

# Clinical considerations for the ageing athlete



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## Background

Many older people are participating in high-intensity activities and sports. Clinicians need to be aware of the physiology of ageing relative to the demands of higher intensity sport. Patient expectations, comorbidities and medication use are important aspects to consider when advising the ageing athlete appropriately.

## Objective

This article highlights the important aspects of maintaining a physically active lifestyle. For the ageing athlete, there are differing needs as well as risks associated with higher intensity physical activity. This article will outline how to cater for these needs and minimise the potential risks.

## Discussion

Appreciating the importance of physical activity as a major public health intervention is essential for all clinicians. Ensuring that the ageing athlete is able to participate safely and optimally in higher intensity physical activity is an increasing expectation.

It is apparent that Australians are becoming less physically active.<sup>1</sup> As overall life expectancy is increasing,<sup>2</sup> proportionally, we are seeing more people in the older age groups participating in competitive and higher intensity sports.<sup>3</sup> With the increasing aged and aged-athlete population comes a greater demand for health services able to cater to the needs of the more active older population.

Although the process of ageing is dependent on many extrinsic and intrinsic variables, for the purpose of this paper, the American College of Sports Medicine and American Heart Association definition of 65 years of age or older, or 50–64 years of age with clinically significant chronic conditions and/or functional limitations<sup>4</sup> will be used. 'Athlete' will be defined as a person who commits to their sport or activity at least five times weekly – and especially those who compete in organised events – with the activity level achieved being more than what is recommended for general health benefits, and resulting in the heart beating significantly faster and accompanied by shortness of breath that makes talking difficult between deep breaths.<sup>5</sup> This group of people are often referred to as 'master' or 'veteran athletes'.

This paper will focus on the ageing athlete, as defined above, whose physical demands are significantly greater than their non-athlete, age-matched peers. For this identified group, discussion will focus on the following:

- benefits of physical activity
- potential risks associated with physical activity and how to minimise these risks
- nutritional and hydration needs
- use of certain medications and their impact on physical activity, safety and wellbeing.

## The benefits of physical activity

Before one is able to understand and appreciate the needs and demands of the ageing athlete, it is first important to recognise the significant benefits afforded at a population level by becoming or remaining physically active.

The overall health benefits of physical activity are irrefutable.<sup>6–13</sup> As physical activity increases so too does overall function, and the rate of physical and cognitive decline decreases.<sup>14–17</sup> The holistic benefits of 30 minutes of daily physical activity make it the most effective and compelling public health intervention we have available.<sup>6–11,18–20</sup> It is therefore the responsibility of the clinician to ensure that the prescription for physical activity be provided at each patient encounter. Box 1 lists some of the proven benefits of physical activity. It is important to recognise that proportionally, the musculoskeletal and cardiovascular benefits of physical activity for the older person are much greater than those for a younger person.<sup>21,22</sup>

### The potential risks of physical activity for the ageing athlete and how to decrease these risks

Although the ageing competitive athlete may be somewhat more prone to injury than their non-athletic peers,<sup>21</sup> the overall health benefits far outweigh these potential risks.<sup>6–9,11,18–20</sup> The ageing athlete is no more prone to injuries than younger athletes who train and compete at a comparable level.<sup>23–28</sup> There must always be an individual and informed approach when determining how much and which type of physical activity, and what intensity is appropriate, especially with the ageing athlete. For the majority of older people, there are very few absolute contraindications to physical activity. The intensity of the exercise is relative and multifactorial. The risk of injury increases with obesity, volume of exercise and participation in vigorous exercise such as competitive sports,<sup>29</sup> although this is a common trend throughout all ages and not specific to the ageing athlete.

Performing a focused history and a system-specific focused physical examination are essential and, with respect to the ageing

athlete, should always include the cardiovascular, respiratory and musculoskeletal systems. Appropriate investigations will be guided by the focused history and focused examination. As part of a thorough assessment and screening intervention, as a guide, it may be helpful to review The Royal Australian College of General Practitioners' (RACGP) *Guidelines for preventive activities in general practice* (the Red book),<sup>30</sup> particularly sections 5, 7 and 8. There are certain physical features that should preclude the ageing athlete from high-intensity sports;<sup>18,31</sup> these mandate further investigation and appropriate referral. Box 2 lists some of these physical features.

Once all appropriate information has been obtained, the clinician is now in a better position to risk-stratify the patient and determine if there is a need for further investigations. It may be appropriate to consider referral to a sports physiotherapist, sports doctor/physician or sports dietitian if any uncertainty or concerns are present. Recommended guidelines are available to help minimise the risks associated with commencing an exercise program in previously sedentary older people,<sup>22</sup> although discussion of these is outside the scope of this paper.

The more common and potentially more serious risks for the ageing athlete remaining highly active in their chosen sports are threefold:

- an ischaemic cardiac event
- dehydration, electrolyte imbalance and heat-related illness
- musculoskeletal injury.

### The risk of an acute ischaemic cardiac event

A major concern among clinicians regarding the ageing athlete is the risk of a fatal cardiac event while exercising. In the majority of cases, the risk of myocardial infarction associated with exercise is very unlikely;<sup>32</sup> as an example, the risk while jogging is 1 in 396,000 person-hours of activity.<sup>33</sup> The causes of sudden death in athletes are essentially the same as those in non-athletes.<sup>33</sup>

If there is any clinical concern, further assessment and investigation must always be considered. Although certain investigations may be indicated, exercise stress testing may not be the most appropriate first-line screening test. The usefulness and efficacy of routine exercise stress testing before the initiation of a vigorous exercise program in healthy men >45 and women >55 years of age is not well established.<sup>29</sup>

As previously identified, it is essential to obtain a thorough history, including family history, current and past personal health issues, medication use and patients' expectations. As part of the full patient assessment, the clinician may consider performing a resting electrocardiogram (ECG). It is important to recognise that up to 40% of athletes have ECG changes that may not necessarily indicate underlying cardiac disease or abnormalities.<sup>34,35</sup> It is appropriate to always seek expert cardiology opinion when attempting to interpret an apparently abnormal ECG. Box 3 outlines some of the possible ECG changes in the athletic population.

#### Box 1. Benefits of physical activity<sup>21,22</sup>

- Decreased risk for the development and progression of:
  - dementia
  - frank diabetes mellitus
  - depression
  - anxiety
  - fatigue
- 23% reduction in risk of cardiac death
- Up to 50% reduction in the risk of ischaemic heart disease

#### Box 2. Features likely to preclude athletes from high-intensity sport<sup>18,31</sup>

- Left ventricular ejection fraction <50%
- Evidence of exercise-induced myocardial ischemia
- Exercise-induced ventricular arrhythmia
- Exercise-induced systolic hypertension

**Box 3. Potential ECG changes in high performance athletes**

- Abnormal repolarisation pattern
- Increased R or S wave voltage
- Apparent left ventricular hypertrophy
- Diffusely distributed and deeply inverted T waves
- Supraventricular rhythms
- Complex ventricular dysrhythmias
- Profound bradyarrhythmias
- Ventricular ectopic beats

**The risk of dehydration, electrolyte imbalance and heat-related illness and how to decrease the risk**

Ageing is associated with a reduced sensation of thirst.<sup>36</sup> In a hot and dry environment, older athletes produce substantially less sweat than the younger athlete.<sup>36</sup> The combination of a decreased sensitivity to thirst and variable sweating patterns place the ageing athlete at potential risk of fluid and electrolyte imbalance as well as heat-related illnesses.<sup>37</sup>

The ageing athlete should be provided with accurate hydration advice and guidance, as individual needs will vary depending on the activity and environment. The risk of dehydration and fluid and electrolyte imbalance needs to be tempered with the significant risk of hyponatraemia associated with overhydration.<sup>38–40</sup> Athletes of all ages, especially the ageing athlete, should be encouraged to determine their individual hydration needs by pre-activity and post-activity body weight,<sup>40</sup> which is simple to perform and reliable. Relying on the sensation of thirst or hydrating for the sake of hydrating poses significant risks and the advice and guidance of a sports dietitian may be appropriate.

**Musculoskeletal injuries and how to minimise the risk**

The ageing athlete's reaction time and ability to focus attention on a specific task during a stressful situation becomes diminished.<sup>21</sup> Subsequently, acute injuries tend to occur in ageing athletes participating in sports or activities that demand high coordination, reaction time and balance capabilities.<sup>21</sup> A thorough musculoskeletal history and physical examination, including a GALS (gait, arms, legs and spine) screen,<sup>41,42</sup> are mandatory in essentially all cases and will rapidly identify any potential or current problems of the musculoskeletal system.

The most common injuries seen in the older athlete are muscle and joint injuries.<sup>21,29,43</sup> Seventy-five per cent of these injuries involve the lower extremities,<sup>21,43</sup> with the knee being the most commonly injured body site followed by the foot and ankle.<sup>43</sup> The most common mechanism of acute injury in the ageing endurance athlete is a fall or slip.<sup>43</sup> Athletes involved in strength or power sports sustain mostly acute sprains.<sup>43</sup>

The management principles of musculoskeletal injuries in the ageing athlete are no different from those in the younger athlete, although a longer rehabilitation and recovery time may be expected. Early involvement of a sports physiotherapist should always be considered when managing musculoskeletal injuries and associated rehabilitation.

The musculoskeletal system and central nervous system are two of the main systems regulating postural stability. Proprioceptive input from the sole of the foot, sacroiliac joint and cervical spine, as a looped feedback system, are the main postural regulators.<sup>44,45</sup> Subsequently focusing on maintaining and improving the accuracy of this feedback loop is a major determinant in reducing the risk of injury.

Balance re-training has been used successfully in an attempt to maintain the integrity and accuracy of balance and postural stability.<sup>46–49</sup> Most of the balance re-training program may be undertaken in the athlete's own time and incorporated into their daily fitness program. Initially, prescription and supervision of a balance re-training program is best undertaken by a skilled clinician, usually a sports physiotherapist or exercise physiologist trained in the technique.

Balance re-training is a graded technique introducing an unstable surface and degree of unpredictability.<sup>50–52</sup> The ageing athlete progresses through the three stages of re-training – static, functional and dynamic<sup>50</sup> – in a graded and supervised program. This technique may significantly improve strength, balance and coordination, compared with no intervention, or with strength training or resistance training alone.<sup>46–49</sup>

**Nutritional needs**

Compared with their younger counterparts, the average ageing athlete requires a lower amount of energy for body-weight maintenance<sup>53</sup> as their lean body mass is less. Compared with their non-athlete peers, their energy consumption needs are greater.<sup>54</sup>

Although the absolute nutritional needs for the ageing athlete do not appear to be significantly different from those of their younger or non-athlete counterpart, there are some aspects that may require refinement. In the majority of cases, dietary supplementation is not indicated and any need for additional nutrients should be achieved solely through the diet. In very rare cases this may not be possible, in which case dietary supplementation may be indicated.<sup>55</sup> If supplementation is clinically indicated, it should be an informed and combined decision between the treating clinician, sports dietitian and athlete. The ageing athlete requires higher amounts of protein to maintain their lean body mass.<sup>53,56–61</sup> In essentially all cases, this can be achieved by a balanced and appropriately planned diet without the need for supplementation.<sup>60,61</sup>

Because of the physiology in older people and increased physical demands, the ageing athlete may require an increased dietary intake of vitamin D,<sup>62</sup> B group vitamins (especially B6<sup>63</sup>

and B12),<sup>65</sup> vitamin E,<sup>64</sup> vitamin C<sup>64</sup> and calcium.<sup>65</sup> The required levels of these vitamins can be achieved without supplementation. To ensure appropriate dietary intake, the advice of a sports dietitian may be appropriate.

## Medications and the ageing athlete

Many older Australians take prescription or over-the-counter medications. In a recent study, 66% of older Australians reported taking five or more medicines and more than 20% reported using 10 or more.<sup>66</sup> Many Australians are taking additional medications that their general practitioner (GP) did not prescribe and is not aware they are using.<sup>67,68</sup> In combination with drug interaction and medication side effects, the end result may potentially place the ageing athlete at risk of an adverse event.

Of all medicines prescribed for older people, antihypertensive medications and nonsteroidal anti-inflammatory drugs (NSAIDs) are among the most common.<sup>66</sup> These two medication groups alone can potentially have a significant adverse impact on athletic performance and increase the risk of adverse outcomes for the ageing athlete. It may be appropriate to discuss the athlete's current medication use, and potential interactions and risks with a pharmacist. Table 1 outlines some common medications, their impact and potential risks.

The doctor treating athletes participating at a national or international level must recognise the legitimate use of drugs in sport and the potential for drug-testing. Subsequently, although it is the absolute responsibility of all athletes competing at these levels to consult the World Anti-Doping Agency (WADA, [www.wada-ama.org](http://www.wada-ama.org)) and the Australian Sports Anti-Doping Authority (ASADA, [www.asada.gov.au](http://www.asada.gov.au)), the prescribing doctor should also consult these organisations when considering drug prescription for athletes.

### Cardiovascular medications

Many of the cardiovascular medications, especially the antihypertensive group, affect the maintenance of cerebral perfusion during increased physical demand by decreasing cardiac output. As a drug group, their use may result in fluid and electrolyte imbalance, decreased exercise capacity, and risk of balance disturbance and falls.<sup>36,37,69,70</sup>

### Nonsteroidal anti-inflammatory drugs

As NSAIDs may be purchased over the counter, the prevalence of use is likely to be much higher than reported.<sup>66</sup> It is possible that the ageing athlete may use this medication more than their non-athlete, age-matched peers. As a drug class, NSAIDs have the potential to pose significant risks.<sup>71-74</sup> For this reason, NSAIDs should be prescribed at the lowest effective dose and for the shortest time necessary to control symptoms.

### Key points

- Proportionally, more people in older age groups are participating in high-intensity physical activity.

**Table 1. Impact and potential risks of medications for the ageing athlete**

Medication class	Impact and potential risks
Angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers	<ul style="list-style-type: none"> <li>• Do not limit maximal oxygen uptake</li> <li>• Hypotension and dehydration secondary to vasodilatory effect</li> </ul>
Diuretics	<ul style="list-style-type: none"> <li>• Fluid and electrolyte imbalance</li> <li>• Dehydration</li> <li>• Increasing risk for heat-related illness</li> </ul>
Beta-blockers	<ul style="list-style-type: none"> <li>• Limited exercise capacity at high intensity</li> <li>• Hypotension with potential for loss of balance, falls and collapse</li> </ul>
Nonsteroidal anti-inflammatory drugs and cyclooxygenase-2 inhibitors	<ul style="list-style-type: none"> <li>• Fatal upper gastrointestinal tract bleeding and perforation</li> <li>• Fatal and non-fatal cardiovascular events</li> <li>• Renal damage</li> <li>• Fluid and electrolyte imbalance</li> </ul>
Statins	<ul style="list-style-type: none"> <li>• Myopathy</li> <li>• Elevated creatinine kinase levels</li> </ul>

- The holistic health and wellbeing benefits associated with increased physical activity are compelling.
- A focused history and examination should always include the respiratory, cardiovascular and musculoskeletal systems.
- Investigations are not always indicated but may be considered if further assessment is indicated.
- Careful and appropriate screening can help identify athletes at potential risk of an adverse cardiac event.
- Fluid intake must be closely determined and monitored by each individual athlete.
- Musculoskeletal injuries often result from deteriorating balance, which can be improved and maintained by appropriately prescribed balance re-training.
- Essentially all nutritional needs can be accommodated by a suitably planned diet, and in most cases, dietary supplementation is neither indicated nor appropriate.
- Many commonly prescribed and over-the-counter medications have the potential for significant impact on physical performance and safety.

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