Framingham Heart Study

Laboratory Data notes for Offspring Exam 9 and Omni Exam 4 [dataset name l_fhslab_ex09_1b_0658d]
August 2014

Exam dates:

Offspring Exam 9: date range 4/11 – 3/14
Omni Exam 4: date range 8/11 – 3/14

Fasting status:

Participants were asked to fast after 8:00 PM, the evening before their clinic exam. Participants were considered to be fasting after a minimum of a 10 hour fast. Please note: there are two fasting variables in the Offspring Exam 9/Omni Exam 4 dataset.

1. Fasting (Yes/No variable)
2. Number of hours fasting

Specimen collection:

Blood was drawn from participants in a supine position, using standard venipuncture technique, typically between 7:00 and 9:00 AM. Specimens were centrifuged for 22 minutes at 2400g at 4°C. Plasma and serum were separated from the cells within 90 minutes of draw. Spot urine specimens were also collected from participants.

1. Cholesterol, HDL cholesterol, triglycerides and glucose were run on EDTA plasma *[Tyco Monoject; 15% EDTA (K3)]*.
2. Other blood chemistry tests were run on serum *[BD Diagnostics, Serum Tubes].*
3. Hematology testing was performed using whole blood *[Tyco Monoject,15% EDTA (K3)].*

Testing:

Chemistry

All chemistry testing was performed on a Roche cobas 501 using Roche reagents.

Test	**Units**
Albumin	g/dL
ALT (alanine aminotransferase)	U/L
AST (aspartate aminotransferase)	U/L
Bilirubin	mg/dL
Calcium	mg/dL
Cholesterol	mg/dL
Creatinine	mg/dL
CRP (C-reactive protein)	mg/L
GGT (gamma glutamyltransferase)	U/L
Glucose	mg/dL
HbA_1c (hemoglobin A1c)	%
HDL cholesterol†	mg/dL
Phosphorus	mg/dL
Triglycerides	mg/dL
Urine albumin (spot urine)	mg/L
Urine creatinine (spot urine)	mg/dL

† HDL cholesterol is a non-Roche application. The FHS method used an off-line precipitation step with dextran sulfate-Mg^{2+}, followed by measurement of cholesterol (Roche) in the non-apo-B containing supernatant.

Indicator variables

In this dataset there are four chemistry assays with values below the FHS measuring ranges. These values have been set to equal the lower limit of the measuring range; see chart below for these values. These assays have indicator variables connected with them.

Indicator variable = 1; value is below the measuring range of the assay
Indicator variable = 2; value is within the measuring range of the assay

Assay	Lower limit of measuring range
CRP	0.15 mg/L
ALT	5 U/L
HDL-C	16 mg/dL
Urine albumin	3 mg/L

Hematology

All hematology testing was performed on a Beckman Coulter HmX Hematology Analyzer using Beckman Coulter reagents.

Parameter	Units
WBC (white blood count)	x 10^3/uL
RBC (red blood count)	x 10^6/uL
Hemoglobin	g/dL
Hematocrit	%
Platelet count	x 10^3/uL
MPV (mean platelet volume)	fL
MCV (mean corpuscular volume)	fL
MCH (mean corpuscular hemoglobin)	pg
MCHC (mean corpuscular hemoglobin concentration)	g/dL
RDW (red cell distribution width)	%
Neutrophil %	%
Lymphocyte %	%
Monocyte %	%
Eosinophil %	%
Basophil %	%
Neutrophil #	x 10^3/uL
Lymphocyte #	x 10^3/uL
Monocyte #	x 10^3/uL
Eosinophil #	x 10^3/uL
Basophil #	x 10^3/uL

Abnormal cell populations

The Beckman Coulter HmX is an automated cell counter. The FHS laboratory is unable to confirm abnormal cell populations. Please note:

- Abnormal red blood cell and platelet populations:
  Counts are unreliable and have been removed from the dataset.
  Abnormal red blood cell population; N=7 participants
  Abnormal platelet population; N=81 participants
- Abnormal white blood cell populations:
  Counts are accurate and have been included in the dataset.
  Abnormal white blood cell population; N=52 participants

Quality Control:

Intra- and inter-assay CVs

- Intra-assay CVs are derived from duplicate data within the same runs. Cholesterol, HDL cholesterol, triglycerides, glucose and creatinine are run in duplicate. All other assays are run in single, with ~10% run in duplicate.
- Inter-assay CVs are derived from quality control specimens, which are included on every run.

	Intra-assay CV %	Inter-assay CV %
Albumin	0.9	2.2
ALT	1.2	3.2
AST	0.8	2.2
Bilirubin	3.9	4.6
Calcium	0.7	1.8
Cholesterol	0.7	2.0
Creatinine	1.6	2.3
CRP	2.5	3.5
GGT	1.0	1.7
Glucose	0.7	1.8
HbA1c	0.8	2.3
HDL cholesterol	0.9	3.0
Phosphorus	0.7	2.3
Triglycerides	1.3	1.9
Urine albumin	4.4	3.5
Urine creatinine	1.2	4.1
WBC	1.2	1.7
RBC	0.5	0.8
Hemoglobin	0.4	0.7
Hematocrit	0.7	**
Platelet count	2.7	2.6
MCV	0.5	1.2
MCH	0.6	**
MCHC	0.9	**
RDW	1.0	1.6
MPV	1.5	1.2
Neutrophil %	0.8	1.3
Neutrophil #	2.0	**
Lymphocyte %	1.8	1.9
Lymphocyte #	2.4	**
Monocyte %	3.9	5.8
Monocyte #	3.9	**
Eosinophil %	6.3	5.4
Eosinophil #	10.1	**
Basophil %	28.5	42.1
Basophil #	56.6	**

*** data not included in QC reports from Beckman Coulter*

Phantom specimens

One phantom sample is collected for every 20 participants. Each phantom set includes the various sample types (EDTA plasma, citrated plasma, serum, whole blood and urine) and is made up of samples from several different participants. Phantoms are bar-coded with Phantom IDs and testing is performed with the identity blinded. Files linking the Phantom ID with the Framingham ID of the donor participant are maintained by the FHS laboratory manager. Phantom data are linked to data from the true Framingham ID and inter-class correlations and CVs are calculated.

	Phantom ICC	CV	N
Albumin	0.725	2.8	130
ALT	0.991	3.3	130
AST	0.983	2.9	130
Bilirubin	0.986	4.5	130
Calcium	0.820	1.3	130
Cholesterol	0.992	1.9%	130
Creatinine	0.994	1.7	130
CRP	0.994	4.2	130
GGT	0.996	3.4	130
Glucose	0.992	1.5	130
HbA1c	0.986	0.7	130
HDL cholesterol	0.993	2.2	130
Phosphorus	0.990	0.9	130
Triglycerides	0.998	1.7	130
Urine albumin	1.000	4.9	87
Urine creatinine	0.999	1.2	115
WBC	0.993	2.5	129
RBC	0.983	1.0	129
Hemoglobin	0.975	1.0	129
Hematocrit	0.944	1.6	129
Platelet count	0.989	2.8	123
MCV	0.953	0.9	129
Neutrophil %	0.991	1.1	129
Lymphocyte %	0.991	2.2	129
Monocyte %	0.923	4.4	129
Eosinophil %	0.993	6.1	129
Basophil %	0.860	26.1	129