

# INPLASY PROTOCOL

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**Support:** TSUM.

**Review Stage at time of this  
submission:** Preliminary  
searches.

**Conflicts of interest:**  
None declared.

## INTRODUCTION

**Review question / Objective:** To explore/summarize the performance of deep learning in automatic localization and segmentation of the median nerve at the carpal tunnel level.

## Deep Learning Algorithm for Automatic Localization and Segmentation of the Median Nerve: a Protocol for Systematic Review and Meta-analysis

Chang, KV<sup>1</sup>.

**Review question / Objective:** To explore/summarize the performance of deep learning in automatic localization and segmentation of the median nerve at the carpal tunnel level.  
**Condition being studied:** Participants with and without carpal tunnel syndrome.

**Information sources:** The following electronic databases will be searched, encompassing PubMed, Medline, Embase and Web of Science. We target the studies investigating in the utility of deep neural network on the evaluation of the median nerve in the carpal tunnel.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 May 2022 and was last updated on 12 May 2022 (registration number INPLASY202250074).

**Condition being studied:** Participants with and without carpal tunnel syndrome.

## METHODS

**Search strategy:** The key terms used for literature search include: "median nerve",

“carpal tunnel syndrome”, “ultrasonography”, “sonography”, “ultrasound”, “artificial intelligence”, “deep learning” “machine learning” and “convolutional neural network”. The following algorithm will be used: (“median nerve” or “carpal tunnel syndrome”) and (“ultrasonography” or “ultrasound” or “sonography”) and (“artificial intelligence” or “deep learning” or “machine learning” or “convolutional neural network”).

**Participant or population:** General population.

**Intervention:** Deep learning algorithm for detecting and segmenting ultrasound images of the median nerves.

**Comparator:** Ground truth of the median nerve on ultrasound images manually labelled by experts.

**Study designs to be included:** Clinical studies enrolling human beings.

**Eligibility criteria:** (1) observational studies enrolling adult participants, (2) employing ultrasound imaging for evaluating the median nerve and (3) applying convolutional neural network on localization and segmentation of the median nerve.

**Information sources:** The following electronic databases will be searched, encompassing PubMed, Medline, Embase and Web of Science. We target the studies investigating in the utility of deep neural network on the evaluation of the median nerve in the carpal tunnel.

**Main outcome(s):** The outcome variables comprised precision, recall, accuracy, F score, dice similarity coefficient and intersection over union.

**Quality assessment / Risk of bias analysis:** The quality of the included studies will be evaluated by the second version of Quality Assessment Tool for Diagnostic Accuracy Studies (QUADAS-2).

**Strategy of data synthesis:** A random effect model will be used for pooling the retrieved data considering the variations in participants’ demographics. The level of heterogeneity will be assessed by I<sup>2</sup> and Cochran’s Q statistics. The publication bias will be evaluated by the distribution of each effect size on the funnel plot and Egger’s test. All the analyses will be conducted by Comprehensive Meta-Analysis software, version 3 and a p value <0.05 will be considered statistical analysis.

**Subgroup analysis:** Not applicable.

**Sensitivity analysis:** Not applicable.

**Language:** No limitation of languages.

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

**Keywords:** Deep learning, convolutional neural network, sonography, neuropathy, segmentation.

**Contributions of each author:**  
Author 1 - Ke-Vin Chang.