Nationwide, between 15 percent and 30 percent of school-age children struggle with chronic pain, ranging from headaches and stomachaches to fibromyalgia, irritable bowel syndrome and other chronic pain syndromes. When not properly addressed, chronic pain can dramatically affect children’s school attendance and performance, social activities and relationships, sleep, appetite, and mental health.

Unlike acute pain, which should be treated vigorously with medication or with psychological techniques like hypnosis, chronic pain requires a focus on helping the child learn to function and cope while efforts are undertaken to soothe the nervous system and reactivate the body’s natural pain control mechanisms, says Lonnie K. Zeltzer, M.D., director, Pediatric Pain Program at Mattel Children’s Hospital at UCLA.

“If a child has surgery or is in the emergency room with a broken bone that needs setting, we focus on turning off the pain with good analgesia or anesthesia,” says Dr. Zeltzer. “With chronic pain, so many systems are involved that using opioids to get rid of the pain is typically not helpful. What’s more important is to help the child begin to spiral back up through incentives and coping strategies that help him or her sleep better, stay in school, and engage in social activities, while also focusing on ways to reduce the pain.”

Chronic pain involves a complex interplay between biology, psychology and environment, Dr. Zeltzer notes. “There is no pain that is either psychological or physical,” she says. For example, stressors at school can activate the child’s central nervous system, which in turn affects neural signals that make the child more vulnerable to a particular chronic pain syndrome. In addition, research has recently shown that exposure to significant acute pain as early as the newborn period can shape the development of the sensory nervous system, making children more prone to pain vulnerability throughout their childhood. Children who experience undertreated acute pain can also develop post-traumatic stress disorder, contributing to chronic pain after the acute pain period has passed.

Dr. Zeltzer notes that children with nerve signaling problems who
“Pediatricians can do a lot by understanding the mechanisms of chronic pain and how anxiety, for example, can actually increase the volume of pain signals and make the pain worse.”

—Lonnie K. Zeltzer, M.D.

The most common types of chronic pain in childhood are headaches and stomachaches. “Children with intractable headaches should be evaluated by a pediatric neurologist, especially if there are other symptoms such as neurologic signs or early-morning vomiting,” Dr. Zeltzer notes. “But many children are suffering from myofacial headaches, in which there is a chronic muscle spasm in the head, neck or shoulders.”

Myofacial pain can be diagnosed by feeling for tenderness at muscle insertion points in front of the ears, or other tender points in the muscles along the back of the neck and between the shoulder blades.

For children with recurrent abdominal pain, a good history will determine whether the child has a functional bowel disorder or should be referred to a pediatric gastroenterologist for further testing. A functional bowel disorder means that the brain-gut nervous system is dysregulated or out of balance.

The child may just have recurrent abdominal pain or may also have other gastrointestinal symptoms, such as diarrhea, constipation, nausea or bloating. Typically, medical evaluations for children with abdominal pain related to functional bowel syndromes do not show serious problems. When children are told that there is “nothing wrong” or that they have pain “because of stress,” they feel that the doctor does not believe them or thinks the pain is imaginary, but their belly is hurting.

“The stomach and intestines can become hypersensitive,” says Dr. Zeltzer, “and these children may feel pain from gas, swallowing food, stomach-wall stretching or having a bowel movement. In these children, the problem isn’t in the intestines themselves but rather the nerve signals to and from the intestines, and that is what needs to be addressed.”

Other types of chronic pain problems include fibromyalgia and complex regional pain syndrome. Fibromyalgia is a condition of widespread pain, with tender points along areas of the back, neck, chest and extremities. It is not uncommon for children with fibromyalgia to also have headaches and irritable bowel syndrome, Dr. Zeltzer says. Complex regional pain syndrome, previously referred to as reflex sympathetic dystrophy, is characterized by extreme sensitivity and pain in a part of the body, sometimes accompanied by vascular changes such as swelling or discoloration.

The problem with treating children who have chronic pain with opioids, Dr. Zeltzer notes, is that the drugs block the body’s pain control system. The rehabilitation effort generally should begin with helping the child learn how to function and cope with the pain until it moves from the foreground to the background and then dissipates, Dr. Zeltzer says. Non-medication strategies include physiotherapy, psychotherapy and complementary therapies such as acupuncture, meditation, Iyengar yoga and art therapy, as well as biofeedback and hypnotherapy. “Any of these modalities can be helpful in restoring balance to the body’s central nervous system,” Dr. Zeltzer notes.

Beyond treatment, pediatricians can contribute a great deal by working with parents to develop behavioral incentive plans to assist the child in gradually increasing function. Parents should also be counseled not to constantly ask their children about the pain. “Parents can empathize when the child brings it up, but always asking about it causes the child to focus on the pain,” Dr. Zeltzer explains.

When parents are particularly anxious about their child’s pain or their own chronic pain, it can also exacerbate matters. “The caregivers need to take care of themselves, because children with chronic pain are often very sensitive to their parents’ feelings,” Dr. Zeltzer says. “If the parents are feeling stress or guilt, that can further rev up the child’s nervous system and cause more pain. Children learn how to cope, function and remain calm by observing their parents; therefore, parents who care for themselves teach children how to feel better.”

Further reading
Avoid Delays When Diagnosing Inflammatory Bowel Disease

Paying careful attention to subtle or atypical symptoms of inflammatory bowel disease (IBD) can help physicians avoid delaying the diagnosis of these chronic conditions, including ulcerative colitis and Crohn’s disease, which are characterized by inflammation of the gastrointestinal tract.

Ulcerative colitis causes inflammation and micro-ulcers in the lining of the large intestine; the inflammation usually occurs in the rectum and lower part of the colon, but it may affect the entire colon. Crohn’s disease usually causes inflammation in the small intestine; the inflammation usually occurs in the ileum, which is in the lowest part of the small intestine, but can affect any part of the digestive tract.

According to Marvin Ament, M.D., chief of the Division of Pediatric Gastroenterology at Mattel Children’s Hospital at UCLA, children who experience unexplained episodes of diarrhea three or four times a year should be evaluated for IBD even if their symptoms do not seem severe. “Outside of infancy, it is not typical to have multiple episodes of diarrhea each year,” he states.

Patients with Crohn’s disease often display no obvious symptoms other than the failure to gain weight and grow. “If a child doesn’t gain weight and grow for six months, something is amiss,” asserts Dr. Ament. “It doesn’t mean they have inflammatory bowel disease—they may have some other disorder—but physicians must try to find an explanation and Crohn’s should be considered as a possible diagnosis.” Among children with Crohn’s disease, 30 percent to 40 percent present with growth failure as the primary symptom of their condition. Along with failure to gain weight and grow, some Crohn’s disease patients experience extra-intestinal symptoms of the disease, including unexplained arthralgia (pain in joints) or joint tenderness for months or years before the gastrointestinal symptoms become apparent.

Symptoms of ulcerative colitis, including abdominal pain, diarrhea and rectal bleeding, can begin to manifest in the first three months of life, especially when there is a family history of colitis. Dr. Ament observes that infants who have ulcerative colitis tend to have a much more severe course of the disease; they tend to be more symptomatic and more difficult to treat.

**Testing for IBD**

Stool and blood tests help distinguish IBD from irritable bowel syndrome, an uncomfortable but less serious colon condition than IBD. Dr. Ament suggests ordering fecal leukocytes, fecal alpha-1 antitrypsin (to check for protein leakage across the intestinal mucosa), sedimentation rates, and C-reactive protein tests. If these tests are negative for IBD, chances are high—95 percent—that the patient does not have IBD. “If these screening tests are negative and you’re still suspicious, then a colonoscopy and biopsy should be ordered as the ultimate test,” Dr. Ament says. “This will be necessary in less than one in 20 patients who have negative stool test results.”

Serological marker tests (an IBD screening panel) can help differentiate between Crohn’s disease and ulcerative colitis, but usually do not provide a definitive diagnosis. “Some serological marker patterns indicate that a patient is more likely to have ulcerative colitis, some are more consistent with Crohn’s disease,” notes Dr. Ament. “But for many patients the serological markers don’t make a strong case in either direction. For these, you just have to use other information to make the diagnosis.”

**Advances in IBD Treatment**

Corticosteroids and isomers of mesalazine have been the traditional medical treatments for IBD. Current IBD drug therapies for both ulcerative colitis and Crohn’s disease—including 6-mercaptopurine (Purinethol®), a chemotherapy agent; infliximab (Remicade®), a monoclonal antibody; and tacrolimus (Prograf®), an immunosuppressant—control inflammation and can help patients avoid taking steroids.

Some patients lack the enzyme necessary to metabolize 6-mercaptopurine. A new test can determine which patients lack this enzyme, and thereby avoid waiting four to six weeks to learn that their bodies don’t produce the metabolites necessary to treat their condition. It can also help predict cases when the patient’s body will produce metabolites that may lead to hepatitis or bone marrow suppression.

Surgical procedures to remove part of the intestine in Crohn’s disease have declined due to improved medical options for the condition. “We used to say that the average patient with Crohn’s disease would have surgery two or three times in their lifetime; I don’t know that we can say that they will have to have surgery even once in their lifetime anymore,” Dr. Ament notes.

Surgical management of ulcerative colitis has improved. Patients who don’t respond to or have adverse reactions to medical therapies may be good candidates for an ileoanal pull-through procedure in which 90 percent to 95 percent of the colon is removed, and the rectal wall preserved and given a lining made from the ileum. This preserves the sphincter muscles and nerves, sparing continence and ejaculatory function. Dr. Ament explains, “You have to tell patients that every time they eat they’re probably going to have to go to the bathroom. However, they’re continent, don’t have a permanent ileostomy, and they can participate in sports and other activities so they can have a more normal life than they otherwise would have.”

**Further reading**


Dubinsky MC, Ofman JJ, Urman M, Targan SR, Seidman EG. Clinical utility of serodiagnostic testing in suspected inflammatory bowel
Corticosteroid Use in Pre-term Babies May Impair Development

Corticosteroids, long thought to be almost miraculous drugs, are now used more cautiously as recurrent courses and high doses have revealed serious side effects. Still, in situations of survival, steroids can provide amazing results.

For more than 30 years, use of prenatal steroids for pregnant mothers in pre-term labor has decreased the incidence of respiratory distress syndrome and increased survival for their premature babies. These steroids act primarily by increasing the surfactant production in the baby’s lungs. Many times, premature babies are born suddenly, before a mother can receive the steroids. In those cases, steroids have been given to babies to help improve respiratory function and get them off the ventilator faster.

If giving corticosteroids to mothers in pre-term labor worked so well, physicians surmised that similar results could be achieved by giving steroids to pre-term newborns with low oxygen levels whose mothers did not receive steroids. The reasoning seemed logical, but the long-term results have proved disturbing.

“Giving steroids to the mother before the baby is born not only improves the lung function but also decreases neonatal intraventricular hemorrhage rates, which in turn decreases neurodevelopmental disorders in premature babies, including cerebral palsy,” explains Meena Garg, M.D., neonatologist at Mattel Children’s Hospital at UCLA.

“But when corticosteroid treatment is given in the neonatal period, following a pre-term birth, the benefits seen with decreased severity of respiratory distress and decreased rate of chronic lung disease were associated with an increased risk of neurodevelopmental impairment, including cerebral palsy. This is the reverse of the prenatal steroid use and was unanticipated until the follow-up studies emerged in the literature three years ago.”

In 2002, published papers began looking at the long-term outcomes in school-age children who had been treated with corticosteroids as premature infants. “This raised the question of whether steroids given to babies cause more problems in terms of cerebral palsy and impaired neurological development,” Dr. Garg explains.

As a result, the American Academy of Pediatrics has discouraged the routine use of corticosteroids in the treatment of chronic lung disease in low-weight infants. “The long-term follow up of babies treated with steroids showed a substantial increase in cerebral palsy and developmental problems. One of the studies actually said that for every seven babies born weighing less than 1,000 grams and treated with steroids, you end up with one extra baby with cerebral palsy,” Dr. Garg points out.

“That was in 2002, and if you look at the current data, approximately 25 percent of very small babies are still being treated with steroids,” she adds.

“At UCLA, we don’t routinely use steroids in pre-term babies. For the last three years it has been an absolute no-no in our unit to treat babies less than 1,000 grams with corticosteroids.”

The data about early as well as long-term neurological effects of steroid use are expanding. According to Dr. Garg, neuroimaging studies at UCLA and other centers have shown decreased head circumference and impaired gray matter growth in babies treated with steroids, in addition to the adverse effect on overall growth. “Although we know that brain imaging does not define brain function, there is definitely a problem with brain development in these babies,” she notes.
Without steroids, small pre-term babies may remain on ventilators longer. Steroids decrease the number of days babies are on oxygen or on a ventilator. “There is an early gain but in the long term you don’t have any gain in pulmonary function,” Dr. Garg explains. “The babies still need to stay in the neonatal intensive care unit just as long because all the other systems need to mature.” Either giving or not giving steroids to these babies does not affect survival, she says.

Two recent studies from England, published in Pediatrics, contradict the data from 2002. Those studies looked at teens 13 to 17 years old and found no long-term difference in neurological outcome, cerebral palsy and school performance in 195 children treated with and without steroids as neonates.

“We don’t think these studies lessen or take away our concerns about adverse neurological outcomes after steroid use since we are seeing all these changes on magnetic resonance imaging (MRI) studies that are suggestive of neurological insult. Most of the reports of babies treated with steroids in the U.S. are still pointing toward these complications,” Dr. Garg says.

Most academic medical centers in the United States are not using steroids in this population, but Dr. Garg says UCLA continues to receive some babies who have already been treated with long-term steroids and come with complications, such as hypertension, hemorrhaging or perforations in the gastrointestinal tract, high blood pressure, high glucose, and cardiomyopathy. These babies need to be weaned from the medications, which can take weeks.

When babies are very sick and very premature and on high ventilator settings, what is the best treatment option? When a critically ill child is caught in the balance of life and death, the use of steroids as a life-saving measure at the risk of compromising neurodevelopmental outcome poses a dilemma for the caring physician.

Emerging research in animal models is showing that timing and dosage of corticosteroids are very important. The general consensus, Dr. Garg notes, is that giving steroids to a very immature baby in the first seven to 10 days of life is more harmful than if used later. “We now avoid the use of steroids entirely with some exceptions, keeping in mind that the cumulative dose is important in terms of the effects on brain and body,” she says.

Most of the studies on cortico-steroids in pre-term babies have used dexamethasone. An alternative—hydrocortisone—is being tried in some studies to see if it causes less neurological impairment. However, the randomized control trial to prove efficacy of hydrocortisone was stopped early due to increased incidence of gastrointestinal perforations in the treated group. The follow-up studies after use of hydrocortisone are relatively few, with only two- to three-year outcomes so far. “However, this is another option if physicians face a dilemma with a critically ill baby. Hydrocortisone seems for the time being to be affecting the brain less but still helping the lung,” she says.

Dr. Garg would like to see collaboration among medical centers treating this population to study the effects of timing and dosage of steroid administration. She observes, “We need to get together with other centers to conduct trials on consistency and timing of dosage, and tracking long-term outcomes and brain imaging to see if dosing schedules are predictive of brain function in the long run.”

Further reading


Barrington KJ. The adverse neuro-developmental effects of postnatal steroids in the preterm infant: a systematic review of RCTs. BioMed Central Pediatr 2001;1:1


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Update on Steroids

Asthma and Allergy

Inhaled steroids are very safe for children of all ages to use to treat asthma, particularly at low or moderate doses, says Robert Roberts, M.D., UCLA pediatric allergist and immunologist. Even if used for long periods of time, the effect on growth is about one centimeter, and the benefits for controlling asthma far outweigh that. Newer leukotriene inhibitor medications work by targeting the body’s inflammatory system, and can be used as a complement to steroids to treat asthma and severe allergic rhinitis and thereby lower the dose of the steroid.

If patients have had several courses of oral steroids over a year, physicians can try anti-IGE medications. Approved for people over the age of 12 years, the medication is injected twice a week, and binds up with IGE, which is the allergy antibody in the lungs and seems to decrease the need for steroids.

Rheumatology

Most children with juvenile rheumatoid arthritis (JRA) can be treated with injectable intraarticular corticosteroids, which work locally, says Kerry Gallagher, M.D., UCLA pediatric rheumatologist. Systemic steroids are used for systemic juvenile rheumatoid arthritis since the children often develop severe fevers, rashes and joint pain, symptoms that are difficult to control without steroids, says Debbie McCurdy, M.D., UCLA pediatric rheumatologist.

Systemic Lupus Erythematosus (lupus or SLE), an autoimmune disease that affects different organs and commonly presents in the second decade of life, often requires a longer course of steroids. “We may need to use high doses of steroids at the onset, but then try to introduce other immune suppressant medications to get steroids down to reasonable doses,” Dr. Gallagher explains.

Henoch-Schonlein Purura, a very common vasculitis, often presents as a purpuric rash, swelling of the extremities, some arthritis, rash and fever. Instead of steroids, Dr. Gallagher recommends nonsteroidal anti-inflammatory medications, ice over the joints, and other modalities until a diagnosis is certain and unless organ involvement develops.
UCLA Implements New Efforts to Address Medical Errors

Improving patient safety has become an important national focus in recent years, especially following a 1999 Institute of Medicine report that estimated that as many as 98,000 deaths per year occur as a direct result of medical error—more than the total of motor vehicle accidents, breast cancer and AIDS deaths combined. In addition to resulting in preventable adverse events—injuries as well as deaths—medical errors cost an estimated $29 billion annually.

Mattel Children’s Hospital at UCLA has taken aggressive steps to reduce the risk of such errors. “We know that as medicine has become increasingly complex, there are more opportunities for mistakes to be made,” says Judith Brill, M.D., chief of critical care and vice chair of clinical affairs for the UCLA Department of Pediatrics. “We recognize that the potential for mishaps is real; we are constantly looking for ways to make improvements that will limit these errors.”

Medication errors are a particular concern. Opportunities for error begin with the written order, which can be incorrect or illegible. The pharmacy is then relied on to ensure proper dosing and to consult with the physician if the ordered dose seems to deviate from the standard. The potential for adverse drug interactions must be considered. The dispensing of the drugs can be mishandled, as can the timing and route by which they are given. In pediatrics, where calculations are often necessary to determine weight- and age-specific dosing, math errors can be made.

The opportunity for medical error is perhaps highest in an intensive care setting, where treatment of acutely ill patients requires coordination of multiple aspects of care. “Errors are rarely the fault of a single person or the result of a single event,” says Dr. Brill.

A good reporting system is key to reducing medical errors. “You have to look at the whole system before you can come up with a good solution,” says Dr. Brill. “We do that not in an accusatory, blame-oriented manner, but rather in the spirit of problem-solving and education.”

Understanding how the culture of medicine affects the likelihood of medical errors and error reporting is an important first step to developing effective strategies to combat them, improving communication between nurses and residents as responsibility for patients is passed during shift changes, and on improving the transmission of critical information when a patient is transferred from one unit to another.

Dr. Mir is spearheading the effort to improve the error-reporting system so that near-mistakes and unreported errors are incorporated. “If the reporting system is too cumbersome, a lot of the near misses are not going to be caught, making it more difficult to understand and address the problems,” she explains.

Under Dr. Mir’s leadership, the Department of Pediatrics is also implementing simulation training for pediatric residents and nurses. Utilizing actors and equipment to simulate real-time critical scenarios, the simulations enable house staff to practice crisis resource management and team skills under stressful situations.

“You have to look at the whole system before you can come up with a good solution. We do that not in an accusatory, blame-oriented manner, but rather in the spirit of problem-solving and education.”

—JUDITH BRILL, M.D.
upper respiratory illness and avoid unnecessary antibiotic prescriptions. The findings, presented May 2004 at the Pediatric Academic Society’s annual meeting in San Francisco, California, concluded that focusing positively on what can be done to make a child feel better, rather than on what is not needed (antibiotics), can increase parents’ acceptance of non-antibiotic treatment and satisfaction with care.

“Oftentimes, the dynamics of a doctor-parent interaction leads the pediatrician to perceive that parents expect a prescription for antibiotics, and this can lead to unnecessary prescribing,” says Rita Mangione-Smith, M.D., lead investigator of the study and a pediatrician at Mattel Children’s Hospital at UCLA.

According to Dr. Mangione-Smith, studies show that patients with respiratory illnesses receive antibiotics 30 percent of the time. However, 55 percent of antibiotic prescriptions for these illnesses are not needed—and inappropriate use can lead to antibiotic-resistant infections.

WHY DO WE FEEL MALE OR FEMALE?

Refuting 30 years of scientific theory that solely credits hormones for brain development, UCLA scientists have identified 54 genes that may explain the different organization of male and female brains. Published in the October 2004 edition of the journal Molecular Brain Research, the UCLA discovery suggests that sexual identity is hard-wired into the brain before birth and may offer physicians a tool for gender assignment of babies born with ambiguous genitalia.

“Our findings may help answer an important question—why do we feel male or female?” explains Eric Vilain, M.D., assistant professor of human genetics and urology at the David Geffen School of Medicine at UCLA and a pediatrician at Mattel Children’s Hospital at UCLA. “Sexual identity is rooted in every person’s biology before birth and springs from a variation in our individual genome.”

Since the 1970s, scientists have believed that estrogen and testosterone were wholly responsible for sexually organizing the brain. In other words, a fetal brain simply needed to produce more testosterone to become male.

To their surprise, the researchers found 54 genes produced in different amounts in male and female mouse brains, prior to hormonal influence. “We didn’t expect to find genetic differences between the sexes’ brains,” admits Dr. Vilain. “But we discovered that the male and female brains differed in many measurable ways, including anatomy and function.”
Health Tips for Parents

Our easy-to-read "Health Tips for Parents" series tackles important issues for parents to keep their children healthy. UCLA experts address topics such as flu shots, the overscheduled child, sibling rivalry, nutrition, eating disorders, and more. You can download copies of "Health Tips for Parents" in English or Spanish at www.healthcare.ucla.edu, and click publications. Or call, 310-794-8949 for more information.