HAWAII PACIFIC NEUROSCIENCE

BRITL (Brain Research, Innovation & Translation Laboratory)

2023-2024 Publications and Presentations

Hawaii BRITL

PUBLICATIONS

2024 BRITL Brain Research, Innovation & Translation Laboratory

Aloha and welcome to the final presentations of the 2024 Hawaii Pacific Neuroscience Summer Internship Program! We are thrilled to showcase the research projects developed by 40 talented research students, guided by 16 dedicated medical students from the John A. Burns School of Medicine. This is the largest cohort of research interns this program has ever accommodated and students have come to Hawaii from as far away as London, England and the Czech Republic.

This year marks the sixth iteration of our Summer Internship Program, a pioneering initiative in Hawaii designed to cultivate a dynamic partnership among undergraduate, graduate, and medical students. Over the academic year, University of Hawaii medical students engage in research projects, and this summer, they have had the opportunity to design, conceptualize, and lead new research initiatives alongside our summer interns. We are particularly proud to celebrate a full-circle moment this year as two former Summer Internship Program students, now second-year medical students, took on leadership roles for the first time.

Throughout the eight-week program, our scholars have conducted clinical research at Hawaii Pacific Neuroscience, gaining invaluable insights into the fundamental aspects of medical and clinical research. Their projects spanned a wide range of neurology topics, including Alzheimer's Disease, migraines, seizures, and neuropathy, among others. They also benefited from lectures by distinguished faculty from the John A. Burns School of Medicine's Department of Quantitative Health Sciences and Hawaii Pacific Neuroscience.

To our summer interns: we are immensely proud of your hard work and dedication. Your ability to embrace new challenges and adapt to the evolving landscape of medicine and research has been truly impressive. We hope this summer has been a rewarding experience, and we encourage you to consider pursuing a career in healthcare or medical research in the future. Congratulations and mahalo nui loa for your outstanding contributions.

Sincerely,

DAR (D-Dré Wright, Anita Cheung, and Ryan Nakamura)
2023 BRITL Scholars
2024 BRITL Scholars and Project Leaders
University of Hawai'i at Mānoa, John A. Burns School of Medicine, Class of 2026

2023-2024 Full Length PUBMED Indexed Publications led by BRITL student scholars

Tiffany Cava Morden F, Xin Liang B, Nguyen L, Carrazana E, Ghaffari-Rafi A, Kai Liow K. Partial Rhombencephalosynapsis Presenting in an Adult with Cerebello-Trigeminal-Dermal Dysplasia. Epilepsy Behav Rep. 2024;27:100688. doi: 10.1016/j.ebr.2024.100688. eCollection 2024. PubMed PMID: 39050404; PubMed Central PMCID: PMC11268192.

Weldon EJ, Nakamura RW, Van T, Goo C, Lee AY, Jahansooz JR, Carrazana E, Liow KK. Exercise and Recovery Following Mild-to-Moderate Traumatic Brain Injury in the Community Setting. Cureus. 2024 Feb;16(2):e53459. doi: 10.7759/cureus.53459. eCollection 2024 Feb. PubMed PMID: 38435185; PubMed Central PMCID: PMC10909398.

Goo C, Morden F, Wong K, Aquino S, Kawamura J, Rubel V, Masca S, Gorenflo R, Carrazana E, Liow K. Familiarity and Perceptions of Aducanumab in Caregivers of Hawaii Alzheimer's Disease Patients: Results of a Telephone Survey. Cureus. 2023 Dec 5;15(12):e50001. doi: 10.7759/cureus.50001. PMID: 38186481; PMCID: PMC10767469.

Kim NN, Tan C, Ma E, Kutlu S, Carrazana E, Vimala V, Viereck J, Liow K. Abnormal Temporal Slowing on EEG Findings in Preclinical Alzheimer's Disease Patients With the ApoE4 Allele: A Pilot Study. Cureus. 2023 Oct;15(10):e47852. doi: 10.7759/cureus.47852. eCollection 2023 Oct. PubMed PMID: 38021568; PubMed Central PMCID: PMC10679961.

Lee AY, Jahansooz JR, Guittu D, Suzuki R, Pak L, Ishikawa KM, Goo C, Chen JJ, Carrazana E, Viereck J, Liow KK. Barriers to Alzheimer Disease Clinical Trial Participation in a Minority Population. Cogn Behav Neurol. 2024 Mar 1;37(1):40-47. doi: 10.1097/WNN.0000000000000359. PubMed PMID: 37878413; PubMed Central PMCID: PMC10948321

Weldon EJ 4th, Hong B, Hayashi J, Goo C, Carrazana E, Viereck J, **Liow K**. Mechanisms and Severity of Exercise Intolerance Following COVID-19 and Similar Viral Infections: A Comparative Review. Cureus. 2023 May;15(5):e39722. doi: 10.7759/cureus.39722. eCollection 2023 May. Review. PubMed PMID: 37398713; PubMed Central PMCID: PMC10310058.

Liang BX, Carrazana E, Viereck J, **Liow KK**. The Gomez-Lopez-Hernandez Syndrome: The Contribution of 2 Hispanic Giants of Pediatric Neurology. J Child Neurol. 2023 Apr;38(5):347-350. doi: 10.1177/08830738231176057. Epub 2023 May 18. PubMed PMID: 37203136.

Buffenstein I, Kaneakua B, Taylor E, Matsunaga M, Choi SY, Carrazana E, Viereck J, **Liow KK**, Ghaffari-Rafi A. Demographic recruitment bias of adults in United States randomized clinical trials by disease categories between 2008 to 2019: a systematic review and meta-analysis. Sci Rep. 2023 Jan 2;13(1):42. doi: 10.1038/s41598-022-23664-1. PubMed PMID: 36593228; PubMed Central PMCID: PMC9807581.

2023-2024 National and International Presentations led by BRITL student scholars

Cheung AJ, Nishimura MK, Miyaki KJ, Stephens TA, Weldon EJ, Jahansooz JR, Lee AY, Matsunaga M, Chang JC, Carrazana E, Viereck V, **Liow KK**. Exploring Radiculopathy in Underserved Communities: A Focus on AANHPI Populations and Risk Factors. **Neurology 102 (17_supplement_1), 5405 American Academy of Neurology 2024 Annual Meeting, April 15, 2024 Denver, CO**

The Safety and Efficacy of Dual Calcitonin Gene-Related Peptide Therapies for Migraine Treatment. Ho Hyun Lee, Reyn Yoshioka, Man Ian Woo, Lana Liquard, Julia Jahansooz, Edward Weldon, Anson Lee, Kyle Ishikawa, Nicole Little, Enrique Carrazana, Jason Viereck, Kore Liow. **Neurology 102 (17_supplement_1), 3820 American Academy Neurology Meeting, 2024 April.**

Tobacco, Marijuana, and Antidepressant Use Prior to Concussion Are Associated with Increased Depression Risk in Post-concussive Syndrome Patients. Eli Snyder, Ryan Nakamura, Miriya Ogawa, Kaylin Bersamin, Edward Weldon, Julia Jahansooz, Anson Lee, Kyle Ishikawa, Janette Abramowitz, Enrique Carrazana, Jason Viereck, Kore Liow. **Neurology 102 (17_supplement_1), 3832. American Academy of Neurology 2024 Annual Meeting; April 14, 2024; Denver, CO.**

Factors Associated with Depression Risk in Post-Concussive Syndrome Patients in Hawaii. 2024. Eli Snyder, Ryan Nakamura, Miriya Ogawa, Kaylin Bersamin, Edward Weldon, Julia Jahansooz, Anson Lee, Kyle Ishikawa, Janette Abramowitz, Enrique Carrazana, Jason Viereck,, Kore Liow. **American Neuropsychiatric Association 34th Annual Meeting; March 8, 2024; Houston, TX**

Cheung AJ, Nishimura MK, Miyaki KJ, Stephens, TA, Weldon EJ, Jahansooz JR, Lee AY, Matsunaga M, Chang JC, Carrazana E, Viereck V, Liow, KK. Exploring Radiculopathy in Underserved Communities: A Focus on AANHPI Populations and Risk Factors. The 3rd **International Conference on Controversies in Neuropathic Pain, November 20, 2023, Brussels, Belgium (Oral Platform Presentation)**

EEG slowing and CSF amyloid status: Implications for Alzheimer's disease detection and progression. N Kim, S Nakahira, A Lee, E Hagen, E Carrazana, J Viereck, K Liow. Journal of the Neurological Sciences 455. World Congress of Neurology, Montreal, CANADA, 2023 October

Investigating Young Atypical Stroke Risk Factors and Etiologies in Native Hawaiian and Pacific Islander Populations. D-Dre Wright, Michelle Lu, Anson Y. Lee, Edward J. Weldon, Julia R. Jahansooz, Kyle M. Ishikawa, Enrique Carrazana, Jason Viereck, Kore K. Liow. **Journal of the Neurological Sciences 455. World Congress of Neurology, Montreal, CANADA, 2023 October.**

Chronic Migraine and Comorbidity Characterization: A Focus on Native Hawaiians and Other Pacific Islanders. Anita Cheung MPH Michelle Lu, Anson Y. Lee, Julia R. Jahansooz MS, Edward J. Weldon, Meliza Roman, Enrique Carrazana, Jason Viereck, Kore Kai. Liow, Journal of the

Neurological Sciences, Volume 455, 121626 . 2023 **World Congress of Neurology, Montreal, CANADA, 2023 October.**

Impact of Return-to-Exercise on Traumatic Brain Injury Recovery in a Community Setting. Edward Weldon, Ryan Nakamura, Tracy Van, Ana Nakamura, Chancen Law, Connor Goo, Meliza Roman, Enrique Carrazana, Jason Viereck, Kore Liow. American Academy of Neurology. **Neurology 100 (17_supplement_2), 2895. 2023 American Academy Neurology Annual Meeting, April 2023, Boston, MA**

Investigating the Prevalence of Psychiatric Disorders in Multiple Sclerosis with Autoimmune Comorbidities (P5-3.008). Shin Chang, Plyfaa Suwanamalik-Murphy, Jenna Okazaki, Donovan Roy, Masako Matsunaga, Connor Goo, Enrique Carrazana, Jason Viereck, Kore Liow. **Neurology 100 (17_supplement_2), 2371. 2023 American Academy Neurology Annual Meeting, April 2023, Boston, MA**

Different Experiences in Chronic Migraine Etiology, Treatment and Comorbidities of Hawaii's Ethnic Groups (P14-12.006). Michelle Lu, Kacey Yamane, Dane Keahi, Michael Tong, Connor Goo, Devashri Prabhudesai, John Chen, Vimala Sravanthi Vajjala, Enrique Carrazana, Jason Viereck, Kore Liow. Neurology 100 (17_supplement_2), 2566. 2023 American Academy Neurology Annual Meeting, April 2023, Boston, MA

The Gomez-Lopez-Hernandez Syndrome: the contribution of two Hispanic giants of Pediatric Neurology.(P4-3.004). BX Liang, J Viereck, KK Liow, E Carrazana. Neurology 100 (17_supplement_2), 2782. 2023 American Academy Neurology Annual Meeting, April 2023, Boston, MA

Barriers To Alzheimer's Disease Clinical Trial Participation in Hawaii's Minority-Majority Population. Anson Y Lee, Julia R Jahansooz, Darrell Guittu, Rexton Suzuki, Lauren Pak, Kyle M Ishikawa, Connor Goo, John J Chen, Enrique Carrazana , Jason Viereck, **Kore K Liow**. 2023 **ADPD Advances in Science & Therapy. March 2023, Gothenburg, Sweden.**

Impact of Mild Cognitive Impairment On One's Fall Risk And Risk For More Frequent And Severe Traumatic Brain Injuries. Chloe Delos Reyes, Ryan Nakamura, Anson Lee, Edward Weldon, Julia Jahansooz, Kyle Ishikawa, Enrique Carrazana, Jason Viereck, Kore Liow. **Journal of the Neurological Sciences, Volume 455, 121903. 2023 World Congress of Neurology, Montreal, CANADA**

Pilot Study: Are there differences in Spinal Cord Involvement in Multiple Sclerosis (MS) Patients of Native Hawaiian and Other Pacific Islander (NHOPI) Descent?

Sarah Bellatti[1,2]; James Romero[1]; Sofia Muniz[1]; Ethan Chang[1]; Bradon Hong[1,2]; Ryan Nakamura[1,2]; Anita J. Cheung, MPH[1,2]; D-Dré D. Wright[1,2]; Kyle Ishikawa[3]; Enrique Carrazana, MD[1]; Kore Liow, MD[1,2]

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Objective: Determine whether newly diagnosed MS patients of NHOPI descent, as compared to newly diagnosed MS patients of other races in Hawaii, differ in presentation, initial spinal Magnetic Resonance Imaging (MRI) findings, and Expanded Disability Status Scale (EDSS) scores.

Introduction: In their 2013 paper, Amezcua and colleagues suggest that spinal cord lesions on initial presentation may correlate with disability in Hispanic MS patients, and posit that spinal MRI may help predict long-term outcomes. Similar studies in Caucasian and Asian MS populations concur. However, no studies have examined the NHOPI population or analyzed initial presentation, imaging, and disability across the various racial/ethnic groups in Hawaii.

Methods: This is a single center retrospective study of patients aged ≥18 years diagnosed with MS (ICD-10 G35) between 2008-2023. Demographics, comorbidities, and presenting EDSS scores were collected. Initial spine and brain MRI reports and EDSS scores at time of imaging were recorded as available. Patients with unknown racial status or yet to be seen in the office were excluded.

Results: The racial breakdown of the 128 patients gathered: 85 Caucasian (C), 12 Hispanic (H), 10 Asian (A), 9 Black (B), 6 NHOPI, and 6 Other (O). There was no significant difference in demographics or comorbid conditions among races. Caucasians presented at a significantly older age compared to Hispanics (p=0.0015; C: median=49, IQR 36-59; H: median=32, IQR=27-38). NHOPI had significantly higher EDSS scores at presentation compared to Hispanic (p=0.036; NHOPI: median=4.75, IQR 4.13-5.38; H: median=3.25, IQR 3.0-3.50). No significant differences were found across races for either spine MRI lesion burden or location (n=62: C=46, H=6, A=6, B=4, NHOPI=3, O=3), or brain MRI lesion burden or location (n=67: C=47, H=6, A=5, B=3, NHOPI=3, O=3). Multiple lesions on spine MRI correlated significantly with higher EDSS scores than those with 1 lesion on spine MRI (p=0.0067), but this relationship did not hold when compared to those with no lesions (p=0.58).

Conclusions: This study found no difference in the burden or location of spinal or brain MRI lesions at diagnosis among Hawaii's MS population by race. Small sample size and varying detail of MRI reports require further corroboration of these results.

Multiple Sclerosis (MS) in Hawaii: How do Caucasian MS patients compare against MS patients of other races?

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Objective: To uncover similarities and differences in clinical presentation and imaging between the Caucasian MS patient population and MS patients of other racial backgrounds in Hawaii.

Introduction: Historically, MS has largely been considered a disease that disproportionately affects Caucasians. However, current literature points to an increasing burden of MS in racial minorities. This study aims to compare how the Caucasian MS population compares to MS patients of other racial backgrounds in Hawaii.

Methods: This is a single center retrospective study of patients aged ≥18 years diagnosed with MS (ICD-10 G35) between 2008-2023. Demographics, comorbidities, and presenting EDSS scores were collected for all patients. Initial spine and brain MRI reports and EDSS scores at time of imaging were recorded as available. Patients with unknown racial status or yet to be seen in the office were excluded.

Results: Of the 128 patients analyzed, 85 were Caucasian (C) and 43 were confirmed members of other racial groups (ORG). There were no significant differences in sex, home zip code, insurance status, or family history of MS. Caucasians had a lower prevalence of hypercholesterolemia (p=0.021) and slightly lower EDSS scores at time of presentation (p=0.047; C: median of 3.50, IQR 3.00-4.50; ORG: median of 4.00, IQR 3.25-5.00). While there was no difference in age at time of initial presentation, age at the time of spine MRI differed significantly, with Caucasians older at the time of their spine MRI compared to patients from other racial groups (p=0.017; C: median=43, IQR 35-58; ORG: median=37, IQR 28-44). No significant differences were found for either spine or brain MRI lesion burden or lesion location.

Conclusions: In this Hawaii-based study, Caucasian MS patients had a lower burden of hypercholesterolemia, lower initial EDSS scores, and older age at time of spine MRI. These results may be attributed to socioeconomic and historical factors that favor access to healthcare for Caucasians; however, these speculations need further investigation for confirmation.

Exploring Carpal Tunnel Syndrome in Underserved Communities: A Focus on AANHPI Populations and Risk Factors

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Background/ Objectives:

Carpal tunnel syndrome (CTS) is a debilitating nerve condition caused by compression of the median nerve in the carpal tunnel. This study aims to address the paucity of research on CTS in Asian American, Native Hawaiian and other Pacific Islanders (AANHPI) populations and to identify differences in clinical presentation, comorbidities, and treatment of AANHPI in contrast to other ethnocultural racial groups in Hawaii.

Methods:

This retrospective cohort study utilizes data from a single neurological care center in Hawaii. Adults aged ≥18 years diagnosed with CTS between 2019-2023 were identified using ICD10 codes. Patients without confirmation of diagnosis via electromyography (EMG), clinical presentation, or sufficient demographical data were excluded. Statistical analysis was completed on R, with $p<0.05$ considered statistically significant.

Results:

Data from 326 patients are included in the analysis. The cohort consisted of 36% NHPIs and 30% Asians. AANHPI had the highest rates of public insurance usage. Native Hawaiians and Pacific Islanders had the highest rates of obesity ($p<0.001$) while Asians had the lowest rate of obesity ($p<0.001$). Native Hawaiians and Asians had higher rates of hypertension ($p=0.018$, $p=0.005$), and diabetes ($p=0.002$, $p=0.031$) compared to Whites. Native Hawaiians had a higher proportion of hyperlipidemia compared to Whites ($p=0.007$). Asians had a lower proportion of treatment with opioid agonists compared to others (AIAN, Blacks, Hispanics).

Conclusion:

AANHPI patients presenting with CTS are more likely to have public insurance, and present with hypertension and diabetes. Native Hawaiian patients specifically were also more likely to be obese and present with hyperlipidemia. These findings are vital for addressing the underlying comorbidities seen in CTS to reduce treatment disparities among AANHPI patients.

Comparison of EEG Biomarkers in Alzheimer's and Mild Cognitive Impairment With and Without Comorbid Major Depressive Disorder

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Introduction:
Understanding the differences in EEG biomarkers among patients with Alzheimer's Disease (AD) and Mild Cognitive Impairment (MCI), both with and without comorbid Major Depressive Disorder (MDD), is crucial for advancing diagnostic and therapeutic strategies. This study investigates comorbid depressive disorders associated with distinct EEG biomarker profiles, providing insights into the neurobiological interplay of their impact on cognitive impairment.

Methods:
In the preliminary phase of this study, data was collected from the HPN EHR database focusing on neurological diagnoses of AD, MCI, and comorbid psychiatric condition (MDD). EEG biomarkers were extracted using the BEAM method. For the current analysis, a total of 104 participants were divided into four groups: AD, MCI, AD + MDD, and MCI + MDD. The primary biomarkers investigated were N1 Peak Latency, P300 Max Latency, P300 Max Amplitude, Individualized Theta/Alpha Ratio (ITAR), P1 Peak Latency, and P2 Peak Latency . Given the numerical nature of the data, a one-way ANOVA was performed to identify significant differences among the groups, followed by post hoc testing using Tukey's method to pinpoint specific group differences. An exploratory significance level was set at $P = 0.10$.

Results:
The analysis revealed that the null hypothesis was not rejected for N1 Peak Latency, P300 Max amplitude, and the Eyes Open and Eyes Closed ITAR, indicating no significant differences between the four groups (AD, MCI, AD + MDD, MCI + MDD) in these biomarkers. However, for P300 Max Latency, P1 Peak Latency, and P2 Peak Latency, the null hypothesis was rejected, suggesting significant differences between the groups. Consequently, post hoc testing using Tukey's method was conducted to determine the specific group differences. While no significant differences were found in N1 Peak Latency, statistically significant differences were observed in P300 Max Latency, P1, and P2. It is important to note that these findings are based on an exploratory significance level of 0.10, which may not imply clinical relevance.

Conclusions:
As this was an exploratory project, we set our significance level at 0.10. Despite this higher threshold, differences in N1 Peak Latency, P300 Max amplitude, and the Eyes Open and Eyes Closed ITAR among the four groups (AD, MCI, AD + MDD, MCI + MDD) were insignificant, while P300, P1, and P2 showed significant differences. For P300 Max latency, post hoc testing revealed no significant pairwise differences, suggesting that combined group means may differ, which could be related to varying levels of MCI. But for P1 and P2 post hoc testing revealed significant differences between AD and MCI groups, and none for the other group comparisons. This outcome prompts the investigation of additional biomarkers to better distinguish between MCI and AD, and it indicates that MDD may impact biomarker values, warranting further exploration.

Comparative Efficacy of Neural Network Biomarkers and MMSE in Diagnosing Mild Cognitive Impairment: A Pilot Study

Janette Bow-Keola[1,2], Daniel Vodak[1,3], Kai Moriyama[1,4], Yun Pine[1,5], D-Dré Wright[1,2], Anita J. Cheung[1,2], Ryan Nakamura[1,2], Chathura Siriwardhana[2], Enrique Carrazana[1], Kore Liow[1,2]

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Introduction

Mild Cognitive Impairment (MCI) is a precursor to dementia and Alzheimer's disease, making early detection crucial. The Mini-Mental State Examination (MMSE) is commonly used for diagnosing MCI but has limitations. BEAM™ (Biomarker-based Electrophysiology for Advanced brain Monitoring) is a novel diagnostic tool that combines EEG with automated neurocognitive tests, potentially offering superior early detection.

Objective

To evaluate the effectiveness of BEAM™ compared to MMSE in predicting MCI by analyzing the correlation between BEAM™ biomarkers and age, as well as evaluating the accuracy of BEAM™ biomarkers and MMSE against the expected values for MCI patients.

Methods

A retrospective chart review was conducted at Hawaii Pacific Neuroscience on patients who underwent BEAM™ tests between March and June, 2024. Focusing on 45 patients diagnosed with MCI, aged 50-80 years, and with an MMSE score of 24 to 30, data collection included age, gender, race, comorbidities, BEAM™ parameters, and MMSE scores. Statistical analyses included Pearson correlation tests and significance tests using R studio software.

Results

Several BEAM™ parameters had 95% confidence intervals that fell outside the normal range. The AO N1 peak latency exhibited a moderate correlation with age (0.43, $p=0.003$). The MMSE scores, though statistically significant, exhibited a weaker correlation with age (-0.35, $p=0.019$). Notably, AO N1 peak latency demonstrates a stronger correlation against age than MMSE against age with a difference of 0.08.

Conclusion

While BEAM™ parameters may be sensitive in identifying subtle cognitive deficits, MMSE scores may not adequately capture the early stages of cognitive decline in this patient population. The results support the hypothesis that BEAM™ may be a more reliable tool for the early detection of early cognitive changes associated with age compared to MMSE. The significant correlations between BEAM™ biomarker AO N1 peak latency and age underscore its potential in clinical settings for diagnosing MCI.

Utility of EEG biomarkers in the early identification of Alzheimer's Disease: A systematic review

Kylie Yamauchi[1,2], Bryan Chaleunxay[1,3], Kenneth Lin 2[1,4], Nhat Vallo 3[1,4], Ryan Nakamura[1,2], Anita J. Cheung MPH[1,2], D-Dré Wright[1,2], Enrique Carrazana[1], Kore Liow[1,2]

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Introduction:

Alzheimer's disease (AD) is a progressive chronic neurodegenerative disease standing as the leading cause of dementia worldwide. With no current cure for AD, an early diagnostic tool that can identify mild cognitive impairment in AD is critical as it significantly impacts prognosis, treatment options, and quality of life. Thus, electroencephalogram (EEG) biomarkers are proposed by the Alzheimer's Neural Network EEG (ANNE) research lab to be a crucial and noninvasive tool in identifying and managing AD.

Methods:

Methodological processes for this study included a systematic literature review. The ANNE project is based off the work done at UC Berkeley: Public Health and Health Sciences Division. The database that was searched for the study included PubMed. The keyword search term included Alzheimer's disease p300. Inclusion criteria included articles that were found in PubMed, peer-reviewed, with a minimum sample size of 20 participants. Studies included either discussing auditory oddball tasks, ERP, or neuropsychological battery exams. Exclusion criteria included studies not published within the last 12 years, not originally published in English, and studies not focused on human subjects. Studies whose abstracts were not explicitly focused on the P300 EEG biomarker in relation to AD or MCI were excluded from our review.

Results:

The initial keyword search yielded 308 articles. After filtering by publication date, language (English only), and focus on human subjects, 108 articles remained. From these, 36 articles were selected based on their relevance to the P300 biomarker and its association with AD or MCI. The studies consistently found that AD patients exhibited reduced P300 amplitudes and prolonged P300 latencies compared to healthy controls. Specifically, AD patients had lower P300 amplitudes at the Pz electrode site and longer latencies, indicating slower cognitive processing. The systematic review confirms the high sensitivity and specificity of P300 metrics, emphasizing their potential as valuable biomarkers for early AD diagnosis. These findings highlight the need for standardized protocols and further validation to establish the clinical utility of the P300 ERP in diagnosing AD.

Conclusion:

P300 can be used as a biomarker to detect AD since larger P300 amplitudes are associated with better short-term and long-term memory. The P300 latency reflects an individual's information processing speed before making a response and P300 research is the current focus for the systematic review paper and these articles highlight important and relevant information regarding P300 and EEG. This research is applicable for the ANNE lab due to the potential that P300 holds in being a possible biomarker for AD.

Characterizing Fall Risk in Patients with Mild Cognitive Impairment

Ryan Nakamura[1,2], Jill Morimoto[1,3], Andrew Kai[1,3], Gabrielle Sarmiento[1,4], Michaela Kop[1,2], D-Dré D. Wright[1,2], Anita J.Cheung MPH[1,2], Chris Deng[2], Enrique Carrazana, MD[1], Kore Kai Liow, MD, FACP, FAAN[1,2]

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Introduction

Recent studies suggest people living with dementia (PLwD) are at greater risk of falling. Fall prevention guidelines have not made fall prevention guidelines for PLwD because of weak understanding of the relationship of cognitive function to increased fall risk. This study's aim is to determine the correlation between MMSE scores and fall incidence. The study also compares falls risk across different ethnic groups of patients at Hawai'i Pacific Neuroscience.

Methods

Retrospective review of 274 patients diagnosed with MCI between 11/1/2022-11/1/2023 was conducted. Patients without MMSE/MOCA scores were excluded from the study. Variables collected include demographics, falls, cognitive metrics, comorbid conditions, and medications at time of MCI diagnosis.

Results

Of the 274 patients included, the mean age was 72.9 years old, 50.7% were male, and the mean MMSE score was 24.32. Medicare was the most common form of insurance (65.8%); Asian (36.3%) and Caucasian (35.2%) were the most prevalent ethnicity. Both insurance type and ethnicity were insignificant ($p>0.99$) when conducting the chi-squared analysis. There was also no significant correlation between MMSE score and total number of falls (Spearman's Rho=0.053). In the univariate analysis, Age ($p=0.008$) and Age at Diagnosis ($p=0.006$) were significantly associated with the number of falls. Anticholinergics ($p=0.039$) and antihypertensives ($p=0.027$) were also significantly associated with increased falling, which was detected with a chi-square test.

Conclusion

Characterizing fall risk in patients with MCI is complex as varying factors contribute to one's risk. This study contributes to the conversation suggesting that one's age, their age at diagnosis, and medications have an impact on their fall risk. These findings can help create fall prevention guidelines in the MCI population.

Antidepressant Treatment and Cognitive Impairment Patterns: An Analysis Across Racial Groups in Alzheimer's Disease

Lauren Kim[1, 2], Zena Fadel[1,3], Connor Weldon[1,4], Anita J. Cheung MPH[1,2], Ryan Nakamura[1,2], D-Dré D. Wright[1,2], Enrique Carrazana MD[1,2], Kore K. Liow MD[1,2]

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Introduction: Alzheimer's disease (AD), a subset of dementia characterized by progressive cognitive decline is a debilitating form of dementia that commonly causes depression, affecting about 40% of those impacted by the disease. In Hawaii, approximately 31,000 individuals aged 65 and older are affected by AD. Previous research suggests that antidepressant medications may slow AD progression due to their neuroprotective effects. This study explores antidepressant use patterns among AD patients, considering demographic factors, comorbidities, and cognitive impairment severity among these patients.

Methods: This retrospective cohort study included 243 patients diagnosed with AD (early onset, late onset, unspecified) at Hawaii Pacific Neuroscience, using patient data collected from 5/1/2015 to 5/1/2023. This data collection phase was focused on gathering demographic information, relevant comorbidities, Mini-Mental State Evaluation (MMSE) scores, antidepressant medications, and other medications via a chart review. Statistical analysis, including Fisher's Exact Test and Kruskal-Wallis rank sum test, were used to determine significance.

Results: The study analyzed patients averaging 77.6 years old, with 80 males and 163 females. Antidepressant use was higher among Asian (N = 89) and White (N = 56) patients, primarily SSRIs. Patients with moderate cognitive impairment had the highest usage of antidepressants, followed by those with mild impairment. Hypertension was the most common comorbidity (67.9%) among those on antidepressants. No significant differences in hyperlipidemia, heart conditions, alcohol use, drug use, or smoking based on antidepressant use. Significant differences in MMSE scores ($p<0.001$) were noted across racial groups, with moderate impairment highest among Asian (51.3%) and NHPI (41%), mild impairment most frequent among Asian patients, and severe impairment primarily in White patients.

Conclusion: The findings indicate that antidepressant use varies by racial groups and cognitive impairment. Higher usage among Asian and White patients, especially SSRIs, suggests demographic trends in treatment. Although the study had limited statistically significant results, it identified potential trends in antidepressant use and Alzheimer's progression. Limitations include incomplete patient history and restricted access to treatment centers. Further research is needed to explore additional variables. comorbidities, and specific populations to better understand factors influencing antidepressant use in Alzheimer's patients. Expanding future studies will improve depression management in Alzheimer's disease across diverse populations.

Epidemiology of Diabetes Among Asian American, Native Hawaiian/Pacific Islander Patients with Alzheimer Disease

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Background
Previous studies indicate that diabetes may accelerate the progression of Alzheimer's Disease (AD), potentially affecting racial groups with higher diabetes prevalence. There is a need for further research into the epidemiology of diabetes among AD patients in Hawaii.

Objective
This study aims to investigate diabetes prevalence and associated comorbidities among Asian American and Native Hawaiian/Pacific Islander (AANHPI) AD patients in Hawaii, with a focus on understanding risk factors linked to AD. Additionally, we aim to examine the risk factors and cognitive implications of white matter hyperintensities (WMH) and global cortical atrophy (GCA) in diabetic versus non-diabetic AD patients.

Method
We performed a retrospective review of AD patient records from a single center in Hawaii, from June 2018 to June 2024. Variables assessed included age at diagnosis, gender, race, marital status, comorbidities, and scores on the Mini-Mental State Examination (MMSE), Fazekas scale, and GCA scale. Comparisons were made with Pearson's Chi-squared test, Fisher's exact test, and Kruskal-Wallis rank sum test as appropriate, using R software version 4.4.1.

Results
Among 586 patients, including 286 Asians, 89 Native Hawaiians/Pacific Islanders (NHPI), and 182 Whites, NHPI were diagnosed with AD at a younger age compared to Asians and Whites. NHPI had the highest rates of hypertension, diabetes, heart failure, and coronary artery disease. NHPI also had a higher body mass index (BMI) and lower alcohol consumption compared to Asians and Whites. Asians exhibited more severe WMH compared to NHPI and Whites. Older age and the presence of hypertension, diabetes, hyperlipidemia, hypercholesterolemia, or a prior stroke were associated with more severe WMH.

Conclusion
NHPI AD patients in Hawaii experience a higher prevalence of diabetes, are diagnosed at a younger age, have higher BMI, and more comorbidities compared to other racial groups that may contribute to an increased risk of AD.

Native Hawaiian and Pacific Islander Participation in Alzheimer's Disease Clinical Trials

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Introduction: Alzheimer's Disease (AD) is the most common neurodegenerative disorder in the United States, and it disproportionately burdens minority populations[1]. Previous research demonstrated that Asian and Native Hawaiian patients were less likely than White patients to participate in AD clinical trials[1,2]. Native Hawaiians and Pacific Islanders (NHPI) make up 27% of the population in Hawaii and 0.5% of the United States population[3,4]. The goal of this study was to determine what percentage of AD clinical trial participants were NHPI, as well as a breakdown of their demographics.

Methods: Data was obtained from a retrospective chart review of electronic medical records from patients with a diagnosis of AD who participated in AD clinical trials between the years 2020 to 2024. Patient charts were reviewed for demographics and AD clinical trial participation. One-way ANOVA or Kruskal-Wallis rank sum test for continuous variables and Fisher's Exact Test or Pearson's Chi-squared test for categorical variables were used to examine differences across racial groups. A p-value less than 0.05 was considered statistically significant.

Results: The data consisted of 244 patients who participated in AD clinical trials. Overall, White patients had the highest percentage of participation (31%), followed by Asian (24%), and NHPI (10%) patients. However, 31% did not have race information in their medical records. NHPI patients represented, on average, the youngest group diagnosed with AD at 71 years old ($p=0.01$).

Conclusion: Many participants did not report racial information making it difficult to effectively compare NHPI participation in clinical trials against other racial groups. More research should be done to further investigate NHPI participation in clinical trials and what barriers exist in this specific patient population resulting in lower clinical trial participation rates despite earlier age of AD onset.

Characterizing Epilepsy in Asian American and Native Hawaiian/Pacific Islander Populations

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Background
Epilepsy is a neurological disorder affecting around 50 million people globally, but there is limited research focusing on Native Hawaiian Pacific Islander (NHPI) and Asian American individuals with epilepsy. This project aims to expand on the current literature by comparing the clinical presentations of epilepsy in both Asian Americans and NHPIs with those of other race groups.

Methods
A retrospective chart review was conducted on patients diagnosed with epilepsy seen at Hawaii Pacific Neuroscience (HPN) between 1/1/2023 and 12/31/2023. Demographics, epilepsy characteristics (clinical presentation, etiologies, severity, and treatment), and comorbidities were collected. Significant differences were derived between each racial group through the use of statistical tests: Kruskal-Wallis rank sum test, Pearson's Chi-squared test, and Fisher's Exact Test for Count Data with simulated p-value.

Results
Data was gathered for 393 individuals: 134 Caucasian, 87 Asian, 102 Native Hawaiian, 27 Other Pacific Islanders, and 43 Other Race. Native Hawaiians had a higher proportion of public insurance compared to Caucasians (82% vs 63%). Asians were older at age of onset than Other Races (36 vs 20 median age). Native Hawaiians had a higher use of rescue medications than Asians (20% vs 5.8%). Native Hawaiians and Pacific Islanders had higher BMIs than Caucasians or Asians ($p = <0.001$).

Conclusions
This research study is the first to compare the Asian American and Native Hawaiian population to one another, and all other present races. Prevalent use of rescue medication amongst Native Hawaiians potentially signifies higher severity of epilepsy, which may have a correlation to higher BMIs. However, further studies must be conducted to better understand these findings.

CPAP Therapy Compliance in Obstructive Sleep Apnea Patients in Hawaii

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Introduction

Obstructive Sleep Apnea (OSA) is a blocked airway due to the collapse of throat muscles which results in patterns of breathing interruptions while asleep. Positive airway pressure (PAP) therapies are treatments utilized for the airways to remain open with the delivery of pressurized air through a mask. Therapies include (but are not limited to): Continuous (CPAP), Bilevel (BiPAP), Auto (APAP), and Auto-Bilevel (Auto-BiPAP).

Objectives

We investigated and evaluated the CPAP adherence and compliance of OSA-diagnosed patients in Hawai‘i, and determine associations between variables (e.g., OSA severity and CPAP adherence, average initial AHI per ethnicity group, and average reduction in AHI per compliance for ethnic groups combined and individually), and expand the timeframe on previous research.

Methods

We conducted a retrospective chart review of patients treated at HPN and diagnosed with OSA utilizing the eClinicalWorks medical record database. 1,277 patients were identified using the ICD 10 code for OSA (G47.33) within the respective timeframe(June 2022 - June 2024). Observations on 370 patients were made across 15 variables which included sex, age, zip code, insurance, race/ethnicity, social history, cardiac history, BMI, weight, height, OSA severity, AHI score, type of PAP therapy, and compliance of PAP therapy.

Results

CPAP adherence was significantly associated with age, insurance type, illicit drug use, and OSA severity. When comparing AHI scores by race groups, NHPI have a significantly higher average initial AHI score than other races.

Conclusions/Discussion

Results align with previous research regarding the comparison of AHI scores by the individual racial group and OSA among NHPI. Patients with less/no compliance are slightly younger opposed to patients with compliance, which may indicate a need to emphasize CPAP adherence to younger patients. Patients with private and public insurance exhibited significantly higher adherence rates compared to those with other types of insurance which highlights the potential role of insurance coverage in facilitating better adherence to PAP therapy. There is a notable association between the severity of OSA and PAP therapy adherence which suggests that more severe symptoms may drive higher adherence rates, indicating a need for increased emphasis on education and resources for patients with mild/moderate OSA. Patients with a history of illicit drug use presented with a higher adherence rate, presenting an intriguing area for further research. Understanding the factors contributing to this adherence could provide broader strategies to implement PAP therapy adherence in other populations.

Exploring the Connection of Obstructive Sleep Apnea, Parkinson's Disease, and Demographic Disparities

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Introduction

Previous research has shown a link between Obstructive Sleep Apnea and Parkinson"s disease. Showing a bidirectional modality one can precede the other and vice versa. It has also been shown that OSA is more prevalent in NHPI populations compared to their white counterparts and that Parkinson's shows a similar relationship. Our study aims to evaluate the prevalence of sleep disorders in patients with Parkinson's and if there is a directional demographic discrepancy in those patients.

Methods

This was a retrospective study on 271 patients within the last 5 years diagnosed with Parkinson's. Data was collected on demographic information, presence and age of sleep disorders, and current medication relating to Parkinson's or OSA using HPN's medical data base as well as information obtained from sleep studies within the sleep clinic. Patients with dementia and lewd bodies were excluded from the study for their association with RBD.

Results

The results of the study found using linear regression little correlation to gender, ethnicity (caucasian vs PI), or BMI with prevalence of OSA with PD. Insomnia was the most significant risk factor that patients with PD had that also had OSA (p-value of 0.099). The other variables checked were found to be insignificant.

Conclusion

Our findings which showed all but insomnia to be insignificant as a connecting variable differs from the current evidence in the literature likely due to the small sample size and lack of demographic reporting. Further studies or a continuation is recommended for the future to further confirm these findings. A better understanding about the relationships and correlations in specific demographics will contribute to early diagnosis and management strategies and enhance quality of life by facilitating more effective symptom management.

Exploring Psychosocial Risk Factors in Parkinson's Disease: A Closer Look at Marital Status

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Background: Current research has explored the relationship between different psychosocial risk factors, primarily marital status, and its impact on neurodegenerative disorder prognosis. Within this research, no study has looked specifically at the role of these psychosocial factors on patients with Parkinson's Disease (PD). The primary purpose of this study is to 1) determine whether marital status affects the presentation and progression of patients with PD and 2) the clinical and social profile of PD patients within each marital group.

Methods: A retrospective chart review was conducted on all patients with a diagnosis of PD at Hawaii Pacific Neuroscience between 2017-2022. The severity of PD was measured using the Levodopa Equivalent Daily Dosage (LEDD) rating scale. A Fisher's exact test and Pearson's Chi-squared was used to determine whether there was any association between marital status categories, various psychosocial factors, and PD presentation and progression.

Results: Of the 317 patients, 14.8% were single, 55.5% were married, 11.4% were divorced/separated, 14.5% were widowed, and 3.8% did not specifiy. Patients in the single group had the earliest age of onset compared to the other groups (64, $p<0.001$). Single patients also had the highest BMI at time of PD diagnosis (28, $p=0.0.046$). There is a positive correlation between time of initial PD diagnosis to most recent follow-up visit, and the change in LEDD scores seen among those that were married ($p<0.001$) and separated/divorced ($p=0.014$) . This suggests faster progression of disease severity.

Conclusions: Our data indicates significant psychosocial impacts of marital status on PD. Single patients are diagnosed at an earlier age than other marital groups. In addition, they also had on average, a higher BMI when controlled for race, suggesting BMI to be a significant risk factor in single patients for PD. However, those who are married and separated/divorced had a faster progression of PD. These findings highlight the need for tailored support and management strategies based on marital status to improve patient outcomes and quality of life for those living with PD.

Evaluating Risk Factors for Back Pain in Native Hawaiian and Other Pacific Islanders

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Introduction

Back pain is a widely prevalent diagnosis in which previous research has focused on how its "multidimensional" risk factors change based on race. However, no research has focused on risk factors for back pain within the Native Hawaiian and other Pacific Islander (NHOPI) populations.

Objective

Uncover potential risk factors for back pain in NHOPI patients and explore how known risk factors have differing impact on NHOPI patients.

Methods

Retrospective chart review of 230 patients at the Spine and Pain Management Center at Hawaii Pacific Neuroscience, an outpatient neuroscience clinic. Patients selected had ICD 10 code M54.5, low back pain. NHOPI included self-identifying patients, regardless of other listed races. Demographic data, presentation at time of diagnosis, past medical history, treatment plan, health comorbidities, and diagnosis status were recorded.

Results

46% of NHOPI patients reported uncategorized health comorbidities in comparison to 30% of non-NHOPI. ($p=0.012$). 36% of non-NHOPI patients reported no health comorbidities compared to 19% of NHOPI patients ($p=0.005$). A parallel relationship existed for neurologic comorbidities. 23% of NHOPI patients were smokers as opposed to 8.4% of non-NHOPI patients ($p=0.002$). A greater proportion of non-NHOPI patients were categorized as Healthy Weight ($p=0.008$) and a greater proportion of NHOPI patients were categorized as Obese II ($p=0.042$).

Conclusions

The combination of uncategorized comorbidities with BMI and smoking suggests that there may be an emphasized social aspect to NHOPI patients' risk factors for back pain, presenting potential additional avenues for prevention and treatment of back pain.

Investigating the Relationship Between Patient Characteristics and Severity of Chronic Migraines

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Background
Previous research on Hawaii's population found that Native Hawaiian or Pacific Islanders with chronic migraines were more likely to have a higher body mass index, hyperlipidemia, insomnia, diabetes, and polypharmacy compared to other racial groups. However, differences in patient characteristics based on severity of migraines have not been studied in this population. Thus, this study aims to identify differences in demographics and comorbidities among patients in Hawaii with high vs. low severity chronic migraines.

Methods
We performed a retrospective chart review of 459 patients with chronic migraines from June 2021 - June 2024 at Hawaii Pacific Neuroscience in Honolulu, Hawaii, excluding patients without migraine frequency data. Severity was designated as <15 (low) or 15+ (high) headache days per month at the most recent visit. Wilcoxon rank sum tests, Fisher's Exact Tests, and Pearson's Chi-squared tests were performed.

Results
Higher severity migraines were associated with amnesia ($p=0.031$), neck pain ($p=0.006$), radiculopathy ($p=0.004$), and tricyclic antidepressant use ($p=0.035$), while chronic pain syndrome approached significance ($p=0.053$).

Conclusions
Our findings were consistent with previous literature, which showed that radiculopathy, cervicalgia, and transient global amnesia have been associated with chronic migraines. This highlights the importance of addressing various pain conditions in patients with chronic migraines and may warrant earlier screenings & medication interventions in order to prevent their progression to severe chronic migraines. Further research should elucidate the relationship between chronic migraines and tricyclic antidepressants, as increased usage in patients with higher severity migraines may have masked significant differences in depression scores in this cohort.

Analyzing the Relationship Between Patient Ethnicity and Differences in Treatment for Chronic Migraines

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Background

Standard treatments for chronic migraine (CM) are classified as abortive (acute) or preventative (prophylactic) drugs. This study aims to determine if a correlation exists between certain ethnicities or comorbidities and medications prescribed for patients with chronic migraines among the Native Hawaiian and Pacific Islander (NHPI) population in Hawaii.

Methods

A retrospective chart review was conducted using adult patients diagnosed with CM at Hawaii Pacific Neuroscience from 2021 to 2024. Patients were identified using ICD-10 codes. Patient charts were reviewed for socio-demographics, lifestyle factors, psychiatric and medical comorbidities, clinical presentation, and medication. Statistical analyses were performed on R, with $p<0.05$ considered statistically significant.

Results

The data included 340 CM patients. NHPI (51%, $p<0.001$) were publicly insured. Preventative medications were more commonly prescribed to White (71%) and NHPI (75%, ` $p<0.01$). Among the comorbidities analyzed, increased BMI (31.1, $p<0.001$) , obesity (15%, $p<0.001$) and type 2 diabetes (6.3%, $p=0.042$) were significantly more common in the NHPI population than non-NHPI. NHPI also reported higher rates of pain scale ($p=0.017$) with an average rating of 7 ($p=0.001$).

Discussion

This study highlights key differences in CM treatment, particularly among NHPI. NHPI and Asians had higher rates of public and private insurance, suggesting insurance status may contribute to the type of medications prescribed. NHPI patients exhibited higher pain scales and higher rates of prescribed preventative medications, suggesting a racial disparity in treatment options for NHPI compared to non-NHPI.

2024 BRITL Brain Research, Innovation & Translation Laboratory

The Brain Research, Innovation & Translation Laboratory (BRITL) Neuroscience research program is part of the University of Hawaii John Burns School of Medicine MD5 MED 599 Neuroscience Research Course. University Hawaii medical students may sign up for elective credit while working at BRITL in MD5 MED 599 Neuroscience research credit.

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Final Oral Presentation 8.10.24 Pictures
Orientation Pictures 6.15.24 Pictures