

# Periodization for Combatants

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## Abstract

In this article I'm going to take a step by step approach to the basic building blocks to athletic preparation. There are many ways to go about this process, so I'm going to attempt to offer you a simplistic and logical approach, which I hope will encourage you to further research periodization in greater depth.

## What is Training?

When looking back at earth's history, the first signs of life appeared around 1,500,000,000 years ago. The first mammals appeared around 200,000,000 years ago, the first primates appeared around 40,000,000 years ago and around 2,000,000 years ago the first humans appeared. Over the past 1, 500,000,000 years, millions of species have come and gone, the survival of a species largely depends on its ability to adapt to changes in its environment. Nearly all species have the ability to adapt to minor changes in their environment, those that can't die, while others that are better equipped to deal with change go onto produce offspring that are equally equipped or even more equipped to adapt to the environmental changes that have occurred (natural selection).

Humans have evolved to populate nearly every corner of the planet. They have adapted to live in the coldest regions of North Alaska to some of the hottest deserts in Central Australia to the highest altitudes of the Himalayas.

Currently 17% of the worlds population live in the developed world, this means that allot of us have had to adapt to the technological revolution. This particular adaptive phase in the evolution of humans is responsible for a higher rate of inactivity, obesity and poor health in many people.

Below are examples of two different working environments and the adaptation processes involved.

### **EXAMPLE 1**

If we look at labourer (eg. a brickies labourer) who spends 8 hours a day 5-6 days a week moving bricks and mortar around, their adaptation to their environment would be as follows.

- 1) Some increase in over all muscle mass.
- 2) Increase in overall strength, including core strength.
- 3) Increased lung function
- 4) Hypertrophy of the heart muscle, which will result in a greater stroke volume.
- 5) Increased elasticity of blood vessels
- 6) Less likely to be overweight or obese due to the calories expended over the working day.

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## EXAMPLE 2

If we look at a typical office worker that spends on average 8 hours a day sitting at a computer, 5-6 days a week, their adaptation to their environment would be as follows.

- 1) Shortening of their hipflexors and hamstrings from sitting all day (these muscles are important for maintaining correct pelvic alignment).
- 2) Deterioration of other postural muscles
- 3) Atrophy of the heart muscle.
- 4) Loss of elasticity in blood vessels.
- 5) Loss of lung function.
- 6) Often overweight or obese from inactivity.

Our evolutionary process and our ability to adapt allows us to adapt to these types of conditions in a relatively short amount of time. Some of the adaptations in the above two examples take effect in the matter of weeks while others will take effect over months and years.

Training to improve sporting performance is no different, one could say that example 1 is training while example 2 is de-training, even though the thought of training or de-training was more than likely the last thing on the minds of individuals when they applying for these types of jobs.

The main difference between the individuals in the above two working environments and individuals specifically training to improve sporting performance, is the individuals in example 1 and 2 put up with their working environment in the pursuit of financial gains, where the individuals in pursuit of improving athletic performance are in control of their environment and are able to manipulate their environment to achieve their desired training goals.

## What is Periodization?

Periodization is the planning and the timing of all the individual components that an athlete needs to help them reach their full potential and excel in their chosen sport.

The concept of periodization is to

- 1) look ahead at an athletes sporting calendar
- 2) Pick out the most important yearly events
- 3) Map out the athletes training so the athlete will peak at just the right time to ideally achieve a PB (personal best result) in each targeted yearly event. For combatants, it is ideally turning up to a fight/tournament in a physical and mental state that is superior to all previous fights/tournaments.

Although the concept of periodization is quite simple, for the self trained athlete and novice coach it can be quite intricate and at times confusing. There are many excellent text books out there on periodization, however if you don't have a basic understanding of sports science, then as great as these text books are, they often add further confusion to the uneducated (and sometimes the educated as well). In this article I am going to attempt to go through the concept of periodization in a simplistic and logical manner, which I hope will spark some interest and encourage coaches/trainers and combatants to go into periodization in more depth. Periodization is the scientific approach to ensuring that an athlete/combatant continues to develop to reach their full potential.

## **Analysing the requirements of your sport**

Now we have a better understanding of what training and periodization is, we now need to identify the requirements of your sport so we can then set about training the specific biomotor abilities (speed, strength, endurance, power, flexibility, skills etc) that will help you to excel in your chosen sport. Once the dominant biomotor abilities have been identified, the true concept of periodization begins.

## **Training the dominant biomotor abilities**

When training the dominant biomotor abilities, you need to consider setting out your training plan so your focus is on improving one biomotor ability at a time, while you ideally maintain all previous improvements that have been made on each of the other dominant biomotor abilities.

Now in the untrained athlete and to a lesser extent the novice athlete, it is possible to make small improvements during a maintenance phase, however in an advanced athlete, the workload required to make even minimal gains is so high that even maintenance of the other dominant biomotor abilities is in it self a challenge.

Let's say for arguments sake you are a boxer, the dominant biomotor abilities in your sport (in addition to your boxing skills) are power and more specifically power endurance (the ability to be able to continually throw punches at near maximal to maximal intensity), as the break down of power is strength and speed, in a theoretical periodized strength and conditioning program for boxing you would start off with

- 1) A functional strength base (read "Making The Client Bulletproof").
- 2) You would then progress to a specific strength phase, where the resistance training exercises you perform replicate the movement patterns involved in throwing punches. In addition to your specific strength training, you will also need to maintain your functional strength.
- 3) You would then progress to a speed phase, where you would practice throwing high velocity strikes with immaculate technique. In addition to your speed training, you will also need to maintain your functional strength and your specific strength.
- 4) You would then progress to a specific power phase, where you would combine your specific strength gains with your speed gains and ideally introduce some specific plyometric exercises (read article "Increase Your Punching Power"). The objective of this phase is to use specific plyometric exercises to convert your specific strength and speed gains into raw power, which is then further refined with the use of focus pads and punching bags. In addition to your power training, you will also need to maintain your functional strength, your specific strength and speed.
- 5) You would then progress to a specific fitness phase, where you would use specific fitness training drills to increase your aerobic and anaerobic fitness, (read article "Fighting Fit"). In addition to your fitness training, you will also need to maintain your functional strength and your specific strength, your speed and power.

- 6) As there is no off-season as such for boxing, in addition to your strength & conditioning training, you are more than likely going to be attending boxing training on a regular basis as well.
- 7) Approximately 6-weeks out from your fight you would ideally cut right back on your resistance training (allot of fighters will cut out their resistance training all together) to really concentrate on your fitness and skill work.
- 8) About a week away from the fight, you would ideally start tapering which involves reducing your work load even further and cutting right back on your fitness training so your body can supercompensate (tapering and supercompensation will be explained later in this article). At this point you would ideally “rest” your body while maintaining some “light” sparing sessions, with the objective being to further refine your motor skills (e.g. sharpen your reflexes).
- 9) After your fight, you and your trainers/coaches would ideally analyse the fight, work out which dominant biomotor abilities need improving on and map out an appropriate training plan to achieve those goals.

As you can see, in the ideal world there is alot of work to do to improve one biomotor ability while at the same time maintaining all improvements previously made in each of the other dominant biomotor abilities and to attempt to make improvements in all your dominant biomotor abilities at the same time is an unrealistic and impossible task, especially in an athlete who has some serious training years under their belt.

## **Volume & Intensity**

Volume & Intensity have an inverse relationship in regards to high volume or high intensity training.

- 1) High volume training is accompanied by low intensity training.
  - 2) High intensity training is accompanied by low volume training.
  - 3) Medium volume training is accompanied by medium intensity training.
- High volume/high intensity training increases the risk of injuries and puts the body into a state of fatigue that requires longer periods of recovery time; this can delay or interfere with the athletes/combatants next training session, which inturn can disrupt the athletes/combatants weekly training plan (micro-cycle).

### **Volume & intensity over a weekly training plan (micro-cycle)**

Our weekly training load to maintain all previous gains made in each of our dominant biomotor abilities would require at least one high intensity/low volume training session, where the goal for each training session would be to ideally achieve, or get as close as possible to achieving your previous PB. When looking at improving a specific biomotor ability over the duration of a macro cycle/training phase (a 4-6 week period), you would generally need around 2-3 training sessions a week which would include one high intensity training session and either a medium intensity training session (for 2 training sessions a week) or a medium and low intensity training session (for 3 training sessions a week). Now let's say for arguments sake the focus for your current macro-cycle/training phase is fitness, your training volume for an average week would look something like this.

- 1) One high intensity functional strength workout.
- 2) One high intensity specific strength workout.
- 3) One high intensity speed workout.
- 4) One high intensity power workout.
- 5) One low intensity fitness session.
- 6) One medium intensity fitness session.
- 7) One high intensity fitness session.

Most boxing coaches aren't going to let you cut back on your boxing training to let the strength and conditioning coach take over, so in addition to your strength & conditioning sessions, you are more than likely going to face 3-5 boxing sessions a week as well, of which several of these training sessions are more than likely going to be high in intensity too. In total our weekly training volume adds up to 10 -12 training sessions per week.

### **Volume & intensity over a single training session**

The volume versus intensity rule also applies to individual training sessions, as our boxer has a minimum of 5 high intensity training sessions a week; we need to make sure that the number of exercises/training drills is also kept to a minimum while still being effective and specific to their needs. In addition to keeping the number of exercises/training drills to a minimum, you also need to keep the volume/number of sets/intervals for each exercise/training drill to a minimum as well. Let's say for arguments sake you are maintaining your functional strength, your goal for each training session is to lift or get as close as you can to lifting your previous PB, you would ideally warm up using the minimal amount of sets required to safely attempt your maximal lift once and repeat the same protocol for each resistance training exercise.

### **“Skills Coach” versus the “Strength & Conditioning Coach”**

In professional sports such as AFL (Australian football league/Australian rules football), NFL (National football league/Gridiron) etc, the strength & conditioning coach is employed as part of the coaching staff and has an intricate role to play along with all the other coaches where they all work together as a team in the best interests of the club. For a strength & conditioning coach and a skills coach to do their jobs effectively, there must be harmony between the two coaches which sometimes isn't the case, especially in sporting clubs that don't employ their own strength & conditioning coach, in such cases individual strength & conditioning coaches are often employed by individual athletes/combatants to work outside of their sporting club, which often results in a non working relationship between the two coaches. A great working relationship between the strength & conditioning coach and the skills coach will ensure that both coaches work together in the best interests of their athletes/combatants, through their various macro-cycles/training phases so specific training sessions (e.g. specific speed sessions, specific fitness sessions, specific power sessions etc) can be intergraded into the regular skills sessions which in turn can reduce the athletes/combatants weekly training volume.

## When not to train

When it comes to training, you'll find that the majority of people fall into one of two categories.

- 1) Those who look for every excuse to get out of training.
- 2) Those who are terrified that if they don't train all the time, they will go backwards.

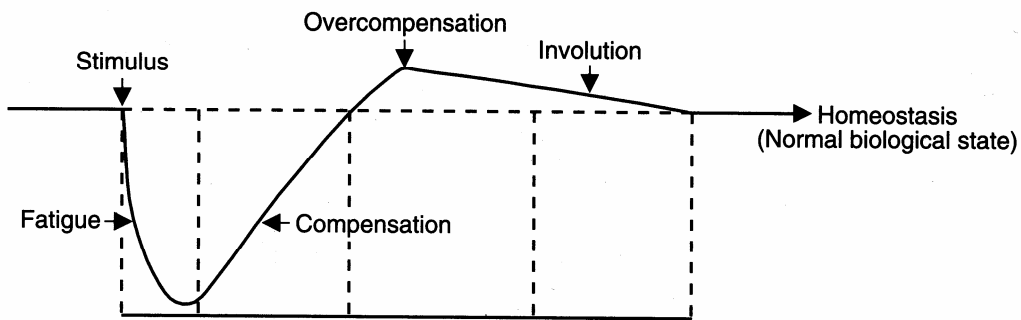
For those who fit into the second category, it can often be hard for them to get their head around the concept of taking time off training.

Earlier on in this article we identified training as our body's natural inbuilt survival skills to be able to adapt to its environment. When it comes to training, we manipulate our training environment to create a training stimulus that is ideally specific to our needs and while our body is resting, our body supercompensates so it can better cope with its environment (training environment).

The bottom line here is our body only gets bigger, stronger, faster, fitter, more powerful, more flexible and more skilful while our body is resting. Resting doesn't only refer to sleeping at night, resting also refers to having a light training day about every 3-4 days, having a light training week about every three weeks, and having a really light training week (nearly taking the week off) approximately every six weeks.

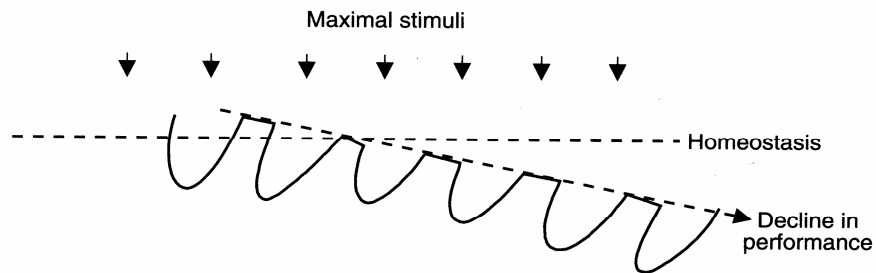
The table below is taken from Bompas book "Serious Strength Training".

The homeostasis line represents where an athlete/combatant currently is prior to a training stimulus that is greater than their body is accustomed to. After an appropriate training stimulus, the body goes into a state of fatigue and while our body is resting, our body regenerates to better cope with the same training stimulus next time (overcompensation). The ideal time for the next training session (when looking at improving a specific biomotor ability) is at the peak of the compensation curve. If the time between the training sessions for the same is too long, then gains from the body supercompensating will diminish.



**Figure 3.7** The supercompensation cycle of a training session modified from Yakovlev (1967).  
Reprinted from Bompas 1983.

If the time between the training sessions for the same biomotor ability is too short, or if the athlete/combatant is overtraining in general, then the athlete will stay in a state of fatigue, which will result in a decline in performance as depicted in the table below.



**Figure 3.8** The effect of continuous overload training on one's body and one's working capacity.  
Reprinted from Bompa 1983.

Over training not only leads to a decrease in sporting performance, it can make you prone to injury and lower your immune system, making you more vulnerable to sickness.

## Tapering

“Tapering” is having a period of really light training prior to a sporting event/fight etc, this light period of training allows the body to fully rest and recover from the weeks/months of prior training and also allows the body time to supercompensate. There is often conjecture as to how many days/weeks you should taper for, some studies have shown that around 1-week is an ideal period of time for the body to rest and fully supercompensate, while other studies have shown that around 2-weeks is an ideal period of time for the body to rest and fully supercompensate. I believe that the length of time needed for an athlete to taper properly isn't so cut and dry and instead depends on

- 1) The volume of the workload in the weeks/months prior to the taper.
- 2) The intensity of the workload in the weeks/months prior to the taper.
- 3) The volume of the workload during the tapering period.
- 4) The intensity of the workload during the tapering period.
- 5) The individual athlete/combatant.

Remember our principal of training “individuality”, each sport has different training requirements, each athlete/combatant has different tolerances to different training stimulus's, each coach places different workloads on their athletes/combatants, therefore you can't give a generalized time frame, instead you need to get to know your athlete/combatant, keep a well documented training diary and with a little trial and error you'll get it just right.

## Recovery Methods

Recovery methods are designed to help an athlete/combatant get through their weekly training load. Our boxers average weekly training load came to about 10-12 training sessions a week, if our boxers skills coach and strength & conditioning coach can work together, we can reduce that by 1-3 training sessions a week, this means that there are going to be several days in the same week where our boxer is going to have to face two training sessions in the same day. To help our boxer get through two training sessions in the same day, our boxer should consider an early to mid morning training session followed by a late afternoon to early evening training session, in addition our boxer should also consider

- 1) Cooling down properly after each training session to help in the removal of lactic acid that has accumulated through the training session.
- 2) In addition to cooling down properly, our boxer should also consider using contrast showers, which will further assist in the removal of lactic acid.
- 3) A light stretching session at the end of each training session to help return those tight and tired muscles back to their resting length.
- 4) Massage.
- 5) Consuming liquid carbohydrates immediately after training and continuing to consume an adequate intake of carbohydrates over the next few hours to assist in replenishing the body's glycogen stores for the next training session.
- 6) Making sure their overall diet is adequate to meet the demands of training.

### **When should I eat and drink after exercise?**

To take advantage of the body's desire to replace glycogen stores after exercise, we recommend that a post-event snack be eaten within two hours after exercise, although the first 30 minutes may be the most crucial time. The body replaces glycogen at the quickest rate when carbohydrate foods and drinks are eaten soon after exercise. This becomes very important when an athlete trains or competes two or more times a day and they need to replace glycogen quickly. A larger meal can be consumed later when an athlete has cooled down and feels more comfortable. Muscle glycogen can generally be replaced at 5% per hour, so it takes about 20 hours to replace an empty glycogen fuel tank.

(Sports Dietitians Australia)

## **Cutting Weight**

As the majority of combatant sports involve combatants fighting in set weight divisions, the majority of combatants fight at their lightest possible weight in attempt to fight smaller and lighter opponents. Combatants who drop large amounts of body weight in a small amount of time and/or dehydrate themselves to make weight need to be aware of the down side of this practice and how it can destroy months of hard specific training. Periodizing your training is a scientific approach to mapping out your training, to bring about the improvements needed for you to go on and excel in your chosen sport; the problem with cutting weight, especially large amounts of weight in a small amount of time is that it requires high volume cardiovascular routines and severe calorie restrictive diets at a time where the combatant should be resting (tapering) and making sure their glycogen stores are full, **“this contradicts what periodization is all about!”** This high volume cardio vascular training combined with a severe calorie restricted diet at a time when a combatant should be tapering and making sure their glycogen stores are full will result in

- 1) A loss in strength.
- 2) A loss in speed.
- 3) A loss in power.
- 4) A loss in fitness.
- 5) A loss in reaction time.
- 6) Impaired concentration levels.
- 7) Lowered glycogen stores.
- 8) The combatant being dehydrated.



## Essential strategies for weight (fat) loss or making weight

- Choose a body fat/weight that keeps you healthy in the long term.
- Choose a balanced diet, emphasizing a low-modest fat intake.
- Eat a little less energy (kilojoules/calories) than you burn in training or competition to achieve a slight calorie deficit, and therefore a healthy weight (or body fat) loss. Don't crash diet.
- Learn how to handle eating out socially and include treats. You should not become obsessed about, or even frightened of, the occasional splurge.
- Have a training program that complements your weight (fat) loss strategies. If you need to make a specific competition weight, heavy weight training may need to be reduced or balanced with aerobic training.
- Be wary of times when weight (fat) levels may fluctuate more, for example 'off season' or injury. Monitor these changes and adjust your dietary intake and training to suit.
- Gradually reduce weight (not more than 0.5-1.0 kg per week) or 2-5 mm of fat each week if using skinfold (the pinch test) measurements.
- Train not more than 2.0 kg away from your optimal competition weight.
- Seek professional advice from a sports dietitian on dietary requirements for your sport, or whether a weight category or body fat level is realistic for your physique.

(Sports Dietitians Australia)

## Dangers of Dehydration

Dehydration is often used as a quick way to 'make weight'. Fluid loss of as little as 1% of body weight will decrease performance, especially in sports like light weight rowing or boxing where a combination of strength and endurance is needed. Other side effects of dehydration include:

- Fatigue
- Nausea
- Cramping
- Poor co-ordination and reaction time (can result in serious injury depending on the sport)

With significant fluid loss (greater than 2% of body weight) effects include:

- Increased body temperature resulting in heat stress/exhaustion
- Muscle breakdown
- Impairment of kidney function
- Electrolyte imbalance
- Circulatory and eventually heart failure

Dehydration to make weight has been associated with a number of deaths in otherwise healthy, fit individuals.

(Sports Dietitians Australia)

When dropping body weight prior to a fight/tournament, combatants need to continue their resistance training to minimise their strength and power loss. Your body perceives how strong it needs to be from its environment (training environment) and through changes in body weight, the bigger and heavier you are, the stronger you must be to move your bodies mass around, so as you drop weight, you body perceives that that it doesn't need to be as strong and burns muscle/protein in addition to fat as fuel, which results in a loss in strength and power. To help minimise muscle atrophy, combatants should

- 1) Maintain the training stimulus that tells the body that it needs as much muscle mass as possible to cope with its training environment.
- 2) Maintain an adequate intake of protein, even though there is an overall calorie reduction to reduce body weight.
- 3) Drop no more than a ½-1-kg (1-2 lbs) in body weight per week.

Ideally combatants through good nutrition should always stay no more than 2 kilograms (4-pounds) from their fighting weight all the time (as recommended by Sports Dietitians Australia), then look at losing that excess weight through good nutrition in the weeks leading up to (not during) their tapering period, only then will the combatant turn up to their fight/tournament fully tapered, fully hydrated, carbed up and in the greatest possible physical and mental shape.

## **The complexity of periodized plans for full contact combatant sports**

In most sports (including combatant sports with structured tournaments) you have an off-season, a pre-season and a main-season, during the off season and the pre-season, athletes usually hit the gym to make improvements in specific biomotor abilities for the oncoming season. Unfortunately with most full contact combat sports, there isn't an "off-season", "pre-season" or a "main-season" as such, so unless combatants are prepared to take a considerable length of time off fighting each year (to make up the equivalent of an off-season/pre-season), it's going to be harder to set out a balanced and progressive periodized annual plan.

To help counter this problem, where possible

- 1) Combatants should avoid taking fights on a moments notice.
- 2) Trainers/coaches should look at where their combatants are now, look at where they need to be for their next fight, identify what's required to meet those training goals, map out a time table, then look at negotiating a fight in advance to fit in with their training timetable.
- 3) Combatants and their coaches should reassess their training goals after each fight, if everything is going well; the combatant ideally continues to fight regularly as if they are in the equivalent of a main season (in which case their training goals are to maintain all improvements previously made in their dominant biomotor abilities, with the exception of training to further refine their motor skills/boxing skills). If the combatant isn't having regular success, then the combatant and their trainers/coaches should consider a brief rest period, followed up with what is the equivalent to off-season/pre-season training where the combatant goes back to addressing the improvements needed in each of the dominant biomotor abilities in a structured periodized training plan.

- 4) If a combatant is having regular success, then they need to make good use of the time between fights. Ideally around 10-12 weeks (which allows for a maximum of 4-5 fights per year) is what I would consider the minimal amount of time between fights, this minimum period of 10 -12 weeks allows
- a) A rest period of around 1 week after each fight, which may vary if a combatant has had a long and hard fight and/or has sustained injuries.
  - b) A 4-5 week period (macro-cycle/training phase) to work on a specific biomotor ability (the biomotor that needs the most improvement on).
  - c) Another 4-5 week period (macro-cycle/training phase) to bring their fitness back up to scratch and further refine their motor skills.
  - d) A period of around 1-week to taper (this will vary slightly as discussed previously in this article under tapering).

In the ideal world, all fights would be negotiated in advance to fit in with the combatants training schedule/timetable, however this often isn't the case, If you can't get a fight scheduled to fit your timetable, then ideally make sure the fight is scheduled far enough in advance for you or your combatants to be ready in time. Once a fight has been scheduled, the coaches/trainers need to work out at how many weeks they have to prepare and divide the time appropriately, when dividing up and allocating time, you should allow 4-6 weeks for a macro-cycle/training phase, to bring about improvements in a specific biomotor ability.

## Conclusion

In this article I barely scratched the surface of periodization, there is no doubt that it can be quite a complex issue, however if you want to be the absolute best that you can possibly be, or if you want the combatants that you train to be the absolute best that they can possibly be, then you need to utilise sports science. There are many excellent books out there on periodization, for those that want to take the next step. Tudor O Bomba is my periodization mentor and I consider him one of the best, if not "the best". You can find his books and other excellent books on periodization at [www.humankinetics.com](http://www.humankinetics.com)

## References

Figure 3.7 "the supercompensation cycle of a training session"  
 Bompa (1996) Serious Strength Training  
 Chapter 3 Microcycles and weekly training goals  
 Human Kinetics ISBN: 88011-834-2

Figure 3.8 "The effect of continuous overload training on one's body and one's working capacity"  
 Bompa (1996) Serious Strength Training  
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“When should I eat and drink after exercise?”

Eating & Drinking During and After Sport  
(Sports Dietitians Australia)

[www.sportsdietitians.com](http://www.sportsdietitians.com)

“Essential strategies for weight (fat) loss or making weight”

Body Fat Control and Making Weight  
(Sports Dietitians Australia)

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“The dangers of dehydration”

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