

Skeletal Muscle Index as a Predictor of Clinical Outcomes in Head and Neck Radiotherapy: Preliminary Results of a Retrospective Cohort Study

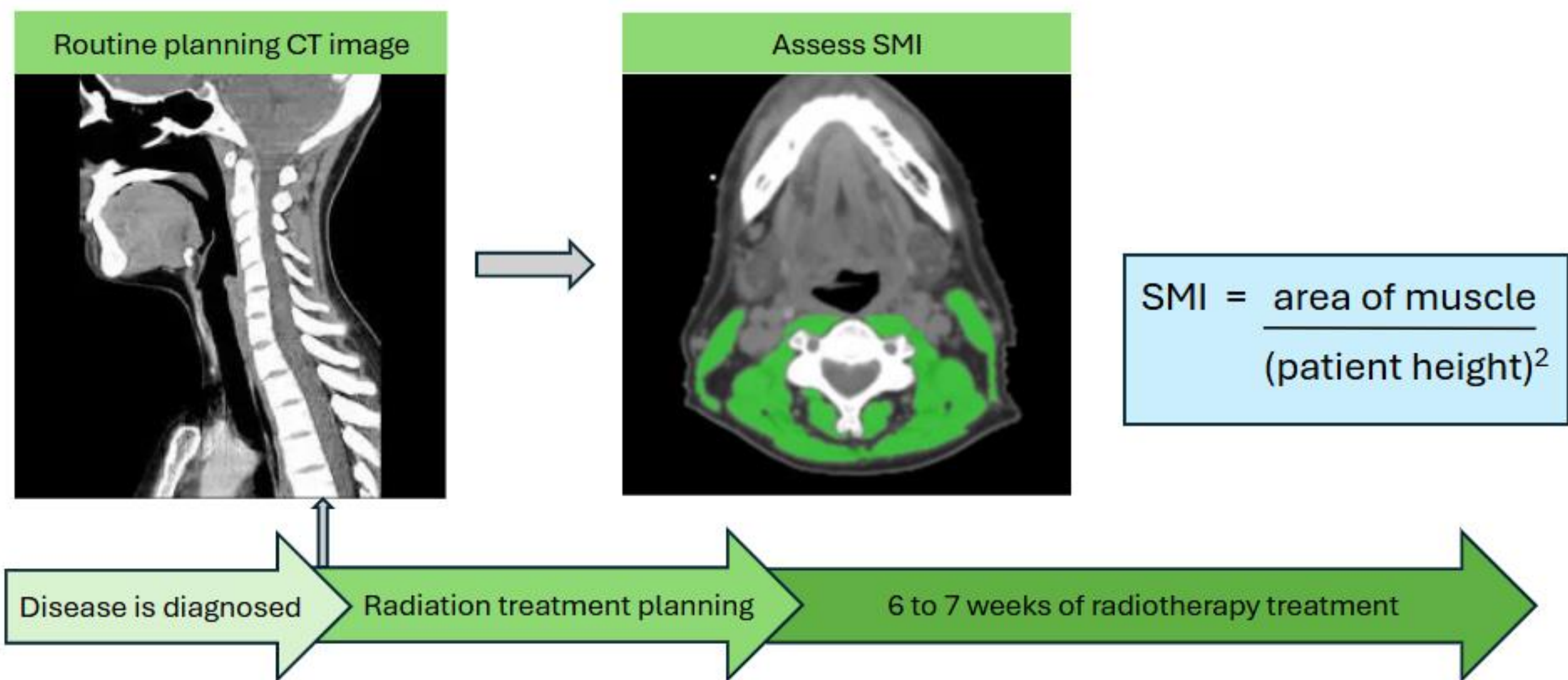
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Introduction

Low muscle quantity, defined by computed tomography (CT)-based skeletal muscle index (SMI), is emerging as a predictor of clinical outcomes in patients with head and neck cancer (HNC)¹. This study aims to evaluate whether CT-defined SMI is associated with all-cause mortality in patients with HNC.



Preliminary Results

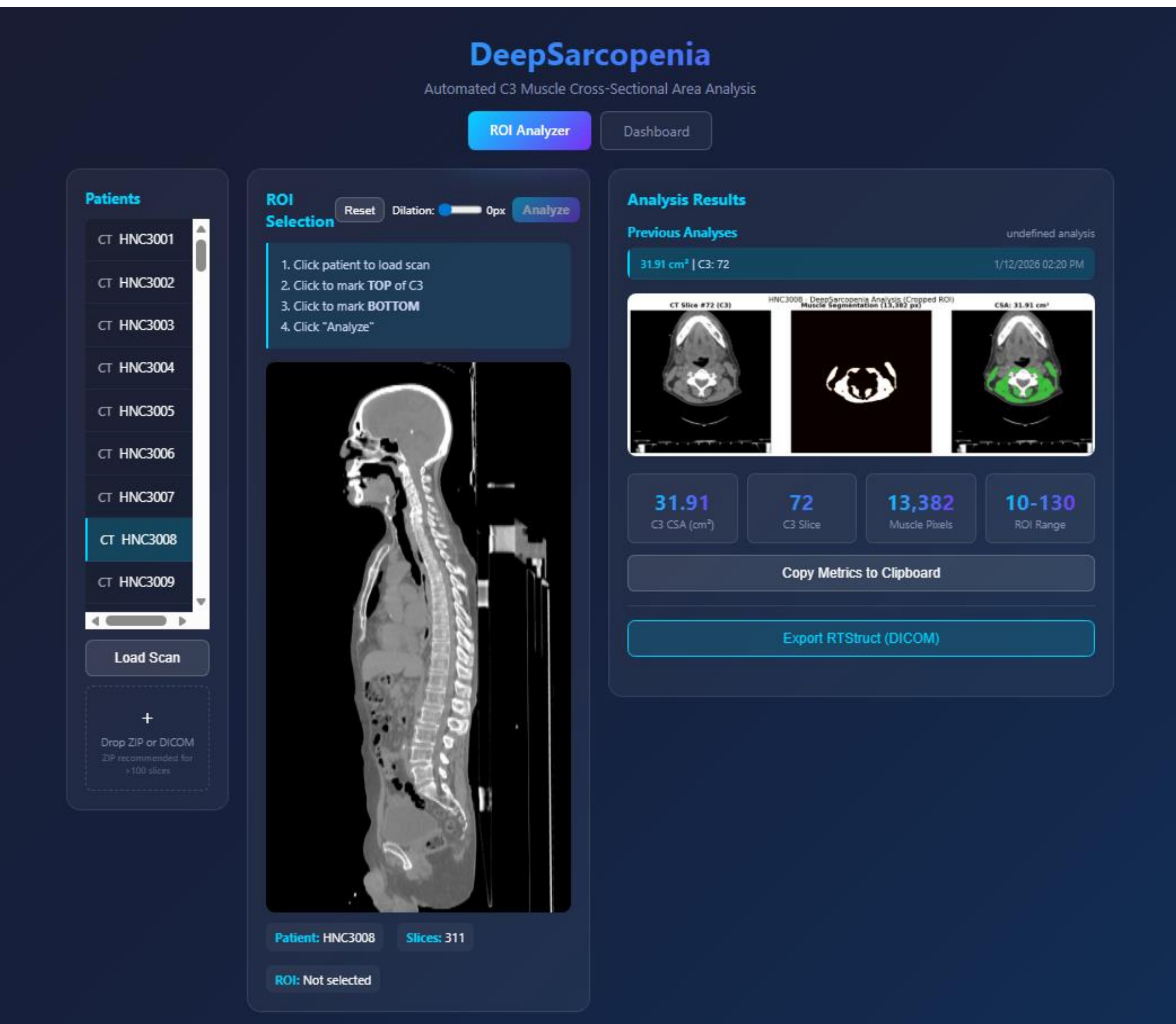
In this preliminary analysis, n=50 patients (mean age: 61) were included, of whom 10 were females, and 35 had received definitive RT. Of those 50 patients, 14 died. Cox regression identified no statistically significant predictors of all-cause mortality, likely attributable to limited statistical power at this stage. However, notable trends emerged. Higher BMI showed a borderline association with improved survival (HR 0.93, 95% CI 0.85-1.01, p=0.07), while lower SMI per 5 units trended toward an increased risk of mortality (HR 1.93, 95% CI 0.76-4.88, p=0.16). Age, disease stage, and tobacco use were not significant predictors in this limited sample. As this is an ongoing study, continued data collection and expansion of the cohort size are anticipated to provide the necessary power to validate these associations in future analyses.

Variable	HR (95%CI)	p
Age per year	1.01 (0.96-1.05)	0.81
BMI per kg/m ²	0.93 (0.85-1.01)	0.07
Sex (females)	1.25 (0.35-4.52)	0.73
Race (Black)	1.55 (0.52-4.65)	0.44
Concurrent chemotherapy (yes)	0.56 (0.19-1.60)	0.28
Disease stage (≥3)	2.03 (0.62-6.67)	0.24
Tobacco use (yes)	0.99 (0.33-3.02)	0.99
History of alcohol abuse	0.77 (0.21-2.77)	0.69
SMI per 5-unit lower	1.93 (0.76-4.88)	0.16

BMI: body mass index; SMI: skeletal muscle index

Methods

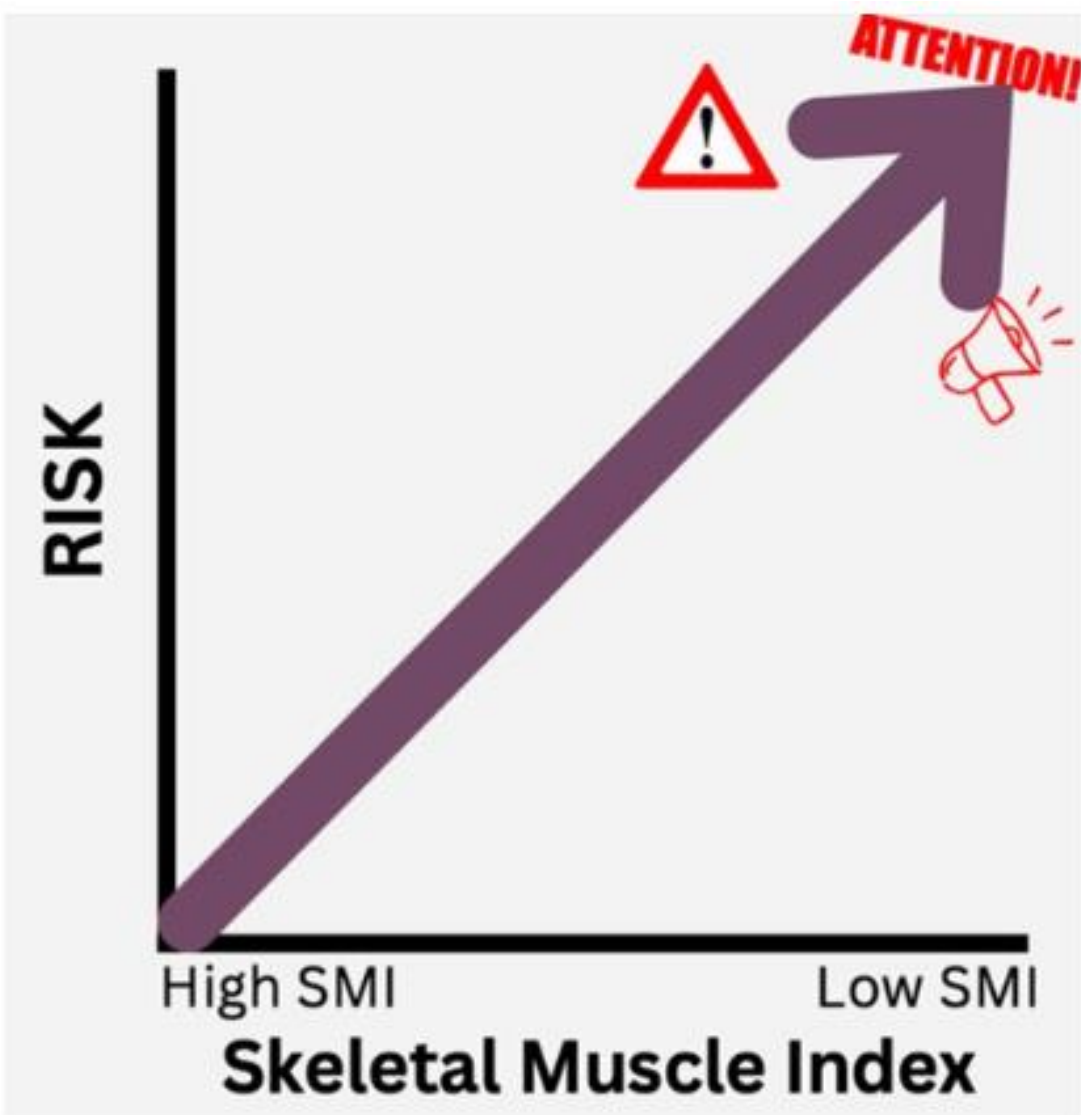
This is an ongoing retrospective study of patients with HNC treated with definitive or adjuvant RT from January 2014 until October 2023. A pretrained deep-learning model² was used to segment and quantify the cross-sectional area (cm²) of the skeletal muscle at the third cervical level (C3), which was then divided by the square of the patient's height in meters to derive the SMI. Demographic-, disease-, and treatment-related variables were extracted from medical records. Univariate Cox regression analyses were performed to assess the associations between baseline characteristics and all-cause mortality.



- Non-exhaustive list of variables assessed :
- Overall Survival
 - Two-year local/regional recurrence
 - Smoking history
 - Alcohol history
 - Age at treatment
 - Use of feeding tube
 - Concurrent chemotherapy
 - Disease staging
 - Disease site
 - Etc.

Discussion

The findings of this study will shed light on the prognostic value of radiographic SMI for clinical outcomes in patients with HNC, which may aid risk stratification while enabling more personalized monitoring strategies and improved adaptive RT workflows.



References

1. Findlay M, White K, Lai M, Luo D, Bauer JD. The association between computed tomography-defined sarcopenia and outcomes in adult patients undergoing radiotherapy of curative intent for head and neck cancer: A systematic review. *J Acad Nutr Diet*. 2020;120(8):1330-1347.e8.
2. Ye Z, Saraf A, Ravipati Y, et al. Development and validation of an automated image-based deep learning platform for sarcopenia assessment in head and neck cancer. *JAMA Netw Open*. 2023;6(8):e2328280. doi:10.1001/jamanetworkopen.2023.28280

Acknowledgements

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