

# January 2019 Newsletter

Turrumurra Trotters  
Running since 1974

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# The Newsletter

## Re-cap of the month, plus announcements:

Dear all

Michael Fortune not only is running his fastest times at TT, but he also prepared the drinks during January with the assistance of Ralph Pain for one week. Thank you to Michael and Ralph. We do not have anybody for February yet and I will prepare for next Saturday in the hope that someone can come forward for the rest of February.

At the moment we have the following drinks ‘helpers’.

March	Richard Clough
April	Roger Mail
May	Daina Lee
June	Martin Smith
July	Brian & Lynne Matthews
August	John & Margaret Marshall
September	John Sheppard
October	Martin & Debbie Backhouse
November	
December	

You will see we have a couple of months spare. Even if you cannot do the balance of February or November or December but are prepared to do one other month, please let me know and I may be able to make a change to accommodate your preference.

At present we are running the 8.6km course. The 10.2km course starts on 16 February and continues until 23 March.

### Some runs coming up:

#### Sydney Striders, 10 km Saturday series

The first race of the year is next **Saturday, 2 February** at 7 am at Homebush. <http://www.sydneystriders.org.au/striders>

“We wanted to offer your group the same discount as we did last year but this year it's available for the year”.

Discount code: striderfriends

#### Orange Running Festival, 2 & 3 March 2019

2km Junior Dash 2 KM Saturday 2 March 2019 4.00 pm

Marathon, Sunday 3 March 6:30 am

Half Marathon, Sunday 3 March 6:45 am

10 km, Sunday 3 March 9:30 am

5 km, Sunday 3 March 10:30 am

Over the years a number of TT families have attended the weekend activities including the run and fine restaurants.

#### Lindfield Rotary Club Fun Run, 7 April 2019

Each year we try to have as many TT people attend this almost local event.

Chipped Bibs

This year we are using electronically chipped bibs and these will be mailed to all participants who register early, ie prior to **Wednesday, 27 March, 2019**. This will enable those runners to arrive at the Roseville Oval "ready to start", no queues to stand in. Participants who register from **Wednesday, 27 March, 2019** on will need to collect their chipped bib early on the day of event, **Sunday, 07 April, 2019**.

#### Start times

- 2Km Fun Run & Walk – 8.00am
- 5Km Fun Run & Walk – 8.10am
- 10Km Fun Run & Walk – 8.20am

Those competitors who need to collect their chipped bib on the day of event should allow a minimum of 30 minutes prior to start time to collect bibs and pins before assembly at the starting line.

<http://www.lindfieldrotaryfunrun.org.au>

Regards

Alan

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## Your hips may be your Achilles

Pain in your Achilles tendon could be linked to stiffness in your hips, according to a team of Australian researchers reporting in the journal *Medicine & Science in Sports & Exercise* last year. For their paper, the team from the University of Melbourne and the Australian Catholic University compared the hip biomechanics of runners with and without Achilles pain. They found that those with Achilles tendon problems had reduced hip mechanics and suggested this might force them to compensate their running style so that greater loads were placed on the ankles and tendons with each stride. Release tight hip flexors by kneeling down and extending your right leg into a lunge position on the floor. Place hands on hips and keep your torso upright. Tuck your glutes under the pelvis and bend the right knee to feel a stretch in your left leg. Hold for up to 60 seconds, repeat on the other side.

## Eat some jelly

For years, athletes have claimed that taking vitamin C and gelatine supplements helps to heal damaged tendons — and they may be right. Two amino acids — glycine and proline — found in collagen, the protein that is vital for the building and repair of the body's tissues, are also found in gelatine. And with vitamin C also important for collagen synthesis, scientists have shown that having the two available in the bloodstream before exercise can enhance absorption into tendons. In a study at the Australian Institute of Sport, published last year in *The American Journal of Clinical Nutrition*, researchers showed how taking a 15g dose of vitamin C enriched gelatine powder mixed into blackcurrant cordial — it also could be made into jelly — an hour before a workout had benefits for tendon injury prevention and repair.

## Daily heel raises

One exercise that studies have shown to be consistently successful in strengthening and reducing pain in afflicted Achilles tendons is the heel raise. There are various progressions — and always see a physio if in doubt (or in pain) — but start with the isometric hold. Stand sideways to a wall or support (for balance) and lift on to your tiptoes, hold for about 45 seconds and lower heels back down to the floor. "Hold the pose with the heel at different distances from the floor to gain strength through a range of positions," suggests physiotherapist Paul Hobrough, author of *Running Free of Injuries*. Repeat four times. As you become stronger, move on to concentric calf raises: place both hands on a wall and raise up on to tiptoes before lowering. Hobrough suggests 3 x 15 repetitions for three weeks.

## Shenzhen Half-Marathon embroiled in cheating scandal, more than 250 bans handed down

**More than 250 runners have been caught cheating during the Shenzhen Half-Marathon in China, with organisers handing out hundreds of bans after last weekend's race (25 November 2018).**

The majority of the bans were for runners taking shortcuts — 237 people were caught on traffic cameras cutting through bushes — while several other runners were found to be wearing fake bibs.

Organisers said those who took the shortcut would have run up to three kilometres less than the full 21.1km distance.

"We deeply regret the violations that occurred during the event," Chinese news outlet Xinhua quoted organisers as saying.

"Marathon running is not simply exercise, it is a metaphor for life, and every runner is responsible for him or herself."

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Chinese media has come down harshly on the scandal, with the People's Daily calling on runners to "respect the marathon and respect sporting spirit", while Xinhua labelled it "deeply shameful".

**"Don't run and forget why you run. Don't let the marathon turn sour," it said.**

A sharp rise in the number of events in recent years and mass participation has also been blamed for the problem.

China has held 1,072 marathons and road races this year, up from 22 in 2011, according to the Xinhua report, quoting figures from the Chinese Athletics Association.

## Training ideas

Chris Wardlaw – dual Olympian and coach of Steve Moneghetti, Kerryn McCann, Craig Mottram and numerous other top distance runners shares his views on training.

Article originally written for 'Australian Runner' magazine by Chris Wardlaw.

Training for distance is definitely not rocket science, though for middle distance it gets a little more problematic! I reckon there are a few principles that should act as a checklist for any training program from 800m through to a Marathon.

Obviously there needs to be variations on the theme depending on the distance to be raced, the time of year, key competitions and lifestyle considerations.



**Getty image from the 1978 TM race – Chris Wardlaw leading at the turn from Bill Rodgers and Toshihiko Seko.**

### Principle 1 – Run long at least once a week

This can be an hour for some, 2½ hours for others depending on the athlete, event and stage of development. Why? Long running develops aerobic endurance, muscular skeletal strength and rhythm / cadence which is so essential for the optimal stride length for the athlete at the required speed.

## Principle 2 – Run long again during the week

See Principle 1. This run would be 20 – 30% shorter than the long run.

## Principle 3 – Think in one to two year programs

So many athletes think in day to day planning or weekly. So often I hear athletes say they have put together 3 weeks. Real development comes from long strings of continuity in training.

## Principle 4 – You need to be ‘fit’ in order to ‘train’

Many, many athletes in middle distance do not get fit enough through steady continuous running to do ‘sessions’. All training is ‘sessions’. The training elements in Principles 1 and 2 are the main sessions in a week!

## Principle 5 – Use the environment

Don't hesitate to run over hills, rough ground, grass, footpaths and tracks. All the varied surfaces strengthens the muscular skeletal aspects of the athlete. Fartlek can be as beneficial as being on the track. Training on less than perfect surfaces makes putting on spikes at the track for a race a so much better ‘feel’.



**Steve Moneghett and Benita Willis training in Falls Creek Australia.**

## Principle 6 – Avoid Injury

If you follow the first 5 principles you will lower the risk of injury. Injury breaks continuity ... fitness is harder to build... training is then dangerous. Training through an injury is madness. Days off early when an injury is present can save months later. If something does not warm up then... stop.

## Principle 7 – Travel light

Gravity does not ever give up. One or two kilograms can make an incredible difference to an athlete's performance.

## Principle 8 – Look after yourself

The greatest enemy to fitness is lack of regular sleep. Eat well. Rest is training! Female athletes must be rigorous in managing their iron etc.

## Principle 9 – The hard-easy principle is found in every good program

Belt yourself each day in training and you will not get to the level you should. Recovery training is as much a part of training as a set of 400s the day before. 400s for fitness, 200s for form is a variant on this principle.

## Principle 10 – Plan the way ahead

Often athletes start with tomorrow's training or next week's race rather than looking to the goal ahead and working backwards. Rick Cooke will explain goal displacement in a future issue!! If you start at the goal next week's race may not be the best thing to do.

## Principle 11 – Beware the Super Session

I prefer to lower the risk and maximise the chances of getting to the line fit and ready by preaching moderate training (the ü factor) week upon week rather than creating a great diary entry but not getting to the line when you need to.

## Principle 12 – Enjoy your running

Be demanding on yourself but don't make it life or death. The sun will come up tomorrow .....I think!!

## Parkrun (overseas)

John Gilpin who was an early TT member, has been running Parkruns in the UK. (See attachment)

I thought I'd provide you with some mirth. See below for my 1st place in a recent parkrun in the VM70-74 category; quite a buzz for someone who always finished way down the pack! (Typically there are only two or three of us and on other occasions I've ended up both second and last.)

I've started doing parkruns more regularly when I'm in London now that Tim has found fitness as part of his family responsibilities (son Oscar and daughter on the way).

## Is There Plastic in Your Tea?



### Story at-a-glance -

Nearly all tea bags contain plastic woven through the paper to increase the durability of a product designed to stay together inside a cup of hot water for many minutes. The heat releases minute pieces of plastic from the bag, as well as phthalates. Since the bags contain plastics, they are not completely biodegradable or compostable and a spokesperson from Twinings Tea recommends tea bags should not be used in compost piles or added directly to soil.

Dangers from consuming plastics include an increased intake of phthalates, associated with hormone disruption, increased risk of miscarriage and low vitamin D levels.

By using loose leaf tea, steeped in fresh, pure water with a reusable infuser or tea strainer, you can enjoy the many benefits of tea while avoiding plastic exposure.

In the U.S., there aren't scheduled tea breaks or tea-related routines, but it is still one of the most widely consumed beverages, found in nearly 80 percent of all U.S. households.<sup>1</sup>

In 2017, Americans consumed over 84 billion servings of tea and more than 3.8 billion gallons.<sup>2</sup> Nearly 86 percent of that was black tea, followed by 13 percent green tea and the small remaining amount a mixture of oolong, white and dark teas. Multiple benefits are associated with drinking tea, including consuming antioxidants, polyphenols and a variety of minerals. Long-term tea drinking may improve blood pressure,<sup>3</sup> and studies find green tea improves brain function, staving off cognitive disorders such as dementia.<sup>4</sup> But before drinking your next cup of tea, reconsider your use of bagged tea.<sup>5</sup>

## Would You Like Some Plastic With Your Tea?

Tea bags are only slightly more convenient than using loose leaf tea, yet in 2014 nearly 77 percent of the tea made in the U.S. was prepared using [tea bags](#).<sup>6</sup> Eighty-seven percent of millennials report regularly drinking tea, and on any given day over half the American population has a hot cup of tea.

While you might imagine the U.K. claims the honour of drinking more tea than any other country, the recognition actually went to Turkey in 2016.<sup>7</sup> There are direct links to the amount of tea a person drinks and their risk of serious health problems. However, the majority of tea brewed in the U.S. is made with tea bags, most of which are made with plastic.

How tea bags are manufactured will vary depending upon the brand. Nearly 70 to 80 percent of an individual bag is made from compostable paper, while the remainder contains heat-resistant polypropylene.<sup>8</sup> This is done to help prevent the bag from breaking apart in hot water. However, this also means minute pieces of plastic are likely deposited in your drink.

The bags with the highest amount of plastic are those which are crimped and pressed shut, using heat to melt plastic to seal the bag. These are standard square, rectangular or round and crimped and pressed on all sides. Manufacturers place plastic in the paper fibres, which melt when heated to seal the tea bag shut.<sup>9</sup>

Additionally, some companies treat paper tea bags with a chemical — epichlorohydrin — to prevent tears, which has been deemed a probable human carcinogen.<sup>10</sup> It is known to react with water to form 3-MCPD, another possible human carcinogen.<sup>11</sup>

## Don't Be Fooled by Compostable or Biodegradable Labels

Manufacturers use tea bags with varying degrees of biodegradability. Some use material derived from starch treated by an enzyme to create a compound with a “plastic” character that can be spun into filaments.

As explained above, most bags, including the string and tag variety, contain [polypropylene](#) with small amounts of acrylic copolymer emulsions to prevent the bag from breaking down in hot water. But, this also means small pieces of plastic will be left in the soil if you compost the bags. A spokesperson from Twinings Tea commented:<sup>12</sup>

"We would not recommend that tea bags are used directly on the soil as a fertilizer or soil conditioner, as they are likely to take a longer time to break down. We would recommend that they are composted in a compost bin, or wormery first to optimize the availability of any nutrients for the plants."

Another type of manufactured bags are silken tea bags, often touted as an eco-friendly choice.<sup>13</sup> However, despite the name, the bags are made from fossil fuel-based nylon, which lasts forever. Although plant-based plastic is sometimes labelled biodegradable or compostable, just because it's made of plant-based plastic does not automatically mean it will biodegrade.

Biodegradable means the product can be broken down by microorganisms over time. However, there is no stipulation that no toxic residue will remain, only that the product is no longer visible.

Compostable means the product undergoes a biological decomposition and breaks down into carbon dioxide, water, inorganic compounds and biomass, leaving no [toxic residue](#). Any product making a claim of biodegradability or compostability should quote the standards used in testing, as without this the label is meaningless.<sup>14</sup>

## Dangers Associated With Plastic in Your Food

Plastic will last for hundreds of years or longer, yet most of the products using plastic are used once and thrown away. Chemical additives, used to make the plastic more durable and flexible, are also harmful to the environment and human health. Phthalates, used to make plastics more durable, are loosely bound to the product.

Have you noticed how some flexible plastic products slowly get more brittle over time? This happens as the phthalates are slowly released into the environment. Similarly, when you dip your plasticized tea bag in a cup of hot water, you speed the release of tiny plastic pieces and phthalates from the tea bag.

The dangers associated with phthalates are related to their effect on your hormonal system. They are remarkably powerful hormone disruptors, and recent research confirms they're capable of causing males in all species to develop feminine characteristics.<sup>15</sup>

Data have demonstrated pregnant women exposed to [phthalates](#) have a higher risk of miscarriage.<sup>16</sup> The chemicals have also been shown to feminize male genitals and to increase the risk of [asthma](#).<sup>17</sup>

Phthalates also have negative health effects on adults. In one study, research demonstrated a link between low levels of vitamin D and an increased intake of phthalates.<sup>18</sup> These results are important as vitamin D is essential for brain, bone and heart health. Low levels have been linked to a higher risk for [depression](#),<sup>19</sup> mental decline<sup>20</sup> and [chronic migraine headaches](#).<sup>21</sup>

Disturbingly, an alarming 10,000 chemicals are allowed to be added to food and food-contact materials in the U.S., either directly or indirectly. You'll find a discussion of the impact plastics have on your health in my previous article, "[Are These Perilous Chemicals in Your Food?](#)"

## Benefits From Tea Are Extensive

There may be good reason [black tea](#) is one of the more popular tea drinks. With each sip, it provides you with multiple antioxidants, polyphenols, tannins and various minerals with impressive health benefits. For example, black tea has been shown to:

- Improve your gut microbiome<sup>22</sup>
- Aid in weight loss<sup>23</sup>
- Regulate blood sugar
- Improve mental focus and energy levels<sup>24</sup>
- Fight free radicals,<sup>25</sup> thereby improving cardiovascular health<sup>26</sup> and reducing your risk of cancer<sup>27</sup>

High quality [green tea](#) is also well-recognized for its disease prevention and antiaging properties. Polyphenols may account for up to 30 percent of the dry leaf weight of green tea, including flavonoids and catechins. One of the most powerful catechins is epigallocatechin-3-gallate (EGCG).

EGCG has been found to positively impact a number of conditions, including obesity, Type 2 diabetes, heart disease and cancer. EGCG also helps prevent plaque formation in your arteries and brain, enhances brain function and prevents age-associated brain degeneration.<sup>28</sup>

Oolong tea is neither a black or green tea but is produced from the *Camellia sinensis* plant. What sets the four true teas apart (black, green, white and oolong) is their degree of fermentation.

[Organic oolong tea](#), made from the buds and stems of the plant, is described as "slightly fermented and semi-oxidized,"<sup>29</sup> and as a result has a taste that falls between green tea and black tea. Oolong tea offers many of the same benefits of green and black tea. It is rich in antioxidants polyphenols, accounting for oolong tea's positive effects.

## Brewing Loose Leaf Tea for a Perfect Cup

Due to limited space, tea bags often are filled with leftover smaller leaves and dust produced when higher grade loose leaf tea is gathered. When you brew full leaf loose tea, there is room for the leaves to unfurl and move freely in the water, resulting in a more full-flavored, richer taste.

Loose leaf tea is also better for the environment as bags are not fully biodegradable or compostable. Brewing the perfect cup of loose leaf tea takes only a minute or two longer than using a packaged bag. It's all about getting timing, temperature and duration right for the variety of true or herbal tea you're brewing.<sup>30</sup>

For instance, naturopath and founder of Bodhi Organic Tea, Lisa Guy, recommends brewing white and green teas at 158 F (70 C) and black tea at 185 F (85 C). Amino acids, responsible for the rich flavour, are released at lower temperatures. Steeping tea for a long period of time or using boiling water will increase the amount of tannins and result in a more astringent or bitter flavor.<sup>31</sup>

Brewing a flavourful pot of tea begins with [fresh, pure water](#). To ensure the right temperature, either turn off the kettle before boiling or pour boiling water into a glass or ceramic cup, allowing it to cool before adding the tea leaves. Avoid using metal as it can give the tea an unwanted flavor.<sup>32</sup>

Add about 1 teaspoon of tea or herbs for every 6-ounce cup you plan to drink. Loose tea can be steeped in a reusable infuser or tea strainer.<sup>33</sup> Timing is also important. Guy recommends white tea should be steeped for one to three minutes, while green tea should steep for one to two minutes. Black tea will infuse the water with full flavour in just 45 seconds to one minute.<sup>34</sup>

Overall, tea is part of a healthy diet. Although some studies use far higher amounts of EGCG than you'd be able to comfortably get from drinking tea, if you enjoy it, a few cups a day is certainly a healthy and flavourful addition. Just be sure to drink your tea "straight," as adding milk and/or sugar will counter many of the benefits. Lemon juice, on the other hand, will enhance the antioxidant content.

## Experts share their verdict on the 10,000 step challenge



**Fact or fiction: Do we really need 10,000 steps a day for health? Photo: Getty**

Over the years, the popularity of wrist-worn fitness trackers has exploded and inspired an entire generation of step counters who strive for the magic 10,000 a day.

Most fitness trackers such as the Fitbit or Apple Watch will encourage users to take the 10,000 step challenge, which is not surprising in the least considering the recommendation was born out of a marketing campaign to promote the world-first pedometer.

“At the time, [Japanese] researchers determined that the average person took 3500-5000 steps per day,” accredited exercise physiologist Brendan Cummins told The New Daily.

“Dr Yoshiro Hatano and his team determined that walking 10,000 steps per day meant burning a 20 per cent of caloric intake through activity, which meant an extra 500 calories expenditure per day.

“This led to the first pedometer devices being manufactured, and they were called ‘Manpo-kei’ or the 10,000 steps measure.”

Since then, this seemingly arbitrary figure has turned into much more than marketing gold. Many published studies have gone on to show the benefits of the 10,000-step message in promoting physical activity.

Fitness trackers provide many people with that extra bit of motivation when it’s needed most, and some official health groups such as the Heart Foundation have embraced this basic premise by incorporating step counting into their [healthy living message](#).

[One study](#), cited by the World Health Organisation (WHO), found research participants walked more when recommended to take 10,000 steps a day compared to those who were advised to take a 30-minute walk.

Some studies have gone further and shown a link between the number of steps we take (or don’t take) and actual health outcomes.

“Achieving 10,000 steps is a good goal, with several studies showing that achieving this figure reduces all sorts of health risks, including depression” Mr Cummins said.

“Sitting time or being sedentary for too long without breaks is a big health risk, irrespective of ‘formal’ activity levels.”

An [Australian study](#) found women who achieved more than 7,500 steps per day had a 50 per cent lower prevalence of depression than women taking less than 5000 steps per day (proving an association between the two factors, rather than cause-and-effect).

[Another study](#) in postmenopausal women found that the research participants who took up to 10,000 steps had significantly lower BMI than women who took fewer than 5000 steps a day.

But given its marketing origins, the 10,000 figure has been questioned by some health experts and scientists. In June, UK public health official Mike Brannan said the target “is believed to come from a pedometer manufacturer in Japan” and that “there’s no health guidance that exists,” he told reporters.

Dr Ben Ewald from the Centre for Clinical Epidemiology and Biostatistics at the University of Newcastle said that most people would still benefit from increasing their daily steps, regardless of the count.

“A good target for a health benefit is 2000 steps or 4000 steps more than what they’re currently doing,” he told *The New Daily*.

“If someone is currently only doing 4000 steps a day, if they can push that up to 6000 steps a day that’s a benefit.

“For young otherwise healthy active people, 10,000 steps is a good target. If they can get to 12,000 steps that would be even better for them.”

His research has found that people could cut the time they spend in hospitals by walking an extra 4300 steps, or the equivalent of three kilometres, per day. Published in the [Medical Journal of Australia](#), the research involving people aged 55 and over showed that annual hospital days dropped by 9 per cent for every 1000 extra daily steps.

“The step counter baseline reduces their chance of ending up in hospital and needing hospital care over the subsequent 10 years,” he said.

“We also did some analysis of whether there was any threshold in which step counters start to make a difference, and that turned out to be a bit variable depending on which health outcome you were looking at, such as cholesterol level, body weight, glucose levels.”

Dr Ewald said some health outcomes improved when the number of steps increased up to 15,000 per day. However, other benefits plateaued once someone reached 8000 steps.

Adding to this complexity are some other factors. First, the 10,000 rule does not factor in exercise intensity. Walking on a flat surface might have different health outcomes to huffing and puffing up and down a hill over the same number of steps. Second, not all devices read the same – although the technology is improving.

“Some devices can give you twice as many steps, and 10,000 on a Fitbit is not necessarily the same as 10,000 on a waist-worn pedometer,” Dr Ewald said.

Mr Cummins acknowledged that there were variations in activity tracking device accuracy, “but not enough to suggest they are not worth an investment”.

Finally, walking and running are not for everyone.

For example, people who have knee or joint pain may be better off shifting their energy to other aerobic exercises such as cycling or swimming, Dr Ewald said.

Overall, he stressed that maintaining an adequate level of physical activity was more important than obsessing over a particular figure.

“What I tell people is to do the type of exercise that they enjoy, and that they’ll keep on doing,” Dr Ewald said.

“If they just do it for a week or a month, that’s not beneficial. It should be a lifelong habit. If people like swimming, they should get swimming. If they hate swimming, there’s no point telling them they should be swimming.”

## Why Your Doctor is Wrong About Cholesterol

- Cholesterol is a waxy substance found in nearly every cell of your body and is essential to good health. It plays a role in hormone production, digestion, the manufacture of vitamin D following sun exposure, and helps protect your cell membranes
- The most concerning risk factors for cardiovascular disease are insulin resistance, Type 2 diabetes and the chronic inflammation associated with these conditions
- Other factors at play as well, such as how you eat — whether you’re rushing or taking your time — and other stress-related factors, both physical and psychological
- Damage of the interior layers of your arteries precedes heart disease, and this damage can be induced by a number of factors, including smoking, high blood pressure, elevated blood sugar and inflammation
- Once the artery is damaged, cholesterol-rich plaque begins to build up as a protective mechanism. Problems arise when the rate of damage and resultant blood clot formation outpace or outstrip your body’s ability to repair

As noted by Zoe Harcombe, Ph.D.,<sup>1</sup> “It is virtually impossible to explain how vital cholesterol is to the human body. If you had no cholesterol in your body you would be dead.”

Your liver manufactures most, about 80 percent, of the cholesterol your body requires, which in and of itself suggests your body cannot survive without it. The remaining 20 percent comes from your diet. However, dietary cholesterol is absorbed at a rate of 20 to 60 percent, depending on the individual,<sup>2</sup> and if you consume less, your body will compensate by making more and vice versa.

Animals use cholesterol in much the same way, hence beef, pork and chicken have similar levels of cholesterol, averaging 25 milligrams of cholesterol per ounce.<sup>3</sup>

[Cholesterol](#) has long been vilified as a primary cause of cardiovascular disease (CVD), yet numerous studies refute this hypothesis, demonstrating that cholesterol has virtually nothing to do with [heart disease](#) — at least not in the way conventional medicine presents it.

As noted by Harcombe, the notion that there is good and bad cholesterol is also wrong. Low-density lipoprotein (LDL) and high-density lipoprotein (HDL) are not actually cholesterol; they're carriers and transporters of cholesterol, triglycerides (fat), phospholipids and proteins.

"LDL would more accurately be called the carrier of fresh cholesterol and HDL would more accurately be called the carrier of recycled cholesterol," she says.<sup>4</sup> What's more, dietary cholesterol has no impact on the cholesterol level in your blood, so how could dietary cholesterol pose a health risk?

## Does High Cholesterol Cause Cardiovascular Disease?

In an April 16, 2018, podcast (embedded at the top of this article), Christopher Kelly with Nourish Balance Thrive interviewed Dr. Malcolm Kendrick, a British physician and author of "Doctoring Data: [How to Sort Out Medical Advice from Medical Nonsense](#)," "The Great Cholesterol Con," and "A Statin Nation: Damaging Millions in a Brave New Post-Health World."

An outline<sup>5</sup> and transcript<sup>6</sup> of the interview can be found on the Nourish Balance Thrive website. In this interview, Kendrick discusses the true cause of cardiovascular disease and "the specific environmental and psychosocial factors that cause the most harm." You can also view the video above, in which Kendrick delivers a half-hour lecture on "Why Cholesterol Does Not and Cannot Cause Heart Disease."

In short, the most concerning risk factors for cardiovascular disease are actually insulin resistance, Type 2 diabetes and the chronic inflammation associated with these conditions. However, Kendrick argues there are other factors at play as well, such as how you eat.

Americans are notorious for rushing through their meals, while some other countries, such as France, encourage a slower, more leisurely pace during meals, which may affect how the food is metabolized.

"I still think that probably is partly the case because clearly if you eat in a rushed fashion and you gobble it down and then you rush around immediately afterwards, your body is not in the correct metabolic rate to digest your food," Kendrick says,<sup>7</sup> adding:

"I was looking at some studies<sup>8</sup> from Japan where they got people to eat a meal whilst being read a boring lecture and asked to eat the same meal whilst a comedian was telling jokes. And when the comedian was telling jokes, the blood sugar level was considerably lower."

## Stress Increases Your Cardiovascular Disease Risk

Kendrick also notes the links between stress and elevations in insulin levels (as insulin is counteracted by stress hormones) and blood clotting factors, and cites data showing that death rates from cardiovascular disease parallel stressful events that affect an entire nation.

For example, in 1989, the heart disease rate skyrocketed in Lithuania, the same year the Soviet Union collapsed. This pattern can also be seen in other European countries. Meanwhile, the LDL hypothesis has failed to hold in a number of studies.

As just one example, Kendrick cites a BMJ study where they looked at LDL levels in people over 60, finding that those with the highest LDL levels actually had the lowest overall mortality, including CVD mortality.<sup>9</sup>

## For Cardiovascular Disease to Occur, There Must be Arterial Wall Damage

Kendrick has written an extensive series of articles on the cardiovascular disease process. A summary of this voluminous work can be found in "What Causes Heart Disease — Part 59,"<sup>10</sup> posted on his blog November 27, 2018. In it, he dissects the fallacies inherent in the conventional LDL/cholesterol hypothesis, and explains the thrombogenic theory of cardiovascular disease as a more reliable counterhypothesis. He writes in part:<sup>11</sup>

"For the LDL hypothesis to be correct, it requires that LDL can travel past the lining of the artery, the endothelial cells, and into the artery wall behind. This is considered the starting point for atherosclerotic plaques to form.

The problem with this hypothesis is that LDL cannot get into any cell, let alone an endothelial cell, unless that cell wants it to. We know this, for certain, because the only way for LDL to enter any cell, is if the cell manufactures an LDL receptor — which locks onto, and then pulls the LDL molecule inside. There is no other passageway. This is an inarguable fact ...

Others have argued that ... the LDL simply slips through the gaps between endothelial cells and that is how it gets into the artery wall. Again, this is impossible. There are no gaps between endothelial cells. Endothelial cells are tightly bound to each other by strong protein bridges, known as 'tight junctions.'

These tight junctions can prevent the passage of single ions — charged atoms — which makes it impossible for an LDL molecule to slip through, as it is many thousands of times bigger than an ion. This, too, is an inarguable fact. Ergo, the initiation of an atherosclerotic plaque (the underlying problem in cardiovascular disease) cannot be triggered by LDL leaking into an undamaged artery wall. Which means that, if you want to get LDL (or anything else) into the artery wall, you first must damage the endothelium/lining of the artery."

The American National Heart, Lung, and Blood Institute admits that damage of the interior layers of your arteries precedes heart disease, and that this damage can be induced by a number of factors, including smoking, high blood pressure, elevated blood sugar, inflammation and, as Dr. Zach Bush and Stefanie Seneff, Ph.D., promote: glyphosate. Once the artery is damaged, cholesterol-rich plaque begins to build up as a protective mechanism.

"However, it is what happens next, where we rapidly diverge in our thinking," Kendrick writes.<sup>12</sup> "The mainstream believes that, after damage has occurred, it is LDL, and only LDL, leaking into the artery wall that triggers a whole series of downstream reactions that lead to plaques forming.

However, once you have damaged the endothelium there is no longer a barrier to stop anything getting into the artery wall. So, why pick on LDL? You also have proteins, red blood cells, platelets and Lp(a) and VLDL. Indeed, anything in the bloodstream now has free entry."

## The Thrombogenic Theory

Kendrick presents the thrombogenic theory — initially suggested by Karl von Rokitansky in 1852<sup>13</sup> — as a counter-theory to the flawed LDL/cholesterol hypothesis. In summary, the thrombogenic theory goes as follows:

1. Endothelial damage occurs, resulting in the formation of a blood clot
2. The resulting blood clot is minimized in size by plasmin, an enzyme that breaks up blood clots
3. A new endothelial layer grows over top of the remnants of the blood clot, thereby incorporating it into the artery wall
4. Macrophages (white blood cells specializing in repair) break down and digest any remnants of the blood clot. The macrophages are in turn broken down along with their contents, and eliminated from your body through your lymph glands.

While this process leads to inflammation, it is a healthy response and not a disease state per se. Problems only arise "when the rate of damage, and resultant blood clot formation, outstrips the ability of the repair systems to clear up the mess," Kendrick explains.

So, while endothelial damage and resulting blood clotting is at the heart of cardiovascular disease, the only time this natural repair process will cause problems is when damage outstrips repair.

## Factors That Raise Your Cardiovascular Disease Risk

As noted by Kendrick, "For good health, you want to maintain a balance between the blood being too ready to clot, and the blood not clotting when you need it to."<sup>14</sup> So, what factors might lead to a situation in which the arterial damage is greater than your body's ability to repair it? Kendrick's "short list" includes over 30 factors, and there are many others. On this list are:

- Use of certain drugs, including oral steroids, omeprazole, Avastin and thalidomide
- Diseases such as Cushing's disease, Kawasaki's disease, [rheumatoid arthritis](#), [systemic lupus erythematosus](#), chronic kidney disease and acute renal failure, sickle cell disease, [malaria](#) and Type 2 diabetes, as well as bacterial and viral infections
- Acute physical and mental stress, and chronic mental stress
- Heavy metal exposure, including lead and mercury
- Certain nutritional deficiencies, including vitamins B and C deficiencies

Next there are factors that promote blood clot formation and/or inhibit the dissolution of blood clots, all of which also raise your CVD risk. Again, there are many factors that can do this, including but not limited to:

- Raised levels of lipoprotein (a), blood sugar, very low density lipoprotein (VLDL) and fibrinogen (fibrinogen binds tightly to the blood clot, creating a tough plug; with excess fibrinogen in your blood, you may end up with larger, more tough to dissolve blood clots)
- Dehydration
- Stress hormones such as cortisol
- Nonsteroidal anti-inflammatory drugs
- Acute mental and/or physical stress

Lastly, there are factors that impair your body's repair system, i.e., the formation of a new endothelial layer over the blood clot, and the clearing of debris from the blood clot, and these also raise your risk for CVD. Factors that prevent new endothelial cells from being formed include but are not limited to:

- Certain drugs such as Avastin, thalidomide, omeprazole and any drug that lowers synthesis of nitric oxide (conversely, anything that [increases nitric oxide](#) in our body will reduce your risk of heart disease<sup>15</sup>)
- Old age
- Chronic kidney disease
- [Type 2 diabetes](#)
- [Inactivity](#) (lack of exercise)

Factors that impair clearance of debris from within the arterial wall include:

- Use of oral steroids, immunosuppressant drugs, certain anti-inflammatory drugs and many anticancer drugs
- Age
- Chronic negative psychological stress

## The Role of Inflammation in Cardiovascular Disease

According to Kendrick, while chronic inflammation is recognized as a contributing factor for cardiovascular disease, not all inflammation is bad. In fact, the use of anti-inflammatory drugs (which can impair useful acute inflammation) has been linked to an increase in cardiovascular disease risk, "Which suggests that if you interfere with the healing response to arterial injury, you are going to make things worse — not better," he says, adding:<sup>16</sup>

"[T]he real reason why [chronic] inflammation is being seen as a possible cause of CVD is because inflammatory markers can be raised in CVD. To my mind this just demonstrates that in people with CVD, lots of damage is occurring, therefore there is more repair going on, so the inflammatory markers are raised.

However, the mainstream has decided to look at this from the opposite side. They see a lot of inflammation going on and have decreed that the inflammation is causing the CVD — rather than the other way around. Frankly, I think this is bonkers. But there you go.

Anyway, where has all this got us to? I shall try to achieve a quick summary. The LDL hypothesis is nonsense, it is wrong, and it does not remotely fit with any other factors known to cause CVD.

The thrombogenic theory, on the other hand, fits with almost everything known about CVD. It states that there are three, interrelated, processes that increase the risk of CVD:

- Increased rate of damage to the endothelial layer
- Formation of a bigger or more difficult to remove blood clot at that point
- Impaired repair/removal of remnant blood clot.

Any factor that does one of these three things can increase the risk of CVD ... You need to have three or four, maybe more, and then things really get going ... All of which means that — in most cases — CVD has no single, specific, cause. It should, instead, be seen as a process whereby damage exceeds repair, causing plaques to start developing, and grow — with a final, fatal, blood clot causing the terminal event."

## More Evidence Cholesterol Is Not the Enemy

The Minnesota Coronary Experiment was a study performed between 1968 and 1973 that examined the relationship between diet and heart health.<sup>17</sup> The researchers used a double-blind randomized trial to evaluate the effect of vegetable oil (high in [omega-6 linoleic acid](#)) versus [saturated fats](#) in coronary heart disease and death.

The results were left unpublished until 2016, when they appeared in the BMJ. An analysis of the collected data revealed lowering your cholesterol levels through dietary intervention did not reduce your risk of death from coronary heart disease. According to the researchers:<sup>18</sup>

"Available evidence from randomized controlled trials shows that replacement of saturated fat in the diet with linoleic acid effectively lowers serum cholesterol but does not support the hypothesis that this translates to a lower risk of death from coronary heart disease or all causes.

Findings from the Minnesota Coronary Experiment add to growing evidence that incomplete publication has contributed to overestimation of the benefits of replacing saturated fat with vegetable oils rich in linoleic acid."

The researchers found that for every 30-point drop in total cholesterol, there was a 22 percent increase in the risk of death from cardiac disease. On autopsy, the group eating vegetable oil and the group eating saturated fat had the same amount of atherosclerotic plaques in their arteries, but the group eating saturated fat experienced nearly half the number of [heart attacks](#) as the group eating vegetable oil.

Similarly, a scientific analysis<sup>19</sup> of three large reviews published by statin advocates (which attempted to validate the current belief that statin treatment helps prevent cardiovascular disease) concluded the three studies in question failed to satisfy criteria for causality and drew faulty conclusions. Specifically, the authors found:<sup>20</sup>

There was no association between total cholesterol and the degree of atherosclerosis severity

Total cholesterol levels are generally not predictive of the risk of heart disease and may be absent or inverse in many studies

In many studies LDL was not associated with atherosclerosis and in a large U.S. based study of nearly 140,000 patients who suffered an acute myocardial infarction, LDL levels at the time of admission were lower than normal

Adults over the age of 60 with higher LDL levels generally live longer

Few adults who experience familial hypercholesterolemia die prematurely

The researchers concluded that high cholesterol levels cannot be the main cause of heart disease as those with low levels have nearly the same degree of sclerosis as those with high levels, and the risk of having a heart attack is the same or higher when cholesterol levels are low.

They believe the hypothesis has been kept alive by reviewers using misleading statistics and excluding results from unsuccessful trials while ignoring numerous contradictory observations.<sup>21</sup> For a description of other studies debunking the saturated fat myth, often linked closely to increasing cholesterol levels, see my previous article, "[The Cholesterol Myth Has Been Busted — Yet Again.](#)"

## Why Statin Drugs Are Ill Advised for Most

While the dietary guidelines for Americans no longer focus on reducing dietary cholesterol to protect your heart, and U.S. cholesterol treatment guidelines have stopped using total cholesterol as a measure of heart disease risk, honing in on elevated LDL cholesterol instead, we're still far off the mark when it comes down to how to best prevent heart disease.

Refined sugar and processed fructose are in fact the primary drivers of heart disease, so that's where the focus needs to be — not on driving down your cholesterol with the aid of a statin drug (and/or avoiding healthy saturated fats in your diet).

The only subgroup that might benefit from a statin are those born with a genetic defect called familial hypercholesterolemia, as this makes them resistant to traditional measures of normalizing cholesterol.

There are many important reasons why you should not take a statin drug unless you have this genetic defect, including but not limited to the following. For more information about each of these, see "[5 Great Reasons Why You Should Not Take Statins.](#)"

### 1. They don't work as advertised

— A 2015 report<sup>22</sup> published in the Expert Review of Clinical Pharmacology concluded that statin advocates used a statistical tool called relative risk reduction to amplify statins' trivial beneficial effects. If you look at absolute risk, statin drugs benefit just 1 percent of the population. This means that out of 100 people treated with the drugs, one person will have one less heart attack.

Another systematic review<sup>23</sup> published that same year concluded that in studies where death was the primary prevention endpoint, statins taken for up to six years postponed death by 5 to 19 days. In secondary prevention trials, death was postponed by 10 to 27 days.

Median postponement of death for primary and secondary prevention was three and four days respectively. When you consider the many health hazards associated with these drugs, this minuscule benefit hardly warrants statin treatment.

### 2. They deplete your body of CoQ10

— Statins block HMG coenzyme A reductase in your liver, which is how they reduce cholesterol. This enzyme also makes CoQ10, which is an essential mitochondrial nutrient that facilitates ATP production.

As noted in a 2010 study,<sup>24</sup> "Coenzyme Q10 is an important factor in mitochondrial respiration," and "Primary and secondary deficiencies of coenzyme Q10 result in a number of neurologic and myopathic syndromes." Since they impair your mitochondrial function, they could potentially affect any number of health problems, as without well-functioning mitochondria, your risk for chronic disease increases significantly.

### 3. They inhibit the synthesis of vitamin K2,

a vitamin that protects your arteries from calcification.

### 4. They reduce ketone production<sup>25</sup>

— If you take CoQ10 while on statins you still have not solved the problem, as the same enzyme (HMG coenzyme A reductase) also inhibits your liver's ability to produce ketones, water-soluble fats that are essential to keep your body metabolically flexible. Ketones are also important molecular signalling molecules. So, statins make it virtually impossible to achieve [nutritional ketosis](#).

### 5. Because of 2, 3 and 4, statins increase your risk for other serious diseases. Including:

Liver problems<sup>30,31</sup> to statin-induced CoQ10 deficiency

Heart failure — Primarily due to statin-induced CoQ10 deficiency

Cancer — Research<sup>28</sup> has shown that long-term statin use (10 years or longer) more than doubles women's risk of two major types of breast cancer: invasive ductal carcinoma and invasive lobular carcinoma

Diabetes — Statins have been shown to increase your risk of diabetes via a number of different mechanisms, two of which include increasing your insulin resistance, and raising your blood sugar.

Neurodegenerative diseases

Musculoskeletal disorders and motor nerve damage — Research<sup>29</sup> has shown that statin treatment lasting longer than two years causes "definite damage to peripheral nerves."

Cataracts

## Crucial and Recommended Nutritional Supplements if Taking a Statin

If you decide to take a statin, make sure you take CoQ10 or ubiquinol (the reduced form) with it. One study evaluated the benefits of CoQ10 and selenium supplementation for patients with statin-associated myopathy.<sup>32</sup>

Compared to those given a placebo, the treatment group experienced significantly less pain, decreased muscle weakness and cramps, and less fatigue. A vitamin K2 supplement is also highly recommended. MK-7 is the form you'll want to look for in supplements; it's extracted from the [Japanese fermented soy product called natto](#).

## Newer Cholesterol Drugs Are Not Safer

Also, beware of a newer class of cholesterol absorption inhibitors called [PCSK9 Inhibitors](#).<sup>33</sup> PCSK9 is a protein that works with LDL receptors that regulate LDL in the liver and release LDL cholesterol into the blood. The inhibitors block that protein, thus lowering the amount of LDL circulating in your blood; in clinical trials, these drugs lowered LDLs by about 60 percent. However, as discussed earlier, LDL has no direct bearing on your CVD risk.

What's more, while these drugs are being touted as the answer for those who cannot tolerate some of the side effects of the other drugs, such as severe muscle pain, trials have already discovered that PCSK9 inhibitors can produce "neurocognitive effects," with some patients experiencing confusion and attention deficits.<sup>34</sup> There's evidence suggesting these drugs may actually be even more dangerous than statins.

## Assessing Your Heart Disease Risk

As you evaluate your risk of cardiovascular disease, there are specific ratios and blood level values that will tell you much more than your total cholesterol number. For example, an [NMR LipoProfile](#), which measures the size of your LDL particles, is a far better assessment of your risk of heart disease than total cholesterol or total LDL. The following tests will also give you a better assessment of your potential risk for heart attack or CVD:

- **Cholesterol ratios** — Your HDL/cholesterol ratio and triglyceride/HDL ratio is a strong indicator of your risk. For your HDL/cholesterol ratio divide your HDL by your total cholesterol and multiply by 100. That percentage should ideally be above 24 percent. For your triglyceride/HDL ratio divide your triglyceride total by your HDL and multiply by 100. The ideal percentage is below 2 percent.
- **Fasting insulin level** — Sugar and carbohydrates increase inflammation. Once eaten, these chemicals trigger a release of insulin, promoting the accumulation of fat and creation of triglycerides, making it more difficult for you to lose weight or maintain your normal weight. Excess fat around your midsection is one of the major contributors to heart disease.<sup>35</sup> Your [fasting insulin level](#) can be determined by a simple, inexpensive blood test. A normal fasting blood insulin level is below 5 microunits per millilitre (mcU/ml), but ideally, you'll want it below 3 mcU/ml. If your insulin level is higher than 3 to 5, the most effective way to optimize it is to reduce net carbs.
- **Fasting blood sugar level** — Studies have demonstrated people with higher fasting blood sugar levels have a higher risk of heart disease.<sup>36</sup> In fact, when your fasting blood sugar is between 100 and 125 mg/dl, your risk of coronary artery disease increases to 300 percent more than those whose level is below 79 mg/dl.<sup>37,38</sup>
- **High sensitivity C-reactive protein (HS-CRP)** — This is one of the best overall measures of inflammation and an excellent screen for your risk of heart disease. Ideally your level should be below 0.7 and the lower the better.
- **Iron level** — Iron creates an environment for oxidative stress, so excess iron may increase your inflammation and increase your risk of heart disease. An ideal [iron level](#) for adult men and non-menstruating women is between 40 and 60 nanograms per millilitre (ng/ml). You do not want to be below 20 ng/ml or above 80 ng/ml.

The simplest and most efficient way to lower your iron level if elevated is to donate blood. If you can't donate, then therapeutic phlebotomy will effectively eliminate the excess iron. Heavy metal detoxification will also naturally reduce high iron.

## How to Avoid Heart Disease

In closing, remember that high total cholesterol and even high LDL are insignificant when trying to determine your heart disease risk, and dietary cholesterol and saturated fat are not contributing factors.

Probably the best predictor for CVD is your insulin sensitivity. Considering how insulin resistance drives chronic disease in general, not just heart disease, I strongly recommend measuring your fasting insulin on a regular basis and taking immediate action if you find yourself inching toward insulin resistance.

As for preventing or reversing insulin resistance, the following general guidelines will set you on the right track:

1. Dramatically reduce your net carbs and eliminate processed fructose, as this is what set this cascade of metabolic dysfunction into motion in the first place. Replace the lost calories with higher amounts of healthy fats, not protein. My [optimized nutritional plan](#) can guide you through this process.
2. Normalize your omega-3-to-omega-6 ratio. Most get far too little omega-3, found in fatty fish such as [wild Alaskan salmon](#), sardines, anchovies, fish oil and krill oil, and too much omega-6, as it is plentiful in processed vegetable oils and hence processed and fried foods.
3. [Optimize your vitamin D level](#) by getting regular, sensible sun exposure. Other nutrients of importance include magnesium and vitamins K2 and C.
4. Get eight hours of high quality sleep each night to normalize your hormonal system. Research has shown sleep deprivation can have a significant bearing on your insulin sensitivity.
5. Get regular exercise, as it is a powerful way to help normalize your insulin sensitivity.

## Is Aerobic Exercise the Key to Successful Aging?



Aerobic activities like jogging and interval training can make our cells biologically younger, according to a noteworthy new experiment. Weight training may not have the same effect, the study found, raising interesting questions about how various types of exercise affect us at a microscopic level and whether the differences should perhaps influence how we choose to move.

There is mounting and rousing evidence that being physically active affects how we age, with older people who exercise typically being healthier, more fit, better muscled and less likely to develop a variety of diseases and disabilities than their sedentary peers. But precisely how, at an interior, molecular level, exercise might be keeping us youthful has not been

altogether clear. Past studies have shown that exercise alters the workings of many genes, as well as the immune system, muscle-repair mechanisms and many other systems within the body.

Some researchers have speculated that the most pervasive anti-aging effects of exercise may occur at the tips of our chromosomes, which are capped with tiny bits of matter known as telomeres. Telomeres seem to protect our DNA from damage during cell division but, unfortunately, shorten and fray as a cell ages. At some point, they no longer safeguard our DNA, and the cell becomes frail and inactive or dies.

Many scientists believe that telomere length is a useful measure of a cell's functional age.

But researchers also have found that telomeres are mutable. They can be lengthened or shortened by lifestyle, including exercise. A [2009 study](#), for instance, found that middle-aged competitive runners tended to have much longer telomeres than inactive people of the same age. Their telomeres were, in fact, almost as lengthy of those of healthy, young people. But that study was associational; it showed only that older people who ran also were people with extended telomeres, not that the exercise necessarily caused that desirable condition.

So for the [new study, which was published in November in the European Heart Journal](#), many of the same scientists involved in the 2009 study decided to directly test whether exercise would change telomeres. They also hoped to learn whether the type and intensity of the exercise mattered.

The researchers began by recruiting 124 middle-aged men and women who were healthy but did not exercise. They determined everyone's aerobic fitness and drew blood to measure telomere length in their white blood cells (which usually are used in studies of telomeres, because they are so readily accessible). They also checked blood markers of the amount and activity of each person's telomerase, an enzyme that is known to influence telomere length.

Then some of the volunteers randomly were assigned to continue with their normal lives as a control or to start exercising. Others started a supervised program of brisk walking or jogging for 45 minutes three times a week, or a thrice-weekly, high-intensity interval program consisting of four minutes of strenuous exercise followed by four minutes of rest, with the sequence repeated four times.

The final group took up weight training, completing a circuit of resistance exercises three times a week.



Researchers monitored people's heart rates during their workouts, and the exercisers continued their programs for six months. Afterward, everyone returned to the lab, where the scientists again tested fitness and drew blood.

At this point, the volunteers who had exercised in any way were more aerobically fit.

There were sizable differences, however, between the groups at a molecular level. Those men and women who had jogged or completed intervals had much longer telomeres in their white blood cells now than at the start, and more telomerase activity. The weight trainers did not. Their telomeres resembled those of people in the control group, having remained about the same or, in some instances, shortened during the six months.

These results would seem to indicate that exercise needs to be aerobically taxing to extend telomeres and slow cellular-level aging, says Dr. Christian Werner, a cardiologist and researcher at the University of Saarland in Germany, who led the new study.

“In the parameters we looked at, endurance exercise was clearly ahead of resistance training,” he says.

The reasons might lie with differences in intensity, he adds. “Even though resistance exercise was strenuous,” he says, “the mean pulse rate was much lower than with running,” resulting in slighter blood flow and probably less physiological response from the blood vessels themselves. Those who did resistance training would have produced less of a substance, nitric oxide, that is thought to affect the activity of telomerase and contribute to lengthening telomeres.

But the findings do not indicate that weight training does not combat aging, he says. Like the other workouts, it improved people’s fitness, he says, which is one of the most important indicators of longevity.

Over all, he says, the results underscore that differing types of exercise almost certainly lead to potentially synergistic impacts on our cells and bodily systems. In future studies, he and his colleagues would like to study the cellular effects of various combinations of endurance and strength training.

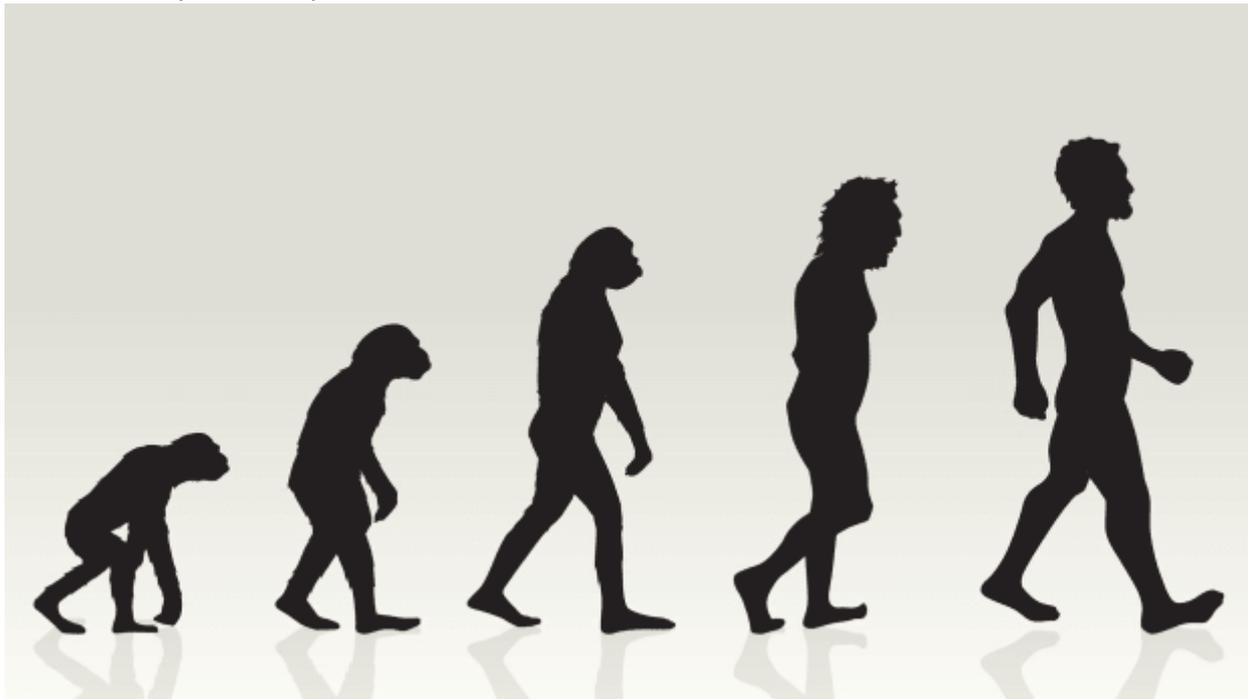
But for now, the message of the new study, he says, is that exercise of any kind may change the nature of aging, even for people who already are middle-aged. “It is not too late,” he says, “to keep your cells young.”

## Science shows how walking keeps the brain developing deep into old age

When Professor Anthony Hannan speaks on the phone at work, he gets up and walks around his office. If it's not disturbing anyone, he'll wander further afield, through the corridors of Melbourne's Florey Institute of Neuroscience and Mental Health.

Hannan is an international expert on neuroplasticity – the way neural cells in the brain change in response to experience – and he is also a great advocate for walking.

The two are inextricably linked and he takes every opportunity [to enforce incidental activity](#): "I take the stairs, I walk to get lunch and I use public transport because it forces me to walk to the train station and back."



Walking is one of the things that distinguishes us from all other animals and, according to a Harvard Medical School Review, "walking doesn't get the respect it deserves".

He says the brain is the only organ in the body that never stops developing and although it sounds extraordinary, an ordinary daily activity such as walking helps to keep it developing.

While the science supports this, it also makes good sense from the perspective of evolutionary biology.

As head of the neuroplasticity and epigenetics laboratory at The Florey, Hannan views our brains as products of our evolutionary past.

"Our genome has been evolving over millennia and we still have the same genomes as our hunter-gather ancestors who were active and not obese. Those who were not physically active, starved to death because they couldn't get enough food."

"We are maladapted for modern lifestyle. It is unnatural to sit at a desk all day. Not moving around does not fit our genetic make-up and physiology. We are just naked apes, evolved to be out on the savanna hunting and gathering."

## More complex

A sedentary lifestyle, he says, accelerates ageing of both body and brain.

We were once sedentary apes leading a relatively simple life. When we began evolving into hunter-gatherers, our lives became more complex.

As mental and physical demands increased, so our brains and nervous systems evolved to help us navigate the world. Our cognitive powers evolved while we were on foot.

Walking is one of the things that distinguishes us from all other animals and, [according to a Harvard Medical School Review](#), "walking doesn't get the respect it deserves".

While we know it is good for the body, for mechanical function and circulation and perhaps mood, the way it impacts upon the brain is just beginning to be understood.



Neuroplasticity and walking are inextricably linked.

The great muscles of the legs not only supply power to the circulatory system, they send a suite of chemicals up to the brain and take others back.

Hannan says blood flow in the brain is not a trivial issue. The vasculature is dense and it's not just a matter of plumbing and oxygen, there are many signals that the blood delivers to and removes from the brain.

While the brain is in constant cross-talk with the whole body, its chemical conversation with the muscles is conducted by tiny molecules, including those called myokines.

These molecules only began to be investigated in earnest this century. Given they are still being explored, some claims have overstated the science.



The great muscles of the legs not only supply power to the circulatory system, they send a suite of chemicals up to the brain and take others back.

## Central role

But it is agreed myokines play a central role in keeping muscle healthy and helping it adapt to an increased physical workload.

Among them are factors that promote the growth and survival of motoneurons, the nerves that help the muscles function. With physical activity, Hannan says muscles release myokines which can travel through the blood brain barrier into the brain. Stem cells capable of generating new neurons reside in the brain. Physical activity can drive growth factors into the brain to help the generation of new neurons and new connections between old neurons, which in turn may improve learning and memory and [delay the onset of dementia](#).

"So, physical activity is not just turning up the blood pump and flushing out the brain, it is sending specific signals."

He says until a couple of decades ago it was thought the adult brain was fixed and remained so – apart from age-related deterioration – throughout adulthood.

Now the brain, with its billions of interconnected neurons, is seen as a mind machine that is dynamic and responsive rather than hard-wired for life.

"We know experience and environment can also sculpt structural and functional changes in the brain and can cause growth of new neurons, as well as new connections, or synapses."

These changes can be detected structurally on MRI.

## Five pillars

Hannan describes [five pillars of brain health](#) which work alone and in concert. They are physical activity, cognitive stimulation, managing stress, sleeping well and maintaining a good diet.

There are also knock-on effects, with those who [are active tending to](#) sleep better and those who sleep better tending to be more able to deal with stress.

He became internationally known when his team became the first to show that environmental enrichment helps to slow the progression of brain disease in mice.

"We are dealt a deck of genetic cards at conception. It's our genome and there's nothing we can do about it. But we can do something about our 'envirome', our total exposure to environmental factors from conception to old age."

Physical activity can change expression of genes in the brain. This is a highly complex process and could be mediated, not only through the muscles but the immune system, the gut and the heart, he says.

Hippocrates once described walking as "man's best medicine" but today we don't really know how much of it to do, when and at what pace.

Back in 1997, a seminal review of the value of walking was published in the journal Sports Medicine. It analysed all the available evidence about this, the only sustained dynamic aerobic exercise common to everyone except for the seriously disabled or very frail.

Now, the British Journal of Sports Medicine has published a special edition on walking to mark the 21st anniversary of that review, to reflect progress in the field and see what can be upgraded for the 21st century.

"Despite the advances in neuroscience a lot remains to be understood [about walking](#) and how to best promote it at the population level," says Professor Emmanuel Stamatakis, editor of the anniversary edition.

"Advancements in the science of walking specifically have been fair but not what one would expect for an activity of the importance and potential of walking.

"Future studies that use wearables have great potential to help us better understand what would be an optimal amount of walking for people with different characteristics," Professor Stamatakis says.

It is never too late to change and he says the edition's shameless ambition is to ignite serious discussion to advance research on how to make walking the most accessible and convenient mode of transport for all.

His current advice is for people to look at their baseline and to move more, at any intensity.

"If you walk very little, make a modest increase in the first instance so you get up your daily walking to a level where you can comfortably maintain it as part of ongoing and longer-term lifestyle," he says.

"I'm not a big fan of too drastic changes because they are not sustainable in the long term for most people."

National survey data from Australia showed that only 19 per cent of adults [walk at least 10,000 steps a day](#).

Although this is an arbitrary number created as part of a marketing campaign for a Japanese pedometer in the 1960s, Stamatakis says it's a good number for most adults to aspire to.

## Lower risk

In June this year he led a collaborative study, with the universities of Cambridge, Ulster and Limerick, showing [increased walking pace is associated with longevity](#).

An analysis of over 50,000 walkers showed it was associated with lower risk of cardiovascular disease and all-cause mortality.

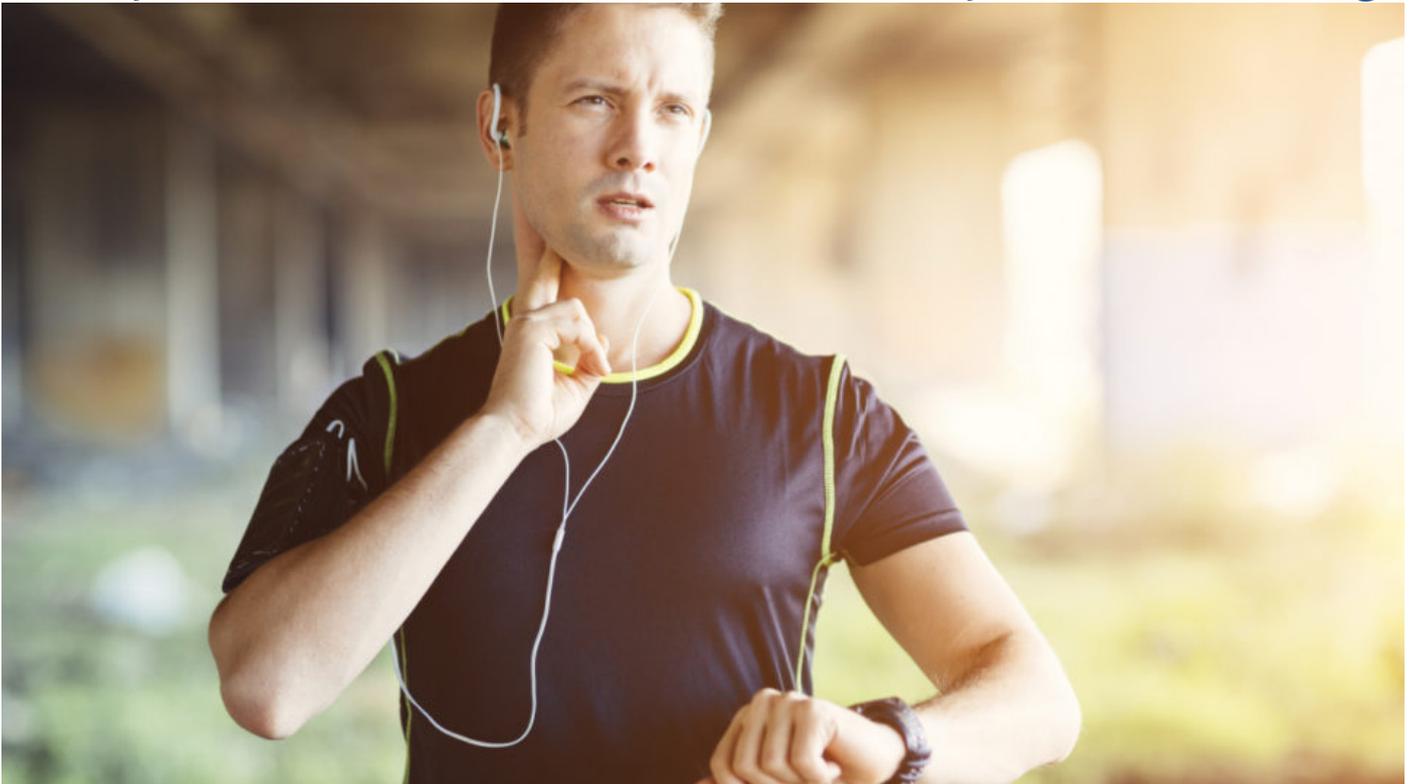
Walking at an average pace was associated with a 20 percent risk reduction of death from all causes compared with walking at a slow pace.

This rose to 24 per cent for those walking briskly or fast. The protective effects of brisk and fast walking were a lot more pronounced for those aged 60 or more.

While a fast pace is often defined as five to six kilometres per hour, this can differ considerably with individual fitness levels.

"Brisk" for many people is also a pace that makes you slightly out of breath when sustained for more than a few minutes.

## Run to your heart's content? The verdict on the safety of marathon training



Is it safe for non-athletes to start marathon training? We ask a leading sport cardiologist. Photo: Getty

One of the strongest protective factors against a heart attack is your level of fitness. But, the question playing in the back of some people's minds as they take up a new physical activity is: does too much exercise, particularly of the vigorous kind, do more harm than good?

Training for a marathon, triathlon, or other endurance event is no easy feat. Each bout of strenuous exercise puts extra pressure on the cardiovascular system, the joints, muscles and the mind.

And as an increasing number of everyday joggers take their training to the 'next level', it raises some complex and confronting questions around the safety of extreme sport.

Among the experts leading this discussion from a heart health perspective is Dr Andre La Gerche, a world-renowned sports cardiologist from the Melbourne-based Baker Heart and Diabetes Institute.

He says that the typical demographic of marathon runners has been changing in recent decades, triggering a new wave of research into this area.

"Looking at marathons 30 years ago, it was a younger, fitter population. Now it's a middle-aged and older population, often without a big history of sporting participation," Dr La Gerche tells The New Daily.

Watching from the sidelines of any marathon event, and it would seem that he's right. The typical endurance runner, with their lean, sinewy physique, is no longer the only passing figure on the challenging 42-kilometre course.

Now, it's your next door neighbour: the weekend warrior who's usually desk-bound at work; a father-of-three or your grandmother; or the guy who made it his mission to go from 'couch to 5k', and then some.

"From a public health perspective, it's a really good thing because exercise training is such a positive thing for health. But it presents some unique issues."

One of these key issues, Dr La Gerche says, is the risk of a heart attack. Over the past couple of years, he's been leading a joint Australian-Belgian study that is looking into the effects of endurance exercise on heart function, particularly in the long-term.

Some of the preliminary findings from the [Pro@Heart study](#) will be presented at the institute's Sports Cardiology Conference taking place in Melbourne next week.

Other topics at the [conference](#) by leading cardiologists include Exercise as the antidote for the ageing heart and a case study review of heart problems in middle-aged athletes.

Dr La Gerche says it's not clear if the rate of heart attacks is increasing in middle-aged athletes.

What is known, and widely accepted, is that strenuous exercise is a proven trigger for cardiac events, and if you are going to have a heart attack then training for a marathon is a high-risk time for one. (Cardiologists see more people for heart attacks while training for a marathon than during or after the actual race, Dr La Gerche says).

This is known as the exercise paradox.

“As medical researchers it’s a reminder that there are some people in that group that might have a heart attack, and it would be better if we could predict who those people will be,” Dr La Gerche says.

However, participating in regular exercise reduces a person’s risk of a heart attack in the long run. And that’s when the picture becomes muddier, for both the public and the experts.

“Regular exercise protects your heart. Your heart is stronger, and your heart arteries are less likely to become blocked.

## **You can’t outrun a heart attack, but you can reduce your overall lifetime risk.”**

But, the crux of the issue is the intensity of exercise or physical activity.

A US study published in 2000, [Triggering of sudden death from cardiac causes by vigorous exertion](#), found that the relative risk of sudden death in men during and after 30 minutes of vigorous exertion was 17 times higher than during times of lighter exercise.

The 21,481 men included in the study were in their 40s to 80s and were followed for 12 years during the study period.

However, the male participants who did regular exercise were still far better off than those who were physically inactive, the researchers found.

“Men who exercised at least five times per week had a much lower [relative] risk,” the authors wrote in the paper.

Adding a caveat that “this risk was still significantly higher than that during periods of lighter exertion or none”.

It’s this regular, light to moderate exercise that has been widely touted by official health groups and doctors for decades.

That’s the message from bestselling author and cardiologist Dr James O’Keefe Jr who barracks for the moderately-paced runner in his popular TED Talk from 2012. He suggests, that for longevity and health, runners should hit the pavement regularly, but not too hard or fast, and for fun and enjoyment more often than not.

Australia’s official physical activity [guidelines](#) recommend that adults work their way up toward five hours of moderate intensity physical activity, or up to 2.5 hours of vigorous intensity exercise per week.

Dr La Gerche says that people can successfully take up marathon events in middle-age or older. Not only can they achieve this goal safely, he argues, but it will also have a positive impact on their cardiovascular health.

## **Spotting the top warning signs**

Experts from both sides agree that getting active far outweighs not doing anything at all, but there are some important warning signs to look out for.

Chest pain: “We regard chest pain as anything from about the nose to the knees, because it can present in funny ways,” Dr La Gerche says

Pay particular attention to any chest pain that presents while exercising but goes away at rest

Shortness of breath, especially if it suddenly worsens

Heart palpitations or irregular heart rhythm

Light-headedness or a feeling that you’re going to pass out while exercising

Dr La Gerche says that people should take these symptoms seriously, even if it feels as though the symptoms are minor or unrelated.

“The one that always shakes me is the person who has had clear symptoms and thought, ‘that can’t be my heart because I’m too fit’.”

He advised that people 45 and over have their cholesterol and blood pressure checked, regardless of fitness level, pacing your training efforts over a longer period, rather than overexerting yourself, and seeing a doctor if you notice any symptoms.

“There’s a lot of reasons to be fit, a lot of reasons to train, but it’s not an insurance policy,” he says.

“If people get into sport in a sensible and educated way, overall they’re safe, and if they develop any symptoms or any concerns that’s when they need to see their doctor.”

## Eight simple tests to check your fitness



**The squat** test predicts overall cardio-respiratory fitness, flexibility and strength.

After the marathon of festive indulgence, it is worth considering the fallout. Many of us are less fit than we think and, with the toll that the festive season has just taken on our bodies, January presents a mountain to climb in terms of returning to a respectable state of health.

“A lot of people would be surprised to learn that they would be classified as having a sedentary lifestyle, but inactivity is widespread,” says John Brewer, professor of applied sport science at St Mary’s University in Twickenham, London. “And levels of inactivity often slump to a new low around Christmas.”

Keeping tabs on your fitness levels is one way to stay on track. Exercise scientists have come up with several new tests to assess your status, and there are a couple of classics that will provide a great snapshot of your health. Brewer suggests doing the following tests every four to six weeks and keeping a log of the results. “They are a test, not a method of training, so don’t expect the test itself to get you fit,” he says. “You need to exercise regularly to see improvements in scores, but they can be a great source of motivation.”

### How fast can you climb stairs?

**The test:** Time yourself climbing four flights of stairs. If you manage it in 45 to 55 seconds without stopping, you have a good fitness level. Under one minute is fine, but higher than that suggests you need to increase your gym work.

**What it predicts:** Risk of dying from cancer and heart disease.

**How it works:** Frequent stair-climbing has been linked to lowered blood pressure, reduced risk of disease and improved fitness in numerous studies.

The latest study to promote it as a must-do activity was published by the European Society of Cardiology this month after a study by a team of cardiologists from the University Hospital A Coruna in Spain. Led by the study author, Jesus Peteiro, they put 12,615 participants with known or suspected coronary artery disease through a treadmill test of their heart strength as measured by metabolic equivalents, or METs — one MET being the amount of energy needed to sit down and six METs the amount to jog slowly.

In the trial, those who could handle 10 METs of treadmill activity were deemed to have good “functional performance” and to be at a lower risk of dying from heart disease, cancer or other causes. However, a running machine isn’t necessary, the researchers emphasised; all you need is access to a flight of stairs.

“There are much cheaper ways to estimate if you could achieve 10 METs on the treadmill test,” Peteiro says. “If you can walk very fast up three floors of stairs without stopping or fast up four flights without stopping, you have good functional capacity. If not, it’s a good indication that you need more exercise.”

## How long can you stand on one leg?

**The test:** Stand with your eyes open and raise one leg off the floor. Time how long you can maintain that position. Your aim is longer than 20 seconds.

**What it predicts:** Your risk of stroke, small blood vessel damage in the brain and reduced cognitive function as you age.

**How it works:** Research published in the American Heart Association's journal *Stroke* three years ago showed how this simple test can reveal much about your cognitive function and brain health. A team from the Centre for Genomic Medicine at Kyoto University School of Medicine in Japan asked 841 women and 546 men with an average age of 67 to stand on one leg for as long as they could in three separate trials. They also had the health of their brain vessels evaluated using MRI scans.

The maximum time anyone managed the one-leg stand was 60 seconds, but those who wobbled before 20 seconds were found to have small blood vessel damage, which, said the associate professor Yasuharu Tabara, the study's author, "may indicate an increased risk for brain disease and cognitive decline".

When you can manage 20 seconds, try doing it with your eyes closed. According to the UK's Medical Research Council, a study of people in their 50s showed that those who could stand on one leg for 10 seconds with their eyes closed were the most likely to be fit and well in 13 years. If they managed only two seconds, they were three times as likely to die before the age of 66.

## How fast do you walk?

**The test:** Use an app such as Strava (or a stopwatch to time yourself over a measured distance) to find out how many kilometres you cover in an hour of walking. Your aim is a brisk pace of 5km/h to 7km/h (or 2.5km to 3.5km in a half-hour).

**What it predicts:** Your risk of heart disease.

**How it works:** In June last year, a study of 50,000 people by researchers at the University of Sydney, in collaboration with the universities of Edinburgh, Limerick and Ulster, showed that the quicker your walking pace, the lower your risk of cardiovascular disease, particularly as you get older. For the trial, the team analysed results of 11 surveys carried out on people who lived in Britain between 1994 and 2008 in which they reported their walking pace themselves. The results in the *British Journal of Sports Medicine* showed that fast walkers aged 60 or older had a 53 per cent lower risk of death from cardiovascular causes.

Walking at a brisk pace also was linked with a 24 per cent reduction in the risk of death from all causes across a 16-year period compared with dawdling, while an average pace also brought benefits, cutting the risk of mortality by about a fifth. "A fast pace is generally 5km/h to 7km/h, but it really depends on a walker's fitness levels," says Emmanuel Stamatakis from the University of Sydney's school of public health, who led the trial.

"An alternative indicator is to walk at a pace that makes you slightly out of breath or sweaty when sustained."

## Can you scratch your upper back?

**The test:** Place one hand behind the shoulder on the same side with the palm of your hand against your skin and fingers extended and the other hand behind the back, fingers extended. Ask someone to measure the number of centimetres your middle fingers are short of touching (a minus score) or overlapping each other (a plus score). Your aim is to try to get - fingertips touching.

**What it predicts:** Upper-body flexibility and postural decline.

**How it works:** Kim Saha, a physiotherapist, says that too much sitting and slouching has a terrible effect on our shoulder flexibility. "Often we are unaware that we are becoming more hunched over our phones and our desks, and that it can have an impact on our future health," Saha says.

"Failure to address a downturn in upper-body flexibility can cause serious problems and pain down the line."

Neck and shoulder problems, such as "shoulder impingement", a painful condition caused by tendons rubbing on bone in the limited space at the top of rounded shoulders, is common.

"And a hunched back puts pressure on the discs — the cushioning pads — between the bones of the lower back, so that they become compressed," Saha says. "It can cause pain in the back, neck and pelvis."

Keeping tabs on your flexibility is important, particularly for men. Researchers reporting in the *Clinical Interventions in Ageing* journal several years ago found that shoulder flexibility declines more rapidly in men than women; their results showed that, after the age of 60, women performed 20 per cent to 40 per cent better in the back-scratch test than men.

## Can you do 30 squats in under a minute?

**The test:** The aim is to perform a deep squat — lowering your bottom as close to the floor as you can — 30 times in 45 to 60 seconds.

**What it predicts:** Overall cardio-respiratory fitness, flexibility and strength.

How it works: The squat test is a favoured measure of aerobic fitness among researchers, and two studies published last year — one by a team from the National Taiwan Normal University reporting in *BioMed Research International* and the other published in the journal *PLOS One* by medical experts at the University of Florida — hailed it as also being as effective, but simpler, than treadmill walking or step-ups. It's widely used in many countries, including France, although in medical settings doctors will measure heart rate before and after the test to calculate your maximal oxygen uptake.

“Maintaining your ability to do squats is very important as you get to middle age and beyond,” says Dalton Wong, founder of Twenty Two Training.

“Performed in quick succession, they will work your heart and lungs, but the exercise also engages the major muscles in the lower body, improving posture, strength and range of movement.”

## How fat are you?

The test: Calculate your BMI (body mass index) by dividing your weight (in kilograms) by the square of your height (in metres). Below 18.5 is underweight, 18.5 to 24.9 is healthy, above 24.9 is too heavy, and above 30 is obese.

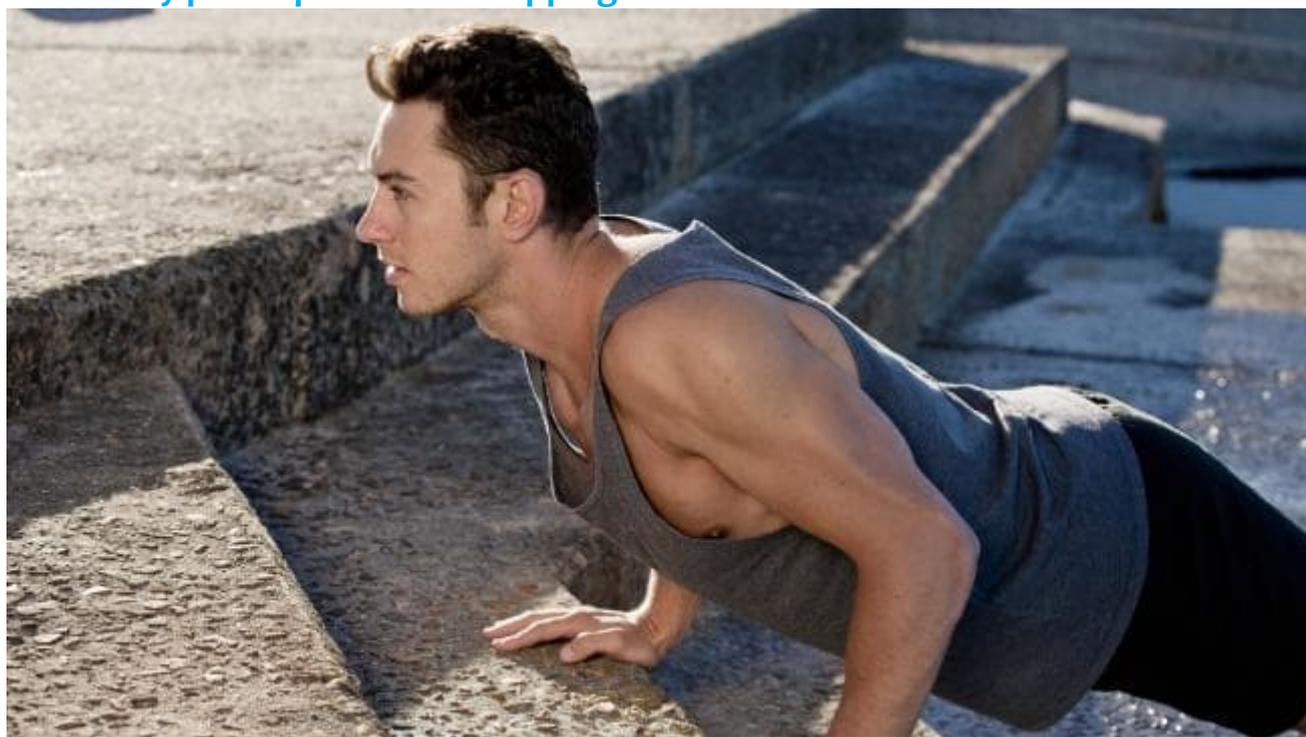
What it predicts: Your overall health risk.

How it works: Using BMI as a measure of fitness and health drifts in and out of vogue in the medical profession.

It's controversial because it doesn't take into account muscle mass and distribution, but the latest study, conducted by epidemiologists at the University of Bristol, suggests that it is as accurate as fat testing for predicting some health problems. Joshua Bell, who led the study, analysed a trial of 2840 people and found that those who had a higher total body fat and a high BMI at ages 10 and 18 were linked with “damaging levels of cardiometabolic traits”, such as raised blood pressure and adverse cholesterol and inflammatory profiles, when they reached adulthood.

“BMI is often criticised,” Bell says. “Our study asked how useful it really is for detecting the health effects of obesity by pitching it against more objective body scan measures.” He says that the results, published recently in the *Journal of the American College of Cardiology*, confirmed that “simple BMI gives very similar answers to more detailed measures” yet costs “virtually nothing”.

## How many push-ups without stopping?



The test: Perform as many consecutive full push-ups as you can without stopping, then compare your score with the American College of Sports Medicine tables below.

What it predicts: Cardio-metabolic health and frailty or risk of falling as you get older.

How it works: “Push-ups are a measure of strength endurance, a combination of pure strength and the sort of endurance you need for aerobic exercise like running, swimming and cycling,” Brewer says. “Because they engage muscles in the legs, core and upper body, push-ups are considered a supreme all-round exercise and your ability to perform them is a good pointer towards your overall fitness.” If you are unable to do a full press-up, try modified ones with your knees on the ground.

## Scores

Ages 20 to 29:

Men: 36 (excellent), 28 (good),  
16 (needs improvement)

Women: 30 (excellent), 20 (good), 9 (needs improvement)

Ages 30 to 39

Men: 30 (excellent), 21 (good),  
11 (needs improvement)

Women: 27 (excellent), 19 (good),  
7 (needs improvement)

Ages 40 to 49

Men: 25 (excellent), 16 (good),  
9 (needs improvement)

Women: 24 (excellent), 14 (good), 4 (needs improvement)

Ages 50 to 69

Men: 21 (excellent), 10 (good),  
6 (needs improvement)

Women: 21 (excellent), 10 (good),  
1 (needs improvement)

Ages 60 to 69

Men: 18 (excellent), 10 (good),  
4 (needs improvement)

Women: 17 (excellent), 11 (good),  
1 (needs improvement).

## The sit-and-rise test

The test: Stand upright with clear space around you. Without leaning on anything, lower yourself to a sitting position on the floor. Then stand back up, trying not to use your hands, knees, forearms or sides of your legs.

Start with 10 points and subtract one point for putting a hand, forearm or knee on the floor and another point for putting a hand on your knee. If you lose balance subtract 0.5 of a point. Tally your final score.

What it predicts: Flexibility, balance, muscle strength and longevity.

How it works: Brazilian scientists reporting in the *European Journal of Preventive Cardiology* in 2012 used this simple test to predict the longevity of more than 2000 people aged 51 to 80.

Those who scored fewer than eight points in the test were found to be twice as likely to die within the next six years compared with those who scored a higher number of points.

People who scored three or fewer points were more than five times as likely to die within the same period compared with those who scored more than eight points.

## Meet the average-sized American

Meet the average American man. He weighs 89.8 kilograms and stands 1.75-metres tall. He has a 102-centimetre waist, and his body mass index is 29, at the high end of the "overweight" category.

The average woman? She is roughly 1.6 metres tall and weighs 77.5 kg, with a 99 centimetre waist. Her BMI is close to 30.

That's not at all how Americans used to look. New data shows men and women gained a whopping 10.8 kilograms on average from 1960 to 2002; through 2016, men gained an additional 3.6 kilograms, and women another 3.1 kilograms.

The [new report](#), published by the National Centre for Health Statistics, contains some remarkable insights into changes in the American body in recent decades.

In 1999, white men averaged 87 kilograms, and black men, 85.7 kilograms. By 2016, the average white man weighed 91.6 kilograms, and the average black man, 90 kilograms.

Average waist size among white men increased to 102 centimetres in 2016 from 99 centimetres in 1999, and among black men to 99 centimetres from 96.5 centimetres.

An average woman in 1999 weighed 74.4 kilograms and had a 91.4 centimetre waist. Black women averaged 84.4 kilograms in 2016, almost unchanged since 1999. But the average white woman weighed 73.5 kilograms in 1999 and 77.6 kilograms in 2016.

Average waist size among black women in 2016 rose to 102 centimetres from 99 centimetres in 2016, and among white women to 96.5 centimetres from 91.4 centimetres.

## Hispanic data

The CDC has data on Hispanics beginning only in 2007, when Hispanic men weighed on average 83.5 kilograms. By 2016, the figure was 86.6 kilograms. The average Hispanic woman in 2016 weighed 76.6 kilograms, compared with 73 kilograms in 2007.

Among all men, age-adjusted mean height increased to 1.763 metres in 2005 from 1.758 metres in 1999, and then decreased to 1.755 metres by 2016. The decrease may result from an increasing population of Mexican-American men, whose average height in 2016 was 1.689 metres.

Black men's average height decreased to 1.755 metres in 2016 from 1.76 metres in 2005. Women's average height did not change significantly over the period.

"People tend to over-report their height and underreport their weight," said senior author, Cynthia Ogden, an epidemiologist at the CDC. The new figures, she noted, are the result of actual measurements.

## Why running shoe designers may have been getting it wrong for years

Even the most high-tech running shoe could be failing to help you run better, following surprising research from Queensland scientists.

A team from the University of Queensland has been looking into how a group of small muscles in the foot - the plantar intrinsic muscles - affect how we walk and run.

UQ researcher Glen Lichtwark said they had been expecting to find the muscles activated during walking and running, but instead found the opposite.

"We took the muscles away by applying a nerve-block to the foot," Professor Lichtwark said.

"When we did this and measured how the foot deforms when it hits the ground, nothing really changed,"

"We found that if you're standing up and balancing, when you don't have a lot of force put through the feet then the muscles do have a lot to do with affecting how the arch works.

"But as soon as we go to the high forces of walking and running the muscles just aren't strong enough to influence how the arch of the foot works."

Professor Lichtwark said the finding could change the way foot injuries were treated, and how running shoes were developed.

"If we're going to develop treatments to treat plantar fasciitis or develop new shoes to minimise the shock which is going through our feet, then it's really important to know what these muscles do," he said.

"So now we know it's more of a passive structure which is supporting the arch of the foot, it becomes easier to design an assistive device which prevents the arch from deforming too much and being damaged."

Many people may be surprised scientists are still finding out how the human foot works, but Professor Lichtwark said a lot about the way muscles and ligaments interact in the body remains a mystery even now, and findings opposite to what researchers had been expecting can lead them to exciting innovations.

However, one of the key problems was trying to get volunteers for study.

"For these very small muscles, to measure when they turn on and off, we need to stick really small needle electrodes into the foot to measure the muscle activity," he said.

"They're really hard measurements to do - firstly you need to find participants who are willing to have needles stuck into their feet."

Despite that high bar, Professor Lichtwark said the study, conducted in association with the University of Exeter in the UK, had been a success, and provided valuable insight into how the foot operates.

**Please note. I hope you realise any medical views are not my own, some may reflect my interest in the subject. Alan**