTA purple top tubes during baseline appointments and were kept on ice at the Cancer Center until sent to the laboratory by study personnel. Blood samples were put in a centrifuge at 1300 RCF for 10 min at 4°C. The layer of plasma at the top was transferred via pipette into 1.5 mL microcentrifuge tubes and were kept on ice, as well as remaining blood pellet at the bottom. All tubes were frozen to -80°C. All frozen tubes were transferred to Dr. Elizabeth Blackburn’s laboratory at the University of California San Francisco. Dr. Jue Lin of Dr. Blackburn’s Laboratory, conducted telomere length assays using an adapted protocol (Lin et al., 2010) from methodology originally outlined by Cawthon (2002)

Measures:
- Multigroup Ethnic Identity Measure (MEIM)
- Traumatic History Questionnaire (THQ)
- Leukocyte Telomere Length

Hypothesis: Telomere length was found to be shorter in Caucasians than from Minority patients. The focus of this study is to explore the associations between minority status, instances of trauma, smoking behavior, and the potential links between these factors and leukocyte telomere shortening.

DISECUSSION

Due to the exploratory rather than confirmatory nature of this study, a number of questions remained unanswered and warrant further investigation. Surprising, LTL Length was found to be shorter in Caucasians than from Minority patients. The focus of this study is to explore the associations between minority status, instances of trauma, smoking behavior, and the potential links between these factors and leukocyte telomere shortening.

HYPOTHESIS

- Instancies of trauma, as determined by the Traumatic History Questionnaire (THQ), will occur more frequently in individuals that identify as a minority.
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RESULTS

Surprisingly, LTL Length was found to be shorter in Caucasians than from Minority patients. We explored confounding factors that may have contributed to this counterintuitive finding, including gender and smoking history. In this sample, Caucasians had significantly higher pack years than minorities (R = .244 p = .041 N=52). High pack years is also strongly correlated with Telomere Length shortening (R = -2.058 p = .032 N= 52).

Disease severity did not vary significantly across ethnicities (p = .225). Traumatic history was not significantly correlated with LTL length. Telomere length in both Caucasian and Minority lung cancer patients, one of them being exposure to trauma. The focus of this study is to explore the associations between minority status, instances of trauma, smoking behavior, and the potential links between these factors and leukocyte telomere shortening.

FUTURE DIRECTIONS

- What other health behaviors can negatively impact telomere length in Lung Cancer patients besides smoking?
- What other psychological factors negatively impact lung cancer survivorship besides trauma?
- Explore why, despite shorter telomeres and higher pack years, why Caucasians had similar disease severity as minority patients.
- Explore the different psychological factors that impact Telomere length.

REFERENCES


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