Conclusion: Habitual pro-inflammatory dietary pattern was independently associated with higher risk of incident gout in these prospective cohorts, even beyond the pathway through adiposity. Our findings support a role for chronic inflammation in development of gout, similar to CVD¹ and T2D.² Adhering to a diet with lower inflammatory potential may modulate systemic inflammation, potentially reducing gout risk and these life-threatening comorbidities.

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OP0236

THE EFFECT OF UV-B RADIATION EXPOSURE ON THE RISK OF DEVELOPING RHEUMATOID ARTHRITIS

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Background: UV-B radiation has known immunomodulatory properties, but to what extent UV-B radiation exposure might affect the occurrence of rheumatoid arthritis (RA) has been relatively little studied, and with partially contradictory results.

Objectives: To investigate the association between sun- and travel habits, as proxy markers for UV-B radiation exposure, and risk of incident RA, overall and by RA subtype.

Methods: We performed a matched case-control study of 1151 incident cases with new-onset RA and 2374 population controls from the Swedish Epidemiological Investigation of Rheumatoid Arthritis (EIRA) study, recruited between 2006 and 2017. The association between sunbathing frequency, solarium use, and frequency of travels to sunnier countries than Sweden (exposures) and risk of RA (outcome) were assessed as odds ratios (OR) with 95 % confidence intervals (CI) through logistic regression, and adjusted for age, sex, residential region, year of study entry, body mass index, education, income, smoking and alcohol consumption. We further assessed effect modification by self-reported skin type, income and education, and by rheumatoid factor (RF) serostatus.

Results: Overall, the frequency of sunbathing, and solarium use, were similar among RA cases and controls: 'never doing sunbathing' amongst RA cases vs. controls: 22% vs. 21 %, 'sunbathing daily when possible': 10% vs. 12%, and solarium use 13% vs. 12%. The proportion of 'not travelled abroad to a sunnier country than Sweden during the past 5 years' was higher for RA cases than

Table 1. RA cases and controls with adjusted odds ratios and confidence intervals for overall risk of RA and by RA serostatus.

Exposure variable	N				OR* for RA (95% CI)		
	RA cases	Controls	RF+	RF-	All RA	RF+	RF-
Sunbathing^a							
Never	249	495	161	85	ref	ref	ref
At least once a month	398	844	265	124	1.05 (0.85-1.29)	1.07 (0.84-1.36)	0.98 (0.72-1.34)
At least once a week	376	751	239	130	1.11 (0.90-1.38)	1.07 (0.83-1.37)	1.21 (0.88-1.66)
Daily	120	278	75	43	0.91 (0.69-1.20)	0.86 (0.62-1.20)	0.96 (0.64-1.46)
Travel^b							
Never	314	537	208	103	ref	ref	Ref
Seldom	294	568	193	97	0.98 (0.79-1.21)	0.98 (0.77-1.25)	0.98 (0.71-1.35)
Once a year	359	805	227	121	0.82 (0.67-1.01)	0.80 (0.63-1.02)	0.83 (0.61-1.13)
More than once a year	176	463	112	61	0.68 (0.54-0.87)	0.68 (0.51-0.91)	0.70 (0.48-1.01)
Solarium^c							
Never	991	2083	634	336	ref	ref	Ref
Once per year or more	153	290	107	46	1.07 (0.85-1.35)	1.08 (0.83-1.40)	1.11 (0.77-1.59)

OR = adjusted odds ratio, CI = confidence interval, N = number of participants, RA = rheumatoid arthritis, ref = reference, RF= rheumatoid factor. a Frequency of sunbathing if the weather invites to it? b Frequency of travels to a country sunnier than Sweden in the last 5 years? c Frequency of solarium use in the last 5 years? *Adjusting for age, sex, region, index year, BMI, smoking, alcohol consumption, education level and income. <4 % of data was missing for all variables.

controls: 27% vs. 23%, and 'travelling abroad more than once a year' was less common among RA cases: 15% vs. 20%.

Sunbathing frequency was not linked to risk of RA (OR 0.91, 95% CI 0.69-1.20), nor was solarium use (OR 1.07, 95% CI 0.85-1.35). Stratification by skin type revealed no major effect modification, nor did stratification by RF status. In contrast, frequency of travel to sunnier countries than Sweden was inversely associated with RA risk comparing the most to least frequent travelers (OR 0.68, 95% CI 0.54-0.87). When stratified by educational level, this association was confined to individuals with medium (OR 0.69, 95% CI 0.48-0.98) or high (OR 0.60, 95% CI 0.50-0.91) and absent among subjects with low education (OR 1.10, 95% CI 0.56-1.99). No such interaction was observed between travel habits and income.

Conclusion: Proxy markers for UV-B exposure (sunbathing frequency and solarium use within the past five years) do not seem to be strong risk factors for RA. Frequency of travels abroad was inversely associated to RA risk. The nature behind this association remains unclear.

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OP0237

EXPOSURE TO ENVIRONMENTAL AIR POLLUTANTS AS A RISK FACTOR FOR PRIMARY SJÖGREN'S SYNDROME: A POPULATION-BASED COHORT STUDY

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Background: Recent studies suggest that air pollution may play a role in autoimmune diseases. However, few of them report the correlation between air pollution and primary Sjögren's syndrome (pSS).

Objectives: We sought to determine whether people exposed to environmental fine particulate of air pollution have a higher risk of developing pSS.

Methods: We performed a retrospective population-based cohort study from the National Health Insurance Research Database (NHIRD) of Taiwan's population, using the international Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to categorize each disease diagnosis. Air pollution data on Nitric oxide (NO), methane (CH₄), and carbon monoxide (CO) were obtained from the Taiwan Air Quality-Monitoring Database (TAQMD), where daily air pollution data from community-based monitoring sites (78 sites since 1993) was available on a real-time basis. We followed up from January 1st, 1998 to the endpoint of SS diagnosis or to December 31, 2011. The daily average air pollutant concentrations were divided into 4 quartile-based groups (Q1-Q4). The incidence rate, hazard ratios (HRs), as well as 95% confidence intervals for pSS, were stratified by the quartiles of air pollutant concentration, and calculated with a Cox proportional regression model. Finally, Ingenuity Systems Pathway Analysis (IPA) was conducted to identify activated pathways among air way epithelial cells exposed to airborne coarse, fine, and ultrafine particles, and parotid gland tissues from pSS patients using Z-score visualization.

Results: A total of 200 patients were diagnosed with SS. The mean age of patients with pSS was 53.1 years. The incidence of pSS was 0.11%. With the increase in exposure concentrations of nitrogen dioxide, methane, and carbon monoxide (from Q1 to Q4), the incidence rate for pSS of per 1000 person-years increased from 0.7 to 1.19, from 0.93 to 2.14, and from 0.57 to 1.06, respectively. Moreover, compared with Q1, the adjusted HR in Q4 after adjusting for age, gender, monthly income and urbanization levels increased to 1.86, 2.21 and 2.04, respectively. IPA analyses suggested that the underlying cellular mechanisms involved up-regulation of chronic inflammatory pathways including fibrosis signaling pathway.

Conclusion: Exposure to air pollutants, specifically NO, CH₄, and CO, was associated with SS development, mostly driven by fibrotic signaling cascades occurred during chronic inflammation.

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OP0238

DRUG COST FOR BIOLOGIC AND TARGETED SYNTHETIC DMARDS FOR RHEUMATOID ARTHRITIS PATIENTS IN NORWAY FROM 2010 TO 2019 - A COUNTRY WITH A NATIONAL TENDER SYSTEM FOR DRUG PRESCRIPTION

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Background: Biologic and Target Synthetic disease-modifying antirheumatic drugs (BTSs) have caused a paradigm shift in the treatment of patients with inflammatory joint disorders, e.g., rheumatoid arthritis (RA), where remission is now attainable [1]. The high cost of BTSs has caused restrictions on use and prescription, contributing to inequality of care worldwide [2]. An annual tender system was introduced in 2008 in Norway to reduce the costs of these drugs [3].

Objectives: Explore changes in drug costs for BTSs for RA patients treated at Norwegian rheumatology outpatient clinics between 2010 and 2019.

Methods: The project BioRheuma (BIOlogic treatment of patients suffering from inflammatory RHEUMAtic disorders in Norway) aimed to monitor patients treated with BTSs while using a designed computer program. Anonymized data files from the ten participating centers were merged and analyzed (EXCEL and SPSS). For each year in the ten-year period, the annual total cost for BTSs and mean BTS cost for treatment of one patient was calculated for all current BTSs users, for all those who started BTSs, and for patients starting naïve to BTSs. The cost was calculated based on price offers given at the annual tender process for the different years.

Results: The number of registered RA patients in the databases increased from 4909 in 2010 to 9335 in 2019. Simultaneously, the number of patients treated with BTSs increased from 1959 (39.9%) in 2010 to 4209 (45.1%) in 2019. The total treatment expenditure of these BTS treated patients was lowest in 2010 with 226 million Norwegian Kroner (NOK), highest in 2014 (350 million NOK) treating 3448 patients, and second-lowest in 2019 (255 million NOK).

The number of BTSs used for each year (Figure 1) is shown for all current users, all who started new BTSs treatment, and those starting BTSs naïve to BTSs. The same figure also reports the average cost of treating one RA patient with BTSs in these three groups. For the current users of BTSs, when the number of treated patients during follow-up doubled, the mean cost to treat one patient with BTSs was reduced by approximately 50% (decreasing from 115497 NOK in 2010 to 60701 NOK in 2019). The number of patients starting on BTSs approximately doubled, while keeping a steady small increase for the naïve patients to BTSs (382 in 2010 to 405 in 2019). The average starting treatment cost decreased from 114549 NOK in 2010 to 37384 NOK in 2019, and from 114987 NOK in 2010 to 28249 NOK in 2019, for patients starting on BTSs and for patients naïve to BTSs, respectively.

Figure 1. A ten-year overview of treating RA patient with BTSs

Conclusion: Our data shows that the average annual costs of treating a Norwegian RA patient on a current BTS, with a national tender system, were reduced by approximately 50% over the ten years 2010-19. For patients starting on a BTS, the average annual cost was reduced by approximately 75%. The consequence for the payers is that treatment can be offered at a lower price, and thus costly drugs may become more available for patients. We believe that mechanisms like the Norwegian tender system enforced upon the commercial pharmaceutical market improve competition and increase availability and use of costly drugs.

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OP0239

PSYCHOMETRIC EVALUATION OF FUNCTIONAL ASSESSMENT OF CHRONIC ILLNESS THERAPY-FATIGUE IN PATIENTS WITH ACTIVE ANKYLOSING SPONDYLITIS

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Background: Due to its impact on their health-related quality of life (QoL), fatigue is considered a core domain of disease assessment in patients (pts) with ankylosing spondylitis (AS). Psychometric data analyses in pts with rheumatoid and psoriatic arthritis have previously demonstrated that the Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) is a reliable and valid measure in these pt populations,^{1,2} but there are limited data supporting the psychometric validity and reliability of the FACIT-F scale in adult pts with active AS.

Objectives: To further evaluate the psychometric properties of the FACIT-F scale in adult pts with active AS.

Methods: This post hoc analysis used data from the Phase (P)2 (NCT01786668, Study 1) and P3 (NCT03502616, Study 2) studies of tofacitinib in pts with active AS. Second-order confirmatory analysis (CFA) evaluated the measurement model of FACIT-F with two domains (Experience and Impact) and the total score at baseline (BL) and the studies' respective primary analysis time points, Week (W)12 (Study 1) or W16 (Study 2). At the same time points, internal consistency reliability was examined by Cronbach's Coefficient alpha (α), and convergent validity was assessed through correlations of FACIT-F domain and total scores with a set of pt-reported outcomes (PROs): Pt Global Assessment of Disease Activity (PtGA), total back pain/nocturnal spinal pain due to AS, Short Form-36 Health Survey (SF-36v2), Bath AS Functional Index, Bath AS Disease Activity Index and ASQoL. Test-retest reliability was assessed by calculating Intraclass Correlation Coefficients (ICCs). The known-groups validity assessment was derived from an anchor-based repeated measures longitudinal model, with PtGA scores as the anchor (PtGA represented pt state from 'no disease activity' to 'very active disease' [PtGA=0 and 10, respectively]), and FACIT-F domain/total scores as the outcome. Estimations of ability to detect change and meaningful within-pt change (MWPC) were derived from anchor-based repeated measures longitudinal models, with change from BL in PtGA scores as the anchor and change from BL in FACIT-F domain/total scores as the outcome.

Results: The CFA model fit the data well (Bentler's Comparative Index ≥ 0.92 at BL, W12 [Study 1] and W16 [Study 2]), supporting the measurement model of the FACIT-F scale in pts with AS. Across time points in each study, the FACIT-F domain and total scores demonstrated excellent internal consistency (Cronbach's Coefficient $\alpha \geq 0.88$), and correlations between FACIT-F domain/total scores, and all PROs assessed generally exceeded 0.40. Generally, in both studies, the largest correlations (0.62–0.85) were between FACIT-F domain/total scores and the SF-36v2 vitality domain score and ASQoL. Test-retest reliability was acceptable for all FACIT-F domain/total scores (ICC ranged from 0.75–0.89 in both studies). An approximately linear relationship was observed between FACIT-F total scores and PtGA scores in both studies (Figure), as well as for Experience and Impact domain scores. The differences in FACIT-F domain/total scores were large and statistically significant between 'no disease activity' and 'very active disease' pt groups (standardised effect size ≥ 1.17), supporting known-groups validity. Ability to detect change was evidenced by an approximately linear relationship between changes in PtGA and FACIT-F domain/total scores in both studies; when pts experienced a change in PtGA, values for FACIT-F domain/total scores changed