ADDING VARIETY TO YOUR TRAINING

Why you need Variety

Each one of your muscles is composed of three types of muscle fibres:

- Slow twitch
- Intermediate fast twitch
- Fast twitch.

When exercising these fibres are recruited in a 'ladder':

Walking or jogging uses almost exclusively **slow twitch**. As pace increases **intermediate** fibres are used, then **fast twitch** as you speed up towards 5k pace, hills or sprints.

A distance run will recruit about 75% of **slow twitch** and about 10% of **intermediate.**

A tempo run will recruit 100% **slow twitch**, 50% **intermediate** and up to 5% **fast.**

Running at 5k pace will recruit 100% **slow twitch**, 85% **intermediate** and 50% **fast.**

Running at mile pace will recruit 100% **slow twitch**, almost 100% **medium** and over 80% **fast**

To train each muscle fibre type for maximum performance – need to schedule a variety of weekly workouts to including a distance run, a long run and one or two interval/repetition session(s) per week.

CONTINUOUS RUNS

Distance Runs:

"Running your distance runs slowly won't make you a slow runner. Training incorrectly – not doing the full range of workouts required to build speed – will make you a slow runner."

The correct pace for your distance runs is the pace that guarantees you'll get 100% of the hoped for benefits:-

- Strengthening slow twitch muscle fibres
- Strengthening connective tissue like bones and tendons
- Increasing the number and size of mitochondria (microscopic, aerobic energy-producing power plants) within each slow-twitch fibre.
- Increasing the number of capillaries surrounding each slow-twitch fibre (capillaries carry oxygen and nutrients to your muscle fibres).
- Increasing the amount of carbohydrate fuel (glycogen) stored within each slow twitch fibre.
- Strengthening your heart, so that you can pump more blood with each heartbeat.
- Improving your nervous system's ability to recruit slow-twitch fibre into action, thereby creating a more efficient stride and reducing the amount of energy you'll expend.

To trigger all these need to run at a conversational pace – about 2 minutes per mile slower than 5k pace for faster runners and up to 3 minutes for slower runners. This equates to about 65-75% VO_2 max.

If you run too hard it delays recovery for your next run.

VO_2 max at various paces:

- Jogging – 60%
- Regular Distance run – 70%
- Tempo pace – 85%
- 5k pace – 95%

- 3k pace – 100%

Tempo Runs

Can be completed at 3 different paces:-

- Marathon pace: roughly 40-60 seconds slower than 5k pace
- Half Marathon pace: 25-40 seconds slower than 5k pace
- 60 minute pace: 15-25 seconds slower than 5k pace

Avoid the incorrect pace – all out!

Benefits:

- Increased mitochondria for recruited slow and intermediate fibres.
- Increased capillaries for recruited fibres – increasing their supply of nutrients and oxygen.
- Improved ability to utilise and clear lactate (a carbohydrate energy source) from within recruited muscle fibres.
- Improved ability to buffer and export acidic hydrogen ions from recruited fibres, as well as manage other fatigue-inducing by-products of anaerobic energy production.
- Improved ability to burn fat as a fuel source.

Distance and tempo workouts are effective for increasing the number of capillaries and mitochondria in slow twitch and some intermediate fibres.

Hills

Can include these in your longer runs.

Benefits:

- Hills increase the volume of muscle fibres you recruit while running.
- By working more muscle fibres, hill running improves nervous-system coordination between muscle-fibre types, not to mention the muscle groups (e.g. hamstrings and quadriceps) they represent.
- Long hills challenge the energy-producing capacity of all fibre types.
- Running uphill creates ankle flexibility, improving your stride.
- Hill running increases Achilles tendon stiffness, which improves “elastic recoil”
- Hill training stimulates adaptions similar to resistance training and these adaptions improves your ability to produce force.

While distance runs over flat terrain recruit mostly slow-twitch fibres, hill runs draw upon a large percentage of intermediate fibres and some fast twitch to provide the force required to battle gravity. You put more muscle fibres into action and then work those fibres strenuously with the result being stronger intermediate and fast twitch muscle fibres.

Using all the muscle fibres demands increased input from your nervous system. Your nervous system adapts by learning more efficient routes (neural pathways) for communicating commands to muscles and muscle fibres. You develop a more efficient stride which carries over to all your running – uphill, downhill, slow and fast.

Working all your muscle fibre types for a prolonged period uphill demands a large sustained energy supply. Your muscles adapt with improvements to both aerobic and anaerobic energy producing capability.

Lengthen the long run.

Approx 90 minutes into a distance run, your slow twitch fibres begin to run out of muscle glycogen (each one of your muscle fibres has its own unique supply of this energy producing carbohydrate). This forces other slow twitch fibres – ones not previously recruited – to take over from them. Run long enough and intermediate fibres are activated too.

Draining the gas tanks of some fibres whilst activating other triggers several beneficial adaptations:-

- Creates new capillaries for all recruited muscle fibres as your body struggles to maintain supply lines over a long period of time.
- Increases glycogen storage capacity in all affected muscle fibres – your muscle fibre's carbohydrate fuel tanks can double in size.
- Improved aerobic energy production in all recruited fibres.
- Improves ability to burn fat as an energy source.
- Increases supply or aerobic enzymes (these enzymes facilitate aerobic energy production).
- Improves nervous-system control of recruited fibres, leading to a more efficient stride.
- Strengthens recruited muscle fibres and connective tissue.

INTERVALS / REPETITIONS

VO_2max Workouts

5ks burn a lot of oxygen – its 90-95% fuelled by aerobic energy – energy created within muscle fibres using carbohydrates, fats and oxygen. You should already have the carbs and fats needed to produce more aerobic energy – its oxygen that's deficient.

You don't increase your oxygen supply by breathing in more air – you do it by improving transportation of oxygen to your muscle fibres.

While your heart and major blood vessels handle bulk transport of oxygen throughout your body, it's your capillaries that deliver oxygen to muscle fibres. The only way to route more oxygen to muscle fibre is to create more capillaries. Once delivered, oxygen is used by each muscle fibre's mitochondrial power plants to create energy. Bottom line – you need to create more capillaries and bigger, more numerous mitochondria.

VO_2max is defined as the maximum amount of oxygen that your body can consume in one minute. It's NOT the amount of oxygen you can breathe into your lungs. It's the amount of oxygen that your mitochondria consume to create energy.

For a VO_2max workout to be effective (i.e. to stimulate the creation of lots of capillaries and mitochondria) you need to run repetitions at a minimum of 90% of your current VO_2max. Less won't stimulate required improvement, working at greater will leave you more fatigued without offering an increased benefit.

Training should be at one of 3 paces:

10k pace – approx. 90% VO_2max

5k pace – approx. 95% VO_2max

3k pace – approx. 100% VO_2max

VO_2max reps are best measured in minutes, not distance because it's the amount of time at near VO_2max that counts, not the distance travelled at that effort.

Repetitions should last a minimum of 2 minutes (it takes approximately 2 mins of running for your aerobic system to reach VO_2max, with a maximum length of 6 minutes (4-5 minutes at 3k pace. The recovery interval should be 2-4 minutes.

Examples:

8 reps of 2mins with 2-3 mins recovery give not give you any minutes at VO_2max.

6 reps of 3 mins with 3 mins recovery would give you 6 mins at VO_2max.

5 reps of 4 mins with 3 mins recovery would give you 10 mins at VO_2max.

An exception to the 2 minutes rep rule is if shorter reps are combined with 30-40 seconds of recovery (VO_2max remains high for 30-40 seconds post repetition). Reps must be short – 200-400m to avoid excessive fatigue.

Short repetitions/Intervals

Running these strengthens your heart, sharpens your anaerobic system and improved leg speed.

Heart is strengthened by increasing your "stroke volume", the amount of blood your heart pumps with each beat – the more per beat, the more oxygen you send by way of your bloodstream to your muscles.

Short reps also build your anaerobic system – the system that provides most of your energy for the first 150-250m of a 5k. When you accelerate off the start line, your energy requirements increase immediately. Your aerobic system can't increase its energy output as quickly. That's because you can't increase aerobic energy production until your lungs, heart and bloodstream deliver a larger supply of oxygen to your muscles, a process that takes 30-40 seconds. Until then you rely on anaerobic energy (energy produced within your muscle without using oxygen) to pick up the energy slack.

Short reps combined with longer recovery intervals allow you to practice this 30-40 second anaerobic energy burn multiple times. NB short recovery intervals are counterproductive as they allow you aerobic energy system to remain powered up, negating the need for increased anaerobic energy.

You get better at producing anaerobic energy and you get better at buffering the fatigue-producing by-products that accompany it which otherwise could begin shutting down your muscles after a mile!

Another benefit is short reps done at 1500 to 3k pace recruit 100% of your available intermediate muscle fibres and about 80% of fast twitch. This allows you to strengthen fibres that don't get used during either distance or longer reps, but which will be recruited in a 5k. The result is improved leg speed.

Hill Repeats

Hill repeats include reps that last between 30 seconds and 2 minutes with rest intervals (jogging and walking) that are double or triple the length in time, of the reps.

While workouts like distance and tempo runs, $V0_2$max reps and long hills trigger adaptations in the number and size of mitochrondria in your muscle fibres (increase aerobic energy -producing potential), intense workouts such as hill repeats turbocharge those mitochondria, significantly increasing their output of aerobic energy.

Because hill repeats shorten the distance your foot travels downward and require extra overall force generation to fight gravity, they improve your ability to produce muscular force on the ground – result is a quicker cadence (more steps per minute) and increased stride length i.e. you get faster.

Also stimulate other training adaptations:

- Significantly strengthen all muscle-fibre types,
- Rewire your nervous system to recruit all muscle fibre types simultaneously.
- They increase your heart's stroke volume.

Use a hill that's challenging but not so steep that you can't maintain a good stride. Don't run hill reps by pace – instead target slightly more intense than a 5k race (1500m-3k effort). Avoid running continuously.

Downhill Running

Nothing strengthens your quadriceps for running more effectively than downhill strides or downhill tempo.

Workout requires running downhill at an accelerated pace thereby increasing the intensity of eccentric muscle contractions associated with running. An eccentric muscle contraction occurs when a muscle both contracts and stretches at the same time. An eccentric contraction of your quadriceps occurs every time your foot touches down during a running stride. Your front thigh contracts to brake and support you, but it simultaneously stretches to allow your knee to bend.

In contrast, a concentric contraction occurs when a muscle contracts and shortens.

It's important to include eccentric training for two reasons:-

1. Eccentric contractions produce substantially more force than concentric contractions, increasing the training load for the muscle fibres that are activated.
2. Eccentric contractions are associated with post-workout muscle soreness.so you need to immunise your legs against that possibility.

Your leg muscles, especially quadriceps, respond by getting stronger – a lot stronger than running on the flat.

Downhill running also strengthens both connective tissue and your nervous system's control of muscle contractions, improving what's known as leg "stiffness" – a measure of your leg's resistance to bending at the ankles, knees and hips when your foot touches the ground. Less bending means less energy loss, less time on the ground and a more efficient stride. Additionally, you'll improve your knee lift, stride length and cadence.

After initial muscle strengthening, you'll require less recovery after a session of downhill running than following a hard track workout.

You won't get these benefits from the normal downhill running during distance runs.

Strides

These are short bouts of faster running with recovery in between ,50-150m (or 15-30 seconds) of running at speeds ranging from 5k to mile pace. To start take 10-15 secs to accelerate and hold top end speed for at least 10 seconds before decelerating. Slow to a jog, walk or stand. Repeat 1-5 times.

Can be done at the end of a warm up, or tag 2-4 at the end of a distance run.