by Sherry Werner*

# Softball Pitching

## at the Centennial Olympic Games

**Softball is essentially a scaled-down version of baseball. The playing field is smaller, with the bases 60 feet apart as compared to 90 feet in baseball. Instead of throwing from an elevated mound, a softball pitcher throws from a flat pitching circle with an eight-foot radius from the pitching rubber.**

Unlike baseball, a softball pitcher may pitch as many as ten seven-inning games in one weekend tournament. This can result in 1,500 to 2,000 pitches in a three-day period. Considering the fact that these pitches are thrown with release velocities of 60 to 75 miles per hour, the throwing arm endures significant stress.

In 1996, softball celebrated its inaugural year at the Games of the XXVI Olympiad, the Centennial Games, in Atlanta. During the summer of 1997, competition began in the Women's Professional Fastpitch League. Despite the increasing number of participants and throwing arm injuries, few studies have explored the windmill throwing motion. It is estimated that approximately 50% of pitchers at the elite level have time-loss injuries at some point during their careers. Fatigue fractures of the ulna in softball pitching have been documented, as have cases of radial neuropathy. In addition, increased cases of surgical intervention for rotator cuff and glenoid labrum pathology are reported each year.

Recently, an IOC (Medical Commission's Subcommission on Biomechanics and Physiology of Sport) grant was awarded to study softball pitching during the 1996 Olympic Games. Sherry Werner, Ph.D., and Tricia Murray, both from the Steadman-Hawkins Sports Medicine Foundation; Sarah Smith, Ph.D., from the US Olympic Training Center, and Morris Levy, Ph.D., from California State University, San Bernardino, participated in the Olympic project.

High-speed video data were collected with a Peak Performance Motion Measurement system on 26 of the 30 pitchers during the 10-day Olympic softball competition. Video analysis of each pitcher began with a process called digitizing. Using a computer linked to a VCR, 20 body landmarks were tracked, frame by frame, throughout the pitching motion from two camera views. Data from the two cameras were then synchronized in time and mathematically combined to produce a three-dimensional representation of the pitch.

*Softball at the Atlanta Games.*

Over 50 parameters related to pitching mechanics were calculated, as were the stresses on the throwing arm. In addition, ball speed was divided into its contributions from the trunk, upper arm, forearm and hand.

The pitching data were then analyzed with respect to pitching performance and injury prevention. Parameters of pitching mechanics related to increased ball speed were identified. Knowledge of these parameters will enable coaches to optimize pitching mechanics for improved performance.

Parameters of pitching mechanics which contribute to shoulder stress were also isolated. A distraction force, equal to that encountered in baseball pitching, was found to occur at the instant of ball release for the Olympic softball pitchers. An understanding of specific principles of pitching mechanics which affect shoulder stress will allow coaches and clinicians to attempt to reduce the stress and, thus, limit the potential for injury.

Results of the Olympic softball study were distributed to the 101 members of the International Softball Federation (ISF). In addition, some four scientific manuscripts will be submitted to peer-review journals. In order to further disseminate the information, Dr. Werner continues to report results in a monthly column in *Fastpitch World Magazine.* She has also worked with the Canadian and Australian National Softball teams and speaks

to coaching groups throughout the United States and Canada.
Also as a result of the Olympic softball project, changes were adopted in the Little League Softball rule book regarding pitching regulations. A series of instructional pitching videotapes (from a biomechanical perspective) will also be developed by Little League in a combined effort between Dr. Werner and Michele Smith, a pitcher on the 1996 US Olympic softball squad. *Report to the Coaches: Softball Pitching at the 1996 Olympic Games* is available via the Internet.

Increasing interest in the scientific aspects of softball is encouraging. The impact of the IOC Olympic project has been far-reaching. Prior to 1996, research attention and support was non-existent in the sport. Today, interest in the biomechanics of softball continues to grow around the world. For the first time in its history, the international softball community appears to have an interest in the science behind the sport. The Amateur Softball Association and the ISF have expressed their concern for "replacing long-standing myths with scientific fact to educate athletes, coaches, etc.". It is hoped that this interest will continue to grow and that additional studies will be undertaken. Thanks to the support of the IOC, a scientific basis has been established. As the sport moves toward only its second Olympic season, softball has the potential to join the list of other sports (i.e. athletics, gymnastics, swimming and diving, etc.) with rich scientific heritage.

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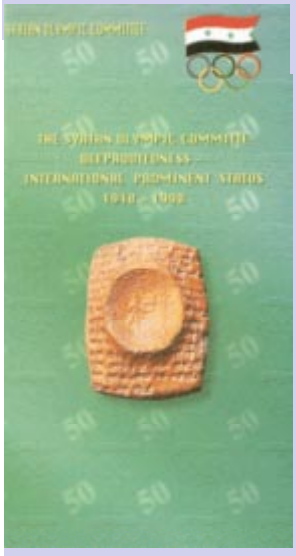
# News flash

## Syrian Arab Republic

To mark its 50th anniversary, the Syrian NOC invited numerous Syrian and Arab personalities, including Toni Khouri, IOC member in Lebanon, Hani Moustapha, director of the Youth and Sports Administration of the League of Arab States, Suleiman Ali Hajar, secretary of the Egyptian NOC, Souheil Khoury, president of the Lebanese NOC, Zeid Khiami, director of Youth and Sports in Lebanon, Ali Youssef Hussein, treasurer of the Kuwaiti NOC and Mouafac Al Fawaz, vice-president of the Jordanian NOC. On the same occasion, the headquarters of the Syrian Olympic Academy was inaugurated, in the presence of Said Hammadi, head of the Office of Youth and Sports in Syria. The NOC also organized a ceremony in honour of the pioneers of the Olympic Movement in Syria. Various speakers stressed the importance of the NOC's role in spreading the Olympic ideals and principles in the country and region as a whole, as well as relations between the Syrian NOC and the IOC and other NOCs around the world. The election of Samih Moudallal as an IOC member was one of the highlights of 1998 for Syrian sport. In addition, the NOC has produced a book which retraces the development of Syrian sport over the last 50 years and looks at Syrian participation in the Olympic Games.



*Some of the guests at the Syrian NOC's 50th anniversary celebrations: (from right to left, first row) Nour El Houda Karfoul, Mohamad Ali Hassan, Toni Khoun, Souheil Khoury, Zeid Khiami, Samih Moudallal, Said Hammadi and Suleiman Ali Hajar.*