EXERTIONAL heat illness (EHI) includes several activity-related conditions that most likely occur in hot, humid weather conditions. Traditionally, heat cramps, heat exhaustion, and heat stroke have been classified as exertional heat illnesses; however, heat syncope and exertional hyponatremia can also be classified as a heat and activity-related illness. Although each condition is worthy of discussion, only exertional heat stroke (EHS) and exertional hyponatremia have potentially fatal consequences if not recognized and properly treated. Exertional hyponatremia was discussed in Part 1 of our series. The focus of this second report is to discuss the prevention, recognition, and management of EHS.

As outlined in the National Athletic Trainers’ Association (NATA) Position Statement, there are several prevention strategies including heat acclimatization, proper nutrition, practice guidelines, and rest periods that an athletic trainer should consider. Evidence exists that many of these strategies are successful ways to lessen the risk of EHS.

When an athlete collapses during or just after intense exercise in the heat, an accurate measure of core body temperature is needed. Many body temperature assessment devices exist, but only rectal thermometry has been documented as a valid, reliable, and practical measurement tool in a field setting. Given that many of the common methods that athletic trainers use to obtain core body temperature, such as temporal, tympanic, aural, oral, axillary, forehead sticker, are invalid for EHS diagnostic purposes, the need to do rectal temperature assessment is imperative.

When rapid cooling of an EHS victim is warranted, many athletic trainers do not utilize the method that has been proven to provide the superior cooling rate. Although many methods exist to cool the body, cold water immersion provides the most rapid cooling for an athlete suffering from EHS. Many myths about the use of the technique exist; however, it has been proven as the most effective (in terms of superior cooling rates and superior survival rates) means to cool a hyperthermic athlete, and the NATA and the American College of Sports Medicine (ACSM) recommend its use when treating EHS. Among major issues that must be addressed when developing an appropriate athletic training curriculum related to the physiological and medical issues of exercise in the heat are rapid recognition of EHS and
immediate cooling using the most efficient techniques. The ACSM and NATA position statements provide the fundamental knowledge that students should read and become familiar with as you teach and discuss these topics.1,5

Following the same format as in Part 1,3 we will address the essential heat-related curriculum issues, as well as recommended pedagogical teaching strategies that match lesson plan objectives for the topic area. The information presented will directly address the NATA competencies outlined within the 4th edition;7 however, this information will extend beyond the basic requirements of the competencies. Our hope is to encourage AT educators to provide their students with the most accurate and appropriate information, as documented by the research, to continue to enhance the prevention, recognition, and treatment of EHS. Parts 3 and 4, respectively, will outline in more detail the strategies for rectal thermometry and cold water immersion.

Discussion

Recently, Gould and Caswell8 have investigated learning preferences among undergraduate athletic training students (ATSs). Their results indicated that most of the ATSs surveyed (~ 60%) prefer teaching that is highly structured and passively involves them as learners, whereas slightly more than a quarter favored an environment that encouraged social interactions with fewer learning constraints.8 Almost 20% favored teaching that encouraged them to problem solve, conduct experiments, and be involved in independent learning activities.8 Gould and Caswell recommend that athletic training educators “design a curriculum that incorporates instructional styles that challenge students to ‘flex’ from their dominant instructional preferences. Challenging students to flex their styles is an important component of fostering students’ future professional development.”9 (p. 48)

ATSs employ various learning methods,10-13 and their preferences for learning oftentimes reflect their learning environment14 or the topic.13 Corroborating with Gould and Caswell’s6-9 recommendation, it is advantageous to design heat and hydration curricula both to support and mimic the milieu of ATSs’ fieldwork and future professional endeavors. In the previous report, we advocated a social constructivist perspective on knowledge building, which suggests that students build understanding within a social environment.3

Recent developments in neuroscience have increased understanding of the manner in which the brain functions while learning, resulting in guiding principles for teaching. These principles support variation in teaching methods and the social constructivist perspective that stresses the role of the context in supporting learning.

Brain research indicates that the foundation for learning involves identification of patterns, and new learning takes place when an experience is connected to prior understandings.15-16 Learning is best accomplished through repetition and problem solving, where practice can address high levels of critical and creative thinking.15 Emotion cannot be separated from cognition; in fact, students learning within an environment to which they have emotionally connected will understand and retain the knowledge at a more profound level.15 Some teaching principles for brain-based learning include establishing an environment in which students can relate to and interact with the context and material in an effort to be emotionally connected to the topic;15-18 actively engaging students by addressing multiple learning styles, and encouraging transfer by having students recall their knowledge then applying it to a new situation.15 Educators operating from a social constructivist perspective would see a connection to these teaching principles, given that they emphasize the role of the learning environment, such as using dialogue to help students become emotionally connected to the topic.

We drew from the literature to design activities (Table 1) focused on core heat objectives that should be addressed in an athletic training curriculum. We consider these objectives to be essential for an entry-level education and necessary for a thorough understanding of exercising in the heat and its potential consequences. A description of the general types of teaching strategies (i.e., background connection, lecture, dialogic discussions, and experiential learning) can be found in the first part of this series.3 The background connection activities are similar to what Caine and Caine17 term “global experiences” that support brain-based learning, which have students recall previous knowledge and experiences. Since students may not have direct experiences with EHI, particularly EHS, we recommend that they read literature detailing the athlete’s experience with EHS prior to the commencement of the recommended activities. The suggested teaching strategies assume students have read some articles that provide them with a knowledge base for development of new