

targeted interventions **OBJECTIVES/GOALS:** The emergence of multidrug-resistant tuberculosis (MDR-TB) poses serious challenges for the global eradication of tuberculosis. Recent research has shown that transmission is now the dominant driver of MDR-TB. However, our limited understanding of where and among whom MDR-TB is transmitted hampers efforts to control person-to-person spread. **METHODS/STUDY POPULATION:** We used several analytic approaches to characterize the dynamics of MDR-TB transmission in Shanghai, China. We identified all culture-confirmed MDR cases between 2009-2016 in the city and 1) estimated individual-level risk factors for MDR disease; 2) mapped the TB cases by their home addresses and used a Bayesian spatial disease mapping method to identify regions with an elevated risk of MDR-TB; and 3) we sequenced all MDR isolates to understand whether transmission explained variance in risk that was not attributable to the distribution of individual or location-specific risk variates. **RESULTS/ANTICIPATED RESULTS:** There were 1034 MDR-TB cases among 16,315 culture-confirmed TB cases during the study period. Bayesian disease mapping identified spatial heterogeneity of MDR-TB and determined four hotspots with an elevated risk of MDR-TB, none of which were fully explained by individual or regional-covariates (Figure 1). Sequencing revealed that more than 40% of the MDR-TB strains were in genomic clusters, indicating recent MDR-TB transmission. Most importantly, MDR-TB cases in three of the four large clades (>8 isolates) were spatially concentrated in three strain-specific hotspots (Figure 2). **DISCUSSION/SIGNIFICANCE OF FINDINGS:** With the combination of traditional epidemiological tools, geographical, and genomic methods, this study revealed multiple loci of transmission of specific MDR-TB clades within a single city. Identification of where and among whom MDR-TB is transmitted can inform the design of targeted interventions.

Evaluation

27042

Pressure-pain thresholds at baseline and in response to isometric exercise in Achilles tendinopathy

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ABSTRACT IMPACT: Baseline presentation in AT (higher upper trapezius PPT with no difference at calf or tendon) may suggest a mechanism for persistent symptoms: with more advantageous central pain processing and no tradeoff peripherally, they may choose to continue their usual activities without regard for further damage to the affected tendon. **OBJECTIVES/GOALS:** Exercise-induced hypoalgesia, a reduction in pain with exercise, is often observed in healthy populations but is not well established in Achilles tendinopathy (AT). The aim was to compare pressure-pain threshold (PPT) at baseline and after fatiguing isometric exercise in AT and healthy controls. **METHODS/STUDY POPULATION:** 21 participants were recruited for the study: 7 AT (26.5 ± 8.8 yrs), 14 control (22.1 ± 3.2 yrs). After a familiarization session, participants completed an experimental session that involved performance of intermittent maximal voluntary isometric contractions (MVICs) (2s:2s duty cycle) in a Biodex3 dynamometer (Biodex Medical, Shirley, NY) for 4 minutes. PPT was measured at the medial gastrocnemius (calf), Achilles tendon, and upper trapezius at baseline

and immediately following the fatiguing isometric task using a Somedic Algometer (Somedic AB, Sweden). Data are expressed as Mean(SD). Change in PPT is expressed as a percentage of baseline PPT. Units for PPT are kPa. A priori alpha was set to 0.05. **RESULTS/ANTICIPATED RESULTS:** There was no change in tendon or calf PPT following isometric exercise in AT (tendon: p=0.78; calf: p=0.76), while both increased (i.e., exercise-induced hypoalgesia) in controls (tendon: 9.5(17.8), p=0.03; calf: 21.3(22.7), p<0.01). Neither group experienced a post-exercise change in upper trapezius PPT (AT: p=0.35; control: p=0.37). There was no between-group difference in baseline calf (p=0.14) or tendon (p=0.19) PPT. However, baseline and post-exercise upper trapezius PPT were significantly higher in AT (baseline: 335.6(194.8); post-exercise: 321.2(170.1)) than in controls (baseline: 193.7(75.1), p<0.01; post-exercise: 198.1(79.1), p<0.01). **DISCUSSION/SIGNIFICANCE OF FINDINGS:** These findings suggest: (1) in persons with AT, central pain processing is altered at baseline, but unaffected in response to isometric fatiguing exercise; and (2) in persons with AT, peripheral pain processing is unaffected at baseline, but is altered in response to this mode and dosage of fatiguing isometric exercise.

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Can Ultrasound detect changes to spinal cord blood flow before and after injury?

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ABSTRACT IMPACT: To track recovery and mitigate additional spinal cord injury (avoiding further paralysis), we are assessing the applicability of an implantable ultrasound device that can monitor the tissue health postoperatively. **OBJECTIVES/GOALS:** To date, no method has been developed that monitors spinal cord perfusion rate (mL/min/g) or pressure (mmHg) successfully after the surgery. Our goal is to design, construct, and validate (in animal models) a novel sensor that quantifies postoperative tissue perfusion in patients with SCI at the site of and downstream from the injury. **METHODS/STUDY POPULATION:** A sample size of 10 animals will allow us to test our hypothesis to track tissue perfusion before and after the SCI using ultrasound. After prepping and scrubbing the animal, the skin will be incised with a blade, bony structures will be removed and the spinal cord will be revealed. A 25-g weight will then be dropped from a height of 15 cm, and the animal will be observed for contraction of the lower extremities, a sign that the cord was damaged. Using Doppler ultrasound settings available on commercial transducers, we will investigate the acceptable frequency, as well as proper Doppler mode with and without contrast agents, and with and without elastography (stiffness mapping of the tissue). A range of frequencies will be tested (5 -25 MHz). **RESULTS/ANTICIPATED RESULTS:** It is expected that at frequencies 12 MHz and above, our radiologist collaborators would be able to easily detect the blood flow. It is also expected that the injury will have a noticeable effect on the changes of this detected blood flow. We aim to present figures demonstrating ultrasound image qualities obtained at various frequencies. We expect three such figures: one for gray scale ultrasound imaging, one for color Doppler and finally, one for spectral Doppler, which is the one mostly used to quantify blood flow. **DISCUSSION/SIGNIFICANCE OF FINDINGS:** To monitor recovery and mitigate secondary injury in patients with traumatic SCI, there is a need to monitor tissue perfusion intra-operatively. To address this need, we will design, construct, and validate a novel sensor that will postoperatively quantify tissue perfusion for the SCI patients at the site of the injury.