# Range of Motion of the Upper Cervical Spine: Flexion, Extension, Lateral Bending, and Axial Rotation

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Clinical evaluation of upper cervical spine instability with manual therapy ⇨ Normal range of movement?

*In vitro simulation of the clinical test: 10 upper cervical spine specimens*

📍 *Impact Laboratory (I3A), Alcañiz*

## Introduction

- Common symptom in adults: neck pain
- Manual therapy to examine patients: screening cervical spine instability

**Objective**

To quantify motion and applied torque

## Methodology

*Hidalgo et al., 2020. Musculoskelet. Sci. Pract.*

- Motion capture system (Vicon)
- Measure device (Faro)
  - Coordinates of Vicon markers and anatomical landmarks → Coordinate systems to quantify the motion
- Force and torque sensor (AMTI)

## Results

| | ROM (°) | Torque (Nm) |
|---|---|---|
| **Flexion** | 19.8 ± 5.3 | 0.7 ± 0.2 |
| **Extension** | 14.4 ± 7.7 | 0.9 ± 0.3 |
| **LB – R** | 4.7 ± 2.3 | 0.8 ± 0.2 |
| **LB – L** | 5.6 ± 3.2 | 1.0 ± 0.3 |
| **Rot – R** | 33.9 ± 6.6 | 0.6 ± 0.1 |
| **Rot – L** | 28.0 ± 6.9 | 0.6 ± 0.2 |

ROM: range of motion; LB: lateral bending; Rot: axial rotation; R: right side, L: left side.

## Conclusions

- Valuable results from a clinical point of view: first in vitro tests with C2 fixed *(as in manual therapy)*

**Lateral bending:** *Hidalgo et al., 2020. Musculoskelet. Sci. Pract.* **Axial rotation:** *Hidalgo et al., 2020. Clin Biomech.*

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