
OSTEOPOROSIS TREATMENT

WITH NON-DRUG THERAPIES

BANKS NUTRITION CENTER

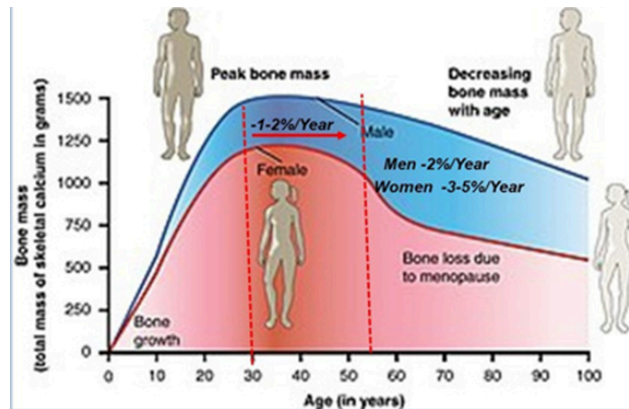
INTRODUCTION

Our population is aging and with that comes higher amounts of age-related diseases. Front and center in that is osteoporosis. Non-drug treatment efforts have centered around providing raw materials for bone including minerals like calcium, vitamins D and K2, and exercise. While these measures are needed as a part of a broader treatment program, they have only marginal effects as stand-alone therapy.

TREATING OSTEOPOROSIS WITH NON-DRUG THERAPIES

Our population is ageing and with that comes higher amounts of age-related diseases. Front and center in that is osteoporosis. Non-drug treatment efforts have centered around providing raw materials for bone including minerals like calcium, vitamins D and K2, and exercise. While these measures are needed as a part of a broader treatment program, they have only marginal effects like stand-alone therapy.

Bone develops wear related microcracks over time. Areas with these microcracks must be repaired to maintain bone strength. This repair process is called bone remodeling. Each year 10% of bone undergoes remodeling with the entire skeleton being rebuilt in a decade. Two types of bone cells perform the remodeling, osteoclasts which remove the old bone and osteoblasts which fill new bone back in.



With age, osteoclasts tend to increase their activity while osteoblasts decrease in number and activity. The effect of this shift in balance is gradual bone loss. Surprising to many, this shift begins gradually at about age 35. Between 35 and 55 years bone density loss is at 1-2% per year. At about age 55 corresponding to hormonal decline, the loss accelerates to 3-5%.

Many drug therapies are available to modify the shift in activity of osteoclasts and osteoblasts to prevent further bone loss and to actually improve bone density. Unfortunately, these drugs are associated with adverse effects, some of which such as osteonecrosis of the jaw and transverse femoral fractures, are serious. Many patients will refuse these therapies based on the risk, while others discontinue them because they have experienced an adverse outcome.

The shift in balance between osteoclasts and osteoblasts causing greater bone removal than repair involves several factors. Osteoclasts are driven by inflammatory signaling, and their activity can be increased by the greater levels of inflammation that occur with age termed "inflammaging." At the same time, the number of osteoblasts declines. Those cells only live from 12 to 100 days after which they need to be replaced by a specific stem cell in bone marrow called mesenchymal stem cells (MSC).

During aging these bone marrow MSCs become fewer and are replaced with fat. This diminishes the replenishment of osteoblasts at the same time as the osteoclasts are increasing in activity. The net effect is bone loss. So yes, the problem has several pieces all of which need to be addressed in a treatment program for optimal benefit.

KNOW WHERE WE ARE STARTING

1

Many patients will have a recent DEXA bone density scan. The level of disease helps us understand the intensity of recommended treatments discussed below. If the last DEXA is more than a year prior, a new one should be performed.

2

We will also order lab markers that show the degree of loss of bone matrix and tell us if matrix repair is increasing with treatment. Bone matrix is the collagen fiber network that houses bone cells and is where the bone minerals attach for strength much like rebar strengthens concrete. More discussion of bone matrix is below. Additional labs will be done to determine systemic inflammatory activity and blood vitamin D levels.

Find causes of inflammation increasing osteoclast bone removal

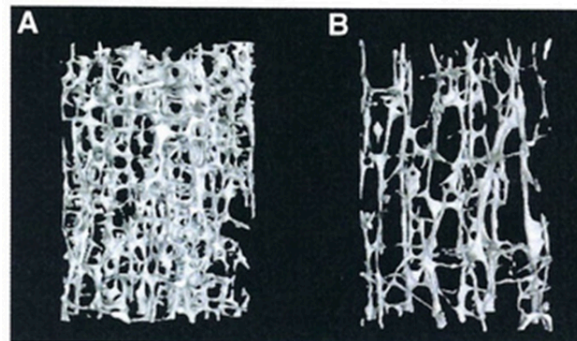
1

Osteoclasts increase their activity with high inflammation. An example of this is the high rates of osteoporosis secondary to inflammatory diseases such as rheumatoid arthritis. At the initial intake we will take a comprehensive history and exam to look at inflammatory levels and what may be causing elevation.

STIMULATING BONE FORMATION

1

This step has several pieces. The first is to rebuild bone matrix. This matrix is a woven network of collagen fibers which house the bone cells and hold hydroxyapatite which is the main mineral in bone. The left half of the diagram shows normal bone collagen matrix. The image on the right is osteoporotic bone matrix which is considerably thinned



The first step is to provide the material to rebuild bone collagen. This requires very small collagen peptides of only 4-5 amino acids. They must also contain the amino acids glycine and proline which are basic to bone matrix allowing collagen fibers to link together. While there are many collagen supplements available, only these specific peptides have a high affinity for bone matrix. In a clinical trial of supplementation with these specific peptides, improvement in BMD at 4 years increased 5-8%.

2

Other factors help with the rebuilding of bone matrix. The building is done by osteoblasts, and that population is diminished in osteoporosis. These cells must be replenished by mesenchymal stem cells in bone marrow migrating to the weakened bone and differentiating into osteoblasts. As osteoclasts begin dissolving matrix in early remodeling, signaling proteins called bone morphogenic proteins (BMPs) in the matrix are released. They migrate to bone marrow stimulating stem cells to begin differentiating into osteoblast and to migrate to the remodeling area.

Injections of BMPs have been used in the repair of non-unions in complex fractures since the 1980s to augment new bone formation. That method of delivery, however, is not feasible for diffuse diseases as in osteoporosis. More recently, BMPs are available as a dietary supplement which can be used to augment systemic bone regeneration

BONE REGENERATION THERAPIES

Exercise has a role in stimulating bone regeneration. While it is helpful and should be a part of a more comprehensive program, it has only a small effect as a stand-alone treatment. Resistance exercise seems to have the greatest effect replicating the loading signal that triggers bone remodeling.

Pulsed electromagnetic therapy (PEMF) has been used over the past 3 decades to augment healing of complex fractures and augment bone formation in surgical fusions of the spine. The devices for that were applied to either the fracture site or the surgical site. More recently systems with large magnetic solenoids which can cover large areas of bone have been developed. The system we use is shown in the photo below.

Studies of the commonly used drug therapies for osteoporosis have found that they can increase bone density from 8-12% in the spine over 3 years and 5-10% in the hip. The trials using PEMF therapy have shown increases in bone mineral density of 15% to 30%. Equally important, no adverse effects occurred in these trials which is a unique benefit associated with PEMF therapy.



Laser therapy has also shown to be effective in increasing bone density, although moderately less than can be achieved with PEMF. Laser therapy is the best option for those who have an implanted electrical device such as a pacemaker which prevents the use of PEMF

According to Aristotle "the whole is greater than the sum of its parts".

It is important in a complex, chronic disease such as osteoporosis that has several causative parts to use a comprehensive treatment program that addresses as many as possible. While the nutrients used in bone such as minerals, vitamin D and vitamin K alone are not enough to restore bone density, they must be there in adequate amounts in a treatment program. A good analogy to bone repair is building a house. The nutrients above are the building materials and the cells/osteoblasts are the builders. Both must be present for building to actually take place.

There are also several herbs that are documented to help slow osteoclastic bone removal and to stimulate osteoblastic bone repair. They provide an augment to the effects of PEMF therapy.

Maintaining treatment gains

The most important factor driving osteoporosis is age. Drug therapies for osteoporosis are continued over the long-term as aging continues to drive the factors that cause the disease. A non-drug program is similar. A PEMF and nutrition treatment program involves an initial intensive treatment program which is followed by an ongoing "maintenance" therapy, typically twice monthly.

Healthy aging requires more effort than was needed to be healthy during the first 40-50 years of life. The major concern with osteoporosis is fragility fracture, most typically of the spine or hip. These fractures are often highly disabling with age and preventing them is extremely important.

NEXT STEPS

Where do you go from here? Sustainable, low-risk non-drug therapy is a healthy option.

It is important in a complex, chronic disease such as osteoporosis that has several causative parts to use a comprehensive treatment program that addresses as many as possible. It is also a chronic, progressive disease which tends to march on with more age. Most if not all of drug therapies tend to be for life. A non-drug program is similar. Treatment involves a 3-4-month intensive treatment program which is followed by an ongoing infrequent therapy session, typically monthly. Healthy aging requires more effort than was needed simply to be young and not sick. However, working at it pays high dividends.

01

Initial Exam and Individualized testing

Contact us to schedule an appointment to get started assessing your individual treatment needs.

02

Address Underlying Causes of Inflammation

Make necessary lifestyle and supplemental changes to slow the chronic progression of osteoporosis.

03

Bone Regeneration Therapy

Using PEMF Therapy when indicated, increase bone mineral density and slow bone loss.

According to Aristotle, 'the whole is greater than the sum of its parts'

ACKNOWLEDGEMENTS

1. Ebid et al. Long-term effect of full-body pulsed electromagnetic field and exercise protocol in the treatment of men with osteopenia or osteoporosis: A randomized placebo-controlled trial. F1000Res, 2021;10:649.
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3. Abdelaal et al. Effect of pulsed electromagnetic therapy versus low-level laser therapy on bone mineral density in the elderly with primary osteoporosis: a randomized, controlled trial. Bull Fac Phys Ther, 2019;22:34-39

To schedule an appointment, call the number below or visit our website for more information.

CONTACT

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