



HORMONE REPLACEMENT AND OSTEOPOROSIS

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OSTEOPOROSIS IN GENERAL

- MOST COMMON BONE DISORDE
- 25 MILLION PERSON AFFECTED
 - 80% WOMEN
- OCCURS MOST COMMONLY IN MENOPAUSE

GENERAL INFO CONTINUED

- 33% OF WOMEN OVER AGE 65 HAVE OSTEO
- 20% OF WHITE WOMEN > 50 HAVE OSTEO OF HIP
- 16% OF WHITE WOMEN >50 HAVE OSTEO OF VERTEBAE
- HISPANIC & AFRICAN AMERICAN RATES LOWER

MOST IMPORTANT RISK FACTORS

- INSUFFICIENT BONE MASS AT THE TIME OF SKELETAL MATURITY
- RAPID LOSS OF BONE AFTER MENOPAUSE
 - 1 SD LESS IN BONE DENSITY INCREASES HIP FRACTURE 2.5 TIMES
 - LIFETIME RISK OF ANY FRACTURE IN WHITE WOMEN IN 75%
 - \$13 BILLION DOLLARS SPENT IN 1995



RISK FACTORS FOR BONE LOSS

- LOW BODY WEIGHT
- RECENT WEIGHT LOSS
- HX OF FRACTURES
- FAMILY HX OF FRACTURES
- SMOKING
 - PTS WITH ANY OF THESE FACTORS HAVE A GREATER RISK OF FRACTURE REGARDLESS OF BONE MASS

BONE MASS

- MEASURED AT HIP AND SPINE
 - USING DUAL ENERGY XRAY ABSORPTIOMETRY (DXA)
- IF BONE MASS WITHIN 1SD OF IDEAL BONE MASS = NORMAL BONE
- IF =1-2.5 SD OSTEOPENIC (MILD TO MODERATE BONE DEFICIENCY)
- IF >2.5 OSTEOPOROTIC WITH GREATER FRAGILITY

BONE DENSITY DETERMINATIONS

- INDICATED TO DETERMINE IF PATIENT DECLINES HRT OR IF SHE STOPS HRT AFTER BEGINNING.
- IF PATIENT HAS LARGE NUMBER OF RISK FACTORS AND IS IN THE PERIMENOPAUSAL YEARS

EVALUATING PATIENT

- DETERMINE RISK FACTORS (HISTORY)
- DETERMINE BONE MASS (DXA)
- DETERMINE DYNAMIC BONE LOSS
 - collagen degradation products in urine
 - n telopeptide
 - pyridinoline
 - deoxyprididinoline peptides



MANAGEMENT OF PATIENT WITH OSTEOPOROSIS

- RULE OUT SECONDARY CAUSES
 - BONE MARROW ABNORMALITY (MULTIPLE MYELOMA)
 - HYPERTHYROIDISM
 - HYPERPARATHYROIDISM



OSTEOMALACIA

- LOW BODY WEIGHT
 - DUE TO POOR NUTRITION
- INADEQUATE SUN LIGHT
- CHEMICAL MARKERS
 - LOW-NORMAL CALCIUM & PHOSPHOROUS
 - LOW 25HYDROXYVIT D
 - ELEVATED PARATHYROID HORMONE
 - LOW URINARY CALCIUM



HIGH OR LOW TURNOVER OSTEOPOROSIS

- HIGH TURNOVER
 - OSTEOCLASTIC ACTIVITY
 - MORE BONE RESORPTION THE OSTEOLBLAST CAN REPAIR
 - MOST COMMON TYPE OSTEOPOROSIS
 - USUALLY OCCURS AT MENOPAUSE
 - DIAGNOSE WITH HIGH LEVELS OF COLLAGEN CROSS LINK DEGRADITION PRODUCTS
 - N TELOPEPTIDES & PYRIDINOLINE PEPTIDE



LOW TURNOVER OSTEOPOROSIS

- FAILURE OF OSTEOBLAST TO FORM BONES
- OSTEOCLASTIC RESORPTION NORMAL

GENERAL TREATMENT PRINCIPALS

- PREVENTION
 - MAXIMIZE PEAK BONE MASS
 - ADEQUATE CALORIC INTAKE
 - PHYSIOLOGIC CALCIUM AND VIT D
 - NORMAL MENSTRUAL STATUS
 - CORRECT AMMENORRHEA AND OLIGOMENORRHEA
 - APPROPRIATE EXERCISE

TREAT BONE RESORPTION AT MENOPAUSE

- ANTIRESORPTIVE AGENTS
 - HRT
 - ESTROGEN
 - TAMOXIFIEN
 - RALOXIFENE
 - BIPHOSPHONATES
 - CALCITONIN
 - CALCIUM & VIT D



CALCIUM

- 1500MG/DAILY
 - DIFFICULT TO GET FROM DIET
 - NEED SUPPLEMENTATION
 - CALCIUM CARBONATE BEST
 - 500MG TID WITH FOOD
 - GAS AND CONSTIPATION
 - CALCIUM CITRATE
 - DOES NOT CAUSE GAS AND CONSTIPATION

CALCIUM CONT'D

- DAIRY PRODUCTS
- BROCCOLI, TOFU,
- RHUBARB
- WILL NOT PREVENT BONE LOSS COMPLETELY BY ITSELF
- REDUCE FRACTURES BY 10%
- ENHANCES EFFECTS OF ESTROGEN
- VITD 800 UNITS INCREASE ABSORPTION

ESTROGEN

- INCREASES CALCIUM ABSORPTION AND RETENTION
- TRUE DEFICIENCY BEGINS RIGHT PRIOR TO MENOPAUSE
- 0.625 MG OR EQUIVALENT APPROPRIATE DOSE
 - EXCEPT FOR HIGH RISK PT
 - MAY NEED HIGHER DOSE
- DECREASES HIP FX BY 25% AND VERT FX BY 50%

ESTROGEN CONTINUED

- NONOSSEOUS EFFECTS
 - HOT FLASHES
 - GENITOURINARY ATOPY
 - 50% REDUCTION IN CORONARY ART DISEASE
 - PREVENT SOME TYPE DENTAL PROBLEMS
 - PREVENT OR POSTPONE ALZHEIMERS

ESTROGEN RISKS

- UTERINE CANCER
 - TAKE WITH PROGESTERONE
- BREAST CANCER
 - NO ESTROGEN 11 WOMEN GET BREAST CA
 - WITH ESTROGEN 14 WOMEN WILL GET BREAST CA
 - ONLY INCREASED IN WOMEN WHO HAD TAKEN HRT OVER 10 YEARS
- OVERALL HRT INCREASES THE QUANTITY AND QUALITY OF LIFE

ESTROGEN CONTRAINDICATIONS

- STRONG FAMILY HX OF BREAST CANCER
 - USE SERMS INSTEAD
- HX THROMBOSIS OR STROKE
- LIVER DISEASE

MENOPAUSE

- BONE LOSS 2% PER YEAR
 - 8% CANCELLOUS BONE
 - 0.5% CORTICAL BONE
 - SLOWS IN ABOUT 6-10 YEARS
- ESTROGEN CAUSE 2% GAIN A YEAR
 - IF PT STOPS ESTROGEN IN 7 YRS IT WILL BE AS IF SHE NEVER TOOK HORMONES

TAMOXIFEN

- ENHANCES BREAST SURVIVAL
 - BENEFIT GONE AFTER 5 YEARS
- 70% AS EFFECTIVE AS ESTROGEN IN INCREASING BONE MASS
- DOES NOT RELIEVE HOT FLASHES
- INCREASED RISK OF UTERINE CANCER

SERMS

- RALOXIFENE
 - REDUCES INCIDENCE OF BREAST CA BY 50%
 - DECREASE SYMPTOMS BY 50%
 - VERY EFFECTIVE AT IMPROVING BONE MASS

CALCITONIN

- ANTIRESORPTIVE
- DECREASES NUMBER OF OSTEOCLAST
- FORMS: SUB Q, NASAL, RECTAL SUPPOSITORY (200UNITS)
- USE WITH CALCIUM
- ANALGESIC EFFECT
 - USE IN PATIENTS WITH SYMPTOMATIC VERTEBRAL FXS
 - 75% LESS VERTEBRAL FXS
 - NO CHANGE HIP FRACTURES

BIOPHOSPHONATES (FOSAMAX)

- ETIDRONATE
- BINDS SURFACE OF HYDROXYAPATITE CRYSTALS
INHIBITS RESORPTION
- DOES NOT INHIBIT REPAIR
- ALENDRONATE
 - 5MG DAY FOR PREVENTION OF BONE LOSS
 - 10MG DAY FOR TREATMENT OF OSTEOPOROSIS
 - 10 YEAR HALF LIFE
 - DO NOT USE IN WOMEN WITH REPRODUCTIVE DESIRES

BIOPHOSPHONATES CONTINUED

- TAKE WITHOUT FOOD
 - BONE MASS IMPROVEMENT CONTINUES 4 YEARS
 - CESSATION OF ALENDRONATE DOES NOT LEAD TO RAPID BONE LOSS
 - NO NONSKELETAL BENEFITS
 - MAY BE SYNERGISTIC WITH ESTROGEN



BONE STIMULATING AGENTS

- MAY BE USEFUL IN LOW TURNOVER OSTEOPOROSIS
- FLOURIDES
- PARATHYROID HORMONE INJECTIONS



EXERCISE

- LOAD BEARING TYPE ACTIVITIES
- MUST BE ACCOMPANIED BY CALCIUM SUPPLEMENT AND VIT. D
- NOT SUBSTITUTE FOR ANTIRESORPTIVE DRUGS
- THREE TYPES
 - IMPACT EXERCISES
 - STRENGTHENING EXERCISES
 - BALANCE TRAINING
 - PREVENTS FALLS
 - JOGING, WALKING, STAIRS, DANCING, TAI CHI