CEC Self-Test Packet

HOW NEURO-LINGUISTIC PROGRAMMING CAN HELP PERSONAL TRAINING CLIENTS

HELP CLIENTS REPROGRAM THEIR THINKING AND REALIZE THEIR FITNESS GOALS

IT BAND STRETCH

DIFFERENT APPROACH TO ALLEVIATE TIGHTNESS

WHAT IS THE KETOGENIC DIET?

BIANNUAL EDITION: JUNE 2018 Continuing Education Articles for Personal Trainers from the NFPT Blog www.nfpt.com/blog

National Federation of Professional Trainers

NFPT SELF - TEST

JUNE 2018 EDITION

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NOTE: there are articles in this packet which contain links and/or references to resources and information that is only available online. Go to: www.nfpt.com/blog/cec for these additional resources.

We thank you for your commitment to the fitness industry and to the NFPT organization of trainers. Please contact us at 800-729-6378 or at info@nfpt.com with any questions, or to just be in touch - we'd love to hear from you! *We wish you continued success in your endeavors!*

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The Effects of Alcohol on Exercise and Performance

Is it ethical to recommend alcohol to our clients?

An important aspect of professional personal training includes reminding clients of how important clean eating and appropriate hydration are in achieving a healthy body. We often field questions regarding the value of water versus electrolyte replacements, the proper quantity of fluid to consume prior to a half-marathon...the list goes on. However, rarely would we find a reason to validate alcohol consumption in relation to exercise.

Deleterious Drinking Effects

It has been well documented that alcohol acts as a depressant to the central nervous system, slowing the communication between brain cells. At some doses, alcohol in the bloodstream impacts the cerebellum, which plays a crucial role in muscle activity. This, in turn, can lead to a loss of balance. In addition, alcohol acts as a diuretic by expediting the rate at which fluid is lost from the body, accompanied by vital electrolytes. The ensuing increase in lactic acid production worsens fatigue while exercising.

This certainly does not sound like a recipe for successful hypertrophy! Research goes a step further, demonstrating how alcohol consumption impairs the process of protein synthesis, which as we know is crucial for the development and maintenance of lean muscle mass. Binge drinking may actually cause testosterone levels to plummet while increasing <u>cortisol</u>, a hormone that destroys muscle.

The fitness industry's stance on alcohol is due in large part to its lack of nutritional value. Ethanol, the type of alcohol found in beer, wine, and cocktails, creates toxic metabolic byproducts called acetaldehyde and acetate. These are the foes that cause nausea, guaranteed to interfere with a strenuous resistance training session. Chronic ingestion of alcohol can also have deleterious effects on digestion, making it challenging for the body to absorb nutrients like amino acids and B vitamins, key players in muscle synthesis.

Timing Your "Happy Hour"

With such an abundance of information contraindicating the serious athlete's recreational drinking habits, it comes as somewhat of a surprise to learn that a moderate amount of alcohol can actually have beneficial effects on exercise. Similarly to the role that timing of nutrient intake plays in maximizing results, it is not only the quantity of alcohol consumed that will affect exercise but also *when* one toasts "Cheers!" in relation to that hour in the gym.

Although moderate alcohol consumption magnifies muscle weakness when one imbibes immediately after exercise, low doses do not have the same effect. The same research team who presented this data found that healthy males who consumed 0.5 milliliters of alcohol per kilogram of weight immediately after a workout had no change in muscle strength when compared to a control group. Moderated drinking after a workout appears to not have any negative effects on muscle recovery.

The Concept of Moderation

The majority of muscle recovery takes place within 30 minutes of physical activity, and after this time, alcohol may safely be consumed in moderation. The term "moderation" refers to one drink per day for healthy women and two drinks per day for healthy men.

In an article that appeared in *Time* magazine by one of my favorite health writers, Dr. Sanjay Gupta, readers are provided with an explanation for why a drink or two might not be the undoing of a tough workout. Moderate alcohol consumption appears to confer the same positive effects as exercise on cardiovascular health. By increasing the bloodstream's levels of healthy cholesterol, it may be possible to reduce the risks of vascular disease. This is *not* to be interpreted as alcohol becoming a suitable substitute for exercise. Rather, the research was conducted in conjunction with a healthy lifestyle.

Gupta continues his explanation by stating that these positive benefits are likely conferred only upon individuals aged 45 and older. Perhaps this is one reason many doctors suggest a glass of red wine each night to folks in that age demographic. Data collected after a study performed on over 36,000 British and Scottish individuals revealed interesting results. Among these male adult participants, 85 percent were categorized as the "occasional" drinker. Thirteen percent were considered "heavy drinkers", consuming 14 or more units of alcohol per week.

The scientists published their findings in *The Daily Mail:* "Our results provide an additional argument for the role of physical activity as a means to promote the health of the population even in the presence of other less healthy behaviors." Professor Matt Field, from the U.K. Centre for Tobacco and Alcohol Studies at the University of Liverpool added: "This is a rigorous piece of research with some clear conclusions.

The relationship between drinking alcohol to excess and increased risk of death is significantly weaker in people who are physically active. Therefore, it appears that physical activity may partially offset some of the harmful effects of drinking, particularly alcohol-attributable cancers."

Brain Strain

Previous research has also found that long-time drinkers who exercise regularly have less damaged white matter in their brains, the area involved in "wiring" of the brain's communication system. This begs the following question: is it the exercise that confers this result, the alcohol consumption in conjunction with exercise, or the drinks themselves? Clearly, further study is warranted on this topic.

How Can We Help?

As educated fitness professionals, it is important to understand the "which came first...chicken or egg?" aspect of <u>pairing alcohol consumption with exercise output</u>. Similarly to the article I wrote and recently published on <u>how sleep and exercise affect each other</u>, erring on the side of proportional moderation is the key take-home concept here.

For my clientele, I most likely will not broach the subject unless I am directly asked. Being armed with scientific data on this topic affords you the opportunity to provide a safe and statistically proven idea for your clients, giving fair deference to each side of the argument. You can then feel confident that your client, on his own time, will make a prudent and informed decision before heading out to the bars.

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Understanding the Tibialis Posterior Muscle

When a client asks you, "What do you think about arch supports?" You can respond by educating them and connecting them to the tibialis posterior muscle. The tibialis posterior covers a lot of bone in the lower leg making it important to know about. Especially since it is essentially the best all natural arch support for your foot.

Tibialis Posterior Muscle Attachments

The tibialis posterior starts at the posterior tibia and fibula, wrapping around the medial side of the lower leg and attaching on the plantar side of the foot.

Here are the attachments:

Proximal, posterior shafts of tibia and fibula; and interosseous membrane

Bases of metatarsals 2,3,4 All 5 tarsals (navicular, 3 cuneiforms, cuboid)

Don't get lost in the complicated anatomical words.

Find this muscle on yourself. Palpate between the posterior tibia and fibula bones on the back side of your lower leg. It's probably tender in there.

Now, look at the green play-doh on Andy the skeleton to the right while palpating the underside of your right foot. Locate the bones that you see in the photo by feeling around for them. If it's tender you are in the right area!

It can take awhile and practice to find the attachments on the plantar surface of your foot. But, it's a nice massage while you explore.

Tibialis Posterior Muscle Actions

- Ankle plantar flexion
- Ankle inversion
- Ankle adduction
- Foot supination

This fourth movement is the one that is referenced in the title. Supination is usually a term learned for forearm movement, with the opposite being pronation. It's also a term used for the foot. Supination happens when the arch becomes rigid for push off. It's essential to get the foot, leg and entire body moving forward for every step you take.

Envision the tibialis posterior muscle attachments under your foot getting pulling medial and superior toward the posterior tibia and fibula attachments. The motion is similar to what would happen if you tried to pick a pen up off the floor with your foot. Your toes would do the grasping, but imagine what the rest of the foot and ankle would do.

Doing this motion into the ground instead of trying to pick up a pen causes locomotion.



Tibialis Posterior Exercises

Since tibialis posterior is the most natural form of arch support for the feet, it's important to build awareness around this muscle and strengthen it for yourself and your fitness clients.

Return to the motions that this muscle does to create an exercise for it.

1. Press the big toe into the floor to create an exaggerated arch of your foot warm up the muscle and build awareness.

2. Continue the first motion into a calf raise, slowly. Stop when you lose connection with tibialis posterior.

3. Continue the first motion, pressing the big toe into the floor while also adducting the foot toward the midline. Feel the attachments on both sides of the muscle contract while you hold this position for 5-10 seconds. When done properly it'll burn more than a 200 lb. bench press.

4. While walking, focus on this muscle to connect with it. Palpating it before a walk can help bring awareness and blood flow to the muscle.

The tibialis posterior muscle is just as important as the other 600 muscles in the human body. But, it's often over-looked during traditional fitness programs. Tibialis posterior awareness and strength is the answer to many big questions that arise in the realm of exercise. Learn more about it, connect to it and lead your clients to better movement. Learn more about the significance of muscle attachments and their role in exercise by taking NFPT's Fundamentals of Anatomy Course this year.

Reference

What is a Ketogenic Diet?

Atkins Diet, South Beach, the Whole 30, Paleo and now Keto? What's this all about? What does it mean and how can you educate your clients about the potential benefits and barriers?

First, let's take a look at the keywords and their definitions.

Ketogenic

"Related to the excessive amounts of ketone bodies in the body tissues and fluids as a result of incompletely metabolized fatty acid or amino acid breakdown" (Porcari, Byrant, & Comana, 2015).

Ketone body

"Any of the acidic products of lipid metabolism that may accumulate in blood" (Thibodeau & Patton, 2012).

Ketoacidosis

"A metabolic state marked by the accumulation of ketone bodies (ketones) attributed to incompletely metabolized fatty acids or amino acids on account of inadequate amounts of available carbohydrates; results in lowering blood pH which can be potentially harmful and presence of ketones (acetone) on a person's breath" (Porcari et al., 2015).

This is known as diabetic ketoacidosis in individuals with diabetes.

Watch the NFPT Live Episode on the Ketogenic Diet

Ketogenic Diet Composition

At the most simplified level, ketones build up when the body is using fats and/or amino acids (instead of carbohydrates) as fuel. We know carbohydrates are the body's "go to" or preferred energy source (even the brain runs off glucose). However, when the amount of available carbohydrates is low, the body turns to fats and protein to metabolize and create new sources of sugar.

This alternative a survival mechanism.

A typical ketogenic diet is characterized by the following (or similar) macronutrient distribution:

- 5-10% carbohydrates (very low intake)
- 10-20% protein (moderate intake)
- 70-80% fat (very high intake)

Let's do the math. On a 2,000-calorie diet, the daily caloric distribution would look as follows.

- 100-200 calories from carbohydrates (approximately 25-50 grams)
- 200-400 calories from protein (approximately 50-100 grams)
- 1,400-1,600 calories from fat (approximately 156-178 grams)

Eating this type of macronutrient pattern forces the body to deplete stored carbohydrates and turn to alternative fuel sources – fats (this includes body fat, as well) and proteins.

This reaction takes anywhere from three to four days.

As the body is being depleted, individuals often report experiencing a "keto flu" with symptoms of achiness, fatigue, weakness, irritability, reduced libido, and constipation (from a lack of fibrous foods such as grains and fruits). In short, the first week on a keto diet isn't pleasant or tranquil.

You are basically forcing the body to search for other sources of energy (Paoli, Rubini, Volek, & Grimaldi, 2013).

What do you eat on a Keto Diet?

In short, an abundance of good fats (nuts, seeds, avocado oil, olive oil), lean proteins (salmon, grass-fed beef, organic/non-GMO poultry, fermented dairy), and non-starchy veggies. The main goal is to cut out all processed carbohydrates, sugar (including intrinsic sugars found in fruits and grains that cause an "insulin spike").

Keep in mind, the "not so helpful gut bacteria" thrive on processed food and sugar, so cutting these items out of the daily diet plan helps restore gut health and good bacteria. Many keto-friendly foods are also antiinflammatory and have been shown to be beneficial for those with certain digestive issues.

Low-carb diets go awry when individuals do not consume "clean" sources of foods and consume carelessly foods high in saturated fat. Not all fats are created equal and the keto diet doesn't promote eating a pound of bacon a day or a 32-ounce prime rib steak three times a week. The keto diet aims to encourage quality intake of mostly fats and moderate protein.

A ketogenic diet is not synonymous with a high protein diet.

What does the research say?

Before you write off the ketogenic diet as another "fad" in the great list of crazy restrictive dieting approaches, let's examine some of the established and emerging research findings.

A ketogenic diet is a low carb/ high-fat diet. Its basic premise of keeping carbs low is similar to other "low carb" diet trends we've seen in the past. Low carb diets, surprisingly enough, have existed since the 1920s and were once used to treat epilepsy although it's mechanism of action remains a mystery. In later decades, the low carb craze became a way to "treat" obesity (Paoli et al., 2013). Still, there are other purported health benefits and areas of developing research that raise some interesting questions about disease treatment and prevention.

Research has indicated that a ketogenic diet has benefits for weight loss and type II diabetes. Other studies have examined benefits for acne, <u>cancer</u> prevention, polycystic ovary syndrome (PCOS), and treatment for neurodegenerative diseases.

Weight Loss

There is a thermogenic effect of food. This is the energy that it costs the body to digest and metabolize nutrients. It costs more energy to metabolize fats and protein than it does to metabolize carbohydrates, so the body is likely burning more calories. Second, this type of diet has appetite suppressing qualities (Gibson, Seimon, Lee, Ayre, Franklin, Markovic, Caterson, & Sainsbury, 2015). This ultimately leads to consuming fewer calories than are burned and a more favorable body composition.

Diabetes treatment

In restricting the number of carbohydrates consumed, insulin sensitivity is restored. In turn, this will positively impact A1c levels and encourage a return to healthy blood sugar levels (Gibas & Gibas, 2017).

Acne

This area of research is developing and interesting. There is a belief among researchers that certain foods stimulate pathways that ultimately lead to the development of acne (Paoli et al., 2013). Further trials are needed to draw conclusive results about how these pathways work and influence acne.

Cancer

Tumor cells are glucose lovers and they thrive and grow in its presence. The hope and theory is that if we starve the tumor food supply by depleting glycogen, we starve the tumors themselves (Paoli et al., 2013). The question remains if the human body can adapt to other means of energy and substrate utilization, can other cells such as cancer do the same?

Polycystic Ovary Syndrome (PCOS)

Hyperinsulinemia and insulin resistance are quite commonly seen in women who also suffer from PCOS. Again, one of the thoughts here is to restore insulin sensitivity and positively impact the condition (Paoli et al., 2013).

Neurodegenerative Diseases

This may be the most interesting area of study with regard to ketogenic diets as therapeutic approaches. There appears to be a neuroprotective effect of ketogenic diets in many of these types of diseases.

According to Paoli et al. (2013), a common characteristic of neurological diseases is a disruption or defect in "cellular energy utilization", which may explain why forcing the body to choose a different source for energy can positively impact this category of afflictions. However, this area of study is still new and many questions are left to explore. Nonetheless, the preliminary information is promising.

Is ketogenic safe for everyone?

No. This is not a diet that just anyone should adopt nor one that just any health and fitness professional should recommend. It is outside the <u>scope of practice</u> for anyone but a medical doctor or licensed registered dietitian to recommend and supervise.

If your clients ask about the diet, do what you do best. Educate them on what the diet is and how it works, but consistently advise clients to seek the counsel of a qualified professional to help them determine if the ketogenic approach is appropriate.

It is not necessary to follow a ketogenic diet indefinitely. Many find these types of diets impossible to sustain and that's ok. The most significant priority is helping your clients shape and develop sustainable healthy eating styles that they will enjoy consuming. Remember – diet, like exercise, is not one-size-fits-all. Treat each client as they are – an individual with a unique set of needs and goals.

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Does Exercise Improve Sleep Quality?

We all know that exercise, <u>sleep</u>, and health are interconnected. Exercise can certainly improve sleep apnea, but to what extent and under what circumstances?

Knowing about the <u>sleep habits</u> and health conditions of your clients becomes increasingly important when lack of sleep could be threatening beyond the usual consequences of not getting enough.

Each of us has his own preferred method of waking up in the morning, ready to face a new and productive day. Some set a loud alarm clock; others choose to be gently awakened with music; still, others may rely on another person tapping him/her on the shoulder until the eyelids flutter open. For sufferers of sleep apnea, however, awakening can be a jolting and disturbing event.

The Physiology of Sleep Apnea

Sleep apnea is a condition characterized by restless sleep, insomnia and daytime sluggishness. Breathing often slows or even temporarily ceases while the individual sleeps, thereby stressing the cardiac system. While failing to awaken feeling refreshed is certainly bothersome, downplaying the severity of sleep apnea can lead to death.

The most common form of this disorder is Obstructive Sleep Apnea, or OSA. This is caused by an airway blockage, typically formed when soft tissue in the back of the throat collapses as one sleeps. There are a multitude of symptoms associated with OSA in addition to the loud snoring and lack of energy that are frequently reported. Waking up in the morning – or in the middle of the night – with a very dry throat, or even a chocking/gasping sensation, are among the more distressing symptoms.

What Causes OSA?

While OSA can affect both genders and can strike at any age, experts have observed certain key risk factors for developing the condition. A large tongue, large tonsils, and a small jawbone are often noted, as well as the comorbidity of gastroesophageal reflux, commonly referred to as GERD. Nasal cavity problems, such as a deviated septum or sinus issues, also pose a risk.

Exercise Wisely, Sleep Better?

Excess body weight frequently contributes to the onset of sleep apnea. Research scientists have long been interested in the effects of exercise on potentially mitigating the symptoms of OSA, initially thinking in terms of its weight loss effects.

Results of such studies were somewhat surprising. While there appeared to be a positive relationship between regular cardiovascular activity and a reduction in symptoms – as much as a 25% decrease in severity of the condition -- none of the test subjects lost a statistically significant amount of body weight during the time frame of the study.

The good news came rather in the form of an increase in sleep efficiency as well as peak oxygen consumption, while simultaneously reducing the incidence of sluggishness experienced throughout the day.

This surprising outcome caught the attention of Dr. Christopher Kline, a postdoctoral scholar at the University of Pittsburgh School of Sleep Medicine. He calls this outcome "compelling". The average weight of the

participants in this study was over 220 pounds. Dr. Kline feels that "they would have had to lose 22 pounds in order to achieve the same benefit received just through exercise."

OSA is often treated with a continuous positive airway pressure (CPAP) machine worn at night. However, this method is often not suitable for all sufferers. Therefore, the practice of introducing regular aerobic exercise to achieve beneficial effects has been most welcome my physicians and patients alike. Physiological adaptations of regular exercise often include increases in upper airway dilator muscle tone and decreases in fluid accumulation in the neck. These in turn increase the "effectiveness" of overnight rest.

It's Not as Clear-Cut as it Seems



Obstructive sleep opned

Before we celebrate exercise as the panacea for sleep apnea, there is, unfortunately, another side to this coin. A 2014 study published in the *Journal of Clinical Sleep Medicine* highlighted another negative side effect of poor breathing during sleep: impairments to one's *capacity to exercise*. A research study revealed that, compared to those who do not suffer from OSA, affected individuals may actually lack the ability to burn sufficiently high levels of oxygen during strenuous aerobic exercise.

In addition to a reduced capacity for cardiovascular exertion, muscle energy metabolism in these patients was impaired during exercise, and skeletal muscle fibers showed deleterious changes when compared to those in the "healthy" control group. Even upon completion of an exercise session, recovery time held its own unique abnormalities: a reduction in blood volume pumped from the left side of the heart to the right side was observed, as well as a weakened pulse.

Jeremy Beitler, Assistant Clinical Professor in Pulmonary/Critical Care Medicine at the University of California San Diego, was the lead author on one such study. He and his colleagues reached the conclusion that "...the sleep apnea itself causes structural changes in muscle that contributes to these patients' difficulty during exercise."

How Personal Trainers Can Help

Herein lies our professional dilemma when working with an OSA sufferer: do we encourage aerobic exercise to foster the aforementioned benefits, or do we proceed with caution due to the limitations of such an individual's inherent structural barriers to effective exercise?

Realizing that the benefits seem to manifest themselves despite little if any change in body weight, the likely prescription for such a client might be to couple basic aerobic conditioning with a prudent dose of nutritional counseling.

By starting each of these endeavors slowly, a trainer can carefully assess and monitor progress. If success has been made in research studies in the absence of significant weight loss, imagine the potential should the client also shed some unwanted pounds, thereby furthering the improvements of his symptoms.

Prior to increasing time/intensity of aerobic workouts, it is best to inform the client of potential pitfalls due to his physiology and structural make-up. Again, ramping up the workouts slowly is the key to developing lifelong habits while still exercising caution.

Sleep apnea, and OSA, in particular, poses many health threats, both short-term and over the course of a patient's life. If we have the power to alter the course of suffering and help these individuals attain a worry-free and restful overnight sleep, we should utilize our skills to help move these clients in a positive, energetic manner.

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Maximize Triceps Muscle Exercises with Anatomy

What's the difference between doing triceps extensions with a pronated grip, supinated grip and neutral?

This is a common question that arises about the many ways to strengthen the triceps. One of the exercises has more resistance from its antagonistic muscle group, biceps - meaning it might be a more challenging grip.

Anatomy helps us understand triceps extensions better. The body awareness that stems from anatomy knowledge makes imbalances in right to left side muscle recruitment easier to identify. Having symmetry in the body makes exercise more beneficial because there is better alignment. Misalignment often leads to injury.

Changing the way you position the dumbbell, band or cable changes which muscles are recruited, stabilizing and resisting. <u>Understanding the four biceps muscles</u> is also important when learning how the triceps muscles contract because they are on the other side of the joint resisting elbow extension.

An EMG is the only way to know for certain which muscles are working. But, you can call upon body awareness to get pretty close to knowing.

Anatomy of the Triceps Muscles

There are three triceps muscles in your arm. Knowing where each of these elbow extension muscles attaches creates awareness when exercising.

Find each attachment on yourself and on a partner. Use a balloon on a partner to deepen your understanding.

Click the name of each muscle for a short video.

Triceps Brachii Long Head - Lateral border of scapula to olecranon process of elbow



Triceps Brachii Lateral Head - Lateral humerus to olecranon process of elbow



Triceps Brachii Medial Head - Medial humerus to olecranon process of elbow





What is happening in each triceps exercise position?

Supinated Grip Triceps Extension

Your palms are facing the anterior or front of the body in this grip. Anatomically, the radius and ulna are parallel to each other. All of the elbow extension muscles are lined up well to help with this exercise.

Grasp your elbow joint with your opposite hand, wrapping around it. The lateral head of the triceps seems to contract just by supinating so perhaps it has a larger role in this type of extension.

You can also feel the biceps tendon in your elbow pit become taught when supinated, meaning it might resist the motion a little more causing the tricpes muscles to create more force.

Neutral Grip Triceps Extension

Your palms are facing your sides throughout the entire motion in this grip. Place your hand on your proximal (close to elbow joint) radius and ulna. Feel what happens when you move from a supinated position to neutral. The radius stacks on top of the ulna. The biceps tendon is more relaxed meaning it might resist less.

Pronated Grip Triceps Extension

Your palms are facing the posterior or back side of the body in this grip. Remember how the radius and ulna were parallel in supination and stacked in the neutral grip? Now they are crossing over each other.

Grasp your elbow joint with your hand wrapping around it again as you pronate and supinate. Notice the muscles that are tightening when you do this.

Body and Triceps Awareness Exercise

Have you ever had a client who was stronger on one side than the other? Or who complained of discomfort when curling on one side and not the other? Knowing where the muscles attach, being aware of them and cueing are all connected to body awareness.

Try this. Ask a client where they feel muscles contracting in each of the three exercises above. Ask if they feel the same sensation on the right and left sides. Then, show them where the attachments are for each muscle and see if they can feel each muscle working. Review one at a time with them to keep it simple. Of course, try this for yourself first!

Triceps Exercise Variety

Aside from doing bilateral extensions (both arms at the same time) and unilateral extensions (one at a time) you can use bands or cables instead of dumbbells. What's the difference?

The line of pull changes. Especially if you attach the band or cable in front of you versus attaching it up high above you. Different supporting muscles are recruited to stabilize when you change where the band is attached.

Of course, you can also make the repetitions slower, faster, pulse them or just hold the exercise in the hardest position (which is at 90 degrees).

Also, try starting with a neutral grip and rotate into a supinated or pronated grip by the time they get to the end of the motion.

I'd love to hear what you discovered when you worked on body awareness and feeling the triceps brachii muscles on your own body or what your clients are reporting when you help them explore. Please share with us on Facebook.

Get more hands-on experience with anatomy and body awareness. Check out <u>NFPT's Online Fundamentals of</u> <u>Anatomy Video Program</u>.

Balloons, play-doh, pipe cleaners, and ribbons are used to demonstrate each muscle with its attachment point on a skeleton model in a series of videos. You're also shown how to find the attachments on yourself and/or clients. Application exercises and guided visualizations are also provided along with a 50-page workbook.

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Adenosine and its Role in ATP and Athletic Energy

Adenosine Triphosphate is present in every living cell of the body. It is also available as a <u>dietary</u> <u>supplement</u>. Each year, the supplementation industry spends millions of dollars on researching the best way for athletes to gain that highly coveted competitive edge...but can one truly manipulate the body's energy pathways?

It's not up to personal trainers to recommend dietary supplements to their clients, but education is well within our <u>scope of practice</u>.

Adenosine and the ATP Equation

Adenosine is a naturally occurring extracellular signaling molecule that facilitates essential functions in human biology and physiology. From providing the backbone for basic energy transfer to its role in cell signaling, adenosine has such far-reaching effects as inducing vasodilation, regulating activity in the sympathetic nervous system, and reducing blood pressure and heart rate. Such properties are some of the reasons why adenosine and its derivatives are implemented in many therapeutic areas.

Adenosine forms from the breakdown of adenosine triphosphate (ATP), the primary energy source in cells. Chemically, ATP is an adenine nucleotide bound to three phosphates. An abundance of potential energy is stored within the bond between the second and third phosphate groups; this energy can be harnessed to fuel chemical reactions.

When a cell needs energy, it breaks this bond to form **adenosine diphosphate (ADP)** and a free phosphate molecule. In some instances, the second phosphate group can also be further broken down to form **adenosine monophosphate (AMP)**. When a cell possesses excess energy, it stores this energy by forming ATP from ADP and phosphate.

Can Additional Adenosine Affect Performance?

Since ATP is required for the biochemical reactions involved in any muscle contraction, increased amounts of ATP get consumed during periods of high muscular demands, such as vigorous exercise, and must be replaced in order for the muscles to keep moving.

To facilitate this process, adenosine contributes to the regulation of skeletal muscle blood flow by stimulating prostaglandin and nitric oxide synthesis. By influencing the regulation of angiogenesis (the physiological process through which new blood vessels form from pre-existing vessels), adenosine may exert a significant effect on the body's adaptation response to exercise.

Various popular training methods, such as cycling and interval training, may increase adenosine levels and thereby might enhance the response of adenosine-influenced adaptive mechanisms.

Interval training seems to offer the greatest opportunity for elevated adenosine to occur. Adenosine production is dependent upon energy and stress level, and the rate at which ATP is utilized. Since this phenomenon occurs during bouts of interval training, such adenosine-induced adaptations over time may enhance exercise performance.

What is Occurring on a Cellular Level?

Mitochondria are the human body's "furnaces", responsible for producing the energy necessary for all movement and biological processes. These powerhouses, located within cells, convert carbohydrates (glucose, in their most elemental form) to adenosine triphosphate (ATP). Often thought of as a molecular "unit of currency" for intracellular energy transfer, ATP enables our cells to perform an expansive array of functions.

As one might imagine, ATP and athletic performance are closely related. ATP provides the energy required for muscle contractions, blood circulation and cardiac function, and generally fuels the body for whatever it may be doing at any given point in time.

A dedicated elite athlete repeatedly dips into his ATP sources day after day, week after week. Without a sufficient means of replenishing this stock, the energy well begins to run dry. This situation clearly leads to a loss in athletic performance, since the athlete is rendered incapable of performing optimally if his "engine" doesn't have fuel.

The Role of Nutrition in Energy Production

The human body produces ATP through the daily consumption of nutrients. However, many internal and external factors exist in our world that may hinder the amount of nutrients our bodies are able to absorb and utilize. Stress, certain medications, pesticides sprayed on food sources as they grow, and gut flora imbalances are just a few examples of what might interfere with ideal ATP production.

Supplemental Success?

As mentioned above, athletes whose metabolic processes must perform at an optimal level every day need a diet that includes easily absorbed vitamins, minerals, trace nutrients, and high-quality proteins. Foods in their natural, unprocessed state can be broken down into highly bio-available nutrients and building blocks.

When such a pristine diet is unavailable, some athletes turn to supplementation to gain – or maintain – a competitive edge. A research study done on one such supplement revealed that it produced a desirable increase in both ATP and athletic performance. Participants who ingested the product twice a day for three months showed increases in ATP of more than 180% compared to baseline.

The inferred supposition is that the availability of more high-quality building blocks enables athletic training to influence the formation of new mitochondria. If the body's mitochondrial system is functioning optimally, and the number of mitochondria is concurrently increasing, available oxygen is also being utilized to the best of its natural ability. This results in a boost in performance even without any additional training.

As is so often the case in scientific research, results are not always comparable from product to product. Adenosine-5'-Triphosphate Disodium is a common pre-workout supplement which claims to improve blood flow and training performance. However, as opposed to the research study referenced above, the majority of studies performed on this product, even at doses larger than what are typically found in popular pre-workout supplements, revealed little or no benefit to athletic performance.

Strength versus Endurance

Researchers did find that supplemental ATP tended to improve muscular endurance, enabling the athlete to complete a strength -training workout comprised of multiple, lengthy sets. This finding seems to shed a

positive light on the idea that there might be a little boost to recovery and/or mechanisms like increased blood flow.

Less stellar improvements in strength are likely due to the fact that the breakdown of ATP outside of the cells occurs quite rapidly. Since such degradation frees up molecules of adenosine, which we have learned possesses the potential to improve blood flow, it could be reasoned that it is the adenosine alone jump-starting the performance improvements.

Taking an overall view of this study's results, the blood and cellular chemistries between those participants taking ATP and those in the placebo group weren't significantly different; the slight alterations observed were negligible and therefore not enough to account for any improved athletic performance.

During my years as a competitive bodybuilder, my Coach recommended a number of supplements to me, all of them natural and available at an average drugstore or GNC-type retailer. Aimed largely at facilitating recovery as well as enabling the body to more easily draw upon nutrients consumed through food, I definitely supported this industry, and I did have a successful competitive career.

The question as to how influential these products were in that success will always play in my mind, and apparently, even in-depth research can see both pros and cons. Presenting both sides of the coin to clients considering embarking upon this route will help them forge a stronger, more confident trust bond with you, as a trainer as well as a person!

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Intermittent Fasting – Is it the right approach?

Intermittent fasting is growing in popularity for its purported benefits including improved insulin sensitivity, weight loss, managing hunger cues, and increased fat burning (and this is just the short list). But is it for everyone? Is it safe? Is it effective over the long term? Let's look at some facts.

Intermittent fasting (IF) means something different to everyone. Think about other dietary approaches to weight loss such as low-carb, high-protein, <u>Ketogenic</u>, etc. Just because an approach has a title doesn't mean its rules and guidelines are consistent between various schools of thought.

What is Intermittment Fasting?

IF, as defined by the Academy of Nutrition and Dietetics, is the practice of restricting food and any caloriecontaining beverages for a period of time (usually 16 hours). That said, you will find IF defined differently between sources.

That's important to keep in mind as it's not as simple as "don't eat or drink for 16 hours". It gets a little messy when we consider all of the different types of IF approaches.

Some alternate approaches to IF include alternate day fasting (eating every other day), meal-skipping, selective fasting (24-hour fast a couple days a week), and lean gains (16-hour fast and consuming all food within an eight-hour window) (Precision Nutrition).

What does this all mean? Simply stated, IF is an approach that includes going without food or caloriecontaining beverages for specified periods of time. What that time frame looks like hinges upon the ultimate goal.

What does the research say about IF?

If we think about it, we already practice fasting. Humans (throughout history) fast. Humans fasted during scarce food sources, failed crops, poor financial status, and – as well still do – overnight. Fasting is nothing new to the human body.

What we do see is an increase in the research efforts made to determine IF's benefits in clinical cases such as diabetes, Alzheimer's, cardiovascular disease, and many other areas. However, questions about IF's utility and conclusive benefits remain somewhat unanswered.

More research in humans is necessary to continue to build the body of literature and a collection of results before drawing any "cause and effect" conclusions. Some of the most exciting areas of research include IF's potential benefits for cognitive diseases and weight loss.

One study published recently found that IF appeared to protect against cognitive decline, metabolic decrease, and dyslipidemia (<u>Shin, Sham, Kin, & Park, 2018</u>) This study examined IF in estrogen-deficient rats, so how these results translate to humans is still being actively studied. However, the initial results are promising. Because this study used estrogen-deficient animals, the results are also positive potentially preventing metabolic issues related to menopause.

Another area of research is particularly salient to health and fitness professionals – decreasing obesity/enhancing weight loss. A study published in 2017 used every-other-day-fasting (EODF) to examine

how fasting could impact browning of white adipose tissue and gut bacteria (<u>Li et al., 2017</u>). Interestingly, the results indicated gut microbe composition may provide a treatment for metabolic diseases and adipose tissue browning.

This is significant because we know an accumulation of white adipose tissue carries enormous consequences for health – physically and metabolically. Whereas the brown adipose tissue is metabolically active and appears to be uniquely low in obese individuals and those with diabetes (<u>Bartelt & Heeren, 2014</u>).

Is IF something clients should do?

No. There simply isn't enough research (especially in humans) to conclude if this is an approach that everyone needs to try (especially in athletes as we don't know how IF will impact performance). As we know, dieting, much like exercise, is individualized and should remain so. Further, any change in diet should be monitored by a qualified nutrition professional.

While research does indicate IF may positively impact human health, the mechanisms of action aren't fully understood. Further, prolonged or constant fasting has consequences of its own. When it comes to our clients, this approach may not be the best (nor should we be recommending any specific dietary practice). IF can cause dizziness, nausea, fatigue, and a sense of "fog" in the brain.

If you do have a client that is interested in learning more about IF (and you will), consult with the registered dietitian in your network and guide your client accordingly.

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Does Exercise Help Restless Leg Syndrome?

The right exercise at the right time can make a difference for clients suffering from RLS.

"Purposeful movement" is typically seen as a healthy endeavor, but erratic restless movement can be less than desirable.

Restless Leg Syndrome, or RLS, is considered to be a sleep disorder, although its discomfort and outright pain make sleep nearly impossible for some sufferers. While there are many symptoms clustered together to encompass RLS, most individuals living with this ailment describe sensations such as burning, electric shock, itching, and "creeping flesh".

In a somewhat futile attempt at alleviating such symptoms, many patients feel the sudden urge to "walk off" these sensations. Since most incidences are observed upon laying down in preparation for a night's sleep, quiet slumber can prove highly elusive. While these feelings most commonly occur in the lower extremities, RLS can also affect the arms and hands.

Causes of RLS

While RLS does not necessarily discriminate based upon one's gender, there is a high incidence of women developing these symptoms as they approach menopause. This phase of a woman's life is characterized by significant hormonal fluctuations, most notably being the circulating levels of estrogen. Research has demonstrated that very low estrogen can inhibit the metabolism of magnesium. Since this mineral plays a dominant role in encouraging muscle relaxation, a lack thereof can easily trigger restless leg syndrome.

While there are many derivatives of origin for RLS, the single constant seems to be the cluster of irritating sensations that may cast a profoundly negative shadow on activities of daily life. While there are pharmaceutical solutions and treatments to help mitigate such symptoms, more natural paths do exist.

The Role Of Exercise in Alleviating Symptoms

Exercise seems to have elicited mixed results in those who have reported their data to medical professionals. Walking is the most easily accessible form of movement employed to ease the discomfort of RLS. However, timing, as well as the intensity of such exercise, is crucial to its benefits.

Both leisurely strolls and moderate "speed walking" can be effective; even 20-minute increments engaged in once or twice daily prove beneficial. While this activity will fatigue the leg muscles, thereby easing their restlessness at the end of the day, *vigorous* exercise performed close to one's bedtime may actually swing the pendulum in the opposite direction, exacerbating symptoms and further interfering with a good night's sleep.

Controlled Breathing Techniques

Another option that has proven to be effective in combating the negative sensations associated with RLS is participation in a yoga class. The slower, deliberate movements of this Eastern discipline help to calm twitching muscles. The modulated breathing in which one engages during a yoga class creates a serene mind-body-soul connection which can be very soothing for restless legs.

Avoiding Prolonged Inactivity

For those whose lifestyles keep them chained to a desk throughout the workday, such lack of mobility may cause RLS symptoms to increase. For these individuals, discomfort can be alleviated by making time every hour to not only stretch the legs, but also to rotate the ankles 360 degrees several times. Standing while holding on to the edge of the desk, and performing a series of calf raises each hour, will go a long way towards attenuating tensed nerves and releasing stiff calf muscles. These same series of movements may be performed again prior to bedtime.

Whether the exercise engaged in is walking, yoga, swimming or simple calf raises, the resultant lactic acid build-up that typically follows physical activity can be more distressing to individuals living with restless leg syndrome. To prevent lactic acid discomfort, slow but thorough stretching should always be engaged in at the end of any movement session.

Follow a Schedule

Restless leg syndrome often occurs in people whose sleep patterns are irregular, or who already suffer from mental/emotional fatigue. Establishing a regimented bedtime routine and strictly adhering to it over time will help overcome the irritability commonly associated with the negative sensations of RLS. Learn more about <u>sleep science and solutions</u> to help with this mission.

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Exercise and Your Immune System

Your "healthy" exercise program might be ruining your immune system. If you or your clients have been consistently feeling exhausted and drained after workouts or suffering <u>too many colds</u> this season, consider this.

Exercise has often been touted as the best medicine for a multitude of ailments. In the correct amount, it can be beneficial; but as with some many medications on the market, excess dosages can be harmful.

Exercise isn't just a limitless source of healthy goodness; there comes a point when "healthy" spills over into "too much," and we can actually improve our health by engaging in *less* of it. This is not a precept to which one generally expects a personal trainer to adhere, but after considerable research on the topic, there is a great deal of truth to this statement.

Between 60 and 90 % of dedicated amateur and professional athletes who do not over-train report they have fewer colds/upper respiratory issues than their more sedentary counterparts, according to a June 2001 report by the President's Council on Physical Fitness and Sports Research.

Dr. Mark Jenkins, Associate Team Physician for Rice University, writes on the SportsMedWeb site that improved immune function through moderate exercise is "especially true in older athletes, and it appears that regular exercise can help reduce the age-related decline in immune function." However, knowing when to take a step back is just as critical as being able to push oneself out of a slump.

More Work Can Equal Less Potency

More than one component of the immune system may be weakened by excessive training, which is defined as working out intensely for more than 90 minutes. These include changes in the number and function of immune system cells, such as white blood cells, antibodies, and pro- and anti-inflammatory biochemicals such as cytokines.

During the 3 to 72 hours following an overly intense workout, there exists within our bodies a window of opportunity during which "viruses and bacteria may gain a foothold, increasing the risk of subclinical and clinical infection. Thus, the risk of upper respiratory tract infections can increase when athletes push beyond normal limits," according to Jenkins.

There are all kinds of ways to determine when the point of excessive exercise has been reached. Some athletes have a keen sense of self-awareness, and simply "feel" when they could use a rest; others use various metrics, such as a lifting log or mileage count, to determine that their bodies need a day off. From a purely scientific perspective, however, one of the most interesting ways to approach this dilemma is from the vantage point of the immune system.

A healthy amount of exercise seems to provide an overall boost to the immune system. However, overdoing it may actually impair immune function. Endurance athletes such as marathon runners, distance swimmers, and triathletes regularly exhibit significantly depressed immune systems, especially with regard to upper respiratory tract infections. When elite athletes do get colds, their symptoms tend to last longer and be more severe than those of the average recreational gym-goer.

Too Much Of a Good Thing?

The researchers of one study undertaken to illustrate this point examined three groups of subjects: elite athletes, recreational athletes, and a sedentary control group. Their results were both interesting and definitive \sim

- 66% of the elite athletes displayed upper respiratory issues
- The sedentary subject group suffered an illness rate of 45%
- The recreational athletes remained the healthiest of the 3, with only 22% succumbing to colds

The study became even more specific as it explored what aspects of exercise produced the dip in immune response \sim

- Relatively long training sessions (1.5 hours or more), especially without refueling during the workout
- A reasonably high intensity, but not excessively difficult, training session
- Insufficient recovery periods between workouts

It is clear that exercise can bring about significant hormonal changes within the body. Most notably, it raises the levels of norepinephrine and <u>cortisol</u>, "stress hormones" that tend to suppress the immune system. The hormonal changes of exercise cause the numbers of immune cells (including leukocytes, or white blood cells) to drop during and immediately upon completion of the workout.

Many components of the immune system exhibit adverse change after prolonged, heavy exertion, such as the skin, upper respiratory tract mucosal tissue, lung and muscle tissue, and of course, in the bloodstream. A great majority of exercise immunologists believe that during this 'open window' of impaired immunity, viruses and bacteria may gain a foothold, increasing the risk of subclinical and clinical infection. The infection risk may be amplified when other factors related to immune function are present, including exposure to new pathogens, lack of sleep, emotional stress, malnutrition, and/or weight loss.

This belief was founded in the early 1990s with a <u>study</u> conducted by David Nieman, Ph.D. Dr. Nieman introduced the "J-shaped curve", which clearly illustrates how regular <u>moderate</u> exercise may *decrease* the risk of upper respiratory infections while regular <u>intense</u> exercise may *increase* the risk of these infections.

A study of 10 elite male cyclists, results of which were published in 2010 in the *Exercise Immunology Review*, revealed that a long session of intense exercise (in this case, two hours of hard cycling) may temporarily boost some aspects of the immune system response (like certain white blood cell counts), but also temporarily depress other variables, such as phagocytic activity, which is the process used by the body to protect itself from infectious and noninfectious environmental particles and to remove unwanted cells.

Keep in mind that although that tough <u>HIIT workout</u> might be to blame for the sudden appearance of cold symptoms, the benefits derived from such high-intensity training far outweigh the negative aspects, so it is not necessary to avoid such workouts during cold and flu season simply in the name of remaining illness-free.

The safest bet is to increase one's focus on recovery, which seems to mitigate the risk. "Even without exercise, lack of sleep and stress weaken your immune system and predispose you to get sick, and if you add a heavy workout on top of that, you're even more vulnerable," says Purvi Parikh, M.D., an allergist/immunologist with the <u>Allergy & Asthma Network</u>.

Dietary Interventions For Alleviating a Compromised Immune System

Immune cells need glucose to function properly, which our bodies obtain through the <u>consumption of</u> <u>carbohydrates</u>. Several studies have shown that overtraining on a low-carb diet (7-11% carbohydrate) produces a dramatic negative shift in the immune system. This confirms what most trainers preach to clients: athletes need enough carbohydrates to keep themselves properly fueled for the activity at hand.

No single food will magically fend off the flu, but certain nutrients take the lead in helping protect your body from the daily onslaught of bacteria, viruses, and other germs. Protein is one such key nutrient. The antibodies that help fight disease are comprised of proteins.

Many foods high in protein contain additional immune-boosting nutrients. Lean cuts of beef and pork, as well as protein derived from beans, soy, and seafood (especially oysters and crab), contains zinc—a mineral that helps raise the production of infection-fighting white blood cells. Studies have demonstrated that even mild zinc deficiencies can increase the body's susceptibility to infections. Both almonds and cashews are good sources of protein as well as magnesium, both of which help support a healthy immune system.

Almost any kind of fresh fruit and vegetables are good for keeping the immune system properly functioning, but if choices must be made, opting for those rich in vitamins A, C, and E will always be beneficial. Vitamin A, which can be obtained from the consumption of delicious sweet potatoes, carrots, and dark leafy greens, helps white blood cells fight off infections more effectively; it also assists in regulating the immune system.

Deficiency of iron, zinc, or Vitamins A, E, B6, or B12 can be associated with excessive physical training, but no hard evidence exists to point to the theory that high-dose supplements will confer any improvement. Once the body suffers from an inadequate intake, increasing the amount will not immediately rectify the situation. Simply put, our bodies are unable to compensate for overtraining by eating differently in the immediate short-term.

Can Exercise Boost the Immune System?

Some studies show that "moderate intensity" exercise may cut down on the incidence of common colds. Moderate activity includes a 20- to 30-minute walk every day, strength training and/or cardio conditioning at the gym every other day, or biking a few times a week.

In a study appearing in the *American Journal of Medicine*, women who walked 30 minutes every day for 1 year suffered 50% as many colds as those who didn't exercise. Researchers found that engaging in regular exercise may lead to a higher number of infection-fighting white blood cells circulating in the bloodstream.

In a separate study, researchers found that 65-year-olds who participated in regular exercise exhibited the same number of T-cells -- a specific type of white blood cell -- as that found in individuals half their age.

Are Workouts Safe With a Cold or Stuffy Nose?

Mild to moderate physical activity is considered safe even in the presence of a common cold, provided there is no accompanying fever. Exercise may even temporarily relieve mild congestion by opening nasal passages.

Generally speaking, most physicians deem exercise to be acceptable provided all of one's symptoms are above the neck: runny nose, sore throat or sneezing. Symptoms presenting themselves below the neck, such as wheezing, coughing or gastric distress, point to skipping the gym and resting instead. Even under mild illness circumstances, reducing the intensity of a workout will still provide some exercise while not placing the body at risk for a more serious and/or debilitating cold or infection.

Your Bottom Business Line

While it may be tempting to encourage clients to "work through" their symptoms, in an effort to maintain your current income level, sage advice suggests taking a longer view than the next paycheck. We have dedicated ourselves to the preservation and improvement of clients' physical wellbeing, and that does not always mean bigger muscles or improved VO2 max. Considering the entire person rather than his/her individually trained body parts, we must know when it is best to suggest rest and a day or two off from the gym, and when it is safe and appropriate to carry on with business as usual. Becoming familiar with which aspects of intensity can ramp up or depress the body's immune function enables us to provide the best guidance to our clients.

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How to Break Client's Momentum in Strength Training

"Cheating" with momentum while strength training may feel appropriate in the moment, but ultimately you are only cheating yourself out of long-term gains.

As personal trainers, we have the opportunity to bear witness to any number of inappropriate and potentially dangerous weightlifting practices during a typical day at the gym.

Consider for a moment the frequency with which each of us has observed individuals engaged in the following maneuvers:

- Bouncing up and down while performing weighted squats
- Pumping quickly through a set of chest presses
- Swaying of the middle back while doing bicep curls

Such moves are prime offenders of the use of *momentum versus pure strength* while performing a workout.

Momentum Unwrapped

The term "momentum" is defined by two key aspects: (1) mass, or size, of the exerciser as well as the weight being moved, and (2) velocity, or speed. The larger the exercise participant is, the more weight she is typically capable of lifting. If she proceeds through the lifts too quickly and/or places fewer constraints on her movements during the exercise, the greater are the risks caused by the use of momentum.

For everyday movements, the use of momentum is normal and even adaptive. It is the body's way of conserving energy, particularly during activities involving running, throwing or pushing movements.

During strength training, however, momentum becomes counterproductive. It decreases the work done, reducing the tension on the muscle and thereby minimizing the effectiveness of the exercise. The danger comes from the athlete failing to realize the hazard of such a practice to the joints and spinal cord. Momentum over time will overload these areas, causing unnecessary "wear and tear."

Figuring Out The Physics

Newton's Second Law of Motion is commonly referred to as the **Law of Acceleration**, which states that a net force on an object will accelerate it, or change its velocity, in proportion to the magnitude of the force and in the same direction as the force. Simply stated, the rate of change in the momentum of a body is proportional to the applied force and takes place in the direction in which the force acts.

During strength training, momentum is additive—it gains strength with each repetition. The <u>tempo of exercise</u> becomes faster, the muscle works less, and the joints and spine work harder. We can help clients optimize strength training and avoid injury by discouraging their use of momentum.

Stop Momentum Before it Starts

The velocity of a contraction refers to the speed at which a muscle contracts and performs a movement. Controlling the speed of a repetition will stop the use of momentum and force the muscles to do the work since slower movements by their very nature will not cause momentum to build. By cueing a client to stop and "squeeze" or "acknowledge" the contraction at the midpoint of the exercise, we can further eliminate the risk of momentum being employed.

Leaving Ego at the Entrance of the Gym

When working with a new or inexperienced individual at the gym, remind him to forget about competing with the other lifters around him. The purpose of his going to the gym may vary from striving to improve his physique to encouraging and facilitating stress release.

Either way, we are there to take care of only one person: The Client. Help him forget about his ego (with regard to how much he can lift, how fast he executes each move, etc.) and coach him to concentrate on himself and his goals/ needs. The long-term safety of his joints, muscles, and tissues needs to be a priority for both parties involved.

It is Not About the Weight Being Lifted

Another factor that contributes to implementing momentum and bad form is the use of excessive weight. Exercises executed with heavy weight accompanied by good form will definitely improve one's musculature, but excessive weight lifted incorrectly can have adverse consequences. Not only might the lifter experience joint pain; eventually he increases the risk of suffering a muscle/ligament/tendon tear.

The benefits of using lighter weight are threefold:

- 1. If the muscle is lifting a weight that is manageable, the risk of injury is negligible.
- 2. Lifting a lighter weight allows total and complete control of the exercise.
- 3. A lighter weight allows the individual to totally focus on contracting the muscle to the fullest, rather than relying solely on hoisting the weight to complete the repetition.

Guiding the Process

The following 4-step plan will allow us to best serve our clients while allowing them to understand the basics of eliminating the use of momentum in their workouts.

1. Set up. It is our job as trainers to keep our clients' bodies in the correct spinal/joint alignment before starting an exercise. When placing a client into position, check his alignment – are his spine and joints in neutral position? Are his abdominal muscles pulled in to his spine?

2. Define the start, middle, and end. Every exercise has a start, middle, and end, with the end position being the same as the start position. To prevent swinging and bouncing during each repetition, know where these points are. Treat each point as its own distinct movement instead of one movement blurred together.

3. Contract at the peak. At the midpoint of the repetition, always <u>cue the client</u> to pause and contract the right muscles. Counting to control the rate of contraction – and breathing -- back to the start will help the client focus, and stop him from using momentum, thereby allowing the recruitment of more motor units to increase force.

4. Control the speed. Slower repetitions build less momentum than faster ones. Rushing through reps increases the likelihood of relying on momentum. Encourage clients to slow down and <u>practice awareness</u> through each rep.

By understanding the differences between "<u>tempo</u>", "speed" and "momentum", we can help our clients ensure a safe and effective workout every time they visit the gym. Gains in physique, muscularity, strength, and aesthetics come together when muscles are placed under tension appropriately. The blending of physics and fun begins with you!

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Should Personal Trainers Recommend BCAA's to Their Clients?

Have the "Protein Police" been dethroned by the Ace of Amino Acids?

The functioning and cultivating of skeletal muscle lies at the core of our profession. As trainers, we tend to focus on aesthetics and health when working with clients, since these seem to be among the most prevalent reasons individuals give for coming to the gym.

However, we would be remiss in our duties as knowledgeable practitioners if we oversimplify the role of skeletal muscle by describing it merely as the force behind the body's ability to move.

Skeletal muscle is the also the main holding tank of amino acids which are utilized by other bodily tissues. These amino acid reserves are the only resources in the human body that can withstand significant depletion without compromising the ability to sustain life.

The Exercise-Amino Acid Connection

When the body experiences a drop in blood sugar, amino acids come to the rescue as the liver's primary substrate in manufacturing additional glycogen stores. Specifically, it is the nitrogen contained within amino acids that is a key component of DNA and the myriad of other molecules necessary for cell maintenance and replication.

Tissue demands for amino acids skyrocket when the body is under *stress*, which can be categorized as severe illness, traumatic injury or, most applicable to our profession, a serious strength-training regimen. Intense physical activity and recovery are contributors to the significant changes observed in amino acid and protein metabolism within skeletal muscle. It is during these times that the body has a particular demand for branched-chain amino acids, often referenced as BCAAs.

During exercise, muscle protein synthesis decreases as protein degradation increases. As activity levels continue to rise, there is a reduction in the concentration of branched-chain amino acids circulating in the blood plasma as well as within the cells themselves. At the conclusion of a tough training session, therefore, recovery of muscle protein synthesis requires a rescue supply of dietary protein or BCAAs to restore these levels to their former homeostatic balance.

Leucine's Leading Role

BCAA's are unique in that the body cannot manufacture them on its own, and must be obtained from either dietary sources or direct supplementation. In the past, researchers viewed amino acids simply as substances required for the manufacture of muscle and other body proteins—similar to the bricks required to build a house.

Most studies refer specifically to the BCAAs leucine, isoleucine and valine. Since these are the only three amino acids capable of being utilized as "fuel" by muscles tissues, both blood and muscle levels of BCAA's suffer a significant depletion by the end of an intense exercise session. In the case of leucine, however, recent investigations have proven this amino acid to play multiple roles that go well beyond simply providing material to build muscle.

Of the three aforementioned BCAAs, leucine is by far the most abundant, having a 10 -fold greater impact on protein synthesis than any other amino acid.

Solo Act?

BCAAs are preferentially burned as energy by muscles to fuel work output. It is now widely accepted that whey protein is a very rich source of BCAAs, explaining its popularity as a main ingredient in many post-workout supplements shakes. Researchers who study why protein consumption helps stimulate anabolism (the building of muscle) have been able to demonstrate that it is the level of amino acids in the bloodstream that has the greatest impact on boosting protein synthesis in muscles. In particular, the levels of the BCAA leucine seem to correlate the most with protein synthesis.

In a series of brilliantly controlled and executed experiments, researchers examined levels of muscle protein synthesis after subjects' consumption of various formulations of amino acids, and comparing them to control results observed after the ingestion of glucose alone. When a *complete* protein (one that contains all the amino acids) was consumed, protein synthesis increased as expected.

Consuming only essential amino acids netted the same increase, suggesting that non-essential amino acids may not be specifically required to stimulate an anabolic state. When BCAAs were consumed in the absence of any other form of supplementation, the same anabolic spike was once again observed.

The final experiment in the series, the crowning glory, consisted of having the subjects refuel with leucine alone. Remarkably, protein synthesis *still increased on the same order of magnitude*! These findings provided strong evidence that leucine is the driving force behind the ability of dietary protein to stimulate protein synthesis.

There is an interesting possible explanation for these results. Whole proteins take a fairly long time to empty from the stomach into the small intestine and ultimately into circulation, where they can be utilized effectively. Even a fast digesting <u>protein such as whey</u> can take hours to liberate the leucine therein, allowing it to enter circulation.

An isolated free-form leucine supplement, however, becomes quickly absorbed into the bloodstream, thus spiking plasma leucine levels and drastically increasing intracellular leucine concentrations. We have learned that the quality of a protein source is primarily dependent upon its leucine content; therefore, in order for the body to re-set itself into the desired positive nitrogen balance after a workout, a source of leucine must be consumed.

In an environment devoid of sufficient amounts of this BCAA, protein balance will remain negative, causing the process of muscle anabolism to suffer. This lends credence to the data showing how ingesting BCAAs prior to engaging in resistance exercise can reduce muscle soreness.

Bodies Brilliantly Balance BCAA's

One of the most researched pathways of muscle growth is called the mTOR pathway (mechanistic target of rapamycin). This process is highly dependent upon and sensitive to circulating concentrations of leucine. When low levels of this BCAA are detected, the body signals mTOR that the environment is experiencing a lack of dietary protein, and as such cannot synthesize new skeletal muscle. When this occurs, the body simply disables the mTOR pathway.

Once sufficient concentrations of leucine are consumed, mTOR receives the signal that adequate dietary protein is now present and switches on overall protein synthesis. Since an increase in mTOR activity results in

more muscular growth, it is easy to see how important leucine is in the overall scheme of a positive strengthtraining outcome.

Many trainers are not comfortable <u>recommending workout supplementation</u> to their clients, realizing prudently that this may extend beyond their <u>professional scope of practice</u>. However, if the occasion should arise when a client is trying to decide between 2 different supplements, and upon reading the ingredients of each it becomes clear that you can point him in the proper direction, take the time to educate him. The client will benefit and you can feel good about helping him on his healthy journey.

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How Neuro Linguistic Programming Can Help Personal Training Clients

Personal trainers can help clients reprogram their thinking and realize their fitness goals. Without a change in thought patterns behavior doesn't change. Neuro-linguistic programming is a way to accomplish this.

Neuro-Linguistic Programming (NLP) provides a model of change that can help clients find success in their quest to conquer the mental aspect of fitness. NLP can greatly enhance one's physical and mental health by teaching how to set appropriately framed goals.

It is not the <u>role of a personal trainer</u> to be a psychologist or mental health professional, however, it is within our scope to motivate and coach clients toward their health goals.

Getting Inside the Brain

In order for clients to successfully reach fitness goals, developing this "inner game" is critical. What exactly defines a winning "inner game" of fitness?

- <u>Setting clear and reasonable goals</u>
- Cultivating and retaining –the motivation and self-discipline necessary to reach these goals
- Willingness to learn ways of breaking old habits in favor of creating new, healthier ones
- Reformatting self-image, including positive self-talk
- Acknowledging step-by-step progress, thereby building self-esteem

How Does Neuro-linguistic Programming Work?

By learning to address how we take in information through our senses (neurology), translate it into language (linguistic), and make patterns or mental models (programs) that influence our behavior, such programming can ultimately foster greater self-awareness, natural change, and personal excellence. In essence, by working through this process with a client, NLP offers a way to deconstruct the old images (the ones that cause the current detrimental behavior) and construct the new desired actions.

Meeting Clients Where They Are and "Tapping In"

How many of us have encountered new clients who claim they just want to be a Size 2? When asked why they are allowing that number to wield so much power, they often reply that it represents their ideal of a perfect shape. By utilizing the tools of NLP, we can reformat that goal into something realistic and attainable.

Since there is no such thing as a universal "<u>perfect body</u>", our job lies in reprogramming the client's mind to see that what she probably desires is a fit and healthier body. It is important for personal trainers to help clients rephrase goals such as "being a Size 2" to better reflect the true outcome they are seeking: healthy body, improved muscle tone, flexibility, proper nutrition, positive outlook.

How to Listen so Clients Will Speak

NLP takes this entire process a step deeper, and it is there that we find the greatest challenge for personal trainers. We must develop a strong ear: we have to listen to our clients very closely and also be able to infer what is *not* being said.

A client will often claim that weight loss is a top priority and his primary reason for hiring a personal trainer. Over time, however, not only is weight not coming off; your client keeps skipping sessions and providing weak excuses for his absences. As a seasoned professional, you may rightly think," What happened to his priority?"

While we cannot drag a client out of bed and force him to attend his scheduled session – and work hard while he is there – we can ponder what may be standing in his way. Breakthroughs often materialize for a client when the trainer taps into this individual's "inner game" and helps him to reframe his motivation from "losing weight" to something with a more positive framework.

Before this can even occur, however, the trainer must learn about his client's past. What causes him to continually sabotage his own goals? Perhaps the client reveals that he grew up in a household where his mother was constantly dieting and rarely ate meals with the family. This haunted him all through his adolescent development, so much so that as an adult he found it soothing to eat whatever he wanted; losing weight was something with which his mother was obsessed, and he wanted no part of that.

Armed now with the understanding of why the client is getting stuck, a clever and creative trainer can help him shift his perspective by reformatting his original goal into something with a more positive spin. By suggesting that he focus on getting stronger, having more energy, enjoying a better, more <u>restful night's sleep</u>, and finding some healthy recipes to try, you will most likely observe an uptick in his "inner game", a return of his original motivation.

Before too long, the client's weight begins to drop, and all of the aforementioned positive results come to fruition. NLP enables us to help provide the same desired result, albeit through a newly learned and altered neural pathway.

Creating a compelling future is one of the keys to winning the "inner game" of fitness training. Accomplishing this involves visualizing desired goals and successful outcomes. Such images help to inspire us and propel us forward toward a dream, goal or outcome.

Consider asking your client to think about the following:

- "In general, what motivates you?"
- "What inspires you?"
- "What moves you to action, or gets you out of bed in the morning?"

After some thoughtful consideration, he may offer up these responses~

- Success
- Praise
- Recognition
- Love and Acceptance
- Making a difference in the world
- Setting my sights on something I want to make my own (a home, an education, a thinner body, a job, a cause)

These are all examples of "values." When we can connect our future plans and long-term visions to these values, goals become even more compelling.

Neurolinguistic Programming Techniques

NLP techniques, such as those involving timeline work, can be very useful in helping bring a person back into his or her past in order to discover the situations that originally triggered unhealthy eating habits leading to weight gain. It does take more than one or two sessions to identify and reprogram the problematic thought process. Taking this time, however, can help lift the burden off clients so that they are able to move forward with their lives.

A female client confesses that she has always struggled with eating and weight issues. The source of this struggle was her feeling that she didn't deserve to be happy. A trainer can help her explore the origin of this feeling, and in doing so, may discover that the woman had grown up in a poor, rural but hard-working community. As an adult, the client felt guilty that she was more successful than her friends and relatives. She was afraid that if she embraced her success, she would lose it all. Overeating and being heavy was a way of punishing herself for her success so that she wasn't perfect.

Armed with such knowledge, the trainer's job is to help the client reframe the part of her that feels guilty for succeeding. Over time, it is possible to change her perception of success and find other, more satisfying ways to share and celebrate her accomplishments with her family and friends.

Trust and Reframing

Once the positive intention behind the detrimental behavior has been discovered, resources and alternatives are much more easily found. It is important to have other choices that are at least as effective for fulfilling the positive intention of the problem behavior, in order to appropriately address the obstacle. If there are no alternatives, the risk is that the client will become conflicted internally or become overly rigid or dogmatic.

Rather than feeling mistrustful, guilty or ashamed about difficulties, the recognition of one's own positive intention leads to trust and gives a specific strategy for finding other alternatives, rather than becoming frustrated with the typical "trial and error" (or "trial and horror" as it is sometimes called) approach.

The reframing process involves understanding and communicating with one's own thoughts rather than engaging in blaming or punitive behavior. The basic steps involve:

- 1. Identifying the problematic feeling, response or behavior. What behavior or response is getting in the way of a client achieving his fitness goals?
- 2. Discovering the source of the problematic feeling, response or behavior in his past. When did this pattern of behavior start and what were the conditions under which it began to develop?
- 3. Finding the positive intention or motive for the response or behavior. How is that behavior benefitting the client? What does he perceive it to be doing that is at all positive? (This is a particularly difficult idea for many clients.)
- 4. Identifying alternatives and resources that address the positive intention, but without the negative consequences. In what other ways can he derive that same benefit? What resources and understanding does he have now that he did not have at the time this pattern started?
- 5. Enlisting the cooperation of all of his "inner parts" to try a new choice. Which new alternatives and resources might he be willing to try?

Interrupting Thought Patterns

We are all familiar with clients who would rather make excuses than progress. While it may be a source of extreme frustration for us, we can make a choice. Rather than allowing a client to put so much energy into explaining and complaining of his limitations, a perceptive trainer may simply ask, "Why are you telling me this?"

Asking such a question is called a "pattern interruption", a basic but powerful NLP technique with the goal being to interrupt a pattern of behavior that is problematic for the client. The first time you as a trainer create this mild state of uncertainty, you will be surprised at how your client's affect abruptly changes, as if he is stuck figuring out what to say next. This brief opening provides you the opportunity to suggest another outcome.

If a client in his 70's claims, "I am too old to get lean", you might help reframe his preconceived notion by asking the following questions~

- According to whom?
- What are you accomplishing now that you were unable to achieve two months ago?
- Do you feel stronger than you did when we started training together?
- How do you feel in your clothes?

Such innocent inquiries take a client from thinking in terms of a general negative statement to the positive visualization /realization of the progress he has made. Allow your client a few moments to process your questions; then, listen intently as he starts to formulate his answers.

Keep the Focus Positive

Gently push your client to talk about what he actually hopes to accomplish by working with you. NLP specifies that one's goal must be stated in the positive. Very often I encounter clients who explain their current life situation in one of the following two ways. They may easily describe what they are trying to avoid: "I cannot stand to be fat anymore", or a situation in their life that they find upsetting: "This relationship I am in is just awful."

Clearly, practice is needed to help such clients grasp how these thought patterns are keeping them steeped in negativity, which thereby stunts their ability to formulate and move forward with goals. Neuro-linguistic programming can be used as a powerful intervention to alter how a client thinks – and ultimately acts – by reframing the individual's past experiences.

As fitness professionals, the use of NLP as a diagnostic and training tool requires both patience and practice. The <u>fine art of listening</u> seems to be getting obstructed these days by the over-availability of media resources. Many individuals find it easier and more convenient to simply merge with the masses rather than taking the time to respond to the unique skill sets each of us has been given.

Fitness is a complex process. More than merely encompassing the muscular and skeletal structure of the human anatomy, living a "fit" and healthy lifestyle calls for honoring the value of the body as well as facilitating a strong connection between mind and structure.

Fitness training, therefore, may be defined is the art of teaching, supporting and motivating clients to achieve this ultimate goal. Such an endeavor often requires a trainer to look beyond the behavioral aspects of training

and delve into the world within a client's complex mind -- often a tangled web of learned negative habits and preconceived notions of "self" -- and reframe long-held ideals in an effort to redirect thought patterns. Our job is to reawaken a client's "inner game".

Have you had success retraining a client's thought patterns? Have you used the technique of NLP before?

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IT Band Stretch: A Different Approach to Alleviate Tightness

Instead of stretching the IT Band, turn your focus toward the muscles that attach to the IT Band. The IT (Iliotibial) Band is a tendon that connects muscle to bone, just like all tendons do. The IT band connects the tensor fascia latae muscle and the <u>gluteus maximus muscle</u> to the tibia and fibula.

The IT band gets a lot of grief in the fitness industry but is not always the source of the pain it gets blamed for. A brief look at anatomy makes this clear.

The IT Band is a tendon, not a muscle. This means it stretches, without the ability to contract. Contraction is left to muscles. Without the ability to contract, connective tissue has no other choice than to be pulled and stretched - which is rightfully perceived as "tightness". The problem is, it doesn't have the option to become un-tight until....

You turn your attention to the muscles it attaches to. Muscles can become "un-tight" by relaxing. Muscles are like managers. They have more responsibility and can cause the employees (connective tissue) to get irritated (and frustrated).

If rolling and stretching the IT Band isn't alleviating the tightness, try this - go to the muscles. Work on relaxing them with the method of your choice and you just might find that IT Band settling down.



Gluteus Maximus

Attachments: Iliac Crest, Sacruum and Coccyx to Greater Trochanter on Femur.

Actions: Hip Extension, External Rotation, and Abduction.

This is the bulky muscle known as the butt. But....remember there are two other glute muscles (<u>gluteus</u> <u>minimus</u> and <u>gluteus medius</u>) comprising the tissue you feel back there.

The green play-doh on Andy the Skeleton represents Gluteus Maximus.

• Find the attachment sites on yourself to connect better with where this muscle is.

- Palpate them and see if you can get them to contract by performing the actions listed above.
- Place a balloon or rubber band on the two attachment sites on a partner to visualize where the muscle is and see how it contracts when the body moves.



Tensor Fascia Latae

Attachments: Anterior Iliac Crest to IT Band.

Actions: Hip Flexion, Internal Rotation and Abduction.

This is a muscle that often gets tight and many people think it's their hip flexor. But, it's TFL - which flexes the hip very well.

The orange play-doh on Andy the Skeleton represents TFL.

- Find the attachment sites on yourself to connect better with where this muscle is.
- Palpate them and see if you can get them to contract by performing the actions listed above.
- Put a balloon or rubber band on the two attachment sites on a partner to visualize where the muscle is and see how it contracts when the body moves.

IT Band Tightness and Treatment

Now that you know the two muscles that attach to the IT Band you can enhance your awareness of them to know if you're over-working them. Too much exercise in an isolated area like the hip can lead to tightness, compensation, and injury. Knowing the location of muscles also helps to know if you're stretching or massaging them adequately when doing self-care. Being able to teach this information to your clients so they can experience the same connection with their body will set you apart from other personal trainers.

Expand your anatomy knowledge with NFPT's Fundamentals of Anatomy Program.

Balloons, play-doh, pipe cleaners, and ribbons are used to demonstrate each muscle with its attachment point on a skeleton model in a series of videos. You're also shown how to find the attachments on yourself and/or clients. Application exercises and guided visualizations are also provided along with a 50-page workbook.

Applying RPE to Personal Training Sessions

Ratings of Perceived Exertion (RPE) are a measure of intensity that is determined by the way someone feels about how hard his or her body is working.

Effort, discomfort, and fatigue are all sensations one might use to report how intense a particular exercise or session is.

What is RPE?

Put simply, RPE is a subjective measure of how hard you feel like you're working during a set, exercise, etc. Many of our clients will try to tell us they are working as hard as they can when we believe deep down that they are capable of one or two more reps, or just a little extra energy output. The uniformity of such a scale allows professionals and clients/athletes alike a way to put a number to their perceived efforts.

"How Do You Feel?"

Very often, the amount of weight being lifted/pushed by a client is not so heavy as to elicit the perception on his/her part that the load is unmanageable. This feeling is referred to as the "internal load". There are a multitude of reasons why an athlete may experience a higher "internal load", or RPE, than the trainer thinks is warranted:

- Fatigue from previous training session,
- Cumulative fatigue from entire training cycle,
- Poor sleep the night before,
- Excessive stress,
- Change in training time of day

RPE caters generally to people who love data, or those desiring to be both the coach *and* the athlete with regard to their workouts. There is a certain power in the feeling of control and precision overtraining that can often exhibit performance peaks and valleys.

Getting The Most From Your Workouts

In the absence of observing the rate of perceived exertion during a workout, it is possible for a client to undertrain on certain days when a heavier load might have been achievable, and likewise to over-train on days when the mind and/or body simply is not properly engaged due to aforementioned factors. RPE's therefore allow the customization of every training session, ensuring that the athlete is deriving the maximum payback that the body can generate.

RPE Versus Traditional Training

When a coach or personal trainer asks athletes/clients how they *feel* versus prescribing *a particular weight load* to be lifted, it immediately engages and empowers them in the process. Many clients appreciate having a teamwork-type alliance with their trainers, and upon implementing the RPE system, discover a sense of being partners in the training journey.

For those of us more accustomed to an old-school training paradigm, a progression such as this might seem familiar:

Week 1 – 5 reps at 70% of 1Rep Max

- Week 2 5×80%
- Week 3 5×75%
- Week 4 5×85%

While this method certainly allows for a natural loading increase, a missing aspect is mastery over how one *feels* about the intensity of the sets. In comparison, this is what the same 4-week training cycle may look using RPE's:

- Week 1 Goal: a set of 5 reps at RPE of 7/10
- Week 2 Goal: a set of 5 reps at RPE of 8/10
- Week 3 Goal: a set of 5 reps at RPE of 7.5/10
- Week 4 Work up to a set of 5 reps at RPE of 8.5/10

While these protocols may seem to achieve an identical end result, the difference lies in the flexibility of the process, offering a client/athlete the ability to increase or decrease intensity based upon how he is feeling on a given day. This allows for training hard as well as prudently, always respecting the body's reactions to everyday life events.

Endurance Athletes Differ From Resistance Training Clients

For runners and other endurance athletes, the rate of perceived exertion (RPE) is a valuable tool. The use of RPE, in this case, allows for self-regulation of one's efforts. For example, running a prescribed distance at a "moderate pace" may translate to an RPE of 5 or 6 on a 10-point scale. Determining the value of the RPE system for resistance training, however, is a more complicated matter.

To embark upon this, a group of scientists measured the strength and endurance of 80 college-age athletes (55 men and 25 women) who participated in a variety of different sports. Subjects had varying amounts of experience with resistance training and were divided into three groups:

Group 1 -Highly trained athletes (29 men and 10 women), with an average of 24 strength workouts in the last three months.

Group 2 -Moderately trained athletes (26 men and 8 women), with an average of 9 strength workouts in the last three months.

Group 3 – Novices (18 men and 7 women), with no previous resistance training experience.

Prior to embarking upon the study, the novices received technical training in bench press technique. In the first session after the training, researchers tested the 1RM bench press for all participants. As one would expect, bench press strength correlated directly with training experience and gender. In a second session, one week after the first, participants tested their maximum reps at both heavy (about 90% of 1RM) and moderate (about 67% of 1RM) loads.

The results from the first two sessions were used to assign weights and repetitions for the third session, which tested RPE. A week after the second session, participants performed a total of four bench press sets: two sets at low reps, with heavy and moderate weights, and two sets at high reps, also at heavy and moderate

weights. They were then asked to report their RPE based upon a standard 10-point scale. The subjects were unable to see the amount of weight being lifted, making this a true blind testing format.

For low reps, the study found no relationship between RPE and gender, total load, or absolute intensity (% of 1RM). However, in the highly trained group, there was a correlation between RPE and relative volume (% of maximum reps at that weight). This same relationship was not observed in the other groups. The researchers suspect that more highly trained individuals either receive more sensory feedback or are more able to interpret the sensory signals that they receive.

In the high rep sets, this effect was seen in all three groups. Higher relative volume led to increased RPE. This leads one to believe that the predictive value of RPE increases with volume for resistance exercise. Utilizing RPE as a tool for self-regulation seems therefore to be more applicable in sessions involving higher repetition ranges.

Understanding RPE and Utilizing Feedback

When utilizing the original Borg Scale of 6-20, perceived exertion ratings between 12 and 14 suggest activity performed at a moderate level of intensity. As one gains experience in monitoring how the body feels during exercise, he becomes more attuned to when an adjustment in intensity should be implemented. For example, a walker who wants to engage in moderate-intensity activity would aim for a Borg Scale level of "somewhat hard" (12-14).

If he describes his muscle fatigue and breathing as "very light" (9 on the Borg Scale), he may choose to increase his intensity. On the other hand, if he felt his exertion was "extremely hard" (19 on the Borg Scale) he would need to slow down his movements to attain the moderate-intensity range. In later years, the 6-20 scale evolved into the more precise method of rating exertion on a 1-10 scale, which is widely used today.

It is interesting to note that there exists a strong correlation between an individual's perceived exertion rating times 10 and his actual heart rate during physical activity. For example, if a person's rating of perceived exertion (RPE) is 12, his heart rate tends to be roughly 120 beats per minute. While this value is simply a close approximation for an average athletic individual, heart rates can vary quite a bit depending on age and physical conditioning. The Borg RPE chart is also the preferred method to assess intensity among those individuals whose medications might affect heart rate or pulse.

The Advent of Autoregulation

It is important to remind ourselves why "autoregulation of training" using the RPE scale is a worthy pursuit: such a paradigm theoretically allows for attaining the most out of every workout session, whether a client is feeling greatly empowered or has suffered through a poor night's sleep. By adjusting the load based on perceived difficulty as opposed to fixed amounts of weight increases, one can still complete a rigorous workout feeling accomplished instead of defeated.

In this sense, use of the RPE system might lead to a decrease in performance-related stress during a workout. At times when the client feels more rested, he will display better form as he pounds out higher volumes and heavier loads. On days when the mood, energy or biorhythms are suffering, he feels justified in simply doing what he can and moving on.

Ultimately, using RPE is about flexibility and control. However, this technique will not suit every athlete. Since this approach to training is considered more cerebral, the client might be the kind of person who likes things laid out with a directive.

He may want to arrive at the gym knowing you will tell him how much to squat, and how many times to perform the squat. Another consideration is that the Borg scale is less than ideal for those training at lower intensities or higher repetitions, since the question of whether or not just 1 more repetition might have been performed always looms large.

Have you incorporated the Borg RPE format with your clients?

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SELF – TEST: June 2018

- 1. Which of the following is **NOT** true of alcohol?
 - a. It acts as a simulant to the Central Nervous System.
 - b. It acts as a diuretic.
 - c. It impairs the process of protein synthesis.
 - d. It can increase cortisol.
- 2. Which of the following is a positive benefit of moderate alcohol consumption?
 - a. It decreases the bloodstream's levels of healthy cholesterol.
 - b. It may reduce the risks of vascular disease.
 - c. Both of these are positive benefits.
 - d. Neither of these are positive benefits.
- 3. Which of the following is **NOT** a muscle action of the tibialis posterior?
 - a. Ankle plantar flexion
 - b. Ankle inversion
 - c. Foot pronation
 - d. Foot supination
- 4. The tibialis posterior covers a lot of bone, where?
 - a. Upper leg
 - b. Lower leg
 - c. Front of leg
 - d. Back of leg
- 5. Which is more typical of a ketogenic diet when it comes to percentage of fat?
 - a. 10-20%
 - b. 40-50%
 - c. 70-80%
 - d. None of the above
- 6. As the body is being depleted of carbohydrates, individuals often report experiencing achiness, fatigue, weakness, irritability, reduced libido, and constipation. What is this referred to as?
 - a. Keto cold
 - b. Carb cold
 - c. Keto flu
 - d. Carb flu

- 7. Besides weight loss, what other benefit/s/ does the ketogenic diet have?
 - a. Cancer prevention
 - b. Maintains healthy blood sugar levels
 - c. Treatment for neurodegenerative diseases
 - d. All of the above
- 8. Exercise can improve which condition that is characterized by restless sleep, insomnia, and daytime sluggishness?
 - a. Narcolepsy
 - b. Sleep Apnea
 - c. Restless Leg Syndrome
 - d. None of the above
- 9. Which of the following is **NOT** a cause of obstructive sleep apnea?
 - a. Nasal cavity problems
 - b. Gastro reflux
 - c. Large jawbone
 - d. Enlarged tonsils
- 10. A 2014 research study revealed which of the following negative side effects was discovered in OSA sufferers in response to exercise?
 - a. Muscle metabolism was impaired
 - b. Skeletal muscle fibers showed deleterious changes
 - c. Lacking ability to burn high levels of oxygen during strenuous aerobic exercise
 - d. All of the above were discovered in the OSA control group
- 11. How many triceps muscles are in your arms?
 - a. One
 - b. Two
 - c. Three
 - d. Four
- 12. Which of the following is **NOT** a triceps brachii muscle?
 - a. Long
 - b. Short
 - c. Lateral
 - d. Medial

- 13. Which triceps extension grip places more focus on the lateral head?
 - a. Supinated
 - b. Neutral
 - c. Pronated
 - d. The grip doesn't make a difference.
- 14. What is the primary energy source within cells?
 - a. RNA
 - b. ATP
 - c. ADP
 - d. AMP
- 15. What type of training offers the greatest opportunity for elevated adenosine to occur?
 - a. Interval
 - b. Explosive dynamic
 - c. Power lifting
 - d. Muscular isolation
- 16. What do the mitochondria convert into ATP?
 - a. Protein
 - b. Fats
 - c. Carbohydrates
 - d. Calories
- 17. Which of the following can interfere with ideal ATP production?
 - a. Stress
 - b. Medication
 - c. Gut flora imbalance
 - d. All of the above
- 18. Which of the following is **NOT** a purported benefit of intermittent fasting?
 - a. Improved insulin sensitivity
 - b. Weight loss
 - c. Increased fat burning
 - d. Increased strength

19. Which is the most common amount of time in which people fast in intermittent fasting?

- a. 8 hours
- b. 16 hours
- c. 24 hours
- d. 2 days

20. Which of the following is true regarding exercise and restless leg syndrome?

- a. Vigorous exercise can exacerbate RLS.
- b. Moderate speed walking can be effective with RLS.
- c. Both of these are true.
- d. Neither of these is true.
- 21. What builds up following physical activity and can be distressing to individuals with RLS?
 - a. Lactic acid
 - b. Glycogen
 - c. Pyruvic acid
 - d. Phosphate
- 22. What percentage of amateur and professional athletes (who do not over-train) report having fewer colds/upper respiratory issues than their more sedentary counterparts?
 - a. 5-20%
 - b. 30-50%
 - c. 60-90%
 - d. None. Studies show there is no correlation.
- 23. Which of the following is true?
 - a. When elite athletes get colds, their symptoms tend to last longer and be more severe than those of an average recreational gym-goer.
 - b. When elite athletes get colds, their symptoms tend to be shorter and less severe than those of an average recreational gym-goer.
 - c. There is no difference in a cold's severity between elite athletes and average recreational gym-goers.
 - d. There is not enough research done to say either way.
- 24. Which stress hormone does exercise raise, which tends to suppress the immune system?
 - a. Adrenaline
 - b. Cortisol
 - c. Both of these
 - d. Neither of these

- 25. What is a generally accepted physicians' recommendation when it comes to working out with a cold?
 - a. Do not workout when you have a cold.
 - b. You should workout harder when you have a cold.
 - c. Do not workout if your symptoms present themselves below the neck.
 - d. Do not workout if your symptoms present themselves above the neck.
- 26. What is momentum defined by?
 - a. Mass, or size, of the exerciser as well as the weight being moved
 - b. Velocity, or speed
 - c. Both of these describe aspects of momentum
 - d. Neither of these describe momentum
- 27. What law states that a net force on an object will accelerate it, or change its velocity, in proportion to the magnitude of the force and in the same direction of the force?
 - a. Law of Force
 - b. Law of Acceleration
 - c. Law of Velocity
 - d. Law of Momentum
- 28. Which amino acid has a 10-fold greater impact on protein synthesis than any other amino acid?
 - a. Leucine
 - b. Isoleucine
 - c. Valine
 - d. Creatine
- 29. Which of the following occurs during exercise?
 - a. Muscle protein synthesis decreases as protein degradation increases.
 - b. Muscle protein synthesis increases as protein degradation decreases.
 - c. Muscle protein synthesis decreases as protein degradation decreases.
 - d. Muscle protein synthesis increases as protein degradation increases.
- 30. Which of the following best describes Neuro-Linguistic Programming (NLP)?
 - a. Is the study of new exercise 'language'
 - b. Provides a model for sustaining performance in order to maintain physical fitness
 - c. Is a method for programming the brain to love exercise
 - d. Provides a model of change that can help a client to conquer the mental aspects of fitness

- 31. The NLP reframing process involves:
 - a. identify the problematic feeling, response, or behavior.
 - b. discovering the source of the problematic feeling, response, or behavior.
 - c. finding the positive intention or motive for the response of the behavior.
 - d. All of these are involved in the reframing process.
- 32. What does the IT Band connect?
 - a. Muscle to bone
 - b. Tendon to bone
 - c. Muscle to tendon
 - d. Bone to bone
- 33. Which of the following best explains how the IT band works?
 - a. It contracts without the ability to stretch.
 - b. It stretches without the ability to contract.
 - c. It can both contract and stretch.
 - d. None of the above
- 34. Which of the following is a sense one might use to report how intense a particular exercise or session is?
 - a. Effort
 - b. Discomfort
 - c. Fatigue
 - d. All of the above

35. Using the Borg scale, what range suggests a moderate level of activity?

- a. 10-12
- b. 12-14
- c. 14-16
- d. 16-18
- 36. What is the correlation between an individual's perceived exertion rating and their actual heart rate during physical activity?
 - a. There is no correlation.
 - b. The actual heart rate is 10 times the RPE.
 - c. The RPE is 10 times the actual heart rate.
 - d. The actual heart is equal to the RPE.

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