1. **Please provide your preferred information for use in announcing the winners of the competition:**
   a. **Name: IGC Pharma, Inc.**
   b. **Hometown: Potomac, Maryland, USA**
   c. **A recent picture of yourself or digital avatar (feel free to attach separately):**
   d. **Social handle or URL (optional): www.igcpharma.com**

2. **Who are you (mini-bio) and what do you do professionally?**

The Company: Based in Potomac, Maryland, IGC Pharma is at the forefront of clinical-stage biotechnology, passionately dedicated to revolutionizing Alzheimer's disease treatment. Our flagship drug, IGC-AD1, targets agitation in Alzheimer's dementia and is showing remarkable promise in Phase 2 trials. Unlike traditional medications that may take 8-10 weeks to show effects, IGC-AD1 has the potential to provide significant relief within just two weeks, a breakthrough that could profoundly enhance patient care. In addition to our therapeutic advancements, we are leveraging cutting-edge AI models to predict early biomarkers for Alzheimer's, optimize clinical trials, and explore treatments for other neurological disorders. Our AI research also investigates potential interactions with receptors like GLP-1, GIP, and CB1. With 28 patents filed and 12 issued patents and a steadfast commitment to innovation, IGC Pharma is dedicated to advancing pharmaceutical treatments and making a meaningful difference in the lives of those affected by Alzheimer's disease.

The Individuals:
Ram Mukunda Potomac, Maryland, USA
LinkedIn: https://www.linkedin.com/in/ram-mukunda/

Team Captain: Ram Mukunda is the passionate CEO of IGC Pharma, whose decade-long journey in medical and pharmaceutical research reflects his unwavering commitment to transforming the lives of those affected by Alzheimer's disease (AD). With over 50 million people battling this devastating condition, Ram is driven by a heartfelt mission to develop affordable medications and identify early biomarkers. He is deeply concerned about the over 30% of false negative diagnoses, especially in regions where advanced scanning techniques are out of reach. Under Ram's leadership, IGC Pharma is making strides with a multisite, placebo-controlled Phase 2 clinical trial focused on alleviating agitation in dementia caused by AD. He is also pioneering an AI/ML initiative to enhance early detection of the disease, aiming to bring hope to those who need it most. Ram's academic background includes a BS in Mathematics and a BS/MS in Electrical Engineering from the University of Maryland, which underpin his innovative approach to tackling one of the world's most pressing health challenges.

Paola Ruiz Puentes, Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/paola-ruiz-puentes-12b1821b2/
Paola, the AI/ML team manager at IGC Pharma, is a Biomedical Engineer with a profound dedication to transforming medical care through technology. With several years of experience

harnessing deep learning for drug discovery and high-definition image analysis, Paola has channeled her expertise into tackling one of medicine's greatest challenges: Alzheimer's disease. Her work involves developing innovative machine learning tools to advance the diagnosis of Alzheimer's and related disorders. As the AI Manager, Paola is driven by a commitment to improving lives and pioneering breakthroughs that could make a tangible difference in the fight against neurodegenerative diseases.

Pablo Arbeláez Bogotá, D.C, Colombia
Google Scholar: https://scholar.google.com/citations?user=k0nZO90AAAAJ&hl=es
Pablo Arbeláez is a distinguished researcher with over 20 years of experience using AI/ML in medicine, biology, and computer vision. After receiving his PhD in Applied Mathematics, Universite Paris-Dauphine (2005), he spent seven years as an AI researcher at the University of California (Berkeley 2007-2014). He has contributed significantly to fundamental problems in Computer Vision, and his main research focus is on applications of Artificial Intelligence for Social Good. Pablo was recognized with the Artificial Intelligence 2000 Most influential Scholar Award placing him among the 100 most influential researchers in this discipline in the last decade. Since 2014, he has sought to bring AI/ML to Latin America. He is the director of the Center for Research and Formation in Artificial Intelligence at Universidad de los Andes, the first AI-focused academic center in Latin America, demonstrating his commitment to transformative AI solutions and empowering Latin American talent in the global AI community.

Juan Manuel Orjuela Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/juan-manuel-orjuela-rojas-b814415b/
Dr. Juan Manuel is a distinguished neuropsychiatrist from the National Autonomous University of Mexico, renowned for his leadership, open-mindedness, and innovative approach. With a career dedicated to advancing our understanding of Alzheimer's disease and related dementias (ADRD), he has authored numerous influential papers on topics such as managing behavioral symptoms in dementia, the intersection of art and brain function, and non-pharmacological interventions for neuropsychiatric symptoms. Dr. Manuel's expertise has made him a sought-after speaker across Latin America, with invitations to share his insights in Mexico, Ecuador, Peru, Costa Rica, Paraguay, and Argentina. He serves on the board of directors of the Colombian Association of Psychiatry (CAP) and contributes to the neuropsychiatry subcommittee of both the CAP and the International Neuropsychiatric Association. In recognition of his significant contributions, Dr. Manuel received a meritorious mention at the LVI Colombian Congress of Psychiatry in 2017 for his symposium on "Music, Psychoanalysis, and Neurosciences" and was honored with the best research award and the Founders Award by the ACP in 2018 for his groundbreaking work on "Recognition of Musical Emotions in Patients with Behavioral Variant Frontotemporal Dementia."

Nestor Gonzalez Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/nestor-gonzalez-389079233/
Nestor, a skilled systems and computing engineer, brings a wealth of practical expertise in applying machine learning to the medical field. His innovative work includes utilizing machine learning to identify lesions linked to drug-resistant epilepsy through MRI scans. Additionally, Nestor has employed deep learning algorithms to analyze real-time changes in trust dynamics

between humans and technology, leveraging physiological data such as electrodermal activity, heart rate, and brain oxygenation measured by fNIRS. At IGC Pharma, Nestor plays a crucial role in integrating and harmonizing extensive Alzheimer's disease-related databases. His contributions include developing and refining machine learning and deep learning models using these datasets and optimizing state-of-the-art large language models. His dedication to advancing technology in healthcare is integral to our mission at IGC Pharma.

Daniel Crovo Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/daniel-crovo/
Daniel Crovo is a dedicated Electronics Engineer with a passion for applying artificial intelligence to medical research, focusing on early detection of Alzheimer's disease. Currently pursuing a double master's degree in AI/ML and Electronics Engineering, Daniel has honed his skills in developing deep learning models for medical image analysis. His master's thesis is centered on analyzing intracranial EEG signals, demonstrating his expertise in handling complex data. At IGC Pharma, Daniel is at the forefront of utilizing AI techniques to predict Alzheimer's disease progression and identify new socioeconomic risk factors. His innovative approach and commitment to advancing early detection methods are vital to our mission of transforming Alzheimer's care.

Juanita Arbeláez Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/mjarbelaez10/
Juanita is a medical doctor with a master's in Epidemiology and is currently pursuing a master's in Bioethics. Her research focuses on Alzheimer's disease and related neuropsychiatric symptoms, where she applies her statistical expertise to advance AI/ML models. Juanita's skills in scientific writing, database management, and statistical analysis are pivotal in developing and interpreting data-driven insights within AI/ML frameworks. Her work enhances the accuracy and effectiveness of AI/ML models used for Alzheimer's research, contributing to more precise and impactful findings in the field.

Margarita Venegas Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/margarita-venegas-ramírez-403ba813b/
Margarita is a clinical and health psychologist with extensive experience in assessment, research, and training processes. At IGC Pharma, Margarita plays a key role in the Phase II Clinical Trial, where she reviews neuropsychiatric scales, supervises rater training, and ensures the quality of assessments. Additionally, she is integral to the AI/ML initiative, leveraging her expertise and insights to improve the precision of neuropsychiatric evaluations and advance the development of predictive models for Alzheimer's disease. Her insights are valuable for the AI/ML team as she brings a deeper understanding of the various scales and the nuances to interpreting them.

Alejandra Tangarife Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/maria-alejandra-tangarife/
Alejandra Tangarife is a skilled neuro psychologist with a master's degree in neuroscience from Universitat Autónoma de Barcelona. Her career spans psychometric validation, social neuroscience research, and clinical trial development in Alzheimer's disease. Alejandra excels in scientific communication, statistical analysis, and database management, aiming to improve the

integration of mind and body for better health outcomes. At IGC Pharma, Alejandra is a key member of the clinical trial team for the Phase 2 trial of IGC-AD1, focusing on agitation in Alzheimer's disease. Her role involves training, documentation, and coordinating the distribution of supplies to trial sites, ensuring the smooth operation and success of the clinical study.

Evelyn Gutiérrez Bogotá, D.C, Colombia
LinkedIn: https://www.linkedin.com/in/evelyn-gutiérrez/
Evelyn is a Chemical Engineer currently pursuing a Master of Science (MSc) in Clinical Epidemiology. With training in Good Clinical Practice (GCP), Clinical Monitoring, and statistical analysis using STATA, Evelyn brings a strong foundation in clinical research to her role. With four years of experience specializing in Alzheimer's disease, she leads the IGC Pharma Clinical Trial team, ensuring rigorous adherence to protocols and effective management of clinical processes. Her expertise is instrumental in integrating AI/ML technologies into the clinical research framework, enhancing data analysis, and optimizing trial outcomes. Evelyn's leadership in clinical trials aligns with IGC Pharma's commitment to advancing treatments for Alzheimer's disease, leveraging cutting-edge technology to improve patient care and research accuracy.

3. **What motivated you to compete in this challenge?**

Based on which part of the world you are in false negatives in the detection of AD are high. This is especially the case in countries with no access to PET scans and other modern diagnostic biomarkers like p-tau 217. Early reliable detection of AD is of paramount importance to our aging population. While over 50 million individuals worldwide are diagnosed with AD, a further 400 million are prodromal. This is a staggering number. The goals of the Challenge align with our desire to discover early predictors of AD and related dementias. We believe that by using advanced AI/ML models we can discover some of the hidden bio- and socio-markers to gain a deeper understanding of causation, increased risk factors, ADs progression, to help doctors reduce false negatives and help inform public policy.

4. **High level summary of your dataset: the data source, target, predictors, sample size and use for early, inclusive prediction of AD/ADRD.**

We proposed to use the Mexican Health and Aging Study (MHAS) in conjunction with the Mexican Cognitive Aging Ancillary Study (Mex-Cog). The MHAS is a project developed by the National Institute of Statistics, Geography, and Informatics (INEGI) in Mexico and researchers from the Universities of Pennsylvania, Maryland, and Wisconsin in the US. The study aimed to obtain national-level information about the aging process of the population aged 50 and over in Mexico from a broad socioeconomic perspective. MHAS contains six waves of data: a baseline interview in 2001 with follow-ups in 2003, 2012, 2015, 2018, and 2021. The sample was distributed over all 32 states in rural and urban areas. The 2001 and 2003 interviews were conducted using paper and pencil, and from 2012 on, the interviews were completed using Computer Assisted Personal Interview (CAPI). Additionally, the Mex-Cog 2016 and 2021 studies are an in-depth cognitive

assessment applied to a subsample of age 55 and older from MHAS 2015 and MHAS 2018. For the 2016 cohort, the sample was distributed in 8 states selected using a stratified sampling procedure. All MHAS 2015 subjects who were eligible in each state were included. The geographic details of the 2021 cohort are not available yet. For both waves, most of each survey was completed using CAPI; however, paper and pencil were employed for specific cognitive exercises. As target variable we proposed cognitive impairment assessment through a modified Mini-Mental State Examination (MMSE) and the Community Screening Instrument for Dementia (CSI'D). The predictor variables can be divided in four major groups, shown in the following table:

Group	Predictor Variables
Sociocultural Determinants	Childhood socioeconomic conditions, marital status, unions or marriages, family migration history, family structure, including number of children and siblings (deceased and living), parents living status and their education, employment condition, weekly contact with family, transfer behaviors, and social and religious activities (social support), widowhood and its economic consequences, individual income, assets, broad employment, pension history, type of housing, building materials, other indicators of housing quality, property conditions, and availability of consumer durables, access to health insurance coverage.
Behavioral Factors	Smoking cigarettes, alcohol drinking, sleep behaviors
Environmental Factors	Living in rural or urban area.
Biological Factors	Age, sex, gender, high blood pressure, diabetes, cancer, respiratory disease (including asthma), heart attack, heart problems, stroke, arthritis, depression, bone fractures, urinary incontinence, hearing loss, COVID-19, stress measures. Self-reported health conditions, a general cognitive assessment, anthropometric measurements, depressive symptoms, and blood biomarkers analysis for a subset of the data are also relevant within the database.[9]

These databases allow for identifying social and cultural factors that may influence the development and progression of the disease, extending beyond the biological factors that have been more extensively studied. Integrating both types of information—biological and socio-demographic—enhances early detection capabilities by correlating risk factors with early health variations. This means that, for individuals with certain socio-demographic risk factors, minor health changes that might otherwise be considered normal may indicate the disease's onset.

5. **What are two or three unique strengths of this dataset or type of data for early, inclusive prediction of AD/ADRD?**

   a. Utilizing survey-based data to identify and assess risk factors for developing AD/ADRD enables the creation of high-reach tools. These tools would permit the evaluation of a broad segment of the community concerning their potential to develop AD/ADRD.

b. The amount of socioeconomic and demographic information contained within these databases allow for identifying social and cultural factors that may influence the development and progression of the disease, extending beyond the biological factors that have been studied more extensively.

c. In the U.S., non-Hispanic Black and Hispanic older adults are disproportionately more likely than White older adults to suffer from AD/ADRD. However, most clinical research is performed with White Americans. This raises concerns because the low representation of these communities limits the understanding of their risk factors for developing ADRD. Considering that Latinos are the largest and fastest-growing minority in the United States, numbered 63 million in 2022, with nearly 60% of Mexican origin, it is important to develop models tailored to this specific population.

6. **Did you use any tools or resources for developing your submission (e.g., to find a dataset, or explore the contents of a public dataset)?**
We did not use any tools or resources for developing our submission

7. **Were there any data types or sources that you explored but didn't fit for this challenge?**
We identified multiple databases for AD, such as NACC, ADNI and OASIS; however, those databases didn't fit completely in our interest of working with an underrepresented community.

8. **How would you improve or enrich this dataset if you had access to a big research team and an unlimited budget?**
We would include more specific AD-related data, such as blood biomarkers, imaging, and diagnosis by a medical doctor. This clinical data would complement the sociodemographic information and would help identify correlations between them.