Kids Highly Vulnerable to Radiation in Imaging

BY JANE SALODOF MACNEIL
Southwest Bureau

SCOTTSDALE, ARIZ. — Radiation exposure from the diagnostic imaging of children greatly increases their risk of cancer and death decades later, according to speakers at a pediatric update sponsored by Phoenix Children's Hospital.

Dr. Thomas L. Slovis and Dr. Alan H. Friedman urged pediatricians to be judicious, limiting their use of chest x-rays and computerized tomography to essential studies. They also called on pediatricians to insist that radiologists adjust radiation doses to minimize future harm to children.

Among the alarming statistics reported in their separate talks were the following:

► A 1-year-old infant is 10-15 times as likely to develop malignancy as is a 50-year-old adult given the same dose of radiation, according to the International Commission on Radiological Protection.

► The equivalent natural-radiation exposure ranges from 2.4 days of natural exposure during one chest x-ray to 4.3 years of natural exposure during one 30-minute cardiac catheterization. Within this range are one upper-gastrointestinal x-ray (equivalent to 1 year of natural exposure), one barium enema (equivalent to 2.3 years), and one abdominal CT scan (equivalent to 3.3 years).

► The risk of dying of complications from an abdominal CT scan performed in the first year of life is 1:1,000. This is greater than the risk of death from a bicycle accident, drowning, or a medical complication, according to the National Safety Council.

► Low doses of radiation comparable to a CT dose are associated with excess cancers and excess deaths in an ongoing 50-year study of 50,000 atomic bomb survivors (Radiation Research 2000:154:178-86).

The issue is not whether to image, but when and how often and which test to use, said Dr. Friedman, director of the pediatric echocardiography laboratory at Yale University, New Haven, Conn.

"If we're not careful and thoughtful in the use of the technology, we may be exposing our youngest and most vulnerable patients to potentially dangerous and worrisome doses of radiation," he said in an interview. "It may not have an effect in the short term, but we may really start to realize deleterious effects decades down the road."

'We may be exposing our … most vulnerable patients to dangerous doses of radiation.

DR. FRIEDMAN

Along with more judicious use of tests, pediatricians should ask radiologists whether they tailor radiation doses for children, said Dr. Slovis, of the division of pediatric imaging at Wayne State University, Detroit.

He advocated wider application of the concept of ALARA ("as low as reasonably achievable") to radiation dosing in children. "You want the proper dose. If the dose is too low, you can't make the diagnosis," he said.

Various factors make children more susceptible to radiation. Dr. Friedman listed tissue weighting, the exposure of more or-

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How to Lower the Risk of Radiation

► Reduce the number of multiple scans and procedures.

► Reduce the length of time the patient is in the scanner.

► Use bismuth shields, which reduce radiation exposure by up to 67% and don't significantly affect imaging.

► Limit exposure/coverage to the physical area necessary for addressing the clinical question.

► Do not repeat studies too early or too often.

► Discuss the risks with the patients and parents.

► Consider MRI or ultrasound studies whenever possible.

Source: Dr. Friedman

TNF-Blockers Restore Normal Growth in Children

BY ELIZABETH MECHCATIE
Senior Writer

A study that evaluated children with severe juvenile idiopathic arthritis before and after starting anti–tumor necrosis factor treatment indicated that these biological agents appear to be effective in restoring normal growth in this population, reported Dr. Pirjo Tynjälä.

The results also suggest that the improvements in growth are related to the impact these treatments have on inflammation, wrote Dr. Tynjälä of the Hospital for Children and Adolescents, Helsinki University Central Hospital, and her associates (Ann. Rheum. Dis. 2006;65: 1044-9).

The study followed the growth of 71 children with polyarticular disease–course juvenile idiopathic arthritis for 2 years before and 2 years after starting etanercept (43 patients) or infliximab (28 patients). When treatment started, mean age was 9.6 years, mean disease duration was 5.7 years, and the children were refractory to conventional disease-modifying antirheumatic drugs. The dose of etanercept (Enbrel) was 0.4 mg/kg twice a week; the dose of infliximab (Remicade) was 80-200 mg every 6-8 weeks administered intravenously.

In the group overall, the mean growth velocity increased significantly during treatment, which was mostly because of the increase in the 53 children whose growth was delayed before starting treatment. Among the 18 children whose growth was normal or accelerated before treatment, growth velocity increased, but not significantly, during treatment. Over the 4 years, there were no significant differences in the total steroid dose among those with delayed growth and those with normal growth.

After 24 months of treatment, disease was inactive in 52% of the patients, and activity had decreased in the remainder, Dr. Tynjälä and her colleagues wrote.

The change in inflammatory activity "remained a significant predictor of the growth velocity, even after glucocorticoids were taken into account," suggesting that the improved growth velocity may be because of the reduction in inflammation and not "a direct effect of biological agents on growth or on skeletal maturation." ■

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gans, longer life expectancy, and more rapid cell division.

Dr. Slovis said that children receive more radiation than do adults when the same dose of radiation is used. Radiation doses are measured with a phantom and set at a fixed midpoint, he said. This measurement is based on 14 slices, but is independent of the thickness of those slices.

Studies of the effects of radiation in the survivors of the atomic bombings of Hiroshima and Nagasaki include data specific to children.

Among the findings noted by Dr. Friedman is an increased incidence of leukemia, breast cancer, colon cancer, thyroid cancer, and lung cancer. These do not occur immediately, but at the times that would be expected for the specific cancer to develop.

Girls are more radiosensitive than boys, he said, and the risk of cancer development varies dramatically with the patient's age at exposure.

Dr. Slovis said some children with hereditary diseases—including ataxia-telangiectasia, basal cell nevus syndrome, Cockayne's syndrome, Down syndrome, Fanconi's anemia, Gardner's syndrome, Nijmegen breakage syndrome, and Usher's syndrome—are extremely sensitive to radiation and should not be exposed at all, if possible.

He also discouraged the use of radiation in children with hereditary syndromes that have been associated with childhood cancers.

Fetuses and premature babies are especially vulnerable, added Dr. Slovis. He hailed the late Dr. Alice Stewart's work for establishing that radiation in utero increases the relative risk of leukemia and other malignancies.

"How much radiation does a 25-week surviving preemie get?" he asked, comparing them to third-trimester fetuses and urging limited testing in infants. "I don't say don't get an indicated CT," he said. "I say get the indications, and work it through." Physicians should be sure each test they order is necessary, should use "the least invasive modality that gives a high certainty of success," and should discuss the case with a pediatric radiologist whenever they are unsure. ■