PCOG-90: PCORnet Study of Older Persons with Superior Cognitive Performance Over Age 90

Tulane

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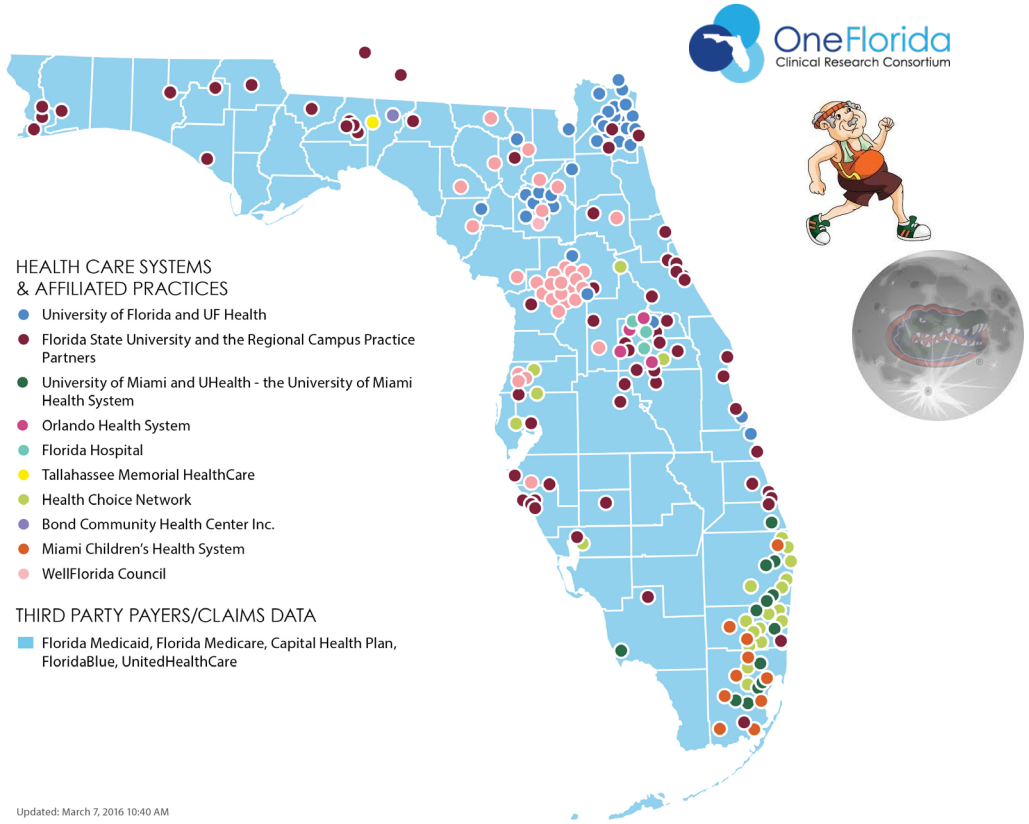
OVERVIEW

- The over 90 population is rapidly growing, with >50% risk for Alzheimer's disease
- U19 Grant Application (submitted 1/25/22; earliest start date 9/1/22)
  - $91 Million total budget/5 years (1,732 pp application)
  - 20 participating sites/6 clinical research networks (70 MPIs/co-Is)
  - >150,000 subjects with a computable phenotype of successful aging
  - 5,000 subjects to be enrolled in a prospective study of superior cognitive fitness
- Overarching Aims
  - To mine existing EMR data relating to medical determinants of health, and link those data with newly collected social, cognitive, digital, and biological health data, and to evaluate factors including genetics, epigenetics, metabolism, the gut microbiome, immune function, environment, and lifestyle, to understand how they associate over time with successful cognitive and biological aging across the health span
  - To conduct studies of superior cognitive performance in racially and ethnically diverse (including African American, Caucasian, and Hispanic) and geographically diverse (including rural and urban) aging populations nationwide.

PRELIMINARY STUDIES



OneFlorida Data Trust

- 15 million patients
- 4,100 providers
- 1,240 practices
- 22 hospitals
- 75% of Floridians

https://onefloridaconsortium.org

UF Moonshot

UNDERSTANDING RESISTANCE, RESILIENCE, AND REPAIR IN THE HEALTH SPAN (OVER 90 STUDY)

AIMS:

1) Identify informatics-based computable phenotypes that enable identification of individuals over 90 who successfully aged by mining medical & social determinants of health information available within the OneFlorida Data Trust

2) Directly assess both the resources needed to re-contact individuals over 90 and the participation rate of those contacted

3) Conduct a pilot study to inform on the feasibility of using computable phenotypes from the OneFlorida Data Trust to identify an over 90 cohort for an intervention aimed at maintaining resilience and independence

SUCCESSFUL AGING COMPUTABLE PHENOTYPE

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EMR FEATURES	DE-IDENTIFIED EXPERTS									
	1	2	3	4	5	6	7	8	9	10
Alive, 90 years or older										
No nursing home placement [NOT COMPUTABLE; ZIP CODE AS PROXY]										
No palliative/hospice care										
Low comorbidity index (Charlson, Elixhauser)										
Low healthcare utilization (hospitalizations, ER)										
Free of dementia, Alzheimer's, related disorder										
Free of stroke										
Free of Parkinson's										
Free of other progressive brain disorders										
Free of communication disorder (e.g., aphasia)										
Free of deafferentation										
Free of gait disorder or falls										
Free of depression or related disorders										
Free of major psychiatric disorders										
Free of extremes of BMI (<18.5, >40)										
Free of chronic opiate use/addiction										
Free of home O2 use										
Free of wheelchair/walker prescriptions										
Free of handicap parking permit **[NOT COMPUTABLE]**										

Green = required
Yellow = unsure
Red = not required

RESULTS

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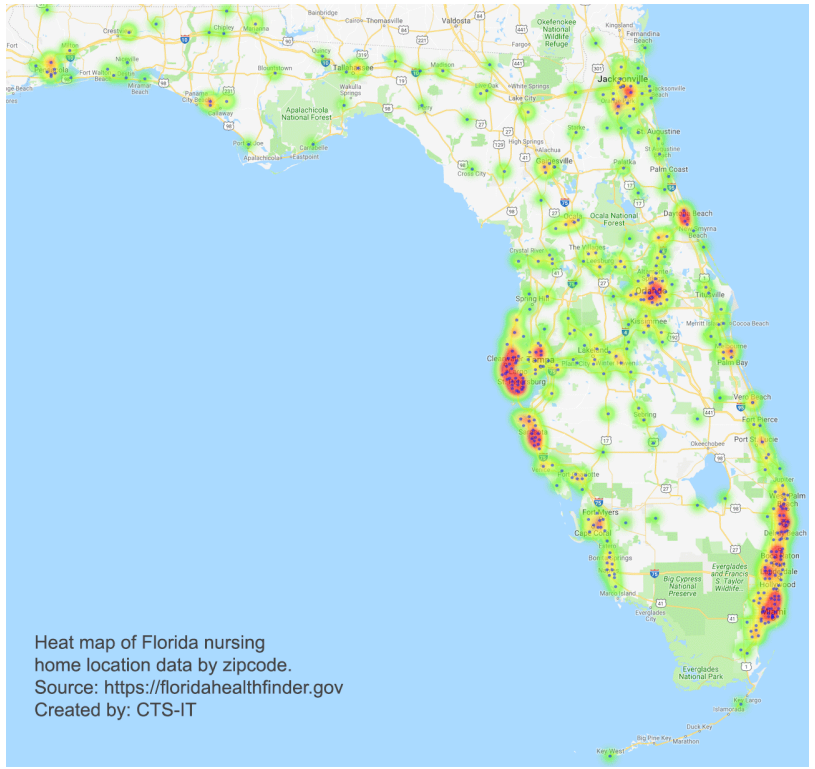


Heat map of Florida nursing home location data by zipcode.
Source: https://floridahealthfinder.gov
Created by: CTS-IT

*Zip code as proxy for nursing home placement; 20,932 Over 90 patients without a FL zip code

Characteristics	Over 90		Over 90 Non-Demented		Over 90 Non-Demented No Nursing Home*		Over 90 Successful Aging (all parameters)	
	N	%	N	%	N	%	N	%
Total	281,927		187,514	66.5%	65,008	23.1%	45,710	16.2%
Demographic								
Sex								
Female	187,092	66.4%	116,405	62.1%	41,097	63.2%	28,276	61.9%
Male	91,511	32.5%	67,831	36.2%	23,618	36.3%	17,158	37.5%
Unknown	3,324	1.2%	3,278	1.7%	293	0.5%	276	0.6%
Race								
White	155,689	55.2%	97,549	52.0%	32,845	50.5%	20,687	45.3%
African American	26,356	9.3%	15,728	8.4%	5,528	8.5%	3,816	8.3%
American Indian	311	0.1%	206	0.1%	64	0.1%	34	0.1%
Asian	2,847	1.0%	1,936	1.0%	775	1.2%	484	1.1%
Pacific Islander	112	0.0%	89	0.0%	44	0.1%	33	0.1%
Multi-race	2,330	0.8%	1,787	1.0%	637	1.0%	433	0.9%
Other	53,420	18.9%	33,676	18.0%	13,747	21.1%	10,515	23.0%
Unknown	40,862	14.5%	36,543	19.5%	11,368	17.5%	9,708	21.2%
Ethnicity								
Hispanic	51,115	18.1%	32,401	17.3%	14,074	21.6%	10,009	21.9%
Non-Hispanic	172,279	61.1%	106,301	56.7%	35,529	54.7%	22,712	49.7%
Unknown	58,533	20.8%	48,812	26.0%	15,405	23.7%	12,989	28.4%

Compute Phenotype

N=3,730
100%

Re-Identify

N=1,884
51%

Contact

N=472
13%

Consent

N=121
3.2%

Validate

N=81

University of Florida Pilot Data

70% persons with computed phenotype cognitively normal (20% MCI, 10% dementia)

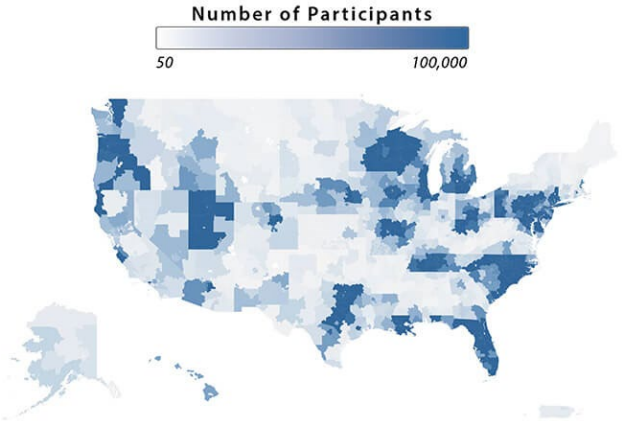
U19 GRANT APPLICATION (NIA)

SIGNIFICANCE: HUNDREDS OF THOUSANDS OF COGNITIVELY FIT NONAGENARIANS!

INNOVATION: LEVERAGING A NATIONAL NETWORK OF EMR REGISTRIES!

- 9 Networks (*6 participating)
- Coordinating Center (Duke)
- 65 Healthcare Institutions/20 Participating
- >66 million people

pcornet®



GPC Greater Plains Collaborative *

INSIGHT Clinical Research Network *

OneFlorida Clinical Research Consortium *

PaTH Network patient empowered research *

REACHnet Research Action for Health Network *

STAR Stakeholders, Technology, and Research CRN *

ADVANCE Collaborative

CAPriCORN

PEDSnet A Pediatric Learning Health System

Table 1: Baseline Characteristics of Patients Aged 90 or Older from January 1, 2012 to December 31, 2019

	All patients with any diagnosis over the age of 90		All patients with any diagnosis over the age of 90 without dementia		All patients with any diagnosis over the age of 90 without dementia and not in a nursing home		All patients with any diagnosis over the age of 90 who are sucessful agers[$]	
	N | Mean	% | SD	N | Mean	% | SD	N | Mean	% | SD	N | Mean	% | SD
Number of Unique Patients[1]	652,016		470,605		452,824		267,382	
Demographics								
Age								
Mean age	91.6	2.5	91.7	2.5	91.7	2.5	91.9	2.6
Sex								
Female	430,977	66%	303,311	64%	291,096	64%	169,930	64%
Male	220,688	34%	166,963	35%	161,399	36%	97,156	36%
Other/Missing[2]	351	0%	331	0%	329	0%	296	0%
Race								
Asian	9,016	1%	6,356	1%	6,241	1%	3,893	1%
Black or African American	51,028	8%	32,059	7%	30,966	7%	17,976	7%
White	483,760	74%	344,127	73%	328,616	73%	177,602	66%
Other/Missing[2]	108,212	17%	88063	19%	87,001	19%	67,895	25%
Hispanic								
Yes	28,681	4%	18,713	4%	18,382	4%	10,833	4%
No	527,053	81%	370,791	79%	354,888	78%	193,080	72%
Other/Missing[2]	96,282	15%	81,101	17%	79,554	18%	63,459	24%
Year of Index Event								
2012	97,940	15%	62,423	13%	59,433	13%	32,261	12%
2013	71,500	11%	49,304	10%	46,370	10%	26,902	10%
2014	72,847	11%	50,948	11%	48,768	11%	28,589	11%
2015	75,363	12%	54,110	11%	51,921	11%	30,745	11%
2016	79,191	12%	57,468	12%	55,435	12%	32,952	12%
2017	81,983	13%	60,743	13%	58,807	13%	34,580	13%
2018	83,602	13%	64,058	14%	62,216	14%	37,136	14%
2019	89,590	14%	71,551	15%	69,874	15%	44,217	17%

PCOG-90 Participating Sites [154,144 subjects with computable phenotype of successful aging]

GPC
- Intermountain
- University of Iowa
- University of Missouri
- University of Nebraska
- UT Southwestern
- University of Utah

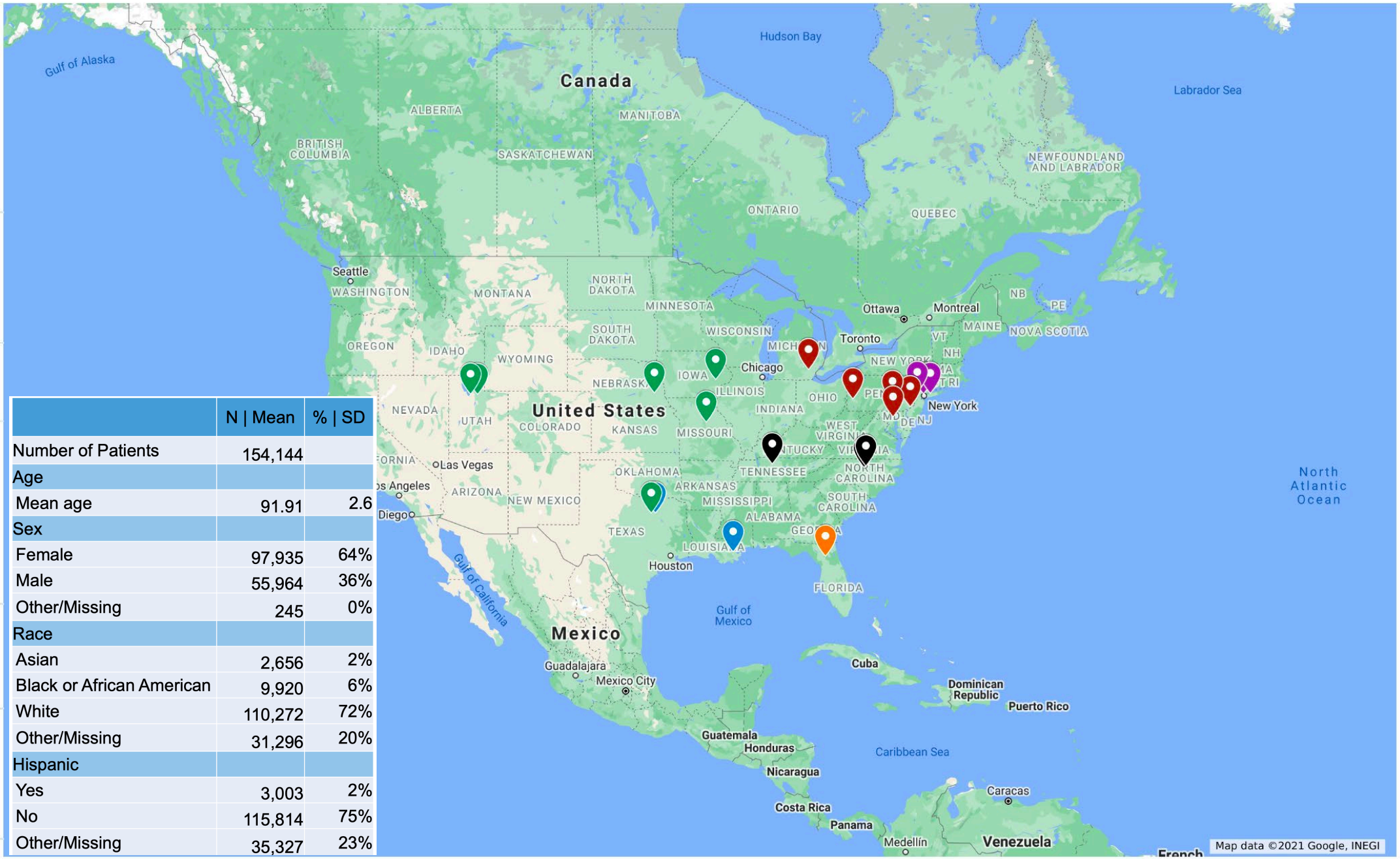
INSIGHT
- Mount Sinai*
- New York University*
- Weill Cornell

OneFlorida
- University of Florida*

PaTH Network
- Johns Hopkins*
- Penn State University
- Temple University
- University of Michigan*
- University of Pittsburgh*

REACHnet
- Baylor Scott and White
- Tulane University

STAR
- Duke University*
- University of North Carolina
- Vanderbilt University*



	N | Mean	% | SD
Number of Patients	154,144	
Age		
Mean age	91.91	2.6
Sex		
Female	97,935	64%
Male	55,964	36%
Other/Missing	245	0%
Race		
Asian	2,656	2%
Black or African American	9,920	6%
White	110,272	72%
Other/Missing	31,296	20%
Hispanic		
Yes	3,003	2%
No	115,814	75%
Other/Missing	35,327	23%

154,144 “successfully aged” 90+ year old’s
5,000 subjects enrolled (half Black or Hispanic)

PCOG 90

ADMINISTRATIVE/COORDINATING CORE
(TULANE*/LPHI/20 Participating Sites)

BIOMEDICAL INFORMATICS CORE
(DUKE/FLORIDA*/LPHI)

RECRUITMENT/RETENTION CORE
(NYU*)

CLINICAL CORE
(FLORIDA*/UNC)

BIOSPECIMENS CORE
(TULANE*)

PROJECT 1: MOLECULAR ARCHITECTURE OF COGNITIVELY SUPERIOR OLDER ADULTS
(TULANE*/FLORIDA)

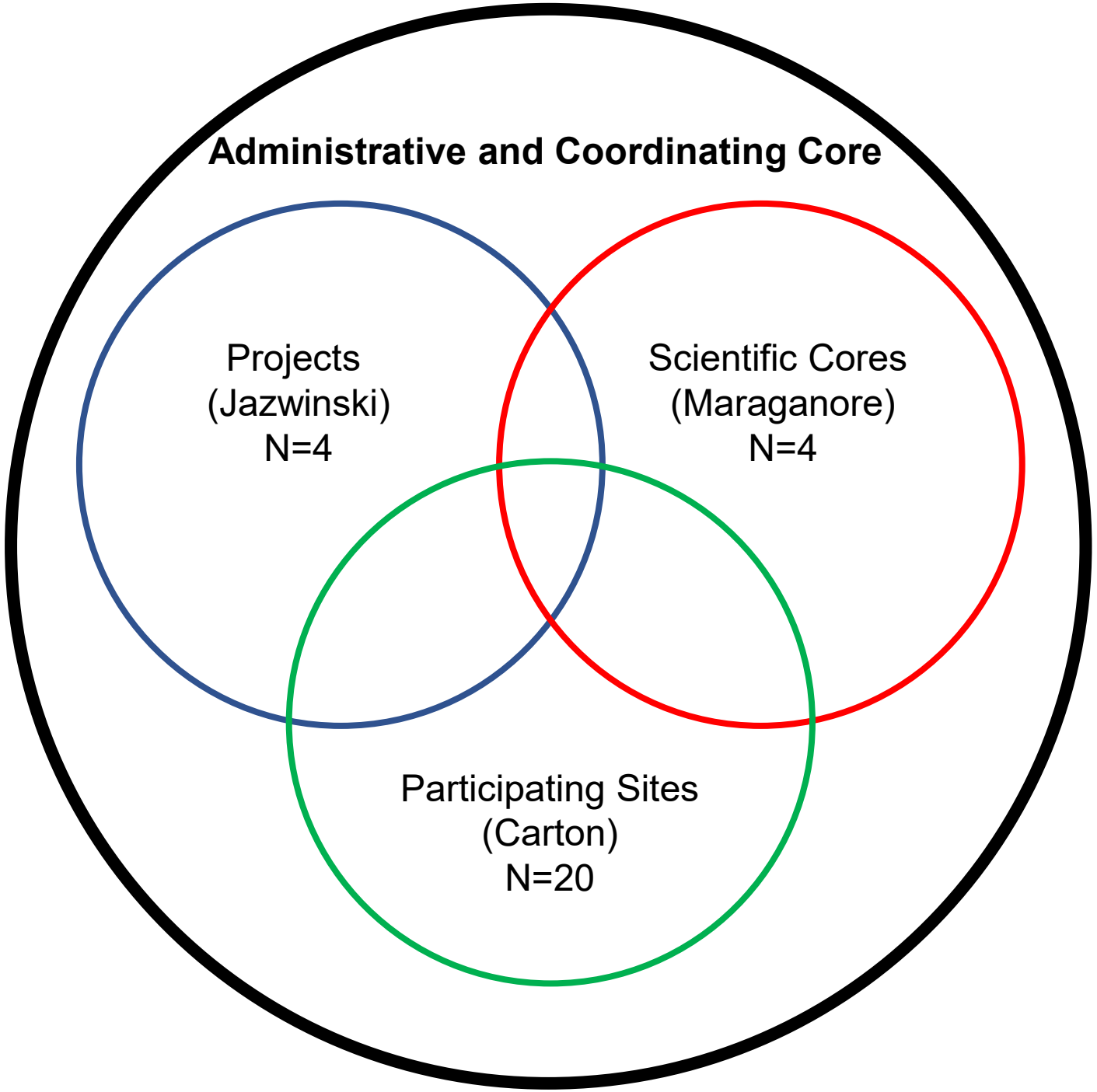
PROJECT 2: MEDICAL AND SOCIAL DETERMINANTS OF COGNITIVE HEALTH LATE IN LIFE
(FLORIDA*/TULANE/UNC)

PROJECT 3: DIETARY PATTERNS, WEIGHT HISTORY, AND MICROBIOTA DETERMINANTS OF COGNITIVE HEALTH LATE IN LIFE
(FLORIDA*/NYU/UNC)

PROJECT 4: DETERMINING COGNITIVE HEALTH LATE IN LIFE THROUGH DYNAMIC BIOMARKERS
(DUKE*/INTERMOUNTAIN)

* lead sites

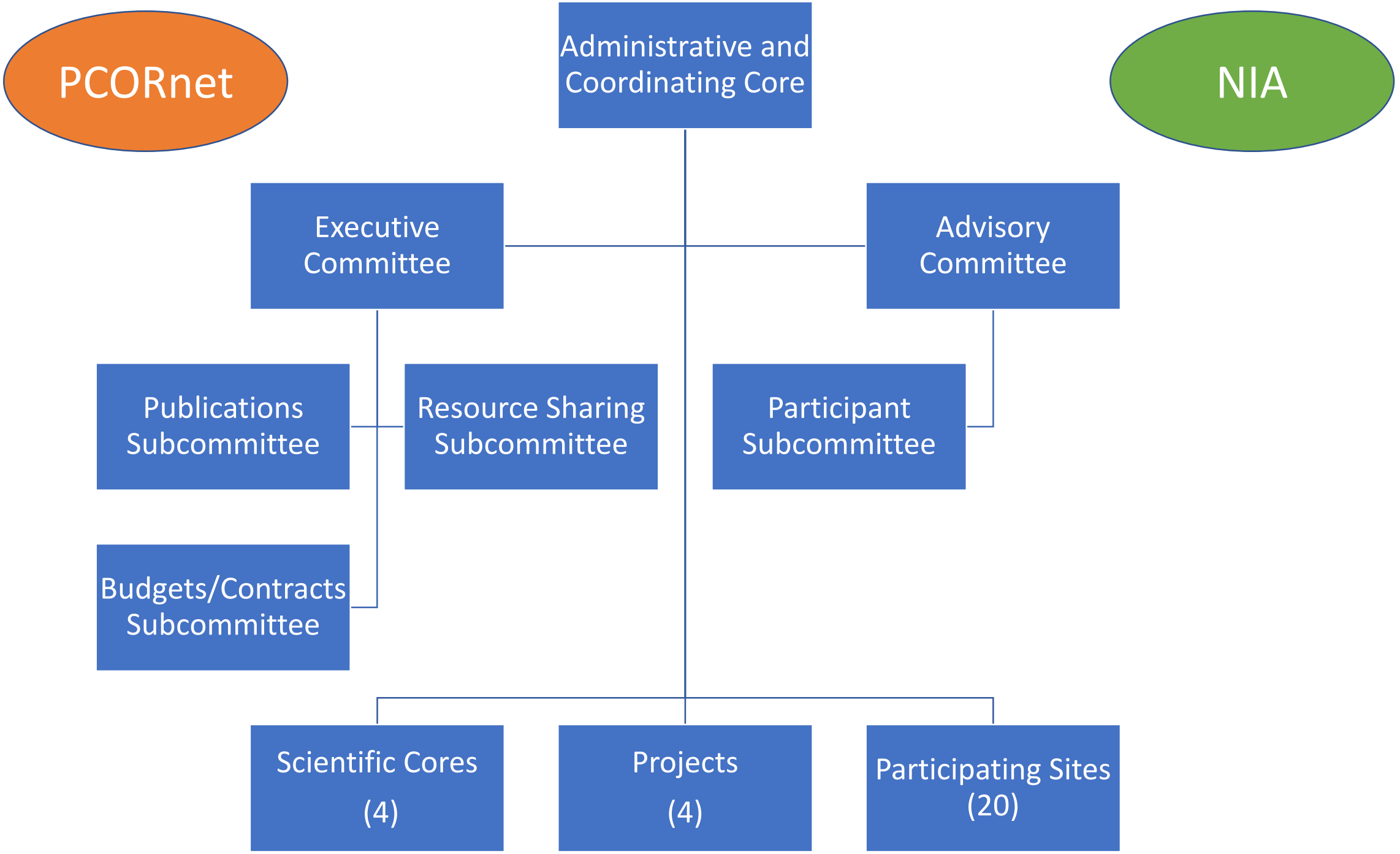
MPI Plan


Administrative and Coordinating Core
Projects
(Jazwinski)
N=4
Scientific Cores
(Maraganore)
N=4
Participating Sites
(Carton)
N=20

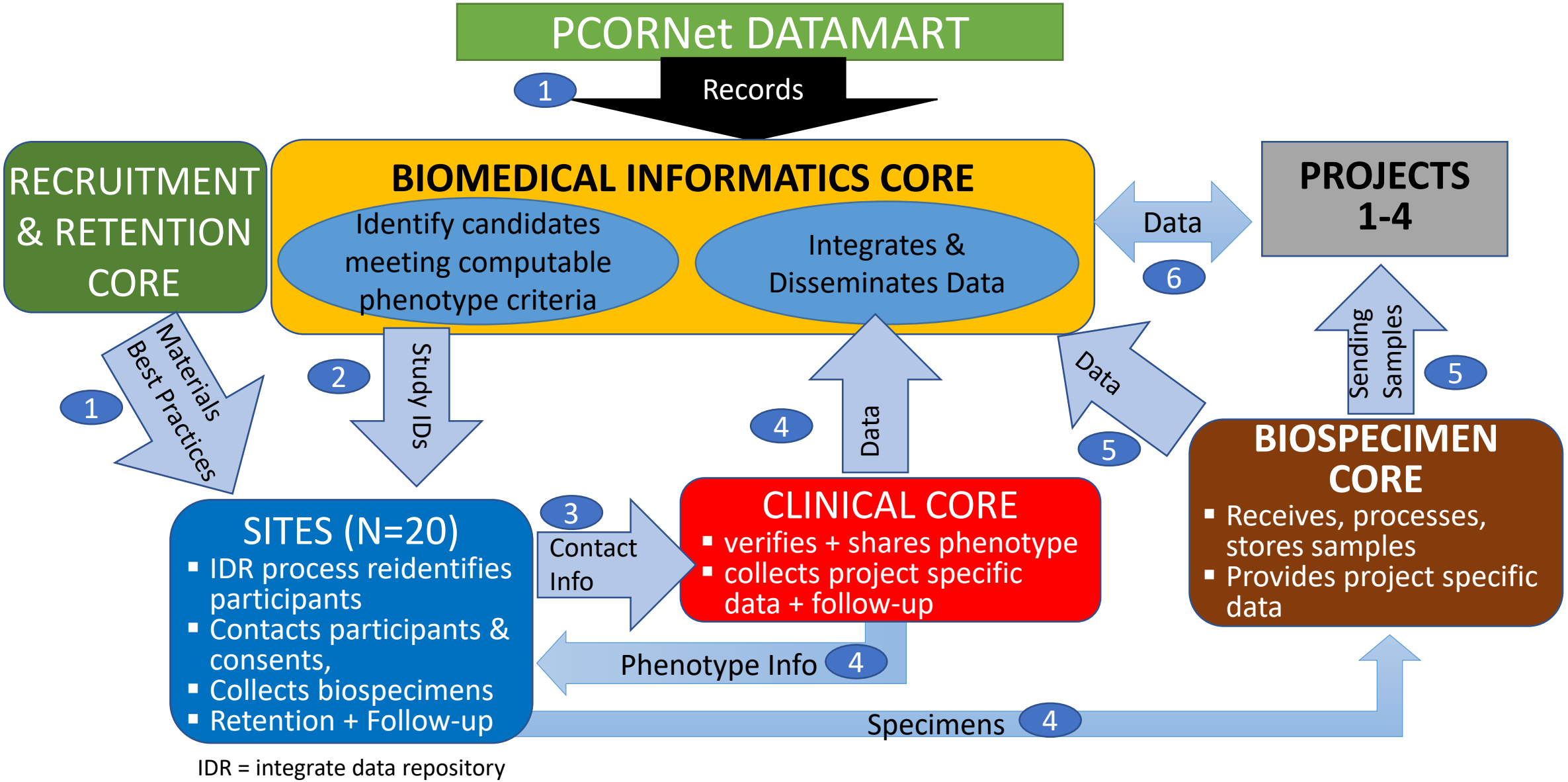
Cores	Core MPIs (* denotes contact PI)
Administrative and Coordinating	Demetrius Maraganore (Tulane University)* Thomas Carton (Louisiana Public Health Institute) S. Michal Jazwinski (Tulane University)
Biomedical Informatics	Jiang Bian (University of Florida)* Thomas Carton (Louisiana Public Health Institute) Sheng Luo (Duke University)
Recruitment and Retention	Joshua Chodosh (New York University)*
Clinical	Glenn Smith (University of Florida)* John Batsis (University of North Carolina)
Biospecimens	Shanker Japa (Tulane University)*

Projects	Project MPIs (* denotes contact PI)
Molecular Architecture of Cognitively Superior Older Adults	S. Michal Jazwisnski (Tulane University)* Matthew Farrer (University of Florida) Sangkyu Kim (Tulane University)
Medical and Social Determinants of Cognitive Health Late in Life: A Health Outcomes and Biomedical Informatics Approach	Yongui Wu (University of Florida)* Jan Busby-Whitehead (University of North Carolina) Demetrius Maraganore (Tulane University) Elizabeth Shenkman (University of Florida)
Dietary Patterns, Weight History, and Microbiota Determinants of Cognitive Health Late in Life	Wendy Dahl (University of Florida)* Andrea Azcarate-Peril (University of North Carolina) Jeanette Beasley (New York University)
Determining Cognitive Health Late in Life Through Dynamic Biomarkers	Heather Whitson (Duke University)* Benjamin Horne (Intermountain Healthcare)

Participating Sites	Site PIs
Baylor Scott and White Health	Jinmyoung Cho
Duke University	Rowena Dolor
Intermountain Healthcare	Benjamin Horne
Johns Hopkins University	Joseph Gallo
Mount Sinai School of Medicine	Mary Sano
New York University	Joshua Chodosh
Penn State University	Cynthia Chuang
Temple University	Anuradha Paranjape
Tulane University	Demetrius Maraganore
Vanderbilt University	Katherine Gifford
University of Florida	Stephen Anton
University of Iowa	Ryan Carnahan
University of Michigan	Raymond Yung
University of Missouri	Blaine Reeder
University of Nebraska	Al Fisher
University of North Carolina	Jan Busby-Whitehead
University of Pittsburgh	Richard Boyce
University of Texas Southwestern	Laura Lacritz
University of Utah	Karen Schliep
Weill Cornell Medicine	Kellyann Niotis


PCORnet
Administrative and Coordinating Core
NIA
Executive Committee
Advisory Committee
Publications Subcommittee
Resource Sharing Subcommittee
Participant Subcommittee
Budgets/Contracts Subcommittee
Scientific Cores (4)
Projects (4)
Participating Sites (20)

Overall



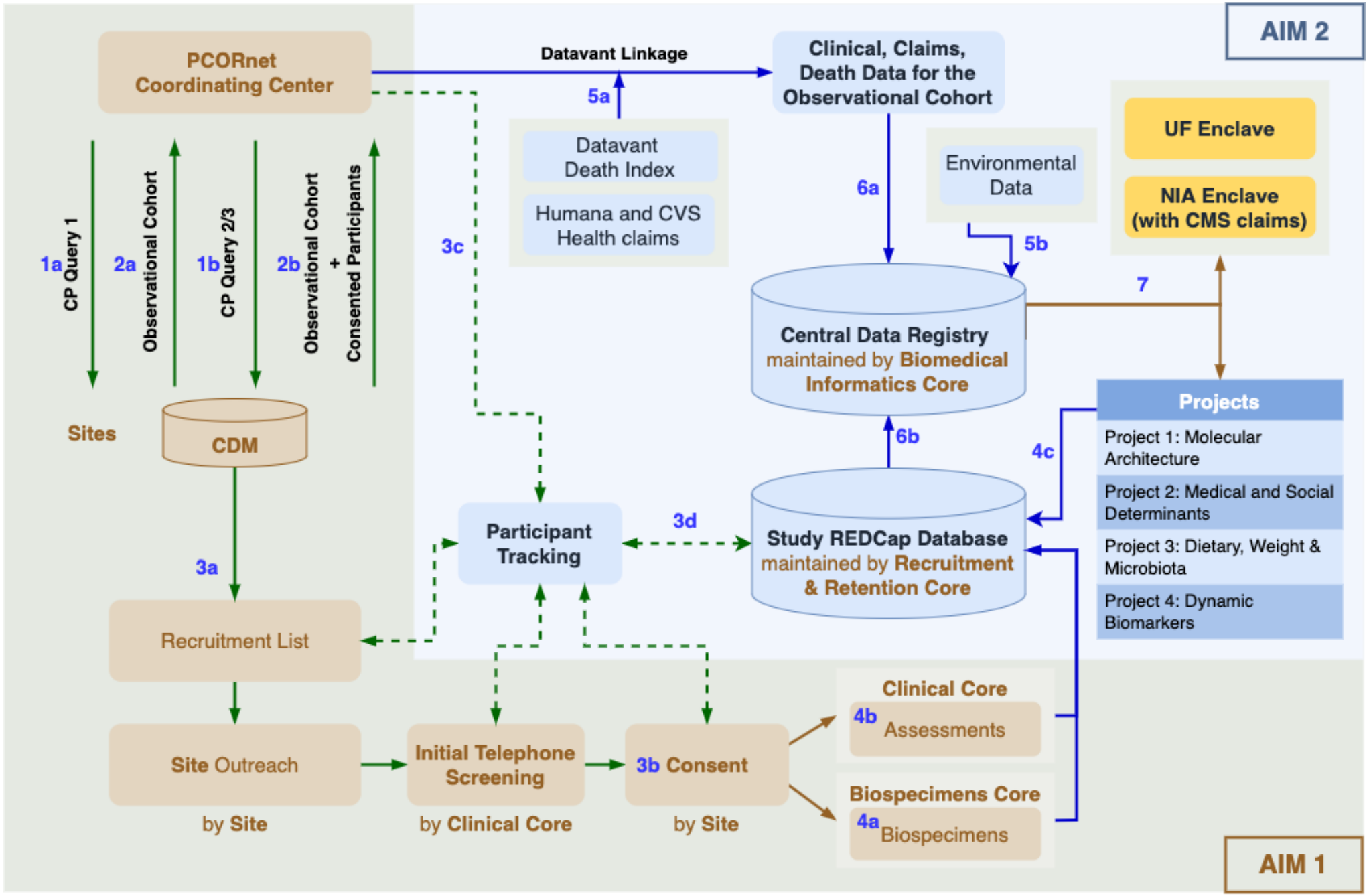
IDR = integrate data repository

TARGETED/PLANNED ENROLLMENT: Number of Subjects			
Ethnic Category	**Females**	**Males**	**Total**
Hispanic or Latino	834	416	1,250
Not Hispanic or Latino	2,500	1,250	3,750
Ethnic Category: Total of All Subjects *	3,334	1,666	5,000
Racial Categories			
American Indian/Alaska Native	34	16	50
Asian	67	33	100
Native Hawaiian or Other Pacific Islander	17	8	25
Black or African American	834	416	1,250
White	2,384	1,191	3,575
Racial Categories: Total of All Subjects *	3,336	1,664	5,000

Half of the subjects will be Black or African American, or Hispanic or Latino

Time interval (months)	0-6	7-12	13-18	19-24	25-30	31-36	37-42	43-48	49-54	55-60
Set up (IRB, training, database, materials)										
Computable phenotype										
Clinical assessments (first)										
Biospecimens collection (first)										
Clinical assessments (second)										
Biospecimens collection (second)										
Clinical assessments (third)										
Biospecimens collection (third)										
Data cleaning and analyses										

Biomedical Informatics Core



Recruitment and Retention Core

Table 1. GOSCE* Communication Checklist
• Communicated concern or intention to help
• Non-Verbal Behavior-communication (e.g. eye contact, posture)
• Acknowledged emotions/feelings appropriately
• Was accepting/non-judgmental
• Used words you understood and/or explained jargon
• Asked questions to see what you understood
• Provided clear explanations/information
• Collaborated with you to identify / decide on possible next steps/plan
• Answered or addressed all of my questions/concern
• Took a personal interest in you; treated you as a person
• Allowed you to talk without interrupting
**GOSCE: Group Objective Structured Clinical Exam*

Figure 1. PCOG Sites (20) Within Six US Regions

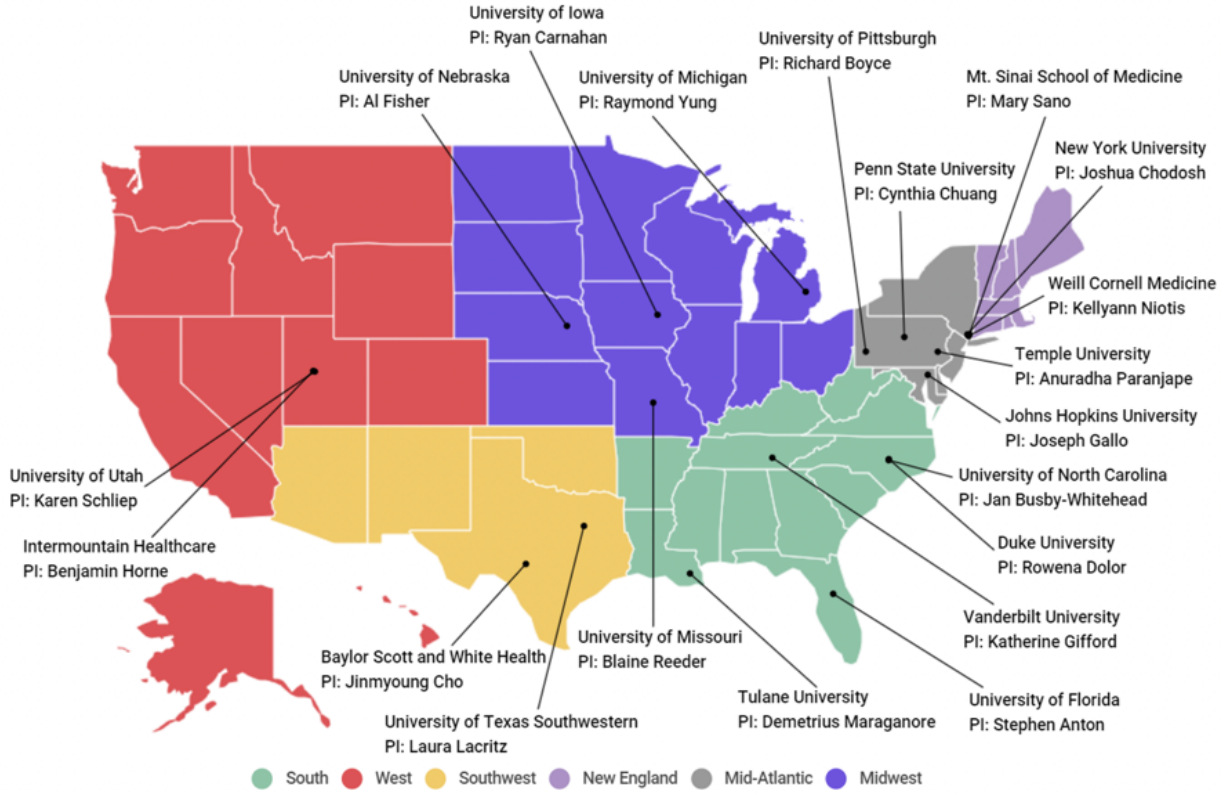
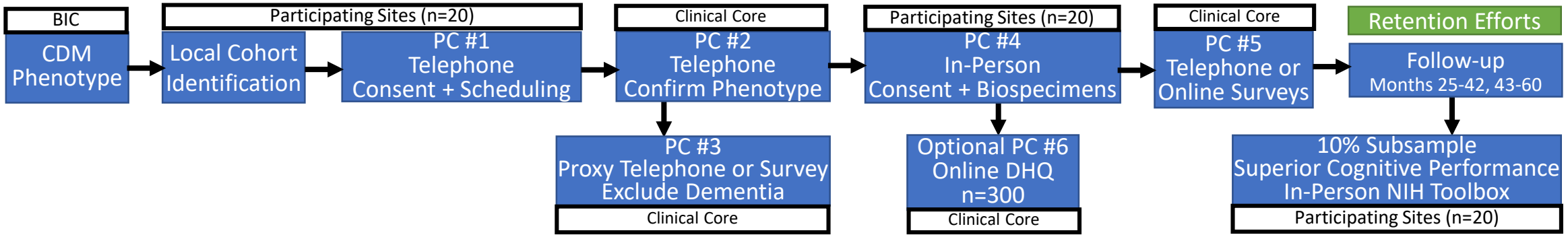


Table 2. Timeline (months)	0-6	7-12	13-18	19-24	25-30	31-36	37-42	43-48	49-54	54-60
• Develop consent forms: paper-based and electronic										
• Develop informatics structure for recruitment, data collection, and retention efforts										
• 2X Monthly meetings: 20-site research coordinators										
• Monthly meetings: biomedical informatics core: track recruitment, retention, biospecimen collection										
• Monthly meetings: MPIs of Cores, projects, 20 sites										
• Generate library of recruitment materials										
• Participants Subcommittee meetings (up to 4) to vet recruitment materials										
• Semi-structured interviews with Participants Subcommittee members and others (n=12)										
• GOSCE training sessions – new and refresher										

Clinical Core



Telephone Interview#1			
Domain	Measure	Items	Time
Demographic*	DOB, sex, income, race/ethnicity, education, living arrangement, proxy	4	3 min
Neurocognitive			
Cognition*	TICS-M	—	30 min
	Recorded 1-minute story telling	1	
Depression*	Patient Health Questionnaire-8	9	
Anxiety*	Generalized Anxiety Disorder-7	7	
Geriatric Syndromes			
Physical Function*	Katz + Lawton ADLs	13	15min
Sensory†	Vision/hearing	2	1 min
	Hearing aids, glasses/contacts	2	1 min
Readiness†	Computer Proficiency Question	12	5 min
Proxy-based iADL/ADL Assessment			
Daily Function	FAQ (for MCI/dementia cases only)	10	10min
Telephone Interview#2			
Demographic†	Insurance, family history, children	3	3 min
Social Measures			
Health Habits†	Current/past use: tobacco, alcohol, drugs	6	4 min
Home Status†	Partner status, household members, home services, mobility aids, driving	5	4 min
Religious †	Behaviors + attitudes	2	2 min
Social Support†	Duke/UNC Functional Social Support	5	3 min
Loneliness†	Loneliness Scale	3	2 min
Self-Reported Physical and Health Measures			
Physical Activity†	Baecke Habitual Physical Activity	9	5 min
Nutrition†	Self-reported weight, height	2	1 min
	Weight History Questionnaire	4	2 min
	Food Security Scale	6	4 min
	MIND Diet Screener	15	10 min
Quality of Life†	PROMIS Global Health 10	10	5 min
Environment†	Lifespace Questionnaire	9	4 min
Optimism†	Life Orientation Test-Revised	10	3 min
Sleep†	Insomnia Severity Index	7	5 min
Pain†	Brief GSS	3	2 min
Falls†	Any falls, falls with injury	3	1 min
Superior Cognition Subsample			
Language*	Picture Vocabulary		4 min
Executive Function*	Dimensional Change Card Sort		4 min
Episodic Memory*	Picture Sequence Memory		7 min
Working Memory*	List Sorting Working Memory		7 min
Processing Speed*	Pattern Comparison		3 min

Table. Definitions of Cognitive Performance[1,2]

Classification	Definition	% Estimated	Special Procedures
Superior cognitive performance	Scoring in the top 10% of local site on the TICS-M	10%	NIH Toolbox Cognitive Battery at follow-up
Normal cognitive performance	Scoring above, at, or within 1.0 SD below age, education, gender expectations (means) on TICS-M (but ≤90th percentile on TICS-M	60%	None
Mild Cognitive Impairment	Scoring more than 1.0 SD below age, education, gender expectations (means) on TICS-M, without significant impairments in ADLs via proxy-based FAQ (score <9).	20%	Proxy-completed FAQ
Dementia	Scoring more than 1.0 SD below age, education, gender expectations (means) on TICS-M, with significant impairments in ADL via proxy-based FAQ (score >9)	10%	Proxy-completed FAQ

Abbreviations: ADL: activities of daily living; FAQ: Functional Assessment Questionnaire; NIH: National Institute of Health; SD: standard deviation; TICS-M: Telephone Interview for Cognitive Status Modified. TICSM expectations (means) will be calculated based on Duff et al 2014.

1) Duff K, Shprecher D, Litvan I, Gerstenecker A, Mast B. Correcting for demographic variables on the modified telephone interview for cognitive status. *The American Journal of Geriatric Psychiatry.* 2014;22(12):1438-1443.

2) Negash S, Smith G, Pankratz S, et al. Successful aging: definitions and prediction of longevity and conversion to mild cognitive impairment. *The American Journal of Geriatric Psychiatry.* 2011;19(6):581-588.

Fig. 1: Schematic representation of the planning phase of biospecimen collection.

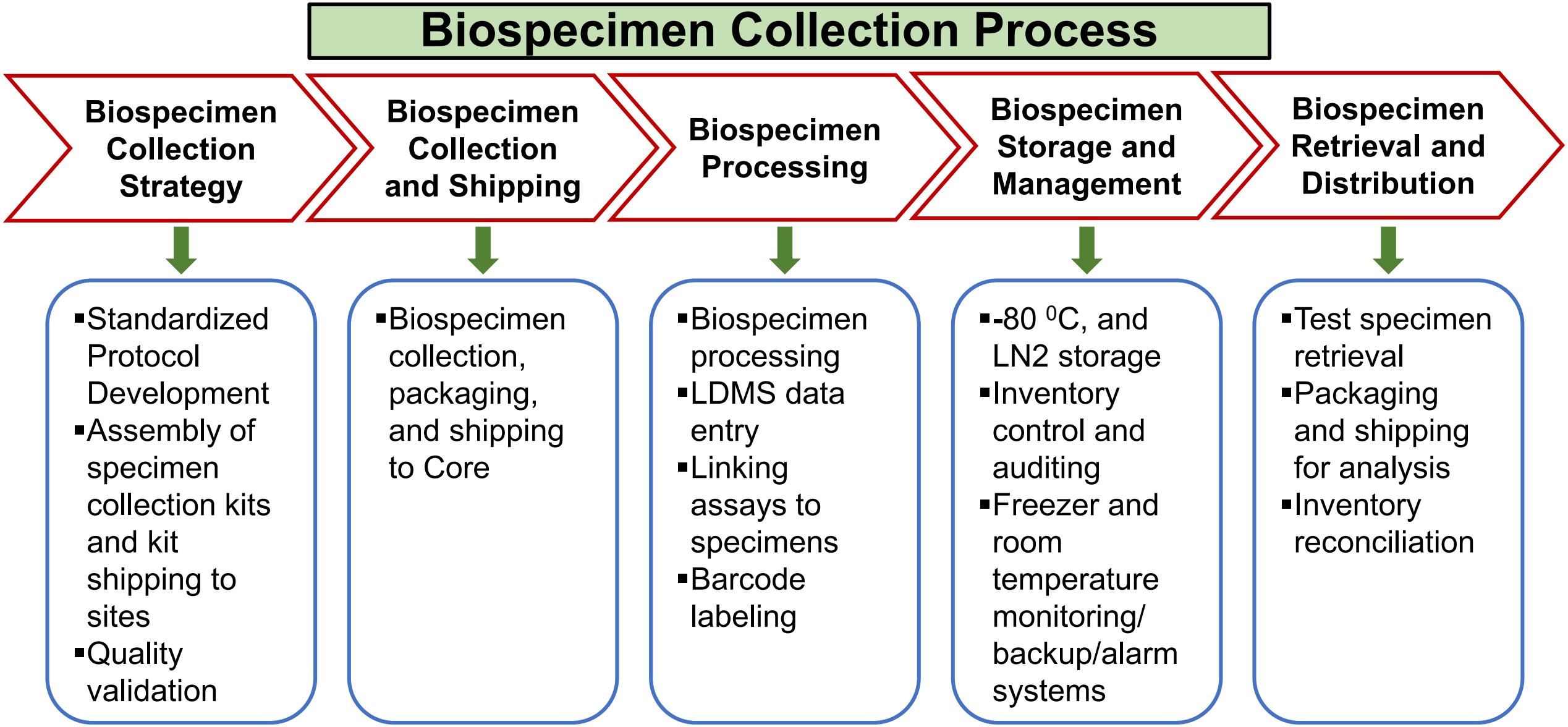


Table 1: Biospecimens collection, processing, storage, and shipping reference - All Sites.

(Blood specimens will be collected after an overnight fast, prior to physical exercise, between 7 -10 AM)

Tube type & Draw Vol (Assay)	Phlebotomy and Lab Instructions	Shipping conditions
Streck RNA Complete BCT, 10 ml x 1 (Transcriptomics)	• Ensure the blood collection tube is at room temperature (15−25 ^{0}C) prior to use. • Mix the filled tube immediately by gently inverting 8-10 times. • Store the collected blood tubes upright at room temperature (15-25 ^{0}C). Avoid disturbing tubes.	Ambient (twice a week)
Paxgene blood DNA tube, 8.5 ml x 1 (Genomics)	• Mix the filled tube immediately by gently inverting 8-10 times. • Store tubes upright at room temperature for from 2 to 72 hours before moving to -70 ^{0}C freezer. ***Note: Store tubes upright in a wire rack. Do not freeze tubes in a Styrofoam™ tray.***	Dry ice (once a month)
Paxgene blood RNA tube, 2.5 ml x 4 (Transcriptomics)	• Mix the filled tube immediately by gently inverting 8-10 times. • Store tubes upright at room temperature for from 2 to 72 hours before moving to -70 ^{0}C freezer. ***Note: Store tubes upright in a wire rack. Do not freeze tubes in a Styrofoam™ tray.***	Dry ice (once a month)
Barricor (Heparin) blood tube, 5.5 ml x 2 (Metabolomics)	• Mix the filled tube immediately by gently inverting 8-10 times. • Deliver tubes to the processing lab. Centrifugation should start within 2 hrs. of blood collection. • To separate the plasma, centrifuge the tubes at 3000 x g for 15 min at 4 ^{0}C. • Transfer plasma into 10 x 0.5 ml aliquots. Evenly distribute remaining volume. • Freeze immediately at -70 ^{0}C until shipping (Aliquots must be frozen within 3 hours of collection).	Dry ice (once a month)
EDTA blood tube, 5 ml x 1 (P-tau181 and other Biomarkers)	• Mix the filled tube immediately by gently inverting 8-10 times. • Deliver tubes to the processing lab. Centrifugation should start within 2 hrs. of blood collection. • Centrifuge the tubes at 1600-1800 x g for 15 min at 4 ^{0}C to isolate plasma. • Transfer plasma into 5 x 0.5 ml aliquots. Evenly distribute the remaining volume. • Freeze immediately at -70 ^{0}C until shipping (Aliquots must be frozen within 3 hours of collection).	Dry ice (once a month)
Stool Collection Kit, (Microbiomics)	• No processing required at collection sites. • After collection of the stool, the sample kit is transported at ambient temperature to the Lab. • The stool sample is stored at -70 ^{0}C until shipping to Biospecimens Core.	Dry ice (once a month)

Table 2: Preanalytical Planning and Centralized Standard Operating Procedures.

Materials

- All tubes, tips and other consumables are checked for their suitability for omics studies.
- Harmonize sample labeling for all participating sites.
- Same brands of sample collectors and blood drawing tubes are used.
- Tube labels withstand all storage conditions including −80 °C.

Study participants

- Specimens are collected after overnight fasting, prior to any physical exercise, between 7 AM and 10 AM.

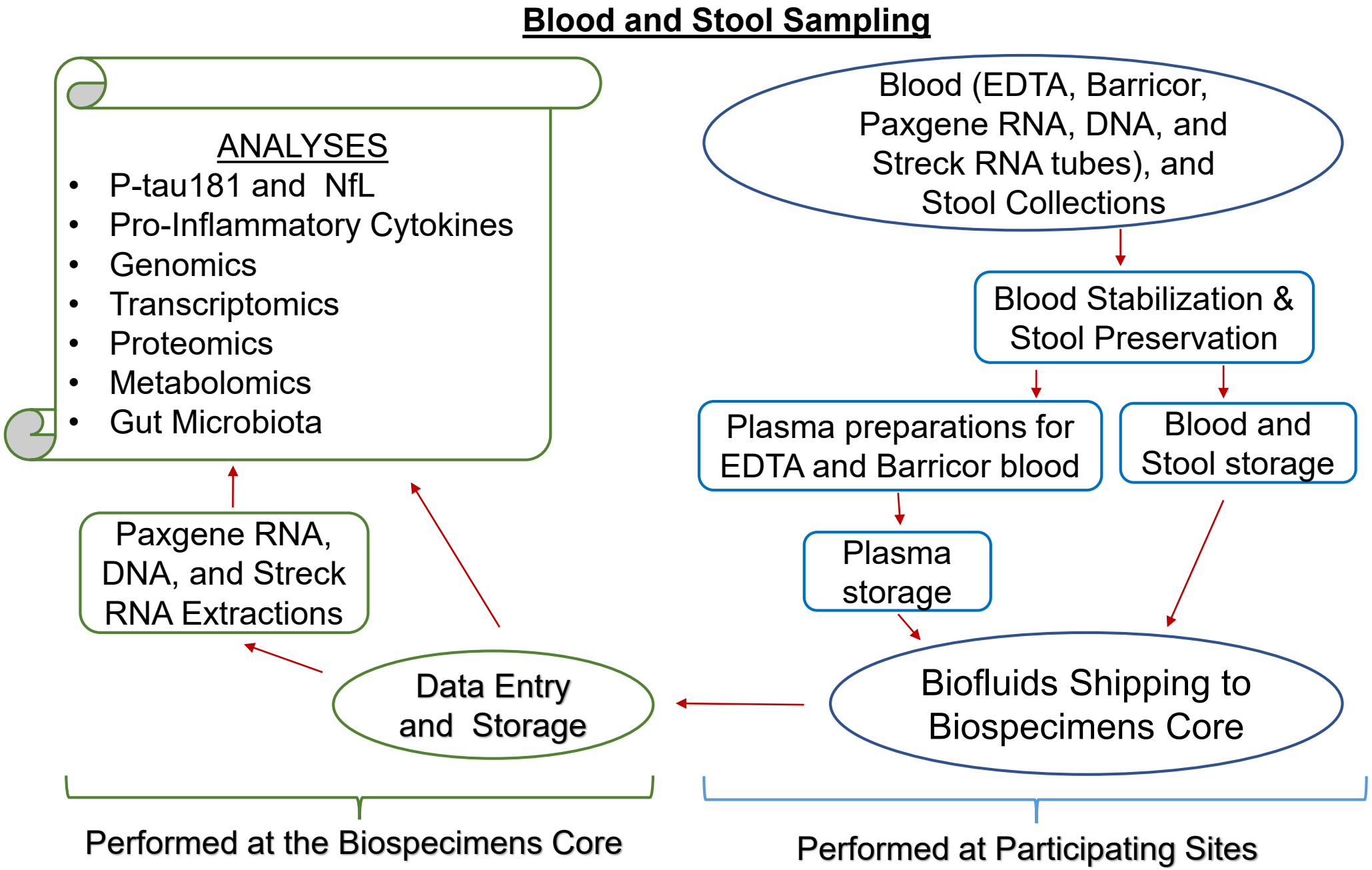
Biospecimens collection and preparation

- Accurate sample labeling.
- Sample types and collected volume, biofluid additives are well-defined.
- Centralized standard collection procedures are established.
- Acceptance criteria regarding sample quality is specified in the procedures.
- All centrifugation conditions (“g” force, temperature, time) are included in the blood processing procedures.
- Post-centrifugation periods until storage are specified in the procedures.
- Volume and number of sample aliquots for long-term storage at −80 °C are established.
- Standardized accurate mixing of thawed samples is established
- Refrozen samples are marked.
- Deviations from the protocol occur, the deviation report is documented and is accessible to all involved protects.

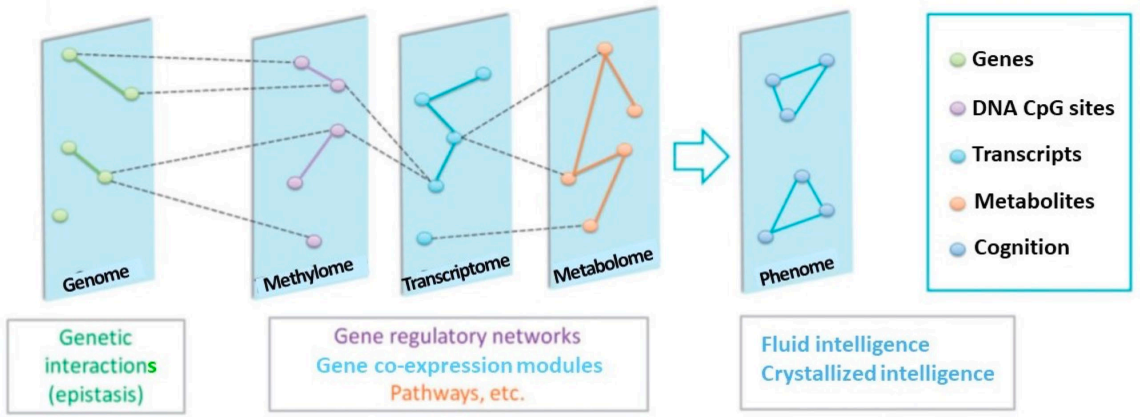
Table 3. Biospecimen collection by visits.

Tube type & Draw vol	Intended use (Assay)	Visit 1 (Enrollment)	Visit 2 (18 months)	Visit 3 (36 months)
Paxgene blood DNA, 8.5 ml	Genomics	X		X
Streck RNA Complete BCT, 10 ml	Transcriptomics	X		X
Paxgene blood RNA, 10 ml	Transcriptomics	X		X
Barricor (Heparin), 10 ml	Metabolomics	X		X
Stool Kit, 1X	Gut microbiota	X	X	X
EDTA blood, 5 ml	P-tau181 & other Biomarkers	X	X	X

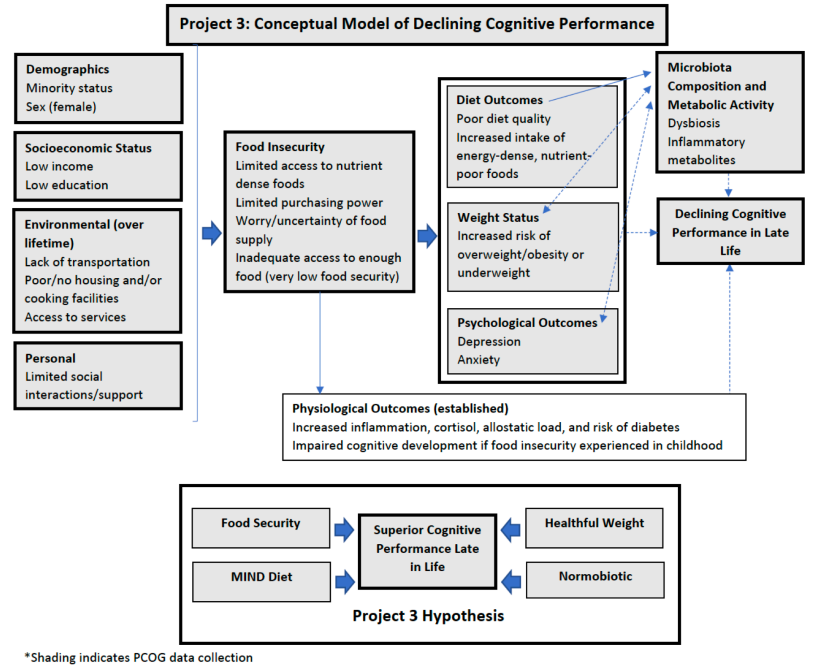
Fig. 2: Schematic representation of specimen collection, extraction, and analysis of biofluids.



Project 1: Molecular Architecture of Cognitively Superior Older Adults

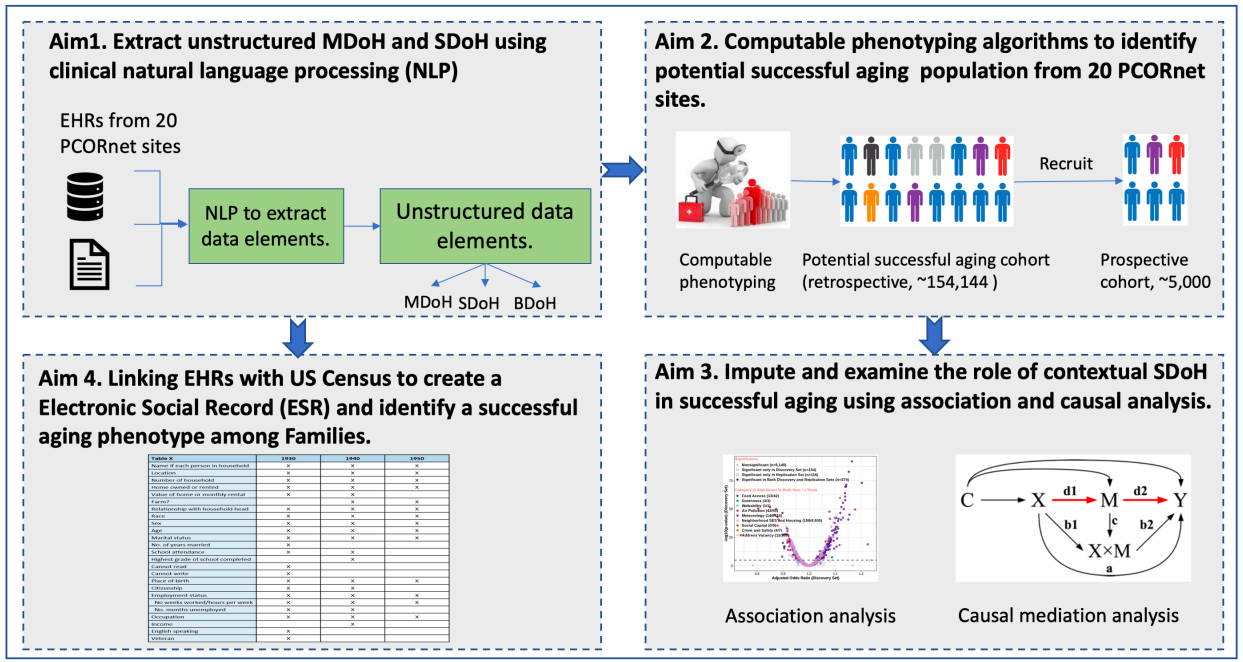


Project 3: Dietary Patterns, Weight History, and Microbiota Determinants of Cognitive Health Late in Life

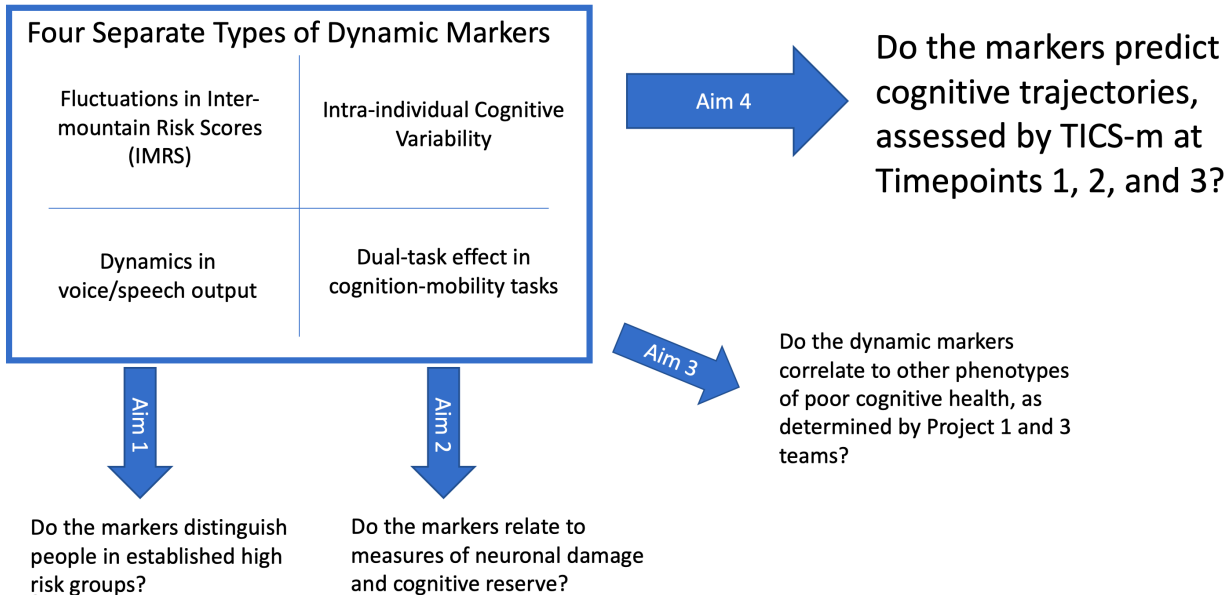


*Shading indicates PCOG data collection

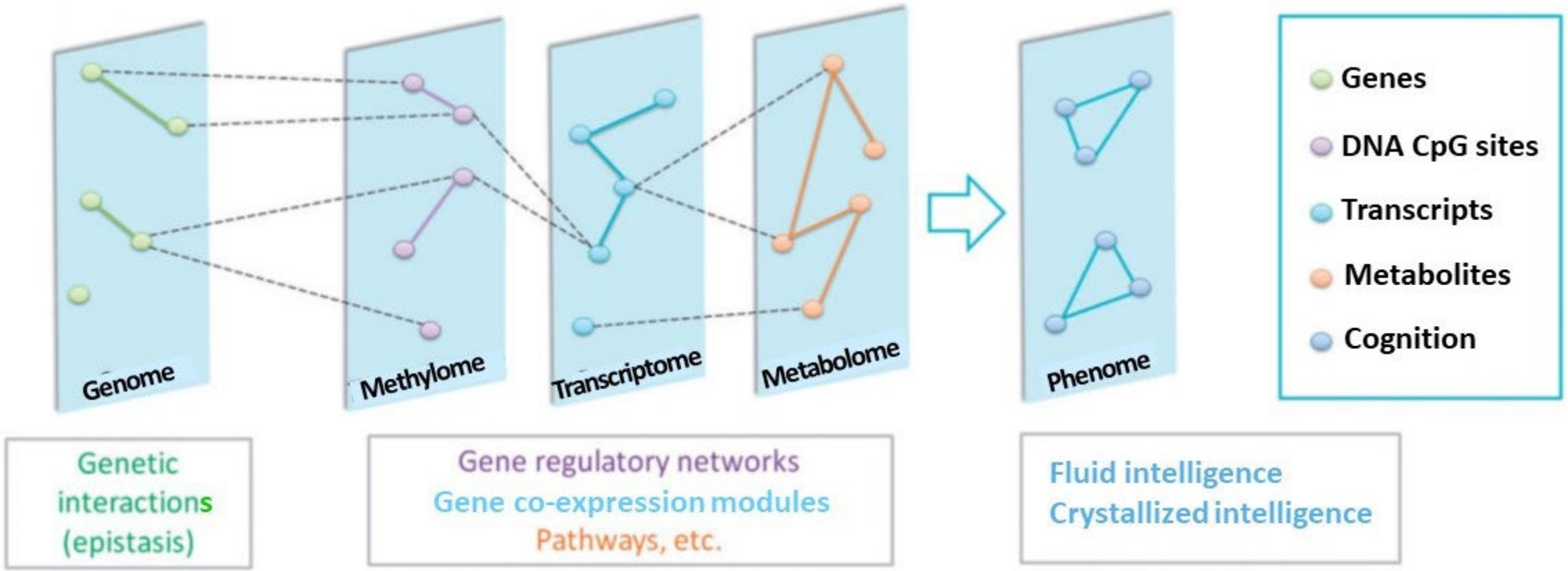
Project 2: Medical and Social Determinants of Cognitive Health Late in Life



Project 4: Determining Cognitive Health Late in Life Through Dynamic Biomarkers



Project 1: Molecular Architecture of Cognitively Superior Older Adults



Project 2: Medical and Social Determinants of Cognitive Health Late in Life

Aim1. Extract unstructured MDoH and SDoH using clinical natural language processing (NLP)

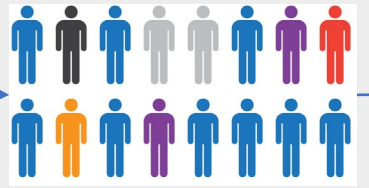
EHRs from 20 PCORnet sites

NLP to extract data elements.

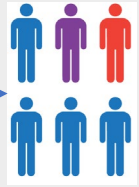
Unstructured data elements.

MDoH SDoH BDoH

Aim 2. Computable phenotyping algorithms to identify potential successful aging population from 20 PCORnet sites.



Recruit



Computable phenotyping

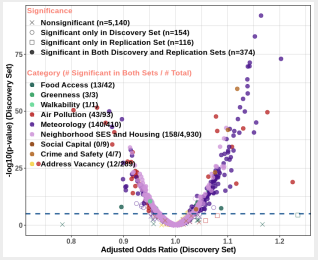
Potential successful aging cohort (retrospective, ~154,144)

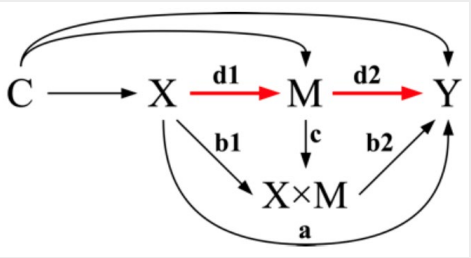
Prospective cohort, ~5,000

Aim 4. Linking EHRs with US Census to create a Electronic Social Record (ESR) and identify a successful aging phenotype among Families.

Table X	1930	1940	1950
Name if each person in household	×	×	×
Location	×	×	×
Number of household	×	×	×
Home owned or rented	×	×	×
Value of home or monthly rental	×	×	
Farm?		×	×
Relationship with household head	×	×	×
Race	×	×	×
Sex	×	×	×
Age	×	×	×
Marital status	×	×	×
No. of years married	×		
School attendance	×	×	
Highest grade of school completed		×	
Cannot read	×		
Cannot write	×		
Place of birth	×	×	×
Citizenship	×	×	
Employment status	×	×	×
No weeks worked/hours per week	×	×	×
No. months unemployed	×	×	
Occupation	×	×	×
Income		×	
English speaking	×		
Veteran	×		

Aim 3. Impute and examine the role of contextual SDoH in successful aging using association and causal analysis.

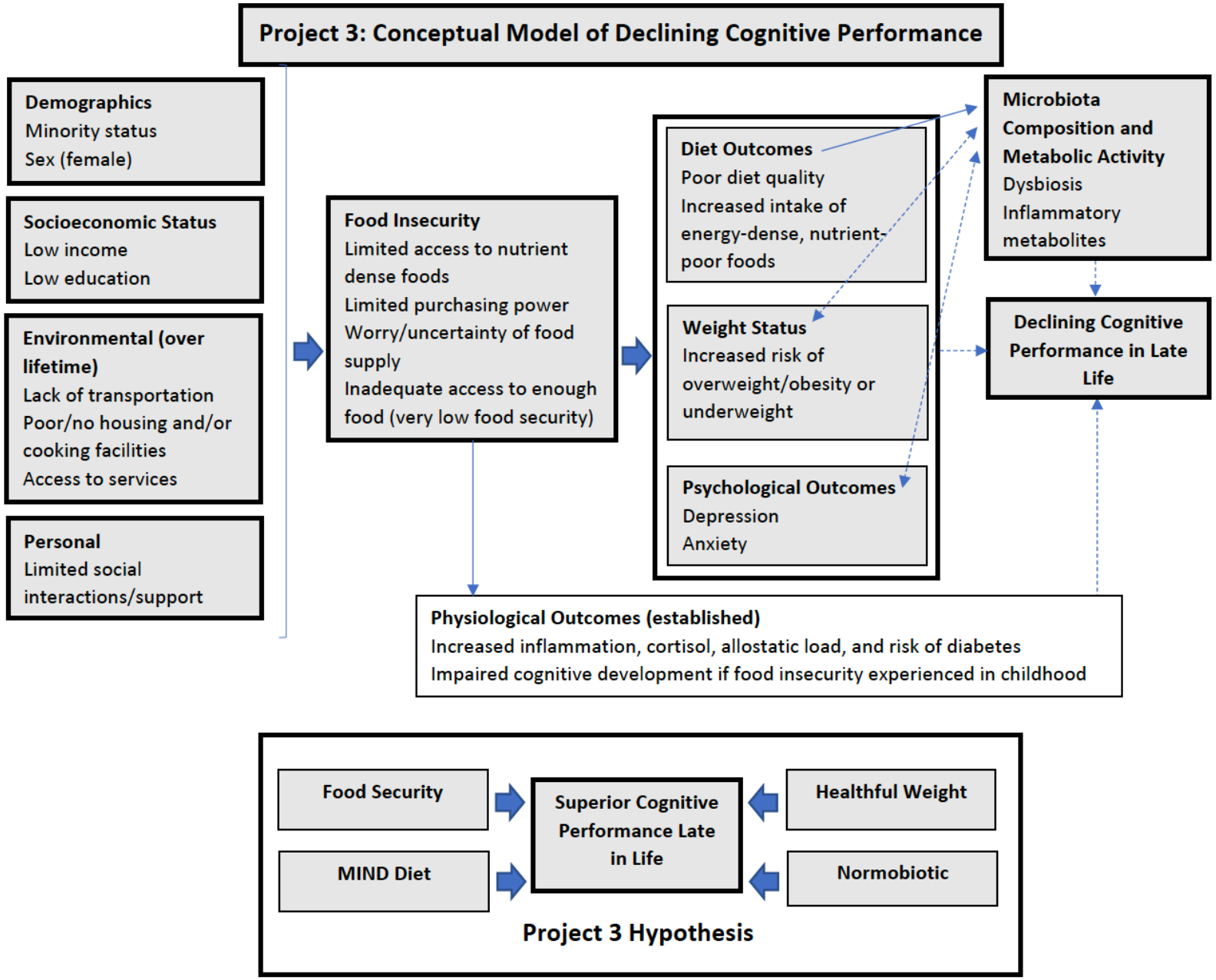




Association analysis

Causal mediation analysis

Project 3: Dietary Patterns, Weight History, and Microbiota Determinants of Cognitive Health Late in Life



*Shading indicates PCOG data collection

Project 4: Determining Cognitive Health Late in Life Through Dynamic Biomarkers

Four Separate Types of Dynamic Markers

Fluctuations in Inter-mountain Risk Scores (IMRS)	Intra-individual Cognitive Variability
Dynamics in voice/speech output	Dual-task effect in cognition-mobility tasks

Aim 1

Do the markers distinguish people in established high risk groups?

Aim 2

Do the markers relate to measures of neuronal damage and cognitive reserve?

Aim 3

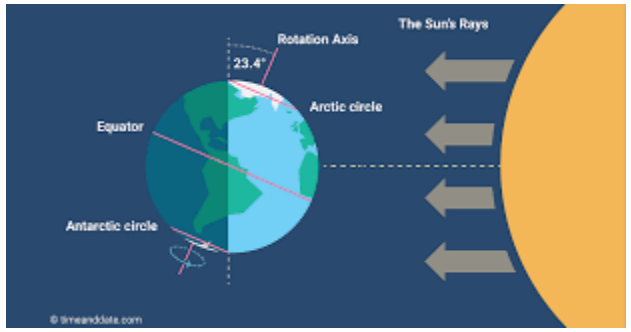
Do the dynamic markers correlate to other phenotypes of poor cognitive health, as determined by Project 1 and 3 teams?

Aim 4

Do the markers predict cognitive trajectories, assessed by TICS-m at Timepoints 1, 2, and 3?

KEY DATES

- Scientific Review (June 21, 2022)



- Start Date (October 1, 2022)

- End Date (September 30, 2027)