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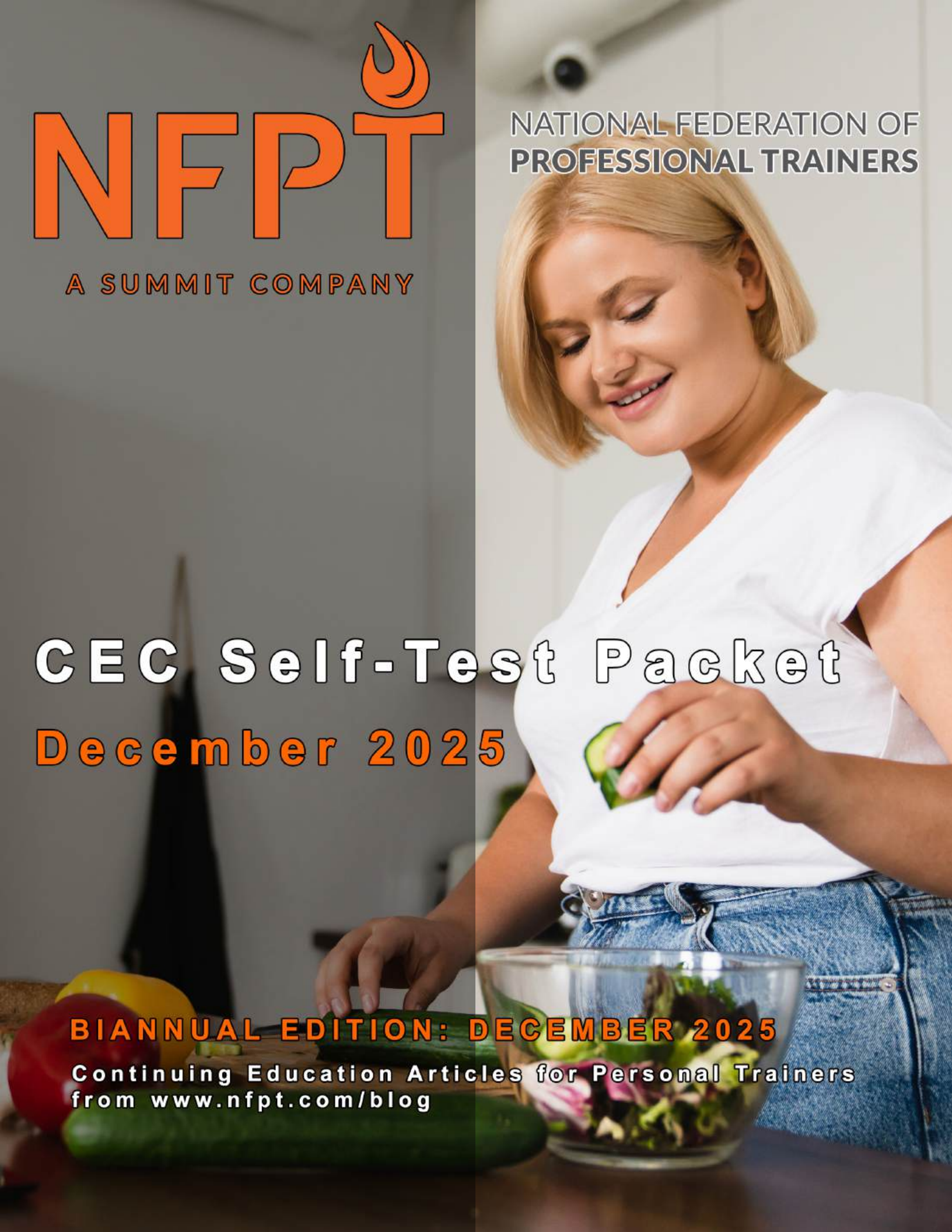

CEC Self-Test Packet

December 2025

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Continuing Education Articles for Personal Trainers
from www.nfpt.com/blog

NFPT SELF - TEST

December 2025 EDITION

Hello NFPT-CPT! Welcome to the winter edition of NFPT's Self-Test for CECs! This continuing education publication is provided to you as part of your personal trainer certification maintenance; we want to contribute to your certification maintenance and professional development in a way that will help you to receive CECs towards your certification. Take the self-test for a NFPT credit award, but don't stop there! Professional development is key to your trainer success. Don't let your CPT credential carry the load of your industry experience, there's so much more to gain from consistent personal enrichment. NFPT offers specialty courses and many more continuing education courses too. We work with a wide variety of recognized continuing education providers that offer hundreds of options for CECs as well; visit us at www.nfpt.com/continuing-education to learn more. This packet includes continuing education articles that come from NFPT's Blog. Articles for this December 2025 self-test edition are from publication months June 2025 to December 2025. All articles are enclosed here to assist you with answering the questions in the back of this packet. If submitting your answers in hardcopy, complete the bubble sheet provided (include your name and contact information) and return to:

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Contents

Unleash The Body's Full Potential with Core-Tex Reactive Trainers

Reactive Training, a fairly new concept in the wellness community, shows great promise both in enhancing performance gains and diminishing risk of injury. This form of training seems successful in athletes of all ages and fitness levels. The Core-Tex company designed a piece of equipment which focuses on such reactive training, offering a myriad of benefits to the physical and neurological aspects of the human body. Here we explore how to incorporate reactive training sessions into clients' regular workout programming, as well as detailing the science behind these unique movements.

The Human Body and Unpredictability

Regardless of the population or the activity, one's ability to react and generate force quickly and safely lies at the very core of functional movement. Reactive/power training can enhance one's ability to stabilize while moving, slowing down and/or stopping, and produce forces at speeds best served for the tasks at hand.

Reactive training involves the integration of dynamic and often unpredictable movements to bring about rapid, coordinated responses from the body's musculoskeletal and nervous systems. In contrast to traditional exercises performed perhaps in a single plane or position --- push-up's, lunges, controlled stretching --- reactive training places its emphasis on enhancing the ability to react swiftly to whatever external stimuli the body may encounter at any point in time. Such training benefits agility, coordination, and overall functional fitness.

The human body boasts the exquisite capacity to adapt to various challenges and ever-changing external stimuli. Reactive training leverages this adaptability by incorporating movements that necessitate quick adjustments and precise muscle recruitment. This type of training not only strives to mimic potential real-life situations, but also boosts neuromuscular control and proprioception.

The Core-Tex Advantage

Core-Tex, a unique piece of equipment rapidly attaining a position of prominence in the world of reactive training, offers a multitude of advantages to fitness buffs and elite athletes alike. Cradled within a base that encases ball transfers oriented to support the convex underside of the platform, this design features the ability to tilt and rotate in multiple directions. The 360-degree swivel creates endless movement options; and such free-form movement challenges body stabilization while simultaneously activating a wide range of muscles.

Below we highlight the many ways in which Core-Tex Reactive training can enhance any client's workouts, regardless of their chose sport:

1. **Multi-Planar Movement ~** Core-Tex's design allows for movement in the lateral, frontal, and transverse plans, much like daily life. This challenges the body to adapt to varying directions, allowing for an all-inclusive workout experience.
2. **Unpredictability ~** A Core-Tex workout's ever-changing movements require users to constantly adjust their body positioning. This challenges the neuromuscular system, fostering improved proprioception and kinesthetic awareness.
3. **Improved Functional Fitness ~** By engaging multiple muscle groups while challenging the body's natural movement patterns, reactive training with can enhance overall functional fitness.
4. **Enhanced Neuromuscular Coordination ~** The dynamic and unpredictable nature of Core-Tex movements promotes better neuromuscular coordination, translating intohttps://personaltrainertoday.com/functional-training-personal-trainers improved athletic performance and reduced risk of injuries.
5. **Increased Core Strength ~** The constant need for stabilization activates the core muscles, leading to stronger and more stable abdominal, back and hip muscles.

Strengthening While Sitting

In addition to the muti-planar movement possibilities offered by the Core-Tex Trainer, sitting on this piece of equipment can actually help the core and lower back, common areas of concern for many individuals. By creating a variable sitting environment, its patented design turns sitting into a dynamic experience, conferring benefits to the lower back, hips, core and pelvic floor.

By sitting on a Core-Tex Trainer throughout an 8-hour workday, as opposed to a traditional office desk chair, users can derive the following benefits ~

- Prevents stress from accumulating on the lower back
- Strengthens abdominal/low back muscles
- Improves posture and focus while working
- Relieves tension and pressure from scoliosis; may help correct postural imbalances

Real Life Forces

Reactive training can include plyometric movements, powerlifting, and strength building workouts. It forces one to focus on quick, powerful and explosive movements, all of which require muscle contractions.

When a client or athlete performs a powerful movement, muscles eccentrically and concentrically contract quickly. The eccentric contraction, known as the loading phase, contains reduced force, while the explosive concentric contraction causes force production. A concentric movement incorporates the stretch capabilities of muscle tissues to store potential energy, utilizing it as kinetic energy (the energy of motion)

when called upon to generate force efficiently. The amortization phase represents the transition between the two aforementioned muscle contractions. The quicker an athlete can move from one to the other, the better his reactive strength.

The nervous system enables all movement throughout the entire body. Motor neurons transmit signals from the spine to all the skeletal muscle within the body. Reactive training can help with the body's physical mobility responses. The shorter the motor response time, the quicker the movement. Clients can benefit from this form of reactive training, helping their bodies adapt to making faster movement decisions while still maintaining a high-performance output. Reactive training serves an important purpose for everyday recreational clients as well, assisting them in activities of daily living.

When helping a client with a reactive training workout program, trainers will do well to keep in mind the key purpose of reactive training: recruiting as many muscle fibers as possible, in the shortest amount of time. This in turn fosters better neuromuscular efficiency and increases a client's ability to produce force. The more force a client can produce, the stronger he grows. This also works well for the client whose goals include fat burning and muscle hypertrophy.

Reactive Training and Injury Prevention

If an athlete’s body learns to produce significant amounts of force in a short time, he will witness a dynamic increase in his sports performance. This transfer of power contributes to speed, agility, strength and overall physical conditioning. To recruit fast-twitch muscle fibers, the body must have the capacity move rapidly.

When a client's body can withstand sudden movements, he inherently lessens his injury risks.

Consider the example of two basketball players of equal height reaching for a jump ball; the one who can react/generate force the fastest will win the toss. The same holds true for the overall population. If upon stepping off a curb, a client loses his balance and falls, perhaps his nervous system needs reactive training. A nervous system trained to react quickly can recruit the necessary muscles at the right time, enabling an individual to regain his balance and decrease his chance of incurring a serious fall or injury. Fitness professionals suggest not incorporating reactive training into a novice client’s program, however, until he has obtained proper flexibility, core strength, and balance capabilities.

For clients attempting to gain muscle mass, even a slight injury can render them temporarily sidelined, thereby limiting growth potential. To avoid injuries, the body must stabilize and move at the various speeds with which our bodies naturally mobilize during everyday activities. If a personal trainer fails to work a client at a variety of speeds, his body does not know how to react when forced to move and, more importantly, stabilize at those speeds. This makes the client vulnerable to injury. Reactive training teaches how to effectively stabilize at various joints, maintain postural equilibrium at faster

speeds, and utilize proper landing mechanics to increase force production when needed. Consider this mode of training as preparing for life's little surprises in a safe, controlled environment. In this manner, when faced with a real-life situation, the brain and nervous system already mastered a management strategy.

Understanding Neuromuscular Efficiency

Neuromuscular efficiency, also known as NME, refers to the efficiency of the nervous system and muscles as they work together to produce movement. Factors that influence NME include muscle contraction timing, coordination, force production, and the skill to perform the movement at hand. High NME allows an athlete to execute complex movements smoothly and efficiently without generating tremendous fatigue. This benefit serves endurance athletes well throughout longer, challenging races/competitions.

Neuromuscular efficiency can serve as a reliable indicator of muscle function and strength, as well as the ability to activate motor units which can then produce force and create movement. The higher the value, the more efficiently athletes can perform their sport's required movements, and with more precision and control as well. These factors typically favor a lessened chance of injury. Keep in mind that the nervous system will only recruit muscles at speeds for which one trains it. If the nervous system never gets exposed to/challenged by quick muscle recruitment, it will fail to respond appropriately.

Final Thoughts

Every activity we perform, whether on the playing field or throughout an average day, requires us to generate force quickly in response to the demands place on our bodies. By training at speeds functionally applicable to everyday life as well as one's chosen sport, we can decrease the risk of injury and enhance overall performance.

If a client wishes to work more efficiently, burn a few extra calories and fast-track his fitness goals, consider adding Core-Tex exercises to his workouts. Creativity, fun and fitness await!

Muscle-Centric Medicine vs. Weight-Centric Culture: Helping Personal Trainers Rethink Body Composition in GLP-1 Users

Per the first article of this series, the emergence of glucagon-like peptide-1 receptor agonists (GLP-1 RAs) has transformed clinical care for individuals with obesity and type 2 diabetes, offering remarkable efficacy for appetite regulation, glycemic control, and weight loss. However, the cultural and clinical emphasis on weight reduction as a proxy

for health—a hallmark of weight-centric thinking—requires critical reexamination in light of muscle-centric health paradigms like Lyon's (2023) Muscle-Centric Medicine schema. As a paradigm, muscle-centric medicine reframes skeletal muscle not only as a structural and locomotor system but as a key regulator of metabolic health, hormonal balance, and longevity (Anderson et al., 2015; Simoneau et al., 1999).

Consequently, this article argues for a decisive pivot away from purely scale-focused outcomes toward preserving—and ideally enhancing—skeletal muscle mass and function in individuals undergoing GLP-1 therapy. For personal trainers, healthcare providers, and exercise professionals, understanding this paradigm shift is essential to guiding clients through sustainable, long-term health improvements while mitigating the potential risks of unintentional muscle loss that accompanies the use of these powerful pharmaceutical interventions.

The Problem with Weight-Centric Culture

Weight-centric culture has traditionally valued body mass index (BMI) or pounds lost as the main indicators of health. Whether arising from the "low-fat" craze of the 90s or more recent popular diets like the ketogenic diet that claim to guarantee weight loss, these approaches remain rooted in a reductionist model. Although convenient, this perspective overlooks the complexity of body composition and the crucial role of lean mass. Consequently, research from Evans and Cummings (2024) underscores the potential dangers of this mindset, highlighting how rapid or excessive weight loss, especially without resistance training, can result in disproportionate losses in lean body mass (LBM). For instance, GLP-1 RAs such as semaglutide and tirzepatide, while effective for reducing adiposity, have also been associated with reductions in muscle mass, particularly when not paired with structured exercise interventions (Jiao et al., 2024; Sargeant et al., 2019).

In this context, a new narrative is necessary—one that centers around strength, skeletal muscle quality, metabolic resilience, and hormonal optimization. To this end, weight loss is not inherently beneficial if it compromises the very tissue responsible for metabolic regulation, immune support, and movement integrity.

Skeletal Muscle as a Metabolic Powerhouse

Skeletal muscle is the primary site of insulin-stimulated glucose disposal, accounting for approximately 80% of uptake under normoglycemic conditions (Anderson et al., 2015). In individuals with obesity or insulin resistance, compromised muscle mass or mitochondrial dysfunction can exacerbate metabolic dysfunction. Fortunately, skeletal muscle is also highly plastic. Through resistance training and mechanical loading, it adapts via hypertrophy, enhanced glucose transporter expression, and improved insulin sensitivity (Wang et al., 2021).

Importantly, the GLP-1 pathway intersects with muscle physiology. Research suggests GLP-1 RAs may improve insulin sensitivity indirectly through improved gut-brain-muscle signaling and direct effects on myocytes (Chai et al., 2014). Moreover, muscle-derived myokines such as IL-6 and irisin modulate systemic inflammation, glucose metabolism, and even cognitive performance (Xu et al., 2021). This endocrine function of muscle further affirms its centrality in whole-body health.

Muscle Preservation in GLP-1 Users: What the Research Says

While GLP-1s do not directly target skeletal muscle, emerging evidence suggests their downstream effects may influence muscle mass depending on exercise status and metabolic health. For example:

- Osaka et al. (2023) observed that GLP-1/basal insulin co-therapy in older adults led to favorable skeletal muscle outcomes, potentially due to improved glycemic control and anabolic signaling.
- Old et al. (2025) reported mixed findings on the mitochondrial effects of GLP-1s in muscle tissue, highlighting the need for adjunct lifestyle interventions to support muscular integrity.
- Khin et al. (2021) found that dulaglutide improved muscle function in aged mice by reducing inflammation and enhancing mitochondrial dynamics.
- Conversely, Sonavane et al. (2025) documented cases of rhabdomyolysis with GLP-1 use, underscoring the need for careful monitoring and strength training to maintain muscle robustness.

Taken together, these findings suggest that GLP-1 therapy's impact on muscle health is not inherently detrimental but is highly modifiable through behavioral strategies, especially resistance training.

Shifting Metrics: From Weight Loss to Muscle Retention

In the era of GLP-1 RAs, the conversation must shift toward muscle-preserving, function-enhancing interventions. Trainers and allied health professionals must advocate for metrics that matter—grip strength, appendicular lean mass, neuromuscular coordination, and metabolic efficiency—rather than simply pounds lost.

Clinical studies demonstrate that skeletal muscle mass is a strong predictor of mortality, mobility, and metabolic flexibility (Cawthon et al., 2020; Beaudart et al., 2014). This is particularly relevant in older adults and those with chronic disease, where sarcopenia increases vulnerability to falls, hospitalizations, and frailty.

Moreover, Meng et al. (2014) identified links between skeletal muscle inflammation and impaired glucose homeostasis, suggesting that muscle preservation is not only a musculoskeletal concern but a systemic health imperative. A muscle-centric intervention

model offers a more holistic lens, aligning with precision medicine goals and population-specific programming.

Practical Applications for Trainers: What to Emphasize

1. Integrate Resistance Training Early and Often

Resistance training should be foundational—not supplemental—for GLP-1 users. Programs should emphasize progressive overload, periodization, and neuromuscular variability to optimize hypertrophy and function (Zhao et al., 2022; Grønfeldt et al., 2020).

2. Prioritize Protein Timing and Quality

Clients undergoing GLP-1 therapy may experience appetite suppression, making it critical to emphasize protein-dense meals to support muscle protein synthesis (Bloom et al., 2018). Resistance exercise combined with protein intake is the most effective way to maintain LBM during weight loss.

3. Track Functional Strength Over Scale Weight

Handgrip dynamometry, chair stands, and isokinetic testing offer more meaningful insights than weight or BMI alone (Bohman et al., 2018; Lima et al., 2019). These measures correlate with daily function and long-term health outcomes.

4. Monitor Recovery and Inflammation

Trainers should remain aware of signs of overtraining or muscle breakdown, particularly as clients may be in a caloric deficit. Supporting recovery through sleep hygiene, mobility work, and nutrient timing is essential.

The Endocrine Role of Muscle: A Case for Cultural Reframing

Weight-centric culture often ignores the hormonal implications of muscle health. Yet skeletal muscle secretes numerous myokines—such as IL-6, irisin, and fibroblast growth factor 6 (FGF6)—that influence systemic inflammation, energy expenditure, and insulin sensitivity (Xu et al., 2021; Magnoni et al., 2014). Resistance training not only enhances muscle size and strength but also modulates these hormonal outputs in ways GLP-1s cannot achieve alone.

Furthermore, exercise-induced GLP-1 secretion—observed in several studies (Kullman et al., 2016; Hamasaki, 2018)—suggests a synergistic interaction between training and pharmacotherapy. The message is clear: Pharmaceutical interventions may initiate

health improvements, but sustained metabolic and hormonal optimization depends on movement, muscle, and metabolism.

Moving Beyond the Scale

GLP-1s offer a powerful tool for improving metabolic health and catalyzing lifestyle change. But without a corresponding shift in how we define and measure success, these tools risk perpetuating the same reductionist thinking that has long dominated public health. Personal trainers are uniquely positioned to lead this evolution, championing strength over shrinkage, performance over pant size, and resilience over restriction.

As we move forward, integrating muscle-centric health approaches like muscle-centric medicine into the discussion about GLP-1 therapy is not only scientifically valid but also morally essential. It highlights the complexity of human health, the importance of movement, and the reality that bodies are designed for more than just weight loss.

Nutrition, Protein, and Appetite Suppression: A Muscle-Forward Strategy for Clients on GLP-1 Agonists

In the era of GLP-1 receptor agonists (GLP-1 RAs), personal trainers face a new wave of clients experiencing rapid weight loss, but not always in the optimal areas. As more individuals turn to medications such as semaglutide and tirzepatide to manage obesity and type 2 diabetes, the focus has shifted from mere fat loss to the preservation of muscle mass. This evolving landscape positions personal trainers at the forefront of a crucial transformation in health coaching that prioritizes lean mass retention, performance nutrition, and resistance-based programming. Central to this movement is a vital truth: **muscle is the foundation of long-term health.**

This article explores the implications of GLP-1-induced appetite suppression on protein intake and muscle retention, providing trainers with actionable strategies to effectively support clients navigating the side effects of pharmacologically driven weight loss. We will discuss topics such as protein timing and supplementation, the importance of nutrient-dense calories, and the emerging approach of “non-hunger-based eating,” all while maintaining a muscle-centric philosophy.

Appetite Suppression and Protein: A Collision Course?

GLP-1 receptor agonists primarily suppress appetite and slow gastric emptying (Urva et al., 2020), creating an energy deficit that promotes weight loss. However, these mechanisms often significantly reduce total protein intake, putting lean muscle mass at risk. To make matters worse, GLP-1 RAs are frequently combined with hypocaloric diets that may not provide enough amino acids for muscle protein synthesis (Beavers et al.,

2018). Although these medications offer glycemic and cardiovascular benefits (Dalsgaard et al., 2017), their ability to preserve muscle remains uncertain at best.

Due to these physiological effects, here's what today's personal trainers need to understand: appetite suppression doesn't differentiate between calorie sources. Specifically, clients may lose their desire to eat, but that loss of appetite impacts protein intake just as much as sugar or saturated fats. The end result? A silent decline toward sarcopenia, especially if resistance training and strategic fueling are not maintained.

Protein Intake Targets: The New Baseline

The scientific literature indicates that protein intake exceeding 1.0 g/kg/day is vital for maintaining muscle mass during weight loss (Beavers et al., 2018). For clients on GLP-1s, targeting **1.2–1.6 g/kg/day** becomes not only optimal but essential. This recommendation aligns with findings from studies on older adults undergoing energy restriction, where higher protein diets improved muscle retention and mobility (Mason et al., 2013). While the timing of protein intake has long been debated, the unique appetite patterns of GLP-1 users require a practical approach: **prioritize protein in meals**, use **strategic supplementation**, and **refuel after training**.

Simply put, every bite counts when clients are limited to 1–2 meals per day because of suppressed appetite. Therefore, it's crucial that these individuals start with protein, end with protein, and front-load their intake earlier in the day when hunger is typically strongest.

Protein Supplementation: Convenience Meets Necessity

Due to the satiety effects of GLP-1 receptor agonists, many clients may find it challenging to consume large meals. This is where supplementation proves beneficial. High-quality whey, casein, or plant-based protein powders—ideally free from heavy metals and containing a minimum of 20–30g per serving—provide a low-volume, easily digestible option to fulfill daily protein requirements without overwhelming the digestive system.

In this context, supplementation is not just a matter of convenience; it holds clinical significance. To illustrate this concept, a controlled trial demonstrated that older adults on hypocaloric diets retained significantly more lean mass when following a nutritionally complete, higher-protein meal plan than those on standard diets (Beavers et al., 2018). In this regard, protein powders can act as "nutritional anchors" in such scenarios, particularly when whole food intake is inconsistent or inadequate.

Calorie Quality Over Calorie Quantity

Appetite suppression fundamentally changes the principles of nutrition. It shifts the focus from simply managing hunger to **maximizing nutrient density**. When calorie

intake decreases due to GLP-1 medications, it becomes crucial that each calorie offers more value. This requires a shift from thinking only about “macros” to emphasizing “micronutrient-rich macros,” prioritizing foods high in quality protein, vitamins, minerals, and bioavailable nutrients.

Consider options like wild-caught salmon, Greek yogurt, eggs, lean meats, legumes, and fermented dairy. These foods not only provide the essential amino acids needed for muscle protein synthesis but also support metabolic pathways vital for insulin sensitivity and mitochondrial health (Andreozzi et al., 2016).

In summary, trainers should focus on the functional qualities of food, not just its caloric content. This muscle-centered approach helps preserve and often enhance lean tissue.

Non-Hunger-Based Eating: Coaching for Compliance

Traditional fitness coaching often advises clients to “listen to their hunger cues.” However, for individuals using GLP-1 receptor agonists (RAs), these cues may be muted, delayed, or even absent altogether. Therefore, trainers need to adopt a new paradigm that emphasizes **non-hunger-based eating**.

This approach encourages clients to view nutrition as **a means of proactively fueling performance rather** than merely responding to hunger. Just as an athlete wouldn’t skip meals on game day due to a lack of appetite, clients on GLP-1s must learn to prioritize eating for strength, energy, and long-term health, even in the absence of hunger.

Here’s how to coach it:

- **When feasible, schedule meals** instead of waiting for hunger to arise.
- **Anchor meals with protein**, then fill in with fibrous vegetables and healthy fats.
- **Use high-quality protein shakes strategically** after training or during midday lulls.
- **Track intake**, not just weight, to meet daily protein targets.
- **Frame eating as self-care**, not as indulgence, especially for high-performing clients who prioritize every other area of their life.

The Long-Term Vision: Muscle as a Metabolic Organ

Trainers hold significant influence in shaping the public narrative surrounding GLP-1s. Rather than concentrating solely on weight loss, we should shift our focus to **muscle retention, metabolic health, and functional capacity**. Skeletal muscle is more than just a passive structure; it functions as an endocrine organ that regulates blood sugar levels, produces myokines, and serves as the body's largest site for glucose uptake (Jiao et al., 2024; Andreozzi et al., 2016).

Without a deliberate emphasis on resistance training and adequate protein intake, individuals using GLP-1s may risk becoming "smaller but weaker"—a paradox that could ultimately deteriorate metabolic health over time. As a result, trainers who advocate for this perspective can offer clients sustainable, science-based frameworks that not only help maintain lean muscle mass but also unlock the full benefits of GLP-1 pharmacotherapy.

Final Thoughts: Precision Coaching for a New Era

As the use of GLP-1 RAs becomes more common, personal trainers must adapt their coaching strategies to meet the needs of this unique population. Appetite suppression, while beneficial for fat loss, creates an environment ripe for muscle loss if protein intake and resistance training are neglected.

By focusing on protein-first eating, non-hunger-based nutrition strategies, and performance-based supplementation, trainers can help clients **retain strength, preserve function, and sustain results**. In this new metabolic frontier, muscle is the metric that matters most, and trainers are the guides who will help clients protect it!

Can Consuming Molecular Hydrogen Supercharge Your Fitness and Health?

Hydrogen, the smallest yet most potent molecule in the biochemical world, now seems to hold the promise of revolutionizing both health and fitness arenas. In this article, we will explore the science behind hydrogen’s powerful antioxidant/anti-inflammatory properties as well as its purported role in reducing fatigue, enhancing endurance, optimizing cellular energy, and accelerating post-workout recovery. We will also touch on the potentially deleterious side effects of which to remain aware before delving into the use of gaseous/aqueous hydrogen.

The Small but Mighty Molecule

Whether obtained through gas-enhanced inhalation, dietary supplements, or specially treated water solutions, hydrogen recently began proving itself as a convincing strategy for performance enhancement, not only for elite athletes but also in exercise physiology and general medicine/wellbeing. Hydrogen has demonstrated the ability to boost exercise capacity in both animal and human studies.

Scientists believe this benefit stems from the molecule’s antioxidant and anti-inflammatory properties; some feel it relates more to a shifting of the body’s anabolic hormones. Consumption of hydrogen-rich water can alter circulating levels of blood glucose and insulin, most likely brought on by enhanced expression of fibroblast growth factor 21 (FGF21), a metabolic hormone known for boosting the body’s response to

insulin and glucose clearance. One hypothesis that has gained traction links these effects with better energy utilization and exercise performance.

Hydrogen Water Defined

The chemical formula for water, H_2O, acknowledges its makeup of 2 hydrogen atoms and 1 oxygen atom; hydrogen water, as the name implies, simply contains additional molecules of hydrogen. The concept originated many years ago in Japan, where individuals prepared what they referred to as a shin'nooru solution. Manufacturers create this solution by adding hydrogen tablets to water, or using specialized devices that infuse the water with hydrogen gas.

“Water already contains hydrogen, but hydrogen water is made by bubbling pure hydrogen gas into water,” says Gill Tietz, an adjunct chemistry professor at Wentworth Institute of Technology in Boston. “It can also be made with electrolysis, which uses electricity to split water into hydrogen and oxygen.”

Athletic Evidence

One research study revealed that hydration with 1.5 L/day of hydrogen-rich water (containing between 0.92–1.02 mM of hydrogen) significantly reduced the blood lactate levels of male soccer players. The additional hydrogen also led to improvements in the typically observed decline of muscle function, which often accompanies bouts of extreme exercise.

Understanding Oxidative Stress

When an athlete engages in intense exercise, the body naturally generates substances called reactive species, chemicals that result from the metabolism of oxygen. Reactive species and antioxidants typically remain in homeostasis within the body. However, when this balance gets thrown off-course, and the reactive species exceeds the antioxidants, oxidative stress occurs in the body.

Exercise-induced oxidative stress can cause the following symptoms ~

- Muscle fatigue/damage
- Inflammation
- Delayed-onset muscle soreness (DOMS)

Since oxidative stress damages the mitochondria (the cell’s energy-producing powerhouse) and hampers high-performance abilities of the body, athletes have begun turning to hydrogen-infused water products to increase their antioxidant response and boost the body’s aerobic and anaerobic responses.

Supporting Post-Workout Recovery

Intense workouts often leave behind damaged muscle tissue, a result of oxidative stress. Studies show that molecular hydrogen helps mitigate this effect. By reducing harmful free radicals, hydrogen water actually attenuates inflammation, thereby hastening the muscle tissues' ability to repair.

As all athletes know, delayed onset muscle soreness (DOMS) often wreaks havoc with back-to-back training days. Since hydrogen water reduces the severity of DOMS, individuals often experience less muscle soreness/stiffness the day following an intense training session, leaving them feeling ready to face the next day's gym challenges.

Boosting Energy and Endurance

As mentioned above, mitochondria have control over fueling the body's energy. However, during high-intensity exercise, they also have the capacity to produce oxidative stress as a byproduct, which can negatively affect an athlete's stamina. Molecular hydrogen protects mitochondria from this damage, allowing them to function optimally, enabling the athlete to power through tough workouts.

When it comes to deriving the most benefit from molecular hydrogen-infused water, the timing of consumption does matter to a certain degree. Consider adding hydrogen water in the following ways ~

- **After a Workout:** Drinking hydrogen water within 30-60 minutes after completing a workout can help reduce inflammation and foster recovery. This enables the individual to face the next workout replenished and refreshed with a minimum of soreness.
- **Before Exercising:** Drinking hydrogen water prior to a workout can help increase endurance, allowing for a longer bout of exercise without fatiguing quite as quickly. By also helping the body handle workouts more efficiently, an athlete may feel like he can push himself a bit further.
- **Everyday Drinking:** Drinking hydrogen-enhanced water throughout the day provides quality hydration and supports overall health. The more consistently one adheres to this commitment, the more benefits will appear over time.

Benefits Beyond Ingestion

One may derive benefits from hydrogen-enhanced water in ways that do not include oral consumption; some have suggested that bathing in it confers measurable value as well. A few studies have shown that hydrogen water helps the skin, particularly for those battling the chronic inflammatory condition of psoriasis. One small study noted that eight weeks of bathing in hydrogen water led to significant skin improvements for these patients, with a quarter of the participants seeing at least a 75% improvement.

The Potential Side Effects of Hydrogen Water

The majority of evidence accumulated to date suggests that hydrogen-infused water does not pose overt or severe health ramifications with regular use, yielding no known toxic effects. However, like any novel “wellness” product, one ought to consider and understand the side effects of hydrogen water, even those rare or mild occurrences. Some users have reported occasional discomfort, especially when consuming large volumes of water.

Below we list a few of the more commonly reported side effects ~

- mild gastrointestinal discomfort
- bloating
- nausea
- diarrhea

These symptoms may occur when the user tries hydrogen water for the first time and/or starts off ingesting large amounts fairly quickly.

In rare cases, some people report mild fatigue or a bit of lightheadedness when they first start drinking hydrogen-rich water. This temporary effect simply reflects the body’s way of adjusting to changes in serum antioxidant levels or metabolism.

Although scientific data and evidence remain scarce, the theoretical possibility exists that the antioxidant properties inherent in molecular hydrogen could interact with prescription medications that also modulate oxidative stress, such as chemotherapy drugs or other immunosuppressants. Individuals can consult with a physician or pharmacist to make sure nothing will interfere with a current course of medical treatment.

Hydrogen gas is produced naturally by gut bacteria in response to the consumption of certain foods. Introducing additional hydrogen molecules directly could potentially exacerbate gas/bloating in some individuals, especially those living with irritable bowel syndrome (IBS) or gut dysbiosis.

Inhalation Therapy

A big concern for athletes who consume large quantities of hydrogen water stems from the very real chance of inducing hyponatremia, a condition of low sodium levels in the bloodstream. Excessive fluid overconsumption can dilute sodium levels to the point of inducing fatigue, mental confusion, headache, and diminished athletic performance.

To that end, individuals have begun experimenting with gaseous hydrogen. Hydrogen inhalation therapy involves breathing hydrogen gas directly through a nasal cannula or mask. Since this method of delivery allows for absorption through the lungs, the hydrogen fuses into the bloodstream, brain, and sensitive tissues more rapidly than

when ingested. This method also ensures a higher and more consistent concentration of molecular hydrogen entering the body as compared to drinking hydrogen water, making it better suited for therapeutic use. According to Dr. Youn Sung Lee, a hydrogen therapy researcher, one single inhalation session can deliver the equivalent of 144 grams of hydrogen, which far exceeds the 1.6 milligrams per liter found in most hydrogen water products. This makes inhalation ideal for those seeking stronger therapeutic effects, such as when managing chronic conditions like arthritis or supporting recovery from heavy workouts.

One research study evaluated the effects of a week's worth of gaseous hydrogen inhalation on exercise performance s. The subjects, both male and female, ranged in age from 22-23 years. Participants received either gaseous 4 % hydrogen or room air via a 20-minute, 1x/day inhalation for 7 days.

Breathing 4% hydrogen for 20 minutes per day resulted in elevating the subjects' peak running velocity, in some cases by as much as 4.2%, compared to the control group who inhaled regular room air. Inhalation of gaseous hydrogen, therefore, appears to show ergogenic properties in healthy individuals.

Increasing Cognitive Properties

Therapeutic molecular hydrogen has been reported to confer neuroprotective effects on the body, most likely due to its antioxidant properties. However, the effects of hydrogen on cognitive impairment due to age-related brain alterations and the underlying mechanisms therein have not garnered much research attention. One study sought to investigate the efficacy of drinking hydrogen water in an effort to prevent or slow spatial memory decline and age-related brain alterations, using the mouse model known as senescence-accelerated prone mouse 8 (SAMP8); this breed typically exhibits early aging symptoms, including declining learning ability and memory.

Treatment with hydrogen water for 30 days prevented age-related declines in cognitive ability and also aligned with increased levels of serotonin in the brain, as well as an uptick in serum antioxidant activity. In addition, drinking hydrogen water for 18 weeks inhibited neurodegeneration within the hippocampus region of the brain, while the control group exhibited a dramatic loss of neurons.

The interplay of multiple mechanisms can lead to the development of later-in-life memory impairment, including age-related alterations in the central nervous system. This may contribute to neuronal cell damage, owing to an increase in reactive oxygen species (ROS). As discussed previously, when ROS formation outpaces the antioxidant defense system, problems ensue. As humans who remain fit longer can expect or at least hope for an increased life span, the need to minimize the development of cognitive defects in the elderly population remains vital.

Recent evidence suggests that molecular hydrogen potentially protects the central nervous system by eliminating ROS. More recently, hydrogen-infused drinking water

reduced the dopaminergic neuronal loss in the mouse model of Parkinson's disease. Further research will aid in the understanding of these processes and ideally secure the ability to capitalize on hydrogen water as a therapeutic treatment.

Weight Training and Power Output

In addition to its many other accolades, recent studies on hydrogen-rich water have explored the potential impact on athletic performance related to resistance training, power production, and muscular strength.

One research study addressed the effects of hydrogen water supplementation -- before, during, and after resistance training -- on muscular endurance performance and neuromuscular status, culling the subjects' perceptual responses after a 48-hour recovery period. At the conclusion of 8 days of this intermittent supplementation, scientists noted significant improvement in the muscular endurance performance of the subjects.

Another study conducted in 2019 found that consumption of hydrogen-rich water by athletic subjects resulted in a substantial drop in serum lactate levels during exercise. These findings seem to suggest that hydrogen-rich water might play a key role in optimizing respiratory function, increasing performance output, and reducing fatigue during intense activities.

While the exact mechanisms behind hydrogen water's role in enhancing strength and power still need further research data, scientists already believe it may once again hinge on those all-important antioxidant properties.

Improving the Quality of Life for Cancer Patients

Moving from the gym to the medical setting, hydrogen-enhanced water solutions show promise in improving the quality of life for individuals undergoing cancer treatments, especially radiation. Some of the more common side effects of radiation therapy include ~

- Fatigue
- Hair loss
- Headaches
- Soreness/skin problems in the treated area
- Nausea

One study involving 49 liver cancer patients showed how consumption of hydrogen-rich water for 6 weeks during radiation therapy greatly improved the quality of life for these individuals. In particular, the water supplementation seemed to offset many of the negative effects of daily radiation treatments. Similarly, patients living with chronic kidney disease and undergoing dialysis showed improved renal function and less fatigue when regularly consuming hydrogen water.

Mitigating Metabolic Syndrome

A diagnosis of metabolic syndrome often leaves such individuals prone to developing heart disease, diabetes, and suffering a stroke. Metabolic syndrome occurs when 3 or more of the following symptoms present themselves concurrently ~

- Elevated triglyceride level
- Hyperglycemia (high blood sugar)
- Hypertension (high blood pressure
- A large waist circumference
- Low levels of high-density lipoprotein (HDL, or “good”) cholesterol

One study found that the above-mentioned markers of metabolic health improved for patients following a 24-week regimen of high-concentration hydrogen water supplementation. While medical professionals warn that hydrogen-enhanced solutions should not replace traditional treatment for metabolic syndrome, they could serve as a helpful adjuvant therapy.

While all of this data and anecdotal evidence indeed sound promising, many of the studies we have outlined in this article only included a small number of subjects. “Research is still extremely limited,” says Kristen Carli, a Registered Dietitian and the owner of Camelback Nutrition and Wellness in Gilbert, Arizona. “Hydrogen water won’t hurt your health, but high-quality studies with large sample sizes and control groups, ideally that look at long-term effects, are needed to determine if hydrogen water truly offers a health benefit.”

Hydrogen water does get absorbed efficiently, which facilitates hydration at the cellular level. For athletes, especially, such consumption will not merely quench their thirst but also more effectively push nutrients and fluids into their muscles. Better hydration does not merely support recovery; it optimizes endurance and performance, making it a promising strategy for athletes or fitness enthusiasts looking to gain an edge during resistance training or competitions.

Is Apple Cider Vinegar Really Good for You? Evidence, Benefits, and Risks

Apple Cider Vinegar (ACV) is a widely used traditional remedy and wellness product. Made by fermenting crushed apples with yeast and sugar, ACV is commonly used in cooking—especially in salad dressings, marinades, and pickling (Benisek, 2024). So, why are athletes and fit pros using it for weight loss, digestion, and other such benefits?

Historically, it's been valued in traditional medicine for its antimicrobial properties and digestive support. Recent studies suggest it may provide tangible health benefits, such as lowering blood sugar and aiding in weight management (Jafarirad et al., 2023). This CEC covers ACV's real benefits and risks, its composition, the reasons behind its effectiveness, contraindications, and when to seek medical guidance for either topical or internal use.

What Is Apple Cider Vinegar?

ACV is a vinegar derived from fermented apple juice, known for its strong aroma, tangy taste, and potential health applications (Cleveland Clinic, 2025).

To understand ACV more fully, it's helpful to look at how it's made. The process begins by extracting juice from crushed apples. There's a first fermentation stage where yeast converts the juice's natural sugars into alcohol. A second fermentation follows, in which bacteria transform the alcohol into acetic acid. This is ACV's key active compound, responsible for its sour taste and the majority of its health effects (Cleveland Clinic, 2025; Jafarirad et al., 2023).

In addition to acetic acid, ACV contains water, antioxidants, and trace nutrients from apples, including (Benisek, 2024):

- Calcium
- Magnesium
- Potassium
- Phosphorus

Raw, unfiltered ACV also contains "The Mother", a cloudy substance made up of beneficial bacteria, proteins, and enzymes. This component is believed to offer added health benefits (Cleveland Clinic, 2025; Jafarirad et al., 2023).

Common Uses of ACV

ACV is versatile. It's used not only in culinary applications like salad dressings and marinades but also as a natural cleaner and skin treatment. It may support digestion, regulate blood sugar, and aid in weight management (Benisek, 2024; Cleveland Clinic, 2025).

Types of Apple Cider Vinegar

Raw/Unfiltered

This form contains "The Mother" and is unprocessed, retaining probiotics and nutrients. It appears cloudy and may have sediment at the bottom. Brands like Bragg and Dynamic Health offer this type. While beneficial for detox drinks, cooking, and natural

remedies, it has a shorter shelf life and a strong taste that some may find off-putting (Benisek, 2024).

Filtered

Filtered ACV is clear and free of sediment due to the removal of The Mother via filtration. Though it has a longer shelf life and milder taste, it lacks many of the probiotics and nutrients present in raw ACV. For this reason, it's mainly used in food preparation and cleaning (Benisek, 2024).

Pasteurized

Pasteurized ACV is heat-treated to eliminate all bacteria, including beneficial ones. It may be filtered or unfiltered, but it is typically clearer (transparent). It’s ideal for food preservation and safe for people with compromised immune systems. However, it is not typically used for health remedies, as it lacks enzymes and probiotics (Benisek, 2024).

Health Benefits of Apple Cider Vinegar

Emerging research supports several health claims associated with ACV. For example, studies in animals suggest acetic acid can reduce fat storage and improve metabolism. A notable human study involving 175 participants found that those who consumed 1–2 tablespoons of ACV daily experienced modest weight loss and improved triglyceride levels over three months (Harvard Health, 2023).

ACV also promotes digestive health by supporting enzymatic activity. While ACV itself isn't an enzyme, it creates optimal conditions in the stomach for digestive enzymes like pepsin (protein), amylase (carbohydrates), and lipase (fats) to function efficiently (Urbinati et al., 2021) due to its impact on the pH in the human body.

Other possible benefits include (Harvard Health, 2023; Jafarirad et al., 2023):

- Improved insulin sensitivity
- Reduced blood sugar spikes
- Appetite suppression
- Potential support for cholesterol and blood pressure levels

ACV also has traditional uses in skincare and household cleaning.

Evidence-Based Claims

Scientific research continues to validate ACV’s (Jafarirad et al., 2023; Mcdonald, 2018):

- Support for blood sugar regulation
- Modest impact on weight loss

- Contribution to digestive enzyme function
- Possible role in fat metabolism and satiety

Risks and Side Effects

Despite its benefits, ACV can have drawbacks (Mayo Clinic, 2025):

- **Tooth Enamel Erosion**: The high acidity can weaken tooth enamel if consumed undiluted.
- **Digestive Discomfort**: Some may experience nausea or heartburn, especially with a sensitive stomach.
- **Medication Interactions**: Individuals taking insulin, diuretics, or other medications should consult a healthcare provider before regular use.
- **Skin Irritation**: When used topically, especially undiluted, ACV can cause burns or irritation.
- **Contraindications**: Not recommended for individuals with ulcers or acid reflux unless advised by a healthcare professional.

How to Use ACV Safely

- **Internal Use**: Dilute 1–2 tablespoons in 8 ounces of water. Avoid drinking it straight.
- **Topical Use**: Always dilute and perform a patch test before applying to larger areas of skin.
- **Best Timing**: Take diluted ACV before meals or mix it into salad dressings.
- **Storage**: Raw, organic ACV should be stored in a cool, dark place.

Apple Cider Vinegar may offer several health benefits, including improved digestion, weight management, and blood sugar control. However, its use is not without risks, particularly if consumed undiluted or used improperly. Individuals taking certain medications or those with underlying health issues should consult a medical professional before use.

Among the three types of ACV, raw/unfiltered is most commonly used for health-related purposes due to its content of probiotics and enzymes ("The Mother"). While it has a shorter shelf life, it is preferred for natural remedies. Filtered and pasteurized varieties are better suited for culinary and cleaning purposes.

Hypertrophy Training: A Guide to Building Lean Body Mass

Hypertrophy training is a workout program focusing on the enlargement of skeletal muscle using high volume (reps and sets) with minimal rest. Even if your goal isn’t to

increase the size of your triceps and biceps, building muscle offers health benefits and weight loss advantages. Therefore, this type of strength training is great to incorporate into almost any training program. Muscle growth occurs with a repetition range of 8 to 12 at 80% of your one rep max (1RM), allowing 30 seconds of rest between each set.

Hypertrophy training, then, is different from training for maximal strength gains. Conversely, some want to lose weight and are fearful that resistance training will give them unwanted muscle growth. But training for weight loss is different from training for hypertrophy. Therefore, if you develop programs according to the science of adaptations occurring in the body, you can rest assured you'll get great fitness results. First, it's important to understand how lean body mass, muscle, grows. Then you can apply the basics of how to develop a workout plan and get the best muscular hypertrophy program possible.

How Does Hypertrophy Training Work?

Resistance training workouts that are high volume and minimal rest in between sets cause cellular changes that make muscle cells larger. Muscle cells are also called myocytes or muscle fibers. The two primary cellular changes with this type of activity are an increase in myofibrils and an increase in sarcoplasmic fluid.

Myofibrils are bundles of protein filaments that contain the contractile elements of the muscle. These contractile elements are called actin and myosin. And, when they overlap, they cause muscular contraction to occur. Likewise, when they lengthen out, they cause muscle relaxation.

The other factor impacting muscle size growth is the increase in sarcoplasmic fluid. Sarcoplasmic fluid is an energy resource that surrounds the myofibrils in the muscles. It contains ATP, glycogen, creatine phosphate, and water. Therefore, during a good hypertrophy training workout, more of this fluid moves to the muscle cells. It does this to supply the muscle with the energy it needs to do the exercise.

There are two exercise physiology concepts related to why muscles get larger. The first concept is muscle fiber type. There are two main categories of muscle fiber types, with the second one having two subcategories. The second involves energy resources the body uses to produce movement. This is bioenergetics.

Muscle Fiber Type

The two muscle fiber types are type I and type II. Type I muscle fibers are slow to fatigue. This means they're involved in ongoing movements like walking. Type II muscle fibers are quick to fatigue but can produce more force. For this reason, they are called fast-twitch muscle fibers.

Type II muscle fibers are larger in size and can be either type IIa or type IIx. Type IIa muscle fibers can be intermediary. This means they can use both aerobic and anaerobic energy sources (metabolism), whereas type IIx only uses anaerobic energy resources. Type IIa muscle fibers have an increase in the cross-sectional area size that's larger than the other muscle fiber types. Therefore, these muscle fibers are the ones exercisers are training when they want bigger muscles.

Hypertrophy training increases the size of the muscle cell. There is also an increase in the number of contractile proteins found in the cell. It is not, however, an increase in the number of muscle fibers. This is determined at birth and by genetics.

Next, understanding how the body uses energy to produce movement helps to narrow down how you need to train if the goal is to increase muscle size.

Energy Source Continuum

There are three ways the body uses energy. This is important in hypertrophy training program design because it helps you know the details of sets, reps, and rest. While you don't need to know the specific steps in how these energy pathways work, you do need to know the:

- Energy source
- Duration
- Recovery needed for replenishment
- Exercise or movement examples

This is the bioenergetic continuum.

Energy Pathway	Oxygen Requirement	Duration	Muscle Fiber Type	Activity Type	Example
ATP-CP	Anaerobic	10 – 15 seconds 1 – 4 repetitions	Type IIx	High Intensity, Short Duration	100m Sprint, High Jump, Baseball Swing
Glycolytic	Anaerobic/Aerobic	30 – 50 seconds 8 – 12 repetitions	Type IIa	Moderately High Intensity and Duration	400m Sprint, Basketball
Oxidative	Aerobic	>60 seconds 12+	Type I	Low Intensity and Long	Marathon, 20 Mile Bike Ride

		repetitions		Duration	

Type IIa muscle fibers have the greatest size potential, means a hypertrophy workout should include compound exercises that target them. These muscle fibers are recruited during moderately intense exercise for 30 to 50 seconds. If the tempo of an exercise is two seconds down and two seconds up, one repetition is a total of four seconds. This is how the repetition range is determined and why clients should be training at an intensity great enough that they can only perform 6 to 12 repetitions.

Developing A Hypertrophy Training Workout Program

To develop a results-oriented program for hypertrophy, you'll adjust acute variables of the workout. These include sets, reps, rest, and more. However, before making these recommendations, you have to start with a comprehensive fitness assessment.

Fitness Assessments In Hypertrophy Planning

Before developing any kind of strength training program, do a comprehensive fitness assessment. Some will want to increase muscle size and lose body fat at the same time. Although this is possible, the body is more efficient at achieving one goal rather than two.

Additionally, the parameters for hypertrophy training are different from a weight loss program. It isn't that clients can't lose weight while training for hypertrophy. Instead, it's that they'll see scale numbers change faster if they hold off on training for muscle growth.

Implementing the right hypertrophy nutrition strategy is even more complex if attempting to both lose body fat and grow in lean body mass at the same time. For weight loss to occur, the body needs to be in an energy, or calorie, deficit. Conversely, to increase in size, it needs to be in an energy-neutral or energy-surplus state with adequate protein intake. For these reasons, determine which is more important first.

If hypertrophy is the most important goal, keep the assessment focused on measurements that you can tie directly to this outcome. You should include body composition testing and circumference measurements. However, other assessments are important for this type of programming as well. For example, you'll need to know the one rep max (1RM). This will help you determine the load for the different exercises. Without this number, you'll be guessing when you decide on the weight for different exercises. The most important 1RM muscular strength exercises include a squat, chest press, and row.

Sets, Reps, And Rest For Muscular Development

Since type IIa muscles are the largest and have the greatest capacity for enlargement, they'll be recruited during the glycolytic pathway. To recruit the type IIa muscle fibers, you have to lift at an intensity level of 75 – 85% with the muscle under tension for 30 to 60 seconds. This equates to a 6 to 12 repetition range. To prevent the muscle cells from using the oxidative pathway to produce energy, the timed rest interval should be about 60 seconds between exercises. For example, if you do a bench press and the next exercise is a chest fly, rest at least 60 seconds. However, if it involves opposing muscle groups or muscles of a different joint, the rest can be shorter.

Training Volume For Muscular Development

Calculating training volume can be based on the muscle group being worked or the training session. Those who are looking for muscular development will commonly work similar muscle groups during a session. More importantly, to determine training volume, it's best to be exact and calculate it according to the body part being trained. Therefore, volume is:

[Number of Reps x Number of Sets] x Number of Exercises per Body Part

Muscular development gains are achieved with high levels of training volume and minimal rest periods will force the cellular changes that need to occur for muscle size increase. The training volume recommendations for muscular development include:

Reps	Sets	Intensity	Tempo	Rest	Number of Exercises
6 – 12	3 – 5	75 – 85%	Moderate	30 – 60 seconds	2 – 4 per body part

Exercise Selection in Program Design

Selecting exercises for hypertrophy begins with knowing the current capability level. This includes posture, stabilization, and technique capabilities. Consider a deconditioned person who wants to gain muscle size, but he doesn't know how to correctly perform a bench press. This individual will have to go through some initial technique and skill development first for motor learning to occur. This can happen by using programs and workouts for functional fitness. After one to four weeks, progress to exercises and a workout routine for building muscle size.

Once you can handle more stress, choose either compound exercises or isolation exercises. A compound exercise has more than one major muscle group responsible for the motion. For example, a squat is an example of a compound exercise. Whereas an isolation exercise targets just one muscle group, like a leg extension.

Because of the moderately high intensity needed to develop muscle cell size, the exercises should be relatively stable. This way, you can put as much tension as possible in the primary muscles rather than the stabilizers. For example, instead of performing a push up on a stability ball, perform a bench press. The stability ball push-up will tax the core stabilization mechanism of the body. Further, the proprioceptive demand from the moving stability ball will dilute the tension from the pectorals and distribute it elsewhere. This type of training, however, can lead to greater strength gains for other reasons and can be included as part of a periodized program. However, for a traditional hypertrophy training session, keep the exercises stabilized and supported.

Then, there are different ways to group the exercises chosen in each session. These groupings include:

- **Pushing versus pulling muscles.** Here, you can group the pushing muscles into one training session and focus only on the chest, shoulders, and triceps. Conversely, you can alternate exercises within the session to do a pushing exercise and then a pulling exercise. The opposing muscle groups in this example maximize time in the training session and reduce time spent resting.

- **Upper body versus lower body muscles**. Similar to the pushing and pulling example, you can do upper-body exercises and alternate with lower-body exercises. Performing these right after one another will provide gains seen in cardiorespiratory training, but allow rest for the muscle cells.

- **Total body circuit training.** In this example, you target each major muscle group in a strength training session. It's difficult to meet the volume demands of muscle development, however. And this type of grouping is more often used in general fitness training or weight loss training.

When grouping exercises and planning workouts for the week, the hypertrophy research recommends targeting each major muscle group twice per week and allowing at least a 48-hour window of recovery time. See the table below for a sample structure.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Pushing	Pulling	Glutes and Hamstrings	Quads and Calves	OFF	Pushing	Pulling

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Glutes and Hamstrings	Quads and Calves	OFF	Pushing	Pulling	Glutes and Hamstrings	Quads and Calves

Resistance Training Systems

There are different ways to structure a workout that sometimes do or do not adhere to the traditional standards of muscular development. While most have research supporting different gains, it's important to note that the differences these types of resistance training systems will make are minimal. What's far more important is programming workouts that are:

- Physiologically effective
- Achievable
- Add motivation to the workout

Part of the art of coaching and program design is creating a system that your client can stick with, find mastery in, enjoy, and achieve results. For many, this includes providing variety in the structure of a workout. The following are different ways to structure a muscular development resistance training program.

- Vertical loading.
- Horizontal loading.
- Peripheral heart action.
- Eccentric loading.
- Pre-exhaustion.
- Post-exhaustion.
- Pyramid training.
- Reverse pyramid.

Sample Hypertrophy Workouts

Alternate Push and Pull	**Sets**	**Rep**	**Intensity**	**Rest**
Bench Press	2 – 4	6 – 12	75 – 85%	30s
Lat Pull	2 – 4	6 – 12	75 – 85%	30s
Bench Chest Fly	2 – 4	6 – 12	75 – 85%	30s
Overhead Lat Pull	2 – 4	6 – 12	75 – 85%	30s
				Rest 60s after 3 sets
Incline Chest Press		10		60s
Cable Row		20		60s

Speed Lunges Right		12		
Speed Lunges Left		12		
				Rest after 3 sets

In conclusion, if you have a goal of increasing muscle size, there needs to be a focus on high volume, moderate intensity, and lower rest to make the cellular changes. Muscle size grows as a result of the recruitment of type IIa muscle fibers, which have the greatest capacity for growth. While there are different ways a personal trainer can piece together a workout, the results will be more based on the ability to comply with the workout. Therefore, muscular development workouts that keep you mentally stimulated while also giving opportunities for mastery will yield the best results.

A Fresh Take on METCON Workouts

If personal trainers find their regular clients growing bored with traditional resistance training and aerobic/HIIT programs, try introducing a cycle of METCON workouts. In this article, we will delve into what makes metabolic training so successful, including exploring the different energy pathways the body utilizes to optimize these routines.

An Overview of METCON

METCON, short for metabolic conditioning, differs greatly from traditional weightlifting and aerobic exercise in that it involves challenging and at times fast-paced interval training. By easing away from long, tedious sessions on a treadmill, athletes discover renewed interest, vigor, fun, and variety. The ultimate goal of metabolic conditioning lies in training the body to achieve a greater efficiency at burning calories.

Perhaps the biggest asset of METCON training plays out in its ability to bring about a significant uptick in metabolism. A typical cardiovascular workout, while beneficial for one’s lungs and heart, does not burn much in the way of adipose tissue. METCON workouts may not burn much during the time spent in the gym; however, the elevation of metabolism lasts for hours or sometimes days following the training session. Knowing this tremendous payoff in advance of the workout helps many individuals push through the intensity.

In terms of accruing lean muscle mass, any workout that requires the athlete to push his body to its limits will almost always facilitate the addition of lean muscle tissue when paired with proper nutrition and appropriate rest. Many serious bodybuilders fear losing their hard-earned muscle tissue as they “lean out” before a competition, a definite risk of extended periods of low-intensity aerobic workouts. With a METCON workout, one can preserve muscle while simultaneously increasing metabolism.

Basic Elements of a METCON Workout

Customizing a METCON workout to a client's preferences and skill level makes it very appealing. So many variables exist upon which to build a workout, and combinations of bodyweight moves, equipment, and pacing mean one can consistently evolve and grow with METCON.

Here we present a list of some of the more common and basic elements of a typical METCON training session:

1. **Resistance training ~** Circuit-style conditioning utilizes equipment such as barbells, dumbbells, kettlebells, and medicine balls, among others. By training for strength or power, one can add lean muscle mass in a relatively short amount of time.
2. **Cardiovascular conditioning** ~ A typical METCON workout may include running, sprinting, biking, shuttle runs, swimming, rowers, and step machines; engaging in both short-burst interval styles and steady-state conditioning works to elevate the metabolism.
3. **Hybrid conditioning** ~ Switching between cardiovascular exercises and strength training moves challenges the body while making sure the athlete never gets bored. In addition, the variations make this workout style extremely customizable.
4. **Making use of bodyweight ~** the acts of lifting one's body, pulling/pushing off the floor, up to the ceiling, or over a bar require a tremendous amount of strength and power. Pull-ups, chin-ups, TRX rows, bench dips, push-ups, and crunches/planks figure prominently in these workouts.
5. **Peripheral heart action training (PHA) ~ This term refers to the movement of blood** to and from peripheral limbs, alternating upper and lower body exercises repeatedly in an effort to force the heart to work at a higher intensity.
6. **Training for speed** ~ Many METCON programs follow the design of exercises performed for time. Speed becomes the factor of concern; however, maintaining proper form and technique tops the priority list to ensure injury-free success.
7. **Training for completion** ~ Some athletes prefer to challenge themselves to complete a specific number of reps per exercise, for a designated number of rounds. Progress comes when the athlete needs fewer rest breaks between exercises and/or can increase the weight utilized in an exercise.

The Body's 3 Energy Systems

Metabolic conditioning provides a dynamic workout that taps into all three of the body's metabolic systems. According to Peloton instructor Ben Alldis, "METCONs often involve a combination of strength training, cardiovascular exercises, and high-intensity intervals in a structured and systematic way to enhance overall metabolic efficiency. The focus is not only on cardiovascular fitness, but also on building strength, endurance, and improving the body's ability to utilize energy efficiently."

The human body relies on 3 unique systems to store energy as well as release it: the phosphagen system, the glycolytic pathway, and the oxidative pathway. “Metabolic conditioning workouts often alternate different exercises or groups of exercises to work between high and moderate intensities and work the aerobic and anaerobic energy systems,” says Alex Rothstein, exercise physiologist and program coordinator of Exercise Science at the New York Institute of Technology. Rothstein adds, “All three systems are always working, but the percentages of energy that come from each vary depending on our body’s needs.”

We can break down which energy system functions during which aspect of a METCON training session ~

- **Phosphagen system**: Used during short bursts of speed/power
- **Glycolytic system**: Used during exercise lasting anywhere from 15 seconds to 3 minutes, typically for speed
- **Oxidative system**: Used during exercise performed at lower intensity and for a longer duration, such as an aerobics class; it kicks in after the other two energy systems fatigue.

It helps to clarify these systems in terms of the type of METCON workout one chooses, often based on time, ability, and goals.

1. **Less exercise, more rest**: Exercises with a work-to-rest ratio of, for example, sprinting for 10 seconds followed by a 2-minute rest, will activate the phosphagen system. This anaerobic system makes use of creatine phosphate to produce energy in the form of adenosine triphosphate (ATP). The phosphagen system responds quickly and works well for short bursts of high energy, but requires more recovery time. A typical exercise-to-rest ratio can vary from 1:12 to 1:20.
2. **Medium exercise, medium rest**: Exercises such as weightlifting or strength training for 60 seconds followed by a 5-minute rest period will make use of the glycolytic system, which requires the presence of adequate glucose or carbs to produce ATP. The glycolytic system kicks in after about 10 seconds’ worth of work in the phosphagen system; this pathway has longer “staying power” before requiring a rest period. Exercises that train the glycolytic system often have ratios of 1:3 or 1:5.
3. **More exercise, less rest**: Longer-duration cardio exercises such as running need to utilize the body’s oxidative system, an aerobic system that uses carbs, fat, and oxygen to produce ATP. Here we find the highest endurance of the three energy systems, and it takes over when the activity requires a long-distance effort. Such exercises have ratios of 1:2, 1:1, or 2:1.

Pros and Cons of a METCON Workout

Any well-designed and properly supervised METCON workout can offer an athlete a multitude of benefits ~

- Mental resilience, determination, and fortitude
- Uptick in excess post-exercise oxygen consumption (EPOC), also known as the afterburn
- Improved cardiovascular health
- Increased strength and endurance
- Boost in metabolic rate/calorie burning efficiency

However, metabolic conditioning can likewise present a few drawbacks ~

- **Too vague:** easily confused with HIIT, not knowing exactly which energy system to target, etc.
- **Not an isolated exercise routine:** most personal trainers suggest engaging in METCON workouts as an adjunct to more traditional modes of exercise, which proves difficult for athletes not working with a fitness professional.
- **Perfect form:** the inclusion of quick movements and speed-based reps found in METCON workouts still requires excellent form in order for the client to benefit completely from the exercises while also side-stepping injury. The requisite speed and intensity may also cause a flare-up of a pre-existing condition.

Metabolic Conditioning vs. HIIT

While both HIIT workouts and METCON training will offer a challenge to the cardiovascular system, the two styles do differ. HIIT alternates between high-intensity bursts and periods of rest, but METCON offers an approach that can address many aspects of metabolism and strength. The fundamentals of HIIT require the athlete to push their body maximally during short interval bursts, followed by a recovery period. METCON, on the other hand, incorporates every training protocol, thereby improving all of the body's energy systems and metabolic pathways.

Favorite METCON Exercises

While one has unlimited variety available in terms of program design, the following exercises figure prominently in a majority of METCON protocols ~

- Jump squats
- Push-ups
- Alternating reverse lunges
- Sprinting in place
- Dumbbell thrusters
- Walking lunges
- Goblet squats
- Lateral lunges
- Burpees

Most trainers guide their beginning clients towards adherence to the basics in terms of exercise choices. Beginning with bodyweight-only moves enables one to learn to pace

himself as he adjusts to this style of training. After mastering the basics, a trainer can seamlessly progress to either more advanced bodyweight-only movements or begin to include exercises that utilize weights.

As the client gains experience and confidence, the trainer can expand the repertoire of exercises, thereby providing a continuous challenge so that the client always makes progress. As mentioned above, focus of both trainer and client must center on proper form and technique, rather than on speed or accomplishing as many reps as possible with a time constraint.

Program Design

Any discussion on METCON training would not feel complete without the inclusion of some sample programs. Owing to the variability of this training style, the personal trainer can consider asking the following questions of his client, to serve as a starting point ~

1. What specific fitness goals do you have?
2. Would you like to target a specific energy system?
3. How much time would you like to spend executing each routine?
4. Do you have a preference for repeating tried-and-true comfortable motions or including a range of options?

After clearly defining the client's goals and preferences, we offer a few sample designs that personal trainers may wish to use as templates.

1. AMRAP (as many rounds as possible) in 12 minutes:

- 10 burpees
- 3 kettlebell swings (choose a moderate weight, or use a heavy object you can safely grip)
- 10 side-to-side jumps
- 10 box jumps or step-ups (using a plyo box or sturdy bench)

Perform all exercises back-to-back without rest. After completing one circuit, rest as little as possible (30-60 seconds) and begin again. Set a goal of completing as many rounds as possible within the 12-minute time frame (again, making sure form remains ideal).

2. Bodyweight EMOM (every minute on the minute) in 9 minutes:

- 8 jump squats
- 8 pull-ups
- 8 pushups
- 8 bicycle crunches
- 8 jumping lunges

- 8 burpees
- 8 hanging knee-raises
- 8 Russian twists
- 8 lunges

Before starting, set a one-minute timer. At the start of the minute, begin doing one of the exercises above. If it takes 35 seconds to complete, then rest for 25 seconds (the remainder of the minute). After the timer goes off, repeat the process with the second exercise, and on down the line in a similar fashion.

3. AMRAP/EMOM with weights in 12 minutes:

- 400-meter run
- 10 knee-highs
- 3 bench presses
- 20 jumping jacks
- 3 deadlifts
- 30 mountain climbers
- 3 squats
- 10 knee-highs
- 3 shoulder presses
- 20 jumping jacks
- 3 pull-ups
- 30 mountain climbers

Using either the AMRAP/EMOM format, perform each of the above exercises, modifying the workout to the client's fitness level and abilities. Here, you have the option of swapping out specific movements if the client wishes to target either his upper body or lower body. Trainers can also substitute exercises that make use of other equipment in the gym, such as kettlebells, medicine balls, or dumbbells.

Among the many important points to remember when engaging in a METCON workout, a personal trainer must help their client pace themselves; the goal of completing the workout must mesh with challenging oneself while also maintaining good form. Before starting any program, walk through the moves with the client so that he may familiarize himself with form, technique, range of motion, injury prevention, and transitioning smoothly from one move to the next.

Encourage the client to have patience and reassure him that his pace will pick up little by little with each workout. Increasing the pace, weight or complexity too soon will only serve to invite injury. Once the program feels comfortable and familiar, up the ante and watch the client's fitness level and confidence hit an all-time personal best.

The Role of Nutrition Coaching in Personal Training

While diverse and often multifaceted, the field of personal training focuses primarily on helping individuals achieve their fitness goals. As such, exercise lies at the root of training sessions. However, nutrition plays an equally important role in fueling the body for optimal results. In this article, we explore the various ways a prudent nutrition plan not only helps clients achieve their goals but also sets them on a path to a healthier lifestyle. We will also discuss the scope of practice to which trainers must adhere to ensure they do not overstep when helping clients with nutritional decisions.

Many Titles, Similar Services

Whether known as a health coach, a nutrition coach, or a personal trainer who also has significant knowledge of fitness nutrition, these professionals take a holistic approach to their clients' well-being. Whereas a personal trainer tends only to work with a client on his fitness goals, and a registered dietitian focuses solely on a client's nutritional needs, a health coach takes into account the whole person. With so many elements of a client's life having the potential to impact their overall health, such as diet, stress, physical activity, sleep patterns, and more, health coaching can blend all of the best elements together and offer clients a complete wellness package.

How Nutrition Fits into the Fitness Plan

With a nutrition coaching certification, fitness professionals can take their nutritional expertise to the next level. According to Brian Sutton, MS, MA, NASM-CPT, CES, PES, CNC, "Nutrition coaches work with the general population to facilitate the inclusion of healthy eating behaviors, and empower their clients to take responsibility for their own health. They are mentors and leaders who guide their clients toward a healthier lifestyle. To be a successful nutrition coach, individuals must possess knowledge of both nutritional science and behavior change strategies."

Most personal trainers cultivated some basic knowledge of nutrition as they studied for their certification exams. As such, many of us already understand the building blocks of good nutrition as they relate to exercise goals. Whether or not trainers feel sufficiently equipped to dole out nutritional advice depends largely on their background, experience, and client relationship.

Fundamentals of Fitness Fuel

One of the primary functions of nutrition in personal training involves guiding clients in how to adequately fuel their bodies. Consuming a balanced diet that includes carbohydrates, proteins, and healthy fats (collectively referred to as macronutrients) optimizes performance during training sessions. Below, we list some of the more commonly recommended foods best suited to fueling an active body:

- **Carbohydrates:** Whole grains (brown rice, quinoa, oats), fruits (bananas, apples, berries), and starchy vegetables (sweet potatoes, butternut squash).
- **Proteins:** Lean meats (chicken, turkey, certain cuts of beef, fish), eggs, dairy products (Greek yogurt and cottage cheese), legumes (beans and lentils), and plant-based protein sources (tofu and tempeh).
- **Healthy Fats:** Avocados, nuts/seeds, olive oil, nut butters, and fatty fish (herring, salmon, trout).

By including these nutrient-dense foods in appropriate quantities in their daily meal plans, clients can provide their bodies with the necessary energy to support their personal training efforts and optimize their performance.

In addition to macronutrients, vitamins and minerals play a crucial role in supporting the body's efforts in personal training. Micronutrients --- vitamins and minerals needed in smaller quantities than the aforementioned categories --- contribute to energy production, bone health, and muscle function.

The Legal Side of Nutritional Advice

While personal trainers may have a client's best interests at heart when wanting to offer nutritional suggestions, we must always keep in mind where to draw the legal line. The scope of practice includes actions, procedures, and processes that a professional may undertake while keeping within the terms of a particular license or credential; regulations often vary between states. Above all, we cannot cross over into nutritional advice that by law belongs in the realm of the medical professionals; suggesting nutritional therapy to treat disease, diagnosing and/or treating eating disorders, and prescribing specific meal plans do not align with a fitness professional's scope of practice.

Below we list the most common services a health coach can and cannot perform, in accordance with most states' laws ~

A certified health coach or personal trainer can:

- Calculate caloric needs using industry calorie calculators.
- Teach healthy portion sizes.
- Teach the proper way to read and interpret food labels.
- Dispel nutrition myths and fallacies.
- Teach how to navigate grocery stores.
- Discuss the pros and cons of various diets.
- Use coaching and communication techniques.
- Teach the health benefits of various food groups.
- Review food logs and provide general guidance.
- Perform body composition testing.

A certified health coach or personal trainer cannot:

- Provide exercise prescriptions.
- Promote or provide medication.
- Suggest drastic caloric restriction.
- Diagnose or treat an eating disorder.
- Create or prescribe specific meal plans.
- Conduct psychological counseling or therapy.
- Provide “nutritional therapy” to treat disease.
- Prescribe extreme practices (detoxes, colon cleanses).
- Go against the recommendations of a healthcare professional.

The majority of these services should come from either a physician or a registered dietitian.

Nutrition as Part of a Behavioral Shift

As personal trainers, we excel at helping clients make lifestyle changes that they can sustain without too much difficulty. With a combination of basic, prudent nutritional suggestions and a sound workout protocol, we can arm our clients with the skills necessary to make positive changes that can last throughout their lives. We can provide an educational support system.

Part of our job includes keeping in mind that, just like one workout does not fit every client’s needs, neither does every meal plan. The best program, the one that will work for a client, must meet the confines of his work/family/lifestyle.

We can try to provide answers to their questions; more importantly, we can ask clients the right open-ended questions ~

- Tell me about your grocery shopping habits.
- What do you typically consider a “serving” of protein at a meal?
- Do you have any food preferences/allergies/religious considerations around food?
- How much time do you have to prepare meals?
- What are your current goals regarding fitness/workouts?

This last question will dictate the best nutritional outlook for the client. Extremely low-calorie meal plans often fail to provide sufficient fuel that avid exercisers need to derive the most from their workouts. Similarly, if a new client reveals that he has medically prescribed caloric restrictions, the personal trainer can adapt the workout protocol to consist of less intense exercises. Whether a client aims to shed unwanted pounds or pack on lean muscle mass, prudent nutrition will serve him well.

Habits, Goals, and the Power to Change

In order to best serve clients' health, wellness, and weight loss goals, trainers must look beyond exercise and even nutrition. Trainers who also practice nutrition coaching must fully realize the importance of focusing on an individual's habits in general. For example, these professionals may focus on a client's sleep habits, explaining that sufficient sleep helps promote more of the hormone that causes satiety and less of the hormone that induces hunger. Sleep habits can, with dedicated effort, change over time, leading to even better lifestyle results both in and out of the gym.

Consider how managing stress will often lead to decreased appetite, better sleep, and more energy. A nutrition coach can highlight these points, bringing them into play as part of the holistic, "whole body" personal training experience. Most individuals report that with better sleep, hormone consistency, and a smaller appetite, they find themselves armed with more willpower and better able to make prudent food choices.

In addition to struggling with fitness-forward nutrition, clients may also find it difficult to set realistic and attainable goals. Personal trainers often encounter eager clients who want to take on every goal all at once, striving to accomplish too much too soon. Often, after a few sessions, they begin to comprehend that sustainable habits and physical changes do not happen quickly. A nutrition coach can provide guidance and accountability, helping clients understand their current starting point and the healthiest, most expedient way to reach their goals.

Each Client Deserves a Unique Nutritional Approach

As we briefly discussed earlier, in order to provide effective nutrition guidance, personal trainers/nutrition coaches must take the time to assess their clients' dietary habits, preferences and goals. Key components of assessing individual needs might include the following ~

- Conducting a comprehensive dietary analysis to understand current eating habits/patterns
- Taking into account dietary restrictions and/or allergies that may impact food choices
- Considering personal preferences, such as vegetarian, vegan, or kosher lifestyles, and working within those parameters
- Identifying specific goals, such as weight loss, muscle gain, and overall health, to meet the client on his terms

Once the trainer grasps a fuller picture of the client's lifestyle and how nutrition may fit into that framework, he can begin to develop a basic working protocol that will align with the client's fitness and nutritional needs. While certainly not as in-depth as the services provided by registered dietitians, personal trainers serving as health coaches can address meal suggestions, timing of nutrient intake, macronutrient parameters, etc.

Likewise, they can excel at offering motivation, making the entire wellness process creative, goal-oriented, and fun.

Final Thoughts

Proper nutrition, a crucial component of successful personal training, will support overall health, fitness goals, and thereby help to maximize clients' results. By fueling the body, promoting muscle building and recovery, managing weight, and customizing nutrition plans, personal trainers can help individuals achieve optimal fitness outcomes.

Typically speaking, nutrition coaches possess a strong working knowledge of nutritional guidelines and behavioral change principles. Clients may choose to inquire in advance whether the trainer feels confident and comfortable in the following areas ~

- How good nutrition can enhance sporting performance
- How a prudent, nutritious diet should meet most of an athlete's vitamin and mineral needs, and provide enough protein to promote muscle growth and repair

The basic training diet should aim for the following ~

- provide adequate nutrients and food energy to meet the demands of training
- enhance adaptation and recovery between training sessions
- include a wide variety of foods to ensure long-term nutrition habits and behaviors
- enable the athlete to achieve optimal body weight and desired body fat levels for his chosen athletic performance
- provide adequate fluids to ensure maximum hydration before, during, and after exercise
- promote the short and long-term health of the clients

We can educate clients by making sure they acknowledge that, while some personal trainers may incorporate basic nutritional guidance into their services, not all personal trainers are qualified to provide in-depth counseling or medical nutrition therapy. Grasping this distinction helps avoid any potential assumptions on the part of both parties regarding the legal scope of practice.

Personal trainers can certainly encourage clients to adopt healthy eating habits, emphasizing the importance of consuming whole foods, incorporating good fats, and prioritizing protein sources. Moreover, they may educate clients on nutrition basics, including the benefits of proper nutrition for overall health and wellness.

Tracking Progress Beyond the Scale: New Metrics for GLP-1 Clients

In the era of GLP-1 medications, it's easy to fall into the trap of celebrating every pound lost. But if you're a personal trainer working with clients on GLP-1 receptor agonists like semaglutide or liraglutide, you know that weight loss is only the beginning. In this regard, true transformation isn't just about what's coming off the scale; it's about what's being built beneath it.

To that end, this article presents a clear case that when training clients on GLP-1s, it is essential to track non-scale metrics. These are the indicators that reveal whether your client is truly improving—not just shrinking. In this next-generation model of personal training, your job is to move beyond aesthetics and help clients reclaim their strength, capacity, cardiovascular resilience, and psychological well-being.

Let's explore the four most critical categories!

Body Composition: Because Weight Loss ≠ Fat Loss

As alluded to in my previous articles, when a client drops 15 pounds on a GLP-1 medication, the real question isn't "How much fat did you lose?"—it's "What amount of muscle did you keep?"

In this regard, preserving lean mass should be priority number one. Studies show that GLP-1 agonists like liraglutide promote fat loss, but muscle mass can be compromised if strength training and protein intake aren't dialed in (Sattar et al., 2021). In these cases, body composition assessments become essential.

Tools such as DEXA scans and bioelectrical impedance analysis (BIA) provide a much more detailed understanding of health than a simple weigh-in. Additionally, skinfold calipers and waist-to-hip ratios can yield valuable insights when applied consistently. However, caution is advised when using skinfold calipers due to the close physical proximity to clients and the potential variability in accuracy if practitioners do not regularly carry out these measurements or maintain their certifications through reputable organizations, such as the International Society for the Advancement of Kinanthropometry (ISAK), which mandates thorough hands-on training for certification. These tools not only indicate whether your client is becoming smaller but also whether they are gaining metabolic strength.

This is particularly important for older clients or those with sarcopenic obesity, as research has demonstrated that resistance training with elastic bands can significantly enhance muscle mass and physical capacity (Liao et al., 2017). While much of this series has concentrated on traditional free-weight and machine-based resistance training in a gym environment, older clients or individuals with limited resources can

effectively utilize band exercises to achieve meaningful training results. Ultimately, the focus should not be on the lightness of the bands but rather on the functional power they are developing.

Functional Fitness: Can They Do More Than Before?

When focusing on older clients, particularly seniors, it's important to remember that you are not just training a body; you are training a person to achieve their goals in everyday life. This is why functional fitness is one of the most effective yet underutilized metrics that trainers can use. As the American population continues to age in the coming decades, many seniors may prefer at-home personal training services or remote training options. Therefore, it's crucial for personal trainers to have simple, travel-ready assessments in their toolkit to meet the needs of this demographic.

To best support this population, rather than chase calorie burn, shift your lens to performance. Use tools like:

- The **30-second sit-to-stand test**
- The **6-minute walk test**
- **Grip strength** assessments
- **Repetition maxes** in basic lifts (e.g., goblet squat, incline push-up)

These assessments are not just performance tests; they are healthspan indicators. In older populations, functional improvements are directly linked to increased independence, improved mental health, and a reduced risk of falls.

For example, Crhová et al. (2020) found that a three-month strength training program in breast cancer survivors led to marked improvements in not only physical performance but also in psychological health and autonomic nervous system regulation. That's the kind of total-person transformation we're after.

To fine-tune load and effort, the Borg Rating of Perceived Exertion (RPE) scale is an excellent tool, particularly when GLP-1 clients experience fluctuations in energy levels. Ultimately, you're not just pushing them harder; you're helping them train smarter.

Cardiovascular Health: A Quiet Powerhouse

GLP-1 medications are now well recognized for their cardio-protective effects, particularly in individuals with type 2 diabetes (Sattar et al., 2021). As trainers, we need to honor that by integrating cardiovascular markers into our assessment and progression model.

Hence, easy-to-track metrics that can leverage many popular wearable devices, like Whoop, Oura rings, or Apple watches, include:

- **Resting heart rate (RHR)**
- **Blood pressure (BP)**
- **Heart rate variability (HRV)**

Improvements in these areas often correlate with enhanced balance of the autonomic nervous system and improved aerobic conditioning. This becomes especially powerful when paired with wearable technology or simple, consistent pulse checks.

According to Schwendinger et al. (2023), accelerometer-based metrics, such as step counts and time spent in moderate-to-vigorous activity levels, are strongly associated with cardiorespiratory fitness. Clients want to feel their hearts working better—and these metrics can help prove that they are.

Finally, let's not forget that even if your client hasn't lost a single pound that week, better RHR or BP readings can be celebrated as the life-extending wins they are.

Psychological Variables: The Hidden Progress Markers

Ask any experienced coach, and they'll tell you: behavior change doesn't happen in the body first. It occurs in the mind. That's why tracking mood, motivation, and emotional regulation should be a cornerstone of your check-in process, not just the quantifiable metrics.

This is particularly important for clients on GLP-1s, where the appetite suppression and body changes can sometimes be emotionally disorienting. In this regard, implementing brief weekly check-ins—either written or verbal—on mood, sleep, stress, and energy can uncover powerful qualitative insights that numbers can't touch.

To illustrate this point, Clifford et al. (2005) demonstrated how cardiovascular rhythms can reveal stress and sleep-related disruptions that may not otherwise be captured. By pairing psychological check-ins with physical monitoring, you create a truly comprehensive feedback loop.

Ultimately, when clients feel more focused, less stressed, and more in control of their habits, they're not just healthier—they're more likely to stay the course.

In Summary: Let's Reframe the Finish Line

Your clients may have started their journey on GLP-1s to lose weight—but that's not the finish line. In fact, the further they go, the less the weight itself matters.

In this regard, real coaching is centered around performance, functionality, resilience, and well-being. It establishes a strong foundation that not only drives weight loss but also promotes vitality, longevity, and independence.

By consistently and clearly tracking these non-scale metrics, you don’t just achieve results—you create genuine transformation.

Empowering Fitness Clients Towards Self-Efficacy and Resilience

Coaching plays a key role in guiding individuals on their journeys towards personal and professional growth. At the epicenter of this process lies the concept of self-efficacy, the belief in one's capacity to perform actions that will help one achieve one's desired results. Self-efficacy profoundly impacts the success of a coach or personal trainer, as it determines whether individuals will ultimately meet their objectives. In this article, we will explore the basics of self-efficacy and how it functions for the clients we coach. Fostering such self-efficacy requires patience, time, dedication, and skill. Read on to learn how to instill this successful feeling into all of your clients.

The Power of Fostering Self-Efficacy

The concept of self-efficacy encompasses much more than mere confidence; it embodies the conviction that one possesses the skills and motivation they will need in order to achieve their goals. Cultivating a strong sense of self-efficacy within a client can positively influence their persistence, their ability to set achievable goals, and the consistency of their efforts. It affects the integrity of one’s belief in overcoming any challenges they may encounter, and their expectation of successful outcomes resulting from their actions.

The relationship between a coach and their client forms the basis of planting and nurturing self-efficacy. Cultivating a rapport within this relationship and establishing a supportive atmosphere enables clients to feel valued, fostering a fertile ground on which their strength and their growth can blossom. The establishment of a trust bond, which goes a long way in a personal training relationship, underscores the client's confidence in achieving set objectives. As trust deepens, it fosters an ideal environment for the growth of self-assurance and, with this, comes self-efficacy.

Communication Paves the Way

A coach's ability to empathize, actively listen, and understand a client's perspective forges the belief that they actually can achieve their goals under the coach's tutelage. Clear and supportive communication, whether through words or gentle hands-on coaching, serves as a guide toward self-efficacy. We may inherently know and believe that a client can accomplish a challenging workout, but understanding the optimal manner in which to effectively relay this communication bridges the gap between aspiration and actualization. Coaches/personal trainers achieve this by always focusing on the client’s strengths. Recognizing a client's efforts and pointing out their successes

both work as powerful catalysts for enhancing their self-efficacy, thereby creating a positive feedback loop that can only amp up and encourage confidence.

By reinforcing one's belief in their abilities, coaches pave the way toward empowerment and self-assurance.

Building Resilience Along the Way

Increased feelings of self-efficacy naturally heighten a client's motivation. Building on this strong belief in one's capabilities, over time, the client fosters a willingness to put forth the efforts required to overcome a plateau; this all originates from a feeling of self-assurance that their endeavors will, in fact, yield positive outcomes.

This process eventually transcends the walls of the fitness center; higher self-efficacy can contribute significantly to building resilience in the face of any manner of life's adversities. Clients who believe in themselves and can see themselves succeeding tend to exhibit greater adaptability and perseverance when faced with setbacks. This quality, in turn, encourages them to bounce back and continue chasing their goals.

In their coauthored book The Resilient Couple: Navigating Together Through Life, Drs. Philip and Lynn Levy write, "Resilience is the ability to bounce forward in the face of a challenge that upends your life. Resilience makes an enormous difference, allowing people to navigate situations that might have seemed impossible otherwise."

3 Key Ingredients for a Positive Client/Trainer Relationship

Any solid relationship requires time to develop; this holds for the concept of self-efficacy vis-à-vis the client/trainer interaction. Here, we present 3 important coaching strategies to bolster self-efficacy:

1. **Invest Time:** The duration of the coaching relationship directly correlates with increased confidence. As a coach, recognizing and celebrating each stride toward the client's objective fuels the individual's self-assurance.
2. **Verbalize Confidence:** Vocalizing belief in oneself amplifies the likelihood of goal attainment. Statements like "I've got this" solidify one's resolve, reinforcing their confidence with each verbal commitment. External verbal support from the trainer likewise reinforces this.
3. **Ask the Right Questions:** Effective coaching hinges on asking questions that prompt self-efficacy statements. Open-ended inquiries foster exploration, empowering individuals to discover their own personal paths to success.

The Four Sources of Self-Efficacy

In 1977, Stanford University psychologist Albert Bandura recognized 4 primary sources of self-efficacy. Their hypothesis stated that only through the interplay of these factors

do individuals cultivate a significant belief or disbelief in their abilities. They predicted that expectations of self-efficacy would determine whether one would initiate coping behaviors, the amount of effort expended on said behaviors, and how long one might sustain this effort when faced with obstacles.

Here we present Bandura's 4 sources of self-efficacy in more detail ~

Mastery experiences: the most powerful initiator of self-efficacy, based upon the direct and personal experience one gains when taking on new challenges and succeeding. By drawing on this direct evidence of past performance, a client begins to infer their future capabilities. In the gym, trainers set a stage for clients to tackle and succeed at challenging tasks; over time, confidence grows.

Vicarious experiences: upon observing others succeeding (or failing) at activities, clients can estimate the likelihood of their own success or failure when performing similar activities; individuals base this opinion on the similarity or difference they perceive between themselves and the other people.

Verbal Persuasion: just a couple of simple words, positive comments, and/or encouragement can suffice, easing overt doubts regarding competency; hearing this makes individuals more likely to push through the obstacle as they continue to pursue their goals.

Physiological Arousal: the least powerful driver of self-efficacy (also known as physiological arousal), this concept does not tend to directly impact one's belief in their ability to perform the task at hand. As an example of this, an individual feeling more tired than usual does not have as significant an impact on their belief about whether they can write a quality 1000-word essay as previous success at writing.

Guiding Clients Towards Greater Self-Efficacy

Experts who have studied this paradigm offer ways in which personal trainers and coaches might work with clients to "raise the bar" on their self-convictions. Here we list a few suggestions that have met with success in the past ~

1. Step outside of one's comfort zone: while initially daunting and even a bit scary, entering unfamiliar territory provides an opportunity to try something different and perhaps more challenging. Having success in this new endeavor increases self-efficacy; an attempt that proves unsuccessful at first simply offers a chance to test one's resilience and try again.

2. Set reasonable goals: tackled one at a time, small goals build positivity and help foster/sustain self-efficacy.

3. Take the long-term view: rather than remain short-sighted, those who possess high levels of self-efficacy adopt a perspective of loftier goals, not letting short-term failures break their stride and erode their convictions.

4. Reframe obstacles: By viewing plateaus and obstacles as productive stepping stones to learning and mastery, one does not place their self-efficacy in jeopardy. By recalling previous challenges and the manner in which one successfully conquered them, they can build resilience and self-efficacy.

Training for Resilience

The majority of personal training and/or coaching sessions tend to focus on ensuring the athlete's success. However, growth can sprout from failures as well. Resilience training helps a client cultivate the ability to rebound from setbacks, face adversity head-on, and adapt in a positive manner to life's undeniable challenges. Since experts do not characterize resilience as a personality trait but rather a dynamic, ever-changing process, clients develop the ability to build psychological strength along with muscle mass.

Resilience activities incorporate techniques that help elicit psychological flexibility. By learning to stand up time and time again after falling to the ground, resilience activities promote emotional regulation and challenge negative thinking.

The Symbiosis of Fitness and Resilience

One research study sought to determine whether fitness might contribute to resilience while at the same time assessing the mediating effect of self-efficacy. The subject group consisted of 431 adults, each of whom participated in filling out fitness assessments. The survey took into account self-efficacy and habitual activity in relation to cardiorespiratory and muscular fitness, regarding resilience in terms of mental health and problem-solving.

Researchers monitored the subjects quarterly over the course of nine months. Data revealed that muscular and self-perceived fitness aligned positively with stress resilience. The scientists extrapolated the data further to conclude that a muscular fitness–resilience relationship arose partly through stronger self-efficacy expectations, and that muscularity and one's perception of their fitness abilities might strongly align with stress resilience.

The Mind-Body Winning Combination

When a client challenges themselves to execute a new potential personal best in regard to weightlifting, they build mental resistance, confidence, and psychological toughness. Overcoming physical challenges in the gym mirrors the mental battles all of us inevitably

face at some point in our lives, which in turn fosters a powerful connection between body and mind. We can delve a bit more deeply into this scenario.

As trainers and athletes know, one of the best benefits of resistance training involves the opportunity to face challenges head-on and in real time. Some clients have goals of heavier lifting; for others, pursuits might take the form of “just 1 more rep” or improving one’s form and technique. If one thinks of these aspirations as obstacles, they can call upon their determination, focus, and belief in their capabilities. They can learn in the moment how to persevere through discomfort/pain/difficulties, push harder, and emerge successful. Resilience “in action” trains the brain that with discipline, consistency, and great effort, one truly can conquer most obstacles.

Fitness, Resilience, and Self-Efficacy

Strength training provides a safe arena in which to attempt a task, fail, and ultimately recover for another try. All of these mental gymnastics serve to reinforce the mindset that failure does not represent an end, merely an opportunity to learn, re-adjust, and try again.

Just as one makes progress in lifting weights through incremental yet consistent efforts, personal resilience grows in a likewise manner. Training reinforces the idea that daily effort, no matter how small, builds toward lasting change, an essential principle for tackling any challenges life may present.

Final Thoughts

A personal trainer does more than just craft workout plans or teach correct exercise forms; they can play a pivotal role in building the discipline and resilience required for the formation of long-term habits and goal achievement.

More than just something in which an individual engages for a 1-hour time frame, weightlifting and fitness serve as mental/psychological training grounds. They transcend the gym floor and teach perseverance, confidence, and emotional resilience. Whether one seeks additional strength, power, or emotional toughness, the ability to push through a challenging task deserves celebrating. The quest for improved self-efficacy and resilience can serve as a solid foundation for all aspects of life.

The ultimate goal of personal training lies not in creating stronger clients but rather in instilling habits and mindsets that last beyond the training sessions. If we can encourage self-efficacy, resilience, and positivity in our clients at the gym, imagine how successfully they will evolve in all aspects of their lives!

1. What is the main goal of reactive training as described in the article?

A. To improve flexibility only
B. To build muscle mass slowly
C. To enhance the body's ability to react quickly and generate force safely in unpredictable situations
D. To focus only on slow, controlled movements

2. What unique feature of the Core-Tex equipment allows for its reactive training capabilities?

A. A fixed, flat platform for stable exercises
B. Multiple resistance bands attached to it
C. A base with ball transfers that supports a convex underside, allowing the platform to tilt and rotate in multiple directions
D. Built-in electrical stimulation

3. Which of the following is *not* listed as a benefit of Core-Tex reactive training?

A. Improved neuromuscular coordination
B. Increased core strength and stabilization
C. Guaranteed muscle hypertrophy after one session
D. Enhanced functional fitness and proprioception

4. Why might reactive training help with injury prevention?

A. It isolates single muscles to avoid overuse
B. It teaches the body to stabilize and respond quickly under unpredictable conditions, reducing the risk of falls or improper landings
C. It reduces overall training volume
D. It focuses only on aerobic conditioning

5. What is meant by "multi-planar movement" in the context of Core-Tex training?

A. Movement restricted to a single plane
B. Movement that combines cardio, strength, and flexibility
C. Movement in lateral, frontal, and transverse planes, mimicking real-life movement demands
D. Movement performed only in water

6. What does the "weight-centric culture" primarily emphasize when assessing health?

A. Skeletal muscle mass and function
B. Hormonal balance and metabolic efficiency

C. Body-mass index (BMI) or pounds lost on the scale
D. Resistance training adherence

7. Why is a “muscle-centric” paradigm beneficial for individuals using GLP-1 therapies?

A. Because it guarantees fat loss without changing lean mass
B. Because skeletal muscle is a key regulator of metabolic health, hormones, and longevity
C. Because it focuses exclusively on cardiovascular fitness
D. Because it avoids medications or dietary interventions

8. What risk is associated with using GLP-1 receptor agonists without resistance training?

A. Only fat mass is lost
B. Loss of lean body mass, including skeletal muscle
C. Increased bone density
D. Enhanced insulin resistance

9. Why is skeletal muscle described as a “metabolic powerhouse”?

A. It releases hormones that store fat
B. It is the primary site of insulin-stimulated glucose disposal
C. It increases appetite
D. It automatically grows when body fat decreases

10. What mindset shift does the article suggest for personal trainers working with GLP-1 users?

A. Focus on rapid fat loss
B. Prioritize muscle preservation through resistance training, nutrition, and tracking strength/function
C. Avoid discussing body composition
D. Encourage clients to lower protein intake

11. According to the article, what is the main nutritional concern for people using GLP-1 receptor agonists (GLP-1 RAs)?

A. They tend to overeat
B. They may not get adequate protein intake due to suppressed appetite and reduced total food intake
C. They require extremely high carbohydrate intake
D. They should avoid any protein supplements

12. What protein intake target does the article recommend for clients on GLP-1 medications to help preserve muscle mass?

A. 0.5–0.8 g/kg body weight per day
B. 1.0 g/kg/day
C. 1.2–1.6 g/kg/day
D. Over 2.0 g/kg/day

13. What practical strategy does the article suggest for timing protein intake for GLP-1 users with reduced appetite?

A. Skip meals often and rely on snacks
B. Only eat protein once per day
C. Prioritize protein in meals, use supplementation if needed, and “front-load” protein earlier in the day when hunger is strongest
D. Eat carbohydrates first, then protein if you still feel hungry

14. Why is a “muscle-forward” nutrition strategy important for people on GLP-1s?

A. Because weight loss alone guarantees good health
B. Because GLP-1s increase carbohydrate cravings so protein must be avoided
C. Because reduced calorie and protein intake without attention to muscle maintenance can lead to loss of lean body mass, harming metabolic and functional health
D. Because muscle is not important — only fat loss matters

15. When protein intake through regular meals becomes difficult due to suppressed appetite, what does the article suggest as an alternative?

A. Skip protein altogether
B. Use protein supplementation (e.g., shakes)
C. Eat more fats instead of protein
D. Only eat when very hungry

16. What delivery method of molecular hydrogen does the article highlight as potentially more effective than drinking hydrogen-infused water?

A. Eating hydrogen-rich food
B. Inhalation therapy (breathing hydrogen gas)
C. Topical skin application
D. Injection

17. In one small study cited in the article, breathing 4% hydrogen gas daily for 20 minutes over a week resulted in what change in exercise performance?

A. A decrease in running speed
B. No change in performance
C. An increase in peak running velocity (in some participants by up to ~4.2%)
D. Guaranteed weight loss

18. What is a possible downside or risk of consuming molecular hydrogen as noted in the article?

A. Guaranteed muscle gain regardless of training
B. Excessive fluid intake from hydrogen water might lead to hyponatremia
C. It acts like caffeine and causes jitters
D. It always causes serious side effects

19. According to the article, why might inhalation of hydrogen gas be more suitable for therapeutic purposes than hydrogen-rich water?

A. Because inhalation is cheaper
B. Because inhalation delivers a higher and more consistent concentration of molecular hydrogen into the body than drinking hydrogen water
C. Because water is always contaminated
D. Because inhalation tastes better

20. What general benefit is the article suggesting molecular hydrogen might offer to athletes or active individuals?

A. It guarantees maximal strength gains without training
B. It may support recovery, reduce exercise-induced oxidative stress, and modestly improve certain performance metrics
C. It replaces the need for hydration
D. It ensures dramatic endurance increases overnight

21. What are some potential health benefits of Apple Cider Vinegar (ACV) mentioned in the article?

A. Improved digestion, weight management, and blood sugar control
B. Guaranteed dramatic muscle gain
C. Complete prevention of chronic diseases
D. Replacement for all medications

22. What is the recommended way to consume ACV, according to the article's safety guidelines?

A. Drink it straight undiluted for maximum effect
B. Dilute 1–2 tablespoons in 8 ounces of water — avoid drinking it straight
C. Take it as a topical skin application daily
D. Eat it mixed with sugar for better absorption

23. Why do some people prefer raw/unfiltered ACV ("with the mother") over filtered or pasteurized ACV?

A. Because it contains probiotics and enzymes that might support gut health
B. Because it tastes sweeter
C. Because it has no acidity
D. Because it's calorie-free

24. What are some of the risks or downsides of using ACV improperly, especially if consumed undiluted?

A. There are no known risks — it's always safe
B. Potential for digestive irritation, throat or esophagus damage, tooth enamel erosion, and possible interactions with medications
C. It guarantees weight gain
D. It instantly cures diabetes

25. What is the article's overall recommendation regarding the use of ACV for health purposes?

A. Treat ACV as a miracle cure and substitute for medical treatment
B. Avoid ACV entirely — it has no benefits
C. Use ACV in moderation (small amounts, diluted or in foods), as a possible complementary dietary ingredient — but don't rely on it for major health changes or disease treatment
D. Drink large amounts daily for maximum benefit

26. What is the primary goal of hypertrophy training?

A. Increasing flexibility and mobility
B. Maximizing endurance capacity
C. Enlargement of skeletal muscle (increasing lean body mass) via high-volume resistance training
D. Rapid fat loss only

27. What repetition and rest-period scheme is recommended for hypertrophy training?

A. 1–3 reps with 3–5 minutes rest
B. 8–12 reps per set at ~80% of 1RM, with about 30 seconds rest
C. 15–20 reps with 2–3 minutes rest
D. Bodyweight circuits with no rest

28. Why is hypertrophy training different from maximal strength training?

A. It uses no weights
B. It uses higher volume, moderate weight, and short rests, unlike maximal strength training, which uses heavy loads and low reps
C. It ignores rest periods entirely
D. It focuses only on aerobic fitness

29. Aside from aesthetics, what is a benefit of building lean body mass through hypertrophy training?

A. Only visual enhancement
B. Improved health benefits and support for weight management
C. Guaranteed loss of all body fat
D. Immunity from all injuries

30. What mechanism makes hypertrophy training effective for enlarging muscles?

A. Aerobic conditioning improvements
B. Cellular changes in muscle fibers caused by high-volume resistance training
C. Isolation without fiber adaptation
D. Reducing muscle use

31. What distinguishes a MetCon (metabolic-conditioning) workout from HIIT?

A. MetCon always uses heavy weights; HIIT uses only bodyweight
B. MetCon targets multiple energy systems and aspects of metabolism/strength, while HIIT focuses on short bursts of high-intensity work followed by rest

C. HIIT lasts longer than MetCon
D. They are exactly the same

32. Which energy system is primarily trained during MetCon when work lasts more than about 10 seconds?

A. Phosphagen system
B. Glycolytic system
C. Oxidative system
D. None — MetCon avoids metabolic systems

33. What is one caution or drawback of MetCon workouts mentioned in the article?

A. They always build maximal strength
B. They are too easy to improve conditioning
C. Quick, speed-based reps can increase injury risk if form breaks down
D. They burn very few calories

34. Which of the following exercises is commonly used in MetCon workouts?

A. Static stretching
B. Jump squats, push-ups, burpees
C. Slow long-distance walking
D. Only machine isolation exercises

35. What is one major benefit of a properly designed and supervised MetCon workout?

A. It guarantees strength gains only
B. Improved cardiovascular health, increased strength and endurance, and enhanced calorie-burning efficiency
C. It eliminates the need for warm-ups
D. It replaces all forms of traditional resistance training

36. According to the article, why is nutrition considered as important as exercise in a personal-training program?

A. Because nutrition supports energy, recovery, and overall results, complementing exercise
B. Because formal exercise isn’t really necessary if nutrition is perfect
C. Because nutrition replaces the need for sleep
D. Because exercise always causes negative health effects

37. What kind of professionals might provide nutrition coaching, as described in the article?

A. Only registered dietitians
B. Trainers or health coaches who also know about fitness nutrition, sometimes with additional nutrition-coaching certification
C. Medical doctors only
D. Anyone, regardless of training or background

38. What is one of the fundamental functions of nutrition coaching within personal training?

A. Teaching clients how to perform advanced weightlifting techniques
B. Guiding clients to consume a balanced diet of macronutrients (carbs, protein, fats) to fuel workouts and support recovery
C. Recommending only high-protein diets for all clients
D. Encouraging clients to avoid carbohydrates entirely

39. What broader approach does nutrition coaching often take, beyond just exercise and diet?

A. Focusing only on dieting and ignoring lifestyle factors
B. Considering all aspects of a client's life — diet, physical activity, sleep, stress, habits — to support overall well-being and sustainable change
C. Ignoring personal preferences and lifestyle constraints
D. Prescribing rigid meal plans without regard for client lifestyle

40. According to the article, what helps a fitness professional stay within the appropriate scope of practice when offering nutrition coaching?

A. Providing medical nutrition therapy to all clients
B. Having a nutrition-coaching certification and offering general guidance rather than prescribing medical-level diets or treating diseases
C. Giving clients strict, one-size-fits-all meal plans
D. Diagnosing and treating clients' nutritional deficiencies

41. According to the article, why is tracking only scale weight often insufficient for clients using GLP-1 medications?

A. Because scale weight always increases even when fat is lost
B. Because weight loss doesn't tell you how much fat was lost vs. how much muscle or lean mass was lost
C. Because scales often give inaccurate readings
D. Because GLP-1 medications prevent any weight change

42. What kinds of assessments does the article recommend to better understand body changes beyond the scale?

A. Only daily weigh-ins
B. Body-composition assessments (e.g. DEXA, BIA), skinfold measurements, waist-to-hip ratio
C. Long questionnaires about eating habits
D. Relying solely on how clothes fit

43. For which population does the article suggest tracking body composition and lean mass is "particularly important"?

A. Teenage athletes only
B. Older clients or clients with sarcopenic obesity
C. Clients who never do resistance training
D. Clients focused purely on cardiovascular performance

44. Besides body composition, what other "non-scale" metrics does the article highlight as critical for evaluating client progress on GLP-1 therapy?

A. Hours spent watching TV
B. Cardiovascular capacity, strength, functional capacity, psychological well-being
C. Only how fast clients lose pounds
D. Number of pills taken

45. According to the article, what should be the priority goal for trainers working with GLP-1 clients undergoing weight loss?

A. Maximize rapid weight loss regardless of muscle loss
B. Prioritize fat-loss while preserving lean mass (muscle)
C. Focus only on appearance changes
D. Avoid any resistance training until weight stabilizes

46. What is the core idea behind "self-efficacy" as described in the article?

A. Feeling better about one's appearance
B. Belief in one's capacity to perform actions that lead to desired results
C. Having a strict diet and workout plan
D. Never experiencing failure

47. Which of the following is *not* one of the four sources of self-efficacy (per the article's reference to Bandura's theory)?

A. Mastery experiences (personal success)
B. Vicarious experiences (observing others succeed)
C. Verbal persuasion/encouragement
D. Genetic predisposition

48. According to the article, how does a good coach-client relationship support the development of self-efficacy?

A. By pushing clients to their limits every session
B. By building trust, actively listening, empathizing, and focusing on clients' strengths and successes
C. By ignoring clients' feelings and focusing only on results
D. By giving the same plan to all clients regardless of background

49. What role does "resilience" play in the framework described in the article?

A. It's unnecessary if self-efficacy is strong
B. It allows clients to bounce back from setbacks and persist toward long-term goals
C. It only refers to physical strength gains
D. It means never feeling tired or discouraged

50. Which coaching strategy is recommended for helping clients build self-efficacy and resilience over time?

A. Always setting extremely high, hard-to-reach goals
B. Encouraging clients to avoid challenges to prevent failure
C. Setting small, achievable goals, celebrating small wins, and gradually increasing challenge — reframing setbacks as learning opportunities
D. Focusing solely on physical performance and ignoring mindset or behavior

SIDE 1

○ RESCORE ○ MARK ✓ ○ TOTAL ONLY/BOTH SIDES

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MARKING INSTRUCTIONS

Use a No. 2 Pencil

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Fill circle completely

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RESCORE		# CORRECT
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ROSTER NUMBER		SCORE
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NAME _____

SUBJECT **DEC 2018 CEC Self Test**

PERIOD _____ DATE _____

TEST ANSWER SHEET B
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