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New Diagnostic Tool for Premies

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Scientists at an Albuquerque research institute say they've found differences in the brains of premature babies that could offer clues to later developmental problems.

The brains of children born prematurely tend to have smaller frontal lobes, lower blood flow and other measurable differences from those carried to full term, according to researchers at the MIND Research Network.

Those differences disappear by the time the child is 3, researchers say, but children born prematurely remain at risk for many lifelong problems, including intellectual disability.

The work suggests brain imaging techniques such as MRI could offer a powerful tool for diagnosing problems in young kids who are otherwise hard to test.

Early diagnosis could lead to more effective treatments, said Dr. John Phillips, medical director of the MIND Research Network in Albuquerque, a nonprofit group created to find new ways to diagnose and treat mental illness and brain disorders.

"I think it's quite clear that neuroimaging can identify differences in children that are born prematurely," Phillips said. "We can see that their brains are clearly different than the children born at term."

More than 500,000 U.S. babies, or 1 in 8, are premature, defined as less than 37 weeks of pregnancy, according to the Centers for Disease Control and Prevention. Pregnancies of 37 weeks or longer are considered full-term.

"Even at 3 years, we're finding that children born full-term do better at simple reasoning tests than the children who are born prematurely," said Jean Lowe, a University of New Mexico neonatal development specialist and professor of pediatrics. But very young children are difficult to test and diagnose, she said.

The MIND researchers studied about 40 kids age 3 and younger. About half were born at 32 weeks of gestation or less, or weighed less than about 3 1/2 pounds.

More than half of those children would be expected to have some developmental problems, Lowe said. They were compared with a control group of kids carried to full term.

As a rule, the lower the child's birth weight and the shorter the pregnancy, the more likely the child is to have problems, Lowe said. The most severe problems are expected in kids born under 2 pounds, or within 28 weeks of gestation.

Premature birth is associated with a wide range of developmental issues ranging from learning disabilities and language delays to physical handicaps

such as motor impairment, respiratory problems and cerebral palsy.

Researchers using magnetic resonance imaging, or MRI, observed differences between children born prematurely and those born full-term. Findings of the yearlong study include:

The frontal lobes of children aged 18 to 22 months who were born prematurely were smaller on average than those in the full-term control group.

Kids ages 18 to 22 months born prematurely show less cerebral blood flow on average than kids born full-term. Strong blood flow is associated with healthy brain activity.

"Blood flow is tied to neural activity," Phillips said. "It may be that the areas where there's less cerebral blood flow aren't working quite as well."

Studies also have found certain regions of the brain, called "resting-state networks," that appear to be important for proper brain functioning. "The brain has to be well-integrated to function properly," Phillips said.

Resting-state networks could indicate whether premature infants will develop properly, Phillips said. In their work with toddlers, Phillips and others found the networks aren't as robust in babies born prematurely.

"There are certain parts of the brain that are resonating at exactly the same frequency because they're interconnected in some way," Phillips said. "Those connections are not quite as strong in the premature kids. If we can identify that some of these networks are not as strong or not functioning as well as they should, that could be an early marker of problems."