

HCHS/SOL Biospecimen Repository as of September 3, 2026

Contents

1. Biospecimen collection by clinic visit..... 1
2. Biorepository availability by storage location and by type of Visit 2
3. Biorepository Impact by Ancillaries. 3

1. Biospecimen collection by clinic visit

HCHS/SOL collected fasting blood specimens and urine at all clinic visits. Specifically, 60mL of blood in Visit 1, 55.5 mL of blood in Visit 2, and 50.5 mL of blood in Visit 3 were collected. The plan for Visit 4 is to collect 53.9 mL blood. Detailed information on each visit collection and the amount used for participants' reports is included in **Tables 1 and 2**.

Table 1. Biosample type collection by clinic visit, HCHS/SOL.

Sample Type	Visit 1 (2008- 2011) Total # of vials	Visit 1 (2008-2011) Volume/vial	Visit 2 (2014- 2017) Total # of vials	Visit 2 (2014-2017) Volume/vial	Visit 3 (2020- 2024) Total # of vials	Visit 3 (2020-2024) Volume/vial	Visit 4 (2027- 2030) (Planned) Total # of vials	Visit 4 (2027-2030) (Planned) Volume/vial
Serum	14	400 µL	14	500 µL	15	500 µL	17	500 µL
Citrate Plasma	7	500 µL	2	500 µL	2-3	500 µL	5	500 µL
EDTA Plasma	15	500 µL	13	500 µL	13	500 µL	16	500 µL
Post-OGTT EDTA Plasma	2	500 µL	2	500 µL	-	-	-	-
Neutral Urine	2	900 µL	2	1500 µL	3	1500 µL	3	1500 µL
Acid Urine	1	1500 µL	1	1500 µL	1	1500 µL	1	1500 µL
Alkaline Urine	1	1500 µL	1	1500 µL	1	1500 µL	1	1500 µL
Packed Cells	1	4 mL	-	-	1	4 mL	1	4 mL
Stock DNA Vials	1	200 µg ave	1	29 µg ave	1	115 µg ave	-	-
Intermediate DNA Dilutions	1	50 µg	-	-	-	-	-	-
Paxgene Whole Blood	1-2	2.5 mL	-	-	-	-	1	2.5 mL
RNA	3	1.2 µg ave	-	-	-	-	-	-
EDTA Whole Blood	2	2.5 mL	2	1.0 mL	2	1.0 mL	2	1.0 mL

Table 2. Biospecimen volume used for immediate feedback report testing by sample type and clinic visit, HCHS/SOL.

Sample Type	Visit 1 (2008-2011) Volume	Visit 2 (2014-2017) Volume	Visit 3 (2020-2024) Volume	Visit 4 (2027-2030) (Planned) Volume
Serum	1 mL	1 mL	250 µL	250 µL
EDTA Plasma	200 µL	250 µL	250 µL	250 µL
Post-OGTT EDTA Plasma	200 µL	250 µL	-	-
Neutral Urine	1.5 mL	1 mL	-	250 µL
EDTA Whole Blood	1 mL	1 mL	1.5 mL	1 mL

2. Biorepository availability by storage location and by type of Visit

Tables 3A, 3B and 3C include the number of samples collected by visit. Visit 1 included 17,382 collections (n=16,415 participants), Visit 2 included 13,023 collections (n=11,623 participants), and Visit 3 included 10,054 collections (n=9,090 participants). Note that these totals include blind duplicates, as well as repeat collections at Visit 1.

Table 3A. Biorepository by storage location at HCHS/SOL Visit 1

Sample Type	Total # of Vials	# of Sample Collections	Storage Location	Total # of Vials	# of Sample Collections	Storage Location
Serum	7	17,332	ARDL	7	17,331	OFF SITE
Citrate Plasma	4	17,260	ARDL	3	17,224	OFF SITE
EDTA Plasma	7	17,310	ARDL	8	17,305	OFF SITE
POST OGTT Plasma	1	14,440	ARDL	1	14,407	OFF SITE
Neutral Urine	2	17,291/17,270	ARDL	-	-	-
Acid Urine	-	-	-	1	17,294	OFF SITE
Alkaline Urine	-	-	-	1	17,291	OFF SITE
DNA	3	17,137	ARDL	-	-	-
Packed Cells	-	-	-	1	17,022	OFF SITE
Paxgene Whole Blood	1/0.5	9,368/7,743	ARDL	1	16,216	OFF SITE
RNA	2	7,743	ARDL	-	-	-
EDTA Whole Blood	1	17,337	ARDL	1	17,328	OFF SITE

18 TOTAL FREEZERS, 9 ONSITE and 9 AT BACKUP LOCATION

Table 3B. Biorepository by storage location at HCHS/SOL Visit 2

Sample Type	Total # of Vials	# of Sample Collections	Storage Location	Total # of Vials	# of Sample Collections	Storage Location
Serum	8	12,932	ARDL	6	12,879	OFF SITE
Citrate Plasma	1	12,847	ARDL	1	12,847	OFF SITE
EDTA Plasma	6	12,908	ARDL	7	12,908	OFF SITE
POST OGTT Plasma	1	9,612	ARDL	1	9,612	OFF SITE
Neutral Urine	2	12,958	ARDL	-	-	-
Acid Urine	-	-	-	1	12,957	OFF SITE
Alkaline Urine	-	-	-	1	12,955	OFF SITE
DNA	1-2	5,763	ARDL	-	-	-
RNA	1 (LABiomed)	298	ARDL	-	-	-
EDTA Whole Blood	1-2	6,288/6,647	ARDL	1	12,877	OFF SITE

9 TOTAL FREEZERS, 5 ONSITE and 4 AT BACKUP LOCATION

Table 3C. Biorepository by storage location at HCHS/SOL Visit 3

Sample Type	Total # of vials	# of Sample Collections	Storage Location	Total # of Vials	# of Sample Collections	Storage Location
Serum	8	10,054	ARDL	7	10,054	OFF SITE
Citrate Plasma	1-2	10,054	ARDL	1	10,054	OFF SITE
EDTA Plasma	7	10,050	ARDL	6	10,050	OFF SITE
Neutral Urine	3	10,054	ARDL	-	-	-
Acid Urine	-	-	-	1	10,054	OFF SITE
Alkaline Urine	-	-	-	1	10,054	OFF SITE
Packed Cells	1	10,054	ARDL	-	-	-
EDTA whole blood	2	10,054	ARDL	-	-	-

8 TOTAL FREEZERS, 5 ONSITE AND 3 AT BACKUP LOCATION

Table 4 shows the percentage of incomplete sample collections by clinic visit. A sample collection is considered complete when there was enough blood and urine collected for all required storage aliquots to be prepared. Overall, the percentage of incomplete samples is 9.2% at baseline, 4.0% at Visit 2, and 6.7% at Visit 3. The percentage of incomplete samples varies from 2.0% to 12.2% by field center and visit. HCHS/SOL protocols were established to collect 49, 37 and 39 storage aliquots at Visits 1, 2 and 3 respectively. Among incomplete sets, the average missing aliquots is low and ranges from 1.8 to 12.7.

Table 4. Biorepository by Study Visit, HCHS/SOL.

		Total Collections	Collections Complete	Collections Incomplete	Percent Incomplete	Total Aliquots	Total Aliquots Missing	Number of Aliquots per Complete Set	Average Missing Aliquots per Incomplete Set
Baseline (2008-2011)	Total	17382	15790	1592	9.2	850018	5329	49	3.4
Visit 2 (2014-2017)	Frozen	13039	12516	523	4.0	449557	2969	35	5.7
Visit 2 (2014-2017)	Whole blood	13023	12973	50	0.4	26046	91	2	1.8
Visit 3 (2020-2023)	Total	10054	9377	677	6.7	390857	5121	39, 38 after 8/11/22*	7.6

*Started study with a 4.5 mL sodium citrate tube collection and 3 aliquots. Due to the COVID pandemic causing numerous supply chain shortages, often only 2.7 mL sodium citrate tube was available commercially, causing more incomplete collections. As time went on, we learned that the manufacturers were discontinuing the 4.5 mL tube and it would not be coming back. On 8/11/22, we switched the aliquot schema to 2 aliquots.

3. Biorepository Impact by Ancillaries

A Biorepository Impact Statement is prepared for each proposal submitted to the Ancillary Study Committee. The amount of sample requested is reviewed by the Laboratory Committee for appropriateness. The Ancillary Studies policy states that up to 250 µL of plasma/serum samples, 500 µL of urine samples, and 0.5 µg of DNA samples can be given for any single ancillary study. There have been a few exceptions in the past when there has been adequate scientific justification for a higher volume. The Central Laboratory has also established a Biorepository Reserve policy to ensure that the study does not run out of biospecimens for any individual participants. This consists of a “Long Term Biorepository Reserve” (LTBR) that includes biospecimens (1-2 aliquots per sample type) for use in future assays that cannot be predicted using current technologies and will not be used until 2034, as well as a “Restricted Use Biorepository Reserve” (RUBR) that includes specimens that have a limited number of aliquots in the HCHS/SOL biorepository. Biospecimens that are part of the RUBR will receive additional scrutiny before approval. It will likely be a provisional approval, conditional on the logistics of sample retrieval and the use of samples by other approved ancillary studies. If more than one study that is approved for these samples receive funding, the laboratory will work with the Coordinating Center and the Principal Investigators of the ancillary studies to ensure everyone has the maximum number of samples possible, given the afore-mentioned logistical considerations.

After extraction, DNA samples are also part of the LTBR. For these samples, instead of individual aliquots, the mass of DNA is used to determine which samples are part of the LTBR. For Visit 1 and Visit 3 samples, the second dilution vial of ~50 µg will be designated as LTBR. A packed cell aliquot for DNA extraction was not collected as part of the Visit 2 core study, so no specific vial will be designated as LTBR. We do have two small (1 mL) Visit 2 EDTA whole blood aliquots available for DNA extraction if funds are available. We will monitor use of these resulting DNA vials and make sure they never go lower than 5 µg.

As of 9/3/2026, biospecimens have been provided to 57 ancillary studies. Biorepository volume used per sample type (or mass for DNA) and clinic visit is shown on **Table 5**. Sample size and eligibility criteria vary by ancillary study. Most studies use a relatively small number of samples compared to the total available in the biorepository.

Table 5. Biospecimens utilized by Ancillary Studies.

Sample Type	Visit	Study	Date Completed	Amount (μL) (μg for DNA)	Number of samples (n)
Citrate plasma	1	H. Pylori Serology (pilot) (AS2016.08)	April 2017	100	39
Citrate plasma	1	H. Pylori Serology (AS2016.08)	Nov 2017	100	16,202
Citrate plasma	1	Hemostasis Phenotypes (AS2022.05)	Oct 2024	250	12,563
DNA	1	CALiCo I	Jan 2012	3	12,667
DNA	1	OLA (Omics in Latinos Initiative)	May 2013	2.5	13,586
DNA	1	Guardian	June 2013	1	3,442
DNA	1	CALiCo II (AS2012.02)	Dec 2014	2	12,917
DNA	1	Matise PAGEII/CALiCo II (AS2012.02)	Dec 2014	1.875	1,074
DNA	1	Addendum to PAGEII/CALiCo II (AS2012.02)	Sep 2015	1	282
DNA	1	SOL WGS and Metabolomics (AS2015.10)	Oct 2016	2	4,250
DNA	1	SOL TOPMED (AS2017.02)	Feb 2017	2.5	2,266
DNA	1	SOL WGS and Metabolomics (AS2015.10)	April 2017	2	267
DNA	1	SOL TOPMED (AS2017.02)	Oct 2017	2.5	1,739
DNA	1	Spirituality and Health (AS2018.13)	Nov 2019	2.4	1,000
DNA	1	SOL-INCA DNAm (AS2017.09)	Mar 2021	1.6	2,880
DNA	1	APOE (SOL-INCA DNAm) (AS2017.09)	Dec 2021	0.625	1,585
DNA	1	Social Stress Epigenetics (AS2017.19)	Jan 2022	1	1,000
DNA	1	Epigenetics of Preterm Birth (AS2019.05)	Feb 2024	1	120
DNA	1	TOPMed DNAm (AS2017.02)	Mar 2025	1	7,895
DNA	1	SOL CAC Protective/Risk Factors (AS2017.32)	Feb 2026	1.3	2,054
EDTA plasma	1	FGF23-Sleep (AS2015.14)	April 2016	155	1,085
EDTA plasma	1	FGF23-Sleep (AS2015.14)	April 2016	310	121
EDTA plasma	1	H. Pylori Serology (pilot) (AS2016.08)	April 2017	100	39
EDTA plasma	1	Persistent Organic Pollutants and Diabetes (AS2013.06)	Feb 2018	1000	2,350
EDTA plasma	1	Diet and Lifestyle and Diabetes Risk (AS2015.23)	Jan 2022	250	1,068
EDTA plasma	1	Eicosanoid Metabolites (AS2018.15)	April 2021	500	16,415
EDTA plasma	1	SOL INCA2 (AS2018.24)	Mar 2022	250	6,503
EDTA plasma	1	Leaky Gut and Heart Disease (AS2021.17)	Mar 2025	200	290
EDTA plasma	1	PFAS and Liver Cancer (AS2021.06)	July 2025	350	99
EDTA plasma	1	SOL INCA-AD (AS2018.24)	Feb 2026	75	6,503
EDTA plasma	1	Proteomics and HF (AS2022.10)	July 2026	150	3,095
EDTA plasma	1	PFASs, apos, and CHD (AS2023.13)	Sept 2026	100	299
EDTA plasma	1	Proteomics and CVD in T2D	In progress	100	9,056
RNA	1	TOPMed RNA Seq (AS2017.02)	June 2023	1 of 3	7,644
Serum	1	Diet and Lifestyle and Diabetes Risk (AS2015.23)	May 2016	100	40
Serum	1	SOL WGS and Metabolomics (AS2015.10)	Sep 2016	500	4,250
Serum	1	SOL WGS and Metabolomics (AS2015.10)	April 2017	500	267
Serum	1	Persistent Organic Pollutants and Diabetes (AS2013.06)	June 2018	50	2,350
Serum	1	GOLD (AS2013.08)	Aug 2020	400	2,319
Serum	1	Metabolomics and Cardiac Function (AS2017.14)	Aug 2020	400	1,350
Serum	1	Lp(a) and ApoB (AS2019.12)	Mar 2021	250	17,146
Serum	1	TOPMed Metabolomics (AS2017.02)	April 2024	400	7,733
Serum	1	Tobacco Biomarkers (AS2023.12)	Oct 2024	200	1,971
Serum	1	PFAS and Kidney Cancer (AS2021.08)	Mar 2025	250	66
Serum	1	Autoimmunity in Hispanics (AS2024.17)	May 2026	200	16,672
Serum	1	PFASs, apos, and CHD (AS2023.13)	Sept 2026	150	571
Serum	1	GOLD 2026 (AS2020.08)	In progress	400	50
Urine, neutral	1	Food Based Biomarkers and Heart Disease (AS2018.07)	Mar 2024	500	206
Urine, neutral	1	Food Based Biomarkers and Heart Disease (AS2018.07)	June 2024	500	60
Urine, neutral	1	Tobacco Biomarkers (AS2023.12)	Oct 2024	500	1,983
DNA	2	SOL-INCA DNAm (AS2017.09)	Mar 2021	1.6	2,880
DNA	2	APOE (SOL-INCA DNAm) (AS2017.09)	Dec 2021	0.625	384
DNA	2	Social Stress Epigenetics (AS2017.19)	Jan 2022	1	1,000

Sample Type	Visit	Study	Date Completed	Amount (μL) (μg for DNA)	Number of samples (n)
DNA	2	TOPMed DNAm (AS2017.02)	Mar 2025	1	4,331
DNA	2	DNAm Socioenvironment and Diabetes (AS2016.12)	Mar 2026	0.56	1,504
DNA	2	SOL CAC Protective/Risk Factors (AS2017.32)	Nov 2025	1.3	2,050
EDTA plasma	2	SOL INCA2 (AS2018.24)	Mar 2022	250	6,541
EDTA plasma	2	Eicosanoid Metabolites (AS2018.15)	April 2021	500	11,231
EDTA plasma	2	Leaky Gut and Heart Disease (AS2021.17)	Mar 2025	200	148
EDTA plasma	2	SOL INCA-AD (AS2018.24)	Feb 2026	75	6,528
EDTA plasma	2	Proteomics and CVD in T2D	In progress	100	4,528
Serum	2	Persistent Organic Pollutants and Diabetes (AS2013.06)	June 2018	50	470
Serum	2	GOLD (AS2013.08)	Aug 2020	500	859
Serum	2	Metabolomics and Cardiac Function (AS2017.14)	Aug 2020	500	1,000
Serum	2	Neighborhood Greenness (AS2018.16)	April 2023	50	6,115
Serum	2	TOPMed Metabolomics (AS2017.02)	April 2024	500	4,298
Serum	2	GOLD 2026 (AS2020.08)	In progress	500	50
EDTA plasma	3	VIDA (AS2018.05)	Nov 2024	50	2,420
EDTA plasma	3	SOL INCA-AD (AS2018.24)	In progress	75	4,287
EDTA plasma	3	Proteomics and HF (AS2022.10)	July 2026	150	1,557
EDTA plasma	3	PFASs, apos, and CHD (AS2023.13)	Sept 2026	100	300
Serum	3	C4R (AS2020.03)	Oct 2022	250	3,580
Serum	3	C4R (AS2020.03)	Mar 2024	250	3,012
Serum	3	Gender minorities (AS2018.22)	June 2024	50	1,284
Serum	3	PASOS (AS2017.31)	July 2025	50	4,454
Serum	3	Asthma Epigenomics (AS2019.06)	Oct 2024	500	250
Serum	3	Asthma Epigenomics (AS2019.06)	July 2025	500	246
Serum	3	Asthma Epigenomics (AS2019.06)	Feb 2026	500	224
Serum	3	PFASs, apos, and CHD (AS2023.13)	Sept 2026	150	300
Serum	3	GOLD 2026(AS2020.08)	In progress	500	1,000
Urine, neutral	3	PASOS (AS2017.31)	July 2025	50	4,345
EDTA plasma	SOL NAFLD	SOL NAFLD (AS2017.30)	Aug 2025	1,000	1,633
EDTA plasma	SOLNAS	DBDC (AS2020.04)	Oct 2025	100	220
Serum	SOLNAS	Dietary Patterns and CVD (AS2016.04)	Oct 2019	250	454
Serum	SOLNAS	Tasevska SOLNAS Ancillary Study (AS2021.10)	Sep 2024	40	616
Urine, spot	SOLNAS	Arsenic Study (AS2016.05)	July 2016	500	88
Urine, spot	SOLNAS	Food Based Biomarkers and Heart Disease (AS2018.07)	Oct 2022	500	466
Urine, 24 HR	SOLNAS	Food Biomarker Center (AS2020.05)	July 2025	250	399
Urine, 24 HR	SOLNAS	DBDC (AS2020.04)	Sep 2025	250	198
DNA	SOL Youth	Genetics of Obesity (AS2014.10)	Sep 2019	0.6	1,410
DNA	SOL Youth	Social Stress Epigenetics-SOL Youth (AS2018.20)	Mar 2023	1.4	1,114