Vision-related quality of life in spondyloarthritis patients with acute anterior uveitis on golimumab: the GO-VISION study

I. Leal[1-3], A.T. Melo[4], C. Ochôa Matos[1,2], C. Ferreira[5], C. Tenazinha[1,2], C. Vaz[6,7], E. Dourado[2,8,9], F. Pimentel[10], F. Cunha Santos[6], H. Fernandes[6], J. Fonseca Ferreira[6,7], M. Silvério-António[11], M. Faria[1,2], M. Guedes[10], M. Cordeiro[10], M. Santos[1,3], N. Khmelinskii[1,2], P. José[1,3], P. Pinto[5], R. Barão[1,3], S. Dinis[6], S. Mano[1,3], S. Fonseca[5], C. Marques-Neves[1,3], E. Vieira-Sousa[1,2], J.E. Fonseca[1,2]

[1]Unidade Local de Saúde de Santa Maria, Centro Académico de Medicina de Lisboa, Lisbon; [2]Instituto de Medicina Molecular João Lobo Antunes (IMM), Faculdade de Medicina, Universidade de Lisboa, Centro Académico de Medicina de Lisboa, Lisbon; [3]Centro de Estudos das Ciências da Visão, Clínica Universitária de Oftalmologia, Faculdade de Medicina, Universidade de Lisboa, Centro Académico de Medicina de Lisboa, Lisbon; [4]Unidade Local de Saúde S. José, Lisbon; [5]Unidade Local de Saúde de Gaia/Espinho, Vila Nova de Gaia; [6]Unidade Local de Saúde da Guarda; [7]Faculdade de Ciências da Saúde, Centro Académico Clínico das Beiras, Universidade da Beira Interior, Covilhã; [8]Unidade Local de Saúde da Região de Aveiro; [9]Aveiro Rheumatology Research Centre, Egas Moniz Health Alliance, Aveiro; [10]Unidade Local de Saúde Lisboa Ocidental, Lisbon; [11]CUF, Clínica do Barreiro, Portugal.

Abstract

Objective

Acute anterior uveitis (AAU) associated with spondyloarthritis (SpA) is a common extra-articular manifestation, significantly impacting the health-related quality of life (HRQoL). The GO-VISION aimed to evaluate the effects of GOL on visual-related (VR) and HRQoL, as well as health-related work productivity (HRWP), in individuals diagnosed with SpA and a history of SpA-AAU.

Methods

This prospective, multicentre study included 20 SpA patients with recent SpA-AAU, treated with GOL and followed for 48 weeks. Data from the 2 years before and 48 weeks after GOL initiation were analysed to assess flare rates. QoL was evaluated using three standardised questionnaires: the National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25), the Short-Form 36 questionnaire (SF-36), and the EuroQol five-dimension scale questionnaire (EQ-5D). Additionally, the impact on HRWP was also studied. The differences between baseline, 24 and 48 weeks were assessed using a one-way repeated measures ANOVA.

Results

Among 20 patients (55% male, 75% tumour necrosis factor-inhibitors (TNFi)-naive, mean age 45.2), AAU flares decreased from 50 in 2 years pre-GOL to 2 during treatment, reducing the incidence rate from 1.82 to 0.10 per 100 patient-years ($p<0.01$). Significant improvements were seen in NEI VFQ-25 total score (71.85–90.10), EQ index (0.74–0.89), SF-36 physical/mental scores (39.89/49.95 to 60.09/65.86), and hours lost to uveitis (4 to 0; all $p<0.02$). Two patients experienced mild TNFi-related adverse events.

Conclusion

GO-VISION suggests the effectiveness of GOL in preventing SpA-AAU flares, improving HRQoL, and enhancing productivity, highlighting the importance of patient-reported outcomes.

Key words

golimumab, spondyloarthritis, acute anterior uveitis, TNF inhibitors, quality of life, work productivity

Inês Leal, MD, PhD
Ana Teresa Melo, MD
Carolina Ochôa Matos, MD
Catarina Ferreira, MD
Catarina Tenazinha, MD
Cláudia Vaz, MD
Eduardo Dourado, MD
Fernando Pimentel, MD, PhD
Filipe Cunha Santos, MD
Henrique Fernandes, MD
Joana Fonseca Ferreira, MD
Manuel António, MD
Margarida Faria, MD
Marta Guedes, MD, PhD
Miguel Cordeiro, MD
Miguel Santos, MD
Nikita Khmelinskii, MD
Patrícia José, MD
Patrícia Pinto, MD
Rafael Barão, MD
Sara Dinis, MD
Sofia Mano, MD
Sofia Fonseca, MD
Carlos Marques-Neves, MD
*Elsa Vieira-Sousa, MD, PhD**
*João Eurico Fonseca, MD, PhD**

**Senior co-authors.*

Please address correspondence to:
João Eurico Fonseca
Faculdade de Medicina de Lisboa,
Av. Prof Egas Moniz 1,
649-135 Lisboa, Portugal.
E-mail: jcfonseca@medicina.ulisboa.pt

Received on March 21, 2025; accepted in revised form on May 9, 2025.

ORCID iD:
I. Leal: 0000-0001-9622-8779
E. Vieira-Sousa: 0000-0002-7170-8802
J.E. Fonseca: 0000-0003-1432-3671

Funding: this study was supported in part by a research grant from the Investigator-Initiated Studies Program of Merck Sharp & Dohme LLC.
The opinions expressed in this paper are those of the authors and do not necessarily represent those of Merck Sharp & Dohme LLC.

Competing interests: none declared.

Introduction

Spondyloarthritis (SpA) comprises chronic inflammatory diseases of the axial skeleton, peripheral joints, and enthesis, strongly associated with anterior uveitis, particularly in ankylosing spondylitis (AS). Up to 40% of patients experience uveitis, with significant complications in 20% (1-3). SpA-associated acute anterior uveitis (SpA-AAU) significantly impacts morbidity, economic burden, and quality of life (QoL) of SpA patients. Patients with SpA-AAU report lower health-related QoL (HRQoL) and vision-related QoL (VRQoL) compared to healthy individuals, affecting psychological, social, and vocational spheres (4, 5). Treating SpA-AAU is challenging, but tumour necrosis factor inhibitors (TNFi) have shown significant improvements in HRQoL and VRQoL for patients with active and inactive disease, highlighting their potential to mitigate the extensive effects of uveitis (6, 7). Although substantial evidence supports the use of adalimumab (ADA) for treating intermediate, posterior, and panuveitis, not all patients with uveitis respond to ADA therapy. Moreover, there is a notable lack of clinical evidence regarding the management of anterior uveitis syndromes (8). Golimumab (GOL) is a human monoclonal antibody against TNF, initially developed in immunised transgenic mice (9), that inhibits both the soluble and transmembrane forms of TNF, binding to their specific receptors and blocking its activity. Its mechanism of action involves inhibiting TNF-dependent pro-inflammatory cytokines from activated macrophages. It has been shown that GOL's ability to neutralise TNF *in vitro* is superior to infliximab (IFX) and ADA. Its superior efficacy in neutralising TNF is complemented by its stability and inhibition of TNF-induced cytotoxicity and endothelial activation (10). GOL is effective in various chronic immune-mediated inflammatory disorders, including rheumatoid arthritis, psoriatic arthritis, SpA and non-radiographic axial SpA, polyarticular juvenile idiopathic arthritis and ulcerative colitis (9, 11, 12). Emerging retrospective case series and reports indicate GOL's capacity to manage SpA-AAU, even in cases refractory to other TNFi agents (13-15). The GO-EASY (Reduced Occurrence Rate of Acute Anterior Uveitis in Ankylosing Spondylitis Treated with GOL) study further supports its use in recurrent SpA-AAU, reinforcing the role of GOL as a safe and effective option for patients unresponsive to first line TNFi treatments (8).

Extending the insights from the GO-EASY study (8), our research endeavoured to conduct a multicentre, prospective, observational, investigator-initiated study to enhance the current understanding of HRQoL in SpA patients with a recent history of SpA-AAU who are commencing treatment with GOL due to SpA activity. By incorporating patient-reported outcome measures (PROM), the study seeks to offer a detailed exploration of SpA patient experiences, particularly addressing the current knowledge gaps in patient-centric outcomes associated with TNFi in uveitis.

Methods

In this study, we primarily evaluated VRQoL, along with HRQoL, health-related work productivity (HRWP), and the recurrence of SpA-AAU in patients after 24 and 48 weeks of treatment with GOL. Adults with active SpA who met the EULAR/ASAS criteria for TNFi treatment initiation and history of SpA-AAU in the previous 24 months, requiring at least topical steroids, were invited to participate. Recruitment lasted from October 2019 to February 2023. The study, being the first of its kind to examine VRQoL in this group, did not perform a sample size calculation due to the absence of data. Participants had to have retrospective uveitis flare data up to 24 months before enrolment or actual history of uveitis flare and be capable of understanding, consenting, and completing questionnaires. The study was explained to all participants, who provided written informed consent. The study protocol was approved by the Ethics Committee of the Lisbon Academic Medical Center (process number 268/2019) and conducted in accordance with the principles of the Declaration of Helsinki (1975/1983). Patient recruitment took place at Unidade Local de Saúde (ULS) de Santa Maria, ULS de

Gaia/Espinho, ULS da Guarda, and ULS de Lisboa Ocidental.

Exclusion criteria for safety aspects were in line with GOL Summary of Product Characteristics (SmPC) (9). We excluded participants recently exposed to investigational treatments, those with corneal or lens opacities obstructing fundus examination, potential cataract surgery, intraocular pressure (IOP) ≥25 mmHg or on ≥2 glaucoma medications, best-correct visual acuity (BCVA) under 20 letters in one eye, recent intraocular or periocular corticosteroid use, diabetic retinopathy, age-related macular degeneration, severe vitreous haze, macular oedema as the only uveitis sign, history of posterior uveitis or scleritis, and recent intravitreal dexamethasone or fluocinolone use within six months or three years before baseline, respectively. Patients could use conventional synthetic disease-modifying anti-rheumatic drugs (cs-DMARDs), systemic glucocorticoids (*e.g.* prednisolone up to 7.5 mg/day or equivalent), or topical glucocorticoids, as per clinical practice.

Assessments were conducted at baseline, with subsequent follow-up visits at 4, 12, 24, 36 and 48 weeks, according to our centre's routine by a team of ophthalmologists and rheumatologists. During ophthalmology evaluations, BCVA and IOP were measured, and biomicroscopy and fundoscopy were performed. Patients independently completed several questionnaires aimed at evaluating their QoL: the National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25) (16), the EuroQol five-dimension scale questionnaire (EQ-5D) (17, 18), including the associated index, and the Short-Form 36 Health Survey questionnaire (SF-36) (21). Additionally, to assess work impairment and the effect of uveitis HRWP, the Work Productivity and Activity Impairment Questionnaire: Specific Health Problem (WPAI – UVEITIS) (20) was utilised. The NEI-VFQ-25 is a validated questionnaire designed to measure VRQoL across multiple dimensions, being specifically tailored for vision studies; it has been integral in assessing the physical, mental, and social aspects of patients' lives in relation to their visual function (16-21). Although not developed exclusively for uveitis patients, it is widely used in the context of this disorder. The questionnaire features 25 items graded on a Likert-type scale, evaluating the severity of visual symptoms or the difficulty of vision-related tasks such as driving or reading. This composite score ranges from 0, indicating the worst VRQoL, to 100, representing the best VRQoL. A change of 4 to 6 points on this scale is considered clinically meaningful, meaning a significant impact on the patient's quality of life related to vision (16, 22-24). The SF-36 Health Survey is a comprehensive measure of HRQoL, focusing on a patient's self-perceived physical and mental health. This survey includes 36 questions, primarily using a 5-point Likert scale, with one question utilising a 3-point scale (29-32). The EQ-5D is a tool for gauging general health status based on an individual preference. It encompasses five dimensions of health – mobility, self-care, usual activities, pain/discomfort, and anxiety/depression – each evaluated using a Likert scale. Additionally, a visual analogue scale (VAS) is used (17, 18, 29). The WPAI-UVEITIS (36) is a validated tool used to measure the impact of uveitis on work productivity and daily activities. It assesses absenteeism, presenteeism, overall work impairment, and activity impairment outside of work, providing a comprehensive overview of how uveitis affects a patient's life.

These questionnaires were administered at baseline, 24 and 48 weeks. All ophthalmological data was accurately recorded in the Portuguese Registry for Ocular Inflammatory Diseases, Uveite.pt (31). In the Rheumatology evaluations, a rheumatologist assessed peripheral joints, entheses, and acute phase reactants, such as C-reactive protein or erythrocyte sedimentation rate. Additionally, disease activity was assessed using indices such as the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and the Axial Spondyloarthritis Disease Activity Score (ASDAS) combined with C-reactive protein (CRP). All rheumatological data were registered in The Rheumatic Diseases Portuguese Registry (Reuma.pt) (32).

Statistical analysis

Statistical analysis was performed with STATA v. 13.0. A $p<0.05$ was considered for statistical significance. Data are presented as mean (± standard deviation [SD]), median (with first [Q1] and third quartiles [Q3]), or percentages. Regarding flares assessment, the period (in months) of active SpA-AAU was subtracted from the observational period, both for the historical and GOL 48 weeks, because during active SpA-AAU, the chances of developing AAU in the other eye are minimal. Subsequently, the period of being at risk for SpA-AAU was calculated for both study periods. Because the start and/or stop date of the SpA-AAU was not precise for retrospective data, an AAU duration of 90 days was assumed, as described elsewhere (8). Then, the number of AAU events per 100 patient-years was reported for the historical and GOL months/year. Finally, the incident rate (events per year at risk), incidence ratio and 95% confidence interval (CI) were calculated, comparing the number of AAUs per year at risk before and during GOL treatment for the 24 weeks. We calculated the median QoL scores along with the interquartile ranges (IQRs) for the three instruments – the NEI-VFQ, the SF-6, and the EQ-5D – at baseline and at the 24 and 48-week time points. Changes in the measured variables were assessed using a one-way repeated measures ANOVA to compare baseline, 24-week, and 48-week values. Given the non-normal distribution, differences in ASDAS and BASDAI scores were evaluated using the Wilcoxon signed-rank test. Univariate and multivariate regression models analysed the relationships between QoL changes and clinical variables such as disease duration, baseline ASDAS/BASDAI scores, and pre-treatment flare counts.

Results

Demographic and baseline characteristics for all patients are presented in Table I. Eleven patients were male (55%) and the mean age at the time of enrolment was 45.2±11.8 (range: 22–65) years old. Five patients (25%) were TNFi-experienced (but not exposed to other bDMARDs), having previously

Table I. Demographic and baseline characteristics.

Characteristic		Values (total = 20 patients)
Gender, male		11 (55)
Age, yrs ±SD	mean±SD (yrs)	45.2±11.8
	range	22-65
Months since SpA diagnosis	mean±SD	169.4±135.8
	range	12-480
HLA-B27 status	positive	11 (55)
	unknown	6 (30)
Previous use of TNFi		5 (25)
ASDAS	median	3.55
	range	0.9-5.1
BASDAI	median	6
	range	1.5-9
Immunosuppressive drugs, current use		
csDMARD		9 (42.1)
Systemic corticosteroid		2 (10)
Mean dose of daily oral prednisolone*		3.75 (0;5)
Flares prior to enrolment (24 months)	mean±SD	2.5±1.8
	range	1-6
RE BCVA logMAR	mean±SD	0.03±0.04
	range	0-0.1
LE BCVA logMAR	mean±SD	0.03±0.06
	range	0-0.2
PROMs		
VFQ total score	median; 1st quartile; 3rd quartile	71.85;48.9;80.80
	range	14.00-94.4
EQ-5D index	median; 1st quartile; 3rd quartile	0.74;0.20;0.78
	range	-0.65-1.00
SF-36 Physical summary score	median; 1st quartile; 3rd quartile	37.81; 21.88; 53.44
	range	7.50-93.75
	median; 1st quartile; 3rd quartile	42.13; 31.16; 74.13
SF-36 Mental summary score	range	12.75-97.5
WPAI uveitis score	Number of hours lost due to uveitis median; 1st quartile; 3rd quartile	4; 0; 7
	Number of hours lost due to uveitis range	0-40
	Uveitis affecting work productivity (0-10) median; 1st quartile; 3rd quartile	6; 3; 8
	Uveitis affecting work productivity (0-10) range	0-10
	Uveitis affecting non-work tasks (0-10) median; 1st quartile; 3rd quartile	5; 2; 6.5
	Uveitis affecting non-work tasks (0-10) range	0-10

Values are reported as n (% of total), median [1st quartile; 3rd quartile] (range), and mean ± SD (min, max) for age.
yrs: years; SpA: spondyloarthritis; HLA-B27: human leukocyte antigen B27; TNFi: Tumour necrosis factor inhibitor; ASDAS: Ankylosing Spondylitis Disease Activity Score; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; csDMARD: conventional synthetic disease-modifying antirheumatic drugs; BCVA: best-corrected visual acuity; logMAR: log of minimum angle of resolution; PROMs: patient-reported outcome measures; VFQ: Visual Functioning Questionnaire; EQ-5D: EuroQol Five-Dimension Scale Questionnaire; SF-36: Short-Form 36 Questionnaire; WPAI Uveitis: Work Productivity Activity Impairment Questionnaire in Uveitis.
*mean dose considering only the two patients on oral prednisolone.

received an average of 1 TNFi (median: 1; range: 1–3). The remaining patients were TNFi-naive and also naive to other bDMARDs. The mean number of previous AAU flares per patient in the past two years before enrolment was 2.5±1.8 (range: 1–6). Only one patient had a history of inflammatory bowel disease, and no patient had previous evidence of psoriasis.

In the two years prior to GOL treatment, all patients experienced a total of 50 acute anterior uveitis (AAU) flares (Table II). During the 48 weeks of treatment with GOL, only two new AAU flares were reported by a single patient. This patient underwent three non-routine ophthalmologic examinations (one in the Emergency Department and two elective ophthalmology appointments), and no additional rheumatology or ophthalmology appointments were required for any other patients. This individual, who had the second longest disease duration, was the oldest in the study (65 years old) and had the second highest BASDAI score at baseline (8.9).

Over the 12-month period, rheumatic disease activity improved significantly, with a median ASDAS-CRP score decreasing from 3.55 at baseline to 1.10 at 12 months, and a median BASDAI score decreasing from 6.0 to 0.8. All comparisons were statistically significant ($p<0.05$, Wilcoxon signed-rank test), given the non-normal distribution of the data.

Table III depicts PROM scores at baseline, 24 weeks, and 48 weeks. Several univariate linear regression models found no significant relationship between changes in SF-36 PCS, SF-36 MCS, or EQ-5D index and disease duration, baseline ASDAS or BASDAI scores, or the number of flares before starting GOL ($p>0.05$). However, a univariate linear regression model showed a significant positive relationship between improvement in VFQ-25 total score and the number of flares before starting GOL ($p=0.012$), with patients who had more flares being more likely to improve their VFQ-25 total score. Additionally, TNFi-naive patients had a higher likelihood of improving their VFQ-25 total score compared to non-naïve ones ($p=0.03$). There was no significant relationship between being naive or not for TNFi and changes in EQ-5D index or SF-36 PCS and MCS ($p>0.05$). Less than 5% of data was missing due to patients' unresponsiveness in very few questions. Due to this minimal number and its potential impact, we decided not to engage in imputation models.

During the study, three subjects had an adverse event possibly related to GOL. Firstly, one participant expe-

Table II. Occurrence rate of acute anterior uveitis flares between baseline and 48 observational weeks.

	Before GOL treatment	During GOL treatment (48 weeks)
Observational patient-years[1]	40	20
Years at risk for a new AAU[2]	27.5	19.5
n. patients with AAU	20	1
n. AAU flares	50	2
n. AAU flares/100 years at risk[3]	181.8	10.3
Incident rate	1.82	0.10
Incidence rate difference of new AAU (95%CI)	-1.72 (-2.24; -1.19) $p<0.01$	
Incidence rate-ratio of new AAU (95%CI)	0.06 (0.01; 0.21) $p<0.01$	

Incidence values are reported as numbers per 100 patient-years and a 95% confidence interval (CI) ratio. Values range may be found inside parentheses. [1]The total number of patient-years observed during the study. [2]The number of observational years minus the AAU period is presented. [3]The number of AAU attacks per 100 patient-years at risk for new AAU.
AAU: acute anterior uveitis; GOL: golimumab; n.: number.

rienced a two-fold elevation in liver function tests one month after starting GOL, which persisted at the 24-week visit. An ultrasound confirmed hepatic steatosis in this patient. Additionally, one other patient developed a testicular mass, mediastinal adenopathy, renal lithiasis, and hypercalcaemia, necessitating the insertion of a renal stent. These findings, along with the testicular mass pathology, were collectively interpreted as a sarcoid-like reaction, leading to the discontinuation of the medication and steroid treatment with consequent resolution of the condition. Another patient had a mild COVID-19 infection, which was managed at home without complications or specific therapy and did not necessitate discontinuing GOL treatment.

Discussion

Forty-eight weeks of GOL treatment in SpA patients with AAU led to a significant reduction in the incidence rate of SpA-AAU flares, from 181.8 to 10.3 per 100 patient-years, alongside a substantial improvement in NEI VFQ-25 scores (from 71.85 to 90.10), overall QoL, and work productivity. In comparison to existing literature on other TNFi, the efficacy of monoclonal antibodies (ADA, IFX) is well established, with reported reductions in AAU flares ranging from 51.8 to 21.4 per 100 patient-years and from 15.6 to 3.4 per 100 patient-years (33, 34). Our findings also suggest that patients with a higher burden of disease, indicated by a greater number of flares prior to GOL initiation, experienced the most substantial improvements in QoL as measured by the VFQ-25. This likely reflects the greater room for improvement in these patients, who may have had more severe disease-related impairments at baseline. Additionally, the observation that TNFi-naive patients showed greater QoL gains compared to TNFi-experienced ones could indicate that earlier intervention with GOL may maximise its therapeutic benefit. These results highlight the potential value of GOL in addressing QoL deficits, particularly in patients with severe or untreated disease. The reduction in SpA-AAU flare incidence and improvements in QoL and work productivity suggest potential economic benefits, including reduced healthcare utilisation and increased patient productivity. The relevance of these results is framed by the significant burden of SpA-AAU symptoms and complications that result in lower HRQoL and VRQoL when compared with healthy subjects (2, 7). The use of some TNFi therapies (ADA and IFX) is associated with improvement in QoL in SpA (28). However, little is known about the QoL of patients with uveitis, or more specifically, SpA-AAU (24, 35). There was some evidence suggesting that poorer visual function is associated with a lower level of QoL (22) and that uveitis has a more debilitating impact on VRQoL than other retinal conditions, such as diabetic retinopathy (36). In the uveitis setting, the use of cs-DMARDs (methotrexate and mycophenolate mofetil, as examples) has also been associated with improved overall well-being and daily functioning (37). Until this date, excluding ADA, there was no prospective evidence in the literature about the impact of other bDMARD drugs in HRQoL in uveitis (7). Vision-related clinical outcomes alone cannot fully capture the impact of SpA-AAU on perceived QoL, as social interaction, mental health, and functional ability play crucial roles. Clinicians often struggle to correlate objective test results with patient experiences, making BCVA or inflammatory grading insufficient for assessing uveitis (38). The underutilisation of PROMs in uveitis has been noted, as they better capture the multidimensional impact of the disease and aspects of visual functioning meaningful to patients. The use of PROMs in ocular diseases enables capturing other aspects of visual functioning that are meaningful to patients (39). Part of the rationale behind the design of this study began with the fact that most of the literature focusing on the role of bDMARDs in uveitis excludes anterior uveitis, for which high-quality evidence is still lacking. Also, the recognition that not all patients with uveitis respond to ADA (it is estimated that up to 25% could be refractory to this treatment) urges the need for evidence with other drugs (40). Briefly, these two unmet needs were the foundation for the GO-VISION study. To the best of our knowledge, this was the first clinical observational protocol designed to prospectively assess the role of bDMARDs in HRQoL in SpA-AAU patients.

It is worth comparing our study with the only other published prospective study assessing GOL in SpA-AAU, the GO-EASY study (8). In GO-EASY, 93 patients were followed for 48 weeks, with the AAU occurrence rate decreasing from 11.1 to 2.2 per 100 patient-years, alongside reduced joint disease activity. However, this study only analysed uveitis flare rates and underlying disease activity, without assessing visual outcomes, and included a broader population where only 27% had a history of AAU. This limitation makes it difficult to determine if GOL prevented flares in patients without prior AAU or if these flares were unrelated to their disease history. In con-

Table III. PROM scores at baseline, 24 and 48 weeks.

Number of patients n=20		Baseline	24 weeks	48 weeks	One-way repeated measures ANOVA
NEI VFQ-25 total score	median; 1st quartile; 3rd quartile	71.85;48.9;80.80	89.3; 71.2; 95;4	90.10; 80.70; 96.30	F(2,36) = 8.80, p<0.01
	range	14.00-94.4	43.7-96.7	71.30-98.30	
EQ-5D index	median; 1st quartile; 3rd quartile	0.74;0.20;0.78	0.89;0.77; 1	0.89; 0.75; 1	F (2,35) = 10.09, p<0.01
	range	-0.65-1.00	0.11-1	0.38-1	
EQ-5D VAS	median; 1st quartile; 3rd quartile	65; 25.5; 73.5	85.5; 72.5; 91.5	90; 80; 90 (60-100)	F (2,35) = 13.92, p<0.01
	range	20-90	40-100		
SF-36 Physical composite score	median; 1st quartile; 3rd quartile	39.89; 28.97; 62.14	36.10; 23.49; 48.53	60.09; 44.93; 73.90	F (2,38) = 10.82, p<0.01
SF-36 Mental composite score	median; 1st quartile; 3rd quartile	49.95; 36.79; 69.31	41.50; 33.37; 50.99	65.86; 39.79; 81.02	F (2,38) = 14.20, p<0.01
WPAI: Number of hours lost due to uveitis	median; 1st quartile; 3rd quartile	4; 0; 7	0; 0; 0	0; 0; 0	F (2,31) = 4.77, p=0.02
	range	0-40	0-0	0-6	
WPAI: Uveitis affecting work productivity (0-10)	median; 1st quartile; 3rd quartile	6; 3; 8	0; 0; 0	0; 0; 0	F (2,29) = 41.38, p<0.01
	range	0-10	0-7	0-5	
WPAI: Uveitis affecting non-work tasks (0-10)	median; 1st quartile; 3rd quartile	5; 2; 6.5	0; 0; 1	0; 0; 0	F (2,32) = 14.86, p<0.01
	range	0-10	0-7	0-6	

Values are reported as median; 1st quartile; 3rd quartile (range).
PROMs: patient-reported outcome measures; NEI VFQ-25: National Eye Institute Visual Functioning Questionnaire 25; EQ-5D: EuroQol Five-Dimension Scale Questionnaire; SF-36: Short-Form 36 Questionnaire; WPAI Uveitis: Work Productivity Activity Impairment Questionnaire in Uveitis.
ANOVA results are reported as F(degrees of freedom between, degrees of freedom within) = F statistic, p-value. The NEI-VFQ-25 is a validated questionnaire designed to measure VRQoL across multiple dimensions, being specifically tailored for vision studies; it has been integral in assessing the physical, mental, and social aspects of patients' lives in relation to their visual function (16). Although not developed exclusively for uveitis patients, it is widely used in the context of this disorder. The questionnaire features 25 items graded on a Likert-type scale, evaluating the severity of visual symptoms or the difficulty of vision-related tasks such as driving or reading. This composite score ranges from 0, indicating the worst VRQoL, to 100, representing the best VRQoL. A change of 4 to 6 points on this scale is considered clinically meaningful, meaning a significant impact on the patient's quality of life related to vision (16, 22, 24. The SF-36 Health Survey is a comprehensive measure of HRQoL, focusing on a patient's self-perceived physical and mental health. This survey includes 36 questions, primarily using a 5-point Likert scale, with one question utilising a 3-point scale (25-27). The EQ-5D is a tool for gauging general health status based on an individual preference. It encompasses five dimensions of health – mobility, self-care, usual activities, pain/discomfort, and anxiety/depression – each evaluated using a Likert scale. Additionally, a visual analogue scale (VAS) is used (17). The WPAI-UVEITIS (30) is a validated tool used to measure the impact of uveitis on work productivity and daily activities. It assesses absenteeism, presenteeism, overall work impairment, and activity impairment outside of work, providing a comprehensive overview of how uveitis affects a patient's life.

trast, GO-VISION focused exclusively on patients with at least one AAU flare before GOL initiation, ensuring a more targeted evaluation. Despite stricter inclusion criteria, which made eligibility more challenging, our study showed a significant reduction in AAU flare rates (from 1.82 to 0.10 per year) even in a cohort that included TNFi-experienced patients, known to have lower response rates to subsequent TNFi therapy (28).

Regarding safety, TNFi-related hepatic abnormalities are often linked to hepatotoxic medications but can also occur independently, though serious cases are rare (41). In our study, hepatic steatosis was detected in the patient with elevated liver enzymes, complicating causality. Another patient developed a florid sarcoid-like reaction, which resolved with systemic steroids. While paradoxical sarcoidosis-like reactions are known with TNFi, mainly etanercept, our findings highlight this rare occurrence with GOL, emphasising the need for vigilance (42).

The results of our study should be interpreted in light of its limitations. First, the absence of a placebo or comparator group limits the ability to isolate the specific effects of GOL. However, this design mirrors that of the GO-EASY study, as it may be difficult or ethi-

cally inappropriate to allocate patients to a group without anti-TNF treatment (8). Additionally, the requirement for patients to have had uveitis in the pre-GOL period, along with the possibility of developing or not developing uveitis in the post-treatment period, represents another limitation. The fact that AAU flares could occur at any time within the 24 months prior to therapy initiation might underestimate the baseline impact of uveitis. Furthermore, the open-label nature of the study could influence self-perceived outcomes. Lastly, while our sample size was small, it is comparable to or larger than most cohorts in the literature on GOL and AAU, excluding the GO-EASY study (11, 15).

Several strengths should also be highlighted. Our study was the first, to our knowledge, to prospectively assess the change of HRQoL during TNFi treatment in SpA patients with a history of AAU. In addition, it showed a good efficacy of GOL in patients with SpA in a real-world setting, including both TNFi-naive and -experienced patients. To date, only a few small, mainly retrospective, studies have reported on SpA-related AAU during GOL treatment. Notably, this study adds to a growing body of evidence proving the efficacy of TNFi in specifically anterior non-infectious uveitis, which is a tremendous unmet need in the literature. Consequent to its design, the study has brought together clinicians from two different specialities in a coordinated effort in research. Undoubtedly, this study instigated teamwork, active discussion, and the development of streamlined routines and touchpoints between clinicians from Ophthalmology and Rheumatology Departments in different centres.

In conclusion, the GO-VISION study, a prospective, history-controlled, multicentre study conducted in a real-world setting, assessed the impact of GOL on the HRQoL for patients with SpA experiencing recent episodes of SpA-AAU. Our findings indicate that GOL not only has the potential to improve VRQoL but also to significantly decrease SpA-AAU flares. The integration of VRQoL as a key endpoint in rheumatic diseases, particularly those with extraarticular manifestations such as ophthalmic ones, underscores its significance in patient care. These results can enhance the evaluation of bDMARD therapies, which, despite their economic and systemic implications, have the potential to substantially improve patient outcomes in diseases where rheumatic and ophthalmic complications intersect.

Acknowledgement

Artificial intelligence tools were used solely to aid translation and not for content generation, data analysis, or statistical interpretation in this manuscript.

References

1. KOPPLIN LJ, MOUNT G, SUHLER EB, KOPPLIN LJ: Review for disease of the year: Epidemiology of HLA-B27 associated ocular disorders. *Ocul Immunol Inflamm* 2016; 24(4): 470-75. https://doi.org/10.1080/09273948.2016.1175642
2. D'AMBROSIO EM, LA CAVA M, TORTORELLA P, GHARBIYA M, CAMPANELLA M, IANNETTI L: Clinical features and complications of the HLA-B27-associated acute anterior uveitis: a metanalysis. *Semin Ophthalmol* 2017; 32(6): 689-701. https://doi.org/10.3109/08820538.2016.1170158
3. VAN DER HEIJDE D, RAMIRO S, LANDEWÉ R *et al*.: 2016 update of the ASAS-EULAR management recommendations for axial spondyloarthritis. *Ann Rheum Dis* 2017; 76(6): 978-91. https://doi.org/10.1136/annrheumdis-2016-210770
4. KALEEMUNNISHA S, SUDHARSHAN S, BISWAS J: Quality of life in non-infectious uveitis patients on immunosuppressive therapy. *Middle East Afr J Ophthalmol* 2014; 21(3): 225-31. https://doi.org/10.4103/0974-9233.134675
5. TAN P, KOH YT, WONG PY, TEOH SC: Evaluation of the impact of uveitis on visual-related quality of life. *Ocul Immunol Inflamm* 2012; 20(6): 453-59. https://doi.org/10.3109/09273948.2012.723781
6. PASADHIKA S, ROSENBAUM JT: Update on the use of systemic biologic agents in the treatment of noninfectious uveitis. *Biologics* 2014; 8: 67-81. https://doi.org/10.2147/btt.s41477
7. SHEPPARD J, JOSHI A, BETTS KA *et al*.: Effect of adalimumab on visual functioning in patients with noninfectious intermediate uveitis, posterior uveitis, and panuveitis in the VISUAL-1 and VISUAL-2 trials. *JAMA Ophthalmol* 2017; 135(6): 511-18. https://doi.org/10.1001/jamaophthalmol.2017.0603
8. VAN BENTUM RE, HESLINGA SC, NURMOHAMED MT *et al*.: Reduced occurrence rate of acute anterior uveitis in ankylosing spondylitis treated with golimumab - The GO-EASY study. *J Rheumatol* 2019; 46(2): 153-59. https://doi.org/10.3899/jrheum.180312
9. European Medicines Agency - EMEA. Simponi (golimumab). 2023.
10. SHEALY D, CAI A, STAQUET K *et al*.: Characterization of golimumab, a human monoclonal antibody specific for human tumor necrosis factor α. *MAbs* 2010; 2(4): 428-39. https://doi.org/10.4161/mabs.12304
11. CALVO-RÍO V, BLANCO R, SANTOS-GOMÉZ M *et al*.: Golimumab in refractory uveitis related with spondyloarthritis. Multicenter study of 15 patients. *Semin Arthritis Rheum* 2016; 46(1): 95-101. https://doi.org/10.1016/j.semarthrit.2016.03.002
12. MISEROCCHI E, MODORATI G, PONTIKAKI I, MERONI PL, GERLONI V: Long-term treatment with golimumab for severe uveitis. *Ocul Immunol Inflamm* 2014; 22(2): 90-95. https://doi.org/10.3109/09273948.2013.844265
13. CORDERO-COMA M, CALVO-RÍO V, ADÁN A *et al*.: Golimumab as rescue therapy for refractory immune-mediated uveitis: a three-center experience. *Mediators Inflamm* 2014;2014. https://doi.org/10.1155/2014/717598
14. CALVO-RÍO V, DE LA HERA D, BLANCO R *et al*.: Golimumab in uveitis previously treated with other anti-TNF-alpha drugs: a retrospective study of three cases from a single centre and literature review. *Clin Exp Rheumatol* 2014; 32(6): 864-68.
15. LANZ S, SEIDEL G, SKRABL-BAUMGARTNER A: Golimumab in juvenile idiopathic arthritis-associated uveitis unresponsive to Adalimumab. *Pediatr Rheumatol Online J* 2021; 19(1). https://doi.org/10.1186/S12969-021-00630-1
16. MANGIONE CM, LEE PP, GUTIERREZ PR, SPRITZER K, COLEMAN AL: Development of the 25-item National Eye Institute visual function questionnaire. *Arch Ophthalmol* 2001; 119: 1050-58. https://doi.org/10.1097/00132578-200201000-00028
17. RAMOS-GONI JM, RIVERO-ARIAS O: Eq5d: A command to calculate index values for the EQ-5D quality-of-life instrument. *Stata Journal* 2011; 11(1): 120-25. https://doi.org/10.1177/1536867x1101100108
18. 2021 ERF. EQ-5D-3L User Guide: basic information on how to use the EQ-5D-3L instrument.
19. WARE JE, KOSINSKI MA, KELLER SD: SF-36 Physical and Mental Health Summary Scales: A User's Manual. The Heath Institute, editor. Boston, MA: New England Medical Center; 1994.
20. ZHANG W, BANSBACK N, BOONEN A, YOUNG A, SINGH A, ANIS AH: Validity of the work productivity and activity impairment questionnaire--general health version in patients with rheumatoid arthritis. *Arthritis Res Ther* 2010; 12(5): R177. https://doi.org/10.1186/ar3141
21. GUI W, DOMBROW M, MARCUS I *et al*.: Quality of life in patients with noninfectious uveitis treated with or without systemic anti-inflammatory therapy. *Ocul Immunol Inflamm* 2015; 23(2): 135-43. https://doi.org/10.3109/09273948.2013.874445
22. SUGAR EA, VENUGOPAL V, THORNE JE *et al*.: Longitudinal vision-related quality of life for patients with noninfectious uveitis treated with fluocinolone acetonide implant or systemic corticosteroid therapy. *Ophthalmology* 2017; 124(11): 1662-69. https://doi.org/10.1016/j.ophtha.2017.05.015

23. MISSAKA RFBG, SOUTO FMS, ALBORNOZ NCA *et al*.: Self-reported quality of life in patients with long-standing Vogt-Koyanagi-Harada disease. *Ocul Immunol Inflamm* 2020; 28(3): 409-20. https://doi.org/10.1080/09273948.2019.1595672
24. HOEKSEMA L, LOS LI: Vision-related quality of life in patients with inactive HLA-B27-associated-spectrum anterior uveitis. *PLoS One* 2016; 11(1). https://doi.org/10.1371/journal.pone.0146956
25. MISEROCCHI E, MODORATI G, MOSCONI P, COLUCCI A, BANDELLO F: Quality of life in patients with uveitis on chronic systemic immunosuppressive treatment. *Ocul Immunol Inflamm* 2010; 18(4): 247-54. https://doi.org/10.3109/09273941003637510
26. SCHIFFMAN RM, JACOBSEN G, WHITCUP SM: Visual functioning and general health status in patients with uveitis. *Arch Ophthalmol* 2001; 119(6): 841-49. https://doi.org/10.1097/00132578-200204000-00015
27. HAASNOOT AMJW, SINT JAGO NFM, TEKSTRA J, DE BOER JH: Impact of uveitis on quality of life in adult patients with juvenile idiopathic arthritis. *Arthritis Care Res* (Hoboken) 2017; 69(12): 1895-902. https://doi.org/10.1002/acr.23224
28. TAŃSKI W, ŚWIĄTONIOWSKA-LONC N, DUDEK K, JANKOWSKA-POLAŃSKA B: Benefit of biological drugs for quality of life in patients with ankylosing spondylitis: a systematic review and meta-analysis of clinical trials. *Adv Exp Med Biol* 2021; 1335: 63-78. https://doi.org/10.1007/5584_2020_611
29. NAIK RK, GRIES KS, RENTZ AM, KOWALSKI JW, REVICKI DA: Psychometric evaluation of the National Eye Institute Visual Function Questionnaire and Visual Function Questionnaire Utility Index in patients with non-infectious intermediate and posterior uveitis. *Qual Life Res* 2013; 22(10): 2801-8. https://doi.org/10.1007/s11136-013-0412-y
30. CIMINO L, NERI P, MISEROCCHI E *et al*.: Non-infectious uveitis burden on quality of life and work impairment assessed through different psychometric questionnaires. *Eur J Ophthalmol 2022*; 32(4): 2282- 90. https://doi.org/10.1177/11206721211034649
31. LEAL I, NOGUEIRA V, MATOS DB *et al*.: Design and development of a web-based prospective nationwide registry for ocular inflammatory diseases: UVEITE.PT - The Portuguese Ocular Inflammation Registry. *Ocul Immunol Inflamm* 2023; https://doi.org/10.1080/09273948.2023.2171891
32. SANTOS MJ, CANHÃO H, MOURÃO AF *et al*.: Reuma.pt contribution to the knowledge of immune-mediated systemic rheumatic diseases. *Acta Reumatol Port* 2017; 42(3): 232-39.
33. VAN DENDEREN JC, VISMAN IM, NURMOHAMED MT, SUTTORP-SCHULTEN MSA, VAN DER HORST-BRUINSMA IE: Adalimumab significantly reduces the recurrence rate of anterior uveitis in patients with ankylosing spondylitis. *J Rheumatol* 2014; 41(9): 1843-48. https://doi.org/10.3899/jrheum.131289
34. RUDWALEIT M, RØDEVAND E, HOLCK P *et al*.: Adalimumab effectively reduces the rate of anterior uveitis flares in patients with active ankylosing spondylitis: results of a prospective open-label study. *Ann Rheum Dis* 2009; 68(5): 696-701. https://doi.org/10.1136/ard.2008.092585
35. GOODCHILD C, O'ROURKE M, HAROON M, FITZGERALD O, MURPHY CC: 5-year longitudinal study of clinical and patient-reported outcomes in acute anterior uveitis. *Eye* (Lond) 2021; 35(2): 651-58. https://doi.org/10.1038/s41433-020-0937-6
36. HUI MM, WAKEFIELD D, PATEL I, CVEJIC E, MCCLUSKEY PJ, CHANG JH: Visual functioning and health-related quality-of-life are compromised in patients with uveitis. *Ocul Immunol Inflamm* 2017; 25(4): 486-91. https://doi.org/10.3109/09273948.2016.1139734
37. KELLY NK, CHATTOPADHYAY A, RATHINAM SR *et al*.: Health- and vision-related quality of life in a randomized controlled trial comparing methotrexate and mycophenolate mofetil for uveitis. *Ophthalmology* 2021; 128(9): 1337-45. https://doi.org/10.1016/j.ophtha.2021.02.024
38. JABS DA: Standardization of uveitis nomenclature for reporting clinical data. Results of the first international workshop. *Am J Ophthalmol* 2005; 140(3):509-16. https://doi.org/10.1016/j.ajo.2005.03.057
39. SOLEBO AL, BARRY RJ, KEANE PA, RAHI JS, DENNISTON AK: Under-utilisation of reproducible, child appropriate or patient reported outcome measures in childhood uveitis interventional research. *Orphanet J Rare Dis* 2019; 14(1): 1-11. https://doi.org/10.1186/s13023-019-1108-3
40. CORDERO-COMA M, CALLEJA-ANTOLÍN S, GARZO-GARCÍA I *et al*.: Adalimumab for treatment of noninfectious uveitis: immunogenicity and clinical relevance of measuring serum drug levels and antidrug antibodies. *Ophthalmology* 2016; 123(12): 2618-25. https://doi.org/10.1016/j.ophtha.2016.08.025
41. YANG H, KAVANAUGH A: Adverse effects of golimumab in the treatment of rheumatologic diseases. *Expert Opin Drug Saf* 2014; 13(1): 103-12. https://doi.org/10.1517/14740338.2013.831403
42. DECOCK A, VAN ASSCHE G, VERMEIRE S, WUYTS W, FERRANTE M: Sarcoidosis-like lesions: another paradoxical reaction to anti-TNF therapy? *J Crohns Colitis* 2017; 11(3): 378-83. https://doi.org/10.1093/ecco-jcc/jjw155