

Trial name	CALERIE 2
Dataset name	DXAA (Body Composition)
Description	DXA (Dual-energy X-ray absorptiometry) is used to measure body composition: % body fat, fat mass (FM), fat free mass (FFM), bone mineral density (BMD), bone mineral content (BMC). The DXA lab recommended corrections to some of the BMD, Area, %BF, and total mass measures, which also affected BMC, fat, FFM and lean variables. These corrections were recommended based on analysis of drift for the DXA machines. Corrections are shown in the specs below. This dataset combines DXA lab results with CRF data.
Comments on data structure	1 record / DEIDNUM/ VISIT
Population	All randomized subjects, as well as some subjects who started baseline but dropped out before randomization
VISITs	Baseline Visits 1-3, Baseline Visits 4-7, Month 12, Month 24 for all subjects. Month 6 (Visits 9.1 and 9.2), Month 18, for CR subjects. (DXA is done twice each at baseline and Month 6, and once at the other visits) VISIT 0 combines the two baseline Visits 4 and 5 into a single baseline mean, and VISIT 9 combines the two Month 6 visits into a single Month 6 mean. VISIT codes
Usage Notes	For Whole Body fat and fat free mass, according to DXA data handling rules, use the variables FM and FFM, which are created by multiplying clinic weight by % body fat from DXA, rather than the variable BTOTFAT and BTOTFFM which are obtained by the DXA, and considered to be less accurate. BTOTPF (whole body %fat) is also used in many analyses. If separate records are needed for each of the two baseline DXAs, use VISITs 4 and 5. If only one overall baseline mean record is needed, use VISIT 0. If separate records are needed for each of the two Month 6 DXAs, use VISITs 9.1 and 9.2. If only one overall baseline mean record is needed, use VISIT 9.
Source data files	CRF/DXASCAN, LABS/DXA, ANALDATA/SUBJECT1, DLWFLAT
Final sort order	DEIDNUM VISIT

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
DEIDNUM	Subject Number	DEIDNUM	C		
PAGENUM	CRF page number	DXASCAN.PAGEID	N		
VISIT	Visit	PAGENUM, DXA.XVISITN	N	Study Visit, based on CRF pages (See Appendix 1) Or DXA.XVISITN	VISFMT
SUBVISIT	Sub-Visit	SUBVISIT	N	Study Sub-Visit, based on CRF pages (See Appendix 1)	SVISFMT

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
DXADT	DXA date (CRF)	DXASCAN.DXADT	DT		
REDXADT	DXA rescan date (CRF)	DXASCAN.REDXADT	DT		
BSCANDT	DXA scan date (lab)	DXA.BSCANDT	DT		
HSCANDT	Hip scan date (lab)	DXA.HSCANDT	DT		
SSCANDT	Spine scan date	DXA.SSCANDT	DT		
RSCANDT	Forearm scan date	DXA.RSCANDT	DT		
DLWSEDT	DLW dose date	DLWFLAT.DLWSEDT	DT	DLW start and end dates are included to determine the lag between DLW and DXA.	
DLWENDDT	DLW end date	DLWFLAT.DLWENDDT	DT		
INRANGE	DXA is within 15 days of DLW	BSCANDT, DLWSEDT, DLWENDDT	N	<p>This variable is an indicator for whether the DXA is within 15 days of the DLW period. This is used for the adherence analysis, where DXA assays must be within 15 days of DLW to be included in the analysis. This is used to create FMA and FFMA.</p> <p>=0 if $.z < BSCANDT < DLWSEDT - 15$ or $BSCANDT > DLWENDDT + 15 > .z$</p> <p>else =1 if $DLWSEDT - 15 \leq BSCANDT \leq DLWENDDT + 15$</p> <p>else missing if any of BSCANDT, DLWSEDT, or DLWENDDT are missing</p>	
CRFDXA	DXA done (CRF)	DXASCAN.DXADT, DXASCAN.REDXADT	N	=1 if DXADT is non-missing or REDXADT is non-missing else =0	
LABDXA	DXA lab data received	BSCANDT	N	=1 if BSCANDT is non-missing	
NDXA	Number of DXAs at visit	LABDXA	N	<p>For VISIT 0 (VISITs 4 and 5 combined) and VISIT 9 (VISITs 9.1 and 9.2 combined), this variable is the sum of LABDXA from the 2 component visits, indicating whether both, only 1, or no DXAs were done.</p> <p>For all other visits, NDXA=LABDXA.</p>	

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
WBDY	Whole body scanned?	DXASCAN.SBDY, REWBDY	N	=1 if WBDY=1 or REWBDY=1 else missing	
FARM	Forearm scanned?	DXASCAN.FARM, REFARM	N	=1 if FARM=1 or REFARM=1 else missing	
SPINE	Spine scanned?	DXASCAN.SPINE, RESPINE	N	=1 if SPINE=1 or RESPINE=1 else missing	
HIP	Hip scanned?	DXASCAN.HIP, REHIP	N	=1 if HIP=1 or REHIP=1 else missing	
WBDYND	Reason whole body not scanned	DXASCAN.WBDYND	N	1=Participant refused 2=Clinician unable to obtain 3=Insufficient time 4=Instrument failure 5=Not required	TUND
FARMND	Reason forearm not scanned	DXASCAN.FARMND	N		
SPINEND	Reason spine not scanned	DXASCAN.SPINEND	N		
HIPND	Reason hip not scanned	DXASCAN.HIPND	N		
CLINWTA	Clinic weight on DXA date	CLWTLONG.CLINWT, CLWTLONG.WTDT, DXADT	N	=CLINWT if WTDT = DXADT	
CLINWTB	Clinic weight closest to DXA date	CLWTLONG.CLINWT, CLWTLONG.WTDT, DXADT	N	Closest clinic weight to DXA date within 7 days. =CLINWT on DXA date as defined above, if there is a record with WTDT=DXADT. If there is no record with WTDT = DXADT, CLINWTB is the clinic weight with the closest date to DXADT, within 7 days.	
WTDTB	Closest DXA weight date	CLWTLONG.WTDT	DT	Date of Clinic weight closest to DXA date. (Date of CLINWTB)	
DXAWTDIF	Diff. between DXA mass and clinic weight	BTOTMASS, CLIWNTB	N	Difference between DXA mass and closest clinic weight = BTOTMASS – CLINWTB	

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
DXWTDDIF	Diff. between DXA and clinic weight date	DXADT, WTDTB	N	Difference between DXA date and closest weight date = WTDTB - BSCANDT	
NOCLINWT	No clinic weight on DXA date	CLINWTA	N	=1 if CLINWTA is missing	
*BMD Where * = the following regions: BTOT BSUB HEAD LARM RARM LRIB RRIB TSPI LSPI PELV LLEG RLEG T IT N W HTOT L1 L2 L3 L4 STOT R13 RM	WBody Total BMD WBody Sub Total BMD Head BMD Left Arm BMD Right Arm BMD Left Rib BMD Right Rib BMD Thor Spine BMD Lumb Spine BMD Pelvic BMD Left Leg BMD Right Leg BMD Trochanter BMD Intertrochanter BMD Neck BMD Wards triangle BMD Hip Total BMD L1 BMD L2 BMD L3 BMD L4 BMD Spine Total BMD Radius 1/3 BMD Radius Mid BMD	DXA.*BMD Where * =: BTOT BSUB HEAD LARM RARM LRIB RRIB TSPI LSPI PELV LLEG RLEG T IT N W HTOT L1 L2 L3 L4 STOT R13 RM	N	Corrections were made to BMD values based on recommendations from the DXA lab. See DXA data handling rules document.	

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
RU U13 UM UU RTOT UTOT RU13 RUM RUU RUTOT	Radius ultra BMD Ulna 1/3 BMD Ulna Mid BMD Ulna ultra BMD Forearm Total BMD Ulna Total BMD Radius + Ulna 1/3 BMD Radius + Ulna Mid Radius + Ulna ultra Radius + Ulna Total	RU U13 UM UU RTOT UTOT RU13 RUM RUU RUTOT			
*AREA For * = (the same list as for BMD) (except RUTOTARE)	Same as for BMD, but Area instead of BMD	DXA.*AREA: * =Same list as for BMD,	N	Corrections were made to AREA values based on recommendations from the DXA lab. See DXA data handling rules document.	
				BMC variables (kg)	
*BMC For * = (the same list as for BMD)	Same as for BMD, but BMC instead of BMD	*BMD and *AREA for same list as BMD	N	For each *, = *BMD x *AREA / 1000	
TRNKBMC	Trunk BMC	DXA.TRNKBMC	N	= DXA.TRNKBMC / 1000	
*PF Where * = the following regions: BTOT BSUB HEAD LARM	Wbody Total %Fat Wbody Sub Total Head %Fat Left Arm %Fat	DXA.*PF Where * = the following regions: BTOT BSUB HEAD LARM	N	Corrections were made to PF values based on recommendations from the DXA lab. See DXA data handling rules document.	

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
RARM TRNK LLEG RLEG AGT AND GYN	Right Arm %Fat Trunk %Fat Left Leg %Fat Right Leg %Fat Total Android+Gynoid %Fat Android %Fat Gynoid %Fat	RARM TRNK LLEG RLEG AGT AND GYN			
*MASS (for * = the same list as PF)	Same as for PF, but Mass (kg) instead of PF	DXA.*MASS Where * = same list as for PF.	N	Corrections were made to MASS values based on recommendations from the DXA lab. See DXA data handling rules document.	
*FAT (for * = the same list as PF) Except: TRUNKFAT instead of TRNKFAT)	Same as for PF, but fat (kg) instead of PF	*PF, *MASS	N	= *MASS x *PF / 100 (use *MASS and *PF as defined above) (Note: for whole body fat mass, use FM (defined below), which is based on the Clinic weight, instead of BTOTFAT)	
*FFM (for * = the same list as PF)	Same as for PF, but FFM (kg) instead of PF	*MASS, *FAT	N	= *MASS - *FAT Use *MASS and *FAT as defined above (Note: for whole body fat free mass, use FFM (defined below), which is based on the Clinic weight, instead of BTOTFFM)	

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
FM	Whole Body FM (clinic weight x %BF)	CLINWTB, BTOTPF, BTOTFAT	N	(Closest Clinic weight multiplied by %BF, if clinic weight is within 7 days of DXA. Otherwise, uses FM from DXA) =CLINWTB x BTOTPF / 100 if CLINWTB is non-missing else = BTOTFAT if CLINWTB is missing	
FFM	Whole Body FFM (clinic weight – FM)	CLINWTB, FM, BTOTFFM	N	(Closest clinic weight – FM, if clinic weight is within 7 days of DXA. Otherwise, uses FFM from DXA). =CLINWTB – FM if CLINWTB is non-missing else = BTOTFFM if CLINWTB is missing	
FMA	Fat mass (adherence rules)	FM, INRANGE	N	This variable is for the adherence analysis only: only FM values within 15 days of the DLW period are included in the analysis. = FM if INRANGE ≠ 0 (i.e. INRANGE = 1 or missing) else missing if INRANGE=0	
FFMA	FFM (adherence rules)	FFM, INRANGE	N	This variable is for the adherence analysis only: only FM values within 15 days of the DLW period are included in the analysis. = FFM if INRANGE ≠ 0 (i.e. INRANGE = 1 or missing) else missing if INRANGE=0	
THIP	Tscore hip total BMD	SEX, ETHNIC, HTOTBMD	N	See SAS code on pages 26-29	
TNECK	Tscore femoral neck BMD	SEX, ETHNIC, NBMD	N	See SAS code on pages 26-29	
TSPINE	Tscore spine total BMD	SEX, ETHNIC, L1BMD, L2BMD, L3BMD, L4BMD, STOTBMD	N	See SAS code on pages 26-29	
HBMDDROP	Drop in Hip total BMD	HTOTBMD, HBMD_BL	N	= HTOTBMD – (HTOTBMD from VISIT=4)	
SBMDDROP	Drop in Spine total BMD	STOTBMD, SBMD_BL	N	=STOTBMD – (STOTBMD from VISIT=4)	
NBMDDROP	Drop in Femoral Neck BMD	NBMD, NBMD_BL	N	= NBMD – (NBMD from VISIT=4)	

Variable name	LABEL	Source variables	C/N?	Definition	Accepted values/ Format
PHBMDDRP	% drop in Hip total BMD	HBMDDROP, HBMD_BL	N	= 100 X HBMDDROP / (HTOTBMD from VISIT=4)	
PSBMDDRP	% drop in Spine total BMD	SBMDDROP, SBMD_BL	N	=100 X SBMDDROP / (STOTBMD from VISIT=4)	
PNBMDDRP	% drop in Femoral neck BMD	NBMDDROP, NBMD_BL	N	=100 X NBMDDROP / (NBMD from VISIT=4)	
BMDALERT	Flagged for low BMD at hip or spine	VISIT, PHBMDDRP, PSBMDDRP, THIP, TSPINE	N	Subjects are flagged for low BMD if there is ≥5% drop in BMD up to Month 12, or ≥10% drop in BMD after Month 12, or T-score at Hip or Spine is < -2.5. =1 if VISIT in (9,11) and max(PHBMDDRP, PSBMDDRP)≥5 Or VISIT>11 and max(PHBMDDRP,PSBMDDRP)≥10 Or .z<THIP < -2.5 Or .z<TSPINE < -2.5 else missing	

SAS code for DXA T-scores

SAS code for calculating BMD T-scores for total hip, femoral neck and total spine.

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*****
**   TOTAL HIP TSCORES                               **
**   USING HOLOGIC NHANES NORMALS                   **
*****
IF PAT_SEX='F' THEN DO ;
  IF PAT_ETH IN ( 'B' ) THEN THIP= ( HTOTBMD - 1.031 ) / 0.156 ;          ** BLACK AGE 45 1.031 0.156 ** ;
  ELSE IF PAT_ETH IN ( 'H' ) THEN THIP= ( HTOTBMD - 0.962 ) / 0.134 ;    ** MEXICAN AMERICAN AGE 35 0.962 0.134 ** ;
  ELSE IF PAT_ETH IN ( 'A' 'C' 'O' 'W' ) THEN THIP= ( HTOTBMD - 0.942 ) / 0.122 ; ** ANY ETHNIC OTHER THAN BLACK OR HISPANIC AGE 25 ** ;
END ;
*****
ELSE IF PAT_SEX='M' THEN DO ;
  IF PAT_ETH IN ( 'B' ) THEN THIP= ( HTOTBMD - 1.177 ) / 0.172 ;          ** 1.177 0.172 BLACK AGE 25 ** ;
  ELSE IF PAT_ETH IN ( 'H' ) THEN THIP= ( HTOTBMD - 1.055 ) / 0.132 ;    ** 1.055 0.132 MEXICAN AMERICAN AGE 25 ** ;
  ELSE IF PAT_ETH IN ( 'A' 'C' 'O' 'W' ) THEN THIP= ( HTOTBMD - 1.033 ) / 0.151 ; ** 1.033 0.151 ANY ETHNIC OTHER THAN BLACK OR HISPANIC
AGE 25 0.942 0.122 ** ;
END ;
*****

IF PAT_SEX='F' THEN DO ;
  IF PAT_ETH IN ( 'B' ) THEN TNECK= ( NBMD - 0.951 ) / 0.142 ;          ** 0.951 0.142 BLACK AGE 25 ** ;
  ELSE IF PAT_ETH IN ( 'H' ) THEN TNECK= ( NBMD - 0.874 ) / 0.118 ;    ** 0.874 0.118 MEXICAN AMERICAN AGE 25 ** ;
  ELSE IF PAT_ETH IN ( 'A' 'C' 'O' 'W' ) THEN TNECK= ( NBMD - 0.849 ) / 0.111 ; ** 0.849 0.111 ANY ETHNIC OTHER THAN BLACK OR HISPANIC
AGE 25 ** ;
END ;
*****

ELSE IF PAT_SEX='M' THEN DO ;
  IF PAT_ETH IN ( 'B' ) THEN TNECK= ( NBMD - 1.073 ) / 0.156 ;          ** 1.073 0.156 BLACK AGE 25 ** ;
  ELSE IF PAT_ETH IN ( 'H' ) THEN TNECK= ( NBMD - 0.977 ) / 0.131 ;    ** 0.977 0.131 MEXICAN AMERICAN AGE 25 ** ;
  ELSE IF PAT_ETH IN ( 'A' 'C' 'O' 'W' ) THEN TNECK= ( NBMD - 0.930 ) / 0.136 ; ** 0.930 0.136 ANY ETHNIC OTHER THAN BLACK OR HISPANIC
AGE 25 ** ;
END ;
*****

LABEL THIP='Tscore Hip Total BMD' ;
THIP=ROUND(THIP,0.0001) ;
LABEL TNECK='Tscore Femoral Neck BMD' ;
TNECK=ROUND(TNECK,0.0001) ;
*****
**   TOTAL SPINE TSCORES                               **

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** USING HOLOGIC NORMALS ** ;
***** ;
IF PAT_SEX='F' THEN DO ;
IF PAT_ETH IN ( 'B' ) THEN DO ; ** BLACK ** ;
    IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.190)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.016)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.129)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.225)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.075)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.162)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.209)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.118)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.185)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.135)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.156)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.112)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.139)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.183)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.150)/ 0.110 ;
END ;
***** ;
ELSE IF PAT_ETH IN ( 'H' ) THEN DO ; ** HISPANIC ** ;
    IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.084)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 0.925)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.028)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.116)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 0.979)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.058)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.101)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.018)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.079)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.034)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.053)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.013)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.037)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.077)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD>.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.047)/ 0.110 ;
END ;
***** ;
ELSE IF PAT_ETH IN ( 'A' 'C' 'O' 'W' ) THEN DO ; ** WHITE , ASIAN , OTHER ** ;
    IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD>.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.084)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 0.925)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.028)/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD>.Z THEN TSPINE=(STOTBMD - 1.116)/ 0.110 ;
    ELSE IF L1BMD>.Z AND L2BMD>.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 0.979)/ 0.110 ;

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ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.058)/ 0.110 ;
ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.101)/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.018)/ 0.110 ;
ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.079)/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.034)/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.053)/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.013)/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.037)/ 0.110 ;
ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.077)/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.047)/ 0.110 ;
END ;
END ;
***** ;
ELSE IF PAT_SEX='M' THEN DO ;
IF PAT_ETH IN ( 'A' 'C' 'O' 'W' ' ' ) THEN DO; ** WHITE, ASIAN , OTHER ** ;
    IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.008 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.094 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.103 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.145 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.053 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.098 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.124 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.070 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.115 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.090 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.087 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.059 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.084 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.121 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.091 )/ 0.110 ;
END ;
***** ;
ELSE IF PAT_ETH IN ( 'B' ) THEN DO ; ** BLACK ** ;
    IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.107 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.201 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.211 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.257 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.156 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.206 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.234 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.175 )/ 0.110 ;
    ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.224 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.197 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.194 )/ 0.110 ;
    ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.163 )/ 0.110 ;
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ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.190 )/ 0.110 ;
ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.231 )/ 0.110 ;
ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.198 )/ 0.110 ;
END ;

***** ;
ELSE IF PAT_ETH IN ( 'H' ) THEN DO ; ** HISPANIC ** ;
  IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.008 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.094 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.103 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.145 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.053 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.098 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.124 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.070 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.115 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.090 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.087 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD> .Z AND L4BMD<=.Z THEN TSPINE=(STOTBMD - 1.059 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD<=.Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.084 )/ 0.110 ;
  ELSE IF L1BMD<=.Z AND L2BMD> .Z AND L3BMD<=.Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.121 )/ 0.110 ;
  ELSE IF L1BMD> .Z AND L2BMD> .Z AND L3BMD> .Z AND L4BMD> .Z THEN TSPINE=(STOTBMD - 1.091 )/ 0.110 ;
END ;
END ;
LABEL TSPINE='Tscore Spine Total BMD' ;
TSPINE=ROUND(TSPINE,0.0001) ;
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