OSTEOPOROSIS AND EXERCISE

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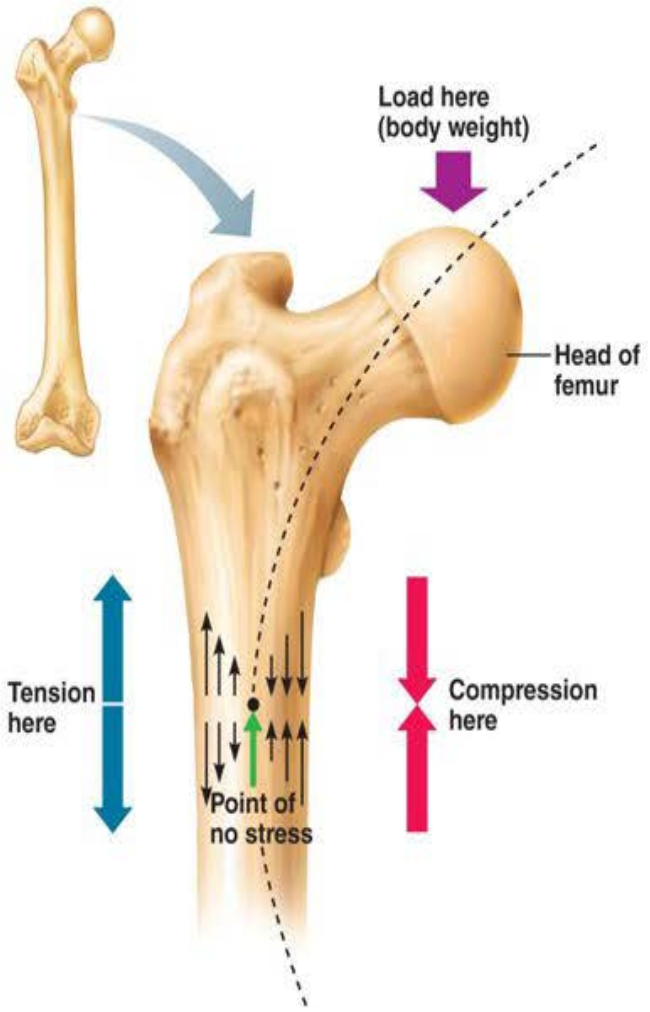
Physiotherapist objectives

- Exercise For Optimal Bone Health In Normal Individuals
- Techniques For Prevention Of Fall In Elderly
- Exercise For Osteoporotic Patients

- **Wolff's law:** A bone grows or remodels in response to forces or demands placed upon it



COMPONENTS AND GUIDELINES

15 MINUTES OF CARDIO, 15 MINUTES OF WEIGHTS, AND AN HOUR OF TALKING MYSELF INTO IT.

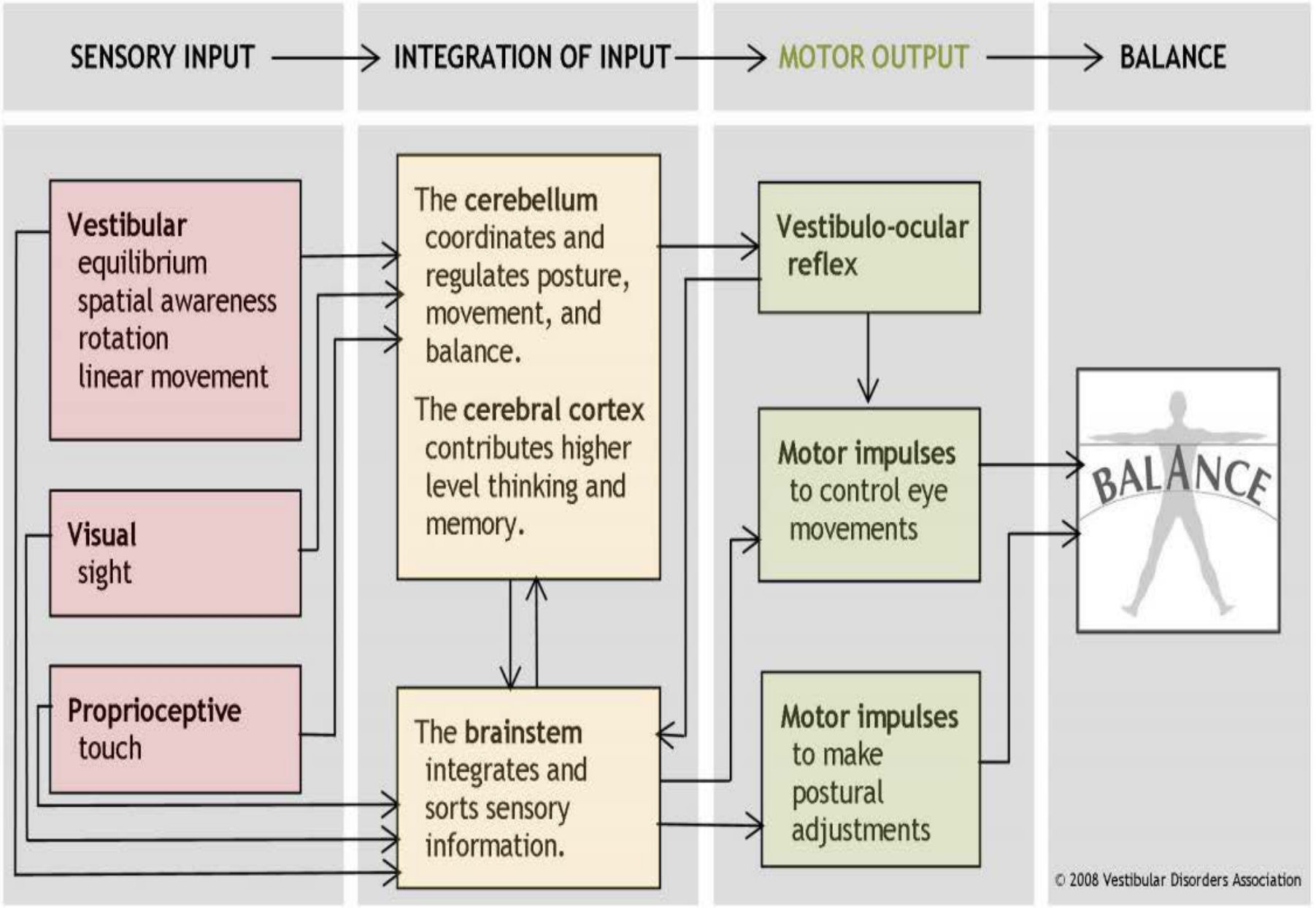
COMPONENTS
Warm up – M/s training – Aerobic/cardio – cool down – stretches

Guide lines	M/S training	Guide lines	Aerobic/Cardio
Intensity	12-15 repetitions	Intensity	55% - 85 % MHR
Frequency	2-3 days/ week	Frequency	5-7 days / week
Volume	1-2 set / major muscle group	Duration	20-60 min
Mode/Muscle Group	10 -11 Major muscle group Machines in start followed by free weights, pulleys	Mode	TM, RB, UB, CT, ELL, ST

FALL

- A fall is an unintentional event that results in the person coming to rest on the ground or another lower level.
- Falls can be described in terms of three phases

1ST PHASE	2ND PHASE	3RD PHASE	4TH PHASE
Displaces the body's center of mass beyond its base of support. extrinsic factors:environmental hazards intrinsic factors :unstable joints, muscle weakness, and unreliable postural reflexes	A failure of the systems for maintaining upright posture. Due to loss of sensory function, impaired central processing, and muscle weakness	An impact of the body on environmental surfaces, usually the floor or ground.	although not part of a fall, concerns the medical, psychological, and health care sequelae of the fall


SENSORY INPUT
INTEGRATION OF INPUT
MOTOR OUTPUT
BALANCE
Vestibular
equilibrium
spatial awareness
rotation
linear movement
Visual
sight
Proprioceptive
touch
The cerebellum coordinates and regulates posture, movement, and balance.
The cerebral cortex contributes higher level thinking and memory.
The brainstem integrates and sorts sensory information.
Vestibulo-ocular reflex
Motor impulses to control eye movements
Motor impulses to make postural adjustments
BALANCE
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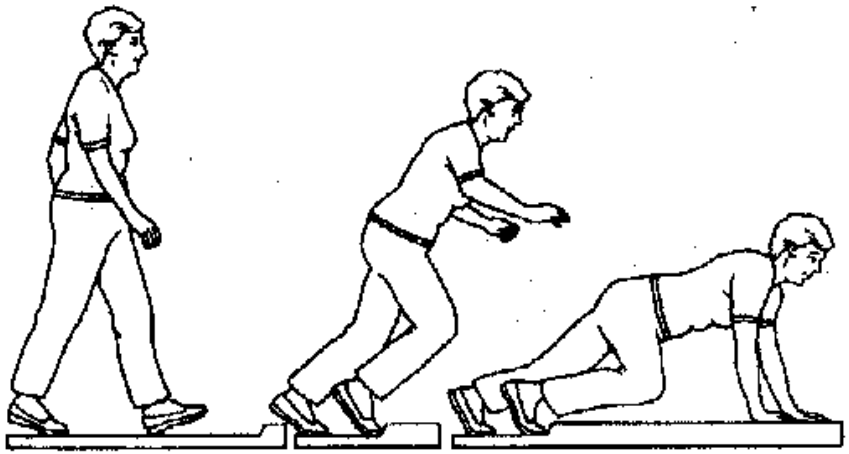
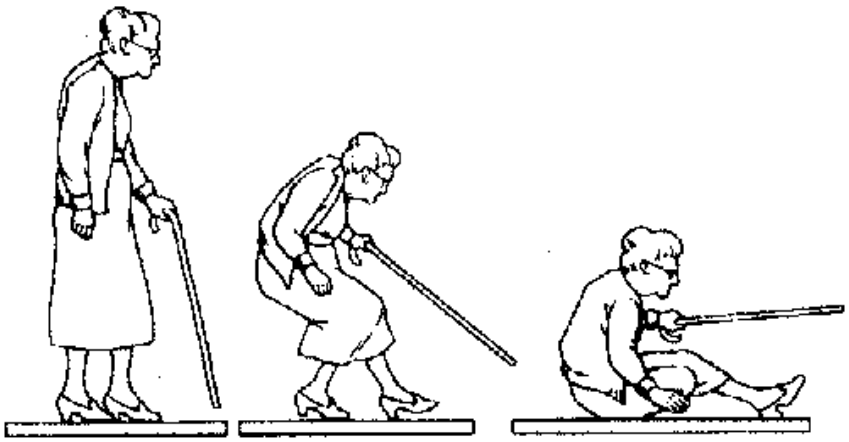
Hip Fracture Prevention: Falling
How do Younger Adults Fall?



*In a younger person, a fall occurring during moderate or brisk walking has enough forward momentum, so that the points of impact are the hands and knees instead of the hip.**

Hip Fracture Prevention: Falling
How do Older Adults Fall?



Older people tend to collapse downwards often landing directly on a hip. A fall occurring while standing still or walking slowly has little forward momentum, therefore the principal point of impact will be near the hip.

GETTING UP *FROM A FALL*

WHAT TO DO IF YOU ARE ALONE

If you are alone when a fall occurs, follow these steps to get up safely and get help.

1. If you are in pain and unable to get up, call for help. If you are not in too much pain, roll to your uninjured side. Rest until you feel strong enough to move.

2. Move on all fours to the nearest form of support, such as a sturdy chair.

3. Bend one knee and use your other foot and arms to brace yourself.

4. Push yourself into a half-standing position and slowly turn yourself around to sit down. Rest until you feel strong enough to call for help.

HOW TO HELP SOMEONE

It is important to let the person get up on his own; you should act only as a guide.

1. Calm the person and let him remain lying down while you check for injuries. Ask him if he can move.

2. If the person can move, gently help him roll onto his side to rest. Place two chairs nearby as shown in the illustration.

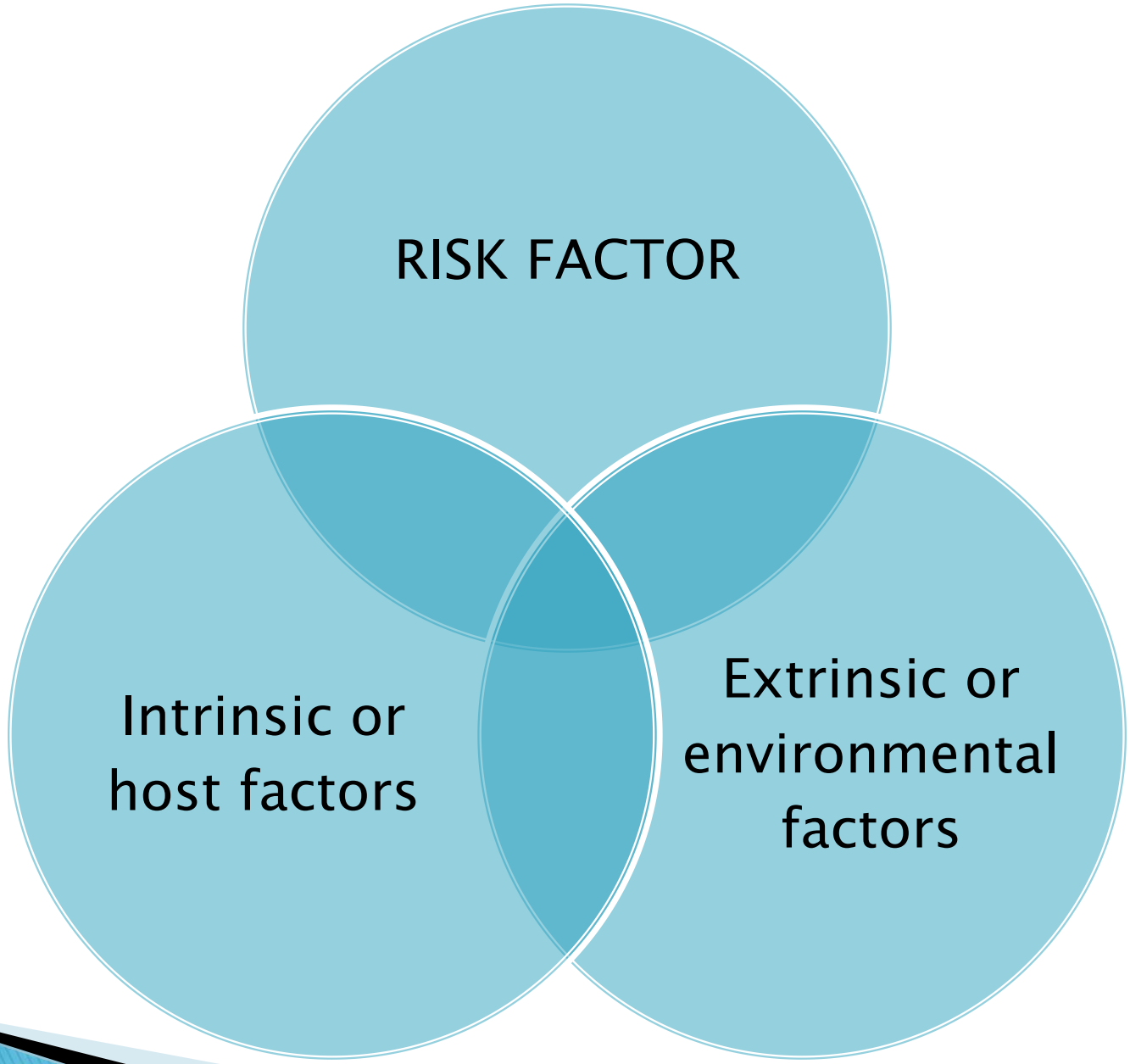
3. Help him move towards the chairs on all fours. Guide the person to prop himself into a kneeling position. Guide him to push himself into a half-standing position and place the second chair behind him.

4. Guide the person to push himself up and sit back on the chair. Do not lift him as undetected injuries may be aggravated.

5. Seek medical help if needed.

Assistive Devices

- Canes and walkers
- seat lift
- Hip protectors


RISK FACTOR
Intrinsic or host factors
Extrinsic or environmental factors

Intrinsic or host factors and Extrinsic or Environmental factors

INTRINSIC FACTORS

- Poor balance
- Weakness
- Foot problems
- Visual impairment
- Cognitive impairment

EXTRINSIC FACTORS

- Poor lighting
- Slippery surface
- Obstacles
- No safety equipment
- Loose carpets
- Polypharmacy

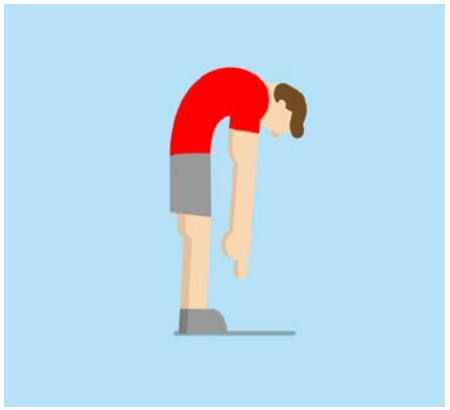
A Comprehensive Approach of Treatment of Falls in Elderly

Deficit/risk factor	*Therapeutic/Preventive strategies*
Postural hypotension	Elevation of head of bed, ankle pumps or hand clenching, pressure stockings
Environmental hazards	Improved lighting, appropriate furniture, protective hip padding, improved floor surface, providing railing on both sides, mark edges of steps with contrasting tape.
Vision deficits	Maximum lighting in home , use of lenses
Impairment of gait	Gait training

Deficit/risk factor	*Therapeutic/Preventive strategies*
Decreased ROM, muscular strength or endurance	Functional activities
Sensory loss	Use of a cane or walking stick
Cervical osteoarthritis, vestibular deficit, parkinsonism	Move kitchen, bedroom and commonly used closet items to shoulder

Deficit/risk factor	*Therapeutic/Preventive strategies*
Dementia	Avoid multitasking
Balance problems	Balance training
Leg length discrepancy	Shoe raise


Balance Training
Single Leg Stand
Body Circles
Knee March
Balancing Wand
Heel to Toe
Stepping
Dynamic Walk
Eye Tracking
Clock Reach
Staggered Stance
Single Limb with Arm



Year	Author	Intervention	Outcome
1996	Kerr et al	Exercise- high intensity and low intensity	intense exercise probably had a positive effect on the femoral neck and in spinal lumbar bone density
2006	Martyn et al	walking	positive effect on the femoral neck
2008	Martyn-St James M	walking	regular walking has no significant effect on preservation of BMD at the spine, whilst significant positive effects at femoral neck are evident. Muscular exercises should be given
2013	Ma D et al	walking	positive effects on femoral neck
2017	Eatemadololama A[1]	Weight training	The result of this research study showed that BMD of long bone improved follow exercise
2017	McMillan et al	Physical activity, weight bearing exercises and resistance training	Physical activity (PA) has potential as a therapy for osteoporosis, yet different modalities of PA have varying influences on bone health.

References:

- 1- Kerr et al., 1996
- 2- Martyn-St James M, Carroll S High-intensity resistance training and postmenopausal bone loss: a meta-analysis.Osteoporos Int. 2006;17(8):1225-40. Epub 2006 Jun 1.
- 3- Martyn-St James M[1], CarrolSone' Meta-analysis of walking for preservation of bone mineral density in postmenopausal women" 2008,Sep;43(3):521-31. doi: 10.1016/j.bone.2008.05.012. Epub 2008 May 26.
- 4-Ma D, Wu L, He ZEffects of walking on the preservation of bone mineral density in perimenopausal and postmenopausal women: a systematic review and meta-analysis. Menopause. 2013 Nov;20(11):1216-26. doi: 10.1097/GME.0000000000000100.
- 5-Eatemadololama A, Karimi MT, Rahnama N, Rasolzadegan MH Resistance exercise training restores bone mineral density in renal transplant recipients.Clin Cases Miner Bone Metab 2017 May-Aug;14(2):157-160. doi10.11138/ccmbm/2017.14.1.157. Epub 2017 Oct 25.
- 6-McMillan LB, Zengin A, Ebeling PR, Scott DPrescribing Physical Activity for the Prevention and Treatment of Osteoporosis in Older Adults.Healthcare (Basel).2017 Nov 6;5(4). pii: E85. doi: 10.3390/healthcare5040085.


Thank You