A Tough Challenge Ahead

Most AMAA members and many non-current members have heard the news that the Boston Athletic Association (BAA) has declined our proposal to continue as a fundraising non-profit organization at the Boston Marathon. It was a blow to the organization financially and a loss to the many past and current members who have run and volunteered at many Boston Marathons.

Here is the best explanation of the recent events. Each summer we submit a request to be a charity partner with the BAA. It is never a sure thing in event fundraising or revenue production when you do not control the event or source of income. It was always our goal to show the BAA that AMAA, its members, and our events at the Boston Marathon added value to the BAA and its marathon. We never took it for granted. Yet, in June of this year, we found out we would have to compete with other nonprofits to be an “official charity” of the Boston Marathon in order to receive “invitational entries” to raise funds at the marathon. Essentially, our one-on-one deal with the BAA was not going to be renewed. By the end of July, we put forward a proposal that we felt was worthy and beneficial to the BAA and the greater community of the Boston Marathon. It came down to (in my best guess) that our NATIONAL RUN A MILE DAYS campaign was not focused enough on the Greater Boston community.

AMAA has never been stronger as a professional non-profit division of American Running. Our sports medicine continuing education symposiums are well-respected and have grown in attendance. Members have raised thousands of dollars that have benefited our NATIONAL RUN A MILE DAYS campaign. The “Run a Mile” effort started with a few schools as test programs in a few towns and counties near staff and members. It has grown virally where we have over 36,000 students in 24 states running the mile each spring. The enthusiasm of ARA and AMAA members along with school teachers and administrators has been infectious. Feedback to lead PE teachers and to our staff has been heart-warming. Kids love learning how to train and run the mile. Along the way, the young kids and youth have learned that staying active through running is important year-round. Discussions in the classrooms have expanded to focus on better eating habits too. AMAA has inspired these young runners, and in turn, given new meaning of “giving” back to a community for our members.

We have a tough road ahead with major challenges. We are seeking new financial partners and other avenues to raise funds. Membership and medical meetings are not enough to sustain our nonprofit organization. We are looking at all options to maintain our sports medicine symposiums at the Boston and Marine Corps Marathons. Both have been sustainable in the past and we are looking at the best way to keep other elements of AMAA intact.

What can each member do? For one, find others to join and become active in AMAA. Find friends in your community or town who would be interested in bringing a RUN A MILE DAYS program to an elementary or middle school in that town, city, or county. Then find ways to raise funds to make that MILE DAYS event happen. It is roughly a $5,000 goal per school of 500 to 600 students to hold a RUN A MILE DAYS campaign. Each school starts training in late winter or early spring and holds the MILE DAYS event in May, some in early June.

We all have faced major challenges in life. For some, like me, it was advanced cancer. For others it may be the end of a job or in the case of ARA and AMAA, a financial loss. We may have to make changes to survive, but we can do just that—survive. All of us have to do our part to overcome the challenge at hand. We can do it.

Best regards,
Dave Watt, Executive Director
AMAA PREMIER MEMBERS

The American Medical Athletic Association wishes to thank those members who have contributed to the organization beyond their annual dues. This list reflects membership upgrades received from August 1, 2015 to November 30, 2016.

OLYMPIAN ($250)
Mary C. Boyce
Julius S. Brecht
Charles (Scott) Clark
Harry Daniell
Ronald Dubin
Edmond G. Feuille, Jr.
Cathy Fieseler* ±
Wade Gaasch
Scott Glickman
Fawwaz Hamati
Jeffrey Hawkins
John Howick
Timothy Lepore
Francene Mason
John McCauliffe
Steve Morrow* ±
Terry Murphy
Robert A. Niedbala* ±
William Paronish
Daniel Pereles
Richard Prokesch
Frank J. Rodriguez, Jr.
Charles L. Schulman
Robert Sholl
Michael Solinger
Joseph L. Verdirame
Joel B. Weber
Philip Zitello
Patrick J. Hogan

SUPPORTER ($100)
Sal Barbera
Matthew Barnes
Christianne Bishop
Bill Borowski
Walter M. Bortz, II ±
Thomas Boud
Brad Carmine
Steven D. Coffman
James Culpepper
Kathleen Doughney
Michael S. Doyle
Robert Erickson
Joseph M. Gaffney
John Geren
John W. Gilpin
Bernard Gitler
Jeff Godin
Steven Grufferman
Michael Hamrock
Beverly Handy
Dexter Handy
Allan Katz
Brian Y. Kim
James M. Larson
J. Mark Lawson
Robert B. Lee
Frank Massari, Jr.
Ronald H. Miller
Robert P. Nirschl
Floyd Okada ±
Mark Rubenstein
Robert A. Sabo
Toussaint G. Toole
Clay Whiting
John Zinkel
Valerie Zugaib

PATRON ($150)
Larry Boies, Jr.
Phil Filbrandt
William Kraus
Tristram C. Kruger
Franklin G. Mason
Michael W. Moats

* Contributions surpass Olympian level
± Life Member making contribution at the level of Premier Member

To become an AMAA Premier Member, please go to www.amaasportsmed.org and click on “Join AMAA.” The funds from this program help support the AMAA running medicine awareness campaigns and the American Running Association’s signature national outreach campaign event National Run A Mile Days held annually in May.

CONTENTS

Message from the President ................... 4
Bob Murray, PhD, FACSM

Psychological Effect of Injury on the Athlete: A Recommendation for Psychological Intervention ............... 8
Shelly Steinbein, MS

Should You Change an Athlete’s Natural Running Form? .................. 11
Thomas C. Michaud, DC

Runners of Yesteryear ......................... 14
Paul J. Kiell, MD

Book Review:
Swim: Why we Love the Water, Blue Mind, and Swimming in the Sink .................. 16
Douglas F. Munro, PhD and Paul J. Kiell, MD

Member Profile:
Mark Lavallee, MD, CSCS, FACSM
Overcoming Early Obstacles and Paying It Forward .................. 18
Jeff Venables
The times they are a changing….

As AMAA Executive Director Dave Watt stated in “Front of the Pack,” most of you know that the American Medical Athletic Association did not obtain charity entries for the 2017 Boston Marathon. What you might not know, however, is that these entries and the fundraising dollars they generated were a major source of funding for the NATIONAL RUN A MILE DAYS campaign. This is the organization’s annual program promoting fitness in elementary and middle school-aged children through running. Obviously, our loss of entries creates a major challenge to continuing this youth program.

Children now have a shorter life expectancy than their parents due to diseases related to obesity and inactivity. This is unacceptable and preventable. Promoting the simple act of training for and running a mile to school-aged children can be a life changing event for many kids who would otherwise be in front of a screen. Promoting NATIONAL RUN A MILE DAYS (www.runamile.org) to schools in your area and keeping your ears and eyes open for sponsorship opportunities can help keep this program alive.

As we move forward into 2017, we still plan to host the 46th Annual Sports Medicine Symposium at the Boston Marathon in April. This has been an outstanding meeting and I hope many of you will attend, even if you aren’t running the marathon (register at www.amaasportsmed.org). Meeting attendees always comment on the outstanding speakers and topics each year and, in my opinion, what is most remarkable about the meeting is that it doesn’t just impact patient care. The information gleaned from the presentations has prompted many attendees to change their own lives, me included. That speaks volumes!

Another meeting to consider attending is our sports medicine symposium held annually in conjunction with the Marine Corps Marathon. The October meeting kicked-off a new three-year partnership between AMAA and MedStar Sports Medicine. As a result, we moved from our decade-long location at Virginia Hospital Center in Arlington to the Georgetown University School of Medicine, my alma mater. It was a great one-day meeting with lectures providing practical information for the clinical setting and field-based activities, as well as a variety of hands-on workshops. Attendees of this meeting are also invited to run the race through entries we receive, or provide volunteer medical care for additional Category 1 CME credit.

So, where do we go from here? We will strive to continue offering outstanding symposiums and encouraging the development of grass-root youth running programs nationwide. But we need you, the members of AMAA, to help us in our efforts. Donations are greatly appreciated and will be put to good use. In our most recent membership renewal mailing, many of you stepped up your support through our Premier membership program by choosing to become a Supporter, Patron, or Olympian. Thank you.

We also need to grow our membership numbers. You have been steadfast in your commitment to AMAA, something the Board of Directors greatly appreciates, but we also need the addition of more young members for the organization to survive and grow into the future. If you work with students or residents, please consider promoting AMAA to them. If you would like organizational materials to share, contact Barbara Baldwin at bbaldwin@americanrunning.org.

I am working with executive director Dave Watt and the Board of Directors to explore options that will allow AMAA and its parent organization the American Running Association to thrive in future years. We have talked about hosting a running camp, continuing our meetings at the Boston and Marine Corps Marathons, and possibly even expanding our meeting venues. We may also explore opportunities for sponsorship to sustain the organization and our charity program. This will be a marathon undertaking and we welcome input and assistance from our members.

Please maintain your membership and consider making a donation to the organization by going to www.amaasportsmed.org and clicking on the “Donate Now” button. Promote the organization to medical professionals, especially young health care workers. Promote the running program to your local schools. Read the AMAA Journal and check out the website regularly. Please be an active member of AMAA so the organization can continue to be viable and productive.

Keep running.

Cathy Fieseler, MD, AMAA President

Caldwell Esselstyn, Jr., MD, author of Prevent and Reverse Heart Disease, captivates the audience at the 2015 AMAA symposium in Boston.
Rod MacKinnon and Bruce Bean are experienced sea kayakers who don’t allow even blustery winter weather to stop them from long padding trips off the coast of Cape Cod. Wet suits, cockpit skirts, and constant padding keep them warm enough in frosty conditions, although they’ve learned firsthand that muscle cramps are not only a major nuisance but can be life-threatening. Balancing in a needle-thin 17-foot long sea kayak miles from shore as wind, waves, and cold conspire to wrench the paddle from your hands is simply not a good occasion to experience cramps of any sort.

MacKinnon and Bean are long-time friends with overlapping professional interests. Both are neuroscientists, MacKinnon an MD with a professorship at Rockefeller University and Bean a PhD professor at Harvard Medical School. (In 2003, MacKinnon was awarded the Nobel Prize in Chemistry for his research on the structure and function of potassium ion channels.) Both individuals cramped almost simultaneously on a kayak trip; their subsequent conversation naturally turned to the issue of cramping. They were curious about what was known about the cause of muscle cramps and what remedies were available. They dug into the literature and quickly realized that the cause of muscle cramps—as well as effective ways to prevent and treat cramps—were unclear and not thoroughly researched.

Exercise-associated muscle cramps (EAMCs) occur during physical activity and are characterized as “… a sudden, involuntary, painful contraction of a muscle or part of it, self-extinguishing within seconds to minutes and … often accompanied by a palpable knotting of the muscle” (18). EAMCs afflict millions of athletes, workers, soldiers, and fitness enthusiasts, who are forced to alter or cease physical activity when the cramp strikes and then deal with subsequent post-cramp soreness (11).

Although the exact cause(s) are not well understood, numerous factors are thought to influence EAMCs (15), including muscle fatigue, prolonged muscle contractions, muscle damage, restricted muscle blood flow, diabetes, dehydration, and hyperthermia (11). This diversity of the factors associated with triggering EAMCs may explain why a variety of interventions, with mixed results, have been attempted to suppress EAMCs (e.g., hydration, electrolyte replacement, stretching, pickle juice, mustard, etc.) (15).

EAMCs are currently thought to be of neurogenic origin, possibly involving persistent inward electrical currents (PICs) in the dendritic tree of the spinal motor neurons, perhaps promoted by a temporary disruption in the balance of input from muscle spindles and Golgi Tendon Organs, which would normally act to prevent too much tension in the tendon and muscle fibers. In turn, these strong ion currents in the membrane are known to lead to changes in excitability and alter discharge patterns of the motor neurons, sending rapid bursts of action potentials down the axon to cause contraction of muscle fibers (8). In the case of cramp-sensitive skeletal muscles, individual motor nerves in the spinal cord control the contraction of hundreds or—in large muscles such as the quadriceps and gastrocnemius muscles—over one thousand individual muscle fibers. A single motor neuron and the muscle cells it innervates are referred to as a motor unit. Uncoordinated contractions of individual motor units can result in localized fasciculations (twitching) that can sometimes be observed under the skin, especially during or after strenuous exercise. Repeated muscle twitches often occur before the onset of muscle cramps, with simultaneous and continuous discharges of several motor units resulting in full-blown muscle cramps (11,15,18). For many athletes, EAMCs can be an infrequent nuisance during training and competition, while others suffer from debilitating cramps numerous times each week. For those cramp-prone athletes, finding a way to prevent or quickly treat EAMCs can mean the difference between continuing the sport they love or quitting out of frustration.

Evidence for a neurogenic origin of EAMCs includes the observation that cramp-prone subjects have a lower threshold for the electrical stimulation of muscle cramps (1,13,16) and that blocking the motor nerve with certain drugs such as anesthetics decreases or abolishes electrically induced cramping (17). In brief, it appears as though a variety of factors (triggers) may alter normal neuromuscular control, especially so during intense or fatiguing exercise, leading to the development of persistent inward currents in the dendritic field of lower motor neurons sufficient to exceed the excitation threshold of affected neurons, perhaps coinciding with a simultaneous reduction in inhibitory input from afferent receptors such as Golgi Tendon Organs (18).

Regardless of the trigger for EAMCs (fatigue, dehydration, etc.), if cramps are of neurogenic origin, interventions that decrease persistent inward currents and motoneuron hyperexcitability may prevent EAMCs from occurring or reduce their severity. This concept is supported by the observation that ingestion of pickle juice significantly reduces the duration of electrically induced muscle cramps (14). The consumption of pickle juice (1 ml/kg BW) immediately after the induction of electrically induced cramp of the flexor hallucis brevis muscle of the foot reduced cramp duration compared to the consumption of deionized water. This experiment suggests that the ingestion of pickle juice triggered a neural reflex in the oropharyngeal space that activated spinal inhibitory neurons and reduced alpha motoneuron activity to the cramping muscle, lessening the duration of the cramp.
Multiple studies of healthy human volunteers using electrically-induced cramps in one foot demonstrated that consumption of a small volume (< 2 oz.) of beverages containing various formulations of TRP channel activators was associated with statistically significant reductions in cramp intensity.

continued from page 5

MacKinnon and Bean suspected that a mouth-to-brain-to-muscle mechanism could be effective at preventing EAMCs. They hypothesized that activation of Transient Receptor Potential or so-called TRP ion channels in the sensory nerves of the oropharynx and upper GI tract could reduce the hyperactivity of the motor nerves that sustain a cramp. TRP channels belong to a superfamily of membrane channels expressed in many cell types, including sensory nerve cells (19,24) involved in the detection of temperature, tastes, stretch, and pressure as well as noxious and pungent chemical agents (12,20). Specifically, TRPA1 and TRPV1 channels are activated by compounds contained in capsicum, garlic, and other pungent plant extracts (5,19). TRP channels allow cations such as sodium, calcium, and magnesium to pass across membranes and are abundantly expressed in sensory nerves in the oropharyngeal space (see Figure 1), including the trigeminal (V), glossopharyngeal (IX), and vagus (X) nerves that project directly and indirectly to the solitary tract nucleus in the lower brainstem, which in turn has connections to various targets in the brain and brainstem, including the locus coeruleus and the dorsal raphe nucleus. Neural projections from these cell groups extend widely throughout the brain and spinal cord, and activation of these efferent neural circuits in the spinal cord may prevent muscle cramps by decreasing PICs, thereby restoring the normal activity of the motor neurons involved in muscle cramping.

In the hope that their initial observation might benefit athletes with EAMCs and possibly patients with frequent muscle cramps, MacKinnon and Bean started a company* to further their research and combat cramping. There are now several lines of converging evidence to support the concept they developed that TRP channel activation by common natural compounds can prevent and treat muscle cramps by increasing the inhibitory tone in the spinal cord and thereby reduce lower motoneuron hyperexcitability. In experiments reminiscent of electrically stimulating frog muscles in high school biology class, multiple studies of healthy human volunteers using electrically-induced cramps in one foot demonstrated that consumption of a small volume (< 2 oz.) of beverages containing various formulations of TRP channel activators was associated with statistically significant reductions in cramp intensity (EMG area under the curve); in some of these experiments the duration of cramp inhibition was found to last 6-8 hours post-ingestion (9,21-23). The researchers hypothesized that the strong excitatory input produced by TRP channel activators increased inhibitory tone in the spine (e.g., reduced PICs), resulting in a significant diminution of cramp characteristics via inhibition of persistent neural input to the affected muscle. This research has now been presented at the last two American Academy of Neurology (AAN) Annual Meetings (21,23) as well as the 2015 Congress of the European Committee for Treatment and Research of Multiple Sclerosis (ECTRIMS) (9).

Another series of five studies used healthy, but cramp-prone athletes as subjects (n = 139). The athletes consumed a proprietary TRP-activator beverage within 30 minutes of their normal training sessions and recorded the frequency, duration, and pain ratings associated with all episodes of cramping. Other training sessions were completed without any intervention or, with some subjects, using a placebo control beverage. The results consistently showed a reduction in the frequency of EAMCs compared to baseline measures (i.e., cramps were prevented in some subjects.) In addition, the athletes reported a quicker return to training after a cramp episode (10).

Researchers at Penn State University recently presented results showing that consumption of TRP channel activators reflexly decreases neural hyperexcitability, thereby preventing cramping (3). Their volitional, non-electrical cramp paradigm is a closer representation of what athletes experience when cramping during exercise. EMG recordings and other measurements were made before, during, and after each cramp episode. Again, consumption of the TRP-activator beverage significantly reduced the EMG area under the curve, consistent with inhibition of motoneuron activity in the cramped muscle. In addition, consumption of the beverage was associated with lower post-cramp muscle soreness ratings in the 20 minutes following the cramp (3), a response possibly due to the reduced intensity and duration of cramp contraction and related pain rather than cramp-induced muscle damage.

Figure 1: A simple schematic of the sensory nerves innervating the oropharyngeal space.

* FlexPharma, Inc.
It is possible that consuming a beverage that sufficiently activates TRP channels might not only prevent muscle cramps but also improve exercise capacity.

Several lines of research are now being pursued to better understand the cause of EAMCs and the pathophysiological conditions that precede the onset of overt muscle cramping. As pointed out, fasciculations or “muscle twitches” are commonly observed before overt cramping. How does the uncontrolled discharge pattern of a single motor neuron suddenly reach a “flashpoint” to expand to neighboring motor neurons in the spinal cord? Why is this phenomenon usually limited to a single muscle? What are the mechanisms that prevent the expansion and keep a cramp localized to a single muscle rather than spread ephaptically, directly across adjacent nerve fiber membranes, to neighboring muscles? Studies are underway to address these questions and understand the immediate and delayed consequences of muscle cramping, as well as what other performance and recovery benefits TRP activation might have for an athlete. A particular focus of this research is the relationship to immediate and delayed onset muscle soreness, muscle damage and inflammation, and the important functional aspect of motor recovery. This promising line of research may provide a better understanding of the neural mechanisms that degrade muscle performance acutely and how the activity of certain neural circuits may positively impact neuromuscular performance such as exercise capacity immediately following treatment intervention and over time.

In this respect, TRP channel activation may have many beneficial consequences for athletes and as well for patients with neuromuscular disease. It is possible that consuming a beverage that sufficiently activates TRP channels might not only prevent muscle cramps but also improve exercise capacity. In fact, previous research has demonstrated performance improvements such as increased cycling power output associated with various types of oropharyngeal stimulation (2,4,6,7,25).

**Practical Implications**

Frequent cramps can be a soul-crushing experience for athletes who pour their hearts and souls into training, only to be sidetracked by an untimely cramp. Finding effective prevention is a welcome relief. For cramp-prone athletes, there are a few scientifically proven interventions on the market nowadays that prevent or treat cramps. Other interventions which have been used to treat muscle cramps include intravenous electrolytes, apple cider vinegar, mustard, sedatives, anti-seizure medications, and even pinching the upper lip, but evidence of reliable efficacy is lacking in most cases. Athletes are always well-advised to follow current guidelines for hydration and nutrition to reduce the fatigue-induced risk of cramping. Stretching a cramped muscle is usually effective at releasing the cramp by activating the afferent inhibitory influence of Golgi Tendon Organs, but athletes don’t want to have to stop, preferring cramp prevention over treatment.

Bob Murray co-founded the Gatorade Sports Science Institute (GSSI) and served as its director from 1985 to 2008. After departing GSSI, Bob founded Sports Science Insights, LLC, where be consults for Flex Pharma, Inc., to identify qualified university scientists to conduct related research projects and help in research design and the interpretation of results.

**REFERENCES**


10. Passe DH. Exploratory data analysis efficacy of a spicy beverage in altering the characteristics of EAMCs in athletes during normal training sessions. *Private communications,* 2016.


At one time or another during their sporting or competitive activities, many athletes may suffer an injury that keeps them from participating for the duration of their recovery. If you have been lucky enough to train without significant injury, it is still likely that you know someone who has had an injury that requires some duration of professional rehabilitation before they can train normally again. These serious injuries and rehabilitation are often accompanied by lingering psychological consequences which can impact the athletes’ well-being as well as their likelihood of returning to sport.

In the United States there are an estimated seven million sport and recreation-related injuries per year (1), not including sport injuries that may go unreported, such as sprains and concussions. According to the National Sporting Goods Association, 521,578 people were treated for bicycle related injuries. Additionally, 83% of amateur or competitive runners experience knee, ankle, and foot injuries which can hinder their quality of life temporarily or definitively (2). Despite efforts to reduce the prevalence of injuries with advancements in sporting equipment, coaching techniques, and sport-specific conditioning, sport and recreational injuries continue to increase over time (1).

When athletes are injured they experience a range of emotions which are frequently more debilitating when they require longer rehabilitation. For instance, Marcus Lattimore, a record-setting freshman of the year tailback and Heisman contender for University of South Carolina suffered a series of sport injuries including a torn Anterior Cruciate Ligament (ACL), dislocated kneecap, torn ligaments and nerve damage. Despite countless surgeries and rehabilitation he was chosen in the fourth round of the NFL Draft. Although Lattimore feels lucky enough to train without significant injury, his knees ability to function at the same level he had previously. There are many athletes ranging from novice to professional level and across a wide range of sports and recreational activities, who have suffered career ending injuries and can relate to experiencing psychological distress including re-injury anxiety (3), depressive symptoms (4), and loss of athletic identity (5) long after they’re physically recovered.

In this brief article, I will examine common psychosocial responses to injury and describe several empirically supported psychological interventions which have effectively reduced emotional distress, as well as improved physical and mental outcomes for injured athletes.

Reinjury Anxiety

Reinjury anxiety is one of the most common psychological reactions experienced by injured athletes (6), as well as the most commonly cited reason presented by athletes for not returning to sport post ACL surgery (7). Reinjury anxiety or fear of reinjury, both used synonymously within the sport injury literature, is defined as an irrational and debilitating fear or anxiety that physical movements will result in painful reinjury (1). In a sample of 49 recreational-level athletes (Mage = 29.15 years) who had undergone ACL surgery one year prior, Tripp et al. (1) found that athletes’ experiencing high reinjury anxiety reported having lower confidence in their ability to return to sport (p < .01). Relatedly, in a sample of 62 athletes (32 men, 28 women ages 18 to 37 years) who underwent ACL surgery three to four years prior, athletes reporting high fear of reinjury also reported their knees not functioning as well as they did prior to their injury (p < .05) (3).

Whereas previous research examining reinjury anxiety has focused on athletes who received ACL reconstruction surgery, several researchers have speculated that fear of injury is always present among athletes especially following a serious injury (1). One can easily imagine an athlete struggling with reinjury anxiety after a myriad of sport and physical activity related injuries. For instance, a swimmer who has gone through shoulder surgery may feel anxious about returning to intense training or competition or a cyclist who suffered a serious accident while riding may feel hesitant about riding on the street and therefore ride with hesitance and less frequency.

Reinjury anxiety is associated with psychological changes including diminished concentration and self-confidence, as well as increase in distractibility and pain awareness (6, 8). In addition, reinjury anxiety may also cause physiological changes including over arousal evident through increased heart rate, generalized muscular tension, and guarding the injured site (9). Thus, an athlete who fears reinjury tends to develop a lack of trust in the injured site which can produce hesitance in performance during rehabilitation and when returning to training and competition. Athletes’ awareness of their substandard performance can then lead to decrease in coordination, muscle tension, and bracing or splinting which are suggested to increase actual reinjury occurrence (9). Overall, both psychological and physiological responses to reinjury anxiety contribute to athletes falling into a cycle of inactivity that may lead to reductions in body strength and flexibility, and can result in athletes experiencing greater pain when active, thereby reinforcing the reinjury anxiety that perpetuates continued avoidance.

Psychological Distress

In addition to reinjury anxiety, athletes can experience depressive symptoms following injury (4). The severity of the depressive symptoms can vary based on the injury, limits to mobility, length of rehabilitation, and delay in the athlete returning to sport or physical activity. Depressive symptoms can arise soon after the injury which could be associated with frustrations due to immobility, difficulties participating in everyday activities, and feelings of injustice and shock associated with the injury. Depressive symptoms can also have a delayed onset and could be associated with feeling socially isolated, loss of skills or opportunities, and overall absence from participating in training or competition which can contribute to loss of athletic identity (10). Thus, an athlete who requires surgery following sport injury may be more vulnerable to depressed mood than an athlete who has less severe sport injuries because of the delay in returning to play (1).

Additionally, athletes who report experiencing somatic symptoms (e.g., physical aches and pains associated with psychological distress) prior to injury could impact the length of their recovery time. For instance, it took 20 days for 80% of patients with somatic symptoms to recover from a concussion; whereas it took 10 days for 80% of patients with somatic symptoms to return to play.
days for 80% of patients without prior physical symptoms (11). This research highlights that healthier minds tend to recover quicker from concussions therefore addressing mental health concerns, such as depressive symptoms, prior to injury could impact the recovery time required following a serious injury. Although research has not explicitly examined depressive symptoms prior to or following injuries commonly experienced by endurance athletes, such as pulled muscles, sprains, or shoulder injuries, one could predict that endurance athletes are also at increased risk for developing mental health concerns, such as depressive and anxiety symptoms, following injury especially a career ending injury.

**Impact on Rehabilitation**

Athletes’ willingness to commit to rehabilitation, as well as the value they give to the rehabilitation process, influences their cognitive, emotional, and behavioral reactions to injury rehabilitation (12). Thus, the way athletes perceive their injury rather than the fact that the injury occurred has a critical role in understanding athletes’ emotional responses, such as depression, reinjury anxiety, and grief. Johnston and Carroll (12) observed that athletes who reported a high fear of reinjury also had certain behavioral responses, including but not limited to being hesitant, not giving 100% effort, and being wary of injury-provoking situations (e.g., during rehabilitation and in sporting contexts). They also found that athletes who positively appraised their injury rehabilitation (e.g., viewed their injury as manageable) reported feeling happiness and relief, which fostered increased adherence to rehabilitation. In contrast, athletes who negatively appraised their injury rehabilitation (e.g., viewed their injury as causing stress) reported feeling frustration, which led to hesitancy and cautiousness toward completing exercises in their rehabilitation program. Further, in 2008, Carson and Polman (13) found that during rehabilitation injured athletes tended to seek more emotional support from the staff in charge of rehabilitation as opposed to family. Injured athletes may find that emotional and informational support from athletic trainers, physicians, or professionals familiar with the rehabilitation process is more helpful for managing stress associated with their injury compared to what is offered by family and significant others (14).

**Recommended Psychological Interventions**

Few medical professionals are aware of the psychological interventions which have helped athletes cope with the mental consequences of injury, including setting and adjusting goals during the rehabilitation process and imagery paired with diaphragmatic breathing intended to induce relaxation (15, 16). Goals can be defined as attaining a specific level or proficiency on a task, usually within a specified time period. Podlog and Eklund (7) found that among 12 elite athletes interviewed over a six to eight month period, the injured athletes who adjusted their goals based on their rate of progress during the rehabilitation process reported feeling more successful during their return to sport compared to the injured athletes who did not adjust their goals (7). The majority of successful goal setting interventions included setting goals that provide structure, steps, and motivation for achieving specific milestones in injured athletes’ rehabilitation, and customizing the goals to fit the individual’s needs (17). Additionally, some researchers have begun exploring the impact of mindfulness, a type of meditation focusing on the breath, being in the present moment, and remaining non-judgmental of any thoughts, or feelings that arise during the course of the meditation, on helping athletes with pain, stress and anxiety management, and focus (17). Additionally, integrating self-compassion exercises holds promise in helping athletes address self-critical thoughts, stress and anxiety, as well as difficulties with focus and pain which tend to arise following injury. Further, imagery is a psychotherapeutic intervention defined as creating sensory rich images within one’s mind (18). Within medical contexts, researchers have conducted interventions where relaxation imagery (e.g., imagining a peaceful place) and motivational imagery (e.g., imagining a medical procedure continued on page 10
The injured athletes who adjusted their goals based on their rate of progress during the rehabilitation process reported feeling more successful during their return to sport compared to the injured athletes who did not adjust their goals.

continued from page 9

or treatment being successful) is often paired with diaphragmatic breathing to help individuals cope with cancer (19), fibromyalgia (20), and tension induced headaches (18). Within sport, motivational imagery paired with diaphragmatic breathing is frequently used by athletes, coaches, and sport psychologists to enhance skill acquisition and recently cognitive specific imagery (e.g., imagining oneself successfully performing in game situations and in the situation in which they had previously been injured) has shown to be effective in reducing injured athletes re-injury anxiety, experience of pain, and improving speed of physical healing (15, 16). For instance, Evans et al. (21) interviewed three rugby players in their mid-twenties who had undergone surgery to repair a sport-related injury (i.e., dislocated shoulder, fractured fibia and tibia, or torn ACL). Each participated in a minimum of three months of rehabilitation and they completed daily self-reflection diaries that provided information for the consultations, and practiced cognitive specific imagery over the course of three months. Their results indicated that the imagery intervention was associated with reduced re-injury anxiety, and increased confidence in overall level of fitness and in returning to sport (21).

Conclusions

For many endurance athletes getting injured is a normal part of the sport which may require a few weeks of working with a physical therapist or at most a short break from participation. However, when the injury is more serious and requires surgery it can quickly become a distressing setback, an event often appraised as impeding progress toward desired goals and for some ending their athletic career. Athletes who have suffered serious injury can likely relate to the psychological consequences discussed in this article and would have benefited from receiving a psychological intervention, such as goal setting, imagery, or mindful self-compassion following their injury. Athletes with prior mental health concerns, as well as athletes requiring surgery and a greater absence from participation in sport or physical activity are at greater risk for experiencing lingering mental health concerns following their physical recovery and should be encouraged to seek services from sport psychologists or sport consultants certified through the Association of Applied Sport Psychology (AASP).

Shelly Steinbein is a doctoral intern at Northwestern University Counseling and Psychological Services. She will receive her PhD in Counseling Psychology with a specialization in Sport Psychology with a specialization in Sport Psychology from the University of North Texas by August 2017. Her research focuses on examining the impact of psychological interventions on athletes’ physical and mental recovery following serious sport injury. Shelly is a former NCAA Division III women’s lacrosse player and has completed several marathons and speed triathlons.

REFERENCES

Should You Change an Athlete’s Natural Running Form?

By Thomas C. Michaud, DC

According to many running experts, making a few small changes in running form can improve speed, efficiency, and reduce injury rates. Alberto Salazar is famous for changing everything from the tilt of a runner’s pelvis to the position of his or her thumbs (1). From a biomechanical perspective, it makes sense that nearly every runner has some slight imperfection in form that can detract from optimal performance. Think of the auto industry putting cars in wind tunnels and blowing streams of smoke over the cars’ exteriors to identify design problems that could result in reduced gas mileage. As related to running, identifying and correcting slight biomechanical glitches should theoretically improve efficiency and increase speed.

Two Popular Running Techniques

Although there are dozens of running clinics out there, the most popular techniques for teaching running form are Chi Running (2) and Pose Running (3). The ideal running form that Chi and Pose Running recommend are very similar. Both techniques strongly discourage making initial ground contact with your heel. Chi runners are taught to strike the ground with the midfoot; while Pose runners make contact a little farther forward on the ball of the foot. Another key concept in Chi and Pose Running is that you must strike the ground with your lead foot directly beneath your pelvis. Chi and Pose advocates state that because this contact point shortens your stride, when you want to run faster, you must increase your step frequency (i.e., cadence). Overstriding is to be avoided at all costs. Both Chi and Pose say the ideal running cadence is approximately 180 steps per minute.

With more than 50% of runners getting injured each year, the notion that a recreational runner could reduce the risk of injury while becoming faster and more efficient is definitely appealing. The question is, do claims of improved efficiency and reduced injury rates have merit? In the past few years, several studies have evaluated Pose and Chi Running. In 2004, the prestigious journal Medicine and Science in Sports and Exercise published a paper in which 20 heel-toe runners were instructed to run using the Pose technique (4). Biomechanical analysis revealed that compared to conventional heel-toe running, Pose running resulted in shorter stride lengths and smaller vertical oscillations of the pelvis. Just as Romanov suggested, Pose runners reduced the magnitude of the initial impact force and also reduced stress on the knee. The only downside was that the Pose runners had increased stress at the ankle.

The results of this study were similar to a more recent study comparing impact forces and movement differences between conventional heel-strike runners and runners experienced in Chi running (5). As with the Pose study, the Chi runners had significant reductions in initial impact force and knee stress, but had to absorb more force with the ankle. Regardless of the added stress on the ankle, these two studies seem to confirm that Chi and Pose running do what they say: they reduce initial impact force while also lessening stress on the knee.

A problem with both of these studies is that the reduced impact forces and lessened knee strain associated with Chi and Pose running most likely had nothing to do with the changes in running form and everything to do with the fact that the Chi and Pose runners ran with shorter stride lengths. If the heel-strike runners would have shortened their strides the same amount as the Chi and Pose runners, they more than likely would have had the same reduction in impact forces, even if they were running with the worst running form possible.

Impact Forces and Ground Contact

The reason stride length is so important is because impact forces are stride length dependent: the shorter you make your stride, the lower the initial impact force will be. In fact, researchers from the University of Wisconsin (6) prove that regardless of running form, runners who decrease their stride length while increasing their cadence can maintain the same running speed while reducing impact forces by as much as 20%. Rather than having a patient spend years trying to master a specific running form, these authors prove that impact forces can be dramatically reduced with a few simple changes in stride length and cadence.

Another common misconception regarding running form is that it is always better to make initial ground contact with the mid or forefoot. According to many running authorities, striking the ground with your heel should be avoided at all costs. Contrary to popular belief, studies involving thousands of athletes show there is no difference in injury rates between runners making initial contact with the heel and those striking with a more forward contact (7). Furthermore, the vast majority of recreational runners are more...
Fig. 2. Joint and muscle interactions present while running. Initial contact (A) can be made with the heel, midfoot, or forefoot. The upside of a heel contact is that it reduces stress on the Achilles tendon and arch and allows the foot to smoothly roll forward (arrow B). The downside is that a heel contact increases force absorbed by the knee. Forefoot contact points (C) allow the gastroc muscle to absorb force, reducing stress absorbed by the knee by as much as 50%. The downside of the forefoot contact is that it can overload the Achilles tendon and the metatarsals. Also, because the initial point of contact acts as a pivot during ground contact (arrow), forefoot contact points cause the heel to initially drop down and back (D), temporarily acting as a brake. Although not illustrated, making contact along the outside of the entire foot (i.e., a midfoot contact point), is often considered the perfect contact point, representing a blend between forefoot and rearfoot contact points. This statement is controversial since 75% elite runners strike the ground along the outside of their heels (13).

Once past the ankle, impact forces travel at about 200 mph into the knee. In addition to allowing the quad to absorb force, bending the knee (E) prevents the hip and pelvis from moving up-and-down too much (F), which is important for injury prevention and efficiency. The gluteus medius muscle is also important for shock absorption because it prevents the opposite hip from lowering (G). The best runners maintain their pelvis in an almost horizontal line, with their knee pointing straight forward. In contrast, runners with poor form allow their opposite hip to drop (H) and their knee to twist in (I). Excessive inward rotation of the knee is one of the worst errors in running form and should be corrected with hip strengthening exercises and gait retraining (i.e., treadmill running in front of a mirror while deliberately keeping the knees moving in a straight line).

Though rarely discussed, backward rotation of the hip at impact (J) is the body’s most important shock absorber (14). Excessively stiff and/or weak hips can lead to injuries by limiting the ability of the large hip muscles to absorb shock. Because of this, chiropractic treatments or other effective methods to enhance hip flexibility, especially in the posterior capsule, are important for improving shock absorption. Another common running form problem associated with tight hips is the crossover running gait. In this running form, the athlete allows his or her feet to crossover a midline while running. This style of running increases the risk of lower leg stress fractures and tendon injuries. Again, improving hip flexibility and strength is the key to correcting this running flaw.
If your goal is to have a running patient become fast and efficient, be cautious about making significant changes in form because runners intuitively pick the running style that works best for them.

efficient when striking the ground heel-first. In a recent study evaluating efficiency while running at different speeds, researchers from Spain prove that compared to mid and forefoot strikers, slower recreational runners are almost 10% more efficient when striking the ground with their heels (8). The benefits associated with heel striking continue until runners reach the 6:25 minute per mile pace, after which heel and midfoot contact points are equally efficient. The reduced efficiency associated with mid and forefoot contact points while running at slow speeds explains why Pose Runners, despite having reduced impact forces, are considerably less efficient than conventional heel-strike runners (9).

Studies comparing impact forces associated with different contact points consistently show that the same force is absorbed by your body whether you strike with your heel or forefoot, the force is just absorbed by different joints. Runners who strike the ground with the forefoot absorb more force with their arches and calves, while runners making initial contact with the heel absorb more force with their knees. Force absorption at different locations explains the higher prevalence of Achilles and plantar fascial injuries in mid and forefoot strikers and the higher prevalence of knee pain in heel strikers. This is the biomechanical version of “nobody rides for free.” If you’re treating a fast runner who has a tendency for knee pain, you might want to consider gradually transitioning the athlete to run with a more forward contact. Conversely, runners plagued by chronic Achilles injuries should be encouraged to run with a heel-first strike pattern in order to reduce the potential for reinjury.

An alternate option for a runner with knee pain is that rather than striking the ground along the midfoot, the athlete should lean slightly forward at the hips during stance phase. Researchers from the University of Southern California (10) prove that a slight forward lean while running transfers forces that would normally be absorbed by the knee into the upper hamstrings and hip with no added force being absorbed by the foot or ankle (Fig. 1). The authors point out that because distance runners rarely hurt their upper hamstrings, rather than increasing the risk of an Achilles injury by transitioning to a midfoot contact point, a better approach would be to incorporate a slight forward lean at the hips.

Keep in mind that while making subtle changes in running form can reduce the potential for injury, the majority of research suggests that making even a slight change in the way you run will reduce overall efficiency. Remember, although runners trained in the Pose style of running have significant reductions in impact forces traveling through the knee, they become significantly less efficient (9). According to exercise physiologist Tim Anderson (11), runners are able to critically evaluate the metabolic cost of every step while running to develop a unique running style that is most efficient for them.

Even though changing running form almost always results in reduced efficiency, there are certain movement patterns present in runners that greatly increase the risk of injury and should therefore be modified. Figure 2 reviews the basics of running form and describes common flaws that should be corrected. Excessive inward rotation of the hip during stance phase is especially problematic because it often results in chronic retropatellar pain.

Conclusion

In summary, the research on running form consistently shows that if your goal is to have a running patient become fast and efficient, be cautious about making significant changes in form because runners intuitively pick the running style that works best for them. The most effective way for advanced runners to improve form and efficiency is to perform high-intensity plyometric drills designed to increase tendon resiliency. Improvements in running form will naturally follow. Conversely, if your goal is to have a running patient avoid injury, the easiest way to do this is to reduce impact forces by shortening the overall stride length while increasing cadence. Because the best predictor of future injury is prior injury, you should encourage a running style that accommodates prior injuries; e.g., runners with a tendency for knee pain should consider making initial ground contact on their midfoot, while runners with a history of Achilles injuries should strike the ground heel first. The bottom line is that excluding a few obvious examples, such as excessive inward rotation of the knee and/or excessive frontal plane motion at the pelvis, the runner is almost always the best judge at choosing the running form that is right for them.

Dr. Thomas Michaud specializes in biomechanical and gait disorders and is the author of numerous book chapters and journal articles on a variety of subjects ranging from biomechanics of the first metatarsophalangeal joint and shoulder, to the pathomechanics and management of vertebral artery dissection. He is also the author of the textbook Foot Orthoses and Other Forms of Conservative Foot Care, which has been translated into four languages and used in physical therapy, chiropractic, pedorthic, and podiatry schools around the world.

REFERENCES


Reprinted with permission from Dynamic Chiropractic 2015; (33)13.
Runners of Yesteryear

By Paul J. Kiell, MD

Many of us may look back at our running “careers” and think about how training methods have changed since we first laced up our running shoes. For some, we may even wish we could go back in time to correct a few of our bad training habits. Perhaps we could have avoided some of our overuse injuries, or even achieved that elusive PR.

Following this notion, I thought it would be fascinating to go farther back to look at training methods from athletes who competed in the first half of the 1900s. Like us, they were pure amateurs holding daytime jobs. For instance, in the epic 1936 Berlin Olympiad 1500m run, Dr. Jack Lovelock was a medical student and Glenn Cunningham was at NYU studying for his doctorate in biological sciences and physical education.

Today, yesteryear’s runners’ methods of training may seem out-of-date, as only a footnote of running’s evolutionary history. But much still applies. They were efficient and economical in time. Much can be learned and/or extrapolated from their training regimens. In many ways they were analogous to all of us who have, or have had, “daytime jobs,” with running being both a diversion and a much-valued hobby.

The runners discussed here, at one time or another, appeared at our AMAA sports medicine symposiums. The main focus will be Glenn Cunningham (1909-1988) with quotes from my book American Miler about this heroic figure. Cunningham spoke at our 1987 post-Boston Marathon banquet. I will also discuss Abel Kiviat (1990 NYC Marathon AMAA symposium speaker), Roger Bannister (1982 Boston Marathon symposium speaker), and Dr. Jack Lovelock (1910–1949) who, in an epic run at the 1936 Olympic 1500m, edged Glenn Cunningham.

Abel Kiviat placed second in the 1500m race at the 1912 Stockholm Olympiad. Nearing age 100, appearing at our 1990 New York City AMAA sports medicine symposium, feisty and garrulous, he regaled us with stories of rooming with the fabled yet unruly Jim Thorpe. He died less than year later; quoted in his obituary, “Today, you hear of high school kids running 50 to 60 miles a week. I never ran five miles in a week.”

Such was not unusual and not that different from Glenn Cunningham’s regimen. But Cunningham was a thinker and knew his own body well. His legs were severely burned in a schoolhouse fire when he was eight or nine years old. Over a two-year period he learned to walk again and eventually was able to run. Lacking a walker, he rehabilitated by grabbing a mule’s tail and going along for the ride, or taking a swing on a rusty gate.

Because of Cunningham’s otherwise debilitating burn injuries, his warm-up was unique and bears lengthy description. In a 1986 recorded telephone interview with him, I asked “You had to take an unusually long warm-up didn’t you?” He responded, “Yes, I did because I had several things that were against me. If I didn’t warm my legs up properly, the circulation not being good, they would naturally tie up. Then I had this neck injury, which would tie up my shoulders, and spread all over me if I didn’t get it loosened up real good.”

His Kansas University coach Bill Hargiss also described his warm-up: “In all Glenn’s racing in the years that followed, he held to the practice of the tremendous warm-up. He set the pattern, I think. It was a matter of the adjustment of the body, of the heart and lungs, and the metabolism of the muscles. The long warm-up eliminated the phenomenon of the second wind. This second wind, so-called, is just a phenomenon of the body catching up, of eliminating carbon dioxide through perspiration, and through the lungs, to make ready for more oxygen. In other words, if you start out in a hard race without warming up . . . you’re just not going to run very well because of this business of the body adjusting to it.”

Sports writer George Trevor described Cunningham’s warm-up as “There’s a purpose behind his eccentric going-on. He tosses his head to loosen up the muscles of his neck; he snorts to clear nasal passages which are too small for a runner; he prances around the track before a race to warm up legs which are covered with scar tissue as the result of burns suffered in a schoolhouse fire; he waits until all rivals are stripped for action before removing his sweat suit in order to keep those scorched legs from being chilled.” (Author’s note: This lengthy description of Cunningham’s unique warm-up has application today. Not only is warm-up important, but also it is an individual matter. Furthermore, the explanation of the “second wind” is applicable although present technical explanations may differ.)
Coach Bill Hargiss described Cunningham’s pre-race meal and also some of his off-the-track attitudes: “Off the track Glenn is a most religious trainer. There is no diet prescribed for him. He eats plain, simple food and not in large amounts. He eats very slowly. Drinks only milk and water, never coffee or tea; has never had a drink of alcoholic liquor of any kind; never used tobacco in any form. Fruit and vegetables play a prominent role in his diet, but he eats meat, preferably beef, once or twice a day. About three hours before he runs he eats the biggest meal of the week, including a thick broiled steak. He sleeps regularly and aims to get at least eight hours sleep each night.”

I am tempted to point out how much track times have changed. The myth of the invincibility of the four-minute mile has been shattered. But can it all be attributed to training methods? In the 1986 phone interview, Cunningham talked about an invitational run in 1981 with Ryun and Santee at the University of Kansas Relays: “There’s one big thing you have to consider when you compare yesterday’s performance with that of today. We have improved our equipment. The shoes now are just designed so well. The University of Kansas, I believe is the only University in the country that has three milers that have held the world’s record: Jim Ryun, Wes Santee and myself . . . . I couldn’t believe that track and those shoes. The shoes were so light. It was like they were filled with helium. I couldn’t keep them on the track. It was unbelievable the difference in what I had to contend with when I was competing.”

Dr. Roger Bannister, another guy with a day job, practiced similar training regimens. Bannister’s workouts, particularly when training to break the four-minute mile, were similar to Cunningham’s. Bannister did repeats of the three-quarter mile hoping to break three-minute repeats.

Running during his one-hour lunch period, Bannister compressed his running workouts into sessions of 48 minutes per day, where he focused upon intense interval training to build a sustained finishing kick. His methods, born out of necessity, were in stark contrast to the usual training undertaken by mile runners at the time (late 40s to mid-50s), where weekly totals of 70 miles (115 km) or more were common.

Cunningham’s workouts were similar to Bannister’s. He stated, “I was never able to do a lot of training as far as practice running was concerned. Most of today’s athletes run from 75 to 150 miles a week. I never ran over five to seven miles and only went on the track three days a week: Monday, Tuesday, and Wednesday. Tuesday, I would take my hard workout, but after the warm-up I would never run over three quarters of a mile. I would only do that usually for short distances, like two 600s or three single quarters. Sometimes I’d just sprint 220s and walk 220s and sprint 220s, or maybe sprint a straightaway and walk the turn.”

Bill Hargiss, after describing Cunningham’s weight lifting and overall body building regimen—something discouraged at the time by most coaches—added “And, by golly, there’s another thing coaches turned thumbs down on in those days. That’s swimming. Yet Jack Lovelock trained more in the swimming pool than he did on the track.”

This is reminiscent of something Dr. George Sheehan, one of the leading college milers of Cunningham’s time, advised about injury: “Go to the pool.” That certainly made sense. Intense training often brings with it injury or at least near injury. Legwork in the pool will hasten injury healing.

Hopefully this trip down training’s memory lane has been helpful both historically and pragmatically. Remember too, for those of us who are older—personal bests and running mileage of yesterday glimmer and fade with father time’s relentless rule. I paraphrase Joe Henderson’s words about performance and time: “Instead of concentrating on our times being good, let’s just focus on having a good time.”

(Author’s note: If you search the Internet on Jack Lovelock, you will find the epic 1936 Olympic 1500m newsreel race. Furthermore, the narrating voice is that of the Harold Abrahams from Chariots of Fire fame.)

Psychiatrist Dr. Paul Kiell, a former marathoner and now active masters swimmer, has written extensively on both topics. Among his books are Exercise and the Mind: The Possibilities for Mind-Body-Spirit Unity (2010) and American Miler: The Life and Times of Glenn Cunningham (2006).
BOOK REVIEWS

Ed. Note: Drs. Doug Munch and Paul Kiell are both refugees from the running world. Neverthless they are both now comfortably ensconced in the swimming world.

Paul was a competitive swimmer turned marathon runner. He completed 17 Boston Marathons and many other endurance events. Sadly, he suffered repeated episodes of DVTs in his left lower extremity that forced him to give up running. He reports, “Luckily I had swimming. After a 40-year absence I was a swimmer again.”

Doug was an elite quarter-miler and high jumper until a leg injury forced him to the sidelines. A natural athlete, midway through his athletic journey he turned to swimming and cycling for both continued fitness and occasional competition.

The physical and mental benefits run parallel in these two sports. Unique to swimming is that it can be relatively injury-free. The reviews presented here will elaborate further on the good things about swimming.

Lynn Sherr

Swim: Why we Love the Water

By Lynn Sherr


Reviewed by Douglas F. Munch, PhD

When a broadcast journalist and writer dive into a topic that has engrossed her for years, things are certain to get interesting. In fact, not just exciting but surprisingly informative as well, leaving few stones unturned. And by the end, she reveals the emotional depth that swimming has played in her life and can play in ours.

First, an aside. Why would one review a book on swimming in a journal that has traditionally focused on runner’s issues? To me, the answer to this question is pretty straightforward. I have met many of AMAA members who were dedicated runners for years, myself included. Due to years of pounding on the track or roads, many of us have sustained injuries that preclude continued running, although fitness (and maybe competition) have been a part of our lifestyle that we are disinclined to give up. The solution for many of us is to find other activities that provide the same benefits of running, without the pounding and recurrent injuries. Two activities come to mind: cycling and swimming. They both provide excellent alternatives to our favorite fitness regimen, without the pounding and offer the possibility of entering triathlons as a relay.

For Lynn Sherr, however, swimming was not an alternative or substitute for running. It was an enjoyable and absorbing part of her life since a toddler. But this book is not really about her personal journey from a youthful love of the water to her more recent objective of swimming the Hellespont channel in Greece. Her journey to swimming this dangerous straight between Europe and Asia is more like an intermittent theme that resurfaces throughout the pages. Instead, Ms. Sherr takes us on a seamless multifaceted voyage of swimming lore and history without becoming an obvious apologist for the sport.

Most of us never think about when humans started to swim. Was it a natural part of our genetic makeup originating when fish evolved to amphibious creatures and then to land-based animals? After all, many of us may have learned from embryology that in the 1870s, Ernst Haeckel first formulated the concept that “ontogeny recapitulates phylogeny,” a catchy phrase although largely defunct in its original meaning today. But Haeckel wasn’t the first to believe that there was truth in some form of recapitulation theory. That honor goes back to the ancient Egyptians in about 640 BCE. Swimming was so important in ancient Egypt that swimmers are depicted in hieroglyphics from ancient Egyptian tombs 1000s of years ago. In 360 BCE, an ancient Greek proverb declared that ignorance in a man is defined as one who can neither read nor swim. Centuries later, Lord Byron, swimming for glory, emulated Leander’s legendary swims for romance to visit his beloved Hero, swam the Hellespont in 1810 and then set his achievement to poetry. Sherr doesn’t stop there. She walks us through an enchanting journey of swimming history and legend through and including modern times, pop culture heroes, poets, movies, and famous personalities from Ben Franklin to Barack Obama who helped make swimming the major sporting event and recreational passion we recognize it to be today.

Contemporary competitive swimming demands four strokes: free style, back stroke, breast stroke, and butterfly. These strokes are the common currency for modern swimmers, both for training and competition. Not surprisingly, this was not always the case. Imagine for a moment the development of high jumping style in track and field. In many of our lifetimes we have seen the dramatic performance changes resulting, in part, from the evolution in technique from scissors, western roll, straddle, and currently, the Fosbury Flop. Ms. Sherr takes us through a similar, albeit more complex, amusing and fascinating evolution of swim strokes and apparatus for enjoyment and eventually to top level modern competition. Her vignettes cover the waterfront of a lifetime of observations from breath control and swim workouts, to training to swim fast. Her descriptions are rendered with alacrity, without creating boredom or the dryness of a swimming magazine or “how-to-do-it” book. I found this book is filled with “I didn’t know that” factoids that often resolve into “isn’t that something” moments.

The late Dr. Oliver Sachs, renowned neurologist, author, and former weightlifter turned swimmer talked about the “essential rightness of swimming” and that learning to breathe bilaterally as simply additional further proof about the plasticity of the brain, even older brains. An acquaintance once told me that the repetitition and focused concentration required in swimming is also a meditation. While Sherr offers examples of swimming’s “essential rightness,” the real essence of this book is passion. To paraphrase Lynn, swimming is an adventure that can await each of us, whether it is in a pool, swim meet, or open water event.

If you swim or are considering swimming as a supplement or alternative to your current training, Swim: Why we Love the Water is an enjoyable and informative read.

Did Lynn complete the challenging and potentially dangerous Hellespont swim? Well, that’s part of the story and the journey. You’ll just have to read the book to find out.

Dr. Douglas Munch is a medical consultant in medicine and biomedical engineering from the Johns Hopkins University School of Medicine in Baltimore, Maryland.

By Wallace J. Nichols, PhD
Reviewed by Paul J. Kiell, MD

I’m always impressed at the prescience of authors and poets where they describe the more transcendent benefits of aerobic exercise. For example, the old Roman dictum Mens sana in corpore sano (You should pray for a healthy mind in a healthy body) or the last lines of Dryden’s 18th century poem: The wise, for cure; God never made his work for man to mend.

In Blue Mind, proclaiming the power of water to heal his mental state, just note this quote originally from Herman Melville’s Moby-Dick, spoken by the protagonist, Ishmael:

“Some years ago—never mind how long precisely—having little or no money in my purse, and nothing to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially when my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people’s hats off—then, I account it high time to get to the sea as soon as I can. This is my substitute for pistol and ball.”

Blue Mind tells of, and scientifically validates with cutting-edge neuroscience, the benefits of exercise per-se, particularly of water, as regulators of the brain neurohormones (endorphins, dopamine, serotonin, etc.), explaining why we are attracted to the streams, the lakes, the rivers, the oceans, and to top it off, even to the color blue itself. The author successfully shows how, through water, we can improve performance, relieve stress and anxiety, and increase overall well-being.

Swimming in the Sink: An Episode of the Heart

By Lynne Cox
Reviewed by Paul J. Kiell, MD

Lynne Cox is an elite athlete who has made her mark in frigid open water swims. She first swam the English Channel at age 15 and was the first woman to swim across Cook Strait (18 miles). Of particular note, she was first to swim off Antarctica in 32-degree Fahrenheit water, without the benefit of a wetsuit, for 25 minutes.

Swimming in the Sink reading begins when she is studied at a laboratory at the University of London. Her extraordinary human capabilities, studied scientifically in ice-cold water, would pave the way for new medical and life-saving practices.

As an athlete, Cox had put her heart into everything she’d ever accomplished. You could easily say, “She had heart.” Literally and figuratively her heart was her strength. Ironically, she would become a victim of “Broken Heart Syndrome.” What then is such an entity? Learning about this condition should be of utmost interest to everyone, especially practitioners of maladies of the heart.

We are all acquainted to phrases in literature and everyday communication like “it broke my heart.” Such phrases now have gained scientific validity. How did this condition arise and specifically how did it hatch in Lynne Cox?

‘Cox was lovingly taking care of her elderly parents. Then, in a short span of time, both died. Their passing was followed by the death of her beloved Labrador Retriever. She was, figuratively, now living in a broken heart state. Literally too. Soon she was beset with bouts of atrial fibrillation, pulmonary edema with fatigue, and breathlessness, all validated by an ejection fraction of 15% (normal 15-70%), the product of enlarged dilated ventricles. Even cardiac transplant was considered.

The title of the book tells of the times she would actually move her hands and arms in a filled sink, “baby steps” in her determination to rehabilitate.

Inspiring is her path to total recovery, motored by excellent medical care, friendships, and the elements of her character that made her a championship athlete.
Mark Lavallee, MD, CSCS, FACSM

Overcoming Early Obstacles and Paying It Forward

By Jeff Venables

Ehlers-Danlos Syndrome, or EDS, is a rare connective tissue disorder characterized by double-jointedness, frequent joint dislocations, elastic skin that bruises and tears easily, poor wound healing, and some life-threatening complications such as risk of blood vessel rupture or even aortic dissection. It’s thought that EDS appears in about one in every 5,000 live births globally.

Traditionally, EDS has severely limited the mobility and activity level of people with this chronic and painful illness, with bracing and corrective surgery often the first lines of defense. Physical therapy has today gained much ground as a supportive treatment, but this was not really the case when AMAA member Mark Lavallee, MD, was a child in Maryland struggling with this poorly understood condition. But to say that all this dramatically changed over the course of Mark’s remarkable life is an understatement.

Mark describes the visible effects of EDS by saying, “I have lots of scars. I pretty much look like I’ve stepped on a landmine or been burned pretty badly.” His childhood was riddled with joint dislocations and continuous trips to the doctor. “I spent a pretty good portion of my young life getting put back together like Humpty Dumpty,” he says. “I pretty badly.” His childhood was riddled with joint dislocations and continuous trips to the doctor. “I spent a pretty good portion of my young life getting put back together like Humpty Dumpty,” he says.

Early destiny with medicine

Also prone to many slicing wounds and abrasions, before finishing boyhood Mark already had received thousands of stitches. His fragile skin led to the unusual effect that his very first dislocation was a child in Maryland struggling with this poorly understood condition. But to say that all this dramatically changed over the course of Mark’s remarkable life is an understatement.

Mark describes the visible effects of EDS by saying, “I have lots of scars. I pretty much look like I’ve stepped on a landmine or been burned pretty badly.” His childhood was riddled with joint dislocations and continuous trips to the doctor. “I spent a pretty good portion of my young life getting put back together like Humpty Dumpty,” he says.

By fifth grade Mark knew he wanted a career in medicine. Around this time Mark met the internationally renowned doctor and professor of medical genetics Victor McKusick, MD, at the Johns Hopkins University School of Medicine. Dr. McKusick died in 2008, after a long career that awarded him what is considered the Nobel Prize of Japan: the Japan Prize in Medical Genomics and Genetics. He is often described as “the father of modern human medical genetics,” and served as the first president of the Human Genome Organization. McKusick’s interest in connective tissue disorders led him to become one of the world’s leading experts on Marfan syndrome, whose effects can be similar to EDS, including double-jointedness, aortic weakening, and other heart problems.

Dr. McKusick’s recommendation to Mark?

“Hobby?”

By the time Mark was a sophomore at Penn State, he was overweight at 5’7” and over 220 lbs. Understandably, “I felt pretty poor about my self-image,” he recalls. Yet as a chance encounter with a classmate began to grow into a friendship, something was about to occur that would fundamentally change his life.

“I met this guy, Bret, in sophomore year, who sat next to me in organic chemistry. He was a bodybuilder.” Bret wanted to improve academically and Mark socially: “His focus was school and mine was wanting to meet people,” Mark says. And so Mark tutored Bret. “I was envious of his body, and he was envious of my brain. It was sort of that Gift of the Magi thing,” he explains, referring to the classic O. Henry story about the poor couple who perform mutual acts of generosity at Christmas.

The classmates eventually became roommates. Mark says, “I helped him study and Bret’s grades went up. And one day he says, ‘Have you ever thought of exercising?’” After explaining that all physical activity had been contraindicated by a world-renowned genetics doctor, Bret simply asked, “How’s that going for you?” The question altered Mark’s life journey forever. “I realized it wasn’t going well,” he says.

Soon after this epiphanic moment, and with Bret as his personal trainer, Mark tentatively began to exercise. When he started, he could not do a single pull-up, nor one push-up. He couldn’t do more than five sit-ups, and attempting to bench press 55 lbs “buried” him. He was 20 years old.

“I couldn’t even hold onto the pullup bar for 30 seconds. But he pushed me. Then I could hold on for 45. Then it was a minute. Then I could almost bend my elbows. It took me three months to do one pull-up,” he says. But he stuck with it.

Lavallee went down from 220 lbs to 155 lbs in one year. In that same amount of time his bench weight increased from 55 lbs to 135 lbs. Most impressively, his shoulder dislocations stopped. And what about that proscription on overhead movements? Never mind reaching for coffee cups, Mark was now military pressing 135 lbs. He wrote to Dr. McKusick, still at Hopkins, with whom he’d had no contact since fifth grade. He even included photos of himself performing the military press, as well as a tongue-in-cheek picture atop a horse. The doctor told him, “I’m glad you’re ok, and I’m glad I was wrong.” That scientific humility meant a great deal, emboldening Lavallee to crack on. “I thought,” he fondly recalls, “I’m onto something.”

A hobby?

Today, Dr. Lavallee is a family and sports medicine doctor and fellowship director (as well as a U.S. Olympic team physician), but several years ago while practicing in South Bend, Indiana, word got out that he also treats EDS patients. And so he uses what he has learned about his own body, as well as about genetics and sports medicine, to help people who sometimes even fly in from other countries to be treated for connective tissue diseases. He calls this his “hobby,” explaining that he never advertised his services in this subspecialty, but there are so few physicians who treat EDS that he is known for this in places as far away as Canada and Mexico.

continued on page 19
In South Bend, he served for 15 years as the director of Sports Medicine at Memorial Hospital, as well as co-director of the South Bend Notre Dame Sports Medicine Fellowship and medical director of the Health and Lifestyle Center, a medically-based, clinically integrated fitness center, health museum, and clinical space.

Three years ago he moved to York, Pennsylvania, and started his clinical practice of sports medicine, family medicine, and an EDS treatment program there as well. He sees these types of patients only “one half day a week,” but the work is clearly important to him; having come so far in managing his own condition, Mark is giving back.

His main roles in York are at Wellspan/York Hospital where he serves as program director of the York Hospital Sports Medicine Fellowship and associate director of the Family Medicine Residency program. He is a clinical associate professor in the Department of Family and Community Medicine at the Penn State University College of Medicine.

Medical technology changes rapidly, but Mark never loses sight of what remains of utmost importance in the role of a physician: the patients. “When it comes down to it, it’s about that human bond between patient and physician. It’s been a cool journey,” he says.

**Shaped—not defined—by EDS**

At age 48 Lavallee is 160 lbs now. He still exercises, having gradually transitioned from primarily strength to endurance training. He happily points out that most of his injuries are age-related, not necessarily caused by EDS. He still has not dislocated his shoulders, and does not hesitate to attribute this to the buildup of muscle around his fragile connective tissue. “My connective tissue sucks, but my muscles are ok,” he says.

This principle of building up muscle to stabilize the joints is familiar to any runner seeking to stave off knee problems into and well beyond middle age. But back when he was 20, this concept was a revelation to Mark and he feels incredibly grateful for Bret’s encouragement and motivation in those crucial weightlifting years. Fittingly, Mark has been the IWF medical director for the World Masters Weightlifting Championships since 1999, as well as for the World Masters Games over a dozen times, and a team physician for USA Weightlifting for nearly two decades, including serving as chairman for the USW Sports Medicine Committee since 2008.

Nowadays, Mark still strength trains a few times a week, but has shifted more to distance swimming, light jogging, and training on an ergometer as his main forms of fitness. He also stays active working on his old Willys trucks, as well as scouting and hiking with his wife, Tara, and their two teenage sons.

Training for quality of life is more important to him than competing, and he equally cares for patients seeking to improve either. As much as he is proud to serve elite athletes, including several U.S. Olympic Trial and Pan-American teams, “It’s about that 94-year-old woman I saw yesterday with bone-on-bone arthritis, and all she wants to do is just walk, clean her house, and spend time with her 95-year-old husband,” he says.

He adds that the patient he’d seen just before that was a professional runner who is trying to best her 3:02 Boston time where he used ultrasound-guided stereotactic techniques to “examine a centimeter-and-a-half of scar tissue in her leg.” It isn’t hard to see that the astonishing variety of patients such as these two is what he means by “cool journey.” He asks, “What other profession can you have such a dichotomy yet still use the same science and people skills?”

His waiting room is unique in that he has purposely paired pediatrics, adolescents, geriatrics, and sports medicine together. In the medical community, this is out-of-the-box thinking to say the least. Yet these patient cohorts ultimately share the same needs: for a doctor’s office, x-ray labs, psychology department, nutritionist, and a fitness facility. The cost savings is immense compared with the traditional model of two separate facilities for these patient groups.

**Enter AMAA**

AMAA member Robert Fawcett, MD (who was profiled in these pages in 2003), was Dr. Lavallee’s predecessor at Wellspan, starting the Sports Medicine Fellowship there in York. When Fawcett retired and Mark took over, he continued the tradition of bringing the residents and fellows to the Marine Corps Marathon to volunteer in the medical tents.

It is something he greatly looks forward to each year. He feels that AMAA’s annual sports medicine symposium, under the fastidious tutelage of Meeting Chairperson COL Francis O’Connor, MD, is world-class. “They get great speakers and look at intriguing topics. The caliber of that conference is extraordinary,” he says.

But it is the race itself that Dr. Lavallee finds truly moving. He sees it as a true honor to be working alongside Marines, whose energy and passion overflow into every volunteer.

He describes how emotional it can be after the flyover at the start of the race when the guns go off. A hush falls and the militarily injured Marines start the marathon at the front of the pack. He recalls wives and husbands, mothers and fathers, pushing their injured sons and daughters in wheelchairs. Other Wounded Warriors make their way on prosthetic limbs. “They let the injured go first,” he says, emotion audible in his voice. “And it’s a huge number—a hundred or more. And you think, this is why we’re volunteering at the race.”

Dr. Lavallee’s longtime service to these heroes and all his patients is dedicated, unflinching, and much appreciated. It is heartening to reflect that with all his fellowship work, he is also training the next generation of healthcare professionals to, like him, always emphasize the “care” part of that word.

*Jeff Venables is the editor of Running & FitNews® and a regular contributor to the AMAA Journal.*
**AMAA Journal**

4405 East-West Highway, Suite 405
Bethesda, MD 20814

---

**46th Annual AMAA Sports Medicine Symposium at the Boston Marathon®**

April 15-16, 2017

The Colonnade Hotel
120 Huntington Avenue
Prudential stop on the Green Line T

**Sign up with the NEW donation program (deadline January 31)!**

**SILVER: $1,500**
- Access to the lowest rate room block at The Colonnade Hotel
- 25% discount on registration for AMAA’s 46th Annual Sports Medicine Symposium at the Boston Marathon
- Recognition in the *AMAA Journal* and at the symposium

**GOLD: $2,500**
- All Silver benefits
- FREE symposium registration
- FREE three-night stay at The Colonnade Hotel
- $500 token toward airfare to Boston

To take advantage of the donation program, please write to amaa@americanrunning.org for registration instructions.

**PLATINUM: $5,000**
- All Gold benefits
- FREE symposium registration
- FREE three-night stay at The Colonnade Hotel
- $500 token toward airfare to Boston

AMAA sports medicine symposiums are intended for physicians, healthcare providers, physical therapists, athletic trainers, and others who have an interest in sports medicine and improving the well-being of patients and clients. Continuing education credit will be provided. For more information, contact Barbara Baldwin at bbaldwin@americanrunning.org.

For regular symposium registration, go to [www.amaasportsmed.org](http://www.amaasportsmed.org). You will receive the room block code for The Colonnade Hotel with the registration confirmation.