

THE 2002 OFFICIAL
PATIENT'S SOURCEBOOK

on

KNEE
LIGAMENT
INJURIES



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AND PHILIP M. PARKER, PH.D., EDITORS

ICON Health Publications
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Dedication

To the healthcare professionals dedicating their time and efforts to the study of knee ligament injuries.

Acknowledgements

The collective knowledge generated from academic and applied research summarized in various references has been critical in the creation of this sourcebook which is best viewed as a comprehensive compilation and collection of information prepared by various official agencies which directly or indirectly are dedicated to the study of knee ligament injuries. All of the *Official Patient's Sourcebooks* draw from various agencies and institutions associated with the United States Department of Health and Human Services, and in particular, the Office of the Secretary of Health and Human Services (OS), the Administration for Children and Families (ACF), the Administration on Aging (AOA), the Agency for Healthcare Research and Quality (AHRQ), the Agency for Toxic Substances and Disease Registry (ATSDR), the Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA), the Healthcare Financing Administration (HCFA), the Health Resources and Services Administration (HRSA), the Indian Health Service (IHS), the institutions of the National Institutes of Health (NIH), the Program Support Center (PSC), and the Substance Abuse and Mental Health Services Administration (SAMHSA). In addition to these sources, information gathered from the National Library of Medicine, the United States Patent Office, the European Union, and their related organizations has been invaluable in the creation of this sourcebook. Some of the work represented was financially supported by the Research and Development Committee at INSEAD. This support is gratefully acknowledged. Finally, special thanks are owed to Tiffany LaRochelle for her excellent editorial support.

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- The Official Patient's Sourcebook on Knee Sprains and Strains
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INTRODUCTION

Overview

Dr. C. Everett Koop, former U.S. Surgeon General, once said, “The best prescription is knowledge.”¹ The Agency for Healthcare Research and Quality (AHRQ) of the National Institutes of Health (NIH) echoes this view and recommends that every patient incorporate education into the treatment process. According to the AHRQ:

Finding out more about your condition is a good place to start. By contacting groups that support your condition, visiting your local library, and searching on the Internet, you can find good information to help guide your treatment decisions. Some information may be hard to find – especially if you don't know where to look.²

As the AHRQ mentions, finding the right information is not an obvious task. Though many physicians and public officials had thought that the emergence of the Internet would do much to assist patients in obtaining reliable information, in March 2001 the National Institutes of Health issued the following warning:

The number of Web sites offering health-related resources grows every day. Many sites provide valuable information, while others may have information that is unreliable or misleading.³

¹ Quotation from <http://www.drkoop.com>.

² The Agency for Healthcare Research and Quality (AHRQ):
<http://www.ahrq.gov/consumer/diaginfo.htm>.

³ From the NIH, National Cancer Institute (NCI):
<http://cancertrials.nci.nih.gov/beyond/evaluating.html>.

Since the late 1990s, physicians have seen a general increase in patient Internet usage rates. Patients frequently enter their doctor's offices with printed Web pages of home remedies in the guise of latest medical research. This scenario is so common that doctors often spend more time dispelling misleading information than guiding patients through sound therapies. *The Official Patient's Sourcebook on Knee Ligament Injuries* has been created for patients who have decided to make education and research an integral part of the treatment process. The pages that follow will tell you where and how to look for information covering virtually all topics related to knee ligament injuries, from the essentials to the most advanced areas of research.

The title of this book includes the word "official." This reflects the fact that the sourcebook draws from public, academic, government, and peer-reviewed research. Selected readings from various agencies are reproduced to give you some of the latest official information available to date on knee ligament injuries.

Given patients' increasing sophistication in using the Internet, abundant references to reliable Internet-based resources are provided throughout this sourcebook. Where possible, guidance is provided on how to obtain free-of-charge, primary research results as well as more detailed information via the Internet. E-book and electronic versions of this sourcebook are fully interactive with each of the Internet sites mentioned (clicking on a hyperlink automatically opens your browser to the site indicated). Hard copy users of this sourcebook can type cited Web addresses directly into their browsers to obtain access to the corresponding sites. Since we are working with ICON Health Publications, hard copy *Sourcebooks* are frequently updated and printed on demand to ensure that the information provided is current.

In addition to extensive references accessible via the Internet, every chapter presents a "Vocabulary Builder." Many health guides offer glossaries of technical or uncommon terms in an appendix. In editing this sourcebook, we have decided to place a smaller glossary within each chapter that covers terms used in that chapter. Given the technical nature of some chapters, you may need to revisit many sections. Building one's vocabulary of medical terms in such a gradual manner has been shown to improve the learning process.

We must emphasize that no sourcebook on knee ligament injuries should affirm that a specific diagnostic procedure or treatment discussed in a research study, patent, or doctoral dissertation is "correct" or your best option. This sourcebook is no exception. Each patient is unique. Deciding on

appropriate options is always up to the patient in consultation with their physician and healthcare providers.

Organization

This sourcebook is organized into three parts. Part I explores basic techniques to researching knee ligament injuries (e.g. finding guidelines on diagnosis, treatments, and prognosis), followed by a number of topics, including information on how to get in touch with organizations, associations, or other patient networks dedicated to knee ligament injuries. It also gives you sources of information that can help you find a doctor in your local area specializing in diagnosing and treating knee ligament injuries. Collectively, the material presented in Part I is a complete primer on basic research topics for patients with knee ligament injuries.

Part II moves on to advanced research dedicated to knee ligament injuries. Part II is intended for those willing to invest many hours of hard work and study. It is here that we direct you to the latest scientific and applied research on knee ligament injuries. When possible, contact names, links via the Internet, and summaries are provided. It is in Part II where the vocabulary process becomes important as authors publishing advanced research frequently use highly specialized language. In general, every attempt is made to recommend “free-to-use” options.

Part III provides appendices of useful background reading for all patients with knee ligament injuries or related injuries. The appendices are dedicated to more pragmatic issues faced by many patients with knee ligament injuries. Accessing materials via medical libraries may be the only option for some readers, so a guide is provided for finding local medical libraries which are open to the public. Part III, therefore, focuses on advice that goes beyond the biological and scientific issues facing patients with knee ligament injuries.

Scope

While this sourcebook covers knee ligament injuries, your doctor, research publications, and specialists may refer to your condition using a variety of terms. Therefore, you should understand that knee ligament injuries is often considered a synonym or a condition closely related to the following:

- ACL Knee Injury

4 Knee Ligament Injuries

- Anterior Cruciate Ligament Injury
- Cruciate Ligament Injury
- Cruciate Ligament Knee Injury
- Pcl Knee Injury
- Posterior Cruciate Ligament Injury
- Posterior Cruciate Ligament Knee Injury

In addition to synonyms and related conditions, physicians may refer to knee ligament injuries using certain coding systems. The International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) is the most commonly used system of classification for the world's illnesses. Your physician may use this coding system as an administrative or tracking tool. The following classification is commonly used for knee ligament injuries:⁴

- 717.83 old disruption of anterior cruciate ligament
- 717.84 old disruption of posterior cruciate ligament
- 844 sprains and strains of knee and leg
- 844.2 cruciate ligament of knee

For the purposes of this sourcebook, we have attempted to be as inclusive as possible, looking for official information for all of the synonyms relevant to knee ligament injuries. You may find it useful to refer to synonyms when accessing databases or interacting with healthcare professionals and medical librarians.

Moving Forward

Since the 1980s, the world has seen a proliferation of healthcare guides covering most illnesses and conditions. Some are written by patients or their family members. These generally take a layperson's approach to understanding and coping with an illness or injury. They can be uplifting, encouraging, and highly supportive. Other guides are authored by

⁴ This list is based on the official version of the World Health Organization's 9th Revision, International Classification of Diseases (ICD-9). According to the National Technical Information Service, "ICD-9CM extensions, interpretations, modifications, addenda, or errata other than those approved by the U.S. Public Health Service and the Health Care Financing Administration are not to be considered official and should not be utilized. Continuous maintenance of the ICD-9-CM is the responsibility of the federal government."

physicians or other healthcare providers who have a more clinical outlook. Each of these two styles of guide has its purpose and can be quite useful.

As editors, we have chosen a third route. We have chosen to expose you to as many sources of official and peer-reviewed information as practical, for the purpose of educating you about basic and advanced knowledge as recognized by medical science today. You can think of this sourcebook as your personal Internet age reference librarian.

Why “Internet age”? All too often, patients with knee ligament injuries will log on to the Internet, type words into a search engine, and receive several Web site listings which are mostly irrelevant or redundant. These patients are left to wonder where the relevant information is, and how to obtain it. Since only the smallest fraction of information dealing with knee ligament injuries is even indexed in search engines, a non-systematic approach often leads to frustration and disappointment. With this sourcebook, we hope to direct you to the information you need that you would not likely find using popular Web directories. Beyond Web listings, in many cases we will reproduce brief summaries or abstracts of available reference materials. These abstracts often contain distilled information on topics of discussion.

While we focus on the more scientific aspects of knee ligament injuries, there is, of course, the emotional side to consider. Later in the sourcebook, we provide a chapter dedicated to helping you find peer groups and associations that can provide additional support beyond research produced by medical science. We hope that the choices we have made give you the most options available in moving forward. In this way, we wish you the best in your efforts to incorporate this educational approach into your treatment plan.

The Editors

PART I: THE ESSENTIALS

ABOUT PART I

Part I has been edited to give you access to what we feel are “the essentials” on knee ligament injuries. The essentials of an injury typically include the definition or description of the injury, a discussion of who it affects, the symptoms that are associated with a given injury, tests or diagnostic procedures that might be specific to the injury, and treatments for the injury. Your doctor or healthcare provider may have already explained the essentials of knee ligament injuries to you or even given you a pamphlet or brochure describing knee ligament injuries. Now you are searching for more in-depth information. As editors, we have decided, nevertheless, to include a discussion on where to find essential information that can complement what your doctor has already told you. In this section we recommend a process, not a particular Web site or reference book. The process ensures that, as you search the Web, you gain background information in such a way as to maximize your understanding.

CHAPTER 1. THE ESSENTIALS ON KNEE LIGAMENT INJURIES: GUIDELINES

Overview

Official agencies, as well as federally-funded institutions supported by national grants, frequently publish a variety of guidelines on knee ligament injuries. These are typically called “Fact Sheets” or “Guidelines.” They can take the form of a brochure, information kit, pamphlet, or flyer. Often they are only a few pages in length. The great advantage of guidelines over other sources is that they are often written with the patient in mind. Since new guidelines on knee ligament injuries can appear at any moment and be published by a number of sources, the best approach to finding guidelines is to systematically scan the Internet-based services that post them.

The National Institutes of Health (NIH)⁵

The National Institutes of Health (NIH) is the first place to search for relatively current patient guidelines and fact sheets on knee ligament injuries. Originally founded in 1887, the NIH is one of the world's foremost medical research centers and the federal focal point for medical research in the United States. At any given time, the NIH supports some 35,000 research grants at universities, medical schools, and other research and training institutions, both nationally and internationally. The rosters of those who have conducted research or who have received NIH support over the years include the world's most illustrious scientists and physicians. Among them are 97 scientists who have won the Nobel Prize for achievement in medicine.

⁵ Adapted from the NIH: <http://www.nih.gov/about/NIHoverview.html>.

There is no guarantee that any one Institute will have a guideline on a specific condition or disease, though the National Institutes of Health collectively publish over 600 guidelines for both common and rare conditions and disorders. The best way to access NIH guidelines is via the Internet. Although the NIH is organized into many different Institutes and Offices, the following is a list of key Web sites where you are most likely to find NIH clinical guidelines and publications dealing with knee ligament injuries and associated conditions:

- Office of the Director (OD); guidelines consolidated across agencies available at <http://www.nih.gov/health/consumer/conkey.htm>
- National Library of Medicine (NLM); extensive encyclopedia (A.D.A.M., Inc.) with guidelines available at <http://www.nlm.nih.gov/medlineplus/healthtopics.html>
- National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS); fact sheets and guidelines at <http://www.nih.gov/niams/healthinfo/>

Among those listed above, the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) is especially noteworthy. The mission of NIAMS, a part of the National Institutes of Health (NIH), is to support research into the causes, treatment, and prevention of arthritis and musculoskeletal and skin diseases, the training of basic and clinical scientists to carry out this research, and the dissemination of information on research progress in these diseases. The National Institute of Arthritis and Musculoskeletal and Skin Diseases Information Clearinghouse is a public service sponsored by the NIAMS that provides health information and information sources. The NIAMS provides the following guideline concerning knee ligament injuries.⁶

What Do the Knees Do? How Do They Work?⁷

The knees provide stable support for the body and allow the legs to bend and straighten. Both flexibility and stability are needed for standing and for motions like walking, running, crouching, jumping, and turning.

⁶ This and other passages are adapted from the NIH and NIAMS (<http://www.niams.nih.gov/hi/index.htm>). “Adapted” signifies that the text is reproduced with attribution, with some or no editorial adjustments.

⁷ Adapted from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS): <http://www.niams.nih.gov/hi/topics/kneeprobs/kneeqa.htm>.

Several kinds of supporting and moving parts, including bones, cartilage, muscles, ligaments, and tendons, help the knees do their job. Any of these parts can be involved in pain or dysfunction.

What Causes Knee Problems?

There are two general kinds of knee problems:

- Mechanical
- Inflammatory

Mechanical Knee Problems

Some knee problems result from injury, such as a direct blow or sudden movements that strain the knee beyond its normal range of movement. Other problems, such as osteoarthritis in the knee, result from wear and tear on its parts.

Inflammatory Knee Problems

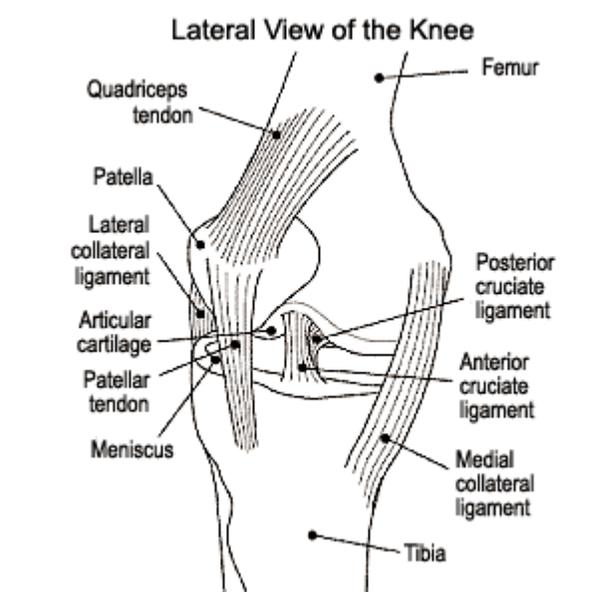
Inflammation that occurs in certain rheumatic diseases, such as rheumatoid arthritis and systemic lupus erythematosus, can damage the knee.

Joint Basics

The point at which two or more bones are connected is called a joint. In all joints, the bones are kept from grinding against each other by padding called cartilage. Bones are joined to bones by strong, elastic bands of tissue called ligaments. Tendons are tough cords of tissue that connect muscle to bone. Muscles work in opposing pairs to bend and straighten joints. While muscles are not technically part of a joint, they're important because strong muscles help support and protect joints.

What Are the Parts of the Knee?

Like any joint, the knee is composed of bones and cartilage, ligaments, tendons, and muscles.



Bones and Cartilage

The knee joint is the junction of three bones: the femur (thigh bone or upper leg bone), the tibia (shin bone or larger bone of the lower leg), and the patella (knee cap). The patella is 2 to 3 inches wide and 3 to 4 inches long. It sits over the other bones at the front of the knee joint and slides when the leg moves. It protects the knee and gives leverage to muscles.

The ends of the three bones in the knee joint are covered with articular cartilage, a tough, elastic material that helps absorb shock and allows the knee joint to move smoothly. Separating the bones of the knee are pads of connective tissue. One pad is called a meniscus (muh-NISS-kus). The plural is menisci (muh-NISS-sky). The menisci are divided into two crescent-shaped discs positioned between the tibia and femur on the outer and inner sides of each knee. The two menisci in each knee act as shock absorbers, cushioning the lower part of the leg from the weight of the rest of the body as well as enhancing stability.

Muscles

There are two groups of muscles at the knee. The quadriceps muscle comprises four muscles on the front of the thigh that work to straighten the leg from a bent position. The hamstring muscles, which bend the leg at the

knee, run along the back of the thigh from the hip to just below the knee. Keeping these muscles strong with exercises such as walking up stairs or riding a stationary bicycle helps support and protect the knee.

Tendons and Ligaments

The quadriceps tendon connects the quadriceps muscle to the patella and provides the power to extend the leg. Four ligaments connect the femur and tibia and give the joint strength and stability:

- The medial collateral ligament (MCL) provides stability to the inner (medial) part of the knee.
- The lateral collateral ligament (LCL) provides stability to the outer (lateral) part of the knee.
- The anterior cruciate ligament (ACL), in the center of the knee, limits rotation and the forward movement of the tibia.
- The posterior cruciate ligament (PCL), also in the center of the knee, limits backward movement of the tibia.

Other ligaments are part of the knee capsule, which is a protective, fiber-like structure that wraps around the knee joint. Inside the capsule, the joint is lined with a thin, soft tissue called synovium.

How Are Knee Problems Diagnosed?

Doctors use several methods to diagnose knee problems:

- Medical history
- Physical examination
- Diagnostic tests

Medical History

The patient tells the doctor details about symptoms and about any injury, condition, or general health problem that might be causing the pain.

Physical Examination

The doctor bends, straightens, rotates (turns), or presses on the knee to feel for injury and discover the limits of movement and the location of pain. The patient may be asked to stand, walk, or squat to help the doctor assess the knee's function.

Diagnostic Tests

The doctor may use one or more of the following tests to determine the nature of a knee problem:

- **X ray (radiography)**--An x-ray beam is passed through the knee to produce a two-dimensional picture of the bones.
- **Computerized axial tomography (CAT) scan**--X rays lasting a fraction of a second are passed through the knee at different angles, detected by a scanner, and analyzed by a computer. This produces a series of clear cross-sectional images ("slices") of the knee tissues on a computer screen. CAT scan images show soft tissues such as ligaments or muscles more clearly than conventional x rays. The computer can combine individual images to give a three-dimensional view of the knee.
- **Bone scan (radionuclide scanning)**--A very small amount of radioactive material is injected into the patient's bloodstream and detected by a scanner. This test detects blood flow to the bone and cell activity within the bone and can show abnormalities in these processes that may aid diagnosis.
- **Magnetic resonance imaging (MRI)**--Energy from a powerful magnet (rather than x rays) stimulates knee tissue to produce signals that are detected by a scanner and analyzed by a computer. This creates a series of cross-sectional images of a specific part of the knee. An MRI is particularly useful for detecting soft tissue damage or disease. Like a CAT scan, a computer is used to produce three-dimensional views of the knee during MRI.
- **Arthroscopy**--The doctor manipulates a small, lighted optic tube (arthroscope) that has been inserted into the joint through a small incision in the knee. Images of the inside of the knee joint are projected onto a television screen. While the arthroscope is inside the knee joint, removal of loose pieces of bone or cartilage or the repair of torn ligaments and menisci is also possible.
- **Biopsy**--The doctor removes tissue to examine under a microscope.

Causes of Anterior and Posterior Cruciate Ligament Injuries

Injury to the cruciate ligaments is sometimes referred to as a “sprain.”⁸ The ACL is most often stretched or torn (or both) by a sudden twisting motion (for example, when the feet are planted one way and the knees are turned another).

The PCL is most often injured by a direct impact, such as in an automobile accident or football tackle.

Symptoms and Diagnosis of Cruciate Ligament Injuries

Injury to a cruciate ligament may not cause pain. Rather, the person may hear a popping sound, and the leg may buckle when he or she tries to stand on it. The doctor may perform several tests to see whether the parts of the knee stay in proper position when pressure is applied in different directions. A thorough examination is essential. An MRI is very accurate in detecting a complete tear, but arthroscopy may be the only reliable means of detecting a partial one.

Treatment of Anterior and Posterior Cruciate Ligament Injuries

For an incomplete tear, the doctor may recommend that the patient begin an exercise program to strengthen surrounding muscles. The doctor may also prescribe a brace to protect the knee during activity. For a completely torn ACL in an active athlete and motivated person, the doctor is likely to recommend surgery. The surgeon may reattach the torn ends of the ligament or reconstruct the torn ligament by using a piece (graft) of healthy ligament from the patient (autograft) or from a cadaver (allograft). Although synthetic ligaments have been tried in experiments, the results have not been as good as with human tissue. One of the most important elements in a patient's successful recovery after cruciate ligament surgery is a 4- to 6-month exercise and rehabilitation program that may involve using special exercise equipment at a rehabilitation or sports center. Successful surgery and rehabilitation will allow the patient to return to a normal lifestyle.

⁸ The National Institute of Arthritis and Musculoskeletal and Skin Diseases Information Clearinghouse has a separate publication on sprains and strains. See the end of this booklet for contact information.

Causes of Medial and Lateral Collateral Ligament Injuries

The MCL is more easily injured than the LCL. The cause is most often a blow to the outer side of the knee that stretches and tears the ligament on the inner side of the knee. Such blows frequently occur in contact sports like football or hockey.

Symptoms and Diagnosis of Collateral Ligament Injuries

When injury to the MCL occurs, a person may feel a pop and the knee may buckle sideways. Pain and swelling are common. A thorough examination is needed to determine the kind and extent of the injury. To diagnose a collateral ligament injury, the doctor exerts pressure on the side of the knee to determine the degree of pain and the looseness of the joint. An MRI is helpful in diagnosing injuries to these ligaments.

Treatment of Medial and Lateral Collateral Ligament Injuries

Most sprains of the collateral ligaments will heal if the patient follows a prescribed exercise program. In addition to exercise, the doctor may recommend ice packs to reduce pain and swelling and a small sleeve-type brace to protect and stabilize the knee. A sprain may take 2 to 4 weeks to heal. A severely sprained or torn collateral ligament may be accompanied by a torn ACL, which usually requires surgical repair.

What Kinds of Doctors Treat Knee Problems?

Extensive injuries and diseases of the knees are usually treated by an orthopaedic surgeon, a doctor who has been trained in the nonsurgical and surgical treatment of bones, joints, and soft tissues such as ligaments, tendons, and muscles. Patients seeking nonsurgical treatment of arthritis of the knee may also consult a rheumatologist (a doctor specializing in the diagnosis and treatment of arthritis and related disorders).

How Can People Prevent Knee Problems?

Some knee problems, such as those resulting from an accident, can't be foreseen or prevented. However, a person can prevent many knee problems by following these suggestions:

- Before exercising or participating in sports, warm up by walking or riding a stationary bicycle, then do stretches. Stretching the muscles in the front of the thigh (quadriceps) and back of the thigh (hamstrings) reduces tension on the tendons and relieves pressure on the knee during activity.
- Strengthen the leg muscles by doing specific exercises (for example, by walking up stairs or hills, or by riding a stationary bicycle). A supervised workout with weights is another way to strengthen the leg muscles that support the knee.
- Avoid sudden changes in the intensity of exercise. Increase the force or duration of activity gradually.
- Wear shoes that both fit properly and are in good condition to help maintain balance and leg alignment when walking or running. Knee problems can be caused by flat feet or overpronated feet (feet that roll inward). People can often reduce some of these problems by wearing special shoe inserts (orthotics). Maintain a healthy weight to reduce stress on the knee. Obesity increases the risk of degenerative (wearing) conditions such as osteoarthritis of the knee.

What Types of Exercise Are Helpful for Knee Problems?

Three types of exercise are best for people with knee problems:

- Range-of-motion exercises help maintain normal joint movement and relieve stiffness. This type of exercise helps maintain or increase flexibility.
- Strengthening exercises help keep or increase muscle strength. Strong muscles help support and protect joints affected by arthritis.
- Aerobic or endurance exercises improve function of the heart and circulation and help control weight. Weight control can be important to people who have arthritis because extra weight puts pressure on many joints. Some studies show that aerobic exercise can reduce inflammation in some joints.

Where Can I Find More Information about Knee Problems?

For more information, contact:

National Institute of Arthritis and Musculoskeletal and Skin

Diseases Information Clearinghouse

National Institutes of Health

1 AMS Circle

Bethesda, MD 20892-3675

Phone: 301-495-4484 or

877-22-NIAMS (226-4267) (free of charge)

TTY: 301-565-2966

Fax: 301-718-6366

<http://www.niams.nih.gov/>

The clearinghouse provides information about various forms of arthritis and rheumatic disease and bone, muscle, and skin diseases. It distributes patient and professional education materials and refers people to other sources of information. Additional information and updates can also be found on the NIAMS Web site.

American Academy of Orthopaedic Surgeons

P.O. Box 2058

Des Plaines, IL 60017

Phone: 800-824-BONE (2663) (free of charge)

Fax: 847-823-8025

www.aaos.org

The academy publishes several brochures on the knee. Single copies of a brochure are available free of charge by sending a self-addressed, stamped (business-size) envelope to (*name of brochure*) at the address above.

American College of Rheumatology

1800 Century Place, Suite 250

Atlanta, GA 30329

Phone: 404-633-3777

Fax: 404-633-1870

www.rheumatology.org

This national professional organization can provide referrals to rheumatologists and allied health professionals, such as physical therapists. One-page fact sheets are available on various forms of arthritis. Lists of specialists by geographic area and fact sheets are also available on this Web site.

American Physical Therapy Association

1111 N. Fairfax Street

Alexandria, VA 22314

Phone: 800-999-APTA (2782) (free of charge)

www.apta.org

The association publishes a free brochure entitled "Taking Care of the Knees."

Arthritis Foundation

1330 West Peachtree Street

Atlanta, GA 30309

Phone: 404-872-7100 or 800-283-7800 (free of charge)

or call your local chapter (listed in the local telephone directory)

www.arthritis.org

The foundation has several free brochures about coping with arthritis, taking nonsteroid and steroid medicines, and exercise. A free brochure on protecting your joints is titled "Using Your Joints Wisely." The foundation also can provide addresses and phone numbers for local chapters and physician and clinic referrals.

More Guideline Sources

The guideline above on knee ligament injuries is only one example of the kind of material that you can find online and free of charge. The remainder of this chapter will direct you to other sources which either publish or can help you find additional guidelines on topics related to knee ligament injuries. Many of the guidelines listed below address topics that may be of particular relevance to your specific situation or of special interest to only some patients with knee ligament injuries. Due to space limitations these sources are listed in a concise manner. Do not hesitate to consult the following sources by either using the Internet hyperlink provided, or, in cases where the contact information is provided, contacting the publisher or author directly.

Topic Pages: MEDLINEplus

For patients wishing to go beyond guidelines published by specific Institutes of the NIH, the National Library of Medicine has created a vast and patient-oriented healthcare information portal called MEDLINEplus. Within this Internet-based system are "health topic pages." You can think of a health topic page as a guide to patient guides. To access this system, log on to

<http://www.nlm.nih.gov/medlineplus/healthtopics.html>. From there you can either search using the alphabetical index or browse by broad topic areas.

If you do not find topics of interest when browsing health topic pages, then you can choose to use the advanced search utility of MEDLINEplus at <http://www.nlm.nih.gov/medlineplus/advancedsearch.html>. This utility is similar to the NIH Search Utility, with the exception that it only includes material linked within the MEDLINEplus system (mostly patient-oriented information). It also has the disadvantage of generating unstructured results. We recommend, therefore, that you use this method only if you have a very targeted search.

The Combined Health Information Database (CHID)

CHID Online is a reference tool that maintains a database directory of thousands of journal articles and patient education guidelines on knee ligament injuries and related conditions. One of the advantages of CHID over other sources is that it offers summaries that describe the guidelines available, including contact information and pricing. CHID's general Web site is <http://chid.nih.gov/>. To search this database, go to <http://chid.nih.gov/detail/detail.html>. In particular, you can use the advanced search options to look up pamphlets, reports, brochures, and information kits. The following was recently posted in this archive:

- **Knee Ligament Injuries: Diagnosis and Treatment**

Source: San Bruno, CA: StayWell Company. 2001. 16 p.

Contact: Available from StayWell Company. 1100 Grundy Lane, San Bruno, CA 94066-3030. (800) 333-3032. Website: www.staywell.com.

PRICE: Call or write for current pricing on single and bulk orders.

Summary: This illustrated booklet provides people who have knee ligament injuries with information on their diagnosis and treatment. Ligaments help control knee motion by connecting bones and supporting the joint. The ligaments most likely to be injured are the anterior cruciate ligament (ACL) and the medial collateral ligament (MCL). The ACL can be injured when a person twists the knee beyond its normal range of motion or changes direction too quickly. The MCL can tear when the knee is struck from the outside. Proper care to make the knee joint stable again takes teamwork. Before the knee can be treated, the patient needs to be evaluated. The evaluation includes a medical history, a physical examination, and diagnostic tests. Nonsurgical treatment may be used if

only one part of the knee is injured. This option begins with rest, icing, and elevation. In the next stage, exercises begin. Surgery may be needed to repair more extensive damage. The booklet provides guidelines that patients should follow in the weeks before surgery and on the day of surgery. These are followed by a description of the procedures used to repair ACL and MCL injuries. In addition, the booklet discusses short and long term recovery from surgery. Immediately after surgery, the focus is on being comfortable, speeding healing, and learning to use crutches. After the healing period is over, the emphasis shifts to participating in active physical therapy and preparing for a return to active living. The booklet also includes a surgical checklist. Numerous figures.

The National Guideline Clearinghouse™

The National Guideline Clearinghouse™ offers hundreds of evidence-based clinical practice guidelines published in the United States and other countries. You can search their site located at <http://www.guideline.gov> by using the keyword “knee ligament injuries” or synonyms. The following was recently posted:

- **ACR Appropriateness Criteria™ for acute trauma to the knee.**

Source: American College of Radiology.; 1998; 9 pages

http://www.guideline.gov/FRAMESETS/guideline_fs.asp?guideline=001657&sSearch_string=knee+ligament+injuries

- **Clinical guideline on knee pain.**

Source: American Academy of Orthopaedic Surgeons/American Association of Neurological Surgeons/American College of Physical Medicine and Rehabilitation/American College of Rheumatology.; 1996; 12 pages

http://www.guideline.gov/FRAMESETS/guideline_fs.asp?guideline=000933&sSearch_string=knee+ligament+injuries

- **Criteria for knee surgery.**

Source: Washington State Department of Labor and Industries/Washington State Medical Association.; 1999; 1 page

http://www.guideline.gov/FRAMESETS/guideline_fs.asp?guideline=001119&sSearch_string=knee+ligament+injuries

Healthfinder™

Healthfinder™ is an additional source sponsored by the U.S. Department of Health and Human Services which offers links to hundreds of other sites that contain healthcare information. This Web site is located at <http://www.healthfinder.gov>. Again, keyword searches can be used to find guidelines. The following was recently found in this database:

- **Knee Arthroscopy: A Patient Guide**

Summary: A consumer health information booklet providing information for arthroscopy and ligament reconstruction procedures.

Source: Educational Institution--Follow the Resource URL for More Information

<http://www.healthfinder.gov/scripts/recordpass.asp?RecordType=0&RecordID=4085>

The NIH Search Utility

After browsing the references listed at the beginning of this chapter, you may want to explore the NIH Search Utility. This allows you to search for documents on over 100 selected Web sites that comprise the NIH-WEB-SPACE. Each of these servers is “crawled” and indexed on an ongoing basis. Your search will produce a list of various documents, all of which will relate in some way to knee ligament injuries. The drawbacks of this approach are that the information is not organized by theme and that the references are often a mix of information for professionals and patients. Nevertheless, a large number of the listed Web sites provide useful background information. We can only recommend this route, therefore, for relatively rare or specific conditions or disorders, or when using highly targeted searches. To use the NIH search utility, visit <http://search.nih.gov/index.html>.

Additional Web Sources

A number of Web sites that often link to government sites are available to the public. These can also point you in the direction of essential information. The following is a representative sample:

- AOL: <http://search.aol.com/cat.adp?id=168&layer=&from=subcats>
- drkoop.com[®]: <http://www.drkoop.com/conditions/ency/index.html>
- Family Village: <http://www.familyvillage.wisc.edu/specific.htm>
- Google:
http://directory.google.com/Top/Health/Conditions_and_Diseases/
- Med Help International: <http://www.medhelp.org/HealthTopics/A.html>
- Open Directory Project:
http://dmoz.org/Health/Conditions_and_Diseases/
- Yahoo.com: http://dir.yahoo.com/Health/Diseases_and_Conditions/
- WebMD[®]Health: http://my.webmd.com/health_topics

Vocabulary Builder

The material in this chapter may have contained a number of unfamiliar words. The following Vocabulary Builder introduces you to terms used in this chapter that have not been covered in the previous chapter:

Aerobic: 1. having molecular oxygen present. 2. growing, living, or occurring in the presence of molecular oxygen. 3. requiring oxygen for respiration. [EU]

Arthroscopy: Endoscopic examination, therapy and surgery of the joint. [NIH]

Biopsy: The removal and examination, usually microscopic, of tissue from the living body, performed to establish precise diagnosis. [EU]

Degenerative: Undergoing degeneration : tending to degenerate; having the character of or involving degeneration; causing or tending to cause degeneration. [EU]

Elastic: Susceptible of resisting and recovering from stretching, compression or distortion applied by a force. [EU]

Femur: The longest and largest bone of the skeleton, it is situated between the hip and the knee. [NIH]

Inflammation: A pathological process characterized by injury or destruction of tissues caused by a variety of cytologic and chemical reactions. It is

usually manifested by typical signs of pain, heat, redness, swelling, and loss of function. [NIH]

Ligament: A band of fibrous tissue that connects bones or cartilages, serving to support and strengthen joints. [EU]

Lupus: A form of cutaneous tuberculosis. It is seen predominantly in women and typically involves the nasal, buccal, and conjunctival mucosa. [NIH]

Orthopaedic: Pertaining to the correction of deformities of the musculoskeletal system; pertaining to orthopaedics. [EU]

Osteoarthritis: Noninflammatory degenerative joint disease occurring chiefly in older persons, characterized by degeneration of the articular cartilage, hypertrophy of bone at the margins, and changes in the synovial membrane. It is accompanied by pain and stiffness, particularly after prolonged activity. [EU]

Patella: The flat, triangular bone situated at the anterior part of the knee. [NIH]

Posterior: Situated in back of, or in the back part of, or affecting the back or dorsal surface of the body. In lower animals, it refers to the caudal end of the body. [EU]

Radiography: The making of film records (radiographs) of internal structures of the body by passage of x-rays or gamma rays through the body to act on specially sensitized film. [EU]

Radiology: A specialty concerned with the use of x-ray and other forms of radiant energy in the diagnosis and treatment of disease. [NIH]

Rheumatoid: Resembling rheumatism. [EU]

Rheumatology: A subspecialty of internal medicine concerned with the study of inflammatory or degenerative processes and metabolic derangement of connective tissue structures which pertain to a variety of musculoskeletal disorders, such as arthritis. [NIH]

Surgical: Of, pertaining to, or correctable by surgery. [EU]

Systemic: Pertaining to or affecting the body as a whole. [EU]

Tears: The fluid secreted by the lacrimal glands. This fluid moistens the conjunctiva and cornea. [NIH]

Tibia: The second longest bone of the skeleton. It is located on the medial side of the lower leg, articulating with the fibula laterally, the talus distally, and the femur proximally. [NIH]

Tomography: The recording of internal body images at a predetermined plane by means of the tomograph; called also body section roentgenography. [EU]

CHAPTER 2. SEEKING GUIDANCE

Overview

Some patients are comforted by the knowledge that a number of organizations dedicate their resources to helping people with knee ligament injuries. These associations can become invaluable sources of information and advice. Many associations offer aftercare support, financial assistance, and other important services. Furthermore, healthcare research has shown that support groups often help people to better cope with their conditions.⁹ In addition to support groups, your physician can be a valuable source of guidance and support. Therefore, finding a physician that can work with your unique situation is a very important aspect of your care.

In this chapter, we direct you to resources that can help you find patient organizations and medical specialists. We begin by describing how to find associations and peer groups that can help you better understand and cope with knee ligament injuries. The chapter ends with a discussion on how to find a doctor that is right for you.

Associations and Knee Ligament Injuries

As mentioned by the Agency for Healthcare Research and Quality, sometimes the emotional side of a condition or injury can be as taxing as the physical side.¹⁰ You may have fears or feel overwhelmed by your situation. Everyone has different ways of dealing with disease or physical injury. Your attitude, your expectations, and how well you cope with your condition can

⁹ Churches, synagogues, and other houses of worship might also have groups that can offer you the social support you need.

¹⁰ This section has been adapted from <http://www.ahcpr.gov/consumer/diagin5.htm>.

all influence your well-being. This is true for both minor conditions and serious illnesses. For example, a study on female breast cancer survivors revealed that women who participated in support groups lived longer and experienced better quality of life when compared with women who did not participate. In the support group, women learned coping skills and had the opportunity to share their feelings with other women in the same situation. There are a number of directories that list additional medical associations that you may find useful. While not all of these directories will provide different information, by consulting all of them, you will have nearly exhausted all sources for patient associations.

The National Health Information Center (NHIC)

The National Health Information Center (NHIC) offers a free referral service to help people find organizations that provide information about knee ligament injuries. For more information, see the NHIC's Web site at <http://www.health.gov/NHIC/> or contact an information specialist by calling 1-800-336-4797.

DIRLINE

A comprehensive source of information on associations is the DIRLINE database maintained by the National Library of Medicine. The database comprises some 10,000 records of organizations, research centers, and government institutes and associations which primarily focus on health and biomedicine. DIRLINE is available via the Internet at the following Web site: <http://dirline.nlm.nih.gov/>. Simply type in "knee ligament injuries" (or a synonym) or the name of a topic, and the site will list information contained in the database on all relevant organizations.

The Combined Health Information Database

Another comprehensive source of information on healthcare associations is the Combined Health Information Database. Using the "Detailed Search" option, you will need to limit your search to "Organizations" and "knee ligament injuries". Type the following hyperlink into your Web browser: <http://chid.nih.gov/detail/detail.html>. To find associations, use the drop boxes at the bottom of the search page where "You may refine your search by." For publication date, select "All Years." Then, select your preferred language and the format option "Organization Resource Sheet." By making

these selections and typing in “knee ligament injuries” (or synonyms) into the “For these words:” box, you will only receive results on organizations dealing with knee ligament injuries. You should check back periodically with this database since it is updated every 3 months.

The National Organization for Rare Disorders, Inc.

The National Organization for Rare Disorders, Inc. has prepared a Web site that provides, at no charge, lists of associations organized by specific conditions and diseases. You can access this database at the following Web site: <http://www.rarediseases.org/cgi-bin/nord/searchpage>. Select the option called “Organizational Database (ODB)” and type “knee ligament injuries” (or a synonym) in the search box.

Online Support Groups

In addition to support groups, commercial Internet service providers offer forums and chat rooms for people with different illnesses and conditions. WebMD[®], for example, offers such a service at their Web site: <http://boards.webmd.com/roundtable>. These online self-help communities can help you connect with a network of people whose concerns are similar to yours. Online support groups are places where people can talk informally. If you read about a novel approach, consult with your doctor or other healthcare providers, as the treatments or discoveries you hear about may not be scientifically proven to be safe and effective. The following Internet sites may be of particular interest:

- **Focus on Men’s Health**
www.focusonmenshealth.com/script/main/forum.asp?li=MNI&ArticleKey=9512
- **Encyclopedia of Sports Medicine and Science**
www.sportsci.org/encyc/aclinj/aclinj.html
- **DMOZ**
dmoz.org/Health/Conditions_and_Diseases/Musculoskeletal_Disorders/Repetitive_Strain_Injuries

Finding Doctors

One of the most important aspects of your treatment will be the relationship between you and your doctor or specialist. All patients with knee ligament injuries must go through the process of selecting a physician. While this process will vary from person to person, the Agency for Healthcare Research and Quality makes a number of suggestions, including the following:¹¹

- If you are in a managed care plan, check the plan's list of doctors first.
- Ask doctors or other health professionals who work with doctors, such as hospital nurses, for referrals.
- Call a hospital's doctor referral service, but keep in mind that these services usually refer you to doctors on staff at that particular hospital. The services do not have information on the quality of care that these doctors provide.
- Some local medical societies offer lists of member doctors. Again, these lists do not have information on the quality of care that these doctors provide.

Additional steps you can take to locate doctors include the following:

- Check with the associations listed earlier in this chapter.
- Information on doctors in some states is available on the Internet at <http://www.docboard.org>. This Web site is run by "Administrators in Medicine," a group of state medical board directors.
- The American Board of Medical Specialties can tell you if your doctor is board certified. "Certified" means that the doctor has completed a training program in a specialty and has passed an exam, or "board," to assess his or her knowledge, skills, and experience to provide quality patient care in that specialty. Primary care doctors may also be certified as specialists. The AMBS Web site is located at <http://www.abms.org/newsearch.asp>.¹² You can also contact the ABMS by phone at 1-866-ASK-ABMS.
- You can call the American Medical Association (AMA) at 800-665-2882 for information on training, specialties, and board certification for many licensed doctors in the United States. This information also can be found in "Physician Select" at the AMA's Web site: <http://www.ama-assn.org/aps/amahg.htm>.

¹¹ This section is adapted from the AHRQ: www.ahrq.gov/consumer/qntascii/qntdr.htm.

¹² While board certification is a good measure of a doctor's knowledge, it is possible to receive quality care from doctors who are not board certified.

If the previous sources did not meet your needs, you may want to log on to the Web site of the National Organization for Rare Disorders (NORD) at <http://www.rarediseases.org/>. NORD maintains a database of doctors with expertise in various rare conditions and diseases. The Metabolic Information Network (MIN), 800-945-2188, also maintains a database of physicians with expertise in various metabolic diseases.

Finding an Orthopedic Surgeon

The American Academy of Orthopaedic Surgeons (AAOS) maintains a free-to-use, searchable database of its member doctors. The AAOS members include orthopedic surgeons practicing throughout the U.S. and Canada. To access the database, go to the Academy's home page at <http://www.aaos.org/> and choose "Find a Surgeon" from the menu bar. This will take you to the search form where you can search for member doctors by name or location. To contact the AAOS directly, use the following information:

American Academy of Orthopaedic Surgeons

P.O. Box 2058

Des Plaines, IL 60017

Phone: 800-824-BONE (2663) (free of charge)

Fax: 847-823-8125

Fax-on-Demand: 800/999-2939

www.aaos.org

Selecting Your Doctor¹³

When you have compiled a list of prospective doctors, call each of their offices. First, ask if the doctor accepts your health insurance plan and if he or she is taking new patients. If the doctor is not covered by your plan, ask yourself if you are prepared to pay the extra costs. The next step is to schedule a visit with your chosen physician. During the first visit you will have the opportunity to evaluate your doctor and to find out if you feel comfortable with him or her. Ask yourself, did the doctor:

- Give me a chance to ask questions about knee ligament injuries?
- Really listen to my questions?

¹³ This section has been adapted from the AHRQ:
www.ahrq.gov/consumer/qntascii/qntdr.htm.

- Answer in terms I understood?
- Show respect for me?
- Ask me questions?
- Make me feel comfortable?
- Address the health problem(s) I came with?
- Ask me my preferences about different kinds of treatments for knee ligament injuries?
- Spend enough time with me?

Trust your instincts when deciding if the doctor is right for you. But remember, it might take time for the relationship to develop. It takes more than one visit for you and your doctor to get to know each other.

Working with Your Doctor¹⁴

Research has shown that patients who have good relationships with their doctors tend to be more satisfied with their care and have better results. Here are some tips to help you and your doctor become partners:

- You know important things about your symptoms and your health history. Tell your doctor what you think he or she needs to know.
- It is important to tell your doctor personal information, even if it makes you feel embarrassed or uncomfortable.
- Bring a “health history” list with you (and keep it up to date).
- Always bring any medications you are currently taking with you to the appointment, or you can bring a list of your medications including dosage and frequency information. Talk about any allergies or reactions you have had to your medications.
- Tell your doctor about any natural or alternative medicines you are taking.
- Bring other medical information, such as x-ray films, test results, and medical records.
- Ask questions. If you don't, your doctor will assume that you understood everything that was said.

¹⁴ This section has been adapted from the AHRQ:
www.ahrq.gov/consumer/qntascii/qntdr.htm.

- Write down your questions before your visit. List the most important ones first to make sure that they are addressed.
- Consider bringing a friend with you to the appointment to help you ask questions. This person can also help you understand and/or remember the answers.
- Ask your doctor to draw pictures if you think that this would help you understand.
- Take notes. Some doctors do not mind if you bring a tape recorder to help you remember things, but always ask first.
- Let your doctor know if you need more time. If there is not time that day, perhaps you can speak to a nurse or physician assistant on staff or schedule a telephone appointment.
- Take information home. Ask for written instructions. Your doctor may also have brochures and audio and videotapes that can help you.
- After leaving the doctor's office, take responsibility for your care. If you have questions, call. If your symptoms get worse or if you have problems with your medication, call. If you had tests and do not hear from your doctor, call for your test results. If your doctor recommended that you have certain tests, schedule an appointment to get them done. If your doctor said you should see an additional specialist, make an appointment.

By following these steps, you will enhance the relationship you will have with your physician.

Broader Health-Related Resources

In addition to the references above, the NIH has set up guidance Web sites that can help patients find healthcare professionals. These include:¹⁵

- Caregivers:
<http://www.nlm.nih.gov/medlineplus/caregivers.html>
- Choosing a Doctor or Healthcare Service:
<http://www.nlm.nih.gov/medlineplus/choosingadoctororhealthcareservice.html>

¹⁵ You can access this information at:
<http://www.nlm.nih.gov/medlineplus/healthsystem.html>.

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- Hospitals and Health Facilities:
<http://www.nlm.nih.gov/medlineplus/healthfacilities.html>

PART II: ADDITIONAL RESOURCES AND ADVANCED MATERIAL

ABOUT PART II

In Part II, we introduce you to additional resources and advanced research on knee ligament injuries. All too often, patients who conduct their own research are overwhelmed by the difficulty in finding and organizing information. The purpose of the following chapters is to provide you an organized and structured format to help you find additional information resources on knee ligament injuries. In Part II, as in Part I, our objective is not to interpret the latest advances on knee ligament injuries or render an opinion. Rather, our goal is to give you access to original research and to increase your awareness of sources you may not have already considered. In this way, you will come across the advanced materials often referred to in pamphlets, books, or other general works. Once again, some of this material is technical in nature, so consultation with a professional familiar with knee ligament injuries is suggested.

CHAPTER 3. STUDIES ON KNEE LIGAMENT INJURIES

Overview

Every year, academic studies are published on knee ligament injuries or related conditions. Broadly speaking, there are two types of studies. The first are peer reviewed. Generally, the content of these studies has been reviewed by scientists or physicians. Peer-reviewed studies are typically published in scientific journals and are usually available at medical libraries. The second type of studies is non-peer reviewed. These works include summary articles that do not use or report scientific results. These often appear in the popular press, newsletters, or similar periodicals.

In this chapter, we will show you how to locate peer-reviewed references and studies on knee ligament injuries. We will begin by discussing research that has been summarized and is free to view by the public via the Internet. We then show you how to generate a bibliography on knee ligament injuries and teach you how to keep current on new studies as they are published or undertaken by the scientific community.

The Combined Health Information Database

The Combined Health Information Database summarizes studies across numerous federal agencies. To limit your investigation to research studies and knee ligament injuries, you will need to use the advanced search options. First, go to <http://chid.nih.gov/index.html>. From there, select the "Detailed Search" option (or go directly to that page with the following hyperlink: <http://chid.nih.gov/detail/detail.html>). The trick in extracting studies is found in the drop boxes at the bottom of the search page where "You may refine your search by." Select the dates and language you prefer,

and the format option "Journal Article." At the top of the search form, select the number of records you would like to see (we recommend 100) and check the box to display "whole records." We recommend that you type in "knee ligament injuries" (or synonyms) into the "For these words:" box. Consider using the option "anywhere in record" to make your search as broad as possible. If you want to limit the search to only a particular field, such as the title of the journal, then select this option in the "Search in these fields" drop box. The following is a sample of what you can expect from this type of search:

- **Downhill Ski Injuries: Trends and Treatments**

Source: Journal of Musculoskeletal Medicine. 18(2): 95-102,105-106. February 2001.

Summary: This journal article provides health professionals with information on recent trends in injuries that commonly occur in downhill skiing and what can be done to diagnose and manage them. The types and incidence of downhill ski injuries have changed with the development of more protective skiing equipment. Knee ligament injuries are the most common category of ski injury. Severe knee sprains, most involving the anterior cruciate ligament (ACL), have tripled since the 1980s. No boots, bindings, or skis currently on the market are designed to protect skiers from ACL injury. Numerous possible mechanisms have been suggested as the cause of ACL injury during downhill skiing. The types most commonly reported are external rotation valgus, hyperextension internal rotation, phantom foot, and boot induced mechanisms. Patients who have ACL insufficiency are best advised to avoid participating in high risk sports; however, surgical intervention is recommended for patients who have ACL insufficiency but want to participate in these sports. Lower extremity injuries have been reduced primarily because boots and binding systems have improved. In the upper extremity, common injuries are skier's thumb, rotator cuff injury, and anterior shoulder dislocation. Conservative treatment is generally indicated for patients with skier's thumb. Rest followed by a strengthening program is recommended for managing partial thickness tears of the rotator cuff in young athletes. Prompt reduction is needed for shoulder dislocation. 5 figures, 3 tables, and 33 references. (AA-M).

- **Evaluation and Treatment of Posterior Cruciate Ligament Injuries**

Source: American Journal of Sports Medicine. 26(3): 471-482. May-June 1998.

Summary: This journal article provides health professionals with an update on current approaches to knee injuries involving the posterior

cruciate ligament (PCL). Improved data on the anatomy and biomechanics of the human PCL have provided orthopedic surgeons with new information on which to base treatment decisions. Injuries to the PCL are reported to comprise approximately 3 percent of all knee ligament injuries in the general population and as much as 37 percent of those seen in emergency departments. Although the diagnosis can often be made with a physical examination, ancillary studies such as radiographs and magnetic resonance images can be very helpful in detecting associated ligament and bony injuries. In general, most partial PCL injuries can be treated without surgery. Treating acute grades I and II PCL injuries involves rehabilitating protective weightbearing and quadriceps muscles. With acute grade III injuries, a 2-to 4-week period of immobilization in full extension is recommended. Chronic grade I and II injuries usually respond well to physical therapy. However, surgical reconstruction is typically recommended for chronic grade III injuries that become symptomatic for pain and instability and for PCL injuries that occur in combination with other structures. The article discusses current surgical techniques of PCL reconstruction based on anatomic and biomechanical studies. When the PCL is repaired, most surgeons choose to reconstruct the anterolateral component using a graft of sufficient size and strength. Further research is needed to evaluate new surgical approaches such as double-bundle reconstructions and tibial inlay techniques, as well as improved techniques for capsular and collateral ligament injuries. 10 figures, 2 tables, and 62 references.

Federally-Funded Research on Knee Ligament Injuries

The U.S. Government supports a variety of research studies relating to knee ligament injuries and associated conditions. These studies are tracked by the Office of Extramural Research at the National Institutes of Health.¹⁶ CRISP (Computerized Retrieval of Information on Scientific Projects) is a searchable database of federally-funded biomedical research projects conducted at universities, hospitals, and other institutions. Visit the CRISP Web site at http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket. You can perform targeted searches by various criteria including geography, date, as well as topics related to knee ligament injuries and related conditions.

¹⁶ Healthcare projects are funded by the National Institutes of Health (NIH), Substance Abuse and Mental Health Services (SAMHSA), Health Resources and Services Administration (HRSA), Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDCP), Agency for Healthcare Research and Quality (AHRQ), and Office of Assistant Secretary of Health (OASH).

For most of the studies, the agencies reporting into CRISP provide summaries or abstracts. As opposed to clinical trial research using patients, many federally-funded studies use animals or simulated models to explore knee ligament injuries and related conditions. In some cases, therefore, it may be difficult to understand how some basic or fundamental research could eventually translate into medical practice. The following sample is typical of the type of information found when searching the CRISP database for knee ligament injuries:

- **Project Title: ACL Deficient Knee--MRI and Biomechanical Modeling**

Principal Investigator & Institution: Buchanan, Thomas S.; Associate Professor; Mechanical and Aerospace Engr; University of Delaware Newark, De 19716

Timing: Fiscal Year 2000; Project Start 1-JUN-1999; Project End 1-MAY-2004

Summary: The overall goal of this work is to provide a detailed understanding of the effect of anterior cruciate ligament injury on knee movement in those who compensate well for the injury and those who do not. Some persons (copers) are able to fully compensate for the absence of the anterior cruciate ligament (ACL) while others (non-copers) are not. Non-copers demonstrate quadriceps femoris weakness, and use kinematic, kinetic, and muscle activity patterns that stiffen the knee joint for stability. They accomplish the joint stiffening via general cocontraction of the muscles around the knee and by reducing the force with which the foot hits the ground. Copers have no quadriceps weakness, normal ground reaction forces, and possess an ability to coordinate the activity of the lower extremity muscles to efficiently distribute control of the knee among the hip, knee and ankle while maintaining normal knee motion. Even using sophisticated motion analysis techniques, copers are indistinguishable from uninjured subjects. A new approach to in vivo analysis of musculoskeletal dynamics uses Cine-phase contrast (Cine-PC) magnetic resonance imaging (MRI) to image and track the moving knee. Cine-PC MRI, a non-invasive technique, is capable of measuring 3D muscle fiber and skeletal velocity, in vivo, during dynamic tasks. Through integration, 3D musculoskeletal movement can be tracked. A combination of the use of this new technology and conventional MRI, electromyography, and musculoskeletal modeling will provide a unique opportunity to elucidate the compensation strategies employed by the copers. There are two aims to this proposal. Aim I is to identify differences in knee kinematics, ligament lengths, tendon lengths, and muscle activation patterns of ACL

deficient patients using Cine-phase contrast MRI and electromyographic analysis that characterize the mechanisms with which the copers, in altering their muscle activation pattern, alter their knee joint kinematics in order to stabilize their knees. Aim II is to identify differences in muscle activation patterns in ACL deficient copers and non-copers using electromyography and biomechanical modeling. Patient specific models of the ACL deficient knee using T1-weighted MRI will be developed and used as input to a biomechanical analysis. Previous work suggests that patients with ACL deficiencies balance knee joint loads between muscles and ligaments using a strategy that is different than that employed by unimpaired subjects. This will be examined for copers and non-copers in this study.

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

- **Project Title: Anterior Cruciate Ligament-Functional Biomechanics**

Principal Investigator & Institution: Andriacchi, Thomas P.; Professor; Mechanical Engineering; Stanford University Stanford, Ca 94305

Timing: Fiscal Year 2001; Project Start 1-APR-1988; Project End 1-MAY-2005

Summary: The long-term goal of this project is to provide information that can be applied to the prevention and treatment of injury to the anterior cruciate ligament (ACL) of the knee. The annual incidence of acute ACL disruptions is approximately 1 in 3000. Treatment of the ruptured anterior cruciate ligament is often complicated by the difficulty in predicting from passive physical examination of the knee which patients will be functionally impaired by the loss of this ligament and which patients will have minimal symptoms. Is it possible that altered patterns of locomotion dynamically compensate for loss of the ACL? Quantifying the relationship between altered patterns of locomotion and changes in the anterior-posterior displacement (AP) and internal-external rotation (IE) of the knee is a fundamental step towards answering this question. This information is clinically important since the AP and IE components of knee motion influence strains in secondary restraints (to anterior laxity) such as the medial meniscus of altered patterns of locomotion for ACL deficient knees. A newly developed point cluster technique will be used to quantify knee kinematics during locomotion. The first hypothesis will test if altered patterns of locomotion (characterized by the magnitude of the moment generated by net quadriceps/knee flexor muscles) are correlated with AP and IE displacements at the knee. Another consideration in this study is the possibility that individual anatomical variations can influence the effect of altered patterns of locomotion on knee kinematics. Previous work has

implicated the extensor mechanism as a possible cause of these adaptations. The second hypothesis will test if the magnitude of the altered pattern of locomotion (defined by the reduction from normal) in the net quadriceps/knee flexor moment) is correlated with knee extensor anatomy. This study will generate fundamental new information on the patient's ability to dynamically control anterior posterior stability of the knee joint in the absence of anterior cruciate ligament. This study will also help to identify critical variables that should be considered in a larger prospective clinical outcome study.

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

- **Project Title: Effects of Position on Osteoarthritis Progression in Extended Knee Radiographs**

Principal Investigator & Institution: Buckwalter, Kenneth A.; ; Indiana Univ-Purdue Univ at Indianapolis 355 N Lansing Indianapolis, in 46202

Timing: Fiscal Year 2000

Summary: Our current knowledge about the rate of tibiofemoral joint space narrowing (JSN) in osteoarthritis (OA) of the knee comes from epidemiologic studies of the radiographic progression. All of these studies have used conventional techniques of knee radiography (i.e., standing anteroposterior (AP) views of the knee in full extension). The extended knee view, however, is inherently limited with respect to assuring the radioanatomic conditions associated with reproducible measurement of joint space width (JSW): alignment of the medial tibial plateau (MTP) with the x-ray beam and centering of the tibial spines beneath the femoral condyle. Several alternative protocols for knee radiography have been developed recently which use fluoroscopy to standardize knee flexion and rotation to achieve proper alignment and centering of the joint space in the x-ray image. Compare to the conventional extended view, these protocols have been shown to afford more precise measurement of JSW and to permit identification of OA knees with a more rapid rate of JSN. It is unclear, however, whether unstandardized positioning in previous studies using extended view radiographs has obscured our understanding of the nature and rate of progression of knee OA. The specific aims of this study are to obtain and analyze >600 paired radiologic knee examinations from 5 previous studies of the radiographic progression of knee OA (i.e., cohorts from Indianapolis, IN; Baltimore, MD; Bristol, UK, Nottingham, UK; Tecumseh, MI). The adequacy of MTP alignment and knee rotation in each image will be graded independently by 3 raters. Additional data will be recorded for each subject, including clinical characteristics (age, sex, race, height, weight) and evaluations of disease progression (i.e.,

Kellgren & Lawrence (K&L) grade, ratings of individual bony features of OA, JSW measurement for each image). The pairs of films will be reconstituted, and each pair will be categorized to reflect the degree of radioanatomic standardization for knee flexion and rotation (i.e., both films acceptable, one film acceptable, neither film acceptable). We will evaluate the effect of radioanatomic positioning by statistical comparison of groups of paired images representing varying levels of radioanatomic standardization with respect to clinical characteristics and observed OA progression (K&L grade, bony features, JSN). To the extent that unstandardized radioanatomic positioning has obscured past results, OA progression should be most uniform and rapid in the group of paired films representing the highest conformity to currently accepted standards for radioanatomic positioning of the knee.

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

- **Project Title: Joint Mechanoreceptor Contributions to Control of Knee Joint Stability**

Principal Investigator & Institution: Rymer, William Z.; Director of Research; Northwestern University 303 E Chicago Ave Chicago, IL 60611

Timing: Fiscal Year 2000; Project Start 1-DEC-1983; Project End 0-NOV-2001

Summary: Osteoarthritis is believed to be induced by repetitive microtrauma to joint cartilage, especially in weight-bearing joints like the knee. This microtrauma can occur both as a result of shear motion between cartilaginous joint surfaces, and/or in compressive loading. While anterior posterior loading of the knee has been studied extensively, there has been less attention paid to knee varus-valgus and axial rotational loading, and to the compensatory role of muscle contractions in promoting knee stability in the varus-valgus plane. Joint stability has been classically attributed to five major factors: bone/cartilaginous contact forces, ligament and capsule stiffness, intrinsic stiffness of active muscles, and reflexively mediated muscle stiffness. Reflex action may, in turn, be mediated either by muscle stretch receptors, by periarticular tissue afferents (ligaments and capsule) and potentially even by skin mechanoreceptors. This latter class of reflexes potentially protects the joint through muscle activation in situations of abnormal valgus loading at the joint. In this setting, an injury of the collateral ligaments will deprive reduce reflex based protection through the disruption of afferents derived from receptors located in these ligaments. Clinically, some injuries to the medial collateral ligaments (MCL) result in complete disruption of the ligament fibers with significant joint instability. The development of posttraumatic osteoarthritis at the knee joint, which may

follow long after MCL injury, is believed to be induced by the injury based-instability. There has been less attention paid to the "nonstructural" effect of these injuries on the ligament, and the interaction of the neurosensory function of the ligament in promoting joint stability. Accordingly, we hypothesize that posttraumatic osteoarthritis associated with MCL injury is attributable, at least in part, to the disruption of afferent pathways originating in ligament receptors. It follows that targeted muscle contractions cannot be elicited by the application of a mechanical valgus stimulus to the MCL injured human knee. We further hypothesize that the application of comparable mechanical stimuli to the contra lateral normal knee elicits reflex responses, which significantly increase the joints stiffness in the valgus direction. These hypotheses will be examined on subjects with complete MCL injuries on one side and a normal knee on the other side. The affected and unaffected knees will be tested at full extension and with different levels of joint muscle preactivation (in hamstrings and quadriceps). Our findings will shed light on fundamental mechanisms of joint stability, and on adverse effects of loss of stability in the MCL injured knee.

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

- **Project Title: Neuromechanics in Progression of Knee Osteoarthritis**

Principal Investigator & Institution: Sharma, Leena; Assistant Professor; Northwestern University 303 E Chicago Ave Chicago, IL 60611

Timing: Fiscal Year 2000; Project Start 1-DEC-1977; Project End 0-NOV-2001

Summary: Knee osteoarthritis (OA) is a leading cause of chronic disability in older persons. The course of knee OA is variable. A widely-accepted paradigm views knee OA severity as the result of local neuromuscular and mechanical factors, acting against a background of susceptibility-determining systemic factors. The local factors include structural elements and joint-protective neuromuscular activity. Impairments in these factors result in increased, suboptimally distributed load transmitted to the articular surface, and may be associated with accelerated disease progression. In this study, we test the hypothesis that malalignment, increased laxity, proprioception deficit, and muscle weakness are associated with more rapid progression of knee OA. Our specific aims are: 1) to measure in 300 patients with tibiofemoral knee OA, defined by radiographic criteria, at baseline, 18 months and 36 months, each of the neuromuscular and mechanical factors noted; 2) to assess change in outcomes, i.e. functional status, using the Western Ontario and McMaster University OA Index Physical Function scale, and radiographic status by measuring joint space width on weight bearing,

semi-flexed, fluoro- confirmed knee radiographs; and 3) to analyze the contribution of each of the local factors to outcome, while controlling for potentially confounding variables, using analytic methods that allow data from both knees to be considered. The results of this natural history study will aid the delineation of the specific events that cause progression of knee OA, suggest targets for non-surgical and surgical intervention development, aid correct interpretation of therapeutic trial results, and facilitate early, cost-effective intervention in mechanical subsets at particular risk for decline.

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

- **Project Title: Role of Joint Afferents in Knee Medio-Lateral Stability**

Principal Investigator & Institution: Dhaher, Yasin Y.; ; Rehabilitation Institute Research Corp Research Corporation Chicago, Il 60611

Timing: Fiscal Year 2000; Project Start 1-SEP-1999; Project End 1-AUG-2002

Summary: We propose to study the role of joint afferents in promoting medio- lateral stability of the human knee joint Preservation of joint stability is necessary to prevent cartilage damage and osteoarthritis. Joint stability has been attributed to five factors: bone and cartilage contact forces, ligament and capsule stiffness, intrinsic stiffness, intrinsic stiffness and active muscles, and reflexively mediated muscle stiffness.. Reflex action may, in turn, be mediated either by muscle stretch receptors or by periarticular tissue afferents (ligaments and capsule). The latter class of reflexes potentially protects the joint through muscle activation in situations of abnormal varus/valgus loading of the joint. We hypothesize that targeted muscle contractions can be elicited by the application of a mechanical varus/valgus stimulus to the human knee, and that these responses significantly increase the joint's stiffness in the varus/valgus plane. Quantitative measures of individual knee muscle action will be determined in 35 subjects. We will use intramuscular electrodes to selectivity stimulate muscles traversing the knee, and a 6-degree of freedom load cell will measure the movements produced. For the same subject population, a rapid varus/valgus positional perturbation will be applied at the subject knee via a servomotor. During the mechanical perturbation, muscle activity will be recorded and the reflex responses in major knee muscles recorded in all subjects. Based on pilot data, we believe that mechanical perturbations resulting in the stretching of joint ligaments will produce a reflex response in muscle traversing the knee joint, and that these reflexes may be organized so as to compensate selectively for varus or valgus loading, and that these reflexes may be organized so as to compensate selectively for varus and valgus loading.

To quantify the stiffness contributed by reflexively mediated muscle contractions, a pseudo-random varus/valgus perturbation will be applied to the knees of all 35 subjects before and after nerve blockade. Joint stiffness and damping coefficients will be estimated using linear models. The reflex stiffness mediated by periarticular afferents will be calculated to be the difference in the computed joint stiffness with and without the neural blockade. We believe that stretch receptors in periarticular tissues of the knee joint play a major role in promoting joint medial-lateral stability, and we further expect that information about the interaction between neurological and mechanical components will have a major impact on how training may improve overall joint stability. Reprogramming the neural component of the joint by physiotherapy may help substitute the loss of function of ligaments induced by joint laxity and thus limit the rate of OA progression.

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

- **Project Title: Tissue Engineered Ligaments**

Principal Investigator & Institution: Kaplan, David L.; Professor; Chemical Engineering; Tufts University Medford Medford, Ma 02155

Timing: Fiscal Year 2002; Project Start 1-APR-2002; Project End 1-MAR-2007

Summary: (provided by the applicant): The proposed tissue engineering studies are motivated by the medical need for biologically based, functional tissues for transplantation. An important issue with respect to engineering tissues in vitro is to understand the role of environmental factors on the process of tissue formation. Controlled in vitro studies of tissue development in three-dimensional culture can improve our fundamental understanding of regulatory signals directing progenitor cell differentiation, affecting the structure and function of engineered tissues formed, such as Anterior Cruciate Ligaments (ACL). In addition, bioreactor systems which allow the stimulation of the cells growing on these matrices by physical forces that are physiological in nature (e.g., tension and torsion in the case of the ACL) could be extended to other skeletal tissues and become a valuable tool for basic biomedical research. Specifically, we propose to test the hypothesis that mechanical forces that are physiological in nature, intensity and frequency for native ACLs will direct human bone marrow stem cell differentiation into ligament-forming cells and result in the in vitro formation of functional equivalents of native ACLs. Our objectives are to (a) gain fundamental insight into the relationships between mechanical and biochemical stimulation and the differentiation of human bone marrow stem cells (hBMSCs) into ligament fibroblasts expressing biochemical and genetic markers

characteristic for cells in native ligaments, and (b) to engineer ligament-like structures with appropriate mechanical properties starting from hBMSCs. In our experimental plan we will study the culture hBMSCs on 3-dimensional crosslinked collagen fiber scaffolds in a bioreactor designed to provide a highly controlled biochemical and mechanical environment. The study will focus on elucidating the relationships between specific biochemical factors oxygen tension, mechanical regulatory signals and growth period, related to (1) cellular differentiation and (2) ligament tissue structure and function. We will build upon our Preliminary Data that demonstrate: (a) hBMSCs undergo selective differentiation to ligament cells due to mechanical forces in the absence of specific exogenous growth factors, and (b) ligament structures are formed during the process. We expect that different combinations of biochemical factors and applied mechanical stresses will influence the rate and extent of differentiation of hBMSCs into ligament-like cells leading to ligament structures in a manner dependent not only on the presence of the specific individual factors, but also on their interactions. The evaluation of the responses will be based on statistical analysis of time-dependent (0, 7, 14 and 28 day) changes in cell proliferation (DNA content), upregulation of the ligament-specific mRNA transcripts (real time RT-PCR). production of collagen type I via western blot and immunohistochemical analysis of structural features, and the mechanical properties

Website: http://commons.cit.nih.gov/crisp3/CRISP.Generate_Ticket

The National Library of Medicine: PubMed

One of the quickest and most comprehensive ways to find academic studies in both English and other languages is to use PubMed, maintained by the National Library of Medicine. The advantage of PubMed over previously mentioned sources is that it covers a greater number of domestic and foreign references. It is also free to the public.¹⁷ If the publisher has a Web site that offers full text of its journals, PubMed will provide links to that site, as well as to sites offering other related data. User registration, a subscription fee, or

¹⁷ PubMed was developed by the National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM) at the National Institutes of Health (NIH). The PubMed database was developed in conjunction with publishers of biomedical literature as a search tool for accessing literature citations and linking to full-text journal articles at Web sites of participating publishers. Publishers that participate in PubMed supply NLM with their citations electronically prior to or at the time of publication.

some other type of fee may be required to access the full text of articles in some journals.

To generate your own bibliography of studies dealing with knee ligament injuries, simply go to www.ncbi.nlm.nih.gov/pubmed. Type “knee ligament injuries” (or synonyms) into the search box, and click “Go.” The following is the type of output you can expect from PubMed for “knee ligament injuries” (hyperlinks lead to article summaries):

Vocabulary Builder

Adhesions: Pathological processes consisting of the union of the opposing surfaces of a wound. [NIH]

Anatomical: Pertaining to anatomy, or to the structure of the organism. [EU]

Bilateral: Having two sides, or pertaining to both sides. [EU]

Biochemical: Relating to biochemistry; characterized by, produced by, or involving chemical reactions in living organisms. [EU]

Biomechanics: The study of the application of mechanical laws and the action of forces to living structures. [NIH]

Cerebral: Of or pertaining of the cerebrum or the brain. [EU]

Chronic: Persisting over a long period of time. [EU]

Collagen: The protein substance of the white fibres (collagenous fibres) of skin, tendon, bone, cartilage, and all other connective tissue; composed of molecules of tropocollagen (q.v.), it is converted into gelatin by boiling. collagenous pertaining to collagen; forming or producing collagen. [EU]

Dislocation: The displacement of any part, more especially of a bone. Called also luxation. [EU]

Distal: Remote; farther from any point of reference; opposed to proximal. In dentistry, used to designate a position on the dental arch farther from the median line of the jaw. [EU]

Electromyography: Recording of the changes in electric potential of muscle by means of surface or needle electrodes. [NIH]

Exogenous: Developed or originating outside the organism, as exogenous disease. [EU]

Extremity: A limb; an arm or leg (membrum); sometimes applied specifically to a hand or foot. [EU]

Fibroblasts: Connective tissue cells which secrete an extracellular matrix

rich in collagen and other macromolecules. [NIH]

Flexion: In gynaecology, a displacement of the uterus in which the organ is bent so far forward or backward that an acute angle forms between the fundus and the cervix. [EU]

Fluoroscopy: Production of an image when x-rays strike a fluorescent screen. [NIH]

Gait: Manner or style of walking. [NIH]

Intramuscular: Within the substance of a muscle. [EU]

Intrinsic: Situated entirely within or pertaining exclusively to a part. [EU]

Invasive: 1. having the quality of invasiveness. 2. involving puncture or incision of the skin or insertion of an instrument or foreign material into the body; said of diagnostic techniques. [EU]

Kinetic: Pertaining to or producing motion. [EU]

Lesion: Any pathological or traumatic discontinuity of tissue or loss of function of a part. [EU]

Locomotion: Movement or the ability to move from one place or another. It can refer to humans, vertebrate or invertebrate animals, and microorganisms. [NIH]

Locomotor: Of or pertaining to locomotion; pertaining to or affecting the locomotive apparatus of the body. [EU]

Mechanoreceptors: Cells specialized to transduce mechanical stimuli and relay that information centrally in the nervous system. Mechanoreceptors include hair cells, which mediate hearing and balance, and the various somatosensory receptors, often with non-neural accessory structures. [NIH]

Neural: 1. pertaining to a nerve or to the nerves. 2. situated in the region of the spinal axis, as the neural arch. [EU]

Neuromuscular: Pertaining to muscles and nerves. [EU]

Paralysis: Loss or impairment of motor function in a part due to lesion of the neural or muscular mechanism; also by analogy, impairment of sensory function (sensory paralysis). In addition to the types named below, paralysis is further distinguished as traumatic, syphilitic, toxic, etc., according to its cause; or as obturator, ulnar, etc., according to the nerve part, or muscle specially affected. [EU]

Proprioception: The mechanism involved in the self-regulation of posture and movement through stimuli originating in the receptors imbedded in the joints, tendons, muscles, and labyrinth. [NIH]

Proximal: Nearest; closer to any point of reference; opposed to distal. [EU]

Sclerosis: A induration, or hardening; especially hardening of a part from

inflammation and in diseases of the interstitial substance. The term is used chiefly for such a hardening of the nervous system due to hyperplasia of the connective tissue or to designate hardening of the blood vessels. [EU]

Standardize: To compare with or conform to a standard; to establish standards. [EU]

Symptomatic: 1. pertaining to or of the nature of a symptom. 2. indicative (of a particular disease or disorder). 3. exhibiting the symptoms of a particular disease but having a different cause. 4. directed at the allaying of symptoms, as symptomatic treatment. [EU]

Torsion: 1. a type of mechanical stress, whereby the external forces (load) twist an object about its axis. 2. in ophthalmology any rotation of the vertical corneal meridians. [EU]

Transplantation: The grafting of tissues taken from the patient's own body or from another. [EU]

Vascular: Pertaining to blood vessels or indicative of a copious blood supply. [EU]

CHAPTER 4. BOOKS ON KNEE LIGAMENT INJURIES

Overview

This chapter provides bibliographic book references relating to knee ligament injuries. You have many options to locate books on knee ligament injuries. The simplest method is to go to your local bookseller and inquire about titles that they have in stock or can special order for you. Some patients, however, feel uncomfortable approaching their local booksellers and prefer online sources (e.g. www.amazon.com and www.bn.com). In addition to online booksellers, excellent sources for book titles on knee ligament injuries include the Combined Health Information Database and the National Library of Medicine. Once you have found a title that interests you, visit your local public or medical library to see if it is available for loan.

Book Summaries: Online Booksellers

Commercial Internet-based booksellers, such as Amazon.com and Barnes & Noble.com, offer summaries which have been supplied by each title's publisher. Some summaries also include customer reviews. Your local bookseller may have access to in-house and commercial databases that index all published books (e.g. Books in Print®). The following have been recently listed with online booksellers as relating to knee ligament injuries (sorted alphabetically by title; follow the hyperlink to view more details at Amazon.com):

- **Dr. Scott's Knee Book: Symptoms, Diagnosis, and Treatment of Knee Problems, Including: Torn Cartilage, Ligament Damage, Arthritis, Tendinitis** by W. Norman Scott (1996); ISBN: 0684811049;
<http://www.amazon.com/exec/obidos/ASIN/0684811049/icongroupinterna>
- **The Knee: A Guide to the Examination and Diagnosis of Ligament Injuries** by Merrill A. Ritter (1979); ISBN: 0398039011
<http://www.amazon.com/exec/obidos/ASIN/0398039011/icongroupinterna>
- **The Knee: Form, Function, and Ligament Reconstruction** by Werner Muller (1983); ISBN: 0387117164
<http://www.amazon.com/exec/obidos/ASIN/0387117164/icongroupinterna>
- **Knee Ligament Rehabilitation** by Todd S. Ellenbecker (Editor) (2000); ISBN: 0443075344
<http://www.amazon.com/exec/obidos/ASIN/0443075344/icongroupinterna>

The National Library of Medicine Book Index

The National Library of Medicine at the National Institutes of Health has a massive database of books published on healthcare and biomedicine. Go to the following Internet site, <http://locatorplus.gov/>, and then select "Search LOCATORplus." Once you are in the search area, simply type "knee ligament injuries" (or synonyms) into the search box, and select "books only." From there, results can be sorted by publication date, author, or relevance. The following was recently catalogued by the National Library of Medicine:¹⁸

¹⁸ In addition to LOCATORPlus, in collaboration with authors and publishers, the National Center for Biotechnology Information (NCBI) is adapting biomedical books for the Web. The books may be accessed in two ways: (1) by searching directly using any search term or phrase (in the same way as the bibliographic database PubMed), or (2) by following the links to PubMed abstracts. Each PubMed abstract has a "Books" button that displays a facsimile of the abstract in which some phrases are hypertext links. These phrases are also found in the books available at NCBI. Click on hyperlinked results in the list of books in which the phrase is found. Currently, the majority of the links are between the books and PubMed. In the future, more links will be created between the books and other types of

- **Acute knee injuries: diagnostic and treatment management proposals.** Author: P.P. Casteleyn; Year: 1999; Brussels: VUB University Press, c1999; ISBN: 905487225X
<http://www.amazon.com/exec/obidos/ASIN/905487225X/icongroupinterna>
- **Biology and biomechanics of the traumatized synovial joint: the knee as a model.** Author: edited by Gerald A.M. Finerman, Frank R. Noyes; Year: 1992; Rosemont, IL: American Academy of Orthopaedic Surgeons, c1992; ISBN: 0892030704
<http://www.amazon.com/exec/obidos/ASIN/0892030704/icongroupinterna>
- **Clinical examination of the injured knee.** Author: Mervyn J. Cross, Kenneth J. Crichton; Year: 1987; Baltimore: Williams & Wilkins; London; New York: Gower Medical Pub., 1987; ISBN: 0683022423
<http://www.amazon.com/exec/obidos/ASIN/0683022423/icongroupinterna>
- **Common knee problems in sport: their assessment, management, and prevention.** Author: written by Ken J. Crichton; produced by the Australian Sports Medicine Federation; Year: 1989; Canberra: The Federation, 1989; ISBN: 1875334017
- **Course of knee-ligament injuries.** Author: by Bengt Balkfors; Year: 1982; Copenhagen: Munksgaard, 1982; ISBN: 8716094735 (pbk.)
- **Fractures involving the knee.** Author: LXII Congress of the Italian Society of Orthopaedics and Traumatology, Rome, 1-4 December 1977; Year: 1977; Bologna: Aulo Gaggi, [1977?]
- **Gonylaxometry: stress radiographic measurement of passive stability in the knee joints of normal subjects and patients with ligament injuries: accuracy and range of application.** Author: by Klaus Jacobsen; Year: 1981; Copenhagen: Munksgaard, 1981; ISBN: 8716090470
- **Guidance on the use of autologous cartilage transplantation for full thickness cartilage defects in knee joints.** Author: National Institute for Clinical Excellence; Year: 2000; London: The Institute, 2000; ISBN: 1842570560
- **Imaging of the knee: techniques and applications.** Author: A.M. Davies, V.N. Cassar-Pullicino (eds.); with contributions by J. Beltran; foreword by A.L Baert; Year: 2002; Berlin; New York: Springer, c2002; ISBN: 3540672923 (alk. paper)
<http://www.amazon.com/exec/obidos/ASIN/3540672923/icongroupinterna>

information, such as gene and protein sequences and macromolecular structures. See <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Books>.

- **Knee: form, function, pathology, and treatment.** Author: edited by Robert L. Larson, William A. Grana; Year: 1992; Philadelphia: W.B. Saunders, c1993 [1992 printing]; ISBN: 0721634958
<http://www.amazon.com/exec/obidos/ASIN/0721634958/icongroupinterna>
- **Knee exertion injuries in adolescents and young adults: a study with special reference to anatomic predisposition.** Author: Urho Kujala; Year: 1986; Turku: [s.n.]: Distribution, Rehabilitation Research Centre of the Social Insurance Institution, 1986; ISBN: 9516692141 (pbk.)
<http://www.amazon.com/exec/obidos/ASIN/9516692141/icongroupinterna>
- **Knee injuries I: medical subject analysis & research guidebook with bibliography.** Author: Trudy Wilson Vaughn; Year: 1987; Washington, D.C.: ABBE Publishers Association, 1987; ISBN: 0881642800
<http://www.amazon.com/exec/obidos/ASIN/0881642800/icongroupinterna>
- **Knee ligament rehabilitation.** Author: [edited by] Todd S. Ellenbecker; Year: 2000; New York: Churchill Livingstone, c2000; ISBN: 0443075344
<http://www.amazon.com/exec/obidos/ASIN/0443075344/icongroupinterna>
- **Knee ligament rehabilitation.** Author: edited by Robert P. Engle; Year: 1991; New York: Churchill Livingstone, 1991; ISBN: 0443087539
<http://www.amazon.com/exec/obidos/ASIN/0443087539/icongroupinterna>
- **Knee ligaments: clinical examination.** Author: Guy Liorzou; [translator, David Finlayson]; Year: 1991; Berlin; New York: Springer-Verlag, c1991; ISBN: 3540537619 (alk. paper)
<http://www.amazon.com/exec/obidos/ASIN/3540537619/icongroupinterna>
- **Knee pain and disability.** Author: Rene Cailliet; illustrations by R. Cailliet; Year: 1992; Philadelphia: F.A. Davis, c1992; ISBN: 0803616228
<http://www.amazon.com/exec/obidos/ASIN/0803616228/icongroupinterna>
- **Knee pain and disability.** Author: Rene Cailliet; Year: 1983; Philadelphia: Davis, c1983; ISBN: 080361621X
<http://www.amazon.com/exec/obidos/ASIN/080361621X/icongroupinterna>
- **Lesioni inveterate capsulo-legamentose del ginocchio: (tecniche chirurgiche) = The knee: chronic capsular ligament injuries: (surgical techniques).** Author: Luciano Roncalli Benedetti, Francesco Marré Brunenghi; Year: 1984; Padova: Piccin, c1984; ISBN: 8829900842

- **Ligament injuries and their treatment.** Author: edited by D.H.R. Jenkins; Year: 1985; London: Chapman and Hall, 1985; ISBN: 0412254700
- **Meniscal allograft transplantation for damaged or removed meniscus.** Author: ECRI; Year: 2001; Plymouth Meeting, PA: ECRI, c2001
- **Meniscus lesions: diagnosis, differential diagnosis, and therapy.** Author: by Peter Ricklin, Alois Rüttimann and Manfredi Suevo Del Buono; Year: 1983; Stuttgart; New York: Thieme, 1983; ISBN: 0865770948 (New York)
<http://www.amazon.com/exec/obidos/ASIN/0865770948/icongroupinterna>
- **MRI of the knee: a discussion paper.** Author: Bernard L. Crowe, David M. Hailey; Year: 1994; Canberra, ACT: Australian Institute of Health and Welfare, c1994
- **Physical therapy of the knee.** Author: edited by Robert E. Mangine; Year: 1995; New York: Churchill Livingstone, 1995; ISBN: 0443089167
<http://www.amazon.com/exec/obidos/ASIN/0443089167/icongroupinterna>
- **Posterior cruciate ligament injuries: a practical guide to management.** Author: Gregory C. Fanelli, editor; with a foreword by M. Mike Malek; with illustrations by Joel Herring; Year: 2001; New York: Springer, c2001; ISBN: 0387985735 (hard cover: alk. paper)
- **Problem knee: diagnosis and management in the younger patient.** Author: M.F. Macnicol; Year: 1986; London: Heinemann Medical Books, 1986; ISBN: 0433201304
- **Problem knee.** Author: Malcolm F. Macnicol; Year: 1995; Oxford; Boston: Butterworth-Heinemann, 1995; ISBN: 0750604875
<http://www.amazon.com/exec/obidos/ASIN/0750604875/icongroupinterna>
- **Rehabilitation of the knee: a problem-solving approach.** Author: [edited by] Bruce H. Greenfield; Year: 1993; Philadelphia: F.A. Davis, c1993; ISBN: 0803643357 (hardcover: alk. paper)
<http://www.amazon.com/exec/obidos/ASIN/0803643357/icongroupinterna>
- **Surgery of the knee.** Author: [edited by] John N. Insall, W. Norman Scott; illustrator, Christopher Wikoff; Year: 2001; New York: Churchill Livingstone, c2001; ISBN: 0443065454 (set)
<http://www.amazon.com/exec/obidos/ASIN/0443065454/icongroupinterna>
- **Symposium on Sports Medicine, The Knee: Denver, Colorado, April 1982.** Author: edited by Gerald Finerman; Year: 1985; St. Louis: Mosby, 1985; ISBN: 0801600251

<http://www.amazon.com/exec/obidos/ASIN/0801600251/icongroupinterna>

- **Traumatic disorders of the knee.** Author: John M. Siliski, editor; line illustrations by Laurel Cook Lhowe; Year: 1994; New York: Springer-Verlag, c1994; ISBN: 0387941711 (alk. paper)
<http://www.amazon.com/exec/obidos/ASIN/0387941711/icongroupinterna>

Chapters on Knee Ligament Injuries

Frequently, knee ligament injuries will be discussed within a book, perhaps within a specific chapter. In order to find chapters that are specifically dealing with knee ligament injuries, an excellent source of abstracts is the Combined Health Information Database. You will need to limit your search to book chapters and knee ligament injuries using the "Detailed Search" option. Go to the following hyperlink: <http://chid.nih.gov/detail/detail.html>. To find book chapters, use the drop boxes at the bottom of the search page where "You may refine your search by." Select the dates and language you prefer, and the format option "Book Chapter." By making these selections and typing in "knee ligament injuries" (or synonyms) into the "For these words:" box, you will only receive results on chapters in books.

General Home References

In addition to references for knee ligament injuries, you may want a general home medical guide that spans all aspects of home healthcare. The following list is a recent sample of such guides (sorted alphabetically by title; hyperlinks provide rankings, information, and reviews at Amazon.com):

- **American College of Physicians Complete Home Medical Guide (with Interactive Human Anatomy CD-ROM)** by David R. Goldmann (Editor), American College of Physicians; Hardcover - 1104 pages, Book & CD-Rom edition (1999), DK Publishing; ISBN: 0789444127;
<http://www.amazon.com/exec/obidos/ASIN/0789444127/icongroupinterna>
- **The American Medical Association Guide to Home Caregiving** by the American Medical Association (Editor); Paperback - 256 pages 1 edition (2001), John Wiley & Sons; ISBN: 0471414093;
<http://www.amazon.com/exec/obidos/ASIN/0471414093/icongroupinterna>

- **Anatomica : The Complete Home Medical Reference** by Peter Forrestal (Editor); Hardcover (2000), Book Sales; ISBN: 1740480309;
<http://www.amazon.com/exec/obidos/ASIN/1740480309/icongroupinterna>
- **The HarperCollins Illustrated Medical Dictionary : The Complete Home Medical Dictionary** by Ida G. Dox, et al; Paperback - 656 pages 4th edition (2001), Harper Resource; ISBN: 0062736469;
<http://www.amazon.com/exec/obidos/ASIN/0062736469/icongroupinterna>
- **Mayo Clinic Guide to Self-Care: Answers for Everyday Health Problems** by Philip Hagen, M.D. (Editor), et al; Paperback - 279 pages, 2nd edition (December 15, 1999), Kensington Publishing Corp.; ISBN: 0962786578;
<http://www.amazon.com/exec/obidos/ASIN/0962786578/icongroupinterna>
- **The Merck Manual of Medical Information : Home Edition (Merck Manual of Medical Information Home Edition (Trade Paper))** by Robert Berkow (Editor), Mark H. Beers, M.D. (Editor); Paperback - 1536 pages (2000), Pocket Books; ISBN: 0671027263;
<http://www.amazon.com/exec/obidos/ASIN/0671027263/icongroupinterna>

CHAPTER 5. MULTIMEDIA ON KNEE LIGAMENT INJURIES

Overview

Information on knee ligament injuries can come in a variety of formats. Among multimedia sources, video productions, slides, audiotapes, and computer databases are often available. In this chapter, we show you how to keep current on multimedia sources of information on knee ligament injuries. We start with sources that have been summarized by federal agencies, and then show you how to find bibliographic information catalogued by the National Library of Medicine. If you see an interesting item, visit your local medical library to check on the availability of the title.

Bibliography: Multimedia on Knee Ligament Injuries

The National Library of Medicine is a rich source of information on healthcare-related multimedia productions including slides, computer software, and databases. To access the multimedia database, go to the following Web site: <http://locatorplus.gov/>. Select "Search LOCATORplus." Once in the search area, simply type in knee ligament injuries (or synonyms). Then, in the option box provided below the search box, select "Audiovisuals and Computer Files." From there, you can choose to sort results by publication date, author, or relevance. The following multimedia has been indexed on knee ligament injuries. For more information, follow the hyperlink indicated:

- **ACL reconstruction with hamstring tendon-ligament anchor (LA) screw.** Source: the American Academy of Orthopaedic Surgeons, Chonnam University Hospital; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, [2000]

- **ACL.** Source: PCL reconstruction using allograft / American Academy of Orthopaedic Surgeons; UPMC, University of Pittsburgh Medical Center; produced by the University of Pittsburgh Medical Center, Department of Orthopaedic Surgery and Creative Se; Year: 1995; Format: Videorecording; [Rosemont, Ill.]: AAOS, c1995
- **Allograft reconstruction of the lateral col[l]ateral knee ligament.** Source: American Academy of Orthopaedic Surgeons; Kerlan-Jobe Orthopaedic Clinic; Year: 1994; Format: videorecording; [Rosemont, Ill.]: AAOS, c1994
- **Anatomic onlay posterior cruciate ligament reconstruction.** Source: the American Academy of Orthopaedic Surgeons, the Cleveland Clinic Foundation; Year: 1998; Format: Videorecording; Rosemont, Ill.: The Academy, c1998
- **Anatomy : the knee.** Source: a presentation of Films for the Humanities & Sciences; produced by Sheffield University Television; Year: 1999; Format: Videorecording; Princeton, N.J.: Films for the Humanities & Sciences, c1999
- **Anterior interval release.** Source: American Academy of Orthopaedic Surgeons, Steadman Hawkins Sports Medicine Foundation; Year: 2001; Format: Videorecording; Rosemont, Ill.: The Academy, [2001]
- **Arthroscopic A.C.L. reconstruction utilizing a quadruple semite[n]dinosus tendon graph and bioabsorbable screws [videorecording].** Source: American Academy of Orthopaedic Surgeons, Institute of Orthopaedics, Lerdsin General Hospital; Year: 2000; Format: i.e. graft; Rosemont, Ill.: The Academy, [2000]
- **Arthroscopic PCL reconstruction.** Source: American Academy of Orthopaedic Surgeons; Year: 1997; Format: Videorecording; Rosemont, Ill.: AAOS, c1997
- **Arthroscopic suture fixation of bony avulsion of the PCL.** Source: the American Academy of Orthopaedic Surgeons, Yonsei University College of Medicine; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, [2000]
- **Arthroscopic treatment of arthrofibrosis following major knee ligament reconstruction.** Source: the American Academy of Orthopaedic Surgeons, Cincinnati Sportsmedicine & Orthopaedic Center; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, [2000]
- **Basic principles in endoscopic ACL reconstruction (patellar tendon autograft).** Source: [presented by] American Academy of Orthopaedic Surgeons, Southern Sports Medicine & Orthopaedic Center, Baptist Hospital Sports Medicine Center; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, [2000]

- **Biomecanica ligamentar do joelho = Knee ligament biomechanics.** Source: American Academy of Orthopaedic Surgeons; Instituto de Orthopedia e Traumatologia, Hospital das Clinicas; Year: 1997; Format: Videorecording; Rosemont, Ill.: AAOS, c1997
- **Combined arthroscopic reconstruction of anterior and posterior cruciate ligaments.** Source: American Academy of Orthopaedic Surgeons, Laboratory of Arthroscopy and Joint Surgery, Roma; Year: 1997; Format: Videorecording; Rosemont, Ill.: The Academy, c1997
- **Diagnosis of posterior cruciate ligament injuries.** Source: [presented by] the American Academy of Orthopaedic Surgeons [and] L.A.S., Laboratory of Arthroscopy and Joint Surgery, Rome, Italy; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, [2000]
- **Endoscopic hamstring ACL : utilizing interference screw fixation.** Source: American Academy of Orthopaedic Surgeons, Steadman Hawkins Sports Medicine Foundation; Year: 1999; Format: Videorecording; Rosemont, Ill.: The Academy, [1999]
- **Half-tunnel modified technique in the A.C.L. knee plastic surgery.** Source: American Academy of Orthopaedic Surgeons; Year: 1999; Format: Videorecording; Rosemont, Ill.: The Academy, [1999]
- **Medial ligamentous repair with ACL reconstruction.** Source: produced by ASMI, American Sports Medicine Institute; presented by Alabama Sports Medicine & Orthopaedic Center; Year: 1997; Format: Videorecording; Rosemont, Ill.: American Academy of Orthopaedic Surgeons, [1997]
- **Meniscus allografting : 3 tunnel technique.** Source: the American Academy of Orthopaedic Surgeons; Year: 2001; Format: Videorecording; Rosemont, Ill.: The Academy, [2001]
- **Microfracture technique : a primary treatment of full-thickness chondral defects in the knee.** Source: Steadman Hawkins Sports Medicine Foundation; Year: 1997; Format: Videorecording; Rosemont, Ill.: American Academy of Orthopaedic Surgeons, [1997]
- **Modified ACL reconstruction technique : femoral tunnel preparation through the anteromedial portal.** Source: the American Academy of Orthopaedic Surgeons; Year: 1999; Format: Videorecording; Rosemont, Ill.: The Academy, [1999]
- **Non-contact ACL injuries in females.** Source: by Mary Lloyd Ireland; American Academy of Orthopaedic Surgeons; Kentucky Sports Medicine; Year: 1998; Format: Videorecording; Rosemont, Ill.: The Academy, [1998]
- **Paradoxical phenomena of the McMurray test : an arthroscopic investigation.** Source: the American Academy of Orthopaedic Surgeons,

Yonsei University, Sevepance Arthroscopy Unit; Year: 1999; Format: Videorecording; Rosemont, Ill.: The Academy, [1999]

- **PCL surgery.** Source: the American Academy of Orthopaedic Surgeons, the University of Texas Health Science Center at San Antonio; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, c2000
- **Quadriceps tendon bone graft : a versatile graft for knee ligament reconstruction.** Source: American Academy of Orthopaedic Surgeons, Cincinnati Sportsmedicine & Orthopaedic Center; Year: 1999; Format: Videorecording; Rosemont, Ill.: The Academy, [1999]
- **Quadriceps tendon graft for ACL reconstruction.** Source: the American Academy of Orthopaedic Surgeons; Year: 1999; Format: Videorecording; Rosemont, Ill.: The Academy, [1999]
- **Repair of injuries to the extensor mechanism : quadriceps and patellar tendons.** Source: American Academy of Orthopaedic Surgeons, Steadman Hawkins Sports Medicine Foundation; Year: 2000; Format: Videorecording; Rosemont, Ill.: The Academy, [2000]
- **Revision ACL surgery : technical considerations.** Source: American Academy of Orthopaedic Surgeons; UPMC, University of Pittsburgh Medical Center; produced by University of Pittsburgh Medical Center, Creative Services and University of Pittsburg; Year: 1995; Format: Videorecording; [Rosemont, Ill.]: AAOS, c1995
- **Surgery of the knee.** Source: John N. Insall, W. Norman Scott; illustrator, Christopher Wikoff; Year: 2001; Format: Edited by; New York: Churchill Livingstone, c2001
- **Therapy in motion : an effective A.C.L. reconstruction rehabilitation program.** Year: 1993; Format: Videorecording; Norman, OK: Therapy in Motion, c1993
- **Update 1994 : meniscal repair, including T-fix.** Source: American Academy of Orthopaedic Surgeons; Kerlan-Jobe Orthopaedic Clinic; Year: 1995; Format: Videorecording; [Rosemont, Ill.]: AAOS, c1995

CHAPTER 6. PHYSICIAN GUIDELINES AND DATABASES

Overview

Doctors and medical researchers rely on a number of information sources to help patients with their conditions. Many will subscribe to journals or newsletters published by their professional associations or refer to specialized textbooks or clinical guides published for the medical profession. In this chapter, we focus on databases and Internet-based guidelines created or written for this professional audience.

NIH Guidelines

For the more common disorders, the National Institutes of Health publish guidelines that are frequently consulted by physicians. Publications are typically written by one or more of the various NIH Institutes. For physician guidelines, commonly referred to as “clinical” or “professional” guidelines, you can visit the following Institutes:

- Office of the Director (OD); guidelines consolidated across agencies available at <http://www.nih.gov/health/consumer/conkey.htm>
- National Institute of General Medical Sciences (NIGMS); fact sheets available at <http://www.nigms.nih.gov/news/facts/>
- National Library of Medicine (NLM); extensive encyclopedia (A.D.A.M., Inc.) with guidelines:
<http://www.nlm.nih.gov/medlineplus/healthtopics.html>
- National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS); fact sheets and guidelines available at <http://www.nih.gov/niams/healthinfo/>

NIH Databases

In addition to the various Institutes of Health that publish professional guidelines, the NIH has designed a number of databases for professionals.¹⁹ Physician-oriented resources provide a wide variety of information related to the biomedical and health sciences, both past and present. The format of these resources varies. Searchable databases, bibliographic citations, full text articles (when available), archival collections, and images are all available. The following are referenced by the National Library of Medicine:²⁰

- **Bioethics:** Access to published literature on the ethical, legal and public policy issues surrounding healthcare and biomedical research. This information is provided in conjunction with the Kennedy Institute of Ethics located at Georgetown University, Washington, D.C.:
http://www.nlm.nih.gov/databases/databases_bioethics.html
- **HIV/AIDS Resources:** Describes various links and databases dedicated to HIV/ AIDS research:
<http://www.nlm.nih.gov/pubs/factsheets/aidsinfs.html>
- **NLM Online Exhibitions:** Describes “Exhibitions in the History of Medicine”: <http://www.nlm.nih.gov/exhibition/exhibition.html>. Additional resources for historical scholarship in medicine:
<http://www.nlm.nih.gov/hmd/hmd.html>
- **Biotechnology Information:** Access to public databases. The National Center for Biotechnology Information conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information for the better understanding of molecular processes affecting human health and disease: <http://www.ncbi.nlm.nih.gov/>
- **Population Information:** The National Library of Medicine provides access to worldwide coverage of population, family planning, and related health issues, including family planning technology and programs, fertility, and population law and policy:
http://www.nlm.nih.gov/databases/databases_population.html
- **Cancer Information:** Access to cancer-oriented databases:
http://www.nlm.nih.gov/databases/databases_cancer.html

¹⁹ Remember, for the general public, the National Library of Medicine recommends the databases referenced in MEDLINEplus (<http://medlineplus.gov/> or <http://www.nlm.nih.gov/medlineplus/databases.html>).

²⁰ See <http://www.nlm.nih.gov/databases/databases.html>.

- **Profiles in Science:** Offering the archival collections of prominent twentieth-century biomedical scientists to the public through modern digital technology: <http://www.profiles.nlm.nih.gov/>
- **Chemical Information:** Provides links to various chemical databases and references: <http://sis.nlm.nih.gov/Chem/ChemMain.html>
- **Clinical Alerts:** Reports the release of findings from the NIH-funded clinical trials where such release could significantly affect morbidity and mortality: http://www.nlm.nih.gov/databases/alerts/clinical_alerts.html
- **Space Life Sciences:** Provides links and information to space-based research (including NASA):
http://www.nlm.nih.gov/databases/databases_space.html
- **MEDLINE:** Bibliographic database covering the fields of medicine, nursing, dentistry, veterinary medicine, the healthcare system, and the pre-clinical sciences:
http://www.nlm.nih.gov/databases/databases_medline.html
- **Toxicology and Environmental Health Information (TOXNET):** Databases covering toxicology and environmental health:
<http://sis.nlm.nih.gov/Tox/ToxMain.html>
- **Visible Human Interface:** Anatomically detailed, three-dimensional representations of normal male and female human bodies:
http://www.nlm.nih.gov/research/visible/visible_human.html

While all of the above references may be of interest to physicians who study and treat knee ligament injuries, the following are particularly noteworthy.

The Combined Health Information Database

A comprehensive source of information on clinical guidelines written for professionals is the Combined Health Information Database. You will need to limit your search to “Brochure/Pamphlet,” “Fact Sheet,” or “Information Package” and knee ligament injuries using the “Detailed Search” option. Go directly to the following hyperlink: <http://chid.nih.gov/detail/detail.html>. To find associations, use the drop boxes at the bottom of the search page where “You may refine your search by.” For the publication date, select “All Years,” select your preferred language, and the format option “Fact Sheet.” By making these selections and typing “knee ligament injuries” (or synonyms) into the “For these words:” box above, you will only receive results on fact sheets dealing with knee ligament injuries. The following is a sample result:

- **ACL Rehabilitation: Regaining Knee Function After an Anterior Cruciate Ligament Injury**

Source: San Bruno, CA: StayWell Company. 2000. 8 p.

Contact: Available from StayWell Company. 1100 Grundy Lane, San Bruno, CA 94066-3030. (800) 333-3032. Website: www.staywell.com.

PRICE: Call or write for current pricing on single and bulk orders.

Summary: This illustrated booklet provides people who have an anterior cruciate ligament (ACL) injury with information on recovering from ACL reconstruction. The ACL is a band of tough, fibrous tissue that joins the upper and lower leg bones and supports the knee joint. Although ACL injury is common among skiers and basketball, football, and soccer players, anyone can injure an ACL. People who have a torn ACL may need ACL reconstruction to make the injury heal properly. The booklet provides guidelines on how to use crutches and recover at home. The booklet highlights the importance of an exercise program to improve muscle control and strength and describes various exercises. Muscle control exercises include the quad set, the straight leg raise, and knee flexion and extension. Muscle strength can be built by riding a stationary bike and doing leg presses, hamstring pulls, and toe raises. Additional strength training exercises include the leg curl, squats, and the wall squat. In addition, the booklet describes agility training exercises that most people can do after they build strength and endurance. 17 figures.

The NLM Gateway²¹

The NLM (National Library of Medicine) Gateway is a Web-based system that lets users search simultaneously in multiple retrieval systems at the U.S. National Library of Medicine (NLM). It allows users of NLM services to initiate searches from one Web interface, providing “one-stop searching” for many of NLM's information resources or databases.²² One target audience for the Gateway is the Internet user who is new to NLM's online resources and does not know what information is available or how best to search for it. This audience may include physicians and other healthcare providers, researchers, librarians, students, and, increasingly, patients, their families,

²¹ Adapted from NLM: <http://gateway.nlm.nih.gov/gw/Cmd?Overview.x>.

²² The NLM Gateway is currently being developed by the Lister Hill National Center for Biomedical Communications (LHNCBC) at the National Library of Medicine (NLM) of the National Institutes of Health (NIH).

and the public.²³ To use the NLM Gateway, simply go to the search site at <http://gateway.nlm.nih.gov/gw/Cmd>. Type “knee ligament injuries” (or synonyms) into the search box and click “Search.” The results will be presented in a tabular form, indicating the number of references in each database category.

Results Summary

Category	Items Found
Journal Articles	5000
Books / Periodicals / Audio Visual	88
Consumer Health	6
Meeting Abstracts	2
Other Collections	0
Total	5096

HSTAT²⁴

HSTAT is a free, Web-based resource that provides access to full-text documents used in healthcare decision-making.²⁵ HSTAT's audience includes healthcare providers, health service researchers, policy makers, insurance companies, consumers, and the information professionals who serve these groups. HSTAT provides access to a wide variety of publications, including clinical practice guidelines, quick-reference guides for clinicians, consumer health brochures, evidence reports and technology assessments from the Agency for Healthcare Research and Quality (AHRQ), as well as AHRQ's

²³ Other users may find the Gateway useful for an overall search of NLM's information resources. Some searchers may locate what they need immediately, while others will utilize the Gateway as an adjunct tool to other NLM search services such as PubMed® and MEDLINEplus®. The Gateway connects users with multiple NLM retrieval systems while also providing a search interface for its own collections. These collections include various types of information that do not logically belong in PubMed, LOCATORplus, or other established NLM retrieval systems (e.g., meeting announcements and pre-1966 journal citations). The Gateway will provide access to the information found in an increasing number of NLM retrieval systems in several phases.

²⁴ Adapted from HSTAT: <http://www.nlm.nih.gov/pubs/factsheets/hstat.html>.

²⁵ The HSTAT URL is <http://hstat.nlm.nih.gov/>.

Put Prevention Into Practice.²⁶ Simply search by “knee ligament injuries” (or synonyms) at the following Web site: <http://text.nlm.nih.gov>.

Coffee Break: Tutorials for Biologists²⁷

Some patients may wish to have access to a general healthcare site that takes a scientific view of the news and covers recent breakthroughs in biology that may one day assist physicians in developing treatments. To this end, we recommend “Coffee Break,” a collection of short reports on recent biological discoveries. Each report incorporates interactive tutorials that demonstrate how bioinformatics tools are used as a part of the research process. Currently, all Coffee Breaks are written by NCBI staff.²⁸ Each report is about 400 words and is usually based on a discovery reported in one or more articles from recently published, peer-reviewed literature.²⁹ This site has new articles every few weeks, so it can be considered an online magazine of sorts, and intended for general background information. You can access the Coffee Break Web site at: <http://www.ncbi.nlm.nih.gov/Coffeekbreak/>.

²⁶ Other important documents in HSTAT include: the National Institutes of Health (NIH) Consensus Conference Reports and Technology Assessment Reports; the HIV/AIDS Treatment Information Service (ATIS) resource documents; the Substance Abuse and Mental Health Services Administration's Center for Substance Abuse Treatment (SAMHSA/CSAT) Treatment Improvement Protocols (TIP) and Center for Substance Abuse Prevention (SAMHSA/CSAP) Prevention Enhancement Protocols System (PEPS); the Public Health Service (PHS) Preventive Services Task Force's *Guide to Clinical Preventive Services*; the independent, nonfederal Task Force on Community Services *Guide to Community Preventive Services*; and the Health Technology Advisory Committee (HTAC) of the Minnesota Health Care Commission (MHCC) health technology evaluations.

²⁷ Adapted from <http://www.ncbi.nlm.nih.gov/Coffeekbreak/Archive/FAQ.html>.

²⁸ The figure that accompanies each article is frequently supplied by an expert external to NCBI, in which case the source of the figure is cited. The result is an interactive tutorial that tells a biological story.

²⁹ After a brief introduction that sets the work described into a broader context, the report focuses on how a molecular understanding can provide explanations of observed biology and lead to therapies for diseases. Each vignette is accompanied by a figure and hypertext links that lead to a series of pages that interactively show how NCBI tools and resources are used in the research process.

Other Commercial Databases

In addition to resources maintained by official agencies, other databases exist that are commercial ventures addressing medical professionals. Here are a few examples that may interest you:

- **CliniWeb International:** Index and table of contents to selected clinical information on the Internet; see <http://www.ohsu.edu/clinweb/>.
- **Image Engine:** Multimedia electronic medical record system that integrates a wide range of digitized clinical images with textual data stored in the University of Pittsburgh Medical Center's MARS electronic medical record system; see the following Web site: <http://www.cml.upmc.edu/cml/imageengine/imageEngine.html>.
- **Medical World Search:** Searches full text from thousands of selected medical sites on the Internet; see <http://www.mwsearch.com/>.
- **MedWeaver:** Prototype system that allows users to search differential diagnoses for any list of signs and symptoms, to search medical literature, and to explore relevant Web sites; see <http://www.med.virginia.edu/~wmd4n/medweaver.html>.
- **Metaphrase:** Middleware component intended for use by both caregivers and medical records personnel. It converts the informal language generally used by caregivers into terms from formal, controlled vocabularies; see the following Web site: <http://www.lexical.com/Metaphrase.html>.

Specialized References

The following books are specialized references written for professionals interested in knee ligament injuries (sorted alphabetically by title, hyperlinks provide rankings, information, and reviews at Amazon.com):

- **Approach to the Patient with a Musculoskeletal Disorder** by Warren D. Blackburn; Paperback, 2nd edition (August 15, 2002), Professional Communications; ISBN: 188473572X;
<http://www.amazon.com/exec/obidos/ASIN/188473572X/icongroupinterna>
- **Connective Tissue and Its Heritable Disorders: Molecular, Genetic, and Medical Aspects** by Peter M. Royce (Editor), Beat Steinmann (Editor); Hardcover, 2nd edition (December 15, 2001), John Wiley & Sons; ISBN: 0471251852;
<http://www.amazon.com/exec/obidos/ASIN/0471251852/icongroupinterna>

- **Current Diagnosis & Treatment in Orthopedics** by Harry B. Skinner; Paperback - 720 pages, 2nd edition (May 26, 2000), McGraw-Hill Professional Publishing; ISBN: 0838503632;
<http://www.amazon.com/exec/obidos/ASIN/0838503632/icongroupinterna>
- **Current Topics in Musculoskeletal Medicine: A Case Study Approach (Athletic Training Library)** by Mark Decarlo (Editor), Kathy Oneacre, M.A. ATC (Editor); Paperback (March 15, 2001), Slack, Inc.; ISBN: 1556424345;
<http://www.amazon.com/exec/obidos/ASIN/1556424345/icongroupinterna>
- **Diagnosis and Treatment of Movement Impairment Syndromes** by Shirley Sahrmann; Hardcover - 384 pages, 1st edition (August 20, 2001), Mosby, Inc.; ISBN: 0801672058;
<http://www.amazon.com/exec/obidos/ASIN/0801672058/icongroupinterna>
- **Diagnosis of Bone and Joint Disorders (5-Volume Set)** by Donald Resnick; Hardcover - 5472 pages, 4th edition (March 8, 2002); W B Saunders Co; ISBN: 0721689213;
<http://www.amazon.com/exec/obidos/ASIN/0721689213/icongroupinterna>
- **Essentials of Musculoskeletal Care** by Walter B. Greene, MD (Editor), Robert K. Snider; Hardcover, 2nd edition (January 15, 2001), American Academy of Orthopaedic; ISBN: 0892032170;
<http://www.amazon.com/exec/obidos/ASIN/0892032170/icongroupinterna>
- **Examination & Diagnosis of Musculoskeletal Disorders** by Miranda Castrp; Hardcover, 1st edition (February 15, 2001), Thieme Medical Pub; ISBN: 0865777411;
<http://www.amazon.com/exec/obidos/ASIN/0865777411/icongroupinterna>
- **Examination and Diagnosis of Musculoskeletal Disorders: Clinical Examination - Imaging Modalities** by William H. M. Castro, et al; Hardcover - 464 pages, 1st edition (January 15, 2001), Thieme Medical Pub; ISBN: 1588900320;
<http://www.amazon.com/exec/obidos/ASIN/1588900320/icongroupinterna>
- **Mechanical Loading of Bones and Joints** by Hideaki Takahashi (Editor); Hardcover - 324 pages, 1st edition (July 15, 1999), Springer Verlag; ISBN: 4431702423;
<http://www.amazon.com/exec/obidos/ASIN/4431702423/icongroupinterna>
- **Musculoskeletal Assessment: Joint Range of Motion and Manual Muscle Strength** by Hazel M. Clarkson; Spiral-bound - 432 pages, 2nd edition (January 15, 2000), Lippincott Williams & Wilkins Publishers; ISBN: 0683303848;
<http://www.amazon.com/exec/obidos/ASIN/0683303848/icongroupinterna>

- **Musculoskeletal Disorders: A Practical Guide for Diagnosis and Rehabilitation** by Ralph M. Buschbacher (Editor); Hardcover, 2nd edition (March 15, 2002), Butterworth-Heinemann; ISBN: 0750673575;
<http://www.amazon.com/exec/obidos/ASIN/0750673575/iconegroupinterna>
- **Musculoskeletal Examination** by Jeffrey Gross, et al; Paperback, 2nd edition (March 2002), Blackwell Science Inc; ISBN: 0632045582;
<http://www.amazon.com/exec/obidos/ASIN/0632045582/iconegroupinterna>
- **Orthopedic Biomechanics** by Paul Brinckmann, et al; Hardcover (March 2002), Thieme Medical Pub; ISBN: 1588900800;
<http://www.amazon.com/exec/obidos/ASIN/1588900800/iconegroupinterna>
- **Orthopaedic Pathology** by Vincent J. Vigorita, Bernard Ghelman; Hardcover - 718 pages (February 15, 1999), Lippincott Williams & Wilkins Publishers; ISBN: 078170040X;
<http://www.amazon.com/exec/obidos/ASIN/078170040X/iconegroupinterna>
- **Pathology of Skeletal Muscle** by Stirling Carpenter, George Karpati; Hardcover, 2nd edition (January 15, 2001), Oxford University Press; ISBN: 0195063643;
<http://www.amazon.com/exec/obidos/ASIN/0195063643/iconegroupinterna>
- **Skeletal Trauma: Basic Science, Management, and Reconstruction** by Bruce D. Browner (Editor); Hardcover, 3rd edition (August 2002), W B Saunders Co; ISBN: 0721694810;
<http://www.amazon.com/exec/obidos/ASIN/0721694810/iconegroupinterna>

PART III. APPENDICES

ABOUT PART III

Part III is a collection of appendices on general medical topics which may be of interest to patients with knee ligament injuries and related conditions.

APPENDIX A. RESEARCHING YOUR MEDICATIONS

Overview

There are a number of sources available on new or existing medications which could be prescribed to patients with knee ligament injuries. While a number of hard copy or CD-Rom resources are available to patients and physicians for research purposes, a more flexible method is to use Internet-based databases. In this chapter, we will begin with a general overview of medications. We will then proceed to outline official recommendations on how you should view your medications. You may also want to research medications that you are currently taking for other conditions as they may interact with medications for knee ligament injuries. Research can give you information on the side effects, interactions, and limitations of prescription drugs used in the treatment of knee ligament injuries. Broadly speaking, there are two sources of information on approved medications: public sources and private sources. We will emphasize free-to-use public sources.

Your Medications: The Basics³⁰

The Agency for Health Care Research and Quality has published extremely useful guidelines on how you can best participate in the medication aspects of knee ligament injuries. Taking medicines is not always as simple as swallowing a pill. It can involve many steps and decisions each day. The AHCQRQ recommends that patients with knee ligament injuries take part in treatment decisions. Do not be afraid to ask questions and talk about your concerns. By taking a moment to ask questions early, you may avoid problems later. Here are some points to cover each time a new medicine is prescribed:

- Ask about all parts of your treatment, including diet changes, exercise, and medicines.
- Ask about the risks and benefits of each medicine or other treatment you might receive.
- Ask how often you or your doctor will check for side effects from a given medication.

Do not hesitate to ask what is important to you about your medicines. You may want a medicine with the fewest side effects, or the fewest doses to take each day. You may care most about cost, or how the medicine might affect how you live or work. Or, you may want the medicine your doctor believes will work the best. Telling your doctor will help him or her select the best treatment for you.

Do not be afraid to “bother” your doctor with your concerns and questions about medications for knee ligament injuries. You can also talk to a nurse or a pharmacist. They can help you better understand your treatment plan. Feel free to bring a friend or family member with you when you visit your doctor. Talking over your options with someone you trust can help you make better choices, especially if you are not feeling well. Specifically, ask your doctor the following:

- The name of the medicine and what it is supposed to do.
- How and when to take the medicine, how much to take, and for how long.
- What food, drinks, other medicines, or activities you should avoid while taking the medicine.
- What side effects the medicine may have, and what to do if they occur.

³⁰ This section is adapted from AHCQRQ: <http://www.ahcpr.gov/consumer/ncpiebro.htm>.

- If you can get a refill, and how often.
- About any terms or directions you do not understand.
- What to do if you miss a dose.
- If there is written information you can take home (most pharmacies have information sheets on your prescription medicines; some even offer large-print or Spanish versions).

Do not forget to tell your doctor about all the medicines you are currently taking (not just those for knee ligament injuries). This includes prescription medicines and the medicines that you buy over the counter. Then your doctor can avoid giving you a new medicine that may not work well with the medications you take now. When talking to your doctor, you may wish to prepare a list of medicines you currently take, the reason you take them, and how you take them. Be sure to include the following information for each:

- Name of medicine
- Reason taken
- Dosage
- Time(s) of day

Also include any over-the-counter medicines, such as:

- Laxatives
- Diet pills
- Vitamins
- Cold medicine
- Aspirin or other pain, headache, or fever medicine
- Cough medicine
- Allergy relief medicine
- Antacids
- Sleeping pills
- Others (include names)

Learning More about Your Medications

Because of historical investments by various organizations and the emergence of the Internet, it has become rather simple to learn about the medications your doctor has recommended for knee ligament injuries. One such source is the United States Pharmacopeia. In 1820, eleven physicians met in Washington, D.C. to establish the first compendium of standard drugs for the United States. They called this compendium the “U.S. Pharmacopeia (USP).” Today, the USP is a non-profit organization consisting of 800 volunteer scientists, eleven elected officials, and 400 representatives of state associations and colleges of medicine and pharmacy. The USP is located in Rockville, Maryland, and its home page is located at www.usp.org. The USP currently provides standards for over 3,700 medications. The resulting USP DI® Advice for the Patient® can be accessed through the National Library of Medicine of the National Institutes of Health. The database is partially derived from lists of federally approved medications in the Food and Drug Administration's (FDA) Drug Approvals database.³¹

While the FDA database is rather large and difficult to navigate, the Pharmacopeia is both user-friendly and free to use. It covers more than 9,000 prescription and over-the-counter medications. To access this database, simply type the following hyperlink into your Web browser: <http://www.nlm.nih.gov/medlineplus/druginformation.html>. To view examples of a given medication (brand names, category, description, preparation, proper use, precautions, side effects, etc.), simply follow the hyperlinks indicated within the United States Pharmacopoeia. It is important to read the disclaimer by the United States Pharmacopoeia (<http://www.nlm.nih.gov/medlineplus/drugdisclaimer.html>) before using the information provided.

Commercial Databases

In addition to the medications listed in the USP above, a number of commercial sites are available by subscription to physicians and their institutions. You may be able to access these sources from your local medical library or your doctor's office.

³¹ Though cumbersome, the FDA database can be freely browsed at the following site: www.fda.gov/cder/da/da.htm.

Reuters Health Drug Database

The Reuters Health Drug Database can be searched by keyword at the hyperlink: <http://www.reutershealth.com/frame2/drug.html>.

Mosby's GenRx

Mosby's GenRx database (also available on CD-Rom and book format) covers 45,000 drug products including generics and international brands. It provides prescribing information, drug interactions, and patient information. Information in Mosby's GenRx database can be obtained at the following hyperlink: <http://www.genrx.com/Mosby/PhyGenRx/group.html>.

Physicians Desk Reference

The Physicians Desk Reference database (also available in CD-Rom and book format) is a full-text drug database. The database is searchable by brand name, generic name or by indication. It features multiple drug interactions reports. Information can be obtained at the following hyperlink: http://physician.pdr.net/physician/templates/en/acl/psuser_t.htm.

Other Web Sites

A number of additional Web sites discuss drug information. As an example, you may like to look at www.drugs.com which reproduces the information in the Pharmacopeia as well as commercial information. You may also want to consider the Web site of the Medical Letter, Inc. which allows users to download articles on various drugs and therapeutics for a nominal fee: <http://www.medletter.com/>.

Contraindications and Interactions (Hidden Dangers)

Some of the medications mentioned in the previous discussions can be problematic for patients with knee ligament injuries--not because they are used in the treatment process, but because of contraindications, or side effects. Medications with contraindications are those that could react with drugs used to treat knee ligament injuries or potentially create deleterious side effects in patients with knee ligament injuries. You should ask your physician about any contraindications, especially as these might apply to other medications that you may be taking for common ailments.

Drug-drug interactions occur when two or more drugs react with each other. This drug-drug interaction may cause you to experience an unexpected side effect. Drug interactions may make your medications less effective, cause unexpected side effects, or increase the action of a particular drug. Some drug interactions can even be harmful to you.

Be sure to read the label every time you use a nonprescription or prescription drug, and take the time to learn about drug interactions. These precautions may be critical to your health. You can reduce the risk of potentially harmful drug interactions and side effects with a little bit of knowledge and common sense.

Drug labels contain important information about ingredients, uses, warnings, and directions which you should take the time to read and understand. Labels also include warnings about possible drug interactions. Further, drug labels may change as new information becomes available. This is why it's especially important to read the label every time you use a medication. When your doctor prescribes a new drug, discuss all over-the-counter and prescription medications, dietary supplements, vitamins, botanicals, minerals and herbals you take as well as the foods you eat. Ask your pharmacist for the package insert for each prescription drug you take. The package insert provides more information about potential drug interactions.

A Final Warning

At some point, you may hear of alternative medications from friends, relatives, or in the news media. Advertisements may suggest that certain alternative drugs can produce positive results for patients with knee ligament injuries. Exercise caution--some of these drugs may have fraudulent claims, and others may actually hurt you. The Food and Drug Administration (FDA) is the official U.S. agency charged with discovering which medications are likely to improve the health of patients with knee ligament injuries. The FDA warns patients to watch out for³²:

- Secret formulas (real scientists share what they know)
- Amazing breakthroughs or miracle cures (real breakthroughs don't happen very often; when they do, real scientists do not call them amazing or miracles)

³² This section has been adapted from <http://www.fda.gov/opacom/lowlit/medfraud.html>.

- Quick, painless, or guaranteed cures
- If it sounds too good to be true, it probably isn't true.

If you have any questions about any kind of medical treatment, the FDA may have an office near you. Look for their number in the blue pages of the phone book. You can also contact the FDA through its toll-free number, 1-888-INFO-FDA (1-888-463-6332), or on the World Wide Web at www.fda.gov.

General References

In addition to the resources provided earlier in this chapter, the following general references describe medications (sorted alphabetically by title; hyperlinks provide rankings, information and reviews at Amazon.com):

- **Complete Guide to Prescription and Nonprescription Drugs 2001 (Complete Guide to Prescription and Nonprescription Drugs, 2001)** by H. Winter Griffith, Paperback 16th edition (2001), Medical Surveillance; ISBN: 0942447417;
<http://www.amazon.com/exec/obidos/ASIN/039952634X/icongroupinterna>
- **The Essential Guide to Prescription Drugs, 2001** by James J. Rybacki, James W. Long; Paperback - 1274 pages (2001), Harper Resource; ISBN: 0060958162;
<http://www.amazon.com/exec/obidos/ASIN/0060958162/icongroupinterna>
- **Handbook of Commonly Prescribed Drugs** by G. John Digregorio, Edward J. Barbieri; Paperback 16th edition (2001), Medical Surveillance; ISBN: 0942447417;
<http://www.amazon.com/exec/obidos/ASIN/0942447417/icongroupinterna>
- **Johns Hopkins Complete Home Encyclopedia of Drugs 2nd ed.** by Simeon Margolis (Ed.), Johns Hopkins; Hardcover - 835 pages (2000), Rebus; ISBN: 0929661583;
<http://www.amazon.com/exec/obidos/ASIN/0929661583/icongroupinterna>
- **Medical Pocket Reference: Drugs 2002** by Springhouse Paperback 1st edition (2001), Lippincott Williams & Wilkins Publishers; ISBN: 1582550964;
<http://www.amazon.com/exec/obidos/ASIN/1582550964/icongroupinterna>
- **PDR** by Medical Economics Staff, Medical Economics Staff Hardcover - 3506 pages 55th edition (2000), Medical Economics Company; ISBN: 1563633752;
<http://www.amazon.com/exec/obidos/ASIN/1563633752/icongroupinterna>

- **Pharmacy Simplified: A Glossary of Terms** by James Grogan; Paperback - 432 pages, 1st edition (2001), Delmar Publishers; ISBN: 0766828581;
<http://www.amazon.com/exec/obidos/ASIN/0766828581/icongroupinterna>
- **Physician Federal Desk Reference** by Christine B. Fraizer; Paperback 2nd edition (2001), Medicode Inc; ISBN: 1563373971;
<http://www.amazon.com/exec/obidos/ASIN/1563373971/icongroupinterna>
- **Physician's Desk Reference Supplements** Paperback - 300 pages, 53 edition (1999), ISBN: 1563632950;
<http://www.amazon.com/exec/obidos/ASIN/1563632950/icongroupinterna>

APPENDIX B. RESEARCHING NUTRITION

Overview

Since the time of Hippocrates, doctors have understood the importance of diet and nutrition to patients' health and well-being. Since then, they have accumulated an impressive archive of studies and knowledge dedicated to this subject. Based on their experience, doctors and healthcare providers may recommend particular dietary supplements to patients with knee ligament injuries. Any dietary recommendation is based on a patient's age, body mass, gender, lifestyle, eating habits, food preferences, and health condition. It is therefore likely that different patients with knee ligament injuries may be given different recommendations. Some recommendations may be directly related to knee ligament injuries, while others may be more related to the patient's general health. These recommendations, themselves, may differ from what official sources recommend for the average person.

In this chapter we will begin by briefly reviewing the essentials of diet and nutrition that will broadly frame more detailed discussions of knee ligament injuries. We will then show you how to find studies dedicated specifically to nutrition and knee ligament injuries.

Food and Nutrition: General Principles

What Are Essential Foods?

Food is generally viewed by official sources as consisting of six basic elements: (1) fluids, (2) carbohydrates, (3) protein, (4) fats, (5) vitamins, and (6) minerals. Consuming a combination of these elements is considered to be a healthy diet:

- **Fluids** are essential to human life as 80-percent of the body is composed of water. Water is lost via urination, sweating, diarrhea, vomiting, diuretics (drugs that increase urination), caffeine, and physical exertion.
- **Carbohydrates** are the main source for human energy (thermoregulation) and the bulk of typical diets. They are mostly classified as being either simple or complex. Simple carbohydrates include sugars which are often consumed in the form of cookies, candies, or cakes. Complex carbohydrates consist of starches and dietary fibers. Starches are consumed in the form of pastas, breads, potatoes, rice, and other foods. Soluble fibers can be eaten in the form of certain vegetables, fruits, oats, and legumes. Insoluble fibers include brown rice, whole grains, certain fruits, wheat bran and legumes.
- **Proteins** are eaten to build and repair human tissues. Some foods that are high in protein are also high in fat and calories. Food sources for protein include nuts, meat, fish, cheese, and other dairy products.
- **Fats** are consumed for both energy and the absorption of certain vitamins. There are many types of fats, with many general publications recommending the intake of unsaturated fats or those low in cholesterol.

Vitamins and minerals are fundamental to human health, growth, and, in some cases, disease prevention. Most are consumed in your diet (exceptions being vitamins K and D which are produced by intestinal bacteria and sunlight on the skin, respectively). Each vitamin and mineral plays a different role in health. The following outlines essential vitamins:

- **Vitamin A** is important to the health of your eyes, hair, bones, and skin; sources of vitamin A include foods such as eggs, carrots, and cantaloupe.
- **Vitamin B¹**, also known as thiamine, is important for your nervous system and energy production; food sources for thiamine include meat, peas, fortified cereals, bread, and whole grains.
- **Vitamin B²**, also known as riboflavin, is important for your nervous system and muscles, but is also involved in the release of proteins from

nutrients; food sources for riboflavin include dairy products, leafy vegetables, meat, and eggs.

- **Vitamin B³**, also known as niacin, is important for healthy skin and helps the body use energy; food sources for niacin include peas, peanuts, fish, and whole grains
- **Vitamin B⁶**, also known as pyridoxine, is important for the regulation of cells in the nervous system and is vital for blood formation; food sources for pyridoxine include bananas, whole grains, meat, and fish.
- **Vitamin B¹²** is vital for a healthy nervous system and for the growth of red blood cells in bone marrow; food sources for vitamin B¹² include yeast, milk, fish, eggs, and meat.
- **Vitamin C** allows the body's immune system to fight various diseases, strengthens body tissue, and improves the body's use of iron; food sources for vitamin C include a wide variety of fruits and vegetables.
- **Vitamin D** helps the body absorb calcium which strengthens bones and teeth; food sources for vitamin D include oily fish and dairy products.
- **Vitamin E** can help protect certain organs and tissues from various degenerative diseases; food sources for vitamin E include margarine, vegetables, eggs, and fish.
- **Vitamin K** is essential for bone formation and blood clotting; common food sources for vitamin K include leafy green vegetables.
- **Folic Acid** maintains healthy cells and blood and, when taken by a pregnant woman, can prevent her fetus from developing neural tube defects; food sources for folic acid include nuts, fortified breads, leafy green vegetables, and whole grains.

It should be noted that one can overdose on certain vitamins which become toxic if consumed in excess (e.g. vitamin A, D, E and K).

Like vitamins, minerals are chemicals that are required by the body to remain in good health. Because the human body does not manufacture these chemicals internally, we obtain them from food and other dietary sources. The more important minerals include:

- **Calcium** is needed for healthy bones, teeth, and muscles, but also helps the nervous system function; food sources for calcium include dry beans, peas, eggs, and dairy products.
- **Chromium** is helpful in regulating sugar levels in blood; food sources for chromium include egg yolks, raw sugar, cheese, nuts, beets, whole grains, and meat.

- **Fluoride** is used by the body to help prevent tooth decay and to reinforce bone strength; sources of fluoride include drinking water and certain brands of toothpaste.
- **Iodine** helps regulate the body's use of energy by synthesizing into the hormone thyroxine; food sources include leafy green vegetables, nuts, egg yolks, and red meat.
- **Iron** helps maintain muscles and the formation of red blood cells and certain proteins; food sources for iron include meat, dairy products, eggs, and leafy green vegetables.
- **Magnesium** is important for the production of DNA, as well as for healthy teeth, bones, muscles, and nerves; food sources for magnesium include dried fruit, dark green vegetables, nuts, and seafood.
- **Phosphorous** is used by the body to work with calcium to form bones and teeth; food sources for phosphorous include eggs, meat, cereals, and dairy products.
- **Selenium** primarily helps maintain normal heart and liver functions; food sources for selenium include wholegrain cereals, fish, meat, and dairy products.
- **Zinc** helps wounds heal, the formation of sperm, and encourage rapid growth and energy; food sources include dried beans, shellfish, eggs, and nuts.

The United States government periodically publishes recommended diets and consumption levels of the various elements of food. Again, your doctor may encourage deviations from the average official recommendation based on your specific condition. To learn more about basic dietary guidelines, visit the Web site: <http://www.health.gov/dietaryguidelines/>. Based on these guidelines, many foods are required to list the nutrition levels on the food's packaging. Labeling Requirements are listed at the following site maintained by the Food and Drug Administration: <http://www.cfsan.fda.gov/~dms/lab-cons.html>. When interpreting these requirements, the government recommends that consumers become familiar with the following abbreviations before reading FDA literature:³³

- **DVs (Daily Values):** A new dietary reference term that will appear on the food label. It is made up of two sets of references, DRVs and RDIs.
- **DRVs (Daily Reference Values):** A set of dietary references that applies to fat, saturated fat, cholesterol, carbohydrate, protein, fiber, sodium, and potassium.

³³ Adapted from the FDA: <http://www.fda.gov/fdac/special/foodlabel/dvs.html>.

- **RDIs (Reference Daily Intakes):** A set of dietary references based on the Recommended Dietary Allowances for essential vitamins and minerals and, in selected groups, protein. The name “RDI” replaces the term “U.S. RDA.”
- **RDAs (Recommended Dietary Allowances):** A set of estimated nutrient allowances established by the National Academy of Sciences. It is updated periodically to reflect current scientific knowledge.

What Are Dietary Supplements?³⁴

Dietary supplements are widely available through many commercial sources, including health food stores, grocery stores, pharmacies, and by mail. Dietary supplements are provided in many forms including tablets, capsules, powders, gel-tabs, extracts, and liquids. Historically in the United States, the most prevalent type of dietary supplement was a multivitamin/mineral tablet or capsule that was available in pharmacies, either by prescription or “over the counter.” Supplements containing strictly herbal preparations were less widely available. Currently in the United States, a wide array of supplement products are available, including vitamin, mineral, other nutrients, and botanical supplements as well as ingredients and extracts of animal and plant origin.

The Office of Dietary Supplements (ODS) of the National Institutes of Health is the official agency of the United States which has the expressed goal of acquiring “new knowledge to help prevent, detect, diagnose, and treat disease and disability, from the rarest genetic disorder to the common cold.”³⁵ According to the ODS, dietary supplements can have an important impact on the prevention and management of disease and on the maintenance of health.³⁶ The ODS notes that considerable research on the effects of dietary supplements has been conducted in Asia and Europe where the use of plant products, in particular, has a long tradition. However, the

³⁴ This discussion has been adapted from the NIH:
<http://ods.od.nih.gov/whatare/whatare.html>.

³⁵ Contact: The Office of Dietary Supplements, National Institutes of Health, Building 31, Room 1B29, 31 Center Drive, MSC 2086, Bethesda, Maryland 20892-2086, Tel: (301) 435-2920, Fax: (301) 480-1845, E-mail: ods@nih.gov.

³⁶ Adapted from <http://ods.od.nih.gov/about/about.html>. The Dietary Supplement Health and Education Act defines dietary supplements as “a product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, mineral, amino acid, herb or other botanical; or a dietary substance for use to supplement the diet by increasing the total dietary intake; or a concentrate, metabolite, constituent, extract, or combination of any ingredient described above; and intended for ingestion in the form of a capsule, powder, softgel, or gelcap, and not represented as a conventional food or as a sole item of a meal or the diet.”

overwhelming majority of supplements have not been studied scientifically. To explore the role of dietary supplements in the improvement of health care, the ODS plans, organizes, and supports conferences, workshops, and symposia on scientific topics related to dietary supplements. The ODS often works in conjunction with other NIH Institutes and Centers, other government agencies, professional organizations, and public advocacy groups.

To learn more about official information on dietary supplements, visit the ODS site at <http://ods.od.nih.gov/whatare/whatare.html>. Or contact:

The Office of Dietary Supplements
National Institutes of Health
Building 31, Room 1B29
31 Center Drive, MSC 2086
Bethesda, Maryland 20892-2086
Tel: (301) 435-2920
Fax: (301) 480-1845
E-mail: ods@nih.gov

Finding Studies on Knee Ligament Injuries

The NIH maintains an office dedicated to patient nutrition and diet. The National Institutes of Health's Office of Dietary Supplements (ODS) offers a searchable bibliographic database called the IBIDS (International Bibliographic Information on Dietary Supplements). The IBIDS contains over 460,000 scientific citations and summaries about dietary supplements and nutrition as well as references to published international, scientific literature on dietary supplements such as vitamins, minerals, and botanicals.³⁷ IBIDS is available to the public free of charge through the ODS Internet page: <http://ods.od.nih.gov/databases/ibids.html>.

After entering the search area, you have three choices: (1) IBIDS Consumer Database, (2) Full IBIDS Database, or (3) Peer Reviewed Citations Only. We recommend that you start with the Consumer Database. While you may not find references for the topics that are of most interest to you, check back periodically as this database is frequently updated. More studies can be

³⁷ Adapted from <http://ods.od.nih.gov>. IBIDS is produced by the Office of Dietary Supplements (ODS) at the National Institutes of Health to assist the public, healthcare providers, educators, and researchers in locating credible, scientific information on dietary supplements. IBIDS was developed and will be maintained through an interagency partnership with the Food and Nutrition Information Center of the National Agricultural Library, U.S. Department of Agriculture.

found by searching the Full IBIDS Database. Healthcare professionals and researchers generally use the third option, which lists peer-reviewed citations. In all cases, we suggest that you take advantage of the “Advanced Search” option that allows you to retrieve up to 100 fully explained references in a comprehensive format. Type “knee ligament injuries” (or synonyms) into the search box. To narrow the search, you can also select the “Title” field.

The following information is typical of that found when using the “Full IBIDS Database” when searching using “knee ligament injuries” (or a synonym):

- **A comparison of ketorolac tromethamine/oxycodone versus patient-controlled analgesia with morphine in anterior cruciate ligament reconstruction patients.**
Author(s): Department of Surgery, The Ohio State University, Columbus, USA.
Source: Popp, J E Sanko, W A Sinha, A K Kaeding, C C Arthroscopy. 1998 Nov-December; 14(8): 816-9 0749-8063
- **Changes in glycosaminoglycan epitope levels in knee joint fluid following injury.**
Author(s): Kennedy Institute of Rheumatology, London, UK.
Source: Hazell, P K Dent, C Fairclough, J A Bayliss, M T Hardingham, T E Arthritis-Rheum. 1995 July; 38(7): 953-9 0004-3591
- **Chondrocyte apoptosis and nitric oxide production during experimentally induced osteoarthritis.**
Author(s): The Scripps Research Institute, La Jolla, California 92937, USA.
Source: Hashimoto, S Takahashi, K Amiel, D Coutts, R D Lotz, M Arthritis-Rheum. 1998 July; 41(7): 1266-74 0004-3591
- **Effect of estrogen on cellular metabolism of the human anterior cruciate ligament.**
Author(s): Department of Orthopaedic Surgery, UCLA School of Medicine 90095, USA.
Source: Yu, W D Liu, S H Hatch, J D Panossian, V Finerman, G A Clin-Orthopage 1999 September; (366): 229-38 0009-921X
- **Engineering the healing of the rabbit medial collateral ligament.**
Author(s): Department of Orthopaedic Surgery, University of Pittsburgh, PA 15213, USA.
Source: Woo, S L Smith, D W Hildebrand, K A Zeminski, J A Johnson, L A Med-Biol-Eng-Comput. 1998 May; 36(3): 359-64 0140-0118

- **Metalloproteinases, tissue inhibitor, and proteoglycan fragments in knee synovial fluid in human osteoarthritis.**
 Author(s): Department of Orthopedics, University Hospital, Lund, Sweden.
 Source: Lohmander, L S Hoerrner, L A Lark, M W Arthritis-Rheum. 1993 February; 36(2): 181-9 0004-3591
- **Postoperative analgesic value of the intra-articular instillation of bupivacaine and morphine after arthroscopic knee surgery.**
 Author(s): Clinic for Orthopedic Surgery, Ernst Moritz Arndt University, Greifswald, Germany.
 Source: Follak, N Ganzer, D Arch-Orthop-Trauma-Surg. 2001 May; 121(5): 278-81 0936-8051
- **Pre- and postoperative intra-articular analgesia for arthroscopic surgery of the knee and arthroscopy-assisted anterior cruciate ligament reconstruction. A double-blind randomized, prospective study.**
 Author(s): 2nd Orthopaedic Department, University of Milan, San Gerardo Hospital, Monza, Italy.
 Source: Denti, M Randelli, P Bigoni, M Vitale, G Marino, M R Frascini, N Knee-Surg-Sports-Traumatol-Arthrosc. 1997; 5(4): 206-12 0942-2056
- **The effects of platelet-derived growth factor-BB on healing of the rabbit medial collateral ligament. An in vivo study.**
 Author(s): Department of Orthopaedic Surgery, University of Pittsburgh, Pennsylvania 15213, USA.
 Source: Hildebrand, K A Woo, S L Smith, D W Allen, C R Deie, M Taylor, B J Schmidt, C C Am-J-Sports-Med. 1998 Jul-August; 26(4): 549-54 0363-5465
- **Treatment with calcitonin suppresses the responses of bone, cartilage, and synovium in the early stages of canine experimental osteoarthritis and significantly reduces the severity of the cartilage lesions.**
 Author(s): Universite de Louvain, International Institute of Cellular and Molecular Pathology, and Saint-Luc University Hospital, Brussels, Belgium.
 Source: Manicourt, D H Altman, R D Williams, J M Devogelaer, J P Druetz Van Egeren, A Lenz, M E Pietryla, D Thonar, E J Arthritis-Rheum. 1999 June; 42(6): 1159-67 0004-3591

Federal Resources on Nutrition

In addition to the IBIDS, the United States Department of Health and Human Services (HHS) and the United States Department of Agriculture (USDA)

provide many sources of information on general nutrition and health. Recommended resources include:

- healthfinder®, HHS's gateway to health information, including diet and nutrition:
<http://www.healthfinder.gov/scripts/SearchContext.asp?topic=238&page=0>
- The United States Department of Agriculture's Web site dedicated to nutrition information: www.nutrition.gov
- The Food and Drug Administration's Web site for federal food safety information: www.foodsafety.gov
- The National Action Plan on Overweight and Obesity sponsored by the United States Surgeon General:
<http://www.surgeongeneral.gov/topics/obesity/>
- The Center for Food Safety and Applied Nutrition has an Internet site sponsored by the Food and Drug Administration and the Department of Health and Human Services: <http://vm.cfsan.fda.gov/>
- Center for Nutrition Policy and Promotion sponsored by the United States Department of Agriculture: <http://www.usda.gov/cnpp/>
- Food and Nutrition Information Center, National Agricultural Library sponsored by the United States Department of Agriculture: <http://www.nal.usda.gov/fnic/>
- Food and Nutrition Service sponsored by the United States Department of Agriculture: <http://www.fns.usda.gov/fns/>

Additional Web Resources

A number of additional Web sites offer encyclopedic information covering food and nutrition. The following is a representative sample:

- AOL: <http://search.aol.com/cat.adp?id=174&layer=&from=subcats>
- Family Village: http://www.familyvillage.wisc.edu/med_nutrition.html
- Google: <http://directory.google.com/Top/Health/Nutrition/>
- Healthnotes: <http://www.thedacare.org/healthnotes/>
- Open Directory Project: <http://dmoz.org/Health/Nutrition/>
- Yahoo.com: <http://dir.yahoo.com/Health/Nutrition/>
- WebMD® Health: <http://my.webmd.com/nutrition>

- WholeHealthMD.com:
<http://www.wholehealthmd.com/reflib/0,1529,,00.html>

Vocabulary Builder

The following vocabulary builder defines words used in the references in this chapter that have not been defined in previous chapters:

Analgesic: An agent that alleviates pain without causing loss of consciousness. [EU]

Bacteria: Unicellular prokaryotic microorganisms which generally possess rigid cell walls, multiply by cell division, and exhibit three principal forms: round or coccial, rodlike or bacillary, and spiral or spirochetal. [NIH]

Bupivacaine: A widely used local anesthetic agent. [NIH]

Calcitonin: A peptide hormone that lowers calcium concentration in the blood. In humans, it is released by thyroid cells and acts to decrease the formation and absorptive activity of osteoclasts. Its role in regulating plasma calcium is much greater in children and in certain diseases than in normal adults. [NIH]

Capsules: Hard or soft soluble containers used for the oral administration of medicine. [NIH]

Carbohydrate: An aldehyde or ketone derivative of a polyhydric alcohol, particularly of the pentahydric and hexahydric alcohols. They are so named because the hydrogen and oxygen are usually in the proportion to form water, $(\text{CH}_2\text{O})_n$. The most important carbohydrates are the starches, sugars, celluloses, and gums. They are classified into mono-, di-, tri-, poly- and heterosaccharides. [EU]

Cholesterol: The principal sterol of all higher animals, distributed in body tissues, especially the brain and spinal cord, and in animal fats and oils. [NIH]

Diarrhea: Passage of excessively liquid or excessively frequent stools. [NIH]

Iodine: A nonmetallic element of the halogen group that is represented by the atomic symbol I, atomic number 53, and atomic weight of 126.90. It is a nutritionally essential element, especially important in thyroid hormone synthesis. In solution, it has anti-infective properties and is used topically. [NIH]

Morphine: The principal alkaloid in opium and the prototype opiate analgesic and narcotic. Morphine has widespread effects in the central nervous system and on smooth muscle. [NIH]

Niacin: Water-soluble vitamin of the B complex occurring in various animal

and plant tissues. Required by the body for the formation of coenzymes NAD and NADP. Has pellagra-curative, vasodilating, and antilipemic properties. [NIH]

Overdose: 1. to administer an excessive dose. 2. an excessive dose. [EU]

Oxycodone: Semisynthetic derivative of codeine that acts as a narcotic analgesic more potent and addicting than codeine. [NIH]

Potassium: An element that is in the alkali group of metals. It has an atomic symbol K, atomic number 19, and atomic weight 39.10. It is the chief cation in the intracellular fluid of muscle and other cells. Potassium ion is a strong electrolyte and it plays a significant role in the regulation of fluid volume and maintenance of the water-electrolyte balance. [NIH]

Proteins: Polymers of amino acids linked by peptide bonds. The specific sequence of amino acids determines the shape and function of the protein. [NIH]

Riboflavin: Nutritional factor found in milk, eggs, malted barley, liver, kidney, heart, and leafy vegetables. The richest natural source is yeast. It occurs in the free form only in the retina of the eye, in whey, and in urine; its principal forms in tissues and cells are as FMN and FAD. [NIH]

Selenium: An element with the atomic symbol Se, atomic number 34, and atomic weight 78.96. It is an essential micronutrient for mammals and other animals but is toxic in large amounts. Selenium protects intracellular structures against oxidative damage. It is an essential component of glutathione peroxidase. [NIH]

Thyroxine: An amino acid of the thyroid gland which exerts a stimulating effect on thyroid metabolism. [NIH]

APPENDIX C. FINDING MEDICAL LIBRARIES

Overview

At a medical library you can find medical texts and reference books, consumer health publications, specialty newspapers and magazines, as well as medical journals. In this Appendix, we show you how to quickly find a medical library in your area.

Preparation

Before going to the library, highlight the references mentioned in this sourcebook that you find interesting. Focus on those items that are not available via the Internet, and ask the reference librarian for help with your search. He or she may know of additional resources that could be helpful to you. Most importantly, your local public library and medical libraries have Interlibrary Loan programs with the National Library of Medicine (NLM), one of the largest medical collections in the world. According to the NLM, most of the literature in the general and historical collections of the National Library of Medicine is available on interlibrary loan to any library. NLM's interlibrary loan services are only available to libraries. If you would like to access NLM medical literature, then visit a library in your area that can request the publications for you.³⁸

³⁸ Adapted from the NLM: <http://www.nlm.nih.gov/psd/cas/interlibrary.html>.

Finding a Local Medical Library

The quickest method to locate medical libraries is to use the Internet-based directory published by the National Network of Libraries of Medicine (NN/LM). This network includes 4626 members and affiliates that provide many services to librarians, health professionals, and the public. To find a library in your area, simply visit <http://nnlm.gov/members/adv.html> or call 1-800-338-7657.

Medical Libraries Open to the Public

In addition to the NN/LM, the National Library of Medicine (NLM) lists a number of libraries that are generally open to the public and have reference facilities. The following is the NLM's list plus hyperlinks to each library Web site. These Web pages can provide information on hours of operation and other restrictions. The list below is a small sample of libraries recommended by the National Library of Medicine (sorted alphabetically by name of the U.S. state or Canadian province where the library is located):³⁹

- **Alabama:** Health InfoNet of Jefferson County (Jefferson County Library Cooperative, Lister Hill Library of the Health Sciences), <http://www.uab.edu/infonet/>
- **Alabama:** Richard M. Scrushy Library (American Sports Medicine Institute), <http://www.asmi.org/LIBRARY.HTM>
- **Arizona:** Samaritan Regional Medical Center: The Learning Center (Samaritan Health System, Phoenix, Arizona), <http://www.samaritan.edu/library/bannerlibs.htm>
- **California:** Kris Kelly Health Information Center (St. Joseph Health System), <http://www.humboldt1.com/~kkhic/index.html>
- **California:** Community Health Library of Los Gatos (Community Health Library of Los Gatos), <http://www.healthlib.org/orgresources.html>
- **California:** Consumer Health Program and Services (CHIPS) (County of Los Angeles Public Library, Los Angeles County Harbor-UCLA Medical Center Library) - Carson, CA, <http://www.colapublib.org/services/chips.html>
- **California:** Gateway Health Library (Sutter Gould Medical Foundation)
- **California:** Health Library (Stanford University Medical Center), <http://www-med.stanford.edu/healthlibrary/>

³⁹ Abstracted from <http://www.nlm.nih.gov/medlineplus/libraries.html>.

- **California:** Patient Education Resource Center - Health Information and Resources (University of California, San Francisco), <http://sfguide.ucsf.edu/barnett/PERC/default.asp>
- **California:** Redwood Health Library (Petaluma Health Care District), <http://www.phcd.org/rdwlib.html>
- **California:** San José PlaneTree Health Library, <http://planetreesanjose.org/>
- **California:** Sutter Resource Library (Sutter Hospitals Foundation), <http://go.sutterhealth.org/comm/resc-library/sac-resources.html>
- **California:** University of California, Davis. Health Sciences Libraries
- **California:** ValleyCare Health Library & Ryan Comer Cancer Resource Center (ValleyCare Health System), <http://www.valleycare.com/library.html>
- **California:** Washington Community Health Resource Library (Washington Community Health Resource Library), <http://www.healthlibrary.org/>
- **Colorado:** William V. Gervasini Memorial Library (Exempla Healthcare), <http://www.exempla.org/conslib.htm>
- **Connecticut:** Hartford Hospital Health Science Libraries (Hartford Hospital), <http://www.harthosp.org/library/>
- **Connecticut:** Healthnet: Connecticut Consumer Health Information Center (University of Connecticut Health Center, Lyman Maynard Stowe Library), <http://library.uchc.edu/departm/hnet/>
- **Connecticut:** Waterbury Hospital Health Center Library (Waterbury Hospital), <http://www.waterburyhospital.com/library/consumer.shtml>
- **Delaware:** Consumer Health Library (Christiana Care Health System, Eugene du Pont Preventive Medicine & Rehabilitation Institute), http://www.christianacare.org/health_guide/health_guide_pmri_health_info.cfm
- **Delaware:** Lewis B. Flinn Library (Delaware Academy of Medicine), <http://www.delamed.org/chls.html>
- **Georgia:** Family Resource Library (Medical College of Georgia), http://cmc.mcg.edu/kids_families/fam_resources/fam_res_lib/frl.htm
- **Georgia:** Health Resource Center (Medical Center of Central Georgia), <http://www.mccg.org/hrc/hrchome.asp>
- **Hawaii:** Hawaii Medical Library: Consumer Health Information Service (Hawaii Medical Library), <http://hml.org/CHIS/>

- **Idaho:** DeArmond Consumer Health Library (Kootenai Medical Center), <http://www.nicon.org/DeArmond/index.htm>
- **Illinois:** Health Learning Center of Northwestern Memorial Hospital (Northwestern Memorial Hospital, Health Learning Center), http://www.nmh.org/health_info/hlc.html
- **Illinois:** Medical Library (OSF Saint Francis Medical Center), <http://www.osfsaintfrancis.org/general/library/>
- **Kentucky:** Medical Library - Services for Patients, Families, Students & the Public (Central Baptist Hospital), <http://www.centralbap.com/education/community/library.htm>
- **Kentucky:** University of Kentucky - Health Information Library (University of Kentucky, Chandler Medical Center, Health Information Library), <http://www.mc.uky.edu/PatientEd/>
- **Louisiana:** Alton Ochsner Medical Foundation Library (Alton Ochsner Medical Foundation), <http://www.ochsner.org/library/>
- **Louisiana:** Louisiana State University Health Sciences Center Medical Library-Shreveport, <http://lib-sh.lsuhscc.edu/>
- **Maine:** Franklin Memorial Hospital Medical Library (Franklin Memorial Hospital), <http://www.fchn.org/fmh/lib.htm>
- **Maine:** Gerrish-True Health Sciences Library (Central Maine Medical Center), <http://www.cmmc.org/library/library.html>
- **Maine:** Hadley Parrot Health Science Library (Eastern Maine Healthcare), <http://www.emh.org/hll/hpl/guide.htm>
- **Maine:** Maine Medical Center Library (Maine Medical Center), <http://www.mmc.org/library/>
- **Maine:** Parkview Hospital, <http://www.parkviewhospital.org/communit.htm#Library>
- **Maine:** Southern Maine Medical Center Health Sciences Library (Southern Maine Medical Center), <http://www.smmc.org/services/service.php3?choice=10>
- **Maine:** Stephens Memorial Hospital Health Information Library (Western Maine Health), http://www.wmhcc.com/hil_frame.html
- **Manitoba, Canada:** Consumer & Patient Health Information Service (University of Manitoba Libraries), <http://www.umanitoba.ca/libraries/units/health/reference/chis.html>
- **Manitoba, Canada:** J.W. Crane Memorial Library (Deer Lodge Centre), <http://www.deerlodge.mb.ca/library/libraryservices.shtml>

- **Maryland:** Health Information Center at the Wheaton Regional Library (Montgomery County, Md., Dept. of Public Libraries, Wheaton Regional Library), <http://www.mont.lib.md.us/healthinfo/hic.asp>
- **Massachusetts:** Baystate Medical Center Library (Baystate Health System), <http://www.baystatehealth.com/1024/>
- **Massachusetts:** Boston University Medical Center Alumni Medical Library (Boston University Medical Center), <http://med-libwww.bu.edu/library/lib.html>
- **Massachusetts:** Lowell General Hospital Health Sciences Library (Lowell General Hospital), <http://www.lowellgeneral.org/library/HomePageLinks/WWW.htm>
- **Massachusetts:** Paul E. Woodard Health Sciences Library (New England Baptist Hospital), http://www.nebh.org/health_lib.asp
- **Massachusetts:** St. Luke's Hospital Health Sciences Library (St. Luke's Hospital), <http://www.southcoast.org/library/>
- **Massachusetts:** Treadwell Library Consumer Health Reference Center (Massachusetts General Hospital), <http://www.mgh.harvard.edu/library/chrcindex.html>
- **Massachusetts:** UMass HealthNet (University of Massachusetts Medical School), <http://healthnet.umassmed.edu/>
- **Michigan:** Botsford General Hospital Library - Consumer Health (Botsford General Hospital, Library & Internet Services), <http://www.botsfordlibrary.org/consumer.htm>
- **Michigan:** Helen DeRoy Medical Library (Providence Hospital and Medical Centers), <http://www.providence-hospital.org/library/>
- **Michigan:** Marquette General Hospital - Consumer Health Library (Marquette General Hospital, Health Information Center), <http://www.mgh.org/center.html>
- **Michigan:** Patient Education Resource Center - University of Michigan Cancer Center (University of Michigan Comprehensive Cancer Center), <http://www.cancer.med.umich.edu/learn/leares.htm>
- **Michigan:** Sladen Library & Center for Health Information Resources - Consumer Health Information, <http://www.sladen.hfhs.org/library/consumer/index.html>
- **Montana:** Center for Health Information (St. Patrick Hospital and Health Sciences Center), <http://www.saintpatrick.org/chi/librarydetail.php3?ID=41>

- **National:** Consumer Health Library Directory (Medical Library Association, Consumer and Patient Health Information Section), <http://caphis.mlanet.org/directory/index.html>
- **National:** National Network of Libraries of Medicine (National Library of Medicine) - provides library services for health professionals in the United States who do not have access to a medical library, <http://nmlm.gov/>
- **National:** NN/LM List of Libraries Serving the Public (National Network of Libraries of Medicine), <http://nmlm.gov/members/>
- **Nevada:** Health Science Library, West Charleston Library (Las Vegas Clark County Library District), http://www.lvccld.org/special_collections/medical/index.htm
- **New Hampshire:** Dartmouth Biomedical Libraries (Dartmouth College Library), http://www.dartmouth.edu/~biomed/resources.html#conshealth.html#
- **New Jersey:** Consumer Health Library (Rahway Hospital), <http://www.rahwayhospital.com/library.htm>
- **New Jersey:** Dr. Walter Phillips Health Sciences Library (Englewood Hospital and Medical Center), <http://www.Englewoodhospital.com/links/index.htm>
- **New Jersey:** Meland Foundation (Englewood Hospital and Medical Center), <http://www.geocities.com/ResearchTriangle/9360/>
- **New York:** Choices in Health Information (New York Public Library) - NLM Consumer Pilot Project participant, <http://www.nypl.org/branch/health/links.html>
- **New York:** Health Information Center (Upstate Medical University, State University of New York), <http://www.upstate.edu/library/hic/>
- **New York:** Health Sciences Library (Long Island Jewish Medical Center), <http://www.lij.edu/library/library.html>
- **New York:** ViaHealth Medical Library (Rochester General Hospital), <http://www.nyam.org/library/>
- **Ohio:** Consumer Health Library (Akron General Medical Center, Medical & Consumer Health Library), <http://www.akrongeneral.org/hwlibrary.htm>
- **Oklahoma:** Saint Francis Health System Patient/Family Resource Center (Saint Francis Health System), <http://www.sfh-tulsa.com/patientfamilycenter/default.asp>

- **Oregon:** Planetree Health Resource Center (Mid-Columbia Medical Center), <http://www.mcmc.net/phrc/>
- **Pennsylvania:** Community Health Information Library (Milton S. Hershey Medical Center), <http://www.hmc.psu.edu/commhealth/>
- **Pennsylvania:** Community Health Resource Library (Geisinger Medical Center), <http://www.geisinger.edu/education/commplib.shtml>
- **Pennsylvania:** HealthInfo Library (Moses Taylor Hospital), <http://www.mth.org/healthwellness.html>
- **Pennsylvania:** Hopwood Library (University of Pittsburgh, Health Sciences Library System), <http://www.hsls.pitt.edu/chi/hhrcinfo.html>
- **Pennsylvania:** Koop Community Health Information Center (College of Physicians of Philadelphia), <http://www.collphyphil.org/koopp1.shtml>
- **Pennsylvania:** Learning Resources Center - Medical Library (Susquehanna Health System), <http://www.shscares.org/services/lrc/index.asp>
- **Pennsylvania:** Medical Library (UPMC Health System), <http://www.upmc.edu/passavant/library.htm>
- **Quebec, Canada:** Medical Library (Montreal General Hospital), <http://ww2.mcgill.ca/mghlib/>
- **South Dakota:** Rapid City Regional Hospital - Health Information Center (Rapid City Regional Hospital, Health Information Center), <http://www.rcrh.org/education/LibraryResourcesConsumers.htm>
- **Texas:** Houston HealthWays (Houston Academy of Medicine-Texas Medical Center Library), <http://hww.library.tmc.edu/>
- **Texas:** Matustik Family Resource Center (Cook Children's Health Care System), http://www.cookchildrens.com/Matustik_Library.html
- **Washington:** Community Health Library (Kittitas Valley Community Hospital), <http://www.kvch.com/>
- **Washington:** Southwest Washington Medical Center Library (Southwest Washington Medical Center), <http://www.swmedctr.com/Home/>

APPENDIX D. CHILDHOOD SPORTS INJURIES AND THEIR PREVENTION

Overview⁴⁰

The following discussion was prepared by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS). It covers the basics of childhood sports injuries and their prevention.

Childhood Sports Injuries and Their Prevention

Childhood sports injuries may be inevitable, but there are some things you can do to help prevent them:

- Enroll your child in organized sports through schools, community clubs, and recreation areas where there may be adults who are certified athletic trainers (ATC). An ATC is also trained in the prevention, recognition and immediate care of athletic injuries.
- Make sure your child uses the proper protective gear for a particular sport. This may lessen the chances of being injured.
- Warm-up exercises, such as stretching and light jogging, can help minimize the chance of muscle strain or other soft tissue injury during sports. Warm-up exercises make the body's tissues warmer and more flexible. Cooling down exercises loosen the body's muscles that have tightened during exercise. Make warm-ups and cool downs part of your child's routine before and after sports participation.

⁴⁰ Adapted from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS): http://www.niams.nih.gov/hi/topics/childsports/child_sports.htm.

And don't forget to include sunscreen and a hat (where possible) to reduce the chance of sunburn, which is actually an injury to the skin. Sun protection may also decrease the chances of malignant melanoma--a potentially deadly skin cancer--or other skin cancers that can occur later in life. It is also very important that your child has access to water or a sports drink to stay properly hydrated while playing.

Treat Injuries with "RICE"

If your child receives a soft tissue injury, commonly known as a sprain or a strain, or a bone injury, the best immediate treatment is easy to remember. "RICE" (Rest, Ice, Compression, and Elevation) the injury. Get professional treatment if any injury is severe. A severe injury means having an obvious fracture or dislocation of a joint, prolonged swelling, or prolonged or severe pain.

"RICE"

- **Rest:** Reduce or stop using the injured area for 48 hours. If you have a leg injury, you may need to stay off of it completely.
- **Ice:** Put an ice pack on the injured area for 20 minutes at a time, 4 to 8 times per day. Use a cold pack, ice bag, or a plastic bag filled with crushed ice that has been wrapped in a towel.
- **Compression:** Compression of an injured ankle, knee, or wrist may help reduce the swelling. These include bandages such as elastic wraps, special boots, air casts and splints. Ask your doctor which one is best.
- **Elevation:** Keep the injured area elevated above the level of the heart. Use a pillow to help elevate an injured limb.

Sprains and Strains

A sprain is an injury to a ligament--a stretching or a tearing. One or more ligaments can be injured during a sprain. A ligament is a band of tough, fibrous tissue that connects two or more bones at a joint and prevents excessive movement of the joint. Ankle sprains are the most common injury in the United States and often occur during sports or recreational activities. Approximately 1 million ankle injuries occur each year and 85 percent of these are sprains.

A strain is an injury to either a muscle or a tendon. A muscle is a tissue composed of bundles of specialized cells that, when stimulated by nerve impulses, contract and produce movement. A tendon is a tough, fibrous cord of tissue that connects muscle to bone.

Growth Plate Injuries

In some sports accidents and injuries, the growth plate may be injured. The growth plate is the area of developing tissues at the end of the long bones in growing children and adolescents. When growth is complete, sometime during adolescence, the growth plate is replaced by solid bone. The long bones in the body are the long bones of the fingers, the outer bone of the forearm, the collarbone, the hip, the bone of the upper leg, the lower leg bones, the ankle, and the foot. If any of these areas become injured, seek professional help from a doctor who specializes in bone injuries in children and adolescents (pediatric orthopedist).

Repetitive Motion Injuries

Painful injuries such as stress fractures (where the ligament pulls off small pieces of bone) and tendinitis (inflammation of a tendon) can occur from overuse of muscles and tendons. These injuries don't always show up on x-rays, but they do cause pain and discomfort. The injured area usually responds to rest. Other treatments include RICE, crutches, cast immobilization, or physical therapy.

Heat and Hydration - Playing It Safe Is Cool

Playing rigorous sports in the heat requires close monitoring of both body and weather conditions. Heat injuries are always dangerous and can be fatal. Children perspire less than adults and require a higher core body temperature to trigger sweating. Heat-related illnesses include dehydration (deficit in body fluids), heat exhaustion (nausea, dizziness, weakness, headache, pale and moist skin, heavy perspiration, normal or low body temperature, weak pulse, dilated pupils, disorientation, fainting spells), and heat stroke (headache, dizziness, confusion, and hot dry skin, possibly leading to vascular collapse, coma, and death). These injuries can be prevented.

Playing Safe in the Heat Is Cool

- Recognize the dangers of playing in the heat.
- Respond quickly if heat-related injuries occur.
- Schedule regular fluid breaks during practice and games.
- Drinking water is the best choice; others include fruit juices and sports drinks.
- Kids need to drink 8 ounces of fluid every 20 minutes, plus more after playing.
- Make player substitutions more frequently in the heat.
- Wear light-colored, “breathable” clothing, and wide-brimmed hats
- Use misting water sprays on the body to keep cool.

Exercise Is Beneficial

Even with the risk of injury, your child’s involvement in sports is important. Exercise may reduce your child’s chances of obesity, which is becoming more common in children. It may also lessen your child’s risk of diabetes, a disease that is sometimes associated with a lack of exercise and poor eating habits.

As a parent, it is important for you to match your children to the sport, and not push him or her too hard into an activity that he or she may not like or be capable of doing. Sports also helps children build social skills and provides them with a general sense of well-being. Sports participation is an important part of learning how to build team skills.

Sports Injury and Prevention

You may not be able to protect your child from all sports injuries, but you may be able to reduce the risk of injury by using preventive measures. It is important to know which sports are more likely to cause injury than others. In addition, check the condition of the athletic area where the sports are to be played. Make sure it is properly maintained.

The following “sports scorecard” shows winning ways to help prevent an injury from occurring.

Football

- This popular sport “leads the pack” in the number of injuries, especially in boys, in organized sports.
- Common injuries and locations: Bruises, sprains, strains, pulled muscles, soft tissue tears such as ligaments, broken bones, internal injuries (bruised or damaged organs), back injuries, sunburn. Knees and ankles are the most common injury sites.
- Safest playing with: Helmet; mouth guard; shoulder pads; athletic supporters for males; chest/rib pads; forearm, elbow, and thigh pads; shin guards; proper shoes; sunscreen; water.
- Prevention: Proper use of safety equipment, warm-up exercises, proper coaching and conditioning.

Basketball

- This popular sport has the highest rate of knee injuries requiring surgery among girls.
- Common injuries and locations: Sprains, strains, bruises, fractures, scrapes, dislocation, cuts, dental injuries. Ankles, knees (injury rates are higher in girls, especially for the anterior cruciate ligament, the wide ligament that limits rotation and forward movement of the shin bone), shoulder (rotator cuff strains and tears, where tendons at the end of muscles attach to the upper arm and shoulder bones).
- Safest playing with: Eye protection, elbow and knee pads, mouth guard, athletic supporters for males, proper shoes, water. If playing outdoors, add a hat and sunscreen.
- Prevention: Strength training (particularly knees and shoulders), aerobics (exercises that develop the strength and endurance of heart and lungs), warm-up exercises, proper coaching, and use of safety equipment.

Soccer

- This sport has dramatically increased in popularity in the past two decades in the U.S.
- Common injuries: Bruises, cuts and scrapes, headaches, sunburn.
- Safest playing with: Shin guards, athletic supporters for males, cleats, sunscreen, water.
- Prevention: Aerobic conditioning and warm-ups, and proper training in “heading” the ball. (“Heading” is using the head to strike or make a play with the ball.)

Baseball and Softball

- Sometimes called “America's favorite pastime.”
- Common injuries: Soft tissue strains, impact injuries that include fractures due to sliding and being hit by a ball, sunburn.
- Safest playing with: Batting helmet, shin guards, elbow guards, athletic supporters for males, mouth guard, sunscreen, cleats, hat, breakaway bases.
- Prevention: Proper conditioning and warm-ups.

Gymnastics

- The performance of systematic exercises.
- Common injuries: Sprains and strains of soft tissues.
- Safest playing with: Athletic supporters for males, safety harness, joint supports (such as neoprene wraps), water.
- Prevention: Proper conditioning and warm-ups.

Track and Field

- Competing at running, walking, jumping, throwing, or pushing events.
- Common injuries: Strains, sprains, scrapes from falls.
- Safest playing with: Proper shoes, athletic supporters for males, sunscreen, water.
- Prevention: Proper conditioning and coaching.

How Your Child Can Prevent Sports Injuries ⁴¹

- Be in proper physical condition to play the sport.
- Know and abide by the rules of the sport.
- Wear appropriate protective gear (for example, shin guards for soccer, a hard-shell helmet when facing a baseball or softball pitcher, a helmet and body padding for ice hockey).
- Know how to use athletic equipment.
- Always warm up before playing.

⁴¹ Adapted from *Play It Safe, a Guide to Safety for Young Athletes*, with permission of the American Academy of Orthopaedic Surgeons.

- Avoid playing when very tired or in pain.
- Get a preseason physical examination.
- Make sure there is adequate water or other liquids to maintain proper hydration.

Additional Resources

For more information on sports injuries and prevention, contact:

**National Institute of Arthritis and Musculoskeletal and Skin Diseases
NIAMS/National Institutes of Health**

1 AMS Circle

Bethesda, MD 20892-3675

Phone: 301-495-4484; 1-877-22NIAMS (free of charge)

TTY: 301-565-2966

Fax: 301-718-6366

E-mail: NIAMSinfo@mail.nih.gov

www.niams.nih.gov/

NIAMS is a part of the Combined Health Information Database (CHID)
at **<http://chid.nih.gov>**

Useful NIAMS Links

- Knee Problems: **www.niams.nih.gov/hi/kneeprobs/kneeqa.htm**
- Sprains and Strains:
www.niams.nih.gov/hi/strain_sprain/sprain_strain.htm
- Growth Plate Injuries: **www.niams.nih.gov/hi/growth_plate/growth.htm**
- Shoulder Problems:
www.niams.nih.gov/hi/shoulderprobs/shoulderqa.htm
- NIAMS Information Clearinghouse: **www.niams.nih.gov/hi/**

Other Useful Links

- American Academy of Orthopaedic Surgeons (AAOS): **www.aaos.org**
- American Academy of Pediatrics (AAP): **www.aap.org**
- American College of Rheumatology: **www.rheumatology.org**
- American Medical Society for Sports Medicine (AMSSM):
www.amssm.org

- American Orthopaedic Society for Sports Medicine (AOSSM): www.sportsmed.org
- American Physical Therapy Association (APTA): www.apta.org
- Arthritis Foundation (AF): www.arthritis.org
- National Athletic Trainers Association (NATA): www.nata.org

References

National Athletic Trainers Association. *What happens if your child is injured on the sports field?* Press release. 9/23/99.

O'Connor, Deborah. *Preventing sports injuries in kids.* Patient Care, 6/15/98, pp.60-83.

Powell, John W, Barber-Foss, Kim D. *Injury Patterns in Selected High School Sports: A Review of the 1995-1997 Seasons.* Journal of Athletic Training 1999;34:(3):277-284.

American Academy of Family Physicians. *Heat-Related Illness: What You Can Do to Prevent It.* Brochure. 1994.

Requa, Ralph. *The scope of the problem: the impact of sports-related injuries.* In Proceedings of Sports Injuries in Youth: Surveillance Strategies, Bethesda, MD, 8-9 April 1991. National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, Bethesda, MD. 11/92, p.19.

Messina, DF; Farney, WC; DeLee, JC. *The incidence of injury in Texas high school basketball.* The American Journal of Sports Medicine. Vol. 27; No.3; 294-299; 1999.

Encyclopedia Britannica Online; <http://members.eb.com>

Vocabulary Builder

Adolescence: The period of life beginning with the appearance of secondary sex characteristics and terminating with the cessation of somatic growth. The years usually referred to as adolescence lie between 13 and 18 years of age. [NIH]

Bandages: Material used for wrapping or binding any part of the body. [NIH]

Collapse: 1. a state of extreme prostration and depression, with failure of circulation. 2. abnormal falling in of the walls of any part of organ. [EU]

Confusion: Disturbed orientation in regard to time, place, or person, sometimes accompanied by disordered consciousness. [EU]

Dehydration: The condition that results from excessive loss of body water. Called also anhydration, deaquation and hypohydration. [EU]

Disorientation: The loss of proper bearings, or a state of mental confusion as to time, place, or identity. [EU]

Dizziness: An imprecise term which may refer to a sense of spatial disorientation, motion of the environment, or lightheadedness. [NIH]

Fatal: Causing death, deadly; mortal; lethal. [EU]

Hydration: The condition of being combined with water. [EU]

Malignant: Tending to become progressively worse and to result in death. Having the properties of anaplasia, invasion, and metastasis; said of tumours. [EU]

Melanoma: A tumour arising from the melanocytic system of the skin and other organs. When used alone the term refers to malignant melanoma. [EU]

Nausea: An unpleasant sensation, vaguely referred to the epigastrium and abdomen, and often culminating in vomiting. [EU]

Neoprene: An oil-resistant synthetic rubber made by the polymerization of chloroprene. [NIH]

Pediatrics: A medical specialty concerned with maintaining health and providing medical care to children from birth to adolescence. [NIH]

Perspiration: Sweating; the functional secretion of sweat. [EU]

Pupil: The aperture in the iris through which light passes. [NIH]

Sunburn: An injury to the skin causing erythema, tenderness, and sometimes blistering and resulting from excessive exposure to the sun. The reaction is produced by the ultraviolet radiation in sunlight. [NIH]

Tendinitis: Inflammation of tendons and of tendon-muscle attachments. [EU]

ONLINE GLOSSARIES

The Internet provides access to a number of free-to-use medical dictionaries and glossaries. The National Library of Medicine has compiled the following list of online dictionaries:

- ADAM Medical Encyclopedia (A.D.A.M., Inc.), comprehensive medical reference: <http://www.nlm.nih.gov/medlineplus/encyclopedia.html>
- MedicineNet.com Medical Dictionary (MedicineNet, Inc.):
<http://www.medterms.com/Script/Main/hp.asp>
- Merriam-Webster Medical Dictionary (Inteli-Health, Inc.):
<http://www.intelihealth.com/IH/>
- Multilingual Glossary of Technical and Popular Medical Terms in Eight European Languages (European Commission) - Danish, Dutch, English, French, German, Italian, Portuguese, and Spanish:
<http://allserv.rug.ac.be/~rvdstich/eugloss/welcome.html>
- On-line Medical Dictionary (CancerWEB):
<http://www.graylab.ac.uk/omd/>
- Technology Glossary (National Library of Medicine) - Health Care Technology: <http://www.nlm.nih.gov/nichsr/ta101/ta10108.htm>
- Terms and Definitions (Office of Rare Diseases):
http://rarediseases.info.nih.gov/ord/glossary_a-e.html

Beyond these, MEDLINEplus contains a very user-friendly encyclopedia covering every aspect of medicine (licensed from A.D.A.M., Inc.). The ADAM Medical Encyclopedia Web site address is <http://www.nlm.nih.gov/medlineplus/encyclopedia.html>. ADAM is also available on commercial Web sites such as Web MD (http://my.webmd.com/adam/asset/adam_disease_articles/a_to_z/a) and drkoop.com (<http://www.drkoop.com/>). Topics of interest can be researched by using keywords before continuing elsewhere, as these basic definitions and concepts will be useful in more advanced areas of research. You may choose to print various pages specifically relating to knee ligament injuries and keep them on file.

Online Dictionary Directories

The following are additional online directories compiled by the National Library of Medicine, including a number of specialized medical dictionaries and glossaries:

- Medical Dictionaries: Medical & Biological (World Health Organization):
<http://www.who.int/hlt/virtuallibrary/English/diction.htm#Medical>
- MEL-Michigan Electronic Library List of Online Health and Medical Dictionaries (Michigan Electronic Library):
<http://mel.lib.mi.us/health/health-dictionaries.html>
- Patient Education: Glossaries (DMOZ Open Directory Project):
http://dmoz.org/Health/Education/Patient_Education/Glossaries/
- Web of Online Dictionaries (Bucknell University):
<http://www.yourdictionary.com/diction5.html#medicine>

KNEE LIGAMENT INJURIES GLOSSARY

The following is a complete glossary of terms used in this sourcebook. The definitions are derived from official public sources including the National Institutes of Health [NIH] and the European Union [EU]. After this glossary, we list a number of additional hardbound and electronic glossaries and dictionaries that you may wish to consult.

Adhesions: Pathological processes consisting of the union of the opposing surfaces of a wound. [NIH]

Adolescence: The period of life beginning with the appearance of secondary sex characteristics and terminating with the cessation of somatic growth. The years usually referred to as adolescence lie between 13 and 18 years of age. [NIH]

Aerobic: 1. having molecular oxygen present. 2. growing, living, or occurring in the presence of molecular oxygen. 3. requiring oxygen for respiration. [EU]

Analgesic: An agent that alleviates pain without causing loss of consciousness. [EU]

Anatomical: Pertaining to anatomy, or to the structure of the organism. [EU]

Arthroscopy: Endoscopic examination, therapy and surgery of the joint. [NIH]

Articular: Of or pertaining to a joint. [EU]

Bacteria: Unicellular prokaryotic microorganisms which generally possess rigid cell walls, multiply by cell division, and exhibit three principal forms: round or coccid, rodlike or bacillary, and spiral or spirochetal. [NIH]

Bandages: Material used for wrapping or binding any part of the body. [NIH]

Bilateral: Having two sides, or pertaining to both sides. [EU]

Biochemical: Relating to biochemistry; characterized by, produced by, or involving chemical reactions in living organisms. [EU]

Biomechanics: The study of the application of mechanical laws and the action of forces to living structures. [NIH]

Biopsy: The removal and examination, usually microscopic, of tissue from the living body, performed to establish precise diagnosis. [EU]

Bupivacaine: A widely used local anesthetic agent. [NIH]

Cadaver: A dead body, usually a human body. [NIH]

Calcitonin: A peptide hormone that lowers calcium concentration in the blood. In humans, it is released by thyroid cells and acts to decrease the formation and absorptive activity of osteoclasts. Its role in regulating plasma

calcium is much greater in children and in certain diseases than in normal adults. [NIH]

Capsules: Hard or soft soluble containers used for the oral administration of medicine. [NIH]

Carbohydrate: An aldehyde or ketone derivative of a polyhydric alcohol, particularly of the pentahydric and hexahydric alcohols. They are so named because the hydrogen and oxygen are usually in the proportion to form water, $(CH_2O)_n$. The most important carbohydrates are the starches, sugars, celluloses, and gums. They are classified into mono-, di-, tri-, poly- and heterosaccharides. [EU]

Cerebral: Of or pertaining of the cerebrum or the brain. [EU]

Cholesterol: The principal sterol of all higher animals, distributed in body tissues, especially the brain and spinal cord, and in animal fats and oils. [NIH]

Collagen: The protein substance of the white fibres (collagenous fibres) of skin, tendon, bone, cartilage, and all other connective tissue; composed of molecules of tropocollagen (q.v.), it is converted into gelatin by boiling. collagenous pertaining to collagen; forming or producing collagen. [EU]

Collapse: 1. a state of extreme prostration and depression, with failure of circulation. 2. abnormal falling in of the walls of any part of organ. [EU]

Confusion: Disturbed orientation in regard to time, place, or person, sometimes accompanied by disordered consciousness. [EU]

Degenerative: Undergoing degeneration : tending to degenerate; having the character of or involving degeneration; causing or tending to cause degeneration. [EU]

Dehydration: The condition that results from excessive loss of body water. Called also anhydration, deaquation and hypohydration. [EU]

Diarrhea: Passage of excessively liquid or excessively frequent stools. [NIH]

Dislocation: The displacement of any part, more especially of a bone. Called also luxation. [EU]

Disorientation: The loss of proper bearings, or a state of mental confusion as to time, place, or identity. [EU]

Distal: Remote; farther from any point of reference; opposed to proximal. In dentistry, used to designate a position on the dental arch farther from the median line of the jaw. [EU]

Dizziness: An imprecise term which may refer to a sense of spatial disorientation, motion of the environment, or lightheadedness. [NIH]

Elastic: Susceptible of resisting and recovering from stretching, compression or distortion applied by a force. [EU]

Electromyography: Recording of the changes in electric potential of muscle

by means of surface or needle electrodes. [NIH]

Exogenous: Developed or originating outside the organism, as exogenous disease. [EU]

Extremity: A limb; an arm or leg (membrum); sometimes applied specifically to a hand or foot. [EU]

Fatal: Causing death, deadly; mortal; lethal. [EU]

Femur: The longest and largest bone of the skeleton, it is situated between the hip and the knee. [NIH]

Fibroblasts: Connective tissue cells which secrete an extracellular matrix rich in collagen and other macromolecules. [NIH]

Flexion: In gynaecology, a displacement of the uterus in which the organ is bent so far forward or backward that an acute angle forms between the fundus and the cervix. [EU]

Fluoroscopy: Production of an image when x-rays strike a fluorescent screen. [NIH]

Gait: Manner or style of walking. [NIH]

Hydration: The condition of being combined with water. [EU]

Incision: 1. cleft, cut, gash. 2. an act or action of incising. [EU]

Inflammation: A pathological process characterized by injury or destruction of tissues caused by a variety of cytologic and chemical reactions. It is usually manifested by typical signs of pain, heat, redness, swelling, and loss of function. [NIH]

Intramuscular: Within the substance of a muscle. [EU]

Intrinsic: Situated entirely within or pertaining exclusively to a part. [EU]

Invasive: 1. having the quality of invasiveness. 2. involving puncture or incision of the skin or insertion of an instrument or foreign material into the body; said of diagnostic techniques. [EU]

Iodine: A nonmetallic element of the halogen group that is represented by the atomic symbol I, atomic number 53, and atomic weight of 126.90. It is a nutritionally essential element, especially important in thyroid hormone synthesis. In solution, it has anti-infective properties and is used topically. [NIH]

Kinetic: Pertaining to or producing motion. [EU]

Lesion: Any pathological or traumatic discontinuity of tissue or loss of function of a part. [EU]

Ligament: A band of fibrous tissue that connects bones or cartilages, serving to support and strengthen joints. [EU]

Locomotion: Movement or the ability to move from one place or another. It

can refer to humans, vertebrate or invertebrate animals, and microorganisms. [NIH]

Locomotor: Of or pertaining to locomotion; pertaining to or affecting the locomotive apparatus of the body. [EU]

Lupus: A form of cutaneous tuberculosis. It is seen predominantly in women and typically involves the nasal, buccal, and conjunctival mucosa. [NIH]

Malignant: Tending to become progressively worse and to result in death. Having the properties of anaplasia, invasion, and metastasis; said of tumours. [EU]

Mechanoreceptors: Cells specialized to transduce mechanical stimuli and relay that information centrally in the nervous system. Mechanoreceptors include hair cells, which mediate hearing and balance, and the various somatosensory receptors, often with non-neural accessory structures. [NIH]

Melanoma: A tumour arising from the melanocytic system of the skin and other organs. When used alone the term refers to malignant melanoma. [EU]

Molecular: Of, pertaining to, or composed of molecules : a very small mass of matter. [EU]

Morphine: The principal alkaloid in opium and the prototype opiate analgesic and narcotic. Morphine has widespread effects in the central nervous system and on smooth muscle. [NIH]

Nausea: An unpleasant sensation, vaguely referred to the epigastrium and abdomen, and often culminating in vomiting. [EU]

Neoprene: An oil-resistant synthetic rubber made by the polymerization of chloroprene. [NIH]

Neural: 1. pertaining to a nerve or to the nerves. 2. situated in the region of the spinal axis, as the neutral arch. [EU]

Neuromuscular: Pertaining to muscles and nerves. [EU]

Niacin: Water-soluble vitamin of the B complex occurring in various animal and plant tissues. Required by the body for the formation of coenzymes NAD and NADP. Has pellagra-curative, vasodilating, and antilipemic properties. [NIH]

Orthopaedic: Pertaining to the correction of deformities of the musculoskeletal system; pertaining to orthopaedics. [EU]

Osteoarthritis: Noninflammatory degenerative joint disease occurring chiefly in older persons, characterized by degeneration of the articular cartilage, hypertrophy of bone at the margins, and changes in the synovial membrane. It is accompanied by pain and stiffness, particularly after prolonged activity. [EU]

Overdose: 1. to administer an excessive dose. 2. an excessive dose. [EU]

Oxycodone: Semisynthetic derivative of codeine that acts as a narcotic analgesic more potent and addicting than codeine. [NIH]

Paralysis: Loss or impairment of motor function in a part due to lesion of the neural or muscular mechanism; also by analogy, impairment of sensory function (sensory paralysis). In addition to the types named below, paralysis is further distinguished as traumatic, syphilitic, toxic, etc., according to its cause; or as obturator, ulnar, etc., according to the nerve part, or muscle specially affected. [EU]

Patella: The flat, triangular bone situated at the anterior part of the knee. [NIH]

Pediatrics: A medical specialty concerned with maintaining health and providing medical care to children from birth to adolescence. [NIH]

Perspiration: Sweating; the functional secretion of sweat. [EU]

Posterior: Situated in back of, or in the back part of, or affecting the back or dorsal surface of the body. In lower animals, it refers to the caudal end of the body. [EU]

Postoperative: Occurring after a surgical operation. [EU]

Potassium: An element that is in the alkali group of metals. It has an atomic symbol K, atomic number 19, and atomic weight 39.10. It is the chief cation in the intracellular fluid of muscle and other cells. Potassium ion is a strong electrolyte and it plays a significant role in the regulation of fluid volume and maintenance of the water-electrolyte balance. [NIH]

Predisposition: A latent susceptibility to disease which may be activated under certain conditions, as by stress. [EU]

Progressive: Advancing; going forward; going from bad to worse; increasing in scope or severity. [EU]

Proprioception: The mechanism involved in the self-regulation of posture and movement through stimuli originating in the receptors imbedded in the joints, tendons, muscles, and labyrinth. [NIH]

Proteins: Polymers of amino acids linked by peptide bonds. The specific sequence of amino acids determines the shape and function of the protein. [NIH]

Proximal: Nearest; closer to any point of reference; opposed to distal. [EU]

Pupil: The aperture in the iris through which light passes. [NIH]

Radiography: The making of film records (radiographs) of internal structures of the body by passage of x-rays or gamma rays through the body to act on specially sensitized film. [EU]

Radiology: A specialty concerned with the use of x-ray and other forms of

radiant energy in the diagnosis and treatment of disease. [NIH]

Rheumatoid: Resembling rheumatism. [EU]

Rheumatology: A subspecialty of internal medicine concerned with the study of inflammatory or degenerative processes and metabolic derangement of connective tissue structures which pertain to a variety of musculoskeletal disorders, such as arthritis. [NIH]

Riboflavin: Nutritional factor found in milk, eggs, malted barley, liver, kidney, heart, and leafy vegetables. The richest natural source is yeast. It occurs in the free form only in the retina of the eye, in whey, and in urine; its principal forms in tissues and cells are as FMN and FAD. [NIH]

Sclerosis: A induration, or hardening; especially hardening of a part from inflammation and in diseases of the interstitial substance. The term is used chiefly for such a hardening of the nervous system due to hyperplasia of the connective tissue or to designate hardening of the blood vessels. [EU]

Selenium: An element with the atomic symbol Se, atomic number 34, and atomic weight 78.96. It is an essential micronutrient for mammals and other animals but is toxic in large amounts. Selenium protects intracellular structures against oxidative damage. It is an essential component of glutathione peroxidase. [NIH]

Standardize: To compare with or conform to a standard; to establish standards. [EU]

Sunburn: An injury to the skin causing erythema, tenderness, and sometimes blistering and resulting from excessive exposure to the sun. The reaction is produced by the ultraviolet radiation in sunlight. [NIH]

Surgical: Of, pertaining to, or correctable by surgery. [EU]

Symptomatic: 1. pertaining to or of the nature of a symptom. 2. indicative (of a particular disease or disorder). 3. exhibiting the symptoms of a particular disease but having a different cause. 4. directed at the allaying of symptoms, as symptomatic treatment. [EU]

Synovial: Of pertaining to, or secreting synovia. [EU]

Systemic: Pertaining to or affecting the body as a whole. [EU]

Tendinitis: Inflammation of tendons and of tendon-muscle attachments. [EU]

Thyroxine: An amino acid of the thyroid gland which exerts a stimulating effect on thyroid metabolism. [NIH]

Tibia: The second longest bone of the skeleton. It is located on the medial side of the lower leg, articulating with the fibula laterally, the talus distally, and the femur proximally. [NIH]

Tomography: The recording of internal body images at a predetermined plane by means of the tomograph; called also body section roentgenography.

Torsion: 1. a type of mechanical stress, whereby the external forces (load) twist an object about its axis. 2. in ophthalmology any rotation of the vertical corneal meridians. [EU]

Transplantation: The grafting of tissues taken from the patient's own body or from another. [EU]

Traumatology: The branch of surgery which deals with wounds and disability from injuries. [NIH]

Vascular: Pertaining to blood vessels or indicative of a copious blood supply. [EU]

General Dictionaries and Glossaries

While the above glossary is essentially complete, the dictionaries listed here cover virtually all aspects of medicine, from basic words and phrases to more advanced terms (sorted alphabetically by title; hyperlinks provide rankings, information and reviews at Amazon.com):

- **Dictionary of Medical Acronymns & Abbreviations** by Stanley Jablonski (Editor), Paperback, 4th edition (2001), Lippincott Williams & Wilkins Publishers, ISBN: 1560534605,
<http://www.amazon.com/exec/obidos/ASIN/1560534605/icongroupinterna>
- **Dictionary of Medical Terms : For the Nonmedical Person (Dictionary of Medical Terms for the Nonmedical Person, Ed 4)** by Mikel A. Rothenberg, M.D, et al, Paperback - 544 pages, 4th edition (2000), Barrons Educational Series, ISBN: 0764112015,
<http://www.amazon.com/exec/obidos/ASIN/0764112015/icongroupinterna>
- **A Dictionary of the History of Medicine** by A. Sebastian, CD-Rom edition (2001), CRC Press-Parthenon Publishers, ISBN: 185070368X,
<http://www.amazon.com/exec/obidos/ASIN/185070368X/icongroupinterna>
- **Dorland's Illustrated Medical Dictionary (Standard Version)** by Dorland, et al, Hardcover - 2088 pages, 29th edition (2000), W B Saunders Co, ISBN: 0721662544,
<http://www.amazon.com/exec/obidos/ASIN/0721662544/icongroupinterna>
- **Dorland's Electronic Medical Dictionary** by Dorland, et al, Software, 29th Book & CD-Rom edition (2000), Harcourt Health Sciences, ISBN: 0721694934,
<http://www.amazon.com/exec/obidos/ASIN/0721694934/icongroupinterna>
- **Dorland's Pocket Medical Dictionary (Dorland's Pocket Medical Dictionary, 26th Ed)** Hardcover - 912 pages, 26th edition (2001), W B Saunders Co, ISBN: 0721682812,

<http://www.amazon.com/exec/obidos/ASIN/0721682812/icongroupinterna/103-4193558-7304618>

- **Melloni's Illustrated Medical Dictionary (Melloni's Illustrated Medical Dictionary, 4th Ed)** by Melloni, Hardcover, 4th edition (2001), CRC Press-Parthenon Publishers, ISBN: 85070094X,
<http://www.amazon.com/exec/obidos/ASIN/85070094X/icongroupinterna>
- **Stedman's Electronic Medical Dictionary Version 5.0 (CD-ROM for Windows and Macintosh, Individual)** by Stedmans, CD-ROM edition (2000), Lippincott Williams & Wilkins Publishers, ISBN: 0781726328,
<http://www.amazon.com/exec/obidos/ASIN/0781726328/icongroupinterna>
- **Stedman's Medical Dictionary** by Thomas Lathrop Stedman, Hardcover - 2098 pages, 27th edition (2000), Lippincott, Williams & Wilkins, ISBN: 068340007X,
<http://www.amazon.com/exec/obidos/ASIN/068340007X/icongroupinterna>
- **Tabers Cyclopedic Medical Dictionary (Thumb Index)** by Donald Venes (Editor), et al, Hardcover - 2439 pages, 19th edition (2001), F A Davis Co, ISBN: 0803606540,
<http://www.amazon.com/exec/obidos/ASIN/0803606540/icongroupinterna>

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