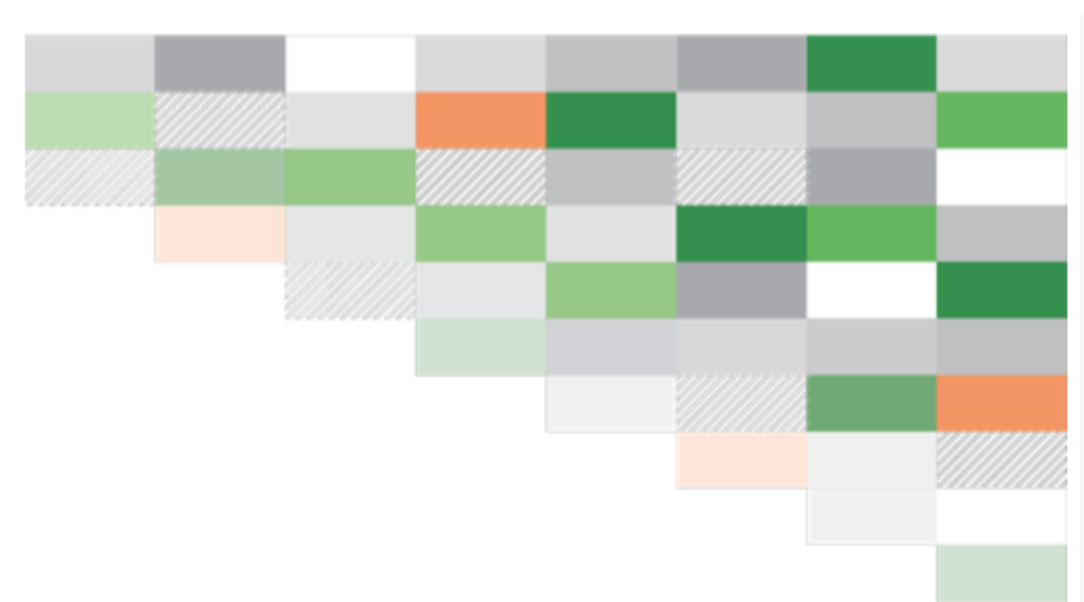




Soluble Urokinase Plasminogen Activator Receptor (SuPAR)

Analysis for Diagnosis of Periprosthetic Joint Infection

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67

joint aspirates
analyzed (60 patients)

64%

confirmed PJI
(n = 43 / 67)

54 ng/mL

optimal synovial
suPAR cut-off

0.80 / 0.70

synovial suPAR
PPV / NPV

Introduction

Periprosthetic joint infection (PJI) affects at least 2% of joint replacements and is a growing clinical and economic burden as arthroplasty volumes rise. Synovial white blood cell count remains the diagnostic gold standard, but soluble urokinase plasminogen activator receptor (suPAR) — an inflammation marker already used in sepsis and cardiac disease — has never been evaluated in synovial fluid.

This study investigates whether suPAR in blood plasma and synovial fluid can serve as a diagnostic biomarker for PJI, using the EBJIS criteria as reference standard.

Methods

Study design: Retrospective single-centre cohort, Jan 2019-Oct 2021; 60 adult patients, 67 joint punctures (knee 82%, hip 16%, shoulder 2%)

Case definition: PJI classified per European Bone and Joint Infection Society (EBJIS) criteria by a blinded assessor

Laboratory analyses: Blood: WBC (whole blood), CRP (plasma), suPAR (plasma) · Synovial fluid: suPAR (ELISA)

Statistical approach: ROC analysis; optimal cut-offs by Youden's J; diagnostic performance reported as PPV and NPV

Results

Of 67 samples, 43 (64%) met EBJIS criteria for PJI and 24 (36%) were PJI-negative. Synovial cell count, plasma CRP, and synovial suPAR were all significantly higher in infected joints ($p \leq 0.002$); plasma WBC and plasma suPAR did not differ between groups ($p \geq 0.132$).

Marker	Cut-off	PPV	NPV
WBC (blood)	9.6 G/L	0.84	0.39
CRP (plasma)	36 mg/L	0.86	0.55
suPAR (plasma)	12 ng/mL	1.00	0.31
suPAR (synovial)	54 ng/mL	0.80	0.70

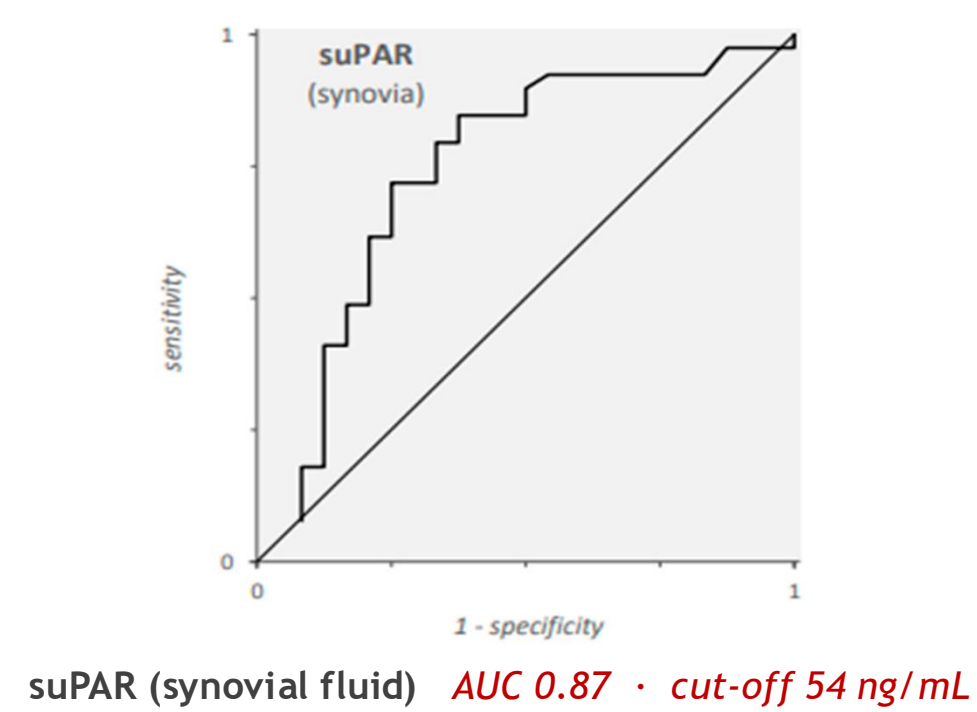
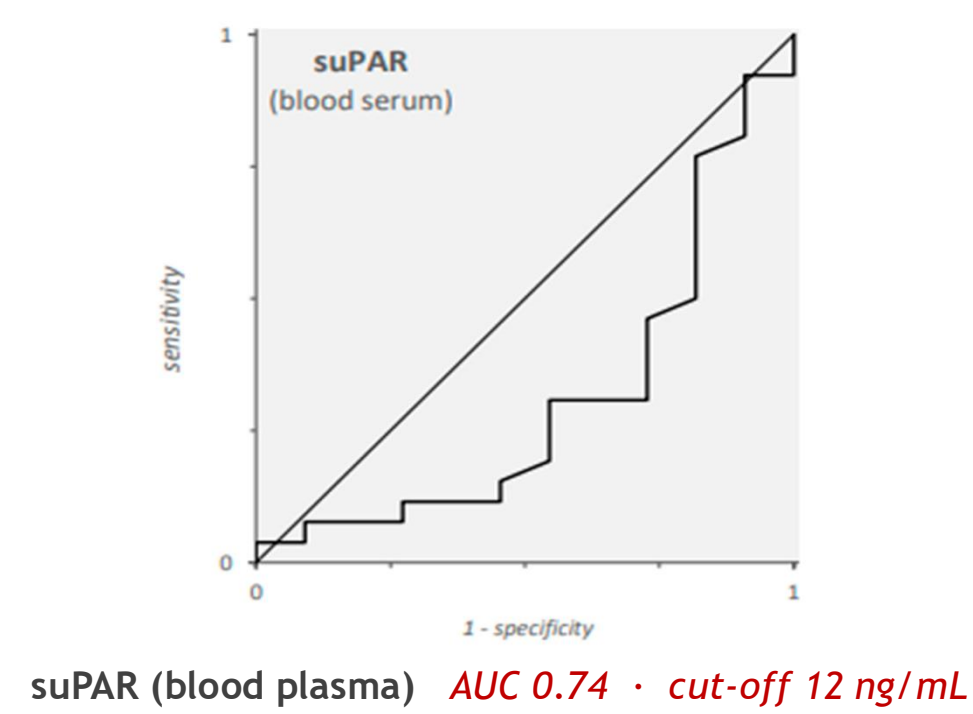
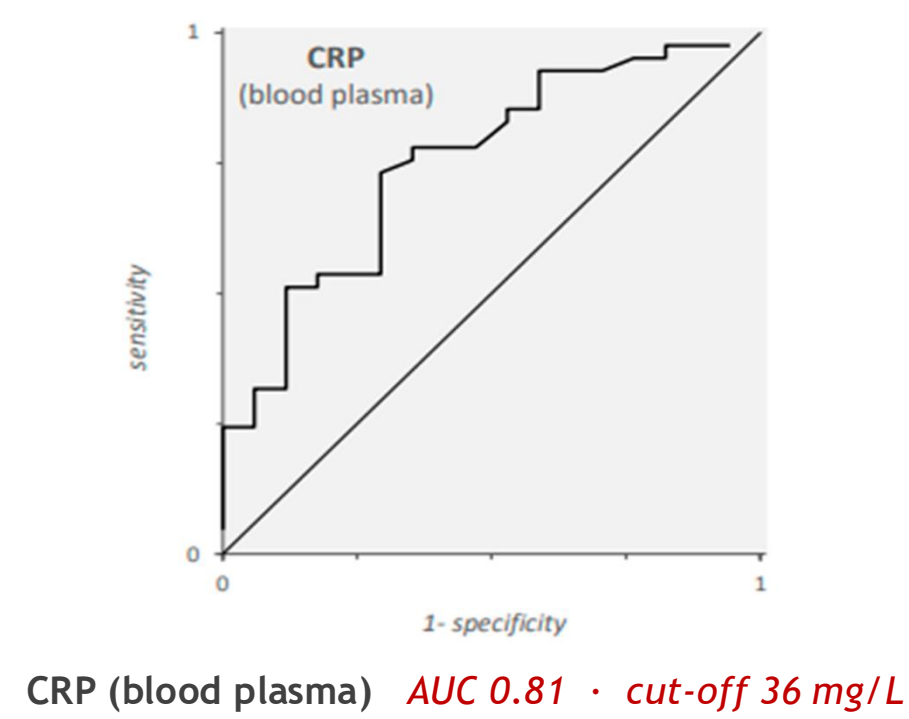
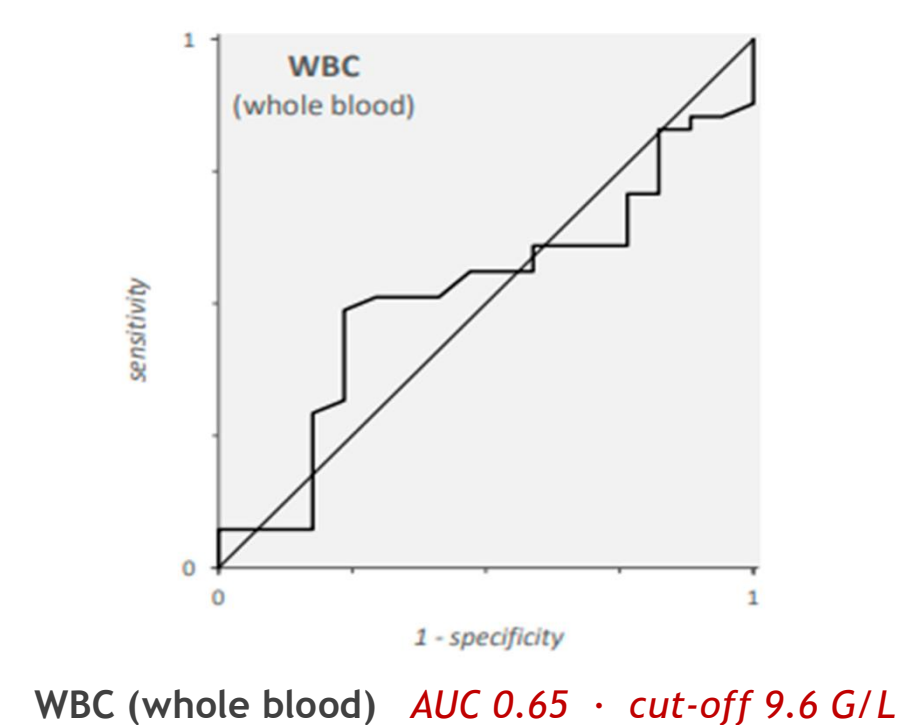
Conclusion

- Synovial suPAR shows solid diagnostic performance, comparable to plasma CRP, and may serve as an alternative or complementary biomarker for PJI.
- Plasma suPAR was highly specific but poorly sensitive — not suitable as a stand-alone screening test.
- An automated, non-cytological suPAR assay could shorten laboratory turnaround versus manual synovial cell counting.
- Findings require validation in larger, prospective, multi-centre cohorts.

KEY TAKEAWAY

Synovial suPAR performs on par with plasma CRP and needs no cytology expertise — a fast, objective candidate to complement synovial cell count in PJI work-up.

Diagnostic Performance — ROC Curves



References

- McNally M, Sousa R, Wouthuyzen-Bakker M, et al. The EBJIS definition of periprosthetic joint infection. Bone Joint J. 2021;103-B:18-25.
- Galliera E, Drago L, Marazzi MG, et al. Soluble urokinase-type plasminogen activator receptor (suPAR) as new biomarker of prosthetic joint infection. Clin Chim Acta. 2015;441:23-28.
- Klim SM, Prattes J, Amerstorfer F, et al. Soluble Urokinase Plasminogen Activator Receptor (SuPAR) Analysis for Diagnosis of Periprosthetic Joint Infection. Antibiotics. 2024;13:179.
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