

Achilles Tendon and Plantar Fascia in Diabetic Foot: Biomechanical and Ultrasound Predictors of Ulcer Risk

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1. INTRODUCTION

Diabetic foot ulcers (DFUs) are among the most serious and disabling complications of diabetes mellitus, with a major impact on quality of life and amputation risk.

Recent evidence suggests that Achilles tendon (AT) and plantar fascia (PF) tendinopathies may represent key biomechanical factors contributing to increased plantar pressures and, consequently, to the development of ulceration.

Ultrasound and sonoelastographic parameters of these structures are emerging as potential non-invasive predictive markers of ulcer risk.

6 STUDY SELECTION



2. AIM

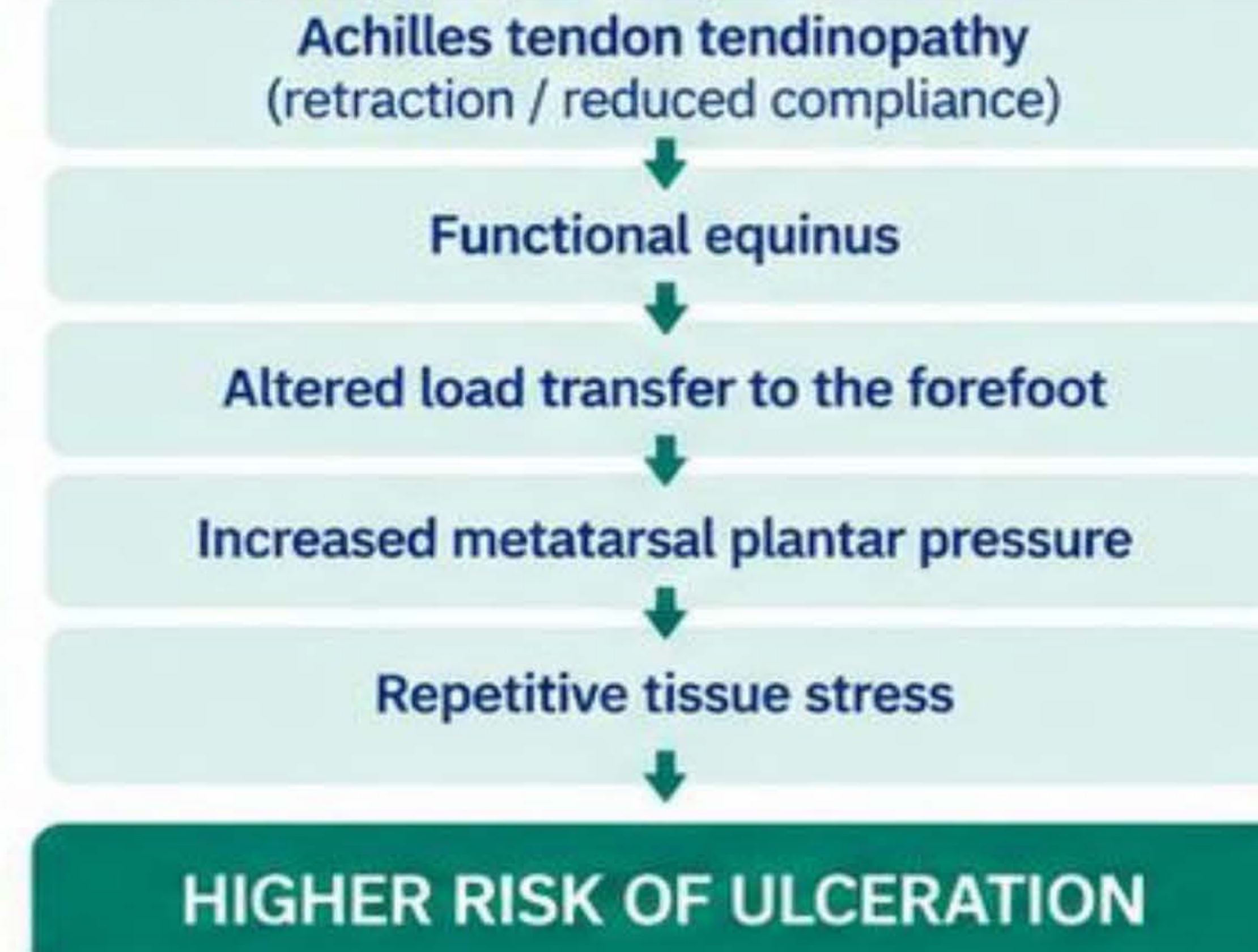
To investigate the role of Achilles tendon (AT) and plantar fascia (PF) abnormalities as biomechanical determinants of plantar overload and to assess whether ultrasound and sonoelastographic features may represent potential non-invasive markers of diabetic foot ulceration risk.

3. METHODS

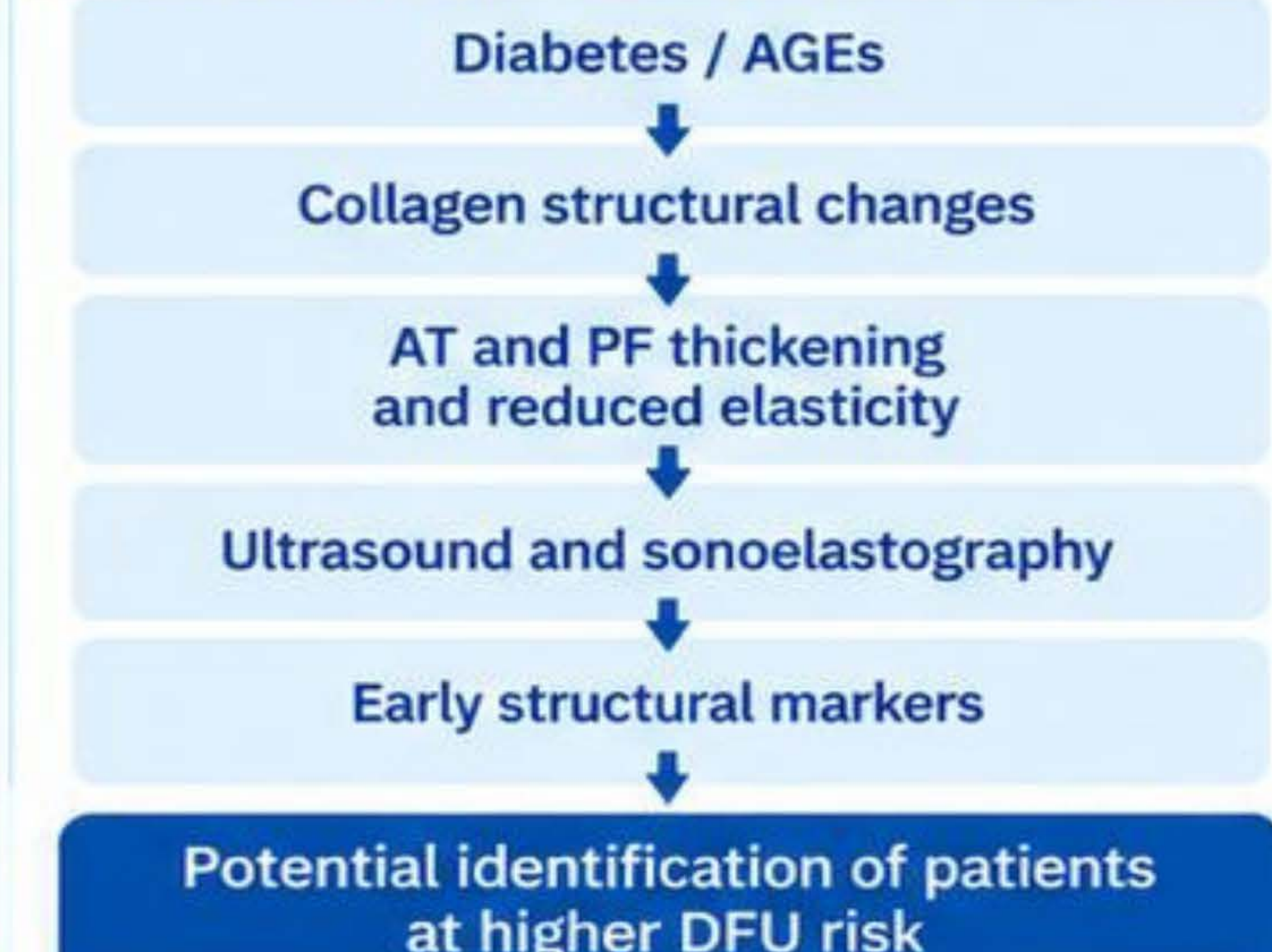
- 1  Systematic review conducted according to PRISMA 2020 guidelines.
- 2  Literature search on PubMed (May–August 2025).
- 3  Inclusion of original studies on adult patients with diabetes.
- 4  Two research questions:
 Q1 – association between AT/PF tendinopathies and biomechanical or plantar pressure alterations;
 Q2 – ultrasound and sonoelastographic as predictive markers of ulceration risk.



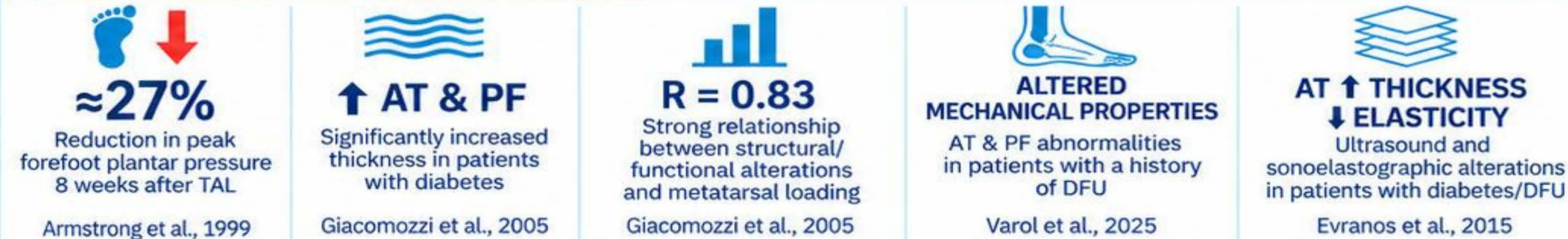
4. Q1 – BIOMECHANICAL PATHWAY From tendinopathies to plantar overload



5. Q2 – PREDICTIVE PATHWAY From imaging to risk stratification



7. KEY FINDINGS (FROM INCLUDED STUDIES)



8. CONCLUSIONS

Achille tendon and plantar fascia tendinopathies represent both biomechanical drives of plantar overload and potential early structural marker of ulceration risk in the diabetic foot. Integrating tendon assessment into screening protocols may improve early risk stratification. Advanced imaging techniques, particularly sonoelastography, appear promising for the early detection of tissue alteration; however, large-scale prospective studies are needed to validate their clinical utility and establish standardized screening protocols.

9. REFERENCES

1.  Giacomozzi C, D'Ambrogio E, Uccioli L, Macellari V. Does the thickening of Achilles tendon and plantar fascia contribute to the alteration of diabetic foot loading? *Clin Biomech (Bristol, Avon)*. 2005;20(5):532–539. doi:10.1016/j.clinbiomech.2005.01.011.
2. Evranos B, Idilman I, Ipek A, Polat SB, Cakir B, Ersoy R. Real-time sonoelastography and ultrasound evaluation of the Achilles tendon in patients with diabetes with or without foot ulcers: a cross-sectional study. *J Diabetes Complications*. 2015;29(8):1124–1129. doi:10.1016/j.jdiacomp.2015.08.012.