



# Obesity and acute lymphoblastic leukemia risk in children, adolescents, and young adults:



## A Children's Oncology Group report

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### Introduction

Prevalence of childhood obesity has increased over the last four decades in the United States<sup>1</sup>

Acute Lymphoblastic Leukemia (ALL) is the most common childhood cancer and its incidence has been gradually increasing since 1975.<sup>2</sup>

Obesity has been linked to at least 13 types of cancer in adults, including hematologic malignancies<sup>3</sup>

Is obesity a previously unrecognized risk factor for childhood ALL?

Obesity



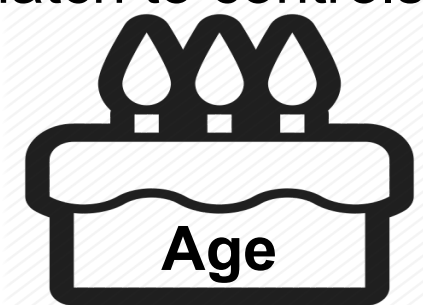
Acute Lymphoblastic Leukemia

### Methods



Cases were children and young adults (aged 2-30 years) diagnosed with ALL between 2004-2017 and treated on frontline COG treatment protocols (n=4726)

1:1 match to controls by:



Individuals were classified on body weight status per CDC age- and sex-based pediatric and adult definitions of Body Mass Index (BMI)

Multivariate logistic regressions were performed assessing associations between BMI classification and ALL adjusting for sex, race/ethnicity, age, socioeconomic status, and weight status

Additional models were performed stratifying by ALL disease characteristics

### Demographic Data

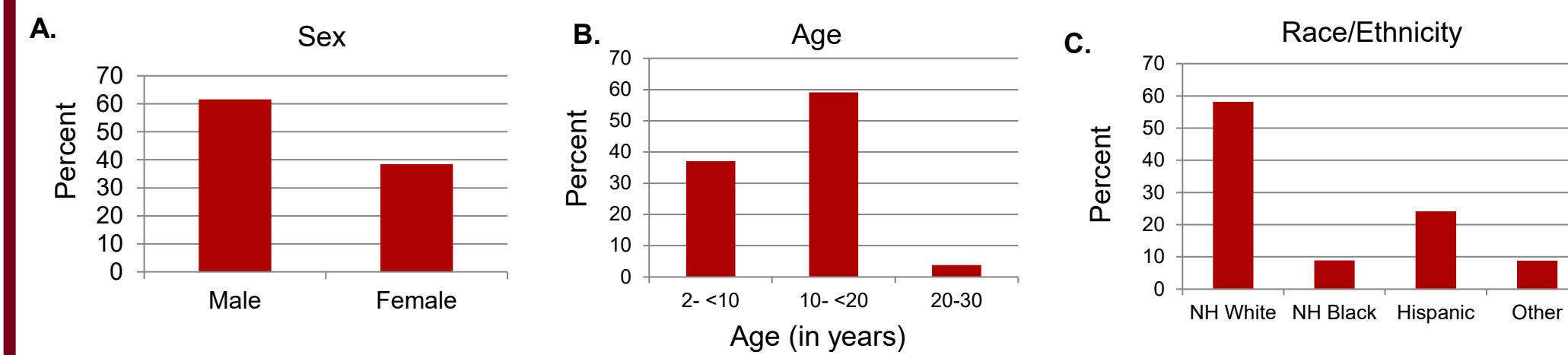


Figure 1: Demographic Data. A-C. Demographics of cases and controls by sex, age, and race/ethnicity, respectively.

### ALL vs BMI Category

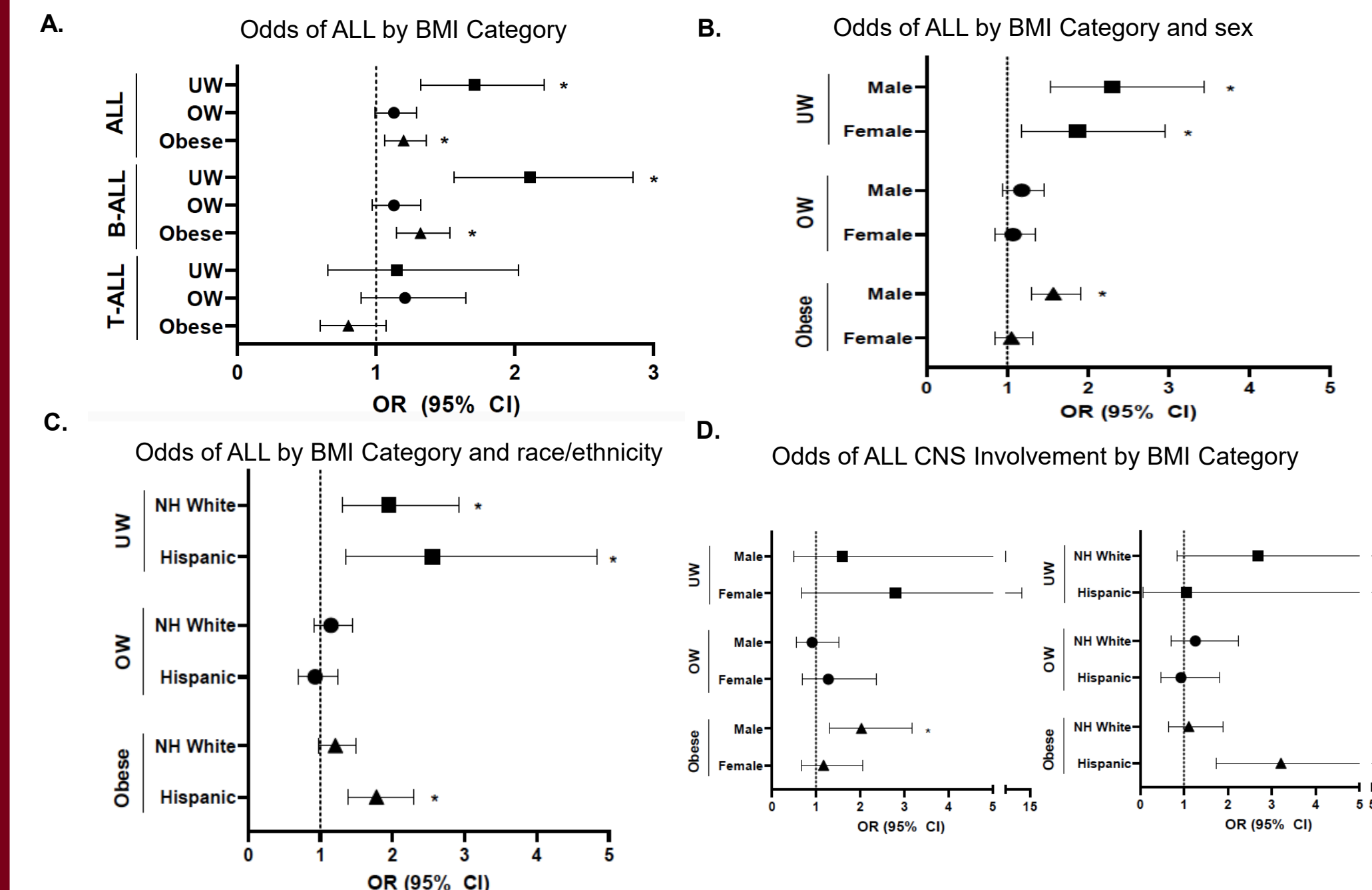
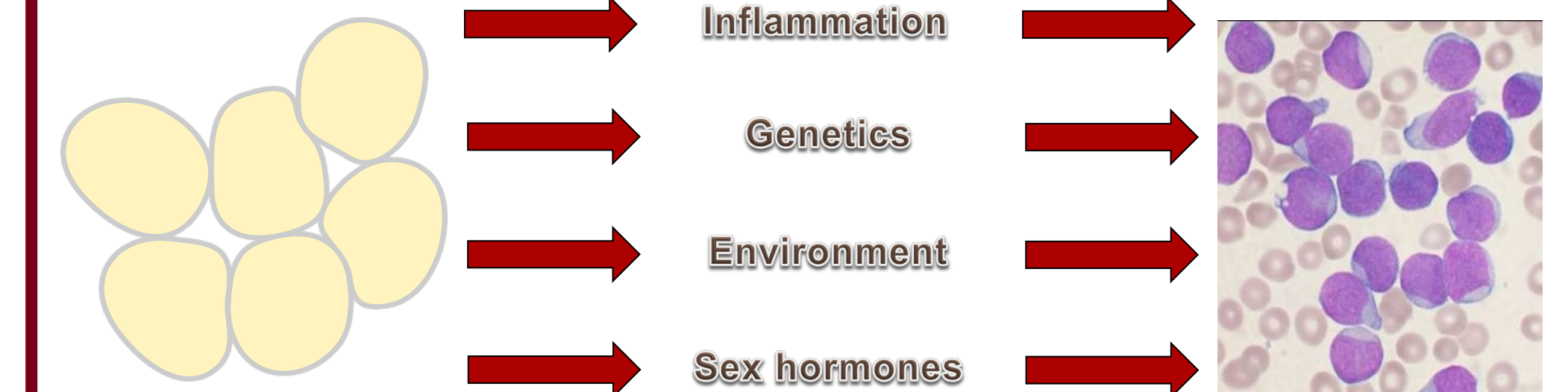


Figure 2: Obesity at time of diagnosis is associated with B-ALL among males and Hispanics. A. Using normal weight as reference, obesity at diagnosis was found to be associated with a diagnosis of ALL, specifically B-ALL. Previously known association of underweight and ALL also observed. B-C. When stratified by sex and race/ethnicity, association between B-ALL and obesity was seen in males and Hispanics. D. Worse Central Nervous System (CNS) status (CNS 2 or 3) at diagnosis was associated with obesity among males and Hispanics \* = significance. Abbreviations: NH, Non-Hispanic; OW, Overweight; UW, Underweight

### Summary

This is the first study, to our knowledge, to show that pre-treatment obesity is associated with B-ALL, specifically among males and Hispanics

Also demonstrated that CNS involvement was associated with obesity



### Conclusions

Obesity is associated with a diagnosis of B- ALL and may be a risk factor contributing to the increasing incidence of ALL

Obesity may be associated with high-risk disease features and may impact prognosis

Sex hormones may play a role in the association between ALL and obesity, since the association was only seen in males in our study

### Future Directions

Further analyze data for other cytogenetic characteristics that may be associated with obesity and have an implication for prognosis

Create an animal model to assess cytokines and adipokines to better understand the association with obesity and ALL, in particular within the CNS microenvironment

### References

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2. Childhood Acute Lymphoblastic Leukemia. National Cancer Institute. [www.cancer.gov](http://www.cancer.gov).
3. Cancers Associated with Overweight and Obesity Make up 40 percent of Cancers Diagnosed in the United States. CDC Newsroom. Centers for Disease Control and Prevention. [www.cdc.gov](http://www.cdc.gov).

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