

Quiz Policies

Eligibility

The NCSF online quizzes are open to any currently certified fitness professional, 18 years or older.

Deadlines

Course completion deadlines correspond with the NCSF Certified Professionals certification expiration date. Students can obtain their expiration dates by reviewing either their certification diploma or certification ID card.

Cancellation/Refund

All NCSF continued education course studies are non-refundable.

General Quiz Rules

- You may not have your quiz back after sending it in.
- Individuals can only take a specific quiz once for continued education units.
- Impersonation of another candidate will result in disqualification from the program without refund.

Disqualification

If disqualified for any of the above-mentioned reasons you may appeal the decision in writing within two weeks of the disqualification date.

Reporting Policy

You will receive your scores within 4 weeks following the quiz. If you do not receive the results after 4 weeks please contact the NCSF Certifying Agency.

Re-testing Procedure

Students who do not successfully pass an online quiz have the option of re-taking. The fees associated with this procedure total \$15 (U.S) per request. There are no limits as to the number of times a student may re-test.

Special Needs

If special needs are required to take the quiz please contact the NCSF so that appropriate measures can be taken for your consideration.

Quiz Rules

What Do I Mail Back to the NCSF?

Students are required to submit the quiz answer form.

What do I Need to Score on the Quiz?

In order to gain the .5 NCSF continued education units students need to score 80% (8 out of 10) or greater on the CEU quiz.

Where Do I Mail My Quiz Answer Form?

You will mail your completed answer form to:

NCSF

Attn: Dept. of Continuing Education

5915 Ponce de Leon Blvd., Suite 60

Coral Gables, FL 33146

How Many CEUs Will I Gain?

Professionals who successfully complete the any continuing education quiz will gain .5 NCSF CEUs per quiz.

How Much does each quiz cost?

Each quiz costs the student \$15.00.

What Will I Receive When The Course Is Completed?

Students who successfully pass any of the NCSF online quizzes will receive their exam scores, and a confirmation letter.

How Many Times Can I Take The Quizzes For CEUs?

Individuals can take each NCSF quiz once for continuing education credits.

Managing the Endocrine Response

An often overlooked physiological relationship that dictates adaptations to exercise is the connective link between the nervous system, immune system, and the endocrine system -- collectively called neuroendocrine-immunology. In response to exercise the tissues must undergo metabolic and cellular processes to support the demands of the work being performed. The harder the work, the more the tissue is "disrupted" from its homeostatic state. Contractile forces upset and damage the muscle fiber, metabolism alters tissue and blood chemistry, and the demand for oxygen challenges the cardiopulmonary system. These acute alterations serve to support and satisfy the effort. One of the contributing support mechanisms is the endocrine system interaction with the working tissues. In some cases the response is to liberate stored energy, othertimes the response serves to manage water balance and electrolyte activity and stimulate neural activity. Regardless of the type of training performed, when the intensity increases so too does the action of the endocrine system.

Managing the endocrine response is one of the most important factors in attaining the desired outcomes of the training. A common programming error of many personal trainers occurs when the training dynamics are mostly right. But mostly right is still somewhat wrong. This suggests that stimulating the correct endocrine response from the training goes a long way in acquiring the adaptations that are trained for, albeit weight loss, muscle gain, or some other physiological and/or physical goal.

When training for gains in muscle mass there is a clearly defined method that elicits the optimal hormonal response. Resistance

training for hypertrophy must include the following:

High volume – multiple sets per muscle group using 8-12 repetitions

High weight – 70-85% of 1RM

Short rest intervals – 30-60 seconds rest between sets

Heavy recruitment – stimulated by time under tension, adequate intensity, and appropriate isolation

To remodel, muscle tissues must be appropriately and regularly disrupted. The combination of heavy resistance over 8-10 repetitions stimulates the release of growth hormone from the anterior pituitary gland and testosterone from the gonads along with several permissive agents. When combined with short rest intervals, the metabolic activity creates an environment where lactic acid production causes pH changes in the tissue and blood. These chemical alterations stimulate growth hormone secretion and its expression on the liver which releases insulin-like growth factor. When stimulated through the use of high volume of training, the tissue experiences significant damage at the cellular level. This damage results in an inflammatory response mediated by hormonal interaction, thereby leading to protein synthesis inside the cell to rebuild or add sarcomeres along the tissues length. Along the way permissive hormones including insulin, catecholamines, and thyroxine help manage the outcome and new tissue mass is attained in fast twitch fibers, while slow twitch fibers experience a reduction in protein degradation response.

Paying close attention to the formula that led to the response, the resistance was heavy and applied over a fairly extended period of

time (time under tension). The 8-12 repetition range is metabolically supported by the glycolytic pathway which causes the build up of hydrogen ions from the lactic acid produced as sugar and split for energy. The 30-60 second rest interval creates significant environmental chaos as only part of the metabolic by-product is defused, and the tissue has only a limited time to recovery. It is this combination of high, prolonged stress with limited recovery that stimulates growth hormone response and subsequent muscle remodeling. Many people strive to add mass when performing resistance training but have only limited success because they do not comply with all aspects of the formula. The most common errors are 1) not enough resistance for the repetitions performed – volitional failure must occur between the defined repetition scheme, 2) the rest intervals are too long – 30-60 seconds on the stop watch is much faster than the mind's time-estimation, and 3) the total volume is not adequate – time spent in the gym does not always equate to actual work performed.

When exercisers use part of the formula they actually stimulate a hormonal response that mirrors moderate strength training. Moderate resistance with 1-3 minute rest intervals does not fit the high strength model, nor the muscle mass model. Essentially, the participant is in between models, or more harshly stated, poorly performing either model. When heavy resistance is used the hormonal action is different. Consequently, so are the outcomes. Strength training uses near maximal resistance of 80-95% 1RM for repetition ranges of 3-6 repetitions per set. The rest interval is 2-5 minutes for maximal recovery prior to the next lift. Obviously, key differences exist in the repetition range and the rest interval. Repetitions of six or less stimulate much more neural activity

than muscle activity. The short time under tension does not stimulate the same level of disruption as the longer bouts used for mass building and the metabolic environment is managed by the phosphagen system rather than the glycolytic pathways, explaining the lower lactate levels and reduced growth hormone release. The long rest intervals used for the rephosphorylation process allow for adequate recovery and less total disruption. The outcome is an immediate response by the catecholamines to stimulate the central nervous system, while there is an increase in testosterone combined with some secretion of growth hormone. The growth hormone response occurs in lower concentration and without the backside mediation of the permissive and chemical agents that stimulate notable increases in insulin-like growth factor concentrations. Likewise, the overall inflammatory response is limited, as the total volume of training both on a daily and weekly basis is far less. This is not to suggest that heavy weight training does not cause disruptive activity, it just affects less tissue due to preferential recruitment patterns and lower volumes of training.

During heavy resistance training the body calls on high-threshold motor units which are not typically stimulated with lower resistance activity. Their contributions to force are substantial, but short-lived. The heavy loads stress the contractile elements of the muscle fiber, but even more so the sarcolemma inside the muscle cell, consequently affecting its ability to function. The neural damage and disruption stimulates a level of muscle remodeling to occur in response to inflammation, but the limited recruitment of tissue and reduced overall anabolic factor stimulate far less protein synthesis. Strength athletes do increase in mass to some degree, particularly in response to the high anabolic response

stimulated by total body effort, but again, not to the level of the mass building model. The amount of anabolic hormone in circulation rises notably when near maximal squats, deadlifts and bent-over rows are performed. It is for this reason that these exercises be included in a program aimed at increasing mass.

If the aim is at decreasing mass the hormonal response can again be managed to predict the outcome. High repetition ranges with moderate intensity 50-70% 1RM and short rest intervals have some commonalities with the actions that stimulate growth. However, there are some obvious differences, which explain the contradictory outcome. Training for weight loss requires caloric expenditure, suggesting high volumes of work. It also must be continuous to accomplish the work in a reasonable period of time because the intensity is lowered. Both are consistent with training for mass but the inherent difference is the resistance used. The high volume of training in the glycolytic pathways stimulate higher lactate concentrations and acid base disruption, which stimulates growth hormone release. Conversely, the low resistance level has a very limited effect on testosterone concentrations and permissive hormones like the catecholamines. The catecholamines, though, do become active post-exercise. When high intensity total body circuits or high volume superset programs are employed, the net work contributes to significant caloric expenditure. The exercise is mainly supported by the glycolytic pathways because the intensity is too high for aerobic management. Therefore, glycogen depletion is rather significant. Post-exercise, the body is in debt due to the high anaerobic contribution and shifts to a glycogen sparing metabolism. Catecholamines are released

that heighten metabolic activity via lipolysis to support the excess post-exercise oxygen debt commonly referred to as EPOC. Using this formula, the resistance training stimulates protein maintenance and caloric expenditure preys heavily on lipid metabolism.

One important factor to remember with high volume training is that it is easy to perform too much exercise. The endocrine system is a trainer's ally in training adaptations when managed purposely and consistently. But trying to overstress the system in hopes of greater response will turn the endocrine system into an enemy. When excessive stress is not matched with recovery, or the training protocol does not change, the body becomes self destructive. Overtraining syndrome, as it is called, causes the continuous release of adrenal hormones. Constant engagement of the adrenal glands stimulates cortisol's secondary response, protein catabolism. The once permissive hormone becomes a destructive agent tearing through the protective proteins and eventually catabolizing structural and contractile units. For this reason it is important to support work with adequate nutrition and create a training program that premeditates rest and recovery and provides for adequate variety. Doing so ensures the outcomes become positive.

CEU Quiz – Managing the Endocrine Response

1. High intensity training using short rest intervals and high lactate production stimulates the release of _____?
 - a. Testosterone
 - b. Growth Hormone
 - c. Catecholamines
 - d. All the above

2. Which of the following does NOT occur as an acute exercise response?
 - a. Contractile forces upset and damage the muscle fiber
 - b. Sarcomeres are added along the myofibrillar chain
 - c. Metabolism alters tissue and blood chemistry
 - d. Demand for oxygen challenges cardiopulmonary system

3. The _____ system is responsible for liberating stored energy, managing water balance and electrolyte activity, and stimulating neural activity.
 - a. Endocrine
 - b. Digestive
 - c. Circulatory
 - d. None of the above

4. True or False. The immune system plays a role in tissue adaptation in response to exercise.
 - a. True
 - b. False

5. The highest concentration of anabolic hormone released in response to heavy resistance lifted for 3-6 repetitions is _____.
 - a. Thyroxin
 - b. Testosterone
 - c. Growth hormone
 - d. None of the above

6. Protein synthesis is initiated by the _____ response following resistance exercise.
- neural
 - inflammatory
 - fatigue
 - sensory
7. Which of the following represents a common error regarding training for increases in muscle mass?
- Volitional fatigue is not reached due to inadequate resistance
 - Rest intervals that last beyond 60 seconds
 - Too little total volume
 - All of the above are correct
8. Exercisers seeking maximal gains in strength should allow for _____ of recovery prior to each set.
- 30-60 seconds
 - 1-2 minutes
 - 2-5 minutes
 - 7-8 minutes
9. Overtraining causes protein catabolism stimulated by _____.
- testosterone
 - growth hormone
 - insulin
 - cortisol
10. Following intense bouts of training aimed at increased caloric expenditure and decreases in mass, the endocrine system releases _____ which act to heighten metabolic activity via lipolysis.
- Growth hormone
 - Insulin-like growth factor
 - Creatine phosphate
 - Catecholamines

Quiz Answer Form

FIRST NAME _____ LAST NAME _____ M.I. _____

TITLE _____

ADDRESS _____ APT. _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

COUNTRY _____ POSTAL CODE _____

CERTIFICATION NO. _____ CERTIFICATION EXP. ____/____/____

MEMBERSHIP NO. _____ MEMBERSHIP EXP. ____/____/____

Quiz Name	Member Price	Total
	\$15	



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Account No. _____

Exp. Date _____

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Date _____

Quiz Answers

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

Fill in each blank with the correct choice on the answer sheet. To receive 0.5 CEUs, you must answer 8 of the 10 questions correctly.

Please mail this Quiz answer form along with the proper enclosed payment to:

NCSF
5915 Ponce de Leon Blvd., Suite 60
Coral Gables, FL 33146

Questions? 800-772-NCSF