SEMINAR EVAA ACADEMY

İzmir

August 28th, 2014

TRAINING FOR MASTER SPRINTERS
EVAA ACADEMY GOALS

- Coaching of master athletes in different events
- Training of master
- Inform athletes about nutrition
- How to keep fit for ages - wellness programs
- Platform of Anti - Doping - Campaign
- Training - camps for master athletes
- Handouts for coaching and training
1. PERIODIZATION AND PLANNING OF THE TRAINING
2. PERIODIZATION: EXAMPLES
3. TWO TRAINING METHODS
4. TRAINING EXERCISES AND TOOLS
5. WORKOUT EXAMPLES
6. AGING AND SPRINTS: THE IMPORTANCE OF STRENGTH
7. PRACTICAL TRAINING and EXERCISES
1. PERIODIZATION AND PLANNING OF THE TRAINING
HOW TO REACH PEAK PERFORMANCE

- **Goal of training**: to reach a high level of performance at a specific time
- **Coach** and **athlete** work together as a **system**.
- The **program** must be properly 1. **periodized** and 2. **planned** considering:
  - **Athletes** and their characteristics (skills and attitudes, work capacity and recovery, experience, aging, weaknesses and strengths)
  - **circumstances** (social commitments, free time, financial capacity, typical injuries - e.g. in the sprint usually stretch the hamstrings - state of shape and health, nutrition and supplementation);
  - the **specialty** and the **major quality required**.
- **Past, present and future** (medium, long and very long term target) influence decisions related to the **major variables of training** like volumes, intensity, density, frequency, methods, duration of cycles
PERIODIZATION OF TRAINING: what does it mean?

- Periodization involves **2 important aspects:**
  - **planning:** long-term strategy
  - **programming:** mode of training

- **Annual Planning Periodization:** to divide the training up into periods (1, 2 or more) during year;

- **Each period:** dominated by **one training goal** – e.g. to get faster, to get stronger, to build endurance, to recover from fatigue, to deliver peak performance – with different **training variables** (volume, intensity, frequency and type of exercise);

- Fix the **best levels** to achieve about **motor skills** – e.g. strength, speed, stamina, their integration and development;

- Consider the **specificity of training tools** of training having an idea of **progression of loads** in a long-term period.
PLANNING OF THE TRAINING: how to create a chart

1. When … can I start my workouts? (start date)
2. When … is the first competition (schedule of races)
3. When … is the most important competition (peak race)?

Identify the most important race and, coming back, decide the duration of the various phases of training and the other races.
TAPER: to lower the accumulated fatigue level to a level as low as possible, while optimizing the race-readiness of the athlete.

- **Volume is gradually lowered** across the phase, about **25-30% and more** compared to peak volume;
- focus on **short and intense training**;
- **recovery of mental and physical activities**.

How long is the taper? **the older the athlete, the longer the taper**.
### PROGRAMMING OF TRAINING: TRAINING PHASES

<table>
<thead>
<tr>
<th>Week of training</th>
<th>Number of weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-ott</td>
<td>21-ott</td>
</tr>
<tr>
<td>23-ott</td>
<td>28-ott</td>
</tr>
<tr>
<td>30-ott</td>
<td>4-nov</td>
</tr>
<tr>
<td>6-nov</td>
<td>11-nov</td>
</tr>
<tr>
<td>13-nov</td>
<td>18-nov</td>
</tr>
<tr>
<td>20-nov</td>
<td>25-nov</td>
</tr>
<tr>
<td>27-nov</td>
<td>2-dic</td>
</tr>
<tr>
<td>4-dic</td>
<td>9-dic</td>
</tr>
<tr>
<td>11-dic</td>
<td>16-dic</td>
</tr>
<tr>
<td>18-dic</td>
<td>23-dic</td>
</tr>
<tr>
<td>25-dic</td>
<td>30-dic</td>
</tr>
<tr>
<td>1-gen</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week of the cycle</th>
<th>Cycle</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre GPP</td>
<td>Gradual recovery with training</td>
</tr>
<tr>
<td>2</td>
<td>GPP</td>
<td>Try and learn new exercises</td>
</tr>
<tr>
<td>3</td>
<td>SPP</td>
<td>Work on the force! Improve explosive strength and time on the 30 m. Do SE with split 60 m (e.g. 2x4x60m).</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Training phase:** the duration depends on the competition schedule, as well as on the time needed **to improve skills** and **to develop the abilities**.

- For each cycle, goal and new lines grow:
  - **strength, resistance and speed** periodization;
  - **technical targets**;
  - **psychological focus**;
  - **diet** periodization;
  - change in **volume** and **intensity of training**.
2. PERIODIZATION: EXAMPLES
### WINTER: 1st period of training
- after **3 weeks load**, following **1 week download**;
- the **maximum force** has been trained in this **macrocycle (SPP)** greater than in the spring variation of the **load: increasing** inside and between microcycle;
- in winter as well as in the spring you can do possibly **EMS sessions**

### SPRING – 2nd period of training
(SPP2 is shorter than the GPP1);

### SUMMER – 3rd period of training
very short and with low volumes, without EMS sessions.

---

**A TRIPLE PERIODIZATION**

3 phases of training composed by 3 sub-periods.

- **Accumulation**
  - 2 weeks
- **Intensification**
  - 3 weeks
- **Maintenance**
  - 2 weeks

<table>
<thead>
<tr>
<th></th>
<th>Accumulation</th>
<th>Intensification</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st period</td>
<td>2 weeks</td>
<td>3 weeks</td>
<td>4 weeks</td>
</tr>
<tr>
<td>2nd period</td>
<td>2 weeks</td>
<td>3 weeks</td>
<td>2 weeks</td>
</tr>
<tr>
<td>3rd period</td>
<td>1 week</td>
<td>3 weeks</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

---

**Peak competition: august**

- **GPP 1**
  - Accumulation
  - 3 weeks
- **GPP 2**
  - Intensification
  - 6 sessions
- **GPP 3**
  - Maintenance
- **SPP 1**
  - Accumulation
  - 3 weeks
  - Maintenance
  - 2 weeks
- **SPP 2**
  - Intensification
  - 6 sessions
- **SPP 3**
  - Maintenance
  - 2 weeks
- **Rec.**

---

**Notes:**
- **EMS**
  - 6 sessions

A TRIPLE PERIODIZATION: 3 sub-periods

- **GPP - general preparation phase**
  accumulation in the gym (e.g. 3x10 or 5x5 @ 60-65%, 1’ rest), posture, tempo run with high volume, uphill and sprint on grass (don’t work at the track and don’t use spikes)

- **SPP - specific preparation phase.**
  work intensely at the track (phase to reach the maximum volume of training), more strength in gym (e.g. 4x3@80-85%, 3’ rest), overall work (tempo run and core).

- **Maintenance**
  download of the volume both at the track and at the gym (10% Lower body, 5% upper body). Reduce slightly the volume of general works (tempo run and core) and cut the force to allow an increase in the intensity and to compete better.

New works at the track or competition must be done only after 10-14 days since starting to download (optimal performance window).
The importance of recovery: EARLT

- Concentrating **specific loads** in a phase (A) there will be a **marked decrease** of **capacity of athletes**, in particular **the ability** to express **explosive strength**.

- This phenomenon has been called **delayed training effect** in the long term (EARLT or LDTE in English - **long-term delayed training effect**):
  - ✓ it is not a danger, it has a **temporary and reversible**
  - ✓ at the end of this program, not only **the functional parameters** return to the initial level, but **go beyond it**

- **Right translation effects**: duration of the EARLT = duration of the LOAD.

- All **new works** (both technique and speed) **should begin only when the EARLT has produced all its effects**.

A = concentration of the load
B = realization - intense loads but low volume

SOVIET STUDIOS, YURI VERKHOSHANSKY
At the end of the loading phase

- at the 7th week (as usual in the series "313"- 3 weeks load, 1 download) there are microcycles - 8th and 9th week- where **loads (both volume and intensity)** must be reduced;
- From the 10th week (for two weeks) the **volume remains low** (almost 40% lower than the week with the increased load), but the **intensity is maximum**;
- Subsequently, **cutting the intensity** to allow you to race (races as the event "intense" for definition): **optimal performance window**.
How the **intense elements** can interact between **heavy** (odd days - 1, 3, 5, 7 ..) and **easy** (equal days- 2, 4, 6, 8) **sessions** during 20 days of training?

- **Load** (volume x intensity) in the **intense days** increases; **load of easy days** which affect the **active recovery** and **overall conditioning** decreases.
- The gap between the two lines becomes **wider and wider** during the loading cycle and going on with the preparation.
3. TRAINING METHODS
TWO TRAINING METHODS

✓ SHORT TO LONG (STL)
✓ LONG TO SHORT (LTS)

Their application will depend on some elements:

- **the type of athlete**: Do I prefer intense work or not?

- **master athletes preparation** and **period of career and training**: Am I able to adapt to heavy loads or is it better to use an intermediate stage, to take a more quiet year and recovery?
1. SHORT TO LONG

Acc->Speed->Speed Endurance

- Athlete who tolerates the **intense work** better and **most explosive**;

- During the weeks, the **progression** of the **sprint distances** and **acceleration** precede the distances used of **special endurance** (in splits e.g. 3x3x60 instead of racing of 180 m)

- In the first macrocycle of work (winter) sprinters will care:
  - more **acceleration** (10-40 meters)
  - more **weights** and **short distances**
  - **resistance means** (such as sled or isorbic)

- In summer work on special endurance and just maintenance of strength; lower volume of training compared to winter.

- Regarding the **progression of the loads**: **intensity** must be increased with **low oscillations** in the volumes of training.
## 1. SHORT TO LONG SCHEMA

<table>
<thead>
<tr>
<th>Week</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; day - Monday</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; day - Wednesday</th>
<th>5&lt;sup&gt;th&lt;/sup&gt; day - Friday</th>
</tr>
</thead>
</table>
| 1<sup>st</sup> week | 2x30 (3’30’’)  
3x4x60 m@20F40M (2’30’’/7’)  
Run A’s 4 x 30 | 4x30  
4x30 starts (5’/8’)  
2x3x20E20F20E (8’/12’) | 2x30 (3’30’’)  
3x4x60 m@20F40M (2’30’’/7’)  
Run A’s 4x30 |
| 5<sup>th</sup> week | 2x30  
4x30 starts (5’/8’)  
2x4x60m@40F20M  
Run A’s 5x30 | 2x30  
4x30 starts (6’/10’)  
2x4x30BU20F (12’/15’)  
3 x 60 m | 2x30, 4x30 starts(5’/8’)  
2x4x60m @ 40F20M  
Run A’s 5x30 |
| 10<sup>th</sup> week | 4x30, 4x30 starts (7’/10’)  
3x60m@60F (15’)  
Run A’s 5x30 | 4x30  
4x30 starts (6’/10’)  
4x60m @ 60F (12’30’’)  
Run A’s 6x30 | 4x30  
4x30 starts (7’/10’)  
3x60m @ 60F (15’) |

*First period of training*
2. LONG TO SHORT

Long Distances->Acceleration->Speed

- Athlete who tolerates unwillingly intense work and rangy;
- at the beginning use of long distances and this allows to keep high volumes of sprint with low intensity (absolute).
- after winter (in the second macrocycle): more emphasis on acceleration (e.g. greater use of sprint with resistance) and the use of resistance means (e.g. sled or the isorbid);
- Then, you can move to three sessions with very low volumes and download weights.
- **distance of acceleration** match with the **distance of special endurance**
- each racing, for long as it can be, needs a certain initial **acceleration** to get to the **cruising speed** that obviously is gradually **shorter** and **lower** when the **distance** increases.
  - ✓ 100 m.: **maximum acceleration** has been used and I need 60 m
  - ✓ 200 m.: the **acceleration is almost maximal** and for this I need 40 m
  - ✓ 400 m.: 30 m.
- Longer the distance, shorter acceleration phase.
## 2. LONG TO SHORT SCHEMA

<table>
<thead>
<tr>
<th></th>
<th>1st day - Monday</th>
<th>3rd day - Wednesday</th>
<th>5th day - Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st week</strong></td>
<td>4x20</td>
<td></td>
<td>4x20</td>
</tr>
<tr>
<td></td>
<td>4x30</td>
<td></td>
<td>2x600m (12’)</td>
</tr>
<tr>
<td></td>
<td>2x300 (7’)</td>
<td></td>
<td>Run A’s 2x60</td>
</tr>
<tr>
<td></td>
<td>Run A’s 3x30</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5th week</strong></td>
<td>4x30</td>
<td>4x10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4x30 starts</td>
<td>4x20 starts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50, 60, 2x250 (20’)</td>
<td>3x30 starts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run A’s 5x30</td>
<td>2x500 (30’)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>more acceleration</td>
<td>Run A’s 80, 100</td>
<td></td>
</tr>
<tr>
<td><strong>11th week</strong></td>
<td>4x30</td>
<td>4x20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4x30 starts</td>
<td>4x30 starts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>150 (35’), 120</td>
<td>4x30 starts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run A’s 4x30</td>
<td>2 x (40, 60, 80)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>shorter with time</td>
</tr>
</tbody>
</table>

*First period of training*
STL: the *speed work* are carried out *with a decent volume* since *the beginning* and then become predominant (from the 6th week).

LTS: the *Special Endurance runs* are dominant species at *the beginning*. 
# SHORT TO LONG: priorities and objectives of the various phases

<table>
<thead>
<tr>
<th></th>
<th>I Period</th>
<th>II Period</th>
<th>III Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Competition</strong></td>
<td>Indoor</td>
<td>Outdoor</td>
<td>Evento Clou</td>
</tr>
<tr>
<td><strong>Main Training distance</strong></td>
<td>10-60 m</td>
<td>30-120 m</td>
<td>60-200 m</td>
</tr>
<tr>
<td><strong>Race distance</strong></td>
<td>50-60 m</td>
<td>100 m</td>
<td>100 m</td>
</tr>
<tr>
<td><strong>Expected Strength Improvement</strong></td>
<td>5-6%</td>
<td>2-4%</td>
<td>0-2%</td>
</tr>
<tr>
<td></td>
<td>Max Improvement</td>
<td>Moderate Improvement</td>
<td>Maintenance</td>
</tr>
</tbody>
</table>
4. TRAINING EXERCISES AND TOOLS
Competitive Exercises (EC):
identical or nearly identical to the conditions of the race.
Acceleration, Maximum Velocity, Speed endurance (SE). The most specific, so in terms of volume and number must be performed with low volume;

Specific Development Exercise (SDE):
reproducing part of the race running with "overload" of the system, so with resistance (e.g. isorobic, sled or climbing) or assisted exercises (fly downwind), intensive and extensive tempo run;

Specific Preparatory Exercise (SPE)
using muscle groups and chains in a similar way of the race, without replaying it and including the physiological systems.
Exercises to stimulate Fmax (squat and bench press), Power (ols, bench press and dynamic squat), explosive force (jumps), reactive force (jumps between hurdles), Strength Endurance (run a’s or uphill)

General Preparatory Exercise (GPE).
Do not reproduce neither the race nor parts of it and don’t involve physiological systems used: they have general character used to improve the weakness, provide a general conditioning and improve recovery.
E.g. strength, core training, flexibility, mobility, general coordination.
100 METERS

100 meters training tools, Crick
200 METERS

200 meters training tools, Crick
100 METERS
1) KI: 60 m and 150 m meters (100%);
2) EC: 30 m blocks, 20-30 m and of course flying distances of KI;
3) SDE: Intensive tempo run and Special Endurance to create volume with high intensity;
4) SPE: Squat and Bench (Maximum Strength) Ols (Power Snatch, for example, for power) Squat Jump (Explosive Strength) with overload and launches, Hurdle Jumps and Sprint jumped (reactive force), Run A's time (or distance, strength endurance);
5) GPE: mobility over hurdles, stretching, circuits of general strength, core training.

200 METERS
1) KI: 60 m, 150 m, 250 m.
2) EC: 30 m blocks, 20-30 m fly, evidence of KI, 300 m;
3) SDE: acceleration with resistance, climb, fly with a favorable wind, run-time intensive SpecEnd 2 (tests above 300 meters), run a’s for strength endurance;
4) SPE: Squat and Bench (Maximum Strength) Ols (Power Snatch eg for power) Squat Jump (Explosive Strength) with overload and launches, Hurdle Jumps and Sprint jumped (reactive force), Run A's time (or distance, strength endurance) or skip over long distances,
5) GPE: Mobility of hurdles, stretching, circuits of general strength, core training.
5. WORKOUT EXAMPLES
- **Intense days** (where you can also work in the gym with full schemes) following **non-intensive days** (in terms of neural point of view).
- The micro-blocks of work have this simple scheme (in green intense days).

## CLASSIC WEEK SPRINT WORKOUT - SPP

<table>
<thead>
<tr>
<th></th>
<th>Elite athlete</th>
<th>Master athlete ex.1</th>
<th>Master athlete ex.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Acc+Speed/Weights</td>
<td>Acc+Speed a/o SpEnd</td>
<td>Acc+Speed a/o SpEnd</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Tempo - MB</td>
<td>Weights</td>
<td>Weights</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Acc+Spec. End/Weights</td>
<td>Tempo - MB</td>
<td>Tempo - MB</td>
</tr>
<tr>
<td>Thursday</td>
<td>Tempo - MB</td>
<td>Acc+Speed a/o SE e/o SpEnd</td>
<td>Acc+Speed a/o SpEnd/Weights</td>
</tr>
<tr>
<td>Friday</td>
<td>Acc+Speed a/o SpEnd/Weights</td>
<td>Weights</td>
<td>Tempo - MB</td>
</tr>
<tr>
<td>Saturday</td>
<td>Tempo</td>
<td>Tempo - MB</td>
<td>Rest</td>
</tr>
<tr>
<td>Sunday</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
</tr>
</tbody>
</table>

*North American and Canadian School*
### CLASSIC WEEK SPRINT WORKOUT - COMPETITION

<table>
<thead>
<tr>
<th>Day</th>
<th>Elite athlete</th>
<th>Master athlete ex.1</th>
<th>Master athlete ex.2 (race w/2 heats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Speed e/o Spec. End 95%/Weights</td>
<td>Rest</td>
<td>Speed e/o Spec. End 95%/Weights</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Tempo - MB</td>
<td>Speed e/o Spec. End 95%/Weights</td>
<td>Tempo - MB</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Speed 95%/weights (OIs and UB)</td>
<td>Tempo - MB</td>
<td>Acc+Speed (low volume)+ Expl</td>
</tr>
<tr>
<td>Thursday</td>
<td>Tempo - MB</td>
<td>Acc + Expl</td>
<td>Tempo - MB</td>
</tr>
<tr>
<td>Friday</td>
<td>Rest</td>
<td>Warm up - MB</td>
<td>Rest</td>
</tr>
<tr>
<td>Saturday</td>
<td>Acc + Expl</td>
<td>Rest</td>
<td>Rest</td>
</tr>
<tr>
<td>Sunday</td>
<td>Race</td>
<td>Race</td>
<td>Race</td>
</tr>
</tbody>
</table>
### Dan Pfaff SCHEDULES – SPP

<table>
<thead>
<tr>
<th>Day</th>
<th>Elite athlete</th>
<th>Master athlete ex.1</th>
<th>Master athlete ex.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Accel-Sprint/Rud/Weights</td>
<td>Acc + Speed</td>
<td>Acc + Speed a/o SE a/o Spec End</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Tecnique/Stretching/Core</td>
<td>Weights</td>
<td>Weights</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Special Endurance/Weights</td>
<td>Tecnique/Stretching/Core</td>
<td>Tecnique/Stretching/Core</td>
</tr>
<tr>
<td>Thursday</td>
<td>Tecnique/Stretching/Core</td>
<td>Acc+SE a/or Spec End</td>
<td>Acc-Speed a/o SE</td>
</tr>
<tr>
<td>Friday</td>
<td>Starts 40 m/Rud/Weights</td>
<td>Weights</td>
<td>SE a/or Spec End + Weights</td>
</tr>
<tr>
<td>Saturday</td>
<td>Special Endurance/Stretching/Core</td>
<td>Tecnique/Stretching/Tempo/Core</td>
<td>Tecnique/Stretching/Core</td>
</tr>
<tr>
<td>Sunday</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
</tr>
</tbody>
</table>

---

Dan Pfaff,
"Speed Development" by A. Faccioni and "Strength: Planning and Methodologies Training of Sprinters North America - Possible Applications to Volleyball"
Generally speed endurance run must be far away from the race.

<table>
<thead>
<tr>
<th></th>
<th>Elite athlete</th>
<th>Master athlete ex.1</th>
<th>Master athlete ex.2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sunday</strong></td>
<td></td>
<td></td>
<td>Acc + SE + Weights (Ols)</td>
</tr>
<tr>
<td><strong>Monday</strong></td>
<td>Acc + Weights (Ols)</td>
<td>Accel-Speed</td>
<td>Tempo + Stretching</td>
</tr>
<tr>
<td><strong>Tuesday</strong></td>
<td>Speed</td>
<td>SE/Spec. Endurance/Weight</td>
<td>Rest</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td>Speed Endurance + Weights (Bench Press and Expl)</td>
<td>Stretching/Core</td>
<td>Speed + Expl</td>
</tr>
<tr>
<td><strong>Thursday</strong></td>
<td>Rest</td>
<td>Rest</td>
<td>Tempo + Stretching</td>
</tr>
<tr>
<td><strong>Friday</strong></td>
<td>Accel + Expl</td>
<td>Accel-Core</td>
<td>Rest</td>
</tr>
<tr>
<td><strong>Saturday</strong></td>
<td>Race</td>
<td>Race</td>
<td>Race</td>
</tr>
</tbody>
</table>

*Dan Pfaff, Speed Development* by A. Faccioni and *Strength: Planning and Methodologies Training of Sprinters North America - Possible Applications to Volleyball*
6. AGING AND SPRINT: THE IMPORTANCE OF STRENGTH
In athletes the **physical changes** reflect the **aging process** itself: a gradual **deterioration** takes place in structure and function in the different issues of the body, leading to **declines** in:

- endurance;
- muscle strength;
- speed capacity.
The men’s **WORLD RECORD SPEED** declined at a rate of 0.8% per year (peak level at age 20-25 and until 55 years of age - steeper declines thereafter with exponential decline from 80 ys); since the 1970s all **age group sprint world records** have improved considerably reflecting the larger number of elite runners competing in masters sprint running as well as more systematic year-long training;

**RECORD PERFORMANCE**: the overall decline in running velocity is 32.5% ~ 60 years (from 10.32 m/s at age 22 to 6.97 m/s at age 80) (Moore 1975, Salthouse 1976)
Velocity curve has often been used to evaluate overall sprint performance.

- The distance required to reach maximum velocity appears to be dependent on the runner’s performance level:
  - LOWER SPRINTERS, e.g. 100 m in 13.0-14.4” at ~ 30 m;
  - FASTER SPRINTERS e.g. 100 m in 10.8-11.7” at ~ 45 m.

Gundlach et al. (1963)
Many authors have emphasized the critical role of the

- hamstrings and gluteal muscles;
- adductor muscles;
- Knee extensors and plantar flexors.
Aging is associated with a reduction ~ 40% in muscle cross-sectional area (over the 60 years from age 20) and this cause the reduction in:

- **Number of fiber** beginning in the third decade of life and declining evident after age 50;
- **Size of fiber** with aging have been more pronounced in type II fibers.

Comparing muscle structure in five 21- to 25 year-old and five 61- to 69-year-old sprinters, Reaburn (1993) found age-related decreases in the size of fast fibers (type IIa and IIb) (20%-27%) and in the whole-muscle area (-23%).

Within the group of older sprinters, type IIa were 35% larger in size than either type I or IIb fibers, suggesting that **sprint training with high-velocity and high-power contractions may overload type IIa fibers more than the others.**
CHANGES IN WHOLE - MUSCLE STRENGTH

**MAXIMAL STRENGTH**: inevitable loss of maximal force-generating capacity. (Quetelet 1835).

The *average decline* has been estimated to be ~ **0.5-1.0% per year**.

**Prolonged training does not attenuate the age-associated loss** of absolute maximal leg strength and the decline in muscle properties (Alway et al. 1996) but *it could limit the extent of loss of relative strength*, because compared whole-muscle force in strength-trained master athletes it is greater than in untrained - normally active people.

**EXPLOSIVE STRENGTH**: loss cause the decrease in size muscle and maximal strength
Age-related changes affecting maximal and explosive strength

Central and muscle activation
- decline in motor unit discharge rate
- reduced double discharges (doupletts)
- decreases in nerve conduction velocity
- impaired excitation-contraction coupling
- increased coactivation of the antagonists

Muscle structure
- reduction in muscle mass:
  - loss of muscle fibers
  - selective atrophy of fast fibers & relative decrease in MyHC II
- reduction in fascicle length

Single fiber contractility
- reduced specific force (Pj/CSA)
- decreased shortening velocity

Tendon and aponeurosis properties
- increase in tendon compliance
- impaired utilization of tendon elasticity

FIGURE 4 Potential age-related changes in neural and muscular factors affecting maximal and explosive strength.
Aims of the study:
- to investigate the associations between age and sprint performance characteristics, in systematically trained male sprinters;
- to study the effects of combined sprint and strength training on the running performance and neuromuscular in older runners in an experimental trial.
SPRINT PERFORMANCE CHARACTERISTICS

A **nonlinear decline** in 100-m and 60-m sprint performance with increasing age.

The effect of age on overall sprint performance is characterized:

1. decreased Vmax,
2. shorter distance to reach Vmax
3. No difference in the time to reach the maximum velocity.

<table>
<thead>
<tr>
<th>60 m indoor</th>
<th>Master sprinters</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-33 yr</td>
<td>70-82 yr</td>
<td></td>
</tr>
<tr>
<td>Time (avarege)</td>
<td>6,98</td>
<td>9,23</td>
</tr>
<tr>
<td>Distance to reach maximum velocity</td>
<td>37,5 m</td>
<td>25 m</td>
</tr>
<tr>
<td>Time to reach maximum velocity</td>
<td>4&quot;1</td>
<td>4&quot;7</td>
</tr>
</tbody>
</table>
Figure shows the Vmax and kinematic stride cycle parameters measured during the maximum speed phase of the 60-m indoor: from youngest to oldest age group, there was a gradual decline:

**Maximum running velocity (Vmax)**
- 5%

**Stride length (Lstr)**
- 4%

**Stride frequency (Freqstr)**
- 1%
EFFECTS OF COMBINED STRENGTH AND SPRINT TRAINING: could it lead to further improvements in strength and sprint performance?

Before 1970s, training for sprinters consisted mainly of running practise. (Sipilä et al. 1991).

Modified 20-weeks training in already highly trained older sprinters, incorporating heavy-resistance and high-power strength exercises to running training led to significant improvements in:

- **sprint time, 100 m** (+ 4%) and **300 m** (+2%) (Reaburn and Mackinnon 1995).
- **selected biomechanical factors** (such as Vmax, Lstep, shortening of tbrake and tpush, jumping exercises, type II fiber size increased by 17-20%);
- **whole-muscle strength**: maximal strength of 29%, explosive strength of 14%, maximal isometric strength of knee flexors of 40% (the greatest improvement may indicate a limited attention in the previous training to hamstring).

![Diagram of the effects of increased strength training in older sprinters](image)
These data suggest that **strength training** (both **heavy-resistance** and **high power exercises**) should become an essential component of the **overall training of master sprint athletes** to maximize long-term adaptations in **neuromuscular and speed performance characteristics** and need to be taken into account when planning training regimes.

**The transfer of increased strength to sprint performance**: limited carry-over effect in agreement with studies in young athletes showing ~ 1.5-2.5% improvements in sprint performance (30-m, 40m) despite ~ 20-30% in muscle strength (Wilson et al. 1996, Harris et al. 2000)

It is possible, that although the **improvement in strength level** can be achieved in a relatively **short period**, it requires **longer time and large number of repetitions** running specific movements before the muscle groups collectively can utilize it.
CLASSIC WEIGHTS

LOWER BODY
Squat
Front squat
Power Clean
Romanian deadlifts
Revers Hyper
Reverse Press
Pull

UPPER BODY
Bench press
Lat Machine
Pulley
FULL SQUAT (Rippatoe)
Squat and different depth (Rippatoe)
FRONT SQUAT

1. Lift bar to shoulders, knees bent.
2. Hold position, weight on heels.
3. Lower body, knees behind toes.
4. Return to standing, weight on heels.
5. Repeat.
ROMANIAN DEADLIFTS
REVERSE HYPER
REVERSE HYPER (Simmons’ bench)
REVERSE HYPER (with cables)
LAT MACHINE
Number of repetitions associated with the maximum.

*Ian King - Table - Continun 1RM and variability*

<table>
<thead>
<tr>
<th>Rps</th>
<th>%1RM</th>
<th>Range %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>95%</td>
<td>94.4 – 97.4%</td>
</tr>
<tr>
<td>3</td>
<td>90%</td>
<td>90 – 95%</td>
</tr>
<tr>
<td>4</td>
<td>87.5%</td>
<td>86 – 92.5%</td>
</tr>
<tr>
<td>5</td>
<td>85%</td>
<td>82 – 90%</td>
</tr>
<tr>
<td>6</td>
<td>82.5%</td>
<td>78 – 85%</td>
</tr>
<tr>
<td>7</td>
<td>80%</td>
<td>74 – 82.50%</td>
</tr>
<tr>
<td>8</td>
<td>77.5%</td>
<td>70 – 83.50%</td>
</tr>
<tr>
<td>9</td>
<td>75%</td>
<td>65 – 81%</td>
</tr>
<tr>
<td>10</td>
<td>73.75%</td>
<td>61 – 79%</td>
</tr>
<tr>
<td>11</td>
<td>72.5%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>68.5%</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>67.5%</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>66.25%</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>65%</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>63.75%</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>62.5%</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>61.75%</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>60%</td>
<td></td>
</tr>
</tbody>
</table>
The breaks between sets depend generally on the objectives and methods. For example, with regard to methods, breaks are varied:

- 0” - 30”: General Force
- 30”-120”: General Strength and Hypertrophy
- 2’- 3’: Strength of neural and metabolic aspects
- 3’ - 5’: Maximum Force - Hypertrophy of neural and metabolic aspects
- 5’-10’: Maximum Strength - Power - Speed
7. PRACTICAL TRAINING and EXERCISES
WARM UP 1 – no intense day
- passive Stretching (without forcing the positions and for a short time)
- mobility
- PNF/AIS active isolated stretching (never force positions)
- Ballistic/dynamic stretching
- paces (kicked back, skip a's, b's skip, run in's) for 10-15m
- throws balls medicines in various ways - launch and chases the ball, picking it up (low intensity)
  - tempo run (short or long distance)
- Sit Up circuit (Fast)
- mobility with hurdles

WARM UP2 – intense day
- WU1 more:
  - dollies jumped, run b's, dollies into sprint
  - throws and BTA (bounds, toss and accelerations) are used to set the condition for the acceleration;
- Acceleration
- Speed/Speed Endurance/Special Endurance
EXERCISES

- STRETCHING
- SPRINT DRILLS
- MEDICINE BALLS – BTA
- STARTS & DRIVE
- CORE: ABS AND LUMBARS CIRCUIT
- MOBILITY HURDLES EXERCISES
STRETCHING
1. PASSIVE STRETCHING

- The kind of stretching more famous (by Bob Anderson)
- You reach the muscle lengthening through positions of maximum flexion, extension or twisting.
- Getting the positions slowly, without force
- Taking the positions for 15-30 sec. without pain.
2. DYNAMIC STRETCHING

- Movement with **high speed** for the flexibility of muscles and tendons;
- Technique: slender in a controlled way legs or arms towards a direction, without bounce or swing
- The agonist muscle contracting rapidly tends to stretch the antagonist muscle (the muscle that in this exercise we want to extend)
BACK EAGLE AND FRONT EAGLE
3. AIS: active isolated stretching

Contract the agonist and stretch antagonist
Then stretch more and more using a rope (10 times)

Some examples
BACK
http://www.youtube.com/watch?v=0RIEP_aDS3o&feature=related
BACK
http://www.youtube.com/watch?v=0RIEP_aDS3o&feature=related
BACK
http://www.youtube.com/watch?v=0RIEP_aDS3o&feature=related
QUADRICEPS
http://www.youtube.com/watch?v=Go_z5wlmj9Q
PIRIFORMIS
http://www.youtube.com/watch?v=-4w2zmE7y_E&feature=related
PSOAS
http://www.youtube.com/watch?v=88xasG4ya-g&feature=related
STICK SHOULDER MOBILITY
http://www.youtube.com/watch?v=u7RdwRbcia4&feature=related
4. P.N.F. Proprioceptive Neuromuscular Facilitation

In the stretch position, contract the muscle you are stretching without changing the ROM. Then you can relax and with the help of other people or a rope stretch more and more the muscle. (3 times)
"Sprint Drills: Gerard Mach Revisited" by J. Lee:

Objectives of these exercises:

- they are not be related on technical aspects (the best and only way to train the technique of the sprint is the sprint itself);
- they are a very good exercises to emphasize the posture and the physical aspects relating to particular phases of the gait cycle in the sprint;
- to get them in a right way, without exceeding at the expense of looseness and fluidity of movement.
Gerard Mach divided up the sprint into three components:

- **A**: lifting the knee
- **B**: hip flexion. All the exercises with the leg extension and energetic action down as the B drills are special exercises to strengthen hamstrings
- **C**: paw and thrust, drive and focus on the extension.

In general, 3x10 for each drill (A, B and C) on the grass. Each exercise has three "speed": Run, skip and run (run), so the drills are called A1, A2, A3, B1, B2, B3, C1, C2, C3;

"**Strength endurance** exercises for distances of 20m or more."
It was driven by the **hip flexors** and **quadriceps**;
- it occurs flexion of the knees and the pelvis rotates forward;
- the action of the arm is simple and is used to balance that of the opposite leg. The arm opposite the leg that is raised is bent 90 degrees at the elbow and rotates back and forth like a pendulum, the shoulder joint acts as a fulcrum. The opposite arm moves simultaneously in the opposite direction;
- both hands should be kept loose at the wrists and should not be raised above the level of the shoulders;
- the emphasis is on pushing down the free leg, allowing you to start lifting the knee of the other leg.
The exercises of Type B's that are dependent on the **quadriceps and hamstrings stretching**;
Push the leg toward the ground, in view of the contact phase;
To this end, the quadriceps almost fully extend the leg from the position seen in the movement A and subsequently the femoral force acting to conduct with the leg and the foot towards the ground;
Foot dorsiflexion should be minimized so that the foot can land near the center.
RUN B’S
The final part of the cycle race is dominated by the hamstrings.
Upon contact, the hamstrings continue to contract, not to limit the extension of the thigh. The emphasis of this exercise is to pull the foot up, directly under the buttocks, to begin another cycle of step (important note: in reality, the recovery action of the foot is more the result of a reflex action rather than voluntary!)
This exercise is performed quickly, style burst.
The arms oscillate rapidly, mimicking the fast movement of the legs and the hands go up a bit 'higher and close to the body with respect to movements A's and B's.
RUN C’s (FAST LEG DRILL)
RUN C’s (FAST LEG DRILL)
DOLLIES STRAIGHT LEG BOUNDS

1. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

2. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

3. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

4. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

5. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

6. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

7. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

8. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible

9. Straight leg bound
   keep legs straight, snap legs back, gain as much with each stride as possible
BUONCED SKIP
MEDICINE BALLS MBs - BTA

Analogy between the preliminary phase of acceleration and FRONT TOSS
The emphasis is on **pumping (drive) of the hands**;

If the action is correct it will be similar to those of **starting**;

**BTA bounds + toss + acceleration**: combination of jump more launches - indicated in abbreviation as **T (toss) of F** – more acceleration:

- **SLT**: standing **long jump**
- **SDF**: standing **double jump**
- **STF**: standing **triple jump**

**Warm up**: SLF, SDF and or STF with launch more acceleration, increasing distance from 5 m to 25-30m (and then you are ready for the main work);

Regarding the **weight of the MBs**: 4-5 kg for boys and 2-3 kg for women.
Working or not with blocks? you have to consider the level of the sprinter and the means of training to improve acceleration progress over the years with increasing experience and the level of force:

- **beginners**
  - massive use of means such as climbs, isorobic/ sled, launches + accelerations, blocks occasionally

- **intermediates**
  - 70% of tools such as climbs, isorobic/ sled, launches + accelerations, 30% departures from the blocks

- **Advanced**
  - work especially from the blocks and the use of other exercises especially during GPP.
STARTING WITH 3 SUPPORTS
CRUNCH STARTS

Some examples starting with 4, 3 or 2 supports but without using blocks; there are no special settings as well you have to departures from the blocks; athletes have to force to find solutions to the best start.

FALLING START

For "falling" means the "fall" or the sprinter tilted forward, you let go as if you should fall on a sack. The obvious consequence is that the sprinter has to react and then explode the start (as start is lower, as you have to be more explosive).

PUSH UP START

This type of start is complicated and will require levels of strength and coordination understood as the ability to find a solution motor for optimal development of a task.
These exercises not only take care of the FExpl (so you can do in each phase of training), but also serve to set the tone of the nervous and muscular sprinter before starting the sprint session (especially dedicated to the acceleration)

- e.g.: 3-4 sets of 4 trials on 30 m (maximum) with maximum effort or 4-5 sets of 4 trials with sub max effort/speed.
A tube which creates a desired resistance to a rope has two holes one for input and one output.....

It is
CORE: ABS and LUMBAR CIRCUIT
LUMBAR EXTENSIONS
LUMBAR EXTENSIONS ON INCLINATED BENCH
MOBILITY HURDLES EXCERCISES
(after core strength and endurance)
LED & TRAIL LEG

FIRE HYDRANT

http://www.youtube.com/watch?v=qmcvTCrnzH8
INVERTED BICYCLE

http://www.youtube.com/watch?v=2iaBX PWGg cg
INVERTED SCISSORS

http://www.youtube.com/watch?v=NSsR9f1T54s&feature=related
WIDE OUTS

http://www.youtube.com/watch?v=2TmuIo8bMkY

PICK UP

http://www.youtube.com/watch?v=p0rxS_VE_2w

SPEED SKATE

http://www.youtube.com/watch?v=PVT1XeayMcE&noredirect=1
We talked about a technical issue, but we must consider that for optimum performance athletes must remain **well-motivated** and focused on their **goals**.
Emanuela Baggiolini

- Athletes and Coaches Working Team Group
- EVAA Academy Manager

- e-mail: emanuela.baggiolini@evaa.ch
- call: +39 347 4658100
- skype: emanuela.baggiolini
- Via Sanzio, 2 - 21022 AZZATE (VARESE)
- ITALY