

Psoriatic Arthritis: Disease State



Module 4:

Psoriatic Arthritis: Assessment Tools & Outcome Measures

Measures of PsA

Diagnosis & Classification of PsA^{1,2}

- Clinical features
- Classification Criteria for Psoriatic Arthritis (CASPAR)

Joint Assessment^{1,2}

- Tender and swollen joint counts
- Enthesitis
 - Leeds Enthesitis Index (LEI)
 - Spondyloarthritis Research Consortium of Canada (SPARCC) Enthesitis Index
- Dactylitis - Leeds Dactylitis Index-Basic (LDI-B)
- Sharp-van der Heijde score modified for PsA (SvdH)
- Axial inflammation - Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)

Non-joint and Associated Symptoms^{1,2}

- Skin
 - Psoriasis Area and Severity Index (PASI)
 - Static Physician/Investigator Global Assessment (sPGA/sIGA)
- Nails Psoriasis Severity Index (NAPSI)
- Itch Numeric Rating Scale (Itch NRS)
- Fatigue Numeric Rating Scale (Fatigue NRS)

Quality of Life and Functional Measures^{1,2}

- Health Assessment Questionnaire-Disability Index (HAQ-DI)
- Dermatology Quality of Life Index (DLQI)
- Medical Outcomes Survey Short-Form (SF-36)

Composite Indices and Criteria^{2,3}

- Disease activity score 28-C-Reactive Protein (DAS-28-CRP)
- Composite Psoriatic Disease Activity Index (CPDAI)
- Psoriatic Arthritis Response Criteria (PsARC)
- Minimal Disease Activity (MDA)
- Disease Activity in Psoriatic Arthritis (DAPSA)
- Clinical Disease Activity in Psoriatic Arthritis (cDAPSA)
- American College of Rheumatology Response (ACR)

PsA=Psoriatic Arthritis.

1. Leung YY, et al. *Front Med (Lausanne)*. 2018;5:246. 2. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85. 3. Tiwari V, Brent LH. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2022. <https://www.ncbi.nlm.nih.gov/books/NBK547710/>(Accessed March 13, 2023).

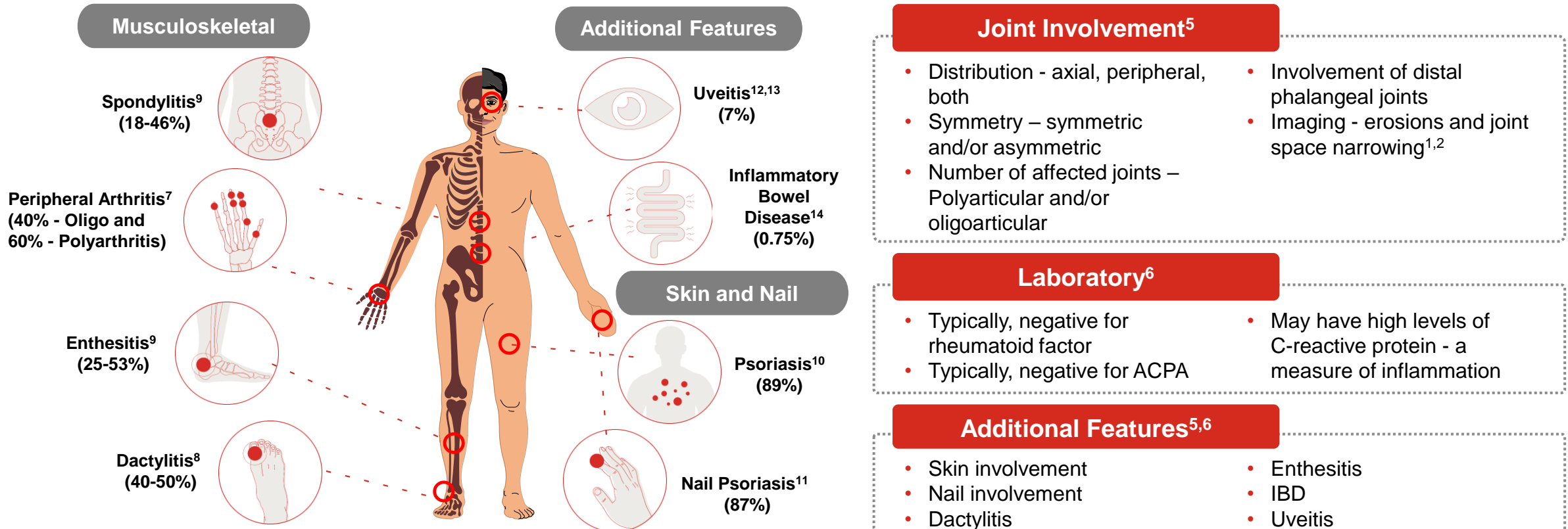
Diagnosis and Classification of PsA

PsA=Psoriatic Arthritis.

Clinical Features in Diagnosis

PsA Clinical Domains

A chronic, systemic inflammatory disease with musculoskeletal and non-musculoskeletal manifestations, including peripheral arthritis, enthesitis, tenosynovitis, tendinitis, dactylitis, inflammatory axial disease, skin and nail PsO, IBD, and uveitis¹⁻⁴



ACPA=Anti-Cyclic Citrullinated Peptide Antibody; IBD=Inflammatory Bowel Disease; PsA=Psoriatic Arthritis; PsO=Psoriasis.

1. Mease P. *Clin Exp Rheumatol*. 2015;33(Suppl. 93):S104-S108. 2. Gossec L, et al. *Ann Rheum Dis*. 2020;79:700-712. 3. Ritchlin CT, et al. *N Engl J Med*. 2017;376:957-970. 4. Gladman DD, et al. *Ann Rheum Dis*. 2005;64(Suppl. II):ii14-ii17. 5. Kishimoto M, et al. *Best Pract Res Clin Rheumatol*. 2021;35(2):101670. 6. Tiwari V, Brent LH. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2022. <https://www.ncbi.nlm.nih.gov/books/NBK547710/> (Accessed March 13, 2023). 7. Acosta Felquer ML, et al. *Clin Exp Rheumatol*. 2015;33(5 Suppl 93):S26-30. 8. Ritchlin CT, et al. *N Engl J Med*. 2017;376:957-970. 9. Liu JT, et al. *World J Orthop*. 2014;5:537-543. 10. Peluso R, et al. *Clin Rheumatol*. 2015;34:745-753. 11. Gladman DD, et al. *Ann Rheum Dis*. 2005;64(Suppl II):ii14-ii17. 12. Rosenbaum JT. *Clin Rheumatol*. 2015;4:999-1002. 13. Au S, et al. *Psoriasis Forum*. 2011;17:169-179. 14. Charlton R, et al. *Ann Rheum Dis*. 2018;77:277-280.

CASPAR: Classification Criteria for Psoriatic Arthritis

- To be classified as having PsA, a patient should have inflammatory articular disease (joint, spine, or enthesal) with a score of ≥ 3 points from the 5 categories listed in the following table^{1,2}

Criterion ^{1,2}	Description ¹
1. Evidence of psoriasis (one of a, b, or c; a maximum of 2 points for this criterion)	
a) Current psoriasis ^a (2 points)	Psoriatic skin or scalp disease present currently, as is judged by a rheumatologist or dermatologist
b) Personal history of psoriasis (1 point)	A history of psoriasis obtained from the patient, family physician, dermatologist, rheumatologist, or other qualified healthcare professional
c) Family history of psoriasis (1 point)	A history of psoriasis in a first- or second-degree relative per the patient
2. Psoriatic nail dystrophy (1 point)	
	Typical psoriatic nail dystrophy, including onycholysis, pitting, and hyperkeratosis, as observed during current physical examination
3. Negative test result for RF (1 point)	
	By any method except latex, but preferably by ELISA or nephelometry, according to the local laboratory reference range
4. Dactylitis (one of a, b; 1 point)	
a) Current	Swelling of an entire digit
b) History	A history of dactylitis recorded by a rheumatologist
5. Radiologic evidence of juxta-articular new bone formation (1 point)	
	Ill-defined ossifications near joint margins (excluding osteophyte formation) on plain X-ray films of hand or foot

^aCurrent psoriasis is assigned a score of 2, and all other items a score of 1.

CASPAR=Classification Criteria for Psoriatic Arthritis; ELISA=Enzyme-Linked Immunosorbent Assay; PsA=Psoriatic Arthritis; RF=Rheumatoid Factor.

1. Taylor W, et al. *Arthritis Rheum.* 2006;54(8):2665-2673. 2. Raychaudhuri SP, et al. *J Autoimmun.* 2017;76:21-37.

Joint Assessment

Joint Count: Tender and Swollen Joint Count

Assessing a Patient

Introduction:^{1,2}

- Inflammatory arthritis is one of the key features of PsA. As in rheumatoid arthritis (RA), the joints are assessed using a swollen and tender joint count

Purpose:²

- Joints are palpated for the purpose of determining if they are tender and/or swollen, the latter implying the presence of active synovitis, and both implying the presence of inflammation

Assessment:^{1,2}

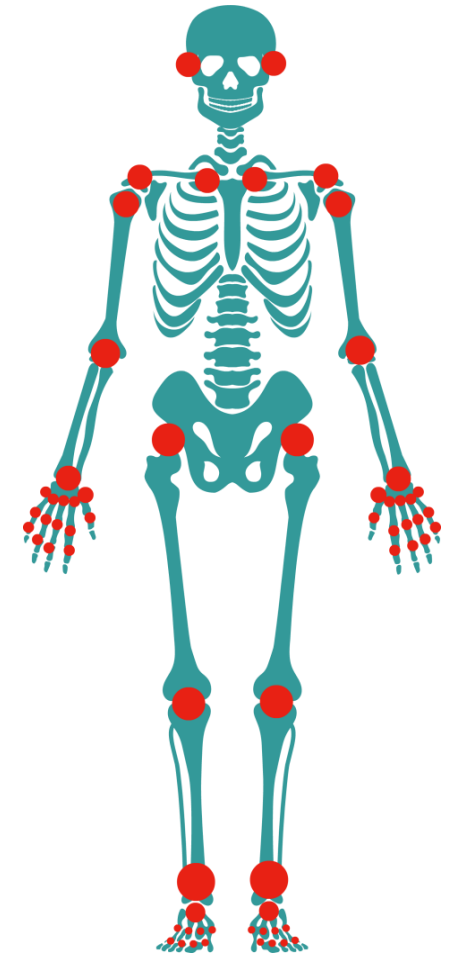
- Joints are assessed for tenderness and swelling
- A rule of thumb is to apply ~4 kg/cm² of pressure (enough to blanch the tip of the examiner's fingernail) at the joint line
- A physical examination of 68 tender and 66 swollen joint count (including the DIP joints of the hands and excluding hip swelling) is recommended in PsA as compared with 28-joint count in RA*
- Results are collected on a simple score sheet, on paper, or electronically

Scoring:²

- Presence or absence of tenderness and swelling (0=Absence and 1=Presence)

Interpretation:²

- Used in composite measures of arthritis such as the ACR score, DAS scoring systems, or PsARC, as well as emerging composite scoring systems



*Joints assessed include the distal interphalangeal (DIP), proximal interphalangeal (PIP), and metacarpophalangeal joints of the hands; the wrist, elbow, shoulder, acromioclavicular, sternoclavicular, temporomandibular, hip, knee, ankle, and midtarsal joints; and the metatarsophalangeal and PIP joints of the feet.

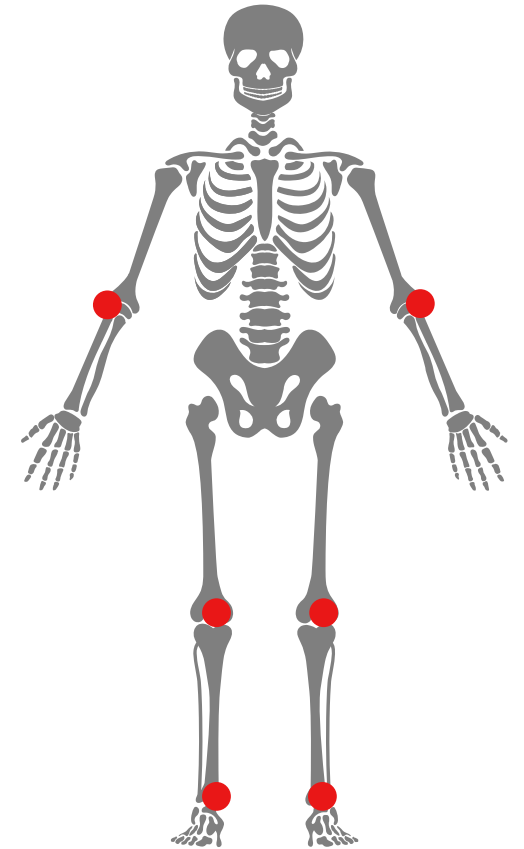
ACR=American College of Rheumatology; DAS=Disease Activity Score; DIP=Distal Interphalangeal; PsARC=Psoriatic Arthritis Response Criteria; RA=Rheumatoid Arthritis.

1. Tiwari V, Brent LH. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2022. <https://www.ncbi.nlm.nih.gov/books/NBK547710/> (Accessed March 13, 2023). 2. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85.

Leeds Enthesitis Index (LEI)

Assessing a Patient and Getting a Result

- Measurement of enthesitis at 6 bilateral sites^{1,2}
 1. Lateral epicondyles of the humerus
 2. Medial femoral condyles
 3. Achilles tendon insertions
- At each site, a score of 0 (no pain) or 1 (painful) is given after palpation by the healthcare practitioner^{1,2}
 - Enough pressure should be exerted so that the fingernail of the examiner is blanched^{1,2}
- Scores range from 0 to 6^{1,2}

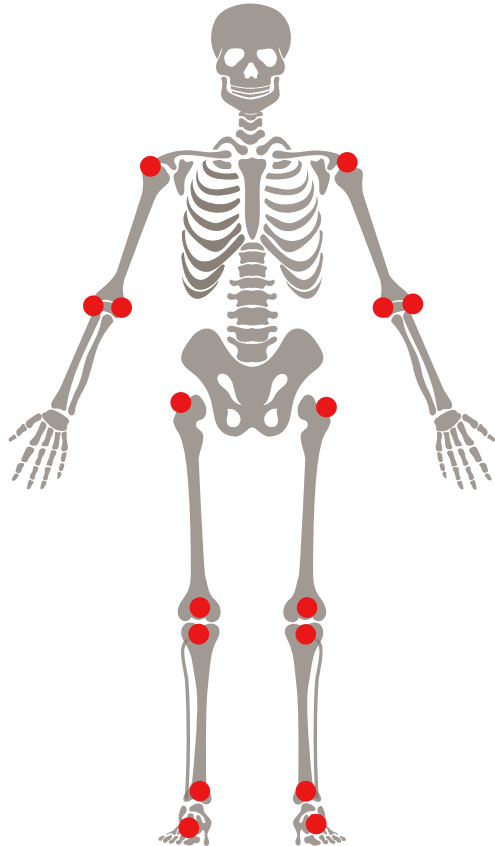


1. Palominos PE, et al. *Adv Rheumatol*. 2019;59(1):23. 2. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85.

Spondyloarthritis Research Consortium of Canada (SPARCC) Enthesitis Index

Assessing a Patient

Measurement of enthesitis at 16 bilateral sites^{1,2}

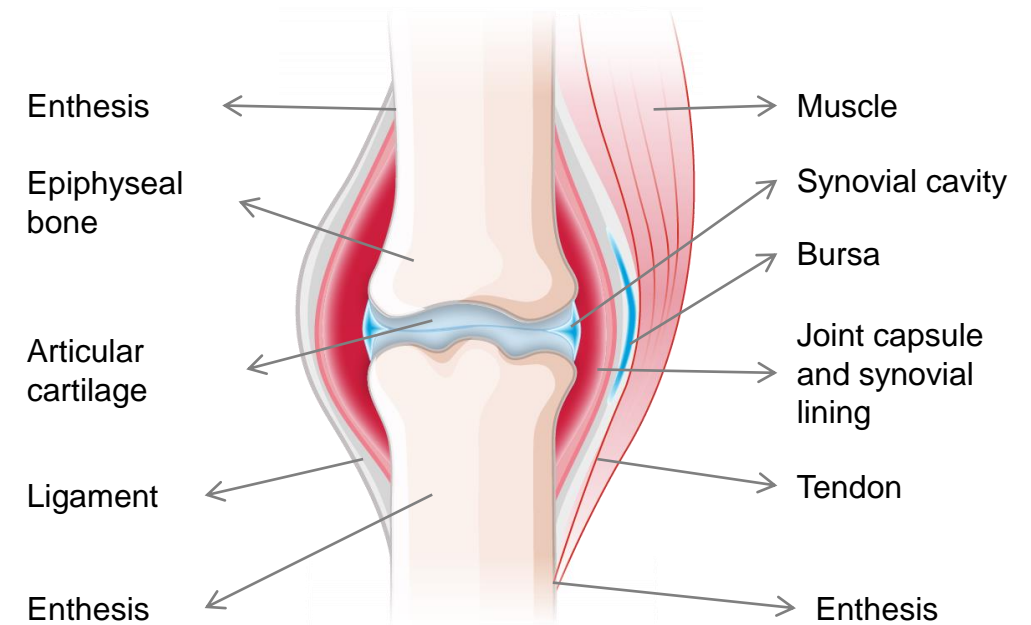


Upper limbs

- a) Medial epicondyle
- b) Lateral epicondyle
- c) Supraspinatus insertion into greater tuberosity of humerus

Lower Limbs

- a) Greater trochanter
- b) Quadriceps insertion into the superior border of the patella
- c) Patella ligament insertion into the inferior pole of patella/tibial tubercle
- d) Achilles tendon insertion into calcaneum
- e) Plantar fascia insertion into calcaneum



1. Palominos PE, et al. *Adv Rheumatol*. 2019;59(1):23. 2. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85.

Leeds Dactylitis Index-Basic (LDI-B)

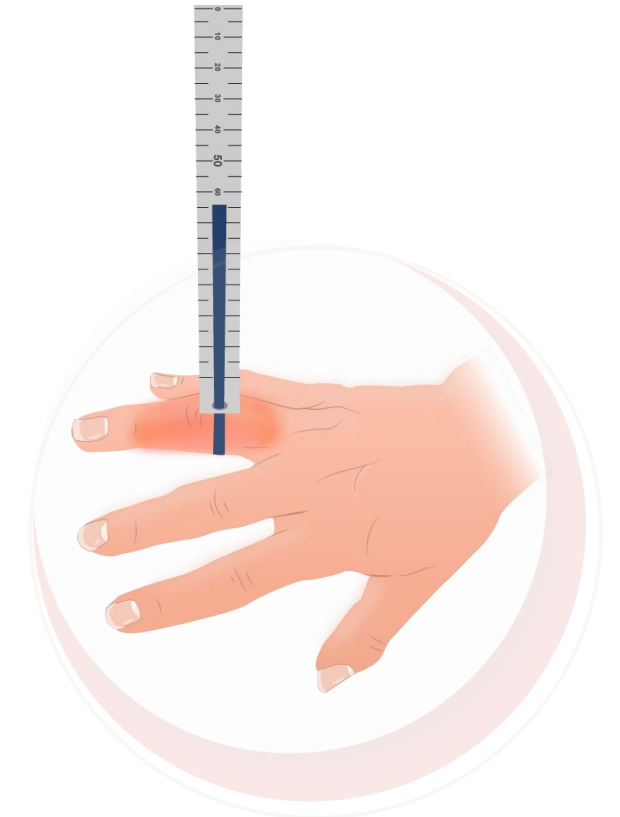
Assessing a Patient

- LDI-B has been developed to measure the severity of dactylitis in each digit¹
- Once the presence of dactylitis is established in each digit, the calculated ratio of measurements is multiplied by the tenderness score^{1,2}
 - The ratio of the circumference of the affected digit to the circumference of the digit on the opposite hand or foot is measured¹⁻³
 - Tenderness is assessed in the area between the joints: 0=not tender, 1=tender^{1,2}
- The results then added to produce a total score across digits with 0 being no dactylitis^{1,2}

Note: A variation of the LDI (referred to as the **LDI basic**) substituted the original tenderness grading (0–3) with a binary score reflecting either the presence or absence of tenderness (1 or 0, respectively)⁴

LDI-B=Leeds Dactylitis Index-Basic.

1. Mease PJ, et al. *Ann Rheum Dis*. 2017;76:79-87. (Online Supplement). 2. Helliwell PS, et al. *J Rheumatol*. 2005;32:1745-1750. 3. Healy PJ, Helliwell PS. *Arthritis Rheum*. 2008;59:686-691. 4. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85.



The Leeds Dactylitis Instrument

van der Heijde Modified Total Sharp Score (mTSS) for PsA

Origin and Development

The Sharp-van der Heijde (SvdH) Modified Score for PsA was derived from a scoring method developed for RA

Original Sharp
Method for RA

1971

Modified Sharp
Score for RA

1985

SvdH Score
for RA

1989

SvdH Modified Score
for PsA

2005

Sharp Scoring Method for RA

- Total Sharp Score developed for the assessment of images in RA (1971)¹
 - Assesses 2 types of bone changes - bone erosion and JSN¹
 - Twenty-nine areas in each hand/wrist are assessed for erosions and 27 joints are assessed for JSN²
 - This original version is no longer used²

Modified Sharp Scoring Method for RA

- Sharp modified his scoring method in 1985 to improve its accuracy²
 - Seventeen areas were assessed for erosion and 18 areas for JSN²

Sharp van der Heijde Scoring Method for PsA

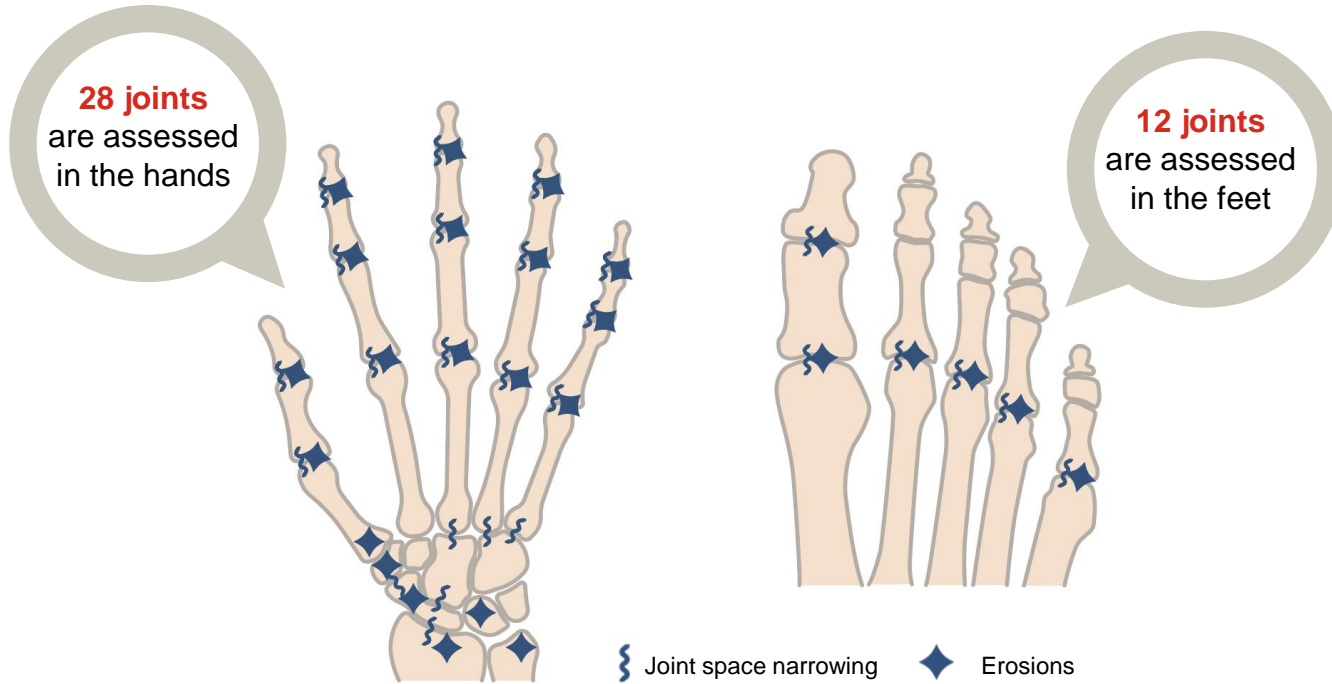
- van der Heijde added the assessment of hands and feet and modified the scoring for patients with PsA^{3,4}
 - Six joints in each foot are assessed for erosion and JSN using a scale of 0-5 for the feet and 0-4 for the hands^{3,4}
 - In PsA, the DIP joints in the hands are added to give a total number of areas for each hand of 20⁴
 - In the modified score, scoring for erosion is weighted more heavily than for JSN¹
 - Gross osteolysis and pencil-in-cup bone erosion were also added to the scoring system^{3,4}

DIP=Distal Interphalangeal Joint; JSN=Joint Space Narrowing; PsA=Psoriatic Arthritis; RA=Rheumatoid Arthritis.

1. Clinical review report: Ixekizumab (Taltz): (Eli Lilly Canada Inc.) [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018. <https://www.ncbi.nlm.nih.gov/books/NBK540005/> (Accessed March 13, 2023). 2. Boini S, Guillemin F. *Ann Rheum Dis*. 2001;60(9):817-827. 3. van der Heijde D, et al. *Arthritis Res Ther*. 2020;22(1):18. 4. van der Heijde D, et al. *Ann Rheum Dis*. 2005;64(Suppl 2):ii61-ii64.

Sharp-van der Heijde score modified for PsA (SvdH)

Assessing a Patient



Joint Space Narrowing Score (max. 208)

Scored 0 [normal] to 4 [no detectable joint space or fusion or dislocation] for each joint in both the hands and the feet

Erosion Score (max. 320)

Scored 0 [no erosions] to 5 [multiple erosions, sum of scores 5 or more] for joints in the hands and 0 to 10 for joints in the feet [proximal plus distal sides]

Score	Erosions ^a	Joint space narrowing ^b
0	No erosion	Normal
1	Discrete erosion	Focal or general narrowing ≤25% of original joint space
2	Large erosion not passing the mid-line	Definite narrowing of ≤50% of original joint space
3	Large erosion passing the mid-line	Definite narrowing of >50% of original joint space or subluxation
4	Multiple erosions (sum of erosions adding to 4)	No detectable joint space, ankylosis or complete luxation
5	Multiple erosions (sum of erosions adding to 5)	

Erosion Score + Joint Space Narrowing Score = Total Score

Maximum: 528

^aFor both hand and feet joints. The whole joint is scored for the hands to give a maximum score of 5, while each site of the joint is scored in the feet for a maximum score of 10;

^bJSN scores vary from 0 to 4 in both the hands and feet, with 0 being normal and 4 being the absence of joint space with evident ankylosis or subluxation.

JSN=Joint Space Narrowing; PsA=Psoriatic Arthritis.

van der Heijde D, et al. Arthritis Res Ther. 2020;22(1):18.

Modified Total Sharp Score (mTSS) for PsA

How to Interpret Results

- Higher scores = greater damage and comparisons are usually made relative to a placebo¹
- Lower change = less structural progression (ie, greater structural inhibition)¹
- mTSS score change can be interpreted based on different criteria:²
 - No absolute change (≤ 0.0)
 - Clinically meaningful change (≤ 0.50)
 - Change greater than the interrater reliability between 2 readers of the images (Small Detectable Change)
- The mTSS has been validated and used in multiple trials for biologics in PsA¹



mTSS=Modified Total Sharp Score; PsA=Psoriatic Arthritis.

1. van der Heijde D, et al. *Arthritis Res Ther.* 2020;22(1):18. 2. van der Heijde D, et al. *RMD Open.* 2019;5(1):e000898.

Differences Between X-Ray, MRI, and Ultrasound Assessments for the Detection of Structural Changes in PsA

	X-Ray ^{1,2}	MRI ^{1,3,4}	Ultrasound ¹
Advantages	<ul style="list-style-type: none"> • Fast, feasible, reliable, and relatively inexpensive procedure • Widely used assessment to provide a record of cumulative joint damage 	<ul style="list-style-type: none"> • No ionizing radiation • Able to visualize all peripheral and axial joints, and the entheses to assess structural damage in detail • More sensitive than X-rays for detecting articular, peri-articular, and soft tissue changes 	<ul style="list-style-type: none"> • No ionizing radiation • Useful for the evaluation of structural changes in the bone surface (erosions) • Sensitive for the detection of intra- and extra-articular joint involvement in peripheral PsA
Limitations	<ul style="list-style-type: none"> • Exposure to ionizing radiation • Cannot detect early inflammatory changes affecting soft tissue 	<ul style="list-style-type: none"> • Clinical usefulness in PsA relies on assessment of structural damage of PsA • Fairly expensive • Metal plate can cause serious problems in MRI like causing a force in scanning, inducing currents and heating, causing static magnetic field 	<ul style="list-style-type: none"> • Unable to provide full bone evaluation as it cannot penetrate bone • Not sensitive to axial disease manifestations • More operator dependent

MRI=Magnetic Resonating Image; PsA=Psoriatic Arthritis.

1. Crespo-Rodríguez AM, et al. *Insights Imaging*. 2021;12(1):121. 2. Sudol-Szopińska I, et al. *J Ultrason*. 2016;16(64):65-77. 3. Bagel J, Schwartzman S. *Am J Clin Dermatol*. 2018;19(6):839-852. 4. Body MRI Research Group (BMR):Stanford Medicine; 2018. <https://med.stanford.edu/bmrgroup/Research/mri-near-metal.html> (Accessed January 2023).

Extra-musculoskeletal Manifestations and Associated Symptoms

Psoriasis Area and Severity Index (PASI)

Assessing a Patient

- Measurement combining assessments of the body-surface area involvement in 4 anatomical regions (head, trunk, arms, legs) and the severity in each region¹⁻³
- **0-6 scale for the area assessment**¹⁻³
 - 0=no involvement
 - 1=<10%
 - 2=10-29%
 - 3=30-49%
 - 4=50-69%
 - 5=70-89%
 - 6=90-100%
- **0-4 scale for the severity assessment for each of 3 symptoms**¹⁻³
 - Erythema (redness)
 - Induration (thickness)
 - Desquamation (scaling)

1. Clinical review report: Ixekizumab (Taltz): (Eli Lilly Canada Inc.) [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018. <https://www.ncbi.nlm.nih.gov/books/NBK540005/> (Accessed March 13, 2023). 2. Chow C, et al. *J Eur Acad Dermatol Venereol*. 2015;29(7):1406-1414. 3. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85.

Static Physician's Global Assessment (sPGA)

How to Get a Result

- While PASI is the most used measure of psoriasis burden in trials and observational studies, a PGA of psoriasis burden is also often used¹
- The overall sPGA score for a patient is given by the total average for the 3 symptoms of induration, erythema, and scaling:²
 - 0 = Clear
 - 1 = Minimal
 - 2 = Mild
 - 3 = Moderate
 - 4 = Severe
 - 5 = Very severe



Psoriasis

sPGA=Static Physician's Global Assessment.

1. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63 Suppl 11:S64-S85. 2. Chow C, et al. *J Eur Acad Dermatol Venereol*. 2015;29(7):1406-1414.

Nail Psoriasis Severity Index (NAPSI)

Assessing a Patient

- The fingernail is divided with imaginary horizontal and longitudinal lines into quadrants^{1,2}
- Each fingernail is given a score for nail bed psoriasis (0-4) and a score for nail matrix psoriasis (0-4) with a total possible score of 0–80 for fingernails, or 0–160 if toenails are included^{1,2}

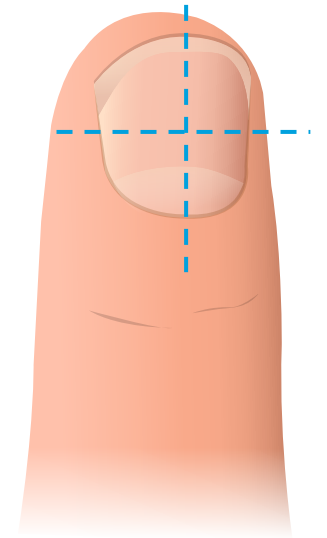
Assess the presence (1) or absence (0) of any nail features in each quadrant:^{1,2}

- Pitting
- Leukonychia
- Nail plate crumbling
- Red spots on the lunula
- Oil drop (salmon patch) discoloration
- Onycholysis
- Nail bed hyperkeratosis
- Splinter hemorrhage

Patients are ranked based on the severity of their nail bed and nail matrix signs:

Nail plate pitting, crumbling, onycholysis, oil-drop discoloration, and/or nail bed hyperkeratosis^{3,4}

- 0 = Clear
- 1 = Minimal
- 2 = Mild
- 3 = Moderate
- 4 = Severe



1. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85. 2. Sandre MK, et al. *Semin Arthritis Rheum*. 2014;44(2):162-169; 3. Kaeley GS, et al. *J Rheumatol*. 2021;48(8):1208-1220. 4. Hudgens S, et al. *Value Health*. 2022;25(9):1582-1589.

Quality of Life and Functional Measures

Health Assessment Questionnaire-Disability Index (HAQ-DI)

Assessing a Patient

- Patient-reported standardized questionnaire to measure disease-associated disability (assessment of physical function)¹
- Consists of 20 questions referring to 8 domains^{1,2}



- Two supplementary questions regarding the use of aids or devices modify the scores of each domain^{1,2}
- The HAQ-DI scores the patient's self-perception on the degree of difficulty^{1,2}

0 = Without any difficulty, 1 = With some difficulty, 2 = With much difficulty, and 3 = Unable to do

HAQ-DI=Health Assessment Questionnaire-Disability Index.

1. Clinical review report: Ixekizumab (Taltz); (Eli Lilly Canada Inc.) [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018. <https://www.ncbi.nlm.nih.gov/books/NBK540005/> (Accessed March 13, 2023). 2. Bukhari M, Kent A. *Rheumatology (Oxford)*. 2020;59(2):267-268.

Dermatology Life Quality Index (DLQI)

How to Interpret Results

- The DLQI was developed to measure the disability experienced by patients with different dermatologic conditions
- DLQI questionnaire comprises 10 questions, each of which is scored on a 4-point scale such as¹
0 = Not at all/not relevant, 1 = A little, 2 = A lot, 3 = Very much
- A score of 0 or 1 is interpreted as skin problems having no impact on quality of life¹

DLQI score ¹	Effect on patient's life ¹
0-1	No effect at all
2-5	Small effect
6-10	Moderate effect
11-20	Very large effect
21-30	Extremely large effect

- According to “**rule of ten**” patients with BSA >10 or PASI >10 or DLQI >10 considered to exhibit moderate to severe psoriasis and those with values <10 were considered to display mild psoriasis²

BSA=Body Surface Area; DLQI=Dermatology Life Quality Index; PASI=Psoriasis Area and Severity Index.

1. Shah FY, et al. *Int J Res Med Sci.* 2020;8(9):3277-3280. 2. Salgado-Boquete L, et al. *Life (Basel).* 2021;11(7):627.

36-item Short-form Survey (SF-36)

Assessing a Patient



- Addresses general health concepts not specific to any age, disease, or treatment group
- Comprises eight concepts, with varying items included within the individual components

Physical
component

**Physical
functioning**



**Role –
Physical**



Bodily pain



**General health
perceptions**



Mental
component

**General mental
health**



**Role –
Emotional**



Vitality



Social functioning

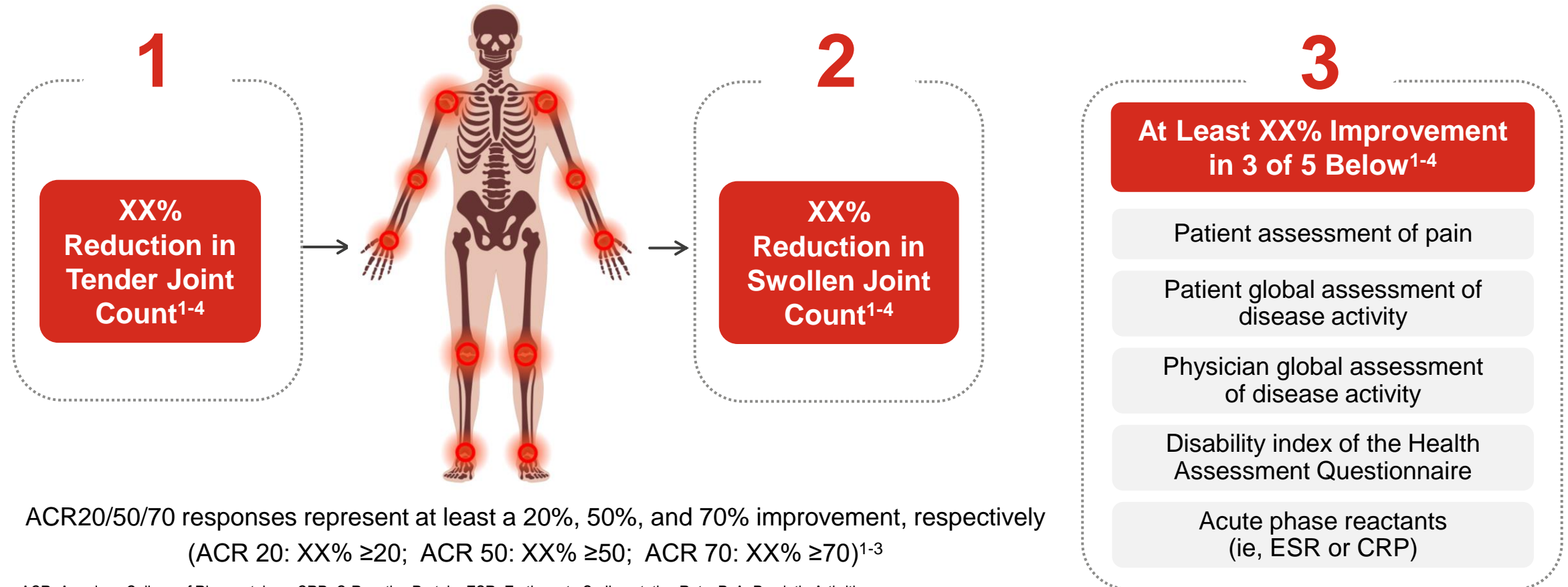


SF-36=36-Item Short-Form Survey.
Ware Jr JE, et al. *Med Care*. 1992;30(6):473-483.

Composite Measures

Joint Assessment Based on American College of Rheumatology (ACR) Response

ACR20 response criteria is used as the primary outcome measure and ACR50/70 as secondary outcome measures in PsA clinical trials¹⁻⁴



ACR20/50/70 responses represent at least a 20%, 50%, and 70% improvement, respectively (ACR 20: XX% \geq 20; ACR 50: XX% \geq 50; ACR 70: XX% \geq 70)¹⁻³

ACR=American College of Rheumatology; CRP=C-Reactive Protein; ESR=Erythrocyte Sedimentation Rate; PsA=Psoriatic Arthritis.

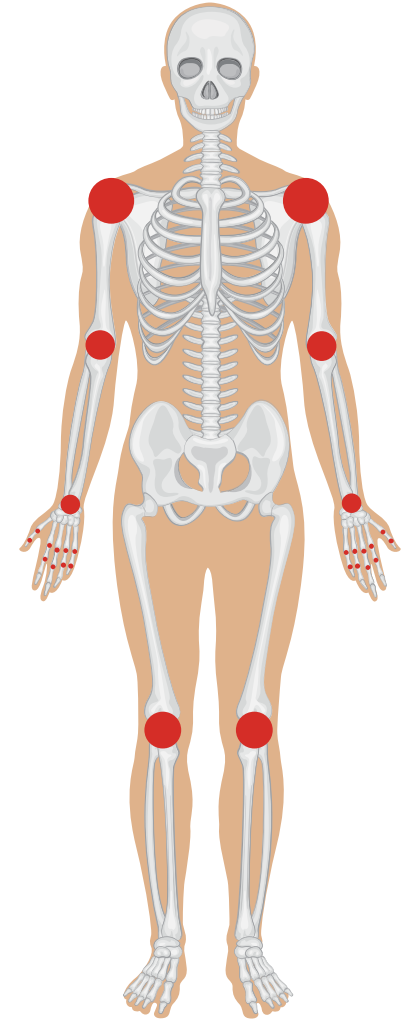
1. Tiwari V, Brent LH. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2022. <https://www.ncbi.nlm.nih.gov/books/NBK547710/> (Accessed September 13, 2022).

2. Clinical review report: Ixekizumab (Taltz): (Eli Lilly Canada Inc.) [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018. <https://www.ncbi.nlm.nih.gov/books/NBK540005/> (Accessed March 13, 2023). 3. Gottlieb A, et al. *J Am Acad Dermatol*. 2008;58(5):851-864. 4. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl. 11):S64-S85.

Disease Activity Score (28 Diarthrodial Joint Count) (DAS 28)

Assessing a Patient and Getting a Result

- Count of how many joints from 28 joints are swollen and/or tender¹
 - Proximal interphalangeal joints of the fingers²
 - Metacarpophalangeal joints²
 - Wrists, elbows, shoulders, and knees²
- CRP or ESR laboratory result in mg/L or mm from that visit^{1,2}
- Patient-reported disease activity or general health on a visual analog scale (0-100 mm) from that visit^{1,2}



CRP=C-Reactive Protein; DAS 28-CRP=Disease Activity Score (28 Diarthrodial Joint Count) Based on C-Reactive Protein.

1. Nielung L, et al. *Arthritis*. 2015;2015:401690. 2. Ali RH, et al. *J Med Ultrasound*. 2019;27(1):33-39. 3. <https://www.das28.nl/nl-nl/> (Accessed March 28, 2023).

Disease Activity Score (28 Diarthrodial Joint Count) (DAS 28)

How to Interpret Results

Online DAS 28-CRP calculator

Interpretation:

- DAS 28 score ranges from 0 to 9.4¹
 - Remission: <2.6²
 - Low: 2.6 to <3.2²
 - Moderate: 3.2 to 5.1²
 - High: >5.1²
- DAS change of 1.2: Major improvement²
- DAS change of 0.6: Moderate improvement²

DAS28-CRP Calculator

Enter clinical data: Value:

tender joint count (0-28)

swollen joint count (0-28)

CRP (mg/l)

VAS general health patient (mm)

Calculate **DAS28** Reset

version 1.1 by M. Flendrie, Pittiman and J. Fransen

Formula²

- $DAS28-CRP = 0.56 \times \sqrt{TJC28} + 0.28 \times \sqrt{SJC28} + 0.014 \times PtGH + 0.36 \times \ln(CRP) + 0.96$
- $DAS28-ESR = 0.56 \times \sqrt{TJC28} + 0.28 \times \sqrt{SJC28} + 0.014 \times PtGH + 0.70 \times \ln(ESR)$

Additional Information








CRP= C-Reactive Protein; DAS=Disease Activity Score; DAS 28-CRP=Disease Activity Score (28 Diarthrodial Joint Count) Based on C-Reactive Protein; ESR=Erythrocyte Sedimentation Rate; TJC-Tender Joint Count; SJC=Swollen Joint Count.

1. Greenmyer JR, et al. *ACR Open Rheumatol.* 2020;2(9):507-511. 2. Nielung L, et al. *Arthritis.* 2015;2015:401690.

Composite Psoriatic Disease Activity Index (CPDAI)

How to Get a Result

- Based on the treatment guidelines developed for PsA by GRAPPA¹
- Mixture of patient-reported measures and clinical examinations are used to develop a composite score across 5 domains in PsA¹
- Scores range from 0 to 15 for assessment including spinal disease^{1,2}
- A higher score indicates higher disease activity^{1,2}

	None (0) ^{a,1}	Mild (score=1) ¹	Moderate (score=2) ¹	Severe (score=3) ¹
 Peripheral arthritis	TJC and SJC=0	TJC or SJC ≤4 joints; normal function (HAQ <0.5) ^b	≤4 joints and function impaired (HAQ-DI >0.5) OR >4 joints and normal function (HAQ-DI ≤0.5)	>4 joints and function impaired (HAQ-DI >0.5)
 Skin disease	PASI=0	PASI ≤10 and DLQI ≤10	PASI ≤10 and DLQI >10; OR PASI >10 and DLQI ≤10	PASI >10 and DLQI >10
 Enthesitis	No based on Yes/No question	LEI ≤3 sites; normal function (HAQ <0.5) ^b	LEI ≤3 sites and function impaired (HAQ-DI >0.5) OR >3 sites and normal function (HAQ-DI ≤0.5)	LEI >3 sites and function impaired (HAQ-DI >0.5)
 Dactylitis	No based on Yes/No question	Digit score ≤3; normal function (HAQ <0.5) ^b	Digit score ≤3 and function impaired (HAQ-DI >0.5); OR digit score >3 and normal function	Digit score >3 and has function impaired (HAQ-DI >0.5)
 Spinal disease	BASDAI=0 and ASQoL=0	BASDAI <4; normal function (ASQoL <6)	BASDAI <4 but function impaired; BASDAI >4 but normal function	BASDAI >4 and function impaired

^aThe absence of symptoms scores 0 for all signs; ^bHAQ only counted if clinical involvement of domain (joint/enthesitis/dactylitis) is present.

ASQoL=Ankylosing Spondylitis Quality of Life; BASDAI=Bath Ankylosing Spondylitis Disease Activity Index; CPDAI=Composite Psoriatic Disease Activity Index; DLQI=Dermatology Life Quality Index; HAQ=Health Assessment Questionnaire; HAQ-DI=Health Assessment Questionnaire-Disability Index; LEI=Leeds Enthesitis Index; PASI=Psoriasis Area and Severity Index; TJC=Tender Joint Count; SJC=Swollen Joint Count.

1. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl 11):S64-S85. 2. Helliwell P, et al. *Arthritis Res Ther*. 2018;20(1):242.

Minimal Disease Activity (MDA) Criteria

Assessing a Patient

- Objective was to define a composite score that would identify low or MDA across the different symptoms of PsA at a given point in time¹
- The GRAPPA 2010 definition was made after consultation with specialists from both dermatology and rheumatology²
- MDA definition uses a set of 7 criteria across different PsA symptoms^{1,3}:
 - The number of required criteria can vary
 - Improvement in the skin is not required in the standard definition; thus, patients can still meet MDA while having significant skin symptoms
 - Consensus on the number and required criteria are currently being discussed in the scientific field

Criteria ^{1,2}	Standard MDA ^{1,3}	MDA 6 ^{1,3}	MDA 7 ^{1,3}
Total tender joint count ≤1	Any 5 of these 7 criteria	Any 6 of these 7 criteria	✓
Total swollen joint count ≤1			✓
Enthesitis count ≤1			✓
PASI ≤1 or sPGA (0,1) or BSA ≤3%			✓
HAQ-DI ≤0.5			✓
Patient global assessment VAS ≤20			✓
Patient pain VAS score ≤15			✓

✓=Compulsory Criteria; BSA=Body Surface Area; DAS=Disease Activity Score; GRAPPA=Group for Research and Assessment in Psoriasis and Psoriatic Arthritis; HAQ-DI=Health Assessment Questionnaire-Disability Index; MDA=Minimal Disease Activity; PASI=Psoriasis Area Severity Index; PsA=Psoriatic Arthritis; VAS=Visual Analog Scale.

1. Clinical review report: Ixekizumab (Taltz): (Eli Lilly Canada Inc.) [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018. <https://www.ncbi.nlm.nih.gov/books/NBK540005/> (Accessed March 13, 2023). 2. Mease PJ. *Arthritis Care Res (Hoboken)*. 2011;63(Suppl 11):S64-S85. 3. Coates LC, Helliwell PS. *J Rheumatol*. 2016;43(2):371-375.

Conclusion

- Over the past decade, assessment tools and measures of psoriatic arthritis (PsA) have rapidly advanced due to the necessity for valid and reliable assessments in clinical trials^{1,3}
- Joint inflammation and damage, enthesitis, dactylitis, skin and nail disease, spondylitis, physical function, and quality of life are the core domains that need to be evaluated^{2,3}
- As these single-domain and composite measures become simpler, practical measures will advance for use in clinical practice¹
- The advancement of the assessment tools and outcome measures in PsA allows more specific evaluation of disease activity and response to therapy with the goal of attaining remission or minimal disease activity³

1. Wong PC, et al. *Int J Rheumatol*. 2012;2012:839425. 2. Tiwari V, Brent LH. Psoriatic Arthritis. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2022. <https://www.ncbi.nlm.nih.gov/books/NBK547710/> (Accessed March 13, 2023). 3. Mease P. *Clin Exp Rheumatol*. 2015;33(Suppl. 93):S104-S108.

US Medical Education

Scan the code below for additional resources on Psoriatic Arthritis



SCAN HERE



Lilly

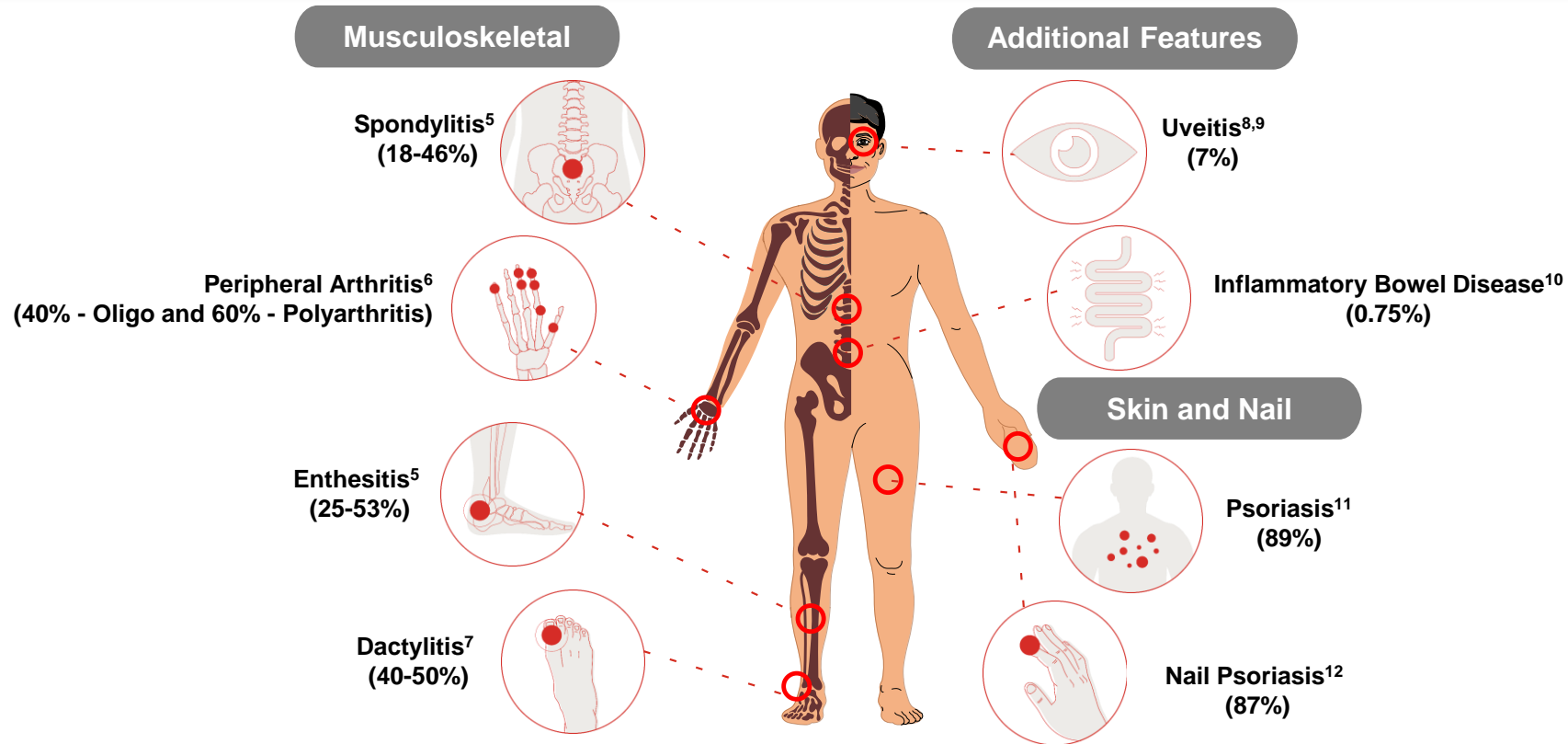
Supplemental Slides

The following material have been provided for additional context to the information presented above in the Composite Measure Section

Clinical Features in Diagnosis

PsA Clinical Domains

A chronic, systemic inflammatory disease with musculoskeletal and non-musculoskeletal manifestations, including peripheral arthritis, enthesitis, tenosynovitis, tendinitis, dactylitis, inflammatory axial disease, skin and nail PsO, IBD, and uveitis¹⁻⁴



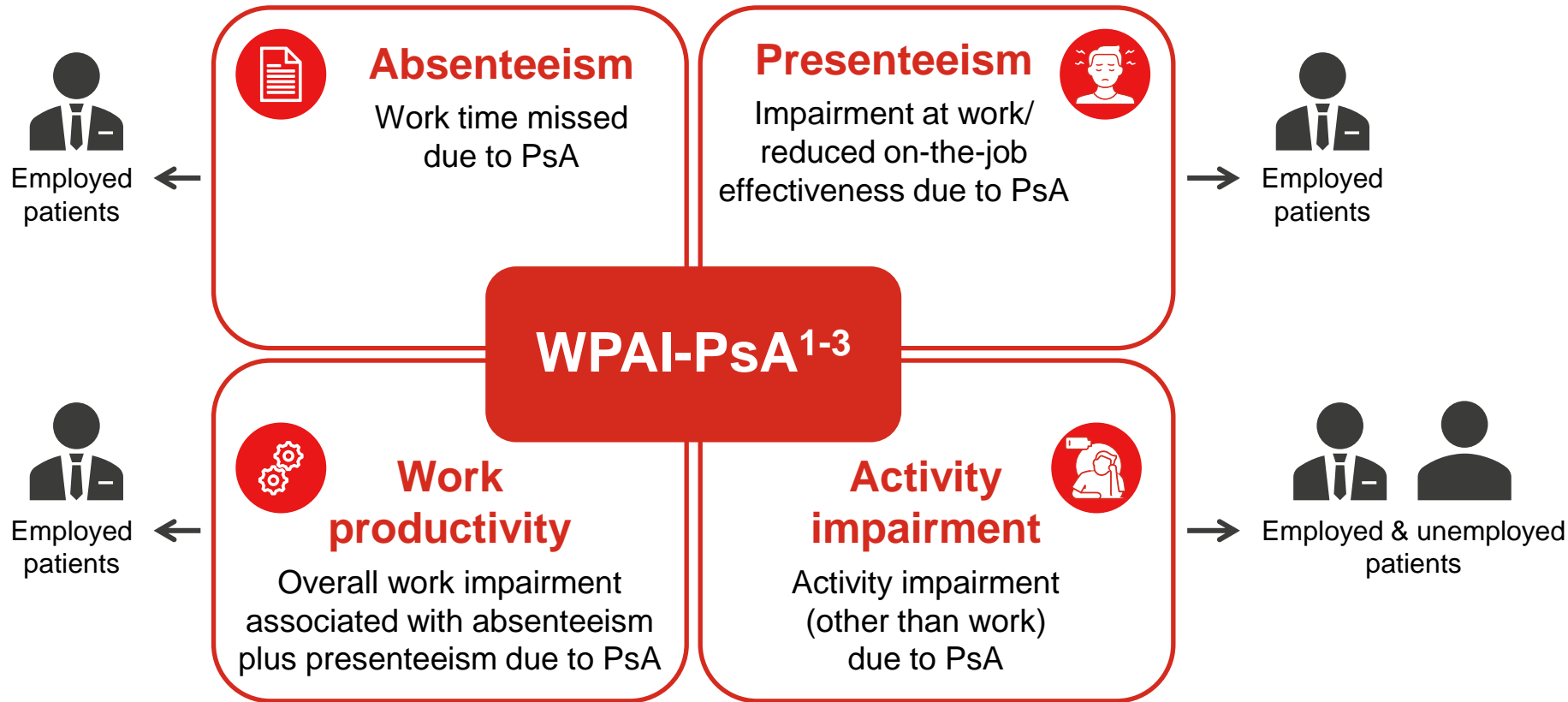
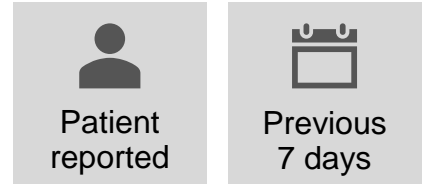
IBD=Inflammatory Bowel Disease; PsA=Psoriatic Arthritis; PsO=Psoriasis.

1. Mease P. *Clin Exp Rheumatol*. 2015;33(Suppl. 93):S104-S108.
2. Gossec L, et al. *Ann Rheum Dis*. 2020;79:700-712.
3. Ritchlin CT, et al. *N Engl J Med*. 2017;376:957-970.
4. Gladman DD, et al. *Ann Rheum Dis*. 2005; 64(Suppl. II):ii14-ii17.
5. Liu JT, et al. *World J Orthop*. 2014;5:537-543.
6. Acosta Felquer ML, et al. *Clin Exp Rheumatol*. 2015;33(5 Suppl 93):S26-30.
7. Ritchlin CT, et al. *N Engl J Med*. 2017;376:957-970.
8. Rosenbaum JT. *Clin Rheumatol*. 2015;4:999-1002.
9. Au S, et al. *Psoriasis Forum*. 2011;17:169-179.
10. Charlton R, et al. *Ann Rheum Dis*. 2018;77:277-280.
11. Peluso R, et al. *Clin Rheumatol*. 2015;34:745-753.
12. Gladman DD, et al. *Ann Rheum Dis*. 2005;64(Suppl II):ii14-ii17.

Work Productivity and Activity Impairment Questionnaire – PsA

Comprising 4 scores¹⁻³

Scores expressed as % impairment (0-100%), higher scores denote more impairment



Six questions, most of which ask respondents about their experiences in the **previous 7 days**:⁴

1. Current employment (YES/NO)
2. Hours of work missed
3. Hours of work missed for other reasons^a
4. Total hours worked
5. How much has PsA affected productivity while working? (scale of 0-10)
6. How much has PsA affected other regular activities? (scale of 0-10)

WPAI-PsA=Work Productivity and Activity Impairment Questionnaire-Psoriatic Arthritis.

1. Reilly MC, et al. *Pharmacoeconomics*. 1993;4(5):353-365. 2. Kristensen LE, et al. *Rheumatology (Oxford)*. 2023;62(2):629-637. 3. Erdem D, et al. *Ann Rheum Dis*. 2019. 78(Suppl 2) [Abstract Number: AB0746].

4. Reilly associates. WPAI translations. WPAI:PsA. https://view.officeapps.live.com/op/view.aspx?src=http%3A%2F%2Fwww.reillyassociates.net%2FWPAI-PsA-v2_0-English-US-original.doc&wdOrigin=BROWSELINK (Accessed 05 April, 2024).

Work Productivity and Activity Impairment Questionnaire – PsA

The 4 variables of WPAI-PsA are expressed as **percentages** ($\times 100$) and calculated in the following ways:^{1,2}

- **Absenteeism** =
$$\frac{\text{Hours missed due to PsA (Q2)}}{(\text{Hours missed due to PsA [Q2]} + \text{Total hours worked [Q4]})}$$
- **Presenteeism** =
$$\frac{\text{How much PsA has affected work productivity (Q5)}}{10}$$
- **Work productivity loss** (also called overall work impairment) =
$$\text{Absenteeism score} + ([1 - \text{Absenteeism score}] \times \text{Presenteeism score})$$
- **Activity impairment** =
$$\frac{\text{How much PsA has affected other regular activities (Q6)}}{10}$$

PsA=Psoriatic Arthritis; Q=Question; WPAI-PsA=Work Productivity and Activity Impairment Questionnaire-Psoriatic Arthritis.

1. Reilly associates. WPAI translations. WPAI:PsA. https://view.officeapps.live.com/op/view.aspx?src=http%3A%2F%2Fwww.reillyassociates.net%2FWPAI-PsA-v2_0-English-US-original.doc&wdOrigin=BROWSELINK (Accessed 05 April, 2024). 2. Reilly associates. WPAI Scoring. http://www.reillyassociates.net/WPAI_Scoring.html (Accessed 05 April, 2024).

DAPSA/cDAPSA

Assessing a Patient

Introduction:¹⁻³

- DAPSA is a GRAPPA and OMERACT guideline–recommended, validated composite measure that consists of five items: SJC66, TJC68, PtGA VAS, patient pain VAS, CRP*

Purpose:⁴

- Joints are palpated for the purpose of determining if they are tender and/or swollen, the latter implying the presence of active synovitis, and both implying the presence of inflammation

Components of cDAPSA:⁴

- Swollen joint count, tender joint count, patient global, pain, and CRP level

Method of Administration:⁴

- Patient global and pain VAS (score in cm), physical examination (SJC66 and TJC68), and laboratory (CRP level in mg/dl) recorded on paper or electronically

Scoring:⁴

- Sum of patient global and pain VAS in centimeters, numerical swollen and tender joint count of 66 and 68 joints, respectively, and CRP level in mg/dl

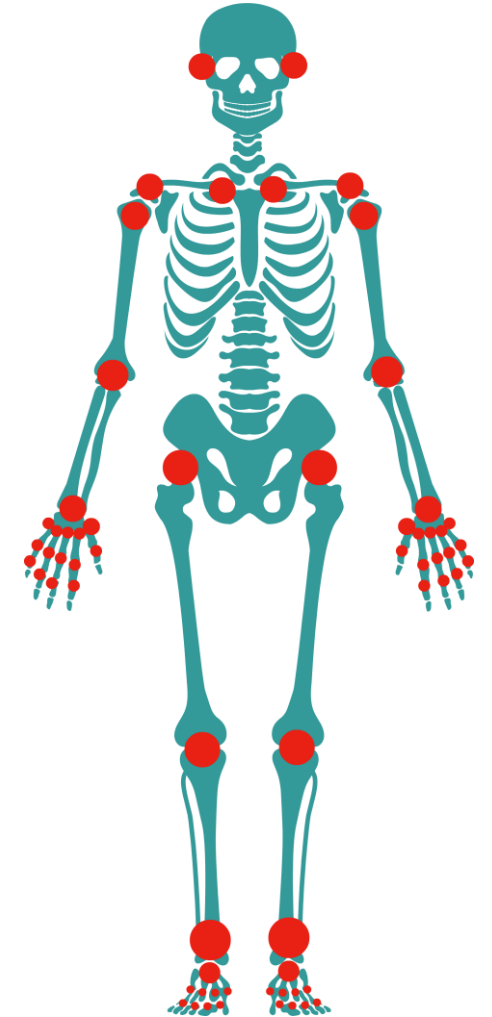
Interpretation:⁴

- Higher scores reflect more severe disease activity

*If CRP is not included, it is called the clinical or cDAPSA (4 items);

CRP=C-reactive protein; VAS=Visual Analog Scale.

1. Coates LC, et al. *Arthritis Rheumatol.* 2018;70(3):345-355. 2. Smolen JS, et al. *Ann Rheum Dis.* 2018;77(1):3-17. 3. Schoels MM, et al. *Ann Rheum Dis.* 2016;75(5):811-818. 4. Mease PJ. *Arthritis Care Res (Hoboken).* 2011;63(Suppl. 11):S64-S85.



Summary of Composite Measures in PsA

	ACR ¹	DAS28 ^{2b}	CPDAI ³	MDA ^{3a}	DAPSA ^{3b}
Laboratory (CRP or ESR)	✓	✓			✓
Joints: Swollen	✓	✓	✓	✓	✓
Joints: Tender	✓	✓	✓	✓	✓
Joints: Pain VAS	✓				
Patient Pain VAS	✓			✓	✓
Patient Global VAS		✓		✓	✓
Physician Global VAS					
Skin			✓	✓	
Enthesitis			✓	✓	
Dactylitis			✓		
Spine			✓		
Function			✓	✓	
HRQoL	✓		✓		

^aMDA requires improvement in 5 of 7 domains; VLDA requires improvement in all 7 domains. ^bUnidimensional measure (only focuses on joints/global assessment).

1. Gottlieb A, et al. *J Am Acad Dermatol.* 2008;58(5):851-864. 2. Nielung L, et al. *Arthritis.* 2015;2015:401690. 3. Smolen JS, et al. *Ann Rheum Dis.* 2018;77:3-17.