# Overview

By isolating the torso rotation and minimizing vestibular influences, this study aims to directly assess the impact of hyperactive trigger points on proprioceptive communication and provide quantitative data on how muscle contraction affects proprioceptive feedback and muscle fatigue.

## Research Question

How does the continuous contraction of hyperactive trigger points affect the communication between muscles and proprioceptors?

## Expected Outcomes:

* Hypothesize that participants with hyperactive trigger points will show reduced proprioceptive accuracy and increased deviation in laser pointing tasks.
* Expect to find a correlation between the level of muscle contraction and the degree of proprioceptive impairment.

## Research Design Using a Laser Pointing Device

Objective: To quantify the proprioceptive response in individuals with hyperactive trigger points using a laser pointing device, while isolating the torso rotation and vestibular system.

# Methodology

### Participants:

* Conduct data collection on a sample of participants from Heal study with diagnosed hyperactive trigger points in specific muscle groups (etc., trapezius, rhomboid)
* Include a control group with no trigger points for comparison.

### Equipment:

* A laser pointing device[[1]](#footnote-1) to measure movements and proprioceptive responses.
* A stabilizing apparatus[[2]](#footnote-2) to isolate torso rotation[[3]](#footnote-3) and minimize vestibular influence.
* EMG sensors[[4]](#footnote-4) to monitor muscle activity and confirm the presence of hyperactive trigger points.

#### Procedure:

##### Baseline Measurement:

* Have participants perform a series of baseline proprioceptive tasks using the laser pointing device to establish their normal proprioceptive accuracy.
  + Simple task:
    - Left and right rotation, flexion and extension
  + Advanced task:
    - Sinusoidal movement

##### Induction of Hyperactive Trigger Points:

* For the experimental group, identify and palpate hyperactive trigger points using standard clinical techniques.
* Apply pressure to confirm hyperactivity (continuous contraction) through EMG readings.

##### Proprioceptive Task:

* Participants perform proprioceptive[[5]](#footnote-5) tasks involving precise pointing and movement tracking using the laser pointing device.
  + Head-mid-flexion to neutral task.
    - Citation
  + Advanced task:
    - Any paper??

### Data Collection:

* Measure deviations from target positions, response times, and movement accuracy.
* Record EMG activity to correlate proprioceptive performance with muscle contraction levels.

#### Isolation of Torso Rotation and Vestibular System:

* Ensure participants are seated in a chair with their torso securely fixed to prevent rotation.
* Use a headrest or similar device to minimize vestibular input and ensure that proprioceptive responses are isolated to the target muscle groups.

#### Data Analysis:

* Compare the proprioceptive performance of participants with hyperactive trigger points to the control group.
* Analyze the relationship between the degree of muscle contraction (as indicated by EMG) and proprioceptive accuracy.
* Evaluate any changes in proprioceptive performance over time or with repeated tasks.

1. [SenMoCor](https://www.optp.com/SenMoCOR-LED-Laser-Headlamp), [TongXiSs](https://www.amazon.com/TongXiSs-Rechargeable-Headlamp-Adjustable-Sensorimotor/dp/B0CPP5JZFB) [↑](#footnote-ref-1)
2. [option1](https://www.amazon.com/Wheelchair-Support-Patient-Disabled-Adjustable/dp/B08HZ64XYX/ref=sr_1_9?crid=283M45AL6H65B&dib=eyJ2IjoiMSJ9.oOrWms80pnOGiLr47bCMxpXBMgY4aBsScQiNLG0ktEkRun2GRAJMtDtGUrlukyMdGDa2-PSJjIYbIYwXbLT0rhqYmLEufNtERjXVmnWPLkoXCjj0-fWFhcuC6PJZpLxm4p2011W1paQcs5ZZCmW7JfCX1Tvj1ZTk6JF_KRq7YQ5whyAjNo1YfF4_6s1KRqSBmDZuS0kcTc5NyeXy6ehv7QmlRMh3YddqyqLsJPWGYbBaEl5Ji5mWC1FIxPPjO7gCghYnSISh-LYQeojRT9CgRPXBrLxCii80q4vPK711t6w.W9Zvs9wvfedqNm6N4CYgBD7nndj4optO1mmozU_W5xQ&dib_tag=se&keywords=seatbelt+for+torso+movement&qid=1716036711&sprefix=seatbelt+for+torso+movement%2Caps%2C110&sr=8-9), [option2](https://www.amazon.com/Wheelchair-Comfortable-Breathable-Lightweight-Restraining/dp/B0C23XQC9J/ref=sr_1_23?crid=283M45AL6H65B&dib=eyJ2IjoiMSJ9.oOrWms80pnOGiLr47bCMxpXBMgY4aBsScQiNLG0ktEkRun2GRAJMtDtGUrlukyMdGDa2-PSJjIYbIYwXbLT0rhqYmLEufNtERjXVmnWPLkoXCjj0-fWFhcuC6PJZpLxm4p2011W1paQcs5ZZCmW7JfCX1Tvj1ZTk6JF_KRq7YQ5whyAjNo1YfF4_6s1KRqSBmDZuS0kcTc5NyeXy6ehv7QmlRMh3YddqyqLsJPWGYbBaEl5Ji5mWC1FIxPPjO7gCghYnSISh-LYQeojRT9CgRPXBrLxCii80q4vPK711t6w.W9Zvs9wvfedqNm6N4CYgBD7nndj4optO1mmozU_W5xQ&dib_tag=se&keywords=seatbelt+for+torso+movement&qid=1716036711&sprefix=seatbelt+for+torso+movement%2Caps%2C110&sr=8-23) [↑](#footnote-ref-2)
3. Can seatbelt kind of wrap that be used? What does the literature justification? [↑](#footnote-ref-3)
4. Check with Prof. Sikdar and Prof. Acuna or look for literature how EMG sensors can be integrated? [↑](#footnote-ref-4)
5. * Tasks should include both static (holding a position) and dynamic (tracking moving targets) components.

   [↑](#footnote-ref-5)