

Introduction to Track & Field Terminology and Periodization

Dan Dearing
The Bolles School

Teachers & Mentors

- Loren Seagrave
- Latif Thomas
- Scott Christenson
- Tony Veney
- Ron Grigg
- Boo Schexnader
- Marc Mangiacotti and many more coaching friends constantly helping

Rest, Regeneration & Recovery

- Rest – The absence of work
- Regeneration – The period of time between workouts. This is when fitness improves.
- Recovery – Period of time between bouts of work within a workout. This should vary from session to session to drive differences in the effect of the training stimulus.

Art and Science of Training

- You must have a basic understanding of the science to be able to create the art
- Bio-motor abilities among athletes vary widely
- You must understand how the body adapts to different stimuli to understand how to use those stimuli to improve performance

Energy Systems

- **Anaerobic Energy System**
 - ATP System – 1-6 Seconds
 - Creatine Phosphate System – 8-15 Seconds
 - Lactate System (Glycolysis) – 20 - 60 Seconds
 - 400 Runners – Lactic Peaks at ~ 40"
 - 800 Runners – Lactic Peaks at ~ 80"
- **Aerobic System** – 2 minutes and longer
 - Lactic Acid clearance / equilibrium – 4mMol

Event Energy Demands as a Training Marker

Astrand 2003, Noakes 2004, Chapman 2004

Event	Duration	Aerobic	KCAL used	Anaerobic Glycolytic	KCAL used	Anaerobic Alactic	KCAL used	Total KCAL used
800 Meters	2 minutes	50 %	45	44 %	40	6 %	5	90
1600 Meters	4 minutes	70 %	100	28 %	42	2 %	3	145
3200 Meters	10 minutes	87 %	249	13 %	36	<1 %	1	286
5000 Meters	15 minutes	92 %	372	8 %	32	<1 %	1	405
10,000 Meters	30 minutes	95 %	700	5 %	30	<1 %	1	730

Anaerobic ATP/CP System

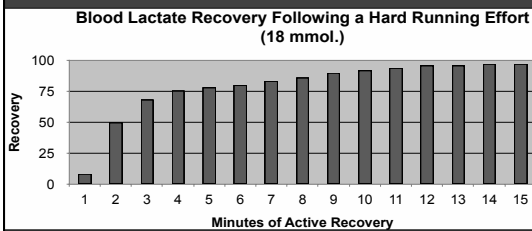
- ATP provides energy for the first 4-6 seconds of muscle contractio (this much is stored in the muscle cells)
- Creatine Phosphate replenishes ATP for another 4-9 seconds before CP stores begin to deplete. Replenishes at a decreasing rate out to around 20 seconds.
- Develop this system with high intensity runs of 4-12 seconds

Anaerobic Lactate System

- After 20 seconds, anaerobic glycolysis produces ATP and lactic acid, but muscle ATP and CP are still major contributors up to ~40"
- This process restores ATP at a much slower rate than ATP/CP system and lactic acid is created faster than the system can neutralize/ buffer it.
- Lactate / Mitochondria paradox
- ASSE vs GSSE

Recovery Timeframe

(Wilmore and Costill 2004)

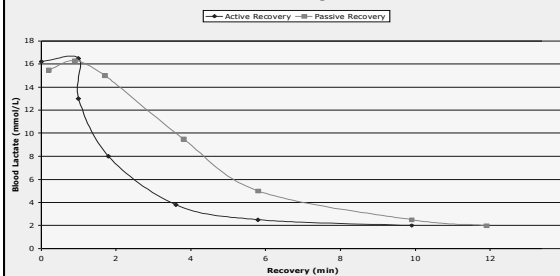


Produced Blood Lactate Levels are Race Specific

Distance	% Lactate Anaerobic	mmol/L Lactate
Rest	0.5%	0.8-1.8 mmol/L
30 meters	19%	2-5 mmol/L
100 meters	70%	14-16 mmol/L
200 meters	80%	18 mmol/L
400 meters	53%	24 mmol/L
800 meters	44%	21 mmol/L
1600 meters	19%	15 mmol/L
3200 meters	13%	12 mmol/L

Lactate Tolerance

Tolerance and Recovery: Blood Lactate



Paces on the Anaerobic Side

- **Acceleration** – 10-30m run at maximum effort (1-4")
- **Maximum Velocity** – 30-60m run at maximum effort (4-8")
- **Speed Endurance** – 60-150m run at max or near max effort (8-20")
- **Special Endurance 1** – 150-300m run at 90-100% intensity (20-40")
- **Special Endurance 2** – 300-600m run at 90-100% intensity (40-120")

Aerobic Energy System

- After 2 minutes, ATP is restored using carbohydrates and fats
- Replenishes ATP at the slowest rate of the three systems, but can continue to do so for several hours
- Can be developed with Extensive and Intensive Tempo for sprinters with managed recovery

Paces on the Aerobic Side

- **VO2 Max Run** – 800-3200m run at VO2 Max Pace
- **Lactate Threshold Runs** – 2-7 Miles, run at 75-85% of VO2 Max Pace
- **Aerobic Threshold Runs** (“Recovery Runs”, “Strength Runs”, “Medium Effort”) – Run at 70% of VO2 Max Pace
- **Long Runs** - ~20% of weekly mileage – run at conversational pace (60-70% of VO2 Max)

Tempo Intervals

- **Extensive Tempo** – Aerobic Capacity & Efficiency
 - 100-600m run at 65-79%
 - Keep heart rate in the 120-140 range
 - 30”-2’ efforts with 2-4’ recovery
- **Intensive Tempo** – Anaerobic Capacity
 - 100-600m run at 80-89%
 - Keep heart rate in the 140-170 range
 - Mixed Energy System – Lactic and Aerobic
 - 30”-2’ efforts with 3-10’ recover
 - Precursor to Speed and Special Endurance

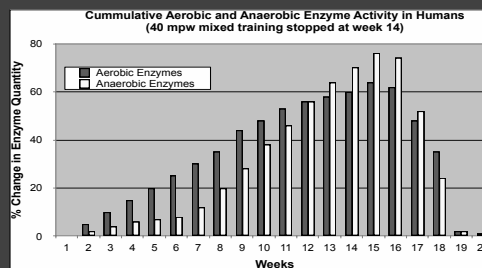
Regeneration Timeframes

- **24 hour recovery** – Acceleration, Max Velocity, Long Runs, Strength Runs, Extensive Tempo
- **48 hour recovery** – Races, Speed Endurance, Special Endurance 1 & 2, Lactic Threshold (Tempo) Runs, Vo2 Max Runs, Race Specific Hills, Mixed Energy System workouts
- **72 Hour Recovery** – Races in extreme heat, large set of Anaerobic Intervals, Long Time Trials

Macro, Meso & MicroCycles

- Transition Phase between Macro Cycles allows for physiological regeneration and psychological recovery
- 10% of the year off from training, in 2 blocks
- Macrocycle – Track Season
- Mesocycle – one of four parts of Track Season
- Microcycle – training “week”

Effects of Training and Detraining on Key Physiolog Markers (Hargreaves 2013)



Setting Up Your Annual Plan

- General Preparation
–30-40% of season
- Specific Preparation
– 20-30% of season
- Pre-Competitive
–15-20% of season
- Main Competitive
–20-25% of season

Distance Vs Sprinters

- Aerobic training requires 20-24 weeks of training to elicit full structural changes in the body – Heart enlarges, increasing blood volume, etc
- Anaerobic training requires 9-11 weeks of training to elicit chemical changes in the body – buffering system for lactic acid buildup. Less structural changes.

General Preparation

- Longest phase of the season
- Anatomical Adaptation
- Sprinters focus on acceleration and max velocity work, as well as developing aerobic capacity. All together to start GPP
- Distance focus is on aerobic development through mix of AT, LT and VO2 Max runs

Specific Preparation

- Things start looking more like track
- Races Start
- Combined system development is the main focus
- Encourage running hard on hard days and easy on easy days
- Avoid too many medium days
- Races are workouts

Specific Preparation cont.

- A time of interesting invitational meets
- 400m-1600m runners – time of extensive anaerobic lactate training
- Volume remains high and intensity increases
- Recovery and regeneration issues are critical

Pre-Competitive

- Combined system development continues to be main focus for 400m-1600m runners
- Most complicated/complex and intense portion of the training program
- Races are important here, but training is still the main focus
- Avoid too many easy days preparing for races

Main Competitive

- Races themselves provide some of the strongest training stimulus
- A transition from efficiency work (intervals) to capacity work (repetitions).
- Athletes are training to race
- Staying healthy and strong are crucial
- Stimulate aerobic system every 96 hours
- Stimulate anaerobic system every 72 hours

5 Biomotor Abilities

- Speed
- Strength
- Flexibility
- Coordination
- Endurance

5 Biomotor Abilities

- Speed –
 - **Acceleration** (1-4") – short hill runs, block work, flat track, resistance runs, Focus on shin angle
 - **Max Velocity** (4-8") – Fly runs, Sprint-Float-Sprint
 - **Speed Endurance** – (8-15") – Recovery dictates the training effect
 - ASSE
 - GSSE

5 Biomotor Abilities

- Strength
 - General Strength – Body Weight Exercises, Weightroom, Core/Pillar Training, Medicine Ball Routines, Multi-Throws,
 - Power – Multi-Jumps, Olympic Lifts

5 Biomotor Abilities

- Flexibility
 - Static and Active Flexibility
 - Dynamic Flexibility & Movements
 - Hurdle Mobility
 - Speed Drills – Progression from Low to High Impact

5 Biomotor Abilities

- Coordination
 - General Coordination – From general to specific
 - Everything – Warm up drills, GS work, running, jumping, lifting
 - Specific Coordination –
 - Speed work, plyos, bounding, block work, speed drills, wickets

5 Biomotor Abilities

- Endurance
 - General Endurance
 - GS Circuits
 - Extensive Tempo
 - Intensive Tempo
 - Long Hills
 - Specific Endurance
 - Split (Broken) Runs
 - Special Endurance 1 & Special Endurance 2
 - Competitions

A Primer on Interval and Repetition Running

- Intervals have short and incomplete rest.
- Repetition Runs are longer with more complete rest.
- Intervals = efficiency work
- Repetition Running= capacity work
- Work may be anaerobic or aerobic.
- Intensity is determined by rest period.
- Total workout volume can exceed race distance, but not individual bouts of work.

Intervals v. Repetition Running

	Intervals	Repetition Running
Focus	Rest	Work
Recovery	Incomplete	Near Complete
Intensity	High	Very High
Work Length	Fraction of Race	Near Race Distance
Total Volume	Varies with Rest	= or > than Race Distance

Intervals Vs Repetitions

- Intervals – Efficiency Work
 - “Get you there”
- Repetitions – Capacity Work
 - “Keep you there”