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WWW.GOLFMED.NET NEWSLETTER

Welcome to our first and unique newsletter that has a specific focus on golf specific training, golf injuries golf specific exercises, golf specific nutrition, golf specific research, biomechanics and much more.

The October 2002 issue covers many of these aspects.

The newsletter is user friendly in order that you can collect the worksheets under each category.

It will also be possible for your training staff and members to submit articles to be presented and we are looking for people to link on to the website **www.golfmed.net.**

The newsletter is free but we would like you to consider forwarding it to others who may have a similar interest in golf in order that we can continue to offer a free service.

The newsletter will be funded by the sales of our golf specific software and books from www.golfmed.net

We look forward to your feedback at golfphysio@golfmed.net

www.golfmed.net Newsletter
Oct - Dec 2002

1. Golf Specific Fitness – Ramsay McMaster Physiotherapist

The Golf Specific Functional Testing and Golf Drill System to Enhance Correct Swing Patterns in your Lesson Plan

By Ramsay McMaster (golfphysio@golfmed.net)
and Mark Holland (markholland@ausport.gov.au)

Key Words:

A good physiological model
A good technical model
Common technical Breakdowns
Body Segments
Kinetic Chain Theory
Golf Specific Tests and Drills
4 Point Breakdown System

Introduction

It is clear to see that after databasing over 4000 golfers and working closely with PGA Professionals specific patterns are common in golf swings. In assessing poor swing patterns in golfers and matching them up against their musculo-skeletal screenings, we have found that specific physiological breakdown can cause technical problems or inhibit technical improvement. From this information we have produced a Functional Testing System which can be used to confirm diagnosis of these patterns.

Breakdowns within these functional tests would confirm that the golfer has physiological breakdowns in their body which can inhibit or restrict the ability to maintain good form when practicing or trying to improve technically.

The functional tests are graded from level 1-6. At each level a four point system is put into place to identify common breakdowns. Obviously, the less points accumulated, the less the breakdowns in that functional position. Examples of the four breakdowns are seen in the paper on the A4 worksheets.

If there is a consistent inability to reduce the point system, physiotherapy, massage and myotherapy intervention is recommended to ensure quality of movement and positioning in each test is achieved. This in turn should enable the golfer to achieve and maintain good technical positions by performing the test which then becomes a golf specific exercise. The golfer can then move from a base level to a more difficult level of the same functional test and keep improving once they have good patterns of movement and have good associated physiological form within their diagnostic drills. This will, through their specificity, produce golf specific exercises moving golfers away from generic exercises that have minimal relevance to coaching and the golfer's swing.

Results have shown the following positive outcomes:

1. The software system inter-relates golf technique with the golf specific physiology of the individual athlete.

2. Coaches and golf associations can use it immediately to identify coaching problems related to physiological weakness and breakdown.

3. The four-point system can be used by the coach to identify breakdowns in the different body segments. It can make the player aware, ensuring good form throughout these exercises and goal-setting the golfer/athlete to reduce these points to improve quality of movement.

4. It makes the golfer accountable for their own physiological testing and exercise prescription. As stated, golf specific exercises can then be prescribed and gradually the loading can be increased. This is obviously crucial for tour players and traveling high-level amateur players.

5. These drills can be integrated to the golf drills and practice regimes to ensure these muscles stay activated, and good functioning of this pattern is enhanced through practice regimes.

It promotes good duty of care.

NB. This paper was presented at the World Science Congress at St Andrews 2002.

For further information click on to the CD & Books section and or the Lectures and Seminars section at www.golfmed.net

Send your thoughts on www.golfmed.net to golfphysio@golfmed.net

2. Golf and Nutrition – Rob Wood

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The Body Chemistry of Golf – Part I

Go and look in your golf bag right now and in the bottom of the pockets I can guarantee you will find one of these three things…a rubber foam filled half ball thing of unknown use or origin, a plastic pitch mark repairer the size of a shovel (free with a magazine in 1972), and a banana. To the uninitiated, the banana would be the most surprising object, but we recognize it as the staple diet of all golfers. In recent years tennis players seem to have adopted it as their traditional mid-match fayre, and can often be seen munching through a whole hand during a five-setter, but we golfers have known that the single banana is the ultimate in sporting sustenance for decades.

So is it that simple…we just pack one and peel one as needs be, and that's all the nutritional preparation you need for a round of golf. I don't think so. The "game" is becoming a "sport", and the elite players are beginning to follow this trend with physical, mental and nutritional preparation that rivals that of other sportsmen. In my previous article I took you through some of the exercise training techniques that apply to the physicality of the game, but in this one we are going to look at the physiology of the game.

A round of golf around a 6500 yard course will see you walking 3.7 miles just from tee to green as a necessity, and you can clearly add a further 1.5 miles for green to next tee, and excursions to the nether reaches of various fairways. Admittedly, it is not a route march, and you will usually be taking around 3.5 hours to do the full circuit, however you will be carrying, or dragging a full pack (I weighed my carry bag before a round, and it came to 25lbs).

Interspersed in this endurance event are the swings themselves, ranging from explosively powerful torsional full body movements, to exquisitely controlled and “damped” precise movements. Every swing also demands a short period of intense and focal mental concentration.

Your average 70 kg man has a recommended calorie intake of around 2000cals per day….physical activity is fueled by metabolising these calories, and walking consumes around 6 cals per minute, that’s 360 cals per hour, or potentially 1260 cals during a round.

However golf is not a sustained walk, and therefore it is not a sustained “metabolic burn”, meaning that less calories are consumed. Still, a good estimate is that we will consume around 700 cals just due to the physical exertions of a round. Surprisingly, the brain is a major consumer of cals, genuinely giving food for thought, and it will burn off a further 100 cals as it copes with the demands of concentration, psychological stress and anxiety especially in a competition situation.

The same man during an easy 3 hour walk will produce around 70-100 mls of sweat, and he will lose even more fluid than this via the evaporation effect of breathing….interestingly both levels will rise significantly in extreme hot and cold weather.

The sustained physical and mental activity will not only consume “fuel”, but also “additives”. We will convert body chemicals such as sugars, hormones, vitamins and minerals which ultimately will all need to be replaced or re-constructed.

On a recent round of golf I wore a heart rate monitor and recorded the activity of my heart during the whole round. The heart beat at rest for a healthy individual should be close to 72 beats per minute; your maximum heart rate during peak physical activity can be approximated by subtracting your age from 220, so as a 35 year old man my maximum should be 185 beats per minute.

The highest heart rates during the recorded round were 120 bpm, and these were always during fairway walking carrying my bag; at one stage I peaked to 135 ascending a ridge on what is a links course. On teeing off with a driver, after one practice swing my heart rate was a consistent 100bpm, but I feel that with the pressure of a competitive game, adrenaline fuelled “nerves” would push this to 115bpm.

At no stage during the round did my heart rate drop beneath 74 bpm, and my own resting rate is 65 bpm….I even tried some relaxation and breathing techniques whilst putting, but still did not drop below 74. Clearly golf requires a degree of cardiac demand, but for the average healthy individual it seems that this demand is within a comfortable range of cardiac stress, and therefore can almost certainly contribute to maintaining some degree of cardio-vascular fitness.

Quite clearly golf is a game of sustained and controlled physical, physiological and mental exertion, and any preparation that helps our body cope with these stresses can ultimately improve our performance. Not many of us aspire to be elite golfers, but we all aspire to be good golfers; likewise not many of us will follow strict physical training programmes and diet regimes, but we will have a go at the easy quick fixes that may give us that edge.

When it comes to nutrition for golfers, carbohydrates are the key, and in basic terms there are really two types that we are interested in. “Simple” carbohydrates (sugars, fructose, fruit juices, syrups, honey) are the quick-burning rocket fuel, easily digestible, giving a rapid kick of available energy. “Complex” carbohydrates (potatoes, bread, rice, cereals, pasta) are the slow-burning fuels that provide a sustained release of energy over the more prolonged period of time that we take to digest them, and in this way, stocking up on them gives us a “full tank” on which to call upon throughout a round.

Carbo-loading is a popular concept with endurance sportsmen, and the very reason why the London Marathon organizers have their Pasta Party for the runners the night before the race. Pasta is an ideal source of accessible complex carbohydrate, and I recommend that the night before a competition, or if you are going to tackle 36 holes, then load up with a pasta based meal and plenty of French bread…opt for a scoop less Bolognese sauce, but an extra one of spaghetti.

Breakfast should include plenty of toast, and one of the new multigrain cereals for that extra carbo-boost. During the round you will be consuming your energy reserves, and you may also be delaying a normal meal-time. You need to consume something that will give you both a quick kick of energy, and also an extra dose of slow burn fuel to see you through the remaining holes.

This is when you reach for your banana…100 cals of raw energy, easily digestible fruit sugars, and it comes in a bio-degradable wrapper. Good though it is, it may not be the best option.

Health shops and high street chemists stock sports nutrition bars (“balanced energy bars”) that offer an even more efficient solution to mid-round energy lows. They are light-weight, small and don’t go off! A more traditional option, that is again packed with carbohydrate energy, are the individually packed flapjacks and oatmeal cookies.

It is a tradition amongst golfers to thrash around the inward nine developing a raging thirst in order to make that 19th hole experience even more enjoyable. Baking under a mid-day sun, or 6 layers of gortex we route-march the 5 miles with, if you are lucky, half a bottle of flat, warm coke and an old barley sugar to wet the palette. I am constantly surprised by how many of my playing partners never take a drink with them out onto the course. 60% of the total human body mass is made up of water…muscles and nerves are 75% water. Water is genuinely the essence of life, and it's abundant presence within the body is essential for the efficient performance of neural and muscle tissue.

Even a 2% drop in total body water content is enough to have an inhibitory effect on body physiology. In real terms for a golfer, this means get even a little dehydrated and there will be deterioration in your co-ordination and your concentration; not handy when your heaving a 4 foot lever at a bantam egg ball, aiming to propel it 213 yards into a jam jar on a windy day. Water is free, buy yourself a large refillable sports drink bottle, the pop-tops are quick and easy to use, and the bag will get lighter as you keep drinking. It is recommended that you drink around a quarter of a pint every 3 holes, whether you feel thirsty or not as the sensation of thirst always lags behind physiological need.

I would also advise that shortly before you start a round you drink around a pint to prime your fluid levels. Dehydration and low energy levels come hand in hand, and one way to combat both is to take with you an isotonic, balanced sports drink. These can be bought in powdered form, mixed in your sports bottle, and will give you a hit of fluid, glucose, minerals and salts, especially useful on really hot days when partial dehydration is all too common. Remember alcohol is a diuretic, and when you re-fuelling at lunch for the afternoon 18, if it's a society day, go for it, after all golf is meant to be fun, but make sure you refill your drinks bottle because you're going to need it. If it's a competition, stick to the fruit juices, and plenty of them. Ideal competition lunch is bread based, a big filled french-stick will give you the carbohydrate load that you will definitely require in the afternoon.

If you are prepared to pay 100 quid on a putter that might give you that little edge then it makes sense to follow a few guidelines that will definitely improve your performance. Remember that the most important instrument to good golf is not the club that you are holding, but the body that swings it.

The Key Points:

- Golf is an endurance sport. Take up a regular programme of walking or cycling. A regular walk of 1 hour/3 miles is sufficient as a starting point. Before a run of competitions, or a golfing holiday, for 3 weeks prior increase your endurance exercise.
- Crawling onto the 16th green, out of breath, sweating and with a heart rate in the double centuries is not going to help you sink that putt. Get fitter.
- The evening before a competitive round load up with a carbohydrate based meal.
- Always carry a supply of sports energy bars etc. in your bag, and eat as soon as you feel the need.
- Golfers cannot drink enough fluids. Around a pint before the round. Always carry a full water bottle (1 litre in summer) and make it part of your routine to sip at it regularly during the round. Sports drinks can give you that extra edge, especially in hot weather. Drink before you feel thirsty.
- The value of the correct food and drink carried far outways the inconvenience of it's weight.

Thanks to Dietician Helen West BSc, S.R.D for her help with this article.

For further information click on to the CD & Books section and or the Lectures and Seminars section at www.golfmed.net

Send your thoughts on www.golfmed.net to golfphysio@golfmed.net

3. Golf Development – Pia Neilson and Lynn Marriott

Pia is one of the original innovators of the Swedish Golf Program and has worked with top Tour Players including Anneka Sorrenstan.

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Lynn and Pia's thoughts...

As we often say, "You as a golfer can't separate yourself." You are an integrated physical, mental, emotional being on the course. How can you enhance that integration in all your practice? We often hear comments that what we do is the "mental stuff". That is partially true... our intention and belief is to coach the whole human being of which the mental is a part. We have read comments by both of Tiger's and Annika's competitors that if they had the mind and focus of them they could be that good. During the BESTCOACH program in November, Michael and Andy Nusbaum will share with us how to access more of this incredible potential of ours….

Dr. Anders Ericsson - department of psychology at Florida State University, has studied the subject of practice and expert performance for many years and across many different domains. The research and studies indicate those expert performers in sports, music, writing, chess... engage in what Dr. Ericsson calls "deliberate practice".

"Deliberate practice is to engage in activities, specifically designed to improve performance, with full concentration. The individuals then actively try to go beyond their current abilities. It's done in limited periods of intense concentration. Mindless repetition is the direct opposite of deliberate practice.

Dr. Ericsson's research also suggests:

- It takes at least 10 years of intense involvement in deliberate practice to attain international levels of expert performance.
- Deliberate practice in elite performers is limited to 4-5 hours a day. It's the ability to sustain the concentration necessary for deliberate practice that limits the hours.
- The primary challenge appears not to be maintaining the desired level of activity once it has been reached, but the process of changing from one steady state to another.
- Finding the appropriate balance between strain and rest is one of the major challenges for individuals pursuing their limits of performance.
- Most individuals never achieve very high levels of performance in a domain because they are unacquainted with highly refined, intense deliberate practice and the complex mechanism mediating expert performance.
- The myth that hard work at the start will enable one to coast into future success is not supported by the evidence, and it most likely reflects confusion between merely maintaining a performance at a high level and continued futher improvement of performance.

Lynn and Pia's thoughts...

Often we say to our students, "You can practice as much as you want as long as you have a clear purpose and can stay present with that purpose." To count how many balls you hit or how many hours you spend on the range or course doesn't make much sense. Productive practice is about how present you can stay with your intention and measured in the quality of the experience vs. quantity of time or golf balls hit. If you want to be in the zone you have to "practice" the zone... practice with a concentrated mind.

Another important aspect is to support the player's ability to discover and nurture their intrinsic motivation. This motivation can and will change over time. We witness this especially in golf where many of our players stay in the game for decades. To really know what you as a player WANT and what it means to you... seems vital to be able to commit to the "deliberate" practice. We incorporate a lot of Dr. Ericsson's wisdom in our **GOLF54 Experience Great Golf** programs.

AE: "Even if we were able to specify the exact path of development for the highest levels of performance at some point in time, such as today, excellence is protean, not static, and by the time we discovered that description, expert performers will have reached even higher levels of performance."

Lynn and Pia's thoughts...

It's great to have all the studies and research AND it's important that many of us keep on being creative, curious, courageous to dare to do new things before it has been validated by research. What is your 54 and how do you plan on staying focused and committed to it?

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Send your thoughts on www.golfmed.net to golfphysio@golfmed.net

4. Golf Coaching – Sandy Jamieson

PGA Australia – AAA Accredited

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Pro-active or Re-active it's your choice

When trying to improve your golf you have a very distinct choice, that is whether to be a Pro-active or Re-active learner. Most golfers are Re-active learners which means they react to poor shots by immediately trying to change their technique or thinking to eliminate that particular shot before playing their next. The problem with this type of learning is they rob themselves of any permanent consistency due to constant change, becoming so obsessed with hitting bad shots that these are the only ones that they see themselves playing. The reactive golfer can tend to get so despondent that they reach the point of giving up because of frustration, which is usually when the shots that bring them back next time are hit due to mentally letting go, enabling some unhampered strokes to be played.

The reactive golfer tends to follow a cycle that is the high of the tip that worked one-week to win the ball comp, and then the low of feeling like a beginner the next when the tipsters swing falls apart. Listening to tips or having a key feeling isn't necessarily the wrong thing to do, many great players do exactly that, but the difference is they give them a chance to work by not disregarding them after the first bad shot.

A proactive learner who reads the instructional articles in magazines every month would still be using the advice from last month's magazine when they received the next one. It goes without saying that the people who benefit the most from tuition are the ones that practice consistently between regular lessons. In my experience it is better to practice for ten minutes a day even without a ball, than is to put in one long session per week!

There are several advantages to this type of practice firstly they are more likely to remember exactly what it is they are practicing if they follow the same daily routine, and secondly practice without a ball is portable meaning affective practice is within everybody's reach.

We need to not only be proactive with our technical skills but also with the physical, mental and strategical aspects of golf as well. Whole hosts of professional people are becoming available to help golfers with specific areas of there game. Physiotherapists, Osteopaths, Chiropractors, Massage Therapists, Dietitians and Strength and Conditioning coaches are providing information and programs specifically for golf.

There are countless Sports Psychologists working directly with golfers many who have written books on the topic. Becoming strategically better on the golf course is not solely learnt from the mistakes made on the course but from teaching professionals, books, and magazines and from watching better players both live and on television.

All this information will be available at www.golfmed.net in the form of articles product or the seminars advertised so stay tuned.

For further information click on to the CD & Books section and or the Lectures and Seminars section at www.golfmed.net

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5. Golf Biomechanics – Rob Neal

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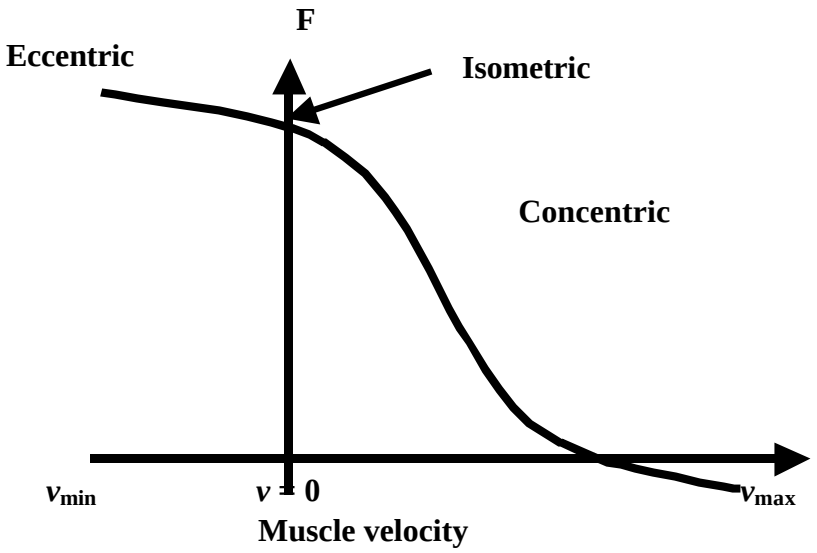
Why do you have a backswing?

Have you ever wondered why you have a backswing in golf (or a wind-up in throwing)? Sport scientists, and particularly biomechanists have pursued this question and by synthesising theories of mechanics and physiology, a sound explanation has been postulated. Movement patterns that involve a "backswing" prior to a "forward swing" are known, in the scientific literature as ***stretch-shorten cycles***.

Early theorists argued that the increased work possible using such movement patterns relied on the storage and return of elastic energy. This energy was believed to be stored in the tendons and other elastic structures in series with the contractile machinery of the muscle. Whilst this argument was plausible, careful scrutiny of the underlying mechanism indicated that the augmented work was not due to an energy storage-return process. In the 1990's, a group of Dutch researchers led by van Ingen Schenau and Huijing completed some ingenious and revolutionary modelling of and anatomical work on skeletal muscle. It was through this groundbreaking work that a consistent and logical explanation of the stretch-shorten cycle was developed. In order to understand this work, some background material should be reviewed.

The Force-velocity relationship in human muscle underpins the explanation. Figure 1 shows this relationship in which the speed of contraction influences the force output of the muscle. Thus, a muscle can produce its greatest tension when contracting eccentrically, followed by isometric loading and its least amount of tension when it is contracting quickly, concentrically. Thus to take maximum advantage of this property the contraction speed needs to be kept to a minimum when possible.

Figure 1. Graph of the force-velocity relationship in human muscle



The next factor to understand (recall!) is that it takes a quantum of time between the instant when the nerve action potential reaches the muscle and maximum tension is produced in the entire muscle. In fact, this delay can be as large as 500 ms! Thus, for example, in squat jumping, you would be over half way through the jump by the time maximum force in the muscle was obtained! It gets worse!! The maximum force that you could achieve would also be less than your isometric or eccentric maximum because the muscle would be contracting concentrically and at a moderate velocity by this time in the jump!

The final concepts to acknowledge are the definition of the work of a force and the work-energy relationship. Simply, work is the product of force and distance or torque and angular distance and the area under the force-distance (torque-angular distance) function is the energy that is given to the system as a result of the action of the force.

Let's put it all together. When we perform a stretch-shorten cycle we force the muscles that are going to be involved in generating the energy during the concentric part of the movement, to contract eccentrically first. The benefits of having them act this way are threefold:

1. there is an increased amount of time for the muscle to build up the tension levels
2. the muscle acts eccentrically, therefore its force generating capacity is at its highest, and
3. at the start of the concentric phase, the force in the muscle is very high, allowing it to produce large amounts of work

Thus in golf, as in all other power sports, a "backswing" or preparation phase is crucial to performance. The best example of a stretch-shorten cycle in golf is the rotational relationship between the pelvis and upper torso. During the backswing the upper torso rotates past the pelvis (by ~45-50^{o}). Toward the end of the backswing, the oblique abdominal muscles contract eccentrically to stop the rotation of the upper torso relative to the pelvis. This eccentric action builds tension in these muscles, putting them at a very high loading level at the start of the downswing. During the downswing phase, these muscles can then produce large amounts of work (energy), which has the potential to be transferred outwardly to the arms and eventually to the club head.

Listed below are other examples in golf where stretch-shorten cycles are used

1. the posterior deltoid and latissimus dorsi muscles
2. lateral trunk flexors
3. those muscles that produce ulnar deviation of the wrist
4. muscles that supinate the forearm of the leading arm
5. muscle that pronate the forearm of the trailing arm

This list is not exhaustive but serves to highlight how critical the stretch-shorten muscle contraction cycle is when maximum work output (in a limited period of time and through a restricted range of movement) is required. These stretch shorten cycles occur at different times in the swing compared to the trunk rotational example given above.

In summary, the stretch-shorten cycle is a movement pattern that allows golfers to generate large amounts of work efficiently. Understanding how these cycles work requires a knowledge of basic muscle physiology, the concept of the work of a force and the relationship between work and energy. In a future article I will show how sequencing in the swing is crucial to performance.

For further information click on to the CD & Books section and or the Lectures and Seminars section at www.golfmed.net

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6. NATIONAL SPORTS INFORMATION CENTRE

The National Sport Information Centre, a program of the Australian Sports Commission has an extensive collection of golf books, journals and videotapes.

Listed below are articles and research papers that may be ordered from the NSIC.

Order form and prices can be found at the website - **http://www.ausport.gov.au/nsic/docdel.html**

Contact Details

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Facsimile: +61 2 6214 1681

Internet: http://www.ausport.gov.au/nsic/

Comparison of spine motion in elite golfers with and without low back pain.
Lindsay, D.
Journal of sports sciences (London)
ISSUE: 20 8 Aug 2002 599-605
KEYWORDS: Golf | Professional | Back | Pain | Posture | Address | Swing | Injury | Comparison Study | Man

The effects of outcome imagery on golf-putting performance.
Taylor, J.A.
Journal of sports sciences (London)
ISSUE: 20 8 Aug 2002 607-613
KEYWORDS: Golf | Putting | Confidence | Visualization | Achievement | Skill | Comparison Study

High-performance driver design: benefits for all golfers.
Hocknell, A.
Journal of sports sciences (London)
ISSUE: 20 8 Aug 2002 643-649
KEYWORDS: Golf | Driver | Design | Impact | Achievement | Skill

Major fit: how I changed the composition of my body and won my first major at the British Open.
Duval, D.
Australian golf digest (Sydney, Aust.)
ISSUE: Aug 2002 70-75
KEYWORDS: golf | physical fitness | strength training | exercise | Duval, D.

The effect of imagery function and imagery direction on self-efficacy and performance on a golf-putting task.
Short, S.E.
Sport psychologist (Champaign, Ill.)
ISSUE: 16 1 Mar 2002 48-67
KEYWORDS: Golf | Putting | Skill | Visualization | Self-efficacy

Metamotivational state reversals during matchplay golf: an idiographic approach.
Hudson, J.
Sport psychologist (Champaign, Ill.)
ISSUE: 16 2 June 2002 200-217
KEYWORDS: Golf | Motivation | Psychological Momentum

In the neck of time. A smooth and solid swing begins at the top with neck rotation.
Benson, M.J.
Sports medicine update (Birmingham, Ala.)
ISSUE: 16 1 2001 6-7
KEYWORDS: Golf | Biomechanics | Swing | Neck | Cervical Vertebrae

Burning question: why aren't there more left-handers in pro golf?
Sports illustrated (Los Angeles)
ISSUE: 96 4 28 Jan 2002 26
KEYWORDS: golf | professional | laterality | statistics
Sports Illustrated tries to answer why left-handed golfers are less prevalent than they are in other sports.