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Trial record **1 of 1** for: CNVA237A2303

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1-year Study to Assess the Efficacy, Safety, and Tolerability of Glycopyrronium Bromide (NVA237) in Chronic Obstructive Pulmonary Disease (COPD) (GLOW2)

This study has been completed.

Sponsor:
Novartis

Information provided by (Responsible Party):
Novartis

ClinicalTrials.gov Identifier:
NCT00929110

First received: June 25, 2009
Last updated: August 9, 2012
Last verified: August 2012
History of Changes

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Results First Received: June 22, 2012

Study Type:	Interventional
Study Design:	Allocation: Randomized; Endpoint Classification: Safety/Efficacy Study; Intervention Model: Parallel Assignment; Masking: Double Blind (Subject, Caregiver, Investigator); Primary Purpose: Treatment
Condition:	Chronic Obstructive Pulmonary Disease
Interventions:	Drug: Glycopyrronium bromide Drug: Placebo to glycopyrronium bromide Drug: Tiotropium

Participant Flow

Hide Participant Flow

Recruitment Details

Key information relevant to the recruitment process for the overall study, such as dates of the recruitment period and locations
A total of 1993 patients were screened from 180 participating sites, of whom 1066 were randomized to 1 of the 3 treatment groups in a 2:1:1 ratio glycopyrronium bromide:placebo:tiotropium.

Pre-Assignment Details

Significant events and approaches for the overall study following participant enrollment, but prior to group assignment
No text entered.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Participant Flow: Overall Study

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg

STARTED	**529**	**269**	**268**
COMPLETED	**411**	**193**	**206**
NOT COMPLETED	**118**	**76**	**62**
Adverse Event	**40**	**29**	**18**
Subject withdrew consent	**40**	**23**	**26**
Unsatisfactory therapeutic effect	**20**	**9**	**6**
Lost to Follow-up	**7**	**7**	**3**
Protocol deviation	**5**	**2**	**4**
Administrative problems	**4**	**1**	**2**
Death	**2**	**2**	**2**
Abnormal laboratory value(s)	**0**	**1**	**0**
Abnormal test procedure result(s)	**0**	**1**	**1**
Patient inability to use the device	**0**	**1**	**0**

Baseline Characteristics

Hide Baseline Characteristics

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
No text entered.

Reporting Groups

	Description

Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Total	Total of all reporting groups

Baseline Measures

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg	Total
Number of Participants [units: participants]	**525**	**268**	**267**	**1060**
Age [1] [units: years] Mean (Standard Deviation)	**63.5 (9.05)**	**63.6 (9.14)**	**63.9 (8.25)**	**63.6 (8.87)**
Gender [1] [units: participants]				
Female	**186**	**95**	**99**	**380**
Male	**339**	**173**	**168**	**680**

[1] Demographic data are based on the safety population which was defined as all patients who received at least 1 dose of study medication whether they were randomized or not. The number of patients in the safety population was less than the number of randomized patients, ie, some randomized patients did not receive study medication (4 in the glycopyrronium bromide group, 1 in the placebo group, and 1 in the

tiotropium group).

Outcome Measures

Hide All Outcome Measures

1. Primary: Trough Forced Expiratory Volume in 1 Second (FEV1) at Week 12 [Time Frame: Week 12]

Measure Type	Primary
Measure Title	Trough Forced Expiratory Volume in 1 Second (FEV1) at Week 12
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. Trough FEV1 was defined as the average of measurements made 23 hours 15 minutes and 23 hours 45 minutes post-dose. The analysis included baseline FEV1 measurement, baseline inhaled corticosteroid use (Yes/No), FEV1 prior to inhalation of short-acting β2 agonist (SABA), and FEV1 45 min post-inhalation of SABA as covariates.
Time Frame	Week 12
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and

	10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**513**	**245**	**253**
Trough Forced Expiratory Volume in 1 Second (FEV1) at Week 12 [units: Liters] Least Squares Mean (Standard Error)	**1.469 (0.0141)**	**1.372 (0.0173)**	**1.455 (0.0170)**

No statistical analysis provided for Trough Forced Expiratory Volume in 1 Second (FEV1) at Week 12

2. Secondary: Transition Dyspnea Index (TDI) at Week 26 [Time Frame: Week 26]

Measure Type	Secondary
Measure Title	Transition Dyspnea Index (TDI) at Week 26
Measure Description	The TDI measured changes in dyspnea from baseline during treatment and included 3 domains: Functional impairment (activities of daily living), magnitude of task (intensity of activity), and magnitude of effort (difficulty breathing). Each domain was rated from -3 to 3 (major deterioration-major improvement). The total score ranged from -9 to 9; minus scores indicate deterioration. The analysis included the same covariates as the primary Outcome Measure.
Time Frame	Week 26

Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**470**	**217**	**238**
Transition Dyspnea Index (TDI) at Week 26 [units: Units on a scale]	**2.13 (0.240)**	**1.32 (0.289)**	**2.26 (0.281)**

Least Squares Mean (Standard Error)			

No statistical analysis provided for Transition Dyspnea Index (TDI) at Week 26

3. Secondary: Health-related Quality of Life (QoL) Assessed With the St. George Respiratory Questionnaire (SGRQ) at Week 52 [Time Frame: Week 52]

Measure Type	Secondary
Measure Title	Health-related Quality of Life (QoL) Assessed With the St. George Respiratory Questionnaire (SGRQ) at Week 52
Measure Description	The SGRQ contained 51 patient-rated items divided into three components: Symptoms (respiratory symptoms, their frequency, and severity), Activity (activities that cause or are limited by breathlessness), and Impacts (social functioning and psychological disturbances resulting from airway disease). A total score for the 3 components was calculated and ranged from 0 to 100. Higher values indicate greater impairment of QoL. The analysis included the same covariates as the primary Outcome Measure.
Time Frame	Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**499**	**248**	**251**
Health-related Quality of Life (QoL) Assessed With the St. George Respiratory Questionnaire (SGRQ) at Week 52 [units: Units on a scale] Least Squares Mean (Standard Error)	**40.85 (0.854)**	**44.16 (1.040)**	**41.32 (1.024)**

No statistical analysis provided for Health-related Quality of Life (QoL) Assessed With the St. George Respiratory Questionnaire (SGRQ) at Week 52

4. Secondary: Time to First Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52 (patients with no moderate or severe exacerbations who completed the study were censored at the final visit date, which may have exceeded 52 weeks)]

Measure Type	Secondary
Measure Title	Time to First Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52)
Measure Description	Time to first moderate or severe COPD exacerbation was calculated as the number of days from baseline to the day

	on which the patient experienced the first moderate or severe COPD exacerbation. A COPD exacerbation was considered to be moderate if treatment with systemic corticosteroids and/or antibiotic was required. A COPD exacerbation was considered to be severe if treatment for moderate severity and hospitalization was required.
Time Frame	Baseline to Week 52 (patients with no moderate or severe exacerbations who completed the study were censored at the final visit date, which may have exceeded 52 weeks)
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg

Number of Participants Analyzed [units: participants]	**525**	**268**	**267**
Time to First Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52) [units: Days] Median (Full Range)	**363.0 (1 to 402)**	**231.0 (1 to 380)**	**364.0 (1 to 423)**

No statistical analysis provided for Time to First Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52)

5. Secondary: Change From Baseline in the Mean Daily Number of Puffs of Rescue Medication Taken During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Change From Baseline in the Mean Daily Number of Puffs of Rescue Medication Taken During the Study (Baseline to Week 52)
Measure Description	The number of puffs of rescue medication taken in the previous 12 hours was recorded in the Patient Diary in the morning and evening. The mean daily number of puffs of rescue medication taken was calculated by dividing the number of puffs of rescue medication per day over the 52 weeks of the study by the number of days with non-missing rescue medication data. Rescue medication data recorded during the 14 day run-in period was used to calculate the baseline. The analysis included the same covariates as the primary Outcome Measure. A positive change score indicates more puffs taken.
Time Frame	Baseline to Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**523**	**263**	**263**
Change From Baseline in the Mean Daily Number of Puffs of Rescue Medication Taken During the Study (Baseline to Week 52) [units: Puffs] Least Squares Mean (Standard Error)	**-1.58 (0.151)**	**-1.20 (0.184)**	**-1.83 (0.183)**

No statistical analysis provided for Change From Baseline in the Mean Daily Number of Puffs of Rescue Medication Taken During the Study (Baseline to Week 52)

6. Secondary: Trough Forced Expiratory Volume in 1 Second (FEV1) at Day 1, Week 26, and Week 52 [Time Frame: Day 1, Week 26, and Week 52]

Measure Type	Secondary
Measure Title	Trough Forced Expiratory Volume in 1 Second (FEV1) at Day 1, Week 26, and Week 52
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. Trough FEV1 was defined as the average of measurements made 23 hours 15 minutes and 23 hours 45 minutes post-dose. The analysis included the same covariates as the primary Outcome Measure.
Time Frame	Day 1, Week 26, and Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**500**	**250**	**245**
Trough Forced Expiratory Volume in 1 Second (FEV1) at Day 1, Week 26, and Week 52 [units: Liters] Least Squares Mean (Standard Error)			
Day 1	**1.478 (0.0088)**	**1.388 (0.0109)**	**1.471 (0.0109)**
Week 26 (n=451, 219, 233)	**1.458 (0.0161)**	**1.324 (0.0196)**	**1.408 (0.0191)**
Week 52 (n=416, 196, 210)	**1.412 (0.0157)**	**1.303 (0.0198)**	**1.392 (0.0191)**

No statistical analysis provided for Trough Forced Expiratory Volume in 1 Second (FEV1) at Day 1, Week 26, and Week 52

7. Secondary: Trough Forced Vital Capacity (FVC) at Day 1, Week 12, Week 26, and Week 52 [Time Frame: Day 1, Week 12, Week 26, and Week 52]

Measure Type	Secondary
Measure Title	Trough Forced Vital Capacity (FVC) at Day 1, Week 12, Week 26, and Week 52
Measure Description	Trough FVC is defined as the average of the post-dose 23 h 15 min and the 23 h 45 min FVC values. Just prior to FVC measurement, patients performed normal tidal breathing. The patient was given a few breaths warning before being told “At the end of the next normal breath out, take a deep breath all the way in”; they were then verbally encouraged to make a maximal effort before relaxing. The analysis included the same covariates as the primary Outcome Measure.

Time Frame	Day 1, Week 12, Week 26, and Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**500**	**250**	**245**
Trough Forced Vital Capacity (FVC) at Day 1, Week 12, Week 26, and Week 52			

[units: Liters] Least Squares Mean (Standard Error)			
Day 1	**2.936 (0.0165)**	**2.757 (0.0205)**	**2.930 (0.0206)**
Week 12 (n=442, 204, 217)	**2.985 (0.0265)**	**2.802 (0.0329)**	**2.970 (0.0323)**
Week 26 (n=418, 196, 208)	**2.962 (0.0299)**	**2.758 (0.0361)**	**2.892 (0.0355)**
Week 52 (n=395, 186, 201)	**2.866 (0.0335)**	**2.687 (0.0399)**	**2.866 (0.0383)**

No statistical analysis provided for Trough Forced Vital Capacity (FVC) at Day 1, Week 12, Week 26, and Week 52

8. Secondary: Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 [Time Frame: 5, 15, and 30 minutes; 1, 2, 3, 4, 6, 8, 10, and 12 hours; 23 hours 15 minutes; and 23 hours 45 minutes post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52]

Measure Type	Secondary
Measure Title	Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. The analysis included the same covariates as the primary Outcome Measure. Data was not collected at all time points for all Days and Weeks.
Time Frame	5, 15, and 30 minutes; 1, 2, 3, 4, 6, 8, 10, and 12 hours; 23 hours 15 minutes; and 23 hours 45 minutes post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS), serial spirometry subgroup: A subgroup of approximately one third of all randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	**Placebo to Glycopyrronium Bromide**	**Tiotropium 18 µg**
Number of Participants Analyzed **[units: participants]**	**144**	**79**	**76**
Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 **[units: Liters]**			

Least Squares Mean (Standard Error)			
Day 1, minute 5 (n=135, 74, 74)	1.494 (0.0135)	1.416 (0.0166)	1.447 (0.0164)
Day 1, minute 15 (n=139, 75, 74)	1.548 (0.0152)	1.428 (0.0185)	1.485 (0.0185)
Day 1, minute 30 (n=143, 77, 74)	1.561 (0.0180)	1.409 (0.0218)	1.483 (0.0219)
Day 1, hour 1 (n=144, 76, 75)	1.583 (0.0172)	1.404 (0.0213)	1.514 (0.0212)
Day 1, hour 2 (n=144, 75, 75)	1.639 (0.0202)	1.445 (0.0248)	1.569 (0.0247)
Day 1, hour 3 (n=143, 74, 73)	1.629 (0.0199)	1.435 (0.0249)	1.587 (0.0248)
Day 1, hour 4 (n=144, 70, 74)	1.599 (0.0221)	1.415 (0.0281)	1.560 (0.0275)
Day 1, hour 6 (n=142, 71, 74)	1.578 (0.0204)	1.426 (0.0255)	1.575 (0.0252)
Day 1, hour 8 (n=137, 70, 75)	1.544 (0.0226)	1.431 (0.0284)	1.545 (0.0278)
Day1, hour 10 (n=134, 72, 75)	1.546 (0.0235)	1.415 (0.0290)	1.537 (0.0286)
Day 1, hour 12 (n=130, 69, 70)	1.522 (0.0254)	1.369 (0.0307)	1.480 (0.0306)
Day 1, hour 23, minute 15 (n=129, 71, 72)	1.471 (0.0214)	1.396 (0.0259)	1.481 (0.0255)
Day 1, hour 23, minute 45 (n=128, 74, 75)	1.518 (0.0210)	1.446 (0.0252)	1.499 (0.0249)
Day 15, minute 5 (n=135, 65, 73)	1.494 (0.0246)	1.421 (0.0315)	1.490 (0.0299)

Day 15, minute 15 (n=133, 70, 72)	**1.530 (0.0246)**	**1.411 (0.0307)**	**1.537 (0.0303)**
Day 15, minute 30 (n= 139, 70, 74)	**1.551 (0.0236)**	**1.417 (0.0297)**	**1.516 (0.0289)**
Day 15, hour 1 (n=140, 68, 74)	**1.575 (0.0242)**	**1.409 (0.0305)**	**1.540 (0.0296)**
Week 5, minute 5 (n=134, 66, 68)	**1.550 (0.0247)**	**1.448 (0.0319)**	**1.525 (0.0305)**
Week 5, minute 15 (n=136, 67, 70)	**1.575 (0.0239)**	**1.452 (0.0305)**	**1.543 (0.0295)**
Week 5, minute 30 (n=135, 67, 70)	**1.630 (0.0260)**	**1.481 (0.0327)**	**1.584 (0.0317)**
Week 9, minute 5 (n=128, 66, 70)	**1.562 (0.0268)**	**1.417 (0.0341)**	**1.520 (0.0326)**
Week 9, minute 15 (n=130, 66, 71)	**1.583 (0.0267)**	**1.441 (0.0340)**	**1.534 (0.0326)**
Week 9, minute 30 (n=130, 67, 71)	**1.603 (0.0265)**	**1.427 (0.0335)**	**1.549 (0.0323)**
Week 12, minute 5 (n=130, 69, 70)	**1.497 (0.0254)**	**1.385 (0.0319)**	**1.474 (0.0315)**
Week 12, minute 15 (n=129, 67, 66)	**1.523 (0.0251)**	**1.373 (0.0317)**	**1.481 (0.0315)**
Week 12, minute 30 (n=133, 69, 67)	**1.517 (0.0275)**	**1.362 (0.0336)**	**1.488 (0.0335)**
Week 12, hour 1 (n=132, 67, 69)	**1.557 (0.0273)**	**1.369 (0.0341)**	**1.519 (0.0333)**
Week 12, hour 2 (n=129, 65, 68)	**1.596 (0.0290)**	**1.434 (0.0365)**	**1.565 (0.0353)**
Week 12, hour 3 (n=126, 64, 69)	**1.600 (0.0291)**	**1.443 (0.0375)**	**1.566 (0.0353)**

Week 12, hour 4 (n=124, 64, 68)	**1.584 (0.0319)**	**1.442 (0.0407)**	**1.535 (0.0383)**
Week 12, hour 6 (n=123, 63, 69)	**1.558 (0.0321)**	**1.443 (0.0407)**	**1.520 (0.0381)**
Week 12, hour 8 (n=121, 64, 69)	**1.535 (0.0310)**	**1.408 (0.0385)**	**1.479 (0.0374)**
Week 12, hour 10 (n=124, 61, 69)	**1.541 (0.0296)**	**1.435 (0.0392)**	**1.532 (0.0365)**
Week 12, hour 12 (n=122, 58, 68)	**1.522 (0.0313)**	**1.422 (0.0417)**	**1.487 (0.0382)**
Week 12, hour 16 (n=109, 56, 57)	**1.431 (0.0320)**	**1.360 (0.0425)**	**1.378 (0.0404)**
Week 12, hour 22 (n=117, 60, 63)	**1.420 (0.0268)**	**1.349 (0.0350)**	**1.371 (0.0333)**
Week 12, hour 23, minute 15 (n=126, 66, 67)	**1.518 (0.0269)**	**1.456 (0.0345)**	**1.520 (0.0335)**
Week 12, hour 23, minute 45 (n=124, 65, 63)	**1.513 (0.0294)**	**1.470 (0.0377)**	**1.488 (0.0374)**
Week 16, minute 5 (n=123, 65, 64)	**1.538 (0.0296)**	**1.430 (0.0362)**	**1.515 (0.0359)**
Week 16, minute 15 (n=124, 65, 65)	**1.557 (0.0309)**	**1.422 (0.0380)**	**1.530 (0.0377)**
Week 16, minute 30 (n=125, 65, 65)	**1.570 (0.0303)**	**1.409 (0.0370)**	**1.535 (0.0368)**
Week 20, minute 5 (n=125, 66, 63)	**1.518 (0.0281)**	**1.393 (0.0348)**	**1.453 (0.0351)**
Week 20, minute 15 (n=124, 65, 63)	**1.535 (0.0285)**	**1.380 (0.0354)**	**1.479 (0.0356)**
	1.576 (0.0277)	**1.391 (0.0349)**	**1.502**

Week 20, minute 30 (n=125, 65, 63)			**(0.0350)**
Week 26, minute 5 (n=123, 62, 64)	**1.483 (0.0278)**	**1.361 (0.0368)**	**1.415 (0.0352)**
Week 26, minute 15 (n=121, 61, 61)	**1.521 (0.0280)**	**1.377 (0.0373)**	**1.464 (0.0358)**
Week 26, minute 30 (n=125, 64, 64)	**1.529 (0.0285)**	**1.353 (0.0372)**	**1.439 (0.0359)**
Week 26, hour 1 (n=127, 64, 64)	**1.546 (0.0275)**	**1.364 (0.0359)**	**1.462 (0.0349)**
Week 26, hour 2 (n=124, 64, 63)	**1.590 (0.0317)**	**1.422 (0.0403)**	**1.520 (0.0395)**
Week 26, hour 3 (n=124, 64, 64)	**1.614 (0.0303)**	**1.442 (0.0391)**	**1.555 (0.0380)**
Week 26, hour 4 (n=124, 64, 62)	**1.577 (0.0304)**	**1.416 (0.0384)**	**1.519 (0.0377)**
Week 26, hour 23, minute 15 (n=120, 55, 61)	**1.477 (0.0323)**	**1.374 (0.0422)**	**1.416 (0.0399)**
Week 26, hour 23, minute 45 (n=117, 56, 61)	**1.483 (0.0296)**	**1.401 (0.0395)**	**1.405 (0.0376)**
Week 34, minute 5 (n=125, 62, 63)	**1.515 (0.0293)**	**1.359 (0.0385)**	**1.407 (0.0372)**
Week 34, minute 15 (n=123, 62, 63)	**1.529 (0.0300)**	**1.360 (0.0394)**	**1.425 (0.0379)**
Week 34, minute 30 (n=125, 62, 62)	**1.567 (0.0302)**	**1.353 (0.0398)**	**1.452 (0.0385)**
Week 34, hour 1 (n=125, 62, 63)	**1.557 (0.0285)**	**1.352 (0.0376)**	**1.472 (0.0361)**
Week 42, minute 5 (n=119, 61, 58)	**1.512 (0.0305)**	**1.394 (0.0401)**	**1.490 (0.0394)**

Week 42, minute 15 (n=123, 61, 58)	**1.520 (0.0305)**	**1.412 (0.0403)**	**1.491 (0.0396)**
Week 42, minute 30 (n=123, 61, 58)	**1.537 (0.0332)**	**1.391 (0.0431)**	**1.517 (0.0424)**
Week 50, minute 5 (n=120, 60, 57)	**1.490 (0.0269)**	**1.357 (0.0348)**	**1.422 (0.0341)**
Week 50, minute 15 (n=123, 60, 57)	**1.529 (0.0285)**	**1.375 (0.0369)**	**1.452 (0.0362)**
Week 50, minute 30 (n=123, 60, 58)	**1.545 (0.0287)**	**1.368 (0.0375)**	**1.470 (0.0366)**
Week 52, minute 5 (n=124, 60, 57)	**1.456 (0.0276)**	**1.337 (0.0368)**	**1.377 (0.0359)**
Week 52, minute 15 (n=122, 59, 58)	**1.502 (0.0282)**	**1.380 (0.0378)**	**1.428 (0.0364)**
Week 52, minute 30 (n=125, 62, 58)	**1.483 (0.0280)**	**1.366 (0.0370)**	**1.407 (0.0362)**
Week 52, hour 1 (n=125, 62, 57)	**1.525 (0.0271)**	**1.356 (0.0359)**	**1.439 (0.0352)**
Week 52, hour 2 (n=124, 61, 58)	**1.554 (0.0295)**	**1.418 (0.0393)**	**1.479 (0.0382)**
Week 52, hour 3 (n=123, 62, 56)	**1.558 (0.0263)**	**1.384 (0.0349)**	**1.487 (0.0345)**
Week 52, hour 4 (n=121, 60, 55)	**1.535 (0.0297)**	**1.381 (0.0395)**	**1.468 (0.0390)**
Week 52, hour 6 (n=118, 59, 54)	**1.494 (0.0294)**	**1.370 (0.0392)**	**1.461 (0.0388)**
Week 52, hour 8 (n=119, 59, 54)	**1.473 (0.0300)**	**1.358 (0.0398)**	**1.418 (0.0394)**
Week 52, hour 10 (n=119, 59, 55)	**1.478 (0.0304)**	**1.349 (0.0397)**	**1.419**

			(0.0391)
Week 52, hour 12 (n=120, 58, 52)	**1.451 (0.0334)**	**1.369 (0.0446)**	**1.347 (0.0444)**
Week 52, hour 16 (n=117, 53, 46)	**1.377 (0.0309)**	**1.277 (0.0422)**	**1.329 (0.0420)**
Week 52, hour 22 (n=118, 60, 52)	**1.391 (0.0302)**	**1.314 (0.0397)**	**1.282 (0.0396)**
Week 52, hour 23, 15 minutes (n=121, 62, 57)	**1.447 (0.0287)**	**1.362 (0.0378)**	**1.387 (0.0371)**
Week 52, hour 23, 45 minutes (n=122, 61, 57)	**1.434 (0.0281)**	**1.337 (0.0372)**	**1.359 (0.0364)**

No statistical analysis provided for Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52

9. Secondary: Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 [Time Frame: 5, 15, and 30 minutes; 1, 2, 3, 4, 6, 8, 10, and 12 hours; 23 hours 15 minutes; and 23 hours 45 minutes post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52]

Measure Type	Secondary
Measure Title	Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52
Measure Description	Just prior to FVC measurement, patients performed normal tidal breathing. The patient was given a few breaths warning before being told “At the end of the next normal breath out, take a deep breath all the way in”; they were then verbally encouraged to make a maximal effort before relaxing. The analysis included the same covariates as the primary Outcome Measure. Data was not collected at all time points for all Days and Weeks.
Time Frame	5, 15, and 30 minutes; 1, 2, 3, 4, 6, 8, 10, and 12 hours; 23 hours 15 minutes; and 23 hours 45 minutes post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52

Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS), serial spirometry subgroup: A subgroup of approximately one third of all randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**144**	**79**	**76**
Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9,			

12, 16, 20, 26, 34, 42, 50, and 52 [units: Liters] Least Squares Mean (Standard Error)			
Day 1, minute 5 (n=135, 74, 74)	3.027 (0.0304)	2.826 (0.0363)	2.956 (0.0363)
Day 1, minute 15 (n=139, 75, 74)	3.050 (0.0335)	2.802 (0.0403)	2.991 (0.0406)
Day 1, minute 30 (n=143, 77, 74)	3.055 (0.0343)	2.752 (0.0416)	2.979 (0.0422)
Day 1, hour 1 (n=144, 76, 75)	3.148 (0.0377)	2.791 (0.0460)	3.041 (0.0463)
Day 1, hour 2 (n=144, 75, 75)	3.179 (0.0373)	2.802 (0.0460)	3.049 (0.0461)
Day 1, hour 3 (n=143, 74, 73)	3.190 (0.0433)	2.826 (0.0526)	3.119 (0.0531)
Day 1, hour 4 (n=144, 70, 74)	3.138 (0.0414)	2.783 (0.0515)	3.102 (0.0512)
Day 1, hour 6 (n=142, 71, 74)	3.173 (0.0419)	2.846 (0.0514)	3.148 (0.0513)
Day 1, hour 8 (n=137, 70, 75)	3.071 (0.0404)	2.804 (0.0506)	3.074 (0.0498)
Day1, hour 10 (n=134, 72, 75)	3.134 (0.0414)	2.865 (0.0514)	3.119 (0.0510)
Day 1, hour 12 (n=130, 69, 70)	3.030 (0.0444)	2.709 (0.0535)	3.012 (0.0537)
Day 1, hour 23, minute 15 (n=129, 71, 72)	2.991 (0.0385)	2.800 (0.0478)	2.988 (0.0471)
Day 1, hour 23, minute 45 (n=128, 74, 75)	3.014 (0.0364)	2.817 (0.0444)	2.994 (0.0442)

Day 15, minute 5 (n=135, 65, 73)	**3.051 (0.0439)**	**2.793 (0.0553)**	**3.014 (0.0534)**
Day 15, minute 15 (n=133, 70, 72)	**3.103 (0.0443)**	**2.790 (0.0536)**	**3.103 (0.0536)**
Day 15, minute 30 (n= 139, 70, 74)	**3.134 (0.0420)**	**2.825 (0.0519)**	**3.078 (0.0513)**
Day 15, hour 1 (n=140, 68, 74)	**3.152 (0.0434)**	**2.770 (0.0537)**	**3.060 (0.0528)**
Week 5, minute 5 (n=134, 66, 68)	**3.139 (0.0430)**	**2.866 (0.0551)**	**3.071 (0.0534)**
Week 5, minute 15 (n=136, 67, 70)	**3.165 (0.0501)**	**2.850 (0.0611)**	**3.092 (0.0602)**
Week 5, minute 30 (n=135, 67, 70)	**3.248 (0.0540)**	**2.884 (0.0644)**	**3.180 (0.0636)**
Week 9, minute 5 (n=128, 66, 70)	**3.195 (0.0543)**	**2.826 (0.0644)**	**3.097 (0.0632)**
Week 9, minute 15 (n=130, 66, 71)	**3.167 (0.0507)**	**2.823 (0.0615)**	**3.101 (0.0603)**
Week 9, minute 30 (n=130, 67, 71)	**3.231 (0.0567)**	**2.821 (0.0675)**	**3.149 (0.0664)**
Week 12, minute 5 (n=130, 69, 70)	**3.060 (0.0492)**	**2.728 (0.0596)**	**3.023 (0.0596)**
Week 12, minute 15 (n=129, 67, 66)	**3.081 (0.0482)**	**2.740 (0.0588)**	**3.018 (0.0593)**
Week 12, minute 30 (n=133, 69, 67)	**3.058 (0.0479)**	**2.696 (0.0585)**	**3.027 (0.0591)**
Week 12, hour 1 (n=132, 67, 69)	**3.164 (0.0543)**	**2.737 (0.0663)**	**3.098 (0.0655)**
Week 12, hour 2 (n=129, 65, 68)	**3.190 (0.0526)**	**2.784 (0.0664)**	**3.155 (0.0649)**

Week 12, hour 3 (n=126, 64, 69)	**3.240 (0.0569)**	**2.864 (0.0713)**	**3.146 (0.0685)**
Week 12, hour 4 (n=124, 64, 68)	**3.119 (0.0576)**	**2.745 (0.0714)**	**3.084 (0.0686)**
Week 12, hour 6 (n=123, 63, 69)	**3.158 (0.0594)**	**2.852 (0.0731)**	**3.120 (0.0700)**
Week 12, hour 8 (n=121, 64, 69)	**3.083 (0.0534)**	**2.760 (0.0657)**	**3.011 (0.0644)**
Week 12, hour 10 (n=124, 61, 69)	**3.130 (0.0581)**	**2.860 (0.0722)**	**3.117 (0.0692)**
Week 12, hour 12 (n=122, 58, 68)	**3.072 (0.0599)**	**2.771 (0.0770)**	**3.020 (0.0722)**
Week 12, hour 16 (n=109, 56, 57)	**2.933 (0.0645)**	**2.701 (0.0800)**	**2.880 (0.0785)**
Week 12, hour 22 (n=117, 60, 63)	**2.924 (0.0517)**	**2.673 (0.0647)**	**2.870 (0.0629)**
Week 12, hour 23, minute 15 (n=126, 66, 67)	**3.091 (0.0548)**	**2.862 (0.0676)**	**3.110 (0.0671)**
Week 12, hour 23, minute 45 (n=124, 65, 63)	**3.055 (0.0507)**	**2.826 (0.0630)**	**3.004 (0.0638)**
Week 16, minute 5 (n=123, 65, 64)	**3.156 (0.0608)**	**2.864 (0.0719)**	**3.104 (0.0723)**
Week 16, minute 15 (n=124, 65, 65)	**3.156 (0.0576)**	**2.801 (0.0695)**	**3.082 (0.0699)**
Week 16, minute 30 (n=125, 65, 65)	**3.198 (0.0552)**	**2.815 (0.0676)**	**3.112 (0.0679)**
Week 20, minute 5 (n=125, 66, 63)	**3.093 (0.0526)**	**2.781 (0.0630)**	**2.993 (0.0643)**

Week 20, minute 15 (n=124, 65, 63)	**3.112 (0.0545)**	**2.770 (0.0655)**	**3.029 (0.0666)**
Week 20, minute 30 (n=125, 65, 63)	**3.157 (0.0559)**	**2.778 (0.0677)**	**3.050 (0.0688)**
Week 26, minute 5 (n=123, 62, 64)	**2.994 (0.0528)**	**2.700 (0.0670)**	**2.954 (0.0658)**
Week 26, minute 15 (n=121, 61, 61)	**3.041 (0.0513)**	**2.692 (0.0652)**	**2.976 (0.0644)**
Week 26, minute 30 (n=125, 64, 64)	**3.054 (0.0464)**	**2.700 (0.0597)**	**2.994 (0.0589)**
Week 26, hour 1 (n=127, 64, 64)	**3.077 (0.0520)**	**2.678 (0.0658)**	**3.016 (0.0651)**
Week 26, hour 2 (n=124, 64, 63)	**3.110 (0.0516)**	**2.771 (0.0655)**	**3.080 (0.0650)**
Week 26, hour 3 (n=124, 64, 64)	**3.210 (0.0648)**	**2.871 (0.0765)**	**3.176 (0.0762)**
Week 26, hour 4 (n=124, 64, 62)	**3.111 (0.0551)**	**2.791 (0.0664)**	**3.086 (0.0664)**
Week 26, hour 23, minute 15 (n=120, 55, 61)	**3.056 (0.0600)**	**2.803 (0.0749)**	**2.932 (0.0721)**
Week 26, hour 23, minute 45 (n=117, 56, 61)	**2.998 (0.0512)**	**2.752 (0.0667)**	**2.895 (0.0646)**
Week 34, minute 5 (n=125, 62, 63)	**3.023 (0.0573)**	**2.731 (0.0715)**	**2.881 (0.0706)**
Week 34, minute 15 (n=123, 62, 63)	**3.016 (0.0553)**	**2.731 (0.0691)**	**2.898 (0.0683)**
Week 34, minute 30 (n=125, 62, 62)	**3.081 (0.0555)**	**2.687 (0.0715)**	**2.971 (0.0708)**
Week 34, hour 1 (n=125, 62, 63)	**3.072 (0.0564)**	**2.703 (0.0707)**	**2.963 (0.0699)**

Week 42, minute 5 (n=119, 61, 58)	**3.033 (0.0583)**	**2.716 (0.0744)**	**3.069 (0.0746)**
Week 42, minute 15 (n=123, 61, 58)	**3.022 (0.0539)**	**2.695 (0.0706)**	**3.065 (0.0699)**
Week 42, minute 30 (n=123, 61, 58)	**3.057 (0.0565)**	**2.723 (0.0734)**	**3.098 (0.0734)**
Week 50, minute 5 (n=120, 60, 57)	**3.022 (0.0596)**	**2.731 (0.0727)**	**2.963 (0.0726)**
Week 50, minute 15 (n=123, 60, 57)	**3.042 (0.0592)**	**2.702 (0.0726)**	**2.937 (0.0725)**
Week 50, minute 30 (n=123, 60, 58)	**3.094 (0.0613)**	**2.731 (0.0749)**	**2.985 (0.0747)**
Week 52, minute 5 (n=124, 60, 57)	**2.940 (0.0551)**	**2.645 (0.0701)**	**2.860 (0.0702)**
Week 52, minute 15 (n=122, 59, 58)	**2.960 (0.0518)**	**2.640 (0.0675)**	**2.935 (0.0666)**
Week 52, minute 30 (n=125, 62, 58)	**2.939 (0.0499)**	**2.625 (0.0650)**	**2.929 (0.0652)**
Week 52, hour 1 (n=125, 62, 57)	**3.031 (0.0564)**	**2.617 (0.0698)**	**2.980 (0.0704)**
Week 52, hour 2 (n=124, 61, 58)	**3.062 (0.0556)**	**2.714 (0.0689)**	**3.021 (0.0689)**
Week 52, hour 3 (n=123, 62, 56)	**3.108 (0.0648)**	**2.716 (0.0766)**	**3.053 (0.0779)**
Week 52, hour 4 (n=121, 60, 55)	**3.021 (0.0585)**	**2.694 (0.0724)**	**2.978 (0.0735)**
Week 52, hour 6 (n=118, 59, 54)	**2.986 (0.0614)**	**2.690 (0.0770)**	**2.982 (0.0781)**
	2.961 (0.0646)	**2.637 (0.0793)**	**2.942**

Week 52, hour 8 (n=119, 59, 54)			**(0.0805)**
Week 52, hour 10 (n=119, 59, 55)	**3.000 (0.0701)**	**2.687 (0.0840)**	**3.012 (0.0844)**
Week 52, hour 12 (n=120, 58, 52)	**2.881 (0.0631)**	**2.636 (0.0831)**	**2.849 (0.0847)**
Week 52, hour 16 (n=117, 53, 46)	**2.857 (0.0694)**	**2.542 (0.0857)**	**2.772 (0.0873)**
Week 52, hour 22 (n=118, 60, 52)	**2.812 (0.0670)**	**2.604 (0.0810)**	**2.716 (0.0827)**
Week 52, hour 23, 15 minutes (n=121, 62, 57)	**2.888 (0.0595)**	**2.678 (0.0751)**	**2.852 (0.0755)**
Week 52, hour 23, 45 minutes (n=122, 61, 57)	**2.855 (0.0558)**	**2.607 (0.0700)**	**2.797 (0.0702)**

No statistical analysis provided for Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; 1, 2, 3, 4, 6, 8, 10, and 12 Hours; 23 Hours 15 Minutes; and 23 Hours 45 Minutes Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52

10. Secondary: Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post Dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 [Time Frame: 5, 15, and 30 minutes; and 1, 2, 3, 4 hours post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52]

Measure Type	Secondary
Measure Title	Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post Dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. The analysis included the same covariates as the primary Outcome Measure. Data was not collected at all time points for all Days and Weeks.
	5, 15, and 30 minutes; and 1, 2, 3, 4 hours post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50,

Time Frame	and 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**525**	**268**	**267**

Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post Dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 [units: Liters] Least Squares Mean (Standard Error)			
Day 1, minute 5 (n=495, 255, 253)	1.443 (0.0067)	1.357 (0.0081)	1.402 (0.0081)
Day 1, minute 15 (n=502, 255, 254)	1.501 (0.0074)	1.359 (0.0090)	1.437 (0.0090)
Day 1, minute 30 (n=507, 252, 254)	1.524 (0.0103)	1.357 (0.0126)	1.468 (0.0125)
Day 1, hour 1 (n=511, 256, 254)	1.552 (0.0082)	1.353 (0.0101)	1.484 (0.0101)
Day 1, hour 2 (n=513, 253, 252)	1.612 (0.0090)	1.397 (0.0113)	1.549 (0.0112)
Day 1, hour 3 (n=510, 248, 252)	1.590 (0.0088)	1.389 (0.0111)	1.560 (0.0109)
Day 1, hour 4 (n=504, 239, 250)	1.590 (0.0095)	1.396 (0.0121)	1.549 (0.0117)
Day 1, hour 23, minute 15 (n=481, 243, 239)	1.459 (0.0093)	1.364 (0.0115)	1.457 (0.0115)
Day 1, hour 23, minute 45 (n=474, 239, 232)	1.482 (0.0094)	1.390 (0.0117)	1.473 (0.0118)
Day 15, minute 5 (n=498, 223, 243)	1.491 (0.0123)	1.368 (0.0157)	1.472 (0.0151)
Day 15, minute 15 (n=487, 229, 239)	1.527 (0.0123)	1.371 (0.0154)	1.514 (0.0151)
Day 15, minute 30 (n=503, 233, 242)	1.538 (0.0122)	1.368 (0.0152)	1.504 (0.0150)
Day 15, hour 1 (n=501, 229, 240)	1.561 (0.0121)	1.379 (0.0153)	1.525 (0.0150)

Week 5, minute 5 (n=476, 221, 231)	**1.509 (0.0125)**	**1.371 (0.0161)**	**1.488 (0.0157)**
Week 5, minute 15 (n=479, 222, 234)	**1.538 (0.0126)**	**1.389 (0.0162)**	**1.508 (0.0157)**
Week 5, minute 30 (n=480, 223, 234)	**1.564 (0.0129)**	**1.396 (0.0165)**	**1.525 (0.0160)**
Week 9, minute 5 (n=454, 217, 227)	**1.529 (0.0126)**	**1.366 (0.0159)**	**1.499 (0.0157)**
Week 9, minute 15 (n=459, 220, 225)	**1.550 (0.0132)**	**1.376 (0.0164)**	**1.515 (0.0163)**
Week 9, minute 30 (n=460, 220, 226)	**1.569 (0.0125)**	**1.378 (0.0158)**	**1.531 (0.0157)**
Week 12, minute 5 (n=453, 212, 230)	**1.502 (0.0136)**	**1.349 (0.0173)**	**1.477 (0.0167)**
Week 12, minute 15 (n=448, 205, 222)	**1.527 (0.0131)**	**1.352 (0.0171)**	**1.501 (0.0166)**
Week 12, minute 30 (n=455, 212, 226)	**1.522 (0.0139)**	**1.352 (0.0176)**	**1.491 (0.0170)**
Week 12, hour 1 (n=455, 210, 227)	**1.556 (0.0139)**	**1.364 (0.0178)**	**1.528 (0.0171)**
Week 12, hour 2 (n=446, 207, 225)	**1.595 (0.0145)**	**1.423 (0.0185)**	**1.558 (0.0178)**
Week 12, hour 3 (n=444, 204, 225)	**1.592 (0.0145)**	**1.414 (0.0186)**	**1.561 (0.0177)**
Week 12, hour 4 (n=437, 202, 224)	**1.558 (0.0152)**	**1.416 (0.0193)**	**1.534 (0.0183)**
Week 12, hour 23, minute 15 (n=430, 200, 214)	**1.481 (0.0143)**	**1.381 (0.0183)**	**1.457 (0.0177)**
Week 12, hour 23, minute 45 (n=426, 195, 205)	**1.493 (0.0149)**	**1.413 (0.0190)**	**1.472**

			(0.0187)
Week 16, minute 5 (n=429, 207, 218)	**1.514 (0.0151)**	**1.373 (0.0185)**	**1.487 (0.0181)**
Week 16, minute 15 (n=428, 209, 219)	**1.530 (0.0155)**	**1.372 (0.0189)**	**1.491 (0.0186)**
Week 16, minute 30 (n=433, 209, 220)	**1.546 (0.0160)**	**1.372 (0.0194)**	**1.505 (0.0190)**
Week 20, minute 5 (n=430, 206, 218)	**1.495 (0.0159)**	**1.351 (0.0198)**	**1.464 (0.0192)**
Week 20, minute 15 (n=430, 207, 220)	**1.525 (0.0164)**	**1.362 (0.0203)**	**1.495 (0.0196)**
Week 20, minute 30 (n=431, 207, 221)	**1.544 (0.0164)**	**1.362 (0.0203)**	**1.498 (0.0195)**
Week 26, minute 5 (421, 202, 213)	**1.479 (0.0153)**	**1.339 (0.0189)**	**1.429 (0.0185)**
Week 26, minute 15 (n=414, 200, 207)	**1.504 (0.0155)**	**1.340 (0.0193)**	**1.458 (0.0191)**
Week 26, minute 30 (n=424, 206, 213)	**1.513 (0.0161)**	**1.341 (0.0196)**	**1.451 (0.0193)**
Week 26, hour 1 (n=425, 206, 212)	**1.541 (0.0160)**	**1.345 (0.0193)**	**1.487 (0.0190)**
Week 26, hour 2 (n=420, 203, 208)	**1.570 (0.0176)**	**1.388 (0.0212)**	**1.524 (0.0210)**
Week 26, hour 3 (n=416, 204, 213)	**1.570 (0.0181)**	**1.398 (0.0216)**	**1.526 (0.0211)**
Week 26, hour 4 (n=416, 203, 208)	**1.547 (0.0175)**	**1.384 (0.0211)**	**1.504 (0.0208)**
Week 26, hour 23, minute 15 (n=405, 187, 202)	**1.464 (0.0175)**	**1.326 (0.0217)**	**1.415 (0.0212)**

Week 26, hour 23, minute 45 (n=401, 185, 198)	**1.474 (0.0175)**	**1.354 (0.0218)**	**1.426 (0.0215)**
Week 34, minute 5 (n=408, 194, 212)	**1.481 (0.0167)**	**1.338 (0.0210)**	**1.422 (0.0202)**
Week 34, minute 15 (n=407, 191, 214)	**1.508 (0.0172)**	**1.333 (0.0215)**	**1.443 (0.0206)**
Week 34, minute 30 (n=410, 196, 215)	**1.518 (0.0172)**	**1.331 (0.0214)**	**1.444 (0.0206)**
Week 34, hour 1 (n=412, 195, 215)	**1.534 (0.0171)**	**1.331 (0.0213)**	**1.464 (0.0205)**
Week 42, minute 5 (n=398, 189, 199)	**1.489 (0.0172)**	**1.342 (0.0218)**	**1.459 (0.0213)**
Week 42, minute 15 (n=405, 188, 201)	**1.511 (0.0171)**	**1.344 (0.0218)**	**1.477 (0.0211)**
Week 42, minute 30 (n=405, 189, 201)	**1.518 (0.0183)**	**1.350 (0.0229)**	**1.496 (0.0222)**
Week 50, minute 5 (n=386, 185, 199)	**1.454 (0.0155)**	**1.336 (0.0197)**	**1.429 (0.0190)**
Week 50, minute 15 (n=391, 187, 203)	**1.496 (0.0156)**	**1.341 (0.0199)**	**1.462 (0.0192)**
Week 50, minute 30 (n=392, 186, 204)	**1.504 (0.0166)**	**1.341 (0.0210)**	**1.475 (0.0200)**
Week 52, minute 5 (n=401, 188, 197)	**1.436 (0.0155)**	**1.305 (0.0200)**	**1.419 (0.0195)**
Week 52, minute 15 (n=394, 183, 200)	**1.471 (0.0159)**	**1.323 (0.0208)**	**1.451 (0.0198)**
Week 52, minute 30 (n=402, 189, 202)	**1.471 (0.0164)**	**1.319 (0.0209)**	**1.451 (0.0202)**
Week 52, hour 1 (n=404, 190, 201)	**1.499 (0.0161)**	**1.325 (0.0205)**	**1.482 (0.0198)**

Week 52, hour 2 (n=402, 186, 202)	**1.526 (0.0177)**	**1.363 (0.0224)**	**1.511 (0.0214)**
Week 52, hour 3 (n=400, 186, 199)	**1.525 (0.0171)**	**1.344 (0.0215)**	**1.509 (0.0207)**
Week 52, hour 4 (n=397, 184, 199)	**1.504 (0.0176)**	**1.346 (0.0222)**	**1.501 (0.0213)**
Week 52, hour 23, minute 15 (n=388, 183, 198)	**1.419 (0.0169)**	**1.303 (0.0215)**	**1.397 (0.0205)**
Week 52, hour 23, minute 45 (n=395, 185, 199)	**1.424 (0.0165)**	**1.320 (0.0210)**	**1.411 (0.0201)**

No statistical analysis provided for Forced Expiratory Volume in 1 Second (FEV1) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post Dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52

11. Secondary: Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 [Time Frame: 5, 15, and 30 minutes; and 1, 2, 3, 4 hours post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52]

Measure Type	Secondary
Measure Title	Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52
Measure Description	Just prior to FVC measurement, patients performed normal tidal breathing. The patient was given a few breaths warning before being told “At the end of the next normal breath out, take a deep breath all the way in”; they were then verbally encouraged to make a maximal effort before relaxing. The analysis included the same covariates as the primary Outcome Measure. Data was not collected at all time points for all Days and Weeks.
Time Frame	5, 15, and 30 minutes; and 1, 2, 3, 4 hours post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	**Placebo to Glycopyrronium Bromide**	**Tiotropium 18 µg**
Number of Participants Analyzed **[units: participants]**	**525**	**268**	**267**
Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52 **[units: Liters]** **Least Squares Mean (Standard Error)**			

Day 1, minute 5 (n=495, 255, 253)	**2.915 (0.0145)**	**2.731 (0.0174)**	**2.856 (0.0174)**
Day 1, minute 15 (n=502, 255, 254)	**2.982 (0.0164)**	**2.719 (0.0199)**	**2.903 (0.0198)**
Day 1, minute 30 (n=507, 252, 254)	**3.004 (0.0177)**	**2.692 (0.0219)**	**2.937 (0.0217)**
Day 1, hour 1 (n=511, 256, 254)	**3.074 (0.0173)**	**2.732 (0.0214)**	**2.975 (0.0213)**
Day 1, hour 2 (n=513, 253, 252)	**3.119 (0.0182)**	**2.762 (0.0227)**	**3.033 (0.0226)**
Day 1, hour 3 (n=510, 248, 252)	**3.129 (0.0193)**	**2.811 (0.0243)**	**3.073 (0.0239)**
Day 1, hour 4 (n=504, 239, 250)	**3.076 (0.0192)**	**2.767 (0.0244)**	**3.031 (0.0237)**
Day 1, hour 23, minute 15 (n=481, 243, 239)	**2.926 (0.0178)**	**2.745 (0.0220)**	**2.923 (0.0220)**
Day 1, hour 23, minute 45 (n=474, 239, 232)	**2.930 (0.0178)**	**2.749 (0.0221)**	**2.923 (0.0224)**
Day 15, minute 5 (n=498, 223, 243)	**2.984 (0.0222)**	**2.760 (0.0282)**	**2.980 (0.0272)**
Day 15, minute 15 (n=487, 229, 239)	**3.016 (0.0220)**	**2.748 (0.0274)**	**3.030 (0.0270)**
Day 15, minute 30 (n=503, 233, 242)	**3.028 (0.0212)**	**2.756 (0.0269)**	**3.018 (0.0265)**
Day 15, hour 1 (n=501, 229, 240)	**3.068 (0.0213)**	**2.757 (0.0271)**	**3.023 (0.0267)**
Week 5, minute 5 (n=476, 221, 231)	**3.004 (0.0215)**	**2.768 (0.0277)**	**3.011 (0.0270)**
Week 5, minute 15 (n=479, 222, 234)	**3.024 (0.0234)**	**2.771 (0.0294)**	**3.024 (0.0286)**

Week 5, minute 30 (n=480, 223, 234)	**3.085 (0.0243)**	**2.804 (0.0305)**	**3.063 (0.0297)**
Week 9, minute 5 (n=454, 217, 227)	**3.047 (0.0262)**	**2.767 (0.0313)**	**3.029 (0.0309)**
Week 9, minute 15 (n=459, 220, 225)	**3.050 (0.0257)**	**2.764 (0.0312)**	**3.046 (0.0311)**
Week 9, minute 30 (n=460, 220, 226)	**3.079 (0.0265)**	**2.768 (0.0322)**	**3.079 (0.0319)**
Week 12, minute 5 (n=453, 212, 230)	**2.991 (0.0253)**	**2.726 (0.0313)**	**2.978 (0.0304)**
Week 12, minute 15 (n=448, 205, 222)	**3.003 (0.0252)**	**2.735 (0.0316)**	**3.004 (0.0307)**
Week 12, minute 30 (n=455, 212, 226)	**2.985 (0.0251)**	**2.707 (0.0314)**	**2.987 (0.0306)**
Week 12, hour 1 (n=455, 210, 227)	**3.062 (0.0267)**	**2.741 (0.0333)**	**3.048 (0.0322)**
Week 12, hour 2 (n=446, 207, 225)	**3.093 (0.0266)**	**2.801 (0.0335)**	**3.065 (0.0324)**
Week 12, hour 3 (n=444, 204, 225)	**3.129 (0.0275)**	**2.839 (0.0346)**	**3.096 (0.0332)**
Week 12, hour 4 (n=437, 202, 224)	**3.050 (0.0278)**	**2.793 (0.0349)**	**3.054 (0.0333)**
Week 12, hour 23, minute 15 (n=430, 200, 214)	**2.991 (0.0282)**	**2.799 (0.0349)**	**2.985 (0.0341)**
Week 12, hour 23, minute 45 (n=426, 195, 205)	**2.977 (0.0268)**	**2.799 (0.0336)**	**2.946 (0.0332)**
Week 16, minute 5 (n=429, 207, 218)	**3.016 (0.0301)**	**2.753 (0.0362)**	**3.009 (0.0355)**
Week 16, minute 15 (n=428, 209, 219)	**3.029 (0.0293)**	**2.737 (0.0353)**	**3.002**

			(0.0348)
Week 16, minute 30 (n=433, 209, 220)	3.063 (0.0298)	2.747 (0.0359)	3.036 (0.0353)
Week 20, minute 5 (n=430, 206, 218)	2.985 (0.0286)	2.744 (0.0349)	2.966 (0.0338)
Week 20, minute 15 (n=430, 207, 220)	3.020 (0.0293)	2.749 (0.0356)	2.994 (0.0345)
Week 20, minute 30 (n=431, 207, 221)	3.058 (0.0309)	2.774 (0.0374)	3.028 (0.0362)
Week 26, minute 5 (421, 202, 213)	2.956 (0.0289)	2.733 (0.0352)	2.945 (0.0345)
Week 26, minute 15 (n=414, 200, 207)	2.980 (0.0298)	2.713 (0.0363)	2.959 (0.0360)
Week 26, minute 30 (n=424, 206, 213)	2.983 (0.0282)	2.715 (0.0342)	2.949 (0.0337)
Week 26, hour 1 (n=425, 206, 212)	3.034 (0.0293)	2.721 (0.0352)	2.997 (0.0346)
Week 26, hour 2 (n=420, 203, 208)	3.049 (0.0308)	2.777 (0.0370)	3.036 (0.0366)
Week 26, hour 3 (n=416, 204, 213)	3.097 (0.0331)	2.831 (0.0389)	3.065 (0.0381)
Week 26, hour 4 (n=416, 203, 208)	3.022 (0.0312)	2.776 (0.0369)	3.021 (0.0364)
Week 26, hour 23, minute 15 (n=405, 187, 202)	2.971 (0.0321)	2.758 (0.0387)	2.901 (0.0379)
Week 26, hour 23, minute 45 (n=401, 185, 198)	2.952 (0.0305)	2.759 (0.0373)	2.883 (0.0368)
Week 34, minute 5 (n=408, 194, 212)	2.967 (0.0321)	2.713 (0.0387)	2.919 (0.0374)

Week 34, minute 15 (n=407, 191, 214)	**2.983 (0.0327)**	**2.718 (0.0392)**	**2.948 (0.0376)**
Week 34, minute 30 (n=410, 196, 215)	**3.002 (0.0333)**	**2.690 (0.0400)**	**2.947 (0.0386)**
Week 34, hour 1 (n=412, 195, 215)	**3.014 (0.0336)**	**2.711 (0.0400)**	**2.959 (0.0385)**
Week 42, minute 5 (n=398, 189, 199)	**2.982 (0.0344)**	**2.727 (0.0415)**	**2.983 (0.0406)**
Week 42, minute 15 (n=405, 188, 201)	**3.001 (0.0336)**	**2.713 (0.0410)**	**3.001 (0.0398)**
Week 42, minute 30 (n=405, 189, 201)	**3.016 (0.0345)**	**2.734 (0.0419)**	**3.021 (0.0408)**
Week 50, minute 5 (n=386, 185, 199)	**2.925 (0.0328)**	**2.729 (0.0393)**	**2.942 (0.0381)**
Week 50, minute 15 (n=391, 187, 203)	**2.971 (0.0330)**	**2.729 (0.0398)**	**2.962 (0.0384)**
Week 50, minute 30 (n=392, 186, 204)	**2.999 (0.0342)**	**2.731 (0.0409)**	**2.998 (0.0394)**
Week 52, minute 5 (n=401, 188, 197)	**2.899 (0.0309)**	**2.673 (0.0377)**	**2.916 (0.0367)**
Week 52, minute 15 (n=394, 183, 200)	**2.942 (0.0314)**	**2.701 (0.0389)**	**2.969 (0.0371)**
Week 52, minute 30 (n=402, 189, 202)	**2.923 (0.0325)**	**2.666 (0.0391)**	**2.962 (0.0378)**
Week 52, hour 1 (n=404, 190, 201)	**2.992 (0.0339)**	**2.696 (0.0405)**	**3.011 (0.0393)**
Week 52, hour 2 (n=402, 186, 202)	**2.997 (0.0354)**	**2.727 (0.0421)**	**3.005 (0.0405)**
Week 52, hour 3 (n=400, 186, 199)	**3.029 (0.0359)**	**2.742 (0.0427)**	**3.020 (0.0413)**

Week 52, hour 4 (n=397, 184, 199)	**2.984 (0.0359)**	**2.725 (0.0425)**	**2.991 (0.0410)**
Week 52, hour 23, minute 15 (n=388, 183, 198)	**2.866 (0.0349)**	**2.675 (0.0419)**	**2.865 (0.0402)**
Week 52, hour 23, minute 45 (n=395, 185, 199)	**2.869 (0.0342)**	**2.694 (0.0406)**	**2.868 (0.0390)**

No statistical analysis provided for Forced Vital Capacity (FVC) 5, 15, and 30 Minutes; and 1, 2, 3, and 4 Hours Post-dose at Days 1 and 15; and Weeks 5, 9, 12, 16, 20, 26, 34, 42, 50, and 52

12. Secondary: Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 4 Hours Post-dose at Day 1 and Weeks 12, 26, and 52 [Time Frame: From 5 minutes to 4 hours post-dose at Day 1 and Weeks 12, 26, and 52]

Measure Type	Secondary
Measure Title	Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 4 Hours Post-dose at Day 1 and Weeks 12, 26, and 52
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. Measurements were made at 5, 15, and 30 minutes; and 1, 2, 3, and 4 hours post-dose. Standardized FEV1 AUC was calculated by the trapezoidal rule. The analysis included the same covariates as the primary Outcome Measure.
Time Frame	From 5 minutes to 4 hours post-dose at Day 1 and Weeks 12, 26, and 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**519**	**266**	**264**
Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 4 Hours Post-dose at Day 1 and Weeks 12, 26, and 52 [units: Liters] Least Squares Mean (Standard Error)			
Day 1	**1.570 (0.0075)**	**1.373 (0.0092)**	**1.514 (0.0092)**
Week 12 (n=460, 214, 232)	**1.560 (0.0134)**	**1.384 (0.0170)**	**1.531 (0.0164)**
Week 26 (n=430, 206, 216)	**1.546 (0.0160)**	**1.369 (0.0194)**	**1.495**

			(0.0190)
Week 52 (n=405, 192, 203)	**1.502 (0.0162)**	**1.336 (0.0203)**	**1.487 (0.0196)**

No statistical analysis provided for Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 4 Hours Post-dose at Day 1 and Weeks 12, 26, and 52

13. Secondary: Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 12 Hours Post-dose at Day 1 and Weeks 12 and 52 [Time Frame: From 5 minutes to 12 hours post-dose at Day 1 and Weeks 12 and 52]

Measure Type	Secondary
Measure Title	Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 12 Hours Post-dose at Day 1 and Weeks 12 and 52
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. Measurements were made at 5, 15, and 30 minutes; and 1, 2, 3, 4, 6, 8 10, and 12 hours post-dose. Standardized FEV1 AUC was calculated by the trapezoidal rule. The analysis included the same covariates as the primary Outcome Measure.
Time Frame	From 5 minutes to 12 hours post-dose at Day 1 and Weeks 12 and 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS), serial spirometry subgroup: A subgroup of approximately one third of all randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description

Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**144**	**77**	**76**
Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 12 Hours Post-dose at Day 1 and Weeks 12 and 52 [units: Liters] Least Squares Mean (Standard Error)			
Day 1	**1.566 (0.0168)**	**1.407 (0.0207)**	**1.534 (0.0206)**
Week 12 (n=133, 69, 70)	**1.539 (0.0261)**	**1.398 (0.0324)**	**1.505 (0.0320)**
Week 52 (n=125, 62, 58)	**1.492 (0.0265)**	**1.364 (0.0352)**	**1.424 (0.0344)**

No statistical analysis provided for Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the

Curve (AUC) From 5 Minutes to 12 Hours Post-dose at Day 1 and Weeks 12 and 52

14. Secondary: Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 23 Hours 45 Minutes and From 12 Hours to 23 Hours 45 Minutes Post-dose at Weeks 12 and 52 [Time Frame: From 5 minutes to 23 hours 45 minutes post-dose at Weeks 12 and 52]

Measure Type	Secondary
Measure Title	Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 23 Hours 45 Minutes and From 12 Hours to 23 Hours 45 Minutes Post-dose at Weeks 12 and 52
Measure Description	FEV1 was measured with spirometry conducted according to internationally accepted standards. Measurements were made at 5, 15, and 30 minutes; 1, 2, 3, 4, 6, 8, 10, and 12 hours; 23 hours 15 minutes; and 23 hours 45 minutes post-dose. Standardized FEV1 AUC was calculated by the trapezoidal rule. The analysis included the same covariates as the primary Outcome Measure.
Time Frame	From 5 minutes to 23 hours 45 minutes post-dose at Weeks 12 and 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS), serial spirometry subgroup: A subgroup of approximately one third of all randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**133**	**69**	**70**
Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 23 Hours 45 Minutes and From 12 Hours to 23 Hours 45 Minutes Post-dose at Weeks 12 and 52 [units: Liters] Least Squares Mean (Standard Error)			
Week 12	**1.486 (0.0236)**	**1.380 (0.0298)**	**1.459 (0.0294)**
Week 52 (n=125, 62, 58)	**1.445 (0.0261)**	**1.339 (0.0346)**	**1.379 (0.0338)**

No statistical analysis provided for Forced Expiratory Volume in 1 Second (FEV1) Standardized (With Respect to Length of Time) Area Under the Curve (AUC) From 5 Minutes to 23 Hours 45 Minutes and From 12 Hours to 23 Hours 45 Minutes Post-dose at Weeks 12 and 52

15. Secondary: Number of Moderate or Severe Exacerbations of Chronic Obstructive Pulmonary Disease (COPD) Per Year During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Number of Moderate or Severe Exacerbations of Chronic Obstructive Pulmonary Disease (COPD) Per Year During the Study (Baseline to Week 52)
Measure Description	The number of moderate or severe exacerbations of COPD per year during the study was calculated by dividing the total number of exacerbations during the study by the total number of years of treatment. A COPD exacerbation was considered to be moderate if treatment with systemic corticosteroids and/or antibiotic was required. A COPD exacerbation was considered to be severe if treatment for moderate severity and hospitalization was required.
Time Frame	Baseline to Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**525**	**268**	**267**
Number of Moderate or Severe Exacerbations of Chronic Obstructive Pulmonary Disease (COPD) Per Year During the Study (Baseline to Week 52) [units: Exacerbations per treatment year] Number (95% Confidence Interval)	**0.54 (0.496 to 0.869)**	**0.80 (0.586 to 1.105)**	**0.62 (0.614 to 1.085)**

No statistical analysis provided for Number of Moderate or Severe Exacerbations of Chronic Obstructive Pulmonary Disease (COPD) Per Year During the Study (Baseline to Week 52)

16. Secondary: Percentage of Patients Who Experienced a Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Percentage of Patients Who Experienced a Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52)
Measure Description	A COPD exacerbation was considered to be moderate if treatment with systemic corticosteroids and/or antibiotic was required. A COPD exacerbation was considered to be severe if treatment for moderate severity and hospitalization was required.
Time Frame	Baseline to Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or

another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**524**	**266**	**266**
Percentage of Patients Who Experienced a Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52) [units: Percentage of participants]	**32.8**	**40.2**	**30.1**

No statistical analysis provided for Percentage of Patients Who Experienced a Moderate or Severe Chronic Obstructive Pulmonary Disease (COPD) Exacerbation During the Study (Baseline to Week 52)

17. Secondary: Percentage of Nights With “no Nighttime Awakenings” During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Percentage of Nights With “no Nighttime Awakenings” During the Study (Baseline to Week 52)
Measure Description	A night with “no nighttime awakenings” was defined as any night where the patient did not wake up due to 1 or more of 6 symptoms (respiratory symptoms, cough, wheeze, amount of sputum, color of sputum, and breathlessness). Symptoms occurring during the previous 12 hours were recorded each morning and evening by the patient in an electronic diary. The percentage of nights with ‘no nighttime awakenings’ was calculated as the total number of nights with “no nighttime awakenings” over the 52 week treatment period divided by the total number of nights where diary recordings were made.
Time Frame	Baseline to Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist

	salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**523**	**263**	**262**
Percentage of Nights With "no Nighttime Awakenings" During the Study (Baseline to Week 52) [units: Percentage of nights] Least Squares Mean (Standard Error)	**57.36 (1.842)**	**52.15 (2.239)**	**55.47 (2.230)**

No statistical analysis provided for Percentage of Nights With "no Nighttime Awakenings" During the Study (Baseline to Week 52)

18. Secondary: Percentage of Days With "no Daytime Symptoms" During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Percentage of Days With "no Daytime Symptoms" During the Study (Baseline to Week 52)
Measure Description	A day with "no daytime symptoms" was defined as any day where the patient recorded no cough, no wheeze, no production of sputum, no feeling of breathlessness (other than when running), and no puffs of rescue medication during the previous 12 hours in evening entry in the electronic patient diary. The percentage of days with "no daytime symptoms" was calculated as the total number of days with "no daytime symptoms" over the 52 week treatment period divided by the total number of days where diary recordings were made.
Time Frame	Baseline to Week 52

Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**522**	**263**	**263**
Percentage of Days With “no Daytime Symptoms” During the Study (Baseline to Week 52) [units: Percentage of days] Least Squares Mean (Standard Error)	**6.54 (1.208)**	**3.81 (1.431)**	**7.14 (1.424)**

No statistical analysis provided for Percentage of Days With "no Daytime Symptoms" During the Study (Baseline to Week 52)

19. Secondary: Percentage of "Days Able to Perform Usual Daily Activities" During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Percentage of "Days Able to Perform Usual Daily Activities" During the Study (Baseline to Week 52)
Measure Description	A "day able to perform usual daily activities" was defined as any day where the patient recorded in their electronic diary in the evening that they were not prevented from performing their usual daily activities due to respiratory symptoms during the previous 12 hours. The percentage of "days able to perform usual daily activities" was calculated as the total number of "days able to perform usual daily activities" over the 52 week treatment period divided by the total number of days where diary recordings were made.
Time Frame	Baseline to Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and

	10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**522**	**263**	**263**
Percentage of "Days Able to Perform Usual Daily Activities" During the Study (Baseline to Week 52) [units: Percentage of days] Least Squares Mean (Standard Error)	**38.02 (1.883)**	**36.18 (2.270)**	**38.09 (2.259)**

No statistical analysis provided for Percentage of "Days Able to Perform Usual Daily Activities" During the Study (Baseline to Week 52)

20. Secondary: Change From Baseline in the Mean Daily Total Symptom Score During the Study (Baseline to Week 52) [Time Frame: Baseline to Week 52]

Measure Type	Secondary
Measure Title	Change From Baseline in the Mean Daily Total Symptom Score During the Study (Baseline to Week 52)
Measure Description	The daily total symptom score was defined as the sum of the morning and evening patient self-reported diary assessments of 6 symptoms (respiratory symptoms/impact on daily activities, cough, wheeze, amount of sputum, color of sputum, and breathlessness). Means for baseline (14 day maximum run-in period) and the 52 week treatment period were calculated. Mean scores ranged from 0-18, with a higher score indicating worse symptoms. A negative change score indicated improvement.

Time Frame	Baseline to Week 52
Safety Issue	No

Population Description

Explanation of how the number of participants for analysis was determined. Includes whether analysis was per protocol, intention to treat, or another method. Also provides relevant details such as imputation technique, as appropriate.
Full Analysis Set (FAS): All randomized patients who received at least 1 dose of study medication.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Measured Values

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Number of Participants Analyzed [units: participants]	**523**	**263**	**263**
Change From Baseline in the Mean Daily Total Symptom Score During the Study (Baseline to Week 52)			**-1.87**

[units: Units on a scale] **Least Squares Mean (Standard Error)**	**-1.85 (0.125)**	**-1.42 (0.149)**	**(0.149)**

No statistical analysis provided for Change From Baseline in the Mean Daily Total Symptom Score During the Study (Baseline to Week 52)

Serious Adverse Events

Hide Serious Adverse Events

Time Frame	No text entered.
Additional Description	No text entered.

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Serious Adverse Events

	Glycopyrronium Bromide	Placebo to Glycopyrronium	Tiotropium 18

	50 µg	Bromide	µg
Total, serious adverse events			
# participants affected / at risk	**65/525 (12.38%)**	**43/268 (16.04%)**	**40/267 (14.98%)**
Cardiac disorders			
Acute coronary syndrome † [1]			
# participants affected / at risk	**2/525 (0.38%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Acute myocardial infarction † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Angina pectoris † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**3/268 (1.12%)**	**0/267 (0.00%)**
Atrial fibrillation † [1]			
# participants affected / at risk	**4/525 (0.76%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Atrial flutter † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Bradycardia † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Cardiac failure † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Cardiac failure acute † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Cardiac failure congestive † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Cardiopulmonary failure † [1]			

# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Cardiovascular insufficiency † [1]			
# participants affected / at risk	0/525 (0.00%)	0/268 (0.00%)	1/267 (0.37%)
Congestive cardiomyopathy † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Myocardial infarction † [1]			
# participants affected / at risk	0/525 (0.00%)	0/268 (0.00%)	1/267 (0.37%)
Right ventricular failure † [1]			
# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Supraventricular tachycardia † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Tachyarrhythmia † [1]			
# participants affected / at risk	1/525 (0.19%)	1/268 (0.37%)	0/267 (0.00%)
Ear and labyrinth disorders			
Vertigo † [1]			
# participants affected / at risk	0/525 (0.00%)	2/268 (0.75%)	0/267 (0.00%)
Eye disorders			
Retinal detachment † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Gastrointestinal disorders			
Abdominal mass † [1]			
# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Abdominal pain † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Colitis † [1]			

# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Colitis ischaemic † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Constipation † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Gastrointestinal haemorrhage † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Haemorrhoids † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Inguinal hernia † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Intestinal obstruction † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**2/267 (0.75%)**
Nausea † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Pancreatitis acute † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Rectal haemorrhage † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Rectal ulcer haemorrhage † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Subileus † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Vomiting † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**

General disorders			
Asthenia † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Impaired healing † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Influenza like illness † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Non-cardiac chest pain † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**3/267 (1.12%)**
Pyrexia † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Ulcer haemorrhage † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Hepatobiliary disorders			
Cholecystitis † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Cholecystitis chronic † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Cholelithiasis † [1]			
# participants affected / at risk	**2/525 (0.38%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Infections and infestations			
Bronchitis † [1]			
# participants affected / at risk	**3/525 (0.57%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Cellulitis † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**1/267 (0.37%)**

Clostridial infection † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Diverticulitis † [1]			
# participants affected / at risk	**2/525 (0.38%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Gastroenteritis † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Herpes zoster † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Lobar pneumonia † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**2/267 (0.75%)**
Lower respiratory tract infection † [1]			
# participants affected / at risk	**2/525 (0.38%)**	**1/268 (0.37%)**	**1/267 (0.37%)**
Pneumococcal sepsis † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Pneumonia † [1]			
# participants affected / at risk	**7/525 (1.33%)**	**7/268 (2.61%)**	**4/267 (1.50%)**
Pneumonia bacterial † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Pseudomonas infection † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Pyothorax † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Sepsis † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Sinusitis † [1]			

# participants affected / at risk	0/525 (0.00%)	0/268 (0.00%)	1/267 (0.37%)
Upper respiratory tract infection † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	1/267 (0.37%)
Upper respiratory tract infection bacterial † [1]			
# participants affected / at risk	2/525 (0.38%)	3/268 (1.12%)	2/267 (0.75%)
Viral infection † [1]			
# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Viral upper respiratory tract infection † [1]			
# participants affected / at risk	0/525 (0.00%)	0/268 (0.00%)	2/267 (0.75%)
Injury, poisoning and procedural complications			
Burns third degree † [1]			
# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Collapse of lung † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Contusion † [1]			
# participants affected / at risk	0/525 (0.00%)	0/268 (0.00%)	1/267 (0.37%)
Fall † [1]			
# participants affected / at risk	0/525 (0.00%)	0/268 (0.00%)	1/267 (0.37%)
Heat exhaustion † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Hip fracture † [1]			
# participants affected / at risk	2/525 (0.38%)	0/268 (0.00%)	0/267 (0.00%)
Incisional hernia, obstructive † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Injury † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)

Joint dislocation † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Limb crushing injury † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Lower limb fracture † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Radius fracture † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Rib fracture † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Spinal column injury † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Spinal compression fracture † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Spinal fracture † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**1/267 (0.37%)**
Splenic injury † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Stab wound † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Upper limb fracture † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Wrist fracture † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Metabolism and nutrition disorders			

Dehydration † [1]			
# participants affected / at risk	**4/525 (0.76%)**	**2/268 (0.75%)**	**0/267 (0.00%)**
Fluid overload † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Hyperglycaemia † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Hypokalaemia † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Hyponatraemia † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Musculoskeletal and connective tissue disorders			
Back pain † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**1/267 (0.37%)**
Cervical spinal stenosis † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Myositis † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Neck pain † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Osteoarthritis † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Spinal osteoarthritis † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Neoplasms benign, malignant and unspecified (incl cysts and polyps)			

Adenocarcinoma † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Biliary neoplasm † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Bladder transitional cell carcinoma † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Bronchial carcinoma † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Colon cancer † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Lentigo maligna stage unspecified † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Lung squamous cell carcinoma stage unspecified † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Malignant melanoma † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Polycythaemia vera † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Prostate cancer † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Uterine leiomyoma † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Nervous system disorders			
Carotid artery stenosis † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**

Cerebrovascular accident † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Convulsion † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**1/267 (0.37%)**
Dizziness † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Epilepsy † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Haemorrhagic stroke † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Syncope † [1]			
# participants affected / at risk	**3/525 (0.57%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Transient ischaemic attack † [1]			
# participants affected / at risk	**3/525 (0.57%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Vertebrobasilar insufficiency † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Psychiatric disorders			
Anxiety disorder † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Depression † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**1/267 (0.37%)**
Mental disorder † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Renal and urinary disorders			
Acute prerenal failure † [1]			

# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Renal failure † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Renal failure acute † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	1/267 (0.37%)
Renal injury † [1]			
# participants affected / at risk	1/525 (0.19%)	1/268 (0.37%)	0/267 (0.00%)
Reproductive system and breast disorders			
Benign prostatic hyperplasia † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	1/267 (0.37%)
Testicular necrosis † [1]			
# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Respiratory, thoracic and mediastinal disorders			
Acute respiratory failure † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	1/267 (0.37%)
Chronic obstructive pulmonary disease † [1]			
# participants affected / at risk	19/525 (3.62%)	16/268 (5.97%)	13/267 (4.87%)
Cough † [1]			
# participants affected / at risk	0/525 (0.00%)	1/268 (0.37%)	0/267 (0.00%)
Dyspnoea † [1]			
# participants affected / at risk	0/525 (0.00%)	2/268 (0.75%)	0/267 (0.00%)
Dyspnoea exertional † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)
Hypercapnia † [1]			
# participants affected / at risk	1/525 (0.19%)	0/268 (0.00%)	0/267 (0.00%)

Hypoxia † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Pneumonia aspiration † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Pneumothorax † [1]			
# participants affected / at risk	**2/525 (0.38%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Productive cough † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Pulmonary congestion † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Pulmonary embolism † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Pulmonary oedema † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**
Pulmonary toxicity † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Respiratory arrest † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Respiratory failure † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**4/268 (1.49%)**	**1/267 (0.37%)**
Skin and subcutaneous tissue disorders			
Angioedema † [1]			
# participants affected / at risk	**0/525 (0.00%)**	**0/268 (0.00%)**	**1/267 (0.37%)**
Vascular disorders			
Aortic aneurysm † [1]			

# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Hypertension † 1			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Hypotension † 1			
# participants affected / at risk	**2/525 (0.38%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Orthostatic hypotension † 1			
# participants affected / at risk	**1/525 (0.19%)**	**0/268 (0.00%)**	**0/267 (0.00%)**
Subclavian artery stenosis † 1			
# participants affected / at risk	**0/525 (0.00%)**	**1/268 (0.37%)**	**0/267 (0.00%)**

† Events were collected by systematic assessment
1 Term from vocabulary, MedDRA

Other Adverse Events

Hide Other Adverse Events

Time Frame	No text entered.
Additional Description	No text entered.

Frequency Threshold

Threshold above which other adverse events are reported	2%

Reporting Groups

	Description
Glycopyrronium Bromide 50 µg	Patients inhaled glycopyrronium bromide 50 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Placebo to Glycopyrronium Bromide	Patients inhaled placebo to glycopyrronium bromide once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.
Tiotropium 18 µg	Patients inhaled tiotropium 18 µg once daily in the morning between 8:00 AM and 10:00 AM via a single-dose dry-powder inhaler (SDDPI) for 52 weeks. Daily inhaled corticosteroid treatment (if applicable) was to remain stable throughout the study. The short-acting β2-agonist salbutamol/albuterol was available for rescue use throughout the study.

Other Adverse Events

	Glycopyrronium Bromide 50 µg	Placebo to Glycopyrronium Bromide	Tiotropium 18 µg
Total, other (not including serious) adverse events			
# participants affected / at risk	**305/525 (58.10%)**	**164/268 (61.19%)**	**156/267 (58.43%)**
Gastrointestinal disorders			
Diarrhoea † [1]			
# participants affected / at risk	**10/525 (1.90%)**	**6/268 (2.24%)**	**5/267 (1.87%)**
Dry mouth † [1]			
# participants affected / at risk	**16/525 (3.05%)**	**5/268 (1.87%)**	**4/267 (1.50%)**
Gastrooesophageal reflux disease † [1]			
# participants affected / at risk	**4/525 (0.76%)**	**6/268 (2.24%)**	**3/267 (1.12%)**
Nausea † [1]			
# participants affected / at risk	**9/525 (1.71%)**	**6/268 (2.24%)**	**4/267 (1.50%)**
General disorders			
Oedema peripheral † [1]			
# participants affected / at risk	**9/525 (1.71%)**	**6/268 (2.24%)**	**8/267 (3.00%)**

Infections and infestations			
Bronchitis † [1]			
# participants affected / at risk	**19/525 (3.62%)**	**9/268 (3.36%)**	**12/267 (4.49%)**
Lower respiratory tract infection † [1]			
# participants affected / at risk	**22/525 (4.19%)**	**9/268 (3.36%)**	**10/267 (3.75%)**
Nasopharyngitis † [1]			
# participants affected / at risk	**47/525 (8.95%)**	**15/268 (5.60%)**	**21/267 (7.87%)**
Sinusitis † [1]			
# participants affected / at risk	**28/525 (5.33%)**	**14/268 (5.22%)**	**9/267 (3.37%)**
Upper respiratory tract infection † [1]			
# participants affected / at risk	**57/525 (10.86%)**	**33/268 (12.31%)**	**29/267 (10.86%)**
Upper respiratory tract infection bacterial † [1]			
# participants affected / at risk	**28/525 (5.33%)**	**25/268 (9.33%)**	**20/267 (7.49%)**
Urinary tract infection † [1]			
# participants affected / at risk	**14/525 (2.67%)**	**8/268 (2.99%)**	**16/267 (5.99%)**
Viral infection † [1]			
# participants affected / at risk	**1/525 (0.19%)**	**6/268 (2.24%)**	**4/267 (1.50%)**
Viral upper respiratory tract infection † [1]			
# participants affected / at risk	**9/525 (1.71%)**	**13/268 (4.85%)**	**9/267 (3.37%)**
Musculoskeletal and connective tissue disorders			
Arthralgia † [1]			
# participants affected / at risk	**10/525 (1.90%)**	**7/268 (2.61%)**	**7/267 (2.62%)**
Back pain † [1]			
# participants affected / at risk	**24/525 (4.57%)**	**9/268 (3.36%)**	**12/267 (4.49%)**
Nervous system disorders			

Dizziness † 1			
# participants affected / at risk	**9/525 (1.71%)**	**6/268 (2.24%)**	**5/267 (1.87%)**
Headache † 1			
# participants affected / at risk	**25/525 (4.76%)**	**14/268 (5.22%)**	**12/267 (4.49%)**
Respiratory, thoracic and mediastinal disorders			
Chronic obstructive pulmonary disease † 1			
# participants affected / at risk	**180/525 (34.29%)**	**106/268 (39.55%)**	**85/267 (31.84%)**
Cough † 1			
# participants affected / at risk	**21/525 (4.00%)**	**12/268 (4.48%)**	**12/267 (4.49%)**
Dyspnoea † 1			
# participants affected / at risk	**14/525 (2.67%)**	**11/268 (4.10%)**	**6/267 (2.25%)**
Oropharyngeal pain † 1			
# participants affected / at risk	**6/525 (1.14%)**	**6/268 (2.24%)**	**2/267 (0.75%)**
Rhinorrhoea † 1			
# participants affected / at risk	**1/525 (0.19%)**	**9/268 (3.36%)**	**4/267 (1.50%)**
Vascular disorders			
Hypertension † 1			
# participants affected / at risk	**20/525 (3.81%)**	**12/268 (4.48%)**	**14/267 (5.24%)**

† Events were collected by systematic assessment
1 Term from vocabulary, MedDRA

Limitations and Caveats

Hide Limitations and Caveats

Limitations of the study, such as early termination leading to small numbers of participants analyzed and technical problems with measurement leading to unreliable or uninterpretable data
No text entered.

More Information

Hide More Information

Certain Agreements:

Principal Investigators are **NOT** employed by the organization sponsoring the study.
There **IS** an agreement between Principal Investigators and the Sponsor (or its agents) that restricts the PI's rights to discuss or publish trial results after the trial is completed.
The agreement is: ☐ The only disclosure restriction on the PI is that the sponsor can review results communications prior to public release and can embargo communications regarding trial results for a period that is **less than or equal to 60 days**. The sponsor cannot require changes to the communication and cannot extend the embargo. ☐ The only disclosure restriction on the PI is that the sponsor can review results communications prior to public release and can embargo communications regarding trial results for a period that is **more than 60 days but less than or equal to 180 days**. The sponsor cannot require changes to the communication and cannot extend the embargo. Other disclosure agreement that restricts the right of the PI to discuss or publish trial results after the trial is completed. ☑ **Restriction Description:** The terms and conditions of Novartis' agreements with its investigators may vary. However, Novartis does not prohibit any investigator from publishing. Any publications from a single-site are postponed until the publication of the pooled data (ie, data from all sites) in the clinical trial.

Results Point of Contact:

Name/Title: Study Director
Organization: Novartis Pharmaceuticals
phone: 862 778-8300

No publications provided by Novartis

Publications automatically indexed to this study:

D'Urzo A, Kerwin E, Overend T, D'Andrea P, Chen H, Goyal P. Once daily glycopyrronium for the treatment of COPD: pooled analysis of the GLOW1 and GLOW2 studies. Curr Med Res Opin. 2014 Mar;30(3):493-508. doi: 10.1185/03007995.2013.858618. Epub 2013 Nov 19.

Kerwin E, Hébert J, Gallagher N, Martin C, Overend T, Alagappan VK, Lu Y, Banerji D. Efficacy and safety of NVA237 versus placebo and tiotropium in patients with COPD: the GLOW2 study. Eur Respir J. 2012 Nov;40(5):1106-14. doi: 10.1183/09031936.00040712. Epub 2012 Jul 26.

Responsible Party:	Novartis
ClinicalTrials.gov Identifier:	NCT00929110 History of Changes
Other Study ID Numbers:	**CNVA237A2303** 2008-008394-63 (EudraCT Number)
Study First Received:	June 25, 2009
Results First Received:	June 22, 2012
Last Updated:	August 9, 2012
Health Authority:	United States: Food and Drug Administration Argentina: Administracion Nacional de Medicamentos, Alimentos y Tecnologia Medica Australia: Department of Health and Ageing Therapeutic Goods Administration Belgium: Federal Agency for Medicinal Products and Health Products Canada: Health Canada Chile: Comisión Nacional de Investigación Científica y Tecnológica Colombia: INVIMA Instituto Nacional de Vigilancia de Medicamentos y Alimentos Czech Republic: State Institute for Drug Control France: Afssaps - Agence française de sécurité sanitaire des produits de santé (Saint-Denis) Germany: Federal Institute for Drugs and Medical Devices Hungary: National Institute of Pharmacy Israel: Ministry of Health Italy: The Italian Medicines Agency Korea: Food and Drug Administration Malaysia: Ministry of Health Mexico: Ministry of Health Netherlands: Medicines Evaluation Board (MEB) New Zealand: Food Safety Authority Peru: Ministry of Health

Philippines: Bureau of Food and Drugs
Poland: Ministry of Health
Russia: Ministry of Health of the Russian Federation
South Africa: Department of Health
Thailand: Food and Drug Administration
Turkey: Ministry of Health
Ukraine: Ministry of Health
United Kingdom: Medicines and Healthcare Products Regulatory Agency