

## THE BENEFITS AND COST-EFFECTIVENESS OF PREVENTION, SCREENING, AND TREATMENT FOR OSTEOPOROSIS

Twenty-four million Americans currently suffer from osteoporosis, a reduction in bone mass that increases susceptibility to fractures (Gold et al., 1993). Given the prevalence of the disease and its debilitating effects, it is critical for a standard benefits package to include counseling, screening, and treatment for women when medically appropriate.

✓ Measures to prevent osteoporosis include counseling women to eat a diet rich in calcium, perform weight bearing exercise, and take proactive steps to avoid fractures.

✓ For women at high risk, screening for low bone mass and treatment, including changes in diet and exercise, may be appropriate. Hormone replacement therapy may be worthwhile for some women.

✓ Prevention and treatment of osteoporosis could reduce the \$7 to \$12 billion (1991 dollars) in direct and indirect costs resulting from hip fractures.

- There are approximately 1.3 million bone fractures a year attributable to osteoporosis, including roughly 250,000 hip fractures, 250,000 wrist fractures, and 500,000 vertebral fractures (Cummings, 1985).
- At age fifty, a white woman has a 15 percent lifetime probability of sustaining a hip fracture and a 1.5 percent chance that she will die from such a fracture (Grady et al., 1992).

### HEALTH BENEFITS OF CHANGES IN BEHAVIOR AND DIET

Women should receive information from their doctors and other reliable sources on preventing osteoporosis through diet and exercise:

- Diets rich in broccoli, milk, fish, liver, egg yolk, and citrus fruits increase calcium absorption and improve bone density (Bilezikian and Silverberg, 1992; Gold et al., 1993; Kiel et al., 1987; Yuodovin, 1994).

- Women should avoid alcohol, caffeine, and smoking, which are associated with a reduction in bone mass (Yuodovin, 1994).
- A four year study of 82 women ages 35 to 65 indicated that exercise slows bone loss. However, experts disagree as to how much exercise is beneficial and at what stages of life (Pollner, 1985).
- Combining exercise with increased calcium intake slowed the rate of bone loss among approximately forty post-menopausal women with a mean age of 56 and low forearm bone density (Prince et al., 1991).

**Counseling osteoporotic patients prevents hospitalizations and reduces fracture risk:**

- **Counseling osteoporotic women to avoid drugs that cause sedation, remove loose throw rugs, and install night lights and side rails can reduce fatalities resulting from falls, the major cause of accidental death for elderly women (Levin, 1991).**

**THE BENEFITS AND LIMITATIONS OF SCREENING AND TREATMENT**

**Because there is no definitive level of bone density below which women are at risk of fractures, screening may not necessarily be beneficial. Women should consult with their doctors to determine if they are at risk and might benefit from screening.**

- There is a substantial overlap in bone mass for osteoporotic and non-osteoporotic women. Therefore, simply identifying women with low bone mass does not determine which women are in need of treatment (Pollner, 1985).
- **One study conducted in Seattle among 874 women found that screening for osteoporosis and treating patients with low bone mass with long-term hormone replacement therapy reduces the risk of osteoporotic fractures by approximately 50 percent (Weiss et al., 1980).**

**WHO IS AT RISK?**

- Risk factors include Northern European ancestry, fair complexion, a family history of osteoporosis, a sedentary lifestyle, a diet low in calcium, a short, thin build, early menopause, no children or a teenage pregnancy (MacPherson, 1987).
- Certain medical factors also increase a woman's risk, including, removal of the ovaries, diabetes, kidney or liver disease, use of drugs that contain cortisone or aluminum, extended bed rest or immobilization, periodontal disease, scoliosis, and surgical removal of part of the stomach or small intestine (MacPherson, 1987).

**REDUCING OSTEOPOROSIS  
DECREASES DISABILITY AND  
HOSPITAL CARE:**

- Screening, early treatment, and fall prevention counseling could reduce the seven million restricted days a year for the non-institutionalized caused by osteoporotic fractures (Fahs, 1991).
- Preventing hip fractures would reduce hospitalizations. Each hip fracture is followed by an average of 21 days of hospitalization, according to data from the Commission on Professional and Hospital Activities (Clark and Schuttinga, 1992).
- Preventing hip fractures prevents nursing home admissions. Hip fractures are responsible for the conversion from independent to dependent living of 75 percent of patients; 25 percent require nursing-home hospitalization (Peck, 1989).

**Although some studies have had positive results, further information is required to determine whether treatment with calcium, calcitonin, and fluoride effectively prevents bone loss or reduces the risk of fractures in post-menopausal women** (Pollner, 1985).

- **Intervention with estrogen, calcium, and calcitonin late in the natural course of osteoporosis significantly reduces the incidence of hip fractures**, according to a study of 5,618 women over the age of 50 in 14 Southern European health centers (Kanis et al., 1992).
- **Calcitonin treatment increases bone mass by between four and nine percent**, depending on the frequency of the dose, according to an Italian study of 820 osteoporotic women ages 44 to 70 (Gennari, 1985).

**Hormone replacement therapy (HRT) appears to reduce the risk of fractures and may increase bone mass in conjunction with exercise; however, the benefits may decrease as women age. Women should confer with their doctors as to whether HRT is appropriate:**

- Ten of 11 studies of estrogen and hip fractures conducted since 1970 have concluded that **women receiving estrogen have a reduced risk of hip fractures compared to non-users** -- relative risk of 0.75 (Grady et al., 1992).
- **Women receiving hormone replacement therapy in conjunction with added exercise increased their bone density by 2.7 percent but also experienced side effects including vaginal bleeding and breast tenderness** according to a study of 120 women with low forearm bone density (Prince et al., 1991).
- One study found that while estrogen treatment reduced the risk of fracture by 58 percent among a group of women with average age of 72, **by the time these women had reached an average age of 79, there was no difference in the risk of fracture between those women who had received estrogen treatment and those who had not** (Ettinger and Grady, 1993).

- Hormone replacement therapy has negative and positive side effects unrelated to its effect on bone density. On the other hand, negative side effects include vaginal bleeding, breast tenderness, and increased risk of certain cancers including endometrial cancer and possibly breast cancer. On the other hand, there is evidence that HRT reduces the risk of coronary heart disease (Grady et al., 1992).

## **COST-EFFECTIVENESS**

Although the studies cited here indicate that screening and treatment may be cost-effective, it is important to note that these studies do not take into account the additional costs to the health care system that might result from an increased incidence of certain cancers, nor the reduction in medical expenditures that would result from a decrease in coronary artery disease. If the benefits of hormone replacement therapy decline as women age or when the therapy is discontinued (see for example Ettinger and Grady, 1993), then treatment may not be as cost-effective in the long run as it appears to be from these studies.

### **Studies indicate that screening and treatment may be cost-effective:**

- Screening and treating women with perimenopausal bone densities of less than 9g/cm<sup>2</sup> or less than 1.0 g/cm<sup>2</sup> would cost \$11,700 and \$22,100, respectively, per year of life gained (1987 dollars), according to a study based on a hypothetical cohort of asymptomatic, perimenopausal women with intact uteri and on data from Rochester, Minnesota (Tosteson et al., 1990).

### **According to a study based on data from the Third National Cancer Survey, the Boston Collaborative Drug Surveillance Program, and fees reported to the Medicare Bureau (Weinstein, 1980):**

- The cost of estrogen treatment per quality-adjusted year of life saved for women with intact uteri is approximately \$7,420 for symptomatic women and \$5,460 for women with clinical osteoporosis (without annual biopsies).
- For women with prior hysterectomies, the cost per quality adjusted year of life saved is approximately \$4,800 for symptomatic women and \$3,200 for women with clinical osteoporosis (without annual biopsies) (1980 dollars).
- These treatments are comparable in cost to the common coronary artery bypass graft which costs \$7,300 per year of life saved (1991 dollars).

## **POTENTIAL SAVINGS**

### **Screening and treatment of osteoporosis reduces fractures and their associated costs:**

- Prevention and treatment of osteoporosis could reduce the \$7 to \$12 billion (1991 dollars) a year in direct and indirect costs resulting from hip fractures (Levin, 1991).

**Screening women for low bone mass and providing treatment may save money as well as prevent fractures**

According to Clark and Schuttinga, 1992:

- **Savings of \$5.1 million (1988 dollars) in direct and indirect costs could be realized over a 40 year period** by screening 100,000 white American women age 50 in 1988 and treating 90 percent of the high risk and 70 percent of the mid-risk women with estrogen/progestin therapy, even after the program's cost is included, according to a computer-simulation study.
- **Savings of \$27.6 million (1988 dollars) in direct and indirect costs above the price of the program could be realized over 40 years**, if 50 percent of the 1.09 million white American women age 50 in 1988 were screened for osteoporosis and 90 percent of the high and 70 percent of the mid-risk women were treated.
- Including other health benefits, such as a decrease in coronary heart disease, in the calculations may result in even greater savings, while inclusion of costs associated with increased incidence of certain cancers would decrease the cost-effectiveness.

- **Each prevented hip fracture saves approximately \$10,250 to \$12,100 (1987 dollars) in hospital costs**, according to an estimate using 1987 Medical diagnostic related group reimbursement weights to projected 1987 national standardized payment amounts for urban hospitals (Tosteson et al., 1990).

- **Each prevented nursing home admission saves approximately \$25,550 (1987 dollars) annually** (Tosteson et al., 1990).

- Implementing strategies to prevent osteoporosis-related fractures could reduce the \$31 to \$62 billion cost (1990 dollars) of the estimated 350,000 osteoporosis-related hip fractures expected annually by the year 2020 (Melton et al., 1990).

---

This Research-in-Brief is part of IWPR's Research and Resource Kit on *Preventive Health Services for Women: Benefits and Cost-Effectiveness*, produced by Stephanie Aaronson and Nicoletta Karam with the assistance of Ellen Cutler in August 1994. The project was funded by the Nathan Cummings Foundation, with additional funds for dissemination provided by The Ford Foundation. A related annotated bibliography is available from the Institute for Women's Policy Research, describing the studies cited in this fact sheet as well as additional studies that are of interest.

IWPR has produced eight fact sheets and annotated bibliographies on the benefits and cost-effectiveness of women's preventive health services relating to breast cancer, cervical cancer, domestic violence, family planning, mental health, prenatal care, osteoporosis, and sexually transmitted diseases. Each fact sheet/bibliography pair is available from IWPR for \$5.00; the entire Kit, which includes all topics and comes in a three-ring binder, is available from IWPR for \$20.00. Members of IWPR receive discounts on this kit and all publications. Please contact IWPR for information on membership and bulk order discounts.1