Disciplinary Scientific Sector	BIOS-08/A Molecular Biology CHEM-01/A Analytical Chemistry
Contract Duration (max 24 months)	24 months
Profile of the Researcher to be Hired:	The candidate must hold a PhD in Biomedical/Biotechnological/Pharmaceutical Sciences and demonstrate solid experience in diagnostics, biochemistry, molecular and cellular biology applied to bone and cartilage development, with a particular interest in hereditary diseases of bone and cartilage and in the transcriptional regulation of the skeleton. The candidate should possess expertise in single-cell transcriptomics, flow cytometry, lab-on-chip diagnostics, point-of-care systems, advanced statistics for integrating molecular and clinical patient data, bioinformatics and multivariate analysis, handling and analysis of biological samples from patients, and advanced skills in mouse models.
Description of the Research Project the Postdoctoral Researcher Will Be Involved In:	The project focuses on two key concepts: evaluating the relative risk (RR) of an athlete incurring specific injuries, such as anterior cruciate ligament rupture or Achilles tendon rupture, and identifying individuals at high risk of such orthopedic injuries. The main objective is to provide these individuals with targeted support in planning training programs and personalized dietary regimens aimed at preventing or reducing injury risk through an approach based on early diagnosis, real-time performance monitoring, and genetic and clinical data. The project consists of three main phases: 1. Collection and manipulation of biological samples from study participants, a fundamental step for obtaining the genetic material required for analysis. The samples will undergo DNA extraction and purification, ensuring the isolation of genetic material suitable for subsequent analyses, using both miniaturized innovative analytical approaches and traditional methods to assess accuracy and statistical correlation. 2. Identification of specific single nucleotide polymorphisms (SNPs) and circulating biomarkers in biological fluids potentially correlated with an

	increased risk of injuries, particularly to tendons and ligaments. The investigation focuses on key genes using advanced molecular biology and biochemistry techniques, supported by the design and application of point-of-care analytical methods enabling real-time and decentralized measurements, to confirm the association between these genetic variants and injury predisposition.
	3. Integration of genetic data with clinical and anamnestic information of the participants. Using advanced statistical tools, artificial intelligence techniques, and bioinformatics methods, possible correlations between specific SNPs, circulating biomarkers in peripheral fluids, and the incidence of orthopedic injuries will be analyzed. In particular, supervised and unsupervised machine learning models will be used to identify complex predictive patterns not evident with traditional analysis, improving individual risk stratification. The results of this analysis will enable the development of tailored prevention strategies based on the individual athlete's genetic and molecular profile, supported by the development of wearable diagnostics for continuous and adaptive performance monitoring. This personalized approach will allow athletes to adopt targeted training programs and nutritional regimens, aimed at reducing injury risk and safely and effectively improving their athletic performance.