



## Thesis Project Form

**Title (tentative):** Study shoulder pain in professional water polo players

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### Description

#### Motivation and application domain

Water polo is a popular aquatic contact sport, and has the highest rates of injuries amongst other aquatic disciplines during competitions (16.2% to 19.4%). Although the majority of observed traumatic injury incidence occur to the head and fingers during matches, the most common overuse injury area is the shoulder. The most common condition is called Shoulder Impingement Syndrome (SIS), which is a multifactorial condition causing pain. Usually, it is due to the modification of intrinsic and extrinsic mechanisms of the rotator cuff eliciting, eventually a damage of the shoulder structures, and can be the consequence of an unbalanced action of shoulder muscles with loss of central position of the humeral head. Despite so, deeper analysis on muscle activity and coordination is necessary to obtain a deeper characterization of such syndrome

#### General objectives and main activities

The general goal of the study is to characterize muscular activity of water polo players during overhead movements and to find a link with the presence of pain and tendon lesions.

The main activities will consist in:

- identify muscle synergies of the athletic gesture
- identify how shoulder pain influence the kinematic and muscle patterns during the athletic gesture
- evaluate how eventual modification in muscle synergies might depend on pain, athlete strength and articular structure's lesions

#### Training Objectives (technical/analytical tools, experimental methodologies)

1. Background literature analysis
2. Development of the pipeline for movement segmentation, analysis and characterization
3. Data collection and analysis

**Place(s) where the thesis work will be carried out:** DIBRIS, via all'Opera Pia 13

### Additional information

**Maximum number of students:** 1