

Internship offer
M2 Musculo-Skeletal system, Locomotion, Exercise (MuSkLE)

Title of the Internship: Relationship between strength balance of glenohumeral rotator muscles and humeral head translation in overhead athletes. Effects of muscular fatigue on the glenohumeral joint stability.

Laboratory: Laboratoire Interuniversitaire de Biologie de la Motricité – UR 7424 (<https://ufr-staps.univ-lyon1.fr/recherche/libm>)

Research team (name, website): Sport Performance and Injury Prevention (<https://libm.univ-st-etienne.fr/fr/equipes/spip.html>)

Supervisor to contact (name, email address): Isabelle ROGOWSKI (isabelle.rogowski@univ-lyon1.fr)

Project description including a short introduction, aim/objectives and methods/approach to be used

Glenohumeral instability is a major problem in athletes engaged in sports involving upper extremity. Glenohumeral instability is characterized by abnormal translations of the humeral head in the glenoid cavity. If this instability is not early managed, it predisposes athletes to secondary injuries, including labral tears or rotator cuff pathology. Although the etiology of glenohumeral instability is multifactorial, imbalances in strength of rotator cuff and periscapular muscles may impair the distribution of the force couples around the glenohumeral joint. Understanding the effects of these imbalances on the humeral head translation may be crucial to better manage glenohumeral instability nonoperatively.

This project aims to investigate the relationship between glenohumeral rotator muscle strength balance and the static and dynamic stability of the glenohumeral joint in overhead athletes, with a particular focus on fatigue-related effects. Work to do:

- Synthesis of scientific literature to assess strength balance in glenohumeral rotator muscle, to generate and assess muscular fatigue, and to assess static and dynamic glenohumeral stability
- Experimental procedure: recruitment of participants & data collection (ultrasound imaging system, isokinetic/isometric dynamometer, surface electromyography, force platforms, video analysis)
- Data processing and advanced analysis
- Writing Master thesis

References

Menderes, Y., Aktaş, B. E., Utku, B., Deliceoglu, G., Kabak, B., & Karanfil, Y. (2026). Ultrasound-based shoulder adaptations in elite female handball players. *Research in Sports Medicine*, 1-13.

Miyazaki, T., Uekama, K., Machida, T., Maesako, S., & Taniguchi, N. (2024). Investigation of the limiting factors of shoulder joint complex motion in college baseball players: motion analysis of the humeral head and rotator cuff using ultrasound. *JSES international*, 8(3), 570-576.

Russell, M. S., Drake, J. D., & Chopp-Hurley, J. N. (2026). Congruency of Fatigue-Mediated changes in shear wave Velocity, upper limb Force, muscle Activity, and kinematics of the scapular stabilizer muscles. *Journal of Electromyography and Kinesiology*, 103157.

Skills required:

Training in Sport Sciences or Biomechanics (movement) – Strong affinity for motion analysis and computer programming (Matlab, Python for example); Spoken and written English, Spoken French (B2) – Diligence, initiative, Ability to work independently and in a team.