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## The Effect of Monopolar Radiofrequency Energy on Articular Cartilage

A B S T R A C T & C O M M E N T A R Y

**Synopsis:** *This paper challenges previous reports regarding the beneficial effects of the use of radiofrequency to treat articular cartilage injuries. Monopolar radiofrequency energy caused long-term damage to cartilage in an animal model.*

**Source:** Lu Y, et al. The effect of monopolar radiofrequency energy on partial-thickness defects of articular cartilage. *Arthroscopy* 2000;16(5):527-536.

In a well-designed study using a sheep model, 36 animals (bilateral knees) were randomized into three groups: 1) untreated partial thickness cartilage injury (Sham); 2) radiofrequency (RF)-treated partial thickness cartilage injury; and 3) partial thickness cartilage injury converted to a full thickness defect with microfracture. Six knees from each group were studied at 0, 2, 12, and 24 weeks after surgery. Carefully obtained cartilage samples were studied by light microscopy, confocal laser microscopy, and scanning electron microscopy for chondrocyte viability, thickness of reparative tissue, staining, and structure of reparative tissue at each time period.

In the untreated group, almost all of the chondrocytes remained viable at all time periods. In the RF-treated group, a zone of chondrocyte death was present at time zero, and this zone expanded at subsequent intervals and persisted the entire length of the study. Scanning electron microscopy demonstrated a smoother surface in the RF-treated group; however, this was felt to be related to a melting effect. The total histologic score was significantly higher for the untreated group vs. the RF group at all time periods. The microfracture group was associated with defects that predictably filled in with fibrocartilage, resulting in total histologic scores that were significantly higher than the RF group at all intervals except time zero. Staining demonstrated that RF caused detrimental effects to chon-

## INSIDE

*Long-term results of partial meniscectomy reported to equal meniscal repair*  
**page 74**

*How do meniscal and chondral injuries affect the results of ACL reconstruction?*  
**page 75**

*Neer inferior capsular shift for multidirectional instability of the shoulder*  
**page 76**

*Arthroscopic debridement of shoulder osteoarthritis*  
**page 77**

Volume 2 • Number 10 • October 2000 • Pages 73-80

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drocyte function and the cartilaginous matrix.

## ■ COMMENT BY MARK MILLER, MD

This study is one of the first published papers to advocate caution in face of the raging popularity of indiscriminate use of RF for any problem identified with the arthroscope. It is interesting that two of the researchers are among the most widely recognized proponents of laser and RF treatment; therefore, careful consideration of their findings is critical. Legitimate scientific studies are only now defining a reasonable role for RF "shrinkage." Extending indications for what may turn out to be a limited role for this new technology before it can be carefully evaluated in studies like the present paper is clearly inappropriate. I suspect that studies of RF-treated meniscal tears may yield similar discouraging effects on adjacent soft tissue.

As Lu and associates acknowledge, longer term studies are indicated. They also are aware of some of the limitations of their study, such as the variable depth of cartilage in the sheep model, the relative inprecision of their cartilage cutter, and the limited histologic evaluation that was completed. Nevertheless, this study shows that RF has a lasting detrimental effect on healthy articular cartilage. ❖

**Sports Medicine Reports**, ISSN 1524-0991, is published monthly by American Health Consultants, 3525 Piedmont Rd., NE, Bldg. 6, Suite 400, Atlanta, GA 30305.  
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**GST Registration Number:** R128870672.  
Periodical postage pending at Atlanta, GA.  
**POSTMASTER:** Send address changes to **Sports Medicine Reports**, P.O. Box 740059, Atlanta, GA 30374.

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### Statement of Financial Disclosure

In order to reveal any potential bias in this publication, and in accordance with Accreditation Council for Continuing Medical Education guidelines, we disclose that Dr. DiDuch serves as a consultant to DePuy Orthotech. Dr. Tasto serves on the surgical advisory boards of Arthrocare, Orthopedic Biosystems Limited, and receives royalties from Don Joy, Dr. Griffin, Dr. Gunther, Dr. Harner, Dr. Holmes, Dr. Miller, Dr. Perrin, Dr. Schenck, and Dr. Slaughterbeck report no consultant, stockholder, speaker's bureau, research, or other financial relationships with companies having ties to this field of study.

# Long-term Results of Partial Meniscectomy Reported to Equal Meniscal Repair

ABSTRACT & COMMENTARY

**Synopsis:** A consecutive series of 30 patients with open meniscal repair were retrospectively compared to 30 patients who had undergone a partial or subtotal meniscectomy. Although the incidence and severity of arthrosis after 13 years were similar, one must be careful not to draw direct comparisons in the outcome of the patient groups, as they were not identically matched.

**Source:** Rockborn P, Messner K. Long-term results of meniscus repair and meniscectomy: A 13-year functional and radiographic follow-up study. *Knee Surg Sports Traumatol Arthrosc* 2000;8:2-9.

The meniscus has been shown in numerous studies to play a vital role in the successful performance and well being of the knee. Loss of the meniscus, in part or in total, significantly alters joint function and predisposes the articular cartilage to degenerative changes. As a result, there has been a tremendous amount of time and effort spent over the past couple of decades to repair and, when possible, preserve damaged or torn menisci. Unfortunately, there are still only a limited number of studies on the outcome of meniscal repair reported in the literature with varying results.

Rockborn and Messner retrospectively compared the long-term results of open meniscal repair to arthroscopic meniscectomy in two consecutive series of patients (n = 30). The groups were matched according to sex, age, meniscus lesion, and follow-up time. Subjective (visual analogue scale) and objective assessment of knee function including activity level (using the Tegner and Lysholm activity scores) were assessed at a mean of 13 years (range, 11-17). In addition, the patients underwent radiographic examination and joint fluid analysis. The data of a subgroup of 22 pairs of patients who had been previously examined in a seven-year follow-up study were available for comparison. At seven years, the patients with the open repair had shown improved knee function and less radiographic signs of premature arthrosis than the meniscectomy group. It was anticipated that the superior results of open meniscal repair over arthroscopic meniscectomy should be even more prominent with longer-term follow-up.

Interestingly, the incidence and severity of arthrosis did not differ significantly between the two groups at 13

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years. Most of the patients in the repair group who developed arthrosis between the two follow-up sessions had undergone meniscectomy because of non-healing or rerupture of the meniscus. However, none of the patients in either group had radiographic changes (according to Fairbank) higher than grade-2 arthrosis. Furthermore, there were no differences in knee function, subjective evaluation, range of motion, or muscle strength between groups. The initial superiority of meniscal repair previously reported at seven years was not as evident between the groups at longer-term follow-up.

#### ■ COMMENT BY CHRISTOPHER D. HARNER, MD

Successful meniscal repair has been reported in the literature to vary anywhere from 63-91%. The results are not easily compared between studies due to different patient populations (i.e., patient age, chronicity, tear pattern, rim width, etc.) and techniques of surgical repair. Rim width is considered the most important predictive factor for healing, because tears closest to the meniscocapsular junction (0-3 mm) have the greatest capacity to heal due to their rich vascular supply. Furthermore, experimental studies have shown that partial meniscectomy significantly increases joint contact pressures (meniscal resection of as little as 15-34% has increased contact pressures > 350%).

Although the groups in this study were matched for several variables, there was no randomization, and the decision for the choice of surgical treatment was dependent upon the type of meniscal tear and quality of the tissue. Meniscectomy was performed in cases with obviously degenerative intrasubstance tears; meanwhile, well vascularized longitudinal peripheral tears were treated exclusively with open repair. Furthermore, the repair group had higher levels of activity in terms of sport participation, both pre- and post-operatively and sustained more trauma at the time of the initial injury.

As the groups are not identically matched and are relatively small in number, it is difficult to draw direct comparisons between the long-term outcome of meniscectomy and open meniscal repair. However, the study does provide important information in that the development of arthrosis in both treatment groups is relatively slow and did not yet result in significant subjective complaints or limit the ability of the patients to participate in the sport. This study reaffirms what is already known about meniscal injury; that is, loss of meniscal function leads to degenerative articular changes. However, the time interval over which this occurs is lengthy and variable in nature. ❖

## How Do Meniscal and Chondral Injuries Affect the Results of ACL Reconstruction?

ABSTRACT & COMMENTARY

**Synopsis:** *Articular cartilage damage and meniscal tears requiring partial or total meniscectomy adversely affect the objective and subjective results of ACL reconstruction at intermediate to long-term follow-up.*

**Source:** Shelbourne KD, Gray T. Results of anterior cruciate ligament reconstruction based on meniscus and articular cartilage status at the time of surgery. Five- to fifteen-year evaluations. *Am J Sports Med* 2000;28(4):446-452.

This was a retrospective review of more than 1000 patients undergoing ACL reconstruction between 1982 and 1992. Shelbourne and colleagues attempted to compare the results of ACL reconstruction in patients with meniscal tears requiring meniscectomy and/or grade 3 or 4 chondrosis to patients who had ACL reconstruction without meniscal tears or significant chondrosis. Subjective follow-up, consisting of a modified Noyes questionnaire, was obtained at a mean of 8.6 years after surgery in 75% of the study group. Objective follow-up, which included KT-1000 and complete IKDC evaluation, was obtained in only 39% of the study group at a mean of 7.6 years after surgery.

Subjective scores were significantly lower for patients who had meniscectomies (at least 3 points lower) or chondral injuries (at least 4 points lower). Activity level in these groups was also lower. On objective evaluation, the percentage of normal and nearly normal scores was significantly higher in the non-meniscectomy group with normal articular cartilage. In addition, KT-1000 measurements were significantly higher (2.6 mm vs 2.0 mm) in patients undergoing medial meniscectomy.

#### ■ COMMENT BY MARK MILLER, MD

Although Shelbourne et al make a point that they performed "routine prospective follow-up," this clearly is a retrospective study with all of the problems associated with that type of study. The incompleteness of follow-up, especially for objective testing, was particularly disappointing. Nevertheless, Shelbourne et al draw several conclusions that may have merit.

As expected, meniscectomy, which is known to frequently lead to arthritis, and chondral injury, which basi-

cally is arthritis, adversely affected the results of ACL reconstruction. The medial meniscus is a secondary stabilizer to anterior translation; therefore, it is not surprising that partial or total meniscectomy will result in greater laxity by KT-1000 testing even in ACL-reconstructed knees. It was interesting that there was no difference in results of acute vs. chronic ACL reconstructions. It was also interesting that ACL reconstruction appeared to have a protective effect against developing meniscal tears in this study. Finally, the paper at least partially challenges the findings of Daniel<sup>1</sup> and colleagues, who, in their landmark natural history study, suggested that ACL reconstruction resulted in more arthritis than patients with ACL-deficient knees. The present study suggests that ACL reconstruction does not lead to a higher incidence of arthritis. Instead, it appears that the associated meniscal and chondral injuries, which signify a more severe initial injury, play a more important role in the development of arthritic changes. ❖

## Reference

1. Daniel DM, et al. Fate of the ACL-injured patient. A prospective outcome study. *Am J Sports Med* 1994;22:632-644.

# Standing the Test of Time... Neer Inferior Capsular Shift for Multidirectional Instability of the Shoulder

ABSTRACT & COMMENTARY

**Synopsis:** *The Neer inferior capsular shift for multidirectional instability stands the test of time and sufficiently stabilizes the shoulder in these complex patients with global shoulder instability.*

**Source:** Pollock RG, et al. Operative results of the inferior capsular shift procedure for multidirectional instability of the shoulder. *J Bone Joint Surg Am* 2000;82:919-928.

**M**ultidirectional instability (mdi) in the shoulder is instability in more than one direction. Neer described the inferior capsular shift procedure for the treatment of shoulder MDI in a classic article in 1980, which reported good results at short-term follow-up. The purpose of this article is to provide the reader long-term follow up on the Neer Approach to shoulder MDI.

A retrospective review of Neer's approach for shoulder

MDI between 1982 and 1992 identified 52 shoulders in 49 patients. Only three patients were lost to follow-up, leaving 49 shoulders to study. The average postoperative follow-up was 61 months. The patients were included in the study if they gave a history and exam consistent with MDI (+ sulcus sign, + anterior apprehension, + posterior stress test) and did not respond to appropriate shoulder and scapular strengthening exercises. Patients were excluded if they exhibited willful or voluntary instability. Twenty-eight male and 18 female patients were an average age of 23 when they underwent a surgical repair. A traumatic event precipitated the shoulder instability in 51%, no traumatic event precipitated the instability in 31%, and recurrent micro trauma was noted in 18%. An anterior approach was used in 69%, and a posterior approach was used in 31%. The direction of the surgical approach for the capsular shift was determined by the physical exam in the operating room. All patients underwent an inferior capsular shift procedure as described by Neer and Foster. The surgical procedures are well outlined in this article.

The intraoperative findings identified a redundant capsule in all patients, a detachment of the antero-inferior labrum in 10 shoulders, a posterior labral tear in one shoulder and fracture of the glenoid rim in two shoulders. Shoulder stability was obtained in 96% of the shoulders at the time of final follow-up. Two shoulders needed additional repair for recurrent instability. Sixty-seven percent were pain free and 96% had full range of motion. Eighty-six percent of athletes returned to their sporting events but only 69% achieved the same pre-morbid condition within their sport.

Of the 34 patients undergoing an anterior approach, 91% had good or excellent results, 94% remained stable, and 91% had full motion. Of the 15 shoulders undergoing a posterior approach, 100% had a good or excellent result and remained stable, and 93% had full range of motion.

## ■ COMMENT BY JAMES R. SLAUTERBECK, MD

This is a great long-term follow-up study of Neer's approach to MDI. Several points are worth mentioning in this article.

First, the decision on whether to perform the capsular shift by an anterior or posterior approach is based upon the predominant direction of instability on exam and by history. The intraoperative exam is the best time to determine the surgical approach and gives the best identification of the true instability pattern. Therefore, the capsular shift should be performed by a posterior approach when significant posterior laxity is identified and by an anterior approach if significant anterior laxity is identified on the preoperative exam.

Second, one must examine the glenoid attachment of the capsule and labrum because untreated avulsions from the glenoid will not give a stable base on which to shift the capsule to the humerus. This study demonstrates that repair of the labrum and capsule to the glenoid in addition to the capsular shift to the humerus will give a good outcome.

Third, this study supports the concept that many of our patients have significant laxity in the shoulder and function well until a traumatic event moves them from functional laxity to pathological instability. More than 50% of the patients with MDI presented with this type of traumatic history.

In my opinion, this is an excellent long-term follow-up paper describing a single approach to shoulder MDI. The results are convincing. The shoulder scoring system used in this manuscript could be improved upon by using one of the more accepted measurement scoring systems. Further study of patients evaluated prospectively and measured by a standardized and tested scoring system would be an excellent follow-up to this article. ❖

## Arthroscopic Debridement of Shoulder Osteoarthritis

ABSTRACT & COMMENTARY

**Synopsis:** Arthroscopic treatment of shoulder arthritis was effective at improving pain, motion, and function if there was still joint congruity and some joint space remained on an axillary radiograph.

**Source:** Weinstein DM, et al. Arthroscopic debridement of the shoulder for osteoarthritis. *Arthroscopy* 2000;16:471-476.

Osteoarthritis (oa) of the shoulder is common, even though it does not occur as frequently as in the hip or knee. In general, realignment or osteotomy techniques offer little compared to the hip or knee, so surgical treatment is limited to arthroscopic debridement or arthroplasty. Few papers in the literature address the outcome of arthroscopic debridement, so Weinstein and colleagues at Columbia Presbyterian analyzed their results with arthroscopic treatment of shoulder OA and tried to determine what characteristics led to better results.

Over a six-year period, Weinstein et al treated 25 patients with an average age of 46 arthroscopically for primary OA of the shoulder. All of the patients had failed at least three months of nonoperative treatment, includ-

ing nonsteroidal anti-inflammatory drugs (NSAID's), physical therapy and home exercises, with the average duration from initial visit to surgery being 23 months. No patient had severe loss of joint space with osteophyte formation and loss of concentricity between the humeral head and glenoid, which Weinstein et al considered a contraindication to arthroscopic treatment. Preoperatively, half of the patients had moderate to severe loss of motion, and about one-third had been misdiagnosed with impingement, frozen shoulder, etc., so that OA as the primary problem was only identified arthroscopically.

The operative technique included debridement of unstable chondral fragments or impinging osteophytes, labral tears (5), loose bodies (3), SLAP tears (2), and partial rotator cuff tears (2). A consistent finding was a thickened subacromial bursa that was removed in 23 of 25 patients; however, only two patients underwent acromioplasty. Also, only two patients underwent acromioclavicular (AC) joint resection.

Follow-up averaged 34 months with a minimum of one year. All of the patients experienced some pain relief initially, with 76% maintaining the improvement through final follow-up. Only two of 25 noted the pain had returned to the preoperative level. Ten of the 12 patients with stiffness improved their motion significantly with the procedure, and seven of 13 patients who had given up recreational sports preoperatively were able to resume these after surgery.

### ■ COMMENT BY DAVID R. DIDUCH, MS, MD

The knee literature has numerous articles regarding the expected outcome of arthroscopic debridement or chondroplasty for OA. Results generally show 40-70% improvement, with deterioration of outcome as length of follow-up increases. Prognostic factors that bode for a better result include normal alignment and early degenerative changes. Weinstein et al have effectively looked at their shoulder patients in retrospective fashion to try to determine which patients with OA would be more likely to have a better outcome with arthroscopic debridement, so that we can use their findings prognostically. All of the patients did better initially, and only 24% noted deterioration over time. This is encouraging. Better outcome was associated with less severe degenerative changes, although this did not reach statistical significance. Other factors such as age, gender, duration of symptoms, previous surgery, and radiographic stage did not correlate with the success rate.

What are we to make of these results? It would appear that arthroscopic debridement of shoulder OA offers a good outcome if the degenerative changes are not too advanced. Joint congruity must be preserved as well as

some joint space visible on axillary radiograph. Patients are likely to improve their pain and motion and function for a moderate duration. Not doing an acromioplasty with the bursectomy may be important in minimizing the scar formation in the subacromial space and preserving motion. Admittedly, the follow-up in this paper is somewhat short at 34 months, but only one of the patients was worse to the point of going on to arthroplasty and 92% were satisfied with the procedure and would do it again. This is helpful prognostic information in the treatment of the young, active patient with shoulder OA. ❖

## Osteochondral Lesions of the Talus

ABSTRACT & COMMENTARY

**Synopsis:** Higashiyama and colleagues described the preoperative MRI findings in patients with osteochondral lesions of the talus and how these changes reverse after successful surgical intervention.

**Source:** Higashiyama I, et al. Follow-up study of MRI for osteochondral lesion of the talus. *Foot Ankle Int* 2000;21(2):127-133.

Twenty-two ankles in 21 patients had MRI examinations before and after treatment of their talar lesions. Higashiyama and colleagues used T1- and T2-weighted images. The clinical symptoms were improved basically in all patients postoperatively. The T1 image diminished after surgery and all low signal T2-weighted images disappeared after arthroscopic drilling. High signal T2-weighted image changes seen in 13 cases before treatment disappeared in 10 of these postoperatively.

Higashiyama et al concluded that surgical treatment reduced the abnormal stress of the underlying bone elements caused by the unstable osteochondral fragment, leading to the reduction of the low intensity area. The loss of the T2-weighted images was considered indicative of obliteration of the interface between the fragment and the talar bed with bony union.

MRI imaging of the osteochondral lesions of the talus seems to be an effective tool for postoperative evaluation, thereby allowing the surgeon the ability to assess the need for further treatment.

### ■ COMMENT BY JAMES P. TASTO, MD

Osteochondral lesions of the talus have been classified as I through IV in terms of their stability. They are classi-

cally located anterolaterally or posteromedially on the talus.<sup>1</sup> The work-up for a patient with sometimes normal x-rays and persistent ankle pain that does not appear to be of soft tissue origin should involve the judicious use of an MRI scan.<sup>2</sup> The choice and type of surgical intervention is centered around the integrity of the fragment. This dictates whether it is replaced and stabilized, or removed and the area curetted, drilled, or abraded.

The immediate short-term results in the treatment of osteochondritis dissecans of the talus, whether it be an anterolateral lesion or posteromedial lesion, are usually good, and the patient usually can return to sporting activities. However, long-term results in these cases, particularly when they involve removal of a large, non-viable fragment, are less optimistic and may lead to subsequent degenerative changes in the ankle. It is useful for the clinician to be aware of the various classifications and locations of these lesions, as well as the appropriate surgical intervention and encouraging short-term results. ❖

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1. Anderson IF, et al. Osteochondral fractures of the dome of the talus. *J Bone Joint Surg Am* 1989;71:1143-1152.
2. Dipaola JD, et al. Characterizing osteochondral lesions by magnetic resonance imaging. *Arthroscopy* 1991;7:101-104.

## Does Ultrasound Enhance Stretching of Soft Tissue Contractures?

ABSTRACT & COMMENTARY

**Synopsis:** Ultrasound did not increase tissue stretch with a continuous applied load as compared to sham ultrasound treatment with the same applied load.

**Source:** Reed BV, et al. Effects of ultrasound and stretch on knee ligament extensibility. *J Orthop Sports Phys Ther* 2000;30:341-347.

The use of heat and stretch to increase ligament extensibility has long been part of the standard of care in rehabilitation. Quite often, the choice of heat has been continuous wattage ultrasound (CWUS). In fact, ultrasound has long been a primary method of heat delivery in rehabilitation circles. A basic assumption has been that one of the effects of heat on connective tissue is that it increases extensibility. The

purpose of this study was to determine whether ultrasound and stretching increased extensibility of the medial collateral ligament (MCL). Instrumentation included the Genucom knee joint arthrometer that can introduce either anterior/posterior forces or medial/lateral forces that are quantifiable relative to the angle of the knee or displacement.

The sample included 21 normal adult female volunteers with a mean age of 31.5 years  $\pm$  11 years and with no history of pathology. The procedure included a 10 lb valgus force applied to the knee joint with displacement measured over a 40-minute time period. This was done on two separate testing dates 28 days apart to control for possible hormonal fluctuations of the subjects. Two pre-tests were done at five-minute intervals followed by treatment, which included either a static valgus stretch and ultrasound or static valgus stretch and a sham ultrasound. After treatment, three post-tests were performed again at five-minute intervals. All Genucom measurements and manual stretching were performed by the same tester. The soundhead movement was applied in a typical circular pattern at approximately 4 cm per second. The ultrasound dosage was 3 MHz;  $1.25 \text{ W/cm}^2 \times 2.5$  min. Statistical analysis included a two-way factor repeated measures analysis of variance.

Results indicated that there was a significant difference with regard to stretching from the pre-test measures whether the sham ultrasound was applied or whether true ultrasound was applied. In other words, stretching caused ligament extensibility, but ultrasound did not contribute to that extensibility.

#### ■ COMMENT BY CLAYTON F. HOLMES, EdD, PT, ATC

While ultrasound has long been used as a method of heat delivery in rehabilitation, there is little evidence to support its use. There is evidence in animal models that ultrasound does heat tissues below the surface; however, the clinical relevance of this heating has long been in question. In addition, the direct effects on tissue extensibility of heat delivered by any method needs further study.

This was an excellent study that controlled for several possible confounding variables. In addition, reliability of the genucom was well documented, including its use by these particular researchers. One concern regarding study design is whether the duration of ultrasound treatment would sufficiently heat the tissues to generate any effect. Comparing various durations of treatment might have been helpful. While this study did not measure heat delivery, it is clinically applicable because it measured a

possible effect of that heat, tissue extensibility. In fact, the major finding of this study was that ultrasound did not affect tissue extensibility. This is critical because one of the most common physical agents prescribed in rehabilitation of soft tissue injury is ultrasound and this study did not support its effectiveness in performing a commonly assumed physiological effect. It is possible that ultrasound would have effects on scar tissue or contracture different than on the intact MCL. While more study certainly needs to be done, evidence such as this could indicate that ultrasound may not be the choice of heat delivery to soft tissue. It would be interesting to perform the same study and compare ultrasound with other forms of heat delivery. Perhaps moist heat and other less invasive forms of heat delivery may be more appropriate. ❖

## Sun and Active Patients

### ABSTRACT & COMMENTARY

**Synopsis:** *Repeated exposure to ultraviolet light can result in premature aging of the skin as well as an increased risk of precancerous and cancerous (basal cell carcinoma, squamous cell carcinoma, and malignant melanoma) lesions.*

**Source:** Davis J. Sun and active patients. *The Physician and Sports Medicine* 2000;28:779-785.

Davis reminds us that sunburn (the acute manifestation of overexposure to sunlight) is not the only danger of excessive exposure to sunlight. Solar radiation spans wavelengths from 270-5000 Newton meters (Nm), and includes infrared light, the light that warms us (wavelength  $>$  800 Nm), visible light at the mid spectrum range (400-800 Nm), and ultraviolet (UV) A, B, and C from 320-400 Nm, 290-320 Nm, and 200-290 Nm respectively.

UVA, the wavelength of light responsible for aging, is poorly absorbed by the ozone layer; whereas UVB, responsible for producing sunburns as well as precancerous and cancerous lesions, is moderately absorbed by the ozone layer. UVC, also found in halogen light bulbs, is well absorbed by the ozone layer and therefore very little UVC reaches our skin.

Since there is less atmospheric ozone filtration

when the sun is directly overhead (10 a.m.-2 p.m.), the chance of sunburn is greatest at this time. Not only does the sun's radiation cause sunburn and precancerous and cancerous lesions, but it also triggers dermatological diseases such as xeroderma pigmentosum, oculocutaneous albinism, and lupus erythematosus. Additionally, sunlight can precipitate photosensitivity induced by oral medications, such as sulfa drugs and oral contraceptives, and NSAIDs, such as naproxen sodium.

Exposure to UVA and UVB can suppress certain delayed-type hypersensitivity responses such as allergic contact dermatitis; however, the immunosuppressive effect of UV rays may also be responsible for the reoccurrence of cold sores (herpes simplex labialis).

Davis' suggestions for protection against the harmful side effects of UV light include avoiding the sun during midday when UV rays are more intense, wearing clothing (hats, long pants, long sleeved shirts) to shield the skin from UV rays where feasible, and using physical sunscreens such as titanium dioxide and zinc oxide or chemical sunscreens of at least a no. 15 sun protective factor (SPF).

### ■ COMMENT BY LETHA Y. GRIFFIN, MD, PhD

Although most sports medicine physicians are excellent at reminding athletes to stay well hydrated during the heat of summer, few emphasize the significant risk of exposure to the UV rays present in our surroundings. Unfortunately, athletes exercising in the heat are unable to use clothing such as long sleeved shirts and long pants to screen out the harmful effects of UV light, as such would promote overheating during exercise. Sun visors or hats, though, are often feasible. Moreover, athletes should be reminded to wear chemical or physical sun screens and to apply them liberally and frequently when exercising in the sunlight. One should remember that although infrared radiation is absorbed by water droplets and clouds, UVA and UVB are not well absorbed by clouds and hence one can still be exposed to the harmful effects of the sun's radiation even on cloudy days.

Coaches should be reminded to try to minimize the number of practice sessions scheduled for midday when the heat index is higher and the risks of exposure to the harmful effects of sunlight are also higher. ❖

### 12. What is the effect of monopolar radiofrequency energy on partial-thickness defects of articular cartilage?

- a. Beneficial effect with chondrocyte proliferation at 12 weeks post surgery
- b. No adverse effect
- c. Limited chondral damage that resolved at 12 weeks post surgery
- d. Progressive chondral damage that persisted at 24 weeks post surgery

### 13. Which of the following is considered to be the most important factor in predicting successful healing following meniscal repair?

- a. Tear length
- b. Patient age
- c. Tear pattern
- d. Rim width
- e. Surgical technique

### 14. What is the long-term effect of meniscal tears requiring at least partial meniscectomy and grade 3 or 4 chondrosis on the fate of ACL reconstruction?

- a. Meniscal tears result in a worse outcome, but chondral injuries do not have any effect.
- b. Chondral injuries result in a worse outcome, but meniscal injuries do not have any effect.
- c. Both meniscal tears and chondral injuries have a significant adverse effect on the results of ACL reconstruction.
- d. Neither meniscal tears or chondral injuries have a significant adverse effect on the results of ACL reconstruction.

### 15. The useful diagnostic imaging technique for preoperative and postoperative evaluation of osteochondral lesions of the talus is which of the following?

- a. CT Scan
- b. Bone Scan
- c. MRI Scan
- d. Plain x-rays

### 16. Multidirectional instability of the shoulder with the primary instability on exam in the posterior direction is best treated by:

- a. a Putti Platt procedure
- b. an anterior capsule and labral repair combined with an extended inferior capsular shift from the anterior approach.
- c. a combined anterior and posterior approach with labral reconstructions and a capsular shift.
- d. a posterior capsule and labral repair combined with an inferior capsular shift from the posterior approach.

### 17. Which of the following was considered a contraindication to performing arthroscopic debridement for shoulder arthritis?

- a. Joint incongruity
- b. Type III acromion
- c. Preoperative stiffness
- d. Partial thickness rotator cuff tear
- e. Previous surgery