NHANES Open Space
September 11-12, 2003

Session Title: Bone density and osteoporosis

Session Headlines:

For NHANES, new technologies are unfeasible and unproven in the short term.

NHANES skeletal measures should be in the most relevant form for public health applications. BMD measures can be turned into measures of bone strength. Main question is - What proportion of Americans has the bone strength for everyday activities?

NHANES shouldn't think about researchers, who need precise information; must consider public health importance of a functional skeleton.

Movement is away from BMD and T-scores. Fracture risk is the best measure. While the idea is still hypothetical, is BMD is even needed.

Need to anticipate data needs for future, i.e., variables needed for fracture prediction algorithm. Model measures absolute fracture risk. Endorsed by International and Nation Bone Foundations (IOF, NOF).

Need to explore whether we can use data from current DXA total body scans in the IOF-NOF model and whether height is related to hip axis length. Model will use any BMD from any source, including ultrasound, for wide applicability.

What interview data, other types of data will be needed to increase the precision of the model? Examples are weight or BMI, personal history of all fractures, not just hip, spine, wrist, family history of osteoporosis.

Bone turnover is an independent measure of fracture risk. State of the art is now bone markers, such as serum CTX and osteocalcin. Need 1 measure of bone formation and 1 measure of bone resorption. May be more feasible to

base prediction of fractures on bone turnover rather than bone density, but controversial. At this point, there is no agreement on exactly which markers are the best. In light of this, it's probably better to hold off and consider using stored serum

National Research Council subcommittee on Fluoride has a shortage of information on fluoride in bone. It is possible that MRI can provide the information. Need to confirm what MRI can do with Imaging institute at NIH, but not practical for NHANES. No current fluoride biomarker available.

There may be a connection between oral health and bone density.

New imaging machines will be able to identify critical bone areas. May be able to reanalyze old DXA data to provide this information.

Fracture history offers opportunities for longitudinal follow-up; may want to do a questionnaire follow-up on fractures and analyze stored sera.

DHANES staff is working with staff at Johns Hopkins on development of section modulus, which will make NHANES data generalizable to the rest of the world. Section modulus is an indicator of bone strength. May be considered for 2005. Hip geometry data from NHANES III have just been released, which includes section modulus. Anne is working with Tom to explore whether the current total body scans can be reprocessed for geometry and strength measures.

Prevalence of hip fractures seems to be going down; is it related to body size/bone size? There are secular trends upward in peak growth. What can NHANES reconstitute from previous surveys?

Bone density measures are important politically. Hip fractures are important, but because they are relatively rare until over age 80, it has been hard to show that osteoporosis treatments are cost effective if the target is hip fracture alone. However, when consider all fractures are considered, these treatments are cost effective. For this reason, NHANES should consider asking about all fractures, not just hip/wrist/spine. The relationship of diet to bone health works primarily via its effects on BMD (although protein status may also be important as an overall marker of frailty). So if we measure BMD, it is not as critical to measure diet for fracture prediction.

Next Steps/Action Items:

NHANES needs to anticipate new data requirements; what will be needed for absolute fracture risk model?

NHANES will need to do its homework before the next survey cycle. The role of bone density in osteoporosis diagnosis is rapidly changing, as are the technologies for measuring bone status in more detail (e.g., give structure information in addition to BMD). What are the new technologies?

Does NHANES have the ability to stay ahead of the field? Redo hip scans or skip the next 2-year cycle for future technologies?

NHANES needs to develop a relationship with NIH imaging institute.

NHANES needs to be creative in how it uses data; can do HSA analysis of the existing DXA scans rather than adding pQCT.