

ASSOCIATIONS BETWEEN THE SYSTEMIC IMMUNE-INFLAMMATION INDEX AND TUMOR RESPONSE IN PATIENTS WITH HEAD AND NECK CANCERS

Iona M.A. Palmer, B.A.³; Alyssa W. Kabithe, B.S.³; Baylee Polzin, B.S.³; Christina L. Albert, B.S.¹; Elizabeth Cash, Ph.D.^{1,2,3}

¹Department of Otolaryngology: Head & Neck Surgery & Communicative Disorders; ²Brown Cancer Center; ³University of Louisville School of Medicine

Introduction

Background:

Head and neck cancers (HNCs) are among the most recalcitrant to treatment. Advancements in treating and understanding many other cancer types have allowed for comparatively better tumor responses, which often corresponds with decreases in mortality rates. However, HNC tumor responses to treatment have remained comparatively static.

Recent literature has used the systemic immune-inflammatory index (SII)^{1,2,3,4} in a variety of high-risk medical cases, including laryngeal cancer¹, depression³, and hip fracture⁴. This study aimed to explore the association between hematologic inflammatory indicators and tumor response and to determine whether the systemic immune-inflammatory index (SII) could be a valuable tool in predicting HNC tumor responses to treatment.

Hypothesis:

We hypothesize that higher systemic immune-inflammatory index values will predict poorer tumor responses to treatment.

Methods

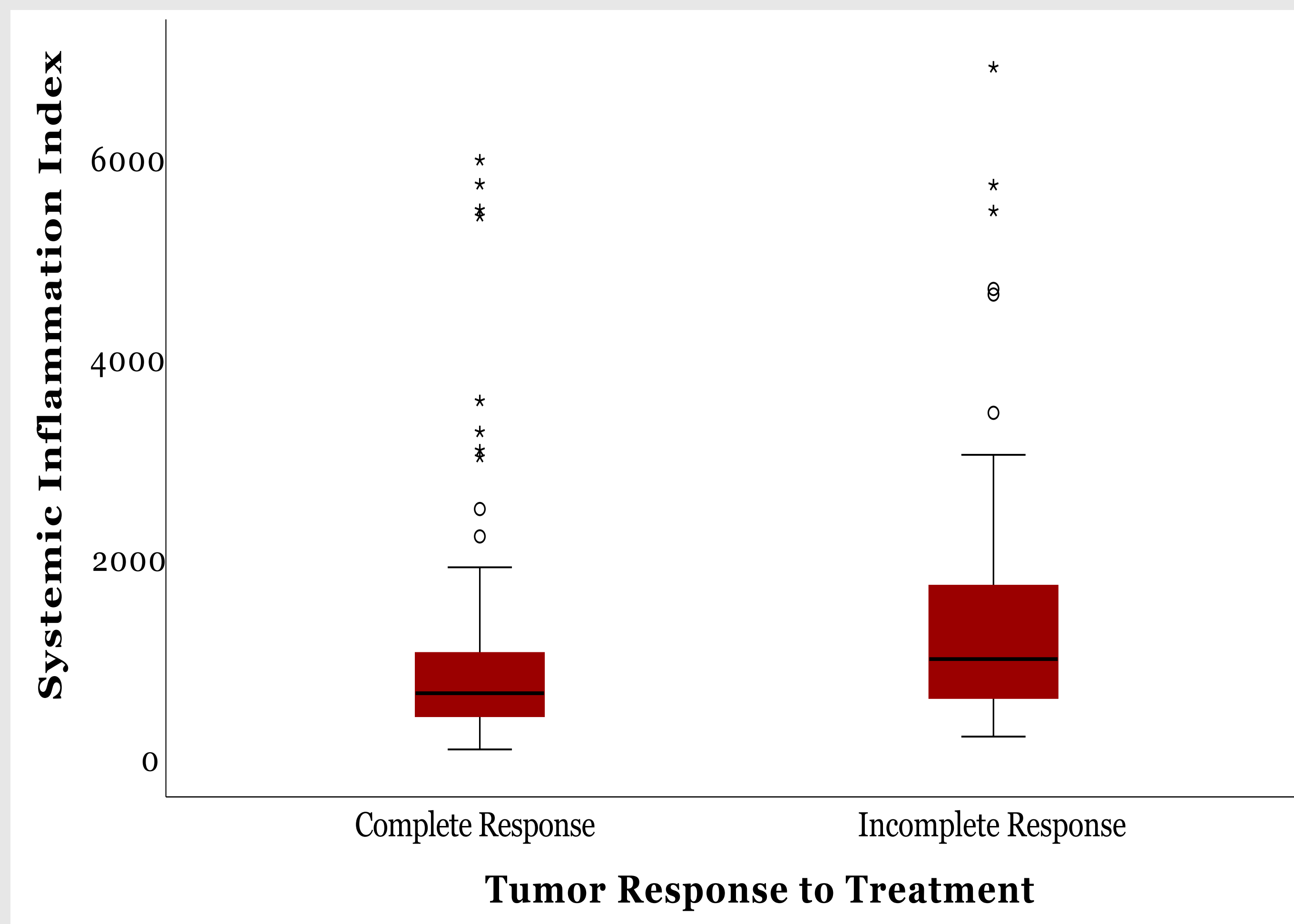
This retrospective study assessed 208 recently-diagnosed HNC patients as they presented for their initial treatment planning visit. Routine complete blood count (CBC) measures were used to calculate SII with the following formula:

$$SII = (\text{neutrophils} \times \text{platelets}) / \text{lymphocytes}.$$

Cancer treatment response was documented as complete versus any presence of a tumor within six months of treatment completion. Incomplete tumor responses could be further subdivided into the following categories:

- residual tumor
- early recurrence
- death

Logistic regression tested the relationship between SII and cancer treatment response.



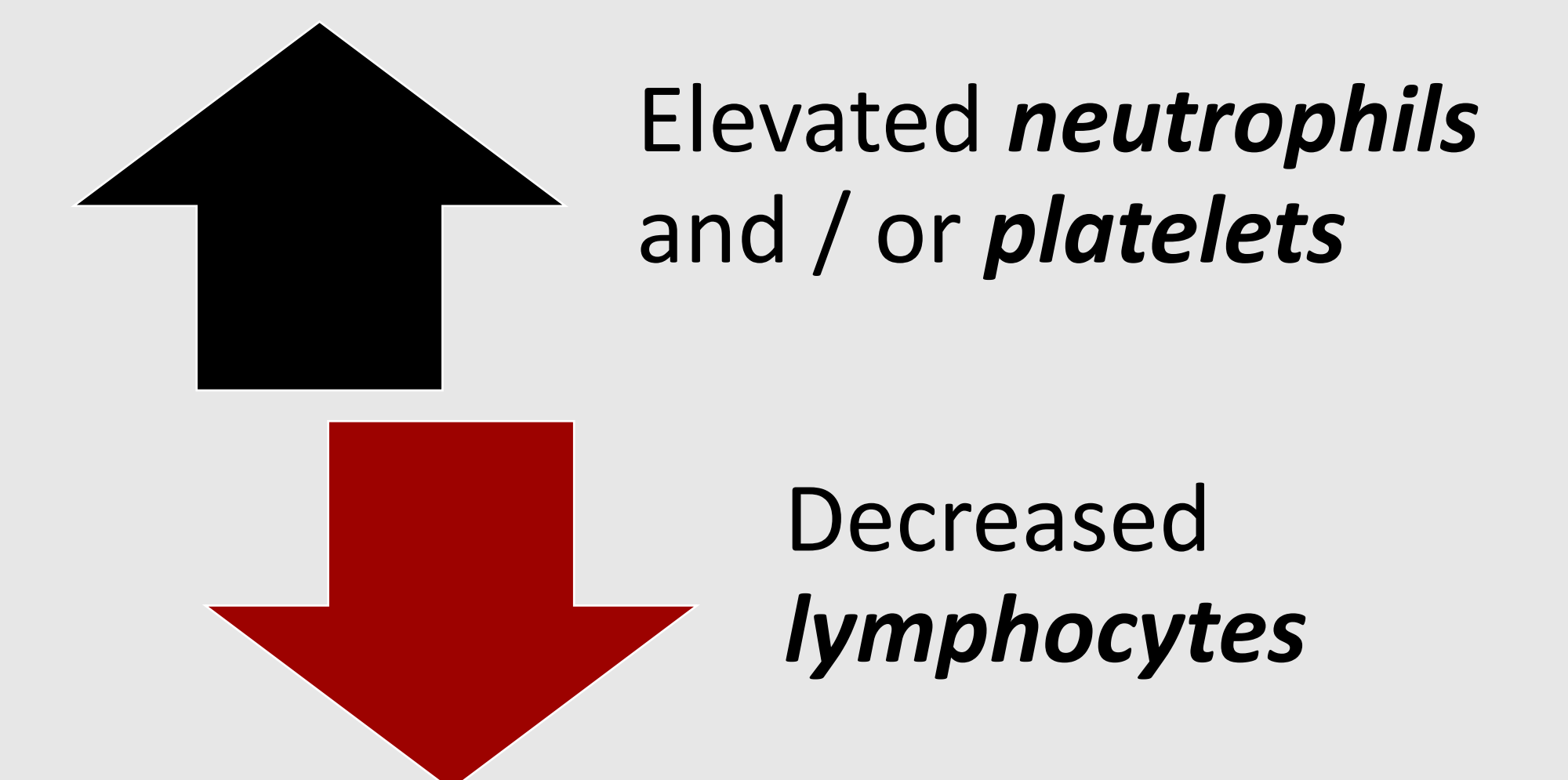
SII *	Complete Response (n = 144)	Incomplete Response (n = 64)
Mean	942.82	1449.83
Median	648.07	989.79
Std. Deviation	997.20	1409.86
Minimum	85.92	214.26
Maximum	5980.29	6909.82

Results

Elevated SII values significantly predicted an increased risk of patients experiencing an incomplete tumor treatment response at six months post-treatment (Odds ratio = 1.930, 95% CI = 1.297-2.871, p = 0.001).

While an objective cutoff point for high SII levels has yet to be determined, background literature typically indicates such a point in the upper 900s. Our study supports this: patients with incomplete responses had respective median and mean SII values of 989.79 and 1449.83. These values are higher than those of our complete-response patients, who had median and mean SII values of 648.07 and 942.82.

Hematologic Inflammatory Indicators and Their Roles in Elevating SII Values

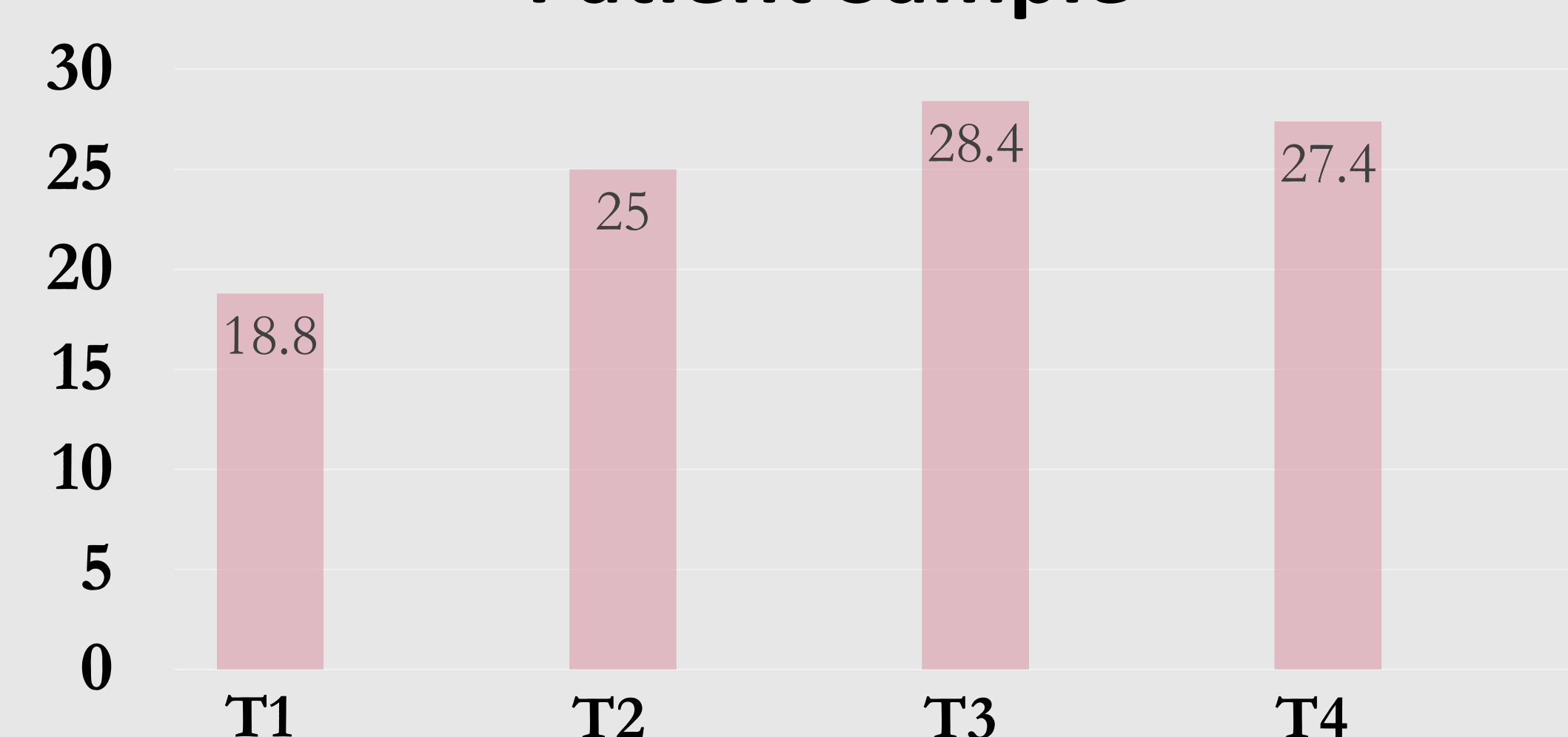


Conclusions

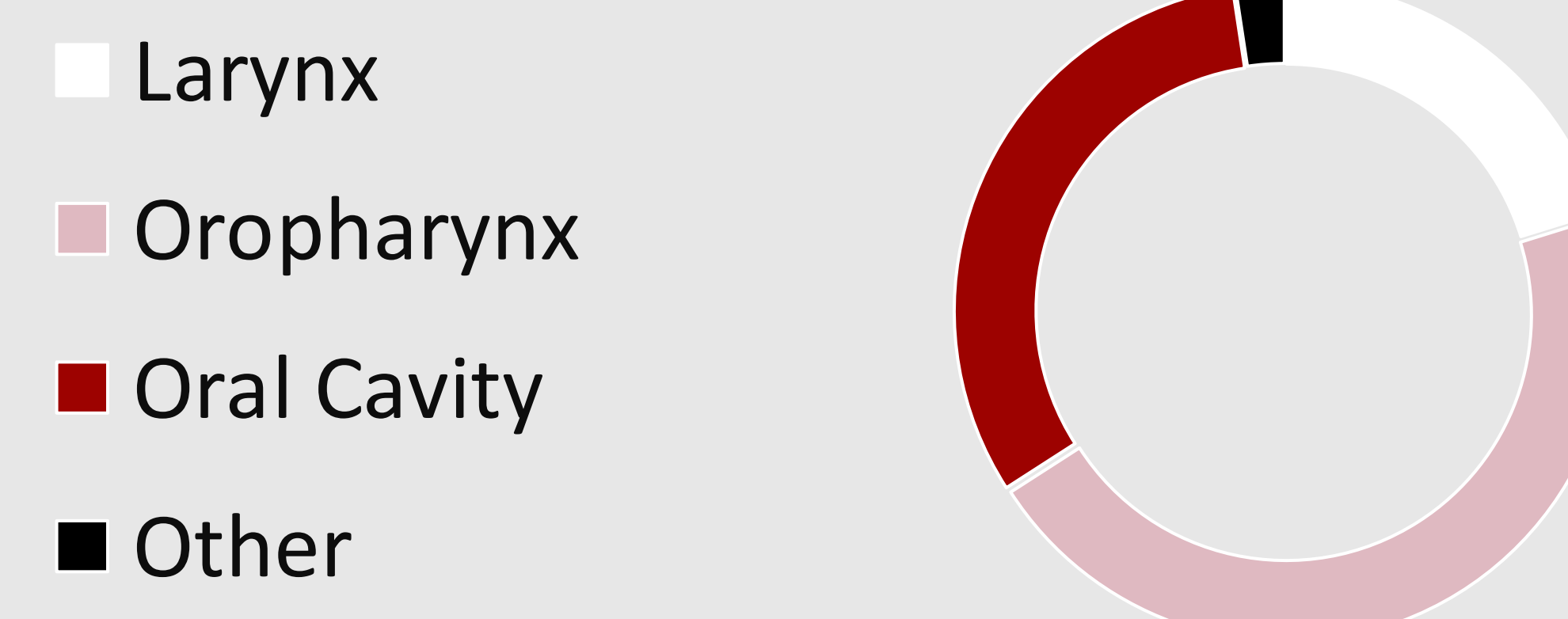
The SII is a promising tool for health care providers in that it significantly predicts HNC tumor treatment outcomes, with higher SII values indicating risk for worse treatment responses.

Statistically significant associations between SII values over 989.79 and incomplete HNC tumor responses to treatment warrant future research. If further studies support ours, health care providers may decide to take a more aggressive approach in treatment of patients with elevated SII levels. Providers may also take additional measures to prepare the patient for a decreased likelihood of successful tumor response to treatment.

T-Stage By Percentage of Patient Sample



Tumor Site By Percentage of Patient Sample



References

1. Akkas & Yucel, 2021, "Prognostic value of systemic immune inflammation index in patients with laryngeal cancer," *European Archives of Oto-Rhino-Laryngology*, 278:1945–1955.
2. Saroul et al., 2022, "Prognosis in Head and Neck Cancer: Importance of Nutritional and Biological Inflammatory Status," *Otolaryngology – Head and Neck Surgery* 2022, Vol. 166(1) 118-127.
3. Wang et al., 2021, "Association Between Systemic Immune-Inflammation Index and Diabetic Depression," *Clinical Interventions in aging* 2021:16, 97-105.
4. Wang et al., 2021, "Systemic immune-inflammation index independently predicts poor survival of older adults with hip fracture: a prospective cohort study," *BMC Geriatrics*, 21:155

Acknowledgements

Research supported by a grant from the National Cancer Institute: Grant R25-CA134283.