

# In the Know

All about... cerebral palsy



The HamaspiK Gazette is pleased to present In the Know: A new column of concise, comprehensive and current overviews on dozens of disorders, diseases and diagnoses. We'll be looking at a different health subject every month. When you need to know, all you need to know will be... In the Know.

## What is cerebral palsy?

Cerebral palsy (suh-REEB-ruhll PALL-zee) is brain damage that affects movement. Cerebral means "of the cerebrum," a part of the brain. Palsy means "disorder of movement or posture."

Put otherwise, cerebral palsy is a brain problem that causes muscle-control problems. The disorder is not caused by problems in the muscles or nerves.

Cerebral palsy was first known as "Little's Disease." It was first identified in a research paper by English orthopedic surgeon Dr. William John Little in 1861. It later became known as "cerebral paralysis." In 1887, Sir William Osler popularized the term *cerebral palsy*.

Today, cerebral palsy is known to be mostly caused by damage to the motor control centers of the developing brain during pregnancy, childbirth, or after birth up to about age three.

In turn, conventional wisdom dictates that this damage is mostly caused by temporary lack of oxygen flow to an otherwise healthy brain before or during childbirth.

However, "it's not true," says Ruth Nass, MD, a professor of child neurology and child and adolescent psychiatry at NYU School of Medicine. Dr. Nass notes that MRI scans of most CP newborns will reveal pre-existing brain structure problems not caused by oxygen deprivation or other medical errors.

"Most cerebral palsy cases are caused by genetic disorders and brain malformations," Dr. Nass explains.

Dr. Nass further points out that cases of cerebral palsy indeed caused by hypoxic aschemic insult, or injury to the brain due to temporary lack of oxygen during childbirth, are readily identifiable when the newborn requires resuscitation in the delivery room, or feeds poorly, is floppy, lethargic or otherwise sick in the nursery.

However, viral infections of an infant's brain, or blunt-force impacts to the head, even in adulthood, can also cause cerebral palsy.

Cerebral palsy causes many symptoms, including weak muscles, slow reflexes, slow growth, lowered coordination, joint and bone deformities, balance problems, depth perception problems, walking problems, vision problems, hearing problems, speaking problems, involuntary movement or inability of movement. Cerebral palsy can also cause epilepsy.

Cerebral palsy, or CP, can be very mild, very severe, or anything between. The mildest CP cases consist of slight clumsiness or even less. The severest CP cases consist of complete inability to speak or move.

Cerebral palsy is a *disorder*, not a *disease* or *illness*. There is no CP virus. It isn't contagious.

People with CP will have the condition all their lives.

CP is not a progressive disorder. The brain damage neither improves nor worsens. For example, a case of CP that affects only the legs will not later spread to the arms or back. However, symptoms of CP can become worse with age.

People with CP do not by definition suffer from mental retardation or disability, though many do. Many people with CP have IQs that are normal (and often higher than average). Others suffer mentally from nothing more than some developmental delays and/or learning difficulties, mainly because of the inability to express whatever healthy cognitive abilities they do possess.

According to 2008 figures from

United Cerebral Palsy, a leading CP support organization, 764,000 U.S. adults and children have one or more of the symptoms associated with CP.

Of the dozens of common disabilities, cerebral palsy is one of the most visible and most misunderstood.

About three out of every 1,000 children are born with CP. It is more prevalent among males, and also more common in multiple births.

Cerebral palsy also gave rise to the popular negative phrases "spastic" and "spaz" (and "spaz attack"). A British charity called The Spastics Society was formed in 1952, with "spastics" meaning people with CP. However, the words "spastic" and "spaz" have been extensively used ever since as a general insult to disabled and enabled people alike whenever they seem overly uncoordinated, anxious, or unskilled in sports or any other activity.

## Types of CP

There are four types of cerebral palsy (CP): *Spastic*, *athetoid*, *ataxic* and *hypotonic*.

Spastic CP is the most common type of CP. Seventy to 80% of all CP cases are spastic.

Athetoid CP is the second-most common type of CP. Ten to 20% of all CP cases are athetoid.

Ataxic CP is the third-most common type of CP. Only 10% of all CP cases are ataxic.

Hypotonic CP is the least common type of CP. Less than 10% of all CP cases are hypotonic.

Many CP patients have a combination of two or more types of CP. For example, 30% of athetoid, ataxic and hypotonic CP patients also have spastic CP.

The most common combination of cerebral palsy is spastic and athetoid. The least common mix is athetoid and ataxic. However, any mix may occur.

Each type affects a different part of the brain and therefore creates

different symptoms. However, all CP patients have damage to the area of the brain that controls *muscle tone*, or the muscles' ongoing contraction that constantly maintains the body's overall posture.

As a result, CP patients may have increased muscle tone, reduced muscle tone, or both. Which parts of their bodies are affected by the abnormal muscle tone depends upon where the brain damage occurs.

Another symptom common to most CP patients is bent or elongated bones. A CP patient, for example, may have curved leg bones because the stiff (or weak) leg muscles put unequal pressure on one side of a leg bone during childhood growth, causing it to bend during childhood growth. Alternatively, muscles may restrict bones from growing to their full normal length, giving CP patients one limb slightly shorter than its twin. This, in turn, can make walking or otherwise using the limbs difficult if not impossible.

Bottom line? CP mainly causes physical problems, not mental problems.

### Spastic CP

Spastic CP may generally be defined by stiff and difficult movement.

Spastic CP is caused by *spastic*, or stiff, muscles and tendons. Patients with spastic CP have one or more tight muscle groups which limit movement, produce stiff and jerky movements, and make it hard to move from one position to another or to hold and release objects.

This is because normal muscles work in pairs: when one group of muscles contract, the other group relaxes—allowing healthy, flowing body movement. But with spastic CP, complications in brain-to-nerve-to-muscle communication throws off the normal balance of muscle tension, with all muscles contracting (or relaxing) together, hindering effective movement.

Spastic CP patients have damage

to the brain's *corticospinal tract* or *motor cortex*. This affects the nervous system's ability to receive gamma amino butyric acid in the area(s) affected by the disability, which in plain English means the brain cannot properly send movement instructions to the muscles.

As a general rule, there are three subcategories of spastic CP: *spastic diplegia*, *spastic hemiplegia* and *spastic quadriplegia*.

Spastic *diplegia* generally affects the body below the waist, causing the tightening of leg and hip muscles and the legs to *scissor*, or cross at the knees, making it difficult to walk. Most spastic CP patients have some level of spastic diplegia—and most CP spastic diplegia patients also have *strabismus*, or crossed eyes, making most crossed-eyed to some degree.

Spastic *hemiplegia* affects one side of the body, stiffening muscles on that entire side. This is caused by damage to the brain's opposite side. (The brain's right half controls the body's left half and vice versa.)

Spastic *quadriplegia*, the severest form of spastic CP, is characterized by the inability to move or feel both arms, both legs, and other body parts. Spastic quadriplegia is caused by an injury to the spinal cord, and usually includes mental retardation, problems with mouth and tongue muscles, and difficulty in speaking.

Continued on Page E8

# In the Know: cerebral palsy

Continued from Page 7

Occasionally, terms such as *monoplegia*, *paraplegia*, *triplegia*, and *pentaplegia* may also be used to refer to specific manifestations of spastic CP.

## Athetoid CP

Athetoid CP may generally be defined by involuntary and uncontrolled movement.

Athetoid CP is caused by damage to the *cerebellum* or *basal ganglia*, areas of the brain that enable smooth, coordinated body movements and proper body posture. (As such, it is sometimes called *chorea-athetoid* cerebral palsy or *dyskinetic* cerebral palsy.)

Athetoid CP patients have difficulty controlling their muscles. The arms and legs of an athetoid CP patient may move or twitch on their own with no warning. Athetoid CP tends to primarily affect the face, arms, and trunk.

These involuntary movements often interfere with speaking, feeding, reaching, grasping, and other skills requiring coordinated movements. Athetoid CP can also cause *dyarthria*, or difficulty speaking, because of difficulty controlling the tongue, breathing and vocal chords.

Athetoid CP patients often also have low muscle tone and problems maintaining correct sitting and walking posture.

## Ataxic CP

Ataxic CP may generally be defined by low muscle tone and poor coordination of movement.

Ataxic CP is caused by damage to the cerebellum. Ataxic CP patients tend to appear unsteady and shaky because ataxic CP affects sense of balance and depth perception.

Ataxic CP patients often have poor coordination and walk unsteadily with a wide based gait, placing their feet unusually far apart. It is also common for ataxic CP patients to have difficulty with visual and/or auditory processing, as well as with such common tasks as writing or drinking from a cup.

The most significant characteristic of ataxic cerebral palsy is tremor, especially when attempting quick or precise movements, such as writing or buttoning a shirt. These tremors tend to worsen when attempting voluntary movements such as reaching for a book. The hand and arm will typically begin to shake, becoming more severe as the hand gets closer to the object and increasing the completion time necessary for the task.

## Hypotonic CP

Hypotonic CP may generally be defined as CP that causes severe low muscle tone.

Hypotonic CP patients tend to appear floppy and limp, and can move only a little if at all. In early infancy, *hypotonia* can be easily seen by the inability of the infant to gain any head control when pulled by the arms to a sitting position (this symptom is often referred to as *head lag*).

Hypotonic CP patients may display a variety of symptoms, primarily motor-skills delay, poor reflexes,

decreased strength, decreased activity tolerance, rounded shoulder posture and poor attention and motivation.

Since hypotonic CP is most often diagnosed during infancy, it is also known as *floppy infant syndrome* or *infantile hypotonia*.

Low muscle tone is not to be confused with low muscle strength, however: The patient with low tone merely has healthy muscles that are just slow to contract and cannot remain contracted for normal lengths of time.

## What causes CP?

Cerebral palsy is caused by brain damage.

The more severe the brain damage, the more severe the symptoms, and the less severe the brain damage, the less severe the symptoms.

Known causes of brain damage include toxins, lead poisoning, physical brain injury, bleeding in the brain, Shaken Baby Syndrome, high blood pressure and exposure to radiation.

Infections in the mother, even infections that are not easily detected, may triple the risk of the child developing CP. This is mainly because infections trigger the body's release of *cytokines*, infection-fighting cells that can also damage the fetus' brain if too many are released.

Such infections include rubella (German Measles), bacterial meningitis, viral encephalitis, toxoplasmosis, cytomegalovirus, Rh disease (jaundice), and flu.

Another factor is that 40% to

50% of CP children are preemies. However, it is not clear why so many CP children are preemies. It may be because their lungs and other organs are not fully developed, creating a higher risk of oxygen starvation—and the resulting brain damage that may appear as CP. But it also may be caused by preexisting brain damage which in turn triggers premature birth—compounded by oxygen starvation and further damage immediately before, during or after birth.

Additionally, some CP cases are mild enough to make detection and diagnosis difficult and/or not even visible to the eye.

It should be noted that these are *risk factors*, not *determinants*, of cerebral palsy—there is no sure way of predicting or preventing cerebral palsy.

## Diagnosing CP

Cerebral palsy is usually diagnosed between the first few days and months of birth.

Birth indicators of CP may be any of the following:

- Crossed eyes
- Spinal curvature
- Low muscle tone
- Blue or dusky skin
- Abnormal reflexes
- Body arching to one side
- Tremors in arms and/or legs
- Lethargy or lack of alertness
- Small jawbone or small head
- Seizures within 24 to 48 hours
- Poor sucking or feeding
- Poorly formed heart, kidneys or other organs

• Absence of breathing, requiring resuscitation

• Problem maintaining body temperature after birth

• Abnormal or high-pitched cry, or absence of crying

• Meconium staining on the baby at time of delivery

• Excessive stiffness in the arms, legs or both, or one on side of the body

• Excessive floppiness in those same areas

Cerebral palsy is also diagnosed in infants or toddlers when developmental milestones like rolling over, sitting up, crawling, walking and talking are missed. Such diagnoses are usually made between six and 12 months, when these developmental milestones would otherwise show.

Parents are more likely than doctors to notice such signs of cerebral palsy, especially if this is not their first child.

Other infant CP symptoms are: Difficulty controlling the head when picked up, stiff legs that scissor when picked up, reaching with only one hand while keeping the other in a fist, or crawling with one hand and leg while dragging the opposite hand and leg.

There is no one single specific test for cerebral palsy.

A cerebral palsy diagnosis is not made overnight. Doctors may first order X-rays and blood tests to find out if some other disease may be causing the problem. Tests like CTs and MRIs may be ordered. Symptoms are then usually monitored for some time by an *interdisciplinary team*: a group of professionals with specialties in different areas.

Doctors may delay CP diagnoses because groups of tests and assessments are needed to rule out such other conditions like *neuromotor dysfunction*, or delay in the maturation of the nervous system; *motor disability*, indicating a long-term movement problem; *central nervous system dysfunction*, which is a general term to indicate the brain's improper functioning; or *static encephalopathy*, meaning abnormal brain function that is not getting worse.

Doctors may sometimes delay diagnosing CP because a child's central nervous system can sometimes recover partially or even completely after an injury occurs. A child's brain has a much greater capacity to repair itself than adult brains: If brain injury occurs early, the uninjured areas can sometimes at least partially take over some of the injured areas' functions.

Doctors may also hesitate to diagnose CP because motor symptoms such as muscle tone or involuntary movement can change over your child's first two-three years before stabilizing. After this age,



**The Great American Outdoors:** Hamaspik of Orange County Day Hab Manager Moshe Kraus sent the *Gazette* these two fabulous shots from an April 7 outing. The friendships, and natural vistas, speak for themselves.