2017 Ohio Association of Track and Cross Country Coaches Clinic

Lactate Threshold Training

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Lactic Acid

- First discovered in 1780 in sour milk.
- Produced in metabolic pathway glycolysis.
- In 1920s, Nobel Prize winners A.V. Hill and Otto Meyerhof discovered that lactic acid is produced during fatiguing muscle contractions in the absence of oxygen.

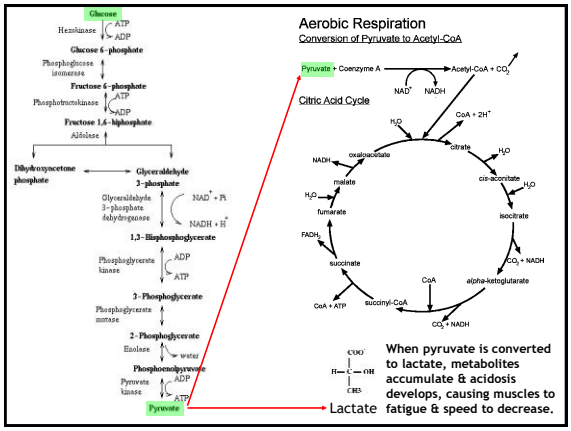
At physiological pH, lactic acid exists as lactate.

Lactate Threshold
Many Terms for the Same Thing!

- Lactate Threshold (LT)
- Anaerobic Threshold (AnT)
- Individual Anaerobic Threshold (IAT)
- Ventilatory Threshold (VT)
- Onset of Blood Lactate Accumulation (OBLA)
- Lactate Breakpoint (LB)
- Maximal Lactate Steady State (MLSS)
- Acidosis Threshold (AT)

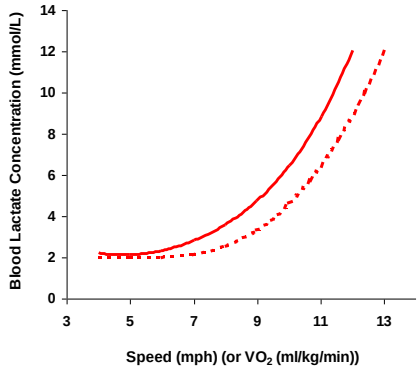
Acidosis Threshold

- Represents transition between running that generates energy almost purely aerobically and running that includes energy from both aerobic and oxygen-independent (anaerobic) metabolism. Fastest pace above which lactate production begins to exceed its removal.
- Fastest pace above which blood lactate concentration begins to increase exponentially.
- Fastest pace that can be sustained aerobically.
- Pace at which aerobic metabolism (Krebs cycle & electron transport chain) can't keep up with production of pyruvate from glycolysis.



Acidosis Threshold

- As speed increases, contribution from fat decreases and contribution from carbohydrates increases.
- At speeds above AT, only carbohydrates (blood glucose & muscle glycogen).
- Training AT increases speed at which lactate accumulates and acidosis occurs, enabling you to run at higher %VO_2max for longer time.
  - Increasing AT pace allows you to run faster before you fatigue because it allows you to run faster before O_2-independent metabolism begins to play significant role.
  - Ability to sustain hard pace for long time is greatly influenced by AT.



Training Acidosis Threshold

- Best stimulus to improve AT is continuous or interval-type training performed at, or slightly faster than, current AT pace.
- Among hardest types of workouts for runners to do correctly, so monitoring by coach is essential.
- AT training is the best aerobic bang for your buck.
- AT training makes what was an anaerobic intensity before now high aerobic.
- The longer the race, the more important it is to train AT.

AT Pace

- Slower/recreational runners:
  - 20-30 sec/mile slower than 2-mile race pace
  - 75-80% max HR
- Highly-trained/competitive runners:
  - 35-45 sec/mile slower than 2-mile race pace
  - 85-90% max HR
- Subjectively feels comfortably hard (7-8 on scale of 1-10)

AT Workouts

Continuous AT Runs

3-4 miles up to 7-8 miles (or ~45 min)

AT Intervals

reps @ AT pace with short rest periods
4 x 1 mile @ AT pace w/ 1 min rest
8 x 1,000 meters @ AT pace with 1:00 rest

AT+ Intervals

short reps @ slightly faster than AT pace with very short rest periods
2 sets of 4 x 800-1,000 meters @ 10 sec/mile faster than AT pace w/ 45 sec rest & 2 min rest between sets

AT/LSD Combo Run

medium-long runs with portion @ AT pace
12-16 miles w/ last 2-4 miles @ AT pace
2 miles + 3 miles @ AT pace + 6 miles + 3 miles @ AT pace