IT’S NOT JUST HOTFLASHES! HERE COME OSTEOPOROSIS, JOINT PAIN, AND GOUT

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BILLINGS CLINIC
RHEUMATOLOGY
MENOPAUSE

• SENESCENSE OF THE OVARIES WITH ABSENCE OF ESTROGEN PRODUCTION

• MAY HAVE PROGRESSIVE ONSET THREE YEARS BEFORE ACTUAL CLIMACTERIC

• USUAL CONCERNS TO GYNECOLOGIST RELATED TO HIGH ESTROGEN RECEPTOR TISSUES, I.E. UTERUS, VAGINA, BREAST.

• OTHER TISSUES ALSO ARE HIGHLY ESTROGEN DEPENDENT WHICH IS THE BASIS OF THIS PRESENTATION
YOUR BONE

• BONE CELLS ARE REPLETE WITH ESTROGEN RECEPTORS.
• THE PREMENOPAUSAL STATE IS THAT OF BONE FORMING CELLS, OSTEOBLASTS, IN BALANCE OR POSITIVE BALANCE RELATIVE TO BONE REMOVAL CELLS, OSTEOCLASTS.
• BONE IS CONSTANTLY REMODELING.
• BONES MAY BE TRABECULAR (SPONGY) OR CANCELLOUS (TUBULAR)
• TRABECULAR BONE HAS A LARGE BONE SURFACE AREA, AND HIGHER RATE OF BONE TURNOVER THAN CANCELLOUS BONE.
• BONES DENSITY IS RELATED TO BONE STRENGTH.
BONE DENSITY MEASUREMENT

- Most common method of assessing bone density is DXA.
- A dual energy x-ray beam is passed through the body site, and a comparison between soft tissue and bone absorption is determined.
- A score is calculated based on a population database
- T-Score, bone density relative to young gender matched controls.
- Z-score, bone density compared to ‘normal’ population of your age.
- T-score gives a ‘relative’ rather than absolute fracture risk.
METABOLIC BONE CLASSIFICATION

• Osteopenia – low bone mass with a T-score greater than -2.5. There is less bone, but bone is morphologically normal.

• Osteoporosis- low bone mass with T-score less at or less than -2.5. There is much less bone, but bone is morphologically normal.

• Osteomalacia- bone is morphologically abnormal and not adequately calcified. The amount of bone matrix is normal. Prototype disease-Rickets. May be osteopenic or osteoporotic on DXA.

• A classification of osteoporosis is given irrespective of bone density if fragility fracture has occurred, i.e. humeral head, Colles, hip, or vertebral fracture at fall from standing height.
ISSUES WITH T-SCORES AND CLASSIFICATION

- Changes in BMI and bone size may confound interpretation. A small bone can register as an osteoporotic bone.
- T-Score gives relative rather than absolute fracture risk.
- Although T-score less than -2.5 is osteoporotic, most fractures actually occur in the osteopenic range.
- Results between different manufacturers and sites are not comparable. This is due to machine differences, patient positioning, and population database differences.
ABSOLUTE FRACTURE RISK

- With most fractures occurring in osteopenic range, and concerns related to overtreatment, desire for absolute risk tool evolved.

- University of Sheffield, England, developed FRAX assessment tool which provides a 10 year absolute fracture risk for hip and any fragility fracture in the osteopenic patient.

- Uses demographic data including gender, age, height, weight, smoking, alcohol consumption, steroids, parental hip fracture, prior fracture, RA, hip BMD, (secondary osteoporosis).

- FLAW-Accounts only for current and not length of or past demographics.
TREATMENT GUIDELINES BASED ON FRAX

- FRAX not validated for patient already on treatment.
- Treatment suggested if:
  - If 10 year risk of hip fracture is greater than 3%
  - If 10 year risk of any non-hip fracture is 20%
- May allow decision for non-treatment if scores are low
- Should always be calculated for patient in osteopenic range
WHAT ABOUT OSTEOMALACIA

• CAN OCCUR AT ANY AGE AND VERY COMMON IN TEEN YEARS
• BONE IS INADEQUATELY MINERALIZED
• RELATED TO VITAMIN D DEFICIENCY
• CORRECTED BY VITAMIN D SUPPLEMENTATION
• PTH MAY BE ELEVATED AND CAN BE FOLLOWED WITH VITAMIN D LEVEL TO CONFIRM TREATMENT BENEFIT
• MAY HAVE KIDNEY STONES AS PART OF PRESENTATION
• BONE PAIN CAN OCCUR WITH OSTEOMALACIA
MUSCULOSKELETAL PAIN

• ALL CONNECTIVE TISSUES INCLUDING BONE, SKIN, CARTILAGE, AND TENDONS HAVE ESTROGEN RECEPTORS.

• CONSEQUENCES:
  – BONE- OSTEOOPENIA/OSTEOPOROSIS
  – SKIN- DRYNESS, LOSS OF ELASTICITY
  – TENDONS- DRYNESS, LOSS OF ELASTICITY
  – CARTILAGE- DRYNESS, BRITTLENESS, FIBRILLATION

• Dryness of tendons leads to generalized stiffness

• Dryness of cartilage may accelerate osteoarthritis after menopause.
MUSCULOSKELETAL PAIN II

- OSTEOARTHRITIS HAS STRONG HEREDITARY COMPONENT. SIGNS AND SYMPTOMS BEGIN IN THE PRE-MENOPAUSAL PERIOD.

- SMALL JOINTS OF THE HANDS AND BASE OF THE THUMBS AFFECTED FIRST.

- THUMB ARTHRITIS MAY BE WORSE ON NON-DOMINANT SIDE.

- ARTHRITIS MAY PROGRESS MORE RAPIDLY WITH VITAMIN D DEFICIENCY

- TENDON STIFFNESS MAY CONTRIBUTE TO PAIN AND GELLING, 'MENOPAUSAL RHEUMATISM'
GOUT

• GOUT IS THE ACCUMULATION OF URIC ACID CRYSTALS IN JOINTS AND TISSUES.

• GOUT MAY BE ACUTE (I.E., THE BIG TOE) OR CHRONIC

• THE GREATEST RISK FACTOR FOR GOUT IS MALE GENDER

• GOUT IS EXCEEDINGLY RARE IN PREMENOPAUSAL WOMEN IN THE ABSENCE OF HEMATOLOGIC MALIGNANCY OR KIDNEY DISEASE

• ELEVATED SERUM URIC ACID ABOVE ITS SOLUBILITY POINT IS A NECESSARY EVENT PRIOR TO DEVELOPING GOUT
URIC ACID

• URIC ACID IS AN INSOLUBLE SALT AND PRODUCT OF PURINE METABOLISM IN HUMANS

• PURINES ARE BUILDING BLOCKS OF DNA AND RNA, AND WHEN DNA/RNA ARE BROKEN DOWN, PURINES ARE RELEASED.

• LARGEST SOURCE OF PURINES AND CONSEQUENTLY URIC ACID IS THE BONE MARROW.

• THE MAJOR ROUTE OF URIC ACID EXCRETION IS THROUGH THE KIDNEYS

• URIC ACID BECOMES MORE INSOLUBLE AS THE TEMPERATURE OF THE AFFECTED AREA DECREASES
POSTMENOPAUSAL GOUT

• GOUT MAY BEGIN APPROXIMATELY 6 YEARS AFTER MENOPAUSE.
• LACK OF ESTROGENS REDUCES URIC ACID EXCRETION FROM THE KIDNEY
• URIC ACID SLOWLY ACCUMULATES OVER PERIOD OF YEARS
• URIC ACID IS ATTRACTED TO ROUGH SURFACES, I.E., ARTHRITIS OR PLACES OF PRIOR INJURY
• GOUT WILL OCCUR IN NON-TYPICAL LOCATIONS IN WOMEN vs MEN
• DIAGNOSIS OFTEN MISSED IN WOMEN
HEBERDEN’S NODES vs GOUT
POSTMENOPAUSAL GOUT
Medication Effects

• LOW DOSE ASA AND DIURETIC THERAPY MAY WORSEN GOUT OR SHORTEN TIME UNTIL GOUT PRESENTATION
• AROMATASE INHIBITORS MAY ALSO INCREASE GOUT RISK
• NIACIN MAY COMPETE WITH URIC ACID EXCRETION AS RAISE LEVEL OF URIC ACID
• DEHYDRATION REDUCES URIC ACID EXCRETION.
• PATIENTS UNDERGOING CHEMOTHERAPY, RADIATION, OR SURGERY ARE AT INCREASED RISK OF GOUT
POSTMENOPAUSAL GOUT
Dietary Effects

- DIET IS INEFFECTIVE AT TREATING GOUT DUE TO MAJOR BONE MARROW PRODUCTION OF URIC ACID
- DIETARY INDISCRETION MAY PRECIPITATE AN ACUTE GOUT ATTACK
- HIGH PURINE FOODS INCLUDE SHELLFISH, TURKEY, SAUSAGE. DAIRY, CEREALS, AND GRAINS LOW IN PURINES.
- ALCOHOL HAS MUTIPLE PROPERTIES TO PRECIPITATE GOUT ATTACKS.
  - BEER vs WINE vs LIQUOR
- HIGH FRUCTOSE CORN SYRUP PROMOTES INCREASE PURINE CATABOLISM.
TAKE HOMES

• GOUT IS A CHRONIC METABOLIC DISEASE ASSOCIATED WITH ELEVATED LEVELS OF URIC ACID.

• ESTROGEN PROMOTES THE EXCRETION OF URIC ACID. THIS IS LOST AT MENOPAUSE.

• EXCEPT UNDER UNUSUAL CIRCUMSTANCES, GOUT DOES NOT OCCUR UNTIL AFTER MENOPAUSE IN WOMEN.

• MENOPAUSE HAS SIGNIFICANT EFFECTS ON CONNECTIVE TISSUES WHICH MAY CAUSE OSTEOPOROSIS, WORSEN OSTEOARTHRITIS, AND BE MANIFEST AS TENDON AND JOINT PAIN.