as part of a treat-to-target strategy in early rheumatoid arthritis: impact of joint area, repeated injections, MRI findings, anti-CCP, IgM-RF and CRP. *Annals of the rheumatic diseases* 2012, 71(6):851-856.

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THU0085 RHEUMATOID ARTHRITIS AND ALLERGIC DISEASES

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Background: Historically, RA was considered a T_H1 disease while asthma and allergy were considered T_H2 diseases (1). However, several studies show an association between RA and asthma (2), and more recently, allergic disease (3).

Objectives: We first aimed to determine the association between RA and asthma after controlling for important confounders including allergic disease, urban environment, and passive smoke exposure. Second, we aimed to determine the association between RA and various allergy types.

Methods: This case-control study identified 1,023 cases of RA (175 incident) within a single-center biobank population using a rules-based algorithm that combined self-report with two diagnosis codes. Exposures were self-reported on biobank questionnaires. Logistic regression models calculated the association of exposures with RA, adjusting for potential confounders.

Results: Asthma was associated with RA after adjusting for allergies, urban environment, and passive smoke exposure (OR 1.28, 95% CI 1.04 to 1.58). History of allergic disease was also associated with RA (OR 1.30, 95% CI 1.12 to 1.51), especially food allergy (OR 1.38, OR 1.08 to 1.75, see Figure 1). Results from the incident RA cohort mirrored these findings, though the association with asthma was not significant (OR 1.17, 95% CI 0.66 to 2.06).

Abstract THU0085 – Figure 1. Adjusted association between allergy types and RA.

Conclusion: Asthma and allergies may be associated with increased risk of RA. It is possible a broader problem with immune dysregulation underlies both RA and allergic diseases, and having one predisposes to the other.

REFERENCES:

- [1] Singh VK, Mehrotra S, Agarwal SS. The paradigm of Th1 and Th2 cytokines: its relevance to autoimmunity and allergy. *Immunol Res*. 1999;20(2):147-61.
- [2] Sheen YH, Rolfes MC, Wi CI, Crowson CS, Pendegraft RS, King KS, et al. Association of Asthma with Rheumatoid Arthritis: A Population-Based Case-Control Study. *J Allergy Clin Immunol Pract*. 2018;6(1):219-26.
- [3] Lai NS, Tsai TY, Koo M, Lu MC. Association of rheumatoid arthritis with allergic diseases: A nationwide population-based cohort study. *Allergy Asthma Proc*. 2015;36(5):99-103.

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THU0086 PREDICTING TNFALPHA INHIBITOR TREATMENT RESPONSE USING SERUM CYTOKINES IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Background: Tumour necrosis factor- α inhibitors (TNF α i) are the main biologics (b-MARDs) used to treat active rheumatoid arthritis (RA) in patients that have failed disease modifying treatment (DMARD). However, 10% of patients with rheumatoid arthritis, TNF α inhibitors do not work at all. Patients are continued on this treatment for several months risking side-effects in the hope that the treatment will work. Another 40% of patients respond partially to this treatment and have to also be treated with other drugs such as methotrexate and prednisone in addition to treatment with TNF α i. Biomarkers offer an opportunity to identify before starting or soon after starting treatment with TNF α i which patients will be responders and whether prednisone and other drugs can be reduced and optimise the risk-benefit of treatment.

Objectives: We undertook a series of experiments with the following objectives: determine whether cytokine biomarkers will predict which patients with rheumatoid arthritis are: (a) sustained DMARD early treatment responders (b) sustained TNF α i early treatment responders, (c) TNF α i early treatment failures.

Methods: We used the Millipore's MILLIPLEX MAP Human Th17 Magnetic Bead kit for the simultaneous quantification of the following cytokines: IL-1 β , IL-2, IL-4, IL-5, IL-6, IL-9, IL-10, IL-12p70, IL-13, IL-15, IL-17A, IL-17E/IL-25, IL-17F, IL-21, IL-22, IL-23, IL-27, IL-28A, IL-31, IL-33, GM-CSF, IFN γ , MIP-3 α , TNF α and TNF β . γ , MIP-3 α , TNF α and TNF β . We evaluated 14 patients with RA starting on a DMARD and 26 patients with RA starting on a TNF α i after failing DMARDs. These cytokines were assayed monthly 2 or 3 months prior to starting a TNF α i to evaluate month-to-month cytokine variability and every month up to 5 months after initiation of treatment. RA disease activity was measured using the RA Disease Activity Score (DASCRP28) which includes joint counts, CRP and a patient-reported outcome of health status. All samples were blocked with Heteroblock to reduce rheumatoid factor and other heterophilic antibodies. Rheumatoid factor was measured before and after blocking. The same negative and positive controls were included across all plate runs. All assays were done in singlet to accommodate longitudinal samples. Mixing studies were undertaken to evaluate whether cytokine results could be analysed using quantitative statistics.

Results: We had 67 serum samples in the DMARD treated group and 202 serum samples in the TNF α i treated group because of the longitudinal study design. Using mixed effects linear regression to account for longitudinal data in a model that included all 25 cytokines, treatment-time and treatment type (DMARD or TNF α i/-DMARD), we found that in patients on DMARDs, IL-6, IL-1 β , IL-28A, and TNF β were associated with treatment response. However, in TNF α i treated patients, TNF- α , GM-CSF and IL-6 were associated with treatment response. Only p values <0.005 are reported given that 25 cytokines were included in the model.

Conclusion: In this study of treatment response comparing DMARDs and TNF α i in a longitudinal cohort of 26 patients with a total of 202 samples measuring TNF α and GM-CSF may predict early TNF α i responders.

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THU0087 UTILITY OF INFRARED THERMOGRAPHY FOR THE EVALUATION OF RHEUMATOID ARTHRITIS

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Background: Rheumatoid Arthritis (RA) is a chronic inflammatory disease, which predominantly affects the hands. Currently in clinical practice, we explore the number of swollen and painful joints in order to evaluate the activity of the disease. Infrared thermography (IT) is a non-invasive, lacking ionizing radiation, operator-independent and low-cost technique that allows to measure the temperature of the cutaneous surface through the taking of a photograph.

Objectives: To determine the utility of IT in the evaluation of hands arthritis in patients with RA.

Methods: A cross-sectional study was performed, including patients with RA according to 2010 ACR/EULAR criteria attended in our Hospital between February and March 2018. Demographic, clinical and analytical characteristics of patients were registered. Number of painful and swollen joints were assessed for each patient, including wrist, metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints. Subsequently, a standardised photograph of the dorsal aspect of both hands was taken with a thermal camera (FLIR T250 model) (Figure 1). With this technique mean temperature (MeanT) and maximum temperature (MaxT) were assessed at each joint. Also, differential temperature (DifT) was assessed (mean temperature at joint - temperature at forearm skin).

Results: We included a total of 42 patients. 76% were women, mean age at diagnosis was 56.7 years old. 29 patients were positive for rheumatoid factor and 31 for anti-citrullinated peptide antibody. At the time of the assessment, medium CRP was 9.19 mg/L and ESR was 14.77 mm/h.

MeanT for the 65 swollen joints was 1.5°C higher than the 847 non-swollen joints ($p=0.000$). Independent analysis for each joint level (wrist, MCP and PIP) revealed higher temperature in swollen joints (Table 1). Similar results were obtained for painful joints. ROC curves and areas under the curve (AUC) were calculated for wrist, MCP and PIP joints, obtaining the most favorable results for DifT in wrist and MCP joints, and for MaxT in PIP joints, allowing to calculate a cut-off point at each joint level (Table2).

Figure 1. Selective temperature increase over third PIP of the left hand.

	Swollen	Number of joints	MeanT	P value	MaxT	P value	DifT	P value
TOTAL	NO	847	31.68°C	0.000	32.26°C	0.000	-1.26°C	0.000
	YES	65	33.18°C		33.71°C		-0.28°C	
Wrist	NO	68	32.62°C	0.005	33.21°C	0.004	-0.31°C	0.000
	YES	14	33.79°C		34.40°C		+0.55°C	
MCP	NO	391	32.02°C	0.044	32.72°C	0.066	-0.95°C	0.036
	YES	23	33.02°C		33.61°C		-0.15°C	
PIP	NO	388	31.18°C	0.000	31.64°C	0.000	-1.74°C	0.013
	YES	28	33.01°C		33.47°C		-0.81°C	

Table 1. Correlation between swollen joints and MeanT, MaxT and DifT.

	AUC	Cut-off value	Sensibility	Specificity
Wrist	0.878 (DifT)	-0.0169°C	0.929	0.743
MCP	0.640 (DifT)	+0.10331°C	0.609	0.770
PIP	0.713 (MaxT)	34.27°C	0.679	0.770

Table 2. AUC, sensibility and specificity.

Conclusion: In patients with RA, there is a statistically significant relationship between joint temperature measured by thermal imaging and the presence of swollen and painful joints in the assessment by the rheumatologist. The ROC curves indicate an acceptable sensitivity and specificity and allow to determine cut-off temperatures for clinical use.

Infrared thermography could be a useful tool in the assessment and monitoring of arthritis in RA patients.

REFERENCE:

- [1] Jones B, Hassan I, Tsuyuki RT, Dos Santos MF, Russell AS, Yacyshyn E. Hot joints: myth or reality? A thermographic joint assessment of inflammatory arthritis patients. Clin Rheumatol. 2018 Sep 20;37(9):2567-71

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THU0088 BASELINE ADIPONECTIN LEVELS PREDICT FUTURE DEVELOPMENT OF RHEUMATOID ARTHRITIS IN SUBJECTS WITH OBESITY

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Background: Adiponectin is a cytokine produced by the adipose tissue and is involved in both metabolic and inflammatory processes¹. In obese subjects, serum adiponectin levels are surprisingly low². On the contrary, adiponectin levels are increased in serum and synovial fluid of subjects with established rheumatoid arthritis (RA)^{1,3}.

Objectives: By exploiting a longitudinal study enrolling more than 4000 obese subjects, we aim to determine if serum adiponectin levels are a risk factor for the development of RA in obese subjects.

Methods: The Swedish Obese Subjects (SOS) study is a longitudinal controlled trial on the effect of bariatric surgery on the incidence of obesity-related diseases. It includes 4047 obese subjects whereof 2010 underwent bariatric surgery and 2037 constituted the matched control group^{4,5}. SOS study participants who developed RA were identified by searching the Swedish National Patient Register. Eleven subjects with prevalent RA at baseline are excluded by the analyses. Patients were followed up until diagnosis of RA, death, migration or end of follow-up (December 2016). Total adiponectin was measured using the Quantikine ELISA kit from Quantikine ELISA kit from Bio-Techne (Minneapolis, MN, USA).

Results: Adiponectin measurement at baseline was available for 3691 subjects. Among those subjects, 82 subjects developed RA during a follow up for up to 29 years. High serum adiponectin levels at baseline were associated with the incidence of RA, independently of bariatric surgery, sex, age, body-mass index, smoking, and C-reactive protein and erythrocyte sedimentation rate levels (adjusted Hazard Ratio HR per 10 µg/mL adiponectin 1.70, 95% confidence interval CI 1.12-2.60, P value=0.01). When stratifying the population according to the median of baseline adiponectin, subjects with adiponectin greater than 6.8 µg/mL had a higher risk to develop RA during follow up (log-rank P 0.028, unadjusted HR 1.64, 95% CI 1.05-2.56, P=0.03, Figure 1).

Conclusion: In a large cohort of obese subjects followed up for up to 29 years, serum adiponectin levels were associated with the incidence of RA years before the onset of clinical signs. The association between adiponectin and the incidence of RA was independent of other risk factors, including C-reactive protein, smoking and bariatric surgery.

REFERENCES:

- [1] Fantuzzi G. Adiponectin in inflammatory and immune-mediated diseases. Cytokine 2013;64:1-10.
- [2] Hotta K, Funahashi T, Arita Y, et al. Plasma concentrations of a novel, adipose-specific protein, adiponectin, in type 2 diabetic patients. Arterioscler Thromb Vasc Biol 2000;20:1595-9.
- [3] Lee YH, Bae SC. Circulating adiponectin and visfatin levels in rheumatoid arthritis and their correlation with disease activity: A meta-analysis. Int J Rheum Dis 2018;21:664-72.
- [4] Sjöström L, Larsson B, Backman L, et al. Swedish obese subjects (SOS). Recruitment for an intervention study and a selected description of the obese state. Int J Obes Relat Metab Disord 1992;16:465-79.
- [5] Sjöström L, Narbro K, Sjöström CD, et al. Effects of bariatric surgery on mortality in Swedish obese subjects. N Engl J Med 2007;357:741-52.