ORIGINAL RESEARCH

Systemic Immune-Inflammation Index and Systemic Inflammation Response Index Predict the Response to Radioiodine Therapy for Differentiated Thyroid Cancer

Yan Wang [1,2], Junshun Chang[1], Ben Hu [3], Suyun Yang[1]

[1]Department of Nuclear Medicine, First Hospital of Shanxi Medical University, Taiyuan, Shanxi, 030001, People's Republic of China; [2]Academy of Medical Sciences, Shanxi Medical University, Taiyuan, Shanxi, 030001, People's Republic of China; [3]The Fifth Clinical Medical School of Anhui Medical University, Hefei, Anhui, People's Republic of China

Correspondence: Ben Hu; Suyun Yang, Email a917744537@163.com; wangyan86@sxmu.edu.cn

Purpose: This research sought to evaluate the clinical value of systemic immune-inflammation index and systemic inflammation response index in predicting the response to radioactive iodine (RAI) therapy in individuals diagnosed with differentiated thyroid cancer.

Patients and Methods: This retrospective study included 406 patients with differentiated thyroid cancer who received initial RAI therapy and follow-up from December 2019 to December 2023. Patients were divided into two groups based on imaging and serum indicators to evaluate the response to radioactive iodine treatment: the ER group (excellent response) and the non-ER group (suboptimal response). Systemic immune-inflammation index and systemic inflammation response index were calculated based on peripheral blood cell counts before treatment. Multivariable logistic regression analysis was used to assess the independent associations of these indices with the therapeutic response to radioiodine treatment. Receiver operating characteristic (ROC) curves were graphed and the area under the curve (AUC) was calculated to evaluate their predictive ability.

Results: Compared to the ER group, patients in the non-ER group had significantly elevated systemic immune-inflammation index and systemic inflammation response index levels ($p < 0.001$). After adjusting for confounding factors, there was a significant association between these indices and the response to radioactive iodine treatment in patients with differentiated thyroid cancer. The optimal cutoff values for predicting the response to RAI treatment were 668.91 for systemic immune-inflammation index (AUC=0.692, sensitivity 58.2%, specificity 73.1%, 95% CI: 0.639–0.745, $p < 0.001$) and 0.47 for systemic inflammation response index (AUC=0.664, sensitivity 85.6%, specificity 42.7%, 95% CI: 0.612–0.717, $p < 0.001$).

Conclusion: Systemic immune-inflammation index and systemic inflammation response index could be valuable for predicting the response to RAI treatment in individuals diagnosed with differentiated thyroid cancer. Further research is needed to explore their practical utility, and these novel inflammation markers could serve as adjunct tools in clinical practice.

Keywords: systemic immune-inflammation index, systemic inflammation response index, differentiated thyroid cancer, radioactive iodine therapy

Introduction

Thyroid cancer is the most common endocrine malignancy, and its incidence has been steadily increasing in recent decades.[1,2] According to the International Agency for Research on Cancer of the World Health Organization, thyroid cancer ranked ninth in global cancer incidence in 2020.[3] Differentiated thyroid cancer (DTC) accounts for over 90% of all types of thyroid cancer, including papillary, follicular, and oncocytic subtypes.[4,5] It is typically an indolent tumor with low mortality and good prognosis.[6] Radioactive iodine (RAI) therapy uses the radioactive isotope iodine-131 and is currently a widely used and effective treatment for DTC postoperatively. According to the treatment objectives, it can be

divided into three levels: remnant ablation, adjuvant therapy, and treatment of known disease.[7,8] In 2015, the American Thyroid Association (ATA) proposed a dynamic response assessment system, emphasizing that the initial response to RAI therapy is crucial for dynamically estimating the risk of recurrence and monitoring the disease outcome in DTC patients.[9] It has been reported that approximately 15–20% of patients still experience recurrence/residual disease or gradually lose response to RAI after initial treatment.[4,10,11] Consequently, these patients with suboptimal treatment response have increased rates of recurrence and disease-specific mortality.[12] Furthermore, the inability to accurately identify populations with unsatisfactory prognosis results in a lack of clinical strategies to balance treatment risks and disease progression risks based on individual patient characteristics. This leads to a significant phenomenon of over-treatment with radioactive iodine in DTC, resulting in wastage of healthcare resources and decreased health-related quality of life for patients.[13–15] Therefore, it is necessary to identify the factors influencing the response to RAI therapy in order to screen patients with suboptimal treatment efficacy early. However, current research on factors related to the response to RAI therapy mainly focuses on physiological factors associated with radioactive iodine avidity and thyroid function indicators. It is crucial to search for and validate additional potential prognostic markers, as it holds significant importance in identifying the clinical characteristics of patients with unsatisfactory treatment response and providing individualized ongoing management plans.

Promoting tumor inflammation and avoiding immune destruction are closely associated with the occurrence, development, and prognosis of cancer.[16] In recent years, inflammatory markers, as biological molecules capable of reflecting the degree of host inflammation and immune function balance, have gained significant attention and have been proven to be prognostic indicators for various types of cancer.[17] Compared to traditional inflammatory markers, inflammatory markers calculated using peripheral whole blood cell counts have the advantages of being easily obtainable and simple and cost-effective. Examples include the systemic immune-inflammation index (SII), systemic inflammation response index (SIRI), platelet-lymphocyte ratio (PLR), and neutrophil-lymphocyte ratio (NLR). Furthermore, a ten-year follow-up study involving 85,154 participants demonstrated that SII and SIRI have superior predictive capabilities for cancer prognosis compared to NLR and PLR.[18]

Given that the interaction between inflammatory factors and immune cells in the tumor microenvironment (TME) is an important factor influencing the prognosis and treatment outcomes of DTC, it is essential to explore the potential value of inflammatory markers in predicting the prognosis of DTC.[19,20] However, research on their association with the prognosis of DTC is limited, and there have been no studies focusing on the predictive value of the novel inflammatory markers SII and SIRI for the response to radioactive iodine therapy in DTC. Therefore, the aim of this study is to analyze the correlation between the SII and SIRI levels before initial iodine therapy in DTC patients and treatment response, as well as to evaluate the predictive value of SII and SIRI for the response to RAI therapy.

Materials and Methods
Study Design and Participants

From December 2019 to December 2023, data was gathered from patients with DTC who received RAI treatment at the First Hospital of Shanxi Medical University in this retrospective study. Inclusion criteria: (1) Age ≥18 years; (2) The surgical procedure of thyroidectomy includes the complete or near-complete removal of the thyroid gland, with or without dissection of neck lymph nodes; (3) First-time RAI treatment; (4) Pre-treatment anti-thyroglobulin antibodies (TgAb) <115 IU/mL and thyroid-stimulating hormone (TSH) >30 uIU/mL. Among these patients, those meeting the following criteria were excluded: (1) Presence of autoimmune diseases; (2) Acute inflammatory diseases; (3) Participants with myeloproliferative and lymphoproliferative disorders; (4) Incomplete baseline data; (5) Participation in drug research institution trials; (6) Lack of follow-up records after RAI treatment or incomplete follow-up data. In the end, a total of 406 patients were included. This study adhered to the principles of the Helsinki Declaration and was approved by the Ethics Committee of the First Hospital of Shanxi Medical University (No. KYLL-2024-110). Given the retrospective nature of the study and the confidential handling of all patient data, the Ethics Committee of the First Hospital of Shanxi Medical University waived the requirement for informed consent. The participant flowchart is shown in Figure 1. This manuscript adheres to the corresponding STROBE checklist (Supplementary Table 1).
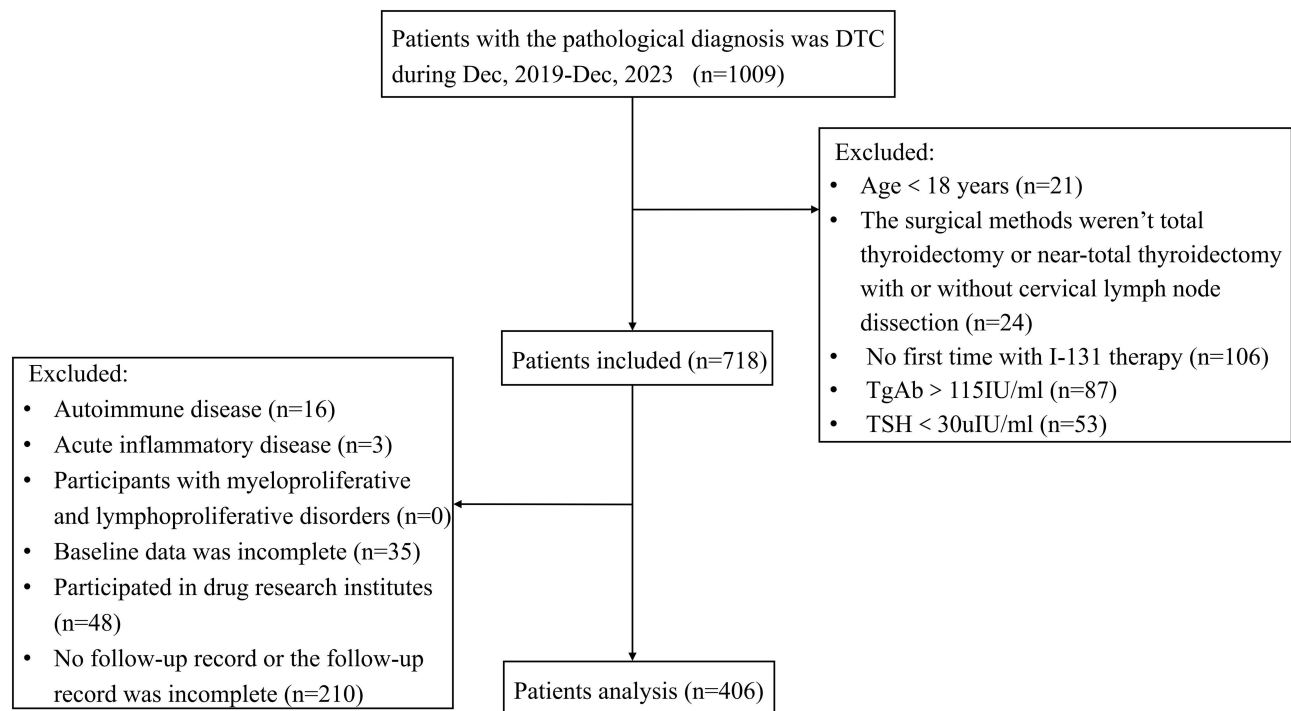
Patients with the pathological diagnosis was DTC during Dec, 2019-Dec, 2023 (n=1009)

Excluded:
- Age < 18 years (n=21)
- The surgical methods weren't total thyroidectomy or near-total thyroidectomy with or without cervical lymph node dissection (n=24)
- No first time with I-131 therapy (n=106)
- TgAb > 115IU/ml (n=87)
- TSH < 30uIU/ml (n=53)

Patients included (n=718)

Excluded:
- Autoimmune disease (n=16)
- Acute inflammatory disease (n=3)
- Participants with myeloproliferative and lymphoproliferative disorders (n=0)
- Baseline data was incomplete (n=35)
- Participated in drug research institutes (n=48)
- No follow-up record or the follow-up record was incomplete (n=210)

Patients analysis (n=406)

Figure 1 The participant flowchart.

Radioactive Iodine Therapy

Patients were instructed to adhere to a low-iodine dietary regimen for a period ranging from 2 to 4 weeks prior to the commencement of treatment, and to cease the intake of levothyroxine for a duration of 3 to 4 weeks as per physician's instructions. On the day of admission, blood biochemistry tests and thyroid-related imaging studies were performed to comprehensively assess their baseline condition. The I-131 dose ranges from 1.11–5.55GBq (30–150mCi) or higher. All patients underwent a post-therapeutic I-131 whole-body scan (Rx-WBS) 2 to 7 days following the treatment. Subsequently, patients underwent regular follow-up visits to monitor changes in thyroid function indicators after I-131 therapy, adjust thyroid hormone doses, and maintain serum TSH levels within a reasonable suppression range in a timely manner.

Response Assessment

According to the 2015 ATA guidelines, the response to RAI therapy is assessed within 6–12 months post-RAI treatment based on both serological and imaging results.[9] Serological results include changes and trends in thyroglobulin (Tg) and TgAb levels, while imaging results include neck ultrasound, diagnostic I-131 whole-body scan (Dx-WBS), CT, magnetic resonance imaging (MRI), whole-body bone scan, PET/CT, etc. According to the guidelines,[9] patient treatment responses are classified as excellent response (ER), biochemical incomplete response (BIR), structural incomplete response (SIR), and indeterminate response (IDR). This process was independently carried out by two experienced nuclear medicine physicians, and the results were finally compiled and unified. In this study, we further transformed the four-category outcome into a two-category outcome: ER and non-ER (BIR+SIR+IDR).

Peripheral Blood Parameters

To ensure the sensitivity and accuracy of the test results, elbow venous blood samples were collected from each patient on the treatment day in the morning on an empty stomach. The collected blood parameters included platelet count, neutrophil count, lymphocyte count, and monocyte count. The formula for calculating SII is platelet count multiplied by

neutrophil count divided by lymphocyte count, and the formula for calculating SIRI is neutrophil count multiplied by monocyte count divided by lymphocyte count.

Data Collection

Data collection was based on biological considerations and published literature,[21–23] including age, gender, body mass index (BMI), smoking history, alcohol history, hypertension history, cardiovascular disease (CVD) history, diabetes history, time interval between thyroid surgery and RAI treatment, I-131 dose, tumor location, maximum tumor diameter, extrathyroidal extension, multifocality, number of lymph node metastases, location of lymph node metastases, pre-treatment stimulated thyroglobulin (presTg), and Rx-WBS results. According to the 8th edition of the American Joint Committee on Cancer (AJCC) guidelines and the 2015 ATA guidelines,[9,24] patients were classified based on TNM staging, AJCC staging, and ATA risk stratification for recurrence. The results of data organization were carefully examined by two clinical doctors and, if there were any doubts, evaluated in detail by a nuclear medicine specialist.

Statistical Analysis

Analysis was performed using EmpowerStats (www.empowerstats.com) and R software version 4.3.2 (http://www.R-project.org). Continuous variables following a normal distribution were presented as mean (standard deviation) and compared using t-tests. For data that do not conform to a normal distribution, descriptions were provided using median and interquartile range, and comparisons were conducted using the Mann–Whitney test. Categorical variables were presented as frequencies and percentages, and compared using the chi-square test or Fisher's exact test. The SII and SIRI were categorized into tertiles, and the association of SII and SIRI with the response to RAI treatment was analyzed using multivariate logistic regression. The regression models (Model 1 to Model 2) were tested by adjusting for potential confounding factors. Model 1 was adjusted for age, gender, and body mass index, while Model 2 was fully adjusted for a set of variables including age, gender, body mass index, smoking history, alcohol history, hypertension history, cardiovascular disease (CVD) history, diabetes history, time interval between thyroid surgery and RAI treatment, I-131 dose, tumor location, maximum tumor diameter, extrathyroidal extension, multifocality, number and location of lymph node metastases, presTg levels, Rx-WBS results, TNM staging, AJCC staging, and ATA risk stratification for recurrence. Variables with a variance inflation factor (VIF) >5 were removed from the model to prevent multicollinearity, and the results were reported in terms of odds ratios (OR) along with corresponding 95% confidence intervals (CI). Receiver operating characteristic (ROC) curves were plotted, and Bootstrap resampling (500 iterations) was used to calculate the area under the curve (AUC) with a 95% CI to analyze the predictive value of SII and SIRI for the response to RAI treatment. The maximum value of the Youden index was used to determine the sensitivity and specificity of the predictive factors. P-value <0.05 was considered statistically significant.

Results
Clinical Characteristics

A comparison was made between 146 patients in the non-ER group and 260 patients in the ER group. Table 1 presents the differences in baseline data between the two groups of patients. Compared to the ER group, the non-ER group showed statistically significant differences in terms of gender, extrathyroidal extension, number and location of lymph node metastases, AJCC stage, ATA risk stratification, RAI dose, Rx-WBS results, tumor size, presTg levels, neutrophils, lymphocytes, SII, and SIRI. The SII and SIRI values in the non-ER group were significantly elevated (Figure 2). However, no significant differences were observed between the two groups in terms of platelet count and monocyte count (p>0.05).

Association of SII and SIRI with RAI Treatment Response

In the unadjusted model, compared to the SII Q1 group as the reference, the risk of suboptimal response to radioactive iodine treatment was nearly 1.52 times higher in the Q2 group (OR=2.52; 95% CI: 1.42–4.46; p=0.002) and 5.36 times higher in the Q3 group (OR=6.36; 95% CI: 3.62–11.15; p<0.001); compared to the SIRI Q1 group, the risk of poor

Table 1 Comparison of Baseline Data Between the ER and Non-ER Groups

Variables	Non-ER	ER	P-value
N	146	260	
Age (years)	43.80±10.26	43.17±12.98	0.270
BMI (kg/m^2)	24.87±4.33	24.59±3.60	0.372
Sex n (%)			0.009
Male	57(39.04%)	69 (26.54%)	
Female	89(60.96%)	191 (73.46%)	
Cancer position n (%)			0.445
Unilateral	81 (55.48%)	134 (51.54%)	
Bilateral	65 (38.62%)	126 (48.46%)	
Extrathyroidal extension n (%)			0.007
No	72 (49.32%)	164 (63.08%)	
Yes	74 (50.68%)	96 (36.92%)	
Multifocal cancer n (%)			0.929
No	63 (43.15%)	111 (42.69%)	
Yes	83 (56.85%)	149 (57.31%)	
Number of lymph node metastasis n (%)			0.002
0	7 (4.79%)	34 (13.08%)	
≤5	51 (34.93%)	110 (42.31%)	
>5	88 (60.27%)	116 (44.62%)	
Lymph node metastasis n (%)			0.010
N0	7 (4.79%)	34 (13.08%)	
N1a	123 (84.25%)	210 (80.77%)	
N1b	16 (10.96%)	16 (6.15%)	
AJCC n (%)			<0.001
I	107 (73.29%)	225 (86.54%)	
II	31 (21.23%)	30 (11.54%)	
III	2 (1.37%)	5 (1.92%)	
IV	6 (4.11%)	0 (0.00%)	
Recurrence risk n (%)			<0.001
Low risk	0 (0.00%)	5 (1.92%)	
Medium risk	108 (73.97%)	243 (93.46%)	
High risk	38 (26.03%)	12 (4.62%)	
I-131 dose n (%)			<0.001
<100	1 (0.68%)	1 (0.38%)	
100–150	95 (65.07%)	248 (95.38%)	
≥150	50 (34.25%)	11 (4.23%)	
Rx-WBS results n (%)			<0.001
Thyroid region	108 (73.97%)	231 (88.85%)	
Lymph node region	27 (18.49%)	29 (11.15%)	
Distant metastasis	11 (7.53%)	0 (0.00%)	
Time interval n (%)			0.091
Early	103 (70.55%)	203 (78.08%)	
Late	43 (29.45%)	57 (21.92%)	
Hypertension n (%)	25 (17.12%)	36 (13.85%)	0.375
Diabetes n (%)	8 (5.48%)	20 (7.69%)	0.398
CVD n (%)	3 (2.05%)	5 (1.92%)	0.927
Maximum tumor diameter (cm)	1.70±1.09	1.31±0.84	<0.001
PresTg (ng/mL)	89.40±203.98	3.13±4.95	<0.001
PLT (*10^9/L)	272.47±83.92	269.10±64.42	0.651

(Continued)

Table 1 (Continued).

Variables	Non-ER	ER	P-value
Neutrophils (*10⁹/L)	4.61±1.27	3.77±1.24	<0.001
Lymphocytes (*10⁹/L)	1.66±0.40	1.83±0.50	<0.001
Monocytes (*10⁹/L)	0.28±0.09	0.28±0.10	0.340
SII	788.37±345.17	615.12±393.24	<0.001
SIRI	0.80 ±0.35	0.63±0.40	<0.001

Notes: For continuous variables, mean ± SD or median (interquartile range). For categorical variables, frequencies (percentages).
Abbreviations: PTC, papillary thyroid carcinoma; BMI, body mass index; AJCC, the 8th edition staging system for differentiated thyroid cancer; RAI, radioactive iodine; Rx-WBS, Post-therapy whole-body scanning; CVD, cardiovascular disease; PresTg, pre-treatment stimulated thyroglobulin; PLT, platelet count; SII, systemic immune-inflammation index; SIRI, systemic inflammation response index.

response to radioactive iodine treatment was nearly 3.01 times higher in the Q2 group (OR=4.01; 95% CI: 2.29–7.04; p<0.001) and 3.08 times higher in the Q3 group (OR=4.08; 95% CI: 2.33–7.15; p<0.001). In models 1 and 2, after adjusting for potential confounding factors, the association between SII, SIRI, and the response to radioactive iodine treatment remained significant, as shown in Table 2.

Predictive Value of SII and SIRI for RAI Treatment Response

For predicting the response to initial RAI treatment, the ROC curve results (Figure 3 and Table 3) showed that the AUC for SII was 0.692 (95% CI: 0.639–0.745, P < 0.001), with a sensitivity of 58.2% and specificity of 73.1%, and the optimal cutoff value was 668.91. The AUC for SIRI was 0.664 (95% CI: 0.612–0.717, P < 0.001), with a sensitivity of 85.6% and specificity of 42.7%, and the optimal cutoff value was 0.47.
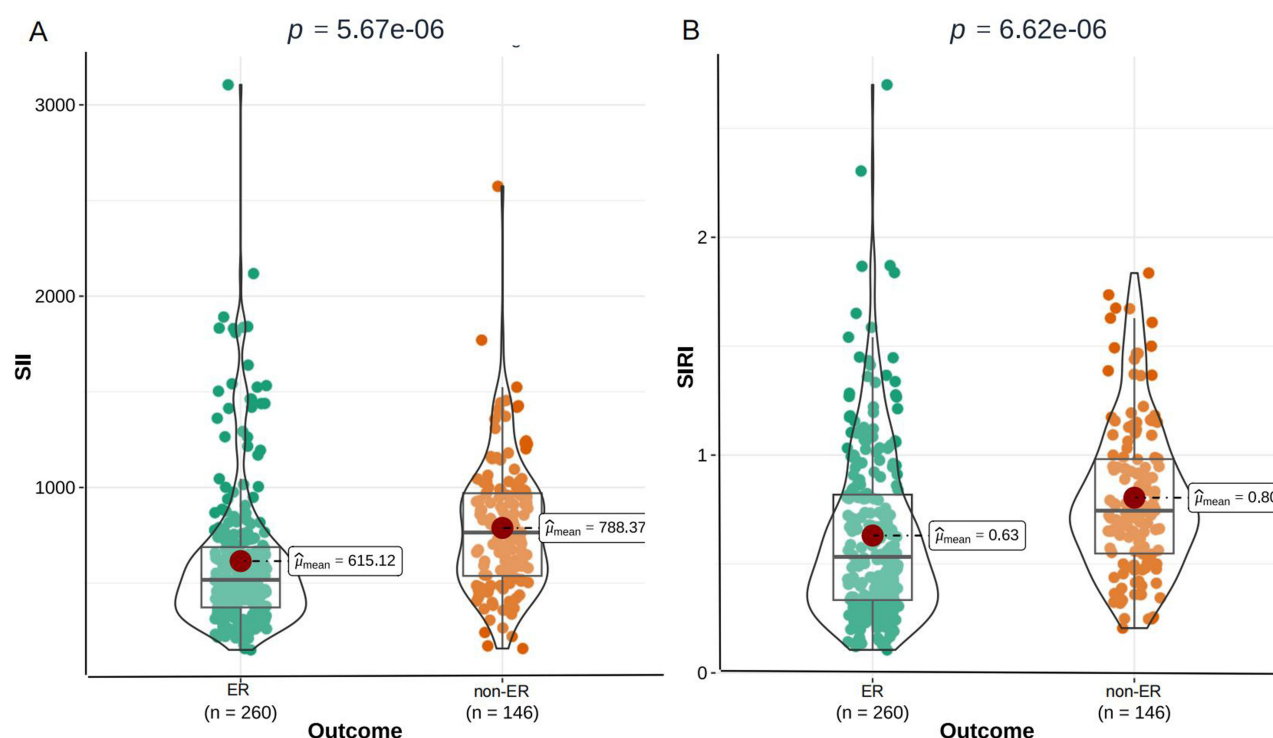

Figure 2 Violin plots of SII (**A**) and SIRI (**B**) in the ER and non-ER groups.

Table 2 Association of SII, SIRI and RAI Treatment Response

Exposure	Non-Adjusted Model	Model 1	Model 2
	OR (95% CI) P-value	OR (95% CI) P-value	OR (95% CI) P-value
SII tertiles			
Q1	Reference	Reference	Reference
Q2	2.52 (1.42,4.46) 0.002	2.55 (1.42,4.57) 0.002	2.47 (1.26,4.82) 0.008
Q3	6.36 (3.62,11.15) < 0.001	7.49 (4.16,13.48) < 0.001	6.94 (3.55,13.56) < 0.001
SIRI tertiles			
Q1	Reference	Reference	Reference
Q2	4.01 (2.29,7.04) < 0.001	3.85 (2.19,6.80) < 0.001	3.98 (2.09,7.58) < 0.001
Q3	4.08 (2.33,7.15) < 0.001	3.94 (2.24,6.95) < 0.001	2.60 (1.34,5.03) 0.005

Notes: Model 1 was adjusted for age, gender, and body mass index, while Model 2 was fully adjusted for a set of variables including age, gender, body mass index, smoking history, alcohol history, hypertension history, cardiovascular disease (CVD) history, diabetes history, time interval between thyroid surgery and RAI treatment, I-131 dose, tumor location, maximum tumor diameter, extrathyroidal extension, multifocality, number and location of lymph node metastases, presTg levels, Rx-WBS results, TNM staging, AJCC staging, and ATA risk stratification for recurrence. Variables with a variance inflation factor (VIF) >5 were removed from the model to prevent multi-collinearity, and the results were reported in terms of odds ratios (OR) along with corresponding 95% confidence intervals (CI).
Abbreviations: SII, systemic immune-inflammation index; SIRI, systemic inflammation response index.

Discussion

This study analyzed the role of SII and SIRI in predicting the response to initial RAI treatment in patients with DTC. The results of the study showed that compared to the ER group, the SII and SIRI values were significantly elevated in the non-ER group (p < 0.001). After adjusting for covariates, the association between SII, SIRI, and the response to RAI treatment remained significant. ROC curve analysis revealed that the AUC for SII was 0.692 (95% CI: 0.639–0.745, P < 0.001) with an optimal cutoff value of 668.91; the AUC for SIRI was 0.664 (95% CI: 0.612–0.717, P < 0.001) with an optimal cutoff value of 0.47. Compared to SIRI, SII is more effective in identifying patients who may have an adverse
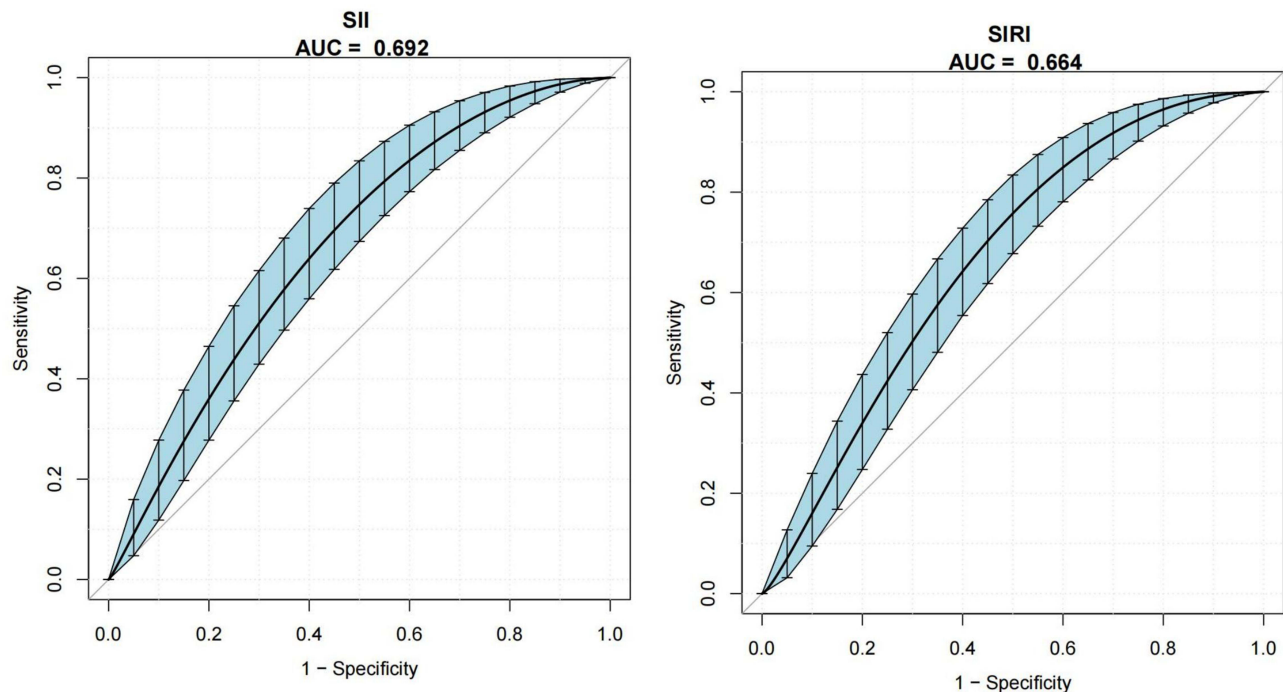

Figure 3 Receiver Operating Characteristic (ROC) Curves for SII and SIRI.

Table 3 ROC Analysis Showed the Value of SII and SIRI in Predicting the Response to Radioactive Iodine Therapy

Variable	AUC	p-value	95% CI		Cut-off Value	Sensitivity	Specificity
			Lower	Upper			
SII	0.692	P < 0.001	0.639	0.745	668.91	58.2%	73.1%
SIRI	0.664	P < 0.001	0.612	0.717	0.47	85.6%	42.7%

Abbreviations: SII, systemic immune-inflammation index; SIRI, systemic inflammation response index.

prognosis. The above results indicate that high levels of SII and SIRI indicate immune-inflammatory stimulation in patients with DTC, suggesting that before the initial iodine treatment, we should pay close attention to improving the tumor microenvironment of DTC patients.

As research in the field of cancer treatment advances, scholars increasingly recognize the ongoing, dynamic interaction between the tumor microenvironment and the biological behavior of cancer cells, as well as their response to treatment methods. An increasing number of studies suggest that immune-inflammatory cells in the tumor micro-environment can influence the functionality of DTC cells and the effectiveness of RAI treatment.[4,25] The involved mechanism may be that activated immune cells in the TME stimulate tumor cells and stromal cells to release pro-inflammatory chemokines, activating the inflammatory pathways to promote the activation of cancer-associated fibroblasts (CAFs), leading to the deposition and remodeling of the extracellular matrix (ECM). At the same time, the secretion of factors such as interleukin-6 (IL-6), interleukin-1 beta (IL-1β), vascular endothelial growth factor (VEGF), colony-stimulating factor 1 (CSF-1), C-C motif chemokine ligand 2 (CCL2), etc., promotes the accumulation of regulatory T cells (Tregs) and immune suppression, thereby driving increased resistance to RAI.[20,26–28] Given the complexity of the response process to RAI therapy, further in-depth research is still needed to elucidate the specific mechanisms by which immune-inflammatory cells participate in the response to RAI treatment. This will provide new therapeutic insights for patients with unsatisfactory response to RAI therapy.

SII and SIRI, as two novel inflammation markers composed of three subtypes of platelets and leukocytes, do not solely rely on changes in a single cell type. They can more comprehensively reflect the balance of host inflammation and immune status.[29] Italian scholars compared the SII values of 93 DTC patients with those of 33 healthy individuals and found that the SII of DTC patients was higher compared to the healthy population (p=0.000).[30] Zhao et al analyzed the clinical data of 702 papillary thyroid carcinoma (PTC) patients and found that SII is an independent predictor of lateral lymph node metastasis in PTC.[31] In Pang et al's study, machine learning models were used to complement the predictive role of SIRI for central lymph node metastasis in PTC.[32] The above studies have different limitations, including small sample sizes, the clinical applicability of predictive models needing further investigation, and only investigating the relationship between SII, SIRI, and the prognosis of DTC surgical treatment. As is well known, prognostic studies of DTC involve three stages: surgical treatment, RAI treatment, and TSH suppression therapy.[9] In addition, existing studies have shown that presTg levels, TSH levels and intestinal microbiota have predictive value for the prognosis of RAI treatment.[33–35] However, there is currently no literature evaluating the predictive efficacy of RAI treatment response using convenient peripheral blood parameters. Therefore, compared to other studies, this research reveals the roles of SII and SIRI in predicting the prognosis of initial RAI treatment, providing a valuable complement to current research on DTC and inflammatory markers. Moreover, our study identified the potential of SII and SIRI in early identification of unsatisfactory RAI treatment response. As cost-effective and convenient inflammatory markers, they possess certain clinical utility.

Furthermore, we observed gender differences in the response of DTC patients to RAI treatment. Despite the higher incidence of DTC in female patients,[36] they exhibit a more favorable response to RAI treatment, consistent with previous research findings.[37] A large multicenter retrospective cohort study in Korea revealed that female gender was a significant predictor of ER (p<0.001).[22] Unfortunately, the specific mechanisms underlying gender differences have not been clarified. Future studies could be designed to investigate through which pathways gender differences specifically influence the response to RAI treatment. Additionally, studies have reported that butyrylcholinesterase (BChE) may serve as a potential biomarker for thyroid cancer,[38] and its role in immune regulation and inflammatory response has been

well-established.[39–41] Therefore, investigating the relationship between BChE levels and the response to RAI therapy may represent an intriguing direction for future research.

Our work still has some limitations. Firstly, this study only included baseline values of SII and SIRI, their dynamic changes may provide better prognostic value. Secondly, although patients with diseases that could affect peripheral blood inflammatory indices were excluded, peripheral blood parameters may still be influenced by other factors, leading to some variability and instability. Therefore, forthcoming investigations should prioritize the implementation of multicenter, large-sample, prospective cohort studies or randomized controlled trials to enhance the completeness, accuracy, reliability, and generalizability of the data. Finally, it is important to note that cytological examination can reveal pathological features of immune-inflammatory responses. Future research could explore whether thyroid cytological assessments, such as the Bethesda classification system, provide additional insights into predicting patient response to RAI therapy.

Conclusion

The results of this study suggest that SII and SIRI could be valuable for predicting the response to RAI therapy in individuals diagnosed with differentiated thyroid cancer. They may serve as auxiliary tools for monitoring the patient's status. In clinical practice, promptly monitor patients displaying abnormal inflammatory markers and implement targeted measures. Compared to SIRI, SII may be more effective in identifying patients who may have an unfavorable prognosis. Further research is needed to assess their clinical utility.

Data Sharing Statement

The datasets generated and/or analyzed during the study are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

This study adhered to the principles of the Helsinki Declaration and was approved by the Ethics Committee of the First Hospital of Shanxi Medical University (No. KYLL-2024-110). Given the retrospective nature of the study and the confidential handling of all patient data, the Ethics Committee of the First Hospital of Shanxi Medical University waived the requirement for informed consent.

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Disclosure

Yan Wang is the first author. The authors declare that they have no financial or conflicts of interest.

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