

# Evaluating treatment choice among patients with moderate or severe psoriasis in the United States

April W. Armstrong,<sup>1</sup> Sayeli Jayade,<sup>2</sup> Sanika Rege,<sup>2</sup> Namita Joshi,<sup>2</sup> Vardhaman Patel,<sup>3</sup> David Davidson,<sup>3</sup> Samaneh Kalirai,<sup>3</sup> Daniel Wolin,<sup>4</sup> Kimberly Boyle,<sup>4</sup> Dipen Patel,<sup>2</sup> Lauren Seigel<sup>3</sup>

<sup>1</sup>Keck School of Medicine, University of Southern California, Los Angeles, CA; <sup>2</sup>OPEN Health, Bethesda, MD; <sup>3</sup>Bristol Myers Squibb, Princeton, NJ; <sup>4</sup>RTI Health Solutions, Research Triangle Park, NC



## Synopsis

- While several psoriasis treatments are available and in development, different treatment modalities are associated with varying effectiveness, risks, and economic burden, and these factors are likely to influence patients' decisions related to their psoriasis treatment.
- This study explored the element of treatment decision-making driven by patient experiences.
  - A cross-sectional, web-based survey captured the demographic and clinical characteristics, treatment attributes affecting therapeutic decisions, and perceptions of a new, hypothetical, once-daily oral psoriasis treatment (deucravacitinib) among patients with moderate to severe plaque psoriasis.
- Understanding the factors that drive patients' treatment preference is crucial for guiding clinical decision-making.

## Objectives

- Primary**
  - To identify factors associated with the choice of a new once-daily oral psoriasis treatment with efficacy superior to that of existing oral therapies in patients with moderate to severe psoriasis currently receiving apremilast, tumor necrosis factor inhibitors (TNFi), ustekinumab, topical, or nonprescription treatments.

## Secondary

- To rank the importance of treatment attributes to patients with moderate to severe psoriasis using apremilast, TNFi, ustekinumab, topical, or nonprescription treatments.
- To elicit views on a new once-daily oral psoriasis treatment among patients with moderate to severe psoriasis using apremilast, TNFi, ustekinumab, topical, or nonprescription treatments.
- Target product profile (deucravacitinib)**
  - Tablet formulation with once-daily dosing.
  - Clinical studies showed:
    - ~ 53% of patients reported clear/mostly clear skin within 4 months.
    - ~ 83% of patients who reported a 75% reduction in psoriasis severity maintained this improvement at 1 year.
    - Non-serious adverse events, such as cold-like symptoms, headache, diarrhea, nausea, rash, and risk of herpes infection, led to few discontinuations.
  - Regular laboratory monitoring is not required, although pre-injection testing may be needed.
  - Out-of-pocket costs may be similar to those of the alternative psoriasis treatments in consideration.

## Methods

- A cross-sectional, web-based survey of the demographics and clinical characteristics of patients with psoriasis, their views on treatment characteristics that affect treatment-related decisions, and their perceptions of a new, hypothetical, once-daily oral psoriasis treatment.
- Patients were assigned to predefined treatment groups: apremilast, a TNFi, ustekinumab, a topical therapy/phototherapy, and/or the counter (OTC) treatments or no treatment, based on their self-reported current treatment at the time of the survey.
- A hypothetical psoriasis treatment profile, described by dosage, efficacy, adverse effects, and out-of-pocket costs, was shown to the patients to elicit their views on: (1) interference with everyday life, (2) convenience, (3) treatment-related anxiety, and likelihood of initiating treatment, both (a) without a safety warning and (b) with a safety warning.
- Inclusion criteria**
  - ≥ 18 years of age.
  - Residing in the United States.
  - Able to read and understand English.
  - Physician-diagnosed (self-reported) moderate or severe plaque psoriasis.
- Exclusion criteria**
  - Mild psoriasis.
  - Lack of online consent for the web-based survey.

## Data collection process

- The study was reviewed and approved by an Institutional Review Board.
- The study used a convenience sample of patients with moderate or severe psoriasis who were recruited by Global Perspectives to collect patient-reported data.
- Patients were asked to complete an electronic patient survey that included questions from patient-reported outcome (PRO) instruments and de novo questions.
- Potential survey participants were provided with a link to the survey and completed screening questions to determine eligibility, followed by an informed consent checkbox.
- The final survey was administered to 882 patients.

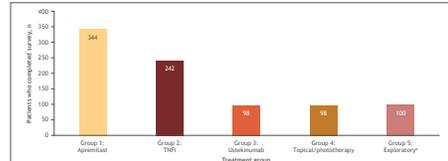
## Statistical analysis

- Stepwise multivariable logistic regression was conducted to determine sociodemographic and clinical characteristics associated with the choice of the new treatment among patients who were currently receiving treatment or who had never received treatment.
  - Independent variables: treatment group, age, sex, race/ethnicity, psoriasis severity over the past week, comorbidities, disease and treatment duration, presence of psoriatic arthritis (PsA) at baseline, number of flares, and number of body regions affected.
- Treatment attributes (route of administration, extent of skin clearance, laboratory monitoring, durability, safety, and dosing frequency) were ranked as an ordinal category (scale of 1–6) by patients.
- Chi-square test was conducted to detect significant differences between patient rankings of each treatment attribute and to assess the variations in patient views on the new oral treatment.

## Results

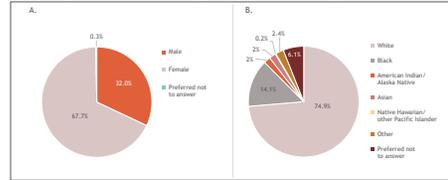
- Figure 1 shows the responses of the 5 baseline treatment groups surveyed.
- The study sample included 882 patients (mean age = 45.7 [±12.8] years); the majority were female (67.7%), most were White (74.9%), and their average duration of time since psoriasis diagnosis was 14.9 [±11.8] years (Figure 2 and 3, Table 1).
- Of 882 patients, 818 (92.8%) were currently receiving treatment and had been on their current treatment for a mean of 2.9 (±4.8) years (Table 2).
- With their current treatment regimen, 50.8% of patients in the total study population described their psoriasis over the past week as mild, very mild, or none, while 36.5% reported it as moderate and 12.7% reported it as severe or very severe (Table 2).

Figure 1. Targeted baseline treatment groups



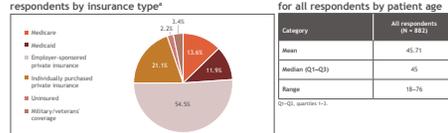
The majority group included patients who were currently receiving treatment (n = 818), apremilast (41.2%) and TNFi (39.2%) were the most commonly used treatments, and OTC or no treatment was the least common group (6.3%) (Table 3).

Figure 2. Key baseline characteristics, by sex (A) and race/ethnicity\* (B)



Percentages sum to >100% because respondents could select multiple race/ethnicity, as applicable.

Figure 3. Key baseline characteristics for all respondents by insurance type\*



Percentages sum to >100% because respondents could select more than 1 insurance type, as applicable.

Table 2. Key baseline clinical characteristics

Parameter	Statistic or category	All respondents (N = 882) (n)
Treatment status, n (%)	Currently receiving treatment	818 (92.8)
	Was receiving treatment but has stopped	47 (5.3)
	Never received treatment	17 (1.9)
Treatment duration, years	Mean (SD)	2.86 (4.81)
	Median (Q1–Q3)	1.0 (0.0–3.0)
	Range	0–42.0
Current treatment type, n (%)	Over-the-counter (OTC) nonprescription	225 (27.5)
	Topical prescription steroid	230 (28.1)
	Topical vitamin D analog	49 (6.0)
	Other topical treatment	55 (6.7)
	Ultraviolet light phototherapy	51 (6.2)
	Apremilast	356 (44.5)
	Ustekinumab	101 (12.3)
	TNFi treatment	295 (38.7)
	None	31 (3.8)
	Very mild	155 (17.4)
Psoriasis severity over the past week, n (%)	Mild	162 (18.4)
	Moderate	322 (38.5)
	Severe	86 (9.8)
	Very severe	26 (2.9)

SD, body surface area; Q1–Q3, quartiles 1–3; SD, standard deviation; TNFi, tumor necrosis factor inhibitor.

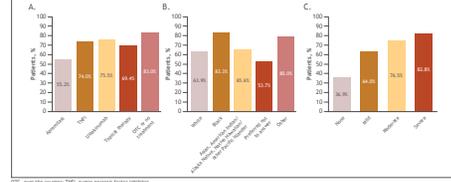
- Among patients who were currently receiving treatment or who had never received treatment (n = 835), apremilast (41.2%) and TNFi (39.2%) were the most commonly used treatments, and OTC or no treatment was the least common group (6.3%) (Table 3).
- Of patients who had never received treatment, 88.2% expressed intent to start the new oral psoriasis treatment, compared with 80.8% of patients who used nonprescription OTC treatment, 75.5% of patients who used ustekinumab, 74.0% of patients who used a TNFi, 65.4% of patients who used topical therapy, and 55.2% of patients who used apremilast (Figure 4).
- Willingness to start the new once-daily oral treatment was high across all groups, including patients currently using apremilast.
- In response to questions about the new treatment, 83.7% reported that it would be convenient, 65.0% reported that it would cause less anxiety than an injection or infusion, 55.3% reported that it would interfere less with their everyday life, and 50.2% reported that it would reduce their symptoms more than their current psoriasis treatment (Figure 5).

Table 3. Intent to start a new once-daily oral psoriasis treatment

Attribute	Category	Intent to start new treatment		
		All, N = 835 (n)	Yes, n = 723 (n)	No, n = 239 (n)
Treatment group	Apremilast	344 (41.2)	190 (34.2)	154 (55.0)
	TNFi	342 (39.0)	179 (32.3)	63 (23.5)
	Ustekinumab	98 (11.7)	74 (13.3)	24 (8.6)
	Topical therapy	98 (11.7)	48 (12.3)	30 (10.7)
	OTC or no treatment	53 (6.3)	44 (7.9)	9 (3.2)
Race/ethnicity	White	610 (73.1)	390 (70.3)	220 (78.6)
	Black	114 (13.7)	95 (17.1)	19 (8.8)
	Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander	32 (3.8)	21 (3.8)	11 (3.9)
	Preferred not to answer	54 (6.5)	29 (5.2)	25 (8.9)
	Other	25 (3.0)	20 (3.6)	5 (1.8)
	None	130 (15.6)	48 (8.8)	82 (29.3)
	Mild	308 (36.9)	197 (35.5)	111 (39.4)
Moderate	296 (35.7)	228 (41.1)	70 (25.0)	
Severe	99 (11.9)	82 (14.8)	17 (6.1)	

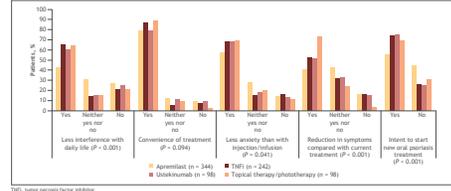
OTC, over the counter; TNFi, tumor necrosis factor inhibitor.

Figure 4. Intent to start a new once-daily oral treatment, by treatment group (A), race/ethnicity (B), and psoriasis severity over the past week (C), all P < 0.001



OTC, over the counter; TNFi, tumor necrosis factor inhibitor.

Figure 5. Views on a new once-daily oral treatment, by treatment group

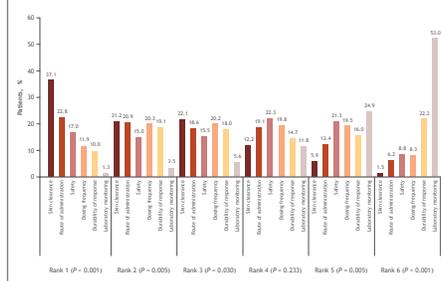


OTC, over the counter; TNFi, tumor necrosis factor inhibitor.

- Only treatment group, race/ethnicity, and psoriasis severity were statistically significant factors in the model.
- The following responses were examined for intent to start a new once-daily oral treatment (yes/no), by selected categories:
  - ~ 83% of Black respondents would start the new once-daily oral treatment.
  - Compared with White patients, the odds ratio (OR) of intent to start the new treatment was 2.4 (95% confidence interval [CI], 1.4–4.2) among Black respondents (P = 0.034).
- Intent to start the new once-daily oral treatment increased with psoriasis severity over the past week, with 76.5% of respondents with moderate psoriasis and 82.8% of respondents with severe disease answering "yes".
- Compared with patients with no psoriasis symptoms or signs over the past week, the OR of intent to start the new treatment was 3.2 (95% CI, 2.0–4.7) among patients with mild psoriasis, 5.0 (95% CI, 3.1–8.2) among patients with moderate psoriasis, and 7.6 (95% CI, 3.9–15.0) among patients with severe psoriasis, all P < 0.001.
- ~ 79.6% of patients who responded that the new once-daily oral treatment would cause them less anxiety than an injection would start the new treatment.
- ~ 87.6% of respondents who believed that the new once-daily oral treatment would reduce their symptoms more than their current treatment would start the new treatment.

- Asked to rank characteristics of psoriasis treatment in order of importance, 58.3% of respondents ranked "extent of skin clearance" as first or second, while 43.7% ranked "route of administration" as first or second (Figure 6).

Figure 6. Reason for treatment choice ranking



## Conclusions

- This large, real-world study provided an account of how psoriasis impacts patients' lives and treatment choices.
- Patients with severe disease, Black patients, and patients receiving injectable treatments were more likely to choose the new oral treatment compared with patients with mild disease, White patients, and patients receiving apremilast, respectively.
- Willingness to start the new psoriasis treatment was common among all treatment groups.
- The new treatment was viewed as causing less anxiety compared with injectables across all treatment groups.
- Extent of skin clearance and route of administration were reported as the top-ranked reasons for patients' psoriasis treatment choice.
- Considerations of the treatment characteristics that drive the decision-making of patients with psoriasis is crucial for making effective treatment recommendations in clinical practice.

## Reference

1. Feldman SR, et al. *J Health Econ*. 2016;41:141–157.

## Acknowledgments

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## Disclosures

- AWA: Has served as a research investigator, scientific advisor, and/or speaker for AbbVie, Amgen, Acucis Biopharmaceuticals, AGLN, Boehringer-Ingelheim, Bristol Myers Squibb, Dermavant, Dermira, Eli Lilly, Epi, Incyte, Leo, Janssen, Merck, Novartis, Orto Dermatologica, Pfizer, Sanofi Genzyme, Sun, Regeneron, and UCB.
- LS, DS, SK, and WP: Employees of and may own stock options in Bristol Myers Squibb.
- NJ, SK, SJ, and DP: Employees of OPEN Health, which received consulting fees from Bristol Myers Squibb.
- DW and MB: Employees of RTI Health Solutions, which received consulting fees from Bristol Myers Squibb.

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## Synopsis

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- While several psoriasis treatments are available and in development, different treatment modalities are associated with varying effectiveness, risks, and economic burden, and these factors are likely to influence patients' decisions related to their psoriasis treatment<sup>1</sup>
- This study explored the element of treatment decision-making driven by patient experiences
  - A cross-sectional, web-based survey captured the demographic and clinical characteristics, treatment attributes affecting therapeutic decisions, and perceptions of a new, hypothetical, once-daily oral psoriasis treatment (deucravacitinib) among patients with moderate to severe plaque psoriasis
- Understanding the factors that drive patients' treatment preference is crucial for guiding clinical decision-making

## Objectives

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### Primary

- To identify factors associated with the choice of a new once-daily oral psoriasis treatment with efficacy superior to that of existing oral therapies in patients with moderate to severe psoriasis currently receiving apremilast, tumor necrosis factor inhibitors (TNFis), ustekinumab, topicals, or nonprescription treatments

### Secondary

- To rank the importance of treatment attributes to patients with moderate to severe psoriasis using apremilast, TNFis, ustekinumab, topicals, or nonprescription treatments
- To elicit views on a new once-daily oral psoriasis treatment among patients with moderate to severe psoriasis using apremilast, TNFis, ustekinumab, topicals, or nonprescription treatments

### Target product profile (deucravacitinib)

- Tablet formulation with once-daily dosing
- Clinical studies showed:
  - 53% of patients reported clear/mostly clear skin within 4 months
  - 83% of patients who reported a 75% reduction in psoriasis severity maintained this improvement at 1 year
  - Non-serious adverse events, such as cold-like symptoms, headache, diarrhea, nausea, rash, and risk of herpes infection, led to few discontinuations
- Regular laboratory monitoring is not required, although pre-initiation testing may be needed
- Out-of-pocket costs may be similar to those of the alternative psoriasis treatments in consideration

## Methods

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- A cross-sectional, web-based survey of the demographics and clinical characteristics of patients with psoriasis, their views on treatment characteristics that affect treatment-related decisions, and their perceptions of a new, hypothetical, once-daily oral psoriasis treatment
- Patients were assigned to predefined treatment groups: apremilast, a TNFi, ustekinumab, a topical therapy/phototherapy, and over-the-counter (OTC) treatments or no treatment, based on their self-reported current treatment at the time of the survey
- A hypothetical psoriasis treatment profile, described by dosage, efficacy, adverse effects, and out-of-pocket costs, was shown to the patients to elicit their views on: (1) interference with everyday life, (2) convenience, (3) treatment-related anxiety, and likelihood of initiating treatment, both (4) without a safety warning and (5) with a safety warning

### Inclusion criteria

- $\geq 18$  years of age
- Residing in the United States
- Able to read and understand English
- Physician-diagnosed (self-reported) moderate or severe plaque psoriasis

### Exclusion criteria

- Mild psoriasis
- Lack of online consent for the web-based survey

### Data collection process

- The study was reviewed and approved by an Institutional Review Board
- The study used a convenience sample of patients with moderate or severe psoriasis who were recruited by Global Perspectives to collect patient-reported data
- Patients were asked to complete an electronic patient survey that included questions from patient-reported outcome (PRO) instruments and de novo questions
- Potential survey participants were provided with a link to the survey and completed screening questions to determine eligibility, followed by an informed consent checkbox
- The final survey was administered to 882 patients

### Statistical analysis

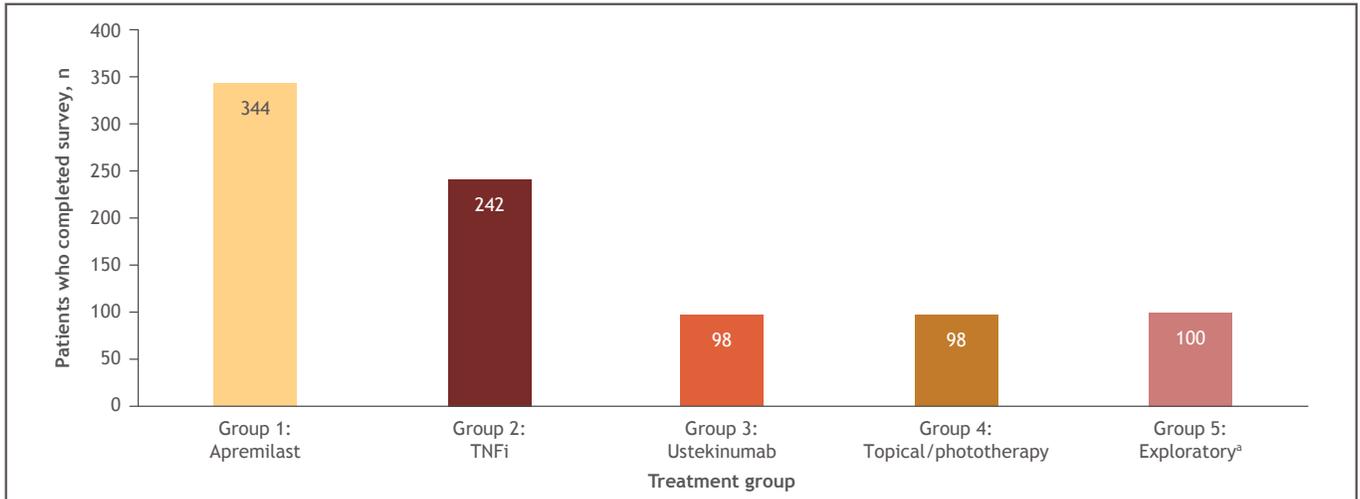
- Stepwise multivariable logistic regression was conducted to determine sociodemographic and clinical characteristics associated with the choice of the new treatment among patients who were currently receiving treatment or who had never received treatment
  - Independent variables: treatment group, age, sex, race/ethnicity, psoriasis severity over the past week, comorbidities, disease and treatment duration, presence of psoriatic arthritis (PsA) at baseline, number of flares, and number of body regions affected
- Treatment attributes (route of administration, extent of skin clearance, laboratory monitoring, durability, safety, and dosing frequency) were ranked as an ordinal category (scale of 1–6) by patients
- Chi-square test was conducted to detect significant differences between patient rankings of each treatment attribute and to assess the variations in patient views on the new oral treatment

## Results

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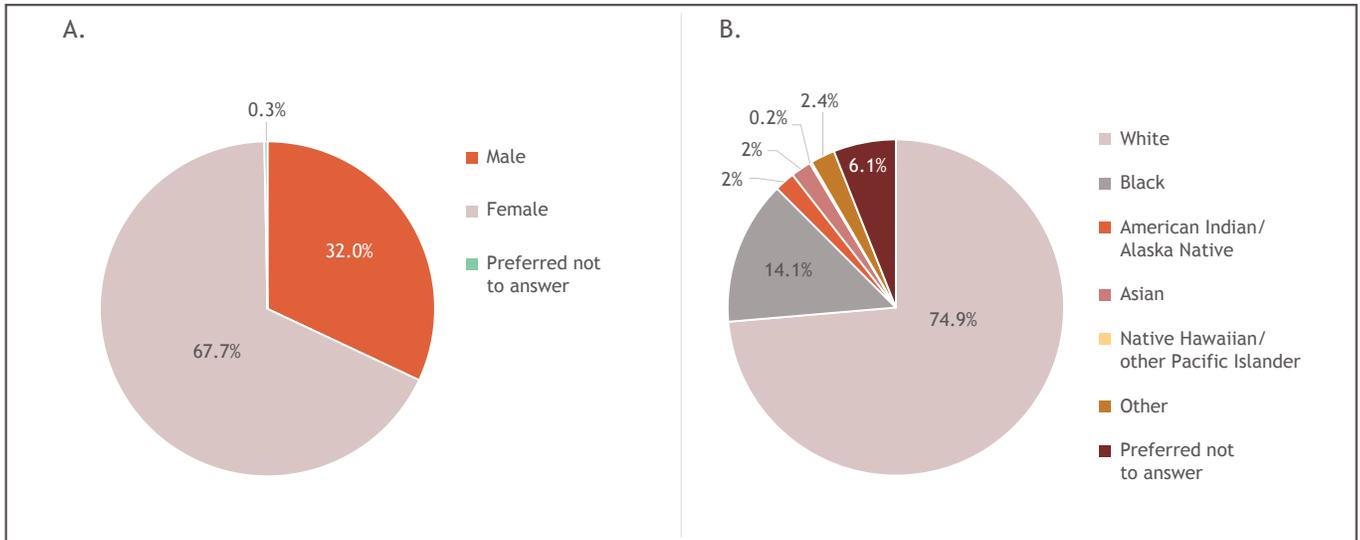
- **Figure 1** shows the responses of the 5 baseline treatment groups surveyed
- The study sample included 882 patients (mean age = 45.7 [ $\pm 12.8$ ] years); the majority were female (67.7%), most were White (74.9%), and their average duration of time since psoriasis diagnosis was 14.9 ( $\pm 11.8$ ) years (**Figures 2 and 3; Table 1**)
- Of 882 patients, 818 (92.8%) were currently receiving treatment and had been on their current treatment for a mean of 2.9 ( $\pm 4.8$ ) years (**Table 2**)
- With their current treatment regimen, 50.8% of patients in the total study population described their psoriasis over the past week as mild, very mild, or none, while 36.5% reported it as moderate and 12.7% reported it as severe or very severe (**Table 2**)

**Figure 1. Targeted baseline treatment groups**



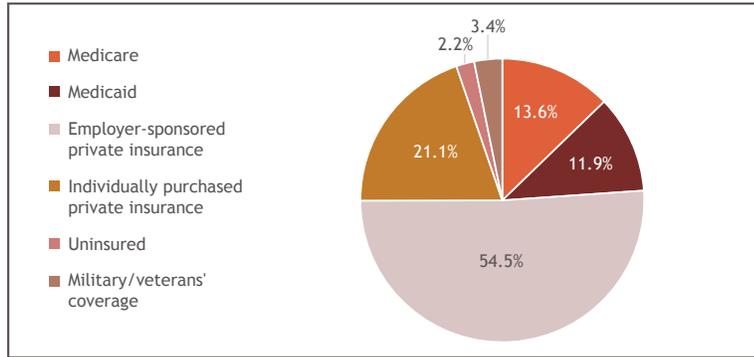
<sup>a</sup>The exploratory group included patients who were using nonprescription treatments (n = 36), patients who had never received treatment (n = 17), and patients who had received treatment in the past but were not currently receiving treatment (n = 47). TNFi, tumor necrosis factor inhibitor.

**Figure 2. Key baseline characteristics, by sex (A) and race/ethnicity<sup>a</sup> (B)**



<sup>a</sup>Percentages sum to >100% because respondents could select multiple races/ethnicities, as applicable.

**Figure 3. Key baseline characteristics for all respondents by insurance type<sup>a</sup>**



<sup>a</sup>Percentages sum to >100% because respondents could select more than 1 insurance type, as applicable.

**Table 1. Key baseline characteristics for all respondents by patient age**

Category	All respondents (N = 882)
Mean	45.71
Median (Q1–Q3)	45
Range	18–76

Q1–Q3, quartiles 1–3.

**Table 2. Key baseline clinical characteristics**

Parameter	Statistic or category	All respondents, N = 882 (%)
Treatment status, n (%)	Currently receiving treatment	818 (92.8)
	Was receiving treatment but has stopped	47 (5.3)
	Never received treatment	17 (1.9)
Treatment duration, years	Mean (SD)	2.86 (4.81)
	Median (Q1–Q3)	1.0 (0.0–3.0)
	Range	0.0–42.0
Current treatment type, n (%)	Over-the-counter nonprescription	225 (27.5)
	Topical prescription steroid	230 (28.1)
	Topical vitamin D analog	49 (6.0)
	Other topical treatment	55 (6.7)
	Ultraviolet light/phototherapy	51 (6.2)
	Apremilast	356 (43.5)
	Ustekinumab	101 (12.3)
	TNFi treatment	251 (30.7)
Psoriasis severity over the past week, n (%)	None	31 (14.8)
	Very mild	155 (17.6)
	Mild	162 (18.4)
	Moderate	322 (36.5)
	Severe	86 (9.8)
	Very severe	26 (2.9)

BSA, body surface area; Q1–Q3, quartiles 1–3; SD, standard deviation; TNFi, tumor necrosis factor inhibitor.

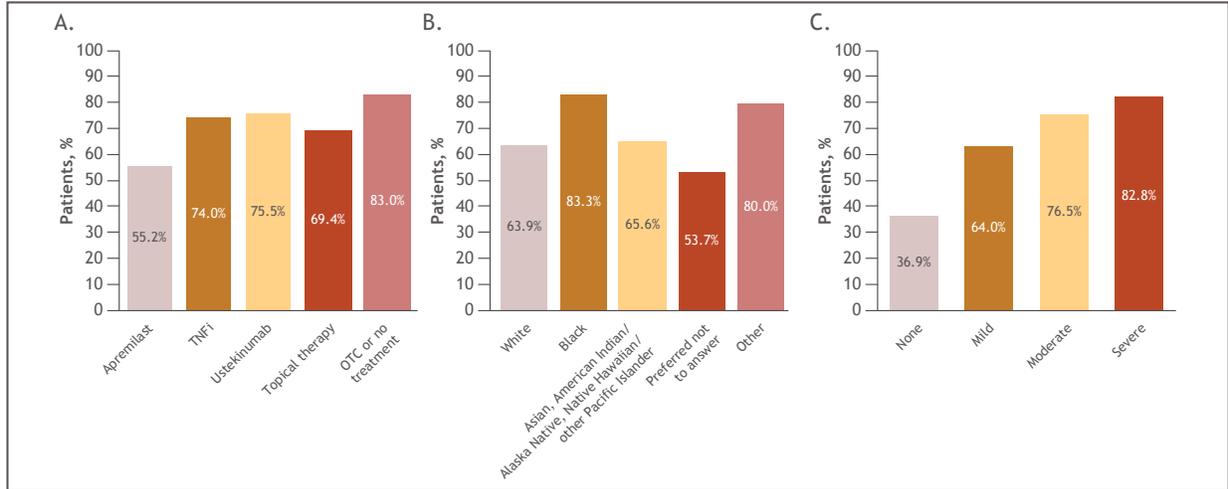
- Among patients who were currently receiving treatment or who had never received treatment (n = 835), apremilast (41.2%) and TNFis (29.0%) were the most commonly used treatments, and OTC or no treatment was the least common group (6.3%) (Table 3)
- Of patients who had never received treatment, 88.2% expressed intent to start the new oral psoriasis treatment, compared with 80.6% of patients who used nonprescription OTC treatment, 75.5% of patients who used ustekinumab, 74.0% of patients who used a TNFi, 69.4% of patients who used topical therapy, and 55.2% of patients who used apremilast (Figure 4)
- Willingness to start the new, once-daily oral treatment was high across all groups, including patients currently using apremilast
- In response to questions about the new treatment, 83.7% reported that it would be convenient, 65.0% reported that it would cause less anxiety than an injection or infusion, 55.3% reported that it would interfere less with their everyday life, and 50.2% reported that it would reduce their symptoms more than their current psoriasis treatment (Figure 5)

**Table 3. Intent to start a new once-daily oral psoriasis treatment**

Variable	Category	Intent to start new treatment		
		All, N = 835 (%)	Yes, n = 555 (%)	No, n = 280 (%)
Treatment group	Apremilast	344 (41.2)	190 (34.2)	154 (55.0)
	TNFi	242 (29.0)	179 (32.3)	63 (22.5)
	Ustekinumab	98 (11.7)	74 (13.3)	24 (8.6)
	Topical therapy	98 (11.7)	68 (12.3)	30 (10.7)
	OTC or no treatment	53 (6.3)	44 (7.9)	9 (3.2)
Race/ethnicity	White	610 (73.1)	390 (70.3)	220 (78.6)
	Black	114 (13.7)	95 (17.1)	19 (6.8)
	Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander	32 (3.8)	21 (3.8)	11 (3.9)
	Preferred not to answer	54 (6.5)	29 (5.2)	25 (8.9)
	Other	25 (3.0)	20 (3.6)	5 (1.8)
Psoriasis severity over the past week (based on a 6-point scale)	None	130 (15.6)	48 (8.6)	82 (29.3)
	Mild	308 (36.9)	197 (35.5)	111 (39.6)
	Moderate	298 (35.7)	228 (41.1)	70 (25.0)
	Severe	99 (11.9)	82 (14.8)	17 (6.1)

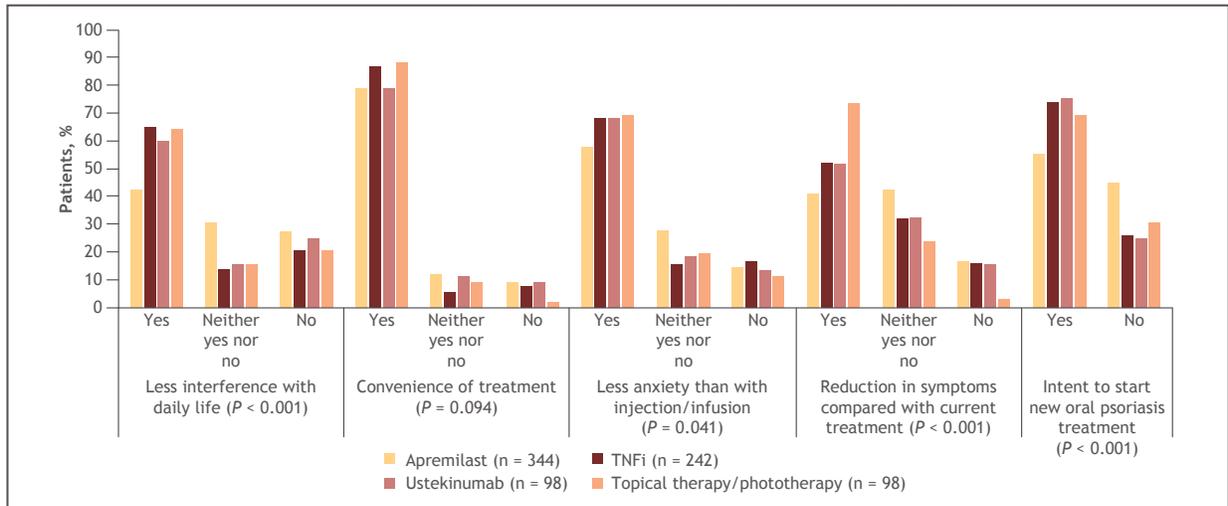
OTC, over the counter; TNFi, tumor necrosis factor inhibitor.

**Figure 4. Intent to start a new once-daily oral treatment, by treatment group (A), race/ethnicity (B), and psoriasis severity over the past week (C), all  $P < 0.001$**



OTC, over the counter; TNFi, tumor necrosis factor inhibitor.

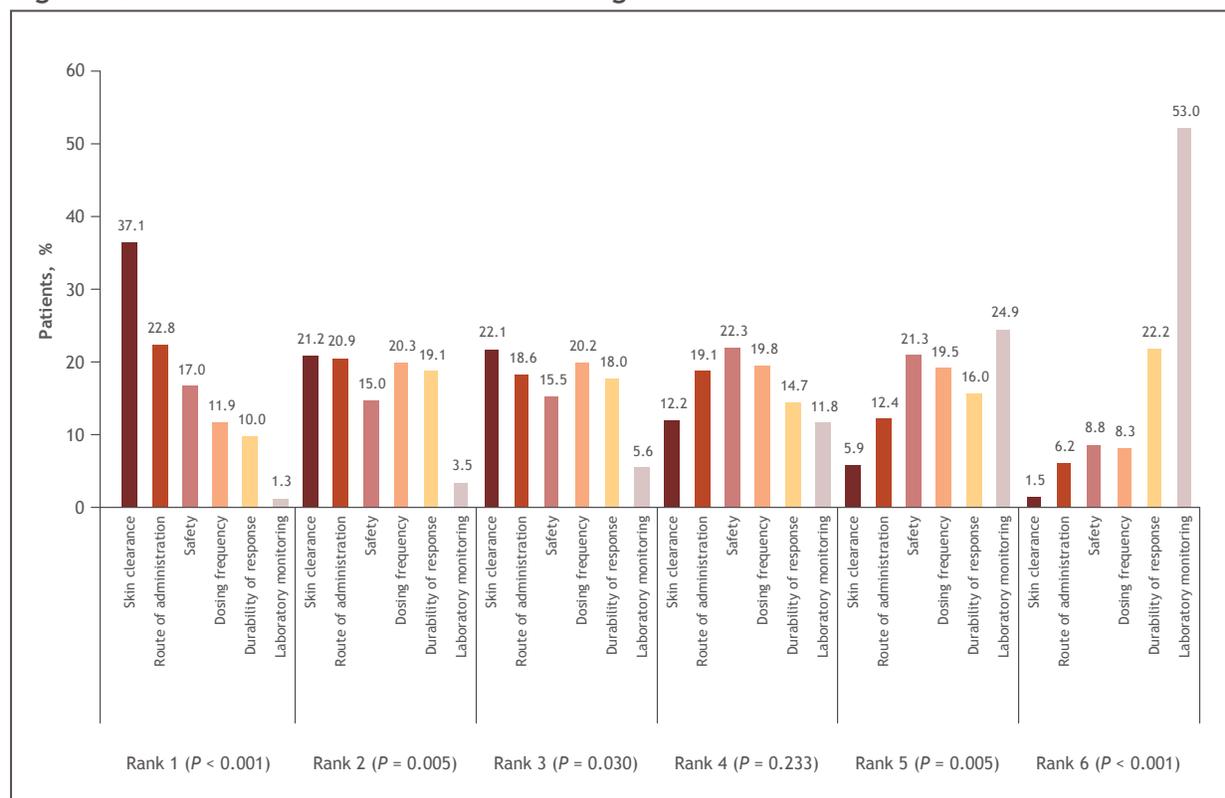
**Figure 5. Views on a new once-daily oral treatment, by treatment group**



TNFi, tumor necrosis factor inhibitor.

- Only treatment group, race/ethnicity, and psoriasis severity were statistically significant factors in the model
- The following responses were examined for intent to start a new once-daily oral treatment (yes/no), by selected categories:
  - 83% of Black respondents would start the new once-daily oral treatment
    - Compared with White patients, the odds ratio (OR) of intent to start the new treatment was 2.4 (95% confidence interval [CI], 1.4–4.2) among Black respondents ( $P = 0.036$ )
  - Intent to start the new once-daily oral treatment increased with psoriasis severity over the past week, with 76.5% of respondents with moderate psoriasis and 82.8% of respondents with severe disease answering “yes”
    - Compared with patients with no psoriasis symptoms or signs over the past week, the OR of intent to start the new treatment was 3.2 (95% CI, 2.0–4.9) among patients with mild psoriasis, 5.0 (95% CI, 3.1–8.2) among patients with moderate psoriasis, and 7.6 (95% CI, 3.9–15.0) among patients with severe psoriasis; all  $P < 0.001$
  - 79.6% of patients who responded that the new once-daily oral treatment would cause them less anxiety than an injection would start the new treatment
  - 87.6% of respondents who believed that the new once-daily oral treatment would reduce their symptoms more than their current treatment would start the new treatment
- Asked to rank characteristics of psoriasis treatment in order of importance, 58.3% of respondents ranked “extent of skin clearance” as first or second, while 43.7% ranked “route of administration” as first or second (Figure 6)
- Laboratory monitoring was ranked least important by more than half (53.0%) of the patients

**Figure 6. Reason for treatment choice ranking**



## Conclusions

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- This large, real-world study provided an account of how psoriasis impacts patients' lives and treatment choices
- Patients with severe disease, Black patients, and patients receiving injectable treatments were more likely to choose the new oral treatment compared with patients with mild disease, White patients, and patients receiving apremilast, respectively
- Willingness to start the new psoriasis treatment was common among all treatment groups
- The new treatment was viewed as causing less anxiety compared with injectables across all treatment groups
- Extent of skin clearance and route of administration were reported as the top-ranked reasons for patients' psoriasis treatment choice
- Consideration of the treatment characteristics that drive the decision-making of patients with psoriasis is crucial for making effective treatment recommendations in clinical practice

## Reference

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1. Feldman SR, et al. *J Health Econ Outcomes Res.* 2016;4:141-157.

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