Pediatric Joint Pain: Is This JIA?

Recognize inflammatory pain before the laboratory results arrive

A practical approach to examination, ANA testing, and JIA phenotypes

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Disclosures

FINANCIAL RELATIONSHIPS

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MEDICATION USE

Some (most) medications discussed may be used off-label in pediatric rheumatology.

Learning Objectives

By the end, you should be able to make the next clinical decision with confidence.

1	DISTINGUISH	Distinguish inflammatory from non-inflammatory musculoskeletal pain using key historical and physical examination features.
2	USE ANA WELL	Critically apply ANA testing in the evaluation of pediatric joint complaints — including appropriate indications, interpretation, & when NOT to order.
3	RECOGNIZE JIA	Use the seven ILAR categories for formal classification and recognize four bedside phenotype families that guide the next clinical step.

Teaching strategy: Pattern recognition first; taxonomy and testing support the bedside impression.

Why this matters

Limited subspecialty access makes referral quality a patient-safety issue.

ACCESS

Limited nationally, especially in OK.

Recognition and triage matter.

GET THE RIGHT CHILD IN	Objective arthritis, systemic inflammation, uveitis, or a compelling history supportive of rheumatic disease.
AVOID LOW-VALUE TESTING	An indiscriminate “rheumatology panel” creates anxiety, raises health care costs, and is not useful in the diagnosis of non-inflammatory pain.
START WITH THE BEDSIDE	A focused history and examination should guide targeted testing; broad laboratory screening is not recommended without compatible clinical findings.

Central premise: The history & examination determine whether a test or referral is warranted.

PART 1

Is the pain inflammatory?

History and examination organize the entire workup.

The goal is not memorization.
The goal is to recognize the pattern.

Image source: illustAC [20]

The first question at the bedside:

Is this pain INFLAMMATORY?

5 Cardinal Signs of Inflammation

Pain (Dolor)

Redness (Rubor)

Immobility/Loss of Function (Functio Laesa)

Swelling (Tumor)

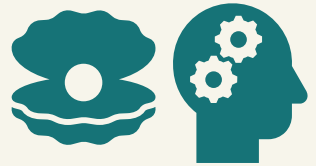
Heat (Calor)

MEDQUIZZONE

Get this distinction right, and the next step becomes much clearer, leading to prompt, appropriate intervention.

Image sources: Buoy Health [21] • MedQuizZone [22]

Inflammatory and non-inflammatory pain behave differently



Use a pattern, not a single symptom.

FEATURE	INFLAMMATORY	NON-INFLAMMATORY
WHEN	Morning or after rest	Later in day or after use
MOVEMENT	Typically improves stiffness	Provokes pain
EXAM	Warmth, effusion, thickening, loss of motion	Normal joint examination or focal mechanical tenderness, allodynia
COURSE	Persistent or progressive	Fluctuating; activity- or stress-linked
LABS	May be abnormal, but can be normal	Usually normal

Positive/negative ESR, CRP, ANA, HLA-B27, and/or RF do not include/exclude JIA

Source: Petty et al. 2021 [1] • PMM [2]

History: find the signal in the noise

MORNING	Stiffness, limp, or wants to be carried
AFTER REST	“Gelling” after class, car rides, or sitting
FUNCTION	Stops walking, playing, dressing, or opening containers
VISIBLE CHANGE	Swelling, loss of motion, or parent phone pics, muscle atrophy

SYSTEMIC SIGNS Prolonged fever, rash, ulcers, weight loss, lymphadenopathy

Red flags: Persistent fever, weight loss, refusal to bear weight, focal bony pain, cytopenias, objective contracture or leg-length discrepancy, or rapidly progressive swelling.

Source: Petty et al. 2021 [1] • PMM [3]

Is this pain INFLAMMATORY?

IF YES OR UNCERTAIN:

- Look for objective arthritis, systemic features, and pattern-specific clues.
- Use targeted tests based on history.
- Refer when appropriate.
- Urgent/unsure – pick up the phone and call us!

IF NO:

- Find the right team to treat the very real but non-inflammatory problem:
  - PT/PT, psychology, psychiatry, sleep, activity, sports medicine, orthopedics, or pain-focused care.
- Do NOT order a “rheum panel”
  - Results are not helpful in the absence of a compatible history and exam
  - Leads to increased cost, unnecessary anxiety, and delays in the patient getting appropriate care

The examination that finds pediatric arthritis

1 WATCH	Walk/run, squat, reach, open hands, turn the neck.
2 COMPARE	Right to left: contour, warmth, motion, muscle bulk.
3 MOVE	Active first, then passive. Look for a fixed loss of motion.
4 FEEL	Effusion, synovial thickening, focal bone or enthesis tenderness.

Arthritis is a finding, not a laboratory result.

Source: Foster et al. 2006 [4] • ACR Image Library [6]

Pediatric arthritis: findings that reveal chronicity or phenotype

ASYMMETRIC SWELLING

Compare both knees, muscle atrophy = chronic

LEG-LENGTH DIFFERENCE

Suggests chronic asymmetric inflammation

JAW ASYMMETRY

TMJ arthritis can be silent

DACTYLITIS

Think psoriatic JIA or SpA

Chronic changes can prove that the disease predates the reported appearance.

Source: Petty et al. 2021 [1] • Nigrovic et al. 2018 [14] • ACR Image Library [6]

Common mimics: organize them by pattern

Non-inflammatory chronic pain still deserves a specific diagnosis and plan.

FOCAL + ACTIVITY	Overuse/apophysitis; patellofemoral pain; osteochondritis dissecans
EVENING / ACTIVITY	Growing pains, hypermobility-associated pain
DIFFUSE + SENSORY	Amplified pain, allodynia, sleep and mood disruption
HIP / STRUCTURAL	Transient synovitis, SCFE, Perthes disease, tarsal coalition
DO NOT MISS	Septic arthritis, osteomyelitis, malignancy, non-accidental trauma

Do not stop at "not rheumatologic." Name the likely pathway & give the family a next step.

Source: Petty et al. 2021 [1] • Lehman & Carl 2017 [5] • PMM [3]

Case 1: Anna

HISTORY

2½-year-old with 3 weeks of morning limp after a minor fall; wants to be carried, improves by afternoon.

EXAM

Warm swollen left knee with:

- Extension loss
- 2-cm leg-length difference (left leg longer)
- Left thigh atrophy

Left elbow contracture

LABS

CBC, CMP, ESR, and CRP normal

DISCUSS

1. **Differential diagnosis?**
2. **Top differential?**
3. **What would you order?**
4. **Next steps?**

Knowledge Check: What findings point to chronic disease?

Anna: Physical Exam Carries the Most Weight

The "fall" explains when the family noticed the limp, not when or why arthritis developed.

INFLAMMATORY

- Morning-predominant limp
- Objective warmth, swelling, & extension loss
- Improves with activity

CHRONICITY

- Muscle atrophy
- Leg-length difference
- Elbow contracture

NEXT STEPS

- Targeted testing to exclude infection or other mimics
- ANA by HEp-2 IFA for uveitis risk stratification, not diagnosis
- Refer

Clinical pearl: Normal ESR and CRP do not rule out oligoarticular JIA.

Source: Petty et al. 2021 [1] • ACR 2026 [7] • Hutchinson et al. 2023 [8] • Angeles-Han et al. 2019 [15]

PART 2

ANA testing: when, why, and when not

Use ANA to answer a specific question, not to generate a differential.

ANA is NOT specific for rheumatic disease without a compatible phenotype

POSITIVE ANA

COMMON	Healthy children and transient post-infectious states can have a positive ANA – up to 30%.
CONTEXT FIRST	Order for objective or specific connective-tissue-disease features.
METHOD	When ANA is indicated, prefer HEp-2 indirect immunofluorescence with a reported titer & pattern.
JIA ROLE	ANA does **not** diagnose JIA; **it helps risk-stratify for asymptomatic chronic anterior uveitis risk in a patient with JIA**.

Do not repeat ANA to monitor symptoms or disease activity.

Source: Ostrov 2023 [9] • Angeles-Han et al. 2019 [15]

A positive ANA changes the probability only when the phenotype fits

LOOK AGAIN	Is there objective arthritis, photosensitive rash, cytopenia, proteinuria, raynaud phenomenon, weakness?
DO NOT CASCADE	Do not order a broad antibody panel solely because ANA is positive.
DO NOT TREND	ANA is not a disease-activity marker.

ANA in JIA

After inflammatory arthritis is established:

- ANA helps stratify eye-screening risk.
- ANA still does not confirm JIA.
- **Isolated ANA plus a normal examination does not equal JIA or arthritis.**

Interpret the patient, then interpret the test.

Source: Ostrov 2023 [9] • Yazdany et al. 2013 [11] • Angeles-Han et al. 2019 [15]

When not to order an ANA:

Without objective or specific autoimmune features, a positive result distracts or causes more anxiety than it helps.

- ✕ Fatigue or insomnia alone
- ✕ Diffuse non-inflammatory pain
- ✕ Chronic headache
- ✕ Mechanical back pain
- ✕ Hypermobility / POTS symptoms
- ✕ Recent viral illness
- ✕ Family history alone
- ✕ “Just to rule out rheumatology”

Better question: What objective finding am I trying to explain?

Source: Ostrov 2023 [9]

PART 3

JIA: recognizable phenotype families

Use seven ILAR categories for formal classification; the four families are a bedside teaching heuristic.

The goal is not memorization. It is recognizing the pattern that changes what you do next.

JIA is an umbrella diagnosis

Under the current ILAR definition, all three elements are required.

1 ONSET

Before the 16th birthday

2 DURATION

Arthritis for at least 6 weeks

3 EXCLUSION

No better infectious, malignant, traumatic, or rheumatic explanation

Classification helps communicate phenotype

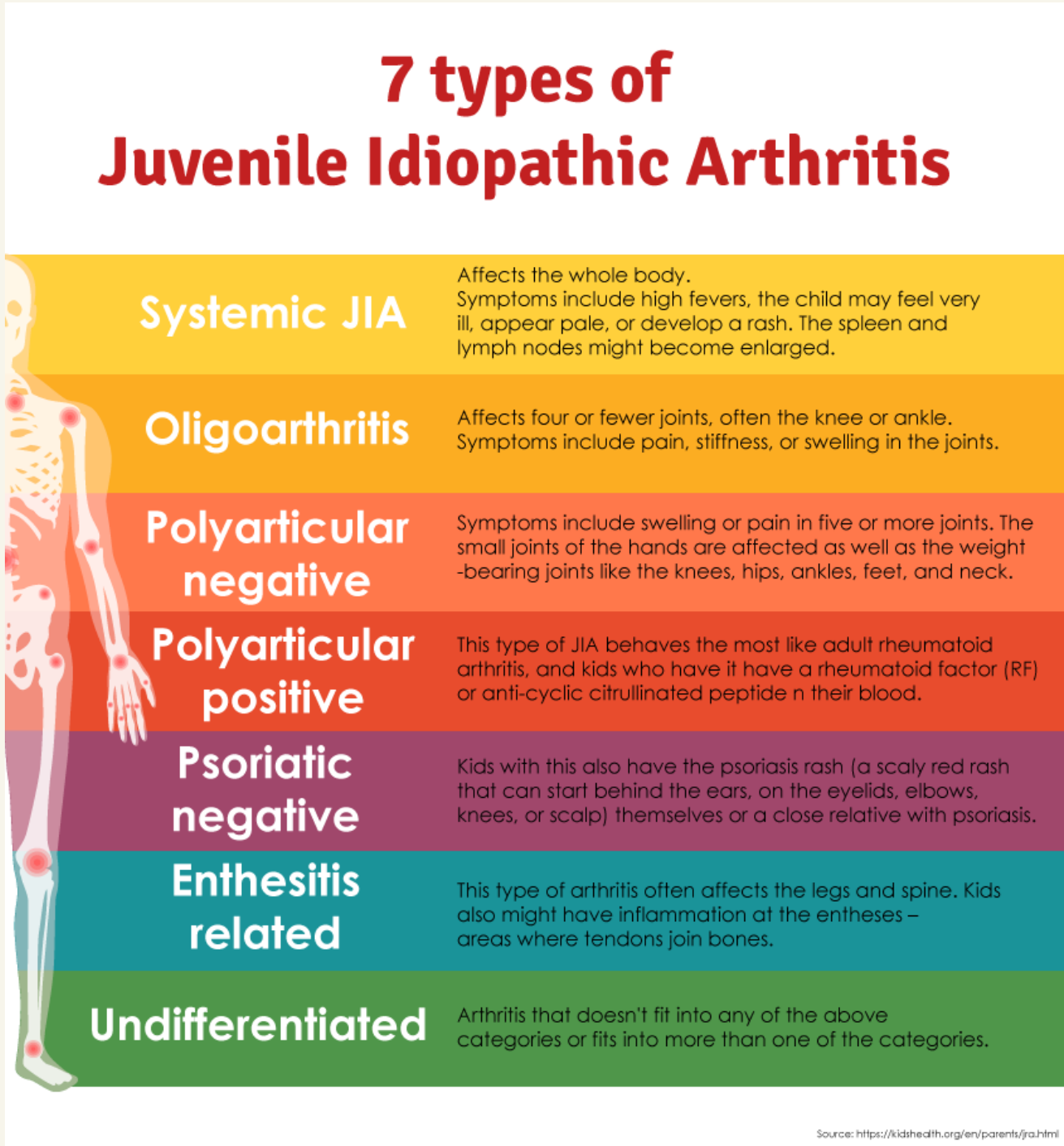
Source: Petty et al. 2004, ILAR [12] • Martini et al. 2019, preliminary PRINTO [13]

The seven ILAR categories

Formal classification has seven categories

Four families on the next slide are a more practical approach for evaluation

Source: Petty et al. 2004 [12] • Martini et al. 2019 [13]



Seven ILAR categories; four bedside phenotype families

EARLY-ONSET ANA+

Oligoarticular • young RF-negative polyarticular • young psoriatic phenotype

Silent uveitis risk

RA-LIKE POLYARTHRITIS

RF-positive polyarticular • older symmetric RF-negative polyarticular

Small-joint burden and damage risk

SPONDYLOARTHRITIS FAMILY

ERA • older psoriatic phenotype

Enthesitis, dactylitis, axial and acute-eye clues

SYSTEMIC / AUTOINFLAMMATORY

Systemic JIA/ Stills Disease

Quotidian fever, evanescent rash, MAS risk

Undifferentiated JIA fits none or more than one ILAR category & remains a legitimate follow-up diagnosis.

Source: Nigrovic et al. 2018 [14] • Petty et al. 2004 [12]

Phenotype 1: young-child, ANA-associated arthritis (bedside pattern)

Asymmetric arthritis may look mild and still carry silent eye risk.

TYPICAL PATTERN

Girl under 6 • one or a few large joints • normal markers possible

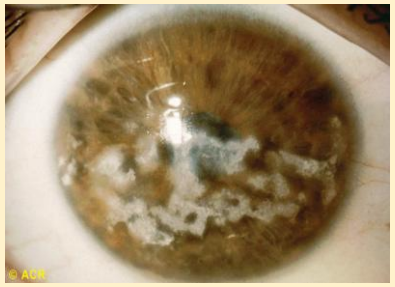
ILAR LABELS	Oligoarticular JIA; some young RF-negative polyarticular or psoriatic disease
CLUES	Asymmetry, contracture, leg-length difference, subtle functional regression
SAFETY ISSUE	Chronic anterior uveitis can be asymptomatic
ACTION	Slit-lamp examination within 1 month of dx; then screen at a risk-based interval

Typically have normal or only mildly increased inflammation markers

Source: Petty et al. 2021 [1] • Hutchinson et al. 2023 [8] • Angeles-Han et al. 2019 [15] • ACR Image Library [6]

Two eye patterns: silent screening disease versus a red-eye emergency

CHRONIC ANTERIOR UVEITIS

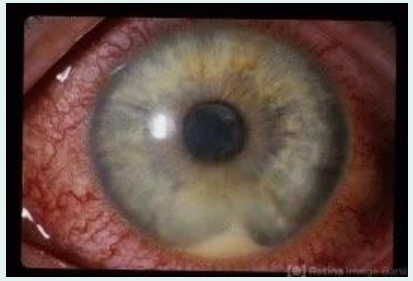


Painless and visually silent

Higher risk with young age at arthritis onset, ANA positivity, & early disease duration

Requires scheduled ophthalmologic screening

ACUTE ANTERIOR UVEITIS



Painful, red, photophobic eye

More typical of HLA-B27 / spondyloarthritis phenotypes

Requires urgent ophthalmic assessment

Absence of symptoms does not reassure in a child at risk for chronic JIA-associated uveitis.

Source: Angeles-Han et al. 2019 [15] • ACR Image Library [6] • ASRS Retina Image Bank [23]

Phenotype 2: RA-like polyarthritis

PATTERN

Symmetric small-joint disease: wrists, MCPs, PIPs, MTPs

RF NEGATIVE

- Heterogeneous
- Older symmetric disease may resemble seronegative RA
- Younger ANA+ disease may behave like extended oligoarthritis.

RF POSITIVE

- Adolescent-predominant
- Often anti-CCP positive
- Erosive risk
- Biologically = to adult seropositive RA.

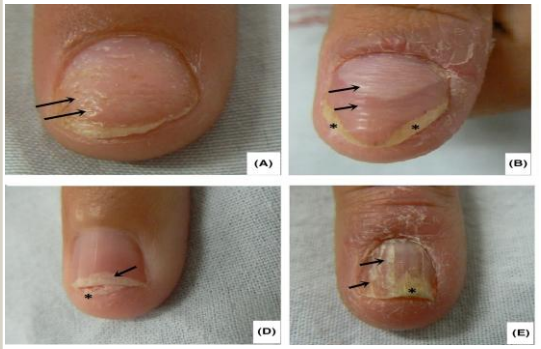
Do not forget TMJ, cervical spine, hips, function, and growth while counting joints.

Source: Nigrovic et al. 2018 [14] • Petty et al. 2004 [12] • ACR Image Library [6]

Phenotype 3: the spondyloarthritis family

Enthesitis, dactylitis, skin and bowel clues matter.

DACTYLITIS



PSORIASIS / NAILS

PALPATE INSERTIONS

- Tenderness at the tendon or ligament
- Enthesitis pattern

ASK ABOUT

- Heel or patellar enthesis pain
- Inflammatory back or buttock pain
- Psoriasis, nail pits, IBD
- Painful red photophobic eye

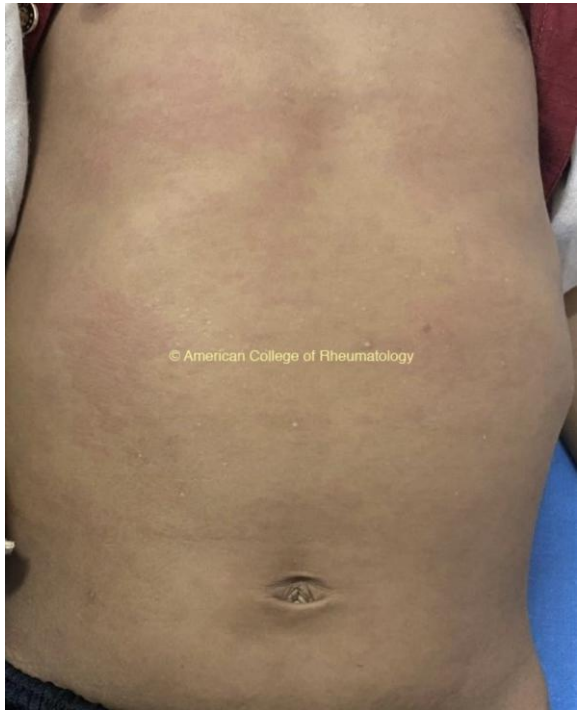
Arthritis can precede psoriasis

HLA-B27 association: HLA-B27 has poor sensitivity & specificity for diagnosis, and you can have spondyloarthritis and be HLA-B27 negative.

Source: Petty et al. 2004 [12] • Nigrovic et al. 2018 [14] • Uber et al. 2018 [19] • ACR Image Library [6]

Phenotype 4: Systemic JIA /Still-disease

An AUTOINFLAMMATORY disease



EVANESCENT RASH

May appear with fever and fade as temperature falls.

FEVER	Spiking fever, typically ≥39°C, for at least 7 days; a quotidian pattern is common
SYSTEMIC	Evanescent rash, lymphadenopathy, hepatosplenomegaly, or serositis
LABS	Marked inflammation may include leukocytosis, thrombocytosis, anemia, & elevated ferritin
RISK	Macrophage activation syndrome can evolve rapidly

Arthritis may be a late finding.

Source: Fautrel et al. 2024 [16] • ACR 2026 [7] • ACR Image Library [6]

Macrophage activation syndrome: recognize the change in trajectory

Catch before criterion is met.

FEVER

Persistent

COUNTS

Platelets or other cell lines fall;
ESR falls/"normalizes"

COAGULATION

Triglycerides rise; fibrinogen falls;
coagulopathy may emerge

LIVER / FERRITIN

AST, CRP, and ferritin rise rapidly

Emergency action: Escalate care emergently; trend CBC, AST/ALT, ferritin, triglycerides, fibrinogen, and coagulation studies. CALL ME!

Source: Fautrel et al. 2024 [16] • Ravelli et al. 2016 [17] • Lerkvaleekul & Vilaiyuk 2018 [18]

What happens after referral?

Treatment is phenotype- and risk-driven, with inactive disease as the target.

1

CONFIRM

Document active joints, function, growth, eye risk, and high-risk sites such as TMJ or hip.

2

CONTROL

The goal is to limit glucocorticoid exposure while controlling diseased.

3

PROTECT

Ophthalmology, immunizations, activity and therapy, bone health, and medication safety.

4

MEASURE

Treat to inactive disease; reassess function, damage, and participation.

For primary care: Help maintain access, preventive care, rehabilitation, & eye-screening follow-through.

Source: ACR 2026 [7]

Case 2: Madison

HISTORY 15-year-old with diffuse pain, fatigue, and insomnia; worse after activity & at the end of the day; no morning stiffness.

EXAM Normal joints; Beighton score 6/9; diffuse tenderness to light touch.

LABS Normal CBC, CMP, ESR, CRP; ANA 1:160 with a dense fine-speckled IFA pattern.

DISCUSS

1. Does ANA change the differential?

2. Does she need a rheumatology referral?

3. Next steps?

Commit to an answer: What is the next useful intervention?

Source: Ostrov 2023 [9]

Madison: treat the phenotype, not the antibody

Her story and examination are non-inflammatory.

WHAT FITS

- Activity-provoked diffuse pain
- No morning stiffness or swelling
- Normal joint examination and inflammatory markers
- Allodynia, hypermobility, poor sleep

WHAT NOT TO DO

- No antibody cascade
- No serial ANA testing
- Do not tell the family that ANA alone means lupus or autoimmune disease
- No rheumatology referral solely for ANA positivity

WHAT HELPS

- Validate symptoms
- Restore sleep and graded activity
- Physical therapy/rehabilitation
- Screen mood, stressors, and function
- Use pain resources when indicated

A positive ANA does not create autoimmune disease. The clinical phenotype still leads.

Source: Ostrov 2023 [9] • Hoffart & Wallace 2014 [10]

FINAL CHECK

Apply what you have learned

Choose the best next step, then explain why the distractors are wrong.

Question 1

Choose the single best answer.

A 4-year-old has 8 weeks of painless right knee swelling and morning stiffness. ESR and CRP are normal, and the patient is afebrile. Which next step is most appropriate?

- **A** Refer to a pediatric rheumatologist for suspected oligoarticular JIA
- **B** Reassure because normal inflammatory markers exclude arthritis
- **C** Order ANA, RF, dsDNA, ENA panel, complements
- **D** Send to the ER for urgent aspiration and possible washout with orthopedics

Source: Petty et al. 2021 [1] • ACR 2026 [7] • Hutchinson et al. 2023 [8] • Angeles-Han et al. 2019 [15]

Question 2

Choose the single best answer.

A 14-year-old boy has heel pain, ankle swelling, morning stiffness, and a painful photophobic red eye. Which diagnosis best unifies the findings?

- **A** Oligoarticular JIA with silent chronic uveitis
- **B** Enthesitis-related arthritis with acute anterior uveitis
- **C** Growing pains with viral conjunctivitis
- **D** Amplified pain syndrome

Source: Petty et al. 2004 [12] • Angeles-Han et al. 2019 [15]

Question 3

Choose the single best answer.

A child with systemic JIA develops a new persistent fever and is found to be pancytopenic with an elevated AST and ferritin after a routine viral infection. What is the best next action?

- **A** Provide reassurance, this is likely another self resolving viral illness
- **B** Obtain cultures, defer MAS-directed evaluation & treatment until infection is excluded
- **C** Repeat ANA to determine whether disease has become autoimmune
- **D** Admission, evaluation, and treatment for suspected MAS

Source: Fautrel et al. 2024 [16] • Ravelli et al. 2016 [17] • Lerkvaleekul & Vilaiyuk 2018 [18]

Answer key: what each question was testing

1 A — Objective arthritis may coexist with normal ESR/CRP. Broad antibody panels and waiting for five joints are inappropriate; ophthalmic evaluation follows diagnosis.

2 B — Heel enthesitis plus arthritis and a painful photophobic eye suggest ERA with acute anterior uveitis; chronic JIA uveitis is usually silent.

3 D — Changing fever plus falling counts and rising AST/ferritin suggests MAS. Evaluate for infection concurrently; do not delay MAS-directed treatment.

Board strategy: Identify the phenotype and the safety issue before interpreting the laboratory distractors.

Source: Petty et al. 2021 [1] • Hutchinson et al. 2023 [8] • Angeles-Han et al. 2019 [15] • Ravelli et al. 2016 [17] • Lerkvaleekul & Vilaiyuk 2018 [18]

Five take-home points

1	START	**Ask whether the pattern is inflammatory.**
2	EXAMINE	**Watch gait, compare sides, test motion, and look for chronic growth changes.**
3	TEST WITH PURPOSE	**ANA answers a specific question; it is not a screening test.**
4	RECOGNIZE PATTERNS	**Use four bedside phenotype families for JIA to help recognize disease.**
5	PROTECT	**Do not miss silent uveitis, acute red-eye disease, systemic inflammation, or MAS.**

You know more than you think: the phenotype tells you what to do next.

Source: ACR 2026 [7] • Ostrov 2023 [9] • Petty et al. 2004 [12] • Angeles-Han et al. 2019 [15] • Ravelli et al. 2016 [17]

Questions?

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