

THE FEMORAL NERVE: A KEY ANATOMICAL CORNERSTONE IN MARTIAL ARTS PERFORMANCE

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The femoral nerve, a major peripheral nerve of the lower limb, plays a crucial role in coordinated hip flexion and knee extension, functions that underpin biomechanical efficiency during defensive and offensive movements in martial arts [1,2]. Despite its critical involvement in generating powerful lower-limb movements and maintaining postural stability during stance, the contribution of the femoral nerve to athletic performance and injury prevention remains insufficiently explored within the sports medicine literature.

The femoral nerve arises from the dorsal divisions of the L2, L3 and L4 spinal nerve roots and descends into the pelvis between the psoas major and iliacus muscles before passing beneath the inguinal ligament into the thigh [3]. It facilitates forceful knee extension and hip flexion by providing motor innervation to the quadriceps femoris, sartorius, pectineus and iliacus muscles, while also supplying sensory innervation to the anterior and medial aspects of the thigh [4,5]. This dual motor and sensory

function allows the femoral nerve to integrate muscular strength with proprioceptive feedback, both of which are essential for executing precise and efficient striking actions during offensive and defensive maneuvers [4-6].

In martial arts, effective kicking mechanics depend on rapid quadriceps activation for knee extension, synergistic iliopsoas engagement for hip flexion and finely tuned proprioceptive input for balance and spatial awareness [7]. The femoral nerve coordinates these neuromuscular events, translating cortical and spinal signals into controlled and explosive limb motion.

Alterations in femoral nerve function, including neuropraxia, conduction delay or entrapment, can disrupt movement timing, reduce power generation and predispose athletes to compensatory movement patterns that increase the risk of musculoskeletal injury [8]. Femoral neuropathy in martial artists may arise from repetitive strain of the hip flexors, direct trauma to the inguinal region, or compression caused by tight belts or protective equipment [8,9]. Clinically, athletes may present with anterior thigh pain, sensory deficits, diminished patellar reflexes and weakness during knee extension [9]. Early recognition through neurological assessment and electromyography is therefore

essential to prevent chronic deficits and to optimize return-to-training outcomes [8,9].

Preventive strategies for femoral nerve injuries in martial arts focus on mitigating risks associated with traumatic hip hyperextension, direct thigh impact and pelvic hematomas that may compromise nerve integrity [8,10]. Key strategies include structured warm-ups protocols, targeted activation of the hip flexors and core stabilization exercises aim at reducing neural tension and maintaining optimal alignment of the pelvis and lumbar spine [11,12]. These interventions should be performed under appropriate supervision to avoid improper techniques that may increase stress on the groin region [11,12]. Additionally, incorporating neurodynamic mobilization and manual therapy may enhance nerve excursion and reduce the risk of entrapment [13]. Technical refinement, particularly in kicking trajectory, stance control and load distribution, also contributes to both performance enhancement and injury prevention [11-13].

The femoral nerve therefore represents more than a conduit for motor output; rather, it constitutes a key neurofunctional structure linking neural control to biomechanical performance in martial arts. A comprehensive understanding of its anatomy, physiology and potential vulnerability to injury may provide valuable insight for sports physicians, physiotherapists and coaches seeking to optimize neuromuscular conditioning while preserving athlete health and longevity. Accordingly, the integrating neural health considerations into training paradigms may enhance striking power and movement precision while promoting sustainable athletic performance through evidence-based practice.

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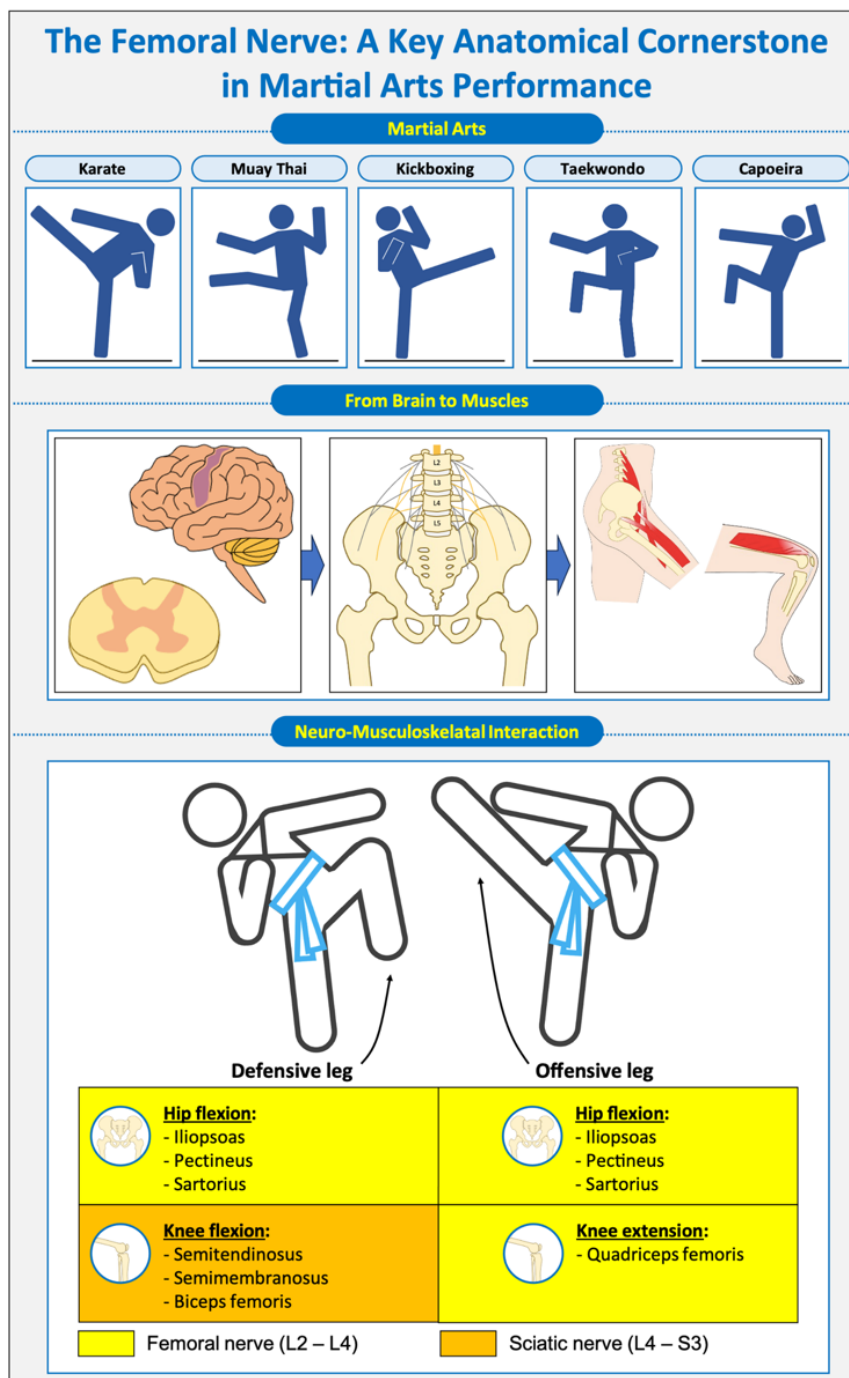


Figure 1. *The femoral nerve:
A key anatomical cornerstone in martial arts performance*