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U.S. Military Parachute Injuries

Why are parachuting injuries a concern?

U.S. paratroopers are a small but vital part of the military Force who jump out of planes and helicopters as part of their job. They serve in combat, infantry, Special Forces, rescue, firefighting, and even aerial demonstration units. Though most paratroopers are in the U.S. Army, each Service has designated parachuting missions.[1]

Paratroopers face a higher risk of certain types of injuries than their non-paratrooper counterparts.[2,3] These injuries (e.g., sprains, fractures, head trauma) can lead to costly hospitalizations and lost duty or training time.

The U.S. protects its paratroopers from injuries through rigorous training, annual qualifications, injury analyses, and equipment advancement.[1-3] As a result, U.S. military parachuting activities have been characterized as "relatively safe."[1] Because of the risks, all Services provide operational paratroopers a Hazardous Duty Incentive Pay known as "Jump Pay."[1]

To become a paratrooper, a Service member must complete the Basic Airborne Course (BAC), aka "Jump School" at Fort Moore, Georgia. A BAC trainee who successfully completes this course is "Airborne qualified," but is not an operational paratrooper and does not receive "Jump Pay." Only the small portion of "Airborne qualified" Service members who join a unit where they maintain active jump status are considered operational paratroopers.

How have paratroopers' injuries changed?

In the past 10 years, equipment changes and additional scientific evidence have altered our knowledge of common paratrooper injuries. Prior studies found a wide range of acute injury rates (3 to 55 injuries per 1,000 jumps) and identified fractured or sprained ankles as the most prominent injuries.

Evidence now suggests paratroopers experience more overuse injuries than acute injuries. This change may be due to the transition to the T-11 square parachute design, procedural changes, and more reliable injury data. It is now recognized that injury risks and rates are also different among BAC trainees and those who become operational paratroopers.

US T-11 non-steerable parachute
Source: DVIDS 6976713
Photo by: SPC Giovanny Lopez

What are common paratrooper injuries?

Paratroopers experience two types of injuries—

- **Acute traumatic injuries** and
- **Cumulative microtraumatic (overuse) injuries** that result from repeated lower-intensity forces over time.[2,3]

Acute traumatic injuries

Acute injuries result from an abrupt high-intensity force on the body.[1] Because the parachute landing is estimated to be a force equivalent to jumping off a 9- to 12-foot wall, the most recognized acute parachuting injuries are to the lower leg, ankle, and foot from a single impact with the ground.[1,4,5]

Today, training includes the paratrooper landing fall (PLF), which spreads the forces of impact across various parts of the body instead of a single joint and reduces the risk of acute injury to the lower extremities.

These lower extremity injuries are still most common among BAC trainees. However, actual operational paratroopers are treated for more acute head, neck, shoulder, and back injuries compared to BAC trainees.

Operational paratroopers experience some of these acute injuries at a higher rate than their non-paratrooper counterparts. For example, operational paratroopers have been found to have more head injuries, such as concussions and traumatic brain injury[2,3] than non-paratroopers or BAC trainees. In addition, they have been treated for more acute shoulder injuries, such as fractures or dislocations of the shoulder or acromioclavicular joint (where the shoulder and collar bone meet).[2,3] Shoulder injuries may be associated with entanglements and entrapment with the static line upon exiting an aircraft. These injuries are often more severe and require a longer recovery period than lower extremity injuries.

Cumulative microtraumatic (overuse) injuries

Similar to their non-paratrooper counterparts, paratroopers experience more overuse injuries than acute injuries. Overuse injuries to the lower back, knees, and shoulders are especially common to all Active-Duty Service members. However, data suggests overuse injuries to the upper-extremity joints (especially shoulder area) are more common among paratroopers.

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What are risk factors for parachuting injuries?

High Altitude Low Operations (HALO) and specialized helicopter jump duties present the highest risk for injuries.

During routine military parachuting, the following factors impact injury risk:[1,5,7]

- **Operational status versus BAC:** Injury risks are higher among paratroopers after they become operational paratroopers than during their BAC training. This is likely due to the risks of uncontrolled operational settings and lack of direct safety oversight.[1]
- **Improper technique:** Parachuter error and failure to adhere to training and doctrinal procedures (i.e., not using the PLF) are reported [1,5] as the leading causes of injury.
- **Time of day and amount of light:** Low visibility conditions, such as night-time, low light, or cloudy conditions, increase injury risk.[1,5]
- **Weight carried:** As the weight of the gear carried by a paratrooper increases, the risk of injury increases (evidence shows a dose-response relationship).
- **Speed of descent/parachute design:** Faster parachute descent increases likelihood of lower extremity injuries such as ankle sprains. The T-11 parachute provides a slower descent than the round parachutes used prior to 2015. [1,6]
- **Wind speed:** Speeds that increase injury risk have been cited as >9 knots up through >15 knots. Winds less than 5 knots may also increase risk.
- **Landing zone/terrain:** Both hard surfaces (such as a landing strip or road) and uneven or rocky terrains pose hazards that can lead to injury.

Data are inadequate to determine the risks attributed to female gender and African-American demographic groups.[2] Also, studies inconsistently suggest inexperience and older age as possible risk factors.[1,4,5]

How can paratroopers prevent parachuting injuries?

Parachuting in the military requires substantial training and qualifications to maintain readiness and skills. Some injury risks are out of a paratrooper's control, but BAC trainees and operational paratroopers can take actions to increase resilience against injury by following these tips:

Fitness and Strength

- Maintain physical fitness to reduce injury risks.
- Meet or exceed DoD Physical Fitness/Body Composition Program basic requirements through proper exercise and nutrition regimens.[9]

Training and Equipment

- **Train smart.** Follow airborne training and doctrine, including the PLF technique and using the T-11 parachute and proper safety gear. These are the paratroopers' allies in the sky.[8]
- **Stay up-to-date.** Consult the latest policies and procedures for airborne operations. They are there to keep paratroopers safe, so stick to the script!
- **Follow current doctrinal procedures.** The PLF is a prime example of a procedural change that has prevented thousands of paratrooper injuries. Learn from paratroopers of the past to avoid injuries. [8]
- **Use current equipment and safety gear.** Use the T-11 parachute and properly use all safety equipment (e.g., helmets, gloves).

  NOTE: Studies from the late 1990s–2010 showed an outside-the-boot parachute ankle brace (PAB) notably reduced ankle injury risk. However, use of the T-11 parachute appears to have further mitigated the risk. Recently, head and neck protective gear recommendations have been suggested.[2]

Key Information Sources

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