

FAST FORWARD

JUST HOW DIFFERENT WILL RUNNING BE 20 YEARS FROM NOW? RW ASKS THE EXPERTS TO DUST OFF THEIR CRYSTAL BALLS AND GIVE US A GLIMPSE OF THE FUTURE

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Our 20th birthday isn't just a time to reminisce over the last two decades. What about the next 20 years? New technology and research into running are gathering momentum, while obesity is ready to crush the Western world. So, will the next two decades bring a revolution in how we approach humankind's most natural form of exercise? Will we uncover the Holy Grail of perfect technique? Will our training plans be tailored to our DNA? And will world records continue to tumble? We asked the most informed names in running to share their vision of what the year 2033 holds.

THE PERFECT WAY TO RUN

'Barefoot running will become less and less relevant, as research needs to find a prescribed biomechanical technique for running that is not yet defined,' says Lee Saxby, one of the world's leading running coaches. 'This is what will occupy future academia and research, and hopefully there can be some agreement in biomechanics and physics, as with the perfect golf swing or swimming stroke. Running does not yet have that template, but if research does lead us to find it then great things will happen. With a template that helps avoid injury, running will be the cheapest, most accessible form of exercise for humankind.'

INJURIES - A THING OF THE PAST?

Saxby isn't alone in seeing the perfect form template as the future, and other leading experts also believe this, rather than shoe technology, will provide the answer to our injury crisis. 'Improvement in injury-prevention lies in the development of skill, where technique is a leading element,' says Dr Nicholas Romanov, top coach and inventor of the Pose method. 'This has been overlooked and underestimated over the last half-century.'

Daniel Lieberman, professor of evolutionary biology at Harvard University, concurs: 'I strongly believe that running is a skill, and how someone runs is more important than what they wear on their feet. We need to open the black-box relationships between variations in movement and variations in the forces that act on tissues, which can cause injury.'

This vision of research into form unravelling the mysteries of injury is also shared by Dr Irene Davis, director of the Spaulding National Running Centre at Harvard Medical School. 'The next 20 years should bring a greater understanding of why we get injured,' says Davis. 'Hopefully there will be more funding to study prevention. Will we have cured running injuries by 2033? I don't think so, but we'll have identified more answers.'

Davis believes research should (and will) focus on footstrike. 'Though the topic is still hotly debated, we are beginning to understand the relationship between impacts and injuries. It is very clear that when we take off our shoes we tend not to land on our heels, and the landing is softer. This is easier on the body.'

Lore of Running author and cutting-edge researcher Tim Noakes also believes we'll get the upper hand in the injury battle: 'There will be great advances in beating injury, so many will run into old age. Landing on the forefoot from an early age will reduce injury risk.'

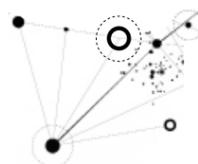
In terms of analysing form, 3D gait technology, which has been used in research for over a decade, could become more relevant as the databases of injury-causing movement patterns grow and models for analysing biomechanical root causes become more sophisticated. 'And mobile monitoring such as mobile apps, instrumented shoes, straps around the ankle and accelerometers are

provide over 20 biomarkers reflecting your state of health, including inflammation levels.

A biosensor that sits on the skin like a temporary tattoo and monitors blood lactate levels has already completed successful human trials. The research, published in the journal *Analytical Chemistry*, paves the way for in-run feedback that will warn runners when they are approaching 'the wall'.

MIND CONTROL

Many athletes and coaches estimate that running marathons and ultras can be up to 80 per cent a mental challenge, and all



ALL DISCIPLINES CAN BE IMPROVED BY MENTAL FOCUS, SO RESEARCH INTO THE WORKINGS OF THE BRAIN DURING EXERCISE WILL DEVELOP

definitely things of the future,' says Davis. 'It's a key way of recording the experiences and footstrikes of people outside the lab, and for understanding when they start to fatigue.'

DNA TRAINING

Bespoke training programmes precisely tailored to suit your genes could be the new reality, according to Noakes. 'We will better understand genetic determinants of how we should train,' he says. 'This will require a lot of research, but it is the way of the future.'

By 2033 there will also be extensive technology to help us gauge our physiological readiness to take on different types and intensities of training. The Omegawave device is already available (£79 for a sensor belt, app and 60-day subscription, omegawave.com) – it tracks seven physiological markers, then uses a formula to assess your capacity for various exercise intensities. This is the beginning of the journey to fully calibrating your workout to the inner workings of your body.

Blood technology will also become widely available for runners. A new company called Wellness FX (wellnessfx.com) in the US says that 70 per cent of data needed for accurate health diagnosis and management is in your blood. From one blood sample they can

running disciplines can be improved by the right mental focus. So, understanding and improving the workings of the brain during exercise will be another major area of development over the next 20 years.

It is already becoming possible to train the brain out of emotion and increase mental focus so athletes can stay cool under pressure – at the start of the 100m, for example. Neurotopia's extraordinary performance Brain Training programme in the US (neurotopia.com) can interpret brain functioning by placing a brainwave sensor headset on an athlete. The sensors listen to the brain's electrochemical activity, and then convert this activity into graphs and scores to provide the athlete with visual feedback. As their brain state moves toward focus, the athlete can see the graph move upward and the score increase. For training purposes, Neurotopia converts some of these graphs into games in which the athlete accelerates towards a goal when the brain's activity is optimal.

HOW FAST CAN WE RUN?

Elite records in athletics have been tarnished by drugs cheats over the last few decades and the recent positive tests of Tyson Gay and Asafa Powell lend little credence to a clean



underbelly in running. 'We should expect steady improvements to records that are in line with historical experience,' says Noakes. 'Dramatic increases will indicate doping.'

But Romanov disagrees, seeing huge potential to smash records in the future. 'We are way behind in terms of what evolution has given us,' he argues. 'Our bodies are supremely developed for much higher achievements and we are, as a human species, just overcoming the main obstacle: our perception of what we can achieve. For example, by my calculation the current capacity of the phenomenal sprinter Usain Bolt over 100m is 9.11, but I am not sure that even he himself is ready to believe in, much less perform, this kind of result. I also

do not see it as impossible to break two hours in a marathon and I still believe there's great potential to break the 800m record again.'

So what will tumble first? 'The 200m world record would be the one I'd really love to break again,' says Bolt. 'To see if it's even possible to go under 19 seconds. That would be special. It would require an almost technically perfect race, and for the weather to be good, but I'm focused on getting myself in a physical condition where I'm capable of doing it.'

At the other end of the distance scale, middle distance legend and BBC commentator Steve Cram reckons 'most [records] are possible, but the men's marathon is the most vulnerable at the moment'. UK Athletics endurance coach

Terrence Mahon agrees that longer distances are susceptible: 'It wouldn't surprise me to see all men's records from the 5000m to the marathon being broken over the next few years. With the marathon it may happen a few times as there are many top-level athletes chasing fast times on some great courses.'

WILL CHEATS PROSPER?

As legitimate science moves forward so, inevitably, does its dark side. But Mahon believes that doping control will start to win the war. 'I do see that doping control will eventually get ahead of the game and win the fight,' he says. 'In the news, we are seeing a lot of athletes getting caught and that's because the testing is getting better and more advanced. Eventually it will become very hard to beat the system.'

Cram is also positive. 'It's an incredibly complicated issue wrapped up in wider attitudes to drugs in society,' he says. 'Broadly speaking though, things are improving in terms of detection, but we still need stiffer penalties and considerably more international funding to keep ahead of the continuing developments in performance-enhancing products and processes.'

REDEFINING THE RUNNING SHOE

Finding the right shoe for you will take on a whole new meaning by 2033. 'In 20 years' time personal customisation will be big: your shoe will be custom-made to your exact anatomy – the right grip, the right reinforced upper and the right mould for your footstrike pattern,' says Dave Dombrow, design director at Under Armour. Aside from personalisation, Dombrow believes functionality will take over in a very positive way. 'Like in cycling, where all the data has driven down the design to be purely functional and aerodynamic, the same will happen with running: the best functioning data for ultimate performance, stripped down to the simplicity of what is the most natural movement for that individual. Yet this is often design at its most beautiful.'

There's also the chance that shoes will adapt to the physical changes that occur as you run long distances. 'Microchips in shoes is an interesting area,' says Dombrow. 'You could start a marathon with your footwear in one position and then later in the race, when you maybe pronate more, your microchip feeds back and interacts with your footwear to adapt the shoe to counteract the pronation and compensate for fatigue.'

Feedback from the shoe will improve, too. 'It is not really about minimalist shoes, but more about shoes allowing the enhancement of our perception,' says Romanov. Nike claims proprioception (your sense of where your body is in space) is now the focus of its designs, while Saxby hopes there will be a revolution in proprioception. 'It would be very exciting if we could find a material that could amplify proprioception and give better sensory feedback and quality than ever before.'

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SMARTER FABRICS

Stuart Brooke, founder of tech running apparel brand Ashmei, has a vision: 'Running clothing will be virtual. You will be running within a microfilament skin suit that you can air-condition to accommodate the current climate and also change the appearance to suit your mood or safety requirements – and all activated via your iPod.'

Dombrow believes apparel will also be custom-made, data-driven and linked to the overall microchip ecosystem to adapt when needed in a race – your running clothes will heat, cool, compress and be more aerodynamic as your body requires.'

Running socks are already entering the battle for greater proprioception. Sensoria socks, which are ready to go into production, have sensors built into the fabric to measure pressure and provide data to a smartphone. Developer Heapsylon (heapsylon.com) says this will provide real-time feedback that allows runners to adjust their strides to reduce their injury risk.

THE VIRTUAL RUNNING CLUB

Already big news, fitness-based social media could see a huge rise, particularly the kind independent to brands. Strava (strava.com) is spreading over the globe, allowing runners and cyclists to compare their data on stretches of roads and trails. The Nike+ community currently looms over the landscape with an extraordinary 20 million members digitally connected – all heralding a new dawn.

RACING INTO THE FUTURE

It's highly likely that we'll see a continued rise in the variety of events on offer, and increasingly elaborate concepts. 'Ten years ago you were pretty limited to marathons, 10Ks and the occasional triathlon. Now there are hundreds to choose from and there is pressure to stand out from the crowd as a participant and as an event organiser,' says Nick Tuppen, head of Threshold Events.

In more traditional running events, Noakes sees a resurgence in shorter distances. 'Both

ultra marathons and shorter distances will become more popular, but the greatest growth will be in shorter races.' Cram, who is race director for the Salomon Kielder Marathon (kielder-marathon.com), sees a generally bright future: 'Running will continue to develop as more events are created that cater to the personal tastes and aspirations of participants. The increased choice helps those entering the events to broaden their horizons. You could be running a trail marathon in Northumberland one weekend and a big city road 10K the next.'

TOMORROW'S FUEL

Sports nutrition could explode, but there are likely to be far more regulations in the industry and scientific research governing direction. Noakes pinpoints better understanding of the role of diet in inflammation and injury as key, and Luke Heeney, product director at Science in Sport (SiS) agrees. 'Delivering nitrates more effectively will help boost performance,' says Heeney. 'Currently less understood is the impact of inflammation on recovery. But by reducing total body inflammation during exercise, recovery times can be shortened, so expect to see more innovation that reduces over-stimulation of blood platelets.'

More and more athletes, in particular marathoners and ultra runners, are starting to train on fat-burning ketogenic diets, and fats could play a much larger role as a fuel source in sports nutrition. 'Virgin coconut oil contains medium chain triglycerides (MCTs), which are fats that act like carbohydrates, metabolising directly in the liver and providing more energy per gram,' says top personal trainer and founder of Takamaka coconut oil Jon Denoris.

There may also be increased focus on plant nutrition, which some believe may be better for the body's physiology as well the planet. Ultra runner Scott Jurek runs on a vegan diet and he credits plant-based fuel for his superior endurance, recovery and overall health. 'Ultra running as a vegan, I feel better than ever,' says Jurek. 'I had always had pretty good endurance, but the soreness I experienced after long runs is gone. I feel lighter, stronger and faster. And I perform better.'

WILL RUNNING SAVE THE WORLD?

With obesity and lack of exercise becoming the biggest killers in the developed world, running could spearhead an exercise revolution. 'As more of the world becomes overweight from changes in diet and reduced physical activity, more of the world will have to find ways to exercise,' says Lieberman. 'And increasingly, exercise will need to involve running, because it is the most basic and least expensive form of vigorous physical activity.'

'The biggest issue is lifestyle and diet,' says Cram. 'Education and guidance will be the biggest weapon. But running is still the easiest exercise available to the majority of people, no matter where they live or what their lifestyle.' Much will change, then, but the simple joy and accessibility of running will endure. ☺