



New Research Provides Groundbreaking Look Into Brain Processes Behind PANS, PANDAS, Sydenham's Chorea

Descrizione

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Columbia University researchers identify key inflammatory processes affecting blood-brain barrier in study of post-streptococcal encephalitis

NEW YORK, Sept. 22, 2026 (GLOBE NEWSWIRE) - For far too long, children and families affected by PANS and PANDAS have waited for answers on what is happening in the brain during acute illness. Now, groundbreaking research from Columbia University Irving Medical Center, in collaboration with PANDAS Network and other patient advocacy groups, is shedding new light on these processes.

Published in

Nature Communications

, the study identifies key inflammatory processes involving the blood-brain barrier that may help explain the severe neurological and psychiatric symptoms associated with these disorders.

Group A Streptococcus (GAS) infections are a major cause of morbidity in both children and adults worldwide. Primary infections like pharyngitis are common, but rarer secondary complications can affect the Central Nervous System and cause severe neuropsychiatric diseases, primarily in children. These complications include Sydenham's Chorea (SC) and Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections (PANDAS), both of which are rheumatic fever sequelae, as well as Pediatric Acute-Onset Neuropsychiatric Syndrome (PANS), an illness associated with other infectious triggers.

A shadow of controversy has slowed progress in understanding these diseases. However, new research by a team of neuroscientists at Columbia University Irving Medical Center - Agalliu Lab, led by Dritan Agalliu, PhD, Professor of Pathology and Cell Biology at Columbia University, illuminates key mechanisms linking the immune system to brain dysfunction using an animal model. These processes were previously unclear.

The team went a step further and identified several upregulated blood markers in 23 acutely sick children that could potentially be used as disease biomarkers to identify and track disease progression.

Using mouse genetic studies, single-cell RNA sequencing of brain cells combined with sophisticated computational analyses and functional studies in a mouse model for the disease, the team showed that GAS infections induce inflammatory gene changes primarily in microglia, the innate immune cells of the brain, and brain endothelial cells that form the blood-brain barrier, which seals the brain from the peripheral immune system.

These inflammatory gene changes result in brain inflammation and loss of blood-brain barrier functions that result in severe symptomology such as acute OCD, movement disorders, neurological symptoms and other abrupt psychiatric changes.

By eliminating several inflammatory molecules called cytokines made by T lymphocytes, including GM-CSF and IL17A, the authors showed that IL-17A is critical for both microglial and BBB gene changes leading to dysfunction. Moreover, the inflammatory cytokines produced by immune cells in the mouse model match those found in patients at the acute phase of the disease.

These findings, reported in a paper published August 11, 2026, in Nature Communications, will help resolve an ongoing debate about SC, PANDAS and PANS. These disorders are characterized by sudden-onset of extreme mental health and neurological symptoms, including obsessive-compulsive symptoms, food-related fears that can cause the patient to stop eating, sensory problems, severe behavioral regression, relapsing choreiform movements and sleep-related issues.

Many cases of SC, PANDAS and PANS occur after an acute infection, and the disorder is thought to result from an immune-system attack on the brain. Yet some clinicians attribute the symptoms to psychosocial factors while doubting the immune origin of these disorders.

By providing a comprehensive analysis of gene changes in multiple brain cells after GAS infections and the analyses of human sera, this research consolidates the neuroinflammatory immune-mediated origin of these disorders. This research also offers promising pathways to identify potential disease biomarkers and develop future medications for these disorders.

Dr. Dritan Agalliu states, “Our work on these disorders began almost 15 years ago by identifying that repeated intranasal infections with GAS induce T lymphocyte migration from the nasal cavity into the brain to trigger blood-brain barrier dysfunction and microglial activation and lead to loss of neuronal function (JCI paper 2016). We then demonstrated that Th17 lymphocytes that trigger autoimmune diseases including those in the brain are responsible for the brain pathology in a mouse model for these disorders (PNAS paper 2020).”

“Our latest study published in Nature Communications provides a comprehensive resource of gene changes that occur in multiple brain cells after repeated GAS infections,” Dr. Agalliu explains. “It also identifies IL17A interacting with its receptors as a key cytokine triggering microglial and brain endothelial cell dysfunction.”

Dr. Agalliu is sympathetic to these children. “These are very dramatic, severe and disruptive illnesses. Many families struggle to obtain appropriate care for these children. I am interested in this work because this area of medicine has been neglected for a long time, and our expertise in

neuroinflammation and blood-brain barrier function could open doors to understanding where the problems start in these children and potentially identify cures.â?•

Dr. Ugur Akcan, PhD, Postdoctoral Research Fellow at Columbia University and co-lead author of the study, feels this work should be viewed with fresh eyes by doctors. â??We have introduced a new idea in this study that IL17A interactions with its receptor in microglia, innate immune cells of the brain, are critical for blood-brain barrier dysfunction. Consistent with robust IL17RA expression in microglia and macrophages after GAS infections, genetic ablation of IL17RA in these cells partially rescues BBB leakage, indicating microglia mediate IL-17A effects on the vasculature. Future studies will identify downstream effectors of IL17A/IL17RA signaling in microglia and how they affect BBB function after GAS infections.â?•

â??Although nearly all children experience pharyngitis, only a small fraction go on to develop neuropsychiatric sequelae. Why some children are vulnerable while most are not remains unexplained, and my future work will focus on defining the genetic risk factors that underlie this susceptibility,â?• Dr. Akcan shares.

Diana Pohlman, Executive Director of PANDAS Network, has been following childrenâ??s cases for nearly twenty years and has seen how much suffering occurs with lack of treatment and available doctors.

â??We would love to get funding to study these children at acute onset and as they are in remission and identify why some children progress to a state of remission and some do not. We have young adults now who recovered from this scary illness offering to help the next generation of little ones,â?• Pohlman shares.

â??We have a handful of beleaguered doctors worldwide who know children can recover. With funding, awareness and compassion, we can knock this illness off the list of misunderstood and neglected diseases.â?•

Charlotte Wayne, PhD, Postdoctoral Fellow at Rockefeller University and former graduate student at Columbia University, is a co-lead author on the study.

To fund additional research, visit <https://pandasnetwork.org/donate/>. To learn more about PANS/PANDAS, visit <https://pandasnetwork.org/> and <https://www.pandasppn.org/> or watch <https://youtu.be/xbwRvaBatQk?si=eAHTfdz3jMEPq4up>.

Media Contact: Diana Pohlman diana@pandasnetwork.org (619) 370-5828

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