



NATIONAL
OSTEOPOROSIS
FOUNDATION

Healthy Bones For Life

PATIENT'S GUIDE



INTRODUCTION

Healthy Bones for Life **3**

SECTION 1

How Bones Change and Grow **5**

SECTION 2

Strong Bones are Important Starting at an Early Age **7**

SECTION 3

What is Osteoporosis? **9**

SECTION 4

Who Gets Osteoporosis? **11**

SECTION 5

What is Low Bone Mass? **13**

SECTION 6

What Women and Men Need to Know **15**

SECTION 7

Bone Mineral Density Test **17**

SECTION 8

Understanding the BMD Test **19**

SECTION 9

Exercise **21**

SECTION 10

What Happens Next? **26**

SECTION 11

Treating Osteoporosis **30**

SECTION 12

Participating in Clinical Trials **36**

SECTION 12

Resources **38**

Healthy Bones For Life

OBJECTIVE

This training guide will help you:

- Understand what osteoporosis is doing to your body.
- Understand what treatment will do for you, your health and your future.
- Understand the positive benefits of the treatment plan and its effect on your future.
- Build your confidence in treating this disease.
- Identify sources of support throughout the course of treatment.



INTRODUCTION

Whether you have osteoporosis, have had a broken bone or are just interested in keeping your bones healthy, the time is right to take charge of your health. It's time to have a conversation with the members of your healthcare team about keeping your skeleton strong and improving your bone health.

GOAL**Bone loss changes your body and your life.**

Your skeleton, which supports your body and protects your internal organs, becomes weaker and is more likely to fracture. Broken bones in the spine can cause height loss, deformity and pain. Hip fractures, the most serious type of broken bone, can make it difficult to take care of yourself or to walk, and are a leading cause of nursing home admissions.

The good news is that osteoporosis and bone loss can be treated and in many cases, fractures can be prevented.

This guide provides an outline for a discussion between you and members of your healthcare team about your skeletal health. The goal of this exercise is to help you get the information you need to build a partnership with your healthcare team and take control of your bone health.

Acknowledgments

The information in this guide was developed by the National Osteoporosis Foundation (NOF) with the assistance of Andrea Singer, MD, NOF Clinical Director. Funding support for this guide was provided by educational grants from Novartis and the Council for Responsible Nutrition.

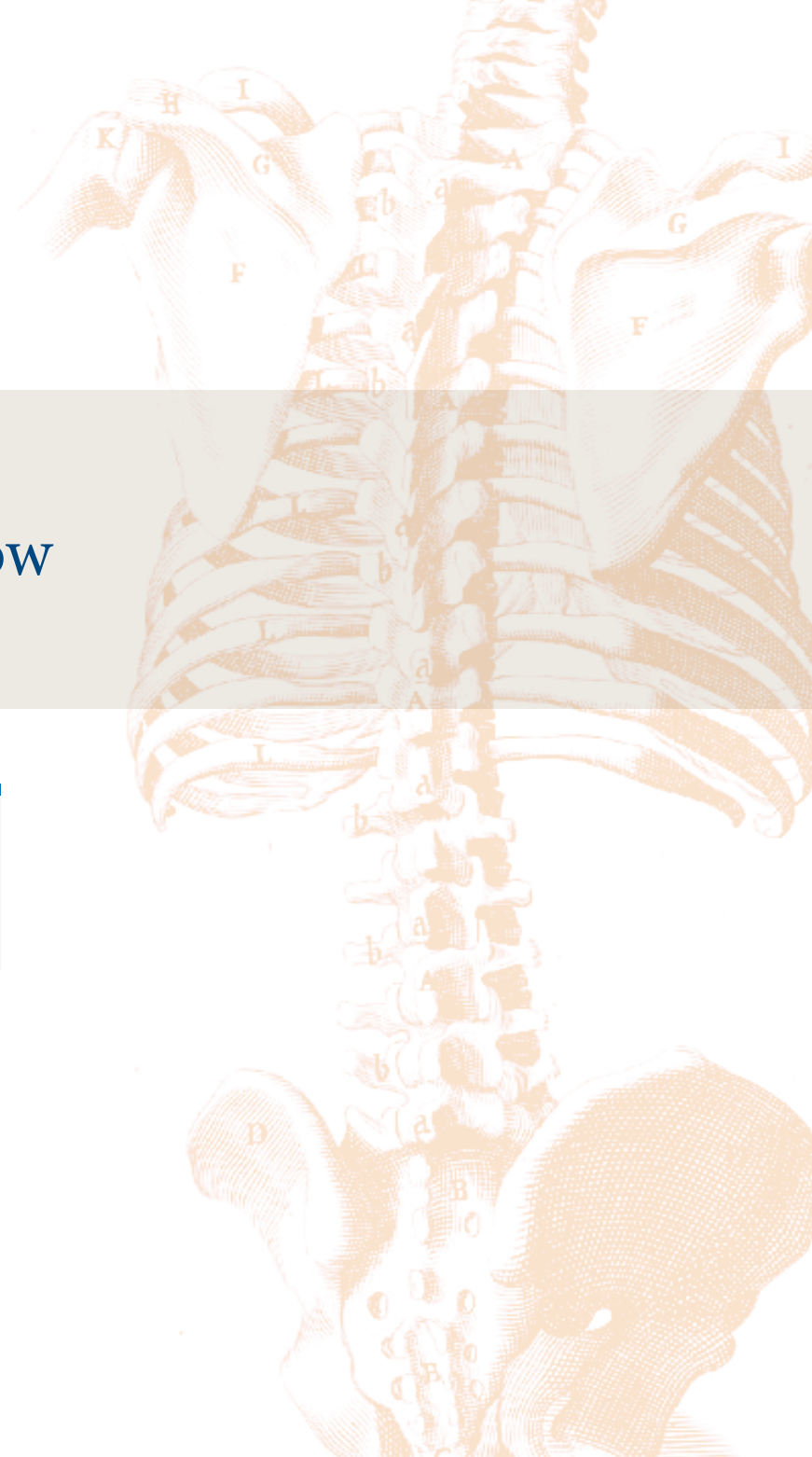
SECTION 1

How Bones Change and Grow

OBJECTIVE

By the end of Section 1, patients will be able to:

- Briefly describe the bone growth cycle throughout life.
- Identify the period of life when bones are the most dense.



KEY POINTS

1. Bones are living tissue and are constantly changing.

From the moment of birth until young adulthood, bones are growing and strengthening. This process is called “modeling”.

2. Bones are made up of three major components that make them both flexible and strong:

- Collagen, a protein that gives bones a flexible framework.
- Calcium-phosphate mineral complexes that make bones hard and strong.
- Living bone cells that remove and replace weakened sections of bone.

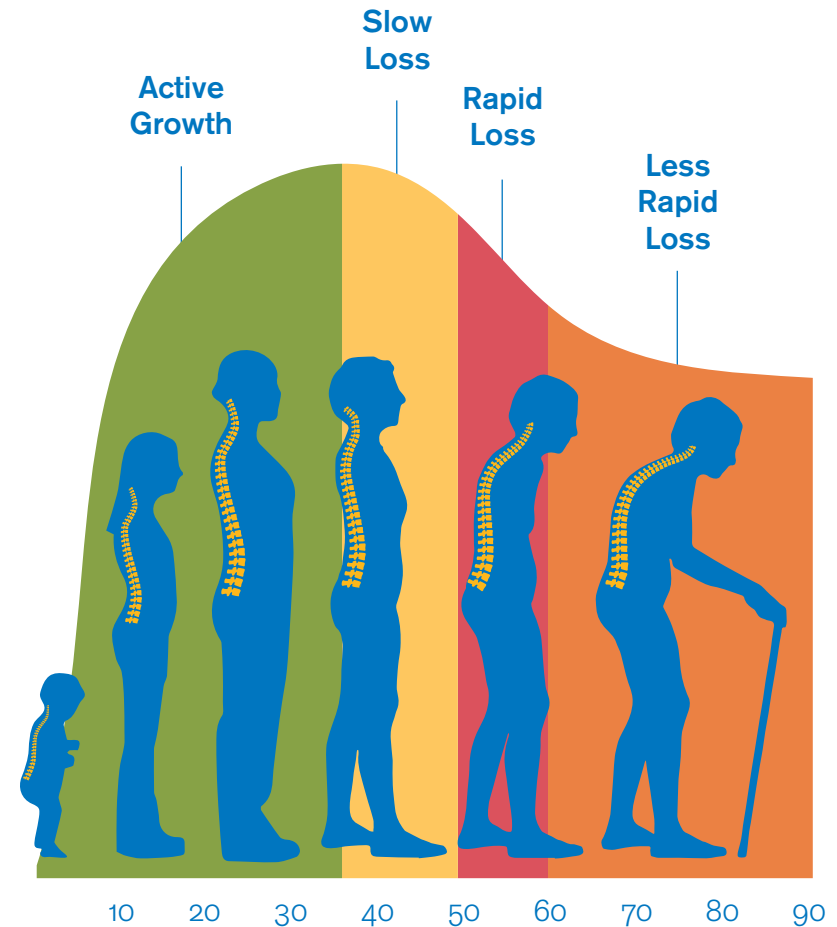
3. Children and teenagers form new bone faster than they lose old bone.

In fact, even after they stop growing taller, young people continue to make more bone than they lose. This means their bones get denser until they reach what experts call peak bone mass. This is the point when you have the greatest amount of bone you will ever have. It usually happens between the ages of 18 and 25 years.

4. Old bone cells are replaced on an ongoing basis, a process known as “remodeling”.

After the active skeletal growth phase in youth, and after menopause in women (a bit later in men), the remodeling process becomes unbalanced and we begin to lose more bone than we replace. This results in a net decrease in the total amount of bone. When the amount of bone loss decreases, it is called low bone density (osteopenia) or osteoporosis. Get enough calcium & vitamin D, exercise regularly, and make healthy lifestyle choices.

BONE GROWTH & LOSS



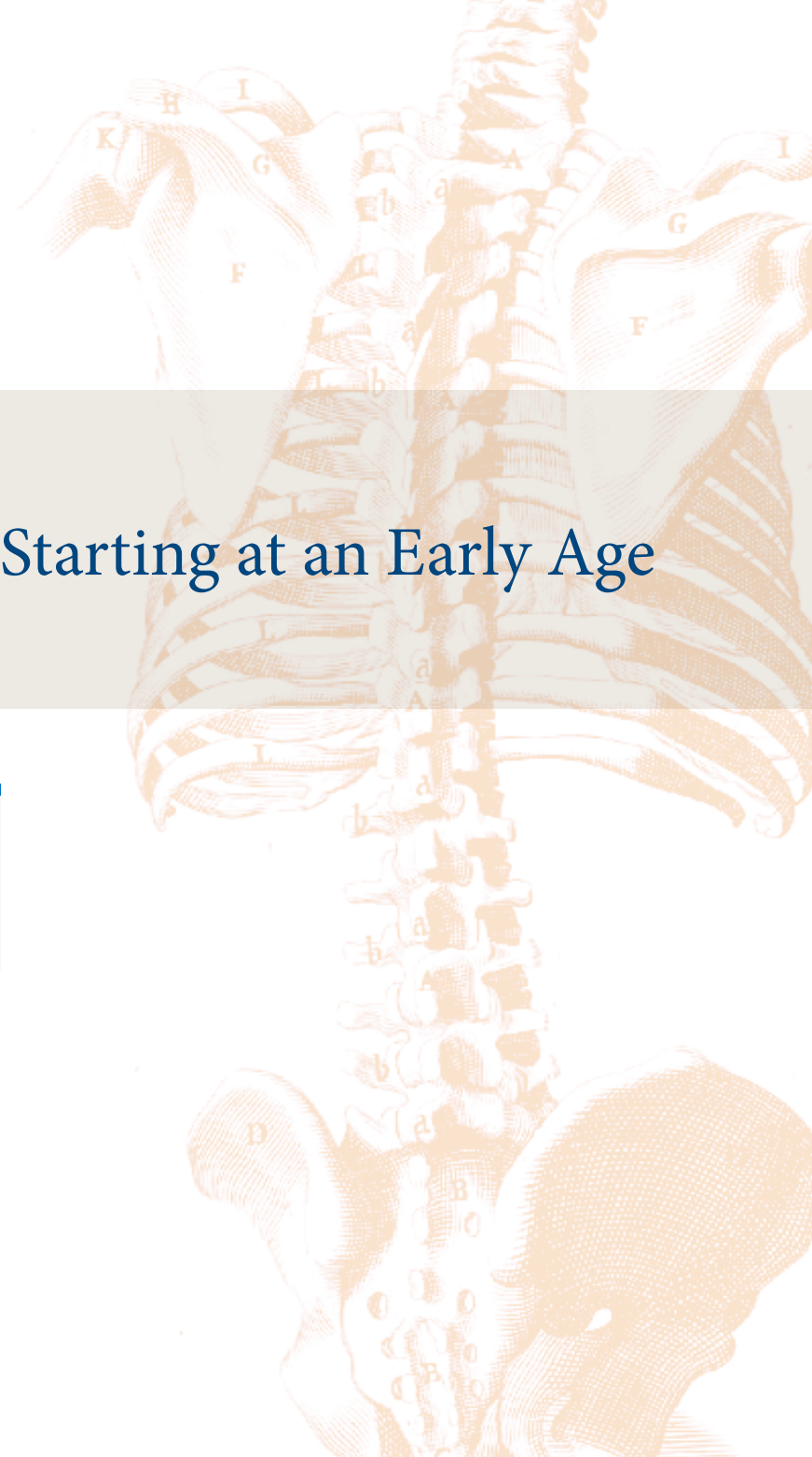
SECTION 2

Strong Bones are Important Starting at an Early Age

OBJECTIVE

By the end of Section 2, patients will be able to:

- Briefly describe lifestyle requirements for strong bones.
- Identify nutrients needed by bones for good health.



**KEY POINTS****1. Keeping your bones strong and healthy may not be on the top of your wellness list... but it should be!**

Think of your bones as a savings account. There is only as much bone density in your account as you deposit.

2. Healthy habits as a child or teenager can pay off years later with stronger bones.

- Young people can build their bones by eating calcium-rich foods, getting enough vitamin D (through sunshine or diet), and exercising regularly.
- The U.S. government publishes Dietary Guidelines for Americans as well as Physical Activity Guidelines for Americans with the intent of helping citizens develop positive lifestyle habits to prevent chronic disease onset.

3. Get enough calcium & vitamin D, exercise regularly, and make healthy lifestyle choices.

SECTION 3

What is Osteoporosis?

OBJECTIVE

By the end of Section 3, patients will be able to:

- State that osteoporosis is a very common condition.
- Briefly describe the relationship between osteoporosis and broken bones or fractures.

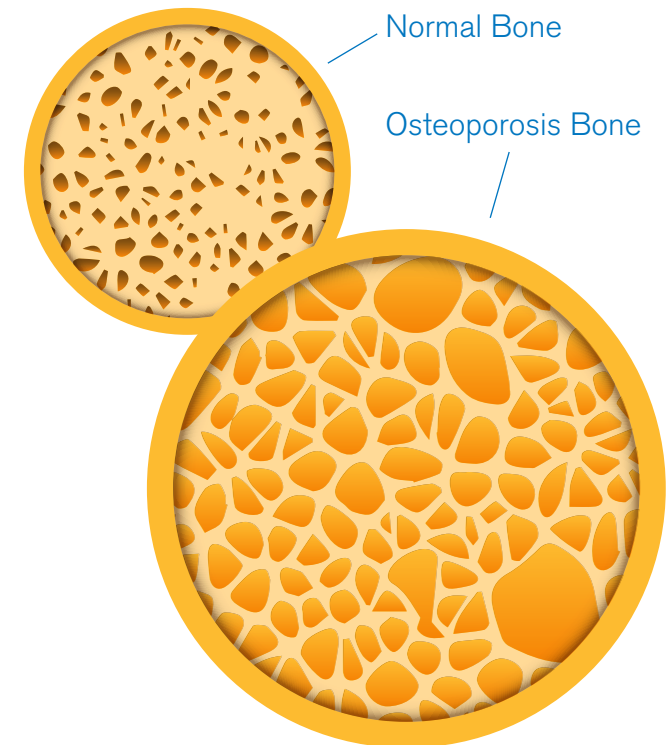


KEY POINTS

1. Osteoporosis is a condition in which the bones become weak and can break more easily.
2. The term osteoporosis literally means “porous bone.”
3. Bone loss is a natural part of aging, but not everyone will lose enough bone density to develop osteoporosis.

However, the older you are, the greater your chance of having osteoporosis.

4. About 9 million Americans over the age of 50 years have osteoporosis.
5. One half of women and two in five men will develop osteoporosis during their lifetime.
6. Osteoporosis is the underlying cause of approximately 2 million fractures every year.
7. Back pain, caused by changes in the vertebrae, may be the first sign that something is wrong.



SECTION 4

Who Gets Osteoporosis?

OBJECTIVE

By the end of Section 4, patients will be able to:

- List a minimum of three risk factors for developing osteoporosis that cannot be changed.
- List a minimum of three risk factors for developing osteoporosis that can be changed.



KEY POINTS

1. Begins in childhood via failure to reach peak bone mass.

2. It is not gender specific:

- **A man** older than 50 is more likely to break a bone due to osteoporosis than he is to get prostate cancer.
- **A woman's** risk of breaking a hip due to osteoporosis is equal to her combined risk of breast, ovarian and uterine cancer.

3. Genetics play a role and so does race and ethnicity.

4. It can be affected by:

- Poor diet, lack of exercise, smoking and drinking too much.

5. Certain medical conditions can also be a risk factor

RISKS

Risks you cannot change:

- Female gender / past menopause.
- Family member with osteoporosis + and/or fractures.
- Thin, small or petite body frame.
- Aging, for both genders.
- Other health conditions like rheumatoid arthritis, celiac disease, overactive thyroid gland.
- History of a broken bone (fracture).
- Use of certain medicines like corticosteroids, anticonvulsants or others.
- History of falls over the past year.

Risks you may be able to change:

- Woman with estrogen deficiency.
- Too little intake of calcium, vitamin D and other nutrients.
- Too little exercise.
- Smoking or past history of smoking.
- Three or more alcoholic drinks per day.
- Excessive intake of coffee, cola or other caffeinated beverages.

SECTION 5

What is Low Bone Mass?

OBJECTIVE

By the end of Section 5, patients will be able to:

- Explain the significance of low bone mass.
- Discuss at least one approach for treating low bone mass.

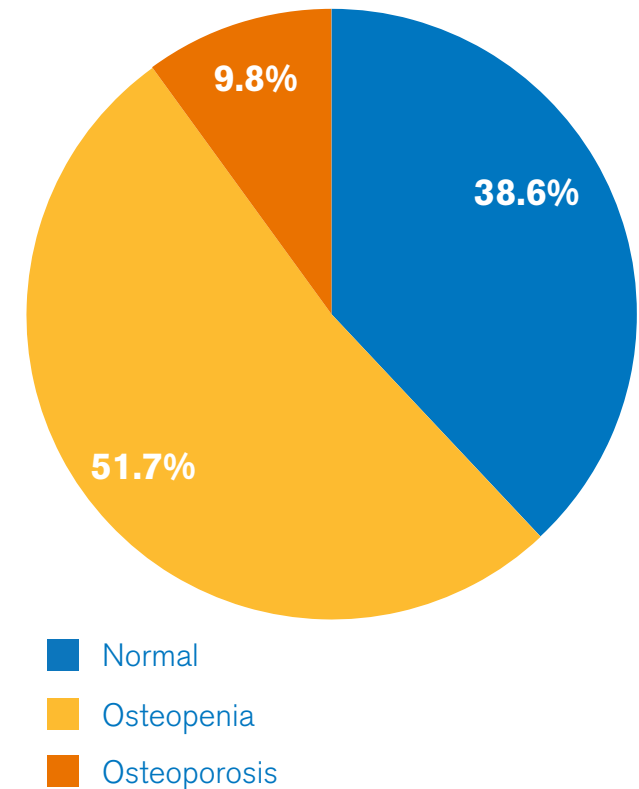


KEY POINTS

1. Low bone mass is when your bone density is lower than normal, but not low enough to be considered osteoporosis.
2. Low bone mass (osteopenia) does not always mean you will get osteoporosis, but it is a risk.
3. Approximately 48 million Americans over the age of 50 years have low bone mass.
4. As we age, we lose more bone than we replace.
5. As with osteoporosis, there are no physical symptoms.

Low bone mass can progress to osteoporosis, but with changes in diet and exercise, you can slow the bone loss.
6. Individuals with low bone mass have a greater chance of developing osteoporosis if they lose bone in the future because they have less bone to lose.
7. People with low bone density are more likely to break a bone compared to people with normal bone density.
8. If you have low bone mass, your doctor will evaluate you to see if you need medication.

LOW BONE MINERAL DENSITY



SECTION 6

What Women and Men Need to Know

OBJECTIVE

By the end of Section 6, patients will be able to:

- Identify a minimum of two gender-based facts about osteoporosis or low bone density.



**WHAT WOMEN
NEED TO KNOW**

1. Low estrogen levels lead to bone loss
 - Estrogen is a hormone that helps protect bone.
2. All women go through menopause and it leads to lower estrogen levels, which cause bone loss.
3. Women's bones are generally thinner than men's & bone density has a rapid decline for a time after menopause.
4. Osteoporosis starts earlier and gets worse faster in women because of midlife hormonal shifts.
5. Women can lose up to 20% of their bone density in the 5-7 years after menopause.
6. 80% of Americans with osteoporosis are women.

**WHAT MEN
NEED TO KNOW**

1. Osteoporosis is associated with some male-only conditions:
 - For example, abnormally low testosterone levels (hypogonadism).
 - Low testosterone levels put men at risk.
2. Men who break a hip or wrist are less likely than women to get treated for osteoporosis.
3. Men may, however, have fewer treatment choices at this time because some drugs have been tested only in women.
4. Starting at about age 65, both sexes lose bone at about the same rate.

SECTION 7

Bone Mineral Density Test

OBJECTIVE

By the end of Section 7, patients will be able to:

- Describe how bone density is measured.
- List at least two reasons for a bone density test to be performed.



**KEY POINTS****1. What is it?**

- Measures the density of minerals, like calcium and other types in your bone.
- Painless.
- May be able to remain fully clothed.
- Takes less than 15 minutes.

2. How is this important?

- Diagnose bone loss and osteoporosis.
- Shows how well osteoporosis medicine is working.
- Predict risk of future bone fractures.

3. How is this performed?

- Dual-energy x-ray absorptiometry (DXA) scan.
- Peripheral dual-energy x-ray absorptiometry (pDXA).
- Quantitative ultrasound (QUS).
- Quantitative Computed Tomography (QCT)
- pQCT (peripheral QCT) scan.
- Radiographic absorptiometry (RA).
- Single energy x-ray absorptiometry (SXA).

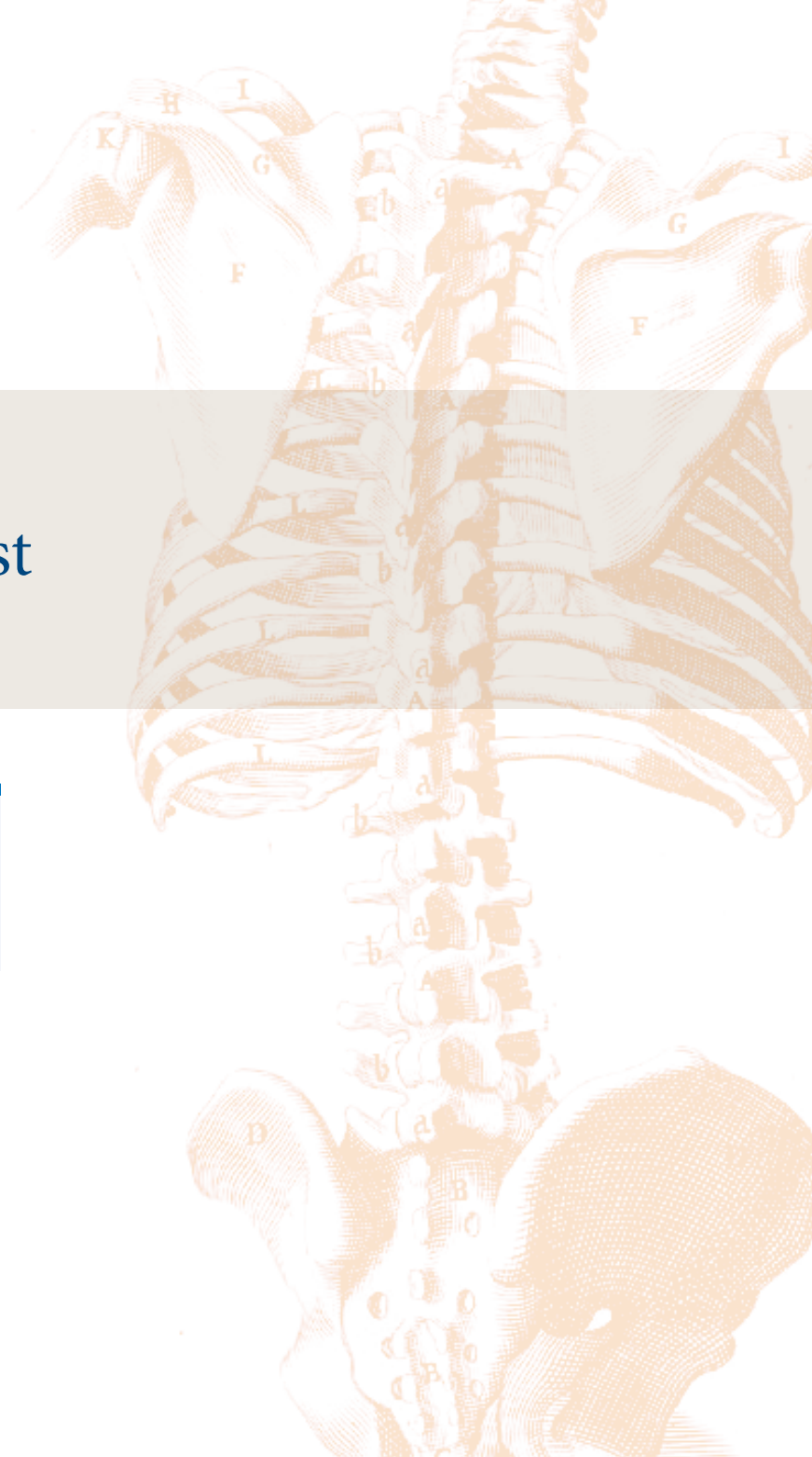
SECTION 8

Understanding the BMD Test

OBJECTIVE

By the end of Section 8, patients will be able to:

- Understand how BMD tests are interpreted.
- Discuss why Z-scores are performed.



KEY POINTS

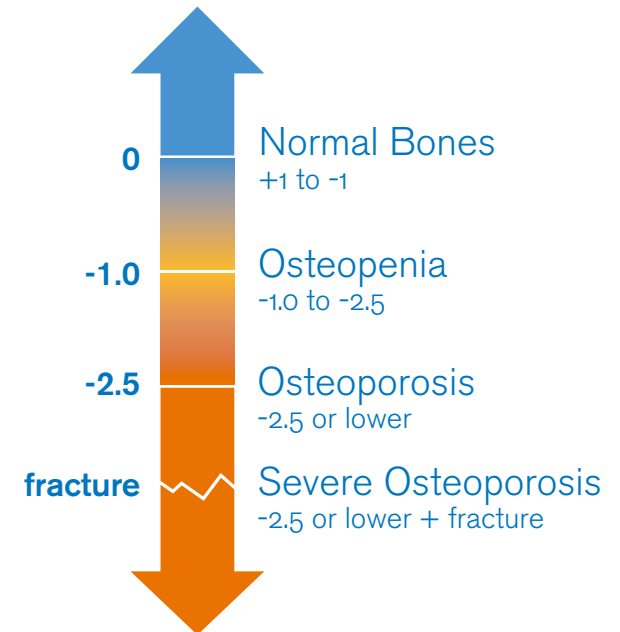
T-score

- Your test result will be compared to the ideal or peak bone mineral density of a healthy 30 year old adult.
- Differences between your BMD and that of a healthy adult are measured in standard deviations (SD).
- The more standard deviations your score is below 0, the lower your BMD and higher your risk of fracture.
- The greater the negative number, the more severe the bone loss.
- Some fractures, especially hip and spine fractures are almost always due to osteoporosis regardless of the T-score.

Z-score

- Used to evaluate BMD in children and adolescents.
- Also used in adults.
- Compares a person's BMD to what is expected in another person of the same age and body size.
- Useful for determining whether an underlying disease or condition is causing bone loss.

T-SCORE = BONE MINERAL DENSITY



SECTION 9

Exercise

OBJECTIVE

By the end of Section 9, patients will be able to:

- Discuss the benefits of exercise for skeletal health.
- List safety considerations for exercise by people with osteoporosis.



KEY POINTS

1. Like your muscles, your bones get stronger when you make them work.
2. This means handling impact, weight of your body or more resistance.
3. Exercise will help increase or maintain bone strength & improve ability to do daily activities.
4. Always check with your healthcare provider to find out what exercises are safe for you.

**WEIGHT-BEARING
EXERCISES**

Weight-bearing exercises include activities that make you move against gravity while being upright, such as fast walking.

Higher impact exercises like jogging and running may not be safe if you have osteoporosis or a history of fracture.

Try to do 30 minutes of weight-bearing exercise, moderate pace, most days of the week.

When you do muscle-strengthening exercises, you move your body, a weight, or some other resistance against gravity.

Muscle-strengthening exercises include lifting weights, using elastic exercise bands or using weight machines. They are also called resistance exercises.

Aim to perform 8-12 different muscle-strengthening exercises to cover main body areas.

1-2 sets of 8-10 repetitions to fatigue, for 2-3 days per week.

**POSTURE
EXERCISE**

- Good posture is important.
- Can minimize kyphosis and reduce the risk of broken bones in the spine.
- Try to work on good posture several times a day.

**BALANCE
EXERCISE**

- Can reduce your chance of falls & broken bones.
- Should be challenging, but safety is the first priority.

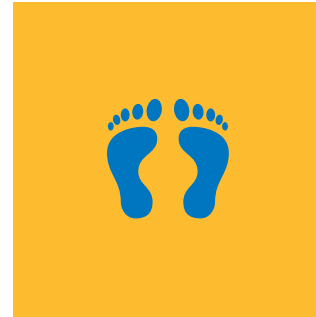
BALANCE EXERCISE



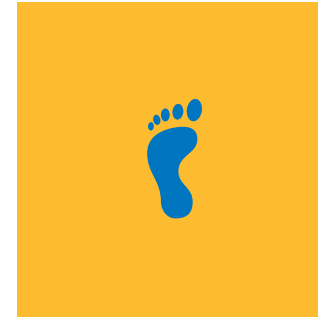
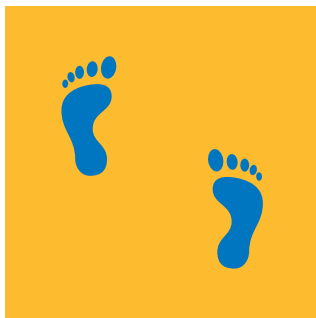
Wide Stance



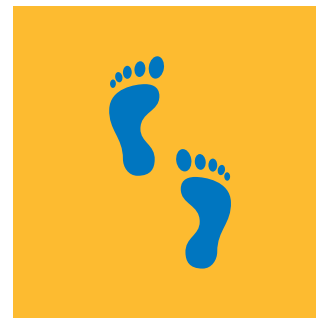
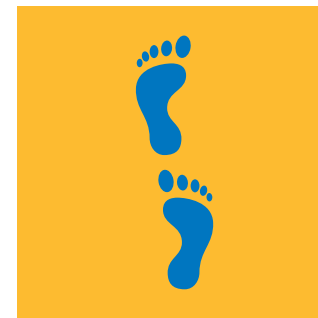
Normal Stance



Narrow Stance

Single limb*
other foot in the air*Wide
Semi-tandem

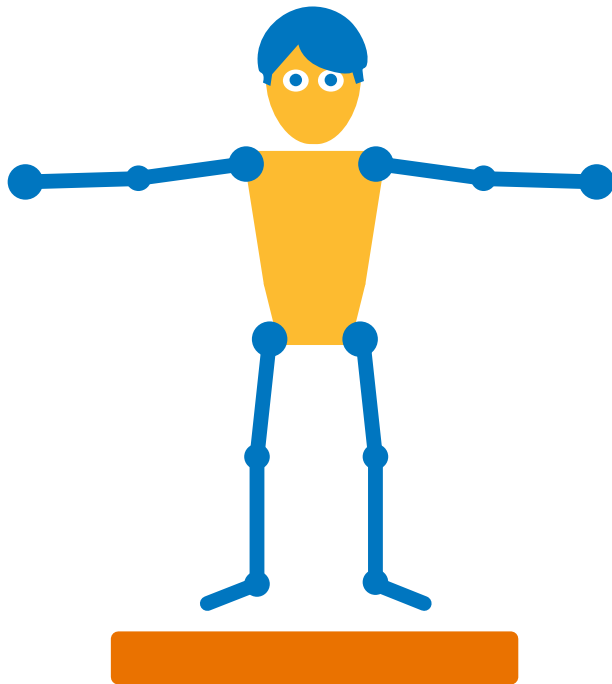
Semi-tandem

Tight
Semi-tandem*

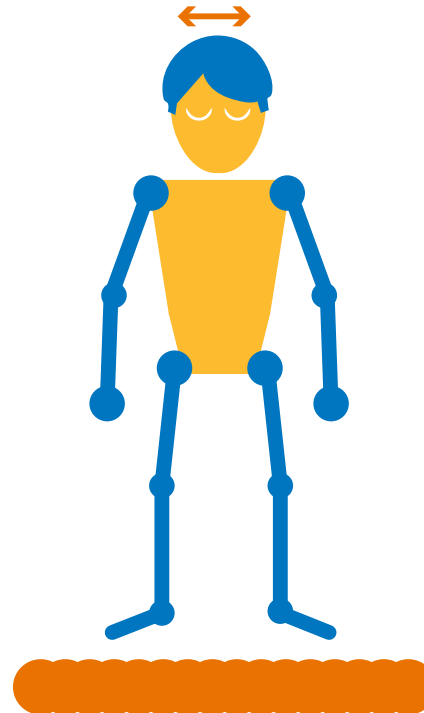
Full tandem*

* Use extreme caution

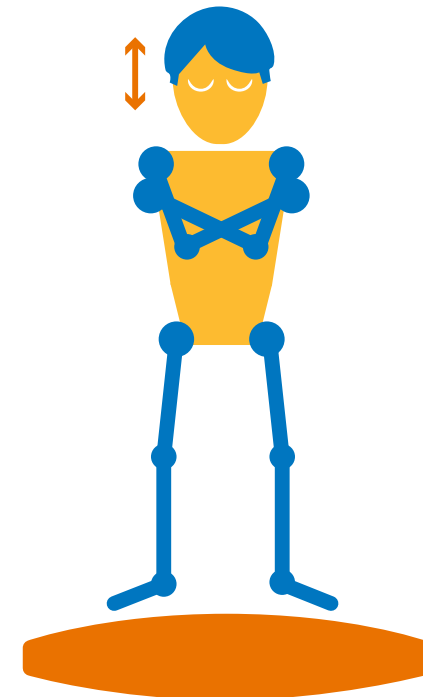
BALANCE EXERCISE



- Eyes:** Open
- Head:** Focus on an object in front of you
- Arms:** Reach out to the sides
- Shoes:** Hard sole shoes
- Surface:** Solid floor (linoleum)



- Eyes:** Closed*
- Head:** Turn right to left
- Arms:** At your sides
- Shoes:** No shoes
- Surface:** Soft floor (carpet)



- Eyes:** Closed*
- Head:** Tilt up and down
- Arms:** Crossed on your chest
- Shoes:** Soft sole shoes
- Surface:** Compliant surface (pillow, foam, balance disc*)

* Use extreme caution

SECTION 10

What Happens Next?

OBJECTIVE

By the end of Section 10, patients will be able to:

- List the components of a comprehensive treatment plan for osteoporosis.
- State the recommended daily intake of calcium and vitamin D
- Explain the benefits and risks of medication therapy for patients with osteoporosis.



KEY POINTS**Develop treatment plan including:**

- Medication/Supplements.
- Exercises.
- Healthy Lifestyle.
- Additional testing.
- Keeping clinician informed of changes in routine or/and general health.

RECOMMENDED TREATMENT**Medications:**

- Your healthcare provider will consider other health problems you have when recommending a medicine.

Calcium recommendations:

- ensure you are getting enough.

Vitamin D: helps absorb calcium & make new bone:

- To get enough vitamin D, many people need to take a supplement.

Exercise (role & safe modifications):

Adhere to the U.S. Physical Activity Guidelines for Americans:

- Weight-bearing.
- Balance training.

Nutrition:

- Adhere to the U.S. Dietary Guidelines for Americans.

Lifestyle issues:

- Smoking cessation, limit alcohol.

CALCIUM & VITAMIN D SUPPLEMENTATION

Calcium is an essential nutrient because it provides the building material for building new bone.

Try to get your daily amount of calcium from your diet first and only take supplements to make up the shortfall.

Consider foods that have calcium added. Ex: some brands of cereal & juices.

Try some healthy alternatives:

- Add beans to soups, chili, and pasta dishes.
- Enjoy a smoothie made with yogurt.
- Include leafy vegetables in your meals.

Your body needs vitamin D to absorb calcium.

It is very difficult to get enough of vitamin D from food alone, so many people will need to take a vitamin D supplement (note: most calcium supplements also contain vitamin D) to obtain their recommended amount.

Fatty fish (e.g. salmon, tuna and mackerel) and fish liver oils are the best sources, while beef liver, cheese and egg yolks contribute small amounts. Milk in the U.S. is fortified with 100 IU of vitamin D per 8 ounce serving.

Your body naturally makes vitamin D with prolonged sun exposure.

However, use of sunscreen with an SPF of 15 or greater impairs this action.

Ask your physician to recommend a vitamin D supplement if needed.

CALCIUM & VITAMIN D FOR WOMEN:

- Under age 50 need 1,000 mg of calcium & 400-800 IUs of vitamin D daily.
- Age 50 and older need 1,200 mg of calcium & 800-1,000 IUs of vitamin D daily.

CALCIUM & VITAMIN D FOR MEN:

- Under age 50 need 1,000 mg of calcium & 400-800 IU of vitamin D daily.
- 50-70 need 1,000 mg of calcium & 800-1,000 IU of vitamin D daily.
- 71 and older: need 1,200 mg of calcium & 800-1,000 IU of vitamin D daily.

CREATING THAT HEALTHY LIFESTYLE

DO

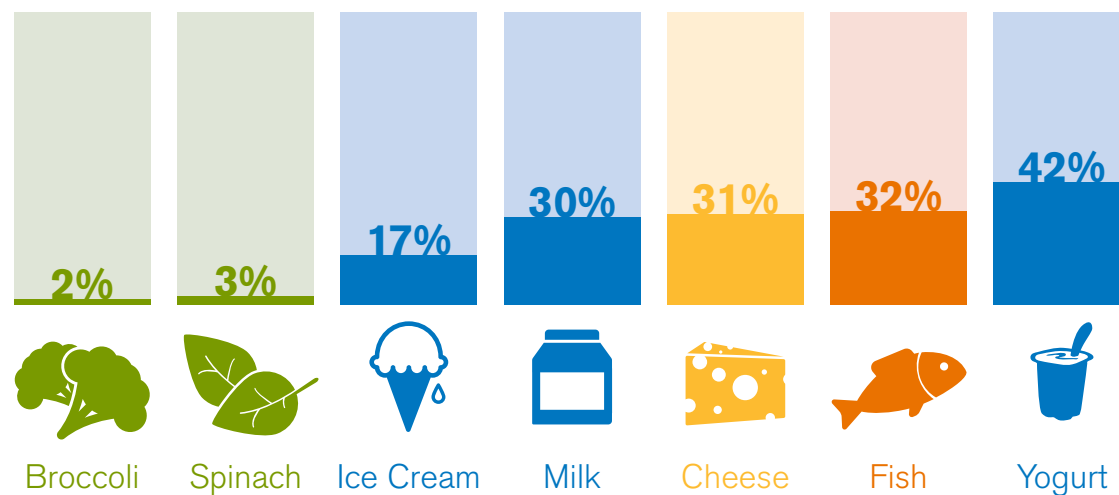
- Eating calcium-rich foods can help your bones no matter what age.
- Consume the equivalent of 3 8-ounce glasses of low-fat or non-fat milk per day to get enough calcium and other nutrients.
- Consume foods rich in vitamin D (e.g. fatty fish) and/or ask your doctor about taking a vitamin D supplement.
- Leafy green vegetables also provide calcium, magnesium and other essential nutrients that help maintain good bone health.

DO NOT

- Salty foods (canned soups and processed meats) can decrease your bone's calcium reserves.
- Excess caffeine (i.e. more than three cups of coffee a day) can also decrease your bone's calcium reserves.
- Excessive alcohol intake can lead to bone loss.

VITAMIN D RICH FOODS

Percentage of daily value



SECTION 11

Treating Osteoporosis

OBJECTIVE

By the end of Section 11, patients will be able to:

- Explain the benefits of medication therapy for patients with osteoporosis.
- Explain the potential risks associated with medication therapy for patients with osteoporosis and fractures.



KEY POINTS

1. While there is no cure, there are steps you can take to slow or stop the progress of osteoporosis or prevent fractures (broken bones).

In some cases, your bones may even improve.

2. If you have osteoporosis or low bone density, you should talk to your healthcare provider about whether you need treatment at this time.

**ANABOLIC
MEDICINE**

Stimulates your body to make new bone more quickly

Increases your bone density

Lowers your risk of breaking bones

Teriparatide (parathyroid hormone or PTH):

- Use in men and women at high risk for fracture.
- Reduces fractures at spine and non-spine sites.
- Give by daily injection for a maximum of 24 months.
- Side effects include leg cramps, nausea, and dizziness.

ANTIRESORPTIVE MEDICINES

Slow the breakdown of bone

Maintain or improve bone density

Lower the risk of breaking bone

Bisphosphonate medicines:

- Reduce bone loss.
- Increase bone density in the hip and spine.
- Reduce the risk of fractures in the spine, hip and other non-spine sites.
- Side effects may include heartburn, nausea, abdominal pain, bone or muscle pain.
- Can be given orally (pill) or intravenously.

Rank ligand (RANKL) inhibitor:

- Slow bone breakdown.
- Increase bone density in the hip and spine.
- Reduce the risk of fractures in the spine, hip and other non-spine sites.
- Given as a subcutaneous injection twice a year.
- Side effects include: Low levels of calcium in the blood, risk of serious skin infections (cellulitis) and skin rash.

Calcitonin:

- Use only when other medicines are not able to be used.
- May reduce the chance of spinal fractures.
- Give by nasal spray or daily injection.
- Side effects include runny nose, bleeding from the nose and allergic reactions.

Estrogen agonist/antagonist medicines (SERMs) (women only):

- Increase bone density in the hip and spine.
- Prevent bone loss.
- Reduce the risk of spinal fracture.
- Side effects may include hot flashes, leg cramps, increased risk of blood clots.

Estrogen therapy, hormone therapy and Tissue-Selective Estrogen Complex (women only):

- Use in early menopause to control menopausal symptoms and hot flashes; will help preserve bone density.
- Primary indication for use is treatment of menopausal symptoms.
- Tissue-Selective Estrogen Complex is a combination of estrogen and bazedoxifene, a SERM, and is used in women who suffer from moderate-to-severe hot flashes (vasomotor symptoms) associated with menopause and to prevent osteoporosis after menopause.
- Side effects include: muscle spasms, nausea, diarrhea, dyspepsia, upper abdominal pain, oropharyngeal pain, dizziness, neck pain, and increased risk of blood clot.

OSTEOPOROSIS DRUGS

Benefits:

- For every 100 women taking bisphosphonates for three years, six will avoid a fracture.
- The protection is best for fractures of the spine (1 in 20 women), but is also significant for hip fractures (1 in 100).

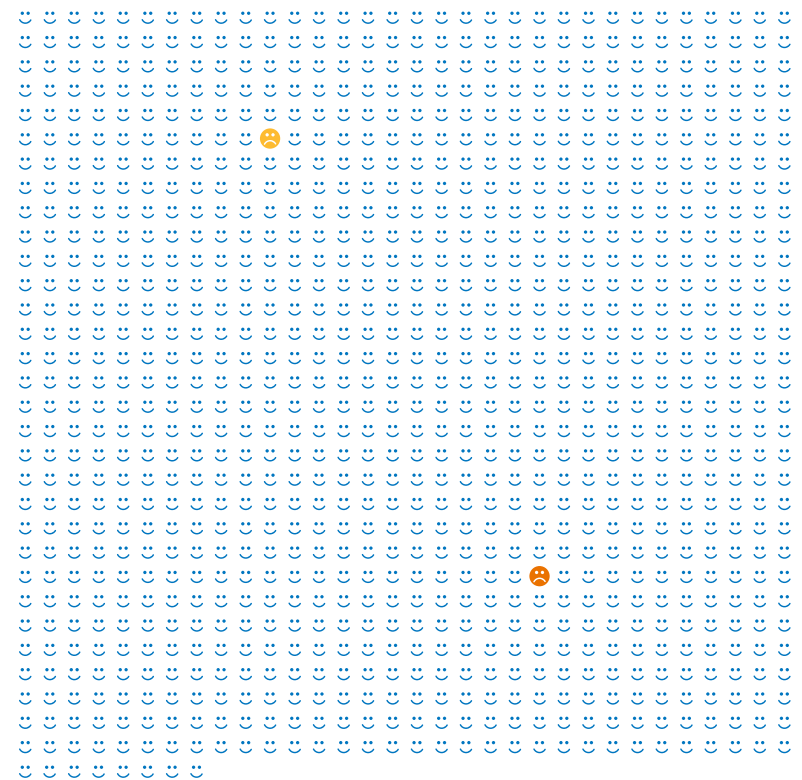
Risks

- Long term treatment of osteoporosis with bisphosphonates, particularly for more than five years, has been linked to some side effects, including atypical femur fracture.
- Osteonecrosis of the jaw (ONJ) is a very rare condition that has been associated with long term, high dose bisphosphonate therapy. The condition is more common in people with poor dental hygiene and in those who are receiving high doses to treat bone loss associated with cancer and cancer treatment.

THE RISK OF TAKING BONE STRENGTHENING MEDICATION

Out of 1,000 people on osteoporosis medication for 5 years:

- ☹️ Less than 1 may have a jaw problem (.01/1000)
- ☹️ Less than 1 may have a rare treatment related fracture (.16/1000)



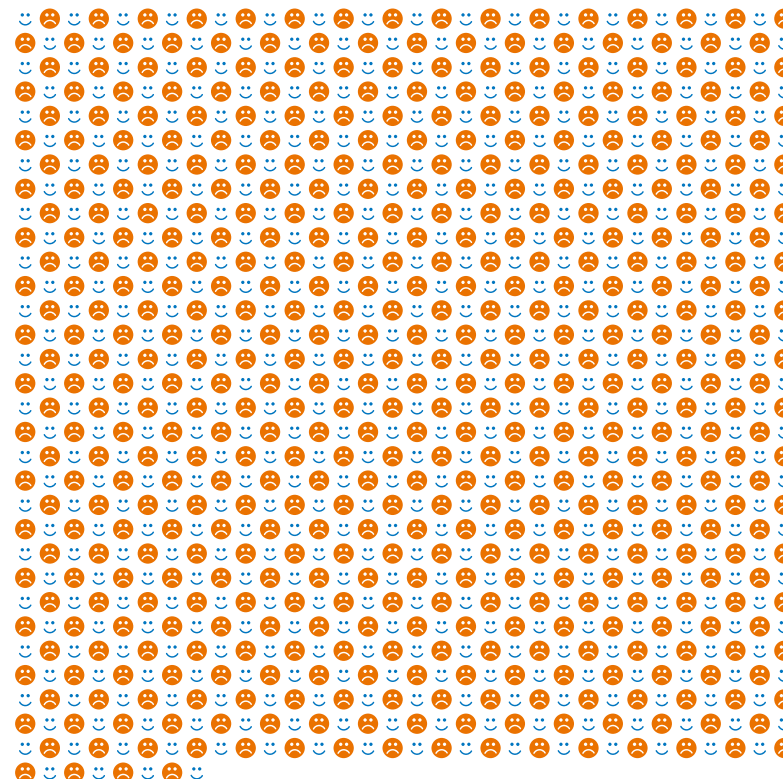
ADHERENCE ISSUES

What happens if I do not treat osteoporosis?

- Your risk of fractures will increase.
- You may have loss of height due to fractures in the vertebrae.
- Spinal fractures may cause a curving deformity of the spine.
- Severe back pain due to vertebral fractures or changes in posture may occur.
- Fractures from osteoporosis may cause temporary or permanent loss of mobility and independence.
- Internal body organs, like the lungs, stomach and intestines may be squeezed for space in the chest and abdomen as the bones in the spine collapse from fractures.

YOUR RISK OF FRACTURE

Out of 1,000 women, 500 will suffer a fracture without treatment for Osteoporosis.



SAFETY**1. Fall prevention:**

- Wear supportive shoes with rubber soles & low heels.
- Have vision & hearing checked often.
- Use hand rails on stairs & escalators.
- Be careful around pets in the home or when walking outdoors.

2. Fall proof your home:

- Remove clutter, cords & throw rugs.
- Keep halls, stairs, and entryways well lit.
- Use night lights in rooms.
- Use nonskid rubber mats near the sink, bathtub and in shower.

3. Follow guidelines for safe movement; avoid movements that put extra stress on the spinal bones:

- Bending forward from waist: sit-ups, abdominal crunches & toe touches.
- Twisting trunk & bending forward.
- Reaching high or far out in front of you.

4. Ask your health care provider if any medicines you take could cause you to feel dizzy or lose balance.

5. Each year 1/3 of all persons over age 65 will fall and many cause broken bones.

6. Knowing how to move, sit and stand properly can help you stay active while avoiding broken bones.

7. People with osteoporosis or who have an increased risk of breaking a bone should avoid the following positions or movements:

- Having a slumped, head-forward posture.
- Twisting the trunk and bending forward when doing activities such as coughing, sneezing, vacuuming or lifting.
- Anything that requires you to reach high or far in front of you. An example is stretching forward to reach into the trunk of your car to get groceries or other items.

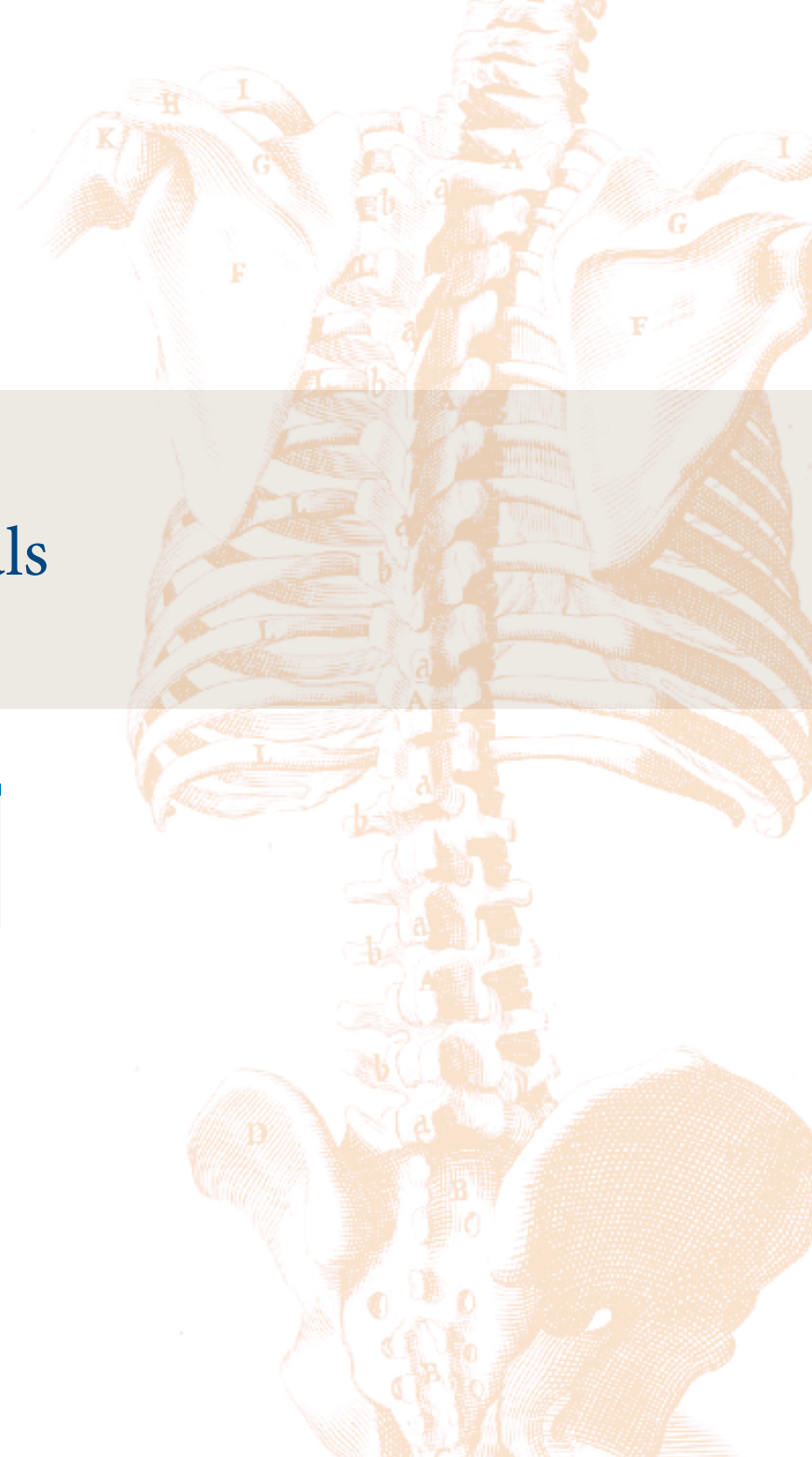
SECTION 12

Participating in Clinical Trials

OBJECTIVE

By the end of Section 12, patients will be able to:

- List possible benefits of participating in clinical trials.



KEY POINTS

- **Clinical trials involve research using human volunteers that are intended to add to medical knowledge.**

Participants receive specific treatments according to the research plan created by the investigators. These treatments may be medical products, such as drugs or devices; procedures; or behavior changes.

- **When a new product or approach is being studied, it is not usually known whether it will be helpful, harmful, or no different than available alternatives (including no treatment).**

The investigators try to determine the safety and efficacy of the treatment by measuring certain outcomes in the participants.

- **Why might you consider participating in a clinical trial?**

- To play a more active role in your own health care.
- To gain access to new research treatments before they are widely available.
- To help others by contributing to medical research.

- **Where can you get more information about clinical trials?**

- www.clinicaltrials.gov
- Your healthcare provider.

SECTION 13

Resources

OBJECTIVE

By the end of Section 13, patients will be able to:

- Relate the NOF website address for more information.



**POINTS TO
EMPHASIZE**

Visit the NOF website at www.nof.org

Join the inspire community! [Click Here](#)

If you want to hear more about Osteoporosis and get informed you can purchase any of the following or more on our website:
<http://nof.org/resources>

