

Childhood Apnea May Exact Cognitive Loss

BY KATE JOHNSON

Montreal Bureau

MONTREAL — Pediatric obstructive sleep apnea may have lifelong physiologic and cognitive consequences even after it is successfully treated, according to Dr. David Gozal, professor of pediatrics at the University of Louisville (Ky.).

"Children have a plastic system, and as such, they can be conditioned to develop differently than they would otherwise if they were not perturbed by sleep-disordered breathing during their childhood," he said at the Eighth World Congress on Sleep Apnea. "It is our duty to start identifying this condition very early and to identify those children at risk for consequences later in life."

Dr. Gozal suggests that sleep apnea may be a childhood antecedent of adult cardiovascular disease in genetically susceptible individuals.

His study in 26 nonobese children with obstructive sleep apnea demonstrated the presence of endothelial dysfunction, compared with controls in response to cuff occlusion applied for 30 seconds to the brachial artery and then released.

"Reperfusion was slow and sluggish in those with sleep apnea, compared to control children," he said. With effective treatment of their sleep apnea, 18 of the 26 chil-

dren normalized to the reperfusion rate of controls.

However, in eight children there was no change in reperfusion rate despite complete resolution of obstructive sleep apnea for 6 months.

"These eight children had a special burden—they had very strong family histories of cardiovascular disease. It might be that, if you have sleep apnea and you have a genetic susceptibility to another disease, the sleep apnea could trigger the onset of a disease to which you are predisposed genetically or it could accelerate the process," he suggested.

Other research by Dr. Gozal and his colleagues has shown that even with treatment, sleep-disordered breathing in early childhood is associated with behavioral and academic problems in middle school. His study of more than 1,500 middle school students found that those in the bottom 25th percentile of academic performance were three times more likely to have received adenotonsillectomy in early childhood for snoring, compared with students in the top 25th percentile. The rate of adenotonsillectomy for recurrent infection was the same in both groups (*Pediatrics* 2001;107:1394-9).

"This tells us that sleep-disordered breathing is associated with neurocognitive morbidity, which is partially irreversible," he said.

"If you lose some IQ points and you are male, you may run the risk of never recovering. Given the theory that estrogen provides neural protection, there is some biological plausibility for these findings," he said in an interview.

Despite his studies showing evidence of residual consequences even after treatment of childhood apnea, other research by Dr. Gozal suggests that early treatment may have the potential to completely reverse such consequences.

"The problem with studies showing residual issues [after treatment]

is that we do not know how long the disease was there before it was treated. Therefore, in the current context of late referral, it is likely that residual deficits will remain. However, it is also likely that with early diagnosis and intervention these residual deficits can be prevented," he said.

Dr. Gozal disclosed that he has various speaking, consultancy, or grant arrangements with Merck & Co., AstraZeneca Pharmaceuticals, and Itamar Medical Ltd. ■

Children 'can be conditioned to develop differently than they would otherwise if they were not perturbed by sleep-disordered breathing.'

Hyperbaric Oxygen Benefits Children With Brain Injury

BY DAMIAN McNAMARA

Miami Bureau

FORT LAUDERDALE, FLA. — Hyperbaric oxygen therapy improves cognitive and social function in children with chronic brain injury, according to a study presented at a symposium on hyperbaric oxygen therapy.

Daily living, socialization, communication, and motor skills significantly improved for 21 children treated with hyperbaric oxygen therapy (HBOT), compared with 21 brain-injured patients who received standard therapy. Researchers included a third group of 21 healthy children to control for normal growth and development, reported Dr. Charles J. Golden at the symposium sponsored by the Ocean Hyperbaric Neurologic Center.

All participants were assessed more than 1 year after onset of their chronic brain injury. The majority had cerebral palsy. The average age of all participants was 4.5 years (range, 12 months to 18 years), said Dr. Golden, professor of psychology and director, Neuropsychology Assessment Center, Nova Southeastern University, Fort Lauderdale, Fla.

Average functioning level was close to two standard deviations below average—"so this was a very low functioning group," he added.

Mild changes in some areas but no changes in the cerebellum were noted after 35 HBOT sessions, compared with baseline, Dr. Golden said. "This is not unexpected. These children had injuries high up in the brain."

"Interestingly, you can predict reasonably well who will be a responder based on response over the first 35 treatments," he said. "Some people are just nonrespon-

ders—you can give them 200 treatments, and they will not respond. Others are marvelous responders who respond well and right away."

After a second round of 35 HBOT treatments, "there was a much greater effect on blood flow ... so it seems to be a time-based effect," Dr. Golden said.

The HBOT group made major changes in all areas that were greater than either the normal or standard therapy control groups.

"This is a group who is at the end—they have failed multiple therapies. And still we have about 70% who respond [to HBOT]," said Dr. Golden. "The plasticity of the brain may be much greater than we imagined. HBOT may stimulate ability of the brain to reorganize itself."

Dr. Golden and his associates used the Vineland Adaptive Behavior Scales to rate basic adaptive, motor, and cognitive abilities "This can be used without a child having to perform for us, which is challenging with cerebral palsy," he said.

They assessed blood flow changes with a series of three single-photon emission computed tomography (SPECT) scans before, during, and after HBOT treatment. They assessed the cerebellum, pons, right and left hemisphere subcortical areas, and the cortical region.

Families were highly motivated to see changes, a possible limitation of the study, Dr. Golden said. In addition, the study was not double-blind, and the sample was self-selected because "we cannot put children in hyperbaric chambers without parent permission."

"Improvements in motor functions [from HBOT] allowed them to do things they could not do at the beginning of the study. The therapy allowed them to make a big jump in terms of their abilities." ■

HBOT May Lead to Improved Cognition in Cerebral Palsy

BY DAMIAN McNAMARA

Miami Bureau

FORT LAUDERDALE, FLA. — Adjunctive hyperbaric oxygen therapy significantly improves cognition for children with cerebral palsy, compared with standard therapy alone, according to an open, ongoing, observational study.

All participants significantly improved their physical, speech, and motor capabilities after 6 months, compared with baseline. Interim results for 84 children whose parents chose hyperbaric oxygen therapy (HBOT) and 20 children in a non-HBOT group were presented at a symposium on hyperbaric oxygen therapy.

Changes in cognition were distinctive. "Children receiving HBOT showed statistically significant improvements in cognitive-only parameters. This is interesting and what is driving us to go on with this treatment," said Dr. Arun Mukherjee of Majeedia Hospital, New Delhi, India.

Researchers used a modified 49-item Gross Motor Function Measure to monitor clinical progress at 2-month intervals. In an attempt to assess the effects of hyperbaric oxygenation, researchers focused on 26 cognitive-only items, which are less dependent on therapist input. "This is the closest measure we can get to brain repair," said Dr. Mukherjee, who is also director of the UDAAN Project for Cerebral Palsy at the Foundation for Spastic and Mentally Handicapped Persons in New Delhi. UDAAN is a Hindi word for flight (of freedom).

Hyperbaric therapy consisted of 100% oxygen delivered at 1.5 atmos-

pheres. Not included in this interim analysis is a recently added third group of patients who receive a low-pressure HBOT option (ambient air delivered at 1.3 atmospheres).

Dr. Mukherjee and his associates launched the UDAAN HBOT-Based Multimode Long-Term Observational Study in 2001 to assess the benefits, if any, of adjunctive therapy for children with cerebral palsy. They tried nerve block with Botox and phenol, computer-assisted biofeedback, and pulsed magnetic field therapy. "We were not impressed with their cost-to-benefit ratio as per Indian prices. Hence, we have dropped them."

Standard therapy consists of special education, occupational therapy, speech therapy, and physiotherapy totaling 2 hours daily. After 5 months of HBOT, clinicians administer 60 sessions of electroacupuncture using transcutaneous electrical nerve stimulation (TENS) specifically designed for cerebral palsy. This therapy reduces pain and discomfort of intensive exercises and helps the brain recognize pathways revived by HBOT, Dr. Mukherjee said at the symposium sponsored by the Ocean Hyperbaric Neurologic Center in Fort Lauderdale, Fla. "This alerts the brain that these circuits are now working," he said.

Short-term treatment has limited other pediatric studies of hyperbaric oxygen for cerebral palsy, Dr. Mukherjee said. In the current investigation, it took 6 months before cognitive differences between groups reached statistical significance. This suggests the need for a long-term commitment to hyperbaric therapy for cerebral palsy. ■