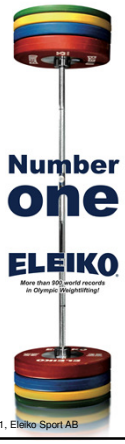

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ELEIKO ACADEMY

WEIGHTLIFTING

Presents

OLYMPIC WEIGHLIFTING STRENGTH WORKSHOP

by Ivan Abadjiev

CSCCa National Conference 2011
Kansas City, Missouri
4-6 May 2011

About Coach Abadjiev

- *Ivan Abadjiev is one of the most successful and prominent coaches in the history of Olympic weightlifting. He is the author of the famous Bulgarian training methodology that is currently widely followed by many elite lifters and coaches.*
- *He was the first Bulgarian weightlifter to be awarded with the top national title of the Merited Master of Sports after he won a silver medal at the 1957 World Championship.*
- *It was however coaching that brought Abadjiev to the level of unprecedented admiration of the weightlifting experts. Abadjiev coached the Bulgarian national team in 1969 - 1989 and 1997 - 2000 and was able to bring it from a mediocre standing to the elite super power of Olympic weightlifting.*
- *Abadjiev's training system was based on high intensity sessions. Unlike the traditional Russian training methodology, Abadjiev's sessions included mostly only classic Olympic lifts performed with lower repetitions but on maximum weights. Supporting lifts were limited predominately to squats. Abadjiev's method contradicted major established views on training process and brought him as many followers as opponents. And, of course, it was proved to work at the time based on the medal track of Abadjiev's students.*
- *During his two decades of work with the national Team Bulgaria and with Team Turkey (in the late 1990s), Abadjiev prepared 12 Olympic champions, 13 silver Olympic medalists, 4 bronze Olympic medalists, 57 world champions, 64 European champions.*

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The Bulgarian Method

A Scientific Approach to Training

- This workshop will introduce a unique aspect of the strength development of an athlete in order to provide optimum performance and results in that athlete's specific sport
- The physical ability of an athlete in all sports is viewed as an exhibition of three fundamental qualities:
  - Strength
  - Speed
  - Endurance
- These qualities should not be viewed separately from one another
- Instead they should be seen as an integrative system to be trained and developed simultaneously in a specific manner, according to the characteristics of the specific sport

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What we will cover today

- Why the Bulgarian System works
- Why it has achieved such extraordinary results on the international stage
- How it can be adapted to any sport that requires explosive strength
  - The keys to success of the Bulgarian Method is firmly rooted in scientific principles such as cell biology, molecular genetics, cell physiology, and other neuro-biological systems

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Scientific Principles behind the Bulgarian Method and why it has become so successful

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The Four Key Scientific Principles of WHY IT WORKS:

- Actin Myosin Complex
  - Single Rep VS Multiple Reps
- Specific Adaptation to Imposed Demand - S.A.I.D.
- Jacob and Monod's Gene Protein Response
- Hyden's Theory of Protein Memory

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1. The Bulgarian Vs. Russian Methodology

"Single VS Multiple Reps"

The Russian Methodology – Multiple Reps

- Called for a series of steps involving periodization, prep stage, interim stage and competition stage

The Bulgarian Method – Single Reps, Max

- Has side-stepped the traditional weight training techniques employed involving multiple repetitions at "less-than- maximal" workloads with a gradual build-up to higher weights
- Was based on a single rep at the athletes' personal maximum
- Before a maximum or PR (personal record) attempt is made, the skeletal muscle fibers are at maximal efficiency, i.e. protein levels, energy levels (ATP, glucose etc), ions (calcium etc) are at maximum output potential

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Training Load and Methodology

- The Bulgarian Method contrasts with models based on repetition, in which the molecules (proteins, ATP etc.) are partially (or wholly!) used up
- In this form of training, fibroblasts form around the skeletal muscle fibers, which use up invaluable ATP supplies
- The muscle fibers themselves grow in mass, but are less efficient when the time arrives for PR attempts

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Training Load and Methodology

- During single rep PR attempts, the speed of muscle contraction reaches very high levels which results in greater muscle mass
  - This is due in large part to an increase in the SR/actin-myosin complex ratio
- This ratio is fundamental since the SR complex supplies the calcium essential for maximal contraction during later tries
- During slower lifting or reduced-load lifting with repetition the SR/actin-myosin complex ratio actually decreases!
- Another disadvantage of repetitive training with sub-maximal loads is the increased number of mitochondria produced in the muscle cell which actually depletes the muscle fiber of ATP
  - One might expect that the available ATP would increase as the number of mitochondria increase but this is not the case!

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Training Load and Methodology

- Weight lifters who train with the Bulgarian single rep PR load system typically have a difficult time adjusting during the initial week of training
- During the first week of weight training athletes will invariably suffer from the following symptoms:
  - Muscle soreness
  - Fatigue
  - Decline in performance
- In the following week of training, weightlifters no longer experience the intense muscle soreness or fatigue
- Many athletes have experienced an improvement in performance,
  - Able to lift higher maximum weights on prescribed days
  - Positive psychological change occurs, which made lifting seem easier

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Training Load and Methodology

- The Bulgarian Method has been shown to heighten lifters' stress-limitation threshold
  - Does not occur in the traditional multiple-repetition methods at lower loads with gradual build-up
- In other methods, athletes were urged to rest for 2-3 weeks to allow recovery from damaged muscle fibers
- The fibers are not typically damaged but merely stretched - this is what causes the soreness (not fatigue)
- And so our athletes were able to side-step the suggested recovery period and continued to train during the following week with excellent results
- This does not mean that the Bulgarian Method does not allow for recovery periods and the rigorousness of training varies greatly on a weekly, monthly, and yearly basis
  - There are some months, in fact, when rigorous training takes place during only one week with three "lighter" weeks

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2. Physiological Adaptation to Stress During Weightlifting

- Hans Selye, at McGill University, developed the concept of stress in living organisms and described the subsequent phenomenon of "adaptation to stress"
- In Selye's experiments on rats, he noted that "stress" was characterized by a syndrome consisting of a triad of symptoms:
  - Hypertrophy of the surrenal cortex
  - Atrophy of the lymphatic organs
  - Ulcers in the Gastro Intestinal tract
- Divided the so-called "adaptation to stress" into three stages
  - The alarm reaction
  - Resistance
  - Exhaustion

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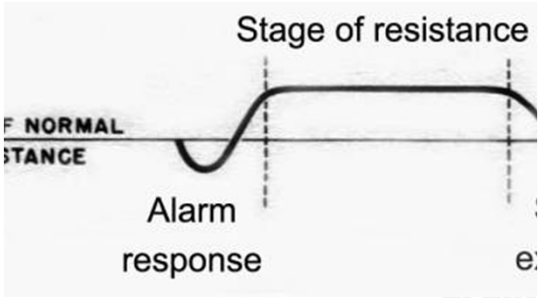
Hans Seyle's General Adaptation Syndrome



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Specific Adaptation to Imposed Demands (SAID)

- Stress (stimulus) comes in many forms
  - Exercise / Physical Activity
- Adaptation (response) to stress varies
  - Specific responsive biological adjustment to stress
  - Muscle, bone, heart, lung, vasculature, tendons, ligaments, joint cartilage, etc.
- If stress is too great, or sufficient recovery time not allowed, then adaptation may be inhibited and there will be a decrement in capacity of physiological systems leading to exhaustion
- Adaptation is complete after limited time span
  - Continued stimulus no longer elicits adaptation

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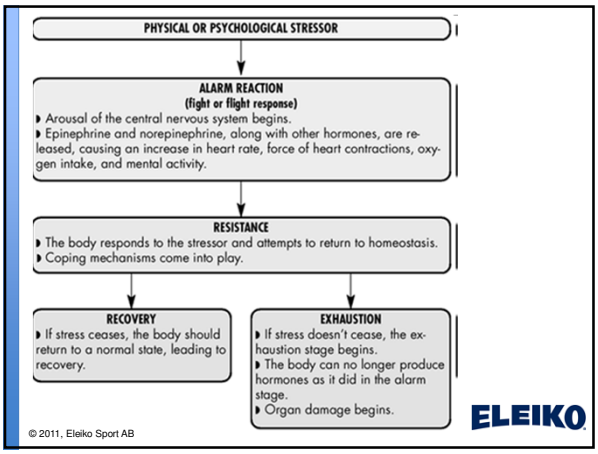

The Stress Limitation System

- In sports, stress is controlled and contained by the "Stress Limitation System"
- During heavy exercise the Central Nervous System (CNS) becomes excited (also because of a marked increase in the production of adrenalin)
- If your brain and CNS become over-excited, it can run out of control and need some form of inhibition to keep it acting normal again

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GABA Role in the Stress Limitation System

GABA (Amino Butyric Acid)

- Is an inhibitory transmitter produced in the brain and the CNS that keeps the body from becoming increasingly restless during stress and also prevents seizures
- GABA is the main player in the so-called "Stress-Limitation System" of the brain and the CNS
- It is the main inhibitor in the brain, and helps in the production of endorphins that provide us with a sense of well-being
- Prostaglandins also play a key role in the stress limitation system.
- GABA is at its highest concentration in specific areas of the brain, including the hypothalamus, the hippocampus and the central brain area
- Is present in up to 40% of all synapses

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The Stress Limitation System

- We noted in our studies above that GABA plays an essential role in keeping the brain and CNS from becoming over-excited during exercise
- One of the mechanisms involved is the suppression of Beta-receptors (located throughout the body), thus reducing the secretion of adrenalin which reaches high levels during exercise
- Until the muscle cells are fully relaxed, these Beta receptors (which secrete adrenalin) will not be fully functional
- Endorphins are involved in the suppression mechanism of the Beta receptors

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The Stress Limitation System

- During heavy load lifting the stressors (including high adrenalin levels) are intensified which aid in the contractile process required for such lifts.
- In this case the GABA system is even more important than it is for lesser-load lifts.
- If stress exceeds a certain threshold, too much adrenalin (as well as other compounds) is produced which can lead to damage to the body over time .
- The GABA system safeguards against stress-related diseases which are numerous: diabetes, heart disease and hypertension, GI ulcers and so on.

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The Stress Limitation System

- The advantage of the Bulgarian method is that, over time, the body develops greater resistance to stress compared to multiple-rep methods at lighter loads
- The scientific reason for this greater resistance is due to many factors, not least of which is an increase in the number and size of the GABA neuro-secretory cells in the brain and CNS
- This structural and functional adaptation allows the brain to secrete greater and greater amounts of GABA as loads increase
- Thus the Bulgarian method helps safeguard athletes against stress-related damage and disease over time
- Other structural and functional changes also occur (the GABA system is very complex) but this presentation will not cover this in depth.

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3. Relationship of the Bulgarian Method With Gene-Protein Response

- The great French researchers Jacob and Monod were pioneers in genetic research and demonstrated the presence of gene activators and repressors
- Following lifting, various metabolites build up and accumulate within the muscle fibers
- When these waste products accumulate, gene repressors on the DNA are de-activated which allow transcription of DNA into specific mRNA molecules, that cause the nucleus in the cytoplasm to be "translated" into proteins and enzymes that break down the metabolites

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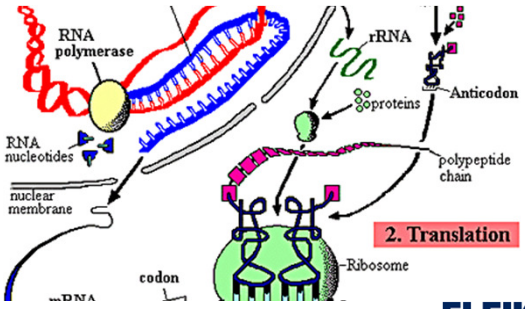
Protein Synthesis



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Relationship of the Bulgarian Method With Gene-Protein Response

- When maximum loads are utilized, as in the Bulgarian method, a greater quantity of metabolites are accumulated in comparison to graduated repetitive lifting.
- The higher loads lead to a marked increase in the number of proteins produced (and the type of proteins produced are different.)
- The end-result is an anabolic effect with an increase in the amount of protein produced in the muscle fibers. As a result, the muscle cells get bigger which, in turn, enhances the contractile properties of the muscle fibers.

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Relationship of the Bulgarian Method With Gene-Protein Response

- Another result of single rep maximal load lifts is a change in the Lysosomal System
- Lysosomes are specialized vacuoles in the cytoplasm that contain enzymes (proteins) that break down wastes deposited in the cell (in this case, muscle cells)
- The resulting enhancement of catabolic activity aids in faster and more efficient waste removal, and consequently speeds up muscle recovery

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The Relationship Between the Bulgarian Training Method and Hyden's Theory of Protein Memory

- When the loads are increased in weightlifting, the corresponding impulses passing through the neurons and the skeletal muscle fibers affect the proteins produced by both the neuronal mRNA and the muscle cell mRNA (the changes in mRNA are also due to changes in the DNA as well)
- The different impulses that result from the differing workloads lead to the translation of different proteins both in the neuron and in the innervated muscle fibers
- The cells develop a "memory" of the proteins produced relative to the different impulses traveling along the nerve and muscle fiber

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Hyden's Theory of Protein Memory

- During the first phase of weightlifting , after lifting, the muscle fibers lose their co-ordination and the muscle fibers experience impaired contractile functionality.
- Much of this impairment Is caused by fatigue resulting from the exhaustion of ions, compounds and enzymes needed for contraction, These include, among others, ATP, calcium and adrenalin.
- When lifting is below 95% PR, lifters are generally able to succeed with similar load lifting following recovery.
- When the lifter attempts lifts beyond the 95% threshold (and especially beyond 97% when the stressors are much greater, initially, athletes are unable to lift similar loads and efficiency falls to about 80% of maximum.

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Hyden's Theory of Protein Memory (cont'.)

- This should not discourage athletes to continue lifts at the same high load even if several tries are necessary to achieve results.
- These lifts are vital because the stress adaption response at lifts above the 95 % and especially above the 97% level leads to the production of "specific proteins" which are needed to succeed
- By the second or third week, athletes will be able to lift maximal loads or even higher loads.
- As training continues, the intervals between maximal load lifting is shortened due to the phenomenon of "protein memory" as mentioned earlier.

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Training Variations Based on Sports Requiring Explosive Strength and Speed

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Training Variations Based on Sports Requiring Explosive Strength and Speed

Every sport requires different muscle fibers to develop. We will look at a few examples:

- Track and Field
  - Sprinters
  - Throwers
  - Middle and Long Distance
  - Jumpers
- Football
- Basketball

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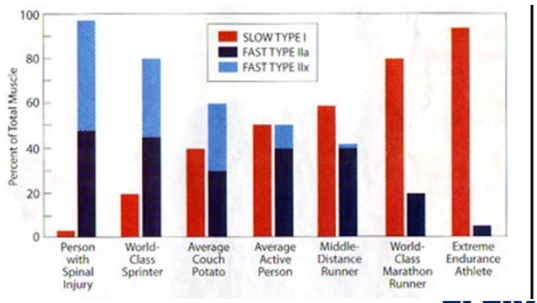
Muscle Fiber Types Vary by Athlete



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Two Types of Muscle Growth

1. Sarcoplasmic Hypertrophy

- Most common among bodybuilders
- Accomplished through higher reps (8-12) and lifting fairly heavy weights
- Demands development of sarcoplasm, a fluid like substance within the cell
  - This form of development causes the muscles to appear bigger
  - This higher volume training does little for maximum strength, it does assist with ATP (energy) production and strength endurance
- Many believe that this is non-functional muscle growing, however it still has a place when seeking to increase size and appearance of a muscle

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Two Types of Muscle Growth

2. Myofibrillar Hypertrophy

- Common among Olympic Weightlifters and those who lift with 85-97% of their 1 rep max
- Forms firm, solid muscles (Muscle Density)
- The only way to get this muscle density is to lift in the lower rep ranges (1-5 rep ranges)
- This form of growth produces increases in
  - Maximum strength
  - Eplosiveness
  - Causes the muscle to grow in size
- It builds fully functional muscle by increasing the number of myosin/actin filaments (sarcomeres) within the cell

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Recommended Sport Specific Programs using Olympic Weightlifting to build explosive Strength

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Football – Off Season

- Monday
  - Power Clean – max, 90% 2x2, 85% 3x3
  - Back Squat – max, 85% 3x3
  - Bench Press – max, 90% 3x2, 85% 3x3
- Tuesday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – max, 90% tree singles
  - Front Squat – max, 90% 5x2
- Thursday
  - Power Clean – max, 85% 3x3
  - Back Squat – max, 90% 3x2
  - Bench Press – 90% 5x2
- Friday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – 95% 5x1
  - Front Squat – max, 90% 3x2

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Football – During Season

- Monday
  - Power Clean – max, 95% 2x1
  - Back Squat – max, 90% 2x2
  - Bench Press – max, 90% 3x2
- Thursday
  - Power Snatch – max, 90% 3x1
  - Split Jerk from the Racks – max, 90% 2x1
  - Front Squat – max, 90%3x1

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Throwers – Off Season

- Monday
  - Power Clean – max, 90% 2x2, 85% 3x3
  - Back Squat – max, 85% 3x3
  - Bench Press – max, 90% 3x2, 85% 3x3
- Tuesday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – max, 90% tree singles
  - Front Squat – max, 90% 5x2
- Thursday
  - Power Clean – max, 85% 3x3
  - Back Squat – max, 90% 3x2
  - Bench Press – 90% 5x2
- Friday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – 95% 5x1
  - Front Squat – max, 90% 3x2

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Jumpers and Sprinters– Off Season

- Monday
  - Power Clean – max, 90% 3x2,
  - Back Squat – max, 85% 3x2
- Tuesday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – max, 90% tree singles
  - Front Squat – max, 85% 3x2
- Thursday
  - Power Clean – max, 85% 3x3
  - Back Squat – max, 90% 3x2
- Friday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – 95% 3x1
  - Front Squat – max, 90% 3x1

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Throwers – During Season

- Monday
  - Power Clean – max, 95% 2x1
  - Back Squat – max, 90% 2x2
  - Bench Press – max, 90% 3x2
- Tuesday
  - Power Snatch – max, 90% 3x1
  - Split Jerk from the Racks – max, 90% 2x1
- Thursday
  - Power Clean – max, 90% 3x1
  - Front Squat – max, 90%3x1
  - Bench Press – 95% 2x1, 90% 3x1

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Jumpers and Sprinters – During Season

- Monday
  - Power Clean – max, 95% 2x1
  - Back Squat – max, 90% 3x1
- Tuesday
  - Power Snatch – max, 90% 3x1
  - Split Jerk from the Racks – max, 90% 2x1
- Thursday
  - Power Clean – max, 90% 3x1
  - Front Squat – max, 90%3x1

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Basketball – Off Season

- Monday
  - Power Clean – max, 90% 3x2,
  - Back Squat – max, 85% 3x2
- Tuesday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – max, 90% tree singles
  - Front Squat – max, 85% 3x2
- Thursday
  - Power Clean – max, 85% 3x3
  - Back Squat – max, 90% 3x2
- Friday
  - Power Snatch – max, 90% 3x2
  - Split Jerk from the Racks – 95% 3x1
  - Front Squat – max, 90% 3x1

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Basketball – During Season

- Monday
  - Power Clean – max, 95% 2x1
  - Back Squat – max, 90% 3x1
- Tuesday
  - Power Snatch – max, 90% 3x1
  - Split Jerk from the Racks – max, 90% 2x1
- Thursday
  - Power Clean – max, 90% 3x1
  - Front Squat – max, 90% 3x1

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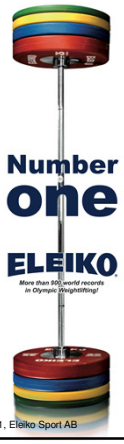

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