NORTHERN CALIFORNIA INSTITUTE FOR RESEARCH AND EDUCATION

D|N|A

DETAILS　　　NEWS　　　AWARDS

Focus on Research

Images from advanced MRI at the center of novel research, collaborations

In Dr. An (Joseph) Vu's line of work, the adage, "a picture is worth a thousand words," is an understatement.

A physicist specializing in ultra-high field magnetic resonance neuroimaging, Vu—who is Director of Advanced Imaging Technology at the VA Advanced Imaging Research Center (VAARC) and Assistant Professor of the Univeristy of California, San Francisco (UCSF) Department of Radiology and Biomedical Imaging—is boosting an already-powerful tool to better depict the complex inner workings of the brain.

New "pictures" offer more detailed stories of circuitry and metabolic processes that may be at the root of neurological disorders and may also show targets for novel therapies.

Since coming to the San Francisco VA Health Care System (SFVAHCS) in 2016, Vu's research has focused on improving the amount of visual information decodable from human magnetic resonance imaging (MRI). Notably, he has advanced the spatial and temporal resolution achievable in functional MRI (fMRI), which maps brain activity by tracking blood flow changes, and diffusion MRI (dMRI), which shows how water molecules diffuse through biological tissues.

Vu's main research instrument is the Siemens 7 Tesla (7T) MRI, located at the SFVAHCS. Only about 30 institutions in the U.S. have a 7T MRI, a machine so powerful and precise that it can image less than a millimeter of tissue. Crucial to extending 7T imaging capabilities beyond the brain to the rest of the body,

An (Joseph) Vu PhD, MRSO (MRSC™)

Director, Advanced Imaging Technology,
VA Advanced Imaging Research Center (VAARC)
San Francisco VA Health Care System

Assistant Professor, Department of Radiology and Biomedical Imaging
University of California, San Francisco

it is the only wide-bore, whole-body 7T in Northern California.

Next generation MRI

Vu is also part of a University of California, Berkeley-led international effort to improve MRI for studying the human brain through the development and

dissemination of the "NexGen 7T" scanner. The ultra-high resolution scanner allows research on underlying changes in brain circuitry in a multitude of neurological and mental disorders, such as dementia, Parkinson's disease, epilepsy, stroke, and autism. The project is part of the Brain Research Advancing Innovative Neurotechnologies (BRAIN) Initiative of the National Institutes of Health (NIH).

"The benefits and power of the NexGen 7T are multi-faceted," said Vu. "The more than doubling of field strength relative to standard clinical scanners is key to achieving high resolution. However, the crowning achievement is the new head gradient system, which is an order of magnitude more powerful than those in traditional 7T scanners and allows for the unprecedented speed and resolution we are now seeing."

"One NexGen 7T benefit for clinical imaging is its user-friendly incorporation of cutting-edge radiofrequency pulse sequence design," he said. "Traditionally, the RF pulse sequence optimization is a very involved process that is done on a per-subject basis. One had to acquire calibration scans, model the head, and calculate how best to excite the whole brain."

"Not every 7T site has the time, expertise, and capability for such an optimized scan protocol," said Vu. "However, with the new pre-calibrated Universal Pulses technique, the images come out very nice on any subject right out of the box. In the past, some clinicians and collaborators have been hesitant to go to 7T because such technology was not readily available."

"These new NexGen 7T technologies remove the hesitancy bottleneck for widespread adoption in clinical neuroimaging and research. It is a game changer."

Pictured: the Seimens 7 Tesla (7T) Plus with a 60 cm bore located at the VA Advanced Imaging Research Center (VAARC). Only about 30 institutions in the U.S. have a 7T MRI and this is the only wide-bore, whole body 7T in Northern California. *Photo courtesy of UCSF.*

SFVAHCS research, collaborations

As Director of Advanced Imaging Technology at the VAARC, Vu is a steward and developer of state-of-the-art MRI technology for clinicians and scientists who are investigating a wide range of neurological disorders and potential therapeutic targets.

These include projects with fellow NCIRE-supported scientists who are addressing VA National Research Priorities, such as Gulf War illnesses (Dr. Linda Chao), traumatic brain injury (Dr. Pratik Mukherjee), as well as pain and opioid addiction (Dr. Irina Strigo).

Often, Vu is at the center of cross-departmental and cross-institutional research at the SFVAHCS. An example is an NIH-funded study led by psychiatrist Dr. Thomas Neylan, research neuroscientist Dr. Linda Chao, and medical informatics and Artificial Intelligence expert Dr. Duygu Tosun-Turgut. The project is testing the hypothesis that PTSD is associated with changes in gray matter myelin content, which affects functional circuits in the brain.

It involves the study of postmortem brain tissue from the National Center for PTSD Brain Bank with collaborators from the Boston VA, as well as living subjects, studied using advanced brain imaging with academic and industrial collaborators at VA Palo Alto Medical Center, Stanford University, Siemens, and SyMRI.

"My role is to oversee the optimization, integration, and harmonization of the advanced MRI technologies employed in this multi-site study, which includes advanced fMRI and Diffusion Imaging, MRI Fingerprinting, and Synthetic MRI, which promises to provide a wealth of information—including estimations of myelin content—in just a matter of minutes," said Vu.

Vu's team at the SFVAHCS's VAARC also handles the acquisition, processing, and analysis of the MRI data for this collaborative study.

Metabolic imaging technology

For research, the 7T MRI is associated largely with brain circuitry and function. Vu, however, now teams also with SFVAHCS researchers in novel studies that explore metabolism in the brain.

"The heightened image quality and fine-grained detail available from the 7T scanner allow neuroscientists to see the brain's neural circuits at the mesoscopic scale of cerebral columns and cortical layers," said Vu.

"Similarly, the granularity of 7T magnetic resonance spectroscopy, which is the foundation for metabolic imaging, has advanced to incredibly high spectral-spatial resolutions."

"We can now study the metabolic effects of psychiatric disorders on brain health in ways that are not available on standard clinical MRI scanners," he said. "MRI and magnetic resonance spectroscopy have become the go-to technology for non-invasive, metabolic imaging of the human brain."

Vu collaborates with Dr. Judith Ford, Co-Director of the UCSF Brain Imaging and EEG Laboratory, and Dr. Yan Li, Director of the UCSF Multimodal Brain Imaging Lab, in a study to quantify the metabolic effects of a ketogenic diet in patients with schizophrenia.

Ford has recently been investigating the benefits of a keto diet on patients struggling with psychiatric conditions such as psychotic bipolar disorder or schizophrenia. The keto diet has functioned as a medicinal tool since 1921 when scientists found it reduced the number of seizures in patients with epilepsy by "calming" the brain's excitability.

She hypothesizes that the common high-carb diet creates instability in the brain's neural networks in patients with schizophrenia and bipolar disorder. The keto diet has shown much promise but needs hard data and meticulous research before it can gain support from health professionals and the broader public.

The study will now provide a wealth of information for researchers studying diet and its benefits. The data collected also include measurements of ketone levels in the blood and the structural and functional images of the brain captured by the 7T scanner.

In a separate study, Li is using a new tool called "deuterium metabolic imaging" to investigate how patients with neurological and psychiatric diseases metabolize glucose—the brain's primary energy source. Comparing scans from healthy brains to those of people with psychosis will help illuminate mechanisms that cause depressive symptoms and perhaps identify treatments for depression.

Skin sodium imaging

In a VAARC study that doesn't involve the brain, Vu collaborates with MRI physicist Dr. Jeremy Gordon and dermatologist Dr. Katrina Abuabara to understand whether dietary sodium increases skin inflammation and whether reducing dietary sodium can ease eczema.

That skin condition is the most common among adults and Veterans, impacting up to 10 percent of the population.

The study will examine whether eczema severity improves after a low-sodium diet. Skin sodium concentration will be measured in research participants using a novel, non-invasive 7T MRI technique. The results will help establish evidence for causal associations between dietary sodium, skin sodium, and protein markers that will be useful in future clinical trials of eczema and other cardiovascular and inflammatory immune conditions.

Committed to clinical collaborations.

Vu has always been interested in clinical research. "Although I majored in electrical engineering as an undergrad and bioengineering in graduate school, I also sought out and enjoyed courses in psychology, neuroscience, anthropology, and even culture," he said.

"Joining the faculty at the SFVAHCS and UCSF and having the opportunity to collaborate with clinicians continue to fuel my interest in applying advanced MRI technology to answer clinical questions about the brain and body and to assist in the development of diagnostic tools and treatments for diseases for which currently none exist," said Vu.

"In just the past five years at the SFVAHCS, I've had the pleasure of collaborating on over 20 projects utilizing and expanding the advanced imaging resources at the VAARC. Being able to help my research collaborators—the VAARC family—succeed, grow, and flourish is a big part of what gets me out of bed each day."

Indeed, Dr. An (Joseph) Vu gets the big picture.
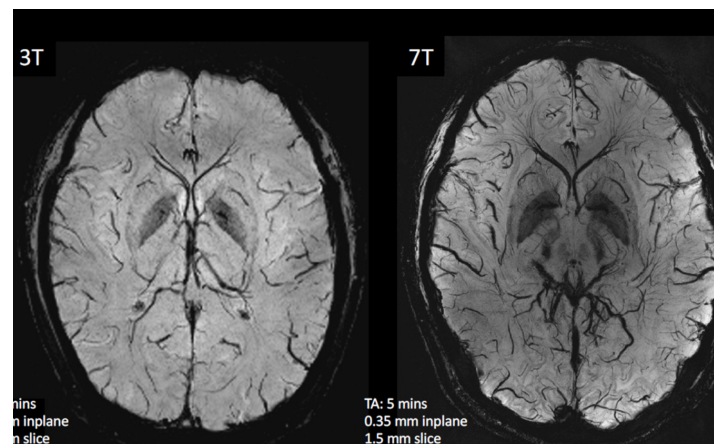
Pictured: a photo comparison of a brain scan using a Seimens 3T model MRI machine versus the more detailed scan provided by the Seimens 7T. *Photo courtesy of Dr. An (Joseph) Vu.*

Q and A: An Interview with Dr. Carolyn Gibson

Q: How did you become interested in women's health?

A: I was in the right place at the right time. I was a psychology major interested in mental health in vulnerable populations, and my first job out of college (University of Virginia) was a research assistant at the National Institute of Mental Health (NIMH), in a lab that focused on reproductive hormones and mental health; so not exclusively women's health, but things like premenstrual dysphoric disorder (PMDD) and depression in perimenopause.

That was my first exposure to women's health and recognition that half the population is understudied when it comes to biomedical research. I started there in 2002, the month after the Women's Health Initiative trial was halted. That was a huge clinical trial studying menopausal hormone therapy; and it was halted early out of concerns about cancer and cardiovascular risks, leading to a sudden and dramatic decline in hormone therapy prescribing and just a sea of change in menopause care. We have long since had a better understanding of that data and maintain that hormone therapy is a safe and effective treatment option for bothersome hot flashes and night sweats for many women when started within 10 years of menopause or by age 60.

Q: So, it was that early in your career when you developed your commitment to women's health and mental health?

Carolyn Gibson, PhD, MPH, MSCP

Women's Mental Health Psychologist
San Francisco VA Health Care System

Associate Director, Center for Data to Discovery and Delivery Innovation (3DI)
San Francisco VA Health Care System

Associate Professor, Psychiatry
University of California, San Francisco

Co-Director, UCSF Women's Health Clinical Research Center
University of California, San Francisco

A: Being at the NIMH felt like being at the epicenter of the discussion in hormone therapy and the change that came after. It was a crash course in menopause and menopause care at a time when suddenly everything we had known was up in the air. I was fascinated by the confluence of biological and psychosocial factors contributing to women's health and mental health; especially in the menopause transition and by how little we knew and talked about this pivotal period in the lifespan. I've kept going in this area ever since, and it just keeps getting more interesting.

Q: The overwhelming majority of Veterans Affairs (VA) patients are men. Why is the San Francisco VA Health Care System (SFVAHCS) a good place for women's health research?

A: I think the VA is the ideal place to study women's health. Women Veterans are a rapidly growing patient population at the VA with complex care needs. I chose to make my career here at the VA because I saw real opportunity to make a meaningful difference in this setting.

I've stayed here because I love working in the communities that build around women's health, including the Women's Mental Health Program and Women's Clinic—where I provide clinical service here at the SFVAHCS—and the national women's health research community, a small but strong network of dedicated, passionate, and collaborative investigators who are committed to informing and improving women's health and health care.

Maybe because it is a smaller focus area, it seems a little easier to be a bigger fish in a small pond and to have meaningful connections and collaborations with national operational partners. We also have resources that help with the inherent challenges of working with a smaller population, like the National Women's Health Practice-Based Research Network to facilitate recruitment and the Women's Health Research Network that promotes collaboration and resource-sharing. With their

encouragement and support, two external colleagues and I launched a national Menopause Research Workgroup this year, with over 30 members from 25 VAs and program offices that participate in bimonthly meetings, resource sharing, and a growing number of collaborations.

Q: What have been some of your key studies and findings?

A: My background is in clinical health psychology, and I really think of mental and behavioral health as all part of health—for example, it is rarely just depression in isolation, but depression along with comorbid medical conditions, life stressors, reproductive health, and more.

The menopause transition can be a period of vulnerability for mental health, chronic health conditions, and bothersome symptoms; but it also is a period of opportunity for reflection and health promotion to improve the trajectory of aging.

Some of my key findings have focused more on that negative side of the scale, showing that women Veterans may have a high burden of menopause symptoms, and showing links between menopause symptom burden, interpersonal trauma exposure, and a range of psychological, aging-related, and chronic health conditions in women.

My current work has been more focused on patient-centered intervention and understanding menopause-related care needs in the VA, informing VA training and program development efforts in this understudied area.

Q: Research and being a Principal Investigator can be arduous. What keeps you motivated?

A: There have been a lot of times that I have been tempted to walk away—when painful administrative tasks and obstacles dominate my time and energy, and some stretches when conducting research felt isolating and without impact.

What keeps me coming back is a sense of mission and purpose and really focusing on community and collaboration. I try to prioritize projects and partnerships that can have a meaningful impact. I feel lucky to have amazing colleagues, mentors, and mentees that I truly enjoy working with and learning from—most of whom happen to be strong, supportive, brilliant women.

Q: You were recently named Associate Director of the new Center for Data to Discovery and Delivery Innovation (3DI), directed by Dr. Salomeh Keyhani. Please tell us about this program.

A: The center brings together almost 30 health services researchers across service lines and disciplines with strong connections to local, regional, and national operational partners. We are just getting started and working hard to build infrastructure and promote community across 3DI with the goal of supporting research and training to amplify health services research on a local and national level with a focus on behavior change.

We hope to benefit research at the SFVAHCS by reducing pain points in the research process, providing methodological and administrative resources, sharing resources and knowledge, facilitating collaboration, and accelerating translation and dissemination. We hope to break down silos not just in research, but also between research and clinical service. It is a very collaborative effort, with Dr. Keyhani leading the charge and an active team of core leads, dedicated staff, and core investigators shaping the vision of 3DI.

Q: What would most people be surprised to know about you?

A: I'm not sure there's much that's surprising. I go through about a book (or audiobook) a week. I never want to play super strategy board games, sing karaoke, or hear about crypto. I can spend hours writing a sentence. I love but constantly lose travel coffee mugs. I also went to Shark Camp.

The Three Major Research Goals of 3DI:
1. Identification and targeted screening for health-impairing behaviors (e.g., substance misuse, disordered eating, and insufficient sleep)
2. Engagement of Veterans in evidence-based care and self-management strategies
3. Implementation of innovative models of evidence-based care that facilitate behavior change

Learn more about the 3DI program at https://www.hsrd.research.va.gov/centers/3di.cfm

New Federal Funding Awards

Congratulations to the following Principal Investigators for your recently funded awards!

Daniel Mathalon, MD, PhD
Project Title: Clinical Trial Data Processing, Analysis, and Coordination Center (CT-DPACC) for the Accelerating Medicines Partnership Schizophrenia (AMP SCZ) Project
Sponsor: NIH via subaward
Activation Date: TBD

An Vu, PhD
Project Title: Narrowing the Mechanistic Gap For Anterior Prefrontal Cortex Function
Sponsor: NIH via subaward
Activation Date: 9/5/2024

Kelly Wentworth, MD
Project Title: Elucidating the Role of TGF-Beta Signaling in Craniofacial Fibrous Dysplasia of the Bone
Sponsor: National Institute of Dental & Craniofacial Research
Activation Date: TBD

Michael Shlipak, MD
Project Title: Kidney Tubular Damage and Dysfunction in Autosomal Dominant Polycystic Kidney Disease
Sponsor: NIH via subaward
Activation Date: TBD

Raymon Swanson, MD
Project Title: Genetic Variants Conferring Susceptibility to Toxicant-Induced Parkinson's Disease
Sponsor: USAMRAA via subaward
Activation Date: TBD

An Vu, PhD
Project Title: Circumventing the Pharmacokinetic/ Pharmacodynamic Limitations of Antioxidant Therapy for Parkinson's Disease By Nose to Brain Delivery of N-acetylcysteine
Sponsor: NIH via subaward
Activation Date: 10/03/2024

Funding Opportunities

Industry Opportunities

Please contact Newton Ong, newton.ong@ncire.org, or Adan Pinedo, adan.pinedo@ncire.org, for further information on the following Industry Opportunities.

Immunome
A phase 1 study of IM-1021 in participants with advanced malignancies." IM-1021 is an Antibody Drug Conjugate targeting ROR1.

Telix Pharmaceuticals
A Multinational, Multicenter, Prospective, Randomized, Controlled, Open-Label, Phase 3 Study of Lutetium-177 Rosopatamab Tetraxetan Plus Standard of Care Versus Standard of Care Alone for Patients with PSMA Expressing Metastatic Castration-Resistant Prostate Cancer Previously Treated with Androgen Receptor Pathway Inhibition.

PearBio
PEAR-TREE2: **P**rospective **E**valuation of **AI R**&D tool for patient stratification: a **T**rial for **R**enal immuno-oncology model **E**xperimental **E**valuation 2.

Please visit the Office of Sponsored Research page on the NCIRE SharePoint at https://ncire.sharepoint.com/ or click [here](#) for the full list of Industry Opportunities.

Federal Funding Opportunities

Please contact Jessica Schmidt, jessica.schmidt@ncire.org, for further information on the following Federal Funding Opportunities.

NIH: [Artificial Intelligence in Pre-clinical Drug Development for AD/ADRD (R01 Clinical Trial Not Allowed)](#)
(RFA-AG-24-049)
National Institute on Aging
• Application Deadline: February 13, 2025

Funding Opportunities continued

NIH: [Alcohol Treatment, Pharmacotherapy, and Recovery Research (R01 Clinical Trial Required)](#)
(PA-25-163)
National Institute on Alcohol Abuse and Alcoholism
• Application Deadlines: February 5, 2025; June 5, 2025; October 5, 2025

NIH: [Pilot Hybrid Effectiveness-Implementation Trials for Mental Health Interventions (R01 Clinical Trial Required)](#)
(PAR-25-178)
National Institute of Mental Health
• Application Deadlines: February 14, 2025; June 17, 2025; October 15, 2025

Please visit the Office of Sponsored Research page on the NCIRE SharePoint at https://ncire.sharepoint.com/ **or click** [here](#) **for the full list of Federal Funding Opportunities.**

In the Helix

Morgan Nguyen
NCIRE Staff Research Associate III, Supervisor

Q: What's the best piece of advice you've ever been given?

A: The best advice I've received is to celebrate the process, not just the end result. Completing a study involves research, critical thinking, writing, and overcoming challenges—each step is an accomplishment. Take a moment to allow yourself to feel pride and recognize your growth and persistence, regardless of the outcome.

Q: What was your best memory from this year?

A: One of my most memorable moments this year was collaborating with researchers from diverse disciplines. While it's often assumed that a team must specialize in the same field to effectively tackle a research topic, I found that bringing together experts from varied backgrounds truly enriched the project.

Q: What's something you are looking forward to in 2025?

A: I'm excited to see how advancements in computational models and neurotechnology will enhance our understanding of neurological disorders, with important implications for both research and clinical applications.

Adan Pinedo
NCIRE Contracts and Grants Specialist III

Q: What's the best piece of advice you've ever been given?

A: One of the most valuable pieces of advice I received was to approach work as an ongoing experiment. Formulate and test hypotheses and be prepared to adjust when outcomes are not as expected.

Q: What was your best memory from this year?

A: One of my most memorable experiences from the past year was traveling to San Francisco and meeting everyone in person. It provided an excellent opportunity to connect face-to-face and visit the main NCIRE office. Additionally, San Francisco itself is a wonderful city to explore.

Q: What's something you are looking forward to in 2025?

A: In 2025, I believe we are all striving for greater stability. I am eager to see continued growth in the awards and contracts secured at NCIRE and to witness the impressive progress made by our investigators.

> If you know an NCIRE employee and would like to be featured in *In the Helix*, contact us at **dna@ncire.org**.
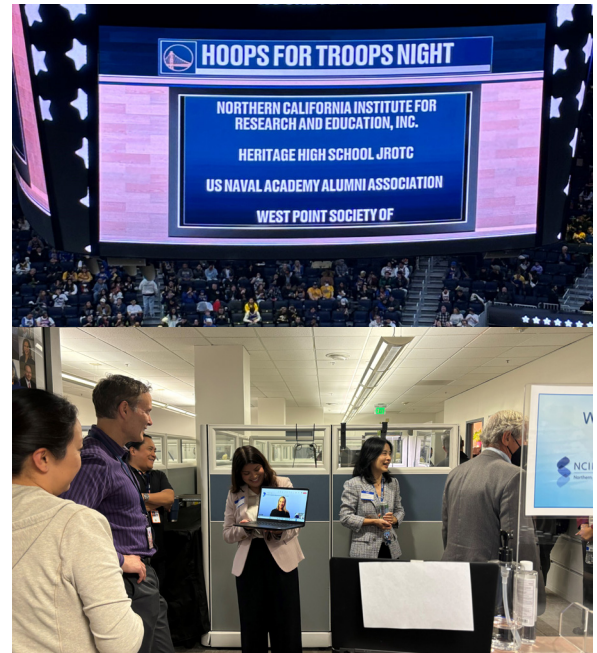
Message from the Chief Executive Officer

It is hard to fathom we are at the end of another year; 2024 brought many successes, opportunities, challenges, and changes.

NCIRE was proud to join the Golden State Warriors honoring our Veterans and active service members at Hoops for Troops on Monday, 11/25/24.

An inaugural Open House was held on 10/17/24, at NCIRE. The event was well attended. It provided an opportunity for Administrative Staff to connect with SFVAHCS Research Staff.

NCIRE offers two generous retirement plans that represent a component of each employee's total compensation package. The Plans are audited annually; both the 403b and Defined Contribution plans. As of December 31, 2023, the combined Net Asset value of both plans represented $49.6M, ~21.5% increase from last year. The audit reports for the calendar year ending 2023 were issued at the end of September 2024. The reports with the Plan accounting and management practices, resulting in a "clean" audit.

I am pleased to share Research Highlights for Fiscal Year 2024:

104 total applications Fiscal Year 2023 - 114 applications A decrease of ~10% from 2023	26 New Federal Awards Fiscal Year 2023 - 34 New federal award A decrease of ~24% from 2023	10 CRADA (industry research funding) Fiscal Year 2023 – 17 New CRADAs A decrease of ~41% from 2023
	4 Other Awards (state, foundation, etc.)	

In the fiscal year 2025 financial planning, there are 51 active investigators, compared to 55 in 2023.

Indirect costs represent administrative expenses associated with the cost of supporting research. Indirect costs are incurred for the benefit or joint objectives of a specific project and organizational activities. These costs are allocated equitably across the organization's activities. Please see details and analysis of distribution of NCIRE's indirect revenue, here.

Reminder, NCIRE's Administrative Office will observe a Winter Closure, 12/23/24-1/1/25. We will resume normal hours 1/2/25. I sincerely wish a happy and safe holiday season to all.

Rebecca Rosales, MBA, CRA
Chief Executive Officer

About NCIRE

NCIRE - The Northern California Institute for Research and Education, Inc. has one mission and one goal: Advancing Veterans Health. We sustain a scientific community of clinicians and researchers and support nearly 200 researchers who have joint faculty appointments at the University of California, San Francisco (UCSF) and the San Francisco VA Health Care System (SFVAHCS) and are working to foster innovation through leadership in the field of Veterans health research. Our broad portfolio of projects receives generous support from the National Institutes of Health, the Department of Defense, and individual donors, making us the largest nonprofit research institute devoted to Veterans health in the US.

NCIRE is a 501(c)3 nonprofit. (Tax ID #94-3084159). Visit NCIRE at www.ncire.org

Follow us on Linkedin:
https://www.linkedin.com/company/ncire

Follow us on Instagram:
https://www.instagram.com/ncireveterans/

Like us on Facebook:
https://www.facebook.com/NCIREVeterans

Follow us on Twitter:
https://twitter.com/NCIRE-Veterans

Follow us on Threads:
https://www.threads.net/@ncireveterans

The DNA Newsletter is an NCIRE Publication.
Editor-in-Chief: Rebecca Rosales, Chief Executive Officer
Staff Contributors: Tai Arceneaux, Lydia Blednyh, Andy Evangelista, Newton Ong, Diana Caal, Azarah Wong, Elena Brown, and Theresa Gio.
Please send comments to dna@ncire.org