

## KINESIOLOGY TAPE APPLICATION TO IMPROVE PISTOL SHOOTING PERFORMANCE IN TACTICAL ATHLETES

For the tactical operator, excellent shooting skills are essential for success in the field. Police officers and military soldiers (i.e., conventional and special forces operators) whose lives are on the line must rely on precision marksmanship. Therefore, target training becomes important in any tactical operators' job. During shooting training, tactical operators experience fatigue and even pain in areas of their shooting arm. The joints that are commonly affected in a tactical operator's shooting arm are the shoulder, elbow, wrist, and those of the hand. Depending on the type of pistol used by the tactical operator, excessive firing (200 – 500 rounds per session) can induce an overload on the tissues of the upper extremity. Common insidious injuries that result from excessive pistol shooting include rotator cuff impingement (shoulder injury), tennis elbow, wrist pain, and de Quervain's syndrome (tenosynovitis of the tendons in the thumb).

Deconditioning may also occur in the musculature of the upper extremities in tactical athletes. An increase of motor unit activation in deconditioned muscles of the shooter's arm will decrease a shooter's tremor (6). According to research, a postural tremor is created from the shooter's arm during aiming of the pistol (6). The postural tremor becomes more apparent in the distal segments of the arm (e.g., the elbow and wrist). During the pistol-shooting stance, the elbow and wrist will constitute a lateral sway (sideways oscillation) as the shooter isometrically holds the pistol, aims at the target, and shoots (6). Factors that contribute to a large amplitude of oscillation include weight of the pistol, experience of the shooter, and strength of the upper extremity (6). A strength and conditioning program consisting of upper extremity exercises for the shoulders, forearms, and wrist muscles can improve the strength in the upper extremity of the tactical athlete. A training program should be implemented rather than relying solely on the use of kinesiology tape for addressing pain and fatigue, however kinesiology tape may be a useful tool for potentially improving shooting performance.

Kinesiology tape is cotton and acrylic-based tape that is applied to the skin. Kinesiology tape is elastic and has the ability to stretch with the skin to allow movement of joints and fascia layering the muscles under the skin. It is non-latex and has a 98% hypo-reaction to the skin. If the tactical athlete has sensitive skin or has a known skin disorder, it is best to check with a dermatologist before using kinesiology tape. The adhesive used to stick to the skin is often a heat-activated glue that is shaped as a fingerprint pattern. This pattern on the tape joins with the ridges deep in the skin and allows the tape's adhesion to the skin's surface.

The action of the kinesiology tape is to interact with the subcutaneous receptors in the skin known as mechanoreceptors. Mechanoreceptors can detect pressure, vibration, and pain. According to research, kinesiology tape may increase proprioception and kinesthetic awareness to the mechanoreceptors of the skin to increase facilitation of muscle activation when stabilizing the extremities (2,3). It has also been documented that the application of kinesiology tape may decrease pain sensation from muscles under repeated strain from overuse injuries (1,2). By stimulating the mechanoreceptors to decrease signals to pain receptors in the skin (known as nociceptors), the kinesiology tape may be able to modulate the pain sensation due to repetitive strain on the muscles in the shoulder, forearm, and wrist caused by repeated recoil from the pistol (1).

The shooter's arm consists of the shoulder, elbow, wrist, and hand (Figure 1). During shooting, these joints become involved in the handling and shooting of the pistol. In order to maintain good precision in the isometric control of the pistol, all the muscles and joints in the shooter's arm need to be in good condition. A kinesiology taping application for the shoulder, elbow, wrist, and hand may prevent postural tremor from the fatigue caused by the repeated recoil of the pistol in the muscles. The kinesiology tape application may also facilitate motor unit recruitment of the muscles by influencing the stimulation of mechanoreceptors within the skin (2,3). The more motor unit recruitment within the muscles from stimulation, the more control of the muscles in the arm the shooter will have with the pistol during shooting drills and practice.

### TACTICAL TAPING APPLICATION OF THE SHOOTER'S ARM

The first area of the shooter's arm that can be taped to help potentially improve performance will be the most proximal segment to the body; the shoulder. The shoulder is the foundation of stability for the shooter. The shoulder is raised to approximately 90 – 100 degrees of flexion during aiming and firing. The shoulder acts like the foundation for the other joints of the arm. It is essential to the tactical athlete that this area is free of fatigue and proper motor unit facilitation of the deltoid is provided. In order to ensure that full muscular facilitation via mechanoreceptor stimulation is provided, the kinesiology taping application will encompass the full deltoid and the acromioclavicular joint.