



**HAL**  
open science

# Genetic polymorphisms influence on sports injuries and muscle damage

Etienne Delforge, Julien Boissiere, Sebastien Imbert, Gérard Dine, Frédéric Daussin

► **To cite this version:**

Etienne Delforge, Julien Boissiere, Sebastien Imbert, Gérard Dine, Frédéric Daussin. Genetic polymorphisms influence on sports injuries and muscle damage. ECSS, Jul 2023, Paris, France. hal-04247185

**HAL Id: hal-04247185**

**<https://hal.univ-lille.fr/hal-04247185>**

Submitted on 18 Oct 2023

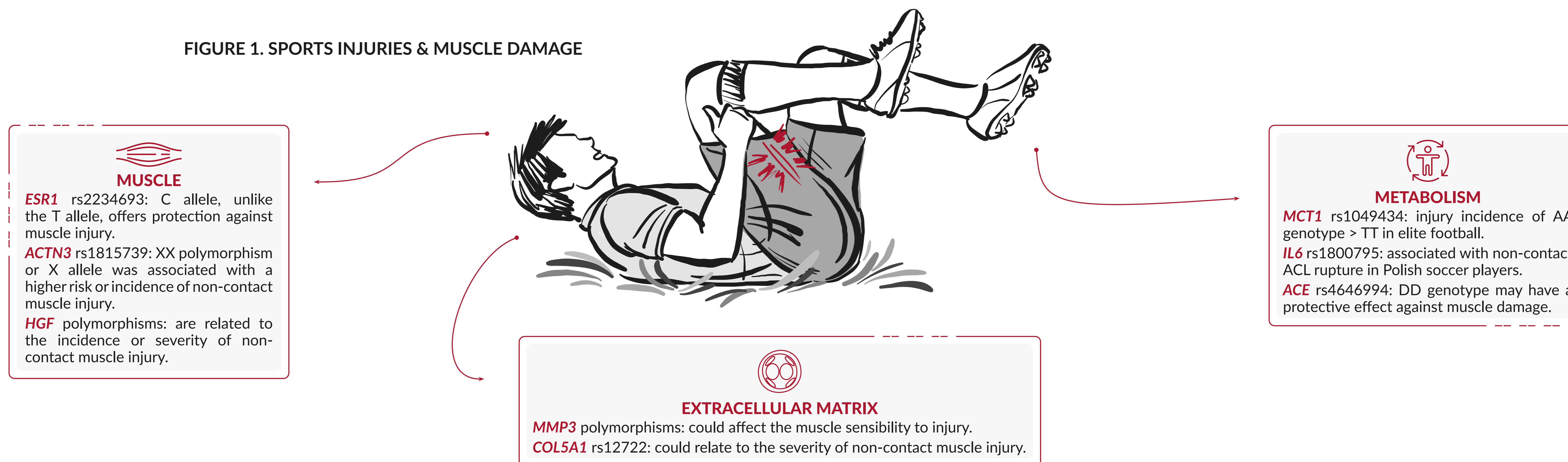
**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# GENETIC POLYMORPHISMS INFLUENCE ON SPORTS INJURIES AND MUSCLE DAMAGE

E. Delforge<sup>1-2</sup>, J. Boissière<sup>1</sup>, S. Imbert<sup>1-3</sup>, G. Dine<sup>2-4</sup>, F. Daussin<sup>1</sup>

FIGURE 1. SPORTS INJURIES & MUSCLE DAMAGE



## 1. INTRODUCTION

**Sports practice** or physical activity has been acknowledged to be **beneficial for health**. However, it **may** also **induce injuries**. Indeed, when related to 1000 hours of practice, injury incidence during training is 3.7 in football and 3.0 in rugby union and even increases to 36.0 and 81.0 (respectively) during matches. **Injuries negatively affect** the players' **performance and health** and may have financial implications for the athletes and/or their clubs. Therefore, **avoiding players' injuries became a priority** and strategies are developed to limit them. Training workloads focused staff attention as their monitoring allows to maximize the training processes and performance and reduce the occurrence of injury. Internal and external outcomes are used to characterize the workload. For the **same external workload**, the internal **responses differ for each people** leading to different levels of fatigue or exercise-induced muscle damage.

## 2. OBJECTIVES

While a high training load and a certain amount of muscle damage are necessary to induce adaptations and promote performance increase, excessive muscle damage favor injury occurrence. Great muscle damage **inter-individual variations** have been **observed following the same external training load**. Scientific evidence support that several factors are involved in the occurrence of injury or exercise-induced muscle damage. Besides exercise characteristics, individual risk factors, such as **genetics**, seem to **be a component to take into account in injury** mechanisms. Particularly, single genetic polymorphism (**SNP**), a variation in DNA sequence, may alter proteins structures and their function within the cell. Studies support that **SNP may be considered a predisposing factor**. Identifying injury-predisposing polymorphisms is of interest to improve training load prescription. **This poster aims to present a review of SNP that affect muscle damage and sports injuries.**

## 3. RESULTS & DISCUSSION

Several **studies support** the **role** of **SNP** in **altering muscle structure** and potentially compromising its integrity. Results suggest that **individuals with specific genetic variations may exhibit a higher susceptibility** to muscle damage or **sports injuries** compared to others. These polymorphisms (Figure 1), which affect the structural composition of muscle components, could make them sensitive to exercise-induced mechanical stress. Furthermore, variations in the inflammatory response and metabolic processes, such as impaired lactate transport across muscle membrane, may further weaken the muscle and increase the risk of injury. Hence, the **presence or lack** of these **SNP appears to contribute significantly** to the **substantial** inter-individual **variability** observed on **sports injuries** or induced muscle damage whereas the external workload exercise is similar.

## 4. CONCLUSIONS

The **present study supports** the **interest** to **assess** genetic **polymorphisms** in athletes to **better individualize training strategies** and workload. During the last decade, several **SNP** involving muscles, ligaments, or tendons may **affect positively or negatively** the risk, incidence, and severity of injuries have been identified. Among them, **ACE, ACTN3, COL5A1, IL6, MCT1, MMP3**, and **HGF** seem to play an important role in sports injuries and muscle damage mechanisms.

✉ **CONTACT**  
etienne@kinesport.fr

1. Univ. Lille, Univ. Artois, Univ. Littoral Côte d'Opale, ULR 7369 - URePSSS, F-59000 Lille, France | 2. Medinetic Learning Kinesport, Pôle scientifique, F-75008 Paris, France | 3. Ligue des Hauts-de-France de rugby, Villeneuve D'ascq, France | 4. IBT Technopole CS 90601 2 rue Gustave Eiffel 10901 Troyes cedex