Athletic Conditioning in Martial Arts (and Beyond)

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Synopsis

Do you believe that strength is simply a generic “quality” of the body? That a sprinter’s speed is just a matter of stride frequency? In *Athletic Conditioning in Martial Arts and Beyond*, Sergej Davidov guides you through an illuminating exploration of human anatomy, physiology, and biochemistry as applied to training. Drawing from extensive experience and a groundbreaking scientific approach, he explains why strength and endurance are not abstract concepts but morphological attributes rooted in the cellular structures of the human body.

Blending scientific insights from Kant and Hegel, Vorob’ev and Weider, with practical field experience, Davidov shows how to achieve sustainable, long-term results without shortcuts or illegal substances.

Abandon outdated methods and discover an innovative system that will enable you to build a stronger, faster, and more resilient body—at any age.

Introduction

This book is the outcome of the scientific and athletic experience I have accumulated over a lifetime. I initially began writing it under the title *Strength Training for Martial Arts*, but as the work progressed, I realized that the training principles developed in these pages apply not only to martial arts, but to all sports in which muscular strength plays a decisive role. Moreover, strength-oriented training, according to my system, can also be adapted to develop muscular endurance. Consequently, I changed the title to *Athletic Conditioning in Martial Arts*.

In this book, I present an innovative training methodology for athletes involved in sports where the expression of strength is one of the determining factors for victory. This methodology is grounded in a deep understanding of biochemistry, physiology, pedagogy, and sports practice. With this knowledge, the use of anabolic agents—or any pharmacological substance whatsoever—becomes entirely unnecessary for increasing strength.

I will reveal the principles behind strength training for weightlifters, wrestlers, boxers, and MMA fighters. I would also like to emphasize that these training principles are equally effective for sprinters, throwers, jumpers, swimmers, soccer players, rugby athletes, and many others.

Above all, I will explain from a medical perspective the foundational concepts of sports biochemistry, physiology, and pedagogy, enabling you to understand how to train in a scientifically sound manner.

In martial arts, an athlete's ability to express strength is a crucial determinant of competitive success.
How, then, do we train the body to express strength? Since ancient times, various methods have been developed to cultivate it. According to legend, as early as 500 BCE, the renowned Greek wrestler Milo of Croton raised a calf as part of his conditioning: when the calf was small, he carried it on his shoulders; as the animal grew, Milo's strength grew with it. By the time the calf had become a full-grown bull, Milo was strong enough to wrestle it to the ground and slaughter it. Thus, the principle of progressive overload was born.

The ancient wrestler, through empirical observation, understood that the strongest individuals could lift the heaviest loads. He therefore hypothesized that by gradually increasing the load over time, the muscles would adapt, and he would become stronger—that quantitative change would lead to qualitative improvement. Here we see the seeds of a scientific approach: Milo of Croton was, in essence, an early theoretical researcher, and his ideas remain relevant even today.

What distinguishes a practitioner-researcher from a theoretical researcher?
The practitioner looks only to the past: relying on accumulated experience, he selects a training methodology based on what has worked before. As a result, he is unable to create anything truly novel. The theorist, by contrast, formulates a hypothesis and tests it. Why is testing necessary? Because until a hypothesis is empirically verified, it cannot be regarded as a theory. One may hypothesize anything, but only scientific experimentation can determine whether it holds true.

Unfortunately, many coaches, guided by personal reasoning rather than evidence, accept as true what is in fact false. In recent years, with the rise of the internet, we have been exposed to thousands of "experts" teaching subjects they barely understand—and the less they know, the more they teach. Even many researchers, constrained by excessive specialization, often reach incorrect conclusions, falling into metaphysical speculation. Therefore, we should affirm only what has been scientifically tested. Those wishing to explore this problem more deeply may consult Immanuel Kant's *Critique of Pure Reason*.

The Greek wrestler used a calf as a natural training load, with overload increasing organically. However, depictions of ancient athletes also show them holding dumbbells. This suggests that they used training implements, although precise training protocols remain unknown. By reasoning logically, we may infer that wrestlers preferred natural loads, such as training partners—or that they practiced throwing heavier discs than standard ones, or even lifting stones, to enhance explosive strength. Sports historians note that dumbbells were also used for long-jump training.

History and Development of Strength Training

In the first half of the sixteenth century, François Rabelais described a character named Gargantua who trained like a multidisciplinary athlete: he swam, ran uphill, climbed, threw weights, and even… shouted. In this way he prepared himself for battle, where he needed to be strong, enduring, and agile at the same time.

From the East—particularly from China and Japan—a unique form of training entered our globalized world, characterized by unusual and sometimes curious exercises. We will return to this subject later.

In the nineteenth century, the world of professional wrestlers and strongmen flourished. They performed in circuses and improvised sporting venues, often accompanied by betting. Their training relied on barbells and dumbbells. A protocol described in contemporary manuals was as follows: choose a load that can be lifted 10 times and train with it until you can lift it 15 times. At that point, increase the weight by 2 kilograms and begin again at 10 repetitions. It is unclear how many days of rest were allotted to each muscle group. Each lineage of strongmen possessed its own secrets for strength development. Some documents from the nineteenth century have survived, but they are neither very clear nor particularly reliable.

At the same time, a student-athlete movement was emerging, especially in England, where university enthusiasts sought to understand how strength should be trained. Thus was born sports pedagogy, which trained professional coaches.

Those interested in strength development relied on programs based on empirical knowledge. The first principle was that of progressivity, already discussed earlier. It is noteworthy that even today, more than 200 years later, a similar approach still predominates.

In the twentieth century, after World War II, significant investments were made in the development of strength sports and athletic training, particularly in the United States and the Soviet Union. In America, Bob Hoffman led the national Olympic weightlifting team, while the Weider brothers focused on bodybuilding. In the USSR, starting in the 1960s, beyond sports pedagogy, scientific research in the field of strength training flourished under the guidance of two-time Olympic champion and professor Arkadij Vorob'ev. Since the 1990s, foundational research has been carried out by Professor Victor Seluyanov.

As long as the rivalry between the two superpowers persisted, substantial funding continued to support scientific research in strength sports. After the collapse of the USSR, however, these financial resources dried up. The last major records in weightlifting, athletics throwing events, and high jump date back to the 1980s.

For example, on September 14, 1984, Jurik Vardanyan achieved a total Olympic lift (snatch + clean and jerk) of 405 kg in the 82.5 kg weight category. That category no longer exists; the closest current category is 89 kg, where the world record is 392 kg, set by Antonio Pizzolato.
Or consider the legendary 266 kg clean and jerk by Leonid Taranenko in the super-heavyweight division, performed on November 26, 1988. As of this writing (December 21, 2021), Lasha Talakhadze has lifted 267 kg—meaning it took 33 years to add just 1 kilogram.

Jurij Sedych threw the hammer 86.75 meters in 1986—38 years ago—and his record remains unbroken. Likewise, the women's high jump world record of 2.09 meters, set by Stefka Kostadinova in 1987, still stands today.

Science, Philosophy, and Training: A Critical Reflection

As we can see, strength-training methodology has remained essentially stagnant for more than thirty years. Sports science in the field of strength has failed to propose truly innovative training methodologies. Since the 1950s, the majority of investment has not been directed toward studying training systems, but toward research on drugs, nutritional supplements, exercise simulators, and various machines for developing muscular strength.

But what is science? And who is a true scientist?

A scientist is someone who, through abstract reasoning, constructs a conceptual model—a hypothesis—and states: “If I have a group of athletes perform these exercises, they will adapt in a certain way, as predicted by my model.”
If the transformation occurs exactly as the scientist anticipated, and if other researchers in independent laboratories obtain the same results, then the hypothesis becomes a scientific theory.

At this point, it is appropriate to speak not only of science, but also of philosophy. Why? Because many people interested in sports interpret research findings in a philosophical manner.

Who is a philosopher? Anyone who reasons and discusses with others on a given subject in an attempt to arrive at a plausible answer. In this sense, we are all philosophers.
There are professional philosophers, whose thinking is grounded in Plato, Aristotle, Kant, and Hegel. And there are amateur philosophers—most of us.

The problem is this: if we obtain a result or formulate an idea using a philosophical method, how can we verify its truth?

Consider, for example, Oparin’s hypothesis on the origin of life on Earth. It cannot be empirically verified.
Or consider the proofs of the existence of God: we may discuss and reason about them until the second coming… but philosophical reasoning alone cannot objectively demonstrate their validity.

Immanuel Kant, in his masterpiece *Critique of Pure Reason*, dismantled such purely speculative arguments.

Science, by contrast, is a system of knowledge obtained through research activity.
A researcher, using abstract reasoning, constructs a model—a hypothesis—and examines it through experimentation.
If the results confirm the hypothesis, it becomes a theory, which we consider an objective reality of our material world.
Other researchers must be able to test the theory and obtain the same results.
This is the scientific method of acquiring knowledge, introduced—historically speaking—by Galileo Galilei and Leonardo da Vinci.

After Isaac Newton founded classical mechanics in the seventeenth century, the nineteenth century witnessed extraordinary scientific achievements.
Michael Faraday provided innovative interpretations of electrical and magnetic phenomena.
Thomas Edison illuminated the world with the incandescent lamp.
Nikola Tesla, Louis Pasteur, Charles Darwin, and many other scientific geniuses, together with entire research institutions, elevated science to unprecedented heights.

In philosophical thought as well, between the eighteenth and nineteenth centuries, rational transformations occurred thanks to Immanuel Kant and Georg Hegel, with his *Science of Logic*.
As an intellectual culmination, in 1883 Friedrich Engels published his masterpiece

Dialectics of Nature, a precise synthesis of humanity's scientific knowledge.

Dialectical materialism, in contrast to classical thought originating with Pythagoras and Socrates, is based on what is material—on what can be measured and studied. Our world is material and must be studied exclusively through scientific means.

I do not deny metaphysical thought—in my view, it is evident that, as the Kabbalists say, "no seed exists below that does not have an angel above."
However, we live here "below," and we must keep our feet firmly on the ground.
It is impossible to sit comfortably on two chairs at once; it is awkward and unstable.

And yet many so-called researchers and coaches, when interpreting scientific data, slip into metaphysics.

My Athletic and Scientific Biography

Since childhood, I admired strong athletes: boxers, wrestlers, and weightlifters. I owned a large book about the Olympic Games, which included a picture of a weightlifting champion from my city. I would look at him with admiration and even a sense of reverence.

At the age of 18, I decided to take up weightlifting, but the coaches at various gyms refused to accept me, saying I was already too old to begin. Nevertheless, I did not give up and continued visiting other gyms until, one day, I arrived at the Dinamo sports club. A staff member told me, "We do not turn anyone away." He pointed me toward a coach. I approached him and—my God!—it was the very man whose photograph appeared in my childhood book: the champion himself.

I was extremely fortunate to begin studying the fundamentals of weightlifting while training among some of the best athletes on the planet. In the 1970s and 1980s, Olympic weightlifting in the Soviet Union was at the peak of its development. I trained on the same platform as European and world champions, under the guidance of an Olympic champion.

I did not possess their genetic predispositions, and for that reason, I worked even harder with the barbell. I read extensively from scientific sports literature and discussed training issues with some of the strongest athletes in the world.

But I would like to recount my athletic biography from the very beginning.

At age seven, my father enrolled me in swimming. After eight years of competitive experience, I disobeyed my parents and said I was tired of swimming back and forth every day (despite being good at it).

My uncle, an athletics coach, placed me under the guidance of one of his colleagues. I competed once and placed second in the 60-meter sprint. But I abandoned track and field as well.

I began going secretly—without telling my parents—to a gym where the hall was divided in two: wrestlers on one side, boxers on the other. Thus, one day I practiced judo, and the next, boxing.

Eventually, I was discovered and taken back to the pool. In a few years, I was expected to enter medical university, where competition for scholarships was extremely high. Strong athletes had notable privileges for admission.

During university, as I mentioned earlier, I devoted all my free time to weightlifting. I frequently spoke with professors from various departments, seeking to deepen my theoretical and practical understanding of sport.

After graduating, I worked in a health district, which allowed me—when necessary—to train twice a day and to travel, even abroad, to compete.

Part-time, I worked in a research laboratory. Among us were scholars from diverse scientific fields. I represented the domains of biochemistry and medicine. All of my scientific findings were applied to myself and to other athletes who were willing to follow my methods.

I remember one hot, stifling summer. I was practicing snatches using lifting straps that helped me hold the barbell. The straps were soaked with sweat and humidity. During one lift, while I was already in the squat position, the barbell began to fall backward. I opened my fingers, but the bar did not slip—it remained stuck to my hands. I collapsed backward along with the weight.

Thank God I did not break anything, but I tore everything that could be torn in both elbows. I lost the ability to lift any weight from the chest upward for several months.

During rehabilitation, I joined the bodybuilders, who had machines suitable for training. There, I was noticed by a coach who was passionate about bodybuilding. He made me an offer:

“You, Sergej,” he said, “already have well-developed legs, back, and shoulders. You’ll need to focus more on your biceps and chest. In five months, our city will host a major international bodybuilding tournament. You have a good chance of reaching the finals. Are you in?”

“I’m in,” I replied.

Five months later, I competed in the championship and placed third in the 90 kg category.
The following year, I placed second in the republican IFBB championship.

The 1990s were extremely difficult—not only for me but for my entire country. I trained little because all my energy was devoted to survival. In 2000, I moved to Italy, and after an adjustment period, I resumed training. Eighteen years ago, I began practicing judo and later MMA and grappling—disciplines I still train in today. I even brought my wife to the gym… and she beats me up there!

For the past forty years, I have conducted scientific research in the field of sport. Before the advent of the internet, I constantly studied scientific journals and abstract collections. When necessary, I requested articles from around the world. Some of the most substantial, well-funded research came from the Massachusetts Institute of Technology and the Moscow State Academy of Physical Culture and Sport.

Evolution and Stagnation in Strength Training

The stagnation present in sports where strength is the determining factor is due primarily to the lack of abstract thinking among coaches.
Many work exclusively based on their own empirical experience, looking only toward the past.

A true researcher, on the other hand, formulates a hypothesis and tests it; if his ideas are confirmed in practice, they become a scientific theory, upon which models and systems can be constructed.

Secondly, modern coaches are often influenced by the capitalist system, where profit comes first.
They are driven to rely on modern technologies: machines, simulators, nutritional supplements, pharmacological anabolic agents, and so on.
Many are convinced that they know everything about sports pedagogy and seek victory through technology and pharmacology.

Thanks to my knowledge, I developed an innovative methodology for strength training that enables athletes to progress consistently without the use of steroids, growth hormone, or other pharmacological anabolic agents.

In instructional manuals from the early twentieth century, it was recommended to use a certain weight for an exercise—such as the slow press—and lift it 10 times for 3–4 sets.
Then, session after session, the athlete would increase the number of repetitions until reaching 15.
At that point, the weight was increased and the cycle restarted from 10 repetitions.

Over time, the gap between training programs for Olympic athletes and those for wrestlers and strongmen widened.
Despite weightlifting manuals warning of the harmful effects of lifting maximal loads, methodology continued to emphasize increasing load, increasing the number of sets, and reducing repetitions.

Weightlifting was developing in the United States, the Middle East, France, Germany, and the Soviet Union.
At that time, an enthusiastic American coach and manager, Bob Hoffman, founded the York Barbell Club.
His athletes followed programs based on the “pyramid” principle, calculating loads as percentages of their individual 1RM for each exercise:

Percentage of 1RM — Repetitions
50% — 15
60% — 10
70% — 8

80% — 6
90–100% — 1

During the competitive period, the pyramid was shortened and more sets were performed between 70% and 90% of 1RM.
This methodology was used for many decades, including the 1960s.

During this period, a highly complex concept emerged: strength training without muscular hypertrophy.
We will examine this subject later.

Coaches wanted their athletes to remain within a given weight category while improving their records—in other words, to increase strength without increasing body mass.

Many coaches, lacking knowledge in biochemistry and physiology, believe that strength is a general quality of the organism influenced by numerous factors.
In reality, strength is a morphological quality, dependent on the quantity of muscle fibers and neurons (motor units) that send electrical impulses to the fibers.
The number of fibers and neurons is genetically determined and does not develop—they do not undergo mitosis. On the contrary, their number tends to decrease with age.
The only things we can train are myofibrils, mitochondria, and the daily renewal of synaptic connections—but we will discuss this later.

Since the 1970s, three main schools of strength training have become established:

1. **Strength training with maximal muscle hypertrophy:** 3–5 sessions per week
2. **Training with 80–90% of 1RM plus limited maximal attempts in the competitive period:** 3–10 sessions per week (Soviet school)
3. **Training with maximal loads:** 12–24 sessions per week (Bulgarian school)

Strength training aimed at developing muscle mass derives from the system of Joe Weider, founder of modern bodybuilding.

The 1950s were crucial for the advancement of strength-training methodologies.
American researchers led by Dr. Berger discovered that training a muscle group using 3 sets of 6 repetitions at approximately 75% of 1RM, three times per week for eight weeks, produced the best results in terms of strength and muscle mass.

This protocol was followed both by Bob Hoffman's weightlifters and by bodybuilders under Joe Weider's guidance.
Athletes such as Tommy Kono and Charles Vinci were both world and Olympic champions in weightlifting and champions in bodybuilding.

Joe Weider can be considered a genius of sport.
He knew how to synthesize empirical data with scientific research and was also an active practitioner.
He developed a universal system suitable for both beginners and elite bodybuilders.

His system required beginners to progress through three basic cycles:

First Mesocycle (3 Months)

- **3 training sessions per week**
- Each session followed a **full-body** structure
- Exercises performed for **2–3 sets of 6–10 repetitions**
- **Goal:** learning proper technique with light loads

Second Mesocycle (2 Months)

- **4 training sessions per week**
- **Monday and Thursday:** first half of the musculature
- **Tuesday and Friday:** second half
- **8–12 repetitions in 4 supersets** for antagonist muscle groups
- Examples: **bench press + pull-ups**, **barbell curl + French press**

Bodybuilding, Personal Experience, and Methodological Revolutions

I began practicing bodybuilding in 1984. At the time, the prevailing approach in my gym insisted that each muscle group had to be trained **three times per week**, performing **15–20 sets** per session.
For example, chest training followed this structure:

1. **Bench press** – 5 sets of 12 to 6 repetitions
2. **Incline bench press** – 5 sets of 8 repetitions
3. **Dumbbell flyes on a flat bench** – 3 sets of 10 repetitions
4. **Barbell pullover** – 3 sets of 12 repetitions

For a while, I managed to progress, but eventually I reached **overtraining** and performance stagnation.
The only “solution” that seemed available was the use of **steroids** to keep the process going.
And so it happened.
However, after some time, even those substances were no longer sufficient to stimulate further muscle growth.

During an international competition, I met a coach who suggested a different approach:
train four times per week, divide the body into two halves—Monday/Thursday one part, Tuesday/Friday the other—and reduce the number of exercises and sets.
According to him, **8 sets per muscle group** were sufficient.

I followed his advice.
After one month, I experienced a remarkable increase in both strength and muscle mass.

As for that coach-advisor: he is still alive today, around 70 years old, trains exactly as he did 40 years ago… and he is in excellent shape.

The Third Cycle of Weider's System

The third cycle of Joe Weider's system was aimed at **maximal strength development**.
The athlete returned to a **full-body protocol**, training **three times per week**.
The exercises were **multi-joint** and foundational:
squat, deadlift, arched bench press, bent-over row, barbell curl, French press, and military press.

They were performed with **cheating**, meaning with slight technical looseness or assisted by a partner.
The prescription called for **3 sets of 6 repetitions**, all **to failure**, as recommended by Dr. Berger.

In the 1980s, the **split system** was developed, dividing the body into three sessions plus one rest day—the so-called **3+1 system**.
For example:

- **Monday:** chest and arms
- **Tuesday:** shoulders and back
- **Wednesday:** legs, calves, and abdominals
- **Thursday:** rest

I also have a story regarding the split system.

During a training camp of the national bodybuilding team (IFBB version), where I was present as a consultant-expert, I observed a young athlete named Victor.
In his previous competition he had placed third.
He was a fanatic of bodybuilding and had previously practiced Greco-Roman wrestling.
He trained obsessively and was clearly overdoing it.

I shared a room with Victor.
One evening we had a long conversation about training.
I explained all his mistakes and proposed a strategic protocol based on the **3+1 split**.
We clarified many concepts.
I advised him to train each muscle group with **two exercises only**, instead of the 4–5 he was performing.

Six to eight months passed.

I was very busy with family and work, no longer following competitive bodybuilding, and had forgotten the conversation with Victor.

A friend of mine, regional secretary of the IFBB, returned from the national championship and told me that Victor had not only won his weight class but also the open division.
He was likely to reach the European podium within three weeks.
What surprised me even more: Victor had registered me as his coach.
My friend showed me a newspaper with the champion's interview, where Victor expressed warm gratitude toward me.

The Concept of Training to Failure

Joe Weider implemented the foundational concept of strength training:
each set must be performed to failure, meaning until the point of complete fatigue, when the muscles burn intensely… and the athlete still forces out two additional repetitions.

At the time, the biochemical and physiological mechanisms underlying this approach were not yet well known, but Dr. Berger and empirical sport experience endorsed it.

This concept was later refined and popularized by **bodybuilder and physician Mike Mentzer**, and subsequently by **six-time Mr. Olympia Dorian Yates**.

In the 1990s, the idea emerged that each muscle group should be trained **only once per week**.
Some successful athletes gave their legs even more recovery time:
in one week they performed **squats and leg extensions**, and in the next **deadlifts and leg curls**.

The Methodological Revolution in Olympic Weightlifting

Returning to Olympic weightlifting in the 1950s–60s:
For assistance exercises such as the military press, squat, and bench press, the previously described **pyramid system** was used.
For the snatch and clean and jerk, the pyramid was reduced:

- **50%** – 10 repetitions
- **60%** – 2–5 repetitions
- **70%** – 2–4 repetitions
- **80%** – 2–3 repetitions
- **90%** – 1–3 repetitions

Maximal weights were lifted **very rarely**.
This approach worked reasonably well for the military press but was ineffective for the other two lifts.
As a result, some athletes lifted more in the press than in the clean and jerk during competition.

In the 1950s, in the 82.5–90 kg categories, the Soviet athlete **Arkadij Vorobyev** dominated.
His last triumph was at the **1960 Olympic Games in Rome**, where he won the gold medal.
Vorobyev was not only an outstanding athlete but also a physician and scientist with a highly analytical mind.

He asked a simple question:
"Why do weightlifters train with low or moderate loads, but compete with maximal loads? It is as if a sprinter prepared like a marathon runner and expected to win the 100 meters."

This question launched a new era of **high-specialization**, in which athletes trained almost exclusively with **maximal or near-maximal loads**.
Weightlifting performance skyrocketed; the 1960s and 1970s were revolutionary.

Vorobyev became a leading figure and later directed the Moscow State University of Physical Culture.
His ideas were shared by **Anatoliy Bondarchuk**, Soviet hammer thrower, Olympic gold medalist in Munich and bronze medalist in Montreal, where his student **Yuri Sedykh** won the gold medal.
In 1986, Sedykh threw the hammer **86.75 meters**, a world record that has remained unbroken for 38 years.

Bondarchuk, working at the University of Physical Education in Kyiv, argued that **training with reduced intensity was entirely useless**.
According to him, only **maximal stimulation** produces record-breaking performance.
Just as in bodybuilding, where every set must be taken to failure, in Olympic weightlifting only lifts performed at **90–100% of 1RM** drive long-term progress.
This concept is applicable to any sport in which **maximal force is a decisive performance factor**.

The Information Era and a Modern Contradiction

Today, thanks to the Internet, all information is readily accessible.
In the past, we eagerly awaited new magazines or books on weightlifting or boxing.
I myself wrote letters to the Massachusetts Institute of Technology or the Moscow Institute of Physical Culture in search of updated scientific material.
Today, everything is available instantly — and one can even spread one's own

theories on YouTube, TikTok, and other platforms.

On social media, one often sees videos of people in lab coats claiming that training to failure is unnecessary for strength development, citing weightlifters as an example.
It is true: if you observe a weightlifting gym, you will see that athletes do not train to failure.
For example, they perform squats with **80% of 1RM**, **5 sets of 3 repetitions**, even though they could perform 5–6.

This seems like a contradiction: highly trained athletes lifting enormous loads without “pushing to the limit.”

But the contradiction does not lie in the principles of Berger, Vorobyev, or Bondarchuk.
The truth is that **all elite athletes use banned substances — without exception**.
The attention of modern coaches and athletes is not directed toward methodological innovation but toward discovering **anabolic agents that evade WADA detection**, or substances that mask their presence.

Endocrine Response and Temporal Limits

In the 1980s, scientific articles began to appear presenting the findings of sports endocrinologists.
They demonstrated that **intense resistance training stimulates testosterone production**.
However, the duration of the training session must not exceed **45–90 minutes**, because beyond this limit **corticosteroids**, which have **catabolic effects**, begin to dominate.

The Bulgarian Case: Ivan Abadzhiev and the Extreme School

An extreme example was the Bulgarian coach **Ivan Abadzhiev**, whose athletes won **12 Olympic gold medals** and **57 world titles**, despite Bulgaria having fewer than 7 million inhabitants.
Under his leadership, the Bulgarian weightlifting team even surpassed the Soviet team, despite the USSR having a population 35 times larger.

His student **Naim Suleymanoglu** was the first lifter in history to clean and jerk **three times his bodyweight**.
At the 1988 Seoul Olympics, in the 60 kg category, he lifted **190 kg**.

Abadzhiev’s team trained year-round, **six days per week**.
Sunday was a rest day.
On **Monday, Wednesday, and Friday**, they trained **six hours per day**, with breaks for meals and naps.

On **Tuesday, Thursday, and Saturday**, they trained **four hours per day**.
They worked with loads at **90% and above of 1RM**, all year long, performing **1–2 repetitions per set**.

A typical day looked like this:

- **9:00–10:00:** snatch
- Break, rest, snack
- **10:30–11:30:** clean and jerk
- Break
- **12:00–13:00:** clean-pull deadlift
- Lunch and rest until 17:00, then afternoon training

Abadzhiev was so dominant that world weightlifting championships began losing spectators: everyone knew that either the Bulgarians or the Soviets would win.
To prevent a decline in global interest, Abadzhiev was removed from the national team, all world records were reset, and the weight categories were modified.

Sports Science Today: Between Stagnation and Fragmentation

We are in 2025… and training methods are still essentially the same as they were forty years ago.
A.N. Vorobyev's book *Weightlifting*, third edition (1981), was considered for decades a sort of "Bible" of sport science.
From the 1960s to the 1980s, the Soviet Union published the annual scientific journal *Weightlifting* — a valuable source still consulted and cited today.

Today, however, we witness a profound and widening separation between sport science and the practical coach.
The scientists who were simultaneously biochemists, physiologists, and philosophers — individuals of broad culture, intellect, and dialectical understanding — have disappeared.

Contemporary researchers investigate only their specific micro-field in an extremely narrow, compartmentalized manner, without perceiving connections to the broader system.
Coaches, on their side, ignore biochemistry, physiology, and philosophy entirely… They merely know how to inject steroids and GH into their athletes.

This fracture has led to methodological stagnation and an increasing dependence on pharmacology.
Scientific culture has been replaced by chemical shortcuts.

For this reason, the next chapter will address:

- **Anatomy:** the structure of the human body and the function of muscle groups
- **Physiology:** the mechanisms that regulate muscle contraction, recovery, and adaptation
- **Biochemistry:** the cellular reactions that determine energy production, protein synthesis, and hormonal response

Above all, we will see how to apply these principles to sport in order to build a **scientific, effective, and sustainable training system — without pharmacological shortcuts.**

Anatomy, Physiology, and Biochemistry Applied to Strength Training

To explain how the ability to express force is trained, we must begin by constructing a model: a healthy adult human.
What is its structure? How does it function?

We divide this model of the organism into five fundamental components:

1. **The idealized cell**
2. **The endocrine system**
3. **The muscle**
4. **The heart**
5. **The locomotor apparatus**

On the basis of these elements, we will construct an advanced technology for strength training.

The Cell

The cell is surrounded by a **phospholipid membrane** that separates it from the external environment.
This membrane is primarily composed of fats.
For this reason, it is essential to consume animal fats, which provide **saturated fatty acids** necessary for proper physiological function.
We also require **unsaturated fatty acids**, abundant in olive oil, which confer membrane elasticity and prevent arteriosclerosis.

Inside the cell, we find:

- **Nucleus:** contains DNA, the cell’s genetic program — the administrative office of the factory.
- **Mitochondria:** the power plants, producing ATP via oxidative phosphorylation.
- **Ribosomes:** responsible for protein synthesis.

- **Lysosomes:** organelles that degrade cellular materials via digestive enzymes.

If we aim to increase strength, we must stimulate the construction of new organelles through enhanced protein synthesis — that is, **anabolism**.

What Determines Strength?

Imagine two MMA athletes, both 77 kg, with identical technical preparation and experience.
One is male, the other female.
Who will win?
Undoubtedly, the male athlete.
Why?
Because he has **greater muscle mass**.

All else being equal, the individual with more muscle is stronger.

Beyond technique and experience, the fundamental determinants of strength are **neuromuscular**: the ability to recruit the greatest possible number of muscle fibers during maximal effort.
An average person activates only **20–30%** of their muscle fibers during a maximal contraction, whereas an elite weightlifter may reach **90%**.

This ability depends on the number of **motor units** — neurons that send impulses to muscle fibers — a parameter largely determined by genetics.

What Determines Muscle Mass?

Muscle mass depends on the **quantity and quality of intracellular organelles**, particularly:

- **Myofibrils:** contractile structures
- **Mitochondria:** energy-producing organelles

Strength is not an abstract capacity but a **morphological quality**, directly linked to the internal structure of the muscle cell.

Protein synthesis depends on hormonal regulation.
A competent coach must know how to induce **hormonal uptake** into the cell in order to activate muscular anabolism.

Hormones and Receptors

Every cell has membrane receptors that transport hormones inside.
Here we refer primarily to **steroids** and **somatotropin (growth hormone)**.

Testosterone and GH are the primary hormones responsible for cellular construction.

Mitochondria utilize oxygen, fatty acids, glucose, and other substrates to produce ATP.
Their by-products are water and carbon dioxide.

Lysosomes, in contrast, mediate **catabolism**.
During intense muscular activity, the cell produces lactic acid — more precisely, **lactate and hydrogen ions (H^+)**.
When excessive, these ions saturate lysosomes, disrupt their membranes, and release enzymes that destroy organelles, causing para-necrosis or complete necrosis.

How to Stimulate Muscular Hyperplasia

If a good coach wishes to stimulate **hyperplasia** — the creation of new organelles — they must:

- Facilitate the entry of anabolic hormones into the cell
- Favor anabolism over catabolism
- Prevent excessive acidification of the intracellular environment (decreased pH)

This task is extremely complex.
To strongly stimulate endocrine glands (GH and testosterone), intense stress is required — but such stress is accompanied by a significant fall in systemic pH due to the accumulation of H^+ ions.

Therefore, we must **minimize lactate production**, as it has destructive effects.

How do we solve this problem?

I will explain it in the next chapter.

The Endocrine System and the Role of Hormones in Muscular Strength

It is now time to discuss the endocrine system, a fundamental component for understanding how strength develops.

Hormonal Activation Through Muscular Stress

Muscular fatigue induces a physiological stress response that activates the **hypothalamic–pituitary axis**.
The adenohypophysis produces two key hormones relevant to strength sports:

- **Somatotropin (Growth Hormone, GH)**
- **Gonadotropic hormones**

(Other hormones are involved, but they are not pertinent for our present discussion.)

Somatotropin (GH)

GH activates DNA transcription, stimulating protein synthesis and the deposition of proteins within cells within minutes.
It exerts a **direct anabolic effect**, along with a **selective catabolic effect**: it mobilizes lipids to produce energy, sparing proteins and delaying their degradation.

Primary effects of GH:

- Stimulates the release of fatty acids from adipose tissue
- Increases lipid concentration in body fluids
- Reduces glucose uptake by tissues, particularly muscle
- Increases hepatic glucose production
- Promotes lean mass development
- Is secreted predominantly during childhood and adolescence
- After age 20, GH synthesis declines rapidly
- By age 50, circulating GH levels are approximately half those of a 20-year-old

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Gonadotropic Hormones and Testosterone

Gonadotropic hormones stimulate the production of testosterone.

Here, we must speak candidly about anabolic agents prohibited by WADA, because testosterone is of colossal importance to strength development.

Testosterone is a steroid hormone of the androgen group, produced primarily by the **Leydig cells** of the testes, and to a lesser extent by the ovaries and adrenal cortex.
It is also present in women, though they tend to convert it more readily into estrogens.

History of Endocrinology and Testosterone

As early as 1889, the Franco-British physiologist **Charles Brown-Séquard** observed that a liquid extracted from animal testicles, when injected into elderly subjects, improved physical performance.
He was one of the founders of modern endocrinology, intuiting the existence of regulatory substances secreted by the body.

Brown-Séquard was a scientific visionary: he created a hypothetical model of an elderly person treated with testicular extracts, predicting improvements in health,

muscular strength, and libido.
He distributed his extracts freely to scientists and volunteers.
The results exceeded expectations.
Thus, the scientific theory and discipline of endocrinology were born.

The impact was such that Arthur Conan Doyle wrote *The Adventure of the Creeping Man*, inspired by these experiments.

From Experimental Extracts to Chemical Synthesis

- **1913:** first testicular transplants
- **1918:** surgeon Loe L. Stanley performed them in a U.S. penitentiary
- **1935:** Adolf Butenandt synthesized testosterone from cholesterol
- That same year, Leopold Ružička and Alfred Wettstein published *Synthetic Preparation of the Testicular Hormone Testosterone*
- **1939:** Ružička and Butenandt won the Nobel Prize

The discovery of anabolic–androgenic steroid synthesis was revolutionary.
In 1935, Ružička synthesized new compounds, including **methyltestosterone**.
By 1937, **testosterone propionate** (injectable) and **methyltestosterone** (oral) were available for clinical studies.

Scientific Confirmation and Clinical Applications

- **1936:** Charles Kochakian demonstrated the anabolic role of testosterone acetate in animals
- **1938:** Allan Kenyon's group confirmed the anabolic effects of testosterone propionate in humans

During World War II, Kochakian proposed testosterone to accelerate postoperative recovery in wounded soldiers.
However, no direct military applications for enhancing strength or endurance were implemented in either the United States or Germany, despite persistent myths to the contrary.

The History of Anabolic Steroids: From Discovery to Sports Diffusion

A key breakthrough for introducing steroids into the pharmaceutical market came from **Russell Marker**, a chemistry professor at the University of Pennsylvania.
In 1944, he founded **Syntex** in Mexico City, which later became a global leader in

steroid production.

In 1945, writer **Paul de Kruif** described the anabolic properties of testosterone propionate and methyltestosterone in his book *The Male Hormone*.
Widely read, this work popularized the muscular potential of testosterone among West Coast bodybuilders in the late 1940s and early 1950s.
The bodybuilding community soon began extensive experimentation with anabolic steroids, becoming the first athletic group to use them systematically.

Mr. Olympia **Larry Scott** admitted that by 1960 he and virtually all top competitive bodybuilders were using anabolic steroids.

The Pharmaceutical Race for Steroids

Another major company, **Searle Pharmaceuticals**, invested heavily in steroid research to outperform its competitors.
Between 1948 and 1955, Searle chemists synthesized **over one thousand derivatives and analogues of testosterone**.

Among them, **norethandrolone**, synthesized by Frank Colton in 1953, was selected for market release.
In 1956, it became the first synthetic oral anabolic steroid approved by the FDA under the brand **Nilevar**.

Up to that point, the only orally active androgen had been methyltestosterone.

Mr. Universe **Bill Pearl** was among the first to experiment with Nilevar in 1958.
He reportedly followed a 12-week cycle at 30 mg per day, increasing his weight from 225 to 250 pounds.
He was also one of the first athletes to publicly acknowledge steroid use, particularly during preparation for the 1961 NABBA Mr. Universe.

Global Expansion of Steroid Development

Between 1950 and 1965, numerous companies synthesized and commercialized nearly all anabolic steroids known today. Among them:

Steroid	Company	Year
Methandrostenolone (Dianabol)	Ciba	1958
Oxymetholone (Anadrol)	Syntex	1961
Oxandrolone	Searle	1964
Stanozolol (Winstrol)	Winthrop	1962

Steroid	Company	Year
Nandrolone decanoate (Deca)	Organon	1962
Boldenone	Squibb	1960s
Trenbolone acetate	Roussel	1960s

Exotic steroids such as **Furazabol**, **Oxymesterone**, and **Mybol** were also developed, used almost exclusively in bodybuilding.

In 1957, Organon introduced **Durabolin** (nandrolone phenylpropionate), which quickly became popular.
Its fame was soon eclipsed by **Deca-Durabolin** (1962), likely the most famous injectable steroid in history.

Dianabol and the American Revolution

In 1958, **Dianabol** (methandrostenolone), synthesized by Ciba Pharmaceuticals, entered the international market and rapidly became the primary choice for bodybuilders and weightlifters, spreading into virtually every sport.

Physician **John Ziegler**, an avid weightlifter, was among the first to promote steroid use for increasing mass and strength.
In the 1950s, he befriended bodybuilder **John Grimek** and other athletes from Bob Hoffman's York Barbell Club.

Ziegler later became team physician for the U.S. national weightlifting team.
Hoffman suspected Soviet steroid use as early as 1952.
At the 1954 World Championships in Vienna, Ziegler learned from a Soviet coach that testosterone was indeed part of their preparation.

Working part-time at the Ciba laboratory in Summit, New Jersey, Ziegler obtained testosterone propionate for "scientific purposes."
In 1954, with his assistance, an experiment began using testosterone propionate on several bodybuilders and weightlifters, including John Grimek and Jim Park, both Mr. America and Mr. Universe titleholders.

Testosterone: Strength, Health, and Vitality

And so on, into the present day.
We could continue discussing anabolic steroids, but there is little purpose: those who are interested already know the subject well.

In the adult male body, testosterone plays a fundamental role in multiple domains:

- Sexual function
- The locomotor apparatus
- General vitality
- Protection from metabolic diseases such as hypertension and diabetes
- Prevention of depression, according to recent studies

Testosterone regulates sexual desire and satisfaction; it is responsible for the "appetite" for sexual activity.
A loss of libido is often associated with hormonal dysfunction.
This applies also to female sexual desire, which tends to decline in the post-menopausal period partly due to reduced testosterone production.

How Hormones Act Within Cells

Hormones enter active cells—those engaged in mechanical work—but they also penetrate inactive cells.
A well-known scientific experiment demonstrated this clearly:

A group of volunteers performed resistance training using only one leg for six months.
The results showed that:

- The trained leg increased its muscle mass by approximately 50%
- The untrained leg also exhibited hypertrophy, although to a lesser degree

This demonstrates that circulating hormones influence the entire organism, not only the regions directly stimulated by exercise.
The body responds systemically, and muscular activity can trigger anabolic processes even in areas not directly involved in the training stimulus.

Muscle: Structure, Biochemistry, and the Risks of Improper Training

Skeletal muscle is the primary organ responsible for the expression of strength.
The fundamental unit of muscle tissue is the muscle fiber, a cell as long as the muscle itself.
Fibers are organized into bundles, and each muscle cell contains organelles known as myofibrils.

Muscle contraction depends on the interaction between two proteins—actin and myosin—located within the myofibrils.

Calcium ions are also essential, as they facilitate cross-bridge formation between filaments.

The Sarcomere and Energy Production

The sarcomere is the functional unit of the myofibril, composed of actin and myosin filaments.
Myosin heads possess enzymatic activity capable of hydrolyzing ATP and creatine phosphate.

When ATP is hydrolyzed, the reaction yields:

- Energy
- Inorganic phosphate (P_i)
- Hydrogen ions (H^+)

To resynthesize ATP, energy is derived from creatine phosphate, which breaks down into free creatine and inorganic phosphate.
These products migrate toward the mitochondria or glycolytic enzymes, initiating oxidative phosphorylation.

Muscle Fiber Types

From a biochemical perspective, muscle fibers are classified as:

- **Glycolytic fibers:** few mitochondria
- **Oxidative fibers:** mitochondria-rich; suited for prolonged, fatigue-resistant work
- **Intermediate fibers:** mixed characteristics

From a biophysical standpoint, fiber types differ in the frequency of neural impulses:

Fiber Type	Frequency (Hz)	Characteristics
Fast-twitch	80–120 Hz	High power
Intermediate	40–80 Hz	Versatile
Slow-twitch	20–40 Hz	Highly resistant

(Values are approximate.)

Energy Production and Supplementation

Muscular activity is fueled by ATP with direct involvement of creatine phosphate.

For this reason, intake of **creatine monohydrate** before training is widely recommended.

Creatine also modulates gene expression, activating—together with GH and testosterone—the protein synthesis pathways responsible for the hyperplasia of muscular organelles.

The Risk of Lactic Acid Accumulation

Individuals with a predominance of glycolytic fibers produce significant amounts of lactic acid during muscular activity.
Lactic acid dissociates into lactate and H^+ ions.

Calcium ions—crucial for contraction—are displaced by excess H^+ ions, impairing muscle contraction.
The more oxidative the muscle, the lower the accumulation of H^+ ions, and the greater the potential for strength and endurance.

Transforming Fibers to Enhance Strength and Endurance

To achieve both strength and endurance, training must promote the conversion of glycolytic fibers into oxidative fibers.
In muscles with a high density of oxidative myofibrils, mitochondria "consume" H^+ ions and convert them into water.

Consequently:

- H^+ ions do not accumulate
- pH does not decrease
- The athlete can train or compete (e.g., in combat sports) without premature fatigue, until glycogen and lipid stores are depleted

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Risks of High-Intensity Training

For individuals with a high proportion of glycolytic fibers, maintaining high-intensity work above the anaerobic threshold for prolonged periods is dangerous—a scenario common in combat sports training.

After only one minute of such activity, systemic acidity rises due to H^+ ions.
These ions infiltrate mitochondria and lysosomes, causing them to rupture.

The consequences include:

- Muscle tissue death

- Formation of necrotic areas, particularly in cardiac tissue

Over the years, many promising young athletes entering national judo and wrestling teams experienced this issue.
They trained hard and achieved competitive success—yet after one or two seasons, they were "burned out."
Tragically, some died at only 20 years of age.

Sports Biochemistry in Five Minutes

Here is a concise overview of sports biochemistry—material rarely found in academic textbooks.
Biochemists often oversimplify living systems, reducing them to the equivalent of a test tube.
Physiologists, on the other hand, frequently lack deep biochemical knowledge, and both groups tend to be distant from real-world athletic practice.

Coaches are close to practice but far from science.
As a result, modern training methodologies often remain stuck in approaches dating back to the 1970s.

Where Do Biochemical Processes Occur?

Biochemical processes occur within each specific type of cell.
In muscle tissue, there are glycolytic and oxidative fibers.
What distinguishes them?

Glycolytic Fiber: Internal Composition

Contains:

- Myofibrils
- ATP
- Creatine phosphate
- Glycogen
- Small lipid droplets

At the onset of work, energy is drawn from ATP.
After approximately 2 seconds, ATP stores are depleted.

Through creatine phosphate, ATP resynthesis continues for 10–30 seconds, depending on availability.

When creatine phosphate is exhausted, glycolysis begins to restore ATP.
A byproduct of glycolysis is pyruvate, which is then reduced to lactate.
Simultaneously, large quantities of H^+ ions are produced, which inhibit muscle contraction.

A glycolytic fiber can function for about 60 seconds before excessive H^+ accumulation halts contraction—even though ATP and restored creatine phosphate may still be present within the cell.

Oxidative Fiber: Internal Composition

Contains:

- The same myofibrils
- ATP
- Creatine phosphate
- Glycogen
- Lipid droplets
- But also: **mitochondria**

Mitochondria consume H^+ ions and produce ATP.
Therefore, intracellular acidity does not increase, and oxidative fibers do not fatigue rapidly.
They can function as long as sufficient fuel is available within the cell.

Innovative Strength Training

In my innovative strength-training methodology, glycolytic fibers are progressively transformed into oxidative fibers by activating mitochondrial hyperplasia.
Let me provide an example.

In a hospital, a patient remains bedridden for 2–3 months.
When they finally stand up, they can barely walk. Why?

1. Muscular coordination has deteriorated
2. During prolonged immobilization, mitochondria die off, and no new ones are formed

As the individual relearns how to walk, they manage only a few steps before becoming breathless.
This is often misinterpreted as heart disease or pulmonary impairment.
In reality, none of this is true.
The actual problem is that the muscles have shifted almost entirely to a glycolytic profile and, under fatigue, produce large quantities of hydrogen ions (H^+).

In the bloodstream, significant amounts of carbon dioxide are stored in bound form.
Hydrogen ions displace this CO_2, causing a rapid release of the gas.
The CO_2 stimulates the medulla oblongata, generating an urgent sensation of dyspnea and the need to exhale forcefully.

The individual believes their heart is failing, when in fact their muscles are simply devoid of mitochondria.
Therefore, if you want to climb stairs in a hospital without gasping for air, you should not “train the heart”—instead, you must convert the glycolytic fibers of the legs into oxidative ones.

Muscle Fuel and Fat Loss

Skeletal muscle contains:

- Glycogen granules
- Lipid droplets

If your goal is fat loss—specifically, reducing subcutaneous adipose tissue—it is crucial to understand how muscular energy supply functions.

Consider brisk walking.
During the activity, muscles utilize intramuscular fat droplets.

After 45–60 minutes, these lipid stores become depleted.
You feel fatigued and hungry.

If you eat at this point, nutrients will be immediately diverted to ATP and creatine phosphate resynthesis.
But if you resist the urge to eat and rest for 45–60 minutes without food, muscle cells will restore lipid droplets by mobilizing subcutaneous fat.

Once replenished, you will feel re-energized and able to walk another 45–60 minutes.
This is how you lose unwanted body fat.

If you enjoy coffee, drink one during the rest period:
subcutaneous adipocytes are direct targets of caffeine, enhancing lipolysis.

If hunger becomes overwhelming, you may eat a small piece of chocolate:
this supplies glucose to the brain while "tricking" the rest of the body.

For even greater fat loss, after the walk and rest period, perform resistance training to induce a hormonal stress response:
GH, testosterone, and norepinephrine strongly promote lipolysis.

Muscle Contraction and Endurance: Science and Personal Experience

Skeletal muscle contraction begins when an electrical signal from motor neurons of the central nervous system reaches the synaptic terminals.
This signal generates an action potential that triggers a biochemical reaction along the membranes of the myofibrils.

Within the cell, bioenergetic processes occur continuously.
Energy is utilized exclusively in the form of adenosine triphosphate (ATP).
ATP hydrolysis is mediated by the enzyme ATPase, which is present wherever energy is required.

The activity of myosin ATPase—located in the myosin heads—is the basis for classifying muscle fibers as fast- or slow-twitch.
The myosin ATPase isoform is genetically predetermined, and the information required to construct a fast or slow isoform depends on the frequency of neural impulses arriving from spinal motor neurons.

The maximum impulse frequency depends on the size of the motor neuron.
Since motor neuron size cannot be altered, muscle fiber composition is hereditary and remains essentially unchanged through training.
Electrical stimulation can be used to temporarily modify fiber characteristics.

The energy from one ATP molecule is enough for a single rotation (power stroke) of a myosin cross-bridge.
The cross-bridge detaches from actin, returns to its original position, binds a new segment of actin, and produces another stroke.
ATP is required primarily for the dissociation step.

Each stroke consumes a new ATP molecule.

In fibers with high ATPase activity, ATP breakdown occurs faster, producing more cross-bridge cycles per unit of time—meaning the muscle contracts more rapidly.

My Personal Experience

To clarify the concept of strength training, I will share my personal experience.
When I began practicing judo and grappling, I immediately noticed that I could not sustain rolling or randori with a strong partner for more than one minute.

I was strong, with well-developed and powerful muscles, but nearly all of them were glycolytic with few mitochondria.

I felt excellent during the first 30 seconds of the match.
But once ATP and creatine phosphate were depleted, I reached the anaerobic threshold:
I became breathless, acidity increased, H^+ ions inhibited muscular contraction and ATP resynthesis from ADP.
My limited number of mitochondria could not recover me, and after about a minute of agony I reached a state "incompatible with life"—haha!

I needed at least 5 minutes of rest before I could start another round of rolling.

This forced me to seek a solution.

My Virtual Model

I began by constructing a virtual model of myself based on empirical training observations and the theories of researchers in biochemistry, physiology, and sports pedagogy.
I immediately decided that my model would exclude any form of pharmacological support due to my philosophical principles.

It was clear that the model had to sustain 5 minutes of close-combat grappling.
What is required to achieve this?

A typical coach would tell me to "develop endurance" and send me running—because they believe endurance is a general quality of the organism, a vague concept inherited from Greek philosophy.

Would that advice be correct or incorrect?
What *is* endurance, really?

Experiments on Endurance

Russian sports medicine scientists performed a series of tests using a cycle ergometer to evaluate muscular functionality and cardio-respiratory characteristics in three groups of national-level athletes:

- Cyclists
- Wrestlers
- Canoe sprinters

The same workload produced different results across the groups:

- Cyclists performed best
- Canoeists performed worst
- Wrestlers were in between

The experiment was then repeated using a hand-cycle ergometer, where the pedals are driven with the arms.

The results inverted:

- Cyclists performed the worst
- Canoeists and wrestlers performed better

What Is Endurance, Really?

A fundamental question arises: *what exactly is endurance?*
First of all, it becomes clear that endurance is **not** a general, overarching characteristic of the human body; rather, it is tightly linked to the **specific muscles involved**. Therefore, endurance must be understood as a **morphological concept**.

Moreover, consider this: cyclists are mediocre runners, yet they excel in speed skating.
Why?
This observation reveals that endurance is **not** a universal capacity of "the legs," but depends on **specific muscle groups within the legs themselves**.

Muscle Biopsy and Targeted Selection

Biopsy analyses of various leg muscles in runners, cyclists, and speed skaters have shown that:

- **Runners** display greater development of the posterior thigh muscles, gluteals, and calf muscles.
- **Cyclists and speed skaters** exhibit remarkable hypertrophy of the **quadriceps**

femoris.

For this reason, experienced speed-skating coaches evaluate young athletes by observing the natural mass of their quadriceps.
One coach reported that he once saw a boy in a high school with unusually large quadriceps. He approached him and said:

> "Join my team, and you'll become a champion."

The boy accepted the invitation—and within four years, he became a world champion.

Debunking a Common Myth: Are Glycolytic Fibers Fast and Oxidative Fibers Slow?

It is widely—and incorrectly—believed that glycolytic muscle fibers are inherently fast and responsible for power output, while oxidative fibers are slow and responsible only for endurance.
This is **not** accurate.

Biopsy studies of the quadriceps in the world's best speed skaters have demonstrated that these muscles consist **primarily of oxidative fibers**—in athletes winning both the **500-meter sprint** and the **10,000-meter event**.

A striking example is **Eric Heiden**, who dominated both sprint and long-distance events, winning gold in the 500 m and 10,000 m. This clearly shows that **maximal efforts can be performed using oxidative fibers**, not exclusively glycolytic ones.

Power Output and Oxidative Fibers

Even track cyclists—whose quadriceps are composed almost entirely of oxidative fibers—possess extraordinarily large and powerful legs.
Thus, the assumption that glycolytic fibers must be fast and oxidative fibers must be slow is **incorrect**.

As stated earlier, muscle-fiber speed is determined by the **isoform of myosin ATPase encoded in the DNA**.
This means that contraction speed is genetically determined.

While hyperplasia of muscle fibers cannot be induced, **hyperplasia of myofibrils** *can* be activated, resulting in significant strength gains in these muscles.

Biochemical Transformation of Muscle Fibers

By training fast-twitch fibers using **high-intensity interval methods**, we can stimulate **mitochondrial hyperplasia**, transforming them from glycolytic to oxidative fibers.

However, it is essential to avoid excessively strenuous training sessions that may "burn out" mitochondria—especially when blood lactate levels exceed **25 mmol/L**.

Vague and Relative Classifications

Therefore, when we use the classification of muscle fibers into glycolytic, intermediate, and oxidative, we must remember that these are **relative and somewhat vague concepts**.
In any given individual, the proportion of fiber types can change over time depending on training, lifestyle, and physiological conditions.

The Concept of Strength

The more an athlete develops the ability to generate force, the better the results in sports such as weightlifting, boxing, wrestling, and in most track-and-field disciplines—throws, sprints, jumps, and so on.
But what exactly is "strength" in the context of athletic performance?

Since the dawn of human societies, people have described others by saying:
"He is strong,"
"He has great endurance,"
"She is so agile it's astonishing."

The science of sport, as well as sport pedagogy, was born in the 19th century with collegiate competitions, especially in England. At universities like Oxford and Cambridge, team sports—rugby, polo, rowing—held great importance.
To win competitions, athletes had to prepare, and this led to the first attempts at systematic training and early research.

This is how sport pedagogy developed and how the profession of the coach emerged.

One of the first to create a theoretical foundation for sport was Lev Matveyev, who in the 1950s at Moscow University developed the modern theory and methodology of physical education. From this work came pedagogical terms such as "strength," "endurance," "speed," and expressions like "strength training" and "endurance training."

But what is strength, really?

Let’s pose a simple question to a weightlifting coach:
“What is the strength we need to train?”
The answer will likely be:
“It’s one of the athlete’s physical abilities.”

If we continue:
“And where exactly is this ability located?”
He will answer:
“In the athlete’s body.”

This is because he studied sport theory from the books of Matveyev and other authors who, even today, rewrite old ideas.
Of course, seventy years ago sport pedagogy was still in its infancy, and Matveyev needed plausible terminology to build a system.

But Matveyev and most modern theorists treat the athlete as if he were a test tube in which biological processes simply “occur.”
In reality, an athlete is much more complex, and his ability to move or accelerate objects—or himself—is rooted in the morphological properties of specific muscles and the nervous system.

The Forstemann Example

Take, for example, a track cyclist like Robert Forstemann.
What immediately catches your eye?
His legs—massive, almost unreal.

Let’s analyze them:

- His quadriceps receive neural impulses at 80–120 Hz
- They are extremely developed
- “Developed” means they contain an almost maximal number of myofibrils and are packed with mitochondria, which makes them highly resistant to fatigue
- He can pedal at maximum speed for over an hour, until his glycogen and fat stores are depleted
- Even his so-called “slow” fibers are large and rich in mitochondria

Meanwhile, his calves, hamstrings, and glutes are relatively average because they play a minor role in the cycling movement.
His arm musculature resembles that of an average man.

So the cyclist’s ability to generate powerful movement comes from the “fast” fibers of his quadriceps and the neural system connected to those muscles.

Strength According to Physics

To clarify what “strength” means, let’s recall middle-school physics:

$F = m \cdot a$
F = force
m = mass of the external load
a = acceleration produced by the force

Or written differently:

$F = dp/dt$
$p = mv \rightarrow$ momentum
v = velocity
t = time

This brings us to the concept of momentum, which is directly proportional to force and inversely proportional to time.
This is the explosive impulse athletes seek.

Mathematically, to improve explosiveness, you can increase force and reduce execution time—that is, increase speed.

With the possible exception of powerlifting, this “burst” is a decisive factor in weightlifting, athletics, and martial arts.

Strength Is Not a “General Ability”

Talking about strength as a general capability of the human body is misleading—this “general strength” does not exist in nature.
It is merely an artificial pedagogical term.

In reality, “strength,” “endurance,” and “speed” are **morphological characteristics** tied to the nervous system and to specific muscles.

For example:

- A cyclist or speed skater must increase the number of myofibrils and mitochondria within particular leg muscles
- A 100-meter sprinter must focus on hamstrings, glutes, and calves
- And even within a specific muscle, we must distinguish:
  – Are the fibers fast, firing at over 80 Hz?
  – Or slow, responding at under 80 Hz?

Conclusion

Whenever we say “strength,” we must remember we are referring to a measurable set of characteristics that allow an athlete to apply acceleration—either to an object or to their own body.

The Concept of Speed and the Myth of Explosive Power

In universities, students are taught that there are different types of strength:
maximal strength, explosive strength, speed strength, and strength endurance.

In track and field, the concept of "explosive power" is widely used.
Essentially, the athlete's ability to express explosive power is trained by increasing muscle force and decreasing the time of movement—that is, increasing speed.

What Is Speed?

Undoubtedly, the fastest athletes in the world are 100-meter sprinters.
They are the true experts in speed.

If you watch them closely, sprinting performance depends on two factors:

1. Step frequency
2. Step length

Pure speed is frequency, and improving frequency is extremely difficult because it is largely genetically determined.

Borzov vs. Bolt

Olympic champion Valery Borzov (1972) ran 100 m in 10.02 seconds with a step frequency of 5.0 steps per second.
Usain Bolt, in 2009, ran 9.58 seconds with only 4.33 steps per second.

It seems contradictory:
The athlete with the higher step frequency is slower.
Why?

Because Bolt's average stride length was 247 cm, while Borzov's was 234 cm.

Bolt produced more force per step, propelling himself 13 cm farther each stride.

In his 9.58 race, Bolt used 40.92 steps.
Other finalists averaged 44.91 steps, with an average length of 223 cm—24 cm less per stride.

While others displayed "speed" in terms of step frequency, Bolt flew down the track through sheer force generation.

Speed = Strength + Technique

This example makes something clear:
A sprinter’s speed is, fundamentally, a function of strength.

If you want to become faster, you must train:

- the cellular machinery of muscle fibers
- and the technical–neurological components of movement

We will discuss strength training later, but first we must fully understand what speed is.

Is Speed Innate?

Experience tells us that some people are naturally faster.
In school, we all saw classmates who ran faster than everyone else.

In arm-wrestling, the winner is often not the strongest, but the most explosive.

Of course, a person who isn’t naturally strong or fast can surpass genetically gifted individuals if they train with consistency and passion after puberty.
But here, we are speaking specifically of people who are genetically fast and explosive.

What Is Speed, Really?

If you ask a coach:
“What is speed?”
He’ll say it is the ability to react and move quickly.

If you ask:
“And where exactly is this ability located?”
He’ll say: in the limbs, in the muscles—perhaps in the nervous system.

This explanation is incomplete.

The Training Dead End

Every track coach knows that an adult sprinter—say, 25 years old—reaches a point after a few years of sprint training where progress stops.

This happens because the athlete has:

- mastered perfect technique
- reached professional awareness

- and hit a plateau

From the coach's perspective, the only remaining solution is anabolic drugs—a topic for later.

The Limits of Speed

So why does speed stop improving?
Coaches say it's due to "biological limits" or other metaphysical ideas.

But if you ask where exactly those limits are, they won't understand the question.

The Metaphysics of Coaching

When coaches talk about human limits, they often echo ancient metaphysics.
But science has advanced dramatically since the 19th century.

What Is Speed? A Scientific Perspective

Modern science—anatomy, physiology, biochemistry, molecular physics—knows enough to answer precisely:

"What is the speed of an athlete?"

Speed is a material characteristic.
It resides in the central nervous system, which activates muscles through motor neurons.

Speed Lives in the Nervous System

An athlete is faster when he has:

- more motor neurons from birth
- thicker axons transmitting electrical impulses
- higher firing frequencies (80–120 Hz)

These traits are encoded in DNA, stored in the cell nucleus.
Therefore, speed is a morphological, genetically determined characteristic.

Motor Neurons Cannot Be Trained

Motor neurons cannot be increased through training.
In fact, they die over time.

We can only maintain the synaptic connections between neurons and muscles. Neurons do not regenerate, and the hype surrounding stem cells remains mostly commercial fantasy.

The Biological Limit and Plateau

When an athlete reaches his technical peak (recruiting nearly 100% of the involved muscle fibers) and psychological peak, performance stagnates.

How can we push beyond this limit?

- By breaking technical stereotypes
- By creating new synaptic connections between motor neurons and muscles

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Strategies to Stimulate New Synapses

Sprinters use uphill sprints.
Hammer throwers train with:

- heavier hammers
- then lighter hammers
- then the standard weight

But the most effective method is training the ability to generate force, following Newton's second law.

Why Steroids Work

Anabolic steroids stimulate protein synthesis in myofibrils.
This is why they are effective for sprinters.

To continue progressing after 4–5 years of post-puberty training, sprinters and throwers must focus primarily on **strength development**.

How Do We Train Strength?

It's a simple question on the surface, but it deserves careful attention.

Take a sprinter, for example: during a race, they perform maximal efforts lasting 10–25 seconds.
This immediately tells us something important — strength training must respect the same time frame.

Guidelines:
• Load: 80–100% of 1RM
• Main muscles involved:
  – Glutes
  – Hamstrings
  – Calves
  – Quadriceps (especially for the start and acceleration)

Hamstring Caution
The hamstrings are particularly vulnerable to strains.
When training for strength and muscle mass, track work must be minimized to avoid endocrine fatigue and overtraining.

Sprint Fibers: Not Only Fast Fibers
It's a common misconception that only fast-twitch fibers are used in sprinting.
Researchers at MFTI (Russian Institute for Sport Technology) demonstrated that slow-twitch fibers are also recruited.

Most Effective Strength Exercises for Sprinters:
• Squats
• Lunges
• Bulgarian split squats
• Deadlifts
• Leg curls
• Power clean from a half-squat position

Final Phase: Mitochondrial Hyperplasia
Heavy strength training develops glycolytic fibers.
But sprinters must maintain speed across the full distance — which requires endurance.
During the final 6 weeks before competition, interval training is introduced:
• 30 m sprints at 90–100%
• Recovery: 2–3 minutes
• Goal: avoid muscle acidification

This method can double mitochondrial density.

Watch the Lactic Acid
Anaerobic-threshold training produces lactic acid.
If the load is excessive, the accumulation of hydrogen ions (H^+) can damage

mitochondria and entire cells.

Annual Periodization
After the competitive season:
1. Return to strength and muscle-mass work
2. Then spend 6 weeks increasing mitochondrial hyperplasia
3. Peak at the right moment

With this system, athletes can keep improving well into their 50s.

The Body Does Not Develop “Qualities” — It Develops Structures
Traditional sports theory speaks of “physical qualities,” but this is misleading. What truly changes are cellular structures.

To increase strength and contraction speed → promote myofibrillar hyperplasia
To increase power and endurance → promote mitochondrial hyperplasia

My Training for MMA and Grappling: Between Biochemistry and Strategy

After studying biochemistry and physiology, I structured a training model with two goals:
• Develop oxidative fibers across the whole body → stimulate myofibrillar hyperplasia
• Induce mitochondrial hyperplasia in glycolytic fibers

Activating DNA for Protein Synthesis
For protein synthesis, the DNA inside the muscle cell must be activated.
Russian scientists identified four main factors that trigger myofibrillar growth:
1. Presence of essential amino acids
2. Anabolic hormones such as growth hormone and testosterone
3. Free creatine availability
4. Optimal concentration of free hydrogen ions (H^+)

How Do We Provide Essential Amino Acids?
Through protein-rich animal foods, which contain all essential amino acids.
American bodybuilding nutritionists suggest 4 g of protein per kg of body weight per day.
Russians recommend 3 g per kg.
For an 80 kg athlete, that's 240 g of protein — roughly 1.2 kg of meat, which is unrealistic to digest daily.
For this reason, I use supplements.

Which Supplements?
I prefer free-form essential amino acids. They're expensive but effective.
Other researchers recommend short-chain polypeptides.

❌ When NOT to Take Them
Many recommend taking amino acids before and after training.
This is a mistake.

The Hormonal Response to Stress
Every workout is a form of stress.
The stronger the stress, the more corticosteroids the body produces.
These hormones:
• Activate energy production

• Burn carbohydrates, fats, and proteins
• Can destroy muscle and GI proteins, potentially causing ulcers

Daytime Catabolism, Nighttime Anabolism
Canadian and Soviet studies (1950s–60s) showed:
• Daytime → catabolic processes
• Nighttime → anabolic processes

If you take amino acids before or after training, they will be burned as fuel.
A much cheaper solution: sugar.
If you feel hungry around training, sugar works — and costs 100 times less.

Training for Myofibrillar Hyperplasia
Strength training is effective only if it stresses the hormonal system sufficiently.
But it must not exceed 120 minutes.

Most effective exercises: multi-joint movements involving large muscle groups:
• Squats
• Deadlifts

If you want to train arms:
1. Do squats first
2. Then biceps
3. Then triceps

For chest and back:
1. Start with deadlifts
2. Then bench press
3. Then back exercises

Hormones and Stagnation
Growth hormone (somatotropin) and testosterone are essential.
Yet even with regular strength training, many athletes stop progressing.

Typical cycle:
• Beginner receives a training plan
• Improves for 2–3 months
• Then stagnation begins
Most quit.
Some continue for health.
A few turn to doping — a path filled with risks.

The Right Amount of Stress
To produce enough anabolic hormones, the stress must be significant.
Every set must be performed:

• To muscular failure
• Plus two more forced reps

Stopping early — when the muscle merely “burns” — does not stimulate growth.

“No pain, no gain.”
Somatotropin and testosterone rise only in response to intense stress.
Without high concentrations of anabolic hormones, strength gains do not occur.

Training as an Endocrine Stimulus
If training does not create stress, it does not activate protein synthesis.

Stimulus → Nervous System → Hormones
• Larger muscle groups → stronger CNS stimulus → more hormonal release

Somatotropin: The Growth Hormone
Experiments show:
• During intense training, somatotropin in muscle cells can increase sixfold
• This elevation can last for up to three days

Circadian rhythms matter:
Most somatotropin is released at night.
Taking essential amino acids before sleep supports protein synthesis.

Nighttime Fat Burning
The fuel for nighttime metabolism is subcutaneous fat.
This means fat loss occurs during sleep — as long as the body is in an anabolic state.

Limits of Endogenous Hormones
After prolonged, highly intense training, the endocrine system may become temporarily exhausted.
Reducing the load is enough for recovery.

Free Creatine: A Key to Protein Synthesis
Free creatine inside the muscle cell is required for protein synthesis.

Creatine cycle:
• Muscles contain phosphocreatine
• During high tension, ATP is regenerated from ADP using phosphocreatine
• After ~20 seconds, free creatine accumulates
• The cell attempts to reconvert it to phosphocreatine
• This occurs optimally under loads of 70–80% 1RM (5–12 reps)

Time Matters More Than Reps
Repetition count is secondary.

What truly matters is time under tension.

Optimal time for muscle growth:
• 20–30 seconds per set

This is the window where conditions for strength and hypertrophy are ideal.

H^+ Ions and DNA Activation

DNA activation depends on the presence of hydrogen ions (H^+), produced by the dissociation of lactic acid.

Lactate Anaerobic Metabolism:

- Produces lactate and H^+ ions
- H^+ alters cellular pH
- Creates micro-lesions in cell membranes
- Facilitates hormone penetration
- Stimulates DNA activation

How to Survive a Full 5-Minute Round: The Science of Explosive Endurance

To fight a full 5-minute round, the only real solution is to develop the highest possible amount of oxidative muscle fibers — fibers packed with mitochondria.

Oxidative vs. Glycolytic Fibers

- Glycolytic fibers produce H^+ ions, by-products of lactic acid
- Oxidative fibers immediately consume lactate inside the mitochondria
- Without lactate accumulation, one of the key triggers for DNA activation for myofibrillar protein synthesis is missing

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How to Train Oxidative Fibers

A strength-training method was needed that could specifically stimulate oxidative fibers.

The “Pumping” Method and Static Contractions

In the 1960s, bodybuilders used what was called “pumping.”

They didn't know the underlying biochemistry, but they knew empirically that it made muscles "swell."

At the Moscow Institute of Physics and Technology, researchers developed a method specifically for oxidative fibers, combining pumping with static contraction.

How It Works

- Static contraction closes the blood vessels
- H^+ ions are not cleared from the blood
- Load is low: 30–50% of 1RM
- This excludes glycolytic fibers, which activate only above 50% of 1RM

Experimental Findings

After 8 weeks of static–dynamic training:

- Gains in absolute strength were equal to those achieved with 70–80% 1RM
- Strength increased by about 2% per workout

Training for Grapplers and Fighters

I began training three times a week using static–dynamic weightlifting.
This was perfect for a grappler, but fighters (MMA, karate, muay thai, boxing) also need explosive work.

Training After Age 60

Around age sixty, neurons die and are not replaced.
Despite this, I needed to be as fast and explosive as the young athletes in my gym.

Which Exercises for Martial Arts?

When you look at the exercises many MMA and striking athletes use, you often see movements that are not very functional.

❌The Myth of the "Stiff Boxer"

An old idea — still common — says:

> "A boxer should not lift weights, or he'll become slow and stiff."

Because of this, some coaches use only:

- Light dumbbells (1.5–2 kg)
- Shadowboxing with weights
- The idea that this increases punch speed

Is this correct or incorrect?

Elastic Bands and Improvisation

I often see athletes in the gym throwing punches with elastic bands attached behind their backs.

I ask:

> "What are you doing?"
> They reply:
> "Training punch power."
> "Who told you that?"
> "Him" — pointing to a trainer who works as a carpenter by day and boxing instructor by night.

Specialized Knowledge Matters

It doesn't take high intelligence to ask a simple question:

> "If I want to train strength, shouldn't I ask weightlifters or hammer throwers?"

They are the real experts.
Yes or no?

Only Explosive and Maximal Efforts Stimulate Real Growth

Exercises must be explosive and performed with maximal force.
Only maximal stimuli produce real development.

The Masters of Strength: Bondarchuk and Abadjiev

Anatoliy Bondarchuk

- Soviet hammer thrower
- Olympic gold in Munich

- Bronze in Montreal (behind his student Yuriy Sedykh)
- Sedykh's 1986 world record — 86.75 m — still stands
- Bondarchuk worked at the University of Physical Education in Kyiv, conducting scientific research in sport

His principle:

> "Throwing the hammer without using full force is absolutely useless."

Only maximal stimulation builds records.

Ivan Abadjiev

- Bulgarian national coach
- Produced:
    - 12 Olympic champions
    - 57 world champions
    - 64 European champions
- His athletes trained 3–5 times per day, lifting only 90–100% of 1RM after warm-up.

People wondered:

> "Why such an insane training frequency?"

A very reasonable question.

Powerlifters train only 3–4 times per week, squatting and deadlifting once every 7–10 days.
But the key is that the central nervous system controls movement through motor neurons that form synaptic connections between nerve and muscle.
These connections form and disappear chaotically.

If an athlete repeats the same technique two or three times a day, seven days a week, the neuromuscular system adapts to that technique.
It preserves existing synaptic connections and creates new ones.
Technique improves until it becomes perfect.

This is a classic dialectical principle: **quantity becomes quality**.

My Personal Example

When I started judo as a white belt, my instructor taught us *ippon seoi nage*.
I loved the technique and began refining it.

He showed me how to practice the entry turns using elastic bands.

Every day at home, I trained those entries.

After a few months, one day, during practice at home, my whole body suddenly understood what I had been doing.
Before, I had been spinning mechanically; now I had a qualitative leap.
I perceived with total clarity what the technique really was.
Quantity transformed into quality — not gradually, but in a single jump.

Later, in randori, I could throw even black-belt competitors with *ippon seoi nage*.

Maximal Loads and Stagnation

Working only with maximal loads improves strength up to a point, but then stagnation appears.
A weightlifter must eventually move to a higher weight class to keep progressing.

Maximal loads develop strength primarily via the nervous system and must be repeated daily.
When a weightlifter stops training, they quickly lose the ability to express maximal force — performance drops sharply.

On the other hand, if strength has been developed by increasing muscle mass, it does not disappear as quickly.
Sometimes an athlete returns from a month of vacation and hits a new PR after two sessions.

Therefore, strength should also be trained with methods that increase muscle mass.

My Future Self: The Model

I needed endurance — but not like a marathon runner.
I needed the endurance of a fighter who battles for five minutes.
At the same time, I wanted the strength of Mike Tyson (just joking… but still a good goal).

I was already strong from years of weightlifting and bodybuilding, but my muscles were entirely glycolytic.
I needed to transform them into oxidative fibers.

Interval Training

For this reason, I began interval training:

- Explosive push-ups on my fists

- Explosive pull-ups on a low bar
- Short sprints up a 30-meter hill

Push-ups and pull-ups were done explosively, with short rests.
The goal was to activate fast-twitch fibers — mine were glycolytic.

I trained all muscle groups three times a week in static–dynamic mode, using a split routine.

To increase punching power, in addition to weightlifting exercises, I went to the creek near my home and trained my oblique abdominal muscles by throwing large, heavy stones — similar to hammer-throw technique.

Training MMA at Age 60

At that time I was sixty years old and practicing MMA.
Age is not a disadvantage.
The older you are, the more recovery time you need.

A 20-year-old can train twice a day, six days a week, and compete on Sunday.
A 60-year-old can do perfectly well with three or four training sessions per week.

Injuries and Recovery

I overdid the sparring sessions, and micro-traumas in my left-shoulder ligaments and right elbow became a real problem.

As a doctor, I didn't focus on the symptoms (pain), but on the cause — and fixed it.
So in April, I stopped MMA training.

At home I had a well-equipped gym, and I began training while sparing the shoulder and elbow.

For muscle recovery you need about two weeks; for bone, four weeks; but ligaments are serious — they require at least three months.

A Typical Day

In the morning I went to the creek with my dog, jogged a bit, stretched, and practiced shadow fighting.

In the evening, three or four times a week, I trained with weights.

Leonardo, the Instructor

Our gym had an instructor named Leonardo.
He started martial arts at age five — karate, wrestling, boxing, and more.
At twenty-seven, he was very experienced, had just left professional MMA, and still competed in grappling.

We spent many mornings together in an almost empty gym.
He admired my physique and wanted well-developed muscles to show off at the beach.

We were the same height: I weighed 78–79 kg; he weighed about 70.

A few months earlier, in September, Leonardo had started "serious" weight training following a program he found online.
I criticized his routine — he got offended.
We made a bet: after one year, who would have better results?

Leonardo hadn't seen me since April, when I stopped due to the shoulder and elbow.
When I returned five months later, in September, ready to train MMA again, I had gained significant muscle and weighed 85 kg.
Leonardo was still 70.

He looked at me and concluded:

> "Steroids."

He simply couldn't imagine that training the "wrong" way (according to the internet) could actually be correct.

Performance Results

After five months, I could roll three minutes with a strong grappler and five minutes with a slightly weaker one.
Before that, after one minute of tight grappling, I was practically in a coma — ah ah ah.

My pulling strength had skyrocketed, and my right hook had become absolutely lethal.

Circuit training

If you walk into a gym where boxers, wrestlers, and practitioners of other combat sports train, you immediately notice that they devote a significant amount of time to circuit training. Since a judo match lasts four minutes, a boxing round lasts two or three, and MMA bouts consist of three or five five-minute rounds, each exercise should be performed at a submaximal power output—approximately 70–80% of 1RM—and every set at each station should be carried out to muscular failure. Only under these conditions do we induce the stimuli that trigger DNA activation and, consequently, protein synthesis within muscle tissue.

A judoka must attack continuously to avoid receiving a shido. The athlete must be as strong as possible. Teddy Riner has been undefeated for many years not because he is the most technical competitor, but because he is stronger than any challenger. Riner is also exceptionally resistant: when his opponents are utterly exhausted during a tournament and stop to rest, he remains standing, calm, and casually watches the matches of his future opponents at the edge of the tatami.

Let us return to circuit training, which was developed in the 1950s. It was categorized according to different types of strength:

1. Strength (which essentially refers to maximal strength);
2. Speed strength;
3. Short-duration strength endurance;
4. Medium-duration strength endurance.

To train the first category—maximal strength—the classic recommendations are: 6–15 exercise stations, a workload at 70–80% of 1RM, 3–6 rounds of the circuit, and no rest between stations.

Consider an MMA fighter as an example. He must be explosive and enduring like Mike Tyson in his prime, and as strong as Riner. Therefore, the circuit should include exercises targeting the entire body: squats, bench press, pull-ups, hook punches on the heavy bag, a semi-squat clean, medicine-ball throws against the wall, military press, and bent-over barbell rows. That gives us eight stations, zero rest between exercises, and three total rounds.

At the first station—squats—an average athlete weighing 80 kg should have a 1RM of at least 120 kg. We load 90 kg, which corresponds to 75%. He must perform at least eight repetitions, which is not easy if executed properly, and the effort lasts about 30 seconds. After only a few seconds, he exceeds the anaerobic threshold, and the body switches to lactate-based energy production. Lactate enters the Cori cycle, but excess H^+ ions displace calcium in the actin–myosin cross-bridges and inhibit ATP resynthesis. After about 30 seconds, the athlete stops and reracks the barbell.

At this point, it is uncertain whether the athlete is still alive or already dead, but the coach pushes him onto the bench for the bench press. Since modern MMA fighters usually bench and squat similar loads, he should theoretically lift the same 90 kg again. But that is not what happens. His heart rate is at 180 beats per minute, his body is saturated with H^+ ions, and he must keep working. If he normally performs eight repetitions, during this circuit he will manage only five or six before failing. In practice, the exercise becomes useless for strength development because the involved muscles do not receive the necessary stimulus.

It is important to note that after an exercise like squats, the athlete should rest at least 8–10 minutes for H^+ ions to clear from the blood. Instead, with his pH already reduced, he moves to the bench press. Needless to say, acidity continues to rise, but the coach already points him toward the pull-up bar.

Let us examine carefully what is happening in the athlete's body. The excessive amount of H^+ ions enters the lysosomes and causes them to rupture. The released enzymes digest everything they encounter. If the athlete continues to push under these conditions, the enzymes eventually destroy the nucleus as well, leading to necrosis of the muscle cell. Damaged skeletal muscle tissue recovers in about two weeks, which is manageable for quadriceps or pectorals. However, cardiac tissue does not regenerate easily. Dead cardiomyocytes are identified as antigens, and the body produces autoantibodies in response. Their interaction leads to the development of cardiac muscle fibrosis, which significantly impairs heart function.

Naturally, there are no reliable statistics on athletes who become ill or die during their competitive careers. Sports physicians are bound by confidentiality. Some journalists have published investigative reports, but today it is nearly impossible to explore the topic further because it is inconvenient for all parties involved.

When I was fifteen, I practiced swimming and was fairly skilled. I would like to make an observation here. Every year, my coach trained two or three groups of about thirty children aged six to eight—meaning 60–90 children annually. By the time they reached puberty, around age thirteen—after six years of training—only two or three out of 360–540 remained. Only those born with a predominance of oxidative muscle fibers could withstand the training load.

It is no secret that swimming training is extremely demanding. Those who survived were not the most talented but the most resilient—which is not the same thing. We had kids who rarely trained seriously and often pretended during sessions, yet won races effortlessly. They had the potential to become great champions, but when exposed to real training intensity, they could not endure it. They had a predominance of glycolytic muscle fibers; their self-preservation instinct activated, and they quit swimming.

Today I practice boxing. Almost every day, boys and girls come to our gym for tryouts. Half of them stay, but after circuit training sessions, they quit. In the end, no more than one athlete per year remains. Boxing coaches often say that many highly technical and extremely talented youngsters can last only one round during competition before losing, due to insufficient endurance. After losing two or three matches in a row, they become discouraged and stop training.

When I was fifteen, a boy my age arrived in our city. He was tall, broad-shouldered, and his name was Jurij. He had come from East Germany and was exceptionally skilled in the 100-meter butterfly, although in the 200-meter butterfly he usually finished among the last. That same year, a new sports high school opened in our area, offering room and board to student-athletes who trained two or three times per day. Some local students, at their parents' request, were allowed to sleep at home.

Jurij was admitted to the school and subjected to a heavy training load intended to improve his performance in the 200 meters. After about six months, one day he returned home after practice, had lunch, and lay down for a nap. An hour later, his grandmother went to wake him up, but Jurij had already died—sudden cardiac arrest in his sleep.

I will now tell the story of two friends with whom I practiced judo: Lorenzo and Stefano.

Lorenzo was a national champion. When I began helping him with his training, he was ranked seventh in the world. He trained two or three times a day and often traveled to Rome for national-team camps. Nothing unusual—this is how everyone trains once they enter the elite circle.

Lorenzo had a dominant, granite-like personality. He was highly determined and was preparing for the Olympics. I immediately noticed that he was suffering from overtraining: his quadriceps were extremely tense and would not relax, even after deep massage. Unfortunately, one knee had already undergone surgery and was painful. To me, it was evident that his tendons could no longer recover and that he needed at least three or four months of rehabilitation.

As a physiatrist, I told him:

"Lorenzo, you cannot continue living like this. You need to stop and let your tendons, heart, and muscles recover. Don't fear being removed from the national team. You are young—only twenty-seven. Your health is more important. Take a three- or four-month time-out, or even better, six months. Go swimming to relax your legs. Lift weights two or three times a week, but without overdoing the squat. Train with Greco-Roman wrestlers—they don't use their legs like in judo, so you'll recover and come back as good as new."

Lorenzo replied that it would be wonderful to do all of that, but too many people had expectations and were pushing him to continue.

So he went on, but his condition worsened. Although unbeatable in Italy, he began losing ground in the world rankings: eleventh, then twentieth…

Now let me introduce Stefano. He had practiced judo since the age of five. At that time he was twenty-one and had just moved into the senior category. He held a third-degree black belt and was accustomed to defeating almost all of the juniors he faced, but against more mature athletes he began to lose. Frustrated and disappointed, he quit judo entirely. He spent time with friends, studied, and worked out at a weightlifting gym: squats, bench press, deadlifts, and other exercises.

When I asked his coach, “Where did Stefano go?”
He replied, “I’d be curious to know that myself.”

After six months away, the prodigal son returned, repentant, and resumed training as usual—four times a week.

One month later, Lorenzo returned from Brazil after a long training camp. He was glad Stefano had come back. They could train together: their weight difference was negligible, two or three kilos.

Training ended with randori. Lorenzo versus Stefano. And—my God—our national champion started losing immediately. Stefano attacked him and threw him. Only thanks to his great experience was Lorenzo able to twist in mid-air and land on his stomach. When he fell, he stayed lying on the tatami because he was exhausted and needed a second of rest. Meanwhile, Stefano was fresh and determined.

Time passed. I didn’t see Lorenzo for seven or eight months. When I returned to my city, I met him on the tatami. I had the impression he had lost ten kilos. I asked, “How much do you weigh, Lorenzo?”
“I weigh fine,” he answered.

He radiated fatigue; his shoulders were slumped, and he looked dissatisfied and in low spirits. Then I left the city. Later I was told that Lorenzo had undergone knee surgery and that the sports physician had refused to grant him clearance for competitive activity—because of his heart.

Lorenzo went to Switzerland, then to the United States, to the best cardiologists. All in vain. His heart was severely damaged.

And afterward? People who would once spot Lorenzo from afar and hurry across the square to greet us no longer noticed him. The journalists who had written odes about him had already moved on to others. And his head coach, as if nothing had happened, continued training young athletes in exactly the same way that had destroyed Lorenzo.

However, enough with the sad stories. Let us return to circuit training, which is supposed to increase strength.
After performing squats and bench press, the athlete is saturated with H^+ ions, has not yet recovered, and proceeds to do pull-ups. Naturally, he accomplishes very little,

because the calcium bridges between actin and myosin have been displaced by H^+ ions, which inhibit muscular contraction. Yet the athlete still has five stations left to complete. What should he do?

The only solution is to lower the intensity of the training and lengthen the recovery time.

Anaerobic-threshold training that lasts longer than 60 seconds “kills” mitochondria. Russian researchers, under the direction of Professor Victor Seluyanov, monitored the Russian national sambo team. The athletes were subjected to an innovative training program. As a test, every 15 days they performed the bench press with 70 kg for as many repetitions as possible, and immediately afterward, with the same load, a bent-over row for the antagonist muscles—also to failure.

Before each test, the ratio of glycolytic to oxidative muscle fibers was analyzed. One shocking result was that the more repetitions an athlete performed with those 70 kg, the fewer mitochondria remained in the muscle. In one case, an athlete who completed 40 repetitions lost 60% of his mitochondria during the test.

Therefore, training at the anaerobic threshold must be carried out with great caution and must not exceed one minute; otherwise, mitochondria die first, followed by muscle cells, and there is a high risk of damaging cardiomyocytes, leading to necrosis and fibrosis of cardiac tissue.

Necessary Conditions for Strength Training

There are two:

1. Increase in muscle mass
2. Increase in synaptic connections between muscle and the nervous system

Muscle mass is the result of activated protein synthesis.
To activate protein synthesis, we must activate DNA.
What determines this activation?

Russian scientists identified four primary factors that initiate DNA activity and stimulate myofibrillar hyperplasia:

1. Adequate levels of essential amino acids within the cell
2. Presence of anabolic hormones such as somatotropin (GH) and testosterone
3. Availability of free creatine
4. Optimal concentration of free H^+ ions

It is no longer a secret that the roles of somatotropin and testosterone are fundamental in strength training. In a sense, athletes go to the weight room primarily to stimulate the endocrine system to produce testosterone and GH.

In my case, when I head to my home gym, my wife asks,

“Where are you going?”
I reply,
“To get my hormones.”

It must be emphasized once again that the central nervous system stimulates the production of anabolic hormones only when the exercise is performed to failure—when the muscle burns intensely with nearly intolerable pain. These are the conditions for strength development.

If a set is interrupted as soon as the athlete feels fatigued, one can safely bet the time has been wasted in terms of strength gains.

As previously stated, the endocrine system has its limits.
What is overtraining?
It is the state of exhaustion of the endocrine system.
Reduce the training load for one or two weeks and everything returns to normal.

It is not possible to train to failure continuously.
Muscles must fully recover, and they must grow larger and stronger than before.
A muscle group can be trained to failure no more than once every two weeks.
Other sessions for the same muscle group must be performed differently.

For example, the bench press for the pectorals can be done daily, even three times a day.
But the session in which the athlete intends to impose maximal load on the pectorals—8–10 sets to failure—can only be performed once every 14 days.

To complete 8–10 sets to failure, each set requires 8–10 minutes of rest to clear H^+ ions.
Otherwise, it is impossible to impose a sufficiently stressful load on the muscle group.

If an athlete performs squats to failure with 120 kg for 10 repetitions, after 3–4 minutes of rest he will not be able to repeat the same 10 reps with the same load, because the high concentration of H^+ prevents it.

Even better, during rest the athlete can perform very light pedaling on a stationary bike, which helps utilize H^+ ions in the mitochondria.

To fill the 10-minute rest interval between two sets of squats, the athlete can do 2–3 other exercises, for example:

- After 2–3 minutes: French press for triceps
- After another 2–3 minutes: single-arm concentration curl for biceps

Thus, I believe it is clear: traditional circuit training aimed at increasing an athlete’s strength is, first of all, ineffective, and second, damaging to health.

Perhaps the wiser option for someone who wants to train strength expression is to consult a powerlifter, who will explain the trade secrets. Yes or no?

Second Category: Strength–Speed–Power

It is suggested to perform 10–15 repetitions at each station—meaning 10–35 seconds of work—with a load corresponding to 50–60% of 1RM.

Let us ask a simple question:
Which sport best represents the human ability to express maximal power output?
Certainly, Olympic weightlifting—the snatch and the clean and jerk.

In earlier chapters, we already established how weightlifters train strength:
3–4 training sessions per day, with loads at 90–100% of 1RM, 1–2 lifts per set.

To train speed, we must work biochemically within the alactic anaerobic metabolism, which lasts only a few seconds—until phosphocreatine stores are depleted.
From a physiological standpoint, the entire body must be relaxed and the mind calm.
These are the conditions required to begin a striking series on the heavy bag, for example:

Jab – right cross – left hook – right uppercut

After that, shake out the arms, wait for both body and mind to recover, and repeat another series at maximal speed.

Only in this way can we expect improvements in speed expression.

But if one must perform 15 repetitions at each station—eight stations total—without stopping, for three circuits…
What kind of speed training can that possibly be?

Third Category: Short-Duration Strength Endurance

The recommendation is 20 repetitions with 40–50% of 1RM.
Let us assume that "short duration" means 1 to 1½ minutes.
Circuit rounds: 3–6.
Rest: none.

Here we enter the terrain of an extremely complex concept.
Coaches and researchers invented the term "strength endurance," even though it does not exist in nature.

Perhaps the intention was to assess an athlete's ability to drag a sufficiently heavy load for about ninety seconds, or to strike an opponent continuously with high force for the same duration.
Let us consider the same circuit used for "strength": squats, bench press, pull-ups, and similar exercises. Eight stations, six rounds, zero rest.

Since, as previously shown, it is impossible to perform each station to failure, the athlete completes 20 repetitions while still retaining additional potential for a few more.

First problem: the set is not sufficiently stressful to induce a meaningful anabolic hormonal response.
Second problem: the athlete is aware that they must work for six non-stop rounds, and therefore conserves energy—at least during the first five.
The effort becomes predominantly aerobic, driven by oxidative muscle fibers operating at low intensity and a frequency of 5–25 Hz.

Oxidative fibers immediately metabolize lactate; therefore, the acidity of the intracellular environment does not increase, and hydrogen ions (H^+) do not accumulate.

Recall the four mandatory factors for strength development:
1. Availability of essential amino acids within the cell
2. Anabolic hormones such as somatotropin and testosterone
3. Free creatine readily accessible
4. An optimal concentration of free H^+ ions

In this type of circuit, the last three factors are absent:
– No anabolic hormonal peak
– No H^+ accumulation
– No free creatine, as alactic metabolism is negligible

Thus, this type of circuit does **not** train any form of strength.

The definition “strength endurance” is inaccurate because the method does not train the athlete’s capacity to express force.

Let us examine the second word: **endurance**.
As clarified in previous chapters, endurance is not an abstract quality: it is a material characteristic dependent on the number of mitochondria.
The more oxidative fibers an athlete possesses, the greater their endurance.

How are oxidative fibers trained?
Through **static–dynamic work**.

Under traditional training methodology, H^+ ions are continually cleared from the blood and the working muscles, removing one of the key factors required to stimulate protein synthesis—the optimal amount of H^+.

Circuit training may help maintain a certain level of endurance, but it does not develop it.

One need only observe 800- or 1500-meter runners: they are lean and display modest results in loaded squats.

As previously stated, many talented young athletes come to boxing or wrestling gyms with genetically low oxidative musculature and poor aerobic capacity. They cannot fight for more than one minute.
Coaches subject them to circuit training, yet the athletes fail to improve.
Their endurance was lacking before, and it remains lacking afterward.
They abandon the sport, discouraged and exhausted by a type of fatigue they cannot tolerate.

In contrast, athletes like Mike Tyson are born with a significant predominance of oxidative muscle fibers.
Cus D’Amato immediately recognized this when he first saw Tyson; he took him into his home and built a team around him.
Young Tyson was capable of fighting relentlessly without perceiving fatigue—and far beyond that…

Looking out the window, one may observe sparrows.
If watched long enough, it becomes evident that they cannot fly continuously for more than 20–30 seconds.
They are extremely easy prey.
In 1958, for example, the Chinese succeeded in killing nearly all the sparrows in the countryside, believing they consumed excessive amounts of grain.

Sparrows have a fundamental problem: their muscles are predominantly glycolytic.
They are unable to maintain movement beyond one minute, even when survival is at stake.
Conversely, migratory birds possess fully oxidative musculature and can fly for days without fatigue.

Therefore, if we aim to increase endurance, we must:
– Train the muscles specific to our sport
– Increase their cross-sectional area
– Fill them with mitochondria

Excess muscle mass should not be feared.
On the contrary, athletic preparation should be oriented toward strength training.

Mike Tyson was a paradigm of this principle: both resistant and strong.
He stood 1.79 meters tall and weighed 100 kg.
Before his involvement with Don King, he was a near-perfect athlete.

Explosive Strength Training

In boxing, Muay Thai, karate, and other combat sports, a very specific approach is commonly used to develop explosive strength. The goal is to deliver punches and kicks with maximal force.
In previous chapters, I have already discussed the concept of explosive strength, but here I would like to examine it in greater detail.

Strength is defined as:
$F = dp/dt$,
where **$p = mv$** (the linear momentum of a point),
v = velocity,
t = time.

Athletes seek this "momentum," which is directly proportional to force and inversely proportional to the time interval. The stronger the athlete, the more powerful the right hook. In the terminal phase of the strike—when the fist makes contact with the opponent—the entire body mass multiplied by the acceleration generated by the musculature must be transmitted through a biomechanical structure that behaves as rigidly as steel.

Imagine standing before a wall you need to break. You have three objects:
– a 10-kg iron pipe,
– a 10-kg wooden log,
– a 10-kg oven-ready plucked turkey.

If you attempt to break the wall with the turkey, nothing will happen.
With the wooden log, you might succeed, although the wood absorbs part of the impact.
With the iron pipe, the result is entirely different—correct?

Thus, when the fist contacts the target, the entire body must become rigid "like steel," in a static contraction—no bending, no yielding, no extraneous movement.

Biomechanics of the Right Hook

The athlete loads the right leg, rotates the body to the right like a coiled spring, then rotates explosively in the opposite direction while extending the leg and rotating the pelvis. The muscles involved include the quadriceps, gluteals, pelvic musculature, calves, oblique and rectus abdominals, and spinal extensors.
The technique then continues through the right arm, which travels in an arc from the level of the cheek to the opponent's head. The involved musculature includes the pectorals, deltoids, triceps, and—partially—biceps and all forearm muscles. Each of these muscles must be exceptionally strong to support both the body mass and the

acceleration generated. The wrist, elbow, and shoulder must not collapse.

In boxing gyms, explosive strength training often involves 1–2 kg dumbbells to mimic punching motions, or a light barbell used similarly. Even more curious is the use of elastic bands attached behind the athlete, as if these tools could somehow produce the strength of Mike Tyson.

Can one develop Tyson-level force by training with 2-kg weights?
Certainly not.

To approach the conditions experienced by the legendary Tyson, an athlete must be capable of lifting at least 100 kg.
It is surprising that many coaches fail to recognize that elite boxers often move up in weight class across their careers.

For example, the legendary Evander Holyfield hired Mr. Olympia Lee Haney to help him move to a higher weight division.
Did any boxing coach ever ask the simple question:
“Why did Holyfield move from cruiserweight to heavyweight, where the punches are much harder?”

The answer is that Evander needed to improve his athletic qualities—becoming stronger and more resistant. He needed “new” muscle mass. A man nearly 190 cm tall must weigh at least 100 kg to reach his full potential.

Everyone knows Manny Pacquiao. At a height of 169 cm, he became world champion in eight different weight classes—from minimumweight (47.6 kg) to super welterweight (69.8 kg).
Through intensive barbell training, Pacquiao gained more than 20 kg of muscle mass.

We could list many more great boxers, but these two examples are sufficient to highlight the concept:
an exemplary boxer must be highly muscular.

Which Exercises Develop Explosive Strength?

Confusion abounds on this topic. Coaches want exercises to mimic the biodynamics of the straight right punch as closely as possible. For this reason, they attach an elastic band behind the athlete and have them throw punches. Sometimes, the athlete simultaneously holds a 2-kg dumbbell in the same hand. The athlete pulls against this contraption, and everyone believes this will produce strength comparable to Holyfield or even Pacquiao.

In his doctoral dissertation, Olympic hammer throw champion Anatolij Bondarchuk analyzed the concept of correlated exercises.
His research demonstrated that a perfect positive correlation is unnecessary.
A correlation coefficient **r = 0.6–0.7** is sufficient for an exercise to be effective.

Explosive Force Originates in the Legs

Nearly all strikes in martial arts begin with the loaded leg that initiates movement. The stronger the quadriceps, gluteals, and calves, the more devastating the punch or kick.

A precise biomechanical analysis of striking reveals that the most functional exercise is the **power clean from a quarter squat**.
To train the punching motion, we must add the **push press** or **power jerk**.

Therefore, the **power clean in a quarter squat or split stance** is a foundational exercise for developing strength in boxing, kickboxing, karate, and related sports.

Proper Use of the Medicine Ball

Considerable confusion exists regarding the medicine ball as well.
It is common to see athletes lift it overhead and slam it forcefully onto the floor.
Is this technique correct?

Let us analyze the involved musculature:
– latissimus dorsi
– teres major
– long head of the triceps
– rectus abdominis

This is an excellent exercise for a lumberjack—
but **not** for a boxer.

With the barbell, it is difficult to find a movement that is both effective and safe for the spine while mimicking striking rotation.
During the power clean, we train nearly all the muscles needed for a punch or kick, except those responsible for pelvic rotation.

For this purpose, the **shovel medicine ball** was invented.
We simply need to use it correctly:
throw it against the wall, not against the floor.
That's all.

Personal Experience and Practical Recommendations

My uncle was a track and field coach.
At the time, I was practicing weightlifting and believed that throwing heavy implements would help me improve explosive strength. I observed how throwers trained, read track and field manuals, and practiced outdoors using an iron shot and stones I found in the area.
I strongly recommend that anyone who wants to hit hard follow my example.

Fundamental Exercises

In addition to the clean, the following exercises can be included:

- power snatch from a quarter squat or split stance,
- push press from the rack,
- high pulls with a snatch grip.

A large number of exercises is unnecessary. What matters is that these few exercises are performed **daily**, to maintain and increase the synaptic connections between the nervous system and the musculature.

Load Progression

During the first months of training, the load itself is not particularly important.
The primary goal is to learn technique.

However, one must understand that the technique of a snatch at **60% of 1RM** differs substantially from the technique at **90% of 1RM**.

In the first two months, beginners progress without major difficulty, working with intensities between **50% and 70% of 1RM**.
But after a few months, to increase strength, one must work seriously with **90% to 100% of 1RM** in **every session**. Otherwise, no meaningful improvement occurs.

Only maximal stimuli develop maximal strength.
Daily stimuli: this is how quantity transforms into quality.

The Prilepin Method

Soviet researchers led by Aleksandr Prilepin demonstrated that training is most effective under the following conditions:

- at **90% of 1RM**, perform **8–10 total lifts**,
- above **90% of 1RM**, perform **4–7 total lifts**.

Naturally, only one lift should be performed per set, with approximately five minutes of rest between sets.

Why Combat Coaches Prescribe Running

I practiced judo, grappling, boxing, Muay Thai, and MMA, and noticed that instructors, coaches, and even recreational practitioners universally force their students to run, as if it were a fundamental activity. They believe this develops so-called “general endurance.”
What does that even mean?

As discussed in previous chapters, endurance is **not** an abstract quality. It is a **morphological** characteristic, determined by the muscles that perform the primary work in a given movement.

For example, a cyclist must develop extremely strong and highly oxidative quadriceps. Track cyclists, in particular, have enormous legs. They are both strong and resistant. They can race 750 meters, but also 57 kilometers, as in the hour record. A clear illustration is German team-sprint champion **Robert Förstemann**, whose legs resemble those of elite bodybuilders.

Thus, what is the purpose of prescribing this kind of training for a wrestler or a boxer?
They even invented a name for it: *“cardio.”*
Which muscles are primarily involved in running? The hamstrings, gluteals, calves, and—under static tension—the abdominals and spinal muscles that maintain upright posture.

Students are instructed to run with moderate effort so that the musculature remains in an aerobic metabolic state. In this way, one can continue running for an hour without eating, and with water and sugar, for two hours if temperatures are moderate.

But let me ask:
Does a judoka or boxer need such preparation when a competitive match lasts 3–4 minutes?
A boxer may fight up to 12 rounds, but I am referring to **high-intensity bouts**, where anaerobic metabolism predominates, and where fatigue means defeat.

It is indisputable: **aerobic running is useless for short-duration, high-intensity combat sports.**

Combat athletes do not even need running for warm-ups.
Judoka warm up effectively with light ground grappling; boxers with shadowboxing or partner drills at close distance.

Running as a Public-Health Myth

It is common to see people running in the streets, convinced it benefits their health. This belief was introduced into Western culture in the 1950s by U.S. Air Force officer **Kenneth Cooper**. He was not a biochemist or a physiologist. He studied public health. He was a military officer who adopted the idea that running improves cardiovascular health.

Let us examine statistics.
What are the leading causes of mortality worldwide—and in Italy?
Cardiovascular and cerebrovascular diseases are at the top. Excluding violent deaths and infant mortality, approximately **50% of deaths in Italy** result from circulatory diseases.

Returning to Cooper: he invented aerobics, wrote books, and ran daily on sidewalks and park trails. He had many followers; at first, they resembled a religious sect.

Over time, his followers began to gain weight because their training increased appetite. Cooper then introduced diet recommendations.
A few more years passed, and adherents complained of knee pain, lower back pain, Achilles tendon pain—especially larger, heavier individuals.

Decades went by, and Cooper's aerobics practitioners began dying at the same ages, and from the same causes, as the general population. In other words, **50% died from cardiovascular diseases**.

Cooper himself—short, light, a small man—ran for many years. But upon reaching old age, he too began suffering from tendon and joint pain. When you are young, cartilage recovers quickly. At sixty, recovery slows dramatically, and sometimes ceasing the activity is wiser.

As the classics say:
"The fool is not the one who makes mistakes, but the one who persists in them."

Thus, Cooper stopped running and began brisk walking instead, sparing his tendons and cartilage. After walking, he often trained with weights to stimulate the endocrine system and increase testosterone and growth hormone production.
It took a lifetime for this man to understand such basic principles.

So, do we derive benefits from long-duration, low-intensity aerobic running?
Certainly not.

For a combat athlete, running must be **high-intensity and short-duration**.
For example: 30-meter sprints along the edge of a soccer field, on grass to avoid damaging the legs and spine. Personally, I prefer sprinting uphill near my home—the soil is soft and the incline steep.

Aerobics as a Cultural Phenomenon

In the 1980s, aerobics exploded as a global phenomenon thanks to **Jane Fonda**, Hollywood actress and political activist. Through her television program and the "Jane Fonda's Workout" videotapes, she taught rhythmic calisthenics in colorful leotards, becoming an icon of home fitness. The first videotape became the best-selling VHS of all time, even surpassing *Star Trek II*.

Modern cardio activities—Zumba, step aerobics, spinning, body combat, and others—derive from that aerobics culture.
From a scientific standpoint, however, these activities do **nothing** to develop strength or provide sport-specific conditioning for combat sports.

Nevertheless, if a group is fortunate enough to have a charismatic instructor capable of inspiring and energizing participants, anabolic hormones are stimulated—benefiting the entire organism, not just the muscles.

Specific Athletic Preparation

We can therefore set aside the celebrated concept of "cardio" and structure training according to the specific demands of the sport. Below is a concrete proposal.

Phase 1: Explosive Strength

Clean to the chest + push press

Progression

- **50% 1RM**: 1 set of 3+3
- **60% 1RM**: 1 set of 3+3
- **70% 1RM**: 1 set of 3+3
- **80% 1RM**: 1 set of 1+1
- **90–95% 1RM**: 6 sets of 1+1

Rest: 4–5 minutes between sets
Light shadow boxing or technical drills may be performed during rest periods.

Phase 2: Medicine Ball Work

Wall throws:

- 5 throws to the right, 5 to the left
- 5 total sets

Phase 3: Squats for Glycolytic–Intermediate Fibers

Barbell on the shoulders, performing squats **without full knee extension** (Ronnie Coleman style).

- **Load:** 70–80% 1RM
- **Repetitions:** 8–12 to failure

- **Rest:** up to 10 minutes

During rest: light cycling + accessory exercises (bench press, pull-ups).

Phase 4: Squats for Oxidative Fibers

- **Load:** 40–50% 1RM

Static–dynamic squats:

- 30 seconds of continuous motion around 90° knee flexion
- 30 seconds rest
- 3 supersets

Total weekly volume: 4–10 supersets per week

Weekly Alternation

- **Week 1:** Glycolytic–intermediate fibers
- **Week 2:** Oxidative fibers

If the athlete struggles to recover, rest intervals between failure sessions should be extended. Light-load squats may be performed daily.

The Truth About Training Programs and Scientific Research

Sports literature is filled with training programs, yet many are designed for athletes who use substances prohibited by WADA. The reality is that no revolutionary method for developing strength has been discovered in decades. The most effective methodologies are 40–50 years old. Why?

Because high-quality scientific research is extremely expensive and offers little return on investment. It is far easier to sell:

- Anabolic drugs, GH, SARMs
- Sports supplements
- Machines and electrostimulation devices

In 1913, John D. Rockefeller founded the Rockefeller Foundation, which heavily invested in pharmacology and medical education. In 1946, the World Health Organization was established in New York, promoting the interests of large investors. The more medication is consumed, the more profit is generated.

And what about sports science?

Serious research on training would require:

- Two groups of 30 athletes
- 8 weeks under identical conditions
- No drugs, alcohol, or smoking
- Validation from 3 independent universities

Even then, most studies are biased because participants are young—under 28—with naturally high levels of testosterone and growth hormone. Their improvements are due to age, not the training method.

Conclusion

We have dismantled one of the most celebrated pillars of modern training: aerobic running and the so-called “cardio.” This practice, born from non-scientific intuition and promoted by figures such as Kenneth Cooper and Jane Fonda, became a cultural dogma rather than a physiological necessity. While running can have benefits in certain contexts, it is neither essential nor effective for combat sports, which rely on short, intense efforts dominated by anaerobic metabolism.

We have demonstrated that:

- Useful endurance for an athlete is **specific**, not “general.”
- “Cardio” does **not** train the muscles actually involved in fighting.
- Aerobics had cultural impact, not scientific validity.
- Effective training relies on explosive strength, failure-based work, muscle-fiber alternation, and intelligent recovery.
- Popular training programs are often designed for **drug-enhanced athletes**, making them misleading for natural practitioners.
- Serious scientific research on training is costly, complex, and not commercially incentivized, while the market prefers selling drugs and equipment.

Ultimately, progress in training will not come from new trends or miraculous products but from a deep understanding of physiology, biochemistry, and direct field experience. The conscious athlete must free themselves from fitness-industry dogmas and build their own path based on specificity, intensity, and intelligent work.

Training does not mean imitating — it means understanding.
And understanding means choosing.
