

## Appendix

### 2019 Update of the American College of Rheumatology Recommended Rheumatoid Arthritis Disease Activity Measures

#### ACR Rheumatoid Arthritis Disease Activity Measure Workgroup

Martin J. Bergman, MD

Jeffrey R. Curtis, MD, MS, MPH

Bryant England, MD – **Lead author**

Salahuddin Kazi, MD

Kaleb Michaud, PhD – **Chair**

Ted R. Mikuls, MD, MSPH

James R. O'Dell, MD

Benedict K. Tiong, MD

Veena K. Ranganath, MD, MS, RhMSUS

Alex Limanni, MD – Quality Measures Subcommittee Co-chair and voting member

Lisa Suter, MD – Quality Measures Subcommittee Co-chair

Regina Parker – ACR administrative staff assigned to group

Amy Turner – ACR administrative staff assigned to group

**Appendix 1.** Systematic literature review searches.

**Appendix 2.** Level of evidence grading system.

**Appendix 3.** Systematic literature review study selection.

**Appendix 4.** Characteristics of studies identified.

**Appendix 5.** Psychometric properties of rheumatoid arthritis disease activity measures

**Appendix 6.** COSMIN scoring for psychometric properties of rheumatoid arthritis disease activity measures.

**Appendix 7.** Summary of literature of RA disease activity measures from period before current search.

**Appendix 8.** References.

## Appendix 1. Systematic literature review searches.

### Ovid MEDLINE

1	(2009* or 2010* or 2011* or 2012* or 2013* or 2014* or 2015* or 2016* or 2017*).ed.	9127306
2	("2009" or "2010" or "2011" or "2012" or "2013" or "2014" or "2015" or "2016" or "2017").yr.	8949875
3	1 or 2	9924200
4	english.lg.	24473340
6	exp validation studies/ or validation stud*.tw. or validate.tw. or validity.tw. or minimal* clinic* important difference*.tw. or detect* change*.tw. or exp "reproducibility of results"/ or reliability.tw. or responsiveness*.tw. or test-retest.tw. or discriminative.tw. or exp observer variation/ or observer variation.tw. or exp Psychometrics/ or psychometric*.tw.	821058
7	exp Arthritis, Rheumatoid/ or (inflammatory adj arthr*).tw. or (early adj arthr*).tw. or (chronic adj arthr*).tw. or ((rheumatoid or reumatoid or revmatoid or rheumatic or reumatic or revmatic or rheumat* or reumat* or revmarthrit*) adj (arthrit* or artrit* or disease* or condition* or nodule*)).tw.	161187
14	("addresses" or "biography" or "case reports" or "comment" or "directory" or "editorial" or "festschrift" or "interview" or "lectures" or "legal cases" or "legislation" or "letter" or "news" or "newspaper article" or "patient education handout" or "popular works" or "congresses" or "consensus development conference" or "consensus development conference, nih" or "practice guideline").pt. not (exp "animals"/ not exp "humans"/)	4024974
16	instrumentation.fs. or Validation Studies.pt. or exp "reproducibility of results"/ or reproducib*.ab,ti. or exp "psychometrics"/ or psychometr*.ab,ti. or clinimetr*.ab,ti. or clinometr*.ab,ti. or exp "observer variation"/ or observer variation.ab,ti. or exp "discriminant analysis"/ or reliab*.ab,ti. or valid*.ab,ti. or coefficient.ab,ti. or "internal consistency".ab,ti. or (cronbach* and (alpha or alphas)).ab,ti. or "item correlation".ab,ti. or "item correlations".ab,ti. or "item selection".ab,ti. or "item selections".ab,ti. or "item reduction".ab,ti. or "item reductions".ab,ti. or agreement.tw. or precision.tw. or imprecision.tw. or "precise values".tw. or test-retest.ab,ti. or (test and retest).ab,ti. or (reliab* and (test or retest)).ab,ti. or stability.ab,ti. or interrater.ab,ti. or inter-rater.ab,ti. or intrarater.ab,ti. or intra-rater.ab,ti. or intertester.ab,ti. or inter-tester.ab,ti. or intratester.ab,ti. or intra-tester.ab,ti. or interobserver.ab,ti. or inter-observer.ab,ti. or intraobserver.ab,ti. or intra-observer.ab,ti. or intertechnician.ab,ti. or intertechnician.ab,ti. or intratechnician.ab,ti. or intra-technician.ab,ti. or interexaminer.ab,ti. or inter-examiner.ab,ti. or intraexaminer.ab,ti. or intra-examiner.ab,ti. or interassay.ab,ti. or inter-assay.ab,ti. or intraassay.ab,ti. or intra-assay.ab,ti. or interindividual.ab,ti. or inter-individual.ab,ti. or intraindividual.ab,ti. or intra-individual.ab,ti. or interparticipant.ab,ti. or inter-participant.ab,ti. or intraparticipant.ab,ti. or intra-participant.ab,ti. or kappa.ab,ti. or kappa*.ab,ti. or kappas.ab,ti. or "coefficient of variation".ab,ti. or repeatab*.tw. or ((repicab* or repeated) and (measure or measures or findings or result or results or test or tests)).tw. or generaliza*.ab,ti. or generalisa*.ab,ti. or concordance.ab,ti. or (intraclass and correlation*).ab,ti. or discriminative.ab,ti. or "known group".ab,ti. or "factor analysis".ab,ti. or "factor analyses".ab,ti. or "factor structure".ab,ti. or "factor structures".ab,ti. or dimensionality.ab,ti. or subscale*.ab,ti. or "multitrait scaling analysis".ab,ti. or "multitrait scaling analyses".ab,ti. or "item discriminant".ab,ti. or "interscale correlation".ab,ti. or "interscale correlations".ab,ti. or ((error or errors) and (measure* or correlat* or evaluat* or accuracy or accurate or precision or mean)).ab,ti. or "individual variability".ab,ti. or "interval variability".ab,ti. or "rate variability".ab,ti. or "variability analysis".ab,ti. or (uncertainty and (measurement or measuring)).ab,ti. or "standard error of measurement".ab,ti. or sensitiv*.ab,ti. or responsive*.ab,ti. or (limit and detection).ab,ti. or "minimal detectable concentration".ab,ti. or interpretab*.ab,ti. or (small* and (real or detectable) and (change or difference)).ab,ti. or "meaningful change".ab,ti. or "minimal important change".ab,ti. or "minimal important difference".ab,ti. or "minimally important change".ab,ti. or "minimally important difference".ab,ti. or "minimal detectable change".ab,ti. or "minimal detectable difference".ab,ti. or "minimally detectable change".ab,ti. or "minimally detectable difference".ab,ti. or "minimal real change".ab,ti. or "minimal real difference".ab,ti. or "minimally real change".ab,ti. or "minimally real difference".ab,ti. or "ceiling effect".ab,ti. or "floor effect".ab,ti. or "Item response model".ab,ti. or IRT.ab,ti. or Rasch.ab,ti. or	4164779

	"Differential item functioning".ab,ti. or DIF.ab,ti. or "computer adaptive testing".ab,ti. or "item bank".ab,ti. or "cross-cultural equivalence".ab,ti.	
25	exp *Arthritis, Rheumatoid/	92544
31	Health status/ or Health level*.tw. or Health Status.tw. or Level of health.tw. or Health status indicators/ or Health status index*.tw. or Health status indicator*.tw. or Health status indic*.tw. or Severity of illness index/ or severity of illness index.tw. or patient outcome assessment/ or patient outcome* assessment*.tw. or Patient-centered outcome* research.tw. or Patient reported outcome*.tw. or Patient perspective*.tw. or Outcome* research.tw. or GAS.tw. or Global arthritis score*.tw. or MOI-RA.tw. or mean overall index for rheumatoid arthritis.tw. or patient-based disease activity score*.tw. or pdas*.tw. or radai*.tw. or rheumatoid arthritis disease activity ind*.tw. or radara.tw. or real time assessment of disease activity in rheumatoid arthritis.tw. or RAID.tw. or rheumatoid arthritis impact of disease score.tw. or rapid 3.tw. or rapid3.tw. or SDAI.tw. or simplified disease activity index.tw. or SIP.tw. or sickness impact profile.tw. or TSC.tw. or therapeutic score card*.tw. or vectra*.tw. or mbda.tw. or multibiomarker disease activity.tw. or multi-biomarker disease activity.tw. or multi biomarker disease activity.tw. or multibiomarker of disease activity.tw. or multi-biomarker of disease activity.tw. or multi biomarker of disease activity.tw. or exp "Surveys and Questionnaires"/ or survey*.tw. or Questionnaire\$.tw. or scale*.ti. or instrument.ti. or instruments.ti. or tool.ti. or tools.ti. or diary.ti. or diaries.ti. or assessment.ti. or assessments.ti. or self-report*.ti. or measure*.ti. or prom.ti. or index*.ti. or checklist*.ti. or rating.ti.	2358810
32	(3 and 4 and 31 and (6 or 16) and 7 and 25) not 14	1647
	(3 and 4 and 31 and (6 or 16) and 7) not 14	217

### **Cochrane Library**

ID	Search Hits	
#1	scale* or instrument or instruments or tool or tools or diary or diaries or assessment or assessments or self-report* or measure* or prom or index* or checklist* or rating:ti (Word variations have been searched)	44746
#2	"patient outcome* assessment*" or "Patient-centered outcome* research" or "Patient reported outcome*" or "Patient perspective*" or "Outcome* research" or "GAS" or "Global arthritis score*" or "MOI-RA" or "mean overall index for rheumatoid arthritis" or "patient-based disease activity score*" or "pdas*" or "radai*" or "rheumatoid arthritis disease activity ind*" or "radara" or "real time assessment of disease activity in rheumatoid arthritis" or "RAID" or "rheumatoid arthritis impact of disease score" or "rapid 3" or "rapid3" or "SDAI" or "simplified disease activity index" or "SIP" or "sickness impact profile" or "TSC" or "therapeutic score card*" or "vectra*" or "mbda" or "multibiomarker disease activity" or "multi-biomarker disease activity" or "multi biomarker disease activity" or "multibiomarker of disease activity" or "multi-biomarker of disease activity" or "multi biomarker of disease activity" or "survey*" or "Questionnaire?":ti,ab,kw (Word variations have been searched)	60507
#3	"Health level*" or "Health Status" or "Level of health" or "Health status index*" or "Health status indicator*" or "Health status indic*" or "severity of illness index":ti,ab,kw (Word variations have been searched)	24822
#4	MeSH descriptor: [Health Status] explode all trees	6453
#5	MeSH descriptor: [Health Status Indicators] explode all trees	18631
#6	MeSH descriptor: [Severity of Illness Index] explode all trees	16726
#7	MeSH descriptor: [Patient Outcome Assessment] explode all trees	165
#8	MeSH descriptor: [Surveys and Questionnaires] explode all trees	46567
#9	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8	129179
#10	MeSH descriptor: [Arthritis, Rheumatoid] explode all trees	4562
#11	(inflammatory next arthr*) or (early next arthr*) or (chronic next arthr*) or ((rheumatoid or reumatoid or revmatoid or rheumatic or reumatic or revmatic or rheumat* or reumat* or revmarthrit*) next (arthrit* or artrit* or disease* or condition* or nodule*)):ti,ab,kw (Word variations have been searched)	9404
#12	#10 or #11	9946
#13	MeSH descriptor: [Validation Studies] explode all trees	1
#14	MeSH descriptor: [Reproducibility of Results] explode all trees	10933
#15	MeSH descriptor: [Psychometrics] explode all trees	2674
#16	MeSH descriptor: [Observer Variation] explode all trees	1956
#17	MeSH descriptor: [Reproducibility of Results] explode all trees	10933
#18	MeSH descriptor: [Discriminant Analysis] explode all trees	174
#19	instrumentation or reproducib* or psychometr* or clinimetr* or clinometr* or observer variation or reliab* or valid* or coefficient or "internal consistency" or (cronbach* and (alpha or alphas)) or "item correlation" or "item	

correlations" or "item selection" or "item selections" or "item reduction" or "item reductions" or agreement or precision or imprecision or "precise values" or test-retest or (test and retest) or (reliab\* and (test or retest)) or stability or interrater or inter-rater or intrarater or intra-rater or intertester or inter-tester or intratester or intra-tester or interobserver or inter-observer or intraobserver or intra-observer or intertechnician or intertechnician or intratechnician or intra-technician or interexaminer or inter-examiner or intraexaminer or intra-examiner or intra-assay or inter-assay or intra-assay or intra-assay or interindividual or inter-individual or intraindividual or intra-individual or interparticipant or inter-participant or intraparticipant or intra-participant or kappa or kappa\* or kappas or "coefficient of variation" or repeatab\* or ((replicab\* or repeated) and (measure or measures or findings or result or results or test or tests)) or generaliza\* or generalisa\* or concordance or (intraclass and correlation\*) or discriminative or "known group" or "factor analysis" or "factor analyses" or "factor structure" or "factor structures" or dimensionality or subscale\* or "multitrait scaling analysis" or "multitrait scaling analyses" or "item discriminant" or "interscale correlation" or "interscale correlations" or ((error or errors) and (measure\* or correlat\* or evaluat\* or accuracy or accurate or precision or mean)) or "individual variability" or "interval variability" or "rate variability" or "variability analysis" or (uncertainty and (measurement or measuring)) or "standard error of measurement" or sensitiv\* or responsive\* or (limit and detection) or "minimal detectable concentration" or interpretab\* or (small\* and (real or detectable) and (change or difference)) or "meaningful change" or "minimal important change" or "minimal important difference" or "minimally important change" or "minimally important difference" or "minimal detectable change" or "minimal detectable difference" or "minimally detectable change" or "minimally detectable difference" or "minimal real change" or "minimal real difference" or "minimally real change" or "minimally real difference" or "ceiling effect" or "floor effect" or "Item response model" or IRT or Rasch or "Differential item functioning" or DIF or "computer adaptive testing" or "item bank" or "cross-cultural equivalence" "minimal\* clinic\* important difference\*" or "detect\* change\*":ti,ab,kw (Word variations have been searched) 158064  
#20 #13 or #14 or #15 or #16 or #17 or #18 or #19 158125  
#21 #20 and #12 and #9 489

limit to 2009 – present -->295

## Embase

#34. 'health status'/exp OR 'disease activity'/exp OR 'disease severity'/exp OR 'medical parameters'/exp OR 'disease assessment'/exp OR 'biological marker'/exp OR 'assessment of humans'/exp OR 'health survey'/exp OR 'patient-reported outcome'/exp OR 'questionnaire'/exp OR 'scoring system'/exp OR 'outcome assessment'/exp OR 'checklist'/exp OR 'measurement'/exp OR 'health level\*':ab,ti OR 'health status\*':ab,ti OR 'level\* of health':ab,ti OR 'health status index\*':ab,ti OR 'health status indicator\*':ab,ti OR 'health status indic\*':ab,ti OR 'severity of illness ind\*':ab,ti OR 'patient outcome\* assessment\*':ab,ti OR 'patient-centered outcome\* research':ab,ti OR 'patient reported outcome\*':ab,ti OR 'patient perspective\*':ab,ti OR 'outcome\* research':ab,ti OR gas:ab,ti OR 'global arthritis score\*':ab,ti OR 'moi ra':ab,ti OR 'mean overall index for rheumatoid arthritis':ab,ti OR 'patient-based disease activity score\*':ab,ti OR pdas\*:ab,ti OR radai\*:ab,ti OR 'rheumatoid arthritis disease activity ind\*':ab,ti OR radara:ab,ti OR 'real time assessment of disease activity in rheumatoid arthritis':ab,ti OR raid:ab,ti OR 'rheumatoid arthritis impact of disease score':ab,ti OR 'rapid 3':ab,ti OR rapid3:ab,ti OR sdai:ab,ti OR 'simplified disease activity index':ab,ti OR sip:ab,ti OR 'sickness impact profile':ab,ti OR tsc:ab,ti OR 'therapeutic score card\*':ab,ti OR vectra\*:ab,ti OR mbda:ab,ti OR 'multibiomarker disease activity':ab,ti R 'multi-biomarker disease activity':ab,ti OR 'multi biomarker disease activity':ab,ti OR 'multibiomarker of disease activity':ab,ti OR 'multi-biomarker of disease activity':ab,ti OR 'multi biomarker of disease activity':ab,ti OR survey\*:ab,ti OR questionnaire\$:ab,ti OR scale\*:ti OR instrument:ti OR instruments:ti OR tool:ti OR tools:ti OR diary:ti OR diaries:ti OR assessment:ti OR assessments:ti OR 'self report\*':ti OR measure\*:ti OR prom:ti OR index\*:ti OR checklist\*:ti OR rating:ti AND ('validation study'/exp OR 'measurement precision'/exp OR 'validity'/exp OR 'measurement accuracy'/exp OR 'reliability'/exp OR 'psychometry'/exp OR 'correlation analysis'/exp OR 'observer variation'/exp OR reproducib\*:ab,ti OR psychometr\*:ab,ti OR clinimetr\*:ab,ti OR clinometr\*:ab,ti OR 'observer variation':ab,ti OR reliab\*:ab,ti OR valid\*:ab,ti OR coefficient:ab,ti OR 'internal consistency':ab,ti OR (cronbach\*:ab,ti AND (alpha:ab,ti OR alphas:ab,ti)) OR 'item correlation':ab,ti OR 'item correlations':ab,ti OR 'item selection':ab,ti OR 'item selections':ab,ti OR 'item reduction':ab,ti OR 'item reductions':ab,ti OR agreement:ab,ti OR precision:ab,ti OR imprecision:ab,ti OR 'precise values':ab,ti OR 'test retest':ab,ti OR (test:ab,ti AND retest:ab,ti) OR (reliab\*:ab,ti AND (test:ab,ti OR retest:ab,ti)) OR stability:ab,ti OR interrater:ab,ti OR 'inter rater':ab,ti OR intrarater:ab,ti OR 'intra rater':ab,ti OR intertester:ab,ti OR 'inter tester':ab,ti OR intratester:ab,ti OR 'intra tester':ab,ti OR interobserver:ab,ti OR 'inter observer':ab,ti OR intraobserver:ab,ti OR 'intra observer':ab,ti OR intertechnician:ab,ti OR intratechnician:ab,ti OR 'intra technician':ab,ti OR interexaminer:ab,ti OR 'inter examiner':ab,ti OR intraexaminer:ab,ti OR 'intra examiner':ab,ti OR interassay:ab,ti OR 'inter assay':ab,ti OR intraassay:ab,ti OR 'intra assay':ab,ti OR interindividual:ab,ti OR 'inter individual':ab,ti OR intraindividual:ab,ti OR 'intra individual':ab,ti OR interparticipant:ab,ti OR 'inter participant':ab,ti OR intraparticipant:ab,ti OR 'intra participant':ab,ti OR kappa:ab,ti OR kappa\*:ab,ti OR kappas:ab,ti OR 'coefficient of variation':ab,ti OR repeatab\*:ab,ti

OR (replicab\*:ab,ti OR repeated:ab,ti AND (measure:ab,ti OR measures:ab,ti OR findings:ab,ti OR result:ab,ti OR results:ab,ti OR test:ab,ti OR tests:ab,ti)) OR generaliza\*:ab,ti OR generalisa\*:ab,ti OR concordance:ab,ti OR (intraclass:ab,ti AND correlation\*:ab,ti) OR discriminative:ab,ti OR 'known group':ab,ti OR 'factor analysis':ab,ti OR 'factor analyses':ab,ti OR 'factor structure':ab,ti OR 'factor structures':ab,ti OR dimensionality:ab,ti OR subscale\*:ab,ti OR 'multitrait scaling analysis':ab,ti OR 'multitrait scaling analyses':ab,ti OR 'item discriminant':ab,ti OR 'interscale correlation':ab,ti OR 'interscale correlations':ab,ti OR (error:ab,ti OR errors:ab,ti AND (measure\*:ab,ti OR correlat\*:ab,ti OR evaluat\*:ab,ti OR accuracy:ab,ti OR accurate:ab,ti OR precision:ab,ti OR mean:ab,ti)) OR 'individual variability':ab,ti OR 'interval variability':ab,ti OR 'rate variability':ab,ti OR 'variability analysis':ab,ti OR (uncertainty:ab,ti AND (measurement:ab,ti OR measuring:ab,ti)) OR 'standard error of measurement':ab,ti OR sensitiv\*:ab,ti OR responsive\*:ab,ti OR (limit:ab,ti AND detection:ab,ti) OR 'minimal detectable concentration':ab,ti OR interpretab\*:ab,ti OR (small\*:ab,ti AND (real:ab,ti OR detectable:ab,ti) AND (change OR difference:ab,ti)) OR 'meaningful change':ab,ti OR 'minimal important change':ab,ti OR 'minimal important difference':ab,ti OR 'minimally important change':ab,ti OR 'minimally important difference':ab,ti OR 'minimal detectable change':ab,ti OR 'minimal detectable difference\*':ab,ti OR 'minimally detectable change':ab,ti OR 'minimally detectable difference\*':ab,ti OR 'minimal real change\*':ab,ti OR 'minimal real difference\*':ab,ti OR 'minimally real change':ab,ti OR 'minimally real difference':ab,ti OR 'ceiling effect':ab,ti OR 'floor effect':ab,ti OR 'item response model':ab,ti OR irt:ab,ti OR rasch:ab,ti OR 'differential item functioning':ab,ti OR dif:ab,ti OR 'computer adaptive testing':ab,ti OR 'item bank':ab,ti OR 'cross-cultural equivalence':ab,ti OR 'validation stud\*':ab,ti OR validate:ab,ti OR validity:ab,ti OR 'minimal\* clinic\* important difference\*':ab,ti OR 'detect\* change\*':ab,ti) AND 'rheumatoid arthritis'/exp/mj NOT ('case report'/exp OR 'directory'/exp OR 'editorial'/exp OR 'letter'/exp) NOT 'editorial'/it NOT 'conference abstract'/it AND [2009-2017]/py AND [english]/lim

#33. 'health status'/exp OR 'disease activity'/exp OR 'disease severity'/exp OR 'medical parameters'/exp OR 'disease assessment'/exp OR 'biological marker'/exp OR 'assessment of humans'/exp OR 'health survey'/exp OR 'patient-reported outcome'/exp OR 'questionnaire'/exp OR 'scoring system'/exp OR 'outcome assessment'/exp OR 'checklist'/exp OR 'measurement'/exp OR 'health level\*':ab,ti OR 'health status\*':ab,ti OR 'level\* of health':ab,ti OR 'health status index\*':ab,ti OR 'health status indicator\*':ab,ti OR 'health status indic\*':ab,ti OR 'severity of illness ind\*':ab,ti OR 'patient outcome\* assessment\*':ab,ti OR 'patient-centered outcome\* research':ab,ti OR 'patient reported outcome\*':ab,ti OR 'patient perspective\*':ab,ti OR 'outcome\* research':ab,ti OR gas:ab,ti OR 'global arthritis score\*':ab,ti OR 'moi ra':ab,ti OR 'mean overall index for rheumatoid arthritis':ab,ti OR 'patient-based disease activity score\*':ab,ti OR pdas\*:ab,ti OR radai\*:ab,ti OR 'rheumatoid arthritis disease activity ind\*':ab,ti OR radara:ab,ti OR 'real time assessment of disease activity in rheumatoid arthritis':ab,ti OR raid:ab,ti OR 'rheumatoid arthritis impact of disease score':ab,ti OR 'rapid 3':ab,ti OR rapid3:ab,ti OR sdai:ab,ti OR 'simplified disease activity index':ab,ti OR [sip:ab,ti](#) OR 'sickness impact profile':ab,ti OR tsc:ab,ti OR 'therapeutic score card\*':ab,ti OR vectra\*:ab,ti OR mbda:ab,ti OR 'multibiomarker disease activity':ab,ti OR 'multi-biomarker disease activity':ab,ti OR 'multi biomarker disease activity':ab,ti OR 'multibiomarker of disease activity':ab,ti OR 'multi-biomarker of disease activity':ab,ti OR 'multi biomarker of disease activity':ab,ti OR survey\*:ab,ti OR questionnaire\$:ab,ti OR scale\*:ti OR instrument:ti OR instruments:ti OR tool:ti OR tools:ti OR diary:ti OR diaries:ti OR assessment:ti OR assessments:ti OR 'self report\*':ti OR measure\*:ti OR prom:ti OR index\*:ti OR checklist\*:ti OR rating:ti AND ('validation study'/exp OR 'measurement precision'/exp OR 'validity'/exp OR 'measurement accuracy'/exp OR 'reliability'/exp OR 'psychometry'/exp OR 'correlation analysis'/exp OR 'observer variation'/exp OR reproducib\*:ab,ti OR psychometr\*:ab,ti OR clinimetr\*:ab,ti OR clinometr\*:ab,ti OR 'observer variation':ab,ti OR reliab\*:ab,ti OR valid\*:ab,ti OR coefficient:ab,ti OR 'internal consistency':ab,ti OR (cronbach\*:ab,ti AND (alpha:ab,ti OR alphas:ab,ti)) OR 'item correlation':ab,ti OR 'item correlations':ab,ti OR 'item selection':ab,ti OR 'item selections':ab,ti OR 'item reduction':ab,ti OR 'item reductions':ab,ti OR agreement:ab,ti OR precision:ab,ti OR imprecision:ab,ti OR 'precise values':ab,ti OR 'test retest':ab,ti OR (test:ab,ti AND retest:ab,ti) OR (reliab\*:ab,ti AND (test:ab,ti OR retest:ab,ti)) OR stability:ab,ti OR interrater:ab,ti OR 'inter rater':ab,ti OR intrarater:ab,ti OR 'intra rater':ab,ti OR intertester:ab,ti OR 'inter tester':ab,ti OR intratester:ab,ti OR 'intra tester':ab,ti OR interobserver:ab,ti OR 'inter observer':ab,ti OR intraobserver:ab,ti OR 'intra observer':ab,ti OR intertechnician:ab,ti OR intratechnician:ab,ti OR 'intra technician':ab,ti OR interexaminer:ab,ti OR 'inter examiner':ab,ti OR intraexaminer:ab,ti OR 'intra examiner':ab,ti OR interassay:ab,ti OR 'inter assay':ab,ti OR intraassay:ab,ti OR 'intra assay':ab,ti OR interindividual:ab,ti OR 'inter individual':ab,ti OR intraindividual:ab,ti OR 'intra individual':ab,ti OR interparticipant:ab,ti OR 'inter participant':ab,ti OR intraparticipant:ab,ti OR 'intra participant':ab,ti OR kappa:ab,ti OR kappa\*:ab,ti OR kappas:ab,ti OR 'coefficient of variation':ab,ti OR repeatab\*:ab,ti OR (replicab\*:ab,ti OR repeated:ab,ti AND (measure:ab,ti OR measures:ab,ti OR findings:ab,ti OR result:ab,ti OR results:ab,ti OR test:ab,ti OR tests:ab,ti)) OR generaliza\*:ab,ti OR generalisa\*:ab,ti OR concordance:ab,ti OR (intraclass:ab,ti AND correlation\*:ab,ti) OR discriminative:ab,ti OR 'known group':ab,ti OR 'factor analysis':ab,ti OR 'factor analyses':ab,ti OR 'factor structure':ab,ti OR 'factor structures':ab,ti OR dimensionality:ab,ti OR subscale\*:ab,ti OR 'multitrait scaling analysis':ab,ti OR 'multitrait scaling analyses':ab,ti OR 'item discriminant':ab,ti OR 'interscale correlation':ab,ti OR 'interscale correlations':ab,ti OR (error:ab,ti OR errors:ab,ti AND (measure\*:ab,ti OR correlat\*:ab,ti OR evaluat\*:ab,ti OR accuracy:ab,ti OR accurate:ab,ti OR precision:ab,ti OR mean:ab,ti)) OR 'individual variability':ab,ti OR 'interval variability':ab,ti OR 'rate variability':ab,ti OR 'variability analysis':ab,ti OR (uncertainty:ab,ti AND (measurement:ab,ti OR measuring:ab,ti)) OR 'standard error of measurement':ab,ti OR sensitiv\*:ab,ti OR responsive\*:ab,ti OR (limit:ab,ti AND detection:ab,ti) OR 'minimal detectable concentration':ab,ti OR interpretab\*:ab,ti

OR (small\*:ab,ti AND (real:ab,ti OR detectable:ab,ti) AND (change OR difference:ab,ti)) OR 'meaningful change':ab,ti OR 'minimal important change':ab,ti OR 'minimal important difference':ab,ti OR 'minimally important change':ab,ti OR 'minimally important difference':ab,ti OR 'minimal detectable change':ab,ti OR 'minimal detectable difference\*':ab,ti OR 'minimally detectable change':ab,ti OR 'minimally detectable difference\*':ab,ti OR 'minimal real change\*':ab,ti OR 'minimally real difference\*':ab,ti OR 'minimally real change':ab,ti OR 'minimally real difference':ab,ti OR 'ceiling effect':ab,ti OR 'floor effect':ab,ti OR 'item response model':ab,ti OR irt:ab,ti OR rasch:ab,ti OR 'differential item functioning':ab,ti OR dif:ab,ti OR 'computer adaptive testing':ab,ti OR 'item bank':ab,ti OR 'cross-cultural equivalence':ab,ti OR 'validation stud\*':ab,ti OR validate:ab,ti OR validity:ab,ti OR 'minimal\* clinic\* important difference\*':ab,ti OR 'detect\* change\*':ab,ti) AND ('rheumatoid arthritis'/exp/mj OR (inflammatory NEXT/1 arthr\* OR early NEXT/1 arthr\* OR chronic NEXT/1 arthr\* OR (rheumatoid OR reumatoid OR revmatoid OR rheumatic OR reumatic OR revmatic OR rheumat\* OR reumat\* OR revmarthrit\*) NEXT/1 (arthrit\* OR artrit\* OR disease\* OR condition\* OR nodule\*) AND (inflammatory:ab,ti OR early:ab,ti OR chronic:ab,ti AND (arthr\*:ab,ti OR artrit\*:ab,ti) OR (rheumatoid:ab,ti OR reumatoid:ab,ti OR revmatoid:ab,ti OR rheumatic:ab,ti OR reumatic:ab,ti OR revmatic:ab,ti OR rheumat\*:ab,ti OR reumat\*:ab,ti OR revmarthrit\*:ab,ti AND (arthr\*:ab,ti OR artrit\*:ab,ti OR disease\*:ab,ti OR condition\*:ab,ti OR nodule\*:ab,ti)))) NOT ('case report'/exp OR 'directory'/exp OR 'editorial'/exp OR 'letter'/exp) AND [2009-2017]/py AND [english]/lim NOT ([animals]/lim NOT [humans]/lim) NOT 'editorial'/it AND ([article in press]/lim OR [in process]/lim) NOT 'conference abstract'/it

#31. 'case report'/exp OR 'directory'/exp OR 'editorial'/exp OR 'letter'/exp

#23. 'rheumatoid arthritis'/exp/mj

#21. 'rheumatoid arthritis'/exp/mj OR (inflammatory NEXT/1 arthr\* OR early NEXT/1 arthr\* OR chronic NEXT/1 arthr\* OR (rheumatoid OR reumatoid OR revmatoid OR rheumatic OR reumatic OR revmatic OR rheumat\* OR reumat\* OR revmarthrit\*) NEXT/1 (arthrit\* OR artrit\* OR disease\* OR condition\* OR nodule\*) AND (inflammatory:ab,ti OR early:ab,ti OR chronic:ab,ti AND (arthr\*:ab,ti OR artrit\*:ab,ti) OR (rheumatoid:ab,ti OR reumatoid:ab,ti OR revmatoid:ab,ti OR rheumatic:ab,ti OR reumatic:ab,ti OR revmatic:ab,ti OR rheumat\*:ab,ti OR reumat\*:ab,ti OR revmarthrit\*:ab,ti AND (arthr\*:ab,ti OR artrit\*:ab,ti OR disease\*:ab,ti OR condition\*:ab,ti OR nodule\*:ab,ti))))

#15. 'health status'/exp OR 'disease activity'/exp OR 'disease severity'/exp OR 'medical parameters'/exp OR 'disease assessment'/exp OR 'biological marker'/exp OR 'assessment of humans'/exp OR 'health survey'/exp OR 'patient-reported outcome'/exp OR 'questionnaire'/exp OR 'scoring system'/exp OR 'outcome assessment'/exp OR 'checklist'/exp OR 'measurement'/exp OR 'health level\*':ab,ti OR 'health status\*':ab,ti OR 'level\* of health':ab,ti OR 'health status index\*':ab,ti OR 'health status indicator\*':ab,ti OR 'health status indic\*':ab,ti OR 'severity of illness ind\*':ab,ti OR 'patient outcome\* assessment\*':ab,ti OR 'patient-centered outcome\* research':ab,ti OR 'patient reported outcome\*':ab,ti OR 'patient perspective\*':ab,ti OR 'outcome\* research':ab,ti OR gas:ab,ti OR 'global arthritis score\*':ab,ti OR 'moi ra':ab,ti OR 'mean overall index for rheumatoid arthritis':ab,ti OR 'patient-based disease activity score\*':ab,ti OR 'pdas\*':ab,ti OR 'radai\*':ab,ti OR 'rheumatoid arthritis disease activity ind\*':ab,ti OR 'radara:ab,ti OR 'real time assessment of disease activity in rheumatoid arthritis':ab,ti OR 'raid:ab,ti OR 'rheumatoid arthritis impact of disease score':ab,ti OR 'rapid 3':ab,ti OR 'rapid3:ab,ti OR 'sdai:ab,ti OR 'simplified disease activity index':ab,ti OR [sip:ab,ti](#) OR 'sickness impact profile':ab,ti OR 'tsc:ab,ti OR 'therapeutic score card\*':ab,ti OR 'vectra\*':ab,ti OR 'mbda:ab,ti OR 'multibiomarker disease activity':ab,ti OR 'multi-biomarker disease activity':ab,ti OR 'multi biomarker disease activity':ab,ti OR 'multibiomarker of disease activity':ab,ti OR 'multi-biomarker of disease activity':ab,ti OR 'multi biomarker of disease activity':ab,ti OR 'survey\*':ab,ti OR 'questionnaire\$':ab,ti OR 'scale\*':ti OR 'instrument:ti OR 'instruments:ti OR 'tool:ti OR 'tools:ti OR 'diary:ti OR 'diaries:ti OR 'assessment:ti OR 'assessments:ti OR 'self report\*':ti OR 'measure\*':ti OR 'prom:ti OR 'index\*':ti OR 'checklist\*':ti OR 'rating:ti AND ('validation study'/exp OR 'measurement precision'/exp OR 'validity'/exp OR 'measurement accuracy'/exp OR 'reliability'/exp OR 'psychometry'/exp OR 'correlation analysis'/exp OR 'observer variation'/exp OR 'reproducib\*':ab,ti OR 'psychometr\*':ab,ti OR 'clinimetr\*':ab,ti OR 'clinometr\*':ab,ti OR 'observer variation':ab,ti OR 'reliab\*':ab,ti OR 'valid\*':ab,ti OR 'coefficient:ab,ti OR 'internal consistency':ab,ti OR (cronbach\*:ab,ti AND (alpha:ab,ti OR alphas:ab,ti)) OR 'item correlation':ab,ti OR 'item correlations':ab,ti OR 'item selection':ab,ti OR 'item selections':ab,ti OR 'item reduction':ab,ti OR 'item reductions':ab,ti OR 'agreement:ab,ti OR 'precision:ab,ti OR 'imprecision:ab,ti OR 'precise values':ab,ti OR 'test retest':ab,ti OR (test:ab,ti AND retest:ab,ti) OR (reliab\*:ab,ti AND (test:ab,ti OR retest:ab,ti)) OR 'stability:ab,ti OR 'interrater:ab,ti OR 'inter rater':ab,ti OR 'intrarater:ab,ti OR 'intra rater':ab,ti OR 'intertester:ab,ti OR 'inter tester':ab,ti OR 'intratester:ab,ti OR 'intra tester':ab,ti OR 'interobserver:ab,ti OR 'inter observer':ab,ti OR 'intraobserver:ab,ti OR 'intra observer':ab,ti OR 'intertechician:ab,ti OR 'intratechician:ab,ti OR 'intra technician':ab,ti OR 'interexaminer:ab,ti OR 'inter examiner':ab,ti OR 'intraexaminer:ab,ti OR 'intra examiner':ab,ti OR 'interassay:ab,ti OR 'inter assay':ab,ti OR 'intraassay:ab,ti OR 'intra assay':ab,ti OR 'interindividual:ab,ti OR 'inter individual':ab,ti OR 'intraindividual:ab,ti OR 'intra individual':ab,ti OR 'interparticipant:ab,ti OR 'inter participant':ab,ti OR 'intraparticipant:ab,ti OR 'intra participant':ab,ti OR 'kappa:ab,ti OR 'kappa\*':ab,ti OR 'kappas:ab,ti OR 'coefficient of variation':ab,ti OR 'repeat\*':ab,ti OR (replicab\*:ab,ti OR 'repeated:ab,ti AND (measure:ab,ti OR measures:ab,ti OR findings:ab,ti OR result:ab,ti OR results:ab,ti OR test:ab,ti OR tests:ab,ti)) OR 'generaliza\*':ab,ti OR 'generalisa\*':ab,ti OR 'concordance:ab,ti OR (intraclass:ab,ti AND correlation\*:ab,ti) OR 'discriminative:ab,ti OR 'known group':ab,ti OR 'factor analysis':ab,ti OR 'factor analyses':ab,ti OR 'factor structure':ab,ti OR 'factor structures':ab,ti OR 'dimensionality:ab,ti OR 'subscale\*':ab,ti OR 'multitrait scaling analysis':ab,ti OR 'multitrait scaling analyses':ab,ti OR 'item discriminant':ab,ti OR 'interscale correlation':ab,ti OR 'interscale correlations':ab,ti OR (error:ab,ti OR errors:ab,ti AND (measure\*:ab,ti OR

correlat\*:ab,ti OR evaluat\*:ab,ti OR accuracy:ab,ti OR accurate:ab,ti OR precision:ab,ti OR mean:ab,ti) OR 'individual variability':ab,ti OR 'interval variability':ab,ti OR 'rate variability':ab,ti OR 'variability analysis':ab,ti OR (uncertainty:ab,ti AND (measurement:ab,ti OR measuring:ab,ti)) OR 'standard error of measurement':ab,ti OR sensitiv\*:ab,ti OR responsive\*:ab,ti OR (limit:ab,ti AND detection:ab,ti) OR 'minimal detectable concentration':ab,ti OR interpretab\*:ab,ti OR (small\*:ab,ti AND (real:ab,ti OR detectable:ab,ti) AND (change OR difference:ab,ti)) OR 'meaningful change':ab,ti OR 'minimal important change':ab,ti OR 'minimal important difference':ab,ti OR 'minimally important change':ab,ti OR 'minimally important difference':ab,ti OR 'minimal detectable change':ab,ti OR 'minimal detectable difference\*':ab,ti OR 'minimally detectable change':ab,ti OR 'minimally detectable difference\*':ab,ti OR 'minimal real change\*':ab,ti OR 'minimal real difference\*':ab,ti OR 'minimally real change':ab,ti OR 'minimally real difference':ab,ti OR 'ceiling effect':ab,ti OR 'floor effect':ab,ti OR 'item response model':ab,ti OR irt:ab,ti OR rasch:ab,ti OR 'differential item functioning':ab,ti OR dif:ab,ti OR 'computer adaptive testing':ab,ti OR 'item bank':ab,ti OR 'cross-cultural equivalence':ab,ti OR 'validation stud\*':ab,ti OR validate:ab,ti OR validity:ab,ti OR 'minimal\* clinic\* important difference\*':ab,ti OR 'detect\* change\*':ab,ti) AND 'rheumatoid arthritis'/exp/mj NOT 'conference abstract'/it AND [2009-2017]/py AND [english]/lim

#14. 'validation study'/exp OR 'measurement precision'/exp OR 'validity'/exp OR 'measurement accuracy'/exp OR 'reliability'/exp OR 'psychometry'/exp OR 'correlation analysis'/exp OR 'observer variation'/exp OR reproducib\*:ab,ti OR psychometr\*:ab,ti OR clinimetr\*:ab,ti OR clinometr\*:ab,ti OR 'observer variation':ab,ti OR reliab\*:ab,ti OR valid\*:ab,ti OR coefficient:ab,ti OR 'internal consistency':ab,ti OR (cronbach\*:ab,ti AND (alpha:ab,ti OR alphas:ab,ti)) OR 'item correlation':ab,ti OR 'item correlations':ab,ti OR 'item selection':ab,ti OR 'item selections':ab,ti OR 'item reduction':ab,ti OR 'item reductions':ab,ti OR 'item agreement':ab,ti OR 'item precision':ab,ti OR imprecision:ab,ti OR 'precise values':ab,ti OR 'test retest':ab,ti OR (test:ab,ti AND retest:ab,ti) OR (reliab\*:ab,ti AND (test:ab,ti OR retest:ab,ti)) OR stability:ab,ti OR interrater:ab,ti OR 'inter rater':ab,ti OR intrarater:ab,ti OR 'intra rater':ab,ti OR intertester:ab,ti OR 'inter tester':ab,ti OR intratester:ab,ti OR 'intra tester':ab,ti OR interobserver:ab,ti OR 'inter observer':ab,ti OR intraobserver:ab,ti OR 'intra observer':ab,ti OR intertechnician:ab,ti OR intratechnician:ab,ti OR 'intra technician':ab,ti OR interexaminer:ab,ti OR 'inter examiner':ab,ti OR intraexaminer:ab,ti OR 'intra examiner':ab,ti OR interassay:ab,ti OR 'inter assay':ab,ti OR intraassay:ab,ti OR 'intra assay':ab,ti OR interindividual:ab,ti OR 'inter individual':ab,ti OR intraindividual:ab,ti OR 'intra individual':ab,ti OR interparticipant:ab,ti OR 'inter participant':ab,ti OR intraparticipant:ab,ti OR 'intra participant':ab,ti OR kappa:ab,ti OR kappa\*:ab,ti OR kappas:ab,ti OR 'coefficient of variation':ab,ti OR repeatab\*:ab,ti OR (replacab\*:ab,ti OR repeated:ab,ti AND (measure:ab,ti OR measures:ab,ti OR findings:ab,ti OR result:ab,ti OR results:ab,ti OR test:ab,ti OR tests:ab,ti)) OR generaliza\*:ab,ti OR generalisa\*:ab,ti OR concordance:ab,ti OR (intraclass:ab,ti AND correlation\*:ab,ti) OR discriminative:ab,ti OR 'known group':ab,ti OR 'factor analysis':ab,ti OR 'factor analyses':ab,ti OR 'factor structure':ab,ti OR 'factor structures':ab,ti OR dimensionality:ab,ti OR subscale\*:ab,ti OR 'multitrait scaling analysis':ab,ti OR 'multitrait scaling analyses':ab,ti OR 'item discriminant':ab,ti OR 'interscale correlation':ab,ti OR 'interscale correlations':ab,ti OR (error:ab,ti OR errors:ab,ti AND (measure\*:ab,ti OR correlat\*:ab,ti OR evaluat\*:ab,ti OR accuracy:ab,ti OR accurate:ab,ti OR precision:ab,ti OR mean:ab,ti)) OR 'individual variability':ab,ti OR 'interval variability':ab,ti OR 'rate variability':ab,ti OR 'variability analysis':ab,ti OR (uncertainty:ab,ti AND (measurement:ab,ti OR measuring:ab,ti)) OR 'standard error of measurement':ab,ti OR sensitiv\*:ab,ti OR responsive\*:ab,ti OR (limit:ab,ti AND detection:ab,ti) OR 'minimal detectable concentration':ab,ti OR interpretab\*:ab,ti OR (small\*:ab,ti AND (real:ab,ti OR detectable:ab,ti) AND (change OR difference:ab,ti)) OR 'meaningful change':ab,ti OR 'minimal important change':ab,ti OR 'minimal important difference':ab,ti OR 'minimally important change':ab,ti OR 'minimally important difference':ab,ti OR 'minimal detectable change':ab,ti OR 'minimal detectable difference\*':ab,ti OR 'minimally detectable change':ab,ti OR 'minimally detectable difference\*':ab,ti OR 'minimal real change\*':ab,ti OR 'minimal real difference\*':ab,ti OR 'minimally real change':ab,ti OR 'minimally real difference':ab,ti OR 'ceiling effect':ab,ti OR 'floor effect':ab,ti OR 'item response model':ab,ti OR irt:ab,ti OR rasch:ab,ti OR 'differential item functioning':ab,ti OR dif:ab,ti OR 'computer adaptive testing':ab,ti OR 'item bank':ab,ti OR 'cross-cultural equivalence':ab,ti OR 'validation stud\*':ab,ti OR validate:ab,ti OR validity:ab,ti OR 'minimal\* clinic\* important difference\*':ab,ti OR 'detect\* change\*':ab,ti

#6. 'health status'/exp OR 'disease activity'/exp OR 'disease severity'/exp OR 'medical parameters'/exp OR 'disease assessment'/exp OR 'biological marker'/exp OR 'assessment of humans'/exp OR 'health survey'/exp OR 'patient-reported outcome'/exp OR 'questionnaire'/exp OR 'scoring system'/exp OR 'outcome assessment'/exp OR 'checklist'/exp OR 'measurement'/exp OR 'health level\*':ab,ti OR 'health status\*':ab,ti OR 'level\* of health':ab,ti OR 'health status index\*':ab,ti OR 'health status indicator\*':ab,ti OR 'health status indic\*':ab,ti OR 'severity of illness ind\*':ab,ti OR 'patient outcome\* assessment\*':ab,ti OR 'patient-centered outcome\* research':ab,ti OR 'patient reported outcome\*':ab,ti OR 'patient perspective\*':ab,ti OR 'outcome\* research':ab,ti OR gas:ab,ti OR 'global arthritis score\*':ab,ti OR 'moi ra':ab,ti OR 'mean overall index for rheumatoid arthritis':ab,ti OR 'patient-based disease activity score\*':ab,ti OR pdas\*:ab,ti OR radai\*:ab,ti OR 'rheumatoid arthritis disease activity ind\*':ab,ti OR radara:ab,ti OR 'real time assessment of disease activity in rheumatoid arthritis':ab,ti OR raid:ab,ti OR 'rheumatoid arthritis impact of disease score':ab,ti OR 'rapid 3':ab,ti OR rapid3:ab,ti OR sdai:ab,ti OR 'simplified disease activity index':ab,ti OR sip:ab,ti OR 'sickness impact profile':ab,ti OR tsc:ab,ti OR 'therapeutic score card\*':ab,ti OR vectra\*:ab,ti OR mbda:ab,ti OR 'multibiomarker disease activity':ab,ti OR 'multi-biomarker disease activity':ab,ti OR 'multi biomarker disease activity':ab,ti OR 'multibiomarker of disease activity':ab,ti OR 'multi-biomarker of disease activity':ab,ti OR

'multi biomarker of disease activity':ab,ti OR survey\*:ab,ti OR questionnaire\$:ab,ti OR scale\*:ti OR instrument:ti OR instruments:ti OR tool:ti OR tools:ti OR diary:ti OR diaries:ti OR assessment:ti OR assessments:ti OR 'self report\*':ti OR measure\*:ti OR prom:ti OR index\*:ti OR checklist\*:ti OR rating:ti  
#5. 'health status'/exp OR 'disease activity'/exp OR 'disease severity'/exp OR 'medical parameters'/exp OR 'disease assessment'/exp OR 'biological marker'/exp OR 'assessment of humans'/exp OR 'health survey'/exp OR 'patient-reported outcome'/exp OR 'questionnaire'/exp OR 'scoring system'/exp OR 'outcome assessment'/exp OR 'checklist'/exp OR 'measurement'/exp OR 'health level\*':ab,ti OR 'health status\*':ab,ti OR 'level\* of health':ab,ti OR 'health status index\*':ab,ti OR 'health status indicator\*':ab,ti OR 'health status indic\*':ab,ti OR 'severity of illness ind\*':ab,ti OR 'patient outcome\* assessment\*':ab,ti OR 'patient-centered outcome\* research':ab,ti OR 'patient reported outcome\*':ab,ti OR 'patient perspective\*':ab,ti OR 'outcome\* research':ab,ti OR gas:ab,ti OR 'global arthritis score\*':ab,ti OR 'moi ra':ab,ti OR 'mean overall index for rheumatoid arthritis':ab,ti OR 'patient-based disease activity score\*':ab,ti OR pdas\*:ab,ti OR radai\*:ab,ti OR 'rheumatoid arthritis disease activity ind\*':ab,ti OR radara:ab,ti OR 'real time assessment of disease activity in rheumatoid arthritis':ab,ti OR raid:ab,ti OR 'rheumatoid arthritis impact of disease score':ab,ti OR 'rapid 3':ab,ti OR rapid3:ab,ti OR sdai:ab,ti OR 'simplified disease activity index':ab,ti OR [sip:ab,ti](#) OR 'sickness impact profile':ab,ti OR tsc:ab,ti OR 'therapeutic score card\*':ab,ti OR vectra\*:ab,ti OR mbda:ab,ti OR 'multibiomarker disease activity':ab,ti OR 'multi-biomarker disease activity':ab,ti OR 'multi biomarker disease activity':ab,ti OR 'multibiomarker of disease activity':ab,ti OR 'multi-biomarker of disease activity':ab,ti OR 'multi biomarker of disease activity':ab,ti OR survey\*:ab,ti OR questionnaire\$:ab,ti

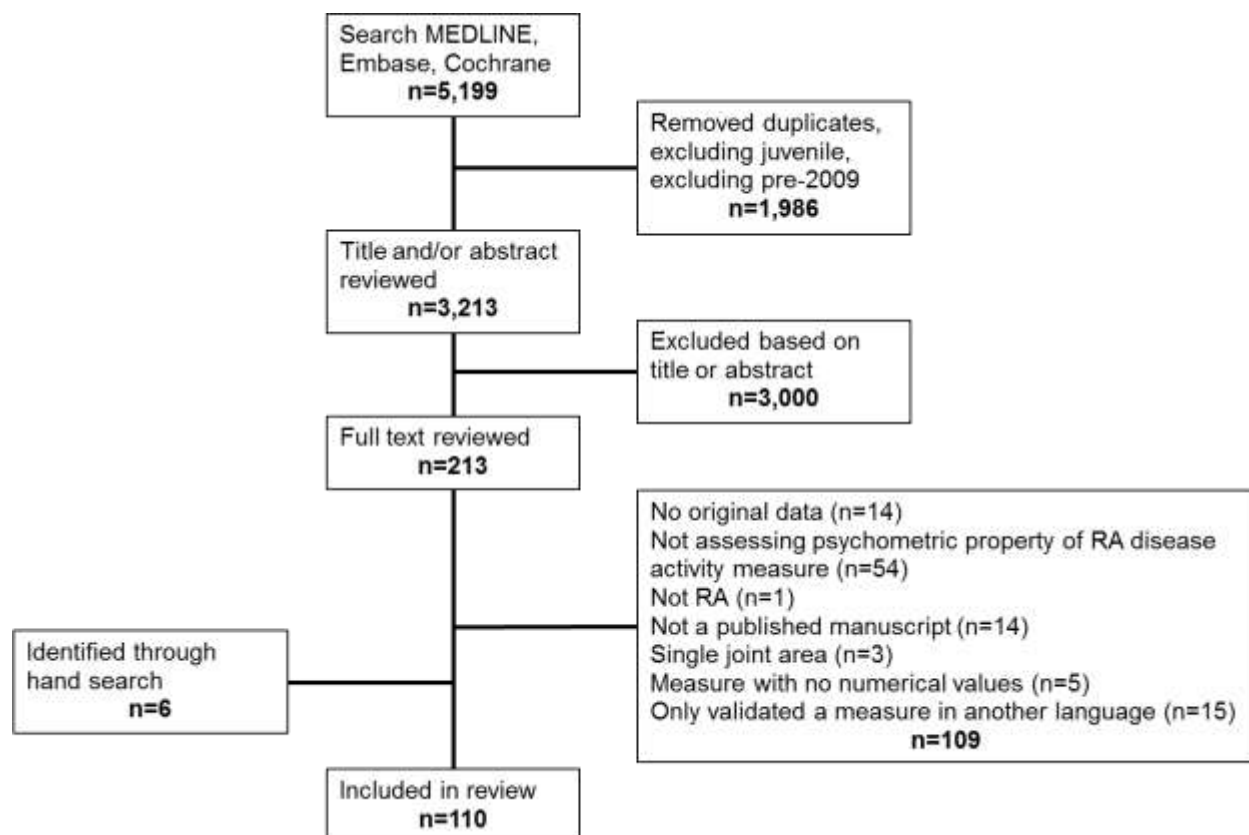


**Appendix 2. Level of evidence grading system**

Level	Rating	Criteria
Strong	+++ or ---	Consistent findings in multiple studies of good methodological quality -OR- in one study of excellent methodological quality.
Moderate	++ or --	Consistent findings in multiple studies of fair methodological quality -OR- in one study of good methodological quality.
Limited	+ or -	One study of fair methodological quality
Conflicting	±	Conflicting findings
Unknown	?	Studies only of poor methodological quality

*Cells left empty if no studies reported on that property.*

### Appendix 3. Systematic literature review study selection.



#### Appendix 4. Characteristics of studies identified.

Author (Reference)	Year	RA disease activity measure(s)	Sample Size	Age, Mean (SD)	Sex (%F)	DAS28, Mean (SD)	Study Setting	Country	Patient Selection
Aga,A.-B. (1)	2016	US-6, US-7, US-12, US-A,B	227 early, 212 established	51 (14) early, 52 (13) est.	63 early, 81 est.	3.5 (1.1) early, 4.7 (1.4) est.	Multicenter	Norway	early RA starting MTX, established RA switching bDMARD
Alemao,E. (2)	2016	DAS28-CRP, CDAI, SDAI	1297	57 (14)	82	3.8 (1.6)	Single center	US	Participant in cohort
Amaya-Amaya,J. (3)	2012	RADAI, RAPID-3, RAPID-4, RAPID-5, DAS28-CRP, CDAI, SDAI	135	54 (11)	79	2.8 (1.3)	Convenience sample	Columbia	Convenience
Backhaus,M. (4)	2009	US-7	120	55 (14)	76	5 (1.3)	Multicenter	-	91% RA; Onset or change in therapy.
Backhaus,T.M. (5)	2013	US-7	432	57 (13)	81	3.8-5.2 (1.3-1.4)	Multicenter	Germany	Changing treatments
Baker,J.F. (6)	2016	RAMRIS	291	49 (13)	81	5.6 (1.1)	RCT golimumab	Ref	MTX naïve and bDMARD naïve
Baker,J.F. (7)	2014	mCDAI, mDAS28, mSDAI	514	-	-	5.3 (1.0)	Multicenter RCT golimumab	Ref	Ref
Baker,J.F. (8)	2014	RAMRIS	291	49 (13)	81	5.6 (1.1)	Multicenter RCT golimumab	Ref	Duration >3 months, active disease
Bakker,M.F. (9)	2012	MBDA score	120	53 (15)	70	5.6 (1.0)	Multicenter open label RCT intensive vs conventional treatment	Ref	early RA
Bakker,M.F. (10)	2012	DAS28	265	47-59 (13-16)	53-72	3.2-4.0 (0.9-1.0)	Multicenter open label RCT intensive vs conventional treatment	Ref	early RA, DMARD/pred naïve
Balsa,A. (11)	2010	SDAI, DAS28	97	56 (12)	72	2.1 (0.7)	University clinic	Spain	Clinically in remission, on DMARD, no recent med changes

Behrens,F. (12)	2013	DAS28	415 (discovery), 1874 (study)	56 (12), 55(12)	78, 77	3.2 (1.3), 5.9 (1.1)	Academic centers, Multicenter non-interventional study adalimumab	Germany, Ref	Discovery cohort - stable, full study cohort
Bentley,M.J. (13)	2010	mDAS28, DAS28, CDAI, SDAI	11674	59-60 (13-14)	75-78%	3.4-4.2 (1.5-1.6)	Large North American Registry (CORRONA)	US	RA, non-missing DAS28
Blanchais,A. (14)	2010	RAPID-3, RAPID-4	26	56.5(95)	-	-	patient organization Association franc, aise des polyarthritiques (Pays-de-Loire chapter)	France	RA patients on MTX, TNFi
Boone,N.W. (15)	2015	RAPID3, DAS28	150	59.7 (10.8)	67	3.4 (1.4)	Atrium-Orbis medical centre hospital in Sittard	Netherlands	stable bDMARDs, and combo with MTX
Bossert,M. (16)	2012	RAPID3, RADA15	200	56.9 (11.5)	75.5	3.6 (1.4)	inpatient/outpatient setting, single center; cross sectional study	France	patients with flare; cDMARDs, bDMARDs
Brode,S. (17)	2013	DAS28-ESR (historical vs up-to-date)	66	61.5	84.8	4.09 (1.8), 4 (1.51)	Clinical observational study	UK	sequentially included; cDMARD; bDMARDs used, often combo therapy
Brulhart,L. (18)	2015	SONAR	6	65.5	83	4.8	-	Switzerland	active disease
Castrejon,I. (19)	2013	RAPID3 vs Boolean and SDAI, DAS28, CDAI, 5 candidate RAPID3 (RAPID3R, RAPID3R+SJ1, RAPID3R+SJ0, RAPID3R+SJ1+DJ1, RAPID3R+SJ0+D1)	720 (813)	48.2 (12.4)	76.2	5.1 (1.3)	Single cohort; ESPOIR cohort	France	Etude et Suivi des Polyarthrites Indifférenciées Récentes (ESPOIR), early RA, in remission

Castrejon,I. (20)	2013	Hospital Universitario La Princesa Index (HUPI)	202	53 (16)	77	-	Early Arthritis Registry of Hospital Universitario La Princesa	Spain	mixed population of patients with early RA (70%) and patients with undifferentiated arthritis (UA), or 30%
Centola,M. (21)	2013	MBDA score	676	56-60 (13-14)	75-91	3.3-5.8	Cohorts (5) from academic centers - OKC, BRASS	US	1987 ACR, exclude >10mg prednisone, severe comorbidities
Chandrashekhara,S. (22)	2013	DAS28-ESR, DAS28-CRP	460	48 (12)	96	4.6 (1.4) ESR	Single center, routine care	India	Routine care
Che,H. (23)	2016	RAPID-3, DAS28-3v	677	49 (12)	77	5.0 (1.2)	ESPOIR French cohort	France	Early inflammatory arthritis fulfilling 2010 ACR/EULAR at 12 months
Cheung,P.P. (24)	2010	DAS28, Pat DAS28, US DAS28	50	59 (13)	76	3.7 (1.3)	Cross-sectional single center	India	Consecutively recruited
Crowson,C.S. (25)	2009	DAS28-ESR, DAS28-CRP	1247	51 (12)	82	6.2 (2.0) ESR	3 clinical trials of golimumab	Ref	Ref, active RA
Curtis,J R. (26)	2012	MBDA score	4 cohorts: 230, 141, 141, 45	54-58	77-84	3.5-5.5	RA patients from 3 cohorts: InFoRM, BRASS registry, Leiden Early Arthritis Clinic cohort	US	Seropositive, seronegative validations, seroneg performance, treatment response; MTX and anti-TNF therapy
Curtis,J.R. (27)	2012	CDAI	578 (improving), 553 (worsening)	54 (15), 54 (15)	84, 85	4.7 (1.2), 4.6 (1.2)	Canadian early arthritis cohort (CATCH)	Canada	Arthritis not needing formal diagnosis of RA
Curtis,J.R. (28)	2015	RAPID3, CDAI	733	55	78	6.3 (1.1)	Randomized trial of RAPID3 & CDAI predicting certolizumab response	US	Active RA, prior DMARD use. Exclude fibromyalgia.

Cyteval,C. (29)	2010	SAMIS (Simplified Rheumatoid Arthritis Magnetic Resonance Imaging Score)	58	53	75.8	-	ESPOIR French cohort	France	RA, unclassified arthritis, and 2 with no arthritis
Dale,J. (30)	2014	DAS28, MSUS assessment	53	-	59	5 (1.1)	randomized from TASER	UK	early RA or CCP+ undifferentiated arthritis
Damjanov,N. (31)	2012	DAS28 US	90	55.8 (11.6)	-	-	Single center	Serbia	RA patients on DMARDs
De Jong, P.H. (32)	2012	DAS28-squeeze, DAS28 BCP (bilateral compression pain)	149 (development), 153 (validation)	55,52	66,69	4.82, 4.88	multicenter, tREACH early RA	Netherlands	early RA
De Jong,P.H. (33)	2012	DAS, DAS28, SDAI, CDAI	296	54	68	4.85	multicenter, tREACH early RA	Netherlands	early RA; DMARD and GC treatment
Dougados,M. (34)	2010	US-38	76	55 (13)	84	5.12 (1.31)	multicenter, international	-	RA requiring TNFi
Dougados,M. (35)	2011	DAS28-PGA-HS, DAS28-PGA-DA, DAS28-PGA-RAID	108	54 (13)	75	5.4 (0.8)	open, single arm therapeutic trial	France	RA with entanercept
Eastman,P.S. (36)	2012	MBDA score	512 (28 in inter-run analyses)	60 (20-91)	76	3.23 (1.07-8.24)	InFoRM, multicenter observational study	North America	First enrolled subjects
Emery,P. (37)	2011	RAMRIS	558	GO-BEFORE 50, GO-FORWARD 51	GO-B: 81%, GO-F 83%	GO-B: DAS28 5.5, GO-F: DAS28 5.3	Phase III RCT golimumab	-	MTX naïve & MTX-IR

Fleischmann,R. (38)	2014	DAS28-ESR, DAS28-CRP, SDAI	2534	-	-	-	moderate RA (PRESERVE), early moderate-to-severe RA (COMET), established moderate-to-severe RA (TEMPO, APPEAL, LARA)		MTX +/- DMARDs
Fleischmann,R. (39)	2016	MBDA score	524	51	-	5.5	Phase III RCT adalimumab and abatacept	Multiple	MTX-IR and biologic naïve
Fujiwara,M. (40)	2013	DAS28-ESR, DAS28-CRP, SDAI, CDAI, RAPID3	250	59.3 (14)	78.4	-	outpatient	Japan	Randomized RA on prednisone, MTX or bDMARD
Gonzalez-Alvaro,I. (41)	2016	Hospital Universitario La Princesa Index (HUPI)	789 (EMECAR), 403 (PEARL)	61 (13), 55 (16)	72, 80	4.2 (1.4), 4.5 (1.5)	PEARL early arthritis, EMECAR long term RA	Spain	UA and long standing RA
Greenberg,J.D. (42)	2009	CDAI, DAS28	10108	60 (14)	76	3.5 (1.5)	Large US registry (CORRONA)	US	Complete ACR core measures and ESR; selected those who initiated DMARD
Gulfe,A. (43)	2009	CDAI, DAS28, SDAI	1789	56 (13)	77	5.5 (1.2)	Treatment registry (South Swedish Arthritis Treatment Group)	Sweden	RA initiating first course TNFi
Hambardzumyan,K. (44)	2015	MBDA score	235	-	72	5.7 (1.0)	SWEFOT RCT of MTX and step-up therapy	Sweden	DMARD naïve initiating MTX
Hambardzumyan,K. (45)	2016	MBDA score	220	-	71	5.7 (1.0)	SWEFOT RCT of MTX and step-up therapy	Sweden	DMARD naïve initiating MTX
Hamdi,W. (46)	2011	CDAI, DAS28, SDAI	100	53 (12)	87	5.5 (1.5) [ESR]	Single center 20-month follow-up study	Tunisia	-

Hammer,H.B. (47)	2010	US78, CDAI, DAS28, SDAI	20	53(21-78)	75	5.3 (3.4-7.7)	Single center, Initiating adalimumab as first bDMARD	Norway	initiating adalimumab
Harrington,J.T. (48)	2009	GAS	185	63 (range 29-88)	-	-	Community based practice	US	Fulfill ACR criteria
Heegaard,C. (49)	2013	Pat report CDAI, DAS28, SDAI	30	60 (15)	77	3.5 (1.0)	Single center outpatient clinic	Denmark	Stable disease activity, no DMARD changes, no hand surgery
Hensor,E.M.A. (50)	2010	DAS28-ESR, DAS28-CRP	520 early, 364 established	58 (14) early, 53 (14) est	64 early, 77 est	6.2 (1.4) early, 6.4 (1.1) est [ESR]	Yorkshire Early Arthritis Register and Comparator established RA cohort	UK	DAS28-ESR and DAS28CRP available, CRP >1
Hirabayashi,Y. (51)	2013	DAS28-ESR	285	60 (13)	-	5.2 (1.3)	Japanese tocilizumab treatment registry	Japan	RA patients newly receiving tocilizumab
Hirano,F. (52)	2016	SDAI	271	61 (14)	77	24.1 (17.7-33.9) SDAI	Multicenter, prospective cohort study	Japan	RA, mod/high disease activity, no hx bDMARD use
Hirata,S. (53)	2016	MBDA score	83	59 (14)	84	5.7 (1.2)	Retrospective cohort from University Clinic	Japan	RA patients who received ADA, ETN, INFX for >1 year and available clinical & serum data
Hirata,S. (54)	2013	MBDA score	125	53 (14)	74	5.8 (1.0) [ESR]	Post hoc analysis BeSt study	Netherlands	RA, symptoms <2 years and participate in BeSt study
Hirata,S. (55)	2015	MBDA score	147	60 (50-68)	84	5.7 (5.0-6.5)	Single center cohort	Japan	RA initiating and continuing TNF for >1 year



Janta,I. (56)	2013	Pt DAS28, Pr DAS28, Pt SDAI, Pr SDAI	69	60 (13)	77	2.6 (1.1)	Single center clinic	Spain	Deemed in clinical remission by treating rheumatologist
Jensen Hansen,I.M. (57)	2016	DAS28	230	66 (15)	68	4.4 (0.9)	Single center registry	Denmark	DAS28 >3.2 and no missing data
Kaneko,Y. (58)	2013	44-joint count; DAS28, SDAI, CDAI	1402	60.1	83	2.8	single center	Japan	RA
Kavanaugh,A. (59)	2010	Pt-DAS28	447	54	79	5.4	multicenter	US	etanercept, MTX
Kawashiri,S. (60)	2011	12j-PDUS	22	64 (9)	72.2	5.69	single center	Japan	RA patients on MTX or TNFi
Khan,N.A. (61)	2012	PTGL, GH	7023	55.2 (13.8)	79.8	-	QUEST-RA	multiple countries	RA patients
Koevoets,R. (62)	2011	DAS (RAI), DAS 0-1, DAS53, DAS44	-	-	-	DAS 4.4	RCT (BeSt)	-	Early RA (<2 years)
Leeb,B.F. (63)	2009	RAPID-3, RADAI-5, DAS28-ESR, CDAI	108	-	77.7	-	hospital based outpatients	-	RA on cDMARDs, bDMARDs
Leng,X. (64)	2016	US-7, US-12	82	48 (13)	80.5	5.7 (1)	multicenter, 8 centers	China	RA on stable DMARD last 12 weeks prior
Leung,A.M.H. (65)	2016	PDAS1, PDAS2, DAS28, CDAI	299	60 (13)	75	-	-	-	RA
Li,W. (66)	2016	MBDA score	163	55 (14)	67	3.3 (2.3-4.3)	Single center	Netherlands	Early RA (<2 years)
Lisbona,M.P. (67)	2016	Hand MRI, DAS28	388	-	-	-	cross-sectional study	Spain	RA various disease activity: early RA and established disease
Madsen,O.R. (68)	2013	DAS28 (3), DAS28 (4)	239	56.5 (13.8)	75.7	4.8 (1.2), DAS28(4) ; 4.6 (1.1), DAS28(3)	DANBIO	Denmark	RA patients on bDMARDs

Madsen,O.R. (69)	2011	DAS28-CRP (3), DAS28-CRP (4)	319	56.5 (13.8)	75.7	4.8 (1.2), DAS28(4) ; 4.5 (1.2), DAS28(3)	DANBIO	Denmark	RA patients failed 1 prior DMARD
Mandl,P. (70)	2013	SDAI, DAS28, multimodal based on US-GS and US- PD.	62	53.8(13.2)	80.6	4.6 (0.5)	multicenter, prospective, randomized	9 European countries	moderate RA
Mandl,P. (71)	2012	US measures (n=66)	62	54 (13)	81	4.6 (0.5)	Multicenter, open- label RCT of etanercept vs cDMARD	14 European countries	Erosive RA with DAS28 3.2 to 5.1 despite stable MTX
Markusse,I.M. (72)	2014	MBDA score	125	53 (14)	75	5.8 (1.0)	BeSt: multicenter RCT RA treatment strategies	Ref	Available specimens
Martins,F.M. (73)	2015	DAS28, CDAI, SDAI	2795	57 (14)	83	4.0 (1.7)	Portugese RA registry	Portugal	Available RA measures
Matsui,T. (74)	2011	DAS28, CDAI, SDAI	1412	60 (11)	86	4.3 (3.4, 5.2)	Japanese rheumatic disease database	Japan	Non missing data
Medeiros,M. (75)	2015	DAs28-ESR, DAS28-CRP, CDAI, SDAI	111	56 (13)	97	4.0 (1.4)	University clinic	Brazil	Exclude if other autoimmune disease
Michaud,K. (76)	2009	CDAI, SDAI	529	67 (11)	9	3.5 (1.3)	US Veteran longitudinal RA registry	US	Two visits with full ACR core measures
Nakahara,R. (77)	2015	RAMRIS, DAS28- CRP	8	57 (6)	88	3.7 (0.8)	Retrospective single center study	Japan	RA, bDMARD therapy, MRI at baseline and 12 months
Nielung,L. (78)	2015	DAS28-ESR, DAS28-CRP	108	60 (51, 67)	69	5.6 (4.2, 6.6) [ESR]	Single center initiating treatment with a biologic	Denmark	Initiating a biologic
Nishimoto,N. (79)	2010	DAS28-ESR, CDAI, SDAI	53	-	-	6.1	RCT of tocilizumab	Japan	MTX-IR, no recent prednisone change, other RCT exclusion criteria
Ohrndorf,S. (80)	2012	US-7	6	-	33	2.3-4.5	Outpatient rheumatology clinic	Germany	-

Perricone,C. (81)	2012	US-6, US-12, DAS28	45	53 (14)	82	4.5 (1.2)	Single university clinic	Italy	initiating etanercept
Pincus,T. (82)	2011	RAPID3, DAS28, CDAI	982	Ref	Ref	Ref	RCT of certolizumab	International	MTX-IR
Pincus,T. (83)	2011	RAPID-3, DAS28	553	Ref	Ref	Ref	Post hoc analyses of two abatacept clinical trials	Ref	Ref
Pincus,T. (84)	2010	DAS28, CDAI, RAPID-3	200	53.4 (16.2)	81	3.7(1.5)	private practice	US	RA patients
Qorolli,M. (85)	2016	RAPID-3, DAS28	68	53.5 (11.6)	85.5	5.9 (1.3)	single center	Serbia	RA
Reiss,W.G. (86)	2016	MBDA score	78	50.7 (14.4)	82.1	5.7 (0.91)	ACT-RAY study, phase 4	US	Tocilizumab treated RA patients
Riazzoli,J. (87)	2010	patient derived DAS28	47	50 (13)	79	5.4(1.2)	multi-center, prospective	Sweden	Adalimumab patients
Rintelin, B. (88)	2009	CDAI, DAS28, SDAI	570	-	77	-	outpatients	Austria	RA patients
Rintelin, B. (89)	2013	RADAI5	705	62.7 (13.4)	76	3.31 (1.37)	outpatients	Austria	RA patients
Rosa,J. (90)	2016	US-6, US-10, US-22	60	59 (15)	85	3.69 (1.42)	single center	Brazil	RA patients, all DMARDS
Salaffi,F. (91)	2009	DAS28, CDAI	2864	58.6	79.1	4.05 (1.38)	randomly selected patients with a regular rheumatologist	Italy	RA patients
Salaffi,F. (92)	2010	PRO-CLARA	196	58(11)	80	3.94 (2)	multicenter	Italy	RA patients on DMARDS, TNFs
Salaffi,F. (93)	2012	DAS28, SDAI, CDAI, MOI-RA, PRO-CLARA, RAPID3, RADAI, PAS	191	56.6 (12.2)	82.7	3.96 (1.44); this is DAS28 ESR	multicenter	Italy	RA patients on DMARDS, TNFs
Sewerin,P. (94)	2014	RAMRIS	26	53 (30)	69.2	3.5 (1.1)	single center	Germany	early RA
Sheehy,C. (95)	2014	DAS28, SDAI	76 pts (532 visits)	60 (14)	63	-	Single Center cohort	UK	No missing data, at least 7 visits
Siemons,L. (96)	2014	DAS28-ESR, DAS28-CRP	682	58 (14)	63	3.9 (1.6)	Multicenter cohort	Netherlands	Non missing DAS28

Siemons,L. (97)	2014	DAS28-ESR, DAS28-CRP	565	58 (14)	63	4.3 (1.5)	Multicenter cohort	Netherlands	Early RA, DMARD/pred naïve, not in remission
Sullivan,M.B. (98)	2010	DAS28-CRP, CDAI, RAPID5, RADAI, GAS	740	57 (14)	83	4.1 (1.5)	Single center cohort	US	Baseline and 1 year DAS28-CRP available
Tamhane,A. (99)	2013	DAS28-CRP, DAS28-ESR	233	53 (12)	85	4.7 (1.4)	Multicenter cohort AA with RA	US	DAS28-ESR3 and DAS28-CRP3 available
Tan,Y.K. (100)	2016	IUS, ICUS, US-7, US-12, DAS28	12	58 (7)	83	5.2	Single center clinic	Singapore	Seropositive with >=5 swollen joints escalating/initiating DMARD/pred
Uhlig,T. (101)	2009	CDAI, DAS28, RADAI, RAPID3, SDAI	28	61 (6)	61	3.1 (1.3)	Recruited from county register	Norway	Stable RA, no treatment changes
Van der Helm-van Mil,A.H. (102)	2013	MBDA score	163	55 (14)	67	-	Leiden early arthritis clinic, single center	Netherlands	Available MBDA, clinical data, radiographs
van Onna,M. (103)	2016	OST	59	mean range 48-59	54-70%	DAS28: 34%REM, 44% low-mod, 22%HDA	Clinic	Netherlands	Recruit from clinics, stratified by DAS28 category. Exclude severe deformity, recent surgery
Walter,M.J. (104)	2014	RADAI, DAS28	159	54 (13)	76	2.7 (2.0-3.4)	Single clinic	Netherlands	No psychiatric illness
Ward,M.W. (105)	2015	DAS28-ESR, DAS28-CRP, CDAI, SDAI	250	51 (14)	78	6.2 (1.2)	Single center clinic	US	Escalating treatment because of active RA
Yamada,Y. (106)	2016	US SDAI	137	22-85	79	-	Single center	Japan	Consecutively recruited
Yi,L. (107)	2016	K/L antibody, DAS28	58	58 (16), 56 (16)	69, 81	-	Single center	China	-
Yoshimi,R. (108)	2015	US-8	234	59 (14)	85	3.5 (1.6)	Single center	Japan	Had MSUS at the center
Zufferey,P. (109)	2014	SONAR, DAS28	536	55 (14)	77-84	3.4 (1.4)	Swiss MSUS registry	Switzerland	A MSUS and clinical assessment available

Zufferey,P. (110)	2014	SONAR, DAS28	307	53-57	67-82	1.7-4	Swiss MSUS registry	Switzerland	A MSUS and clinical data, 38 healthy controls to define "normal" synovitis
Ref = referred to original publication									

**Appendix 5.** Psychometric properties of rheumatoid arthritis disease activity measures.

RADAM	Author (Ref)	Year	Internal Consistency	Reliability	Measurement Error	Content Validity	Structural Validity	Hypotheses testing	Responsiveness
<b>Clinical Disease Activity Index (CDAI)</b>									
	Alemao,E. (2)	2016	-	-	-	-	-	+, rem = improve HAQ & HRQOL	-
	Bentley,M.J. (13)	2010	0.60a	-	-	-	-	-	0.45es, 0.52srm
	Bossert,M. (16)	2012	-	-	-	-	-	0.877r DAS28	-
	Castrejon,I. (19)	2013	-	-	-	-	-	93.6% agreement Boolean, 0.76k Boolean; 98.6% SDAI agreement, 0.95k SDAI	-
	Castrejon,I. (20)	2013	0.46a	-	-	-	-	0.82r CDAI; AUC HUPI (0.956), CDAI (0.964; P 0.343)	For GDA-Ph, CDAI (AUC 0.791, p=0.002). For GDA-P, CDAI (AUC 0.987, p<0.001).
	Curtis,J.R. (26)	2012	-	-	-	-	-	moderate disease activity: CDAI and DAS28-ESR AUC 0.82. high disease activity: CDAI and DAS28-ESR AUC 0.83.	-
	Curtis,J.R. (28)	2015	-	-	-	-	-	-	Week 12: 0.22K RAPID3/CDAI. CDAI more sensitive to response at 12 weeks. CDAI and RAPID responders similar DAS28 improvement. RAPID3 non-responders still had DAS28 improvement.
	De Jong,P.H.P. (33)	2012	-	-	-	-	-	0.81-0.86r DAS variants, 0.76-0.87 DAS28 variants,	-

								0.99r SDAI; 0.63-0.68k DAS variants, 0.57-0.70k DAS28 variants, 0.99k SDAI	
	Fujiwara,M. (40)	2013	-	-	-	-	-	0.867r DAS28-ESR; 0.928r DAS28-CRP	-
	Greenberg,J.D. (42)	2009	-	-	-	-	-	0.84r DAS28ESR, 0.58-0.65k DAS28ESR	0.87r DAS28ESR change; 0.52-0.68k EULAR response
	Gulfe,A. (43)	2009	-	-	-	-	-	0.65-69k H DAS28, 0.49-0.58k M DAS28, 0.54-0.67 L DAS28, 0.14-0.40k R DAS28; 0.83k H SDAI, 0.79-0.80k M SDAI, 0.81-0.88k L SDAI, 0.91-1k R SDAI	0.54-0.68k ACR20/EULAR response
	Hamdi,W. (46)	2011	-	-	-	-	-	CON: 0.90r DAS28-ESR, 0.94r DAS28-CRP, 0.99r SDAI; CAT: 0.77kcc DAS28-ESR, 0.64 kcc DAS28-CRP, 0.85kcc SDAI	-
	Heegaard,C. (49)	2013	-	0.90r after 1 week	LSD 7.8, %LSD 59.4	-	-	-	-
	Kaneko,Y. (58)	2013	-	-	-	-	-	remission rates 28 joints versus 44 joints: CDAI 41% vs 38.4% [total misclassification rate 2.4%]	-
	Khan,N.A. (61)	2012	-	-	-	-	-	LCC 0.99 for CDAI-PTGL and CDAI-GH	-
	Leeb,B.F. (63)	2009	0.21	-	-	-	(+); 1.74 and 1.16 (Eigenvalues)	tau 0.582 compared to DAS28-ESR	-
	Martins,F.M. (73)	2015	-	-	-	-	-	0.874r DAS28, 0.984r SDAI; 0.82k DAS28	-

	Matsui,T. (74)	2011	-	-	-	-	-	0.985r SDAI, 0.895-0.933 DAS28-ESR/CRP; 0.871k SDAI; 0.427k DAS28-ESR	0.847-0.880r DAS28-ESR/CRP, 0.969r SDAI	
	Medeiros,M. (75)	2015	-	-	-	-	-	0.92r DAS28, 0.99r SDAI; 0.93k SDAI, 0.35-0.44k DAS28 (various cut-offs)	-	
	Michaud,K. (76)	2009	-	-	-	-	-	-	0.37k ACR20, 0.52k EULAR Good/Mod	
	Rintelin,B. (88)	2009	0.783	-	-	-	-	agreement between CDAIC and DAS28C, k=0.525; SDAIC and CDAIC, k=0.862	-	
	Salaffi,F (91)	2009	0.53	0.87r; kappa 0.418	-	-	-	-	-	
	Salaffi,F. (93)	2012	-	-	-	-	-	vs DAS28-ESR 0.739r; vs DAS28-CRP 0.648r	SRM 1.24, ES 1.50	
	Sullivan,M.B. (98)	2010	-	-	-	-	-	0.84r DAS28CRP, 0.70r RADAI, 0.94r RAPID5, 0.82r GAS	0.80r DAS28-CRP, 0.63r RADAI, 0.92r RAPID5, 0.62r GAS	
	Uhlig,T. (101)	2009	-	Test-retest: 0.89r, 0.89ICC	MDC 10.6%, SDD 8.05	-	-	0.88r DAS28-ESR, 0.94-0.95r SDAI, 0.76r RAPID3, 0.79r RADAI	-	
	Ward,M.W. (105)	2015	-	-	-	-	-	-	SRM -0.98	
<b>Modified CDAI</b>										
	Baker,J.F. (7)	2014	-	-	-	-	-	0.27-0.32r RAMRIS-S, AUC 0.58 xray prog, mild outperform original	-	
<b>Patient reported CDAI</b>										
	Heegaard,C. (49)	2013	-	0.89r after 1 week	LSD 8.4, %LSD 63.8	-	-	0.92-0.93r Pr CDAI	-	
<b>Disease Activity Score (DAS)</b>										



	De Jong,P.H. (33)	2012	-	-	-	-	-	0.96-0.99r DAS variants, 0.87-0.93r DAS28 variants, 0.83r SDAI, 0.83r CDAI; 0.89-96k DAS variants, 0.80-0.83k DAS28 variants, 0.65k SDAI, 0.65k CDAI	-	
	Koevoets,R. (62)	2011	-	-	-	-	-	0.96-0.99r with DAS derivatives. 0.76-0.98k with DAS derivatives.	-	
<b>Disease Activity Score 28 joint (DAS28)</b>										
DAS28-CRP	Alemao,E. (2)	2016	-	-	-	-	-	+ , rem = improve HAQ & HRQOL	-	
DAS28-ESR	Bakker,M.F. (10)	2012	-	-	-	(-) DAS28 under estimated feet rad progression	-	-	-	
DAS28-CRP	Behrens,F. (12)	2013	-	0.862 reliability coefficient	0.72 SEM	-	-	-	0.31-0.42r functional status difference (better than EULAR response)	
DAS28-ESR	Bentley,M.J. (13)	2010	0.39a	-	-	-	-	-	0.47es, 0.57srm	
DAS28-ESR	Boone,N.W. (15)	2015	-	Calculated: Cohen's kappa 0.13, weighted kappa 0.27; assors 1-3: Cohen's kappa's were 0.17, 0.10 and 0.11	-	-	-	DAS28-ESR and RAPID3 correlated p = 0.576.	-	

DAS28-ESR	Bossert,M. (16)	2012	-	-	-	-	-	Spearman Coefficient: CDAI 0.877, SDAI 0.897	-
DAS28-ESR (historical)	Brode,S. (17)	2013	-	ICC 0.86	95% LoA for DAS28 from -0.66 to 0.48. lower and upper limits had 95 %CI -0.7825 to -0.5365 and 0.359 to 0.605	-	-	-	-
DAS28-CRP	Castrejon,I. (19)	2013	-	-	-	-	-	79.9% agreement Boolean, 0.46k Boolean; 94.7% SDAI agreement, 0.79k SDAI	-
DAS28-CRP	Castrejon,I. (20)	2013	DAS28-ESR (alpha=0.52) DAS28-CRP (alpha=0.47)	-	-	-	-	r=0.89 and n=684 for DAS28- ESR; r=0.91 and n= 664 for DAS28-CRP;AUC DAS28-ESR (0.930; P 0.001), DAS28-CRP (0.945; P 0.077)	For GDA-Ph, DAS28-ESR (AUC 0.864, P 0.229), the DAS28-CRP (AUC 0.889, P 0.625). For GDA-P, DAS28-ESR (AUC 0.814, P 0.218), the DAS28-CRP (AUC 0.833, P 0.739).
DAS28-ESR, DAS28-CRP	Chandrashekara,S. (22)	2013	-	-	-	-	-	-0.71k DAS28-ESR & CRP	-
DAS28-ESR, DAS28-CRP	Crowson,C.S. (25)	2009	-	-	-	-	-	0.96r (DAS28-ESR & CRP), 0.94r DAS28-ESR CDAI, 0.99r DAS28-CRP CDAI	-
DAS28-squeeze	De Jong, P.H. (32)	2012	-	-	-	-	-	Agreement between DAS and DAS28 was 40% vs DAS and DAS28-squeeze 59% vs DAS and DAS28-BCP 65%.	-

DAS28-ESR	De Jong,P.H.P. (33)	2012	-	-	-	-	-	0.85-0.93r DAS variants, 0.89-0.91r DAS28 variants, 0.82r SDAI, 0.81r CDAI; 0.73-0.83k DAS variants, 0.79-0.92k DAS28 variants, 0.63k SDAI, 0.63k CDAI	-
DAS28-ESR	Dougados,M. (35)	2011	-	ICC PGA-HS 0.75, PGA-DA 0.63, PGA-RAID 0.85. ICC DAS28-PGA-HS 0.92, DAS28-PGA-DA 0.92, DAS28-PGA-RAID 0.94	-	-	-	0.94-0.97r	SRM 1.84 - 1.94
DAS28-ESR, DAS28-CRP	Fleischmann,R. (38)	2014	-	0.4-0.79k DAS28-ESR vs DAS28-CRP	-	-	-	DAS28-CRP <2.6 and SDAI<3.3 was 0.2-0.76k; DAS28-ESR <2.6 and SDAI < 3.3 was 0.26-0.51k	-
DAS28-ESR, DAS28-CRP	Fujiwara,M. (40)	2013	-	-	-	-	-	DAS28-ESR: 0.874r SDAI, 0.867r CDAI, 0.659r RAPID3; DAS28-CRP 0.945r SDAI, 0.928r CDAI, 0.725r RAPID3; DAS28-ESR 0.418k SDAI, 0.408k CDAI, 0.257k RAPID3; DAS28-CRP 0.382k SDAI, 0.354k CDAI, 0.279k RAPID3	-
DAS28-ESR, DAS28-CRP	Hamdi,W. (46)	2011	-	-	-	-	-	CON: 0.93r DAS28-ESR/DAS28-CRP; CAT: 0.72kcc DAS28-ESR/DAS28-CRP	-
DAS28-CRP	Heegaard,C. (49)	2013	-	0.79-0.87r after 1 week	LSD 1.1, %LSD 30.2-33.0	-	-	-	-
DAS28-ESR, DAS28-CRP	Hensor,E.M.A. (50)	2010	-	-	-	-	-	DAS28-ESR/CRP: Early - 0.79k baseline, 0.84k 6 mos; est - 0.57k baseline, 0.83k 6 mos	DAS28-ESR EULAR response: early 0.82k, est 0.83k

DAS28-ESR	Hirabayashi, Y. (51)	2013	-	-	-	-	-	AUC 0.91 for boolean remission (DAS28-ESR cut-off 1.54)	-
DAS28-CRP	Jensen Hansen, I.M. (57)	2016	-	-	-	-	-	0.37r HAQ (similar to CDAI), if SJC=0 & crp<6 mg/L 0.12r HAQ	-
	Kaneko, Y. (58)	2013	-	-	-	-	-	remission rates 28 joints versus 44 joints: DAS28 46.6% vs 43.9% [total misclassification rate 2.4%]	-
DAS28-ESR	Khan, N.A. (61)	2012	-	-	-	-	-	LCC 0.98 for DAS28-PTGL and DAS28-GH	-
DAS28-ESR	Koevoets, R. (62)	2011	-	-	-	-	-	0.96-0.99r, 0.76-0.98k	-
DAS28-ESR	Leeb, B.F. (63)	2009	0.165	-	-	-	(+); 1.39 and 0.99 (Eigenvalues bi-dimensional)	tau 0.582 agreement with CDAI	-
DAS28-CRP	Madsen, O.R. (68)	2013	-	Comparison DAS28(3) vs DAS28(4), 0.96r at baseline, 0.97r at 12 weeks.	LoA Comparison DAS28(3) vs DAS28(4): -0.92 to 0.36	-	-	-	0.97r at 12 weeks comparing (3) and (4). SRM 1.04 (4) vs SRM 0.97 (3)
DAS28-CRP	Madsen, O.R. (69)	2011	-	Comparison DAS28-CRP(3) vs DAS28-CRP(4), 0.96r	LoA Comparison DAS28-CRP(3) vs DAS28-CRP(4): -0.95 to 0.37	-	-	-	-
DAS28-ESR	Mandl, P. (70)	2013	-	ICC 0.52	-	-	-	-	SRM 0.87
	Martins, F.M. (73)	2015	-	-	-	-	-	0.874r CDAI, 0.877r SDAI; 0.82k CDAI, 0.81k SDAI; DAS28 less strict remission	-

DAS28-ESR, DAS28-CRP	Matsui,T. (74)	2011	-	-	-	-	-	0.942r DAS28-ESR/CRP, 0.906-0.955r SDAI, 0.895-0.933r CDAI; 0.415k SDAK, 0.427k CDAI, 0.329k DAS28-ESR/CRP	0.927r DAS28-ESR/CRP, 0.858-0.914r SDAI, 0.847-0.880r CDAI
DAS28-ESR, DAS28-CRP	Medeiros,M. (75)	2015	-	-	-	-	-	0.92r DAS28-ESR/CRP, 0.92r CDAI, 0.93r SDAI; 0.31-0.76k DAS28-ESR/CRP with various cut-offs, 0.38-0.46k SDAI, 0.35-0.44k CDAI	-
DAS28-ESR, DAS28-CRP	Nielung,L. (78)	2015	-	-	-	-	-	-	0.75k DAS28-ESR/DAS28-CRP response
DAS28-ESR, DAS28-CRP	Nishimoto,N. (79)	2010	-	-	-	-	-	DAS28-ESR: 0.818r CDAI, 0.854r SDAI baseline, 0.823r CDAI, 0.838r SDAI wk24; Baseline DAS28-CRP: 0.880r CDAI, 0.931r SDAI baseline, 0.898r CDAI, 0.910r SDAI wk24	DAS28-ESR: 0.772r chng CDAI, 0.803r chng SDAI. DAS28-CRP: 0.825r chng CDAI, 0.866r chng SDAI
DAS28-ESR	Rintelin,B. (88)	2009	0.66	-	-	-	-	r 0.91-0.92 with SDAI/CDAI. Agreement between SDAIC and DAS28C, k=0.551; agreement between CDAIC and DAS28C, k=0.525	-
DAS28-ESR	Salaffi,F. (91)	2009	0.72	0.87=correlation; kappa 0.418	-	-	-	-	-
DAS28-ESR, DAS28-CRP	Salaffi,F. (93)	2012	-	-	-	-	-	DAS28-ESRvsCRP 0.787r	DAS28-ESR SRM 1.35, ES 1.80; DAS28-CRP SRM 1.46, ES 1.74

DAS28-ESR, DAS28-CRP	Sheehy,C. (95)	2014	-	-	-	-	-	DAS28-ESR/CRP 0.92r, DAS28-CRP/SDAI 0.91r, DAS28-ESR/SDAI 0.97r; AUC SDAI remission 0.94 DAS28-ESR, 0.98 DAS28-CRP	-	
DAS28-ESR, DAS28-CRP	Siemons,L. (96)	2014	-	-	-	-	-	0.95r DAS28-ESR/CRP, 0.931 ICC DAS28-ESR/CRP; Discrepancy on Bland Altman (DAS28-CRP 0.2 lower on avg)	-	
DAS28-ESR, DAS28-CRP	Siemons,L. (97)	2014	-	0.85r DAS28-ESR, 0.86r DAS28-CRP	-	-	-	-	-	
DAS28-CRP	Sullivan,M.B. (98)	2010	-	-	-	-	-	0.48r RADAI, 0.84r CDAI, 0.71r RAPID5, 0.54r GAS	0.51r RADAI, 0.80r CDAI, 0.70r RAPID5, 0.50r GAS	
DAS28-ESR, DAS28-CRP	Tamhane,A. (99)	2013	-	-	-	-	-	0.92r DAS28-ESR/CRP (3v & 4v); 0.41k (4v), 0.28k (3v)	-	
DAS28-ESR	Uhlig,T. (101)	2009	-	Test-retest: 0.85r, 0.85ICC	MDC 14.4%, SDD 1.32	-	-	0.88-0.89r SDAI, 0.88r CDAI, 0.62-0.70r RAPID3, 0.71-0.72r RADAI	-	
DAS28-ESR, DAS28-CRP	Ward,M.M. (105)	2015	-	-	-	-	-	-	SRM DAS28-ESR -0.98, DAS28-CRP -0.95	
<b>Modified DAS28</b>										
	Baker,J.F. (7)	2014	-	-	-	-	-	0.30-0.33r RAMRIS-S, AUC 0.59-0.62 xray prog, mild outperform original	-	
<b>Modified DAS28 (no acute phase reactants)</b>										
	Bentley,M.J. (13)	2010	0.71a	-	-	-	-	0.87r DAS28, 0.91r SDAI, 0.96r CDAI. 0.70k DAS28, 0.77k CDAI, 0.71k SDAI.	0.50es, 0.58srm	
<b>Patient derived DAS28</b>										

	Cheung,P.P. (24)	2010	-	-	-	-	-	0.949ICC USDAS28, 0.900ICC DAS28	-
	Heegaard,C. (49)	2013	-	0.88-0.92r after 1 week	LSD 0.8-0.9, %LSD 23.2- 25.2	-	-	0.85-0.94r Pr DAS28	-
	Janta,I. (56)	2013	-	-	-	-	-	0.76r Pr-DAS28, 0.62ICC Pr-DAS28, PtDAS28 significantly higher than Pr-DAS28	-
	Kavanaugh,A. (59)	2010	-	0.7771r (TJC between physican/patient) ; 0.4341 (SJC between physican/patient at week 24.	-	-	-	DAS28 0.73, CDAI correation 0.73+; SDAI correlation 0.75+; kappa 0.54 at baseline, 0.57 at week 12, 0.55 at week 24	Kappa 0.45 EULAR response agreement DAS28 and Pt- DAS28
	Riazzoli,J. (87)	2010	-	-	-	-	-	correlations between DAS-28 and patDAS-28 r = 0.91 at baseline, r = 0.90 at 3 months.	-
<b>Ultrasound derived DAS28</b>									
	Cheung,P.P. (24)	2010	-	-	-	-	-	0.978ICC DAS28	-
	Mandl,P. (70)	2013	-	intraobserver 0.65 to 0.75 ICC	-	-	-	0.22-0.26r CRP	0.70-0.88 SRM
<b>Global arthritis score (GAS)</b>									
	Harrington,J.T. (48)	2009	-	-	-	-	-	0.45r PrGA	-
	Sullivan,M.B. (98)	2010	-	-	-	-	-	0.54r DAS28CRP, 0.82r RADAI, 0.73r CDAI, 0.82r RAPID5	0.50r DAS28- CRP, 0.71r RADAI, 0.62r CDAI, 0.71r RAPID5
<b>Hospital Universitario La Princesa Index (HUPI)</b>									
	Castrejon,I. (20)	2013	0.63a	-	-	-	-	0.89r DAS28-ESR, 0.91r DAS28-CRP, 0.71r SDAI, 0.8r CDAI	For GDA-Ph, HUPI (AUC 0.902). For GDA- P, HUPI (AUC 0.841)

	Gonzalez-Alvaro, I. (41)	2016	-	-	-	-	-	Comparison of the AUC for low-moderate disease activity: HUPI 0.909, SDAI 0.832, CDAI 0.789, DAS28-ESR 0.887, DAS28-CRP 0.913. Comparison of the AUC for moderate-high disease activity: HUPI 0.887, SDAI 0.756, CDAI 0.728, DAS28-ESR 0.846, DAS28-CRP 0.859.	-	
<b>Individualized Ultrasound Score (IUS)</b>										
	Tan, Y.K. (100)	2016	-	-	-	-	-	-	SRM -1.08 (7), -1.00 (12) (DAS28 -0.94)	
<b>Individualized Composite Ultrasound Score (ICUS)</b>										
	Tan, Y.K. (100)	2016	-	-	-	-	-	-	SRM -1.11 (7), -1.16 (12) (DAS28 -0.94)	
<b>Kappa/Lambda Hybrid Antibody</b>										
	Yi, L. (107)	2016	-	-	-	-	-	0.41r DAS28	-	
<b>Multi-biomarker Disease Activity Score (MBDA score , Vectra DA score)</b>										
	Bakker, M.F. (9)	2012	-	-	-	0.52r2 DAS28-CRP without CRP; non-CRP biomarkers associated with SJC, TJC, VAS	-	0.72r, 0.86AUC, 0.20-0.41K; marginal predictive rad prog (equal to DAS28-CRP)	24-34% 6m	
	Centola, M. (21)	2013	-	-	-	-	+ 3, CW-LASSO to derive components of DAS28-CRP	-	-	



	Curtis,J.R. (26)	2012	-	-	-	-	-	correlation with DAS28-CR: Seropositive (0.56r) and seroneg (0.43r), AUROC seropos 0.77 and seroneg 0.70. AUROC 0.71. Combined: AUROC 0.76, 0.57r. Seropositive validation: SDAI pearson's 0.55r, CDAI 0.48r, RAPID3 0.47r. Seronegative performance: SDAI 0.29r, CDAI 0.21r, RAPID3 0.26r.	0.51r (baseline to final visit), AUROC 0.77 change in baseline to final visit with DAS28-CRP response; (AUROC 0.72 at 2 weeks with change of DAS28-CRP response)
	Eastman,P.S. (36)	2012	-	Intraassay precision 1.1% (0.9-1.2); interassay precision median CV 1.6% (range 0-6.4%)	-	-	-	-	-
	Fleischmann,R.	2016	-	-	-	-	-	Discordant categorization at several timepoints vs. DAS28-CRP, CDAI, SDAI, RAPID3. MBDA not associated with radiographic progression	Differential improvement in MBDA score with abatacept vs. adalimumab treatment
	Hambardzumyan,K . (44)	2015	-	-	-	-	-	Independent predictor of radiographic progression, DAS28 was not.	
	Hambardzumyan,K . (45)	2016	-	-	-	-	-	Low/mod MBDA less radiographic progression than low/mod DAS28	
	Hirata,S. (53)	2016	-	-	-	-	-	+, predict radiographic progression, independent DAS28	-

	Hirata,S. (54)	2013	-	-	-	-	-	0.66r DAS28-ESR, 0.67r SDAI, 0.56r CDAI; AUC 0.83 boolean remission	0.55r chDAS28, 0.35r chSDAI, 0.18r chCDAI
	Hirata,S. (55)	2015	-	-	-	-	-	-	0.48r ch DAS28-ESR, 0.46r chDAS28-CRP. No significant correlation with chCDAI and chSDAI.
	Li,W. (66)	2016	-	-	-	-	-	MBDA discordant from DAS28, 28SJC, CRP. More predictive than DAS28-CRP for radiographic progression.	-
	Markusse,I.M. (72)	2014	-	-	-	-	-	Radiographic progression AUC 0.606 (better than DAS28)	-
	Reiss,W.G. (86)	2016	-	-	-	-	-	DAS28-CRP vs MBDA score, rho = 0.50; CDAI vs MBDA score, rho = 0.19	change over 24 weeks: MBDA scores decreased proportionately less than the DAS28-CRP.
	van der Helm-van Mil,A.H. (102)	2013	-	-	-	-	-	HDA vs remission more predictive radiographic progression for MBDA score than DAS28-CRP	-
<b>Mean Overall Index for RA (MOI-RA)</b>									
	Salaffi,F. (93)	2012	-	-	-	-	-	vs DAS28-CRP 0.625r, vs DAS28-ESR 0.774r	SRM 1.41, ES 1.70
<b>Optical Spectral Transmission (OST)</b>									
	van Onna,M. (103)	2016	-	-	-	-	-	0.42r DAS28, 0.27r RAMRIS, 0.81 AUROC US	-
<b>Patient Activity Scale (PAS)</b>									
	Salaffi,F. (93)	2012	-	-	-	-	-	vs RAPID3 0.891r; vs RADA1 0.787r	SRM 1.38, ES 1.57

Patient Based Disease Activity Score (PDAS1, PDAS2)									
	Leung,A.M. (65)	2016	-	ICC 0.78 between DAS28 and PDAS1. ICC 0.65 between DAS28 and PDAS2. ICC 0.65 between CDAI and PDAS1. ICC 0.68 between CDAI and PDAS2.	-	-	-	Compared to DAS28, k = 0.44 for PDAS1, k = 0.31 for PDAS2. Compared to CDAI, k = 0.27 for PDAS2, and k = 0.42 for PDAS2.	-
Patient Reported Clinical Arthritis Activity (PRO-CLARA)									
	Salaffi,F. (92)	2010	0.89; alpha = 0.8 for CLARA	-	-	(+); 84.2% and 80% of variance in PRO-CLARA and CLARA; TJC 45%, ROAD 24%, EGA 15.9%	-	correlation with DAS28 0.835 (spearman correlation)	-
	Salaffi,F. (93)	2012	-	-	-	-	-	vs RAPID3; 0.818r	SRM 1.42, ES 1.75
Rheumatoid Arthritis Disease Activity Index (RADAI)									
	Amaya-Amaya,J. (3)	2012	-	-	-	-	-	0.56r DAS28, 0.67r CDAI, 0.65r SDAI	-
	Salaffi,F. (93)	2012	-	-	-	-	-	vs RAPID3 0.818r	SRM 1.03, ES 1.36
	Sullivan,M.B. (98)	2010	-	-	-	-	-	0.48r DAS28-CRP, 0.70r CDAI, 0.76r RAPID5, 0.82r GAS	0.51r DAS28-CRP, 0.63r CDAI, 0.66r RAPID5, 0.71r GAS

	Uhlig,T. (101)	2009	-	Test-retest: 0.89r, 0.92ICC	MDC 14.9%, SDD 1.49	-	-	0.71-0.72r DAS28- ESR, 0.74-0.80r SDAI, 0.79-0.84r CDAI, 0.81-0.89r RAPID3	-
	Walter,M.J. (104)	2014	-	-	-	-	-	H.D.A DAS28 Sn 0.63 Sp 0.71 (RADAI <2.2)	-
<b>Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5)</b>									
	Bossert,M. (16)	2012	-	-	-	-	-	Spearman Coefficient: correlation b/w RADAI5 and DAS28 0.662, CDAI 0.743, SDAI 0.737	-
	Leeb,B.F. (63)	2009	0.906	-	-	-	(+); 3.65 (Eigenvalue)	tau 0.370 with DASESR-ESR, and tau 0.457 with CDAI	-
	Rintelin,B. (89)	2013	-	-	-	-	-	RADAI5 and SDAI 0.52k; RADAI5 and Boolean 0.49k; compared to DAS28 rho 0.655	-
<b>Rheumatoid Arthritis MRI Score (RAMRIS)</b>									
	Baker,J.F. (6)	2016	-	-	-	-	-	Synovitis 0.14-0.27r, osteitis 0.05-0.23r, erosion 0.11-0.28r with HAQ, PtGlobal	Synovitis 0.13- 0.24r, osteitis 0.03-0.11r, erosion 0.06- 0.20r with HAQ, PtGlobal
	Baker,J.F. (8)	2014	-	-	-	-	-	-	0.60-0.61 AUC (vdHS 0.56)
	Emery,P. (37)	2011	-	-	-	-	-	synovitis 0.15-0.40r, osteitis 0.00-0.22r, erosion -0.02-0.23r with DAS28	synovitis 0.22- 0.36r, osteitis 0.13-0.21r, erosion 0.10-0.17 with DAS28
	Nakahara,R. (77)	2015	-	-	-	-	-	RAMRIS 0.37r, RAMRIS-S 0.67r with DAS28-CRP	0.43r RAMRIS, 0.27r RAMRIS-S with change DAS28-CRP

	Sewerin,P. (94)	2014	-	-	-	-	-	-	0.499r change in DAS28, 0.338r change in SDAI
<b>Routine Assessment of Patient Index Data 3 (RAPID3)</b>									
	Amaya-Amaya,J. (3)	2012	-	-	-	-	-	0.52r DAS28, 0.73r CDAI, 0.71r SDAI	-
	Blanchais,A. (14)	2010	-	-	-	RAPID3 components explained most variance of RAPID4. Variance: pain 37%, global 36%, function 27%.	-	-	-
	Boone,N.W. (15)	2015	-	-	-	-	-	DAS28-ESR and RAPID3 correlated $\rho = 0.576$ and $\kappa = 0.27$	-
	Bossert,M. (16)	2012	-	-	-	-	-	Spearman Coefficient: shows correlation b/w RAPID3 and DAS28 0.637, CDAI 0.713, SDAI 0.714	-
	Castrejon,I. (19)	2013	-	-	-	-	-	85.8-93.7% agreement Boolean, 0.55-0.74k Boolean; 85.6-92.1% agreement SDAI, 0.57-0.71k SDAI	-
	Che,H. (23)	2016	-	-	-	RAPID-3 31-43% variance DAS28-3v	-	0.45-0.50r DAS28-3v, 0.70-0.93 AUC DAS28-3v	-

	Curtis,J.R. (28)	2015	-	-	-	-	-	-	Week 12: 0.22K RAPID3/CDAI. CDAI more sensitive to response at 12 weeks. CDAI and RAPID responders similar DAS28 improvement. RAPID3 non-responders still had DAS28 improvement.
	Fujiwara,M. (40)	2013	-	-	-	-	-	0.659r DAS28-ESR; 0.725r DAS28-CRP	-
	Khan,N.A. (61)	2012	-	-	-	-	-	LCC 0.95 for RAPID3-PTGL and RAPID3-GH	-
	Leeb,B.F. (63)	2009	0.871	-	-	-	-	tau 0.328 with DASESR-ESR, and tau 0.370 with CDAI	-
	Pincus,T. (82)	2011	-	-	-	-	-	0.70-0.73r DAS28 and CDAI, 0.53-0.60k DAS28 and CDAI	0.46-0.53K EULAR/DAS28 response criteria
	Pincus,T. (83)	2011	-	-	-	-	-	0.32-0.42k at 26/52 weeks (study endpoints)	0.43-0.51k RAPID-3 response and DAS28/EULAR response
	Pincus,T. (84)	2010	-	-	-	-	-	spearman 0.43 compared to DAS28; 0.61 compared to CDAI	-
	Qorolli,M. (85)	2016	-	-	-	(+); RAPID-3 and SOFI-hand score; 0.51r; RAPID-3 and pulp to palm 0.44r; (-) RAPID-3 and grip	-	0.73r correlation between RAPID-3 and DAS28	-

						strength - 0.69r			
	Salaffi, F. (93)	2012	-	-	-	-	-	vs RADAI 0.818r	SRM 1.26, ES 1.64
	Uhlig, T. (101)	2009	-	Test-retest: 0.88r, 0.90ICC	MDC 14.8%, SDD 1.48	-	-	0.62-0.70r DAS28-ESR, 0.66r SDAI, 0.74-0.76r CDAI, 0.81-0.89r RADAI	-
<b>Routine Assessment of Patient Index Data 4 (RAPID4)</b>									
	Amaya-Amaya, J. (3)	2012	-	-	-	-	-	0.56r DAS28, 0.75r CDAI, 0.73r SDAI	-
	Blanchais, A. (14)	2010	-	-	-	Majority variance explained by RAPID3. Variance: Pain 31%, global 30%, function 23%, TJC 16%	-	-	-
<b>Routine Assessment of Patient Index Data 5 (RAPID5)</b>									
	Amaya-Amaya, J. (3)	2012	-	-	-	-	-	0.66r DAS28, 0.83r CDAI, 0.85r SDAI	-
	Sullivan, M.B. (98)	2010	-	-	-	-	-	0.71r DAS28-CRP, 0.76r RADAI, 0.94r CDAI, 0.82r GAS	0.70r DAS28-CRP, 0.66r RADAI, 0.92r CDAI, 0.71r GAS
<b>Simplified Rheumatoid Arthritis MRI Score (SAMIS)</b>									

	Cyteval,C. (29)	2010	-	Intrareader, for SAMIS: k = 0.66 (erosion), 0.91 (synovitis), 1 (edema); for RAMIS: k = 0.67 (erosion), 0.81 (synovitis), 0.94 (edema). Interreader for RAMIS: k = 0.61 (erosion), K = 0.74 (synovitis), and k = 0.58 (edema); for SAMIS k=0.59 (erosion), K = 0.81 (synovitis), and k = 0.81 (edema).	-	-	-	correlation with RAMIS: Erosion r 0.91, Edema 0.79, Synovitis 0.94	-
<b>Simplified Disease Activity Index (SDAI)</b>									
	Alemao,E. (2)	2016	-	-	-	-	-	+, rem = improve HAQ & HRQOL	-
	Balsa,A. (11)	2010	-	-	-	-	-	0.45r DAS28, 0.25-0.27r number joints PDUS (better than DAS28), better discrimination of absence PD signal than DAS28	-
	Bentley,M.J. (13)	2010	0.61a	-	-	-	-	-	0.37es, 0.45srm
	Bossert,M. (16)	2012	-	-	-	-	-	Spearman Coefficient: .897 DAS28, 0.988 CDAI	-
	Castrejon,I. (19)	2013	-	-	-	-	-	94.7% agreement Boolean, 0.79k Boolean	-
	Castrejon,I. (20)	2013	alpha=0.48	-	-	-	-	r=0.71, n=664 for SDAI; AUC SDAI (0.957; P 0.971)	For GDA-Ph, SDAI (AUC 0.792, P 0.01). For GDA-P, SDAI (AUC 0.786, P 0.208.
	de Jong,P.H.P. (33)	2012	-	-	-	-	-	0.81-0.86r DAS variants, 0.77-0.89r DAS28 variants, 0.99r CDAI; 0.63-	-



								0.68k DAS variants, 0.57-0.71k DAS28 variants, 0.99k CDAI	
	Fujiwara,M. (40)	2013	-	-	-	-	-	0.874r DAS28-ESR; 0.945r DAS28-CRP	-
	Gulfe,A. (43)	2009	-	-	-	-	-	0.69-0.72k H DAS28, 0.55-0.63k M DAS28, 0.55-0.71k L DAS28, 0.15-0.42k R DAS28	0.54-0.71k ACR20/EULAR response
	Hamdi,W. (46)	2011	-	-	-	-	-	CON: 0.90r DAS28-ESR, 0.96r DAS28-CRP, 0.99r CDAI; CAT: 0.78kcc DAS28-ESR, 0.75kcc DAS28-CRP, 0.85kcc CDAI	-
	Heegaard,C. (49)	2013	-	0.91r after 1 week	LSD 7.6, %LSD 54.7	-	-	-	-
	Hirano,F. (52)	2016	-	-	-	-	-	+, achieving SDAI remission better functional and structural outcomes	-
	Kaneko,Y. (58)	2013	-	-	-	-	-	remission rates 28 joints versus 44 joints: SDAI 45.9% vs 43.1% [total misclassifications 2.4%]	-
	Mandl,P. (70)	2013	-	ICC 0.77	-	-	-	-	SRM 1.11
	Martins,F.M. (73)	2015	-	-	-	-	-	0.877r DAS28, 0.984r CDAI; 0.81k DAS28	-
	Matsui,T. (74)	2011	-	-	-	-	-	0.985r CDAI, 0.906-0.955 DAS28-ESR/CRP; 0.871k CDAI, 0.415k DAS28-ESR	0.858-0.914r DAS28-ESR/CRP, 0.969r CDAI
	Medeiros,M. (75)	2015	-	-	-	-	-	0.93r DAS28, 0.99r CDAI; 0.93k CDAI, 0.38-0.46k DAS28 (various cut-offs)	-
	Michaud,K. (76)	2009	-	-	-	-	-	-	0.37k ACR20, 0.54k EULAR Good/Mod

	Rintelin,B. (88)	2009	0.75	-	-	-	-	agreement between SDAIC and DAS28C, k=0.551; SDAIC and CDAIC, k=0.862	-
	Salaffi,F. (93)	2012	-	-	-	-	-	vs DAS28-ESR 0.742r; vs DAS28-CRP 0.661r	SRM 1.33, ES 1.68
	Uhlig,T. (101)	2009	-	Test-retest: 0.87r, 0.88 ICC	MDC 9.6%, SDD 8.26	-	-	0.88-0.89r DAS28-ESR, 0.94-0.95r CDAI, 0.66r RAPID3, 0.74-0.80r RADA1	-
	Ward,M.M. (105)	2015	-	-	-	-	-	-	SRM -0.97
<b>Modified SDAI</b>									
	Baker,J.F. (7)	2014	-	-	-	-	-	0.32-0.35r RAMRIS-S, 0.6 AUC xray prog, mild outperform original	-
<b>Patient derived SDAI</b>									
	Heegaard,C. (49)	2013	-	0.90r after 1 week	LSD 8.3, %LSD 59.9	-	-	0.92-0.93r Pr SDAI	-
	Janta,I. (56)	2013	-	-	-	-	-	0.873r SDAI, 0.678ICC SDAI	-
<b>Ultrasound derived SDAI</b>									
	Mandl,P. (70)	2013	-	intraobserver 0.86 to 0.90 ICC	-	-	-	0.32-0.44r CRP	0.52-1.17 SRM
	Yamada,Y. (106)	2016	-	-	-	-	-	0.51-0.56r ESR (SDAI 0.53r); 0.44-0.49r MHAQ (SDAI 0.47r)	-
<b>Swiss Sonography in Arthritis and Rheumatism (SONAR) Score</b>									

	Brulhart,L. (18)	2015	-	B-mode mean kappa 0.45, Doppler mean kappa 0.37, erosion mean kappa 0.33. Good machines: B-mode mean kappa 0.55 vs 0.33 (low) vs 0.64(high), Doppler mean kappa 0.64(high), erosion mean kappa 0.42 (high).	Mean absolute error: 4.64 (SD: 3.82) for B-mode only.	-	-	-	-	
	Zufferey,P. (109)	2014	-	-	-	-	-	B mode 0.40-0.41r DAS28, PD 0.40-0.41r DAS28	B mode 0.54r DAS28, PD 0.46r DAS28; SRM -0.31 Bmode, -0.23 log(PD); improved only SRM -0.80 Bmode, -0.86 log(PD)	
	Zufferey,P. (110)	2014	-	-	-	-	-	AUC 0.66 Bmode, 0.67 PD for DAS28; AUC 0.68 Bmode, 0.70PD for ACR/EULAR remission; AUC 0.73 combined DAS28, 0.73 combined ACR/EULAR	-	
<b>Ultrasound 6 joint (Perricone)</b>										
	Aga,A.B. (1)	2016	-	-	-	0.66-0.69 r2	-	-	0.55-0.6 SRM	
	Perricone,C. (81)	2012	-	-	-	US-6 detected 98% effusion on US-12, 100% of PDUS and synovitis	-	0.943r US-12 baseline, 0.918r US-12 3 mos, 0.535r DAS28 & 0.519r baseline	-	
<b>Ultrasound 6 joint (Rosa)</b>										

	Rosa,J. (90)	2016	-	-	-	-	-	US6-6 and DAS28 correlation 0.502=rho; AUC 0.80	-
<b>Ultrasound 6 joint (Kawashiri)</b>									
	Kawashiri,S.Y. (60)	2011	-	-	-	-	-	0.67r DAS28, 0.55r SDAI, 0.54r CDAI; 0.92r US-12	-
<b>Ultrasound 7 joint (Backhaus)</b>									
	Aga,A.B. (1)	2016	-	-	-	0.77-0.82 r2	-	-	0.55-0.6 SRM
	Backhaus,M. (4)	2009	-	inter 0.55-0.65K, intra 0.64-0.83 (on static images)	-	-	-	-	0.44r DAS28 3 mos; 0.31-0.38r DAS28 6 mos
	Backhaus,T.M. (5)	2013	-	-	-	-	-	Predict US7 erosion sum score 1 year, but less predictive than DAS28	S-GSUS 0.21- 0.42r, S-PDUS 0.18-0.46r, T- PDUS 0.23-0.32r (DAS28, ESR, CRP); NS in those switching bDMARD
	Leng,X. (64)	2016	-	0.8269r (GS + PD)	-	-	-	0.35-0.54r DAS28, 0.40-0.68r CRP, 0.17-0.64r HAQ, 0.12-0.32 sharp score; AUC 0.65- 0.75 remission	-
	Ohrndorf,S. (80)	2012	-	Inter 0.51k synovitis, 0.29k GSUS, 0.57 PDUS, 0.57k tenosynovitis, 0.45k erosion; intra data not shown (P values ~1)	-	-	-	-	-
	Tan,Y.K. (100)	2016	-	-	-	-	-	-	SRM -0.39 (DAS28 -0.94)
<b>Ultrasound 8 joint (Yoshimi)</b>									

	Yoshimi,R. (108)	2015	-	-	-	0.90 r2 total power doppler	-	0.97r total power doppler, 0.60r DAS28-CRP, 0.59r DAS28-ESR	-
<b>Ultrasound 12 joint (Naredo)</b>									
	Aga,A.B. (1)	2016	-	-	-	0.83 r2	-	-	0.6-0.7 SRM
PDUS	Kawashiri,S.Y. (60)	2011	-	-	-	-	-	0.72r DAS28, 0.60r SDAI, 0.60r CDAI	-
	Leng,X. (64)	2016	-	correlation 0.8269 (GS + PD)	-	-	-	-	-
	Perricone,C. (81)	2012	-	-	-	-	-	0.461r CRP	0.338r DAS28 change
	Tan,Y.K. (100)	2016	-	-	-	-	-	-	SRM -0.49 (DAS28 -0.94)
<b>Ultrasound 14 joint (Dale)</b>									
	Dale,J. (30)	2014	-	-	-	-	-	24-27% of those in DAS28 with remission/low disease activity with PD $\geq$ 2 joints	-
<b>Ultrasound 20, 28, and 38 joint (Dougados)</b>									
	Dougados,M. (34)	2010	0.76 to 0.89 vs 0.76 to 0.88	0.61 to 0.97 vs 0.53 to 0.82	-	-	-	-	0.60 to 1.21 vs 0.96 to 1.36
<b>Ultrasound 78 joint (Hammer)</b>									
	Hammer,H.B. (47)	2010	-	intraobserver: 0.97ICC BM, 0.98ICC PD	-	-	-	Baseline PD&BM: 0.18-28r DAS28, 0.33-45r CDAI, 0.34-46r SDAI; 12mos 0.60-0.64r DAS28, 0.73-0.75r CDAI, 0.77-0.78 SDAI	1-12 mos f/u: - 0.97 - -1.51 SRM BM, -0.83 - -1.21SRM PD, similar to CDAI, DAS28, SDAI
<b>Ultrasound Score A &amp; B (Aga)</b>									
	Aga,A.B. (1)	2016	-	-	-	0.91-0.95 r2	+, 9 factors (GSUS), 10 factors (PDUS)	-	0.6-0.8 SRM
<b>Ultrasound Scores (n=66 indices)</b>									

	Mandl,P. (71)	2012	-	intraobserver ICC 0.85 (0.60- 0.95) GS, 0.80 (0.56-0.93) PDUS (better than clinical exam)	SDC 4.18 (1.08-11.92) GS, 3.75 (1.67-7.29) PDUS	-	-	ESR/CRP 0.06-0.19r GS, 0.12-0.15 PDUS (better than clinical exam)	SRM 0-12wk 0.39 (-0.49-0.76) GS, 0.63 (0.29- 0.95 PDUS) (similar to clinical exam)
--	---------------	------	---	---	---	---	---	--	---

**Appendix 6.** COSMIN scoring of study quality for evaluation of psychometric properties.

Author	Year	RADAMs	Internal Consistency	Reliability	Measurement Error	Content Validity	Structural Validity	Hypothesis Testing	Responsiveness
Aga,A.B. (1)	2016	US-6, US-7, US-12, US-A,B	-	-	-	<b>E</b>	<b>F</b>	-	<b>F</b>
Alemao,E. (2)	2016	DAS28-CRP, CDAI, SDAI	-	-	-	-	-	<b>G</b>	-
Amaya-Amaya,J. (3)	2012	RADAI, RAPID-3, RAPID-4, RAPID-5, DAS28-CRP, CDAI, SDAI	-	-	-	-	-	<b>F</b>	-
Backhaus,M. (4)	2009	US-7	-	<b>F</b>	-	-	-	-	<b>G</b>
Backhaus,T.M. (5)	2013	US-7	-	-	-	-	-	<b>G</b>	<b>G</b>
Baker,J.F. (6)	2016	RAMRIS	-	-	-	-	-	<b>F</b>	<b>F</b>
Baker,J.F. (7)	2014	mCDAI, mDAS28, mSDAI	-	-	-	-	-	<b>G</b>	-
Baker,J.F. (8)	2014	RAMRIS-E	-	-	-	-	-	-	<b>G</b>
Bakker,M,F. (9)	2012	MBDA score	-	-	-	<b>E</b>	-	<b>G</b>	<b>G</b>
Bakker,M.F. (10)	2012	DAS28	-	-	-	<b>E</b>	-	-	-
Balsa,A. (11)	2010	SDAI, DAS28	-	-	-	-	-	<b>F</b>	-
Behrens,F. (12)	2013	DAS28	-	<b>F</b>	<b>F</b>	-	-	-	<b>F</b>
Bentley,M.J. (13)	2010	mDAS28, DAS28, CDAI, SDAI	<b>P</b>	-	-	-	-	<b>G</b>	<b>G</b>
Blanchais,A. (14)	2010	RAPID-3, RAPID-4	-	-	-	<b>G</b>	-	-	-
Boone,N.W. (15)	2015	RAPID-3, DAS28	-	-	-	-	-	<b>F</b>	-
Bossert,M. (16)	2012	RAPID3, RADAI5	-	-	-	-	-	<b>F</b>	-
Brode,S. (17)	2013	DAS28-ESR	-	<b>G</b>	<b>G</b>	-	-	-	-
Brulhart,L. (18)	2015	SONAR	-	<b>P</b>	<b>P</b>	-	-	-	-
Castrejon,I. (19)	2013	RAPID3 vs Boolean and SDAI, DAS28, CDAI, 5 candidate RAPID3 (RAPID3R, RAPID3R+SJ1, RAPID3R+SJ0, RAPID3R+SJ1+DJ1, RAPID3R+SJ0+D1)	-	-	-	-	-	<b>G</b>	-

Castrejon,I. (20)	2013	Hospital Universitario La Princesa Index (HUPI)	<b>P</b>	-	-	-	-	<b>G</b>	<b>G</b>
Centola,M. (21)	2013	MBDA score	-	-	-	-	<b>E</b>	-	-
Chandrashekara,S. (22)	2013	DAS28-CRP, DAS28-ESR	-	-	-	-	-	<b>P</b>	-
Che,H. (23)	2016	RAPID3, DAS28-3v	-	-	-	<b>F</b>	-	<b>G</b>	-
Cheung,P.P. (24)	2010	DAS28, US-DAS28, Pat-DAS28	-	-	-	-	-	<b>F</b>	-
Crowson,C.S. (25)	2009	DAS28-ESR, DAS28-CRP	-	-	-	-	-	<b>G</b>	-
Curtis,J.R. (26)	2012	MBDA score	-	-	-	-	-	<b>F</b>	<b>F</b>
Curtis,J.R. (27)	2012	CDAI	-	-	-	-	-	<b>F</b>	-
Curtis,J.R. (28)	2015	RAPID3, CDAI	-	-	-	-	-	-	<b>E</b>
Cyteval,C. (29)	2010	SAMIS (Simplified Rheumatoid Arthritis Magnetic Resonance Imaging Score)	-	<b>F</b>	-	-	-	<b>P</b>	-
Dale,J. (30)	2014	US-14, DAS28	-	-	-	-	-	<b>P</b>	-
Damjanov,N. (31)	2012	DAS28 US	-	<b>F</b>	-	-	-	<b>F</b>	-
De Jong,P.H. (32)	2012	DAS28-squeeze, DAS28 BCP (bilateral compression pain)	-	-	-	-	-	<b>G</b>	-
De Jong,P.H.P. (33)	2012	DAS, DAS28, SDAI, CDAI	-	-	-	-	-	<b>G</b>	-
Dougados,M. (34)	2010	US-20, US-28, US-38	<b>P</b>	<b>F</b>	-	-	-	-	<b>G</b>
Dougados,M. (35)	2011	DAS28-PGA-HS, DAS28-PGA-DA, DAS28-PGA-RAID	-	<b>F</b>	-	-	-	<b>G</b>	<b>G</b>
Eastman,P.S. (36)	2012	MBDA score	-	<b>P</b>	-	-	-	-	-
Emery,P. (37)	2011	RAMRIS	-	-	-	-	-	<b>G</b>	<b>G</b>



Fleischmann,R. (38)	2014	DAS28-ESR, DAS28-CRP, SDAI	-	<b>F</b>	-	-	-	<b>F</b>	-
Fleischmann,R. (39)	2016	MBDA score	-	-	-	-	-	<b>P</b>	<b>P</b>
Fujiwara,M. (40)	2013	DAS28-ESR, DAS28-CRP, SDAI, CDAI, RAPID-3	-	-	-	-	-	<b>F</b>	-
Gonzalez-Alvaro,I. (41)	2016	Hospital Universitario La Princesa Index (HUPI)	-	-	-	-	-	<b>F</b>	-
Greenberg,J.D. (42)	2009	CDAI, DAS28-ESR	-	-	-	-	-	<b>G</b>	<b>G</b>
Gulfe,A. (43)	2009	CDAI, DAS28, SDAI	-	-	-	-	-	<b>F</b>	<b>F</b>
Hambardzumyan,K. (44)	2015	MBDA score	-	-	-	-	-	<b>G</b>	-
Hambardzumyan,K. (45)	2016	MBDA score	-	-	-	-	-	<b>F</b>	-
Hamdi,W. (46)	2011	CDAI, DAS28, SDAI	-	-	-	-	-	<b>F</b>	-
Hammer,H.B. (47)	2010	US-78, CDAI, DAS28, SDAI	-	<b>P</b>	-	-	-	<b>P</b>	<b>P</b>
Harrington,J.T. (48)	2009	GAS	-	-	-	-	-	<b>F</b>	-
Heegaard,C. (49)	2013	Pat Report CDAI, DAS28, SDAI	-	<b>F</b>	<b>F</b>	-	-	<b>F</b>	-
Hensor,E.M.A. (50)	2010	DAS28-ESR, DAS28-CRP	-	-	-	-	-	<b>G</b>	<b>G</b>
Hirabayashi,Y. (51)	2013	DAS28-ESR	-	-	-	-	-	-	-
Hirano,F. (52)	2016	SDAI	-	-	-	-	-	<b>F</b>	-
Hirata,S. (53)	2016	MBDA score	-	-	-	-	-	<b>F</b>	-
Hirata,S. (54)	2013	MBDA score	-	-	-	-	-	<b>G</b>	<b>G</b>
Hirata,S. (55)	2015	MBDA score	-	-	-	-	-	-	<b>G</b>
Janta,I. (56)	2013	Pt DAS28, Pr DAS28, Pt SDAI, Pr SDAI	-	-	-	-	-	<b>F</b>	-
Jensen Hansen,I.M. (57)	2016	DAS28	-	-	-	-	-	<b>F</b>	-

Kaneko,Y. (58)	2013	44-joint count; DAS28, SDAI, CDAI	-	-	-	-	-	<b>F</b>	-
Kavanaugh,A. (59)	2010	Pt-DAS28	-	<b>F</b>	-	-	-	<b>F</b>	<b>F</b>
Kawashiri,S.Y. (60)	2011	12j-PDUS	-	-	-	-	-	<b>P</b>	-
Khan,N.A. (61)	2012	PTGL, GH	-	<b>E</b>	<b>E</b>	-	-	<b>G</b>	-
Koevoets,R. (62)	2011	DAS, DAS28, DAS53, DAS44	-	-	-	-	-	<b>F</b>	-
Leeb,B.F. (63)	2009	RAPID-3, RADAI-5, DAS28-ESR, CDAI	<b>P</b>	-	-	-	<b>G</b>	<b>G</b>	-
Leng,X. (64)	2016	US-7, US-12	-	<b>F</b>	-	-	-	<b>G</b>	-
Leung,A.M.H. (65)	2016	PDAS1, PDAS2, DAS28, CDAI	-	<b>F</b>	-	-	-	<b>F</b>	-
Li,W. (66)	2016	MBDA score	-	-	-	-	-	<b>F</b>	-
Lisbona,M.P. (67)	2016	Hand MRI	-	-	-	-	-	<b>F</b>	-
Madsen,O.R. (68)	2013	DAS28 (3), DAS28 (4)	-	<b>F</b>	<b>F</b>	-	-	-	<b>F</b>
Madsen,O.R. (69)	2011	DAS28-CRP (3), DAS28-CRP (4)	-	<b>F</b>	<b>F</b>	-	-	-	-
Mandl,P. (70)	2013	SDAI, DAS28, multimodal based on US-GS and US-PD.	-	<b>F</b>	-	-	-	<b>F</b>	<b>F</b>
Mandl,P. (71)	2012	n=66 US indices	-	<b>G</b>	<b>G</b>	-	-	<b>F</b>	<b>G</b>
Markusse,I.M. (72)	2014	MBDA score	-	-	-	-	-	<b>F</b>	-
Martins,F.M. (73)	2015	DAS28, CDAI, SDAI	-	-	-	-	-	<b>G</b>	-
Matsui,T. (74)	2011	DAS28-ESR, DAS28-CRP, CDAI, SDAI	-	-	-	-	-	<b>G</b>	<b>F</b>
Medeiros,M. (75)	2015	DAs28-ESR, DAS28-CRP, CDAI, SDAI	-	-	-	-	-	<b>G</b>	-
Michaud,K. (76)	2009	CDAI, SDAI	-	-	-	-	-	-	<b>G</b>
Nakahara,R. (77)	2015	RAMRIS, DAS28- CRP	-	-	-	-	-	<b>P</b>	<b>P</b>
Nielung,L. (78)	2015	DAS28-ESR, DAS28-CRP	-	-	-	-	-	-	<b>F</b>

Nishimoto,N. (79)	2010	DAS28-ESR, DAS28-CRP, CDAI, SDAI	-	-	-	-	-	<b>G</b>	<b>G</b>
Ohrndorf,S. (80)	2012	US-7	-	<b>P</b>	-	-	-	-	-
Perricone,C. (81)	2012	US-7, US-12, DAS28	-	-	-	<b>E</b>	-	<b>F</b>	<b>F</b>
Pincus,T. (82)	2011	RAPID3, CDAI, DAS28	-	-	-	-	-	<b>F</b>	<b>F</b>
Pincus,T. (83)	2011	RAPID3, DAS28	-	-	-	-	-	<b>G</b>	<b>G</b>
Pincus,T. (84)	2010	DAS28, CDAI, RAPID3	-	-	-	-	-	<b>F</b>	-
Qorolli,M. (85)	2016	RAPID3, DAS28	-	-	-	<b>E</b>	-	<b>F</b>	-
Reiss,W.G. (86)	2016	MBDA score	-	-	-	-	-	<b>G</b>	<b>F</b>
Riazzoli,J. (87)	2010	patient derived DAS28	-	-	-	-	-	<b>F</b>	-
Rintelin,B. (88)	2009	CDAI, DAS28, SDAI	<b>F</b>	-	-	-	-	<b>F</b>	-
Rintelin,B. (89)	2013	RADAI5	-	-	-	-	-	<b>F</b>	-
Rosa,J. (90)	2016	US-6, US-10, US-22	-	-	-	-	-	<b>F</b>	-
Salaffi,F. (91)	2009	DAS28, CDAI	<b>E</b>	<b>F</b>	-	-	-	-	-
Salaffi,F. (92)	2010	PRO-CLARA	<b>F</b>	-	-	<b>P</b>	-	<b>F</b>	-
Salaffi,F. (93)	2012	DAS28, SDAI, CDAI, MOI-RA, PRO- CLARA, RAPID3, RADAI, PAS	-	-	-	-	-	<b>F</b>	<b>F</b>
Sewerin,P. (94)	2014	RAMRIS	-	-	-	-	-	-	<b>P</b>
Sheehy,C. (95)	2014	DAS28, SDAI	-	-	-	-	-	<b>G</b>	-
Siemons,L. (96)	2014	DAS28-ESR, DAS28-CRP	-	-	-	-	-	<b>G</b>	-
Siemons,L. (97)	2014	DAS28-ESR, DAS28-CRP	-	<b>F</b>	-	-	-	-	-
Sullivan,M.B. (98)	2010	DAS28-CRP, CDAI, RAPID5, RADAI, GAS	-	-	-	-	-	<b>G</b>	<b>G</b>
Tamhane,A. (99)	2013	DAS28-ESR, DAS28-CRP	-	-	-	-	-	<b>G</b>	-
Tan,Y.K. (100)	2016	IUS, ICUS, US-7, US-12, DAS28	-	-	-	-	-	-	<b>P</b>

Uhlig,T. (101)	2009	CDAI, DAS28-ESR, RADAI, RAPID3, SDAI	-	<b>P</b>	<b>P</b>	-	-	<b>P</b>	-
Van der Helm-van Mil,A.H. (102)	2013	MBDA score	-	-	-	-	-	<b>G</b>	-
van Onna,M. (103)	2016	OST	-	-	-	-	-	<b>G</b>	-
Walter,M.J. (104)	2014	RADAI, DAS28	-	-	-	-	-	<b>F</b>	-
Ward,M.M. (105)	2015	DAS28, CDAI, SDAI	-	-	-	-	-	-	<b>G</b>
Yamada,Y. (106)	2016	US SDAI	-	-	-	-	-	<b>F</b>	-
Yi,L. (107)	2016	K/L antibody, DAS28	-	-	-	-	-	<b>F</b>	-
Yoshimi,R. (108)	2015	US-8, DAS28	-	-	-	<b>E</b>	-	<b>G</b>	-
Zufferey,P. (109)	2014	SONAR, DAS28	-	-	-	-	-	<b>G</b>	<b>G</b>
Zufferey,P. (110)	2014	SONAR, DAS28	-	-	-	-	-	<b>G</b>	-
COSMIN checklist with 4-point scale (111): E = excellent; G = good; F = fair; P = poor. Lowest individual score for each property determines the overall score for that property.									

**Appendix 7.** Summary of literature of RA disease activity measures from period before current search.

<b>RADAM</b>	<b>Internal Consistency</b>	<b>Reliability</b>	<b>Measurement Error</b>	<b>Content Validity</b>	<b>Structural Validity</b>	<b>Hypotheses testing</b>	<b>Responsiveness</b>	<b>Source</b>
Clinical Disease Activity Index (CDAI)	-	Test retest 0.89r, 0.89ICC	SDD 8.05	Includes ACR core measures	-	Correlates with DAS28, HAQ, US swollen joint, radiographic change.	Discriminates ACR response, correlates with change HAQ	Anderson,J.K. (112)
Disease Activity Score (DAS)	-	test retest 0.8-0.89	-	Includes ACR core measures	-	Correlate with physical function	More responsive than single ACR core measure, less than ACR20	Anderson,J.K. (112)
Disease Activity Score 28 joints (DAS28)	-	test retest 0.85	MID 1.2	Includes ACR core measures	-	0.8k EULAR response, correlate with physical function, correlate with radiographic progression	More responsive than single ACR core measure, less than ACR20, better than DAS	Anderson,J.K. (112)
Global arthritis score (GAS)	-	-	-	-	-	-	-	n/a
Hospital Universitario La Princesa Index (HUPI)	-	-	-	-	-	-	-	n/a
Individualized Ultrasound Score	-	-	-	-	-	-	-	n/a
Individualized Composite Ultrasound Score	-	-	-	-	-	-	-	n/a
Kappa/Lambda hybrid antibody	-	-	-	-	-	-	-	n/a
Mean Overall Index for RA (MOI-RA)	-	-	-	Includes ACR core measures	-	Correlates with DAS28 and HAQ	Change correlates with change in DAS28	Anderson,J.K. (112)

Multi-biomarker Disease Activity Score (MBDA)	-	-	-	-	-	-	-	n/a
Optical Spectral Transmission (OST)	-	-	-	-	-	-	-	n/a
Patient Activity Scale (PAS)	-	-	-	ACR core patient measures, no provider data	-	Correlates with SF-36 and EuroQol	-	Anderson, J.K. (112)
Patient Activity Scale-II (PASII)	-	-	-	ACR core patient measures, no provider data	-	0.25k DAS28, 0.29k PrGA, 0.40k CDAI. Correlates with SF-36 and EuroQol	-	Anderson, J.K. (112)
Patient Based Disease Activity Score (PDAS1)	-	test retest 0.76-0.88ICC	-	Subset of ACR core measures	-	Moderate correlation DAS28, CDAI (0.7-0.9r)	Similar sensitivity to change as DAS28	Anderson, J.K. (112)
Patient Based Disease Activity Score (PDAS2)	-	test retest 0.76-0.88ICC	-	Subset of ACR core measures	-	Moderate correlation DAS28, CDAI 0.0.7-0.8r)	Similar sensitivity to change as DAS28	Anderson, J.K. (112)
Patient Reported Clinical Arthritis Activity (PRO-CLARA)	-	-	-	-	-	-	-	n/a
Rheumatoid Arthritis Disease Activity Index (RADAI)	0.87-0.91a	test retest 0.92ICC	Change 1.4 clinically meaningful	RA symptoms, no physician or lab	One dimensional	Correlated (low/mod) with TJC, SJC, GA. Variable correlation with APRs. 0.53-0.57r DAS28 and HAQ.	Skewed distribution toward normal, limiting numerical improvement. Discriminates EULAR responders.	Anderson, J.K. (112)

Rheumatoid Arthritis Disease Activity Index 5 (RADAI-5)	0.92a	-	-	RA symptoms, no physician or lab	One dimensional	Fair agreement DAS28, SDAI, CDAI (0.29-0.39k). Mod correlation DAS28, SDAI, DAI 0.64-0.74r.	0.57-0.59r and 0.30-0.54k DAS28/CDAI change. No significant group changes between 2 assessments in 3 mos	Anderson,J.K. (112)
Rheumatoid Arthritis MRI scoring (RAMRIS)	-	interreader ICC acceptable at MCP and wrist	SDD determined at wrist and MCP for components	Bone edema, erosion, synovitis. No ACR core measures	-	Bone edema predict erosions. Identify synovitis 90% of clinical remission	Improvement synovitis score with treatment	Conaghan P, (113) Lassere,M. (114) Haavardsholm,E.A. (115) Haavardsholm,E.A. (116) Lisbona,M.P. (117)
Routine Assessment of Patient Index Data 3 (RAPID3)	-	test retest 0.88r, 0.90ICC	SDD 1.48	ACR core patient measures, no provider data	-	0.7r DAS28 and CDAI. Fair agreement in other study.	-	Anderson,J.K. (112)
Routine Assessment of Patient Index Data 4 (RAPID4)	-	-	-	Includes ACR core measures	-	0.7r DAS28 and CDAI	-	Anderson,J.K. (112)
Routine Assessment of Patient Index Data 5 (RAPID5)	-	-	-	Includes ACR core measures	-	0.7r DAS28 and CDAI	-	Anderson,J.K. (112)
Simplified Disease Activity Index (SDAI)	-	te-retest 0.87r, 0.88ICC	SDD 8.26, SDAI change 16 = 1.2 DAS28 change	Includes ACR core measures	-	Correlates with DAS28 (0.8-0.9r), CDAI, HAQ, pain. Predict radiographic progression	Consistent change with DAS28, HAQ, ACR20; correlates with change in HAQ	Anderson,J.K. (112)
Simplified RA MRI Score (SAMIS)	-	-	-	-	-	-	-	n/a
Swiss Sonography in Arthritis and Rheumatism (SONAR) Score	-	-	-	-	-	-	-	n/a
Ultrasound 6 joint (Perricone)	-	-	-	-	-	-	-	n/a
Ultrasound 6 joint (Rosa)	-	-	-	-	-	-	-	n/a

Ultrasound 6 joint (Kawashiri)	-	-	-	-	-	-	-	n/a
Ultrasound 7 joint (Backhaus)	-	-	-	-	-	-	-	n/a
Ultrasound 8 joint (Yoshimi)	-	-	-	-	-	-	-	n/a
Ultrasound 12 joint (Naredo)	-	grading (not acquisition) intraobserver ICC 0.97, interobserver 0.5-0.8 kendall's w	SDD 0.47-1.03, Mean decrease 1.8-4.9	Detected 90-100% of patients with activity on 44 joint US. 0.86r with 44-joint	-	0.35-0.56r DAS28	-	Naredo,E. (118)
Ultrasound 14 joint (Dale)	-	-	-	-	-	-	-	n/a
Ultrasound 20 joint (Dougados)	-	-	-	-	-	-	-	n/a
Ultrasound 28 joint (Dougados)	-	-	-	-	-	-	-	n/a
Ultrasound 38 joint (Dougados)	-	-	-	-	-	-	-	n/a
Ultrasound 78 joint (Hammer)	-	-	-	-	-	-	-	n/a
Ultrasound score A and B (Aga)	-	-	-	-	-	-	-	n/a



## Appendix 8. References

1. Aga AB, Hammer HB, Olsen IC, Uhlig T, Kvien TK, Van DH, et al. First step in the development of an ultrasound joint inflammation score for rheumatoid arthritis using a data-driven approach. *Annals of the Rheumatic Diseases*. 2016;75(8):1444-51.
2. Alemao E, Joo S, Kawabata H, Al MJ, Allison PD, Rutten-van Molken MPMH, et al. Effects of Achieving Target Measures in Rheumatoid Arthritis on Functional Status, Quality of Life, and Resource Utilization: Analysis of Clinical Practice Data. *Arthritis care & research*. 2016;68(3):308-17.
3. Amaya-Amaya J, Botello-Corzo D, Calixto O-J, Calderon-Rojas R, Dominguez A-M, Cruz-Tapias P, et al. Usefulness of patients-reported outcomes in rheumatoid arthritis focus group. *Arthritis*. 2012;2012:935187.
4. Backhaus M, Ohrndorf S, Kellner H, Strunk J, Backhaus TM, Hartung W, et al. Evaluation of a novel 7-joint ultrasound score in daily rheumatologic practice: a pilot project. *Arthritis & Rheumatism*. 2009;61(9):1194-201.
5. Backhaus TM, Ohrndorf S, Kellner H, Strunk J, Hartung W, Sattler H, et al. The US7 score is sensitive to change in a large cohort of patients with rheumatoid arthritis over 12 months of therapy. *Annals of the Rheumatic Diseases*. 2013;72(7):1163-9.
6. Baker JF, Conaghan PG, Emery P, Baker DG, Ostergaard M. Relationship of patient-reported outcomes with MRI measures in rheumatoid arthritis. *Annals of the Rheumatic Diseases*. 2016.
7. Baker JF, Conaghan PG, Smolen JS, Aletaha D, Shults J, Emery P, et al. Development and validation of modified disease activity scores in rheumatoid arthritis: superior correlation with magnetic resonance imaging-detected synovitis and radiographic progression. *Arthritis & Rheumatology*. 2014;66(4):794-802.
8. Baker JF, Ostergaard M, Emery P, Hsia EC, Lu J, Baker DG, et al. Early MRI measures independently predict 1-year and 2-year radiographic progression in rheumatoid arthritis: secondary analysis from a large clinical trial. *Annals of the Rheumatic Diseases*. 2014;73(11):1968-74.
9. Bakker MF, Cavet G, Jacobs JW, Bijlsma JWJ, Haney DJ, Shen Y, et al. Performance of a multi-biomarker score measuring rheumatoid arthritis disease activity in the CAMERA tight control study. *Annals of the Rheumatic Diseases*. 2012;71(10):1692-7.
10. Bakker MF, Jacobs JWJ, Kruize AA, van der Veen MJ, van Booma-Frankfort C, Vreugdenhil SA, et al. Misclassification of disease activity when assessing individual patients with early rheumatoid arthritis using disease activity indices that do not include joints of feet. *Annals of the Rheumatic Diseases*. 2012;71(6):830-5.
11. Balsa A, de Miguel E, Castillo C, Peiteado D, Martin-Mola E. Superiority of SDAI over DAS-28 in assessment of remission in rheumatoid arthritis patients using power Doppler ultrasonography as a gold standard. *Rheumatology*. 2010;49(4):683-90.
12. Behrens F, Tony H-P, Alten R, Kleinert S, Scharbatke EC, Kohm M, et al. Development and validation of a new disease activity score in 28 joints-based treatment response criterion for rheumatoid arthritis. *Arthritis care & research*. 2013;65(10):1608-16.

13. Bentley MJ, Greenberg JD, Reed GW. A modified rheumatoid arthritis disease activity score without acute-phase reactants (mDAS28) for epidemiological research. *Journal of Rheumatology*. 2010;37(8):1607-14.
14. Blanchais A, Berthelot J-M, Fontenoy A-M, le Goff B, Maugars Y. Weekly home self-assessment of RAPID-4/3 scores in rheumatoid arthritis: a 6-month study in 26 patients. *Joint, Bone, Spine: Revue du Rhumatisme*. 2010;77(6):582-7.
15. Boone NW, Teeuwisse P, van der Kuy P-H, Janknegt R, Landewe RBM. Evaluating patient reported outcomes in routine practice of patients with rheumatoid arthritis treated with biological disease modifying anti rheumatic drugs (b-DMARDs). *Springerplus*. 2015;4:462.
16. Bossert M, Prati C, Vidal C, Bongain S, Toussirot E, Wendling D. Evaluation of self-report questionnaires for assessing rheumatoid arthritis activity: a cross-sectional study of RAPID3 and RADA15 and flare detection in 200 patients. *Joint, Bone, Spine: Revue du Rhumatisme*. 2012;79(1):57-62.
17. Brode S, Nisar MK, Ostor AJK. Same-day or historical ESR for disease activity score measurement: does it matter? *Clinical rheumatology*. 2013;32(2):261-5.
18. Brulhart L, Ziswiler H-R, Tamborrini G, Zufferey P, programmes SS. The importance of sonographer experience and machine quality with regards to the role of musculoskeletal ultrasound in routine care of rheumatoid arthritis patients. *Clinical & Experimental Rheumatology*. 2015;33(1):98-101.
19. Castrejon I, Dougados M, Combe B, Guillemin F, Fautrel B, Pincus T. Can remission in rheumatoid arthritis be assessed without laboratory tests or a formal joint count? possible remission criteria based on a self-report RAPID3 score and careful joint examination in the ESPOIR cohort. *Journal of Rheumatology*. 2013;40(4):386-93.
20. Castrejon I, Carmona L, Ortiz AM, Belmonte MA, Martinez-Lopez JA, Gonzalez-Alvaro I. Development and validation of a new disease activity index as a numerical sum of four variables in patients with early arthritis. *Arthritis care & research*. 2013;65(4):518-25.
21. Centola M, Cavet G, Shen Y, Ramanujan S, Knowlton N, Swan KA, et al. Development of a multi-biomarker disease activity test for rheumatoid arthritis. *PLoS ONE [Electronic Resource]*. 2013;8(4):e60635.
22. Chandrashekara S, Priyanka BU. Remission in rheumatoid arthritis by different criteria does not converge over the inflammatory markers. *International Journal of Rheumatic Diseases*. 2013;16(3):291-6.
23. Che H, Combe B, Morel J, Cantagrel A, Gossec L, Lukas C. Performance of patient-reported outcomes in the assessment of rheumatoid arthritis disease activity: the experience of the ESPOIR cohort. *Clinical & Experimental Rheumatology*. 2016;34(4):646-54.
24. Cheung PP, Ruysen-Witrand A, Gossec L, Paternotte S, Le Boulout C, Mazieres M, et al. Reliability of patient self-evaluation of swollen and tender joints in rheumatoid arthritis: A comparison study with ultrasonography, physician, and nurse assessments. *Arthritis care & research*. 2010;62(8):1112-9.
25. Crowson CS, Rahman MU, Matteson EL. Which measure of inflammation to use? A comparison of erythrocyte sedimentation rate and C-reactive protein measurements from randomized clinical trials of golimumab in rheumatoid arthritis. *Journal of Rheumatology*. 2009;36(8):1606-10.

26. Curtis JR, van der Helm-van Mil AH, Knevel R, Huizinga TW, Haney DJ, Shen Y, et al. Validation of a novel multibiomarker test to assess rheumatoid arthritis disease activity. *Arthritis care & research*. 2012;64(12):1794-803.
27. Curtis JR, Yang S, Chen L, Pope JE, Keystone EC, Haraoui B, et al. Determining the Minimally Important Difference in the Clinical Disease Activity Index for Improvement and Worsening in Early Rheumatoid Arthritis Patients. *Arthritis care & research*. 2015;67(10):1345-53.
28. Curtis JR, Churchill M, Kivitz A, Samad A, Gauer L, Gervitz L, et al. A Randomized Trial Comparing Disease Activity Measures for the Assessment and Prediction of Response in Rheumatoid Arthritis Patients Initiating Certolizumab Pegol. *Arthritis Rheumatol*. 2015;67(12):3104-12.
29. Cyteval C, Miquel A, Hoa D, Daures JP, Mariette X, Combe B. Rheumatoid arthritis of the hand: monitoring with a simplified MR imaging scoring method--preliminary assessment. *Radiology*. 2010;256(3):863-9.
30. Dale J, Purves D, McConnachie A, McInnes I, Porter D. Tightening up? Impact of musculoskeletal ultrasound disease activity assessment on early rheumatoid arthritis patients treated using a treat to target strategy. *Arthritis care & research*. 2014;66(1):19-26.
31. Damjanov N, Radunovic G, Prodanovic S, Vukovic V, Milic V, Simic Pasalic K, et al. Construct validity and reliability of ultrasound disease activity score in assessing joint inflammation in RA: comparison with DAS-28. *Rheumatology*. 2012;51(1):120-8.
32. De Jong PH, Weel AE, De Man YA, Huisman AM, Gerards AH, Van Krugten MV, et al. To squeeze or not to squeeze, that is the question! optimizing the disease activity score in 28 joints by adding the squeeze test of metatarsophalangeal joints in early rheumatoid arthritis. *Arthritis and Rheumatism*. 2012;64(10):3095-101.
33. de Jong PHP, Hazes JMW, van Zeben D, van der Lubbe PA, de Jager MH, de Sonnaville PB, et al. Treatment decisions and related costs differ significantly depending on the choice of a disease activity index in RA, according to 1987 and 2010 classification criteria. *Rheumatology*. 2012;51(7):1269-77.
34. Dougados M, Jousse-Joulin S, Mistretta F, D'Agostino MA, Backhaus M, Bentin J, et al. Evaluation of several ultrasonography scoring systems for synovitis and comparison to clinical examination: Results from a prospective multicentre study of rheumatoid arthritis. *Annals of the Rheumatic Diseases*. 2010;69(5):828-33.
35. Dougados M, Ripert M, Hilliquin P, Fardellone P, Brocq O, Brault Y, et al. The influence of the definition of patient global assessment in assessment of disease activity according to the Disease Activity Score (DAS28) in rheumatoid arthritis. *Journal of Rheumatology*. 2011;38(11):2326-8.
36. Eastman PS, Manning WC, Qureshi F, Haney D, Cavet G, Alexander C, et al. Characterization of a multiplex, 12-biomarker test for rheumatoid arthritis. *Journal of Pharmaceutical & Biomedical Analysis*. 2012;70:415-24.
37. Emery P, van der Heijde D, Ostergaard M, Conaghan PG, Genovese MC, Keystone EC, et al. Exploratory analyses of the association of MRI with clinical, laboratory and radiographic findings in patients with rheumatoid arthritis. *Annals of the Rheumatic Diseases*. 2011;70(12):2126-30.

38. Fleischmann R, van dH, Koenig AS, Pedersen R, Szumski A, Marshall L, et al. How much does Disease Activity Score in 28 joints ESR and CRP calculations underestimate disease activity compared with the Simplified Disease Activity Index? *Annals of the Rheumatic Diseases*. 2014.
39. Fleischmann R, Connolly SE, Maldonado MA, Schiff M. Brief Report: Estimating Disease Activity Using Multi-Biomarker Disease Activity Scores in Rheumatoid Arthritis Patients Treated With Abatacept or Adalimumab. *Arthritis Rheumatol*. 2016;68(9):2083-9.
40. Fujiwara M, Kita Y. Reexamination of the assessment criteria for rheumatoid arthritis disease activity based on comparison of the Disease Activity Score 28 with other simpler assessment methods. *Modern Rheumatology*. 2013;23(2):260-8.
41. Gonzalez-Alvaro I, Castrejon I, Ortiz AM, Toledano E, Castaneda S, Garcia-Vadillo A, et al. Cut-Offs and Response Criteria for the Hospital Universitario La Princesa Index (HUPI) and Their Comparison to Widely-Used Indices of Disease Activity in Rheumatoid Arthritis. *PLoS ONE [Electronic Resource]*. 2016;11(9):e0161727.
42. Greenberg JD, Harrold LR, Bentley MJ, Kremer J, Reed G, Strand V. Evaluation of composite measures of treatment response without acute-phase reactants in patients with rheumatoid arthritis. *Rheumatology*. 2009;48(6):686-90.
43. Gulfe A, Aletaha D, Saxne T, Geborek P. Disease activity level, remission and response in established rheumatoid arthritis: performance of various criteria sets in an observational cohort, treated with anti-TNF agents. *BMC Musculoskeletal Disorders*. 2009;10:41.
44. Hambardzumyan K, Bolce R, Saevarsdottir S, Cruickshank SE, Sasso EH, Chernoff D, et al. Pretreatment multi-biomarker disease activity score and radiographic progression in early RA: results from the SWEFOT trial. *Ann Rheum Dis*. 2015;74(6):1102-9.
45. Hambardzumyan K, Bolce RJ, Saevarsdottir S, Forslind K, Wallman JK, Cruickshank SE, et al. Association of a multibiomarker disease activity score at multiple time-points with radiographic progression in rheumatoid arthritis: results from the SWEFOT trial. *RMD Open*. 2016;2(1):e000197.
46. Hamdi W, Neji O, Ghannouchi MM, Kaffel D, Kchir MM. Comparative study of indices of activity evaluation in rheumatoid arthritis. *Annals of Physical & Rehabilitation Medicine*. 2011;54(7):421-8.
47. Hammer HB, Sveinsson M, Kongtorp AK, Kvien TK. A 78-joints ultrasonographic assessment is associated with clinical assessments and is highly responsive to improvement in a longitudinal study of patients with rheumatoid arthritis starting adalimumab treatment. *Annals of the Rheumatic Diseases*. 2010;69(7):1349-51.
48. Harrington JT. The uses of disease activity scoring and the physician global assessment of disease activity for managing rheumatoid arthritis in rheumatology practice. *Journal of Rheumatology*. 2009;36(5):925-9.
49. Heegaard C, Dreyer L, Egsmose C, Madsen OR. Test-retest reliability of the disease activity score 28 CRP (DAS28-CRP), the simplified disease activity index (SDAI) and the clinical disease activity index (CDAI) in rheumatoid arthritis when based on patient self-assessment of tender and swollen joints. *Clinical rheumatology*. 2013;32(10):1493-500.

50. Hensor EMA, Emery P, Bingham SJ, Conaghan PG, Consortium Y. Discrepancies in categorizing rheumatoid arthritis patients by DAS-28(ESR) and DAS-28(CRP): can they be reduced? *Rheumatology*. 2010;49(8):1521-9.
51. Hirabayashi Y, Ishii T, Michinoku Tocilizumab Study G. The DAS28-ESR cutoff value necessary to achieve remission under the new Boolean-based remission criteria in patients receiving tocilizumab. *Clinical rheumatology*. 2013;32(1):123-7.
52. Hirano F, Yokoyama W, Yamazaki H, Amano K, Kawakami A, Hayashi T, et al. Achieving simplified disease activity index remission in patients with active rheumatoid arthritis is associated with subsequent good functional and structural outcomes in a real-world clinical setting under a treat-to-target strategy. *Modern Rheumatology*. 2016:1-9.
53. Hirata S, Li W, Kubo S, Fukuyo S, Mizuno Y, Hanami K, et al. Association of the multi-biomarker disease activity score with joint destruction in patients with rheumatoid arthritis receiving tumor necrosis factor-alpha inhibitor treatment in clinical practice. *Modern Rheumatology*. 2016;26(6):850-6.
54. Hirata S, Dirven L, Shen Y, Centola M, Cavet G, Lems WF, et al. A multi-biomarker score measures rheumatoid arthritis disease activity in the BeSt study. *Rheumatology*. 2013;52(7):1202-7.
55. Hirata S, Li W, Defranoux N, Cavet G, Bolce R, Yamaoka K, et al. A multi-biomarker disease activity score tracks clinical response consistently in patients with rheumatoid arthritis treated with different anti-tumor necrosis factor therapies: A retrospective observational study. *Mod Rheumatol*. 2015;25(3):344-9.
56. Janta I, Naredo E, Martinez-Estupinan L, Nieto JC, De la Torre I, Valor L, et al. Patient self-assessment and physician's assessment of rheumatoid arthritis activity: which is more realistic in remission status? A comparison with ultrasonography. *Rheumatology*. 2013;52(12):2243-50.
57. Jensen Hansen IM, Asmussen Andreasen R, van BH, Emamifar A. The Reliability of Disease Activity Score in 28 Joints—C-Reactive Protein Might Be Overestimated in a Subgroup of Rheumatoid Arthritis Patients, When the Score Is Solely Based on Subjective Parameters: A Cross-sectional, Exploratory Study. *Journal of Clinical Rheumatology*. 2016.
58. Kaneko Y, Kondo H, Takeuchi T. American College of Rheumatology/European League Against Rheumatism remission criteria for rheumatoid arthritis maintain reliable performance when evaluated in 44 joints. *Journal of Rheumatology*. 2013;40(8):1254-8.
59. Kavanaugh A, Lee SJ, Weng HH, Chon Y, Huang X-Y, Lin S-L. Patient-derived joint counts are a potential alternative for determining Disease Activity Score. *Journal of Rheumatology*. 2010;37(5):1035-41.
60. Kawashiri SY, Kawakami A, Iwamoto N, Fujikawa K, Satoh K, Tamai M, et al. The power Doppler ultrasonography score from 24 synovial sites or 6 simplified synovial sites, including the metacarpophalangeal joints, reflects the clinical disease activity and level of serum biomarkers in patients with rheumatoid arthritis. *Rheumatology (UK)*. 2011;50(5):962-5.
61. Khan NA, Spencer HJ, Abda EA, Alten R, Pohl C, Ancuta C, et al. Patient's global assessment of disease activity and patient's assessment of general health for rheumatoid arthritis activity assessment: are they equivalent? *Annals of the Rheumatic Diseases*. 2012;71(12):1942-9.

62. Koevoets R, Klarenbeek NB, Guler-Yuksel M, van Oosterhout M, van Krugten MV, Kerstens PJSM, et al. Simplified versions of the original disease activity score: validation in the BeSt trial. *Annals of the Rheumatic Diseases*. 2011;70(8):1471-4.
63. Leeb BF, Sautner J, Mai HTH, Haindl PM, Deutsch C, Rintelen B. A comparison of patient questionnaires and composite indexes in routine care of rheumatoid arthritis patients. *Joint, Bone, Spine: Revue du Rhumatisme*. 2009;76(6):658-64.
64. Leng X, Xiao W, Xu Z, Zhu X, Liu Y, Zhao D, et al. Ultrasound<sup>7</sup> versus ultrasound<sup>12</sup> in monitoring the response to infliximab in patients with rheumatoid arthritis. *Clinical rheumatology*. 2016;35(3):587-94.
65. Leung AMH, Farewell D, Lau CS, Choy EHS. Defining criteria for rheumatoid arthritis patient-derived disease activity score that correspond to Disease Activity Score 28 and Clinical Disease Activity Index based disease states and response criteria. *Rheumatology*. 2016;55(11):1954-8.
66. Li W, Sasso EH, van der Helm-van Mil AH, Huizinga TW. Relationship of multi-biomarker disease activity score and other risk factors with radiographic progression in an observational study of patients with rheumatoid arthritis. *Rheumatology (Oxford)*. 2016;55(2):357-66.
67. Lisbona MP, Solano A, Ares J, Almirall M, Salman-Monte T, Maymo J. ACR/EULAR definitions of remission are associated with lower residual inflammatory activity compared with DAS28 remission on hand MRI in rheumatoid arthritis. *Journal of Rheumatology*. 2016;43(9):1631-6.
68. Madsen OR. Agreement between the DAS28-CRP assessed with 3 and 4 variables in patients with rheumatoid arthritis treated with biological agents in the daily clinic. *Journal of Rheumatology*. 2013;40(4):379-85.
69. Madsen OR. Is DAS28-CRP with three and four variables interchangeable in individual patients selected for biological treatment in daily clinical practice? *Clinical rheumatology*. 2011;30(12):1577-82.
70. Mandl P, Balint PV, Brault Y, Backhaus M, D'Agostino MA, Grassi W, et al. Clinical and ultrasound-based composite disease activity indices in rheumatoid arthritis: results from a multicenter, randomized study. *Arthritis care & research*. 2013;65(6):879-87.
71. Mandl P, Balint PV, Brault Y, Backhaus M, D'Agostino MA, Grassi W, et al. Metrologic properties of ultrasound versus clinical evaluation of synovitis in rheumatoid arthritis: results of a multicenter, randomized study. *Arthritis and Rheumatism*. 2012;64(4):1272-82.
72. Markusse IM, Dirven L, van den Broek M, Bijkerk C, Han KH, Roday HK, et al. A multibiomarker disease activity score for rheumatoid arthritis predicts radiographic joint damage in the BeSt study. *Journal of Rheumatology*. 2014;41(11):2114-9.
73. Martins FM, da Silva JAP, Santos MJ, Vieira-Sousa E, Duarte C, Santos H, et al. DAS28, CDAI and SDAI cut-offs do not translate the same information: results from the Rheumatic Diseases Portuguese Register Reuma.pt. *Rheumatology*. 2015;54(2):286-91.
74. Matsui T, Kuga Y, Nishino J, Kaneko A, Eto Y, Tohma S. Comparison of composite disease activity indices for rheumatoid arthritis. *Modern Rheumatology*. 2011;21(2):134-43.
75. Medeiros MMdC, de Oliveira BMGB, de Cerqueira JVM, Quixada RTdS, de Oliveira IMAX. Correlation of rheumatoid arthritis activity indexes (Disease Activity Score 28 measured

with ESR and CRP, Simplified Disease Activity Index and Clinical Disease Activity Index) and agreement of disease activity states with various cut-off points in a Northeastern Brazilian population. *Revista Brasileira de Reumatologia*. 2015;55(6):477-84.

76. Michaud K, Mikuls TR, Call SE, Reimold AM, Hooker R, Kerr GS, et al. Poor to modest agreement between rheumatoid arthritis response measures in clinical practice. *Clinical & Experimental Rheumatology*. 2009;27(4):633-40.

77. Nakahara R, Nishida K, Hashizume K, Harada R, Machida T, Horita M, et al. MRI of rheumatoid arthritis: comparing the outcome measures in rheumatology clinical trials (OMERACT) scoring and volume of synovitis for the assessment of biologic therapy. *Acta Medica Okayama*. 2015;69(1):29-35.

78. Nielung L, Christensen R, Danneskiold-Samsøe B, Bliddal H, Holm CC, Ellegaard K, et al. Validity and Agreement between the 28-Joint Disease Activity Score Based on C-Reactive Protein and Erythrocyte Sedimentation Rate in Patients with Rheumatoid Arthritis. *Arthritis*. 2015;2015.

79. Nishimoto N, Takagi N. Assessment of the validity of the 28-joint disease activity score using erythrocyte sedimentation rate (DAS28-ESR) as a disease activity index of rheumatoid arthritis in the efficacy evaluation of 24-week treatment with tocilizumab: Subanalysis of the SATORI study. *Modern Rheumatology*. 2010;20(6):539-47.

80. Ohrndorf S, Fischer IU, Kellner H, Strunk J, Hartung W, Reiche B, et al. Reliability of the novel 7-joint ultrasound score: results from an inter- and intraobserver study performed by rheumatologists. *Arthritis care & research*. 2012;64(8):1238-43.

81. Perricone C, Ceccarelli F, Modesti M, Vavala C, Di Franco M, Valesini G, et al. The 6-joint ultrasonographic assessment: a valid, sensitive-to-change and feasible method for evaluating joint inflammation in RA. *Rheumatology*. 2012;51(5):866-73.

82. Pincus T, Furer V, Keystone E, Yazici Y, Bergman MJ, Luijckens K. RAPID3 (Routine Assessment of Patient Index Data 3) severity categories and response criteria: Similar results to DAS28 (Disease Activity Score) and CDAI (Clinical Disease Activity Index) in the RAPID 1 (Rheumatoid Arthritis Prevention of Structural Damage) clinical trial of certolizumab pegol. *Arthritis care & research*. 2011;63(8):1142-9.

83. Pincus T, Hines P, Bergman MJ, Yazici Y, Rosenblatt LC, MacLean R. Proposed severity and response criteria for Routine Assessment of Patient Index Data (RAPID3): results for categories of disease activity and response criteria in abatacept clinical trials. *Journal of Rheumatology*. 2011;38(12):2565-71.

84. Pincus T, Swearingen CJ, Bergman MJ, Colglazier CL, Kaell AT, Kunath AM, et al. RAPID3 (Routine Assessment of Patient Index Data) on an MDHAQ (Multidimensional Health Assessment Questionnaire): agreement with DAS28 (Disease Activity Score) and CDAI (Clinical Disease Activity Index) activity categories, scored in five versus more than ninety seconds. *Arthritis care & research*. 2010;62(2):181-9.

85. Qorolli M, Hundozi-Hysenaj H, Rexhepi S, Rehxepe B, Grazio S. RAPID3 scores and hand outcome measurements in RA patients: a preliminary study. *Clinical rheumatology*. 2016;1-7.

86. Reiss WG, Devenport JN, Low JM, Wu G, Sasso EH. Interpreting the multi-biomarker disease activity score in the context of tocilizumab treatment for patients with rheumatoid arthritis. *Rheumatology international*. 2016;36(2):295-300.

87. Riazzoli J, Nilsson JK, Telemann A, Petersson IF, Rantapää-Dahlqvist S, Jacobsson LTH, et al. Patient-reported 28 swollen and tender joint counts accurately represent RA disease activity and can be used to assess therapy responses at the group level. *Rheumatology (UK)*. 2010;49(11):2098-103.
88. Rintelen B, Sautner J, Haindl PM, Andel I, Maktari A, Leeb BF. Comparison of three rheumatoid arthritis disease activity scores in clinical routine. *Scandinavian journal of rheumatology*. 2009;38(5):336-41.
89. Rintelen B, Sautner J, Haindl P, Mai H, Brezinschek H-P, Leeb BF. Remission in rheumatoid arthritis: a comparison of the 2 newly proposed ACR/EULAR remission criteria with the rheumatoid arthritis disease activity index-5, a patient self-report disease activity index. *Journal of Rheumatology*. 2013;40(4):394-400.
90. Rosa J, Ruta S, Saucedo C, Navarta DA, Catoggio LJ, Garcia-Monaco R, et al. Does a Simplified 6-Joint Ultrasound Index Correlate Well Enough With the 28-Joint Disease Activity Score to Be Used in Clinical Practice? *JCR: Journal of Clinical Rheumatology*. 2016;22(4):179-83.
91. Salaffi F, Cimmino MA, Leardini G, Gasparini S, Grassi W. Disease activity assessment of rheumatoid arthritis in daily practice: Validity, internal consistency, reliability and congruency of the Disease Activity Score including 28 joints (DAS28) compared with the Clinical Disease Activity Index (CDAI). *Clinical and experimental rheumatology*. 2009;27(4):552-9.
92. Salaffi F, Migliore A, Scarpellini M, Corsaro SM, Lagana B, Mozzani F, et al. Psychometric properties of an index of three patient reported outcome (PRO) measures, termed the CLinical ARthritis Activity (PRO-CLARA) in patients with rheumatoid arthritis. The NEW INDICES study. *Clinical & Experimental Rheumatology*. 2010;28(2):186-200.
93. Salaffi F, Ciapetti A, Gasparini S, Carotti M, Bombardieri S, New Indices study g. The comparative responsiveness of the patient self-report questionnaires and composite disease indices for assessing rheumatoid arthritis activity in routine care. *Clinical & Experimental Rheumatology*. 2012;30(6):912-21.
94. Sewerin P, Buchbender C, Vordenbaumen S, Scherer A, Miese F, Brinks R, et al. Advantages of a combined rheumatoid arthritis magnetic resonance imaging score (RAMRIS) for hand and feet: does the RAMRIS of the hand alone underestimate disease activity and progression? *BMC Musculoskeletal Disorders*. 2014;15:104.
95. Sheehy C, Evans V, Hasthorpe H, Mukhtyar C. Revising DAS28 scores for remission in rheumatoid arthritis. *Clinical rheumatology*. 2014;33(2):269-72.
96. Siemons L, Vonkeman HE, Ten Klooster PM, Van Riel PLCM, Laar VD. Interchangeability of 28-joint disease activity scores using the erythrocyte sedimentation rate or the C-reactive protein as inflammatory marker. *Clinical rheumatology*. 2014;33(6):783-9.
97. Siemons L, ten Klooster PM, Vonkeman HE, van de Laar MAFJ, Glas CAW. Further optimization of the reliability of the 28-joint disease activity score in patients with early rheumatoid arthritis. *PLoS ONE [Electronic Resource]*. 2014;9(6):e100544.
98. Sullivan MB, Iannaccone C, Cui J, Lu B, Batra K, Weinblatt M, et al. Evaluation of selected rheumatoid arthritis activity scores for office-based assessment. *Journal of Rheumatology*. 2010;37(12):2466-8.



99. Tamhane A, Redden DT, McGwin G, Jr., Brown EE, Westfall AO, Reynolds RJ, et al. Comparison of the disease activity score using erythrocyte sedimentation rate and C-reactive protein in African Americans with rheumatoid arthritis. *Journal of Rheumatology*. 2013;40(11):1812-22.
100. Tan YK, Allen JC, Jr., Lye WK, Conaghan PG, D'Agostino MA, Chew L-C, et al. Novel Ultrasound Joint Selection Methods Using a Reduced Joint Number Demonstrate Inflammatory Improvement when Compared to Existing Methods and Disease Activity Score at 28 Joints. *Journal of Rheumatology*. 2016;43(1):34-7.
101. Uhlig T, Kvien TK, Pincus T. Test-retest reliability of disease activity core set measures and indices in rheumatoid arthritis. *Annals of the Rheumatic Diseases*. 2009;68(6):972-5.
102. van der Helm-van Mil AH, Knevel R, Cavet G, Huizinga TW, Haney DJ. An evaluation of molecular and clinical remission in rheumatoid arthritis by assessing radiographic progression. *Rheumatology (Oxford)*. 2013;52(5):839-46.
103. van Onna M, Ten Cate DF, Tsoi KL, Meier AJL, Jacobs JWG, Westgeest AAA, et al. Assessment of disease activity in patients with rheumatoid arthritis using optical spectral transmission measurements, a non-invasive imaging technique. *Annals of the Rheumatic Diseases*. 2016;75(3):511-8.
104. Walter MJ, Mohd Din SH, Hazes JM, Lesaffre E, Barendregt PJ, Luime JJ. Is tightly controlled disease activity possible with online patient-reported outcomes? *Journal of Rheumatology*. 2014;41(4):640-7.
105. Ward MM, Guthrie LC, Alba MI. Clinically important changes in individual and composite measures of rheumatoid arthritis activity: thresholds applicable in clinical trials. *Annals of the Rheumatic Diseases*. 2015;74(9):1691-6.
106. Yamada Y, Ogasawara M, Gorai M, Matsuki Y, Murayama G, Sugisaki N, et al. The synovial grade corresponding to clinically involved joints and a feasible ultrasound-adjusted simple disease activity index for monitoring rheumatoid arthritis. *Modern Rheumatology*. 2016;26(6):844-9.
107. Yi L, Hao M, Lu T, Lin G, Chen L, Gao M, et al. Increased Kappa/Lambda Hybrid Antibody in Serum Is a Novel Biomarker Related to Disease Activity and Inflammation in Rheumatoid Arthritis. *Mediators of inflammation*. 2016;2016.
108. Yoshimi R, Ihata A, Kunishita Y, Kishimoto D, Kamiyama R, Minegishi K, et al. A novel 8-joint ultrasound score is useful in daily practice for rheumatoid arthritis. *Modern Rheumatology*. 2015;25(3):379-85.
109. Zufferey P, Brulhart L, Tamborrini G, Finckh A, Scherer A, Moller B, et al. Ultrasound evaluation of synovitis in RA: correlation with clinical disease activity and sensitivity to change in an observational cohort study. *Joint, Bone, Spine: Revue du Rhumatisme*. 2014;81(3):222-7.
110. Zufferey P, Moller B, Brulhart L, Tamborrini G, Scherer A, Finckh A, et al. Persistence of ultrasound synovitis in patients with rheumatoid arthritis fulfilling the DAS28 and/or the new ACR/EULAR RA remission definitions: results of an observational cohort study. *Joint, Bone, Spine: Revue du Rhumatisme*. 2014;81(5):426-32.
111. Terwee CB, Mokkink LB, Knol DL, Ostelo RW, Bouter LM, de Vet HC. Rating the methodological quality in systematic reviews of studies on measurement properties: a scoring system for the COSMIN checklist. *Qual Life Res*. 2012;21(4):651-7.

112. Anderson JK, Zimmerman L, Caplan L, Michaud K. Measures of rheumatoid arthritis disease activity: Patient (PtGA) and Provider (PrGA) Global Assessment of Disease Activity, Disease Activity Score (DAS) and Disease Activity Score with 28-Joint Counts (DAS28), Simplified Disease Activity Index (SDAI), Clinical Disease Activity Index (CDAI), Patient Activity Score (PAS) and Patient Activity Score-II (PASII), Routine Assessment of Patient Index Data (RAPID), Rheumatoid Arthritis Disease Activity Index (RADAI) and Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5), Chronic Arthritis Systemic Index (CASI), Patient-Based Disease Activity Score With ESR (PDAS1) and Patient-Based Disease Activity Score without ESR (PDAS2), and Mean Overall Index for Rheumatoid Arthritis (MOI-RA). *Arthritis Care Res (Hoboken)*. 2011;63 Suppl 11:S14-36.
113. Conaghan P, Lassere M, Ostergaard M, Peterfy C, McQueen F, O'Connor P, et al. OMERACT Rheumatoid Arthritis Magnetic Resonance Imaging Studies. Exercise 4: an international multicenter longitudinal study using the RA-MRI Score. *J Rheumatol*. 2003;30(6):1376-9.
114. Lassere M, McQueen F, Ostergaard M, Conaghan P, Shnier R, Peterfy C, et al. OMERACT Rheumatoid Arthritis Magnetic Resonance Imaging Studies. Exercise 3: an international multicenter reliability study using the RA-MRI Score. *J Rheumatol*. 2003;30(6):1366-75.
115. Haavardsholm EA, Ostergaard M, Ejbjerg BJ, Kvan NP, Uhlig TA, Lilleas FG, et al. Reliability and sensitivity to change of the OMERACT rheumatoid arthritis magnetic resonance imaging score in a multireader, longitudinal setting. *Arthritis Rheum*. 2005;52(12):3860-7.
116. Haavardsholm EA, Boyesen P, Ostergaard M, Schildvold A, Kvien TK. Magnetic resonance imaging findings in 84 patients with early rheumatoid arthritis: bone marrow oedema predicts erosive progression. *Ann Rheum Dis*. 2008;67(6):794-800.
117. Lisbona MP, Maymo J, Perich J, Almirall M, Perez-Garcia C, Carbonell J. Etanercept reduces synovitis as measured by magnetic resonance imaging in patients with active rheumatoid arthritis after only 6 weeks. *J Rheumatol*. 2008;35(3):394-7.
118. Naredo E, Rodriguez M, Campos C, Rodriguez-Heredia JM, Medina JA, Giner E, et al. Validity, reproducibility, and responsiveness of a twelve-joint simplified power doppler ultrasonographic assessment of joint inflammation in rheumatoid arthritis. *Arthritis Rheum*. 2008;59(4):515-22.