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ON THE COVER

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RESEARCH, INDUSTRY NEWS, BUSINESS TIPS

FEATURES

PERSONAL TRAINING

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ATHLETICS AND FITNESS ASSOCIATION OF AMERICA (AFAA)
WEBSITE: afaa.com
EMAIL: customerservice@afaa.com
PHONE: 800.446.2322 | 602.383.1200
MAIL: 1750 E. Northrop Blvd., Ste. 200
Chandler, AZ 85286

NATIONAL ACADEMY OF SPORTS MEDICINE (NASM)
WEBSITE: nasm.org
EMAIL: nasmcares@nasm.org
PHONE: 800.460.6276 | 602.383.1200
MAIL: 1750 E. Northrop Blvd., Ste. 200
Chandler, AZ 85286

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LAURIE McCARTNEY, PRESIDENT

TAKE FIVE

CHECK OUT FIVE OF OUR FAVORITE HIGHLIGHTS FROM THIS ISSUE!

SPRING AHEAD WITH NEW KNOWLEDGE

"Spring is when you feel like whistling even with a shoe full of slush." It's an old saying, but it brings up an interesting point: Attitude matters. A huge part of our success as fitness professionals lies in our ability to help clients feel like whistling (usually metaphorically) while making a sometimes-challenging transition to a healthier lifestyle (and, at times, literally taking a run through springtime slush). How clients *feel* can make a difference.

In this issue of *American Fitness,* we'll explore the effect of emotions on motivation. For example, our cover story features Sohee Lee, MS, founder of the "Eat. Lift. Thrive." Movement (page 34). Lee overcame daunting obstacles, pursued an education in fitness and nutrition, and now strikes the perfect balance as both a tough-love coach and a compassionate confidante for her clients. Earlier in the issue, Olivia Ellis, MS, shares three steps based on cognitive theory that can help group fitness instructors adapt their music, language and cuing to facilitate members' goals (page 14).

NOW IS THE IDEAL TIME TO DISCUSS THE ROBUST, PROVEN HEALTH BENEFITS OFFERED BY FRUITS, VEGETABLES AND OTHER WHOLE FOODS.

In anticipation of NASM's transformational Nutrition Certification (launching this spring), now is the ideal time to discuss the robust, proven health benefits offered by fruits, vegetables and other whole foods. In the Nutrition column (page 62), you'll discover how these foods fit into the 10 principles of an anti-inflammatory diet.

In this issue's CEU Corner, we take a fresh look at hydration, going well beyond the usual "eight glasses of water" debate. You'll learn anatomy and biochemistry details that determine how water is used in the body—and what happens when there's not enough to go around. Hypohydration, the author notes, does more than affect sports performance. It can wreak havoc on metabolism and lead to the breakdown of muscle tissue, among other things (page 22).

In the interest of homeostasis, our feature on hormones and weight loss examines the roles of insulin, cortisol, sex hormones and thyroid levels. And don't miss our guide for personal trainers who recently passed their NASM-CPT exam (congratulations to you all!). Longtime NASM-CPT Rick Richey, DHSC, MS, shares "what I wish I knew when I started out" (page 48). His good humor and advice—based on the NASM Optimum Performance Training™ model—may help new CPTs make the shift from "nervous" to "excited" as they begin to build their clientele and career.

We are thrilled to welcome new members into the NASM and AFAA families—and to help our existing professionals continue to grow in knowledge and success.

Happy reading,

Laurie McCartney
President – Global Fitness & Wellness Solutions

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BY LAURA QUAGLIO

Training Edge [INDUSTRY NEWS, INSIGHTS & TOOLS]

Help Clients Spring Into Cardio—Both In and Beyond Your Sessions

Spring is the perfect time to get clients out of the gym and into a new cardio routine. "I look at cardio on a bigger scale than many trainers," says Bryan Vahjen, NASM Master Trainer and Senior Program Advisor. "I often assign homework in the gym, but I also encourage people to get outside to hike, bike, run, kayak. I like to find cardio people enjoy. We live in Arizona, where there are so many great ways to enjoy cardio!"

Vahjen is well aware, though, that a personal trainer's time with clients is limited, so carving out even a few minutes for cardio can prove challenging. "Don't look at [it] as your client cheating on you with another exercise modality," he says. "It is an important part of fitness programming."

Here are a few of Vahjen's suggestions for working cardio into clients' programs:

Sneak it into intervals. "I incorporate high-intensity cardio intervals into traditional resistance training routines," he says. "These cardio bouts can be challenging but short in duration—about 30–60 seconds." What's more, high-intensity intervals will burn a great number of calories, he adds, and a large portion will come from fat, not just carbohydrate. "Do it consistently, and body composition will improve."

Assign it as homework. "My first goal for general health for clients in regard to cardio programming is 150 minutes a week—or five 30-minute sessions a week," says Vahjen. "But it can be very challenging to fit that into one-on-one time." His solution is to task clients with doing cardio on their own, and he says it's a great way to perpetuate healthy behaviors in clients. "I only have the luxury of seeing clients three or so times a week, so I am always asking myself, 'What other opportunities do I have to draw them into a healthy lifestyle?'"

Make it a side goal. "Many times, I build programs for clients who have outdoor cardio goals," says Vahjen. For instance, along with a client's main weight loss goal in preparation for a wedding, he might encourage the client to work toward completing a 5K or trail ride. "I do about 20 bike races a year," he adds. "It allows you to check out different parts of the world. I even did a 4-day race in Baja, Mexico, where you ride on the cliffs overlooking the ocean!"

Use it to assess and inspire. Conducting consistent assessments provides additional data for tracking a client's progress. Vahjen suggests adopting the YMCA 3-Minute Step Test and the Rockport Walk Test, both of which are described in *NASM Essentials of Personal Fitness Training* (Jones & Bartlett Learning 2018).

"Sometimes body fat measurements don't tell the whole story," he says. "If a client has a flat [fat loss] measurement but is able to complete way more work in their cardio session than they could 2 weeks ago, that is an opportunity to celebrate their success and keep them engaged."

Go along for the ride. "When I can, I enjoy a good cardio session with clients," says Vahjen. "It keeps them engaged, and they feel like it's a celebrity workout. Cardio with friends is always easier!"

For a research update on the benefits of cardio, see "Cardio Report," page 10.

U.S. PHYSICAL ACTIVITY GUIDELINES: KEY FACTS ABOUT THE REVISIONS

Last November, the U.S. Department of Health and Human Services released an update to its physical activity guidelines—about a decade after the first edition was produced. Chances are you haven't gotten to read the whole guidebook, which spans 118 pages. (If you want to, it is available in its entirety on health.gov/paguidelines/second-edition.)

Fitness professionals using the NASM Optimum Performance Training™ model may already be on point with many of these "new" recommendations. A good example, says NASM Product Manager Ian Montel, MS, NASM-CPT, CES, PES, involves the guidelines for older adults. "This group is now encouraged to use a multifaceted approach to their physical activity, with a focus on balance training for better stabilization and avoidance of falls," he explains. Chapter 10 of *NASM Essentials of Personal Fitness Training* provides programming guidance on balance training, including appropriate progressions and regressions, using the NASM OPT™ model.

Below are some additional highlights Montel says may be of interest:

The minimum of 10 minutes per bout of exercise has been removed. Any amount of physical activity is now viewed as preferable to *no* physical activity.

The update acknowledges a broader range of exercise-related health benefits. New research has led HHS to include additional immediate perks (better sleep, lower blood pressure, less anxiety) as well as new long-term benefits—specifically, reduced risks of excessive weight gain, injuries from falls, dementia and eight types of cancer.

Pregnant women have the same exercise goals as other adults, unless directed otherwise by their doctor. Exercise may also be effective in reducing symptoms of postpartum depression.

Specific guidelines for preschool-aged children have been added. Kids aged 3–5 are encouraged to engage in a variety of different types of physical activity throughout the day.

Bone-strengthening activities have been added to recommendations for children and adolescents. The short-term goal is to include these moves 3 days a week as part of their hour-per-day of exercise, with the long-term goal of staving off loss of bone mass later in life.

Business Builder
Get New Clients —*Without* Advertising

NASM Master Instructor Mallory Fox loves to get new clients, but she is not fond of traditional methods of advertising for her personal training business, Foxy Fitness, based in Scottsdale, Arizona. Instead of using conventional channels, Fox partners with local businesses—private, franchise and big-box—to create events that benefit all parties. This has involved her offering free classes at local retail stores, including lululemon, Athleta and Fleet Feet Sports™. Most of her events benefit a charity, making them win-win-win-win opportunities.

"We hosted a yoga class at Scottsdale Beer Company last Memorial Day—my husband is in the military—and we raised close to $4,000 for a military charity," she says. "About 70 people showed up." For that event, she donated a yoga class and raffled off some personal training sessions, the brewery offered each attendee one free beer, and businesses provided raffle donations. "I've had clothing stores donate a private shopping experience, where the raffle winner can invite 10 friends to join them for a yoga class and a free outfit or a percentage off the merchandise," says Fox. Other businesses like local coffee shops and fitness facilities have gotten in on the act, too, providing gift cards or other donations.

How does this help Foxy Fitness's bottom line? "I don't do any advertisements for my business outside of these events and client referrals, and my schedule is always full," says Fox. "In this day and age, that's incredible. I'm really lucky." (Check out her 10 tips, left.)

MALLORY FOX'S 10 TIPS FOR BUILDING PARTNERSHIPS

We asked Mallory Fox, NASM Master Instructor and owner of Foxy Fitness, what she wishes she had known when she began event planning 10 years ago. Here, her top tips:

1. **Think about your "perfect client," then partner with businesses that want to attract the same type of person.**
2. **Visit local businesses as a customer and get to know the people working there before you ask for something.**
3. **Offer businesses a perk for participating. For example, maybe say you'll hold a class for their employees after hours.**
4. **Go in with a clear plan. This will make it easier for store managers to say yes. (Keep your first event simple!)**
5. **Plan 4 months in advance. Stores follow a quarterly calendar, so you need their buy-in well before the proposed event.**
6. **Start promoting the event 30 days out. Ask the participating businesses to do so as well.**
7. **Put everyone's logos on all marketing materials, T-shirts and anything else you can.**
8. **Involve a charity. Choosing a different charitable organization each time can bring in a whole new group of people.**
9. **Ask about liability. Generally, big stores have their own waivers. If not, use yours. Ask your carrier about adding the site as an "additional insured."**
10. **Don't get discouraged. It took Fox several years to get her first event off the ground, but now she holds about eight per year.**

Form Fix-Up With Mike Fantigrassi:

Box Jumps

One of the most common misapplications of box jumps is using them as a conditioning exercise, says Mike Fantigrassi, NASM-CPT and Master Instructor. "There are a lot of issues with that. One is that form typically begins to break down when people do them quickly. Also, people don't pay attention to the landing, so they aren't absorbing the force very well. That's very stressful on the body. If you land wrong one time, you can tweak something."

Here are his tips on making the most of this move:

Look at the launch. Squatting deeper doesn't make you jump higher; it just slows you down. Instead, start in a quarter-squat or half-squat, at most. "Basketball players aren't going into a full squat before a rebound. You don't need to go low to jump high," adds Fantigrassi.

Never "stick" the landing. When jumping back down, never land with straight legs (like gymnasts do). Keep the landing soft, allowing joints to flex slightly to absorb the impact.

Keep reps low. "The goal of box jumps is to be explosive and jump high, so each box jump is a 1-rep max," says Fantigrassi. "There are a lot of other moves we can do that are safer and lend themselves better to repetition." His advice: Keep box jumps to 8–12 reps with up to 60 seconds of rest in between, and give it your all during each one.

Think before you leap: Stick with a box or other sturdy surface. Stacks of weights, weight benches and overstacked (more than two high) aerobic-exercise step platforms aren't meant for jumping and can be unstable. Also, there's no need to go superhigh. Generally, says Fantigrassi, when you get to this point, you've just turned the move into a tuck jump, where you're pulling your knees higher—not increasing your vertical jump.

BOX JUMP PROGRESSIONS

Progressing clients through this series of exercises may take some time. If a client can do 10 of a particular move while maintaining proper form, that's a good time to increase the challenge.

SAMPLE PROGRESSION

- squat on floor, body weight
- squat on floor, loaded
- squat jump with stabilization
- box jump-up with stabilization
- box jump-down with stabilization
- box jump (jump up, step down)
- step up on box and then jump down
- depth jump (step off box, land with both feet and immediately "explode" into vertical jump)
- lateral or multiplanar box jumps (any type)

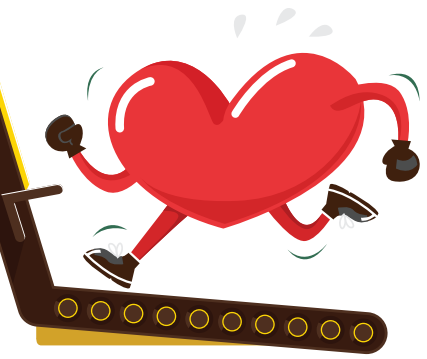
Note: Lowering the height of the box is a good way to regress the box jump.

Cardio Report: Is There Such a Thing as Too Much?

In recent years, experts have asked this question: Is there a cardiorespiratory fitness (CRF) upper limit at which health perks plateau—or CRF turns harmful?

To find out, researchers from the Cleveland Clinic Foundation embarked on the largest reported cohort study of adult exercisers engaging in exercise treadmill testing (ETT), the gold standard for CRF measurement.

In the resultant report, published in *JAMA Network Open,* Kyle Mandsager et al. reviewed medical center ETT records for 122,007 adults from 1991 to 2014 (2018; 1 [6]: e183605). Former studies had



focused largely on moderate (not elite) CRF levels and had relied largely on self-reported data, which can be unreliable.

A retrospective comparison of CRF data and age of death revealed two things: Not only was all-cause mortality inversely related to CRF *at all levels of fitness,* but having a low CRF was a risk factor comparable to *or greater than* "traditional" factors such as coronary artery disease, diabetes and smoking.

The bottom line is that the more fit your heart and lungs are, the longer they're likely to keep doing what they do best: keeping you alive.

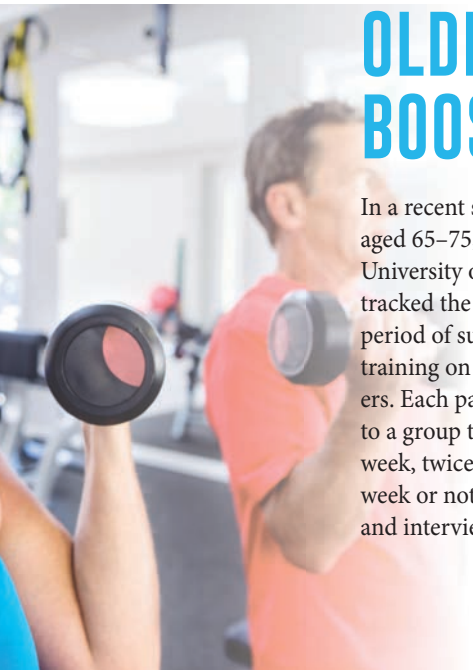
Virtual Reality Activity Feels Easier Than It Is

A recent study published in *Games for Health Journal* looked at the effects of active virtual reality games (AVRGs) on the VO_2max of 41 healthy adults in their 20s (2018; 7 [5]). Since previous research had shown that VR use could increase exercise enjoyment and adherence, the purpose of this study was to quantify its effects on heart rate, VO_2max and rating of perceived exertion.

During the study, participants engaged in three games—Thrill of the Fight (boxing), Audioshield (defending/blocking incoming orbs) and Holopoint (shooting)—for 10 minutes each with 5 minutes of rest between bouts. TOF required full-body motion, while AS and HP focused more on the upper body.

As expected, heart rate and VO_2max were significantly higher during each of the games than at rest, and the more movement a game required, the greater the gains. More interesting, though, was the finding on RPE: Gamers rated VR activities as less vigorous in intensity than was indicated by VO_2max and metabolic equivalents.

The researchers concluded that AVRGs may be a good solution for motivating reluctant exercisers. As specific data on METs becomes available for consumer AVRGs, fitness professionals will be able to use that information to integrate VR workouts into client programming.



OLDER ADULTS: LIFT WEIGHTS TO BOOST MOTIVATION TO LIFT WEIGHTS

In a recent study of 106 adults aged 65–75, researchers from the University of Jyväskylä in Finland tracked the effects of a 9-month period of supervised resistance training on inexperienced exercisers. Each participant was assigned to a group that trained once a week, twice a week, three times a week or not at all. Questionnaires and interviews were used at several points to gather information on exercise continuance, motivation, self-efficacy and planning.

Results reported in the *Scandinavian Journal of Medicine & Science in Sports* showed that adults who took part in a resistance training intervention were, at the end of the study, more intrinsically motivated to continue exercising. One year later, nearly half of these participants were still training either once a week (22%) or twice a week (24%) (2018; doi: 10.1111/sms.13236).

These results can also be motivating for trainers: The findings offer some evidence that a little guidance from a qualified fit pro can eventually lead to a love (or at least enjoyment) of exercise.

Tai Chi and Yoga for Stroke Survivors

Every 4 seconds, an American has a stroke. That equates to about 795,000 people per year, according to Stroke Facts released by the Centers for Disease Control and Prevention (cdc.gov). Of those people, nearly 25% have had a stroke before. For any stroke survivor, mindfulness-based interventions (which use physical movement to focus mental energy) may be a smart addition to other rehabilitation protocols.

Recently, Australian researchers conducted a scoping review of 26 studies (dated 1985–2017). The results, published in *Future Neurology,* noted that both yoga and tai chi may reduce high blood pressure by as much as 16/9 mm Hg (millimeters of mercury). This is important because hypertension is "the leading cause of stroke and the most significant controllable risk factor for stroke," according to the American Stroke Association.

Further, these Eastern exercises help to improve blood lipid profiles and blood sugar levels. With high cholesterol and diabetes making the ASA's list of risk factors for stroke, there is even more reason for survivors to talk to their doctor about joining a yoga or tai chi class.

Get FIT for 5x More Weight Loss

The University of Plymouth in Australia, on its Functional Imagery Training landing page, describes FIT as a behavior change strategy "that uses mental imagery to motivate change. . . . Users have described FIT as a 'mindset shift,' where they exercised or ate healthily because they wanted to, rather than feeling they had to." According to an article published by the Plymouth press office, "FIT goes one step further than [motivational interviewing], as it makes use of multisensory imagery to explore changes by teaching clients how to elicit and practice motivational imagery themselves."

Researchers from Plymouth and Queensland University recently published results of a trial they conducted on 141 adults with a body mass index greater than or equal to 25. Each adult received 4 hours of intervention using either MI or FIT. The outcome, reported in the *International Journal of Obesity,* was shocking: People in the FIT group lost an average of 5 times more weight than the MI group (2018; doi:10.1038/s41366-018-0122-1).

The study's lead researcher, Linda Solbrig, PhD, from the School of Psychology at Plymouth, describes the technique and how it emphasizes emotional and physical sensations through imagery:

> *"We started with taking people [through an exercise] . . . about a lemon. We asked them to imagine seeing it, touching it, juicing it, drinking the juice and [feeling] juice accidently squirting in their eye.*
>
> *"From there we were able to encourage them to fully imagine and embrace their own goals. Not just, 'Imagine how good it would be to lose weight,' but, for example, 'What would losing weight enable you to do that you can't do now? What would that look/sound/smell like?', and [we encouraged] them to use all of their senses."*

Want to give FIT a try? There's an app for that, created by these very same researchers. The Fitz app, launched last October and now available for free on Google Play and iTunes, provides motivational guidance via a "simple chatbot."

LAURA QUAGLIO *loves picking the brains of health and fitness gurus. She's also a mom of two, 2nd degree black belt and award-winning costume designer. This spring, she is adding more mindful fitness to her weekly routine. Luckily, her gym offers a class on it!*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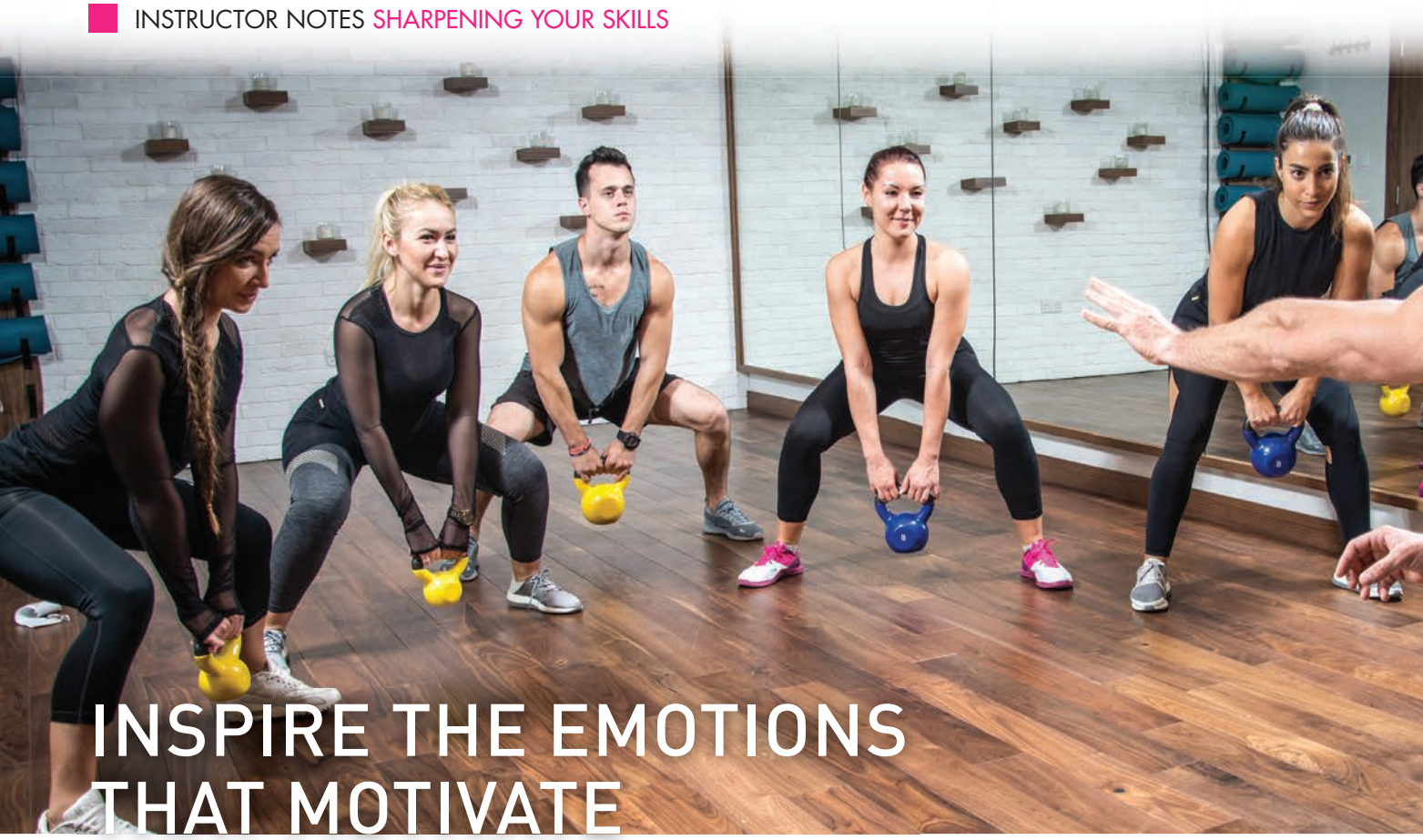

INSPIRE THE EMOTIONS THAT MOTIVATE

Follow these steps to enhance the class experience using the power of emotion.

BY OLIVIA ELLIS, MS

We've all been there: You're teaching a well-designed class with a killer playlist, and your expectation is that everyone is going to be as excited to take your class as you are to be teaching it. But something's missing—there's a vague disconnection that you can't quite pinpoint. Everyone is moving (it's not your choreography or timing), but you're falling short of creating a collective "zone."

In the art of teaching a fitness class, use of emotion can be instrumental to motivating participants and crafting an amazing experience. But while you may want people to "be happy" whenever they're in class, especially in group exercise, feeling happy may not be the best way for them to achieve their goals. Here's how you can leverage emotions effectively to offer the ultimate growth environment.

Harnessing Emotion for Motion

Research has found that when it comes to where individuals place their attention and focus, what matters most is **motivational intensity**—the extent to which someone feels compelled to move toward or away from something. Eddie Harmon-Jones, PhD, a professor at The University of New South Wales, Sydney, compares differences in motivational intensity to the contrast between seeing the whole forest (broad cognitive scope) and seeing the individual trees (narrow cognitive scope). For example, a lower-intensity emotion, such as gratitude, results in a broader cognitive scope, whereas a higher-intensity emotion, such as excitement, leads to a narrower cognitive scope (Harmon-Jones, Price & Gable 2013).

BROAD COGNITIVE SCOPE: If the class goal is for patrons to be aware of their surroundings, see the big picture, and leave feeling that they can creatively tackle their work for the day, eliciting low-level motivational intensity may be advantageous. Positive "low"-motivational-intensity emotions include relaxation, contentment, satisfaction and some forms of happiness, according to Harmon-Jones.

NARROW COGNITIVE SCOPE: On the other hand, if you want participants to focus on a given muscle group or movement or dig deep to perform at their peak, a higher level of motivational intensity may be best. Harmon-Jones says positive "high"-motivational-intensity emotions include desire, determination, interest or excitement.

How do you facilitate emotions in participants to create the type of class experience you're aiming for? To effectively utilize emotions in your instruction, follow this three-step process:

1. Decide where you want participants to focus their attention.
2. Choose the method for facilitating the emotion.
3. Modify emotional strategies throughout the class.

Where to Focus Attention

The question to ask yourself is: Do I want participants to have a broader or narrower scope of attention? The answer depends

on a few factors, such as class format (yoga, indoor cycling, etc.); class segment (warmup, main activity, etc.); and purpose (e.g., hitting a one-repetition maximum or experiencing a rejuvenating session). Your task is to choose an appropriate motivational intensity to guide participants in focusing their attention.

For example, in a yoga class, you may want people to begin with a wide scope so they are aware of how their bodies feel on the mat and in relation to the space around them. As they progress through class, you'll narrow their attention to focus on specific muscle groups or their breathing. At the end of class, you might broaden their scope again by focusing on how they can apply yoga principles to their everyday lives.

For an indoor cycling or interval training session, the broad scope may be more beneficial during times of recovery, whereas the narrow scope could be more helpful during a higher-intensity performance interval. There are many options for altering participants' cognitive scopes within classes.

Choose a Method

Group exercisers inevitably enter class carrying with them whatever has shaped their day. Although you can't influence what happened prior to class, there are small actions you can take to potentially elicit certain emotions that will engage your participants in the task at hand. Music, language and tone of voice can all influence emotion.

Music can affect feelings through lyrics, tempo and even instrumentals, explains Haley Perlus, PhD, certified fitness professional and peak performance consultant. The power of sound can be performance-enhancing because music helps individuals associate (tune in) or disassociate (tune out). Perlus feels this quality can be key to crafting the environment you want for your class.

Listen to a few songs on a playlist you have already built to hear how the messages in the music relate directly to your emotions. *Really listen* to the components of the track. What message is the track trying to convey, and how does a change in instruments or tempo affect you emotionally? Notice that drums or electric guitars may elicit entirely different emotions than violins or a flute. Once you can identify which emotion(s) the track triggers, create categories of tracks and label them with emotions such as "calm" (broad scope, low motivational intensity) or "excitement" (narrow scope, high motivational intensity). When you create a playlist for your class, pick and choose from these music categories to create the ideal emotional environment.

Just as lyrics in music can affect emotion, so can your choice of words and tone of voice. One way to incorporate language is by creating stories around an emotion or even just using a mantra like "stay determined." It's not cheating to state the emotion you are trying to elicit, because your words can turn into what participants are thinking about, thus eliciting that emotion. Link these cues and tone of voice to the music to create the strongest impact!

Music Matching

Emotion	Language	Music
Relaxation	Close your eyes and relax the muscles in your neck—and now your shoulders.	"Good Life" by OneRepublic
Satisfaction	We did a lot of work in class today for our hearts and bodies. Recognize the progress you are making.	"On Top of the World" by Imagine Dragons
Determination	Stay determined.	"High Hopes" by Panic! at the Disco
Desire	To get ready for that 5K, we'll concentrate on your leg muscles.	"Level Up" by Ciara

Find the songs in this chart, along with thousands of other great tracks, in the Yes!GO™ music app. You can choose radio or high-energy remixes, add timers, change the tempo, and make your own custom mixes at getyesgo.com/afaa.

Modify Strategies Throughout Class

Remember that emotions are not "one size fits all." Something that elicits a specific emotion in one person may have a different effect on another. A track with empowering lyrics and a strong beat that elicits a certain positive emotion in you could be associated with a memory from a troubling period in a participant's life. Or an event that happened earlier in the day could hinder someone from being in the mindset to experience certain emotions. So it's crucial to know your participants and be aware of their responses in class.

Luciana Marcial-Vincion, MA, a Spinning® Senior Advisor and Global Master Instructor Team Manager for Mad Dogg Athletics®, agrees that instructors who want to elicit particular emotions need a level of understanding about who their audience is. To develop this, she recommends learning names and welcoming participants to class by shaking hands and maintaining eye contact to build trust in the relationship. Although building rapport takes time, using these strategies can help people feel comfortable and more receptive to certain emotional responses.

Throughout class, adapt emotional cues as you notice what participants are most receptive to. For example, "desire to reach a goal" (e.g., that last rep) and "general excitement" are both emotions that are high in motivational intensity, but individuals may respond to them slightly differently. If you notice that participants are responding more to one than the other, adapt your approach to match.

Being aware of your participants, knowing what is best for them, and adapting your approach throughout class will be the best way to effectively motivate people by using emotions.

Motivational Intensity Influences Results

As you begin to feel more comfortable eliciting emotions, you can play around with the bidirectional relationship between emotions and cognitive scope—meaning that you can not only utilize emotions to direct attention but also direct attention to elicit certain emotions.

For example, Harmon-Jones suggests that focusing narrow attention on one exercise might engender an emotion that could then motivate participants to perform better at another exercise also requiring narrow focus. Likewise, bringing a broader perspective to a certain type of movement could elicit a low-motivation-intensity emotion, such as satisfaction, which could then improve performance of a similar exercise; this could be useful in some forms of yoga.

Emotions are incredibly powerful. The more we are aware of their impact, the more we can influence our participants' performance—and keep people returning to class.

OLIVIA ELLIS, MS, *is a doctoral student studying positive developmental psychology at Claremont Graduate University in Claremont, California, with a specialty in integrating positive psychology into the fitness industry. She is an adjunct professor, personal trainer and group fitness instructor with experience working on the management side of fitness. Email her at olivia.ellis@cgu.edu.*

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Fostering Engagement With "Edutainment"

Inspiring and motivating participants requires a multifaceted approach, so it helps to have several options to pull from. In addition to using the information in this article to increase participant engagement, try balancing the **educational** and **entertainment** needs of a group by providing **edutainment,** a combination of both.

An education-driven instructor focuses on verbal cues that tell participants what muscles they're working, how to progress and regress moves, or what plane of motion they're using. On the other hand, an entertainment-driven instructor engages participants through humor, showmanship, changes in lighting or volume, or use of names and personal connections. Ideally, instructors learn to balance these two styles of teaching to create the most compelling group fitness experience. In other words: Be a rock star!

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SHOULD YOU HOP ON THE FITNESS FRANCHISE TRAIN?

Commitment, time and market research are keys to opening your own business.

BY JAY CROFT

It seems like gyms and fitness centers are popping up everywhere, like fast-food restaurants or convenience stores. Drive past one shopping center, and there's a boutique studio. On the next block, XYZ Sports. Around the corner, maybe, an old standby gym. Fitness franchises are continuing to see growth, and they're also fragmenting in ways that appeal to specific types of consumers—just as McDonald's, Chipotle and Subway each have their own market appeal.

The growth is driven by the burgeoning wellness movement in general and by the decline of brick-and-mortar retail, a disruption that has opened up affordable real estate for fitness facilities. Franchise proliferation outpaces growth in the overall fitness industry, with luxury brands (on one end of the scale) and budget brands (on the other) growing faster than midmarket fitness centers (Carter 2017).

If you're thinking of opening a gym or fitness studio franchise, you likely have many questions. How much will it cost? What's the required commitment level? How can I make my own imprint on a place that's already branded? Most importantly, how do I get started?

Exploring the Franchise Model

To raise awareness about the kind of issues you'll need to consider, representatives of franchises with a range of target markets and business models shared their advice with *American Fitness* on sorting through the wealth of possibilities. Despite some differences between these representatives' companies in terms of physical size, niche and marketing approach, several key lessons emerged. Chief among them:

1. Starting a franchise business is an entrepreneurial effort that will take time and commitment.
2. Businesses succeed in fitness by showing an ongoing commitment to their clients and communities.

The major benefits of franchising are that it gives a business a leg up on marketing and brand recognition and often includes some level of coaching and support, depending on the specific company and agreement. You'll probably pay an initial fee and a monthly percentage of your revenues, although that varies, too. It's important to note that some companies prefer franchise partners who can invest in multiple locations.

Explore the Options

Before you commit to a franchise, review the following checklist:

- **Affirm that you have a passion for fitness and the business.**
- **Determine if the core offering would make you distinctive in your community.**
- **Choose the type of business your community wants and needs.**
- **Consider if the fitness offering is a fad or has staying power.**
- **Experience the franchise brand and carefully research it.**
- **Dive into the details of the initial cost and ongoing financial commitment.**
- **Honestly gauge if your personal finances can support the franchise requirements.**

Keep these next factors in mind as you explore the franchise world.

DECIDE WHAT KIND OF FITNESS FACILITY YOU'RE PASSIONATE ABOUT. Is it a traditional weightlifting room? A women-centric studio? Something trendy and high-tech? Do you want to offer daycare and a juice bar? What about a full set of weights, racks and cardio equipment?

Having a "core product" or service offering is important, says Jamal Gibson, training manager at Burn Boot Camp® in North Carolina, since consumers have so many options nowadays. A core offering makes you distinctive in your community. "You want to have a brand that's going to support the customer experience you're trying to create," he says.

DISCERN WHAT TYPE OF FACILITY IS RIGHT FOR YOUR COMMUNITY. If you're passionate about helping older people stay healthy, for instance, but your city's demographics skew heavily young, then you may want to reconsider your choice of location.

> "Everyone has uniqueness to them; every person has their niche, so the first thing is, you've got to find something that really is your passion. This is a business, and you're going to be spending a lot of time there as an entrepreneur."
>
> *—Cristal Lizama, executive director of franchise operations for FBBC*

RESEARCH THE FRANCHISE BRAND. Once you decide on a brand that you might like to own as a franchise, do your research. Check out its track record, ownership, leadership, press clippings and social media. Then go to a location and try it out, talk to the clients, and get a good feel for what it's about.

CONSIDER THE DIFFERENCES BETWEEN A FAD, A TREND AND A LONG-TERM BUSINESS. Fitness trends pop up all the time, and many of them offer franchise potential if quickly acted upon. But be aware of the difference between a passing fad and something with staying power. Do your research, anticipate when the tipping point might come, and consider if "the latest thing" will still drive your entrepreneurial passion in, say, 5 years. Will your community still want to support it then? Will the overall brand be able to sustain itself?

LEARN ABOUT THE INITIAL COSTS AND ONGOING FINANCIAL COMMITMENTS. These will vary among brands based on business size, niche and equipment needs. One estimate is that total startup costs for a fitness franchise can be anywhere between $30,000 and $300,000 (CostOwl 2018), so you'll need to be informed about your particular choice of franchise to properly prepare.

FIGURE OUT THE FINANCING. Funding is a key concern, no matter which brand you go with. Both you and the company want to make sure it's a match for your financial resources. (*Note:* A lack of information is a red flag for either party.) "Make sure you have the capital to get through the tough times," says Gibson. "Do you qualify as a franchise partner? That means someone who doesn't have to put their last dime into it."

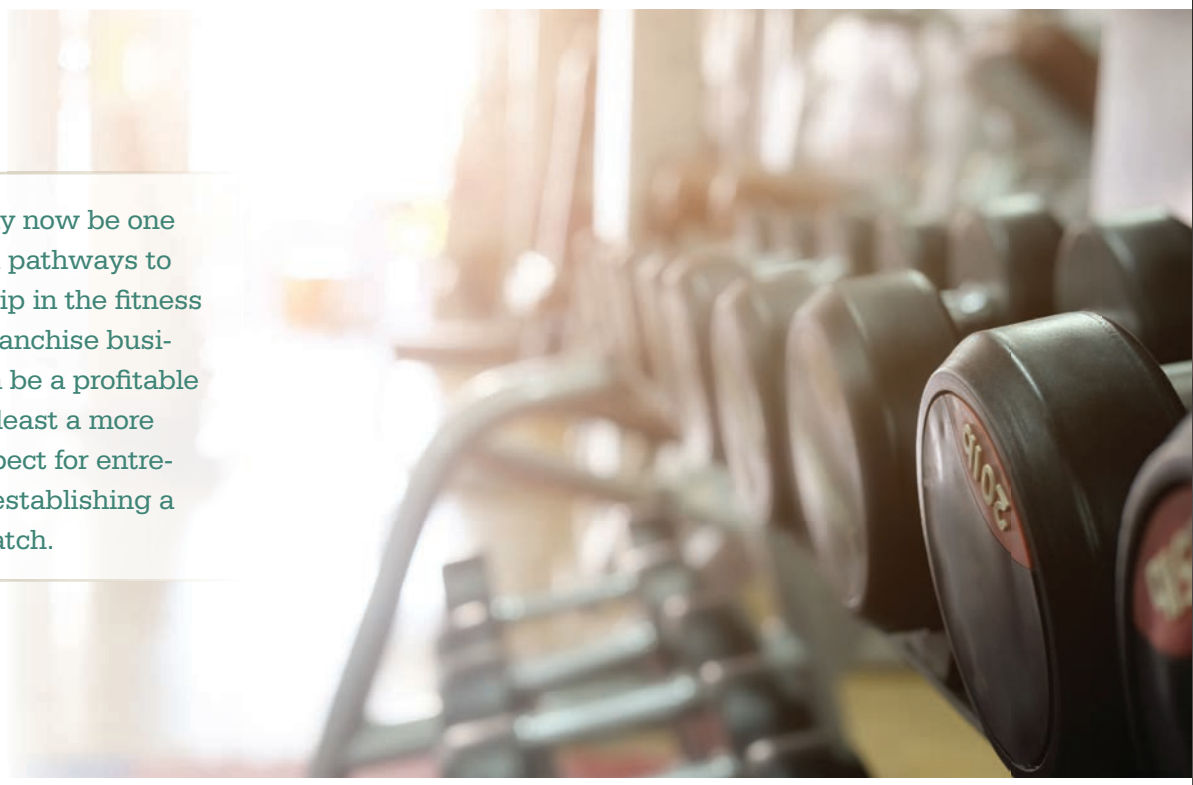
The following two models show how space and equipment needs, finances and the core fitness offering can vary for franchises serving different markets.

The Lower-Overhead Model

"Everyone has uniqueness to them; every person has their niche," says Cristal Lizama, executive director of franchise operations for Fit Body Boot Camp (FBBC), based in Chino Hills, California. "So the first thing is, you've got to find something that really is your passion. This is a business, and you're going to be spending a lot of time there as an entrepreneur."

FBBC crafted its franchise business model around the needs of trainers who want to open a fitness facility with less investment. The initial costs and overhead are designed to be relatively low, since the centers don't rely on a lot of equipment that can be expensive to acquire and maintain. The program focuses on 30-minute group workouts.

Fit Body Boot Camp offers a "classic, hands-on" approach, says Lizama, with a highly personal touch aimed at supporting each individual member. Most of its clients are women, who find the 30-minute workout model highly appealing because work and family obligations often leave them pressed for time. Also, the centers typically don't have a lot of mirrors on the walls or other potentially intimidating décor. "We want to be that comfortable place," Lizama says.



Franchising may now be one of the preferred pathways to entrepreneurship in the fitness industry. The franchise business model can be a profitable venture—or at least a more attractive prospect for entrepreneurs than establishing a brand from scratch.

The More Complex Business Model

UFC GYM comes from a different angle, with a strong brand in its title: Ultimate Fighting Championship.

"Have you ever watched the UFC?" says Shanie Rusth, a franchise development associate for UFC GYM, based in Orange County, California. Most people who consider opening a UFC GYM probably have. "Mixed martial arts people come in and want to train like a fighter. You have to connect, like an athlete."

UFC GYM offers a more complex business model, with three levels of facilities to consider, higher startup fees and recurring royalties. Each level has different target clients, styles and approaches as well as franchising costs. The largest gyms can cover as much as 25,000 square feet.

The gym's leaders help with market research to make sure the right kind of facility opens in the right area. "We want to see our franchisees affect the lives of people in their communities just like it has changed me," Rusth said. "We offer the ultimate fitness community. It changed my life."

Rob McCullough is a former UFC champion known as Razor. He's now senior director of mixed martial arts programming and an international master instructor with UFC GYM. "It's a really cool experience (for franchisees) to be a part of the UFC GYM brand," McCullough said.

Consider the Potential

Franchising may now be one of the preferred pathways to entrepreneurship in the fitness industry. The franchise business model can be a profitable venture—or at least a more attractive prospect for entrepreneurs than establishing a brand from scratch (Bailey 2016).

"You're buying branding, systems and methods," says Gibson. "When you have a brand, it gives you more reach. That's a huge advantage to you in terms of marketing and exposure." Gibson advises that dedication and vision are crucial—success takes time in this industry. "I've seen people think they can just spend money to make it, but they're not really in it like they need to be," he says.

Lizama agrees. "Try the workout, check out the headquarters team, consider the business model," she says. "Do you love the workout being offered? Remember how important your personal passion is to making the right choice. If you're passionate about something, you're going to go that extra mile."

JAY CROFT *is a fitness writer in Atlanta. His company, Prime Fit Content, offers original content for gyms and trainers seeking to reach more people over 50.*

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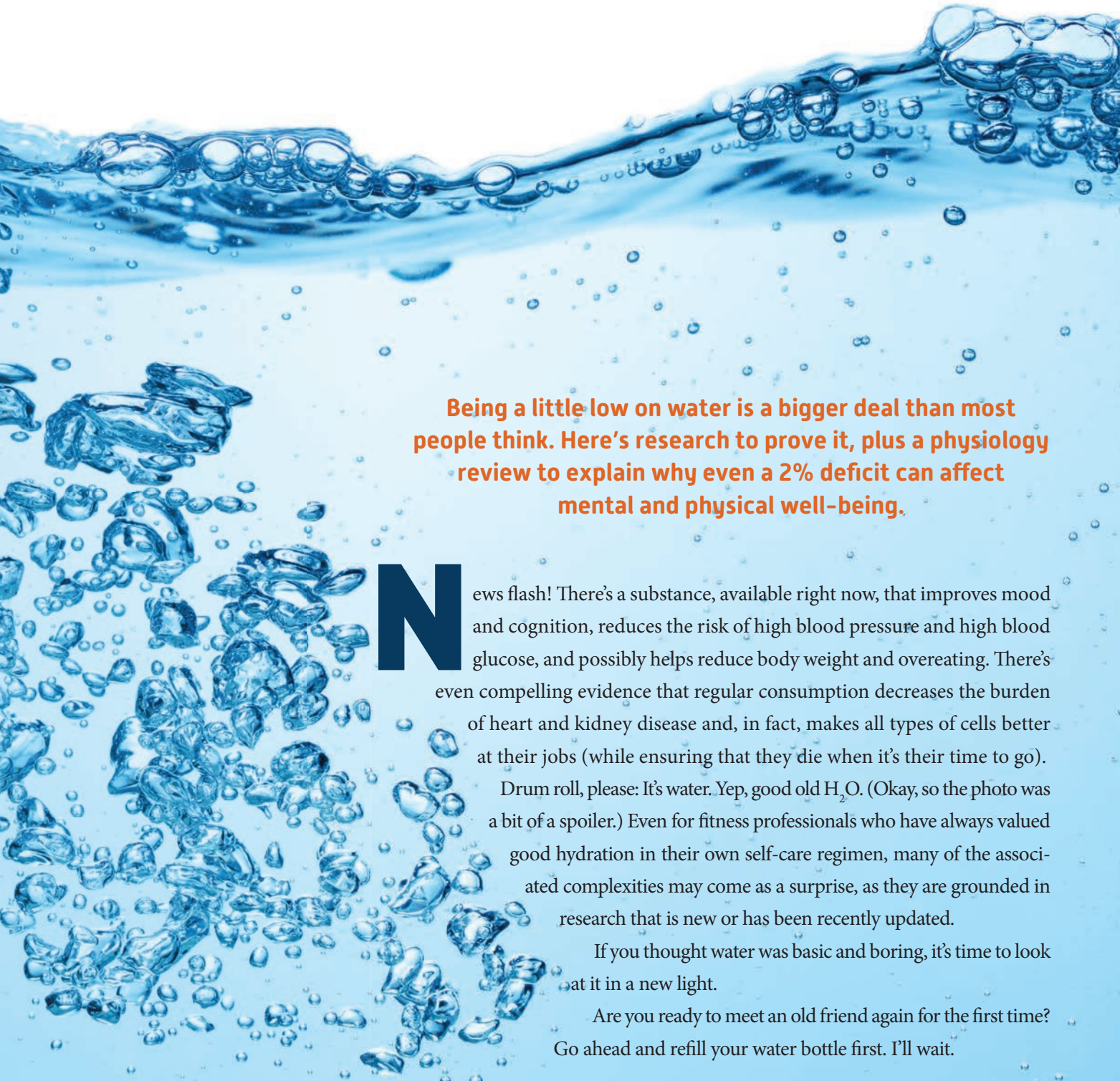
HYDRATION: THROUGH THE LENS OF FITNESS *AND* HEALTH

BY JENNIFER KLAU, PHD



Being a little low on water is a bigger deal than most people think. Here's research to prove it, plus a physiology review to explain why even a 2% deficit can affect mental and physical well-being.

News flash! There's a substance, available right now, that improves mood and cognition, reduces the risk of high blood pressure and high blood glucose, and possibly helps reduce body weight and overeating. There's even compelling evidence that regular consumption decreases the burden of heart and kidney disease and, in fact, makes all types of cells better at their jobs (while ensuring that they die when it's their time to go).

Drum roll, please: It's water. Yep, good old H_2O. (Okay, so the photo was a bit of a spoiler.) Even for fitness professionals who have always valued good hydration in their own self-care regimen, many of the associated complexities may come as a surprise, as they are grounded in research that is new or has been recently updated.

If you thought water was basic and boring, it's time to look at it in a new light.

Are you ready to meet an old friend again for the first time? Go ahead and refill your water bottle first. I'll wait.

It's Not Just "Water In, Water Out"

Hydration. It seems like it should be pretty basic: Drink when you're thirsty; pee when you have to go. You're good. Right? Not quite.

Previously viewed as a state (yes, no or almost), hydration might be better regarded as a process that includes an ongoing set of behaviors and biological functions. Determining a person's hydration status is complex: It shifts repeatedly throughout the course of a day, so it's not a steady state. Addressing hydration as a process makes sense because regular intake of fluids and excretion of urine, in and of themselves, confer benefits beyond maintaining water levels in the body (Lafontan 2014; Perrier et al. 2014).

Water: You Need It, Bad

Humans have an inherent, critical need for water. It is the medium in which all of our metabolic reactions occur. It gives form to our cells, lubricates our joints and tissues, transports nutrients and waste, and dissipates excess body heat (Horswill & Janas 2011; Lang 2007).

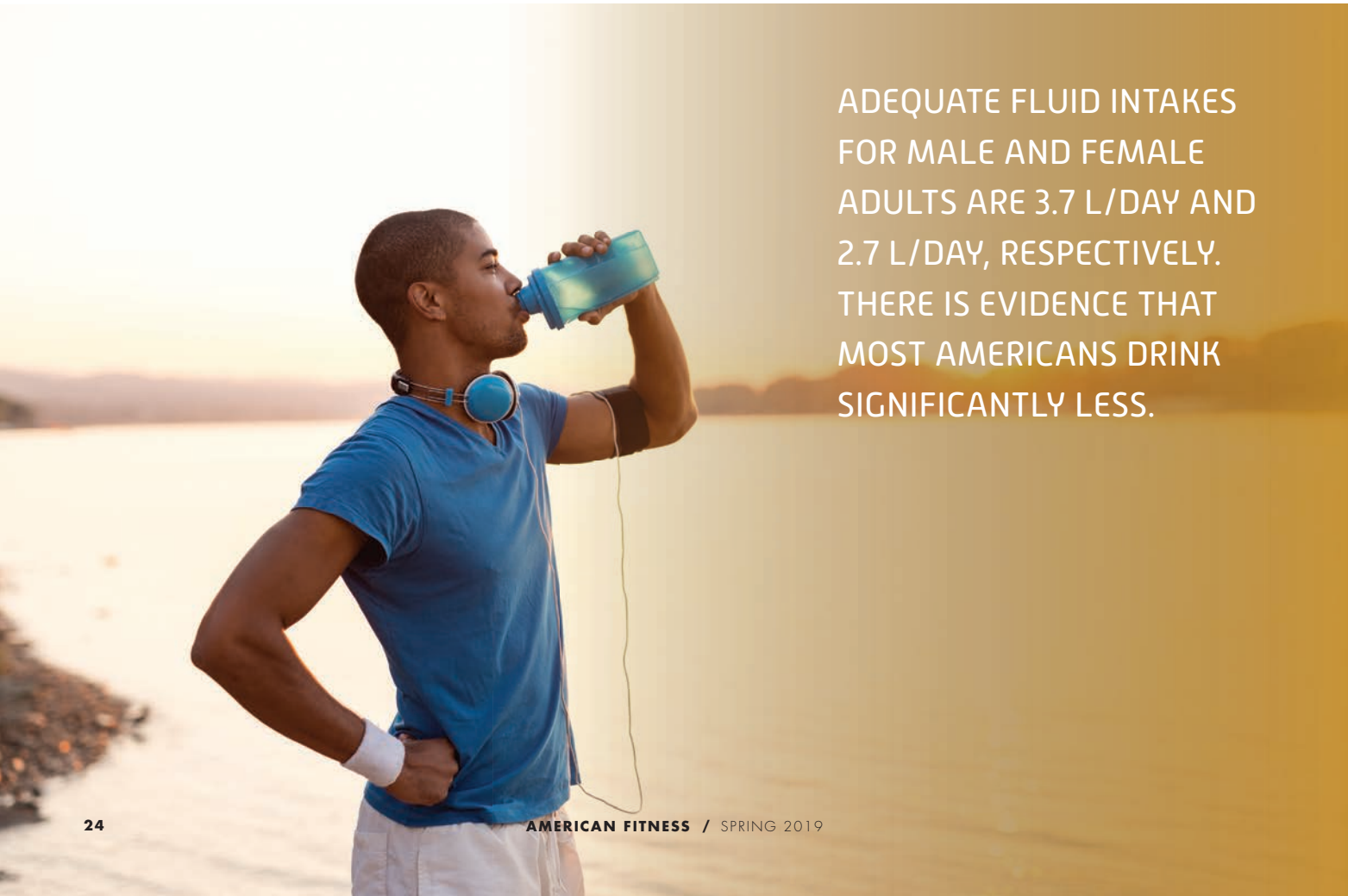
Not only is regular fluid intake (particularly plain water) one of the easiest, cheapest health interventions ever; it may also be one of the keys to optimizing health and well-being over the long term (Lang et al. 2017; Perrier 2017; Perrier et al. 2014). Good hydration habits appear to have an outsized positive impact on renal, cardiovascular and endocrine health and may even play an important role in addressing obesity (Chang et al. 2016; Perrier et al. 2014). For example, in a study of people diagnosed with overweight or obesity, those who consumed 500 milliliters of water just before each daily meal lost 2 kilograms more over the 12-week study than did those on the same diet who did not imbibe before each meal. It seems that drinking water before meals reduced energy intake, improving hydration and weight loss in a single step (Horswill & Janas 2011).

Finally, if that's not enough to get you reaching for plain water, a recent study found that drinking 0.5 liter of water increased energy expenditure *at rest* by 30% for about 90 minutes (Horswill & Janas 2011)!

Water, by the Numbers

The amount of water in the body is referred to as **total body water** (TBW), and it represents 50%–60% of total body mass (or 70%–80% of fat-free body mass) (Horswill & Janas 2011). (However, see "Special Considerations for Senior Populations," page 27, for factors that can limit TBW in seniors.)

TBW is in constant flux, with continual losses to respiration (as water vapor) and insensible sweat (perspiration that happens before it is perceived), as well as intermit-



ADEQUATE FLUID INTAKES FOR MALE AND FEMALE ADULTS ARE 3.7 L/DAY AND 2.7 L/DAY, RESPECTIVELY. THERE IS EVIDENCE THAT MOST AMERICANS DRINK SIGNIFICANTLY LESS.

tent losses to urine, feces and sensible (perceived) sweat. This output is about 2.5 L/day, with additional losses occurring from physical exertion or a hot environment. Also variable (but more within an individual's control) is the intake of fluids necessary to offset these losses. For most people, beverages account for about 60% of water intake, foods 30%. Metabolism contributes the final 10% as a byproduct of fat burning.

Water needs do vary from person to person. For instance, people with obesity require more fluids than nonobese populations, owing to metabolic rate, body surface area and body weight (Chang et al. 2016). For context, however, the National Academy of Medicine (formerly the Institute of Medicine) says that adequate fluid intakes for male and female adults are 3.7 L/day and 2.7 L/day, respectively, with 0.7 L and 0.5 L of that coming from food (Kavouras & Anastasiou 2010). That's a lot of fluid needed from beverages, and there is evidence that most Americans drink significantly less than this.

Yes, No or Almost

If we stop thinking of hydration as a yes/no state, we can start considering the different levels of "almost" and why they matter. Technically speaking, **dehydration** is a 4% or greater drop in TBW, but a fluid loss as small as 2% of body mass will noticeably diminish both mental and physical function. Thanks to the adaptability of the human body, it's fairly easy for people to walk around in a state of mild underhydration (a loss of 1%–3% of TBW)—referred to as **hypohydration**—without drastic day-to-day consequences. However, the acute adjustments that allow the body to compensate can also set us up for longer-term trouble.

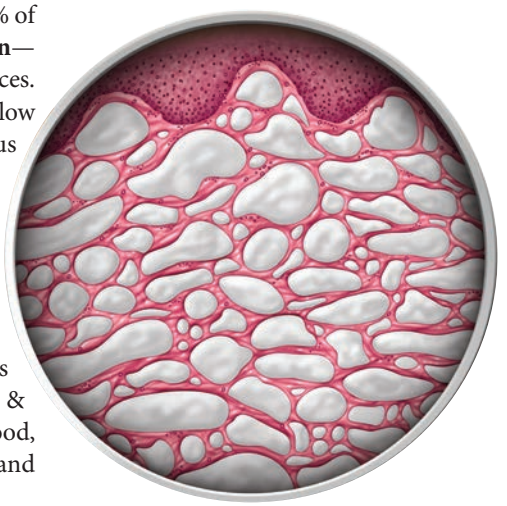
Over the last decade or more, research has focused on the effects of chronic hypohydration and found that it may undermine overall health in ways big and small (Armstrong & Johnson 2018; Benelam & Wyness 2010; Enhörning et al. 2017; Horswill & Janas 2011). It can negatively affect mood, cognition, metabolism, and kidney and cardiac health, while possibly having implications for immune function and cancer prognosis (Benton et al. 2016; Enhörning & Melander 2018; Guelinckx et al. 2016; Melander 2016; Perrier 2017; Roumelioti et al. 2018). (More on consequences later.)

To really grasp how dehydration and hypohydration affect the body, it helps to look more closely at the physical processes involved. As with real estate, one of the first things to consider is location, location, location.

Water, Water—Everywhere

Most water in the body resides in two types of compartments: intracellular (within the cells) and extracellular (outside the cells). The two primary extracellular compartments are the intravascular compartment, which contains plasma (the fluid component of blood), and the interstitial compartment, which contains any fluid not located in

MOST WATER IN THE BODY RESIDES IN TWO TYPES OF COMPARTMENTS. THE INTRACELLULAR COMPARTMENT HOLDS THE FLUID INSIDE CELLS, WHILE THE EXTRACELLULAR COMPARTMENTS CONTAIN PLASMA AND INTERSTITIAL FLUID (BELOW).



Key Terms

dehydration: a loss of 4% or more of total body water (TBW); also the process by which body water is lost

diuretic: spurring extra urine production by kidneys to maintain TBW balance; a substance causing this effect

electrolyte: an electrically charged particle (anion or cation) resulting from salts dissolved in water

euhydration: the ideal amount of body water; necessary to sustain normal physiological functions of the body

extracellular fluid: fluid outside the body's cells; includes fluid in the intravascular compartment (plasma, the fluid component of blood) and fluid in the interstitial compartment (not plasma and not fluid inside cells)

hyperhydration: an excess of TBW

hypohydration: a mild deficit of TBW (loss of 1%–3%)

hyponatremia: water toxicity; decreased concentration of Na+ in the body, due to overconsumption of fluid or a failure to spontaneously remove urine

intracellular fluid: fluid inside the cells

osmolality: the body's water-to-electrolyte balance, measured in milliosmoles of solute per kilogram of solvent (mOsmol/kg)

osmolyte: a substance that affects the flow of fluids via osmosis

osmotic gradient: the difference in concentration between two solutions on either side of a semipermeable membrane

overhydration: excess fluid consumption, leading to excess TBW

rehydration: the process of restoring normal TBW from a hypo- or dehydrated state

tonicity: effective osmotic gradient; relative concentration of solutes; drives movement of water between body compartments

- *hypertonic:* more solutes outside the cell than inside
- *hypotonic:* more solutes inside the cell than outside
- *isotonic:* equal tonicity/relative osmotic pressure

total body water: the overall amount of water in the body

GOOD HYDRATION HABITS MAY PLAY AN IMPORTANT ROLE IN ADDRESSING OBESITY. THEY ALSO APPEAR TO HAVE AN OUTSIZED POSITIVE IMPACT ON RENAL, CARDIOVASCULAR AND ENDOCRINE HEALTH.

the body's cells or plasma. **Intracellular fluid** (ICF) refers to water inside cells, and **extracellular fluid** (ECF) refers to water outside of cells (in the interstitium or plasma).

Because cell membranes are permeable to fluid via aquaporins (specialized water channels), fluid moves freely between the three compartments (intracellular, intravascular and interstitial). One cause of this is osmosis: In osmosis, water moves from areas of high fluid concentration to areas of low concentration in an attempt to balance the levels on both sides of the cell membrane. This movement is driven, in part, by the quantity of solutes (substances dissolved in the fluid) in each compartment. Solutes cannot move through cell membranes, but fluid can. During osmosis, water moves from areas of lower solute concentration to areas of greater concentration, shifting the amount of water on each side of the membrane. An area with a higher solute concentration cannot help but pull water into it, even if this creates other problems.

When equilibrated, the three compartments—think of them as buckets—hold the appropriate amounts of fluid. However, when one bucket experiences a loss of water volume or an increase in solute concentration, water from another bucket is more likely to pour in to balance things out. This difference between solute concentrations on the two sides of a semipermeable membrane is called an **osmotic gradient,** and it drives water flow between compartments.

Water moving into or out of the ICF may cause cells to shrink or expand. A little change in size is a small problem, but large shifts can trigger undesirable signaling cascades affecting metabolism, transport, hormone release, cell proliferation and programmed cell death (Guelinckx et al. 2016; Lang 2007; Lang et al. 2017; Nishiyama & Kobori 2018). Cells get ticked when they shrink or swell. Shrinkage of cells in the ICF is the consequence of chronic hypohydration, and you will soon see why it has been accused of health crimes.

While the rules of osmosis may seem cut and dried (fluid shifts until balance is achieved), the body is more complex than that: Certain parts of the body do a more important job than others, so they take priority when it comes to allocation of resources, including water.

Case in point: Plasma accounts for only 7% of TBW, while most of the body's water—about 60%–70%—is found in intracellular fluid. However, adequate blood volume is critical to maintaining whole-body homeostasis. Plasma is, after all, the body's crucial transporter of nutrients, waste, oxygen and carbon dioxide. Viscous blood doesn't flow as nicely and tends to clump. Lower blood volume (and thicker blood) means each organ system (heart, lungs, kidneys, liver, etc.) has to make do with less, making its job more difficult. Thus, the body prioritizes the intravascular compartment (containing plasma) at the expense of other fluid compartments.

One demonstration of this prioritization is that blood **osmolality**—the balance of water to dissolved substances—remains remarkably consistent in people with widely different levels of habitual water intake. Thus, the intravascular compartment's volume is maintained, but if enough fluid for this purpose is not provided by an external source (i.e., food or drink), the water has to come from somewhere *within* the body.

This need can arise, for example, when "ad libitum" intake (fluid intake based on sensations of thirst or desire for liquid) is subject to "unconscious, involuntary dehydration," where the individual drinks to satiety but does not overcome a water deficit (Stookey, Hamer & Killilea 2017).

What About Electrolytes?

Maintenance of TBW depends not only on fluid ingestion but also on electrolyte concentration gradients in the fluid compartments. **Electrolytes** are the electrically charged particles (anions or cations) from salts dissolved in water, and they are important for both **rehydration** (fluid replacement) and the capacity to hold onto a higher level of body water.

Predominant **osmolytes** in the ICF and ECF are the electrolytes potassium (K+) and sodium (Na+), respectively. Sodium exerts the strongest influence because of its role as primary driver of volume in the extracellular compartments (Leiper 2015).

This information is particularly important when working with endurance athletes, because Na+ is a primary component of sweat, and people with a faster sweat rate will lose more sodium in a given exercise session (Armstrong et al. 2010). Fluid to form sweat is drawn from blood plasma, so exercise of longer duration poses a challenge to blood volume and viscosity. As plasma volume decreases, its **tonicity** increases, thus pulling water out of the body's cells.

Special Considerations for Senior Populations

In people over the age of 65, TBW decreases. This is partly because water is dependent on fat-free mass, so age-related muscle loss, known as sarcopenia, causes TBW levels to drop. Osmo- and baroreceptors also become less sensitive in older adults, so thirst tends to be less pronounced and the kidneys become less effective at concentrating urine. For these reasons, determining hydration status becomes more difficult in seniors than in younger age groups (Armstrong & Johnson 2018; Guelinckx et al. 2016; Kavouras & Anastasiou 2010; Roumelioti et al. 2018).

For more information on the special needs of seniors, the NASM Senior Fitness Specialization provides guidance on fitness programming using the NASM Optimum Performance Training™ model, as well as understanding this group's concerns, common conditions and fitness obstacles. To learn more, visit nasm.org/products/CEU140K.

Most diets in developed countries supply sufficient sodium to retain ingested water and, of note to athletes, to prevent exertional cramps. If you have clients on sodium-restricted diets, they should initiate a discussion with their physician: In 2013, the Institute of Medicine reported that there was a lack of conclusive scientific evidence of benefit (or harm) in reducing sodium consumption to previously recommended levels (Kong et al. 2016). If dietary Na+ is low or restricted, it may inhibit restoration and retention of ingested fluids, which can allow hypohydration to develop or continue. On the other hand, even athletes do not need excessive Na+ intake.

The Body's Balancing Act

The body's fluid-to-electrolyte balance—osmolality—is regulated by the renin-aldosterone-angiotensin system (RAAS). This controller, involving the brain, the kidneys and sensors throughout the body, is tasked with ensuring that we have enough Na+ to sustain cellular function and fluid balance. This, in turn, drives blood volume and therefore blood pressure.

When blood osmolality *increases* above normal (285–295 milliosmoles/kg, or mOsmol/kg), it is detected by osmoreceptors in the brain. This triggers the pituitary to release arginine vasopressin (formerly known as antidiuretic hormone). AVP triggers reabsorption of water by the kidneys, making urine more concentrated. It also results in constriction of blood vessels to maintain blood pressure and elicits feelings of thirst, inducing fluid intake. In conjunction, pressure-sensitive receptors in blood vessels (called baroreceptors) sense the decreased blood volume and respond by triggering the release of aldosterone, a corticosteroid. Aldosterone increases Na+ reabsorption by the kidneys (and because water follows salt, this enhances water retention). Aldosterone also stimulates Na+ appetite, which further increases thirst (Boone & Deen 2008; Enhörning & Melander 2018; Kavouras & Anastasiou 2010; Roumelioti et al. 2018).

When blood osmolality *decreases* or there is a large influx of water from the small intestine, AVP drops, thirst disappears, and the kidneys produce a greater volume of dilute urine.

A Little Low on Water?

While occasional mild hypohydration is not a problem, being *chronically* underhydrated may be a threat to long-term health and well-being. Low TBW keeps the RAAS in a constant state of activity, with high circulating levels of the hormone cortisol. This suggests an overstimulation of the body's stress response system.

In terms of exercise, fluid is important not just for aerobic performance but also

Easy Ways to Check Hydration —Without Lab Work

There are several ways to gauge hydration levels without doing lab work: They involve measures that are easy to check at home, including thirst, body weight, and urine volume and color.

THINK ABOUT THIRST

First thing in the morning, before exercising and before eating or drinking anything, assess your thirst on a scale of 1–9 (with 1 being "not thirsty at all" and 9 being "thirstiest I've ever been"). If you feel "very thirsty," chances are good that you are down about 2% of body weight, meaning you're mildly dehydrated. This thirst perception rating can serve as a good baseline throughout the day (Armstrong et al. 2014).

STEP ON A SCALE

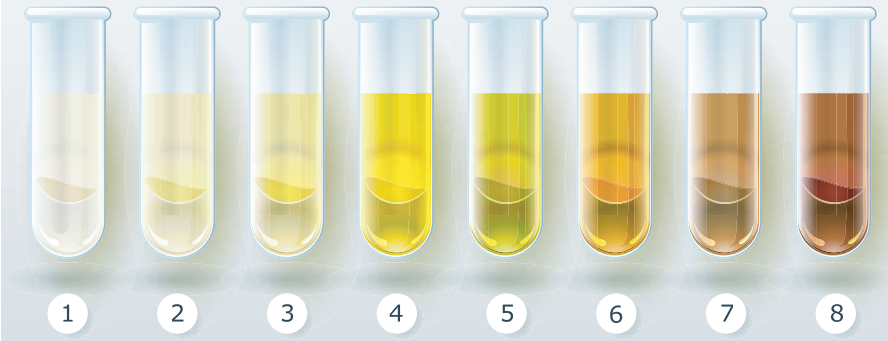
Unless you are actively losing or gaining weight, most day-to-day variations in weight are from fluctuations in total body water. To establish a baseline, weigh yourself nude, first thing in the morning after using the bathroom, 3 days in a row. The average of these three weights is a pretty good representation of your weight. Keep a record of this number and use it for comparison with your postworkout weight. Then rehydrate accordingly.

Caveat: This is not a good gauge in the days after a high salt intake, which will cause fluid retention that does not correspond with good hydration. A sudden excess of water is eliminated very rapidly, within hours of consumption, but excess sodium takes days to be removed, demonstrating that these mechanisms operate on different time frames (Bie & Evans 2016).

CONSIDER YOUR OUTPUT

No one expects you to measure urine output (though you can if you want to), but if you don't need to urinate at least every 3 hours or so, you probably aren't euhydrated. Urine color can also help you assess your hydration level. A pale-yellow color indicates good hydration, and a darker, sunflower-yellow color shows normal hydration or slight dehydration. If the color shifts to a mustardy or brownish color, you are exhibiting a sign of dehydration (see the color chart below).

Caveat: Many things can affect urine color, including drinking a large quantity of water soon before urinating (which can lighten it) or taking B vitamins (which can darken it). Using at least two methods to gauge hydration will give you a clearer picture of where you stand.



If your urine matches 1–3, you are very well hydrated. If you're at a 4, you are hydrated or slightly dehydrated. If you are at 5 or 6, you are dehydrated. From there, the darker the color, the greater the dehydration.

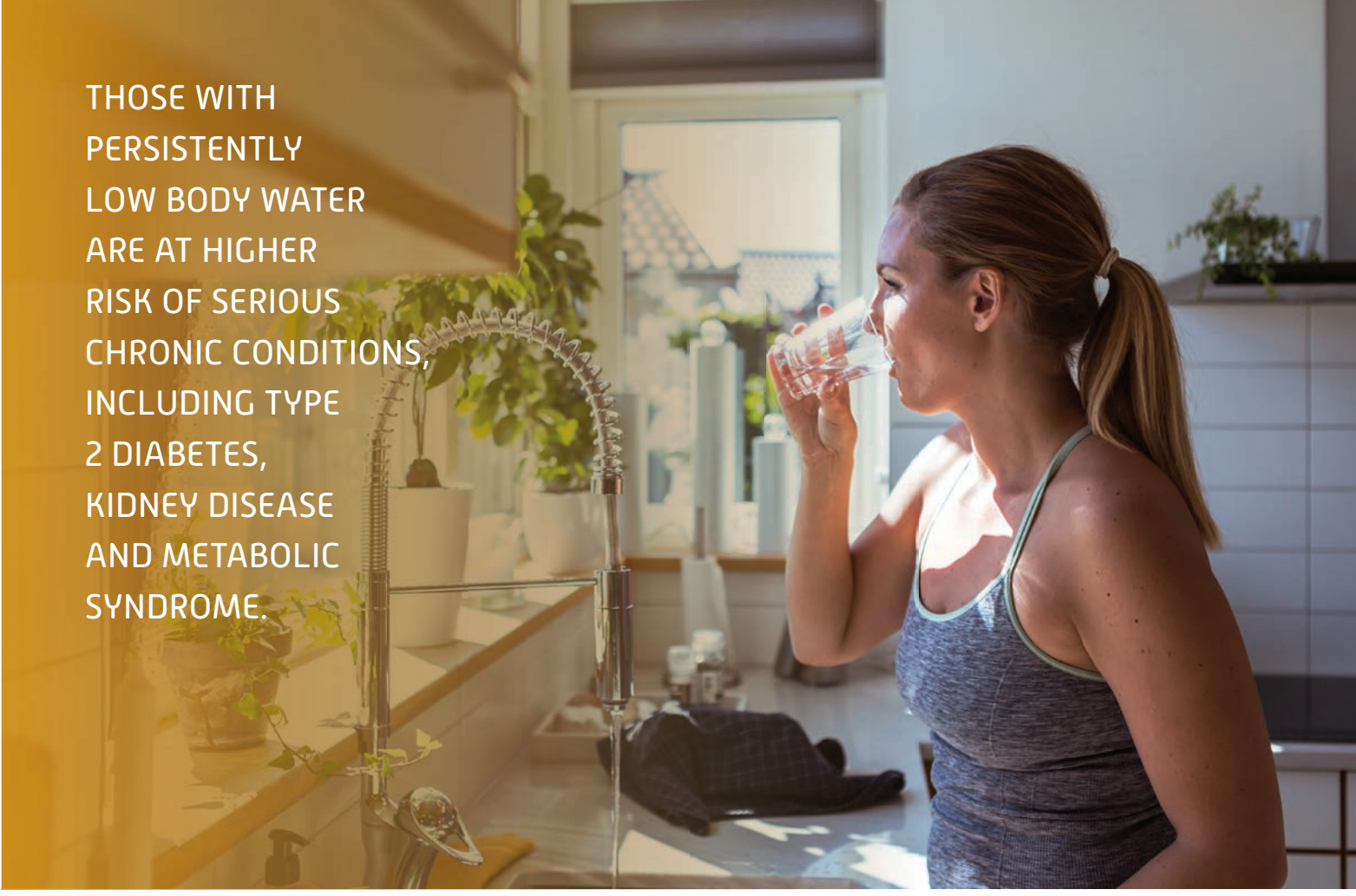
for maintaining optimum muscle tissue. Dehydration leads to increased production of urea (a crystalline compound in urine), suggesting that water deprivation is accompanied by body tissue catabolism (breakdown). Chronic hypohydration appears to increase catabolism even when dietary protein needs are met (Kavouras & Anastasiou 2010; Lang et al. 2017; Stookey et al. 2013).

There is evidence that those with persistently low body water are at higher risk of serious chronic conditions, including type 2 diabetes, kidney disease and metabolic syndrome (abdominal obesity, insulin resistance, hypertension and persistent inflammation). AVP apparently alters liver glucose production and its breakdown of stored glycogen, while also impairing insulin secretion and insulin sensitivity (Qian 2018).

In people diagnosed with type 2 diabetes, low TBW deteriorates glucose regulation. Diabetes is already a challenge to TBW because excess glucose in the blood acts as an osmolyte, pulling water from cells to counteract the higher osmotic pressure in the ECF. The kidney glucose transporters become saturated, so glucose is lost in the urine, pulling excess water with it. Thus, the water never gets to the ICF, where the thirst was triggered—hence, the diabetes symptoms of excessive thirst (triggered by cellular dehydration) and large volumes of urine (following glucose loss in the urine). Although it may seem counterintuitive (given the excessive urine production), restricting water will only exacerbate the problem for people with diabetes. Blood glucose clearly needs to be controlled, but optimal hydration will help the body better manage the condition overall.

A broad range of other diseases are also associated with markers of hypohydration: heart failure, vascular dementia, cognitive impairment, inflammatory bowel disease, cancer and premature mortality (Lang et al. 2017). Obviously, many of these illness are multifactorial, and association is not causation.

Nonetheless, those are heady concerns for a substance that, until recently, didn't even figure into nutrition recommenda-



THOSE WITH PERSISTENTLY LOW BODY WATER ARE AT HIGHER RISK OF SERIOUS CHRONIC CONDITIONS, INCLUDING TYPE 2 DIABETES, KIDNEY DISEASE AND METABOLIC SYNDROME.

tions. Here's the good news: Of all the ills associated with our underactive, overfed modern lives, hypohydration has an inexpensive, uncomplicated fix. In a 2016 study, people with low to moderate fluid intakes who increased their water consumption over as little as 6 weeks saw a nearly 25% drop in circulating copeptin, a marker of AVP associated with low TBW (Lemetais et al. 2017). Study participants consumed either 50%–80% or 80%–120% of fluid intake recommended by the European Food Safety Authority, and results were similar for both groups. These recommendations are lower than those from the National Academy of Medicine. For adults, EFSA recommends water intakes of 2.5 L/day for men and 2.0 L/day for women—that's 1.2 L and 0.7 L less, respectively, than the National Academy of Medicine suggests (EFSA 2017; Kavouras & Anastasiou 2010).

Soaking It Up

Many factors affect how quickly the body takes in fluids consumed in food and beverages. Water absorption, which occurs mainly in the small intestine, is important for everyone but may be particularly of interest to athletes wondering how much (and what) to drink before, during and after various levels of energy expenditure.

Whether we absorb the water from fluids we consume depends on our gastric emptying rate, or how fast fluid leaves the stomach. Gastric emptying rate is a function of several things, including the volume of fluid in the stomach, the calories in that fluid and the body's immediate energy expenditure. Following are some factors to consider when seeking to speed up gastric emptying rate and get fluids to the body parts that need them most.

VOLUME AND TEMPERATURE

In general, the greater the volume of fluid in the stomach, the faster it exits. This is true up to about 600 mL, at which point the rate may level off. Personal tolerance varies, of course. (Many athletes have learned the hard way that a competition or major event is not the time to test one's limits!) Interestingly, refilling the stomach regularly with a larger volume, rather than drinking slowly and continually, will enhance gastric emptying (Leiper 2015); however, drinking a large volume in a short time right after working out is not recommended (see "Sweating the Small Stuff," page 31).

Beverage temperature, contrary to a popular myth, does *not* affect water uptake. Cold drinks are often the most palatable in an exercise situation, particularly in a hot environment, so it's good to know temperature will not slow the rate of gastric emptying or intestinal absorption (Leiper 2015).

CALORIES AND ELECTROLYTES

Plain water is emptied from the stomach and absorbed in the intestine faster than fluids containing electrolytes or calories. But even large doses of fluids with electrolytes or calories are likely to be rapidly filtered, as the body's regulation system may perceive a water overload. Here are a few types of beverages and their notable characteristics:

FRUIT JUICE AND SOFT DRINKS. Solute concentration in fluids (osmolality) is measured in milliosmoles per kilograms. In beverages with similar energy and electrolyte contents, a moderately hypotonic solution (229 mOsmol/kg) is absorbed two times

faster than an isotonic (277 mOsmol/kg) or moderately hypertonic (352 mOsmol/kg) solution. The problem with hypertonic beverages, which include fruit juice and soft drinks, is that they draw water out of the body-water pool into the intestine to make them isotonic; this delays absorption of their water content and makes them ineffective for rapid rehydration, especially during or following competition (Leiper 2015).

SPORTS DRINKS. Carbohydrate-electrolyte solutions (aka sports drinks) that have a carbohydrate concentration of 2.5% or less will empty from the stomach about as fast as plain water. However, sports drinks can have their problems.

Those with carbohydrate concentrations of 6% or higher will *slow* gastric emptying and may cause GI distress during activity (Leiper 2015; Maughan & Leiper 1999). Also, many store-bought versions contain fructose, which has been shown to enhance carbohydrate oxidation at low-to-moderate exercise intensities but can be difficult for some people to digest (Jeukendrup 2017). (Incidentally, fructose is found in fruit juices and many other sweetened beverages, too.)

If someone gets gassy or uncomfortable after drinking a commercial sports drink, fructose may be the culprit. Fortunately, a sports drink can be made at home to suit an athlete's precise tastes and needs, at a low cost.

CAFFEINE. Although caffeine has an acute, mild **diuretic** effect (spurring production of excess urine), it is not dehydrating when consumed in levels below 500–600 milligrams/day. (For context, a Starbucks 12-ounce black coffee has about 240 mg, a double espresso about 160 mg.) Higher caffeine consumption can generate urine in excess of fluid intake, in which case additional fluid should be consumed to counteract this effect (Benelam & Wyness 2010).

Drinking Up, Working Out

When exercise will last longer than 2 hours or take place in high heat, exercisers should arrive optimally hydrated—neither hyperhydrated (with an excess of TBW) nor hypohydrated (at a deficit). This is particularly important if fluid loss from sweat will be high (in which case sodium losses via sweat will probably also be high). Known as **euhydration,** optimal hydration likely improves anaerobic performance and certainly won't hurt it, which cannot be said for taking in too much or too little fluid.

STARTING AT A LOSS

Beginning an endurance event hypohydrated compromises performance: The water deficit increases cardiovascular strain, raises heart rate and rating of perceived exertion for the same relative effort, and amplifies the thirst sensation. High temperatures increase the degree of impairment and discomfort. Using diuretics (which pull water from the

ECF volume) to "make weight" in sports like wrestling and rowing, incurs greater strain during the exercise that follows (Cotter et al. 2014; James et al. 2017).

Dehydration, especially when it exceeds a loss of 2% body mass, reduces endurance exercise performance and shortens time to exhaustion (Armstrong et al. 2007). Anaerobic endurance, muscle strength and power all decrease, as well. Further, such dehydration can induce plasma hyperosmolality, which increases heat storage by delaying and decreasing sweating in an attempt to conserve water (Paull et al. 2016). Performance is more severely affected at fluid losses of 3%–4% of body weight. Therefore, as much as possible, body mass losses during an event should be limited to 1%–2%, and sodium should be included in fluids consumed (Shirreffs 2008).

In cooler temperatures, dehydration of more than 2% may be tolerable, but as the temperature increases, smaller levels of dehydration may have a greater effect. When continuous exercise is performed in heat, fluid intake exerts a greater magnitude of improvement (Shirreffs 2008; McCartney, Desbrow & Irwin 2017).

TOO MUCH OF A GOOD THING

Overhydration does not enhance performance, either. **Hyperhydration** (higher than optimal TBW) does not improve aerobic or anaerobic performance and can, at extremes, be fatal (McDermott et al. 2017). Attempting to "stuff" fluids (especially plain water) beyond thirst can bring on a life-threatening condition called exertional **hyponatremia.**

The "na" in "hyponatremia" refers to sodium's periodic table symbol, Na+. If blood levels of sodium become hypotonic (too dilute), osmotic pressure in the extracellular compartments decreases. Remember that sodium is the primary driver of ECF volume, so its loss or insufficiency means water will flow out of the ECF, further depleting volume, and will flow into the body's cells, causing them to swell. This becomes particularly dangerous in the brain because cell swelling there will lead to increased intracranial pressure, a dangerous condition called cerebral encephalopathy. Exercise also results in the shunting of blood to active muscles, leading to decreases in kidney filtration and urine production and making it harder for the body to counter a fluid overload. Even with Na+ supplementation, exertional hyponatremia can occur, particularly in ultra-endurance events, or those lasting longer than 18 hours.

Because a lower TBW is more easily diluted, women are at higher risk of hyponatremia (Almond et al. 2005), as are people whose initial Na+ levels are low (owing to dietary restrictions, for example). Event duration is another risk factor: The longer it takes athletes to complete a marathon- or Ironman®-distance event, the more opportunity they have to consume excessive fluid, and the longer they will be sweating (and therefore losing Na+). Use of medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) and selective serotonin reuptake inhibitors (SSRIs) confer additional risk (Cotter et al. 2014; Hoffman, Bross & Hamilton 2016). Clients may benefit from being made aware of the potential effects of these common medications.

How to Calculate Sweat Rate

Knowing how much water you lose to sweat can be helpful in sustaining hydration or at least in not losing too much fluid during a practice or event. It will also help you restore euhydration later. Here is an assessment that can help you approximate your average sweat rate (SR).

THE 30-MINUTE SWEAT RATE TEST

1. Empty the bladder, then take a nude weight (ideally in kilograms).
2. Exercise for 30 minutes.
3. Take a nude weight again.
4. Subtract postexercise weight from pre-exercise weight, then double the difference to approximate SR per hour, in liters.

Note: The 30-minute test is easiest if you avoid eating or drinking anything during the exercise. If you drink any fluids beforehand, add that amount to the difference in weights in step 4.

Example: If your pre-exercise weight was 72 kg and you weigh 71 kg afterward, and you did not drink anything before the workout, your SR is 2 L/hour. If the weight difference is 500 grams and you drank 250 mL of fluid beforehand, add that to the 500 g for a loss of 750 g, or an SR of 1.5 L/hour.

SWEATING THE SMALL STUFF

Average sweat rate can help you roughly determine fluid losses, as can simple strategies for checking hydration (see "How to Calculate Sweat Rate," above). Looking at individual losses is important because sweat rate ranges from 0.5 L/hour to extremes of 3.5 L/hour. This does *not* mean you should attempt to consume that amount of fluid during each hour of exercise; it is unlikely you could absorb that much, and overhydration puts you at risk of exertional hyponatremia. Additionally, while negative consequences can ensue from drinking too much before or during exercise, consuming large amounts of fluid over a short time postworkout is not advisable, either. This practice will overstimulate the kidneys, producing large volumes of urine, which undermines rehydration (Jones et al. 2010).

DRINKING MORE WATER MAY BE ONE OF THE EASIEST THINGS YOU'VE EVER SUGGESTED, WITH AN OUTSIZED PAYOFF FOR YOU AND YOUR CLIENTS, FAMILIES AND FRIENDS.

Here's an example of how to gauge rehydration needs: If your sweat rate is 2 L/hour and you consume about 1.5 L/hour, you'll lose about 0.5 kg/hour over your intake, so after 3 hours you will have lost 1.5 kg, or about 2%. If you are able to absorb more than 1.5 L/hour (without feeling fluid sloshing in your stomach), you can try that.

It's important to remember that it doesn't take much overdrinking to overwhelm body Na+ stores. Generally speaking, the best strategy is to drink to thirst or comfort, but not beyond. If water is sloshing in your stomach, you don't need to drink more. See "Easy Ways to Check Hydration," page 28, for strategies that can help you know when enough's enough.

Getting It Back

Following dehydrating events or practices, rehydration is a process that occurs over time and requires ingestion of 150% of the volume lost to sweat. In situations when complete rehydration between events (particularly those of longer duration) is limited by time or availability, athletes should consume fluid as they can and then restore full TBW when possible (overnight, for example). In such cases, sports drinks can aid in replenishing electrolytes and carbohydrates as well as fluids (Leiper 2015; Shirreffs 2008).

A strategy of "metered" fluid consumption can help the process: This refers to dividing up the total fluid to be ingested into eight portions, the first to be consumed immediately after the event, with another dose every 30 minutes thereafter, until the process is complete. Metered consumption increases hydration efficiency—the amount of water retained by the body—without prolonging dehydration.

Of course, postworkout is not the only time when it is important to counter dehydration. If your self-checks indicate dehydration at any time, increase your water intake by about 1.5 L (beyond what you normally drink) during the day. Your urine should be about two shades lighter within about 24 hours (Perrier et al. 2015), a good indicator that you're back on track. This may be a topic to discuss with clients, too, as some may be experiencing chronic hypohydration and not be aware of it.

Show What You Know

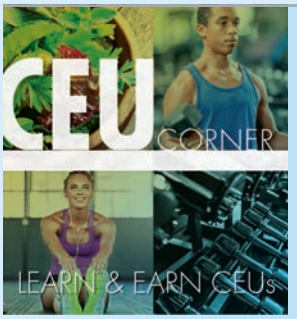
Euhydration is not magic, but it's a goal that can reverberate through one's personal health and fitness. Barring medical contraindication, striving for consistent adequate intake of plain water can only enhance health now and in future years.

As fitness professionals, we provide all kinds of lifestyle improvement suggestions to our clients and gym members. Advising them of ideal hydration habits is another service we can provide that will enhance health. Further, the recommendations are simple and inexpensive, so barriers to improving hydration (other than the inconvenience of frequent urination) are typically low. In fact, drinking more water may be one of the easiest things you've ever suggested, with an outsized payoff for you and your clients, families and friends.

As always, our suggestions are most powerful when we model them, so hydrate thyself—and then help others soak up some knowledge, too.

JENNIFER KLAU, PHD, *has been a fitness professional since 1992. A former master instructor for the Spinning® program and an unapologetic science geek, she is known for her engaging presentations and her ability to make complex information accessible. Her mission is to make the science of exercise actionable. A lifelong athlete, she is a competitive rower, an avid cyclist and a yoga enthusiast.*

References for this article available online at magazine.nasm.org.



CEU QUIZ: Hydration: Through the Lens of Fitness *and* Health

LEARNING OUTCOMES: After reading this article, you will be able to:

- Explain the basics of body water physiology, including compartments where water is stored.
- Identify how improved hydration habits may contribute to long-term health and well-being and/or decrease disease risk.
- Characterize markers of adequate, insufficient and excessive fluid intakes and the risks of going to extremes.
- Calculate sweat rate for exercise and incorporate it into hydration planning.
- Create personalized hydration strategies based on exercise mode, environmental considerations and individual requirements.

1. What type of beverage leaves the stomach most quickly?

a. plain water
b. soda
c. fruit juice
d. sports drink

2. Fluid's direction of flow between body water compartments is driven by _____.

a. volume
b. gravity
c. tonicity
d. size

3. Chronic hypohydration causes cells in the intracellular fluid (ICF) to _____ and may have _____ health consequences.

a. expand, positive
b. shrink, negative
c. expand, negative
d. shrink, positive

4. In ICF, the predominant osmolyte is _____; in extracellular fluid it is _____.

a. Mg+, K+
b. Na+, Mg+
c. K+, Cl-
d. K+, Na+

5. Increased production of _____ suggests that water deprivation is accompanied by _____.

a. urea, catabolism
b. urea, anabolism
c. urine, synthesis
d. arginine vasopressin (AVP), catabolism

6. Risk of hyponatremia is increased by _____ and _____.

a. selective serotonin reuptake inhibitors (SSRIs), excess Na+
b. nonsteroidal anti-inflammatory drugs (NSAIDs), long-duration events
c. NSAIDs, excess K+
d. SSRIs, short-duration events

7. Hypohydration increases _____ and decreases _____.

a. ejection fraction, ability
b. rating of perceived exertion, exercise performance
c. endurance, heart rate
d. agility, thirst

8. The speed at which fluid leaves the stomach is called the _____ rate.

a. gastric distending
b. gastric filling
c. gastric absorption
d. gastric emptying

9. Full rehydration requires consumption of _____ of fluid lost.

a. 75%
b. 100%
c. 150%
d. 200%

10. To avoid excessive fluid loss while rehydrating, a good strategy is to divide the total rehydration fluid into _____ servings and drink one serving every _____ minutes.

a. 6, 30
b. 4, 15
c. 8, 30
d. 10, 15

11. In people over age 65, total body water (TBW) _____.

a. decreases
b. increases
c. stays the same
d. none of the above

12. TBW is related to _____; therefore, people with obesity have _____ fluid needs than those with normal weight.

a. fat mass, greater
b. total body mass, greater
c. fat mass, lesser
d. total body mass, lesser

13. Low TBW keeps _____ constantly active, suggesting _____ of the stress response system.

a. AVP, understimulation
b. the renin-aldosterone-angiotensin system (RAAS), understimulation
c. AVP, normal activity stimulation
d. the RAAS, overstimulation

14. Caffeine starts becoming dehydrating when consumed at levels over _____ milligrams per day.

a. 25–50
b. 50–100
c. 200–300
d. 500–600

15. _____ is a marker of AVP production, and high levels are associated with _____.

a. RAAS, low TBW
b. Copeptin, high TBW
c. RAAS, high TBW
d. Copeptin, low TBW

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"If you don't enjoy what you're doing, you probably aren't going to keep it up."

PHOTO: NATALIE MINH

Sustaining a Thriving Life

SOHEE LEE HELPS PEOPLE CUT THROUGH THE CHATTER OF DIET FADS TO GET TO THE HEART OF WHAT MATTERS: A HAPPY, HEALTHY RELATIONSHIP WITH BOTH FOOD AND MOVEMENT.

BY CANDICE DYER

The SoheeFit studio in San Diego is a gleaming, modern and welcoming fitness center with upbeat music. One thing is noticeably missing, though. There is no cardio equipment. That's because owner Sohee Lee, MS, typically ends up prying her driven, exhausted clients off their cardio-driven devices in favor of free weights and a balanced diet.

"I love helping women fall in love with weightlifting," she says, "and thrive the hell out of life."

Lee is the founder of the "Eat. Lift. Thrive." movement. She is also the author of a book by that name, as well as the e-books *The Beginner's Guide to Macros* and *The Beginner's Guide to Bikini Competitions.* Both a fitness coach and a sports nutritionist, she has developed an evidence-based program that emphasizes highly subjective, customized strength training combined with salutary calorie counting. Sustainability is the goal, along with good health. If clients are looking for a crash diet and fast results—or a grueling workout that slacks off when they're bored, tired or busy—they are probably in the wrong place. After years of research and personal experimentation, Lee always factors in the fallibility of human nature and the age-old pleasure principle.

"If you don't enjoy what you're doing," she says, "you probably aren't going to keep it up. People tend to think that suffering will yield the best results. It doesn't."

Lee does not focus on or obsess about measurements, even while she is helping people whittle them down to reach a goal. "I'm much more concerned with *feeling* good than looking good," she says. "I'm interested in psychology and behavior, in developing good habits that last."

Interventions That Work

Other personal trainers can relate to this scenario: re-educating a client who has been misled one way or another. Most of Lee's clients come to her a little worse for wear, after getting bad advice and poor results from sweating for hours on a track or an elliptical machine. "They're overeager to change their lives," she says. "They set goals that are too lofty and too drastic without outlining how to get there. So they commonly burn out and quit. Or they regress and get into worse shape than they were originally."

Lee functions as her own billboard. A 5-foot-2-inch dynamo of sleek sinew, she's a winner of the OCB Yorton Cup natural bikini competition. She looks as if she works out several hours each day, but really, it's only three or four times a week, often to a soundtrack of '70s music. And she enjoys French fries and ramen. "I'm all about busting the fat-loss myths," she says.

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Once, while preparing for another bikini competition, she ate a Snickers bar every day to prove that you can consume anything and maintain your results—if you are eating correctly overall. Her secret? "Mastering the fundamentals of nutrition." (See "Sohee's Tips for Clients," page 39, for more.)

Some little tricks can help. "I like to talk about what I call 'bite-sized behavior goals,'" she says. "Just leaving off the half-and-half in your latte makes a difference, as does replacing one starch in a meal with one vegetable. Those changes are manageable and provide your micronutrients."

Trigger foods can be a stumbling block for clients, but they can be conquered. Lee approaches this by reminding clients they are in control. "Break the cycle—get it out of your kitchen," she tells them. "Think about the negative experiences you had with that specific food in the past. What was going on? Where were you?

"I'm all about busting the fat-loss myths."

PHOTO: NATALIE MINH

What were you feeling? These factors all contribute to the ease or difficulty of eating in line with our values. When you'd like to have the food again, have it under your terms. Keep the supports in place to rack up many experiences where you eat that food in a way you are happy with. Gradually ease up on these parameters until you are confident enough to reintroduce the food."

And when a client succeeds? "Celebrate!"

Shifting Meal Mindsets

The unspoken hero of many personal training interventions is behavior change. Helping clients get on board with a new way of thinking about and approaching exercise and nutrition makes up a hefty piece of the success pie. Many of Lee's clients have slashed their caloric intake too low, and Lee urges them to raise it to something like 2,100 per day, depending on their regimen.

"I was running 12 miles on 1,000 calories a day before I got together with Sohee," says Tran Tu, who lives in Houston. "I was doing excessive cardio, and she advised me to cut it out." Over 9 months, Tu says she expanded her intake to about 2,100 calories a day. "I was very hesitant about adding more calories, but eventually I learned to trust the process. I gained a few pounds, but my clothes fit me better. The composition of my body changed."

Lee's other clients share similar stories about their initial reluctance to follow her guidelines. Her advice about eating more and doing less cardio seems very counterintuitive to the conventional wisdom of American dieting.

"It took me a while to trust her," says Alida Lippa, a retiree in Laguna Niguel, California. "I was doing fad diets and lots of cardio. I had really wrecked my metabolism. Now I lift weights 4 days a week for about 45 minutes, and I'm eating in a way that doesn't leave me feeling hungry. My only cardio is a leisurely walk. I'm in better shape now than I was 10 years ago. She totally changed my perspective and helped me find balance in all areas of my life."

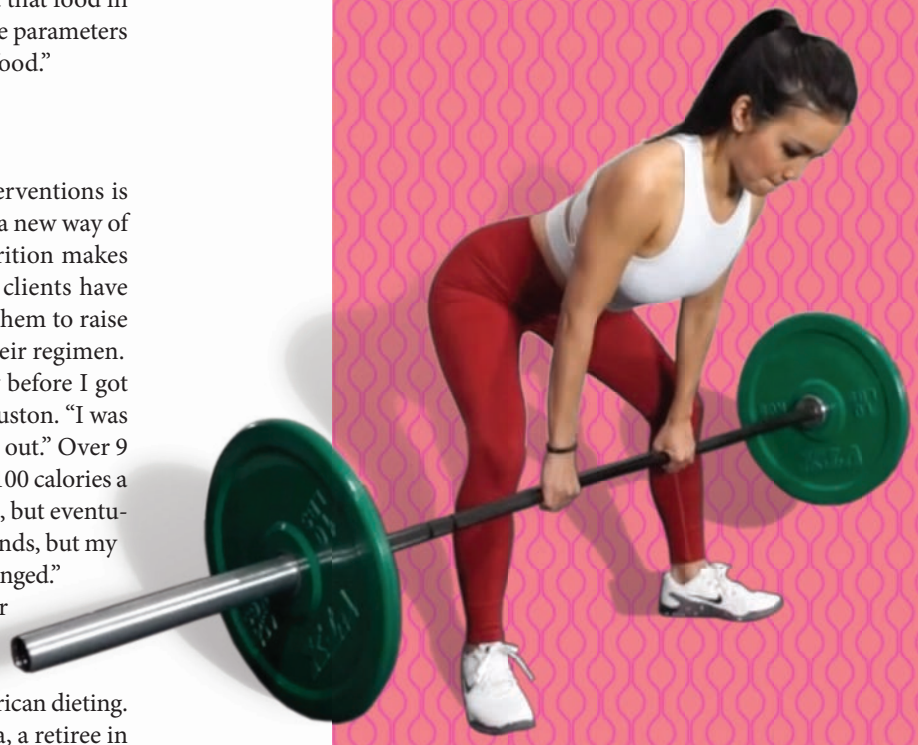
Compassion Comes From Experience

Lee understands firsthand the striving, obsessive mindset of her clients. She was born in Seoul, South Korea, famous for its rigid, high-pressure beauty ideals (many people consider it the world's plastic-surgery capital). She first moved to the U.S. in 1992 but lived all around the world growing up, finally moving here permanently when she began attending boarding school in 2005.

As a teenager, she struggled with bulimia for 8 years. "I was a fanatic," she says. "I lacked awareness and education. The message all around me was that you had to be skinny to be pretty. I thought I'd be prettier and happier if I were skinnier."

On her website (soheefit.com), she posts a haunting photo of herself from that time in her life. Over the course of 3 months, she dropped down to 80 pounds. "I hate to see other women—and children—getting sucked into that way of thinking. Now I know that your quality of life is more important than getting skinny."

Lee says she "stumbled into fitness" after an aha! moment when she saw the cover of a health magazine. "It was a fitness model—I



LEE EARNED A MASTER'S DEGREE IN PSYCHOLOGY, WRITING HER GRADUATE THESIS ON EATING BEHAVIOR. SHE'S NOW GOING FOR A DOCTORATE IN STRENGTH AND CONDITIONING.

"I give tough love, but I'm not a jerk. I'm not a cheerleader either."

don't remember who—and, while my thought process was not 'This will help me overcome my eating disorder,' it was . . . the impetus that got me moving in the right direction."

In college, Lee pondered ways to translate her newfound interest into a career path. She had a flair for writing, so she tried journalism and marketing. It occurred to her that she did not see many women's bylines on the fitness blogs she was reading, so she started her own—and quickly found a receptive audience.

"I was, and am, very interested in the psychology and behavioral aspects of fitness," she says.

She has racked up the credentials to prove it. Lee has a bachelor's degree in human biology with a concentration in psychosocial and biological determinants of health from Stanford and a master's degree in psychology from Arizona State. She did her graduate thesis on the psychology of eating behavior. She is also a certified sports nutritionist, through the International Society of Sports Nutrition, and a certified strength and conditioning specialist. Moreover, she is about to embark on a PhD program in strength and conditioning.

"Sohee is always learning, which is important for me as a client," says Nikki Botts, from San Diego. "I want to know that my coach is constantly trying to improve herself, just like me. It also gives her a larger database of exercises to pull from and a better understanding of how she can make alterations for programs."

Sticking to Science

Currently, Lee coaches dozens of clients—online and in person, scattered across the country—and writes prolifically for her blog and podcasts as well as other educational platforms. She is dedicated to providing the most up-to-date information available and strives to help her clients connect the dots without shame. In addition to being held in high regard by her clients, Lee gets rave reviews from her peers.

"Sohee understands physiology and how the body responds to food," says James Krieger, CEO of Weightology. He has collaborated with Lee in her research. "She's very honest and doesn't give out information that is incorrect. Her program also incorporates a lot of flexibility. There is no one right way to do

PHOTO: NATALIE MINH

something, no magical formula. Adherence is what's important. Also, with Sohee, there are no good or bad foods. It comes down to the amount you eat."

Her clients love the results and feel confident that they're sustainable because of Lee's commitment to doing it right. "Sohee is different from other coaches because she is science-oriented, [stays] on the cutting edge of industry research, and really thinks outside of the box when programming," says Botts, who came to Lee's studio with some injuries. "Sohee was able to adapt exercises so that I was still able to make progress toward my goals. I was so impressed with how she adapted exercises and was willing to meet with me to find the right lifts that didn't cause pain. Sohee is extremely responsive to her clients' needs, encouraging and adaptive. I can tell she really cares about what is best for her clients, even if it is taking a break from dieting for a bit, which scares many women."

Other clients also cite her personal warmth as a confidante. "I give tough love," Lee says, "but I'm not a jerk. I'm not a cheerleader either. I try to be a compassionate coach, gently nudging. If a coach is mean, the client doesn't feel comfortable opening up. I want my clients to feel comfortable being perfectly honest with me."

Lippa says, "Sohee doesn't scold you or [program] more cardio. You can tell her you messed up, that you've overeaten, and she will just ask you, 'What happened?' She gets to the root of it, whether it was emotional eating or some other cause, and you can be mindful for the next time you're tempted."

Marie S., in Los Angeles, was barely eating while doing 2 hours of cardio a day—without losing weight. "It is through her coaching that I went from eating 75 grams of carbs a day to about 330 g of carbs with a fraction of the exercise," she says. "I now lift three to four times a week and do 20 minutes of cardio twice a week. She taught me to let go of my fear of food and embrace strength training."

Tu says she was drawn to Lee because of her personal experience with eating disorders. "I was going through a dark time in my life for 2 years with disordered eating and body dysmorphia," she says. "It was affecting my relationships; I was pushing people away. It was nerve-wracking to send Sohee my measurements and my progress photos because I had such a bad relationship with my body. But she changed all of that. I wish I had met her sooner. My advice to other women who are in a similar situation is to reach out and get help."

Another client who has overcome bulimia with Sohee's help is Andrea Szocs, who lives in Norway. Szocs says that sometimes she feels as if Lee knows her body better than she does. "She is my coach, but she is also like a friend to me," says Szocs. "I trust her, and that is why our partnership is working so well. I think trust is fundamental in a relationship like this. I have never questioned [her programming], and [I've] made amazing progress while working with her. I have shed almost 10 kilograms of body fat, and I have become stronger and leaner."

Szocs adds that Lee also helped her shift her mindset. "It's important to me to do this right, to not get messed up mentally again when starting to register my calories," she says. "Sohee supported me all the way using her knowledge and experience. The fact that she has listened to me and paid attention to my needs and wishes makes me sometimes think of her as my fairy godmother."

Lee cherishes these testimonials.

"When it comes down to it, fitness in and of itself is not what I'm passionate about," she says. "It's you and what's inside that noggin of yours. It's what exists between me and you—this thing called a connection. A bond. I get such a high off nurturing something so intangible and watching as we help each other in some way. There's no one-size-fits-all strategy. I want to make fitness work for you, not the other way around."

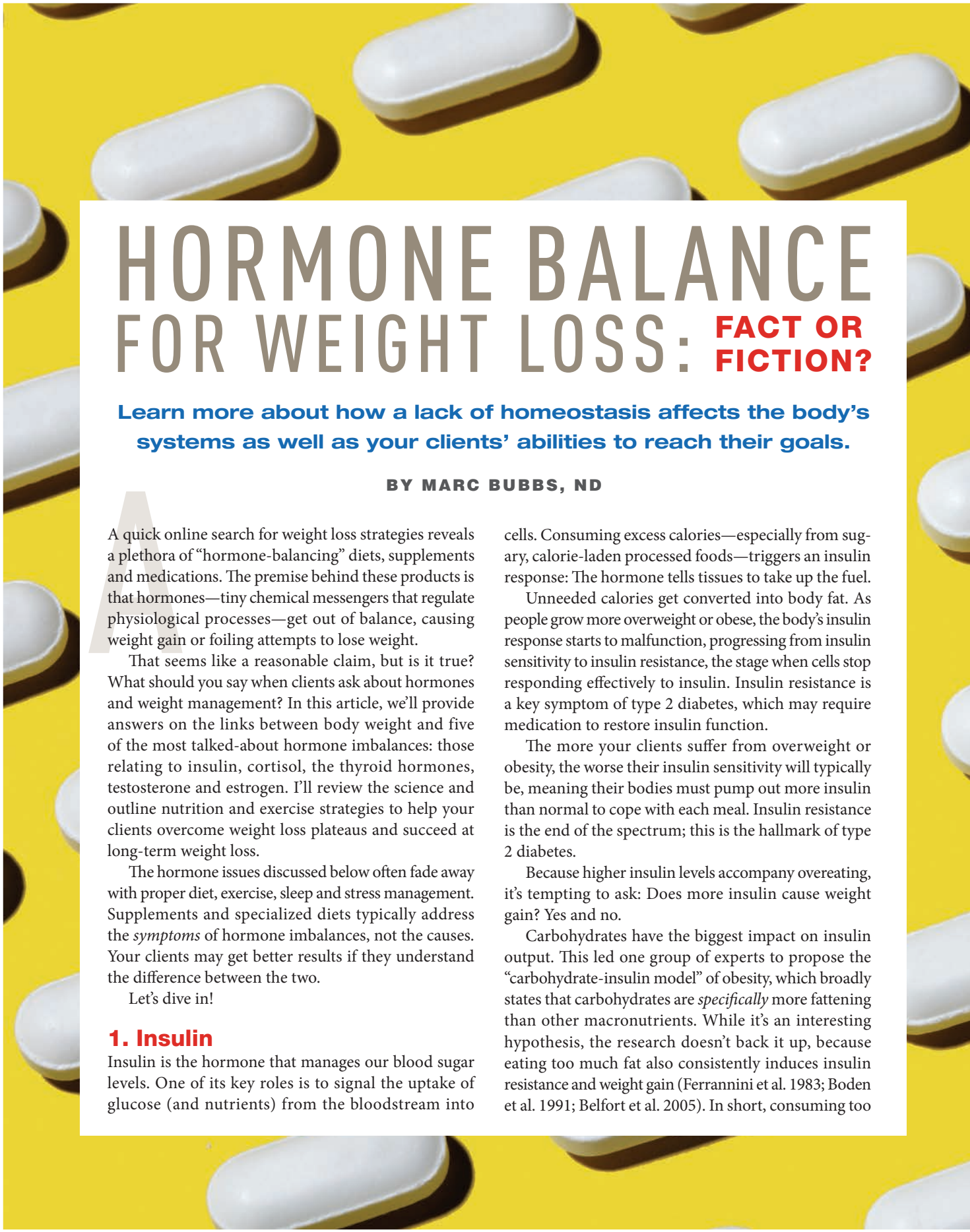
SOHEE'S TIPS FOR CLIENTS

Here are some healthy sound bites Sohee shares with her clients:

- Start first with calories and macronutrients: "Remember that 1 g protein = 4 calories, 1 g carbohydrate = 4 calories, and 1 g fat = 9 calories," she says.
- The most important macro is protein, according to Lee. "Ideally, consume some protein with every meal. As for the others, ratios differ. Go with lower carbs if you prefer higher fats and vice versa as long as you track your calories. That way it is flexible and not overwhelming."
- "You can change your body composition by managing your calories. It's not glamorous. It's not fancy. But it works. A scale helps with precision."
- "Be brutally honest and include all of your snacks. However, minimize the deprivation. If it feels easy, you're more likely to stick with it. Don't be a martyr."
- If you are dining out or traveling, "portion control is your friend."

Note: When talking with clients about nutrition, it's important to stay within your scope of practice as a fitness professional. For example, offering services such as nutritional therapy to treat chronic disease or providing nutritional counseling for eating disorders falls within the area of authority of a registered dietitian or qualified medical professional.

CANDICE DYER *is a writer based in Georgia. Her work has appeared in* Men's Journal, American Profile, Paste, Country Living, HGTV, Atlanta *magazine, and* Garden & Gun. *She is the author of* Street Singers, Soul Shakers, and Rebels With a Cause: The Music of Macon.



HORMONE BALANCE FOR WEIGHT LOSS: FACT OR FICTION?

Learn more about how a lack of homeostasis affects the body's systems as well as your clients' abilities to reach their goals.

BY MARC BUBBS, ND

A quick online search for weight loss strategies reveals a plethora of "hormone-balancing" diets, supplements and medications. The premise behind these products is that hormones—tiny chemical messengers that regulate physiological processes—get out of balance, causing weight gain or foiling attempts to lose weight.

That seems like a reasonable claim, but is it true? What should you say when clients ask about hormones and weight management? In this article, we'll provide answers on the links between body weight and five of the most talked-about hormone imbalances: those relating to insulin, cortisol, the thyroid hormones, testosterone and estrogen. I'll review the science and outline nutrition and exercise strategies to help your clients overcome weight loss plateaus and succeed at long-term weight loss.

The hormone issues discussed below often fade away with proper diet, exercise, sleep and stress management. Supplements and specialized diets typically address the *symptoms* of hormone imbalances, not the causes. Your clients may get better results if they understand the difference between the two.

Let's dive in!

1. Insulin

Insulin is the hormone that manages our blood sugar levels. One of its key roles is to signal the uptake of glucose (and nutrients) from the bloodstream into cells. Consuming excess calories—especially from sugary, calorie-laden processed foods—triggers an insulin response: The hormone tells tissues to take up the fuel.

Unneeded calories get converted into body fat. As people grow more overweight or obese, the body's insulin response starts to malfunction, progressing from insulin sensitivity to insulin resistance, the stage when cells stop responding effectively to insulin. Insulin resistance is a key symptom of type 2 diabetes, which may require medication to restore insulin function.

The more your clients suffer from overweight or obesity, the worse their insulin sensitivity will typically be, meaning their bodies must pump out more insulin than normal to cope with each meal. Insulin resistance is the end of the spectrum; this is the hallmark of type 2 diabetes.

Because higher insulin levels accompany overeating, it's tempting to ask: Does more insulin cause weight gain? Yes and no.

Carbohydrates have the biggest impact on insulin output. This led one group of experts to propose the "carbohydrate-insulin model" of obesity, which broadly states that carbohydrates are *specifically* more fattening than other macronutrients. While it's an interesting hypothesis, the research doesn't back it up, because eating too much fat also consistently induces insulin resistance and weight gain (Ferrannini et al. 1983; Boden et al. 1991; Belfort et al. 2005). In short, consuming too


FICTION
FACT

A NEAT Way to Burn Calories

Many trainers get too focused on the calories clients burn during their training session and forget about how much they move the rest of the day (Levine 2004). This other energy expenditure is called **nonexercise activity thermogenesis (NEAT),** and it actually makes up the bulk of calories *burned* in a day's activity.

If your clients are sedentary, ensuring they're getting enough *movement* during the day should be a top priority. The suggestion for 10,000 steps is a great place to start. In the short term, apps or fitness trackers can be very effective tools for showing clients how inactive they truly are.

It can take 8–12 weeks to build new movement habits. Walking to work, taking the stairs, parking as far away from an entrance as possible (where all the free spots are!), or doing a daily or nightly walk with friends or loved ones are all great ways to add more movement into the day.

many calories—from carbohydrate *or* fat—leads to weight gain. Excessive weight gain eventually leads to insulin resistance.

In fact, excess energy will endanger any cell because the extra energy ramps up reactive oxygen species and inflammation, scrambling the insulin signal and leading to insulin dysfunction or resistance. It becomes a vicious cycle: The body's ability to cope with excess energy gets worse from continuing to consume too many calories, accelerating the downward spiral that ultimately leads to type 2 diabetes and increased risk of death from all causes. Unfortunately, today's world of hyperpalatable processed foods available 24/7 makes it difficult to fight off the urge to keep snacking.

To sum up, weight gain is the most common cause of insulin dysfunction (though not all people with type 2 diabetes are overweight). Thus, when fitness clients who don't have diabetes ask you about "lowering insulin" to lose weight, the best approach is to refocus their attention on the root cause—excess body fat. That means getting back to fundamentals, reducing caloric input and/or increasing energy expenditure (see "A NEAT Way to Burn Calories," above). Of course, clients with a medical diagnosis of diabetes require guidance from a doctor and a nutrition expert.

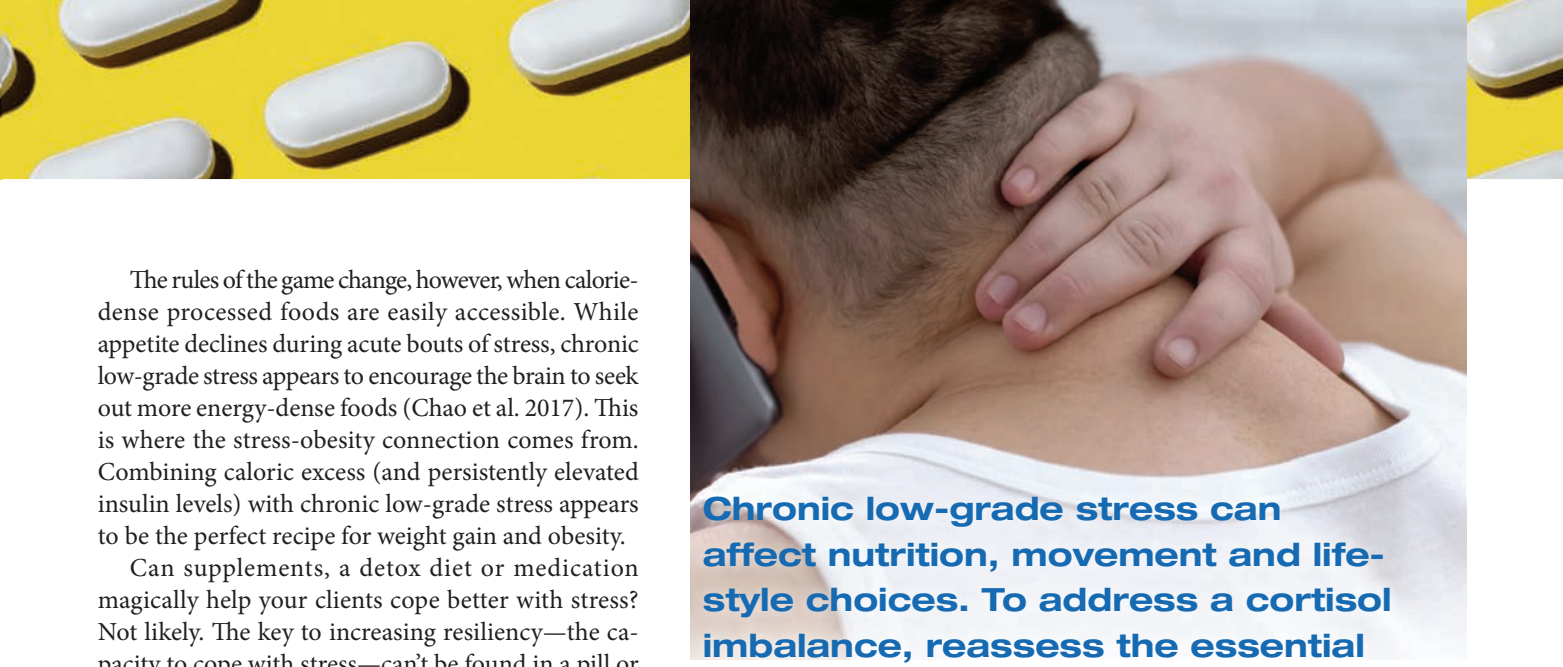
The bottom line is that insulin resistance goes hand in hand with caloric excess (Tam et al. 2010; Sims et al. 1973). Moreover, losing weight improves insulin sensitivity regardless of diet (Salans, Knittle & Hirsch 1968; Goodpaster et al. 1999). In short, to improve insulin sensitivity, your clients need a diet that provides a sufficient caloric deficit for weight loss and that they can adhere to over the long term.

When fitness clients who don't have diabetes ask about "lowering insulin" to lose weight, the best approach is to refocus their attention on the root cause—excess body fat.

2. Cortisol

One of the body's primary stress hormones, cortisol is produced in the adrenal glands, which sit atop the kidneys. When stress activates the sympathetic "fight-or-flight" nervous system, the brain signals the adrenal glands to ramp up cortisol, adrenaline and noradrenaline production. The feedback loop between the brain and the adrenal glands—called the **hypothalamus-pituitary-adrenal axis (HPA axis)**—responds to all types of life stressors, physical, mental and emotional.

Cortisol affects every cell in the body. It's a catabolic hormone by nature, breaking down proteins into their amino acid building blocks to fuel the body during stress, infection, illness, trauma and so on. Does too much stress lead to weight gain? Strictly speaking, no. If you're stranded on a desert island, surges in stress hormones like cortisol and adrenaline will increase fat breakdown as you burn fat and tap carbohydrates stored in the muscles and liver, ultimately leading to weight loss.



The rules of the game change, however, when calorie-dense processed foods are easily accessible. While appetite declines during acute bouts of stress, chronic low-grade stress appears to encourage the brain to seek out more energy-dense foods (Chao et al. 2017). This is where the stress-obesity connection comes from. Combining caloric excess (and persistently elevated insulin levels) with chronic low-grade stress appears to be the perfect recipe for weight gain and obesity.

Can supplements, a detox diet or medication magically help your clients cope better with stress? Not likely. The key to increasing resiliency—the capacity to cope with stress—can't be found in a pill or supplement bottle. You need to help clients reassess the pillars of wellness: sleep, a balanced training plan (with adequate recovery) and nutrition (see "Three Pillars of Wellness," below).

3. Thyroid

"My metabolism is broken!"

This common lament often blames weight management woes on the thyroid gland, which sets the body's metabolic rate and produces hormones that influence how we think, feel, recover and perform.

Chronic low-grade stress can affect nutrition, movement and lifestyle choices. To address a cortisol imbalance, reassess the essential components of wellness.

Declining thyroid function often invites a diagnosis of **hypothyroidism,** in which the brain fails to instruct the thyroid gland appropriately, leading to insufficient hormone production. Hypothyroid symptoms may include fatigue, weight gain, brain fog, dry hair and skin, cold intolerance, and more.

Hypothyroidism is strongly associated with weight gain. Many people struggle with symptoms of thyroid dysfunction despite "normal" blood testing, meaning

Three Pillars of Wellness

The stress hormone cortisol isn't bad—it's essential for adaptation, survival and effective responses to stress. The problem is the impact of chronic low-grade stress on nutrition, movement and lifestyle choices. To address a cortisol imbalance, reassess these essential components of wellness.

SLEEP

Few of us get enough sleep. The average American sleeps about 6.5 hours per night, below the National Sleep Foundation's recommended 7–9 hours (Hirshkowitz et al. 2015). Nighttime exposure to blue light from electronic devices further impairs sleep quality. Your clients are more likely to be "under-recovered" than overtrained. Setting a sleep schedule—consistent bedtime, regular wakeup time and dedicated hour before sleep to unplug from technology—is a great first step in increasing resiliency.

BALANCED TRAINING PLAN

You probably have "chronic cardio" clients who run the same distance day after day, week after week. Not surprisingly, they struggle with improving fitness and losing weight. The trouble is that this repetitive stimulus ("junk miles") takes a toll on the body, limiting effective recovery. Clients of this type will often crave sugars, rely on caffeine for energy, struggle with fitness and get stuck on a weight loss plateau. If you have a "chronic cardio" client, try this: Reduce aerobic training volume and provide a new stimulus by increasing intensity with either sprint interval training or high-intensity interval training. Use your expertise as a fitness professional to find the source of your client's under-recovery, and you'll see dramatic improvements.

NUTRITION

You will no doubt have conversations with clients about topics like meal frequency. While high meal frequency can be a great tool for bodybuilders and competitive athletes, the outcomes for recreational exercisers are more apt to be negative. Some people may think that increasing meal frequency will boost metabolism, thereby aiding fat loss. However, this is not what the science shows. In a research review that looked at 15 studies on meal frequency, only one found a positive association between feeding frequency and improvements in body composition and weight loss (Schoenfeld, Aragon & Kreiger 2015). Keep things simple for your clients: Removing snacking opportunities and getting back to three meals a day can be a highly effective strategy for weight loss.

The good news is, your clients probably don't have a broken thyroid gland. They need to prioritize sleep, watch their nutrition and reduce stress levels.

they don't have a clear medical condition, but they do have suboptimal thyroid output. Though clients, trainers and even doctors may blame the thyroid for weight gain, the question of hormone balance remains: Is a sluggish thyroid causing the weight gain, or is it just a symptom?

Research suggests that medications can yield modest weight loss benefits for people with hypothyroidism (Agnihothri et al. 2014). The benefits occur in those whose level of thyroid-stimulating hormone (TSH) is above 5.0, well outside the normal TSH high range of 4.0. Because higher TSH numbers signal lower thyroid output, people with 5.0-plus TSH readings may well have a "sluggish thyroid." But many people with suboptimal thyroid output are likely to be in the normal TSH range, and drug benefits may not apply to them.

What's next? In a recent interview on my podcast, Shawn Arent, director of human performance at Rutgers University, pointed to evidence in the scientific literature showing that thyroid hormones can be a very useful marker for overtraining in athletes (Arent 2018). The heavy stress and/or high volume of an intense training program can cause elevation in thyroid markers. For nonathletes, chronic life stress from too much work, too little sleep or mental/emotional challenges can yield the same results.

What does all this mean for your clients? Thyroid markers that are mildly out of balance reflect heightened stress or inadequate recovery, so clients are pushing too close to the red line. The good news is, these clients probably don't have a broken thyroid gland. They need to prioritize sleep, watch their nutrition and reduce stress levels (easier said than done, but you get the point).

From an exercise perspective, training load should be your top priority. Ensure that your program design applies proper overload and incorporates periods of training adaptation.

4. Testosterone

For many men, more testosterone means more muscle and a leaner physique, and the notion of improving testosterone levels remains front and center in many men, particularly those over 40. The blogosphere is full of anecdotes saying that boosting low testosterone—or low T—triggers fat burning and packs on lean mass. But how well do these stories of "hormone hypertrophy" hold up?

Research confirms that training the body leads to acute increases in testosterone, growth hormone and insulin-like growth factor-1. Moreover, the better the workout, the greater the hormone output. Seems like hormones trigger hypertrophy, right? Not quite.

Reminding us again that correlation is not causation, Brad Schoenfeld, director of the human performance laboratory at Lehman College in New York, notes that in his research lean muscle gains (highly beneficial for weight loss) occurred *without* the presence of these hormones (Schoenfeld 2013). Thus, the hormone hypertrophy hypothesis has been challenged.

Expert Eric Helms highlights how professional bodybuilders peaking for competition—at the height of their leanness and impressive physiques—all have minuscule testosterone levels (Helms 2018). Helms emphasizes that caloric restriction, in and of itself, is the biggest signal contributing to low levels of free testosterone (i.e., testosterone that is not bound to proteins in the blood). In fact, the prolonged and sustained caloric deficits required to be an elite bodybuilder mean it takes a pro 2–3 months for testosterone levels to return to normal.

A properly designed resistance training plan can prevent a profound drop in testosterone from too much volume, too much intensity or both.

What does this mean for the recreational client looking to burn fat and build muscle? Artificially boosting testosterone is not the answer. Instead, look at root causes of low testosterone. For clients carrying too much belly fat, losing weight should be the top priority. Belly fat is proinflammatory. Chronic inflammation can worsen blood glucose control and exacerbate weight gain. Abdominal adiposity also increases the activity of a hormone called **aromatase,** which helps convert testosterone into estrogen, further reducing testosterone levels.

What if your client doesn't need to lose weight but still struggles with low testosterone? Once you've ensured that the client is eating enough, the next area to address is sleep—the second-most-likely cause of low testosterone, according to research. One study showed that healthy young men (average age 24.3) who got only 5 hours of sleep per night for 1 week saw their testosterone levels drop by 10%–15% (Leproult & Van Cauter 2011). Sleep *quality* is also a factor. (Sleep apnea, a disorder characterized by pauses in breathing or periods of shallow breathing during sleep, compromises sleep quality.) A recent study by the University of Miami linked poor sleep quality to lower testosterone levels and found that for every hour of sleep loss (under 7 hours), men could expect a drop in testosterone (Patel et al. 2018).

Re-examining a client's training plan is crucial to restoring testosterone levels. A poorly periodized plan can quickly lead to inadequate recovery, overtraining and low testosterone levels. Elite and high-level athletes often see such effects when intense training pushes them into the overtraining zone. For the fitness enthusiast or weekend warrior, too much aerobic exercise, too many HIIT sessions and excessive volumes of training in the gym can all lead to inadequate recovery and low testosterone. A properly designed resistance training plan can prevent the profound drop in testosterone that may occur from too much volume, too much intensity or both.

5. Estrogen

Social media is awash with claims that too much estrogen causes hormone imbalances and weight gain, particularly in women. Research suggests otherwise. The worldwide obesity epidemic exploded only in the last 40 years. Why did this "estrogen-dominant" phenotype not cause obesity in the previous 200,000 years of human history? Yes, adults with overweight or obesity often have higher estrogen levels than their slimmer peers—but estrogen isn't *causing* the weight gain.

A quick review: Weight gain reflects the accumulation of fat cells that are highly proinflammatory. That disturbs blood glucose and insulin function, contributing to a downward spiral of poor regulation of insulin and cortisol while estrogen levels move higher. Once again, weight gain *causes* this hormonal disruption—not vice versa.

Since the "estrogen causes weight gain" claim is most often targeted to women, let's look at exercise solutions with women in mind. Often, hourglass or pear-shaped body types do really well when training with heavier weights (e.g., powerlifting or strongman-type training). The most difficult task may be shifting the client's mindset around training. Many women

still fear heavy weights. The mental roadblock of "light weights and cardio" still persists, despite major progress in the fitness community—such as the growth of CrossFit® and, subsequently, the re-emergence of powerlifting—in the last decade. Aim to get your clients to lift heavier loads at lower rep ranges (always with good form). This will ramp up lean muscle gains, increasing metabolic rate and supporting long-term weight loss. The new mantra "strong is the new skinny" seems quite apt in this scenario.

Address the Cause, Not the Symptoms

When your clients ask you about hormones and weight loss, help them understand the difference between symptoms and causes.

Many hormone imbalances are symptoms of weight gain, which triggers proinflammatory responses that affect the body's output of insulin, cortisol, the thyroid hormones, estrogen, testosterone and many other hormones. To lose weight, your clients don't need to balance their hormones with fancy supplements, detox diets or medication. They can achieve success by adopting an integrated wellness plan and addressing lifestyle factors such as lack of sleep and chronic stress. At the end of the day, compliance is king. Ultimately, as clients move along in their weight loss journey, finding a fitness strategy they can maintain over the long term is the key.

Adults with overweight or obesity often have higher estrogen levels than their slimmer peers—but estrogen isn't causing the weight gain.

MARC BUBBS, ND, CISSN, CSCS, *is a naturopathic doctor, a performance nutritionist for the Canadian men's national basketball team, a speaker and the author of* Peak: The New Science of Athletic Performance That Is Revolutionizing Sports *(Chelsea Green 2019). He hosts the* Dr. Bubbs Performance Podcast *and regularly presents at health, fitness and medical conferences across North America, the U.K. and Europe. Find out more at DrBubbs.com.*

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Off to a Great Start: Phase 1 and the New (Novice) Client

FIRST SESSION FOR YOU BOTH? DETAILED PLANNING CAN CALM YOUR CLIENT'S NERVES AND YOUR OWN. HERE'S HOW TO ROLL OUT THE WELCOME MAT USING THE NASM OPT™ MODEL.

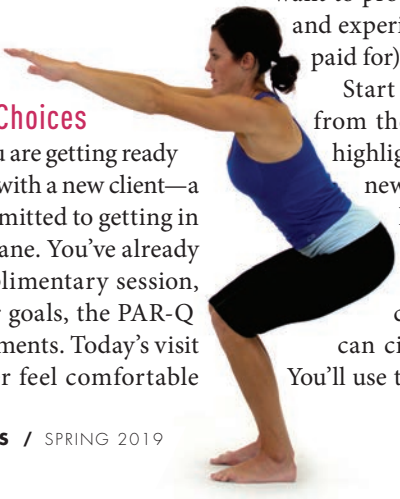
BY RICK RICHEY, DHSC, MS

I was sweating profusely before I trained my first client, and it wasn't from a workout. I was a nervous wreck, continually second-guessing what I was supposed to do. Would I be worth the money? Would I be able to train the client the "right" way? These questions led me to write this article to help new personal trainers better understand what to do during their first training session with a client—in this case, a brand-new exerciser.

Fortunately, the NASM Optimum Performance Training™ model was designed so fitness professionals wouldn't have to struggle with these questions. Most clients, especially those new to training, will start in Phase 1: Stabilization Endurance. As you plan for a client's first "real" session, review the details that follow so you'll be sure to start off on the right foot.

Use Assessments to Guide Exercise Choices

Let's set the scene: You are getting ready for a training session with a new client—a novice exerciser committed to getting in shape. Let's call her Jane. You've already met Jane for a complimentary session, where you went over goals, the PAR-Q and a series of assessments. Today's visit means you made her feel comfortable enough to purchase a package of training sessions. That's a good start; however, what comes next is vital to maintaining and building on this early rapport. You want to provide Jane with the results and experience she expects (and has paid for).



Start by reviewing your notes from the initial assessments and highlight the exercises that your new client enjoys the most (or hates the least!). Select one as her anchoring exercise—a movement she is already comfortable with that you can circle back to at intervals. You'll use this move to challenge her,

keep her motivated or just boost morale after a tough set.

Hopefully, Jane can perform this anchoring exercise with proper form and range of motion. If not, don't make a big deal of it; offer a variation that allows her to be successful. She likes this exercise, so don't ruin it for her—especially on day one!

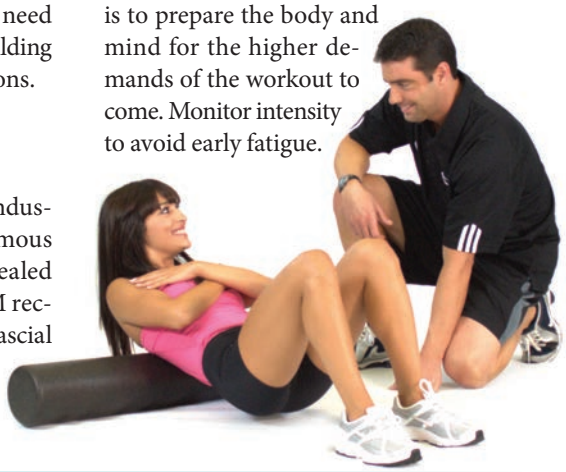
As you select the rest of the session exercises, consider the compensations you identified during assessments, and pick the most notable issues to work on (just one or two). You cannot fix all of them today, so don't try to. Attend to those that need the most attention and you will be building a strong foundation for future sessions.

You cannot fix all of a client's issues today, so don't try to. Attend to those that need the most attention and you will be building a strong foundation for future sessions.

Set the Stage With Movement Preparation

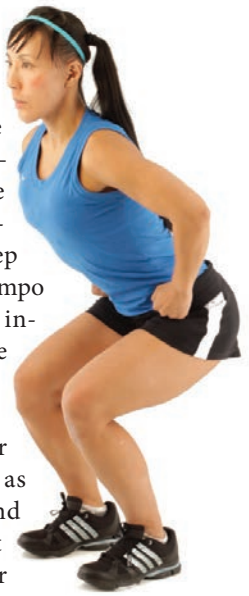
Movement preparation is a fitness industry phrase that has become synonymous with "warmup." If assessments revealed musculoskeletal imbalances, NASM recommends first performing self-myofascial release (such as foam rolling) on tight or overactive muscles. You can follow this with various forms of stretching, mobility and activation drills, as well as core, balance and plyometric exercises. You can even include a short bout of cardio in the warmup any time after the initial SMR.

Keep in mind that, for new clients, the warmup may be about a third of the session. This depends on their current fitness level and what you saw in the assessments. A 20-minute warmup in an hourlong session can seem like a lot of time, so keep it interesting and challenging. It should still feel like a workout. The point, however, is to prepare the body and mind for the higher demands of the workout to come. Monitor intensity to avoid early fatigue.



Review the Acute Variables

The NASM OPT model lays out variables for each phase and goal. Acute variable ranges for Phase 1: Stabilization Endurance are listed in the chart below. The following tips offer additional insights for programming resistance training for new clients:



SETS

Start slowly. One set per body section may be enough of a challenge for the first few sessions—some clients may get sore legs after doing 15 bodyweight squats. Also keep in mind that the slow tempo used in this phase can increase delayed-onset muscle soreness because of the focus on eccentric action (deceleration). Consider this possibility, as well as the client's comfort and performance in the first set, when deciding whether to do a second or third set.

REPS

Twelve to 20 reps may sound like a high number, but for endurance and stability goals this is an excellent range. Phase 1 targets type I muscle fibers, which are physiologically designed for endurance and stability. As new clients approach the final repetitions, there will likely be enough time under tension for them to start reaching volitional or momentary muscular fatigue.

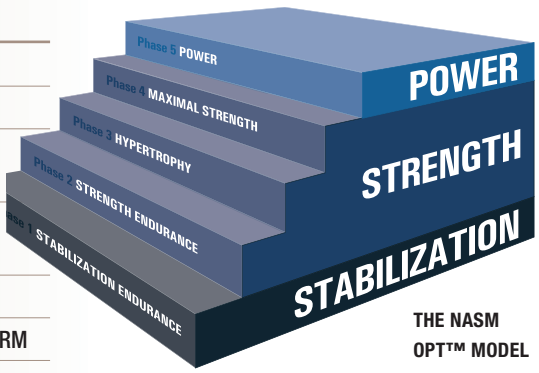
Phase 1: Stabilization Endurance

Note: The rest interval between sets is 0–90 seconds.
Tempo refers to eccentric/isometric/concentric contraction.

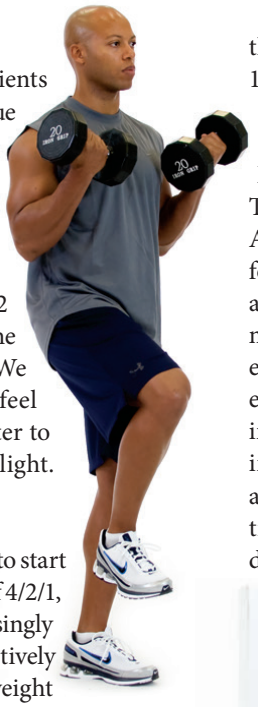
	REPS	SETS	TEMPO	INTENSITY
Flexibility*	1	1–3	30-second hold	n/a
Core	12–20	1–4	slow 4/2/1	n/a
Balance	12–20 (2 legs) 6–10 (1 leg)	1–3	slow 4/2/1	n/a
Plyometrics	5–8	1–3	3–5 seconds; hold on the landing	n/a
SAQ**	2–3	1–2	moderate	n/a
Resistance	12–20	1–3	4/2/1	50%–70% of 1RM

*SMR and static. **Speed, agility and quickness.

Source: *NASM Essentials of Personal Fitness Training* (6th ed.), 2018, p. 370.



THE NASM OPT™ MODEL



LOAD

The goal is to have clients reach the point of fatigue by the end of the set, so if Jane stops at 20 reps but could have completed 30, the weight was too light. If she cannot get to 12 reps without fatigue, the weight was too heavy. We want new clients to feel successful, so it's better to err on the side of too light.

TEMPO

Here's another reason to start light: A tempo range of 4/2/1, or even 3/2/1, is surprisingly slow and can be deceptively difficult. The lighter weight will be easier to lift and control, and the slower tempo will make it easier for you to cue and focus on technique.

The NASM OPT model is the science behind fitness programming, but there is also an art to applying the "personal" portion to personal training . . . so let your personality show, and keep being you!

INTENSITY

The range of intensity in this phase is 50%–70% of 1RM. Fortunately, calculating intensity is essentially built into the NASM OPT model's programming because the upper 1RM number corresponds with the lower rep number.

For example, if a client fatigues on the 12th repetition, you can assume that's approximately 70% of 1RM. So, if the client can do 12 squats with 100 pounds (70% of 1RM), the 1RM will be about 143 pounds (because 100 pounds ÷ 70% = ~143 pounds). If the client doesn't fatigue until the 20th repetition of 100-pound squats, that's likely around 50% of 1RM, so the 1RM would be about 200 pounds.

Evaluate the Equipment Options

Body weight, machines or free weights? The answer is probably yes to all three. All are great when used appropriately for clients, based on their goals, needs, abilities and safety. Keep in mind that many people are uncomfortable when first entering a gym environment, so selecting equipment that is familiar (or at least not intimidating) is key. Avoid automatically introducing clients to the same exercises and equipment that you use in your own training; learn more about each client and deliver what he or she needs.

STRENGTH TRAINING MACHINES provide stability while developing fundamental endurance and strength. For clients who lack stability or have functional limitations, a fixed-motion machine may be the safest place to start. Many trainers balk at using machines because of the fixed plane of motion. Personally, I don't care to use them, but that doesn't mean my (or your) clients won't like them or benefit from them. These machines can increase a client's level of comfort and confidence, which should never be underestimated or devalued.

BODY-WEIGHT EXERCISES, such as pushups, situps and squats, will probably be familiar to new clients. These moves can improve a client's kinesthetic awareness and provide a foundation for progressing.

FREE WEIGHTS can offer an effective stabilization challenge, depending on the client's readiness and technique. Note that free weights may also initially be difficult or intimidating for some clients to use. You can always introduce these items later.

How Hard Should I Push New Clients?

This is an interesting question and worthy of attention. How far clients are willing to be pushed is on a spectrum, as is how hard they perceive they're being pushed. Even people with exactly the same strength levels can perceive intensity differently.

Using the rating of perceived exertion scale is ideal for receiving feedback from clients in real time. Ask them how they feel, on a scale of 1–10 (see chart), with 1 being "sitting on the couch watching Netflix" and 10 being "struggling through an unbearably difficult exercise."

THE 1–10 RPE SCALE

Rating	Description
1	Really easy
2	Fairly light
3	Moderate
4	Somewhat hard
5	Hard
6	Hard
7	Very hard
8	Very hard
9	Very hard
10	Very, very hard (maximal)

If clients give you a number somewhere in the middle, request that they increase intensity. If they are at an 8 or higher, make sure they are absolutely okay with that level, and adjust appropriately. Always start slowly, especially with new clients. You want to be very aware of their current level of fitness and ease them into elevated training intensities. Soreness should not be a goal, and pushing too hard too soon can lead to client attrition (falloff or loss). Make sure new clients don't push too hard simply to please *you.*

Be Flexible With Your Programming

Maybe you spend a lot of time developing Jane's program. Yet, when it's time for her session, you find that it doesn't or cannot go to plan. For instance, the equipment you

expected to use is occupied, out of order, missing, drenched in sweat or otherwise unusable. A real-life example: A trainer at my NYC facility pulled out the battle rope for client drills during peak hours. When he noticed my eyes drilling holes in his soul, he asked if it was too busy (yes!). He looked stunned and did not know what to do next because he had no Plan B. As the saying goes: Don't be that guy.

As a trainer, you need to have situational awareness to keep everyone safe. Situational awareness is the perception of your environment and activity with respect to space and time, an understanding of why it's important, and an ability to decide how best to react to given circumstances.

Have a clear understanding of your client's needs, your own needs, and the positions and actions of those around you. Consider environment, space, exercises and timing. Be acutely aware of other people using equipment that you planned to use, so that you can adjust course if necessary. Fortunately, when you use the NASM OPT model, changing exercises or equipment on the fly can be relatively simple, since there are numerous options.

It Ain't Over, Even When It's Over

When the first session is over, it ain't over! Schedule a follow-up message (text, email or phone call) to check in with your client the next day. It's a simple and effortless task, but it can mean so much. People like knowing you care and are willing to attend to them beyond the time slot they paid for. This speaks directly to the value you bring to their training experience because you are doing more than trading dollars for minutes. In fact, it's one of the best ways to minimize client attrition, so don't limit it to new clients!

Be sure to ask for feedback about intensity, fatigue, soreness, likes/dislikes, etc. This can help you determine whether to scale back or uptick the exercise variables or switch up moves or equipment choices in the next session.

Get Ready for Session Number Two!

Your first session may go great, or it may not. Working with a new client is a learning process for both trainer and client, and your working relationship will continue to develop over time.

The NASM OPT model is the science behind the programming, but there is also an art to applying the "personal" portion to personal training. Remember that new clients signed on because they felt comfortable with you, so let your personality show, and keep being you! You have the tools and skills to give all of your clients a great personal training experience and your undivided attention. So go get 'em!

RICK RICHEY, DHSC, MS, LMT, NASM-CPT, CES, PES, *is a fitness industry educator and owner of ReCOVER and Independent Training Spot in New York City. He has trained numerous high-profile and traditional clients and recently completed his DHSc at California University of Pennsylvania.*

Cues: Choose Your Words Wisely

When my children were developing their walking and running skills, I was not waiting in the wings to critique their mechanics or cue a glute squeeze. Like kids learning a new skill, beginner clients need room to learn, develop and practice. We should strive for structural and neuromuscular efficiency, not perfection, and if clients get stronger and faster in the process, that's icing on the cake. Here are a few more things to keep in mind about your cues:

FOCUS ON PROGRESS, NOT PERFECTION

Your more seasoned clients may not be fond of "attaboy" feedback, but research in motor learning shows that beginner clients do better with encouragement and support. So be sure to give positive commentary, take notice of how clients respond and adjust your level of cheering accordingly.

BE CLEAR AND DIRECT

Take the time to provide clear, direct instructions on which muscles are working and should be felt during a movement. The Tell-Show-Do approach is an excellent start. *Tell* clients what they are going to be doing and why. *Show* them the exercise you want them to perform. Then have them *do* the exercise. It seems simple because it *is* simple. This is probably why it is overlooked.

BE HANDS-OFF WHEN POSSIBLE

Cuing during exercise is often discussed in auditory, visual and kinesthetic terms. Auditory and visual feedback should *always* be your first line of correction and cuing. Saying "Your head is jutting forward, so retract the head" is *always* better than pulling a ponytail back to align the head!

ASK BEFORE TACTILE CUING

Touching can lead to uncomfortable situations; it may also be perceived as inappropriate by either a client or an observer—with potentially serious consequences. The best option is, therefore, not to touch. However, if tactile cuing is indicated, *always* ask permission first, explain what you want to do and tell clients how it will help. Ask them to please let you know if anything makes them uncomfortable, as that is not your intention.

Pilates Mat Essentials

THESE CORE PRINCIPLES AND BASE PILATES MOVES PROVIDE MIND-BODY BENEFITS TO PARTICIPANTS IN ANY GROUP EXERCISE MODALITY.

BY PORTIA PAGE

The great thing about the Pilates method is that it adds a mindful approach to exercise. At its core (pun intended!) are simple, foundational movements that are used in some form or another in almost all fitness classes. You probably already use some of them in your programming. By taking a deeper dive into the specifics of some common Pilates moves, you can offer your group participants additional variety and greater benefits.

Pilates Principles and Progressions

Pilates connects mind and body as one. It uses the body's strength, flexibility and coordination to maximum advantage and requires paying attention to the body throughout each movement.

To deepen the mind-body connection, practitioners rely on six Pilates principles—breathing, concentration, control, centering, precision and flowing movement (rhythm). Using these same principles, we will look at three core movements: the **hundred,** the **teaser** and the **pushup.** Each of these exercises teaches participants a particular movement or movement pattern that becomes a base for more challenging movements. Here, you'll learn the purpose, or focus, of each move and when is the safest, most effective time to include it in a workout. You'll also learn how to prepare for and perform the base movement—and how to incorporate modifications, challenges and variations. The variations sections will explain how to adapt the exercises or progress them into other movements. This will allow you to add variety and/or to match a class to the skill level of the instructor and participants.

INTRODUCE PARTICIPANTS TO A FORMAT THAT MIGHT BE NEW TO THEM BY ADDING BASIC PILATES MOVES.

The Pilates Hundred

This is basically an abdominal curl with arm movements. It can be made simpler or harder just by changing a lever length or varying the arm patterns.

PURPOSE: The basic movement teaches participants how to lift the head without straining the neck. The arm movements encourage circulation and breath while warming the core muscles for harder work ahead. When done with the legs extended, the hundred provides a challenging way to work on overall core strength and coordination. The move can be modified for a variety of levels.

PLACEMENT: The hundred can be used at any point in the workout; however, it was meant to be the first exercise in a Pilates mat workout, so the warmup is a perfect place to introduce this movement.

PREP

- Lie supine with knees bent, feet flat on floor, hands under head, and elbows bent and lifted off floor (in peripheral vision).
- Inhale: Push head into hands and bring chin toward throat (lengthening back of neck).
- Exhale: Lift head, neck and shoulders off mat while keeping light pressure of head pressing into hands. Lift upper body high enough so that neck doesn't strain and gaze is between thighs or at top of knees.
- Inhale: Reach arms to ceiling.
- Exhale: Lower arms to hover beside hips, just above floor, keeping upper body curled up.
- Return to starting position (supine, knees bent, feet flat, hands under head).
- Repeat 4–6 times.

BASE MOVE

- Lie supine with legs straight on floor, arms beside hips, palms down.
- Inhale: Reach arms to ceiling.
- Exhale: Lower arms (palms down) to hover just above floor, beside hips, while lifting legs and upper body off floor.
- Lift upper body high enough to look toward toes, and lift legs high enough to be able to maintain neutral lower back or imprint position. (In imprint position, lower back is pressed flat against floor while navel is drawn in toward spine. Either way, be sure back does not arch.)
- Pump arms up and down in 2- to 4-inch range while inhaling for count of 5 and exhaling for count of 5.
- Repeat 10 times (100 counts—which explains why the move got its name!).

MODIFICATIONS

- Lie supine with knees bent, feet flat on floor. Follow arm movements as described for base move, but do not lift feet.
- Do hundred with legs in tabletop position (legs bent at 90-degree angle, knees over hips, shins parallel to floor) or with legs extended straight up (knees slightly bent if hamstrings are tight).

CHALLENGES

- Change arm pattern by turning pinky side of hand down, and instead of pressing up and down, press in and out toward hips.
- Add leg movements: Include small beating motion with legs (or walk legs up and down) to add coordination/intensity challenge.

VARIATIONS

- To vary starting position, try standing. Take out upper-body curl and instead focus on arms staying strong and straight as they move forward and back in shoulder flexion and extension by sides of hips. The longer lever of the standing body adds challenge.
- Perform this same pattern in high kneeling position (both knees on floor, upper body vertical, not bent at hips) or seated on chair (arm angle will change).

"Practice your exercises diligently with the fixed and unalterable determination that you will permit nothing else to sway you from keeping faith with yourself."

—Joseph H. Pilates

Practice for Pilates Programming

If the versatility of the Pilates moves in this article has piqued your interest, maybe it's time to earn some CEUs and strengthen your core knowledge of mat science. Here are two AFAA courses that can help you stretch yourself (and your members).

PRACTICAL PILATES

In this online program, you will learn 28 mat exercises that focus on conditioning the body. Learn the importance of core stabilization, muscle balance, proper alignment, strength and flexibility while integrating the concepts of mindfulness, fluidity and grace. To find out more, visit afaa.com/courses/practical-pilates.

BEYOND MAT SCIENCE (YOGA AND PILATES)

This course offers a fusion of Pilates and yoga, merging their exercises, breathing techniques and flow sequences and providing a balance between standing and floor work. It will help instructors learn to take the creative ideas in this article to the next level. This program supplies sequences for all levels of fitness, and each sequence includes cardiorespiratory, strength and flexibility training. To find out more, visit afaa.com/courses/beyond-mat-science.

These options are a great way to warm up and teach trunk stability.

The Pilates Teaser

The teaser occurs in all forms of Pilates and can be done on every piece of Pilates equipment. The base movement incorporates rolling along the spine while balancing in a seated position. It requires coordination, core strength and rhythm to master the timing and the shape at the "top" of the movement.

PURPOSE: This movement teaches spinal articulation, strengthens the abdominals and hip flexors, and develops coordination and balance.

PLACEMENT: The teaser works really well in the middle of a workout since the exercise requires students to be well-prepared in both spinal movement and core strength. With preps and modifications, though, the move can work well at any stage of a class.

PREP

- Lie supine, legs in tabletop, arms reaching to ceiling.
- Inhale: Lift upper body and reach hands to lightly hold backs of thighs.
- Exhale: Continue to roll up to modified seated V-position (place hands on backs of thighs to help with lift, if needed).
- Inhale: Pull legs closer to chest while lifting chest as spine lengthens.
- Exhale: Release hands and straighten arms with palms down while maintaining balance between sit bones (ischial tuberosities) and sacrum.
- Inhale: Reach hands to backs of thighs (for balance).
- Exhale: Roll back down to starting position.
- Repeat 4–6 times.

BASE MOVE

- Lie supine with legs in tabletop, arms reaching overhead.
- Inhale: Lift arms toward ceiling and slowly roll up head, neck and shoulders off mat as legs straighten.
- Exhale: Continue to roll up, reaching arms forward and extending legs to 45-degree angle above mat. Find seated V-position and balance at top of move.
- Inhale: Roll spine down toward floor, keeping arms reaching forward, legs long.
- Exhale: Continue roll-down to supine position, keeping legs at 45 degrees.
- Repeat 8–10 times.

MODIFICATION

If the lift in the base move proves to be too challenging, place the hands on the backs of the thighs to assist with the lifting and lowering portions, like this:

- Lie supine with knees bent, feet flat on floor, arms reaching to ceiling.
- Inhale: Lower arms toward thighs and roll upper body up.
- Exhale: Continue to roll up to seated V-position (hands on backs of thighs to help, if needed).
- Inhale: Lift chest and straighten spine (release arms to reach forward if they were behind thighs).

- Exhale: Lift feet off floor to come to V-position balance.
- Inhale: Lower feet back to floor (and reach hands to backs of thighs, if needed).
- Exhale: Roll down and back to starting position.
- Repeat 4–6 times.

CHALLENGE

- From seated V-position balance at top of base move, lower and lift legs 2–4 times while keeping upper body in same position.

VARIATION

- Perform base move one time, but on roll-down from V-position, reach arms overhead and synchronize lowering of legs to floor with lowering of upper body. Come to full supine position with arms overhead and legs stretched long and straight.
- From here, anchor legs and lift arms toward ceiling as upper body curls up and off floor. Continue with full roll-up to seated position, arms reaching forward over thighs/floor.
- Roll back down, then roll up again, keeping legs straight and arms overhead, into V-position balance.
- Repeat 2–4 times.

The Pilates Pushup

The pushup is seen in many different forms of exercise (yoga, for one), as well as in most fitness classes and programs. The reason? It's a perfect exercise to work the entire body and can be regressed and progressed for all levels.

PURPOSE: The pushup strengthens the entire body, with a focus on building upper-body strength and balance, as well as core strength and integrity.

PLACEMENT: Like the other two exercises, this movement can be done just about anywhere in the workout, especially if you start with the prep and then progress the move through modifications. To build up to the intensity and strength needed to perform the pushup with its full expression, however, the move works best as a finale (near or at the end of a workout). By placing it at the end, you can ensure that participants build the necessary skills throughout the workout to feel safe and confident in doing this exercise.

PREP

- Start in all-fours position, knees under hips and arms beneath shoulders. Spine is neutral, and belly is drawn up and in toward spine.
- Sternum drop (scapular) pushup: With straight elbows, retract scapulae by dropping chest and then protract by

The teaser works really well in the middle of a workout since the exercise requires students to be well-prepared in both spinal movement and core strength.

lifting upward and pushing floor away. Lower back remains neutral throughout movement. Repeat 4–8 times.

- Arm walking: Pick up right hand by bending elbow toward ribs to bring right hand toward right armpit. Place right hand back down and repeat, left. Repeat 4–6 sets.

The goal is to warm the wrists, build core control and support, and work on balance.

BASE MOVE

- Stand with feet together, firmly pressing into floor, arms reaching to ceiling, eyes on the horizon.
- Inhale: Bring chin toward chest. Roll down one vertebra at a time, reaching arms toward mat.
- Exhale: Lower onto palms and walk hands out in front of body until you are in high-plank position. (Balance on palms and balls of feet, with wrist stacked below shoulder on each side, legs long and straight, trunk in line from head to heels. Keep abs and glutes tight.)
- Inhale: Bend elbows, keeping them close to rib cage, while bringing chest to elbow height; maintain long line from head to heels.
- Exhale: Straighten arms, pressing body away from floor in one long line.
- Repeat pushup movement (elbows bend/straighten) 4–10 times.
- Walk hands back to feet and roll up to standing position.

MODIFICATIONS

- On roll-down from standing, bend knees as much as needed as hands reach for mat. From high-plank position, lower knees to floor and do pushup move with knees down. Hips will remain extended (not hinged) with chest centered between hands as elbows bend and straighten.
- Alternatively, roll down to all-fours position (hands and knees) and bend and straighten elbows in this position. For an easier option, bend elbows toward thighs (i.e., weight shifts back toward heels). For more challenge, let weight shift forward, keeping hips over heels as elbows bend and straighten.

CHALLENGE

- From high-plank position, lift right leg to hip height and pulse that leg upward while pressing back into heel of left foot on floor; breathe in sniffing pattern throughout.

- Exhale: Lower raised leg and lift the other leg. Repeat, other leg.

VARIATION

- Choose a modified position (on knees or on all fours).
- From high-plank position, walk elbows under shoulders or toward floor and back up to hands, moving from high plank to "hover" (forearm plank) and back to high plank.

Challenge and Variety

Introducing Pilates moves into your classes helps attendees cross-train and reach their goals faster. It also infuses new energy into your programming. Never hesitate to expand your mind and teaching skills so that you're current with exercise research and can confidently share your knowledge with others.

PORTIA PAGE *has been in the fitness industry for more than 27 years as a teacher, program and fitness director, international presenter, and writer. She is the education program liaison for Balanced Body® and the author of* Pilates Illustrated. *She has a bachelor's degree in cognitive science and is PMA-, ACE- and AFAA-certified.*

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BY ALEXANDRA WILLIAMS, MA

Nutrition [FOOD NEWS & FACTS]

Chrononutrition: You Are *When* You Eat

Early to bed and early to rise? This sleep pattern may not make you wealthy or wise (as the saying goes), but it does seem to be linked to better health. Early risers not only have healthier eating patterns, but they also show a lower risk of heart disease and type 2 diabetes than night owls, according to an international meta-analysis of chronotypes. (Chronotype refers to a person's most energetic period of the day, with "early birds" having a "morning chronotype.")

As reported in *Advances in Nutrition,* night owls have more erratic eating patterns and consume more sugars, fat, alcohol, caffeinated drinks, energy drinks, wine, chocolate, fast food and total calories than their early-bird counterparts (2018; 0, 1–13). On the other hand, morning chronotypes are more apt to observe regular mealtimes; eat breakfast more consistently; and consume more fruits, vegetables and grains.

Night owls also tend to eat later in the day, which negatively affects blood glucose levels. The research review linked this habit to a higher rate of chronic disease, especially type 2 diabetes and heart disease. In addition, one study showed that the evening chronotype is associated with higher levels of smoking and physical inactivity, while early risers tend to have higher energy levels and spend more time engaged in moderate-to-vigorous physical activity.

The reviewers noted a research gap with respect to the association between chronotype and chrononutrition (the timing, regularity and frequency of eating) and cardiometabolic health. They also reported that, despite their broad literature review, they could not determine causation: It was not possible to say whether changing behavioral chronotype (or bedtime) would alter eating habits or physical condition. Still, for fitness professionals, it may be helpful to keep in mind these correlations when working with clients of varying chronotypes.

Fortunately, you don't need to wait for more research before you can put the idea of chrononutrition to use. In the new book *What to Eat When: A Strategic Plan to Improve Your Health & Life Through Food* (National Geographic 2018), Michael F. Roizen, MD, and Mike Crupain, MD, MPH, share some surprising tips that may shake up the way you think about mealtimes.

Co-author Roizen offers this simple suggestion, for starters: "If you only eat when the sun is out, and eat 75% of your calories before 7 p.m., you are hacking your metabolism to maximize your health and weight loss. That is using your circadian rhythm to gain the health benefits of intermittent fasting without the pain or unusual [food] choices. And it is a lifestyle you can live with forever. Food is a relationship, like a marriage—it is two ways."

Get Your Antioxidants While They're Hot

Hot *brewed,* that is. Two (possibly caffeinated) researchers published a study that showed differences between hot and cold brew coffee; specifically, that the hot cuppa joe had higher levels of antioxidants.

Niny Rao, PhD, and Megan Fuller, PhD, two chemistry professors from Thomas Jefferson University in Philadelphia, set out to discover whether coffee's chemical makeup differed between the two types of brewing methods. While the acidity levels were found to be similar in both cold and hot brew coffees (pH levels ranged from 4.85 to 5.13 using six different pre-ground light and medium roasts), the hot brew had more total titratable acids (linked to bitterness) and higher antioxidant levels, while the cold-brewed coffee seemed to be less "chemically diverse."

In the discussion and conclusion of the study, published in *Scientific Reports,* Rao and Fuller note that while cold brews may remain preferable to people with gastrointestinal problems (due to their lower acidity), hot water "must extract additional bioactive compounds" from coffee, even when the same beans are used (2018; 8 [1]). For people looking for maximum antioxidant kick in a cold beverage, pouring a hot latte over ice might be the perfect solution.

REGARDLESS OF DIET, THE ENDGAME IS THE SAME

The German Cancer Research Center recently finished the largest investigation on intermittent fasting to date. The study, reported in *The American Journal of Clinical Nutrition* (2018; 108 [5]), examined 150 people with overweight or obesity (aged 35–65). Participants were divided into three groups—intermittent fasting, calorie restriction and a control group. The IF group cut calories by 75% 2 days per week, while the conventional dieters restricted calories by 20% all week long. At the end of both the initial intervention year and a 2-year follow-up, weight loss between the two dieting groups was not significantly different.

In a November 2018 interview with *ScienceDaily,* Tilman Kühn, lead scientist of the study, noted that what really matters is stick-to-it-iveness. ". . . for some people, it seems to be easier to be very disciplined on two days instead of counting calories and limiting food every day," he said. "But in order to keep the new body weight, people must also permanently switch to a balanced diet."

LET'S STUDY OUR FOOD. LITERALLY.

Molecule by molecule, Siddhartha Mukherjee, MD, DPhil, wants us to rethink our diets as a form of molecular therapy that can treat particular diseases. To do that, though, we must begin to give as much research attention to food molecules as we do to those in pharmaceuticals.

"Unlike most medicines, whose effects we sift, measure and scrutinize, often using the most rigorous clinical trials, human diets—the other set of molecules we put into our bodies—have gone relatively unexamined," he wrote in his December 2018 "On Medicine" column for *The New York Times Magazine.*

The thought came to this assistant professor of medicine at Columbia University when he was taking a postsurgery antibiotic to speed healing and prevent infection. He conjectured that, since molecules in his medicine were designed to target certain microbes, perhaps molecules in food could be used similarly. Combining diet and medicine, he believes, can provide a synergy with extensive benefits.

As a physician, biologist, hematologist and oncologist, Mukherjee proposes that scientists run studies in which diet and drugs are used in collaboration to produce a desired effect, such as the reduction of a cancerous tumor. He is hoping to begin research on people with lymphomas, endometrial cancer and breast cancer this year.

Food for (Future) Thought

PERSONAL TRAINERS: Do you want your older male clients to remember your workout advice? Encourage them to consume more leafy greens, red and dark-orange vegetables, berry fruits, and orange juice. A 20-year study from the Harvard T.H. Chan School of Public Health published in the journal *Neurology* (2019; 92 [1]) collected data from 27,872 male health professionals and found that eating more of these foods was associated with a lower risk of memory decline. (The men were about 50 when the study commenced.)

For example, those who drank a half cup of orange juice daily were nearly 50% less likely to develop poor subjective cognitive function (SCF) than those who drank less than one serving per month. Also, men who consumed six servings per day of vegetables (with one serving equaling 1 cup of raw vegetables or 2 cups of leafy greens) were 34% less likely to exhibit poor SCF than men who ate only two servings a day.

"This study of men, memory loss and produce intake continues to [demonstrate] that a balanced diet including ample fruits and vegetables shows a potential benefit for long-term health outcomes," says Amanda Boyer, MS, RDN, CD, NASM-CPT, owner and nutrition therapist, Wholehearted Nutrition in Bloomington, Indiana. "However, it also shows that diet is not the be-all and end-all to perfect health. There are individuals who ate more vegetables who [did develop] cognitive deficits and those who ate less vegetables and did not." This is because other factors play a role in memory, "such as genetics, age, co-existing disease, medication and more," says Boyer.

She hopes future research will delve into similar information regarding *women*—and perhaps examine levels of produce intake that are more moderate. "It would be interesting to see if there is a significantly different outcome if someone were to eat three to five servings versus the observed two or six," she says.

USDA Food Label Update: A New Claim to Look For

In November 2018, the FDA approved a new qualified health claim for edible oils that contain high levels of oleic acid, a monounsaturated fatty acid (MUFA) shown to provide cardiovascular benefits when used to replace saturated fat in the diet. The approved wording:

"Supportive but not conclusive scientific evidence suggests that daily consumption of about 1½ tablespoons (20 grams) of oils containing high levels of oleic acid (at least 70%) may reduce the risk of coronary heart disease. To achieve this possible benefit, oleic acid–containing oils should not increase the total number of calories you eat in a day. One serving of [x] oil provides [x] grams of oleic acid (which is [x] grams of monounsaturated fatty acid)."

The key takeaway for clients is buried in the middle: These fats must be used to *replace* saturated fats, and they must not boost your daily calorie intake. In other words, they're a swap, not an addition. The claim will soon be appearing on high oleic versions of olive, canola, sunflower, safflower and algal oil.

For an interesting glimpse at the level of work involved in adding a new food label claim, you can go to fda.gov and pull up the 27-page document titled "FDA Response to Petition for a Qualified Health Claim for Oleic Acid in Edible Oils and Reduced Risk of Coronary Heart Disease." With a title like that for its response letter, it's no wonder that the label lingo runs on for so long!

The Scoop ON MULTI-INGREDIENT PREWORKOUT SUPPLEMENTS

What do you get when you combine caffeine, creatine, beta-alanine, amino acids and nitric oxide agents? MIPS, aka multi-ingredient preworkout supplements, which many athletes take to improve exercise performance and training adaptations. While a recent review in the *Journal of the International Society of Sports Nutrition* found that most of the relevant research backed these perks, some serious concerns remain.

First is the duration of the studies (most are 12 weeks or less). Second is the lack of transparency regarding ingredients, which makes it difficult for consumers to ensure they are not taking any banned or potentially harmful substances—and to avoid dangerous drug interactions. Third, research is lacking (not surprisingly) on women as well as other "underresearched" groups, such as untrained adults aged 40 and older.

Researchers concluded, "We would recommend discussing specific products and dosages of any supplement with a knowledgeable health professional or sports dietician prior to ingesting any product."

Mindset During Meal Planning Shifts Food Choices

One way to encourage clients to stick to their nutritional goals is to have them intentionally focus on the benefits of healthy food choices. In a recent experiment published in *Appetite,* researchers from the University of Tübingen in Germany learned that individuals can potentially make better food choices regarding portion sizes by adopting a specific mindset as they plan their future meals (2018; 125, 492–501).

In the study, Maike A. Hege et al. directed participants (whose weights were categorized as anywhere from average to obese) to adopt one of four mindsets while choosing the size of their lunch portion:

- a health mindset (a focus on how good the food was for them)
- a pleasure mindset (a focus on how much they would enjoy it)
- a fullness mindset (a focus on staying full until dinner)
- a neutral mindset (receiving no mindset instruction, to serve as an experimental control)

Brain scans showed greater activity in the prefrontal cortex—which is linked to self-control and the cognitive process of future meal planning—when people adopted the health mindset. This mindset also led participants in all weight categories to select a smaller portion of food than they did with any other focused mindset.

Your New Favorite Protein Bar

Looking for a new "favorite" protein bar? Ashley Walterhouse, NASM-CPT, has the perfect recipe for you. A self-described "firm believer in the power of fitness and whole foods . . . and the color turquoise," Walterhouse says the recipe below is a simple variation on her 4-Ingredient Homemade Protein Bars—with some chocolate and coffee flavors mixed in.

One of the perks of making these yourself: You can swap in decaf coffee powder or go half-caf if you're sensitive to the stuff (or want to nosh them at night). Walterhouse says it best: "[You] should consume everything with a little asterisk*—meaning what works for one person may not work for you."

PALEO CACAO-COFFEE PROTEIN BARS

2 cups nuts, such as almonds, pecans, cashews, or walnuts

1 cup egg white powder

¼ cup cacao powder or unsweetened cocoa

3 Tbl espresso powder or instant coffee

18 large Medjool dates, pitted (about 10 oz)

water (as needed)

In a blender or food processor, lightly process the nuts with the powdered ingredients; stop before the nuts are pulverized. Add the dates; process. With the motor running, add 1 tablespoon of water at a time, until the ingredients are sticky (up to 6 tablespoons). Press into a parchment-lined 8-by-8-inch pan; refrigerate 1 hour or freeze 30 minutes. Cut into 12–16 squares. Store in an airtight container in the fridge for up to 3 weeks.

For more delicious recipes for protein bar variations and other menu items, visit Walterhouse's website, FitMittenKitchen.com.

A BEAUTIFUL COINCIDENCE

Foods for "Healthy Aging" Can Improve Workouts, Too

In endless pursuit of the Fountain of Youth, consumers are driving demand for foods and beverages marketed as "promoting healthy aging." So says a review of 2019 trends identified by the marketing intelligence agency Mintel Group. In a November 2018 article on nutraingredients-usa.com, Nikki Cutler quoted Mintel Food and Drink spokesperson Jenny Zegler as saying that more products this year will feature foods from Chinese and Ayurvedic medicine, such as turmeric, green tea extract and medicinal mushrooms.

Aesthetics may be the primary motivation for purchasing these items, but there's a double bonus for the fit-minded among us: These foods have also been found to have a positive effect on exercise performance and recovery.

TURMERIC. In a review of research on curcumin (the key ingredient in turmeric) published in *Foods*, several small studies showed promise for reducing delayed-onset muscle soreness after both cardio and resistance workouts (2017; 6 [10], 92).

GREEN TEA EXTRACT. A small study in *Physiology & Behavior* suggests a positive link between green tea extract and postexercise muscle recovery (2018; 197, 77–82), while another in the *Journal of the International Society of Sports Nutrition* reported an increase in fat oxidation during exercise with GTE—whether it's decaffeinated or caffeinated (2015; 12).

MEDICINAL MUSHROOMS. A report in *BioMed Research International* showed a link between these and a reduction in muscular fatigue. This may be due, in part, to the food's effect on lactic acid and glycogen storage (2017; doi:10.1155/2017/9648496).

ALEXANDRA WILLIAMS, MA, *works in the Exercise Science and Sport Studies Department at UC Santa Barbara with a lot of students who need to improve their nutritional intake.*

An Anti-Inflammatory Diet: What to Eat & Why It Matters

CHRONIC INFLAMMATION AND CHRONIC DISEASES GO TOGETHER LIKE HOT SAUCE AND HEARTBURN. LUCKILY A COMBO OF EXERCISE AND AN ANTI-INFLAMMATORY DIET CAN HELP PREVENT BOTH. HERE'S WHAT YOU NEED TO KNOW.

BY ABBIE GELLMAN, MS, RD

We may think of inflammation as the localized swelling that happens to a twisted ankle or to skeletal muscles after an intense workout. However, there's another type of inflammation that can have a big impact on you and your clients: the kind of chronic, systemic inflammation associated with a slew of health conditions and diseases.

You may have heard that this type of inflammation—a byproduct of chronic physical or psychological stress—can be quelled with exercise. Recent research shows that moderate treadmill exercise boosts immune cells' production of compounds that regulate both local and systemic inflammation. In fact, in as little as 20 minutes, scientists saw changes in inflammation biomarkers (Dimitrov, Hulteng & Hong 2017).

Generally, complementary dietary changes can enhance the benefits of exercise and, in the case of inflammation, provide an additional means to prevent or reverse it.

While there is not necessarily one "anti-inflammatory diet" to be followed, there are many best practices that are fairly easy to employ. Here's a little introduction to the world of anti-inflammatory food and nutrition.

First, What Is Inflammation?

Inflammation is an essential natural response within the human immune system. The immune system's role is to limit physical damage from illness or injury by recognizing and responding to dangers like viruses, bacteria, toxins and even foreign bodies like a splinter. For example, when the immune system senses an immediate threat—like a cold virus or cell damage from a cut—it triggers something called an inflammatory response. The purpose of this response is to stimulate the affected cells to release chemical warriors, such as histamines and prostaglandins, to protect against the intruders while attracting white blood cells and their infection-fighting antibodies.

These processes play a crucial role in wound healing and are useful mechanisms for destroying invading microorganisms (Anft 2016; NIAID 2013). Calling all of these helpers to the scene causes fluid to leak from the bloodstream into the surrounding tissues. The resultant swelling—aka inflammation—helps contain the damage, like wrapping a breakable object in bubble wrap.

In the case of athletes, this inflammatory

response can also accompany exercise-induced damage to skeletal muscle tissue caused by an intense workout (Stoecklein, Osuka & Lederer 2012; Nunes-Silva 2014). This does not mean that exercise is bad, but it does mean that inflammation can actually be both good and bad for you.

When Is Inflammation Problematic?

Sometimes the immune system triggers an inflammatory response to something that is not an actual threat. For example, people with allergies have a violent storm going on within their bodies, with their immune system attacking substances like pet dander, dust and pollen. In people with autoimmune diseases, which include some types of arthritis, the immune response is directed at healthy body cells, causing inflammation (Arthritis Foundation n.d.). Inflammation can also be a reaction to chronic stress, which inhibits the hormones that normally suppress immune responses. This is a little like opening the floodgates of a dam.

While the inflammatory response is vital when the body needs to address an immediate concern (injury or infection), health problems can arise when inflammation doesn't abate. Chronic inflammation has been linked to the onset and progression of many types of disease, including diabetes, cancer, cardiovascular diseases, arthritis, inflammatory bowel disease and obesity (Liu, Wang & Jiang 2017; Arulselvan et al. 2016).

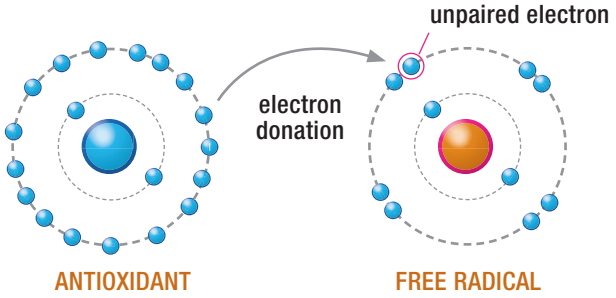
Why Is Chronic Inflammation Bad?

During times of chronic stress, there is increased energy demand on the body, resulting in a higher uptake of respiratory oxygen or a "respiratory burst." To deal with it, the body generates "free radicals" called **reactive oxygen species** (ROS).

As a refresher: A free radical is a molecule that is unstable because of an electron deficit in its outer orbital layer. In search of stability, the free radical will link up to another molecule nearby to "borrow" an electron. This can start a cascade of damage as the "attacked" molecule (having lost an electron) now becomes a free radical itself and seeks to glom onto yet another molecule. The resultant chain reaction can lead to damage in all parts of the affected cell and, eventually, cell death. This series of events also causes inflammation as the body attempts to deal with the onslaught (Arulselvan et al. 2016; Biswas, Das & Banerjee 2017).

But it doesn't end there: While free radicals trigger inflammation, inflammation can likewise trigger the body's production of free radicals, specifically ROS. This vicious cycle of chronic inflammation sets the scene

While free radicals trigger inflammation, inflammation can likewise trigger the production of free radicals. This vicious cycle of chronic inflammation sets the scene for chronic disease. By reducing inflammation, however, we can reduce oxidation—and vice versa.



for chronic disease (Biswas, Das & Banerjee 2017). By reducing inflammation, however, we can reduce oxidation—and vice versa.

Where Diet Comes In

The words "oxygen" and "oxidation" bring us to the topic of antioxidants. **Antioxidants** are compounds that can prevent tissue damage (including inflammation) by linking up with, destroying or preventing the generation of free radicals (Biswas, Das & Banerjee 2017). The exact mechanisms behind this are not completely understood. Antioxidants may blunt the effects of an immune response, short-circuit the inflammation pathways or processes in play during the response, or prevent inflammation from occurring in the first place (Zhu, Du & Xu 2017).

In many cases, the nutrients in anti-inflammatory foods may work by short-circuiting the inflammatory response, binding with free radicals and blunting production of the body's chemicals that trigger and contribute to inflammation.

Top 10 Principles of an Anti-Inflammatory Diet

To prevent or ease inflammation, it is best to limit sources of unhealthy and/or trigger foods and increase intake of healthy, whole, natural and unprocessed foods. Here are some specific best practices and tips regarding what to eat (and avoid) to prevent or ease inflammation in the body.

1 Consume at least 25 grams of fiber daily.

To get your fill of fiber, seek out whole grains, fruits and vegetables. A fiber-rich diet helps reduce inflammation by supplying naturally occurring anti-inflammatory phytonutrients found in fruits, vegetables and other whole foods. Research has found an inverse relationship between biomarkers of systemic inflammation and fiber intake: in other words, the more, the better (Nielsen, Trak-Fellermeier & Joshipura 2017).

2 Eat a lot of fruits and vegetables.

To boost your intake of anti-inflammatory antioxidants, consume at least seven servings of vegetables and two servings of fruit every day. One "serving" equates to half a cup of fruit or cooked vegetables or one cup of raw leafy vegetables. Data suggest that the biomarkers of inflammation affected by whole grains are different from those affected by fruits and vegetables, so it's important to consume both (Kopf et al. 2018).

3 Eat four servings of alliums and crucifers weekly.

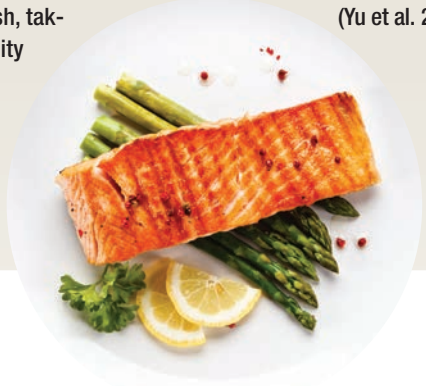
Alliums include garlic, scallions, onions and leeks, while crucifers refer to vegetables such as broccoli, cabbage, cauliflower, mustard greens and Brussels sprouts. Alliums and crucifers contain powerful antioxidant properties, so be sure to weave them into your daily produce intake—to the tune of four servings of each per week. Research shows that garlic, for instance, contains sulfur compounds (including allicin) that have anti-inflammatory properties. In onions, a compound called quercetin helps quell swelling (Zeng et al. 2017). Crucifers, long promoted to prevent chronic disease, contain isothiocyanates and indoles—molecules found to reduce inflammation and oxidative stress (Jiang et al. 2014).

4 Consume omega-3 fatty acids.

Aim to eat lots of foods high in omega-3 fatty acids. Examples include fish, flax meal and walnuts. For people who are vegan or vegetarian or who do not consume fish, taking a good-quality vegan omega-3 supplement can be helpful. Research shows that omega-3 fatty acids reduce inflammation and may help lower the risk of chronic diseases such as heart disease, cancer and arthritis—conditions that often have a high-inflammation process at their root. Findings also suggest omega-3s help reduce the need for corticosteroid medications in people with rheumatoid arthritis.

5 Swap in unsaturated fats.

Unsaturated fats come mainly from vegetables, nuts and seeds. They differ from saturated fats by having fewer hydrogen atoms bonded to their carbon chains. A study in *The American Journal of Clinical Nutrition* found that people who ate more nuts weekly had lower inflammatory biomarkers (Yu et al. 2016).



Good news: The same type of diet that is helpful for enhancing exercise performance, weight maintenance, and long-term health should also naturally lower inflammation.

Anti-Inflammatory Foods: The "Short List"

There is *no* magic bullet or one magic superfood; however, these are some of the whole foods that have strong anti-inflammatory properties:

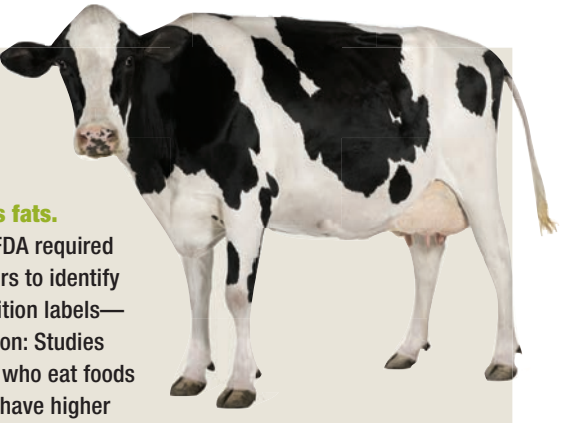
- berries
- cacao
- citrus fruits
- ginger
- grass-fed meat
- green leafy vegetables
- green tea
- wild-caught fish

The best way to obtain the necessary vitamins and minerals to combat inflammation is to implement a whole-foods diet that contains foods rich in **phytochemicals**—antioxidant nutrient compounds that have been found to have an anti-inflammatory effect. Because different foods contain different types of anti-inflammatory agents, eating a range of foods with anti-inflammatory properties is the best strategy.

Fitness professionals can benefit themselves and their clients by becoming familiar with the top 10 principles of an anti-inflammatory diet (see the sidebar, below). Guiding clients in developing these healthy habits should help them with chronic inflammation issues, as well as many of their fitness, weight and health goals.

ABBIE GELLMAN, MS, RD, CDN, *is a chef and the founder of Culinary Nutrition Cuisine LLC. She has more than 10 years of Wall Street and hospitality/food and beverage consulting experience, as well as 10 years of nutrition-related experience. Gellman currently creates cooking and nutrition videos and works with a wide variety of food companies, foodservice operators and private clients.*

References for this article available online at magazine.nasm.org.

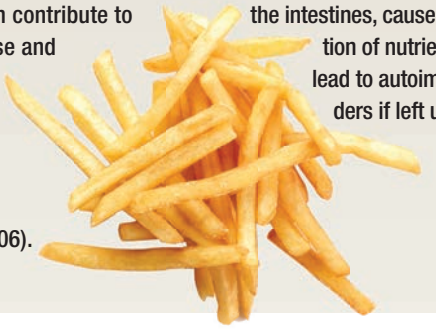


6 Cook with herbs and spices.
Many herbs and spices are known for their anti-inflammatory properties. These include chili peppers, cloves, cinnamon, turmeric, ginger, rosemary, sage and thyme.

For example, studies have shown that supplementing with curcumin, the active ingredient in turmeric, can help significantly improve inflammatory conditions like ulcerative colitis and rheumatoid arthritis (Hewlings & Kalman 2017). Capsaicin, a chemical in chili peppers, has also been found to intercept inflammatory pathways (Zimmer et al. 2012).

7 Avoid hyperpalatables.
Hyperpalatables are processed foods, refined sugars and refined carbohydrates that generally contain excessive sugar, salt and/or fat. This includes any food that contains high-fructose corn syrup or is high in sodium—both of which contribute to inflammation throughout the body. Sugar can activate chemical signals that induce inflammatory pathways (Chen et al. 2018).

8 Limit saturated fats.
Saturated fats are primarily found in animal products; however, they are also found in tropical fat sources such as palm oil and coconut oil. Limit saturated fat to approximately 10% of daily fat intake. One easy method is to choose protein sources that are lower in saturated fat, such as lean meat, poultry and fish. Several studies have shown that saturated fats create fat tissue inflammation that can contribute to heart disease and exacerbate overall inflammation (Giugliano, Ceriello & Esposito 2006).



9 Cut out trans fats.
In 2006, the FDA required food manufacturers to identify trans fats on nutrition labels—and for good reason: Studies show that people who eat foods high in trans fats have higher levels of C-reactive protein, a biomarker for inflammation in the body (St. Onge et al. 2009).

10 Steer clear of personal inflammatory triggers.
Some people have additional inflammatory issues or sensitivities. Here are three of the most common:

Gluten. In people with gluten sensitivity or celiac disease, gluten proteins are interpreted as a threat to the body. This launches an immune response that attacks the intestines, causes malabsorption of nutrients, and can lead to autoimmune disorders if left untreated.

Dairy and casein. Consuming cow's milk may contribute to inflammation in your body if you are sensitive or allergic to lactose.

Alcohol. Alcohol is known to contribute to many diseases and disorders, some of which are inflammation-based.

Putting the Principles Into Action

Many of these anti-inflammatory eating habits go hand in hand: For instance, by eating broccoli, you would be checking off these boxes: more fiber, lots of vegetables, and crucifers. For an extra punch, add anti-inflammatory herbs and spices—such as turmeric and ginger—to increase the antioxidant capacity even more!

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Training a Terminally Ill Client

CAN EXERCISE IMPROVE QUALITY OF LIFE REGARDLESS OF THE GOAL?

BY ZOEY TRAP, MSC

Years ago, I had a beautiful, determined Pilates student named Magdalene. She had stage 4 breast cancer. Though exercise helped to improve her mood and preserve her strength, it didn't alter the diagnosis: terminal. Nothing matches the challenge of helping someone with an incurable illness. Sometimes, the client needs to talk; other times, what's required is silence. Depending on the person's disease, condition and treatment, he or she may live for weeks, months or years. It's a life of uncertainty, and the client may be searching for a way to take charge. Research shows that the desire to be physically active is a priority almost to the end of life (Eyigor & Akdeniz 2014).

I didn't work with Magdalene for a long time—eventually, she switched from Pilates to yoga—but we did what we could in the time we were together. My job was to listen, to keep her moving and to establish boundaries so that my personal opinions didn't intrude on her approach to coping with cancer.

The Crucial Role of Physical Activity

Severe illnesses often impose physical disabilities that can lead to depression, poorer quality of life and higher healthcare expenditures. Progressive disability and feelings of dependency can deplete the desire to live.

Then again, research has also found that physical function appears to be a major factor in determining length and quality of life. A 2012 research review determined that physical activity was "a safe and feasible intervention in patients with advanced-stage cancer" and "a potential method to manage functional decline, symptom management, and [health-related quality of life] for this unique group" (Albrecht & Taylor 2012). A systematic review of 3,816 cancer patients found that moderate-intensity exercise significantly reduced fatigue and increased walking endurance (Mudumbi & Tang 2016).

Programming Considerations

I saw many of the benefits of exercise (see "How Exercise Helps," page 68) in my

time working with Magdalene. During her struggle, she went through a range of alternative and traditional treatments. After her double mastectomy, the cancer escalated. As a member of her support team, I knew my role was to provide compassion, respect her wishes and stay flexible with our sessions.

If you train a client with a terminal diagnosis, it's important to prepare your approach carefully.

MAKE SURE THE CLIENT'S PROGRAM IS *INDIVIDUALLY TAILORED.* Take into account these variables:

- client's age
- disease
- stage of disease
- disease location
- previous and present treatments
- life expectancy
- pain level
- medications
- cognitive/emotional status (Eyigor & Akdeniz 2014)

BEGIN WITH AN ASSESSMENT. Assess motor deficits, range of motion, gait patterns and fall risk. Ask to contact the client's doctor to make sure exercising is okay and to learn what recommendations and guidelines you should address (Bowen 2011). Be sure you know whom to contact in case of an emergency and where the client receives treatment.

REVIEW GOALS. Clients who are terminally ill usually want to stave off fatigue, improve feelings of well-being and manage pain. When setting goals, think beyond aerobic capacity, strength, flexibility and body composition. Always focus on enhancing daily function.

CUSTOMIZE YOUR CARE. Find out what your client's daily life looks like now, what the client wants it to look like, what fears are coming up and what he or she would like to do in your sessions. Build a movement plan that could improve the client's physical and psychological ability to withstand treatments. Always be thinking about reducing the anxiety associated with the illness.

Learn all you can about the disease—past treatments, current therapies, and the side effects the client is feeling today or may experience in the future. Be sure to ask your client to tell you if anything changes.

KEEP THE PROTOCOL OPEN-ENDED. There is no scientific agreement on the frequency, intensity and duration of exercises for those with a terminal diagnosis. Moreover, science hasn't settled on which exercises are appropriate for specific disease states or how those movements should be delivered. Research is improving in this area, but much is still unknown and under-investigated (Albrecht & Taylor 2012).

Current research points to beginning with low intensity and gradually increasing intensity as aerobic capacity improves (Mudumbi & Tang 2016). American College of Sports Medicine guidelines recommend that all cancer survivors do at least 150 minutes of moderate aerobic activity or 75 minutes of vigorous aerobic activity each week and engage in resistance exercise for all major muscle groups at moderate to high intensity 2 days per week. In addition, the guidelines recommend flexibility exercises for the eight major muscle groups (Schwartz, de Heer & Bea 2017).

FOCUS ON THE POSITIVE. Movement should bring joy. The most common exercises for people who are terminally ill include aero-

Consider the Environment

The exercise setting is a prime consideration when working with clients who are terminally ill. One study found that 84% of respondents in this category preferred engaging in physical activity at home because they were uncomfortable with their physical appearance and the competitive, performance-oriented environment of a gym (Albrecht & Taylor 2012).

With this in mind, consider whether your client has a home gym, what kind of equipment and space is available, and whether you need to bring equipment with you. Make sure you assess the safety of the home and ask whether a caregiver will be assisting or perhaps even participating.

How Exercise Helps

Regular exercise may provide a wide range of benefits for those with a terminal illness:

- improved overall health and prognosis
- a less-diminished quality of life compared with nonexercisers
- increased energy levels
- improved body image
- an ability to maintain weight and muscle mass
- decreased symptoms of depression and anxiety
- reduced inflammation
- enhanced quality of sleep
- improved bowel functioning
- relief from edema

Are You Ready to Help?

If you are interested in working with clients who are seriously ill, ask yourself these questions:

- Do you have the emotional resilience to be compassionate and caring without becoming overly emotional in sessions?
- Can you be flexible with last-minute cancellations and changes in session plans and symptoms?
- Are you willing to go into homes or to find private space for training?
- Do you have the time and ability to do research and gather necessary information to teach these clients safely and effectively?

If so, you may be deeply rewarded with a renewed appreciation for life and an enhanced ability to live in the present yourself.

bic activity, relaxation and breath training (Jensen et al. 2014). Joyful exercises like Pilates, tai chi, yoga, Nordic walking and dance may be useful. Just be sure to carefully adjust the intensity to the abilities of the individual.

A Different Perspective on Progression

With this population, progression might not be measured in heavier loads, extra reps or higher aerobic thresholds. Instead, it may mean withstanding pain, suffering less fatigue, having more independence, being more present and living more fully.

Unfortunately, the disease's progress may require a client to regress. Indeed, regressions that allow your client to keep active may be the new normal, and that's fine. Approach a decline in ability with as much positivity and support as you can. Seeing you and starting an exercise session are welcome reprieves from the illness and all that your client associates with it.

People with an incurable illness often need the guidance and direction of a physical activity program. That fact is often ignored by health and fitness professionals, which is too bad, because all of us can participate in exercise and postrehabilitation approaches within palliative care programs. Our efforts can help to alleviate symptoms, improve functional capacities, and increase quality and length of life. Always remember that activity programs for this population must be customized to individual needs, ability and preferences.

Caring All the Way

Some days, Magdalene arrived with good energy, feeling positive. Other times, she had special requests to address something that hurt or something she needed. Eventually, we began to spend more time in meditation and guided relaxation. I got to know her family and to care deeply about them.

Although I moved away a few years ago, I stayed in touch with Magdalene. The last time I saw her, she told me she was dying. Treatment options were exhausted. Nothing else could be done.

She was at peace with this, at peace with herself—and still doing yoga.

ZOEY TRAP, MSC, *owns Pilates Solutions and is the Peak Pilates® educational team leader, a certified Jivamukti yoga instructor and a lifelong student of mind-body movement systems. She dedicates this article to her sister, Jenny, who died of lupus. The author can be reached at zoeytrap@gmail.com.*

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Dealing With Loss

Regardless of the circumstance, coping with death is challenging. The death of a client or participant presents unique challenges for fitness professionals. You may ask yourself: How do I honor my client's memory? How do I grieve? Where do I turn for support?

Emotional support is key to healthy coping, but it can also be difficult because confidentiality and professional boundaries can get in the way of "grieving rituals" typically followed in personal relationships. For example, in some instances, you may not be able to attend the funeral or memorial service; however, you can send flowers and a condolence card, make a donation in the client's name, or take food to the family. Find your own way to grieve and remember—for example, taking time for your own private memorial or writing remembrance notes in a journal.

BY TONY NUÑEZ, PHD

Q+A

YOU ASK, WE ANSWER

WHAT DOES CURRENT RESEARCH SAY ABOUT ASSESSING INJURY RISK, ENCOURAGING CLIENTS TO LOSE WEIGHT AND IMPROVING OLDER PEOPLE'S QUALITY OF LIFE?

CAN ASSESSING SQUAT MOVEMENTS IDENTIFY INJURY RISK?

Assessing injury risk is complex and multifaceted, but research partially funded by NASM suggests that analyzing two foundational movements—double- and single-leg squats—may provide clues to an athlete's likelihood of injury.

The study recruited, assessed and monitored 115 first-year NCAA Division I athletes (51 women; 64 men) who performed double- and single-leg squats in 3 sets of 5 repetitions (on each leg for the singles). Trained assessors viewed the movements from three angles and scored them for proper form. Scores were statistically adjusted into quartiles, and study participants were categorized as poor or non-poor movers. Errors such as forward lean, foot turnouts and weight shift for double-leg squats, and trunk/hip shift, knee valgus and hip drop/hike for single-leg squats, were most frequent among poor movers.

Researchers determined that athletes who made more errors had more lower-extremity injuries than those who performed well. However, they strongly advised using multiple criteria—not just these two squat varieties—to assess injury risk. They also said further research on performing squat assessments must be done to determine the magnitude of their usefulness.

REFERENCE: Eckard, T., et al. 2018. Association between double-leg squat and single-leg squat performance and injury incidence among incoming NCAA Division I athletes: A prospective cohort study. *Physical Therapy in Sport, 34,* 192–200.

SHOULD FITNESS PROS ENCOURAGE CLIENTS TO LOSE WEIGHT?

The benefits of exercise on cardiovascular disease markers are well established; however, there's little evidence to determine whether these benefits are due to exercise, weight loss or a combination of both. To shed light on this, a recent study examined insulin sensitivity and cholesterol levels among exercisers who achieved either no weight loss (<3% reduction in body weight) or modest weight loss (≥3%).

The 163 volunteers (aged 52.4 ± 6.4 years) with overweight or obesity were randomized into three exercise groups or a nonexercise control: low amount, moderate intensity (LAMI); low amount, high intensity (LAHI); and high amount, high intensity (HAHI). Researchers tracked exercise amounts by measuring calories per kilogram per week (14 and 23 kcal/kg per week for LA and HA, respectively) and gauged intensity by measuring peak oxygen consumption (40%–55% and 65%–85% for moderate intensity and high intensity, respectively).

The HAHI exercise group had the highest percentage of modest and clinically significant weight loss (>5% reduction in body weight); however, this was not statistically significant compared with the other groups. Relative fitness level, reduction in triglycerides, non-HDL cholesterol and LDL particles were highest in those who achieved modest weight loss, independent of exercise group. All exercise groups improved insulin sensitivity, with the LAMI group showing the largest improvement.

While exercise is imperative for improving factors associated with CVD, the importance of achieving at least modest weight loss for clients with obesity or overweight should be shared.

REFERENCE: Swift, D.L., et al. 2018. Effects of aerobic training with and without weight loss on insulin sensitivity and lipids. *PLOS ONE, 13* (5), e0196637.

HOW DO EXERCISE AND WEIGHT LOSS AFFECT QUALITY OF LIFE IN OLDER PEOPLE?

People tend to live longer if they maintain a healthy weight, but they place the most value on their health-related quality of life (QOL) and their ability to complete ADLs, especially as they age. In a recent study, researchers analyzed how three scenarios—weight loss alone (WL), weight loss plus aerobic training (WLA) and weight loss plus resistance training (WLR)—affected QOL and social-cognitive outcomes.

The 18-month study recruited 249 overweight or obese adults (aged 66.9 ± 4.7 years) and randomly assigned them to a scenario. WL went on dietary restrictions, aiming for a 7%–10% reduction in body weight over the long term. WLA combined dietary restrictions with 4 days per week of indoor walking at a somewhat-hard intensity. WLR followed the same dietary restrictions and, on 4 days per week, did full-body resistance exercise, maintaining a self-reported hard-to-very-hard intensity. A validated questionnaire assessed participants' health-related QOL, self-efficacy during walking and stair climbing, and satisfaction with physical functions.

Conclusion: Weight loss combined with either aerobic or resistance training elicited better health-related consequences than weight loss alone. As expected, WLA trainees reported greater self-efficacy during walking than the other groups did. WLR trainees reported greater self-efficacy during stair climbing at follow-ups. These results reaffirm that aerobic and resistance exercises can improve the lives of older people, especially when combined with weight loss.

REFERENCE: Fanning, J., et al. 2018. Change in health-related quality of life and social cognitive outcomes in obese, older adults in a randomized controlled weight loss trial: Does physical activity behavior matter? *Journal of Behavioral Medicine, 41* (3), 299–308.

TONY P. NUÑEZ, PHD, *is an assistant professor of human performance and sport at the Metropolitan State University of Denver. He is an active researcher and presenter in the exercise physiology and fitness field.*

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