- [2] Yoo DH, et al. Arthritis Res Ther. 2016;18:82.
 [3] Park W, et al. Ann Rheum Dis. 2013;72(10):1605-12.
 [4] Park, et al. Arthritis Res Ther. 2016;18:25.
 [5] Yoo DH, et al. Ann Rheum Dis. 2017;76(2):355-363.
 [6] Park W, et al. Ann Rheum Dis. 2017;76(2):346-354.

Figure 1. Drug survival probability of patients with RA treated with CT-P13

Figure 2. Drug survival probability of patients with AS treated with CT-P13

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SLE, Sjögren's and APS – clinical aspects (other than treatment)

SAT0172 ANTIBODIES TO BOTH RO52 AND RO60 DEFINE A SUBSET OF SJÖGREN'S MOST SUITABLE FOR CLINICAL TRIALS OF AGENTS TARGETING LYMPHOPROLIFERATIONS

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Background: Anti-SSA antibodies comprise reactivity to two distinct proteins, Ro52 and Ro60, encoded by separate genes and found on separate ribonucleoprotein particles. Specific testing for Ro52 and Ro60 antibodies is now clinically available, yet the phenotypic correlates of Ro52 and Ro60 reactivity profiles have not been well defined.

Objectives: To determine the phenotypic correlates of antibody reactivity to Ro52 alone, Ro52 + Ro60, and Ro60 alone in patients being evaluated for Sjögren's syndrome (SS).

Methods: We initially studied 840 patients seen at the Hopkins Sjögren's Syndrome Center with suspected or established SS. Each had serum tested for antibodies to recombinant Ro52 (Inova Quanta Lite ELISA) and Ro60 (IVTT immunoprecipitation). We then validated our findings in a

second cohort consisting of 194 patients, each with testing for antibodies to recombinant anti-Ro52 and anti-Ro60 by a chemiluminescent assay (Inova Bioflash). Statistical analyses were performed using JMP pro 13. The Chi-square or Fisher exact test was used to compare the groups.

Results: The discovery cohort of 840 patients included 751 (89%) women, with a mean age of 58.5±13.5 years. 371 (44%) patients met the ACR/EULAR classification criteria. There were 311 with anti-Ro52 +Ro60, 108 with anti-Ro60 alone, 95 with anti-Ro52 alone, and 326 with neither antibody. The 311 patients with anti-Ro52+Ro60 reactivity had a distinctive phenotype, with a markedly increased prevalence of ANA ≥ 1:320, RF, IgG ≥ 1560 mg/dL, and SS-B positivity (p<0.008 for all inter-group comparisons) and an increased prevalence of focus score ≥ 1 and hypoechoic lesions on parotid gland ultrasonography which trended toward statistical significance. These differences were also validated in the second cohort, with the exception of focus score and parotid gland hypoechoic lesions, possibly as a result of smaller group numbers. The Ro52 and Ro60 alone groups were equivalent to each other in their phenotypic associations, except for RF, which was higher in the Ro52 alone group. Measures of lacrimal and salivary gland function and the prevalences of extraglandular manifestations did not show consistent differences between the groups or the two cohorts.

Conclusion: Testing anti-Ro52 and anti-Ro60 in patients with suspected or established SS identifies a unique subset, namely those with both Ro52 and Ro60 antibodies, distinguished by a much higher prevalence of B-cell activation markers and glandular inflammation as measured by focus score and hypoechoic lesions. This subset may be most suitable for inclusion in clinical trials where the therapeutic agent targets glandular lymphoproliferation.

Table: The comparison of the differences according to anti-Ro subtypes in 2 different cohorts									
	Discovery cohort (n=840)				All group comparison		Two group comparison		Validation cohort ¹ (n=194)
	Group A: anti-Ro60 alone n=108 (%)	Group B: anti-Ro52 with anti-Ro60 n=311 (%)	Group C: anti-Ro52 alone n=95 (%)	Group D: All negative n=326 (%)	p value ^a	p value ^b	Two group comparison	p value ^c	Two group comparison
ANA ≥ 1:320	25/106 (25.4)	228/297 (76.7)	36/91 (39.5)	41/318 (12.9)	<0.0001	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0156	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0156	B vs A: 0.0004 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0156	
Positive RF	11/104 (10.6)	178/306 (58.2)	27/88 (30.7)	20/321 (6.2)	<0.0001	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0005	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0005	B vs A: 0.0003 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0005	
IgG ≥ 1560 mg/dL	14/100 (14.0)	135/298 (45.3)	12/87 (13.8)	16/306 (5.2)	<0.0001	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0075	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0075	B vs A: 0.0003 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0075	
SSB antibody positivity	16/106 (14.8)	166/311 (53.4)	17/95 (17.8)	23/326 (7.1)	<0.0001	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0008	B vs A: <0.0001 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0008	B vs A: 0.0003 B vs C: <0.0001 B vs D: <0.0001 A vs C: 0.0008	
FLS with FS ≥ 1	5/78 (6.4)	50/150 (33.3)	17/63 (26.9)	38/288 (13.2)	<0.0001	B vs A: <0.0001 B vs C: 0.0004 B vs D: <0.0006 A vs C: 0.0008	B vs A: <0.0001 B vs C: 0.0004 B vs D: <0.0006 A vs C: 0.0008	B vs A: 0.0003 B vs C: 0.0007 B vs D: <0.0006 A vs C: 0.0008	
Parotid hypoechoic lesions	4/14 (28.6)	43/68 (63.3)	3/14 (21.4)	3/38 (7.9)	<0.0001	B vs A: <0.0001 B vs C: 0.0079 B vs D: <0.0003 A vs C: 0.0025	B vs A: <0.0001 B vs C: 0.0079 B vs D: <0.0003 A vs C: 0.0025	B vs A: 0.0003 B vs C: 0.0146 B vs D: <0.0001 A vs C: 0.0025	
Extraglandular manifestations	38/108 (35.2)	156/311 (50.1)	41/95 (43.2)	100/326 (30.7)	<0.0001	B vs A: 0.0042 B vs C: 0.1740 B vs D: <0.0003 A vs C: 0.2450	B vs A: 0.0042 B vs C: 0.1740 B vs D: <0.0003 A vs C: 0.2450	NS in all groups	

RF, rheumatoid factor; FS, focus score; FLS, focal lymphoid salivary gland lesions; SSB, Sjögren's syndrome B antibody; ANA, antinuclear antibody; IgG, immunoglobulin G; A, anti-Ro52 alone; B, anti-Ro52 + Ro60; C, anti-Ro60 alone; D, all negative.

^a p value of chi-square test for trend; ^b p value of Fisher's exact test; ^c p value of chi-square test for trend.

^d A p value of 0.05 was considered significant.

^e A p value of 0.05 was considered significant.

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SAT0173 RENAL GALLIUM SCAN CORRELATED WITH INFLAMMATION IN RENAL HISTOLOGY OF PATIENTS WITH LUPUS NEPHRITIS

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Background: Lupus nephritis (LN) is the leading cause of mortality in lupus patients. But there is only one image assessment method, the histopathology through invasive renal biopsy.

Objectives: This study aimed to investigate the clinical value of the non-invasive image assessment method: renal gallium scan, in renal histological parameters of LN in a cohort of one single tertiary referral center.

Methods: Between 2006 and 2018, a hospital-based observational study was conducted to enroll 266 biopsy-proven and 40 repeated-biopsied LN patients who underwent renal gallium scan before biopsy. The classification and scoring of LN were assessed according to the International

Society of Nephrology/Renal Pathology Society. A delayed 48-hour gallium scan was performed and interpreted by visual and semiquantitative methods. The renal histological results were compared with gallium scan parameters.

Results: Out of 266 participants, 189 (71%) were proliferative LN. Baseline gallium left kidney/spine (K/S) ratio was significantly higher in class IV LN as compared to class III or class V (median [inter-quartile range, IQR]: 1.14 [1.0-1.3], 0.97 [0.9-1.1], 1.035 [0.9-1.2], respectively, $p<0.001$). Patients with higher daily urine protein, renal activity index, endocapillary proliferation and interstitial inflammation tended to exhibit higher gallium uptake by regression analysis. Besides, changes of gallium uptake ratio between 2 biopsies were positively correlated with daily urine protein change ($r=0.699$, $p<0.001$), change of activity index ($r=0.339$, $p=0.033$), endocapillary proliferation ($r=0.380$, $p=0.027$) and neutrophils infiltration ($r=0.405$, $p=0.018$) in renal pathology findings.

	Class I&II (n=7)	III (n=43)	IV (n=146)	V (n=70)	P value
Age	42.0 (33.0-43.0)	31.0 (26.0-40.0)	32.0 (25.0-41.0)	31.0 (26.0-40.3)	0.572
Gender					0.577
F	7 (100.0%)	36 (83.7%)	118 (80.8%)	59 (84.3%)	
M	0 (0.0%)	7 (16.3%)	28 (19.2%)	11 (15.7%)	
Lab data					
Daily urine protein	0.7 (0.1-1.8)	1.9 (1.0-2.5)	3.7 (2.1-5.6)	2.1 (0.9-6.3)	<0.001**
Creatinine	0.7 (0.5-0.8)	0.8 (0.6-1.2)	1.4 (0.9-2.8)	0.8 (0.7-1.1)	<0.001**
eGFR	97.5 (91.0-139.2)	88.3 (65.6-125.6)	48.5 (22.3-79.0)	88.2 (60.8-117.6)	<0.001**
dsDNAAb	248.7 (166.5-477.0)	169.0 (64.7-347.7)	265.4 (125.5-464.1)	126.0 (33.3-286.9)	<0.001**
C3	78.2 (71.3-90.5)	76.4 (63.7-93.2)	54.6 (40.7-67.0)	67.9 (47.9-97.0)	<0.001**
C4	15.1 (4.1-20.9)	14.4 (10.4-22.2)	10.6 (6.7-18.0)	12.5 (7.2-23.5)	0.048*
SLEDAI	18.5 --	14.0 (10.0-14.0)	14.0 (8.0-20.0)	8.0 (5.5-10.8)	0.025*
Renal pathology					
Activity Index	0 (0-1)	3 (1-4)	8 (5.0-10.3)	0 (0-2)	<0.001**
Cellular crescent	0 (0-0)	0 (0-0)	2 (0-2)	0 (0-0)	<0.001**
Necrosis/Karyorrhexis	0 (0-0)	2 (0-2)	2 (0-2)	0 (0-0)	<0.001**
Endocapillary proliferation	0 (0-0)	1 (0-1)	2 (0-3)	0 (0-1)	<0.001**
Hyaline thrombus/wire loop	0 (0-0)	0 (0-0)	1 (0-2)	0 (0-0)	<0.001**
Neutrophils infiltration	0 (0-0)	0 (0-0)	0 (0-1)	0 (0-0)	<0.001**
Interstitial inflammation	0 (0-1)	0 (0-1)	1 (0-2)	0 (0-1)	<0.001**
Chronicity Index	0 (0-1)	2 (0-3)	1 (0-4)	1 (0-2)	0.036*
Glomerular stenosis	0 (0-0)	1 (0-1)	1 (0-2)	0 (0-1)	0.001**
Tubular atrophy	0 (0-0)	1 (0-1)	0 (0-1)	0 (0-1)	0.094
Interstitial fibrosis	0 (0-1)	0 (0-1)	0 (0-1)	0 (0-1)	0.405
Fibrous crescent	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0.066
Tubulointerstitial nephritis	1 (14.3%)	17 (39.5%)	83 (56.8%)	22 (31.4%)	0.001**
Adenocarcinoma	1 (14.3%)	9 (20.9%)	32 (21.9%)	8 (11.8%)	0.343
L1's ratio	0.9 (0.8-1.2)	1.0 (0.9-1.1)	1.1 (1.0-1.3)	1.0 (0.9-1.2)	<0.001**
R1's ratio	1.0 (0.9-1.4)	1.0 (0.9-1.2)	1.2 (1.1-1.4)	1.1 (1.0-1.2)	<0.001**
Gallium visual grading					<0.001**
0-1&1&1-2	4 (57.1%)	19 (44.2%)	26 (17.8%)	18 (25.7%)	
2	1 (14.3%)	17 (39.5%)	42 (28.8%)	33 (47.1%)	
2-3	0 (0.0%)	6 (14.0%)	38 (26.0%)	10 (14.3%)	
3	2 (28.6%)	1 (2.3%)	40 (27.4%)	9 (12.9%)	

Chi-square test. *Kruskal-Wallis test. ** $P<0.05$, *** $P<0.01$

	Univariate			Multivariate1			Multivariate2			Multivariate3		
	B	95%CI	P value	B	95%CI	P value	B	95%CI	P value	B	95%CI	P value
Age	-0.002	(-0.005, 0.000)	0.079									
Gender												
F	Reference											
M	0.004	(-0.076, 0.084)	0.925									
Lab data												
Daily urine protein	0.023	(0.016, 0.031)	<0.001**	0.020	(0.012, 0.027)	<0.001**	0.019	(0.011, 0.026)	<0.001**	0.018	(0.011, 0.026)	<0.001**
Creatinine	0.016	(-0.002, 0.035)	0.088									
eGFR	-0.001	(-0.001, 0.000)	0.884*	0.000	(-0.001, 0.001)	0.965	0.000	(-0.001, 0.001)	0.757			
dsDNAAb	0.000	(0.000, 0.000)	0.113									
C3	-0.001	(-0.002, 0.000)	0.884*	0.001	(-0.001, 0.002)	0.370	0.001	(-0.001, 0.002)	0.257			
C4	-0.001	(-0.004, 0.001)	0.375									
SLEDAI	-0.005	(-0.020, 0.009)	0.448									
Renal pathology												
Activity Index	0.021	(0.015, 0.027)	<0.001**	0.018	(0.010, 0.026)	<0.001**						
Cellular crescent	0.045	(0.022, 0.068)	<0.001**				0.000	(-0.029, 0.030)	0.995			
Necrosis/Karyorrhexis	0.016	(0.017, 0.015)	<0.001**				0.017	(-0.007, 0.040)	0.167			
Endocapillary proliferation	0.073	(0.048, 0.098)	<0.001**				0.029	(-0.010, 0.069)	0.144	0.039	(0.011, 0.068)	0.007**
Hyaline thrombus/wire loop	0.083	(0.049, 0.117)	<0.001**				0.019	(-0.025, 0.064)	0.396			
Neutrophils infiltration	0.001	(0.003, 0.149)	<0.001**				0.008	(-0.048, 0.065)	0.768			
Interstitial inflammation	0.001	(0.007, 0.125)	<0.001**				0.051	(0.011, 0.091)	0.012*	0.053	(0.016, 0.090)	0.005**
Chronicity Index	-0.002	(-0.014, 0.009)	0.700									
Glomerular stenosis	-0.015	(-0.047, 0.017)	0.356									
Tubular atrophy	-0.010	(-0.045, 0.026)	0.592									
Interstitial fibrosis	-0.002	(-0.018, 0.014)	0.899									
Fibrous crescent	0.025	(-0.092, 0.143)	0.672									
Tubulointerstitial nephritis	0.020	(-0.041, 0.081)	0.519									
Adenocarcinoma	-0.024	(-0.101, 0.054)	0.547									
Gallium visual grading												
0-1&1&1-2	Reference											
2	0.175	(0.134, 0.217)	<0.001**									
2-3	0.343	(0.295, 0.390)	<0.001**									
3	0.616	(0.568, 0.665)	<0.001**									

Inter correlation: r (Pearson)

* P<0.05, ** P<0.01

Linear regression. *Significant. ** $P<0.05$, *** $P<0.01$

Conclusion: Higher renal gallium uptake predicts higher active inflammation in LN. Changes of gallium uptake ratio were correlated with changes histopathological parameters and daily urine protein. Renal gallium scan appears to be a valuable non-invasive tool in assessing activities of LN.

REFERENCES

- Tsai, S. C., Hsieh, T. Y., Huang, P. W., & Lin, W. Y. (2016). Absolute quantitative evaluation of 67Ga scintigraphy in lupus nephritis. *Clinical nuclear medicine*, 41(6), 442-446.
- Lin, W. Y., Hsieh, J. F., Tsai, S. C., Lan, J. L., Cheng, K. Y., & Wang, S. J. (2000). Semi-quantitative evaluation of gallium-67 scintigraphy in lupus nephritis. *European journal of nuclear medicine*, 27(11), 1626-1631.
- Nomura, S., Watanabe, Y., Otsuka, N., & Osawa, G. (1996). Gallium 67 scintigraphy as a predictor of renal prognosis in primary immunoglobulin A nephropathy. *American journal of kidney diseases*, 27(2), 204-208.

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SAT0174 CHARACTERISTICS AND TREATMENTS OF PATIENTS WITH SJÖGREN'S SYNDROME IN A REAL-WORLD SETTING

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Background: Sjögren's syndrome (SS) is one of the most common autoimmune diseases. Main symptoms include dry eyes and mouth, followed by difficulty swallowing and serious systemic manifestations including neurological, pulmonary and musculoskeletal effects.¹ However, SS is not homogeneous; it affects patients in different ways, with varying symptoms and severity. Identifying discrete patient types and understanding their commonalities and differences is integral to enhancing disease knowledge, identifying areas of unmet need, defining the size of the affected population and determining appropriate treatment approach.

Objectives: Using data gathered by the SS Foundation through a survey of over 3000 patients with SS, analyses were performed to: 1) describe patient characteristics and treatment in a real-world setting and 2) categorise patients based on baseline characteristics.

Methods: The analytical approach used clustering techniques to synthesise the mixed-data-type survey in two separate analyses. Data were filtered to include patients 40–65 years of age. Analyses were performed firstly to identify relationships between features—related to demographic, disease state, treatments, etc—and secondly to identify clusters of patients. A Bayesian network model was used to evaluate feature correlations and the probability of a specific survey answer given one or many preliminary conditions. With respect to patient clustering, the model used was based on Gower distance and Partitioning Around Medoids, which each can include both numerical and categorical data.

Results: We evaluated comorbidities, symptoms and treatment to identify traits that differed most significantly among patient types. Four discrete patient clusters were identified (disease severity measured by median EULAR SS Patient Reported Index score²; Table 1):

1. Recent: Most recently diagnosed, least severe disease manifestation
2. Slower progressing: Longest time since diagnosis, second-lowest disease severity
3. Second-second: Second in time since of diagnosis, second in disease severity
4. Most severe: Most severe disease manifestations and comorbidities

The most differentiating comorbidities across all clusters included gastroesophageal reflux disease, fibromyalgia and Raynaud's syndrome (Table 2). The symptoms that impacted patients' lives the most and that were differentiating across clusters were brain fog, fatigue and forgetfulness. The treatments that were most contrasting were oral comfort agents, followed by DMARDs and secretagogues (Figure 1). The patient cluster definitions above suggest some contradictions, because not all significant cluster characteristics progressively worsened with increasing disease severity.

Conclusion: These analyses show differences in disease characteristics and treatment across patient clusters; however, more work is required to validate these clusters.