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The Pediatric Orthopedic Service provides coverage to the Phyllis & David Komansky Center for Children's Health at NewYork-Presbyterian Hospital. For more information about the Komansky Center. Visit <http://www.cornellpediatrics.org>

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## So Your Knee Aches Again?

by Daniel W. Green, MD

Do you have a patient that routinely complains of knee aches and pains with structured athletic activity? Among the multitude of possible knee ailments affecting the child athlete is a condition called osteochondritis dissecans. From the Greek words *osteon* (bone) and *chondros* (cartilage) and the Latin word *dissecare* (to cut apart), osteochondritis dissecans (OCD) is a joint disorder in which a piece of articular cartilage attached to a small fragment of bone separates from the rest of the joint surface.

OCD occurs most commonly in the knee, but also appears in the elbow and ankle. The juvenile form of OCD afflicts skeletally immature (open growth plates) children with a maximum incidence between 10 and 20 years old. It is found more frequently in children who are active



athletically and involved in organized sports and is twice as common in males as in females. The child will present with a diffuse ache or sharp pain and swelling in the knee that may be intermittent, often aggravated by running and jumping, and usually alleviated with rest.

Although the etiology of these OCD lesions is unclear, it is believed that repetitive micro-trauma may interrupt the already tenuous

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## Juvenile Idiopathic Arthritis

by Emma Jane MacDermott, MD

One of the most common remarks I hear when I tell people what I do is "You're a pediatric rheumatologist! I didn't know children get arthritis!" But some children do. Childhood arthritis is not common, and people, especially parents, do not expect a child to have joint complaints. Most children who complain of limping, joint swelling, or pain do so because they have had an injury or an infection, but there are a small proportion of children who develop arthritis. We call this Juvenile Idiopathic Arthritis (JIA). Formerly known as JRA, the term has changed to reflect its difference from, the rheumatoid arthritis that affects adults. JIA is not just one disease; it is a term that covers the spectrum of childhood arthritis. Childhood arthritis is categorized according to the pattern of joint involvement.

**Pauciarticular (meaning few joints) JIA:** This is the most common form of childhood arthritis. It affects no more than four joints, usually the large joints, in the first six months of illness. It occurs most commonly in girls with early onset, between



one and four years of age. Symptoms are sometimes mild and may go unrecognized in a child who is learning to walk. Any child who is limping, starts "walking funny," or who has joints that cannot be moved completely due to pain or limitation should be assessed promptly. Early treatment of pauciarticular disease minimizes the risk of joint damage and limb length discrepancy, which occurs because a "hot," swollen joint grows more quickly than a normal joint, and the affected leg may grow longer. Pauciarticular arthritis is associated commonly with inflammatory eye disease, particularly if children are positive for an antibody in the blood called "antinuclear antibody."

(Continued on page 2)



## Sports Injury Prevention

by Heather Williams, PT, DPT

The number of children participating in sports at early ages is higher than ever before. Consequently, so is the number of injuries. While it is valuable for children and young adults to engage in athletic activities, it is important that they properly

train for their sport with strength and conditioning.

Contrary to prior perception, recent studies have shown that growth plates in prepubescent children are not at high risk of epiphyseal fractures when training adheres to recommended guidelines. In fact, strength training may actually enhance bone growth and help to prevent osteoporosis. Children can benefit from strength training in other ways, such as injury prevention, improvement of sports performance, physical fitness, and mental self-image, as well as developing resistance to life-threatening conditions like heart disease and diabetes. In the appropriate environment and under the supervision of qualified individuals, strength training for children has been deemed safe and effective by the American College of Sports Medicine, the American Academy of Pediatrics, the American Society of Sports Medicine, and the National Strength and Conditioning Association.

Parents should be aware that resistance training in prepubescent children does not increase the size of their muscles as in adults. Rather, strength gains are achieved by altering the way the nerves fire. A greater number of muscle fibers are activated by each nerve during a muscle contraction. Thus, the child is able to lift more weight without “bulking up.” Furthermore, “movement intelligence” has been shown to improve with properly supervised strength and conditioning. Movement intelligence occurs when all parts of the body learn to coordinate movement together in the most effective way with no conscious thought, e.g., when a basketball player jumps for a rebound or when a baseball player swings at a pitch. The muscles involved with these movements and responses become inherently and instinctually conditioned to react more efficiently with improved form and technique. The result is superior skill and a reduced risk of injury. Since movement intelligence is learned, and children tend to learn quickly at an early age, it is best to teach it as soon as possible.

Strength and conditioning can be safe and effective for children and adolescents when proper guidelines are met and each program is designed appropriately and individually. Parents must take an active interest in the regimen without resorting to forceful excess. Most importantly, the quality of training should be stressed over the quantity, and when applicable, the training should be as sport-specific as possible. Finally, a child participating in a strength and conditioning program should have fun and enjoy the experience.

## Juvenile Idiopathic Arthritis (Continued)

In its uncomplicated form, pauciarticular disease usually affects a single knee or ankle. Children are often ANA positive, but otherwise have only mild changes in their blood work. They respond rapidly to therapy. While there are some children with more complicated disease that may require more aggressive therapy and / or may have greater frequency of disease flare ups, the prognosis for children with uncomplicated JIA is good. A majority of patients have complete resolution of their symptoms over time.

**Polyarticular (meaning many joints) JIA:** This form of arthritis involves more than four joints in the first six months of the disease onset. It usually begins in several joints often including the hands and fingers. This disease is variable. It occurs more commonly in girls at all ages. There are two peaks in age at onset: young children between 18 months and eight years and teenagers whose disease often starts after the onset of puberty. A subset of these patients may be positive for a blood test called “rheumatoid factor” and can be considered to have early onset adult type rheumatoid arthritis. The differential diagnosis for polyarticular JIA includes reactive or infection associated arthritis, as well as other autoimmune conditions, including systemic lupus erythematosus. Patients with polyarticular JIA are unlikely to “grow out” of their disease, but the prognosis for functionality with treatment is very good.

**Systemic onset JIA:** This is a condition that is characterized by arthritis, fever, and a classic salmon pink colored rash. It is a very different condition from the other forms of childhood arthritis and probably would be better classified as an autoinflammatory condition. Boys and girls are affected equally. Patients typically present looking extremely ill, with recurring high fevers and abnormal blood work: including markedly elevated inflammatory markers and a worsening anemia. The joint complaints may not be present initially, or may be overlooked. These children are often thought to have an infection and are treated with antibiotics before systemic onset disease is considered. An important feature of systemic onset disease is its very typical fever pattern, the temperature returns to normal at least once each day. At this time, the children generally look much improved and the rash often retreats. Systemic onset arthritis is named as such because multiple organ systems may be involved, including the heart, liver, spleen, kidneys, and bone marrow.

**Spondyloarthropathy:** This term means “arthritis of the back” and describes a pattern of arthritis that commonly involves the spine, sacroiliac joints, and inflammation of the tendons at their insertion around the joints (enthesitis). Many different conditions are associated with this pattern of disease, including reactive arthritis, ankylosing spondylitis, and the arthritis associated with inflammatory bowel disease.

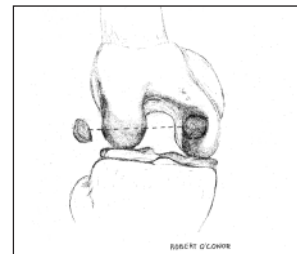
The medications used to treat JIA range from nonsteroidal anti-inflammatory drugs to traditional disease modifying agents, such as methotrexate and cyclosporine, to the now commonly used newer biologic agents. Steroids are sometimes needed, but their use is kept to a minimum due to their broad side effect profile.

All children with JIA are at increased risk of an inflammatory eye disease called uveitis, which can cause silent damage to the eyes, even if joint complaints are under control. They should be seen by an ophthalmologist (an eye doctor with an M.D. after his or her name) at least twice yearly.

Ongoing research into childhood arthritis is making great strides towards understanding the disease and its control. New therapies are broadening our treatment options and improving outcomes. At Hospital for Special Surgery, the Pediatric Rheumatology Department is happy to provide any child displaying symptoms of childhood arthritis with the advice and treatment they need.

# So Your Knee Aches Again? (Continued)

blood supply of the ends of bones in the growing child and contribute to the development of osteochondritis dissecans lesions. Treatment is dependent upon age at presentation, fragment size, fragment location, and fragment stability. Stable lesions in skeletally immature patients are generally well-suited for conservative management, such as activity modification, ice, NSAIDs, and physical therapy. Failed conservative management or unstable lesions will more likely require surgical intervention. Lesions in skeletally mature patients have a more unpredictable course and may require surgery.



## Forever Grateful: One New Jersey Girl Reclaims Her Life From Spondylolysis

by James O'Rourke

When Justine Lancaster of Bloomfield, New Jersey, hobbled into the office of Dr. Daniel Green at Hospital for Special Surgery, anyone hearing the details of her

case might have believed she was a skilled athlete who for decades had pushed her body to the limits. She hadn't been able to shoot a basketball or dance in over a year, had lost a substantial amount of weight, and was on strict bed rest for over six months; but still her pain was so unbearable that she needed medication just to get through the day. Justine, however, wasn't a seasoned veteran with a worn out body incapable of performing – she was a young girl.

Initially, she thought she had simply tweaked her lower back during a basketball game. Throughout the next year, however, Justine was examined and tested by numerous specialists who provided as many different diagnoses, and prescribed various conservative treatments, none of which seemed to make a difference.

Her health continued to deteriorate; she found herself unable to join her friends on the basketball court, or even sit in the classroom. "I was out during 7th grade," she says, referring to the bed rest that robbed her of several months of classroom instruction. "A tutor came to my house and my parents did a lot of review with me. It got a little lonely, but my grandpa came over to watch me."

"It was very hard to watch my daughter's health deteriorate," says Carol Lancaster, Justine's mother. "We were so used to going from sport to sport that it was upsetting that she couldn't do what she loved...all I could think was, 'will my daughter ever get back to a normal life?'"

Following a routine visit to Justine's therapist, Carol made a decision that she claims has forever altered her daughter's life. "Justine's physical therapist suggested that it was time to go to New York and visit HSS," Carol says. "I did research and saw Dr. Green had a good reputation, and this is when I decided to make an appointment."

Dr. Green recognized that Justine's lower back pain was caused by a stress fracture in a portion of the posterior elements of her spine called the pars – a condition referred to as spondylolysis and is found commonly among young athletes. Furthermore, Dr. Green recommended fixing the fracture using more aggressive treatments than Justine's other doctors. He would perform a L5-S1 single level spinal fusion surgery, fusing the fifth lumbar vertebra to the sacrum. Though the procedure is rather common in adult patients, Dr. Green says that few pediatric patients require such measures.

"This type of injury usually happens to kids who are very athletic and competitive – the ones who are doing repetitive motions over

and over," says Dr. Green. "Typically, the treatment is conservative, but in about 5% of cases, conservative treatment doesn't help. In those cases – cases like Justine's – surgery can provide relief."

Though the Lancaster family now knew what it would take to return Justine's quality of life, Carol and Justine both agreed that the prospect of spinal surgery was stressful. "Some relief came when Dr. Green said he could help her, but we also knew that the operation and the recovery would be hard," says Carol. "We were encouraged by friends and family, who kept pushing us to see that there was finally light at the end of the tunnel."

To assuage any fears and concerns, Dr. Green detailed the entire process, including the hospital stay and the months of physical therapy that would strengthen muscles weakened from inactivity.

"I was a little nervous," says Justine, "but I trusted Dr. Green and knew everything would be fine." "Dr. Green was very thorough and explained everything step by step," Carol remarks. "I felt that finally she was going to have a chance at having a better quality of life."

Justine's surgery took place on June 11, 2007 and was a complete success. After spending four days at HSS following the procedure, Justine began a regimen of physical therapy designed to get her walking again. Competitive sports were prohibited for six months, but Justine was able to reclaim one vital element of her life. That September, she returned to school. "It felt good to be back with my friends," says the now vibrant, 15-year-old high school sophomore.

In the years since her spine surgery, Justine's interests, as any teenage girl's interests might, have moved away from sports and toward the arts. But that's not to say that she isn't as energetic and active as ever; on a recent family vacation to the Dominican Republic, she spent her time scuba diving, horseback riding, parasailing, playing volleyball, and swimming.

Though she no longer chases her old hoop dreams, Justine has found other passions to pursue. "I do tap, ballet, and jazz," she says. "In June, I had a dance recital and danced in all three numbers. I also enjoy singing and joined a choir, and I plan on getting back into theatre."

While some families might find all of this activity to be exhausting, for the Lancasters, it all comes as a welcome gift for which they credit Dr. Green and the staff at HSS.

"I always tell people about Dr. Green and HSS, and about the great quality of care we received," says Carol. "The nurses and other workers were all so wonderful when Justine was in the hospital... her family and friends are all so grateful. Dr. Green is Justine's guardian angel."

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# Pediatric Connection

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## Question of the Quarter

### What Is a Difference Between Pediatric Occupational and Physical Therapy?

By Magda Oledzka, PT, MBA, PCS & Meghan Featherston, OTR/L

Occupational and physical therapy offer evaluation and treatment of children with a wide variety of orthopedic, neurologic, rheumatic, and congenital disorders. The emphasis is to rehabilitate the whole child.

Pediatric occupational therapy (OT) focuses on upper extremity functioning, fine motor skills, visual motor integration, coordination, visual perceptual skills, and sensory integration. OT also works on activities of daily living such as play, feeding, dressing, grooming, as well as limitations affecting a child's performance at school.

Pediatric physical therapy (PT) focuses on development of core stability, lower extremity function, and gross motor skills. Physical therapists address specific issues involving proprioception, balance, coordination, strength, endurance, and conditioning. Restoration and/or development of these skills are emphasized during PT through relevant, fun, and challenging activities.

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