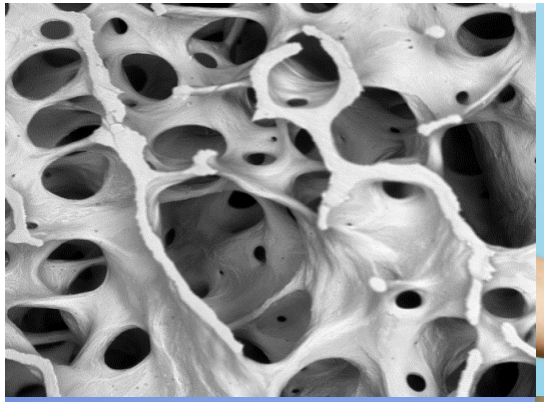




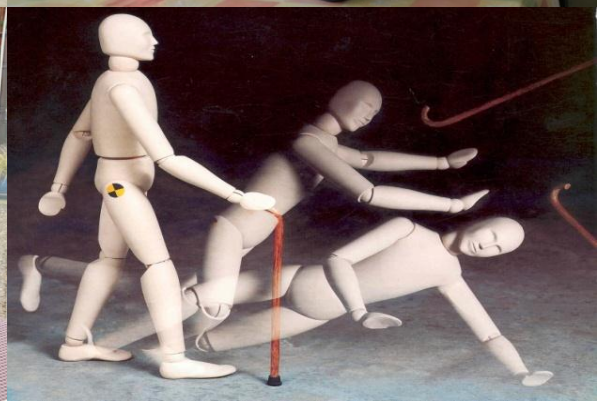

OD Osteoporosis Dorset

prevention through education

Practical Management Of Osteoporosis CONFERENCE 2012

Education Centre, Bournemouth.19 November

The following companies have given funding towards the cost of this meeting but have no input into the agenda or content. Staff from these companies will be present at the meeting and may have a stand promoting their products:

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BONE AND BALANCE EXERCISES

THERESA ROWETT

PHYSIOTHERAPIST

BOURNEMOUTH &POOLE COMMUNITY THERAPY TEAM

Why exercise bone?

Because we know that…..

- **Disuse, prolonged periods of inactivity and unloading of the skeleton promotes reduced bone mass (Holt)**
- **Bed rest induces bone mass decrease in the vertebral spine of approximately 1% a week (Krolner and Toft 1983)**
- **Space flight reduces normal gravitational loads from bones and creates more extreme disuse than bed rest**

When ? How? What Exercise?

Exercise in our early life is very important particularly just before our pre adolescence years to early adulthood (11- 25). This is known as the window of opportunity in maximising bone structure

The CMO recommends (2011) that children should have 60 minutes daily of moderate intensity activity

Sports such as gymnastics, racket sports, volley/basketball, football, dance and are ideal as they provide

- unusual strain distribution
- high strain
- high strain rate
- intermittent dynamic loading

and these are the most osteogenic (Lanyon)

And into Adulthood...

For Adults CMO recommends 30 minutes of moderate-intensity physical activity * > 5 days a week.. Also muscle training at least 2 days a week

*** could include playing sport, high impact aerobic, dance classes, brisk walking, jogging, skipping and jumping**

During this period of our lives we are wanting to preserve bone mass

Older Adults (> 65) CMO recommends 30 minutes of moderate- intensity physical activity >5 days a week..

+

Muscle training at least 2 days a week

+

Balance and co-ordination at least 2 days a week. Avoid being sedentary for extended periods

During this period of our lives we are wanting to maintain bone mass and prevent falls.

What is the best type of exercise to do to improve our bone health?

- **Bone loading : weight bearing endurance and strengthening activities**

- **Intensity : moderate to high bone loading forces which should be progressive. Starting at a low level and building up in increments.**

- **Frequency :Weight bearing endurance activities 3-5 times a week**

  : Resistance exercise 2-3 a week

- **Time : 30 to 60 minutes combination of weight bearing endurance and resistance exercises targeting fracture sites (Kohrt et al)**

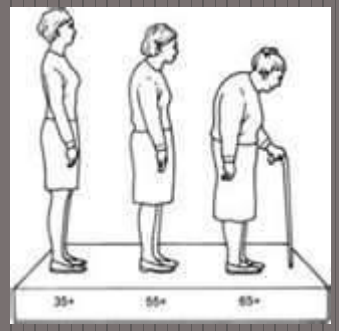
Martyn St James and Carroll 2009

Impact exercise on post menopausal bone loss

- **Jogging mixed with walking and stair climbing and impact exercise with high magnitude resistance exercises were effective at lumbar spine and femoral neck BMD**
- **High impact only were ineffective in increasing BMD at any site**

Osteoporosis : presentation

- Fragility fracture ●Hip (70,000 per annum)
  ● Wrist (50,000 per annum)
  ●Spine (120,000 per annum half of which go unnoticed and asymptomatic)
- Loss of height
- Increased thoracic kyphosis
- Back or neck pain
- Rib pain
- SOB
- Protuberant abdomen
- Hiatus hernia



What exercise do we recommend for people diagnosed with Osteoporosis/Osteopaenia?

- Ideally patients should have a Dexa scan so the severity of the disease is known so an appropriate exercise programme is devised
- A diagnosis of Osteoporosis does not mean stop exercising in fact quite the reverse
- There is no one-size-fits-all prescription in terms of exercise

As a rough guide exercise prescription can be divided into 2 categories

Low risk of #

Higher risk of # and may have had a fragility # in the past

Exercises for people at LOW risk of fracture

Aims of Exercise

- To maintain /strengthen Bone
- To reduce the risk of fracture

Best type of exercises

Progressive resistance Exercise e.g.

In the gym/home targeting

1)Hips
2)Wrists
3)Spine
X3 a week
85% of 1RM
8 reps x3, x 2-3pw
and
<u>progress</u>

Mixed weight – bearing endurance exercise classes e.g.

Exercise to music/aerobic class

These provide weight bearing movement in different directions and bouts of high impact activity

x3-5pw

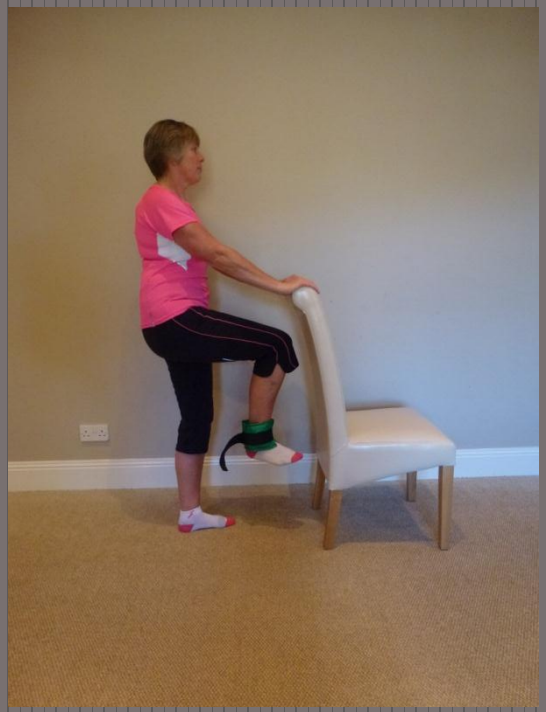
Jumping/Skipping/Jogging

- Great high impact activities/endurance activities
- Jogging can be interspersed with walking and stair climbing as a good way to load hips and spine
- Take into account previous fitness level and any arthritis of spine, hip and knee joints before recommendation

Resistance Exercise Targeting the Hip

Progressive hip resistance training using Theraband

Hip flexor & abductor strengthening and hip bone loading using weights



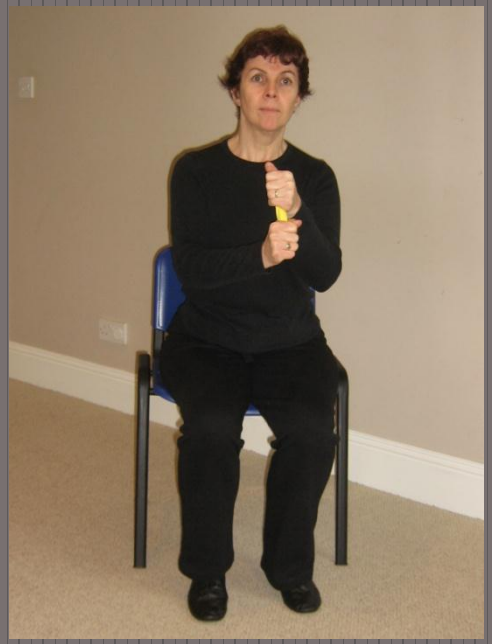
Hip Adduction resistance training

Hip abduction with progression in side lying

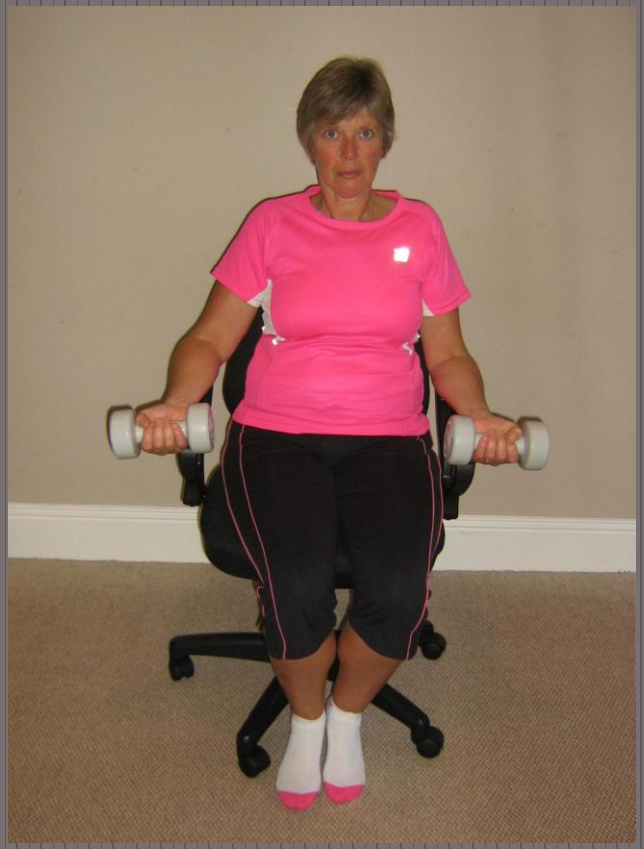
Targeting the Wrist and Upper limb

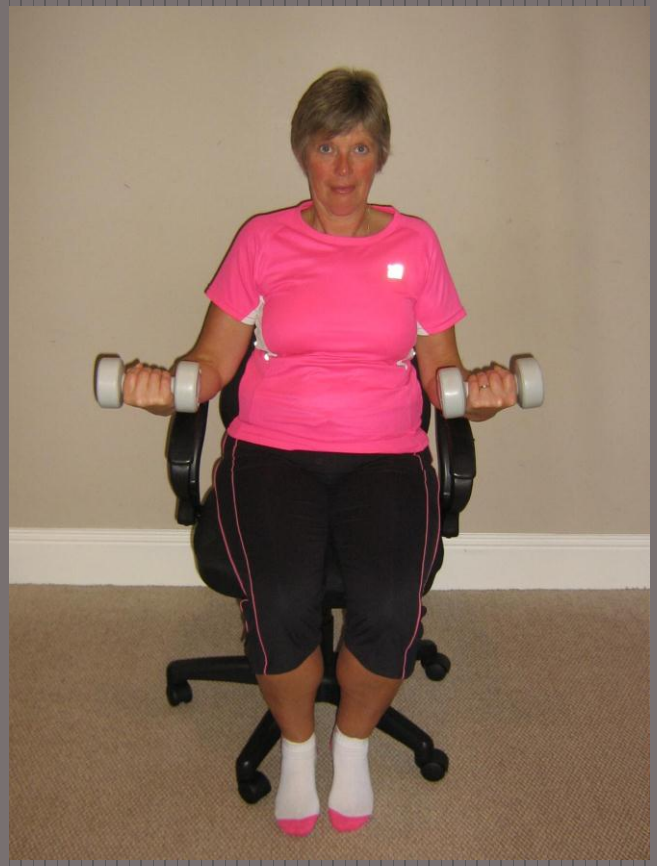
Resistance Training for the Wrist

Targeting the wrist using Theraband

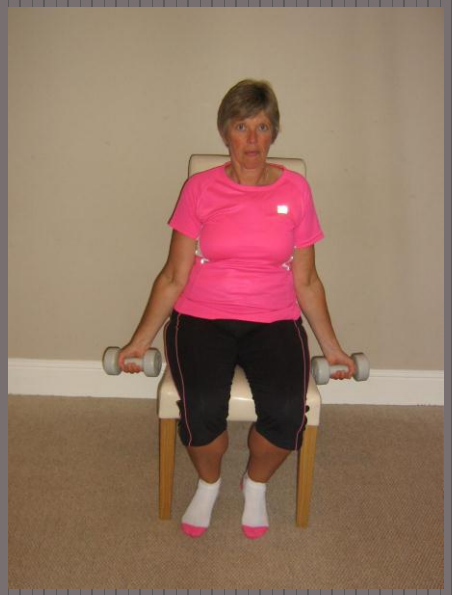


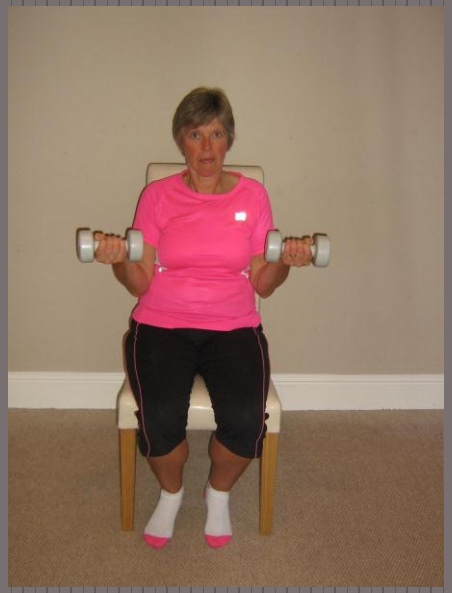
Weight resistance targeting the wrists





Resistance exercises to strengthen upper arm





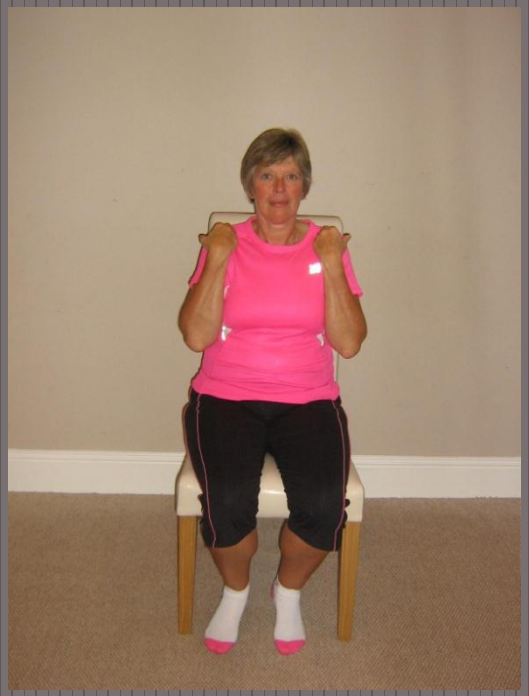
Bone loading through weight bearing

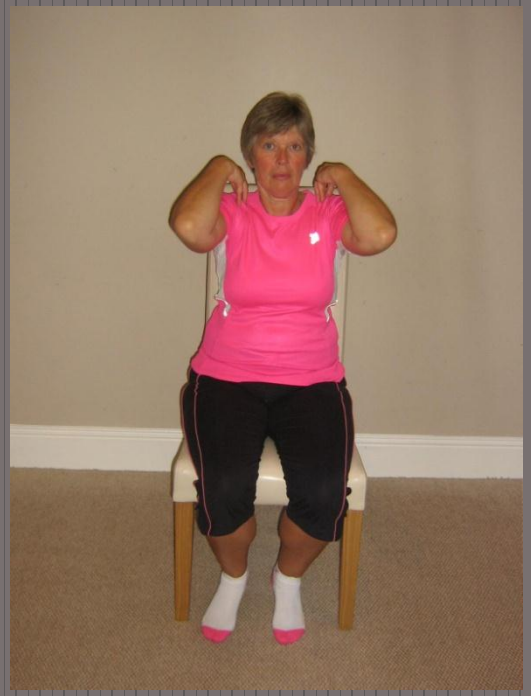
Bone loading through upper limbs

Bone loading and balance

Targeting the Spine

Scapula Retraction/Chest Stretch

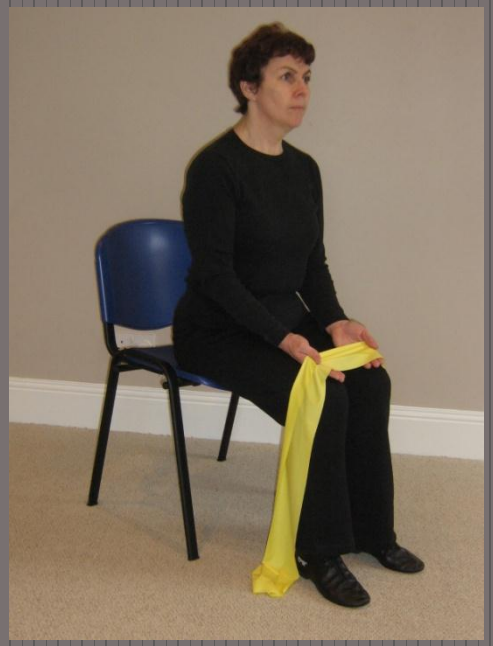




Upper back extension

Back Extension progression

Back Extension with Hip extension



Exercises for people at higher risk of # and have broken bones in the past

Activities and Exercises to AVOID

- High impact exercises : running, jumping, skipping, high impact exercise classes
- Exercises with quick turn of movement

Unsupported forward flexion may be risky for those with previous spinal fractures..(Sinaki&Mickelson 1982)

Type of exercise	Recurrence of Fracture
Back extension	16%
Flexion (abdominal curls	89%
Combined	53%
No exercise	67%

Types of exercise to avoid # with vertebral spine osteoporosis

- Undue compressive strain on the spine
  - spinal flexion
  - spinal rotation, especially with loading
- High risk movement patterns
- High impact work
- High intensity training at the outset

Specific exercises to avoid with diagnosis of vertebral osteoporosis

- Supine abdominal curls
- Resisted backwards rowing
- Double leg extensions
- Rowing machines

Aims of exercise

- Fracture prevention
- Improving bone health
- Reducing the risk of falls
- Improve posture
- Optimise function
- Improve confidence and coping
- Improve general health and well being

Exercise Components

- Weight-bearing/ low impact
- Resistance/ strengthening
- Posture
- Balance
- Flexibility
- Functional activities
- Coordination
- CV/ Endurance

WHY THE OTAGO ?

- Designed specifically to prevent falls
- Was developed and tested in 4 controlled trials in University of Otago in New Zealand
- The exercise programme was effective in reducing falls by 35% and the number of injuries sustained from falls
- The RCP audit falls and bone health and keen advocates of the OTAGO/FAME programmes and HA are audited on its usage

WHAT IS THE OTAGO PROGRAMME?

An exercise programme consisting of

1) Warm up flexibility exercises (5)
2) Progressive lower limb strengthening exercises using weights (3)
3) Balance retraining exercises (12)
4) Functional exercises (2)
5) Walking component

Warm up :Bone loading with weight bearing incorporating co ordination, dynamic balance and endurance.

- Marching with progressions
- Side stepping with progressions
- Heel taps and toe taps forwards /backwards/ sideways
- Stepping forwards/backwards/ wide and narrow

Flexibility Exercises

Quadriceps strengthening using ankle cuff weights

Quadriceps strengthening using Theraband

Hip abduction strengthening using weights

Hamstring Strengthening

We learn to balance as young toddlers and this is achieved by falling....learning the hard way ! As children we are forever challenging our balance and as a consequence it improves

Balance Exercises

- Performed with good posture
- Safe stable location
- Gradually progressed by reducing upper limb support

Balance and strengthening the ankles

Balance Exercises in a class

Gentle squats

Sideways stepping

Tandem Walk

Balance Exercises at Home

One legged stand

Gentle Squats

Tandem Stand

Exercises Advanced Dynamic Balance

Heel Walking

Tandem Walking

Toe Walking

Functional Exercises

Sitting to Standing

Stair climbing

Single step practice

Circuit Session

Walking over uneven surface

Hoopla!

Stride length variation

Coordination, Balance, Reaction speed and FUN

Interesting Research

- Brisk walking in the prevention of postmenopausal osteoporosis

- Femoral neck BMD had fallen in the placebo group to a greater extent

- Relative falls risk higher in walking group 1:2

- # > In brisk walking group (Ebrahim 1997)

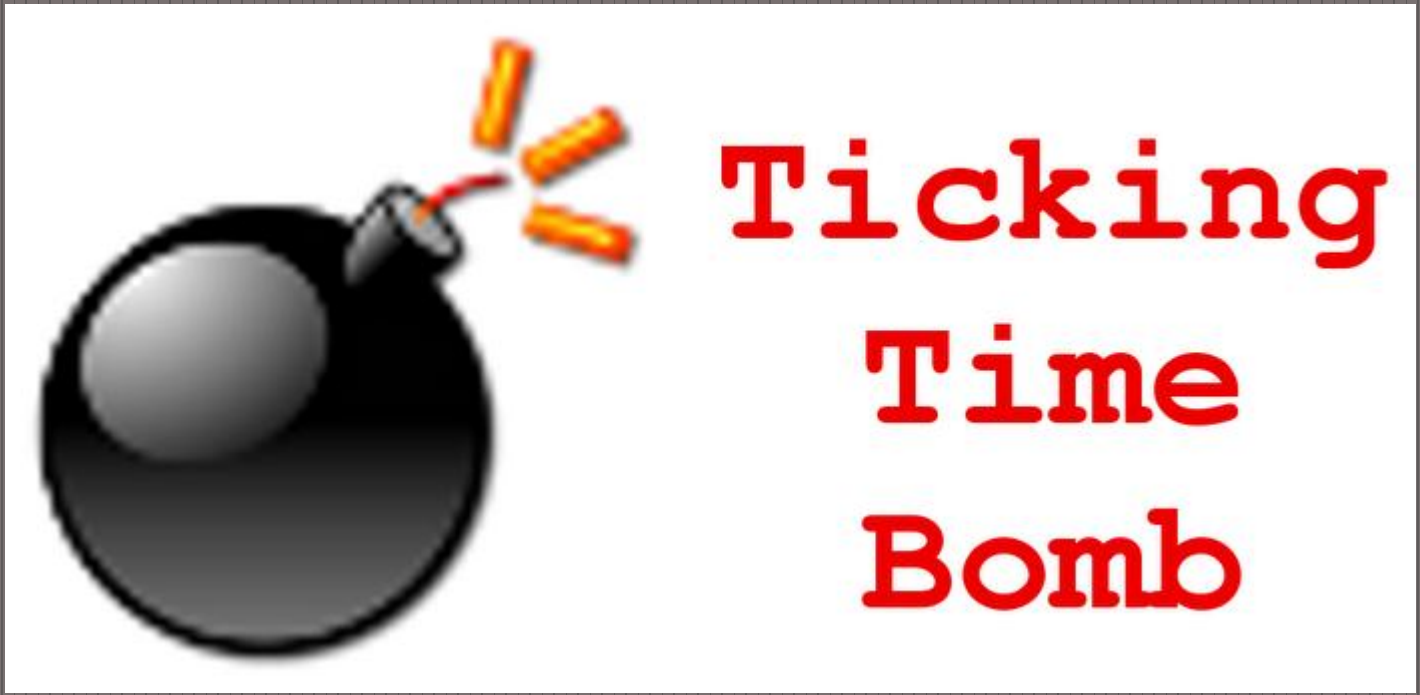
Interesting Research

- 3 minutes standing on one leg daily
- Reduced falls rate but not hip fractures
- Significantly increased hip BMD
- Force on hip equivalent to 54 minute walk!! (Sakamoto 2006)

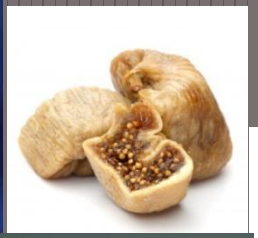
Whole Body vibration Therapy : The current verdict

Most research methodologically was weak-interpret with caution

ACT NOW
TO STOP THE





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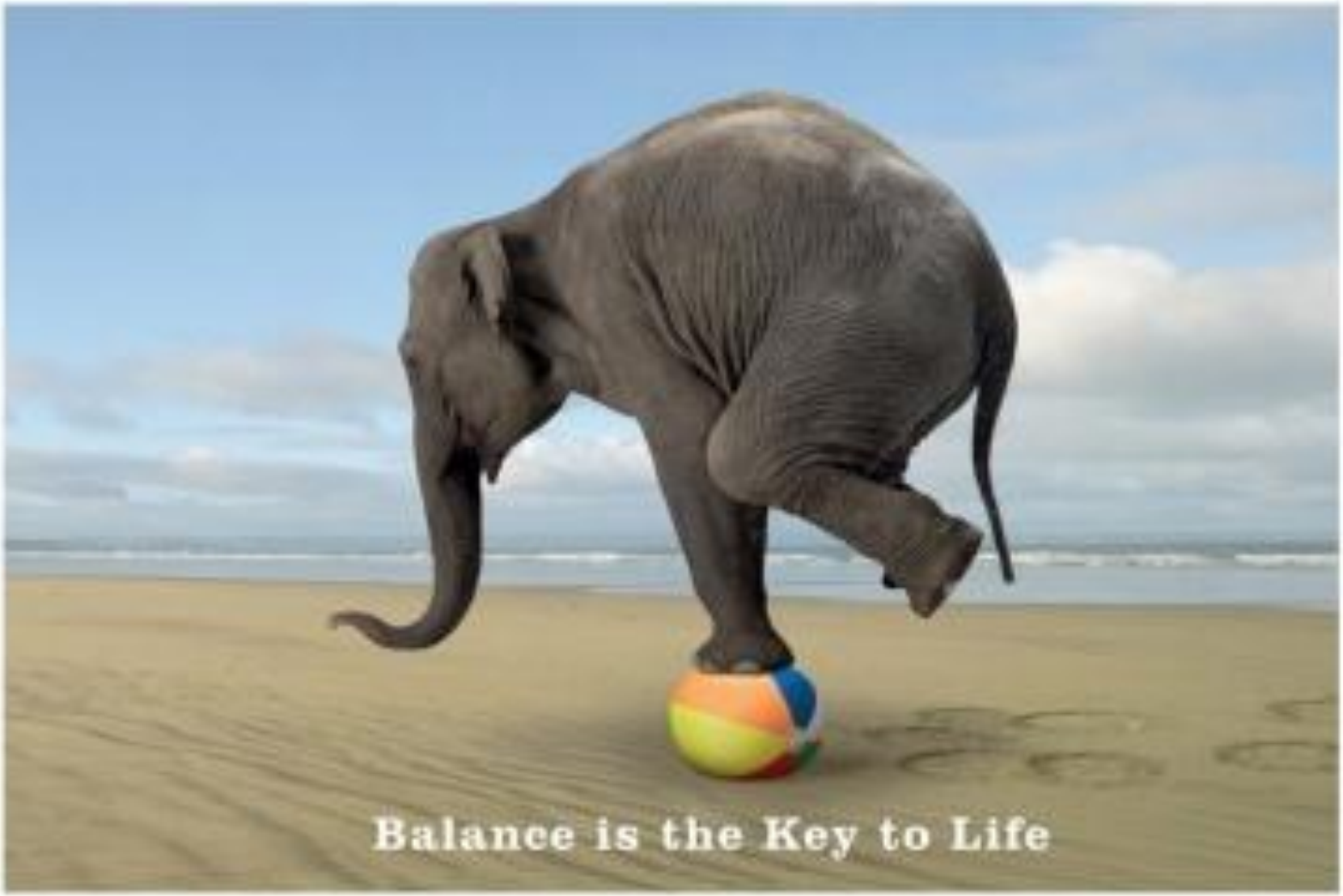
Balance is the Key to Life