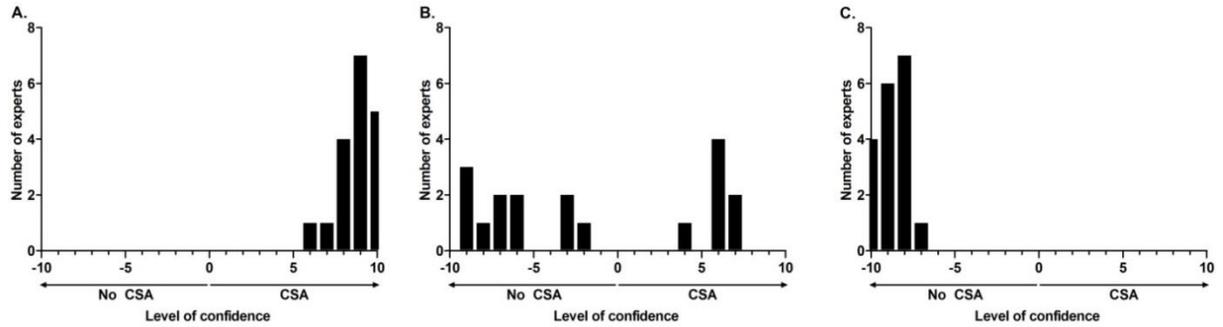


**Online supplementary figure S1. Examples of histograms that present the weighted classifications of all experts for three individual patients (phase-2)**



The weighted classifications of all experts were depicted in a histogram for each patient. Three reviewers then decided independently whether the experts unequivocally agreed on the classification as CSA (A), no-CSA (C) or that the patient should be considered as unclassifiable (B).

**Online Supplementary Table S1. List of 55 items derived after first qualitative round of modified Delphi procedure (phase-1)**

<b>Symptom/sign/characteristic:</b>	<b>Indicated as its presence increased (↑) or decreased (↓) the likelihood of CSA</b>
Age 18-35 years (in comparison to >35 years)	↑
Age 36-60 years (in comparison to <36 and >61 years)	↑
Age >61 years (in comparison to <61 years)	↑/↓
Female sex	↑
Presence of a first-degree relative with RA	↑/↓
Presence of a first-degree relative with psoriasis, inflammatory bowel disease, uveitis or axial/peripheral SpA	↑/↓
Presence of other auto-immune disease (such as type 1 diabetes, auto-immune thyroiditis)	↑
Presence of -or having a history of- psoriasis inflammatory bowel disease or uveitis	↑
Preceding recent child birth (<12 weeks)	↑
Preceding infection (for instance ear/nose/throat, urogenital or gastrointestinal)	↑
Being a current smoker (daily usage)	↑
Being a previous smoker (daily usage)	↑
Preceding trauma in joints with symptoms	↓
Joint symptoms of recent-onset (duration <1 year)	↑
Acute onset of symptoms (onset <2 days)	↑
Increasing number of joints with symptoms over time	↑
Increasing severity of symptoms over time	↑
'Palindromic pattern' of symptoms (alternating presence and	↑

absence of symptoms)	
Most severe symptoms present in the early morning	↑
Improvement of symptoms during the day	↑
Improvement of symptoms with exercise/movement	↑
Improvement of symptoms after using a full anti-inflammatory dose of NSAIDs	↑
Difficulty with making a fist	↑
Muscle cramps in upper and/or lower extremities	↑
Patient-experience of swelling of small hand joints	↑
Joints sensitive to (accidental) touching	↑
Duration of morning stiffness $\geq 30$ minutes	↑
Duration of morning stiffness $\geq 60$ minutes	↑
Duration of morning stiffness $\geq 90$ minutes	↑
Sensations of weakness in a hand/foot	↑
Tingling/burning sensations of hand/foot	↑
Waking at night because of pain	↑
1-3 joints with symptoms	↑
4-10 joints with symptoms	↑
>10 joints with symptoms	↑
Symptoms located in MCP-joints	↑
Symptoms located in wrist	↑
Symptoms located in PIP-joints	↑
Symptoms located in MTP-joints	↑
Symptoms located in several small joint regions (MCP-, wrist, PIP-, MTP-joints)	↑
Symptoms located in large joints	↑/↓
Symmetric symptoms or signs (bilateral in same joint region)	↑
Anxious feeling coincident with onset of musculoskeletal symptoms	↑
Depressive feelings coincident with onset of musculoskeletal symptoms	↑

Fatigue coincident with onset of musculoskeletal symptoms	↑
Sicca symptoms of eyes or mouth	↑
Functional impairment of the joint with symptoms	↑
Weight loss coincident with musculoskeletal symptoms	↑
Redness of joints	↑/↓
Local tenderness of involved joints at physical examination	↑
Presence of Heberden's or Bouchard's nodules	↓
Positive squeeze-test of MCP-joints	↑
Positive squeeze-test of MTP-joints	↑
Increased temperature of joints with symptoms	↑
Subfebrile body temperature (<38.5 °C, <101.3 °F)	↑

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Five items were by some experts indicated that its presence increased the likelihood of CSA (↑) while other experts indicated that its presence decreased (↓) the likelihood of CSA.

**Online supplementary table S2. Results of multilevel univariable and multivariable analyses with the weighted CSA classification as outcome providing the provisional set of parameters describing CSA (phase-2)**

	Univariable		Multivariable	
	Coefficient (95%CI)	p-value	Coefficient (95%CI)	p-value
Joint symptoms of recent-onset (duration <1 year)	2.53 (1.04 to 4.01)	<0.001*	3.58 (1.69 to 5.47) <sup>#</sup>	<0.001
4-10 joints with symptoms	-1.06 (-2.59 to 0.46)	0.17		
Symptoms located in MCP-joints	2.78 (1.42 to 4.15)	<0.001*	2.64 (-0.63 to 5.92) <sup>#</sup>	0.11
Symptoms located in MTP-joints	1.11 (-0.38 to 2.60)	0.15		
Symptoms located in several small joint regions (MCP, wrist, PIP, MTP-joints)	3.02 (1.68 to 4.37)	<0.001*	-2.90 (-6.81 to 1.00)	0.15
Symmetric symptoms or signs (bilateral in same joint region)	1.69 (-0.03 to 3.4)	0.054*	3.16 (0.92 to 5.41) <sup>#</sup>	0.006
Duration of morning stiffness ≥60 minutes	3.14 (1.81 to 4.47)	<0.001*	3.11 (1.37 to 4.84) <sup>#</sup>	<0.001
Most severe symptoms present in the early morning	3.47 (2.03 to 4.90)	<0.001*	1.50 (-0.52 to 3.53) <sup>#</sup>	0.15
Improvement of symptoms during the day	3.52 (2.13 to 4.90)	<0.001*	-1.66 (-3.96 to 0.65)	0.16
Increasing number of joints with symptoms over time	1.62 (-0.37 to 3.62)	0.11		

Patient-experience of swelling of small hand joints	2.27 (0.71 to 3.82)	0.004*	-0.58 (-1.91 to 0.75)	0.40
Presence of a first-degree relative with RA	0.98 (-0.83-2.78)	0.29		
Difficulty with making a fist	2.51 (0.77 to 4.25)	0.005*	3.15 (0.67 to 5.64) <sup>#</sup>	0.013
Local tenderness of involved joints at physical examination	1.52 (-0.27-3.31)	0.097		
Positive squeeze-test of MCP-joints	2.86 (1.46-4.26)	<0.001*	1.75 (-0.17 to 3.66) <sup>#</sup>	0.073
Positive squeeze-test of MTP-joints	0.70 (-1.05-2.45)	0.43		

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Presented are the results of the mixed model with crossed random effects with weighted CSA as outcome. Items that had in univariable analyses a  $p \leq 0.05$  and the item 'symmetric symptoms or signs' which had a univariable p-value of 0.054 were included in multivariable analysis (indicated with \*). The items with a positive coefficient in the multivariable analysis were combined to the provisional set of items describing CSA (indicated with <sup>#</sup>). The exponential of the coefficient (B) is the odds ratio (OR) of a parameter (indicating that a negative coefficient has an OR <1).

**Online supplementary table S3. Results of multilevel univariable and multivariable analyses with the weighted CSA classification as outcome providing the final set of parameters describing CSA on which consensus was reached in phase-2**

	Univariable		Multivariable	
	Coefficient (95%CI)	p-value	Coefficient (95%CI)	p-value
Joint symptoms of recent-onset (duration <1 year)	2.53 (1.04 to 4.01)	<0.001*	3.55 (2.50 to 4.60) <sup>#</sup>	<0.001
4-10 joints with symptoms	-1.06 (-2.59 to 0.46)	0.17		
Symptoms located in MCP-joints	2.78 (1.42 to 4.15)	<0.001*	1.83 (-0.001 to 3.67) <sup>#</sup>	0.05
Symptoms located in MTP-joints	1.11 (-0.38 to 2.60)	0.15*	-2.56 (-3.37 to -1.76)	<0.001
Symptoms located in several small joint regions (MCP, wrist, PIP, MTP-joints)	3.02 (1.68 to 4.37)	<0.001*	-0.45 (-2.68 to 1.77)	0.69
Symmetric symptoms or signs (bilateral in same joint region)	1.69 (-0.03 to 3.4)	0.054		
Duration of morning stiffness $\geq$ 60 minutes	3.14 (1.81 to 4.47)	<0.001*	4.57 (3.31 to 5.83) <sup>#</sup>	<0.001
Most severe symptoms present in the early morning	3.47 (2.03 to 4.90)	<0.001*	1.59 (-0.058 to 3.24) <sup>#</sup>	0.059
Improvement of symptoms during the day	3.52 (2.13 to 4.90)	<0.001*	-1.61 (-3.11 to -0.11)	0.035
Increasing number of joints with symptoms over time	1.62 (-0.37 to 3.62)	0.11		

Patient-experience of swelling of small hand joints	2.27 (0.71 to 3.82)	0.004*	-2.04 (-3.17 to -0.91)	<0.001
Presence of a first-degree relative with RA	0.98 (-0.83-2.78)	0.29*	1.13 (0.49 to 1.77) <sup>#</sup>	0.001
Difficulty with making a fist	2.51 (0.77 to 4.25)	0.005*	4.00 (2.45 to 5.55) <sup>#</sup>	<0.001
Local tenderness of involved joints at physical examination	1.52 (-0.27-3.31)	0.097		
Positive squeeze-test of MCP-joints	2.86 (1.46-4.26)	<0.001*	1.43 (-0.19 to 3.05) <sup>#</sup>	0.083
Positive squeeze-test of MTP-joints	0.70 (-1.05-2.45)	0.43		

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Presented are the results of the mixed model with crossed random effects with weighted CSA as outcome after the suggestions done at the first meeting: removing symmetry from the multivariable analysis and forced including MTP-involvement and a positive family history in the multivariable analysis (items indicated with \* are included in multivariable analysis). The items with a positive coefficient in the multivariable analysis were combined to the final set of items that characterise arthralgia and on which consensus was reached (indicated with <sup>#</sup>). This set was further evaluated in phase-3. The exponential of the coefficient (B) is the odds ratio (OR) of a parameter (indicating that a negative coefficient has an OR <1).

**Online supplementary table S4. Numbers of arthralgia patients with CSA and without CSA selected for phase-3 per participating center**

<b>Center</b>	<b>Total n of included patients (n=322)</b>	<b>N of patients with CSA (n=142)</b>	<b>N of patients without CSA (n=180)</b>	<b>N of patients identified without information on additional investigations (n=139)*</b>
Amsterdam (the Netherlands)	7	7	0	1
Birmingham (United Kingdom)	24	16	8	1
Bucharest (Romania)	33	9	24	13
Debrecen (Hungary)	5	4	1	0
Erlangen (Germany)	10	6	4	0
Groningen (the Netherlands)	18	6	12	15
Leiden (LUMC) (the Netherlands)	47	22	25	41
Leiden (region) (the Netherlands)	13	13	0	13
London (United Kingdom)	30	11	19	14

Lisbon (Portugal)	25	12	13	2
Madrid (Spain)	14	5	9	7
Montpellier (France)	40	15	25	1
Prague (Czech Republic)	17	6	11	17
Umeå (Sweden)	5	2	3	0
Vienna (Austria)	22	4	18	10
Wroclaw (Poland)	12	4	8	4

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\*These patients who were identified based on clinical presentation only (without the information on additional investigations) were used in the main analysis.

**Online supplementary table S5. Result of phase 3; discriminative ability (assessed by the AUC) of the 7 parameters characterising CSA, when the parameters were entered weighted and unweighted in multivariable logistic regression models with the presence or absence of CSA as outcome.**

	Coefficient B of multivariable logistic regression analysis	Rounded and Weighted	Unweighted
Joint symptoms of recent-onset (<1 yr)	2.2	2	1
Symptoms located in MCP-joints	0.4	0	1
Duration of morning stiffness $\geq$ 60 minutes	2.0	2	1
Most severe symptoms present in the early morning	2.2	2	1
Presence of first-degree relative with RA	1.9	2	1
Difficulty with making a fist	0.7	1	1
Positive squeeze-test of MCP-joints	2.7	3	1
Area under the ROC-curve (95%CI)	0.93 (0.89-0.97)	0.93 (0.89-0.97)	0.92 (0.87-0.96)

95%CI, 95% confidence interval.

Assessed were the 139 patients that were identified based on the clinical presentation only and without information on results of additional tests.

An example: using the weighted items a patient with joint symptoms of recent-onset who has difficulty with making a fist and a positive squeeze-test of the MCP-joints has 6 points (2+1+3). The range of scores using this approach is 0-12. In the analysis each patient got a weighted score. The presence/absence of CSA was the outcome and the AUC was determined. Similarly, this was done when the items were unweighted; then the scores ranged between 0 and 7.

**Online supplementary table S6. Subanalysis in 322 patients. Discriminative ability, (assessed by the AUC) of the 7 parameters characterising CSA, when the parameters were entered weighted and unweighted in a multivariable logistic regression models with the presence or absence of CSA as outcome.**

	Coefficient B	Weighted	Unweighted
of multivariable logistic regression analysis			
Joint symptoms of recent-onset (<1 yr)	1.6	2	1
Symptoms located in MCP-joints	0.3	0	1
Duration of morning stiffness $\geq$ 60 minutes	1.3	1	1
Most severe symptoms present in the early morning	1.9	2	1
Presence of first-degree relative with RA	1.1	1	1
Difficulty with making a fist	0.4	0	1
Positive squeeze-test of MCP-joints	1.8	2	1
Area under the curve (95%CI)	0.90 (0.86-0.93)	0.89 (0.86-0.93)	0.88 (0.84-0.92)

95%CI, 95% confidence interval.

For example: using the weighted items a patient with joint symptoms of recent-onset who have difficulty with making a fist and a positive squeeze-test of the MCP-joints has 4 points (2+0+2). Using this approach, each patient got a weighted score (ranging between 0 and 8) and the AUC was determined how this score discriminated patients with and

without CSA. Similarly, this was done when using the items unweighted (the score range between 0 and 7).