

# Balance:

## Maintaining equilibrium

*Text: Guillaume Malan - Biokineticist, Institute for Sport Research, UP*

As human beings we carry the majority of our body weight fairly high off the ground compared to some of our four-footed friends. This means we have a very high center of gravity, and being bipeds, we have a small base of support for our tall structure. This is where balance becomes essential, the ability to have our postures in equilibrium with our base of support (Prentice 2004).

Normally our balance is maintained seamlessly through our daily lives and physical activity; a careful interplay between our sensory inputs and our muscular control. This occurs largely unconsciously and it is only when we try to purposefully improve this skill or try to regain it after injury that we realize the complexity of the task.

Statistics from the United States show that 50% of persons living in nursing homes fall annually, with 11% of them sustaining injuries. (Clark and Kraemer 2009)

The mere fear of falling can already be a restriction in the lives of those suffering from poor balance, a fear that is not always preceded by an actual fall. Physical training can increase one's balance confidence and improve physical capabilities. (Liu-Ambrosea, Khana et al. 2004) Remember that a stronger body is better able to maintain balance than a weaker one, so be sure to do strengthening exercise for your legs and hips such as a sit-to-stand from a chair. The more you are able to do this consecutively and without losing control, the less chance you have to lose your balance.

### Normally our balance works as follows:

#### Step 1:

Our inner-ear, vision and joint senses supply information to our Central Nervous System (CNS) about our body's current position.

#### Step 2:

Our CNS processes these inputs and sends the signal back towards the muscles.

#### Step 3:

The body then responds with co-ordinated and very precisely timed muscular activation to counteract any shifting of our center of gravity.

Now if we for any reason can not accurately sense our center of gravity relative to our base of support, or if we are unable to automatically respond effectively with appropriate muscular contraction, we are likely to fall (Houghlum 2001).

Many factors can affect our balance: muscle strength, joint range of motion, lack of co-ordination, disease, loss of sight and so forth.

Many of these are associated with aging, making the problem of maintaining balance more problematic for the elderly, with a fear of falling being potentially disabling (Liu-Ambrosea, Khana et al. 2004).

Fortunately this is a skill which does respond to training and can well be improved with a little diligence (Laessoe, Hoeck et al. 2007).



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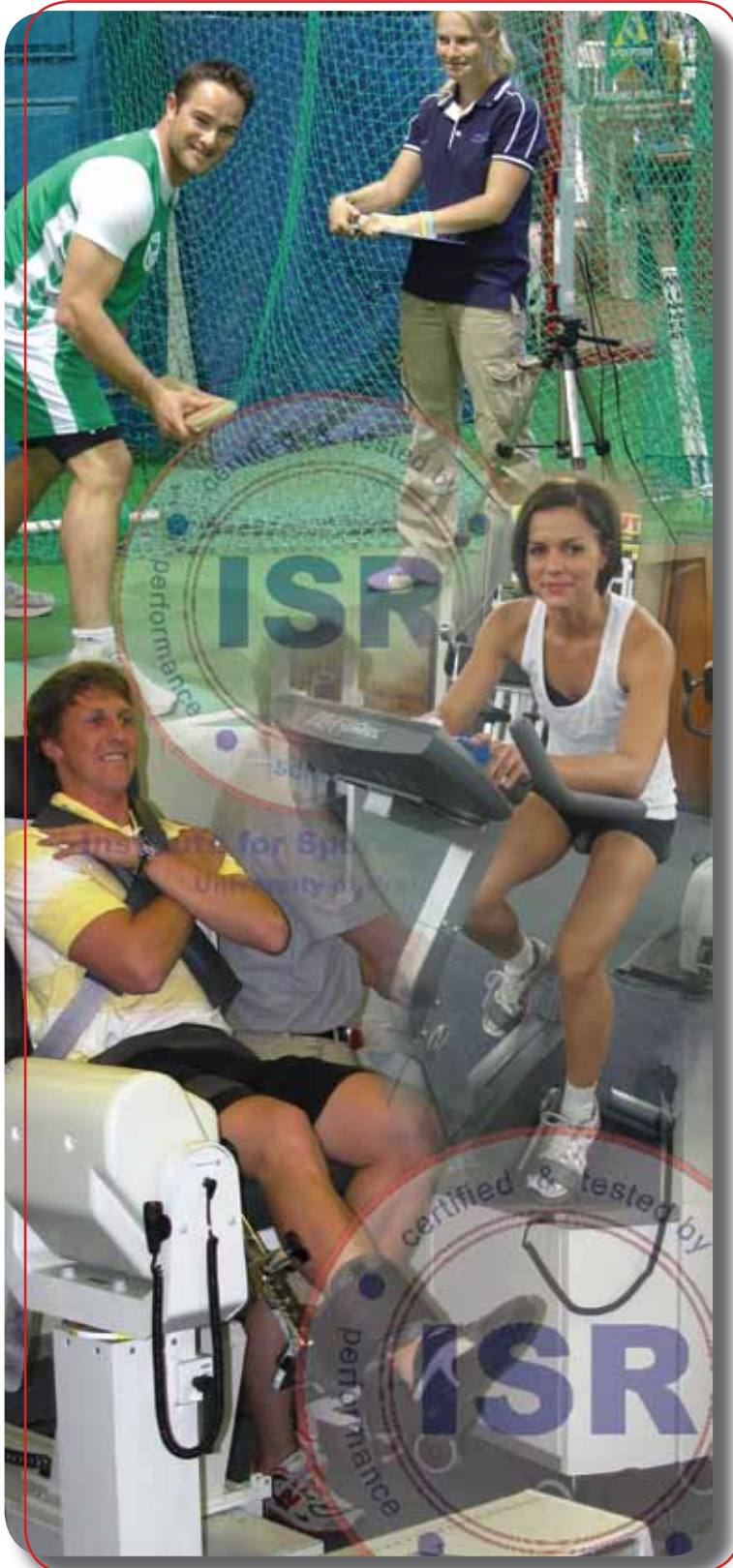
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**Training to improve balance.**

Balance is affected by the following training variables:

**Base of support**

(e.g. smaller base would be standing on one leg instead of two, or an unstable base of support such as standing on a foam pillow or BOSU ball)

**Sensory input**

(e.g. performing the drill with eyes closed to reduce input, or with joint support to enhance proprioception)

**Static vs. Dynamic exercise**

(e.g. merely holding balance in place, or while throwing medicine balls from that same position)

**Speed of execution**

(Slowly and carefully performing a movement may require more balance than merely relying on momentum to carry you through the motion)

You can improve your own balance by following the sequence below, one item at a time. Remember, start from the first item and **do not** go on to the next item unless you have mastered the previous:

- 1** Stand barefoot, feet touching, for 30 seconds. (remain barefoot for all the challenges)
- 2** Repeat the above challenge with eyes closed.
- 3** Stand with feet aligned, so heel of left foot is in front of toes of right foot – 30 seconds, eyes open.
- 4** Now close your eyes and stand again for 30 seconds.
- 5** Do a single leg stand with your eyes open. Hold for 30 seconds.
- 6** Do a single leg stand with your eyes closed. Hold for 30 seconds.
- 7** Single leg stand on BOSU / thick foam pillow for 30 seconds.
- 8** Repeat with eyes closed.
- 9** Perform 10 single leg half squats, slowly, on a BOSU with eyes open.
- 10** Repeat with closed eyes.
- 11** If still too easy, find an exercise ball and attempt balancing on all fours.
- 12** Repeat with eyes closed.
- 13** Finally, try standing on the ball.





Always keep your knee aligned with your foot, and your body position must be upright and stable.

Be warned that attempting balancing on a skill level that is too great can lead to injury. Always have proper supervision and a safe, obstacle free environment with adequate fall protection.

When you find a level which is challenging but do-able then perform 3 sets of 1 min every day.

Through advancements in technology, machines have been created which can measure your ability to balance (as well as your risk for falling) and indeed help you to effectively improve your static and dynamic balance ability. One such device is the Balance SD system produced by Biodex, which features a force plate that can be set to be static as well as wobbly for those with greater balance.

A biokineticist can help you evaluate your balance and your risk for falling, through either measurement with devices such as the above or through functional tests. Should you suspect that your balance is less than optimal, make an appointment today for an evaluation 🌈

#### References

Clark, R. and T. Kraemer (2009). "Clinical Use of Nintendo Wii™ Bowling Simulation to Decrease Fall Risk in an Elderly Resident of a Nursing Home: A Case Report." *Journal of Geriatric Physical Therapy* 32(4): 174 - 180. Houghlum, P. (2001). Therapeutic exercise for musculoskeletal injuries, *Human Kinetics*.  
 Laessoe, U., H. Hoeck, et al. (2007). "Fall risk in an active elderly population – can it be assessed?" *Journal of Negative Results in BioMedicine* 6(2): 11.  
 Liu-Ambrosea, T., K. Khana, et al. (2004). "Balance Confidence Improves with Resistance or Agility Training." *Gerontology* 50: 9. Prentice, W. (2004). *Rehabilitation techniques for Sports Medicine and Athletic Training*, McGraw Hill.