

Should we K.I.S.S.

Oliver Scott

Why we are here today

- **With the possible exception of diet, we know of no single intervention with greater promise than physical exercise to reduce the risk of virtually all chronic diseases simultaneously**

Booth et al JAP 2000

- It has influences as wide as:
 - Obesity, cardiovascular disease, diabetes, osteoporosis and most cancers
 - Gene expression- lipid metabolism, glucose transport as well as pro and anti inflammation post exercise
 - Depression, Parkinson's disease, Dementia and ischemic stroke

Why we train the way we do?

- **So we all agree that exercise is important!**
 - Which type of exercises
 - What are trying to achieve?
 - Is intensity important?
- **Why don't we challenge the way we train?**
 - What activity do you currently prescribe?
 - Know your **why** when you choose an activity!
 - Do your activities best suit the population?

Neural Plasticity

- Brain Derived Neurotrophic Factor (BDNF)
 - Is a protein encoded with the BDNF gene.
 - It acts on neurons of the CNS and the PNS
 - It is active in the hippocampus, cortex and basal forebrain
 - Vital for learning, memory and higher thinking Trends Neuroscience 2002 25 295-301
- Exercise activates molecular and cellular cascades that support and maintain brain plasticity
 - Expression of BDNF
 - Brain vascularisation
 - Neurogenesis
 - Neuronal resistance to injury Trends Neuroscience 2002 25 295-301

Neural Plasticity

- Exercise driven changes in peripheral factors such as increased neuronal activity, neurotransmitters (Ach) and IGF-1 control hippocampal BDNF

Trends Neuroscience 2002 25 295-301

- Learning, which is a higher order brain plasticity increases BDNF and BDNF facilitates learning!

Trends Neuroscience 2002 25 295-301

- Exercise and behavioural stimulation can maintain or improve brain plasticity
 - Games, complex movements and new movements will assist this process

Cerebellum

- **Cerebellum may be involved in placing movement in a wider context including coordination between movements on each side of the body**
- Controls ipsilateral and contralateral limb movement
- Dynamic interplay between joint torques requires significant cerebellum involvement to produce smooth movement
- Integrates visual, proprioceptive and vestibular feedback

Cerebellum

Movement choice can matter!

- **Complex whole body movements**
 - Movement should cross the midline of the body
 - Stimulates the cerebellum fully

Knowledge base

- **Table top anatomy**

- Mostly from cadaver research in the 1930's
- Bodies were electrically stimulated & observed
- **The results are very factual, but how relevant for a standing three dimensional capable body responding to and producing force?**

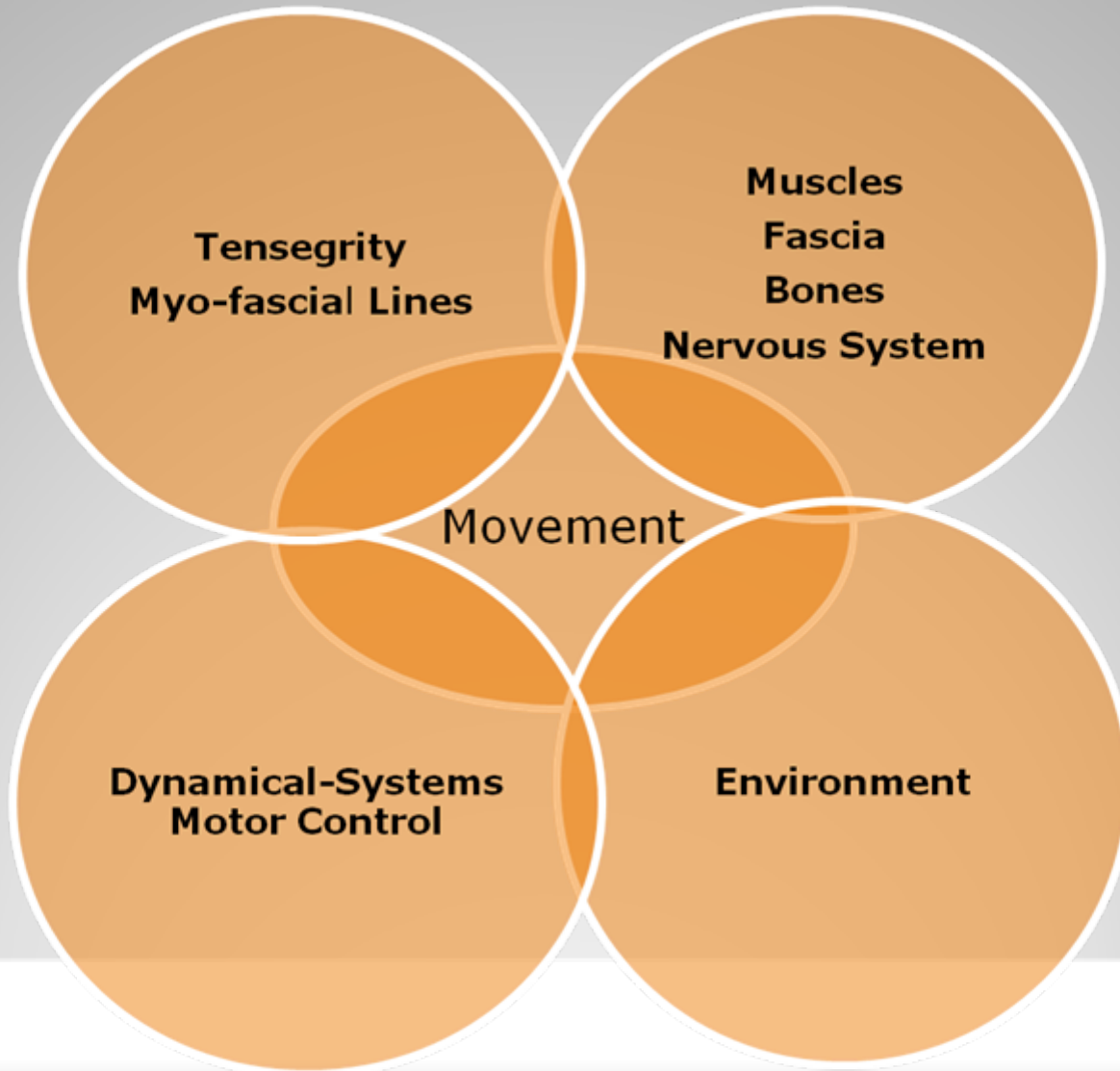
- **Further evidence**

- Polo epidemic in 1950's drove live testing
- Allowing muscle isolation to determine which muscles were involved in movement

Body building or function exercises?

- Body building exercises are still the dominate types of resistance training exercise
 - **How many body builders do we train?**
 - Why are we not choosing mainly functional exercises that promote **power** and strength that is most affected by aging?
- Journal of Gerontology 2000 55A192-198
- What are the common goals of people we prescribe exercise to?

The integrated body



Integration & the kinetic chain

- Integration of the systems into a training method
 - Kinetic chain uses a multi-link system to dissipate & produce **forces** across segments and joints
 - **Train the whole body!**
- **What forces?**
 - Gravity
 - Momentum
 - Ground reaction forces
 - Itself

Functional Anatomy-Integration of muscles



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- The Soleus
- Only a single joint ankle plantar flexor?
- “accelerates the knee into extension **twice as much** as it acts to accelerate the ankle in extension for positions near upright posture” (Zajac & Gordon, 1989)

Functional training

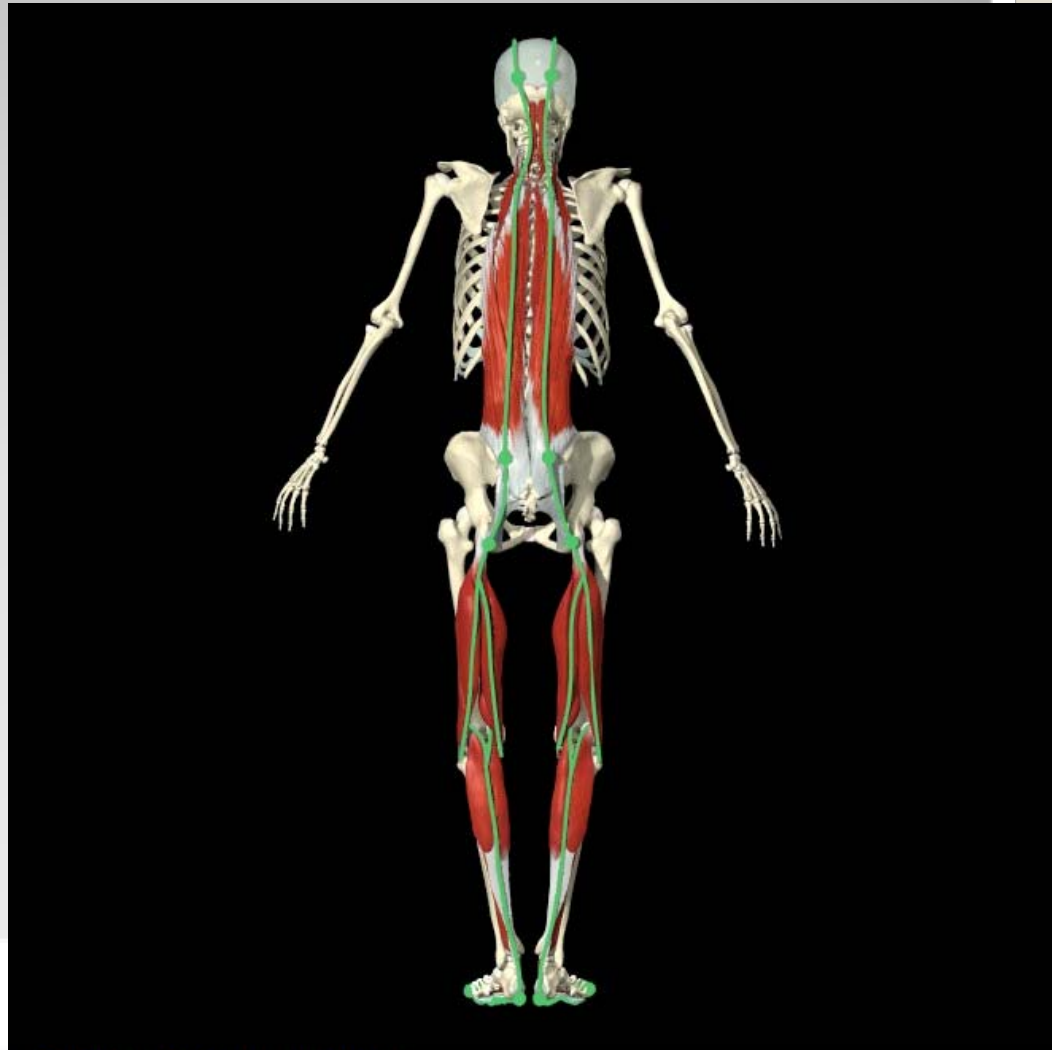
- **How do you know if exercises are functional?**
 - Tri-planar
 - Integrated
 - Proper Gravity orientation
 - Proprioceptively enriched
 - Stabilization – static vs. dynamic
(Gray, Tiberio, 2004)

Loading structures

- Human movement will normally follow eccentric to concentric contraction coupling (stretch shortening cycle)
 - Movements that break this cycle will normally not be as efficient or produce as much force
- We can override this produce any type of contraction
- Most of the exercise we prescribe should follow this format
 - Reduced blood pressure
 - Injuries due to large load on structures and joints
 - Replicates real world movement

Superficial Back Line

- Flexor Digitorum Brevis
- Gastrocnemius
- Hamstrings
- Sacrotuberous Ligament
- Erector Spinae
- Scalp Fascia



Rope Cable Saw

Superficial Front Line

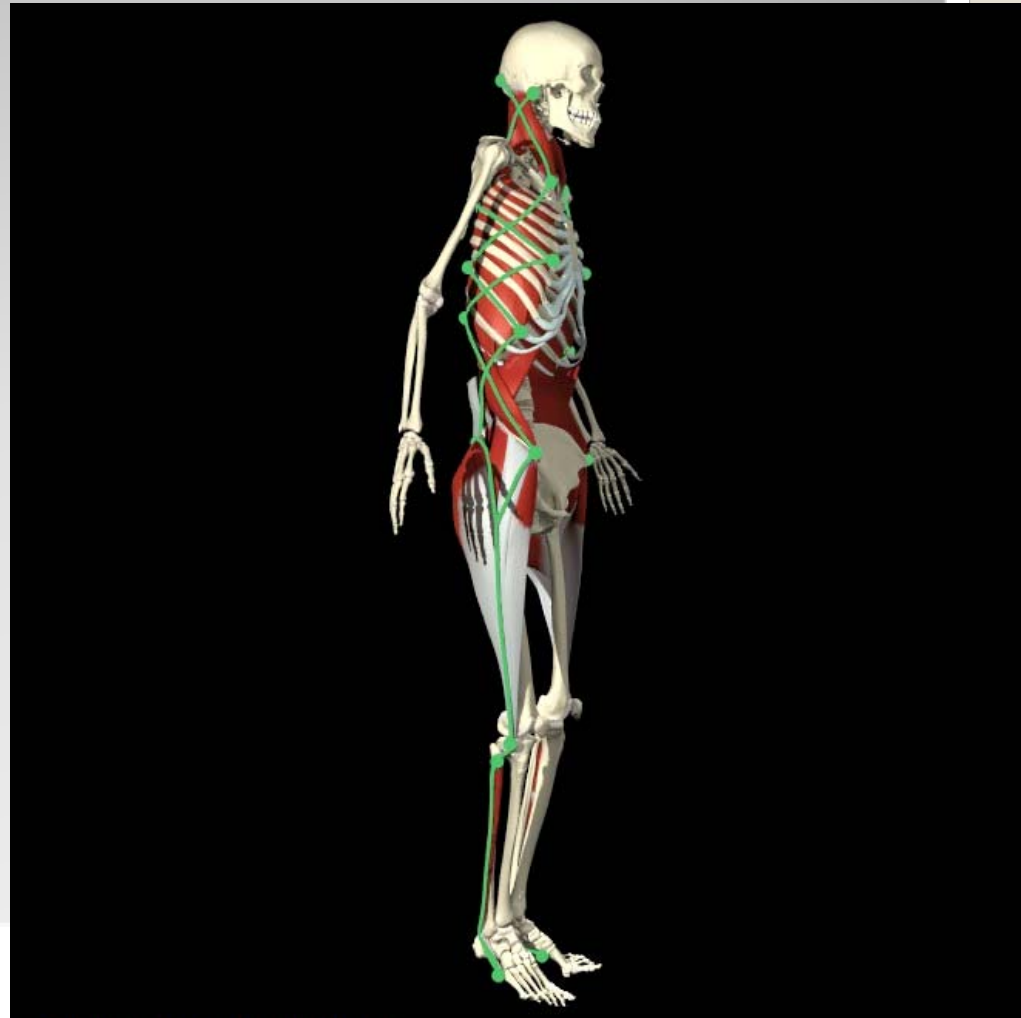
- Extensor Digitorum Longus and Brevis
- Tibialis Anterior
- Patellar Tendon
- Quadriceps (including the Rectus Femoris)
- Rectus Abdominis
- Sternalis
- Sternocleidomastoid



Multi-Directional Punching

Lateral Line

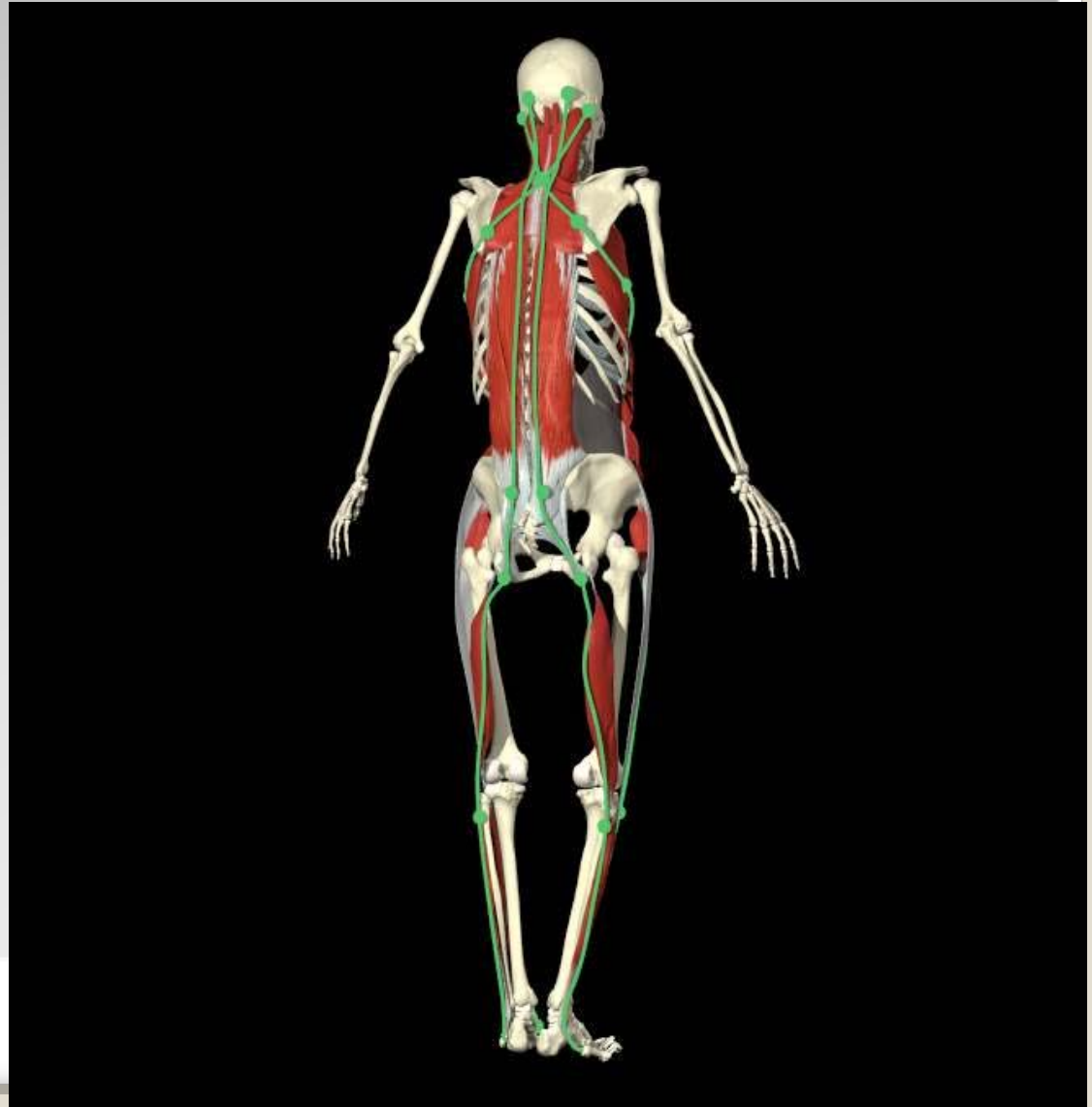
- Peroneus Longus and Brevis
- Anterior Ligament of the Fibular Head
- It-Band, TFL, Glute Max.
- Lateral Abdominal
- External and Internal intercostals
- Splenius Capitis and Sternocleidomastoid



2D uppercut

Spiral Line

- Tibialis anterior
- Peroneus longus
- **Posterior**
- Biceps femoris S/L head
- Sacrotuberous ligament
- Spinae erectors



Spiral Line

- Tibialis anterior
- Peroneus longus
- **Anterior**
- ITB
- Tensor fascia latae
- Internal oblique
- Rectus sheath
- External oblique
- Serratus anterior
- Rhomboids
- Spenius capitus



Y-T-W-L

Games

- **Make it fun**
- **Disassociate exercise with discomfort and boredom**
- Promote stronger group cohesion
- Up-regulate the nervous system
- Increase blood flow

Are machines the enemy?

- **Exercise equipment**
 - machines should we use them?
 - Much of the research that exercise programming is based on are machine/isolation movement
 - **Are they good or bad?**
- **Would free weights, cable resistance, body weight exercises or games be a better choice?**

Questions?

Thank you for having me
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