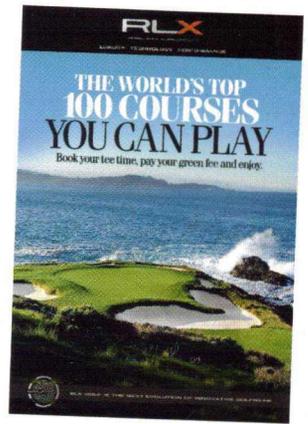


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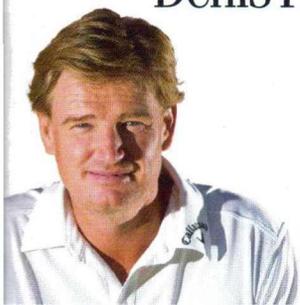
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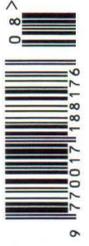
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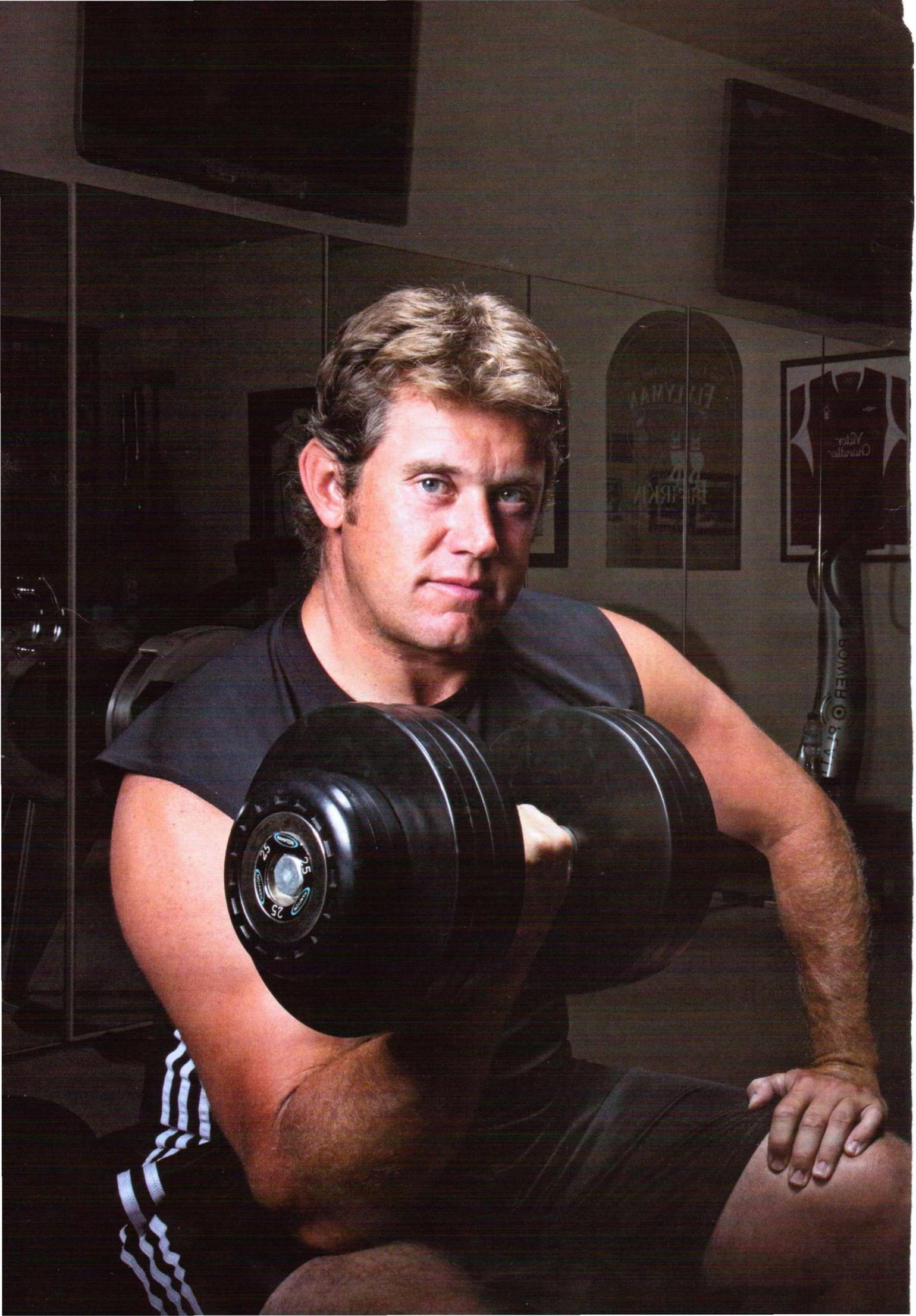
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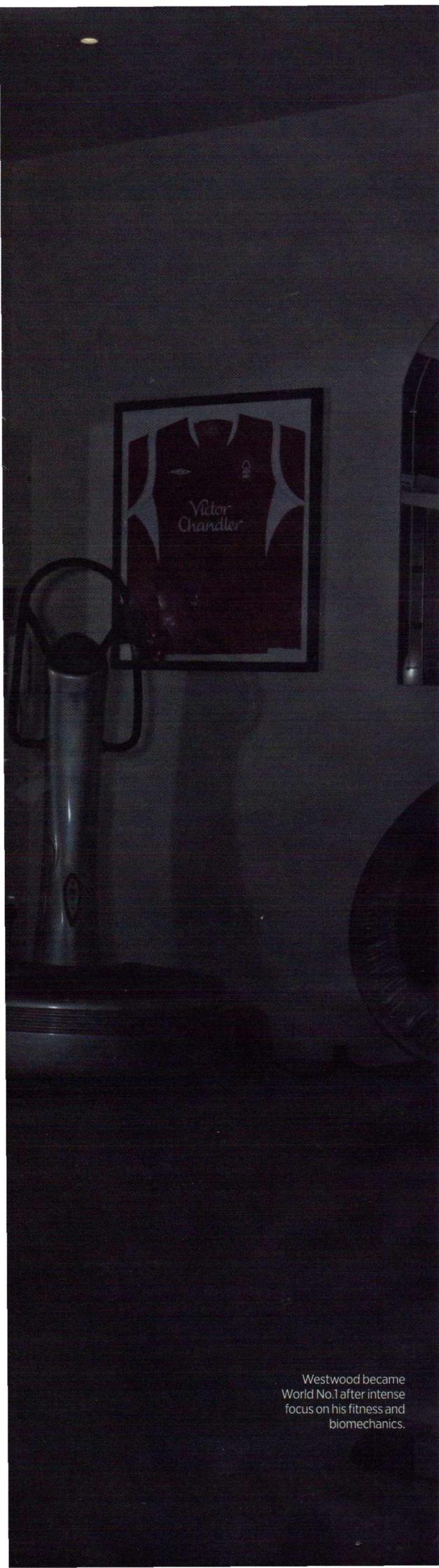
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AUGUST 2012







Westwood became World No.1 after intense focus on his fitness and biomechanics.

Fit for purpose

Physios, coaches and players agree on the way forward: Golf-specific body conditioning

WORDS: Peter Masters

PHOTOGRAPHY: Matthew Harris, Matt Howell, Getty

Want to know the secret to better ball striking and lower scores? You're going to kick yourself. It's biomechanics of course. Now you might say that's not really a secret. Not like Ben Hogan's secret move or the dramatic unveiling of a new driver, those are proper secrets. Surely biomechanics is just a fancy word for getting your body to swing a golf club in an efficient way? Why then is just about every golfer in the world's top 100 turning to biomechanics as the new Holy Grail? The answer is in the stats.

It's a fact. Today's top tour professionals are hitting the ball much straighter and much further than they used to, even the ones heading into middle age. And, while courses are generally getting longer and harder, record scores and stellar performances are still being produced every week. Contrast that to the poor amateur golfer, whose handicap average of 16.2 for men has not changed for over 30 years. There is no doubt, the gap between the paid ranks and the average club golfer ▶

is getting wider and wider even though both benefit from equipment innovations. It isn't just down to practice – conditioning is the key.

When Tiger Woods arrived on the scene, the move towards turning golf into a sport for the athlete gained momentum. Suddenly here was a guy who spent as much time in the gym as he did on the range and he was beating everybody out of sight. Now the cycle has moved on again and it's become a question of combining athleticism with the perfect sequence of movement to gain the perfect economy of strike – that's biomechanics.

Research has shown that amateur golfers use 90% of their peak muscle activity when hitting a golf ball. That's like lifting a heavy weight four times in a row. When you consider that you're doing this maybe 40 times in a round then the level of exertion is quite considerable.

Until recently, few golfers recognised the need for improving their physical conditioning as a path to golfing success and coaches too were focusing more on technique. But no more.

"Biomechanics is somewhat new in the sport of golf," agrees David Leadbetter, a man who has coached many of the game's Major winners, "but the benefits are extreme. It's enabled us to understand the science behind the golf swing in a way that allows you to get to the root cause of a problem much more quickly. If the advent of video was like looking at an X-ray, then the feedback from biomechanics is similar to an MRI. It gives you a 3D image of the swing and shows you things that might not be perceptible to the naked eye."

The sort of power a modern day golfer needs to propel the ball 300 yards, requires at least 32 pounds of muscle.

Something you're not going to find in the hands, arms or even the shoulders.

You have to go to the legs, the thighs and the back before you begin to approach this sort of figure. But even then, you have to know what you're supposed to be doing with them. Jean Jacques Rivet is an expert in biomechanics and heads up the European Tour's new Performance Institute at Terre Blanche in France. Here there are monitors, measuring tools, mats and machinery everywhere. Through his collaboration with technological clothing experts Under Armour, JJ is also looking to develop a

'Biomechanics shows the swing in 3D and reveals things not perceptible to the naked eye'

top that might just help you to hit the ball further. Under Armour already have a pressure vest that is designed to engage the all-important abs.

JJ works with coaches to define programmes to help players maximise their efficiency. For him the most important muscle group of all is the abdominals. You hear Lee Westwood talk about developing his core strength because it's the abs that work as the spring around which the body coils to harness power.

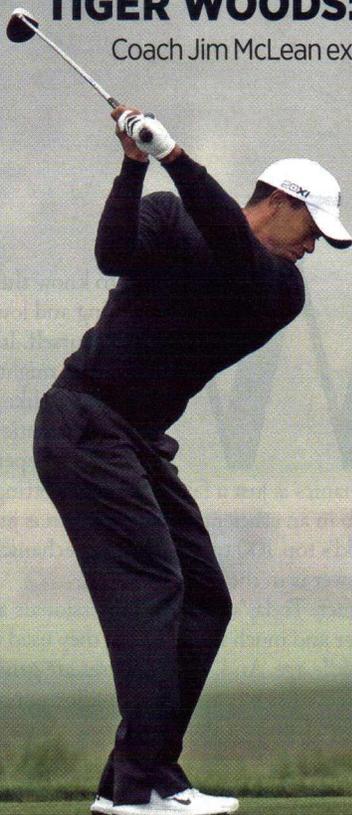
A small muscle at the front of the ankle known as the ▶

TIGER WOODS: BODY STRENGTH

Coach Jim McLean examines a pure power move.

Top of the swing

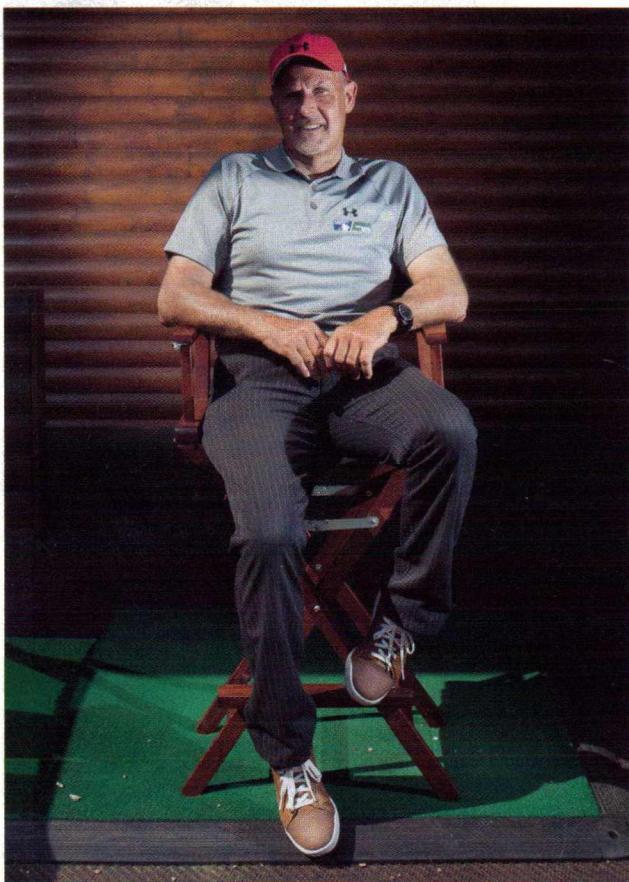
At the top Tiger's left arm and shaft form a beautiful straight line. His left arm is pinned against his chest, slightly above the shoulder plane, and his shoulders have rotated around his spine. He's clearly braced low and against the earth in a power position. I call this the X Factor. The new Tiger has his arms tied in closer to his pivot. The old Tiger's arms were further from his body.



Just past impact

The great Tour players have a huge spring in the core area of the body. Tiger coils that spring against the ground on the way back, then explodes upwards going through impact – a huge power move. The shoulders are now on a steeper plane than they were at the top, meaning the right shoulder moved down and the left shoulder up. This body structure is picture-perfect power.





JEAN JACQUES RIVET'S PERSONAL BIOMECHANICAL NOTES

How three tour pros are using the body to improve.



Matteo Manassero

"Matteo has just finished growing so it's important to gently and physiologically put him on the right road. He's looking to develop power but he must keep the synchronization in his downswing. He's worked with his trainer on strengthening the tibialis anterior and quadriceps. He has to do the same thing with the abdominals and glutes which will optimize ball compression at impact and improve his ball flight."



Raphael Jacquelin

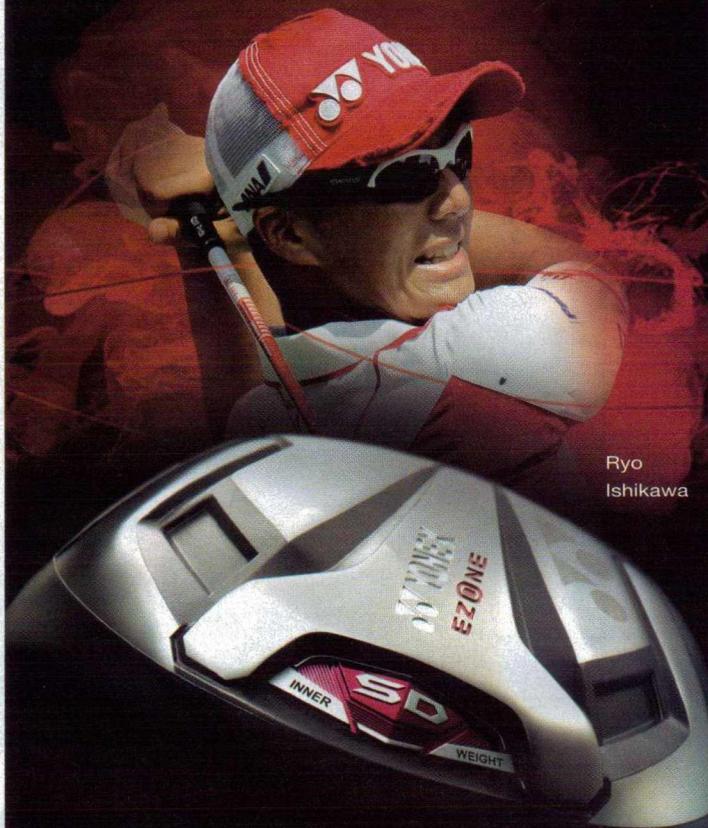
"Raph has some restriction due to an old soccer injury. But he understands exactly how to blend the path of his club with his body turn and that is key here. It works so well that even with his eyes closed, he can hit similarly to the eyes being open. However, he wants to increase the distance. We are working along a biomechanical line (called the hendrix bar) and accepting that the weight can move outside this line, which is giving him a more 'power throwing' sensation."



Rafael Cabrera Bello

"David Leadbetter asked if I could help with his accuracy, power and a higher flight. We checked with the Tour Physio Unit to see if there was a problem that could explain certain points in his body's biomechanics (power was there but it wasn't being delivered consistently at impact). We found that certain muscles, although well developed, were not helping his golf swing and were weakening the kinematic muscle chain. We've changed his gym routine and are looking forward to the French Open now to see if there is a change in our assessment of his core power."

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Far beyond ordinary clubs.



ABOVE: Italian Matteo Manassero is building power on a biomechanically sound platform. "He's been smart," says Under Armour's expert JJ Rivet.

Tibialis Anterior is second on JJ's hit list because it controls balance, while the Latissimus Dorsi, which stretches across the back connecting the shoulder to hips, is number three.

JJ explains that to swing the club properly you must learn a complex set of muscle movements that need to be fired in perfect sequence. The better a player can swing consistently, the more chance he has of ingraining this sequence into his muscle memory. The body rotates as one to start the backswing, but the hips then stop as the shoulders continue to the top. Good sequencing sees the left knee trigger the downswing, making the hips fire before the upper body has completed the backswing. This 'X factor' stretch moment stores immense power which is

'With just a few stretches a golfer can improve his flexibility, make a better turn and hit it further'

then unleashed as the upper body twists back round to catch up. The hips stop as a reaction to jolting the upper torso into action and the wrist cock in the hands delays the release of energy until the last milliseconds.

Leadbetter explains: "A swing can be separated into a sequence or segments. We are talking about the transfer of energy here. Just into the downswing this energy travels all

across the body. When the hips slow it moves to the shoulders and when they slow it moves into the arms. As they slow, it goes to the hands and from there it's transferred to the clubhead. In a good player all this happens at the right time to convert all that energy into ball speed." Much of this can be detected by getting a player to hit balls on a mat under which sensors can trace his centre of gravity and balance. Justin Rose is having a go under the watchful eye of JJ on the range at Wentworth. He's hitting the ball with a slight draw as JJ analyses the movement of his weight from the top of the backswing.

"You can only fire your abs properly if your weight starts in the right heel and moves diagonally to the left toe as you come into impact," says JJ, who points out that with amateurs the weight often stays in the heels.

There is something of a queue forming and as Rose heads off, the young Italian Matteo Manassero is next.

"Matteo's been very sensible," says JJ, "He's not the longest of hitters but part of that is because he's still growing. You must never force things with a young player when the body isn't ready. Do you remember Ty Tryon?"

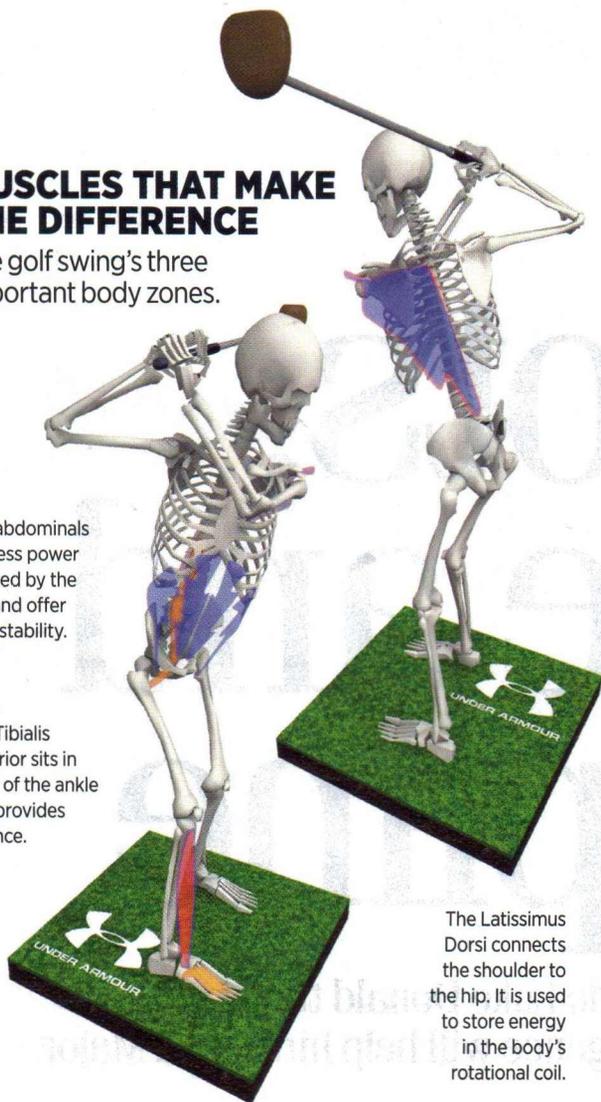
This was a young American hotshot hailed as the next great thing some 12 years ago, but who disappeared off the face of the golfing planet. His was the equivalent of a biomechanical car crash where he drove too fast too soon. He got a back injury that destroyed his career. "Matteo and his team have been smart. They have resisted that temptation and it's only now that

MUSCLES THAT MAKE THE DIFFERENCE

The golf swing's three important body zones.

The abdominals harness power created by the coil and offer core stability.

The Tibialis Anterior sits in front of the ankle and provides balance.



The Latissimus Dorsi connects the shoulder to the hip. It is used to store energy in the body's rotational coil.

he is working on his core strength to produce greater distance.

"We gained 20% for him this winter and I reckon he'll gain another 20% next winter. Matteo wants to be the best, but he also knows that it won't come overnight."

The mat sensors tell an interesting story with Matteo. At impact his body weight registers at 150% through his left foot. This indicates the kinetic power stored in his swing has been used to its full benefit. His body weight increases by 15% on the backswing, drops by 25% as he starts down and then peaks at 150% when it matters most. Many amateurs reduce their body weight at impact as they try to lift the ball off the ground.

"I met JJ about 15 years ago when biomechanics was very raw," adds Leadbetter. "There were a few books out, but no one had a real grasp of it in relation to golf. JJ was able to straighten a slice by putting wedges in a player's shoes and altering his balance points; it was fascinating.

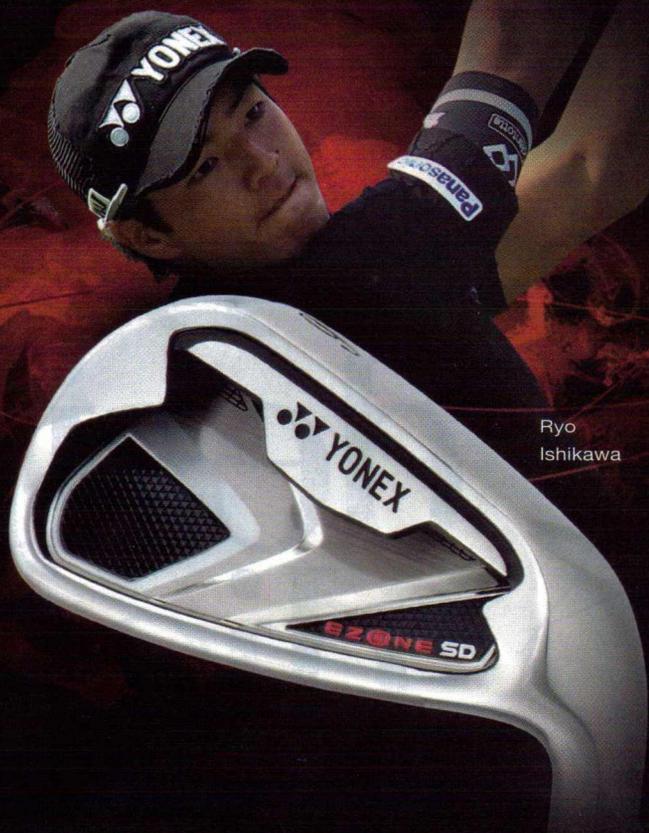
"The fact we can now measure in degrees how much you tilt your hips and compare hip turn to shoulder turn in such detail means we can build a blueprint for each player's swing. All this filters down to the amateur.

"With just a few stretches a golfer can improve his flexibility, make a better turn and hit the ball further. Biomechanics has lifted the mist surrounding golf teaching and helped us see clearly for the first time."

And for that reason just about every golfer in the top 100 in the world is sitting up and taking notice. **gw**

Jean Jacques Rivet is an ambassador for performance clothing experts Under Armour. Visit www.underarmour.com

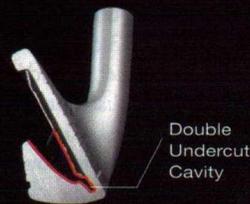
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