

# Transforming the Lives of Tetraplegics

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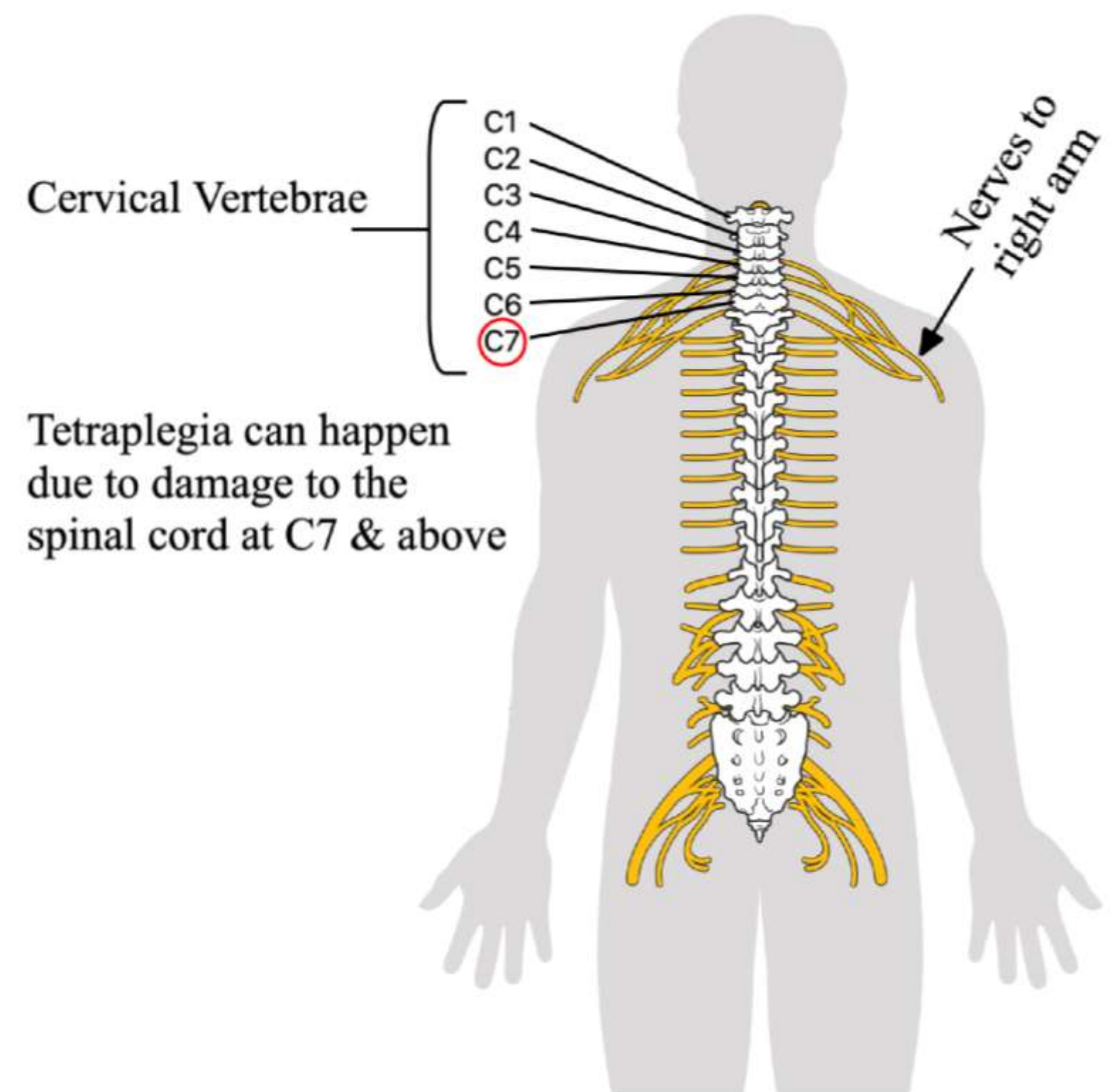
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## What is tetraplegia?

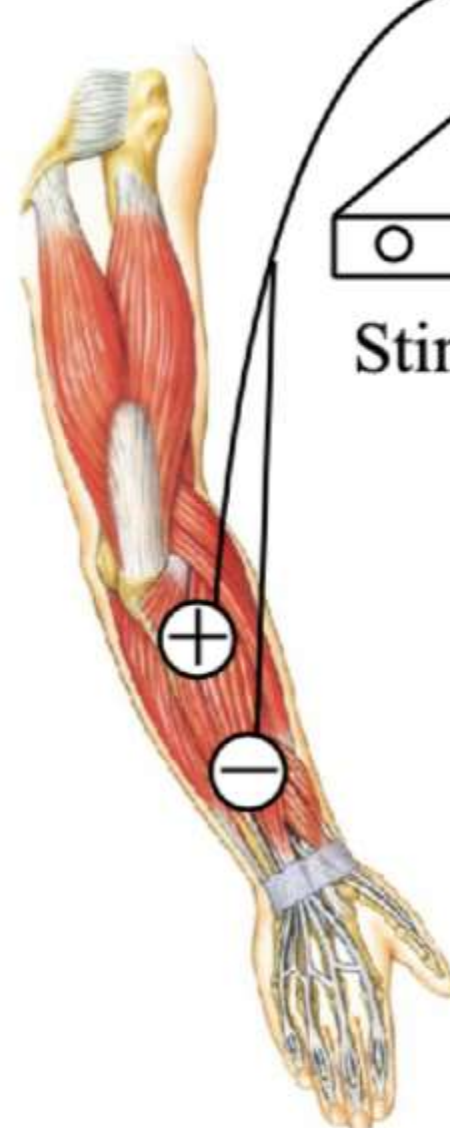
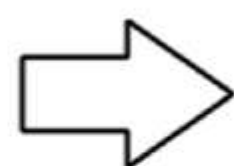
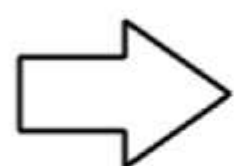
- Injury of the spinal cord at C7 and above leads to tetraplegia (quadriplegia or arm and leg paralysis).
- Tetraplegics lose arm function at different levels, depending on the level of injury.

## Why study this condition?

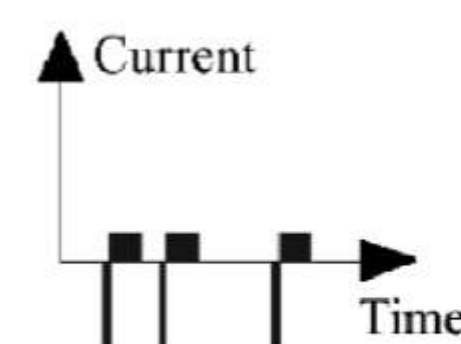
- There is no cure and existing rehabilitation pathways are complex.
- This impairment results in restricted mobility and independence, leading to multiple long-term conditions, affecting well-being and quality of life.



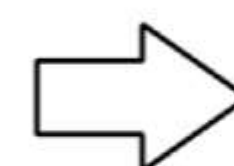
Biomechanics data of patient's arm



Stimulator



The muscle interaction patterns from the model creating certain arm functions will be applied on the patients through Functional Electrical Stimulation.



A potential outcome for a patient could be a smooth reach and grasp function of their arms.

Patient specific computer model of an arm with muscle representation (red lines) to identify the upper limb coordination patterns.

## Our aim & objectives

To restore functionality of the upper limb in people with spinal cord injury using a combination of a musculoskeletal model of the upper limb and surface Functional Electrical Stimulation (FES).

*FES is a technique that applies low-level electrical pulses to artificially create muscle movements.*

## What are the challenges?

Every individual and injury is different, it is challenging to identify an ideal coordination pattern of the upper limb to replicate, and reaction to electrical stimulation could be different from one individual to another.

## How do we address this challenge?

As described in the diagram above, we will develop and validate a methodology to personalise a musculoskeletal computer model of the upper limb in an individual with spinal cord injury. The model will then be used to identify personalised optimum use of the surface Functional Electrical Stimulation for upper limb movement.