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Study of Osteoporotic Fractures (SOF)

Study Collection Forms

Visit 4

Dual X-ray Absorptiometry (DXA)

Whole Body

Form Type: Documentation

LEGEND:

Raw form variable names are located next to the question they represent and do not have a border around the variable name.

Calculated variable names are derived from other variables and have a border around the variable name. The calculated variables names are located in close proximity to the questions from which they were derived.

Some of the questions and measurements on these forms are not being released, and therefore no variable name is provided for them.

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DXA Documentation

SOF began measuring dual x-ray absorptiometry (DXA) on participants at Visit 2 using Hologic QDR 1000 workstations at each of the 4 clinics. At Visit 2, hip and spine scans were performed on most of the participants. Any participant not scanned at Visit 2 was scanned at Visit 3 to complete the data and their data are included in Visit 2 data. At Visit 4, only hips were scanned on the entire cohort, and spine scans were performed on the bone loss cohort. Hips were scanned at all subsequent visits, including on the African American (AA) cohort starting at Visit 6. At Visit 4 whole body scans were performed on the body composition cohort, and at Visits 6 and 7 whole body scans were performed on the year 12 cohort using Hologic QDR 2000 workstations. Whole body change variables were not calculated between visits 4-6 or 4-7 because there is essentially no overlap between the cohorts.

Scans were performed and analyzed at each clinic. Review of scans was done at the UCSF Coordinating Center on random subsets of scans and on problematic scans identified ("flagged") by technicians at the clinics. Some scans are deemed unacceptable and are not included in the data or are set to special missing value code ".W".

At follow-up visits, positioning and analysis were matched to the Visit 2 scans, using the "compare" feature of the Hologic QDR. Generally, the right hip was scanned unless there was a fracture, implant, hardware or other problem preventing the right hip from being scanned, in which case the left hip was scanned. If during the study a different side was scanned, then scans at later visits were matched to the first scan of the new side. In addition to matching the follow-up scan to earlier scans, the earlier scans were re-analyzed by adjusting the regions-of-interest (ROI's) or deleting bone to match the later scan so longitudinal change variables could be calculated. This results in multiple versions of visit scans. For example there are the original scan values for Visit 2, and also longitudinally-adjusted scan values, e.g. a Visit 4-adjusted Visit 2 scan value, a Visit 6-adjusted Visit 2 scan value, etc. The original unadjusted scan is used for cross-sectional data analysis, and the longitudinally-adjusted later visit versions are used for calculating change variables, and for repeated-measures data analysis.

Absolute and percent change variables are calculated using the (current visit – earlier longitudinally-adjusted visit), matching for side (hip scans) and scan mode. Change variables from non-matching sides or scan modes are also set to to special missing value code ".W". In general, change variables are only provided for hip BMD, total spine BMD, and total whole body BMD. The easiest way to calculate additional change variables is to calculate change for only participants with non-missing BMD change, so no checking for matching sides or modes is necessary. For example, to calculate absolute and percent change in total hip BMC between Visits 2 and 4, use the following SAS code:

```
if  V42DTHD>.z then V42DTHC= V4THC-V2THC ;
if  V42DTHD>.z then V42PTHC= 100*(V4THC-V2THC )/V2THC ;
```

To calculate annualized change, simply divide by the number of years between scans, in this case with the variable V42HPYRS.

PLEASE NOTE:
At Visits 6 and 7, hips of SOF participants at 2 of the clinics were measured on the QDR 2000 instead of the QDR 1000. Hip measurements between the QDR 1000 and 2000 are not comparable. We attempted to find a correction based on 20 or 30 people measured on both 1000 and 2000, but were unsuccessful.

Hips of all of the AA participants from the 2 clinics were measured on the QDR 2000, plus a handful from the other 2 clinics.

DXA Documentation

WE STRONGLY RECOMMEND that analysis using data from these visits include QDR serial number (V#HPQDR) as a covariate (instead of clinic) when doing both cross-sectional AND longitudinal analyses by creating dummy variables using V#HPQDR.

IN ADDITION, WE RECOMMEND repeating analyses on QDR 1000 (serial numbers<1000) participants only by setting measurement values to missing for hips measured on QDR 2000 (serial numbers>2000).

This does NOT apply to whole body data since all whole body data were measured on the QDR 2000.

General Naming Conventions:

There are 4 types of variables: cross-sectional visit, change, longitudinally-adjusted visit, change variables, and scan information variables. The variable name is a combination of 5 factors: current visit ($V\#_c$ or AA); type of change variable (C); earlier visit ($\#_e$); scan type or region (S_1 S_2); and type of measurement (M). See tables below for values of M and S_1 S_2.

1. Cross-sectional variables are 5 character variable names. Current visit is identified by the first 2 characters, scan region in the 3rd and 4th characters, and type of measurement in the 5th character.

V	$\#_c$	S_1	S_2	M
—	—	—	—	—

or

A	A	S_1	S_2	M
—	—	—	—	—

2. Longitudinally-adjusted variables are 6 character variable names similar to cross-sectional variables with the earlier visit number at the end. Current visit is identified by the first 2 characters, scan region in the 3rd and 4th characters, type of measurement in the 5th character, and earlier visit number in the 6th character.

V	$\#_c$	S_1	S_2	M	$\#_e$
—	—	—	—	—	—

or

A	A	S_1	S_2	M	$\#_e$
—	—	—	—	—	—

3. Change variables are 7 character variable names. Current visit is identified by the first 2 characters, earlier visit is the 3rd character, type of change variable is the 4th character, scan region in the 5th and 6th characters, and type of measurement in the 7th character. The type of change variable C is either D for absolute change or P for percent change.

V	$\#_c$	$\#_e$	C	S_1	S_2	M
—	—	—	—	—	—	—

or

A	A	$\#_e$	C	S_1	S_2	M
—	—	—	—	—	—	—

Years between scans is named as follows using scan type for S_1 and S_2 :

V	$\#_c$	$\#_e$	S_1	S_2	Y	R	S
—	—	—	—	—	—	—	—

or

A	A	$\#_e$	S_1	S_2	Y	R	S
—	—	—	—	—	—	—	—

4. Scan information variables (hip side, scan date (days since enrolled), scan mode, and QDR serial number) are 7-8 character variable names. For cross-sectional variables, current visit is identified by the first 2 characters, scan type in the 3rd and 4th characters, and SIDE, DAYS, MODE, QDR in the remaining characters. For longitudinally-adjusted variables, the 8th character is $\#_e$, preceded by and SID, DAY, MOD, QDR.

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V $\#_c$ S_1 S_2 X X X X
— — — — — — — —
or
A A S_1 S_2 X X X X
— — — — — — — —
or

V $\#_c$ S_1 S_2 X X X $\#_e$
— — — — — — — —
or
A A S_1 S_2 X X X $\#_e$
— — — — — — — —

Take, for example, Total hip.

a. The Visit 2 cross-sectional visit BMD is V2THD and BMC is V2THC. The Visit 4 cross-sectional visit BMD is V4THD.

b. The Visit 2 BMD longitudinally-adjusted variable at Visit 4 (considered a Visit 4 variable) is V4THD2.

c. Absolute change from Visit 2 to Visit 4 (considered a Visit 4 variable) is V42DTHD. Percent change from Visit 2 to Visit 4 is V42PTHD.

d. A hip information variable for Visit 2 is V2HPSIDE, for Visit 4 is V4HPSIDE, and the Visit 2 longitudinally-adjusted side is V4HPSID2.

Type of measurement (M) abbreviations :

A	Area
C	Bone Mineral Content (BMC)
D	Bone Mineral Density (BMD=BMC/Area)
E	Fat Free Mass (FFM=BMC+Lean)
F	Fat
L	Lean
M	Mass
P	Percent fat

Scan type and region (S_1 S_2) abbreviations:

Scan type		Region	
HP	Hip	TH	Total Hip
		FN	Femoral Neck
		IT	Intertrochanter
		TR	Trochanter
		WD	Wards
SP	Spine	TL	Total Lumbar Spine
		L1	L1
		L2	L2
		L3	L3
		L4	L4
WB	Whole body	TB	Total Whole body
		HD	Head
		LA	Left arm
		RA	Right arm
		LR	Left rib
		RR	Right rib
		TS	Thoracic spine
		LS	Lumbar spine

DXA Documentation

		TK	Trunk
		PE	Pelvic
		LL	Left leg
		RL	Right leg

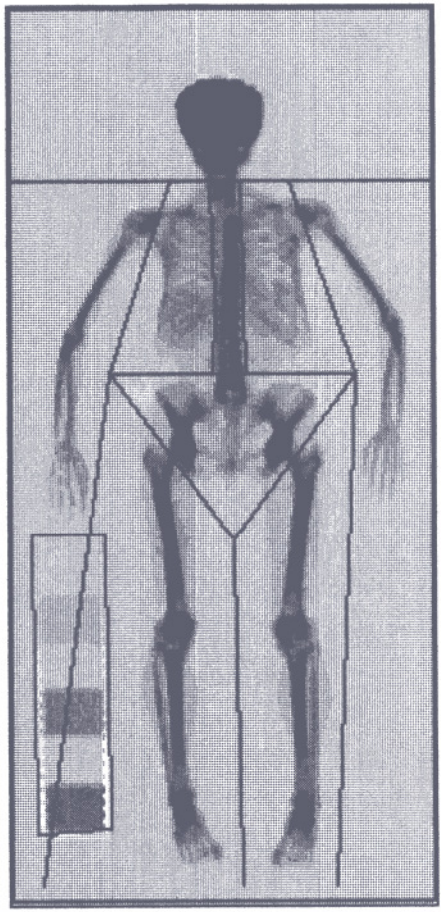
Scan mode coding:

Scan mode	
1	Pencil beam
5	Array

Hologic QDR Serial numbers

Qdr Serial numbers		
Clinic	1000	2000
1	100	2100
1	100	2101
2	200	2200
3	300	2300
4	400	2400

k = d0 =



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Hologic QDR-2000 (S/N 2136)V4WBQDR
Whole BodyV4WBMODE

V4WBDAYS

Name:
Comment:
I.D.: Sex: F
S.S.#: - - Ethnic: C
ZIP Code: Height:
Operator: Weight:
BirthDate: Age:
Physician:
Image not for diagnostic use

TOTAL BMC and BMD CV is < 1.0%

	C.F.	0.999	1.066	1.000
Region		Area (cm2)	BMC (grams)	BMD (gms/cm2)
Head		V4HDA	V4HDC	V4HDD
L Arm		V4LAA	V4LAC	V4LAD
R Arm		V4RAA	V4RAC	V4RAD
L Ribs		V4LRA	V4LRC	V4LRD
R Ribs		V4RRA	V4RRC	V4RRD
T Spine		V4TSA	V4TSC	V4TSD
L Spine		V4LSA	V4LSC	V4LSD
Pelvis		V4PEA	V4PEC	V4PED
L Leg		V4LLA	V4LLC	V4LLD
R Leg		V4RLA	V4RLC	V4RLD
TOTAL		V4TBA	V4TBC	V4TBD

HOLOGIC

Hologic QDR-2000 (S/N 2136)
Whole Body V5.73
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Name:
Comment:
I.D.: Sex: F
S.S.#: - - Ethnic: C
ZIP Code: Height:
Operator: Weight:
BirthDate: Age:
Physician:

TBAR263
F.S. 68.00% 0(10.00)%

Region	BMC (grams)	Fat (grams)	Lean (grams)	Lean+BMC (grams)	Total (grams)	% Fat (%)
L Arm		V4LAF	V4LAL	V4LAE		
R Arm		V4RAF	V4RAL	V4RAE		
Trunk	V4TKC	V4TKF	V4TKL	V4TKE		
L Leg		V4LLF	V4LLL	V4LLE		
R Leg		V4RLF	V4RLL	V4RLE		
SubTot						
~ Head		V4HDF	V4HDL	V4HDE		
TOTAL		V4TBF	V4TBL	V4TBE	V4TBM	V4TBP

~assumes 17.0% brain fat
LBM 73.2% water