Athletes, coaches, and strength and conditioning professionals often view inflammation as if it is an opponent or obstacle to overcome. A widespread idea is that athletes should “fight” against inflammation in order to get rid of it. However, contrary to popular belief, inflammation is the first stage in tissue repair, and it should be viewed and treated as such. This article will explain the physiological process of tendon tissue repair and compare the effects of various responses to tendonitis.

**THE TENDON TISSUE REPAIR PROCESS**

The tissue repair process varies according to the type of body tissue affected. The majority of research on tendon repair has explored the healing process of tendon rupture as opposed to tendonitis (1). However, it can be assumed that the repair process for both tendon ruptures and tendinitis are similar (1).

The tendon repair process occurs in three stages: the inflammatory, proliferative, and remodeling stages. Because this article primarily focuses on the inflammatory stage, the other stages will not be elaborated on as much in this article.

**THE INFLAMMATORY STAGE**

Michael Gross defines inflammation as when the “body tissues are injured by physical trauma, intense heat, irritating chemicals, or infection by viruses, fungi, or bacteria,” (2). Inflammation of a tendon, commonly referred to as tendonitis, is caused by the physical trauma that results from overuse. It is estimated that about 30% of running injuries and about 40% of elbow injuries in tennis players can be attributed to overuse of certain tendons (3). Tendonitis is common in strength and conditioning settings because repetitive physical actions may lead to overuse.

In the inflammatory stage of tendon tissue repair, a hematoma, or blood clot, forms at the affected site (4). The hematoma activates the release of vasodilator chemicals, which cause the tissue’s blood vessels to dilate, or widen. This allows for more blood flow to the affected area, causing the redness and warmth often seen and felt with tendonitis. Vasodilator chemicals also make the tissue’s capillaries significantly more permeable, which allows important fluids to flood the area, causing the swelling seen with inflammation. This swelling then presses on the nearby nerve endings, which results in pain (2). These fluids that flood the area contain erythrocytes (oxygen-delivering red blood cells), neutrophils (protective white blood cells of the immune system), and monocytes (protective single-nucleus white blood cells) (2). Next, protective macrophage cells initiate the phagocytosis process, which rids the area of damaged and dead tissue cells. Lastly, new blood vessels are formed through angiogenesis and new tendon cells (tenocytes) move towards the area of the affected site (3). Inflammation sets the stage for the remainder of the tissue healing process, which includes the proliferative and remodeling stages (2).
THE PROLIFERATIVE STAGE
In the proliferative stage, fibroblast cells, which form the fibers of connective tissue, initiate the synthesis of collagen (4). Type III collagen, which is the main structural protein in tendons, bones, cartilage, and other connective tissues, is most abundant in this stage. Additionally, high amounts of water are present at the site during the proliferative stage (3).

THE REMODELING STAGE
In the final stage of tendon tissue repair, type I collagen fibers, which are present in scar tissue, are organized along the tendon axis. These type I fibers are primarily responsible for generating mechanical strength in the tissue (4). The repaired tissue becomes stiffer and stronger throughout this stage.

COMMON RESPONSES TO INFLAMMATION
There are several ways that individuals respond to inflammation. The three most common responses to inflammation include: neglect, icing the injured area, and using nonsteroidal anti-inflammatory drugs (NSAID). When choosing the response, it is important to take into consideration both the costs and benefits.

NEGLECT
Neglecting inflammation might seem necessary if a coach or an upcoming competition leads to an athlete feeling pressured to play through an injury. However, in many cases it may be better for the athlete to allow their body to rest and complete the innate repair response. Neglecting acute inflammation could contribute to the onset of chronic inflammation or more serious injuries (5).

ICE
Icing, or cryotherapy, has long been accepted as a beneficial response to inflammation. Researchers have concluded that cryotherapy is an effective way to relieve short-term pain (6). A systematic review of the effects of cryotherapy showed that applying ice through a wet towel for periods of 10 min is the most effective method (7).

NSAID
NSAIDs, such as aspirin or ibuprofen (e.g., Motrin®, Advil®, etc.), are effective at reducing the pain caused by inflammation (9). However, NSAIDs should be used judiciously because they reduce pain by inhibiting the body’s innate inflammatory and repair responses (2). In addition, excessive use of NSAIDs can cause a number of negative side effects such as nausea, vomiting, heartburn, bleeding, and diarrhea (6,7,10).

CONCLUSION
Inflammation is the first stage in the tissue repair process and sets the stage for the remainder of the healing process. Instead of viewing it as a foe to be fought and conquered, inflammation should be viewed as a helpful and necessary process to promote healing. There are several common responses to inflammation including neglect, icing, and using NSAIDs. Athletes and strength and conditioning coaches, in consultation with the sports medicine team, should address and monitor inflammation to alleviate symptoms and return athletes to participation.

REFERENCES
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Gabrielle Smith recently earned a Master of Arts degree in Sport and Performance Psychology from the University of Denver. During her time at the University of Denver, Smith served as an extern in the United States Olympic Committee’s Sport Performance Division. She provided biofeedback and neurofeedback training services to athletes in the psychophysiology lab at the Olympic Training Center located in Colorado Springs, CO. She also served as a Sport and Performance Psychology Consultant at the Center for Performance Excellence, where she provided services to middle and high school athletes and coaches. She currently serves as Mental Skills Trainer and Club Coach for Colorado Premier Basketball Club. Prior to attending the University of Denver, Smith graduated from Vanderbilt University in Nashville, TN with a Bachelor of Science degree in Cognitive Studies.

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