

## ONLINE SUPPLEMENTARY DATA

Supplementary Table 1 Frequency of ultrasound pathology

Author	Year	Clinical arthritis / arthralgia (%)	Synovitis (%)	SH (%)	PD (%)	Joint effusion (%)	Bone erosion (%)	Tenosynovitis (%)	Enthesitis (%)
Dreyer et al. <sup>1</sup>	2015	48 (at time of US)	48 (wrist) 36 (MCP)	42 (wrist) 33 (MCP)	33 (wrist, CD) 21 (MCP, CD)	-	6	18	-
Mosca et al. <sup>2</sup>	2015	94.1 (ever) 24.5 (at time of US)	42.2	9.8 (wrist) 15.7 (hand) 16.7 (wrist + hand)	10.7	17	31.4	38.2	-
Mukherjee et al. <sup>3</sup>	2016	-	- <sup>a</sup>	60 (MCP) 80 (MTP) 100 (bursa)	30 (MCP) 10 (MTP) 10 (bursa)	-	- <sup>a</sup>	-	-
Piga et al. <sup>4</sup>	2016	-	-	-	-	-	13.5 (MC head 2) 3.8 (MC head 3) 0.9 (MC head 4) 3.8 (MC head 5) 5.8 (radiocarpal) 4.8 (ulnar head)	-	-
Piga et al. <sup>5</sup>	2016	11.2 (baseline)	- <sup>a</sup>	18.8 (baseline)	12.6 (baseline)	-	16.2 (baseline)	37.5 (baseline)	-
Ceccarelli et al. <sup>6</sup>	2017	100	29.4	76.5	29.4	88.2	58.8	-	-
Lins et al. <sup>7</sup>	2017	15.2 <sup>b</sup>	2.8 <sup>b</sup>	-	-	-	-	4.7 <sup>c</sup>	-
Ogura et al. <sup>8</sup>	2017	100	80	-	-	-	-	93	-
Ruano et al. <sup>9</sup>	2017	17	36.7 (asymptomatic) 83.3 (symptomatic)	76.7 (asymptomatic) 100 (symptomatic)	23.3 (asymptomatic) 83.3 (symptomatic)	-	-	-	-
Salliot et al. <sup>10</sup>	2018	59	40.4	72.2	44	71.5	15.2	10	-
Di Matteo et al. <sup>11</sup>	2018	100	35 <sup>b</sup>	21 <sup>b</sup>	30.9 <sup>b</sup>	9.5 <sup>b</sup>	2.1 <sup>b</sup>	17.7 <sup>c</sup>	24.4 <sup>d</sup>
Di Matteo et al. <sup>12</sup>	2018	76.9	-	-	-	-	-	-	67.7
Lins et al. <sup>13</sup>	2018	100	14.1 (wrist) 1.8 (MCP) 0 (PIP) 2.8 (total)	47.5	-	-	5	22.5	-
Gunasherkar et al. <sup>14</sup>	2018	75	-	22 (wrist) 13 (MCP)	-	-	-	11	-
Abdel-Magied et al. <sup>15</sup>	2018	100	66.7	66.7	33.3	-	23.3	56.7	-

US, ultrasound; MCP, metacarpophalangeal; PIP, proximal interphalangeal; GS, greyscale, PD, power Doppler; CD, colour Doppler;

MTP, metatarsophalangeal; MC, metacarpal.

- a: This parameter was studied but was not reported
- b: This percentage was relative to the total number of joints scanned
- c: This percentage was relative to the total number of tendons scanned
- d: This percentage was relative to the total number of entheses scanned

Supplementary Table 2 Characteristics of ultrasound scanning techniques and settings

Author	Year	Bilateral or unilateral examination	US scanning techniques	US mode	US setting	US machine	US transducer	US transducer frequency (MHz)
Dreyer et al. <sup>1</sup>	2015	Unilateral (by lot)	Yes	GS, CD	Yes	GE, Logiq 9	Linear	9-14
Mosca et al. <sup>2</sup>	2015	Unilateral (non-dominant hand)	No	GS, PD	-	GE, Logiq 9	Linear	14
Mukherjee et al. <sup>3</sup>	2016	Bilateral	Yes	GS, PD	-	Esaote, MyLab70	Linear	8-16
Piga et al. <sup>4</sup>	2016	Bilateral	Yes	-	-	GE, Logiq 9	Volumetric	8-15
Piga et al. <sup>5</sup>	2016	Bilateral	-	GS, PD	-	GE, Logiq 9	Linear	8-15
Ceccarelli et al. <sup>6</sup>	2017	Bilateral	-	GS, PD	Yes	Esaote, MyLab70 X-Vision Gold	Linear	6-18
Lins et al. <sup>7</sup>	2017	Bilateral	Yes	GS	-	HD11 XE US System	-	10-14
Ogura et al. <sup>8</sup>	2017	Bilateral	Yes	GS, PD	Yes	Toshiba, Xario	Linear	7-14
Ruano et al. <sup>9</sup>	2017	Bilateral	Yes	GS, PD	Yes	GE, Logiq E9	Linear	6-15
Salliot et al. <sup>10</sup>	2018	Bilateral	-	GS, PD	-	-	-	10-13
Di Matteo et al. <sup>11</sup>	2018	Bilateral	Yes	GS, PD	Yes	Esaote, MyLab Twice	Linear	3-14, 6-18, 10-22
Di Matteo et al. <sup>12</sup>	2018	Bilateral	Yes	GS, PD	Yes	Esaote, MyLab Twice Esaote, MyLab Class C	Linear	6-18
Lins et al. <sup>13</sup>	2018	Bilateral	Yes	GS	-	Esaote, MyLab 25Gold	-	14
Gunashekar et al. <sup>14</sup>	2018	Unilateral (non-dominant hand)	No	GS	-	Phillips IU22	Linear	7-12
Abdel-Magied et al. <sup>15</sup>	2018	Bilateral	No	GS, PD	-	Siemens, ACUSON X700	Linear	10-18

US, ultrasound; GS, greyscale; CD, colour Doppler; PD, power Doppler.

Supplementary Table 3 Association between clinical, laboratory and other imaging assessments with ultrasound findings

Author	Year	SLE disease activity / damage index	Clinical assessment	Laboratory assessment	Imaging (X-ray, CT, MRI)	Association between US and clinical assessment	Association between US and laboratory assessment	Association between US and other image modality
Dreyer et al. <sup>1</sup>	2015	SLEDAI, SLICC	TJC, SJC, VAS Pain, VAS fatigue, VAS patient's global, VAS physician's global, HAQ, subtypes of SLE arthropathy	ANA, anti-dsDNA	-	Yes	No	-
Mosca et al. <sup>2</sup>	2015	SLEDAI-2K, SLICC/ACR, ECLAM	44-joint count, subtypes of SLE arthropathy, JAI	CRP, ANA, anti-dsDNA, anti-ENA, LAC, aCL, anti-b2GPI, RF, anti-CCP	MRI	No	Yes (CRP only)	-
Mukherjee et al. <sup>3</sup>	2016	SELENA-SLEDAI	Foot Impact Scale (FIS <sub>IF</sub> and FIS <sub>AP</sub> )	RF	-	No	No	-
Piga et al. <sup>4</sup>	2016	SLICC	Subtypes of SLE arthropathy	ANA, anti-dsDNA, anti-Ro/SSA, anti-La/SSB, anti-RNP, anti-Sm, aPL Ab, RF, anti-CCP	CT	Yes	No	Yes
Piga et al. <sup>5</sup>	2016	SLEDAI, SLICC, SDI, BILAG	TJC, SJC, Fixed or reducible MCP subluxation, ulnar drift, swan neck, boutonniere deformities of fingers, Z thumb, tenderness and swelling of flexors and extensors tendons, JAI, SF36v2	CRP, C3, C4, ANA, anti-dsDNA, anti-Ro/SSA, anti-La/SSB, anti-RNP, anti-Sm, RF, anti-CCP	X-ray	Yes	Yes (CRP only)	-
Ceccarelli et al. <sup>6</sup>	2017	SLEDAI-2K, SDI	TJC, SJC, VAS patient's global, VAS physician's, global, DAS28, HAQ-DI	ESR, CRP, C3, C4, ANA, anti-dsDNA, anti-Ro/SSA, anti-La/SSB, anti-RNP, anti-Sm, LA, aCL, anti-b2GPI	-	-	-	-
Lins et al. <sup>7</sup>	2017	-	TJC, SJC	-	-	Yes (tenosynovitis)	-	-
Ogura et al. <sup>8</sup>	2017	SLEDAI	TJC, SJC, DAS28-CRP	ESR, CRP, C3, C4, ANA, anti-dsDNA, anti-Sm, RF, anti-CCP	X-ray	No	No	-
Ruano et al. <sup>9</sup>	2017	SLEDAI-2K, SLICC	Subtypes of SLE arthropathy	ESR, C3, C4, ANA, anti-dsDNA, RF, anti-CCP	-	Yes	No	-
Salliot et al. <sup>10</sup>	2018	SLEDAI	TJC, SJC, VAS joint pain, subtypes of SLE arthropathy	ESR, CRP, ANA, anti-dsDNA, RF, anti-CCP	X-ray	No	No	-
Di Matteo et al. <sup>11</sup>	2018	SLEDAI-2K	Subtypes of SLE arthropathy, JAI	ESR, CRP, ANA, anti-dsDNA, anti-Ro/SSA, anti-La/SSB, anti-Sm, anti-U1RNP, aPL Ab, RF, anti-CCP	-	-	-	-
Di Matteo et al. <sup>12</sup>	2018	SLEDAI-2K, m-BILAG 2004	Subtypes of SLE arthropathy, swelling and tenderness of lower limb entheses	ESR, CRP, C3, C4, ANA, anti-dsDNA, anti-Ro/SSA, anti-La/SSB, anti-RNP, anti-Sm	-	Yes (active enthesitis) No (structural damage of entheses)	Yes (CRP only)	-
Lins et al. <sup>13</sup>	2018	SLEDAI	Swan neck deformity, ulnar deviation, Z thumb, hallux valgus	ANA, anti-dsDNA, anti-Ro/SSA, anti-La/SSB, anti-RNP, anti-Sm, aCL IgG, aCL IgM	-	-	-	-
Gunashekar et al. <sup>14</sup>	2018	-	TJC, SJC, IHAQ	ESR, ANA, RF, anti-U1RNP	X-ray	-	-	-

Abdel-Magied et al <sup>15</sup>	2018	SLEDAI-2K	TJC, SJC, VAS Pain, HAQ-DI	ESR, CRP, C3, C4, ANA, anti-dsDNA, RF, anti-CCP, urine for albumin, casts, red blood cells, pus	-	Yes	Yes (CRP only)	-
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SLEDAI-2K, Systemic Lupus Erythematosus Disease Activity Index 2000; SLICC/ACR, Systemic Lupus International Collaborating Clinics/American College of Rheumatology; ECLAM, European Consensus Lupus Activity Measure; SELENA-SLEDAI, The Safety of Estrogens in Lupus Erythematosus National Assessment – Systemic Lupus Erythematosus Disease Activity Index; SDI, Systemic Lupus International Collaborating Clinics/American College of Rheumatology Damage Index; m-BILAG, musculoskeletal-British Isles Lupus Assessment Group Scale; TJC, tender joint count; SJC, swollen joint count, VAS, visual analogue scale; HAQ, Health assessment questionnaire; FIS<sub>IF</sub>, Foot Impact Scale foot ‘foot impairment’; FIS<sub>AP</sub>, Foot Impact Scale ‘activity limitation and participation restriction’; MCP, metacarpophalangeal; JAI, Jaccoud’s arthropathy index, SF36v2, Short Form 36 version 2; DAS28, disease activity score 28; HAQ-DI, Health assessment questionnaire disability index; IHAQ, Indian health assessment questionnaire; ANA, anti-nuclear antibody; anti-dsDNA, anti-double stranded deoxyribonucleic acid; CRP, C-reactive protein; anti-ENA, anti-extractable nuclear antigen; LAC, lupus anticoagulant; aCL, anti-cardiolipin; anti-β2GP1, anti-beta 2 glycoprotein 1; RF, rheumatoid factor; anti-CCP, anti-cyclic citrullinated peptide antibodies; anti-RNP, anti-ribonucleoprotein; anti-Sm, anti-Smith; aPL Ab, anti-phospholipid antibody; C3, complement 3; C4, complement 4; ESR, erythrocyte sedimentation rate; anti-SSA, anti-Sjögren’s-syndrome-related antigen A; anti-SSB, anti-Sjögren’s-syndrome-related antigen B; IgG, immunoglobulin G; IgM, immunoglobulin M; MRI, magnetic resonance imaging; CT, computer tomography.

Supplementary Table 4 Signaling questions for quality assessment of included studies

<b>Risk of bias</b>	
Patient selection	Was a consecutive or random sample of SLE patients enrolled? Was a case-control design avoided? Were rhus patients separated or excluded in the final analysis?
Index test	Was the sonographer blinded to the clinical and laboratory data of the patients? Was the US scoring method pre-specified?
Reference standard	Was there an imaging used as a reference standard (the best available method to establish the presence or absence of the target condition)? Was the reference standard used in the study likely to correctly classify the target condition? Was the reference standard results interpreted without knowledge of the US findings?
Flow and timing	Was US done at the same time as the clinical reference standard test? Did all patients receive the same reference standard? Were all patients included in the analysis?
<b>Applicability concerns</b>	
Patient selection	Are there concerns that the included patients do not match the review question?
Index test	Are there concerns that US was conducted or interpreted differently from the review question?
Reference standard	Are there concerns that the target condition as defined by the reference standard used in the study did not meet the questions?

Supplementary Table 5 Quality assessment of included studies

<b>Author</b>	<b>Risk of bias</b>				<b>Applicability concerns</b>		
	<b>Patient selection</b>	<b>Index test</b>	<b>Reference standard</b>	<b>Flow and timing</b>	<b>Patient selection</b>	<b>Index test</b>	<b>Reference standard</b>
Dreyer et al. <sup>1</sup>	High	Low	High	Low	Low	Low	High
Mosca et al. <sup>2</sup>	High	Low	Low	Low	Low	Low	Low
Mukherjee et al. <sup>3</sup>	Low	Unclear	High	Low	Low	Low	High
Piga et al. <sup>4</sup>	High	Unclear	Low	Low	Low	Low	Low
Piga et al. <sup>5</sup>	High	Low	High	Low	Low	Low	High
Ceccarelli et al. <sup>6</sup>	Low	Low	High	Unclear	Low	Low	High
Lins et al. <sup>7</sup>	High	Unclear	High	Unclear	Low	Low	High
Ogura et al. <sup>8</sup>	High	High	High	Low	Low	Low	High
Ruano et al. <sup>9</sup>	High	Low	High	Low	Low	Low	High
Salliot et al. <sup>10</sup>	High	Low	High	Low	Low	Low	High
Di Matteo et al. <sup>11</sup>	High	Low	High	Low	Low	Low	High
Di Matteo et al. <sup>12</sup>	High	Low	High	Low	Low	Low	High
Lins et al. <sup>13</sup>	Low	Low	High	Low	Low	Low	High
Gunashekar et al. <sup>14</sup>	High	Unclear	High	Unclear	Low	High	High
Abdel-Magied et al. <sup>15</sup>	High	Unclear	High	Unclear	Low	High	High

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