



# Resistance Training for Triathletes

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## Why?

- Improved muscular strength, endurance and power. Evidence shows performance benefits in run and cycling, not swimming.
- Resistance training improves and maintains connective tissue strength and bone mineral density
- Improves run and cycling economy
- Changes happen due to improvements in muscle, independent of lung and heart adaptation
- Increase lean body mass, contributing to increased basal metabolic rate, helps with fat loss.
- Injury prevention: build bank of connective tissue pre-season. Heavy endurance training makes withdrawals from connective tissue bank balance. Leads to quicker recovery after long sessions
- Develop healthy positive self-image, improves mental health.

## What happens?

- **Neural adaptations**
  - Increased frequency of nerve stimulation of muscle
  - Increased number of muscle fibres contracted
  - Inhibition of opposing muscle group
  - Contraction of synergists (assistants)
  - Responsible for increased strength in first 1-2 months of training
- **Muscle Hypertrophy**
  - Increased fibre size
  - Cross sectional area of muscle
  - Increased ability to develop force
  - Occurs more quickly in type 2 (Fast twitch) fibres
  - Potential for hypertrophy increased with higher % fast twitch (quick gainers)
  - Can train specifically for hypertrophy
- **Muscular endurance protocols**
  - Increased number of capillaries (better O<sub>2</sub> and fuel delivery, waste extraction)
  - Increased number mitochondria (fuel production)
  - Fibre type conversion. Fast twitch fibres become more like slow twitch (oxidative) Increase in fibre size in these aerobic fast twitch fibres as opposed to decrease with endurance training.
  - Improved lactate metabolism
- **Connective Tissue adaptations**
  - Increased number of collagen fibres
  - Improved quality (stronger fibres)
  - Better alignment of collagen to withstand force
  - Degenerative tendons revert to normal appearance with 12 weeks eccentric training protocols
- **Bone**
  - Increased hormones indicative of bone growth
  - Increased bone density at hip and lumbar spine

## Which muscles to train?

- Sport Specific: Bike and run power producers. Scapular stabilisers: postural balance, swim injury prevention, bike position endurance. Lats bike stabilisers, upper body out of saddle climbing, swim

### Muscle

Gluteals

Quads

Calf

Scapular stabilisers/rhomboids

Lats

### Exercise

Squats, leg press, external rotation

Squats, leg press, knee extension

Calf raise

Seated row, bent over row, bench pull

Lat pull down, standing pull down

## How?

- **Sequence of exercises**

- Compound exercises (large muscle mass) first. Eg squat then knee extension
- Exercises with least base of support first. Don't do exercises which need high stabiliser demand when fatigued at end of session

- **Choice of equipment**

## Periodisation

- **Prep**

- Learning/endurance/hypertrophy

### Machines

- Good for isolation
- Common in most gyms
- Lower skill level required
- Relatively easy to maintain form
- Straight line motion (not functional)
- Excellent for novice trainers

### Free Weights

- Common in gyms, economical for home
- Need good technique, higher risk
- Arcs of motion, more sports specific
- Work stabilisers while strengthening prime movers
- Greater variety

- 6 weeks+

- Low intensity, high volume. Can do more than one exercise for main target muscles
- 3-4 sets of 15-20 reps, Slow-moderate contractions

- **Strength**

- During base phase while low intensity training
- Transition carefully from prep to 3 sets of 5-8 reps (80-85% max lift or 1RM)
- High intensity, low volume
- 2-4 minutes rest between sets to allow muscle fuel stores to replenish
- I suggest 2 weeks of 10-15 reps per set on way to max strength for 4 weeks
- Other training will suffer, higher RPE, slower, heavy legs

- **Power Endurance**

- Build/peak for Sprint and Olympic distances
- 3 sets 8-15, Fast lifts: ability to develop force quickly
- 3-5 minutes recovery

- **Muscular Endurance**

- Build/peak for Half IM/IM distances. 4-6 weeks
- Fatigue resistance: ability to maintain higher power output
- Light-moderate load, high reps
- 3 sets 15-20 Fast lifts
- 1-2 minutes recovery only. Will be fatigued third set. Choose weight that allows good technique.
- Specificity: careful with assuming carryover to SBR.
- Need to apply strength in pool, on bike and running

- **Maintenance**

- Weekly
- High intensity, low volume
- 3 sets 6-12, Slow lifts
- 1-2 minutes rest

- **Myths**

- **Myth 1: Weights will slow me down**

- Evidence of improved running and cycling economy in runners and triathletes. Increased running speed at AT and VO<sub>2</sub>max. Improved cycling time to fatigue at submax and VO<sub>2</sub>max speed. Decreased lactate concentrations at all workloads. Lactate threshold increases. No change in VO<sub>2</sub>max.

- **Myth 2: Masculinization of female athletes**

- Inadequate testosterone levels in females to cause hypertrophy. Need dedicated program, diet, supplements over many years to attain bodybuilders physique

- **Injury prevention**

- Technique: instruction in proper lifting technique vital. Programming to allow adaptation before increasing load and balanced selection of exercises also very important
- Allow 1-2 days recovery between sessions
- Light aerobic warm-up
- Pull>push lifts, limit overhead lifts
- Novices: machine weights safe, suitable for first season of training
- Combine with stretching program.