Research Square

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Establishing a Generalizable Early Improvement Cutoff in Psoriasis Area and Severity Index for Outcome Prediction Across Systemic Treatments

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Research Article

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Abstract

Background

Early identification of treatment response is clinically important in psoriasis management, as it may facilitate timely treatment modification and reduce exposure to ineffective therapies. Although early improvement in the Psoriasis Area and Severity Index (PASI) has been associated with long term outcomes for individual therapies, a broadly applicable early PASI threshold across different treatment modalities in real-world practice remains unclear.

Objectives

To evaluate the predictive value of early PASI improvement for subsequent PASI90 achievement across multiple psoriasis treatment modalities and to identify a clinically meaningful early PASI response threshold applicable in routine clinical practice.

Methods

This prospective, multicenter real-world cohort study included adult patients with moderate-to-severe plaque psoriasis receiving methotrexate, phototherapy, IL-17 inhibitors, or IL-23 inhibitors. Receiver operating characteristic (ROC) curve analyses were used to evaluate the predictive performance of week-4 PASI improvement for achieving PASI90 at 3 months and 6 months. The optimal early response threshold was identified using the Youden Index. Multivariable logistic regression analyses were conducted to assess the independent association between early PASI response and subsequent PASI90 achievement.

Results

A total of 2,023 patients were included in the analysis. The optimal week-4 PASI improvement threshold for predicting PASI90 at 3 months was 62% for IL-17 inhibitors, 62% for IL-23 inhibitors, 59% for methotrexate and 61% for phototherapy. Multivariable logistic regression analyses further demonstrated that a PASI improvement of approximately 60% at week 4 was independently associated with a higher likelihood of achieving PASI90 at 3 months.

Conclusions

Achieving PASI60 at week 4 serves as a consistent and broadly applicable early indicator of subsequent PASI90 response across multiple psoriasis treatment modalities. Incorporating this threshold into early treatment assessment may help inform individualized treatment decisions and optimize outcomes in real-world management of moderate-to-severe psoriasis.

1. Introduction

Psoriasis is a chronic immune-mediated disease that requires long-term treatment with substantial variability in therapeutic response between individuals[1,2]. Early identification of treatment response plays a critical clinical role by reducing exposure to ineffective therapies and facilitating prompt modification of treatment adjustment[3]. Multiple studies have indicated that early improvements in psoriasis area and severity index (PASI) under traditional therapies[4,5]or individual biologics[6,7]are associated with improved long-term clinical outcomes in psoriasis patients. However, most of the available evidence is restricted to single drugs or selected trial populations and there is still no widely accepted early PASI threshold applicable across different treatment modalities in routine clinical settings.

In clinical trials evaluating biologic therapies for psoriasis, PASI 90 is widely regarded as an important treatment target as patients who achieve PASI 90 experience substantially greater improvements in health-related quality of life (HRQoL) and lower risk of comorbidities compared with those achieving PASI75[8,9]. Therefore, using PASI90 as the long-term outcome allows a more accurate indicator in real-world practice. Meanwhile, identifying an early and broadly applicable PASI threshold that can reliably predict the achievement of PASI 90 has important clinical implications. Week 4 has been suggested as an appropriate early assessment point, as prior evidence shows PASI improvements at this stage demonstrate initial therapeutic responsiveness and provide clinical guidance for timely treatment decisions[10–12].

Consequently, based on a real-world cohort including methotrexate, phototherapy, IL-17 inhibitors, and IL-23 inhibitors, this study systematically evaluates week 4 PASI response thresholds as predictors of achieving PASI90. Such a tool could facilitate more individualized treatment decisions across systemic therapies, phototherapy, and biologic agents, enabling dermatologists to optimize therapy selection, reduce ineffective treatment exposure, and ultimately improve patient outcomes.

2. Methods

Study Design and Setting

This study analyzed data collected adult patients with moderate-to-severe plaque psoriasis enrolled in the Shanghai Psoriasis Effectiveness Evaluation CoHort (SPEECH). SPEECH is a real-world, prospective, multicenter observational registry designed to evaluate psoriasis treatment patterns and effectiveness of systemic therapies in routine clinical practice. A total of 2,470 patients were enrolled from November 2022 to June 2023 across seven dermatology centers in Shanghai, China. This cohort has been registered at www.chictr.org.cn with registration number ChiCTR2000036186. Ethical approval for the use of clinical data was granted by the Ethics Committee of the Shanghai Skin Disease Hospital (approval No. 2020-36). All participants provided informed consent for study participation and use of their clinical data.

Adult patients (≥ 18 years) with dermatologist-confirmed moderate-to-severe plaque psoriasis were eligible if they provided written informed consent and completed scheduled clinical assessments.

Key exclusion criteria were: individuals presenting with uncontrolled malignancies, active infections, concomitant autoimmune disorders, or conditions potentially affecting treatment evaluation or protocol adherence; current pregnancy or breastfeeding and the absence of baseline data and follow-up information.

Patients received systemic modalities, phototherapy or biologic agents according to clinical judgment and individualized management plans. Clinical evaluations were performed at baseline and during follow-up at 1 month, 3 months and 6 months. All patients provided written informed consent for the research use of their clinical data.

Treatment and Clinical Data Collection

After exclusion of patients with incomplete PASI assessments or loss to follow-up, patients were categorized into four treatment-based subcohort according to the initial systemic therapy received: methotrexate, phototherapy, IL-17 inhibitors (ixekizumab or secukinumab), and IL-23 inhibitors (guselkumab or ustekinumab).

Patients received methotrexate, phototherapy, or biologic therapies according to standard clinical practice and approved dosing recommendations. Clinical data were collected using a standardized protocol to minimize bias. The following baseline demographic and disease-related data were collected: Age (years), Sex, Bodyweight (kg), Height (cm), Lifestyles factors (smoking and alcohol use, educational level), Duration of psoriasis (year), Age at onset of psoriasis (year), Early-onset psoriasis, Family history, Allergy history, History of comorbidities (hypertension, hyperlipidemia, diabetes mellitus, obesity), Prior treatment history (systemic non-biologic treatments, phototherapy, biologic agents), Special areas involvement (joints, nails, scalp, palmoplantar area and genital area), Baseline PASI score, Baseline body surface area (BSA) score and Baseline

dermatology quality of life index (DLQI) score. All clinical evaluations were performed by trained dermatologists following standardized assessment procedures.

Statistical Analysis

Descriptive statistics

Baseline demographic and clinical characteristics were summarized using appropriate descriptive statistics. Continuous variables were summarized using mean with standard deviation or median with interquartile range, depending on data distribution. Categorical variables were described as frequencies and percentages. As the primary objective of this study was to evaluate early PASI thresholds for predicting long-term outcome rather than to perform between-group comparisons, no hypothesis-driven statistical testing was applied to baseline variables.

ROC curve analysis

Week 4 PASI improvement and the achievement of PASI 90 were selected as the early predictor and long-term outcome, respectively, based on evidence supporting their value in assessing therapeutic response. Receiver operating characteristic (ROC) analysis was conducted to evaluate the discriminatory ability of week 4 PASI improvement in predicting the achievement of PASI 90 at 3 months and 6 months. Separate ROC curves were generated for each endpoint, and the corresponding areas under the curve (AUCs) with 95% confidence intervals were calculated as measures of predictive performance. The two AUCs were subsequently compared to determine whether early PASI response provides stronger predictive value for longer-term treatment outcomes.

Youden Index analysis

For the ROC curve with the larger AUC, sensitivity and specificity were subsequently calculated at each percentage of week 4 PASI improvement. The Youden Index (YI) was calculated to identify the threshold of PASI percentage improvement with the highest predictive value, which is defined as $YI(a) = sensitivity(a) + specificity(a) - 1$.

Early PASI response–stratified analysis

To facilitate clinical interpretation of early treatment response, patients were stratified into two subgroups according to whether they achieved the week-4 PASI improvement threshold identified by the Youden Index. For each treatment category (IL-17 inhibitors, IL-23 inhibitors, methotrexate, and phototherapy), the proportions of patients achieving PASI90 at 3 months were calculated within each treatment-specific cohort, including the overall population as well as the two week-4 PASI-defined subgroups. Response rates were expressed as percentages and graphically presented using bar charts to illustrate the association between early clinical response and subsequent treatment outcomes.

Logistic regression

Multivariable logistic regression analyses were performed to evaluate the association between early treatment response and subsequent achievement of PASI90 at 3 months. The dependent variable was achievement of PASI90 at 3 months (yes/no), and the primary independent variable was the achievement of week-4 PASI improvement threshold identified by the Youden Index. Separate hierarchical models were fitted within each treatment-specific cohort. Model 1 included no covariate adjustment. Model 2 was adjusted for demographic and lifestyle factors, including age, sex, BMI, educational level, smoking status, and alcohol consumption. Model 3 was further adjusted for disease-related characteristics, including age at disease onset, hypertension, hyperlipidaemia, arthritis, previous use of biological agents, baseline DLQI score, and baseline PASI score. Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs), whereas a two-sided P value < 0.05 was considered statistically significant.

Software

All statistical analyses were conducted using R software (version 3.6.1) with the packages *pROC*, *ggplot2*, *dplyr*, and *stats*. A two-sided P value < 0.05 was considered statistically significant.

3. Result

3.1 Baseline characteristics

A total of 2,470 patients with plaque psoriasis were initially recruited from the SPEECH cohort (Fig. 1). After exclusion of 237 patients with missing baseline data and 210 patients with insufficient follow-up, 2,023 patients were included in the final analysis (Table 1).

Table 1
Baseline patients and clinical characteristics of the treatment with IL-17 inhibitors, IL-23 inhibitors, methotrexate, and phototherapy.

Characteristics	IL17	IL23	Methotrexate	Phototherapy
	(n = 636)	(n = 312)	(n = 588)	(N = 487)
Mean age, y	47 ± 15	50 ± 16	52 ± 15	49 ± 16
Female, n (%)	157 (24.7%)	68 (21.9%)	153 (26.1%)	170 (34.9%)
Duration of psoriasis, y	15 ± 11	14 ± 13	15 ± 13	13 ± 12
Weight, y	74 ± 16	74 ± 14	71 ± 13	71 ± 14
Height, y	171 ± 8	171 ± 8	169 ± 8	169 ± 8
BMI, kg/m^2	25.3 ± 4.4	25.3 ± 4.1	24.8 ± 3.8	24.6 ± 3.9
Smoking, n (%)				
Never	378 (67.0%)	159 (57.4%)	304 (56.8%)	282 (61.4%)
Former	38 (6.7%)	24 (8.7%)	74 (13.8%)	41 (8.9%)
Current	148 (26.2%)	94 (33.9%)	157 (29.3%)	136 (29.6%)
Alcohol, n (%)				
Never	497 (84.4%)	215 (76.8%)	409 (76.0%)	341 (75.6%)
Former	36 (6.1%)	23 (8.2%)	64 (11.9%)	46 (10.2%)
Current	56 (9.5%)	42 (15.0%)	65 (12.1%)	64 (14.2%)
Education level, n (%)				
High school graduate or less	214 (35.7%)	124 (41.5%)	339 (61.4%)	235 (50.1%)
Some college	160 (26.7%)	72 (24.1%)	105 (19.0%)	100 (21.3%)
College graduate or higher	226 (37.7%)	103 (34.4%)	108 (19.6%)	134 (28.6%)
History of allergy, n (%)	66 (10.5%)	43 (14.0%)	63 (10.9%)	68 (14.0%)
Family history of psoriasis, n (%)	149 (23.8%)	61 (20.0%)	131 (22.8%)	104 (21.4%)
Age of onset, y	31 ± 15	35 ± 17	38 ± 16	35 ± 17
Early onset of psoriasis, n (%)	415 (71.7%)	173 (63.6%)	332 (58.2%)	288 (63.3%)
Prior treatment				
Phototherapy, n (%)	294 (46.9%)	136 (44.7%)	203 (35.4%)	196 (40.5%)
Acitretin, n (%)	232 (37.0%)	101 (33.3%)	162 (28.1%)	87 (17.9%)
Methotrexate, n (%)	115 (18.3%)	51 (16.8%)	73 (12.7%)	20 (4.1%)
Biological agents, n (%)	85 (13.6%)	60 (19.7%)	23 (4.0%)	8 (1.7%)
Obesity, n (%)	127 (20.3%)	63 (20.6%)	105 (18.1%)	74 (15.4%)
Hypertension, n (%)	146 (23.0%)	100 (32.1%)	160 (27.2%)	119 (24.4%)

Abbreviations: BMI, body mass index; PASI, Psoriasis Area and Severity Index; BSA, body surface area; DLQI, Dermatology Life Quality Index.

Characteristics	IL17	IL23	Methotrexate	Phototherapy
	(n = 636)	(n = 312)	(n = 588)	(N = 487)
Hyperlipidemia, n (%)	64 (10.1%)	33 (10.6%)	76 (12.9%)	43 (8.8%)
Non-alcoholic fatty liver disease, n (%)	66 (10.4%)	37 (11.9%)	74 (12.6%)	66 (13.6%)
Arthritis, n (%)	93 (14.6%)	42 (13.5%)	115 (19.6%)	31 (6.4%)
Baseline PASI score	16 ± 9	15 ± 7	14 ± 8	10 ± 5
Baseline BSA score	24 ± 18	21 ± 16	20 ± 16	14 ± 10
Baseline DLQI score	11 ± 7	10 ± 6	9 ± 6	8 ± 6
Abbreviations: BMI, body mass index; PASI, Psoriasis Area and Severity Index; BSA, body surface area; DLQI, Dermatology Life Quality Index.				

Baseline demographic and clinical characteristics are summarized in Table 1. Patients were predominantly male, with a mean age ranging from 47 to 52 years and a mean disease duration of approximately 13–15 years. At treatment initiation, patients receiving IL-17 and IL-23 inhibitors generally presented with a higher baseline disease burden, as reflected by PASI scores.

Obesity and metabolic comorbidities were frequently observed across all treatment categories. Patients receiving biologic therapies commonly had prior exposure to systemic treatment, including phototherapy, methotrexate, or other biologic agents.

3.2 Predictive performance of 4w PASI improvement for PASI90 response

ROC curve analyses were performed to evaluate the predictive performance of week-4 PASI improvement for achieving a PASI90 response at 3 months and 6 months (Fig. 2).

In patients treated with IL-17 inhibitors, the AUCs for predicting PASI90 using week-4 PASI improvement were 0.752 at 3 months and 0.646 at 6 months. In contrast, among patients receiving IL-23 inhibitors, the corresponding AUCs were 0.679 at 3 months and 0.667 at 6 months. For patients treated with methotrexate, the AUCs were 0.835 at 3 months and 0.733 at 6 months, whereas in the phototherapy group, the AUC was 0.670 at both 3 months and 6 months.

Overall, across all four treatment subgroups, week-4 PASI improvement was generally more predictive of PASI90 at 3 months than 6 months.

3.3 Identification of optimal early response thresholds using the Youden Index

The optimal cut-off value of week-4 PASI percentage improvement for predicting PASI90 at 3 months was determined using the YI (Fig. 3). Specifically, the best cut-off values of PASI improvement was 62% for IL-17 inhibitors, 62% for IL-23 inhibitors, 59% for methotrexate, and 61% for phototherapy. The unimodal distribution of YI was observed at a week-4 PASI improvement of approximately 60%, indicating the threshold with the highest combined sensitivity and specificity. On the basis of the limited variation among these values, a week-4 PASI improvement of approximately 60% was identified as a consistent and clinically relevant early response threshold across treatment modalities.

3.4 Week-4 PASI60 as a strong predictor of subsequent response

When patients were stratified according to the week-4 PASI60 cut-off identified by YI analysis, marked differences in 3 months PASI90 response rates were observed across all treatment subgroups (Fig. 4). In the IL-17 inhibitor group, patients achieving PASI60 at week 4 exhibited a higher PASI90 response rate at 3 months compared with those not achieving PASI60 (70.1% vs.

28.0%). And in the IL-23 inhibitor group, PASI90 response rates were higher among patients achieving PASI60 at week 4 (47.7% vs. 22.0%). Similarly, PASI90 response increased in patients meeting PASI60 at week 4 in the methotrexate group (47.0% vs. 6.6%) and phototherapy group (29.0% vs. 9.0%).

To further evaluate whether achievement of PASI60 at week 4 was independently associated with subsequent PASI90 response, multivariable logistic regression analyses were performed. For patients treated with IL-17i, week-4 PASI60 increased odds of achieving PASI90 at 3 months in the partially adjusted model (OR, 6.21; CI, 3.73–10.55) and fully adjusted model (OR, 7.49; CI, 4.34–13.33) (Table 2). Comparable associations were observed in patients treated with IL-23i in both the partially adjusted model (OR, 4.25; CI, 1.99–9.37) and fully adjusted model (OR, 5.64; CI, 2.45–13.80). Among patients receiving methotrexate, similar associations were noted, with week-4 PASI60 increased odds of achieving PASI90 at 3 months in the partially adjusted model (OR, 10.14; CI, 5.24–20.30) and fully adjusted model (OR, 11.41; CI, 5.48–24.96), as well as among those receiving phototherapy in the partially adjusted model (OR, 5.97; CI, 2.26–16.33) and fully adjusted models (OR, 5.77; CI, 2.04–16.80). Collectively, achievement of PASI60 at week 4 was consistently and independently associated with higher odds of PASI90 at 3 months after adjustment for potential confounders.

Table 2
Association between achievement of PASI60 at week 4 and PASI90 at 3 months.

Treatment	Achieving 4w PASI60		Model 1			Model 2			Model 3		
	Achieving 3months PASI90	Not achieving 3months PASI90	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
IL-17 inhibitors	70.09% (246/351)	29.91% (105/351)	5.96	4.23, 8.47	< 0.001	6.21	3.73, 10.55	< 0.001	7.49	4.34, 13.33	< 0.001
IL-23 inhibitors	47.66% (51/107)	52.34% (56/107)	3.24	1.96, 5.38	< 0.001	4.25	1.99, 9.37	< 0.001	5.64	2.45, 13.80	< 0.001
Methotrexate	47.01% (63/134)	52.99% (71/134)	12.54	7.66, 20.96	< 0.001	10.14	5.24, 20.30	< 0.001	11.41	5.48, 24.96	< 0.001
Phototherapy	29.00% (29/100)	71.00% (71/100)	4.11	2.35, 7.15	< 0.001	5.97	2.26, 16.33	< 0.001	5.77	2.04, 16.80	< 0.001
Abbreviations: CI = Confidence Interval, OR = Odds Ratio											
Model 1 : no covariates were adjusted											
Model 2 : adjusted for Age, Gender, BMI, Education level, Smoking, and Alcohol											
Model 3 : adjusted for Age, Gender, BMI, Education level, Smoking, and Alcohol, Age of onset, Hypertension, Hyperlipidemia, Arthritis, Previous use of biological agents, Baseline DLQI score, and Baseline PASI score											

4. Discussion

Previous studies have consistently demonstrated that early clinical improvement may serve as a prognostic indicator of subsequent treatment response in psoriasis[10,13]. In a phase II ixekizumab study, Zhu et al. showed that PASI 40 to PASI 50 at week 4–6 was strongly associated with PASI75 and PASI90 achievement at 3 months, highlighting the clinical relevance of early response assessment[14]. Consistent findings have been reported for conventional systemic therapy, as failure to achieve PASI25 at week 4 predicted a low likelihood of attaining PASI75 at week 16 in patients treated with methotrexate[15]. Importantly, this prognostic signal extends beyond pharmacologic treatments, attainment of PASI30 at week 3 during narrowband UVB phototherapy also shown to predict PASI90 at the end of treatment[16]. Collectively, these studies support the prognostic value of early PASI improvement but also underscore a key limitation: the absence of a standardized, broadly applicable early PASI threshold that can be consistently applied across different systemic treatments in routine clinical practice.

Against this background, we sought to systematically establish optimal early PASI thresholds for biologic agents, conventional systemic therapy, and phototherapy within a single prospective real-world cohort. Notably, we identified a consistent and clinically meaningful threshold of approximately 60% PASI improvement at week 4 that was applicable across treatment categories, supporting the robustness and generalizability of early response assessment in routine practice.

Several factors may explain why PASI60 at week 4 emerged as an optimal and generalizable predictor. Compared with lower thresholds such as PASI25 or PASI30, PASI60 likely reflects a level of early disease control that exceeds transient improvement and more reliably captures true biological responsiveness to therapy. At the same time, it remains attainable within a short treatment window across both rapidly acting biologics and more gradually effective conventional therapies. From a clinical perspective, PASI60 at week 4 therefore represents a pragmatic compromise between sensitivity and specificity: it facilitates early identification of patients unlikely to achieve high-level clearance and reduces premature treatment switching among individuals with slower but meaningful response profiles.

The strong predictive performance of early clinical improvement may reflect pharmacodynamic responsiveness to treatment and underlying disease responsiveness to immune modulation[17].

These differences in predictive performance across treatment modalities are likely attributable to distinct response kinetics rather than fundamental differences in prognostic relevance[18]. Therapies characterized by a rapid onset of action, such as IL-17 inhibitors, tended to show clearer early discrimination between responders and non-responders[19,20], whereas treatments with more gradual response patterns also demonstrated consistent predictive performance over longer follow-up periods[21,22]. Importantly, these findings indicate that early clinical improvement represents a broadly applicable marker of treatment responsiveness, rather than a drug-specific effect.

From a clinical perspective, early identification of patients unlikely to achieve subsequent PASI90 achievement is crucial for optimizing therapeutic strategies. PASI90 has increasingly been recognized as a meaningful long-term treatment target, which has been associated with greater improvements in health-related quality of life and reduced disease burden[23,24]. Our results indicate that failure to achieve PASI60 at week 4 is associated with a substantially reduced probability of achieving PASI90 by 3 months, irrespective of treatment modality. Incorporating week-4 PASI60 into early treatment assessment may therefore facilitate timely treatment modification and reduce prolonged exposure to ineffective therapies in real-world psoriasis management.

The present study is strengthened by several key features. First, the prospective, multicenter and large sample enhance the robustness and external validity of the findings. Second, the inclusion of both conventional systemic therapies and biologic agents allowed direct comparison of early response patterns across treatment modalities within the same real-world cohort. Third, comprehensive adjustment for demographic, lifestyle, and disease-related variables supports the independence of the association between early PASI response and subsequent PASI90 achievement. Finally, the use of PASI90 as the primary endpoint provides a stringent and clinically relevant measure of treatment response.

Several limitations of this study should be acknowledged. As an observational analysis, residual confounding and indication bias cannot be fully excluded despite multivariable adjustment. Treatment allocation was determined by clinical judgment rather than randomization, and PASI assessments were performed at predefined follow-up time points. Future studies should explore whether integrating early clinical response with additional biomarkers or patient-level factors can further refine individualized prediction of treatment outcomes. In addition, validation of the week-4 PASI60 threshold in other real-world cohorts will be important to confirm its broader generalizability.

5. Conclusions

In summary, this real-world study demonstrates that achieving PASI60 at week 4 represents a robust and broadly applicable early indicator of subsequent PASI90 response across multiple psoriasis treatment modalities. Early assessment using this

threshold may provide a practical and clinically actionable tool to support individualized treatment decisions and optimize long-term outcomes in patients with moderate-to-severe psoriasis.

Abbreviations

BMI
body mass index
BSA
body surface area
CI
confidence interval
DLQI
Dermatology Life Quality Index
HRQoL
health-related quality of life
IL
interleukin
IQR
interquartile range
NB UVB
narrow-band ultraviolet B
OR
odds ratio
PASI
Psoriasis Area and Severity Index
ROC
receiver operating characteristic
SD
standard deviation
SPEECH
Shanghai Psoriasis Effectiveness Evaluation CoHort
TNF-α
tumor necrosis factor-alpha
YI
Youden Index.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval for the use of clinical data was granted by the Ethics Committee of the Shanghai Skin Disease Hospital (approval No. 2020-36). All participants provided informed consent for study participation and use of their clinical data.

Consent for publication

Not applicable.

Competing interests

The authors declare no conflicts of interest.

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Authors' contributions

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Availability of data and material

All data and material supporting the findings of this study are contained within the article. Additional information is available from the corresponding author upon reasonable request.

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Figures

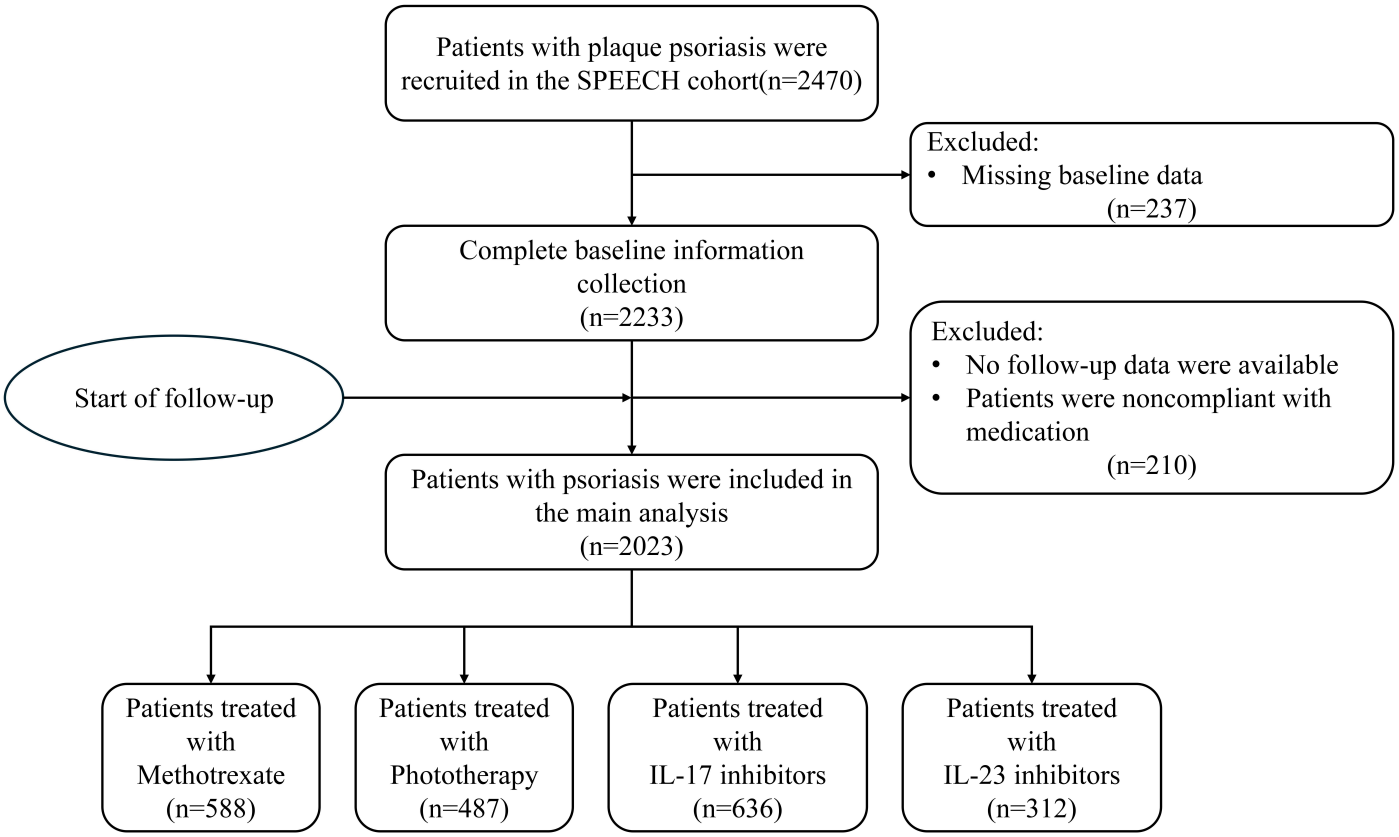


Figure 1

Study flowchart of patients inclusion

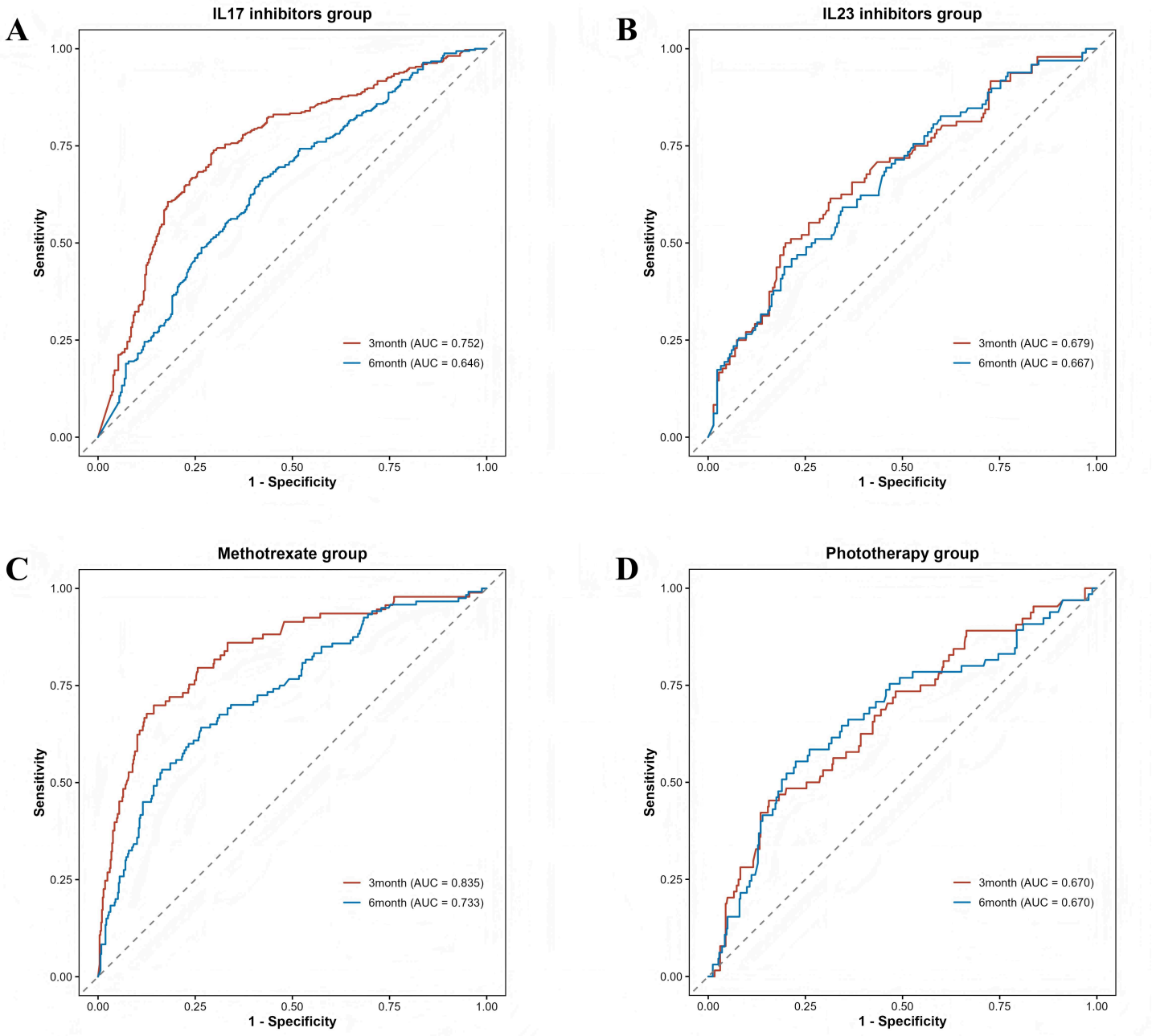


Figure 2

Receiver operating characteristic (ROC) curves for week-4 PASI improvement predicting PASI90 at 3 months and 6 month.

Receiver operating characteristic (ROC) curves for the predictive performance of week-4 Psoriasis

Area and Severity Index (PASI) percentage improvement for achievement of PASI90 at 3 months and 6 months in patients treated with (A) IL-17 inhibitors, (B) IL-23 inhibitors, (C) methotrexate, and (D) phototherapy. Corresponding areas under the curve (AUCs) are presented for each subgroup and time point.

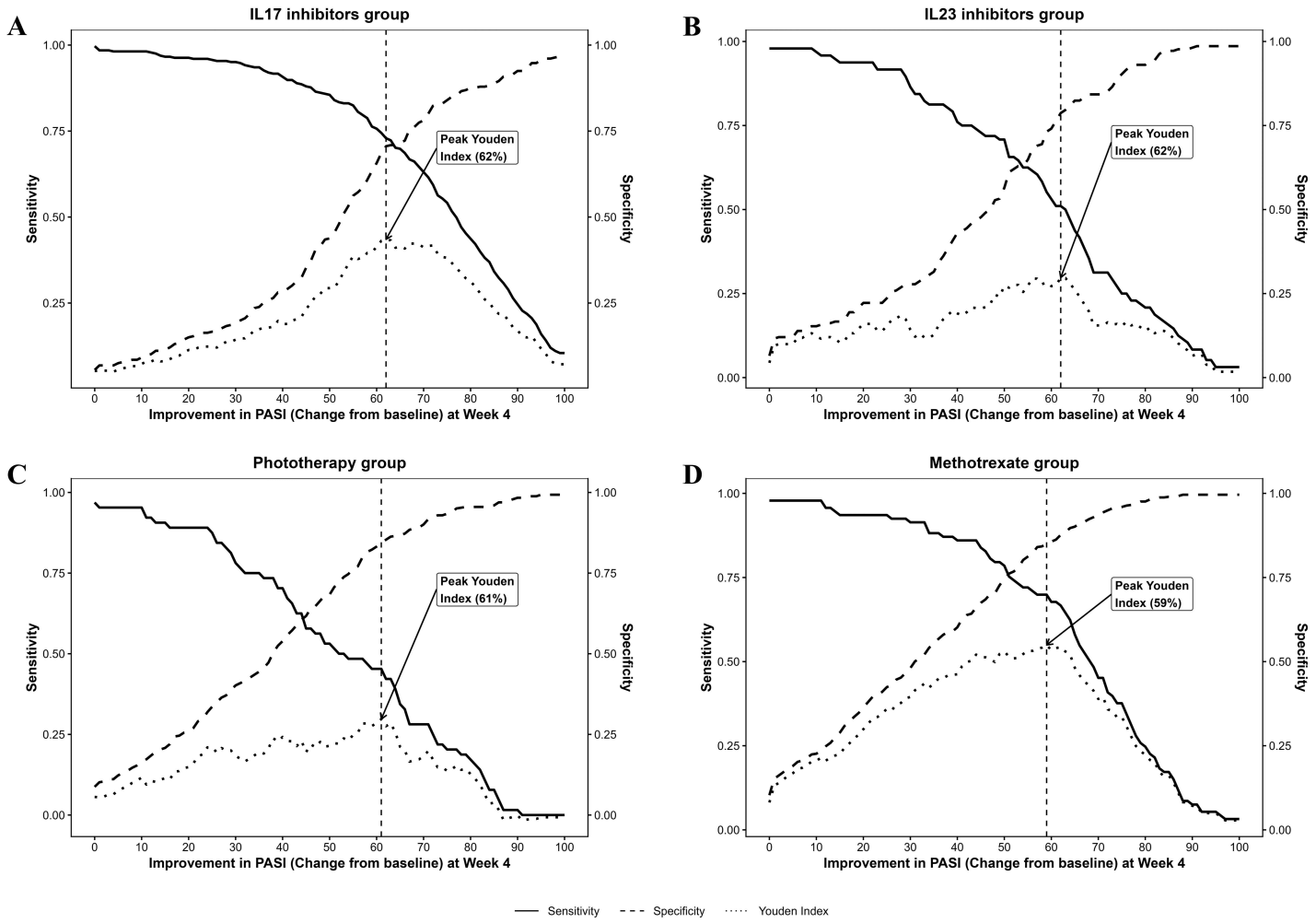


Figure 3

Youden Index, sensitivity and specificity plotted against week-4 PASI improvement.

Youden Index, sensitivity and specificity plotted against each percentage of week-4 Psoriasis Area and Severity Index (PASI) improvement for patients treated with (A) IL-17 inhibitors, (B) IL-23 inhibitors, (C) methotrexate, and (D) phototherapy. Peak Youden Index indicates the optimal early PASI improvement threshold for predicting PASI90 at 3 months in each treatment group.

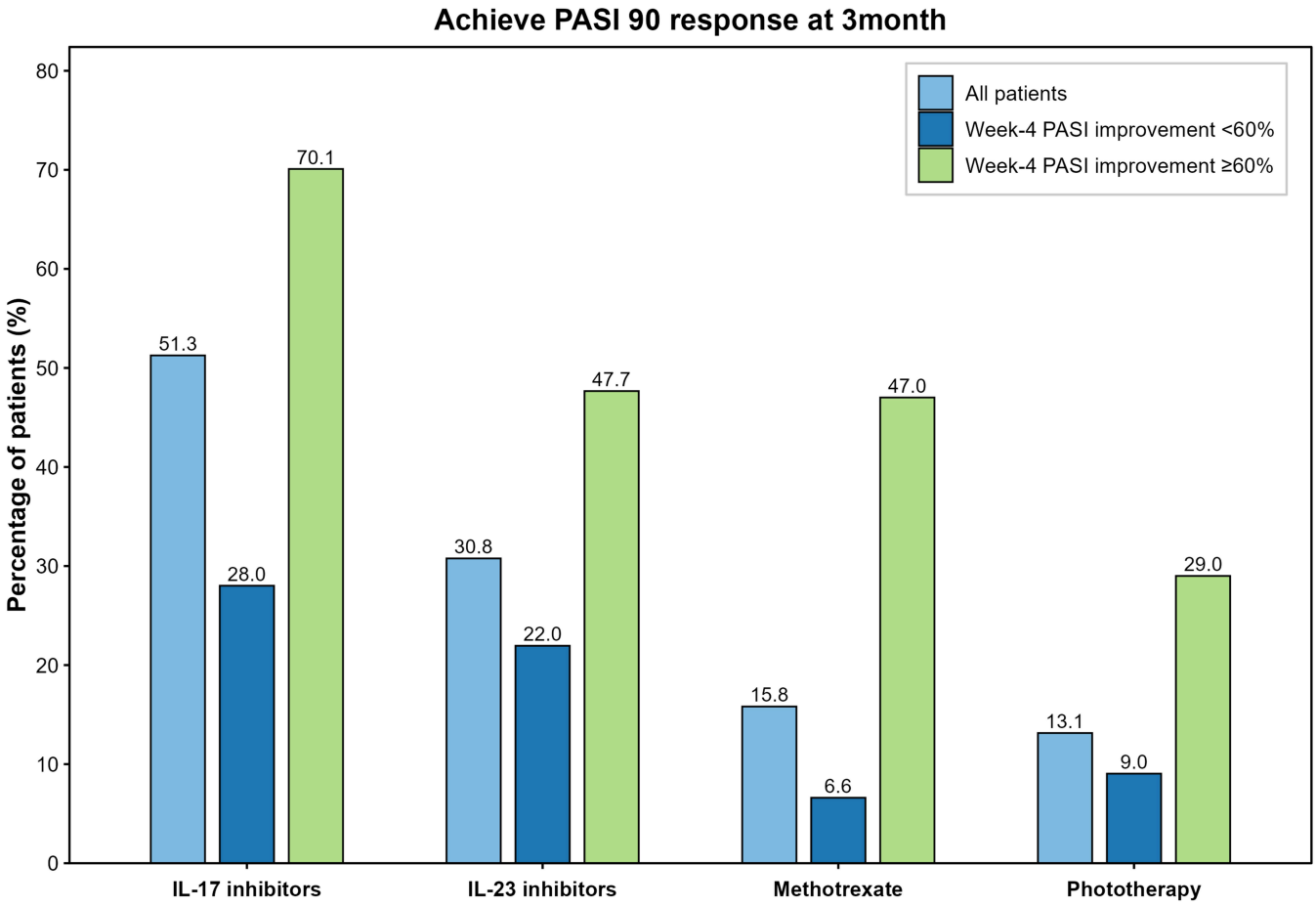


Figure 4

PASI90 response at 3 months between early responders (patients achieving PASI60 at week 4) and early nonresponders across patients treated with IL-17 inhibitors, IL-23 inhibitors, methotrexate, and phototherapy.