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Scientists find new vessel for detecting autism

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Evidence of autism may be found in the composition and malfunction of the brain's blood vessels, a team of scientists has found. Their research sheds new light on the causes of autism, which previously had pointed to neurological make-up rather than to the vascular system, and identifies a new target for potential therapeutic intervention.

"Our findings show that those afflicted with autism have unstable blood vessels, disrupting proper delivery of blood to the brain," explains Efrain Azmitia, a professor in NYU's Department of Biology and the study's senior author.

The study, "Persistent Angiogenesis in the Autism Brain: An Immunocytochemical Study of Postmortem Cortex, Brainstem and Cerebellum," appears in the *Journal of Autism and Developmental Disorders*. Its other co-authors were: Zachary Saccomano, an NYU graduate student; Mohammed Alzoobaee, an NYU undergraduate at the time of the study; Maura Boldrini, a research scientist in the Department of Psychiatry at Columbia University; and Patricia Whitaker-Azmitia, a professor in the Department of Psychology and director of the Graduate Program in Integrative Neurosciences at Stony Brook University.

"In a typical brain, blood vessels are stable, thereby ensuring a stable distribution of blood," adds Azmitia, also an adjunct professor at NYU School of Medicine's Department of Psychiatry. "Whereas in the autism brain, the cellular structure of blood vessels continually fluctuates, which results in circulation that is fluctuating and, ultimately, neurologically

limiting."

In their study, the researchers examined human postmortem brain tissue—some from normal brains and others from those with an autism diagnosis. In the microscopic analysis, the scientists were blind to the nature of the tissue, not knowing if it came from an autistic brain or a typical one.

Their cellular studies uncovered angiogenesis—the creation of new blood vessels—in the autistic brain tissue, but not in that of typical brains. The distinction is a significant one—evidence of angiogenesis indicates that these vessels are repeatedly being formed and in constant flux, underscoring an instability in the blood's delivery mechanism. Specifically, in autistic brains, they found increased levels of the proteins nestin and CD34—molecular markers of angiogenesis—compared to typical brains.

"We found that angiogenesis is correlated with more neurogenesis in other brain diseases, therefore there is the possibility that a change in brain vasculature in autism means a change in cell proliferation or maturation, or survival, and brain plasticity in general. These changes could potentially affect brain networks," Boldrini noted.

"It's clear that there are changes in brain vascularization in autistic individuals from two to 20 years that are not seen in normally developing individuals past the age of two years," observes Azmitia. "Now that we know this, we have new ways of looking at this disorder and, hopefully with this new knowledge, novel and more effective ways to address it."

More information: E. C. Azmitia et al. Persistent Angiogenesis in the Autism Brain: An Immunocytochemical Study of Postmortem Cortex, Brainstem and Cerebellum, *Journal of Autism and Developmental Disorders* (2015). DOI: 10.1007/s10803-015-2672-6

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