



## Work Before Stops Pain After

Physical conditioning to prevent the onset of many common tennis problems is recommended in two papers in a special tennis issue of the *Journal of Science and Medicine in Sport*, the scientific journal of Sports Medicine Australia (SMA).

These problems include shoulder and low back pain and such common tennis conditions as reduced range of motion in joints and decreased flexibility in muscles.

In the first paper, medical researchers at Cornell University and Mt Sinai Hospital in New York recommend physical conditioning – including shoulder and hip stretching programs -- as essential for tennis players if they are to avoid shoulder and low back pain.

They point out that lack of flexibility in athletes has been related to both a decrease in performance and an increase in muscle injury. Repeated demands on a muscle may cause it to shorten because of the vicious cycle of microtrauma and scar formation, followed by more microtrauma with continued use.

Since tennis requires repeated muscle contractions, tightness in players can be a significant source of injury, pain and subsequent decreased performance.

The researchers sought to determine if there was any correlation among professional players between reduced range of motion in the hip and low back pain (LBP), and in the shoulder and shoulder pain. Their secondary aim was to determine if lumbar range of motion deficits correlated with LBP in these athletes. A total of 100 male players from top-ranked amateurs and juniors in the US national team to touring professionals in their first 2 years of play took part in the study.

Their study found that excessive internal rotation deficits in the dominant lead shoulder as well as in the lead hip highly correlated to the presence of shoulder pain and LBP respectively.

“The theory is that, due to repetitive demands on the dominant shoulder and repetitive pivoting at the lead hip, the cycle of microtrauma and scar formation leads to capsular contracture and subsequent reduction in internal range of motion.

“This decrease in internal rotation may decrease efficiency of force production, thereby increasing the chance of injury, perpetuating and worsening the cycle. It was observed that lumbar extension deficits highly correlated to LBP.”

The researchers concluded that physical conditioning including shoulder as well as hip internal rotation stretching programs should therefore be essential aspects in the treatment of tennis players with shoulder pain and LBP.

In the second paper, researchers at the Lexington Sports Medicine Centre in Kentucky and Marshall University in West Virginia report that targeted exercises can be used to deal with common tennis conditions such as reduced range of motion in joints and decreased flexibility in muscles.

The study of more than 50 American tennis players designed to determine the effectiveness of a sport-specific prospective conditioning program in modifying range of motion and flexibility in active young athletes, demonstrates several important points about joint motion and flexibility.

It confirmed previous studies that documented early and consistent ROM deficits and progressive loss of shoulder internal rotation over time in tournaments among competitive tennis players.

It demonstrates that ROM and flexibility can be positively influenced as a result of a specific flexibility program based on a sport-specific evaluation of the sport, and sport-specific evaluation of the athlete.

“The study does not answer all the questions about injury risk from overload or microtrauma in overhead athletes,” the researchers point out.

“The exact relationship of decreased motion and inflexibility to injury is not known. Removing only inflexibility as a risk factor for injury likely will not eliminate the incidence of overload injury. Overload injury is a multifactorial process in which inflexibility is one intrinsic risk factor.

“Improvement in flexibility probably improves the muscle’s ability to maintain integrity under strain, but other factors such as strength (the ability to generate tension), the availability of fuel for energy production, and the frequency of application of the tensile load are also important determinants of tissue response to the loads and therefore the total risk of overload injury.

All these factors need to be addressed in a comprehensive injury prevention program.

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**Further information:** Dominic Nagle (Sports Medicine Australia) 02 6230 4650  
0418 298 519

**Hip and Shoulder Internal Rotation Range of Motion Deficits in Professional Tennis Players**

**VB Vad, Cornell University, New York**

**A Gebeh, Mt Sinai Hospital, New York**

**D Dines, Cornell University**

**D Altchek, Cornell University**

**Abstracts**

One hundred tennis players were recruited from the United States Tennis Association (USTA) National Tennis Team and Professional Tennis Tour to investigate the correlation between hip internal rotation deficits and low back pain (LBP), as well as shoulder internal rotation deficits and shoulder pain. A statistically significant correlation was observed between dominant shoulder internal rotation deficits and shoulder pain. Also observed was a statistically significant correlation between lead hip internal rotation deficits and lumbar extension deficits with LBP. We conclude that due to repetitive demands on the dominant shoulder and repetitive pivoting at the lead hip, the cycle of microtrauma and scar formation leads to capsular contracture and subsequent reduction in internal range of motion. It is likely that the limitation in lumbar extension in the symptomatic group is not only due to decreased flexibility from an increased load on the spine, but also due to a protective mechanism to prevent further exacerbation of the LBP. Physical conditioning that includes shoulder as well as hip internal rotation stretching programs should therefore be essential aspects in the treatment of tennis players with shoulder pain and LBP respectively.

**Range of Motion in Junior Tennis Players Participating in a Flexibility Modification Program**

**WB Kibler, Lexington Sports Medicine Centre, Lexington, Kentucky**

**TJ Chandler, Marshall University, Huntington, West Virginia**

**Abstract**

This study evaluated changes in range of motion (ROM) in competitive male and female junior tennis players participating in a specific conditioning program over a two-year period. Subjects were also compared to an age and sex-matched control group of players not performing the exercises. Fifty-one tennis players, 29 male (mean age 13.6) and 22 female (mean age 13.2) entered the study. Baseline ROM measurements were performed on all players upon entering the study. The conditioning program employed standardised stretch-hold-relax flexibility exercises for all the areas tested. These exercises were taught to the players and each athlete was given a video of the exercises. Compliance with the program was assessed by exercise logs, the parents, and the athletes. High compliers were compared to low compliers. Mean changes in the combined ROM measurements over time indicate improvement in flexibility in most anatomical areas after one year of participation, with small improvements in the second year. With the exception of forearm supination, there were no differences between high compliers and low compliers. Compared to controls, the experimental group showed significant improvement in sit and reach, dominant and nondominant shoulder internal rotation, dominant and nondominant shoulder external rotation, nondominant gastrocnemius, dominant iliotibial band, dominant and nondominant hip internal rotation, dominant and nondominant hip external rotation, dominant and nondominant forearm pronation, and dominant wrist flexion. The areas of greatest significant change were in the shoulder and back, which correspond to the areas of most clinical risk of injury. In conclusion, joint ROM can be positively influenced with a specific conditioning program.