In recent years, unverified claims and online discussions have stirred up a dialogue regarding the potential negative impact of cryotherapy in the sports health care setting. However, much of this dialogue has come from proponents who clearly do not support cryotherapy. We are aware of comments being made such as the following: (1) “cryotherapy doesn’t work;” (2) “ice age is over;” (3) “cryotherapy has never been proven to be effective;” (4) “cryotherapy impedes or is harmful to healing;” and (5) cryotherapy “is the end of ice bags.”

With negative comments such as these, it is essential that health care educators, students, clinicians, and individuals in the health care industry (eg, sales associates and marketers) have an understanding of the facts and fallacies regarding the localized use of cryotherapy as a therapeutic modality. Those individuals must be able to decipher how negative comments, which may come from biased sources whose purpose is to support or market a particular product or technique, are inaccurate, laden with incorrect interpretations, come from research studies that lack adequate study designs with inaccurate comparisons and/or controls, or have insufficient sample sizes to draw appropriate conclusions.

When choosing the therapeutic modality to treat acute, post-acute/subacute, and chronic injuries and conditions, clinicians should establish their treatment goals and then determine whether or how a therapeutic modality can help achieve those goals. Through our experiences with cryotherapy, it is clear that confusion exists or that some clinicians do not completely understand its physiological effects when used for treating soft tissue orthopedic injuries. Therefore, we believe it is important that students, clinicians, and individuals working in the health care industry have a well-established rationale for using cryotherapy and other therapeutic modalities to provide the best patient care. The purpose of this editorial is to provide the reader with clarification in the hope that it improves the effectiveness of cryotherapy when used in the sports health care setting.

Immediately following an acute orthopedic soft tissue injury, clinicians should use cryotherapy as part of a treatment protocol (eg, rest, ice, compression, elevation, and stabilization [RICES]) to limit the amount of tissue damage (eg, secondary injury) and minimize pain perception, metabolic activity, and neural inhibition. When the
injury moves into the post-acute/subacute and/or chronic stages, clinicians should advise their patients to transition from rest to relative rest where cryotherapy could serve as an adjunct to therapeutic rehabilitation. In scenarios where cryotherapy is used as an adjunct to therapeutic rehabilitation in both post-acute/subacute and chronic stages, there is evidence to suggest that it helps to reduce localized pain and arthrogenic muscle inhibition.

We respect the fact that there are other therapeutic modalities that may be beneficial in treating patients. For example, depending on the treatment goal(s), pneumatic compression devices, superficial or deep thermotherapy, certain electrical stimulation techniques, low-intensity pulsed ultrasound, or photobiomodulation are supported in the literature for providing various therapeutic benefits. However, understanding the appropriate parameters needed for the desired physiological effects and which modality may be indicated, contraindicated, or best for the patient during the acute, post-acute/subacute, and chronic stages is important in achieving treatment goals.

When discussing using cryotherapy in the absence of therapeutic rehabilitation in the sports health care setting, outdated concepts continue to be difficult to correct and unfortunately often add to the confusion and misunderstanding. For example, clinicians can continue cryotherapy 72 hours after an injury. Cryotherapy does not eliminate the inflammation process following an acute orthopedic soft tissue injury, nor does it stop hemorrhaging or eliminate swelling or edema. Applying cold immediately followed by heat does not produce a vasoconstriction and vasodilation response, which is often thought to be responsible for removing edema. Finally, applying an ice bag directly to the patient’s skin will not cause cold-induced vasodilation, nor will it cause frostbite in patients who have not been diagnosed as having a preexisting vascular condition.

The treatment mode (eg, ice bag, ice massage, cold gel pack with protective layer, or cryokinetics protocol), temperature reduction, duration of application, and the individual patient’s characteristics will all influence tissue cooling. To exaggerate our point, when discussing ice bag treatment times, historically the focus had been on a set amount of time (ie, 15, 20, or 30 minutes). However, based on our current understanding, cryotherapy treatment parameters (eg, duration) should be chosen based on the treatment goal. For example, if a clinician’s goal is to reduce secondary injury in patients with a greater amount of overlying adipose tissue, a longer treatment time will be necessary to reduce the temperature of deeper tissues and thereby reduce metabolic activity (ie, quadriceps vs lateral ankle). On the other hand, when the clinician’s treatment goal is simply to reduce pain perception, there is no need for clinicians to focus on reducing temperature in the deeper structures. Instead clinicians should direct their concerns to skin temperature decreases that are not influenced by layers of adipose tissue.

In assessing proponents’ arguments regarding why cryotherapy should not be used, we are aware of online posts and discussion boards that attempt to inform the reader that cold application as part of their acute care treatment plan for a musculoskeletal injury can negatively affect vascular structures. However, when such claims are made, it is important for the reader to delve into the sources of information and try to understand why such claims are made. In some cases, those who do not support cryotherapy have referenced research that included patients diagnosed as having hemophilia, a genetic blood clotting disorder that affects approximately 1 in 5,000 individuals. Using references such as this encompass a population that is not generalizable to a majority of the population and should not be used when referring to patients without the disease, especially injured athletes.

Additionally, online posts and discussion boards that are against cryotherapy indicate that ice constricts blood flow and thus impedes inflammatory activity, which theoretically would negatively affect healing. These proponents do not take into consideration the literature demonstrating that cryotherapy does not decrease blood perfusion in resting muscles or in muscles following exercise-induced muscle damage, yet it is beneficial in decreasing pain perception. A better argument would be that decreased tissue temperature reduces cellular metabolism and then in turn suppresses the inflammatory response. However, the lowest recorded intramuscular tissue temperature during ice application in a human is approximately 20°C, which represents an approximately 40% temperature decrease. Temperature decreases reduce metabolism, but it does not eliminate all cellular activity; therefore, it is unlikely that cold eliminates the inflammatory process. To date, there is no direct evidence that cold modalities used for acute orthopedic soft tissue injuries impede healing or time to return-to-participation. The literature suggests that cryotherapy may limit the amount of tissue damage (eg, secondary injury), which would have a positive effect on return-to-participation, whereas the sooner
the cold modality is applied, the more beneficial it may be in reducing cellular metabolic activity. Therefore, the conclusion that cryotherapy negatively affects patient healing is inaccurate and unwise.

In an investigation assessing the effects of cryotherapy on blood perfusion and inflammatory markers following an eccentric muscle damage protocol, the authors present results that are contradictory to the previous studies. After the cold application is removed, the authors indicated that tissue oxygenation improved, implying that cooling tissue negatively affects return to normal function and may delay healing.

When assessing these results, it is important to evaluate the details of the study to determine faulty thinking and flawed conclusions. In one study, the exercise program did not increase blood flow to the muscle, a 15-minute cold treatment was used, and some of the biomarker results indicated a reduction in tissue damage; therefore, it is difficult to accept the authors’ conclusion that cold delays healing. With that said, we need more high-quality, large-scale, randomized controlled trials to appropriately and effectively inform health care providers and individuals who work in the health care industry (eg, sales representatives and marketers). The purpose of this editorial is not to say that we are proponents for or against the use of cryotherapy as part of a therapeutic intervention. We respect the fact that many therapeutic interventions may effectively meet a clinician’s therapeutic goal in providing the best care. Our goal is to remind health care providers and individuals who work in the health care industry that, to best serve patients, the use of therapeutic modalities should be based on the best available and unbiased evidence that is grounded in a sound understanding of physiology. Clinicians should beware of false and inaccurate claims about cryotherapy.

REFERENCES