Identification of pre-race ultrasonographic abnormalities of the achilles tendon and association with future injuries in runners

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Purpose
Several studies have identified that broad structural differences on ultrasonography of the Achilles tendon are associated with future injury. This study aimed to identify more specific abnormalities that are related to pain development in a cohort of half-marathon and marathon runners.

Methods & Study Design
A post-hoc analysis was performed on a dataset of 304 Achilles tendons from 152 asymptomatic runners who had an ultrasound evaluation prior to a half-marathon or marathon race and reported symptoms within 6 months. Five rules were established and examined independently in a blind fashion by three reviewers of varying sonographic experience (medical student, resident, experienced sonographer).

Results
Of five proposed rules, three demonstrated significance in relation to the development of future symptoms: 1) focal deep midsubstance intratendinous hypoechogenicity (OR 10.0 [2.2-46.8], \(p<0.001\)), 2) focal superficial midsubstance intratendinous hypoechogenicity (OR 5.2 [1.7-15.6], \(p=0.001\)), and 3) linear hyperechogenicity extending into middle of tendon from calcaneus (perfect OR, \(p=0.009\)). Inter-rater kappa values were 1) 0.512-0.729, 2) 0.458-0.826, and 3)
1.000. Sensitivity values ranged from 0.025 to 0.150, specificities from 0.967 to 1.000, positive predictive values from 0.250 to 1.000, negative predictive values from 0.876 to 0.887, and area under the receiver operating characteristic curve values from 0.513 to 0.559.

**Conclusion**
This study suggests that certain structural differences in the Achilles tendon visualized on pre-race ultrasound are specific for association with future development of pain. Validation testing on a prospective cohort should be performed.

**Significance**
Utilization of a novel set of simple ultrasound findings of the Achilles tendon may be predictive of future injury in runners.