



Summary Information for Funded Ancillary Studies

(listing here does not include all specific site specific awards)

- 1) SOL Sociocultural Study (9/09-7/11; RC2 HL101649; PIs: Linda Gallo and Frank Penedo). This study involved administration of a comprehensive battery of socioeconomic, cultural, and psychosocial measures to help achieve HCHS/SOL goals of understanding how such processes may contribute to CVD risks and outcomes in the Hispanic population. Tracked as # 2008.02
- 2) SOL Nutrition and Physical Activity Assessment Study (4/10-3/14; R01 HL095856; PI: Yasmin Rahmani). This study had aims to obtain objective biomarker measures of total and resting energy expenditure and of protein, sodium and potassium expenditure; to compare these biomarkers with energy and protein data from the 24-hr dietary recall; to use these data to calibrate self-reported nutrient and physical activity data to increase reliability of analyses on associations with outcomes. Tracked as # 2008.03
- 3) Sleep Patterns as a Risk Factor for Disease in SOL (7/10-6/14; R01 HL098297; PI: Sanjay Patel). This study had aims to determine prevalence of abnormal sleep patterns among H/L; to examine association between sleep-related factors with chronic disease risk factors and outcomes; to assess the role of poor sleep in mediating the effect of SES, demographic, and psychiatric factors on adverse health outcomes. Tracked as # 2008.08
- 4) SOL-Youth Study (4/11-11/14; R01HL102130; PI: Shrikant Bangdiwala) a study of 1,600 boys and girls ages 8-14 years, whose parent/ legal guardian completed the core components of the HCHS/SOL study. Study added a comprehensive assessment of health determinants. Tracked as # 2008.05
- 5) Epidemiologic Determinants of Cardiac Structure and Function among Hispanics (9/11-3/15; R01 HL104199; PI: Carlos Rodriguez). This study had aims to examine the prevalence of echocardiographic left ventricular hypertrophy and systolic and diastolic heart failure; to examine the determinants of cardiac structure and assess the potential contributions of psychosocial, behavioral, and socioeconomic factors. Tracked as # 2009.04 ECHO-SOL2 (9/15-8/16 RC56HL104199) Tracked as 2014.13
- 6) Ocular Healthcare Utilization and Ocular Risk in Hispanics (9/11-9/14; CDC IU58DP002652; PI: David Lee). This study had aims to determine prevalence of visual disorders and risk factors for vision disorders and to assess ocular healthcare utilization and knowledge of recommended ocular healthcare visits and risk factors for the development of visual disorders. Tracked as # 2011.03
- 7) Genetic Predictors of Glucose Homeostasis Measures in Hispanics (7/10-6/14; R01 DK085175; PIs: Jerome Rotter and Steve Rich; SOL PI: Robert Kaplan). This study had aims to identify the genetic predictors of insulin resistance, insulin clearance, beta cell function, and type 2 diabetes mellitus (T2DM). Tracked as # 2009.06
- 8) Genetic Epidemiology Causal Variants Across the Life Course (3/10-6/13; U01 HG004803; PI: Gerardo Heiss), a study of the prevalence of selected genetic variants, gene-trait associations, and gene-environment interactions in any observed associations among H/L and non-Hispanics. Tracked as # 2008.01
- 9) Genetic Epidemiology Causal Variants Across the Life Course, CALiCo Phase II (Spring 2013-Spring 2017; RFA HG-12-010; PI: Kari North), a study of the prevalence of selected genetic variants, gene-trait associations, and gene-environment interactions in any observed associations among H/L and non-Hispanics. Tracked as # 2012.02



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- 10) ECG Pharmacogenomics Ancillary Study (AHA Project # 15GPSPG239 02/1/2015-01/31/2017 PI Christy Avery) will evaluate common SNPs influencing arrhythmogenic adverse drug reactions in European American, African American, and Hispanics/Latino populations. Tracked as # 2013.03
- 11) Paxgene tube collection for whole blood RNA expression studies at SOL Visit 2 (PI Robert Kaplan) Institutional funds for this specimen collection ancillary study. The available funds for this project will allow collection on the first 1,000 participants at the four HCHS/SOL sites. Tracked as # 2014.08
- 12) The Study of Latinos - Investigation of Neurocognitive Aging going by the short name SOL-INCA (R01AG048642-01A1 09/01/2015-04/01/2020 PI Hector Gonzalez). The study funded by the National Institute of Aging is a multisite prospective cohort study of Mild Cognitive Impairment, Alzheimer's disease and vascular dementia among middle-aged and older multiethnic Latinos. Tracked as # 2013.07
- 13) Neighborhood Environments and Cardiometabolic Disorders in Hispanics/Latinos with the shortened name of SOL San Diego CASAS (R01DK106209-01 07/01/2015-06/30/2019 PIs are Linda Gallo and Mathew Allison). Novel multi-level intervention strategies are needed to combat the growing pandemic of obesity and its related comorbidities among highly impacted populations. This project will inform neighborhood interventions to support Latino health as well as behavioral and psychosocial interventions to minimize the negative health impacts of unsupportive neighborhood environments. This NHLBI funded study will determine if Visit 1 macro-scale social and built neighborhood environments are associated with 6-year changes in (1) metabolic health, (2) physical activity, and (3) depression, and whether changes in activity and depression mediate the association between the environment and metabolic health change. The second aim is to determine if 6-year changes in macro-scale neighborhood environments between Visits 1 and 2 are associated with 6-year changes in (1) metabolic health, (2) physical activity, and (3) depression, and whether changes in physical activity and depression mediate the association between neighborhood environment change and metabolic health change. Tracked as # 2014.09
- 14) SOL WGS and Metabolomics (grant info TBD PI Eric Boerwinkle) *Specific Aim 1: Analyze WGS and metabolomics data on 6,000 individuals (2,000 from SOL) to identify genomic regions and specific alleles that significantly influence individual metabolite levels and metabolomics patterns, Specific Aim 2: Analyze existing genomic data (e.g. array genotype data) to evaluate whether the regions identified in aim 1 predict prevalent (i.e. cross-sectional) disease among ~12,800 SOL study participants with genomic data, (Note: This aim will also consider incident disease among 14,758 individuals from the ARIC study. In future years, we will analyze incident disease in SOL, when sufficient numbers of adjudicated cases become available.) Specific Aim 3: To create novel interfaces for the broader scientific community to access these data and results. The data will be made available via dbGAP; annotated genome-metabolome results will be made available via a searchable database and visualization tool developed as part of the proposed workscope.* Tracked as # 2015.10
- 15) Gut Origins of Latino Diabetes Study using the acronym GOLD (1R01MD011389-01 07/08/2016 – 02/28/2021 - PIs Robert Kaplan and Robert Burk) Funded by the National Institute on Minority Health and Health Disparities. A multisite study at the four HCHS/SOL locations with the aims to investigate factors affecting the gut microbiome (GMB) among Latinos. The study will look at differences between national backgrounds (e.g., Mexican, Puerto Rican, Cuban, etc), birthplace, gender, age, adiposity, shared household, genetics and relatedness. Diet is also assessed concurrent with GMB (to update HCHS/SOL V1 diet data) and we will correlate diet with GMB. The second aim is to evaluate the association of the gut microbiome (GMB) with the presence of diabetes and pre-diabetes. Tracked as # 2013.08



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16) Biopsychosocial and Ecological Correlates of Latina Women's Sedentary Behavior: SOL San Diego CASITAS (AHA Funded Population Project 3: Biopsychosocial and Ecological Correlates of Latina Women's Sedentary Behavior 16SFRN27940007 4/1/2016-3/31/2020 - CoPIs: Sheila Castañeda, Daniela Sotres-Alvarez and Mathew Allison). A study to explore innovative psychosocial and ecological correlates of sedentary behavior within the home and/or workplace among 400 San Diego female HCHS/SOL participants who are also participating in the ongoing ancillary study called SOL San Diego CASAS. SOL CASAS is assessing neighborhood impacts on cardiometabolic health. SOL San Diego CASITAS will combine existing data from the HCHS/SOL Visit 1 and Visit 2 exams and SOL CASAS with new sedentary-specific survey data to be collected as part of this protocol. Tracked as # 2015.20

17) Cardiometabolic Outcomes in Multi-Ethnic Physical Activity & Sedentary Behavior Study COMPAS (12/15/16 to 11/30/20, 1R01HL136266-01 PIs Yasmin Mossavar-Rahmani and Robert Kaplan along with Vasam S. Ramachandran from Boston University). US Hispanics/Latinos are the largest US minority group, constituting over 15% of the US population and growing to one-third of the US population by 2050. Hispanics match or exceed any other race-ethnicity group in having a high burden of diabetes and pre-diabetes. Especially given the relatively young age of US Hispanics, the group with prediabetes (e.g., fasting plasma glucose 100-125 mg/dl) are of immense public health importance because 15-30% of people with prediabetes will develop diabetes within five years. Physical activity (PA) is an effective preventive behavior in the battle to prevent diabetes as suggested by the Diabetes Prevention Program. In this context, the Hispanic population presents a paradox. Particularly among males, Hispanics have higher moderate-to-vigorous activity levels than non-Hispanics and light intensity PA is higher and sedentary behavior (SB) is lower among Hispanics than other groups. There is also an apparent contradiction (Hispanic paradox) between a high risk of prediabetes/diabetes among Hispanics, while at the same time Hispanics have favorable mortality rates vs. others and may also have lower incidence of cardiovascular disease (CVD). The study will leverage the Hispanic Community Health Study/Study of Latino Hispanics as well as the Framingham Heart Study (FHS) Third Generation and Omni Gen 2 (FHS Gen3/Omni2) cohorts of multiple race/ethnic groups. This approach not only increases generalizability of our findings to the US mainstream population, but also helps us understand what is unique about Hispanics. In all, 5500 individuals with confirmed prediabetes will be studied, all of whom had 7-day baseline Actical accelerometry measurements (2008-2011) which will be repeated during 2017-2020. This approach will allow us to understand the relationship among PA, SB, onset of diabetes and CVD in a large, representative population study of prediabetics. Tracked as # 2015.12

18) Persistent Organic Pollutants, Endogenous Hormones and Diabetes in Latinos Study **CONTRACT INFO NEEDED TO GO HERE... DATES AND SUCH)**

Led by Chicago based PI Victoria W. Persky, MD, MPH, the Persistent Organic Pollutants, Endogenous Hormones and Diabetes in Latinos Study aka POPs, Hormones and Diabetes study will select 2,350 current HCHS/SOL participants who return for their follow-up visit. Participants will be stratified by baseline glucose measurements (1,175 with prediabetes at baseline and 1,175 with normal baseline glucose measurements) and equally divided between men and postmenopausal women ages 45 -74 years, and with only one participant per household. A case-cohort study design will be used for those with prediabetes at baseline in which 1) a random sample will be taken from enrolled participants meeting the eligibility criteria and 2) an oversample will be taken of persons who transition from pre-diabetes to diabetes during the follow up period to



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ensure that approximately half of those in this category have transitioned to diabetes. Based on data from the follow up, an oversample of eligible participants with normal blood glucose at baseline will not be required, since to date approximately half have transitioned to pre-diabetes or diabetes at the follow up. Data currently being collected as part of the parent HCHS/SOL study that will be used include demographic characteristics, family history of diabetes, reproductive and breast feeding history from the 1st examination, smoking history, height, weight, waist/hip ratio, weight at ages 21,45 and 65, fasting glucose, glucose tolerance test for persons with normal fasting glucose), insulin, lipids, GGT, hsCRP, HgA1C, blood pressure, dietary diet data from two 24 hour food records, exercise, and history of gestational diabetes, thyroid disease, medication use and serum lipids from the 1st and 2nd examinations. In addition, 1 cc of plasma and 0.5 cc of serum previously collected at baseline will be used for measurements of persistent organic pollutants and endogenous hormones.

Tracked as AS #2013.06

19) SOL-INCA-MRI. The ancillary study MRI Measures of Cardiovascular Injury and AD Atrophy in a Study of Latinos (RF1 AG054548, 7/2017 – 6/2022, with Charles DeCarli, MD as PI) has the overall aim of comprehensive MRI quantification of 2800 Latinos in the HCHS/SOL cohort with normal and impaired cognition. Quantification includes measures of vascular brain injuries (i.e., white matter hyperintensities and integrity, MRI evidence of cerebral infarction) as well as measures of cortical volume, cortical thickness and hippocampal volume to estimate AD patterns of cerebral atrophy. The study will also leverage fine-scale population structure to identify novel genetic loci for MRI-defined vascular injury and structural endophenotypes and their neurocognitive outcomes (in the SOL-INCA subgroup). Tracked as AS #2016.02

20) HCHS/SOL Family Lifestyle Outcomes Research, aka SOL-FLOR (9/18/2018 to 6/30/2023, NIDDK award 1R01DK116028-01A1; PIs: Anna Maria Siega-Riz and Daniela Sotres-Alvarez. SOL-FLOR offers a unique opportunity to prospectively investigate the role of preconceptional maternal health status (cardiometabolic biomarkers and diet) on the development of childhood obesity and to understand drivers of overeating, such as food reward related behaviors and psychological stress of women as predictors of child feeding practices and weight. The study proposes to recruit 440 mother-child dyads from HCHS/SOL where the children (age 3-8y) were born after the baseline examination. The study will measure child's weight, height and adiposity (total fat mass as measured by dual-energy X-ray absorptiometry (DXA)), genetic susceptibility for obesity, eating and other lifestyle behaviors, and mothers' food reward-related behaviors. The findings of this research endeavor can help inform future randomized controlled trials aimed at directly changing the psychosocial and behavioral aspects of Hispanic/Latino mother-child dyads to prevent childhood obesity. Tracked as AS #2014.07

21) SOL-VIDA--- (July 2019-June 2024; R01 HL148463-01; PI Jordan Carlson) This observational cohort study will investigate how various sedentary patterns are cross-sectionally (Aim 1a) and prospectively (Aim 2a) associated with CVD risk markers of adiposity, insulin resistance, and blood glucose in 2600 Hispanics/Latinos from 4 regions across the US. Sedentary-risk marker associations will be compared between hip accelerometers (the traditional method) and activPAL (the more accurate method). The role of physical activity and total sedentary time as effect modifiers of the association of sedentary patterns with CVD risk markers will also be investigated (Aims 1&2b) to inform efforts targeting the full spectrum of light, moderate, and vigorous activity. The role of key settings for sedentary time will be explored to inform setting- and individually-tailored efforts and recommendations. These settings will be assessed by Global Positioning Systems and include the home, worksite, neighborhood, and transportation. Tracked as AS #2015.08



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22) Peripheral Artery Disease in SOL/PASOS—(Aug 2019-July 2023; 1R01HL146132-01; PIs Robert Kaplan and Kuni Matsushita) This study examines the factors that help maintain a healthy blood flow to the legs and feet, and how a reduced blood supply to the legs and feet affects our health. The overarching goals of this study are to characterize the impact of PAD on free-living daily physical activity and to examine the value of objective assessment of daily physical activity for PAD management and diagnosis. We propose to evaluate ~6,000 Hispanic Community Health Study/Study of Latinos (HCHS/SOL) cohort participants aged 45 and older. At the upcoming HCHS/SOL visit 3 core examination cycle (2019-2021), we will collect resting and post-exercise ABI, toe-brachial index (TBI), leg symptoms, 7-day accelerometry (Actigraph), walking endurance (2-min walk), and Duplex ultrasound of the major conduit arteries of the lower extremities. This project builds upon a unique long-term cohort study of Hispanics, supported by extensive prior data relating to PAD and physical activity. For example, borderline low ABI 0.9-1.0 was found in 23% of HCHS/SOL participants aged ≥ 45 old at visit 1. Nearly 70% of participants in HCHS/SOL are either diabetic or prediabetic; these populations may particularly benefit from adding TBI to PAD screening protocols, as TBI is less influenced by calcification than ABI.^{8,9} Finally, using HCHS/SOL visit 1 data (2008-11) we can quantify prospective relationships of low ABI to 12-year changes in physical activity assessed by Global Positioning Systems and include the home, worksite, neighborhood, and transportation. Tracked as AS #2017.31

23) Nonalcoholic Fatty Liver Disease, Cardiovascular Disease, and their Associations in Hispanics/Latinos-NAFLD (Sep 2019-Aug 2023; R01HL144707; PI Jorge Kizer and Lima) Leveraging the Visit 3 exam, we will enroll 2000 returning participants to complete questionnaires and undergo CE MRI of the heart and liver. We will assess relationships between nativity and duration of US residence with liver fibrosis and GCS, and parlay longitudinal measures of lifestyle, psychosocial, and sociocultural factors to assess their cumulative impact on these hepatic and cardiac outcomes, while exploring the latter factors' potential mediating effects. We will also evaluate the associations of DAT, defined from MRI-determined visceral adiposity and adiponectin, and PNPLA3 and TM6SF variants, alone and in combination, with liver fibrosis. Then, we will investigate the association between liver fibrosis and both diffuse myocardial fibrosis and myocardial scar, as well as the association between inflammatory sCD14 and procoagulant FVIII and AT with these cardiac phenotypes, exploring whether these attenuate the hypothesized liver-heart relationship. Tracked as AS #2017.30

24) Pulse Wave Velocity/PWV—(July 2019-April 2023; 1R01AG062488-01; PI Michelle Meyer) This study is focused on the stiffening of the arteries and the associated structural damage to small vessels in the brain and reduced cognitive function that precede cognitive impairment and Alzheimer's disease and related dementias. This study will include approximately 9,297 participants in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). We will add pulse wave velocity, a non-invasive arterial stiffness measurement, to all participants during the upcoming Visit 3 planned for December 2019 to November 2023. The HCHS/SOL field center staff will perform the measurements and the data will be managed by the coordinating center at UNC-Chapel Hill. Data for this project will be de-identified and coded and uploaded to the HCHS/SOL coordinating center from the 4 external field center sites. Tracked as AS #2017.21

25) The Hispanic Community Health Study/Study of Latinos Eye Study/SOL-Ojos (Sept 2019-July 2024; UG1EY030410; PIs Charlotte Joslin and David Lee) Is an ancillary study designed to assess the 2010 age-standardized prevalence of chronic eye disease and its associations with risk factors across participants of diverse backgrounds. The HCHS/SOL cohort will be over sampled at the Visit 3 examination to identify 3,000



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older adults aged 40 and above to maximize detection of visual problems and provide an estimate of disease prevalence. Cohort members will be recruited for a detailed eye exam at two field centers (Chicago and Miami). Exams will include the National Eye Institute visual functioning questionnaire and standardized non-invasive measurement and classification protocols for ocular disease detection. Tracked as AS 2015.22

26) Stress Gender and Minority (SGM) Study of Latinos (SOL) Ancillary Study – SGM SOL (Mar 2020-Feb 2025; 1R01HL149778-01; PIs Krista Perreira and Tonia Poteat) – The overall aims of this study are to examine the associations among sexual orientation, gender identity, stigma/discrimination, stress and cardiovascular disease risk in a diverse Hispanic cohort, using the Minority Stress Model as a framework. The research will be conducted with all Visit 3 participants from HCHS/ SOL as well as a 1:2 matched sub-cohort of SGM and non-SGM participants. By expanding the assessment of HCHS/SOL to include measures of sexual orientation, gender identity, stigma, and discrimination, the SGM HCHS/SOL Ancillary Study will provide a significant complement to the parent study, achieve the goal of examining varied risk and protective factors in Hispanic health, and inform future prevention and intervention efforts for distinct Hispanic subgroups in the US. We will address the following specific aims over the study period: (1) Examine the influence of sexual orientation and gender identity on CVD risk among all HCHS/SOL participants at Visit 3; (2) Model pathways from sexual orientation and gender identity to CVD risk through stigma, discrimination, and stress among a 1:2 matched sub-cohort of SGM and non-SGM participants at Visit 3; (3) Examine the influence of stigma/discrimination on sexual orientation and CVD risk relationships among sub-cohort participants at Visit 3. Tracked as AS #2018.22

27) Budoff (CAC 2017.32) details added shortly

28) Talavera/SC Pis (C4R Consortium 2020.03) details added shortly