

FINDING EARLY SIGNS OF AUTISM

The brains of infants who develop the disorder grow too fast, researchers say. The discovery could help doctors prevent impairments before they appear.

BY YUDHIJIT BHATTACHARJEE

For parents who learn their child has autism, the diagnosis often comes as a shock: How could their baby have gone from appearing healthy to having an incurable disorder? Since autism was first identified in the 1940s, researchers have struggled to explain it.

Studies indicate that it may be possible to detect signs of autism at as early as three months of age, long before the disorder manifests itself. Early detection would allow for interventions that might prevent or mitigate the impairments associated with autism. "What we are learning is that autism is a trait, and whether or not that trait becomes a disability depends on early experiences," says Ami Klin, a psychologist at Emory University. That raises the possibility, he adds, "that autism as a profound disability is not inevitable."

Scientists know that autism can be caused by a number of genes, both inherited and mutated, as well as other factors, such as the advanced age of a parent. One fraudulent study blamed it on the childhood vaccine for measles, mumps, and rubella—a provocative claim that has been disproved. Since the late 1990s, the disorder has become increasingly prevalent. Researchers believe that's partly explained by improvements in diagnosis, but they haven't ruled out the possibility that the incidence is increasing,

■ Ten-month-old Aneesa participates in behavioral tests that use play to evaluate her motor skills, reaction time, and other age-appropriate abilities. Her mother, Alia Aamar, has a degree in early childhood education. She recognized that one of Aneesa's two brothers was developing speech abnormalities, which led to his autism diagnosis. As a result, Aneesa has a greater likelihood of developing the disease.

possibility due to biological and environ-
mental factors.

Although researchers haven't estab-
lished the precise origins of autism, they're
gaining a clearer view of how it progresses.
Joseph Piven, a psychiatrist at the Uni-
versity of North Carolina at Chapel Hill,
and his colleagues studied 106 infants
who had an older sibling with autism,
which meant they had a higher chance of
developing the disorder. Scanning their
brains at six months and again at 12 and 24
months using magnetic resonance imag-
ing (MRI), the researchers found strik-
ing differences between the infants who
later developed autism and those who
didn't. The brains of infants who were
subsequently diagnosed with the disorder
grew faster than the others, starting at six
months, expanding more in surface area
until 12 months, and then became larger
in volume in the second year of life, the
team reported in 2017.

The link between brain overgrowth and
a subsequent diagnosis of autism was so
strong that the researchers could use the
brain scans at six and 12 months of age
to accurately predict an autism diagnosis
for eight out of every 10 infants who were
found to have the disorder.

Scans tracing abnormal brain changes
have the potential to allow pediatricians to
spot autism well before symptoms appear.
The deficits that characterize it—language
delays, difficulties with social interaction,
and repetitive behaviors—usually don't
emerge until about two years after birth,

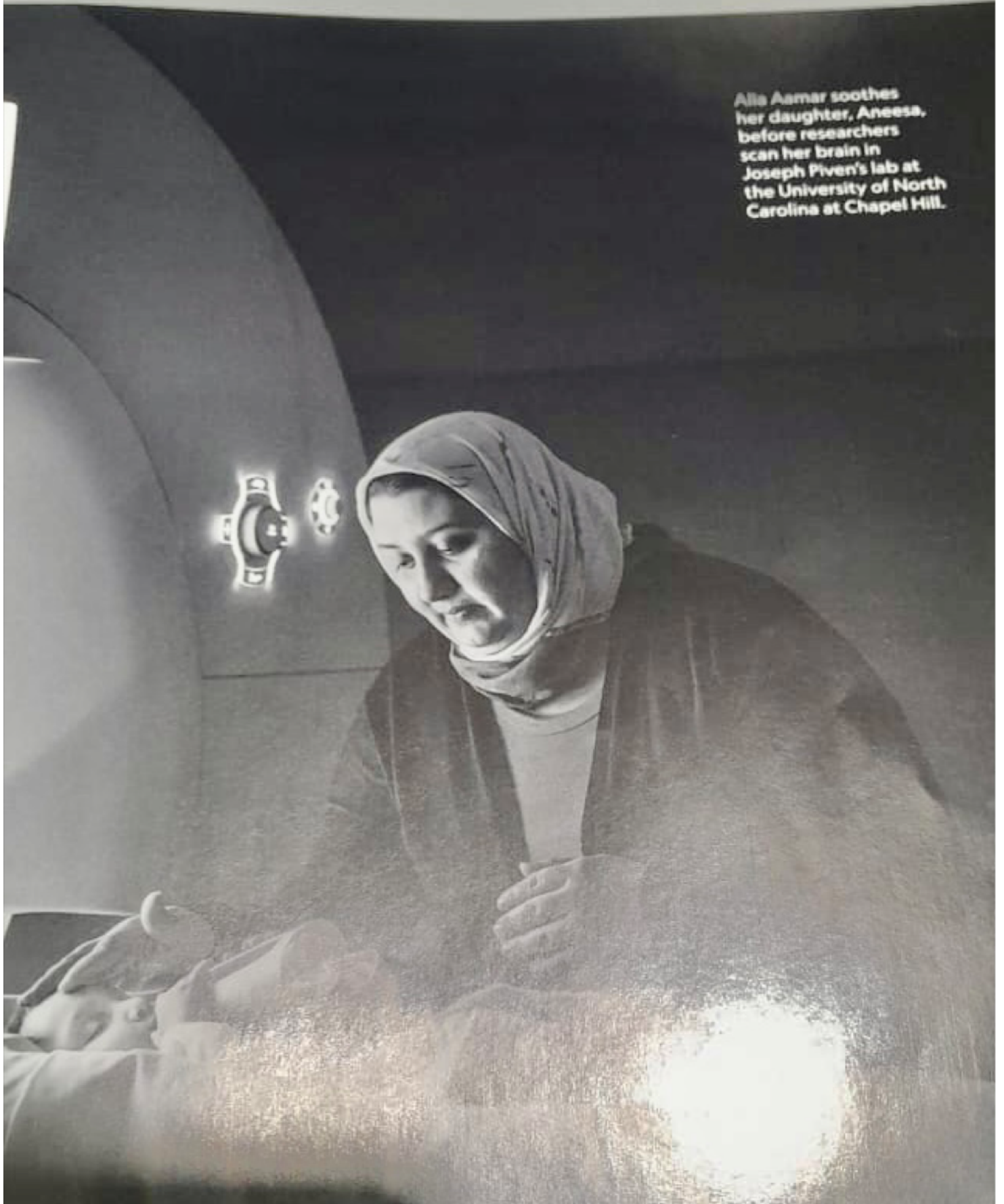
them at a time when they just have some
risk markers," Piven says.
Children with autism undergo inter-
ventions to help them socialize and
communicate, lessening the severity of

which is when most children are diagnosed. "We are talking about detecting

their impairments. With earlier detection, Piven and his colleagues contend, it eventually might be possible to take preemptive action, either through behavior modifications or medication "that

would change the trajectory of the brain." In 2018, a research group led by Charles Nelson, a neuroscientist at Harvard Medical School, published results showing the viability of detecting autism risk in

Alla Amar soothes her daughter, Aneesa, before researchers scan her brain in Joseph Piven's lab at the University of North Carolina at Chapel Hill.





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three-month-old infants by mapping the electrical activity in their brains using an electroencephalogram, or EEG. The researchers conducted the exams on children between the ages of three months and three years. Nelson and his colleagues found that the activity in the brains of infants who were later diagnosed with autism stood out from the rest.

"As early as three months, we see patterns in the EEG that tell us which subset of those children will develop autism," Nelson says.

What these studies reveal about the atypical nature of brain development in the lead-up to autism appears to be consistent with behavioral findings by Klin and his colleagues. Along with Warren Jones, who is a neuroscientist at Emory, Klin

and others tracked the eye movements of babies as they watched videos. Infants between the ages of two months and six months who spent less time looking at people's eyes than typically developing infants were likely to be diagnosed with autism as toddlers, the researchers found. In a study with toddlers, they found that those with autism gazed half as often at faces and twice as much at objects.

The results suggest that infants who go on to develop autism see the world in a fundamentally different way. This profoundly alters how they handle social interactions, which in turn has a cascading effect on their brain development, possibly leading to later impairments. "What seems to be happening is our children with autism are missing thousands and thousands and

■ Alia Amar has learned that by holding her son, who has autism, she can calm him when he starts to lose control.





■ Joseph Piven, here cradling 3D-printed models based on brain scans, has studied autism for more than 30 years. The psychiatrist believes children who develop autism take in their surroundings differently. "It's a problem with how you're experiencing the world through your senses and through your attention systems," he says.

thousands and thousands of experiences of social learning," Klin says.

The findings imply that babies at risk for autism could be nudged to a remedial track. Researchers have been testing behavioral interventions such as the Early Start Denver Model, a program that teaches parents and therapists to use specific strategies, including play, to develop social and language skills development in children with autism. A

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recent trial involving 118 children found that the intervention improved language ability, which researchers say is one of the best predictors of long-term gains for individuals with autism. Geraldine Dawson, a Duke University psychologist who helped create the model, says, "What we want to do, as early as possible, is to bring the baby back into the social world, so they're paying attention and getting that early enrichment."