

# LIBM

## Inter-university Laboratory of Human Movement Biology

EA 7424 - USMB / UJM / UCBL 1

Faculty: UFR Sciences et Montagne

PhD School: Sciences, Ingénierie, Environnement (SIE)

Created in 2006, LIBM is the research laboratory in life sciences applied to sport and physical activity in the Auvergne-Rhône-Alpes region, located on Le Bourget-du-Lac, Lyon and Saint Etienne sites. Our research topics involve human movement biology, through the fields of exercise physiology, biomechanics, neurosciences and engineering. These different fields allow for multidisciplinary research, supported by teams from life sciences, sport sciences, and clinical medicine.

The originality of the laboratory is to develop integrated research ranging from cellular mechanisms to human movement in situ.

Our activities are uniquely oriented towards fields of application with high scientific and societal challenges: health, physical and sports activities and motor performance.



## Research topics

LIBM's research work revolves around 6 research teams:

- › Vascular Biology and Red Blood Cells
- › Deconditioning/reconditioning of muscle and Systemic environment
- › Atherosclerosis, Thrombosis and Physical Activity
- › Physical Ability and Fatigue in Health and Disease
- › Sport Performance and Injury Prevention
- › Mental Processes, cerebral Plasticity and motor Performance

## Expertise

PERFORMANCE	HEALTH	ENGINEERING
Optimization of sports performance Individualization of training	Effects of physical activity on human organism	Equipment comparisons and technology concept validation
Athlete Evaluation	Effects of physical activity on health and quality of life	Innovation
Injury prevention Back to sports	Deleterious effects induced by physical practice, fatigue, injury Individualization of physical activity	Creation of processing routines

## KEY DATA \*

- 61 professors, assistant professors and clinical doctors
  - 48 PhD students
  - 9 post-doctoral fellows and engineers
  - 13 technicians and administrative members
- \* academic year 2022-2023



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## Specific equipment and expertise

### Evaluation of physical capacities in both field and laboratory settings

- › Gas exchange measurement
- › Power-strength-speed and endurance profiles
- › Measurement of the central and peripheral components of the neuromuscular fatigue
- › Assessment of the effects of the physical environment (e.g. altitude, temperature)
- › Physical activity and lifestyle monitoring
- › Posture and balance

### Motion analysis in both field and laboratory settings

- › Analysis of kinematics, strength and muscle activity
- › Accelerometry, shocks and vibrations
- › Functional evaluation
- › Modeling

### Mental processes

- › Brain stimulations
- › Functional and behavioral assessment
- › Neurofeedback and biofeedback

### Muscle Physiology and Biology

- › Muscle capillarization and tissue oxygenation
- › Gene and protein expression
- › Energy metabolism
- › Characteristics of muscle function
- › Markers of inflammation

## Scientific outreach

The LIBM is involved in clinical research through the activities of hospital-university and hospital staff from the University Hospitals of Lyon and St-Etienne.

### Academic and institutional collaboration:

- › SATT Pulsalys & Linksum, Fonds Unique Interministériel (FUI), Agence Nationale pour la Recherche (ANR), DGA, BPI France, Union Européenne, Agence Innovation Défense, Conseil départemental de la Haute Savoie, Conseil départemental de la Savoie, Région AURA, St Etienne Métropole
- › Centre d'Évaluation et de Prévention Articulaire (CEPART), Centre SANTY, Neuron, Neuromyogène, Téléthron, Ramsay Santé, Ligue contre le Cancer, Fondation ARC, Hôpital de la Tour

### Corporate collaborations :

- › French federation of skiing, Athlétisme, rowing, Cycling, Handball, Rugby, climbing and mountain, cardiology, Association European Athletics, International Rock Climbing Research, INSEP
- › Club AG2R la Mondiale, ASSE, OL, Rugby Lou Lyon, FC Grenoble Rugby, ASA
- › Babolat, Cryosock, Décathlon, Dessintey, Fitbit, Hoka, Mavic, Salomon, Sigvaris, Thuasne