

# INPLASY PROTOCOL

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**Corresponding author:**  
Yinghui Hua

hua\_cosm@aliyun.com

**Author Affiliation:**  
Department of Sports  
Medicine, Huashan Hospital,  
Shanghai, China.

**Support:** NNS Found of China.

**Review Stage at time of this submission:** The review has not yet started.

**Conflicts of interest:**  
None.

## Do functional trainings influence proprioception in patients with chronic ankle instability ? A systematic review with meta-analyses

Tao, W<sup>1</sup>; Xue, X<sup>2</sup>; Li, Q<sup>3</sup>; Hua, Y<sup>4</sup>.

**Review question / Objective:** Do functional trainings influence proprioception (kinesthesia, joint position sense, and force sense) in patients with chronic ankle instability?

**Condition being studied:** Lateral Ankle sprain (LAS) is one of the most common sport-related lower extremity musculoskeletal injury. Over 2 million ankle sprains are treated in emergency departments in the US and UK each year, resulting in about \$2 billion of healthcare costs. In long-term prognosis, more than 30 % of patients reporting repetitive bouts of ankle giving way and recurring sprains, termed as chronic ankle instability (CAI). For the patients suffering from persistent symptoms, surgery is usually suggested and most of them can obtain good outcomes, while some still end up poorly and fail to return to sport. One possible can be the sensorimotor deficits, which might be enhanced by functional trainings.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 September 2020 and was last updated on 13 September 2020 (registration number INPLASY202090056).

### INTRODUCTION

**Review question / Objective:** Do functional trainings influence proprioception (kinesthesia, joint position sense, and force sense) in patients with chronic ankle instability?

**Rationale:** The results of studies on the effect of functional trainings on proprioception in CAI patients were in conflicts.

**Condition being studied:** Lateral Ankle sprain (LAS) is one of the most common sport-related lower extremity musculoskeletal injury. Over 2 million ankle sprains are treated in emergency departments in the US and UK each year, resulting in about \$2 billion of healthcare costs. In long-term prognosis, more than 30 % of patients reporting repetitive bouts of ankle giving way and recurring sprains, termed as chronic ankle instability (CAI). For the patients suffering from persistent symptoms, surgery is usually suggested and most of them can obtain good outcomes, while some still end up poorly and fail to return to sport. One possible can be the sensorimotor deficits, which might be enhanced by functional trainings.

## METHODS

**Search strategy:** Search strategies for PubMed: (1) Ankle related terms: (ankle\* OR talo\* OR tibiofib\* OR tibio-fib\* OR “lateral ligament” OR “lateral ligaments”) [Title/Abstract] (2) Injury related terms: (“ankle injuries” [MESH] OR unstable OR instabilit\* OR strain\* OR sprain\* OR rupture\* OR tear\*) [Title/Abstract] (3) Proprioception related terms: (propriocep\* OR sensor\* OR sensa\* OR sense\* OR feedback\* OR movement\* OR motion\* OR kinetic\* OR kinematic\* OR kinesthe\* OR position\* OR forc\* OR match\*) [Title/Abstract] (4) Training related terms: (rehab\* OR train\* OR exercise\* OR program\* OR therap\* OR coordinat\*) [Title/Abstract] (5) Search strategies: (1) AND (2) AND (3) AND (4).

**Participant or population:** Individuals with chronic ankle instability.

**Intervention:** Ankle functional trainings.

**Comparator:** Ankles without functional trainings.

**Study designs to be included:** Crossover or RCT studies.

**Eligibility criteria:** Peer-reviewed human studies in English that investigated the

effect of functional trainings on joint proprioception in the injured ankle of individuals with a history of ankle sprain.

**Information sources:** Seven electronic database, including Embase, Web of Science, SPORTDiscus, PubMed, Scopus, CINAHL and Cochrane Library. The reference lists of each included paper were also checked manually.

**Main outcome(s):** The proprioception scores of the injured ankles.

**Additional outcome(s):** None.

**Data management:** Studies were reviewed independently by two authors (WT, XX). If disagreements couldn't be resolved through discussion, the third reviewer (YH) was consulted. Then, the same procedure was applied to extract following information: demographic data, sample size, description of trainings, details of test methodology (e.g. movement direction, target angle, angular velocity), joint proprioception results (means and standard deviation), and summarized results. The authors were contacted if numerical data were confusing or not reported.

**Quality assessment / Risk of bias analysis:** All the authors discussed the standard of each item before formal rating, and two authors (WT, XX) rated the included studies independently. The inter-rater agreements of the initial ratings were calculated, and the third reviewer (YH) be consulted for disagreements. To assess the quality of studies, the Methodological index for non-randomized studies (MINORS) was applied. To assess the variability of CAI patients, the recommendation of the International Ankle Consortium was applied. The standard CAI criteria included: (1) At least 1 significant ankle sprain that occurred at least 12 months ago and resulted in pain, swelling and at least 1 interrupted day of desired physical activity; (2) Do not have any ankle injury in the past 3 months; (3) Have at least 1 of the classical symptoms.

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**Strategy of data synthesis:** A pair-wised or network meta-analysis of the random-effects model would be performed for the studies similar in proprioception type and movement direction. Standardized mean difference (SMD) was calculated for all data between CAI patients and controls with 95% confidence intervals (CI). Higher SMD represented larger joint proprioception improvement in CAI, with 0.2~0.5 as weak, 0.5~0.8 as moderate, >0.8 as large-sized effect. To evaluate heterogeneity, Q and I<sup>2</sup> statistics were calculated, with p<0.05 as statistically significant and I<sup>2</sup> values ≥75% as high heterogeneity.

**Subgroup analysis:** Movement directions or the subtypes of trainings.

**Sensibility analysis:** Sensitivity analysis would be conducted through removing single study at a time and then evaluating the pooled results again.

**Language:** English.

**Country(ies) involved:** China.

**Other relevant information:** None.

**Keywords:** Training, Proprioception, Ankle instability.

**Dissemination plans:** Published in SCI journals.

**Contributions of each author:**

Author 1 - Weichu Tao - Study design; literature search and selection; data collection; quality rating; statistical analysis; writing of the manuscript.

Author 2 - Xiao'ao Xue - Study design; literature search and selection; data collection; quality rating; statistical analysis; reviewing of the manuscript.

Author 3 - Qianru Li - Study design; reviewing the manuscript.

Author 4 - Yinghui Hua - Supervision of literature search, data collection and quality rating; reviewing the manuscript.