

San Diego BioMed News

The Bench & Beyond

The Inside Scoop

Embracing the everchanging
landscape of biomedical research.

January 2026 | Volume 9 Issue 1





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“Cannabis Use Moderates Methamphetamine- and HIV-Related Inflammation: Evidence from Human Plasma Markers,”

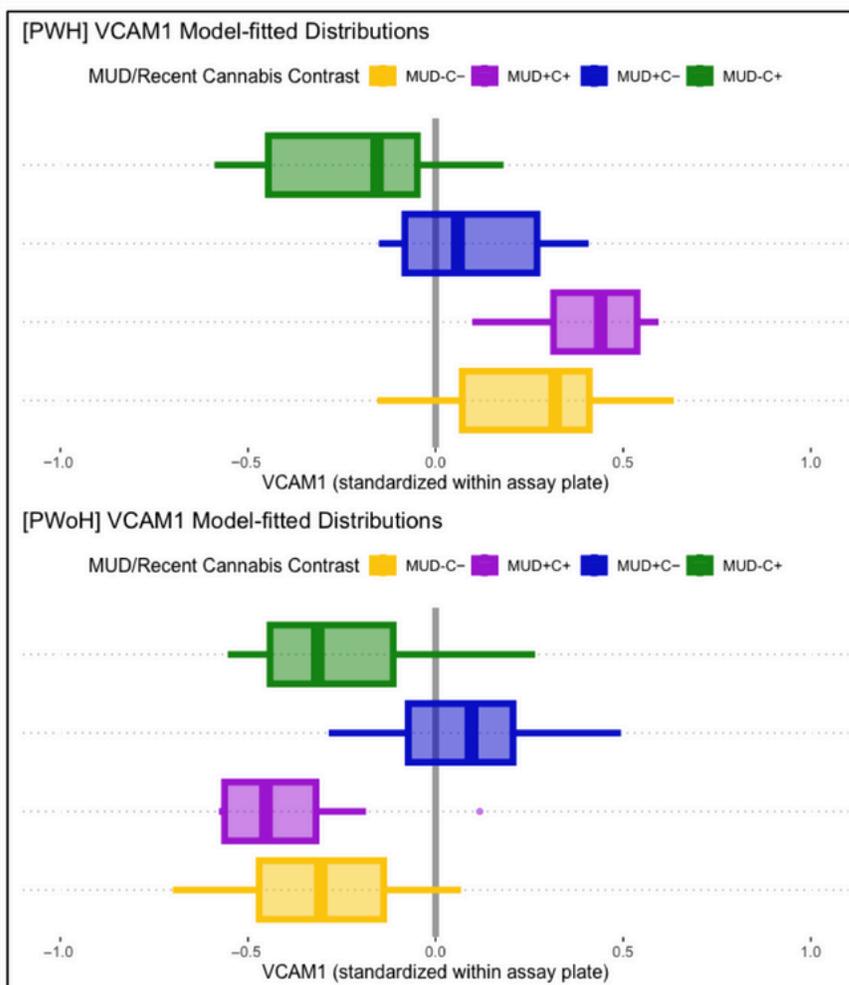
HIV continues to be a public health issue and an incurable chronic infection, despite the availability of antiretrovirals to change the fate from a fatal to a chronic immunodeficiency. Persons living with HIV (PWH) have a high incidence of co-morbid disorders that result from chronic inflammation, including neurological disorders. Importantly, HIV infection rates remain high among people who use addictive substances, especially stimulants such as Methamphetamine (METH). METH further increases risk for aggravating the effects of HIV. Importantly, METH users also use other drugs, cannabis being amongst the most common. Yet, little is known about whether METH or cannabis interact with HIV to modify disease outcomes, and less is known about how these disease modifying outcomes can be tracked with biomarkers.

At San Diego BioMed, the Marcondes lab and the UCSD HNRC and Department of Psychiatry joined forces to examine potentially interacting associations between lifetime methamphetamine use disorder (MUD), recent cannabis use, and HIV. To do this they used four plasma biomarkers for immune and inflammatory functions (CXCL10/IP-10, CCL2/MCP-1, ICAM-1, and VCAM-1).

The researchers analyzed blood levels of all four biomarkers and found that recent cannabis use was associated with lower levels of all four biomarkers in PWH who also had a history of methamphetamine use disorder. However, reduced VCAM-1 levels in people with recent cannabis use was only seen in people without HIV, suggesting that cannabis provided a protective effect on vascular health in this group. These data is shown in the figure to your left. Overall, the findings suggest that cannabinoid-related pathways could be promising targets for treating chronic inflammation caused by HIV and methamphetamine use.

The Marcondes lab is invested in basic and translational science that will help populations of substance users to decrease rates of HIV infection and reverse the damaging effects of METH use. This is a real teamwork effort. Congratulations to all researchers involved, and in particular to the first author of the study, from SDSU/UCSD joint doctoral program, Dr. Jeffrey Rogers.

Read and learn more at
<https://doi.org/10.3390/v17081143>



The figure shows estimated VCAM-1 levels grouped by methamphetamine use disorder history (MUD), recent cannabis use, and HIV status (people with HIV in the top panel and people without HIV in the bottom panel). Those with past-month cannabis use displayed lower VCAM-1 than the comparison group in PWH, but not in PWoH. Those with MUD but not recent cannabis use displayed significantly higher VCAM-1 levels in PWoH, but not in PWH.



Endothelial $\alpha v \beta 3$ integrin induction during hypoxia protects blood–brain barrier integrity

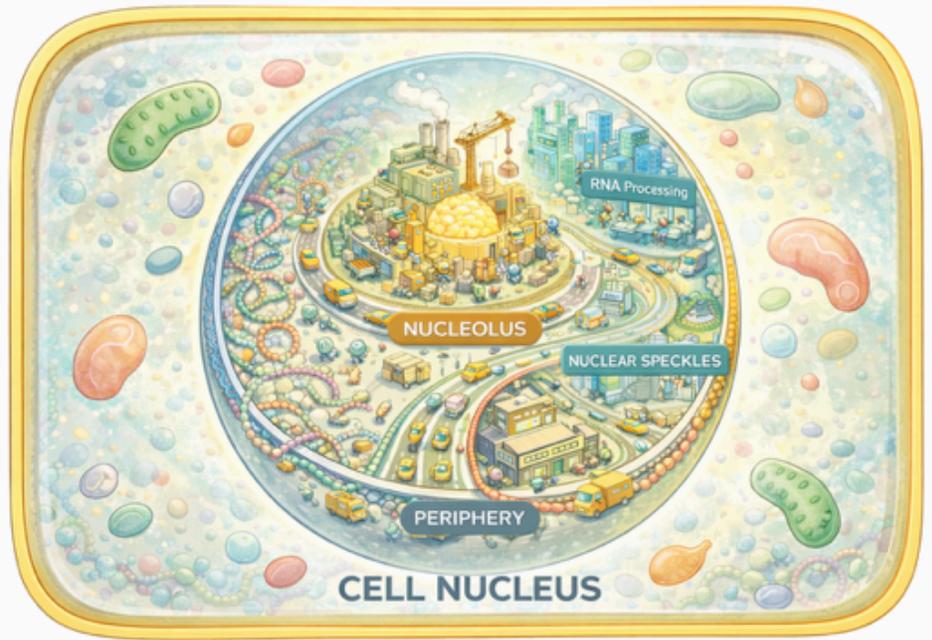
PUBLISHED IN **Proceedings of the National Academy of Sciences of the United States of America (PNAS)**

Your brain houses what's called the Blood Brain Barrier (BBB), which is critical for maintaining brain stability and equilibrium. The natural deterioration of the BBB with age is an important factor in controlling the risk of neurological disease, particularly vascular dementia. The Milner Lab at San Diego BioMed has extensively studied the BBB and the impact of hypoxia on transient vascular breakdown. Their results have defined a novel protective role for a cell type called microglia in preventing hypoxia-associated transient vascular disruption, both in the brain and in the spinal cord.

In this manuscript, the Milner lab builds on their finding that hypoxia stimulates receptor $\alpha v \beta 3$ integrin induction on brain blood vessel endothelial cells. The Milner Lab investigates whether $\alpha v \beta 3$ integrin exerts a destructive or protective influence on BBB integrity. After careful observations, their discoveries suggest that hypoxic induction of endothelial $\alpha v \beta 3$ integrin enhances BBB integrity by stabilizing endothelial adhesion. This raises the interesting possibility that pharmacological upregulation of endothelial $\alpha v \beta 3$ integrin in the aged brain might hold therapeutic promise to prevent and treat vascular dementia.

Read and learn more at: <https://www.pnas.org/doi/10.1073/pnas.2510931122>

An integrated view of the structure and function of the human 4D nucleome



If your DNA is an instruction manual for almost all cellular activities, rewriting that manual may open a pathway to tailoring your genetic makeup to any needs. That possibility drives much of today's studies of DNA.

DNA sits in the cell nucleus, but it isn't just a loose string. DNA folds into a dynamic 3D shape to manage the most immense data storage density and scale imaginable. Understanding the processes behind this phenomenon is the goal of the 4D Nucleome (4DN) project—"nucleome" meaning a complete description of the cell nucleus in space and time analogous to genome, transcriptome, metabolome and proteome. This program funded by the National Institutes of Health brought together scientists from many organizations with the objective of understanding the 3D organization of the DNA in the nucleus and how that organization changes over time.

The latest development of the 4DN program is summarized in a manuscript titled, "An integrated view of the structure and function of the human 4D nucleome," published last month in *Nature*, and featured on the journal's cover.

In this paper, the researchers pay close attention to how nuclear organization affects normal development and various diseases. They studied the 3D structure of the human nucleome to see how DNA loops and folds. They discovered that the way DNA is folded helps decide when and how genes are used and found over 140,000 looping connections where distant parts of DNA touch each other in 3D. Each of these folds can affect cell behavior and possibly contribute to disease. Novel technology also helped the researchers build computer models that predict how DNA is arranged in space and how that arrangement links to gene activity.

San Diego BioMed congratulates the Gilbert Lab as contributors to the manuscript, demonstrating that when and where a chromosome segment is copied affects the structure that forms afterward. Their data also reveals some of the molecular mechanisms that link structure to function. Chromosomes are highly organized structures of manageable pieces of DNA that are wrapped around proteins. Since disruptions in chromosome organization are found in virtually all diseases, understanding the mechanisms that control their structure opens the door to correcting them, paving the way to new pathways to therapies or cures.

This international effort brought together more than 150 laboratories, unified their work into a single story that maps, analyzes, and classifies DNA interactions, plus provides guidelines for future studies.

Read and learn more at <https://www.nature.com/articles/s41586-025-09890-3>

San Diego BioMed participates in Global MAP Foundation Youth Med-Surg discovery Program at Brown Simulation Center in Sharp Grossmont



Scientists from San Diego BioMed's Marcondes lab participated in the amazing initiative coordinated by Dr. Allain Legend Raymond, a cardio thoracic surgeon, and founder the Global MAP Foundation, to provide teens with exposure to medical sciences.

The Med-Surg Discovery workshop was geared at teenagers from 13 to 17 years old and took place on November 8th at the James Brown Simulation Center in Sharp Grossmont. Over 30 teenagers showed up, from La Mesa to Chula Vista. The participants learned to perform life-saving CPR, examined thoracic anatomy in detail, learned principles of surgery and heart dissection, and had the opportunity to learn about pathology of heart and other organ tissues.

San Diego BioMed and the Global MAP Foundation are aligned in the mission to empower the next generation to learn science, and to give people of all ages, backgrounds, and walks of life the opportunity to reach their full potential with dignity.



Weekly workshops

Even with 13 distinct labs that operate with a gracious independence, San Diego BioMed never feels like separate parts creating a whole, but rather one harmonious entity. Interlab connections are prevalent daily in the flow of the San Diego BioMed environment.

Core testaments to this include our Science in Focus Seminars and our Journal Club.

Twice a month our Journal Club members meet to discuss and critically evaluate research published in leading international scientific journals. In addition, research conducted at San Diego BioMed is presented in monthly focused seminars by our principal investigators and postdoctoral fellows. San Diego BioMed also hosts science in focus seminars from vendors or guest speakers. These seminars and discussions play a large part in offering endless opportunities to learn from each other, while also training students or aspiring professionals in their field of interest.





INSTITUTE BAKE OFF

Happy Holidays from the San Diego BioMed Team!

Happy New Year from the San Diego BioMed team to friends, family, loved ones, and all those who support us!

Amidst our daily and weekly routines, San Diego BioMed always strives to balance the hard work with hard play. Whether it's dressing up, sharing food in a bakeoff, or stepping away from the lab to explore the city together, we enjoy building memories that last. When we join together off the bench, we create stronger teamwork on it.

We thank everyone for another successful year and look forward for many more to come!



HALLOWEEN 2025

Rounding out the year &...



A MERRY SAN DIEGO BIOMED



CHRISTMAS WITH COLLEAGUES



WHITE ELEPHANT



HOLIDAY LUNCH

welcoming 2026...

The Bench & Beyond



Stay Tuned!

Thank you for reading San Diego BioMed's triannual newsletter - The Bench & Beyond. We look forward to your continued support!

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