Table of Contents

List of COAST-Y investigators	Page 2
Supplementary Methods	Page 10
Inclusion Criteria	Page 10
Exclusion Criteria	Page 11
Study Design	Page 11
Outcomes	Page 12
Statistical Analyses	Page 14
Supplementary References	Page 14
Supplementary Tables	Page 17

LIST OF COAST-Y INVESTIGATORS

Clinica Adventista de Belgrano, Buenos Aires, Argentina Federico Javier Ariel

Centro Medico Privado de Reumatologia, Tucuman, Argentina Alberto Berman

Centro de Enfermedades del Higado y Aparato Digestivo, Santa Fe, Argentina Judith Carrio

CIR Centro de Investigaciones Reumatologicas, Tucuman, Argentina Eleonora Del Valle Lucero

Consultorios Reumatologicos Pampa, Buenos Aires, Argentina Jose Maldonado Cocco

CER Instituto Medico, Buenos Aires, Argentina Benito Jorge Velasco

KH der Barmherzigen Schwestern Wien BetriebsGesmbH, Vienna, Austria Heinrich Resch Johannes Grisar

EDUMED – Educação em Saúde Ltda., Paraná, Brazil Valderilio Azevedo

LMK Serviços Médicos S/S, Porto Alegre, Brazil Mauro Keiserman

Cpclin Centro de Pesquisas Clinicas, São Paulo, Brazil Flora Marcolino

Hospital de Clinicas de Porto Alegre, Porto Alegre, Brazil Ricardo Xavier

CIP – Centro Internacional de Pesquisa, Goiás, Brazil Antonio Ximenes

Instituto Brasil de Pesquisa Clinica-IBPCLIN, Rio de Janeiro, Brazil Ana Melazzi

CMIP - Centro Mineiro de Pesquisa, Juiz de Fora, Brazil Antonio Scotton

Groupe de Recherche en Maladies Osseuses, Quebec, Quebec, Canada Louis Bessette

University of Alberta Hospital, Edmonton, Alberta, Canada Walter Maksymowych

Centre de Recherche Musculo-Squelettique, Trois-Rivieres, Quebec, Canada Frederic Morin

St. Clare's Mercy Hospital, St. John's, Newfoundland, Canada Al Amin Proton Rahman

MEDICAL PLUS, s.r.o., Uherske Hradiste, Czech Republic Eva Dokoupilova

Arthrohelp s.r.o, Pardubice, Czech Republic Zdenek Dvorak

Revmaclinic, s.r.o, Brno, Czech Republic Vlastimil Racek

Revmatologicky ustav, Prague, Czech Republic Radka Moravcova

Interni a revmatologicka ambulance, Inrea s.r.o., Ostrava, Czech Republic Martina Malcova

Revmatologicky ustav, Prague, Czech Republic Karel Pavelka

Helsinki University Hospital, HYKS, Helsinki, Finland Kari K. Eklund

Kiljava Medical Research, Hyvinkaa, Finland Pentti Jarvinen

Terveystalo Kamppi, Helsinki, Finland Leena Paimela

Hôpital Trousseau, CHRU de Tours, Chambray-lès-Tours, France Philippe Goupille

Nouvel Hôpital Orléans La Source, Orleans, France Eric Lespessailles

Centre hospitalier universitaire Lapeyronie, Montpellier, France Bernard Combe

Rheumazentrum Prof. Neeck, Bad Doberan, Germany Gunther Neeck

Rheumazentrum Ruhrgebiet, Herne, Germany Jürgen Braun

HRF Hamburger Rheuma Forschungszentrum, Hamburg, Germany Andrea Everding

Revita Reumatologiai Kft., Budapest, Hungary Regina Cseuz

Vital Medical Center, Veszprem, Hungary Edit Drescher

Rambam Medical Center, Haifa, Israel Yolanda Braun Moscovici

Tel Aviv Sourasky Medical Center, Tel Aviv, Israel Ori Elkayam

Rabin Medical Center, Petach Tikva, Israel Yair Molad

Barzilai Medical Center, Ashkelon, Israel Tatiana Reitblat

Arcispedale Santa Maria Nuova Azienda Ospedaliera di Reggio Emilia, Reggio Emilia, Italy Carlo Salvarani

Osaka University Hospital, Osaka, Japan Tetsuya Tomita

Kochi Medical School Hospital, Kochi, Japan Yoshinori Taniguchi

St. Lukes International Hospital, Tokyo, Japan Hiromichi Tamaki Tokutaro Tsuda

Juntendo University Hospital, Tokyo, Japan Kurisu Tada

Kagawa University Hospital, Kagawa, Japan Hiroaki Dobashi

Osaka City University Hospital, Osaka, Japan Tadashi Okano Kentaro Inui

Sasebo Chuo Hospital, Nagasaki, Japan Yukitaka Ueki

Kuwana City Medical Center, Mie, Japan Yoshifuji Matsumoto

Japanese Red Cross Okayama Hospital, Okayama, Japan Yoshinobu Koyama Hokkaido University Hospital, Hokkaido, Japan Tatsuya Atsumi

Osaka City General Hospital, Osaka, Japan Hitoshi Goto

Yamagata University Hospital, Yamagata, Japan Yuya Takakubo

Kyung Hee University Hospital, Seoul, South Korea Yeon-Ah Lee

Seoul St. Mary's Hospital, Seoul, South Korea Ji Hyeon Ju

Chungnam National University Hospital, Daejeon, South Korea Seong Wook Kang

Hanyang University Medical Center, Seoul, South Korea Tae-Hwan Kim

Asan Medical Center, Seoul, South Korea Chang Keun Lee

Seoul National University Hospital, Seoul, South Korea Eun Bong Lee

Konkuk University Hospital, Seoul, South Korea Sang Heon Lee

Gangnam Severance Hospital, Seoul, South Korea Min-Chan Park

Seoul Municipal Boramae Hospital, Seoul, South Korea Kichul Shin

Kyunghee University Hospital at Gangdong, Seoul, South Korea Sang-Hoon Lee

Medical Care and Research, S.A. de C.V., Merida, Mexico Aaron Alejandro Barrera Rodriguez

Centro de Investigación en Artritis y Osteoporosis SC, Mexicali, Mexico Fidencio Cons-Molina

Clinica en Investigación en Reumatologia y Obesidad S.C., Guadalajara, Mexico Sergio Duran Barragan

Hospital Universitario "Dr. Jose Eleuterio Gonzalez", Monterrey, Mexico Cassandra Michelle Skinner

Investigación y Biomedicina de Chihuahua, SC, Chihuahua, Mexico Cesar Francisco Pacheco Tena

Unidad de Investigacion en Enfermedades Cronico Degenerative, Guadalajara, Mexico Cesar Ricardo Ramos Remus

Centro de Alta Especialidad Reumatologia Inv del Potosi SC, San Luis Potosi, Mexico Juan Cruz Rizo Rodriguez

Academisch Medisch Centrum, Amsterdam, The Netherlands Marleen G. van de Sande

Antonius Ziekenhuis, Sneek, The Netherlands Eduard (Ed) Griep

Reumatika Centrum Reumatologii, Warsaw, Poland Malgorzata Szymanska

Lubelskie Centrum Diagnostyczne, Swidnik, Poland Tomasz Blicharski

Centrum Kliniczno-Badawcze, Elblag, Poland Jan Brzezicki

Centrum Medyczne AMED, Warsaw, Poland Anna Dudek

Prywatna Praktyka Lekarska P. Hrycaj, Poznan, Poland Pawel Hrycaj

Centrum Leczenia Osteoporozy Klinika Zdrowej Kosci, Lodz, Poland Rafal Plebanski

NZOZ ZDROWIE Osteo-Medic, Bialystok, Poland Artur Racewicz

Szpital Uniwersytecki nr 2 im. Dr J. Biziela, Bydgoszcz, Poland Rafal Wojciechowski

Lecznica MAK-MED, NZOZ, Nadarzyn, Poland Marek Krogulec

Spitalul Clinic "Sf Maria" Bucuesti, Bucuresti, Romania Daniela Opris-Belinski

Sp Clinic Judetean de Urgenta, Constanta, Romania Ana Maria Ramazan

Clinical Rheumatology Hospital #25, St. Petersburg, Russia Galina Matsievskaya

City Clinical Hospital N1 n.a., Moscow, Russia Evgeniya Schmidt

V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia Tatiana Dubinina Marina Stanislav

Ryazan Regional Cardiology Dispensary, Ryazan, Russia Sergey Yakushin

Clinical Hospital for Emergency Care, Yaroslavl, Russia Olga Ershova

Saratov State Medical University, Saratov, Russia Andrey Rebrov

Hospital General Universitario Gregorio Marañon, Madrid, Spain Carlos Gonzalez Fernandez

Centro de Salud Mental Parc Tauli, Barcelona, Spain Jordi Gratacos Masmitja

Hospital Infanta Luisa, Sevilla, Spain Juan Sanchez Burson

Chi-Mei Medical Center, Yongkang City, Taiwan Hung-An Chen

Chang Gung Memorial Hospital –Kaohsiung Branch, Kaohsiung, Taiwan Ying-Chou Chen

National Taiwan University Hospital, Taipei, Taiwan Song-Chou Hsieh

China Medical University Hospital, Taichung, Taiwan Joung-Liang Lan

Chung Shan Medical University Hospital, Taichung City, Taiwan Cheng-Chung Wei

New Cross Hospital, Wolverhampton, United Kingdom Nicholas Barkham

Norfolk and Norwich Hospital, Norwich, United Kingdom Karl Gaffney

Solihull Hospital, Solihull, United Kingdom Sophia Khan

Haywood Hospital, Stoke on Trent, United Kingdom Jonathan Packham Wythenshawe Hospital, Wythenshawe, United Kingdom Pippa Watson

Physician Research Collaboration, LLC, Lincoln, Nebraska, United States Melvin Churchill

Oregon Health and Science University, Portland, Oregon, United States Atulya Deodhar

Articularis Healthcare Group, INC dba Columbia Arthritis Ctr, Columbia, South Carolina, United States Kathleen Flint

Arthritis Rheumatic Disease Specialties, Aventura, Florida, United States Norman Gaylis

Desert Medical Advances, Palm Desert, California, United States Maria Greenwald

Klein and Associates, MD., P.A, Hagerstown, Maryland, United States Mary Howell

Arthritis Consultants INC, Saint Louis, Missouri, United States Akgun Ince

Sarasota Arthritis Research Center, Sarasota Florida, United States Yoel Drucker Jeffery L. Kaine

Altoona Center for Clinical Research, Ducansville, Pennsylvania, United States Alan Kivitz

Klein & Associates, M.D., P.A, Cumberland, Maryland, United States Steven Klein

Articularis Healthcare Group, Inc dba Low Country Rheumatology, Summersville, South Carolina, United States

Clarence Legerton

Center for Arthritis & Osteoporosis, Elizabethtown, Kentucky, United States Daksha Mehta

Arthritis Northwest PLLC, Spokane, Washington, United States Eric Mueller

Arizona Arthritis & Rheumatology Research, Phoenix, Arizona, United States Eric Peters

Marietta Rheumatology, Marietta, Georgia, United States Roel N. Querubin Univ of Texas Health Science Center – Houston, Houston, Texas, United States John Reveille

Arthritis Assoc. & Osteoporosis Ctr of Colorado Springs, LLC, Colorado Springs, Colorado, United States Michael Sayers

Institute of Arthritis Research, Idaho Falls, Idaho, United States Craig Scoville

Shanahan Rheumatology & Immunotherapy, PLLC, Raleigh, North Carolina, United States Joseph Shanahan

Clinical Research Center of CT/NY, Danbury, Connecticut, United States Richard Roseff

Carolina Arthritis Associates, Wilmington, North Carolina, United States Mark Harris

Glacier View Research Institute, Kalispell, Montana, United States Roger Diegel

Care Access Research, Huntington Beach, California, United States Christine Thai

GCM Medical Group PSC, San Juan, Puerto Rico Gregorio Cortes-Maisonet

Mindful Medical Research, San Juan, Puerto Rico Oscar Soto-Raices

Latin Clinical Trial Center, San Juan, Puerto Rico Carlos Pantojas

SUPPLEMENTARY METHODS

Inclusion criteria

The study population for Study COAST-Y included patients from any of the originating studies (COAST-V, COAST-W, or COAST-X), and therefore included patients with rad-axSpA and patients with nonrad-axSpA, with or without prior use of TNF inhibitors.

For most patients, Week 52 of the originating study (COAST-V, COAST-W, or COAST-X) coincided with Week 0 (Visit 1) for Study COAST-Y. Study investigator(s) reviewed patient data from Week 52 in the respective originating study to determine if the patient met all inclusion and none of the exclusion criteria to qualify for participation in Study COAST-Y. If, at Week 52 in the originating study, a patient was not able to enter Study COAST-Y (e.g., due to unresolved safety concerns), investigational product was temporarily interrupted and the patient was evaluated in the originating study for up to 12 weeks beyond Week 52 to determine whether treatment with investigational product could resume. If, in the opinion of the investigator, restarting ixekizumab did not pose an unacceptable risk, the patient could begin participation in Study COAST-Y (Visit 1 [Week 0]).

Patients were eligible to be included in the study only if they met the following criteria:

- 1) Have completed the final study visit in Study COAST-V, COAST-W, or COAST-X. (Note: Patients from Study COAST-X are not eligible if they permanently discontinued ixekizumab and were receiving a TNF inhibitor).
- 2) Must agree to use a reliable method of birth control.
 - a. If the patient is male, the patient must agree to use a reliable method of birth control during the study and for at least 12 weeks following the last dose of investigational product, whichever is longer. Methods of birth control include, but are not limited to, condoms with spermicide and male sterilization.
 - b. If the patient is female and is a woman of childbearing potential who tests negative for pregnancy, the patient must agree to use a reliable method of birth control or remain abstinent during the study and for at least 12 weeks following the last dose of investigational product, whichever is longer. Methods of birth control include, but are not limited to, oral contraceptives, contraceptive patch, injectable or implantable contraceptives, intrauterine device, vaginal ring, or diaphragm with contraceptive gel. (Note: Where required by regulation, a highly effective method of birth control is required. A highly effective method of birth control is defined as one that results in a low failure rate [that is, <1% per year] when used consistently and correctly, such as male sterilization, oral contraceptives, contraceptive patch, injectable or implantable contraceptives, intrauterine device, or vaginal ring).</p>
 - c. If a female patient is a woman of nonchildbearing potential she is not required to use any method of birth control. Nonchildbearing potential is defined as:
 - i. Women who have had surgical sterilization (hysterectomy, bilateral oophorectomy, or tubal ligation).
 - ii. Or, women who are ≥60 years of age.
 - iii. Or, women ≥40 and <60 years of age who have had a cessation of menses for ≥12 months and a follicle stimulating hormone test confirming nonchildbearing potential (≥40 mIU/mL or ≥40 IU/L).

3) Have given written informed consent approved by Lilly or its designee, and the Investigational Review Board/Ethical Review Board governing the site.

Exclusion criteria

Patients were excluded from study enrollment if they met any of the following criteria:

- 1) Have significant uncontrolled cerebrocardiovascular (e.g., myocardial infarction, unstable angina, unstable arterial hypertension, severe heart failure, or cerebrovascular accident), respiratory, hepatic, renal, gastrointestinal, endocrine, hematologic, neuropsychiatric disorders, or abnormal laboratory values that developed during the originating ixekizumab study (COAST-V, COAST-W, or COAST-X) that, in the opinion of the investigator, pose an unacceptable risk to the patient if investigational product continues to be administered.
- 2) Have a known hypersensitivity to ixekizumab or any component of this investigational product.
- 3) Had investigational product permanently discontinued during a previous ixekizumab study.
- 4) Had temporary investigational product interruption at any time during or at the final study visit of the originating ixekizumab study (COAST-V, COAST-W, or COAST-X) and, in the opinion of the investigator, restarting ixekizumab poses an unacceptable risk for the patient's participation in the study.
- 5) Have any other condition that, in the opinion of the investigator, renders the patient unable to understand the nature, scope, and possible consequences of the study or precludes the patient from following and completing the protocol.
- 6) Are currently enrolled in any other clinical trial involving an investigational product or any other type of medical research judged not to be scientifically or medically compatible with this study.

Study design

Patient enrollment for COAST-Y occurred between May 9, 2017 and March 1, 2019. Patients eligible for the RWRP were assigned to treatment groups in the RWRP using a computer-generated random sequence and an interactive web-response system. Randomization was stratified by region and originating study. Patients, study site personnel, and study team members were blinded to treatment assignment during the RWRP. Patients who entered the RWRP were requested to not have any changes to concomitant medications during the RWRP except for the defined retreatment medication or changes needing to be made for an AE or safety reasons.

Patients who were not eligible for participation in the RWRP continued the ixekizumab treatment regimen received during the lead-in period through Week 64, and during the long-term extension period. During the long-term extension period, patients who were receiving IXE Q4W could have their dose escalated to IXE Q2W if the investigator determined the patient may benefit from an increase in dosing frequency to achieve adequate disease control.

During the long-term extension period, patients who participated in the randomized withdrawal-retreatment period continued receiving the treatment they were receiving at Week 64. Patients who had not experienced a flare through Week 64 and experienced a flare during the long-term extension period were retreated with the ixekizumab dosing regimen received during the lead-in period. Patients who had been retreated with ixekizumab Q4W following a flare could have their dose escalated to IXE

Q2W if they had received retreatment for at least 12 Weeks and if the investigator determined that the patient may benefit from an increase in dosing frequency to achieve adequate disease control.

Ixekizumab and matching placebo were supplied as an injectable solution in 1-mL, single-dose, prefilled, disposable manual syringes with study specific labels. Each syringe of ixekizumab was designed to deliver 80 mg ixekizumab. The syringes and contents of ixekizumab and matching placebo were visibly indistinguishable from each other.

Outcomes

ASDAS

Flare was defined as an ASDAS≥2.1 at two consecutive visits or >3.5 at any visit during the randomized withdrawal-retreatment period. The ASDAS is a composite index that assesses disease activity in axSpA.¹⁻³ The components of the ASDAS are total back pain as measured by the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) question 2, the patient global assessment of disease activity, peripheral pain/swelling as measured by BASDAI question 3, duration of morning stiffness as measured by BASDAI question 6, and high sensitivity C-reactive protein in mg/L.

The ASDAS CRP is calculated using the following equation: 0.121 X total back pain + 0.110 X patient global + 0.073 X peripheral pain/swelling + 0.058 X duration of morning stiffness + 0.579 X Ln(CRP+1).⁴ CRP was calculated in mg/L, the range of other variables was from 0 to 10. Ln represents the natural logarithm. ASDAS and all ASDAS components were measured at each study visit.

ASDAS inactive disease and low disease activity are defined as an ASDAS<1.3 or <2.1 respectively.⁵

ASAS

The following ASAS domains were used to determine ASAS20, ASAS40, ASAS 5/6, and ASAS Partial Remission: Patient Global (Assessment of Disease Activity), Spinal Pain, Function (BASFI), Inflammation (mean of BASDAI questions 5 and 6), CRP, and Spinal mobility (lateral spinal flexion from the Bath Ankylosing Spondylitis Metrology Index [BASMI]).⁶ The ASAS20, ASAS40, and ASAS Partial Remission responses were derived from the patient-reported domains of Patient Global, Spinal Pain, Function, and Inflammation. ASAS 5/6 included assessment of all 6 ASAS domains.

An ASAS20 response is defined as a \geq 20% improvement and an absolute improvement from baseline (from originating study) of \geq 1 units (range 0 to 10) in \geq 3 of the 4 patient-reported domains and no worsening of \geq 20% and \geq 1 unit (range 0 to 10) in the remaining domain. The ASAS40 is defined as a \geq 40% improvement and an absolute improvement from baseline (from originating study) of \geq 2 units (range 0 to 10) in \geq 3 of the 4 patient-reported domains without any worsening in the remaining domain. An ASAS 5/6 represents improvement of \geq 20% in at least 5 of the 6 ASAS domains. An ASAS partial remission is defined as a value not above 2 units (range 0 to 10, numeric rating scale in each of the 4 patient-reported ASAS domains.

BASDAI

The BASDAI is a patient-reported assessment consisting of 6 questions that relate to 5 major symptoms relevant to axSpA, including fatigue, spinal pain, peripheral arthritis enthesitis, intensity of morning stiffness, and duration of morning stiffness. ^{6,9} Each question was scored on a numerical rating scale ranging from 0 to 10 with higher score representing worse disease activity. BASDAI 50 represents an improvement of ≥50% improvement from baseline in the BASDAI. BASDAI was assessed at each study visit.

Patient Global Assessment of Disease Activity

The patient is asked to the following question: "How active was your spondylitis on average during the last week?". The answer is recorded on a numerical rating scale ranging from "0" (not active) to "10" (very active). The patient Global Assessment of Disease activity was assessed at each study visit.

High sensitivity C-Reactive Protein

High sensitivity C-Reactive Protein was the measure of acute phase reactant. It was measured using a high sensitivity assay at a central laboratory to assess the effect of ixekizumab on disease activity. High sensitivity CRP was assessed at each study visit.

Spinal Pain

The patient is asked to respond to the following 2 questions (on average during the last week):

- 1. "How much pain of your spine due to ankylosing spondylitis do you have?"
- 2. "How much pain of your spine due to ankylosing spondylitis do you have at night?"

The answers are recorded on an numeric rating scale and are each rated between "0" (no pain) and "10" (most severe pain). The first question was used to derive ASAS responses. Spinal pain was assessed at each study visit.

BASFI

The BASFI is a patient-reported assessment that establishes a patient's functional baseline and subsequent response to treatment. To complete the BASFI, a patient is asked to rate the difficulty associated with 10 individual basic functional activities. Patients respond to each question using an NRS (range 0 to 10), with a higher score indicating worse functioning. The patient's final BASFI score is the mean of the 10 item scores completed on an NRS. The BASFI was assessed at each study visit.

BASMI

The BASMI is a combined index comprising the following 5 clinical measurements of spinal mobility in patients with axSpA: lateral spinal flexion, tragus-to-wall distance, lumbar flexion (modified Schrober), maximal intermalleolar distance, and cervical rotation. ¹¹ Each measurement is scaled to a score of 0 to 10 depending on the result of the assessment (BASMI linear function). The average score of the 5 assessments gives the BASMI linear result. ^{6,12} The BASMI was assessed by a rheumatologist or health care provider who met qualifications for study assessment. The BASMI was assessed at study visits at Weeks 0, 16, 24, 40, 56, 64, 88, and 104, and at an early termination visit when applicable.

SF-36

The SF-36 is a 36-item, patient-reported measure designed to be a short, multipurpose assessment of health in the areas of physical functioning, role – physical, role - emotional, bodily pain, vitality, social functioning, mental health, and general health. The 2 overarching domains of mental well-being and physical well-being are captured by the Mental Component Summary and Physical Component Summary scores. The summary scores range from 0 to 100; higher scores indicate better levels of function and/or better health. Items are answered on Likert scales of varying lengths. The SF-36 version 2 (acute

version), which uses a 1-week recall period, was used.¹³ The SF-36 was assessed at Weeks 0, 24, 40, 64, 88, and 104, and at an early termination visit when applicable.

Safety outcomes

TEAEs were any untoward medical occurrence that either occurred or worsened at any time after treatment baseline, regardless of whether it had a causal relationship with treatment. AEs of special interest included cytopenia, clinically significant hepatic events and/or significant elevations in liver function tests/enzyme elevations, infections, injection-site reactions, allergic reactions/hypersensitivities, cerebrocardiovascular events, malignancies, inflammatory bowel disease, or depression. Data on preferred terms associated with cerebrocardiovascular events were collected and were adjudicated by an external clinical events committee which included a chairman, two cardiologists, and a neurologist. Data on suspected inflammatory bowel disease, including events possibly indicative of ulcerative colitis and Crohn's disease, were collected and adjudicated by an external clinical events committee with expertise in inflammatory bowel disease.

Statistical analysis

Approximately 750 patients were predicted to enter COAST-Y after completion of the originating studies based on the 1-year retention rates from ixekizumab psoriasis studies and from a study of secukinumab in patients with r-axSpA, which had a retention rate of approximately 85%. ¹⁴ Approximately 30% of the 750 patients were estimated to be eligible for entry into the RWRP. ¹⁵ Approximately 100 patients in each IXE treatment group (Q2W and Q4W) were anticipated for randomization in a 2:1 ratio to IXE or placebo. This sample size of 200 was determined to provide over 99% power to detect a difference between the combined ixekizumab treatment group and placebo in the proportion of flare-free patients using a 2-sided Fisher's exact test at the 0.05 level, assuming the flare rates would be 10% for ixekizumab and 70% for placebo.

Descriptive statistics were summarized as observed for the flare population with retreatment, defined as all patients who were randomly assigned at Week 24, experienced a flare after randomization, and received at least one injection of IXE retreatment after flare. Patients were retreated at the next scheduled visit after they had flared. For analyses of recapture of response after flare within 16 weeks of retreatment, patients who flared but recaptured response at the next scheduled visit (i.e. patients who regained response prior to retreatment) were excluded from the analysis so that recapture of response was not incorrectly attributed to retreatment with IXE.

Post-hoc analyses were conducted to evaluate potential predictors of flare. Variables with p-values <0.2 were entered into the multivariate logistic model for stepwise selection, with a p-value of 0.1 as a criterion for removal and stay. Interaction of each of the variables of interest with ixekizumab treatment withdrawal was also evaluated in an individual logistic regression model. Variables and their corresponding interaction were entered into the multivariate logistic regression model for variables found in the stepwise selection procedure; a backward selection was used to build the final model. Results from the univariate model and final model are presented in Supplementary Tables 1, 2, and 3.

SUPPLEMENTARY REFERENCES

1. Machado P, Castrejon I, Katchamart W, et al. Multinational evidence-based recommendations on how to investigate and follow-up undifferentiated peripheral inflammatory arthritis: integrating

- systematic literature research and expert opinion of a broad international panel of rheumatologists in the 3E Initiative. *Ann Rheum Dis* 2011;70(1):15-24. doi: 10.1136/ard.2010.130625 [published Online First: 2010/08/21]
- Machado PM, Landewe RB, van der Heijde DM. Endorsement of definitions of disease activity states and improvement scores for the Ankylosing Spondylitis Disease Activity Score: results from OMERACT 10. *J Rheumatol* 2011;38(7):1502-6. doi: 10.3899/jrheum.110279 [published Online First: 2011/07/05]
- 3. Zochling J. Measures of symptoms and disease status in ankylosing spondylitis: Ankylosing Spondylitis Disease Activity Score (ASDAS), Ankylosing Spondylitis Quality of Life Scale (ASQoL), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Global Score (BAS-G), Bath Ankylosing Spondylitis Metrology Index (BASMI), Dougados Functional Index (DFI), and Health Assessment Questionnaire for the Spondylarthropathies (HAQ-S). Arthritis Care Res (Hoboken) 2011;63 Suppl 11:S47-58. doi: 10.1002/acr.20575 [published Online First: 2012/05/25]
- 4. Machado P, Navarro-Compan V, Landewe R, et al. Calculating the ankylosing spondylitis disease activity score if the conventional c-reactive protein level is below the limit of detection or if high-sensitivity c-reactive protein is used: an analysis in the DESIR cohort. Arthritis Rheumatol 2015;67(2):408-13. doi: 10.1002/art.38921 [published Online First: 2014/10/22]
- 5. Machado PM, Landewe R, Heijde DV, et al. Ankylosing Spondylitis Disease Activity Score (ASDAS): 2018 update of the nomenclature for disease activity states. *Ann Rheum Dis* 2018;77(10):1539-40. doi: 10.1136/annrheumdis-2018-213184 [published Online First: 2018/02/18]
- 6. Sieper J, Rudwaleit M, Baraliakos X, et al. The Assessment of SpondyloArthritis international Society (ASAS) handbook: a guide to assess spondyloarthritis. *Ann Rheum Dis* 2009;68 Suppl 2:ii1-44. doi: 10.1136/ard.2008.104018 [published Online First: 2009/05/14]
- Anderson JJ, Baron G, van der Heijde D, et al. Ankylosing spondylitis assessment group preliminary definition of short-term improvement in ankylosing spondylitis. *Arthritis Rheum* 2001;44(8):1876-86. doi: 10.1002/1529-0131(200108)44:8<1876::AID-ART326>3.0.CO;2-F [published Online First: 2001/08/18]
- 8. Brandt J, Listing J, Sieper J, et al. Development and preselection of criteria for short term improvement after anti-TNF alpha treatment in ankylosing spondylitis. *Ann Rheum Dis* 2004;63(11):1438-44. doi: 10.1136/ard.2003.016717 [published Online First: 2004/03/27]
- 9. Garrett S, Jenkinson T, Kennedy LG, et al. A new approach to defining disease status in ankylosing spondylitis: the Bath Ankylosing Spondylitis Disease Activity Index. *J Rheumatol* 1994;21(12):2286-91. [published Online First: 1994/12/01]
- 10. Calin A, Jones SD, Garrett SL, et al. Bath Ankylosing Spondylitis Functional Index. *Br J Rheumatol* 1995;34(8):793-4. doi: 10.1093/rheumatology/34.8.793 [published Online First: 1995/08/01]
- 11. Jenkinson TR, Mallorie PA, Whitelock HC, et al. Defining spinal mobility in ankylosing spondylitis (AS). The Bath AS Metrology Index. *J Rheumatol* 1994;21(9):1694-8. [published Online First: 1994/09/01]
- 12. van der Heijde D, Landewe R, Feldtkeller E. Proposal of a linear definition of the Bath Ankylosing Spondylitis Metrology Index (BASMI) and comparison with the 2-step and 10-step definitions. *Ann Rheum Dis* 2008;67(4):489-93. doi: 10.1136/ard.2007.074724 [published Online First: 2007/08/31]
- 13. Ware JE, Jr. SF-36 health survey update. *Spine (Phila Pa 1976)* 2000;25(24):3130-9. doi: 10.1097/00007632-200012150-00008 [published Online First: 2000/12/22]
- 14. Baeten D, Sieper J, Braun J, et al. Secukinumab, an Interleukin-17A Inhibitor, in Ankylosing Spondylitis. *N Engl J Med* 2015;373(26):2534-48. doi: 10.1056/NEJMoa1505066 [published Online First: 2015/12/25]

15. Sieper J, Landewe R, Rudwaleit M, et al. Effect of certolizumab pegol over ninety-six weeks in patients with axial spondyloarthritis: results from a phase III randomized trial. *Arthritis Rheumatol* 2015;67(3):668-77. doi: 10.1002/art.38973 [published Online First: 2014/12/04]

SUPPLEMENTARY TABLES

Supplementary Table 1. Proportion of flare-free patients at Week 64 in patient subgroups.

	Withdrawn to Placebo	IXE Q4W	IXE Q2W	Combined IXE
	N=53	N=48	N=54	N=102
Radiographic diagnosis				
r-axSpA	17/33	28/34	25/30	53/64
	(51.5%)	(82.4%)	(83.3%)	(82.8%)
nr-axSpA	12/20 (60.0%)	12/14 (85.7%)	20/24 (83.3%)	32/38 (84.2%)
Prior TNFi experience				
No (bDMARD-naïve)	24/44	33/39	39/46	72/85
	(54.5%)	(84.6%)	(84.8%)	(84.7%)
Yes (bDMARD-experienced)	5/9	7/9	6/8	13/17
	(55.6%)	(77.8%)	(75.0%)	(76.5%)
Concomitant NSAID ^a use				
No	2/6	8/9	4/5	12/14
	(33.3%)	(88.9%)	(80%)	(85.7%)
Yes	28/47	33/39	44/49	77/88
	(59.6%)	(84.6%)	(89.8%)	(87.5%)
Concomitant csDMARDs use				
No	19/32	26/30	27/30	53/60
	(59.4%)	(86.7%)	(90%)	(88.3%)
Yes	11/21	15/18	21/24	36/42
	(52.4%)	(83.3%)	(87.5%)	(85.7%)

The proportion of flare-free patients is presented as the number of responders divided by the number of patients within the subgroup. alncludes COX-2 inhibitors

Abbreviations: bDMARD, biologic disease-modifying anti-rheumatic drug; COX-2, cyclooxygenase 2; csDMARDs, conventional synthetic disease-modifying anti-rheumatic drug; IXE, ixekizumab; nr-axSpA, non-radiographic axial spondyloarthrits; NSAID, non-steroidal anti-inflammatory drug; Q2W, every two weeks; Q4W, every four weeks; r-axSpA, radiographic axial spondyloarthritis; TNFi, tumor necrosis factor inhibitor

Supplementary Table 2. Patient characteristics associated with flare during the randomized withdrawal-retreatment period of COAST-Y (univariate logistic regression model)

Variable	Category	Odds ratio (95% CI)	p-value
Categorical variables		, ,	
Treatment	Placebo (n=53), IXE (n=102)	4.14 (1.95 to 8.77)	<0.001
Residual inflammation by MRI at Week 24 of	Yes (n=55), No (n=84)	2.43	0.022
COAST-Y Anti-drug antibody positive at any time between Week 0 of the originating study and Week 24 of COAST-Y	Yes (n=32), No (n=123)	(1.14 to 5.21) 2.32 (1.02 to 5.28)	0.045
BMI group at Week 0 of COAST-Y	Non-normal (n=86), Normal (n=69) ^a	2.08 (0.98 to 4.42)	0.057*
Length of IXE treatment at Week 24 of COAST-Y	24-60 weeks (n=69), 76 weeks (n=86)	1.65 (0.80 to 3.39)	0.171
Geographic region	Non-Europe (n=97), Europe (n=58)	1.63 (0.76 to 3.53)	0.211
Sustained low CRP ^b	Yes (n=136), No (n=19)	0.57 (0.21 to 1.57)	0.277
Anti-drug antibody positive at Week 24 of COAST- Y	Yes (n=10), No (n=143)	1.98 (0.53 to 7.42)	0.31
CRP group at baseline of originating study	>5 mg/L (n=96), ≤5 mg/L (n=59)	1.46 (0.68 to 3.11)	0.33
HLA-B27 status at baseline of originating study	Positive (n=137), Negative (n=18)	0.69 (0.24 to 1.97)	0.483
Symptom duration group at Week 0 of COAST-Y	≥5 years (n=123), <5 years (n=32)	1.36 (0.54 to 3.45)	0.511
Age group at Week 0 of COAST-Y	≥35 years (n=88), <35 years (n=67)	1.26 (0.61 to 2.62)	0.527
CRP group at Week 24 of COAST-Y	>5 mg/L (n=22), ≤5 mg/L (n=133)	1.36 (0.51 to 3.61)	0.539
Prior TNFi experience	Yes (n=26), No (n=129)	1.29 (0.51 to 3.25)	0.585
Symptom duration group at Week 0 of COAST-Y	≥10 years (n=85), <10 years (n=70)	0.82 (0.40 to 1.68)	0.587
AxSpA classification	r-axSpA (n=97), nr-axSpA (n=58)	1.21 (0.57 to 2.56)	0.614
Concomitant DMARD use at Week 0 of COAST-Y	Yes (n=63), No (n=92)	1.20 (0.58 to 2.47)	0.621
Sex	Male (n=116), Female (n=39)	0.89 (0.39 to 2.00)	0.774
Tobacco use group	Ever used (n=63), Never used (n=92)	1.05 (0.51 to 2.16)	0.901
Tobacco use group	Current use (n=45), Former or never used	1.02	0.969
Continuous variables	(n=110)	(0.46 to 2.23)	
CRP at baseline of originating study	Continuous	1.03	0.005
ASDAS at baseline of originating study	Continuous	(1.01 to 1.04) 1.63	0.024
ASDAS area under the curve ^c	Continuous	(1.07 to 2.49) 1.06	0.024
BASFI at baseline of originating study	Continuous	(1.01 to 1.12) 1.16	0.109
BASDAI inflammation at Week 24 of COAST-Y	Continuous	(0.97 to 1.39) 1.29	0.125
Total back pain at Week 24 of COAST-Y	Continuous	(0.93 to 1.80) 1.19	0.123
		(0.94 to 1.50)	
BASDAI at Week 24 of COAST-Y	Continuous	1.26 (0.92 to 1.73)	0.154
Total back pain at baseline of originating study	Continuous	1.17 (0.94 to 1.46)	0.166
ASDAS at Week 24 of COAST-Y	Continuous	1.67 (0.80 to 3.51)	0.174

BASDAI at baseline of originating study	Continuous	1.17 0.213 (0.92 to 1.49)
CRP at Week 24 of COAST-Y	Continuous	1.06 0.309 (0.95 to 1.19)
BASDAI inflammation at baseline of originating study	Continuous	1.10 0.36 (0.90 to 1.35)
PatGA at baseline of originating study	Continuous	1.10 0.383 (0.89 to 1.36)
CRP area under the curve ^c	Continuous	1.00 0.411 (1.00 to 1.01)
BASFI at Week 24 of COAST-Y	Continuous	1.10 0.52* (0.82 to 1.49)
PatGA at Week 24 of COAST-Y	Continuous	1.02 0.895 (0.78 to 1.32)

^{*}Indicates treatment interaction p-value of <0.05

a Normal BMI category is defined as ≥18.5 and <25 kg/m². Non-normal BMI category includes underweight (<18.5 kg/m²), overweight (≥25 and <30 kg/m²), obese (≥30 and <40 kg/m²), or extremely obese (≥40 kg/m²).

^bSustained low CRP is defined as CRP≤10 mg/L for all visits from Week 0 to Week 24 of COAST-Y.

^cArea under the curve for CRP and ASDAS are defined as the area under the curve across time from Week 0 to Week 24 in COAST-Y Abbreviations: ASDAS, Ankylosing Spondylitis Disease Activity Score; axSpA, axial spondyloarthritis; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASFI, Bath Ankylosing Spondylitis Functional Index; BMI, body mass index; CI, confidence interval; CRP, C-reactive protein; DMARD, disease-modifying anti-rheumatic drug; HLA-B27, human leukocyte antigen B27; IXE, ixekizumab; MRI, magnetic resonance imaging; nr-axSpA, non-radiographic axSpA; PatGA, Patient Global Assessment of disease activity; r-axSpA, radiographic axSpA; TNFi, tumor necrosis factor inhibitor

Supplementary Table 3. Patient characteristics associated with flare during the randomized withdrawal-retreatment period of COAST-Y (multivariate model after stepwise selection)

Variable	Category	Odds ratio (95% CI)	p-value
Categorical Variables			
Treatment	Placebo, IXE	5.12 (2.18 to 12.05)	<0.001
BMI group at Week 0 of COAST-Y	Non-normal, Normal ^a	2.46 (1.03 to 5.86)	0.043
Anti-drug antibody positive status at any time between Week 0 of originating study and	Yes, No	2.63	0.046
Week 24 of COAST-Y		(1.02 to 6.79)	
Continuous Variables			
CRP at baseline of originating study	Continuous	1.03 (1.01 to 1.05)	0.006
ASDAS area under the curve ^b	Continuous	1.07 (1.01 to 1.14)	0.019

^aNormal BMI category is defined as ≥18.5 and <25 kg/m². Non-normal BMI category includes underweight (<18.5 kg/m²), overweight (≥25 and <30 kg/m²), obese (≥30 and <40 kg/m²), or extremely obese (≥40 kg/m²).

^bArea under the curve for ASDAS is defined as the area under the curve across time from Week 0 to Week 24 in COAST-Y Abbreviations: ASDAS, Ankylosing Spondylitis Disease Activity Score; BMI, body mass index; CI, Confidence interval, CRP, C-reactive protein; IXE, ixekizumab.

Supplementary Table 4. Patient characteristics associated with flare during the randomized withdrawal-retreatment period of COAST-Y (final model with interaction effect)

Variable	Estimate (SE)	p-value
Intercept	-1.9620 (0.3856)	< 0.0001
IXE treatment (continued IXE versus withdrawn to placebo)	-1.3937 (0.3209)	< 0.0001
CRP at baseline of originating study	0.0312 (0.0101)	0.0021
Non-normal BMI group at Week 0 of COAST-Y (non-normal versus normal) ^a	0.5215 (0.2238)	0.0198
BASDAI Pain score at Week 24 of COAST-Y	0.2649 (0.1362)	0.0517
Interaction of BASDAI Pain score at Week 24 of COAST-Y with IXE treatment (continued IXE versus	0.3717 (0.1358)	0.0062
withdrawal to placebo)		

 $^{^{\}circ}$ Normal BMI category is defined as ≥18.5 and <25 kg/m 2 . Non-normal BMI category includes underweight (<18.5 kg/m 2), overweight (≥25 and <30 kg/m 2), obese (≥30 and <40 kg/m 2), or extremely obese (≥40 kg/m 2).

Abbreviations: BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BMI, body mass index; CRP, C-reactive protein; IXE, ixekizumab; SE, standard error

Supplementary Table 5. Summary of efficacy outcomes at the time of flare during the randomized withdrawal-retreatment Period of COAST-Y.

	Placebo	IXE Q4W	IXE Q2W	Combined IXE
	N=23	N=7	N=6	N=13
ASDAS, mean (SD)	3.5 (0.9)	2.9 (1.1)	2.8 (0.6)	2.8 (0.9)
High disease activity ^a	12 (52%)	5 (71%)	5 (83%)	10 (77%)
Very high disease activity ^b	11 (48%)	2 (29%)	1 (17%)	3 (23%)
CRP (mg/L), mean (SD)	12.2 (12.7)	6.9 (5.5)	3.6 (2.2)	5.4 (4.5)

Values are presented as n (%) unless otherwise indicated.

Abbreviations: ASDAS, Ankylosing Spondylitis Disease Activity Score; CRP, C-reactive protein; IXE, ixekizumab; Q2W, every two weeks; Q4W, every four weeks; SD, standard deviation.

^aASDAS high disease activity is a score of ≥2.1 and ≤3.5

^bASDAS very high disease activity is a score of >3.5