

# Harmonic technique

Prof. Eyal Lederman DO PhD

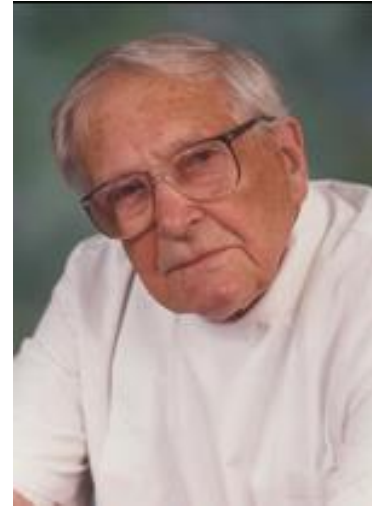
# Brief history of harmonics



Andrew Taylor Still



John Martin Littlejohn



John Wernham

# Definition of Harmonic Technique

A manual technique which brings on a state of resonance within the body

# Mechanics of harmonics

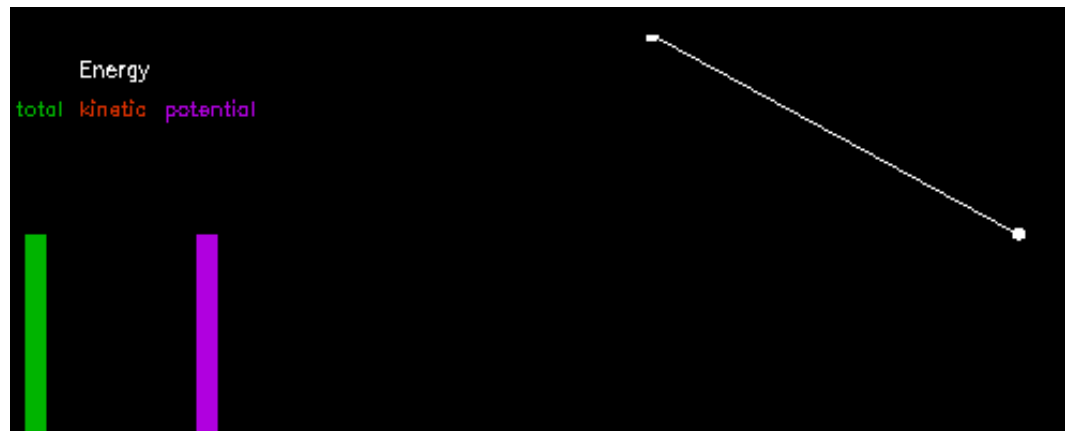
## Pendulums



## Springs



# Pendulum - energy

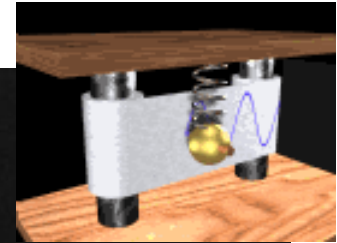
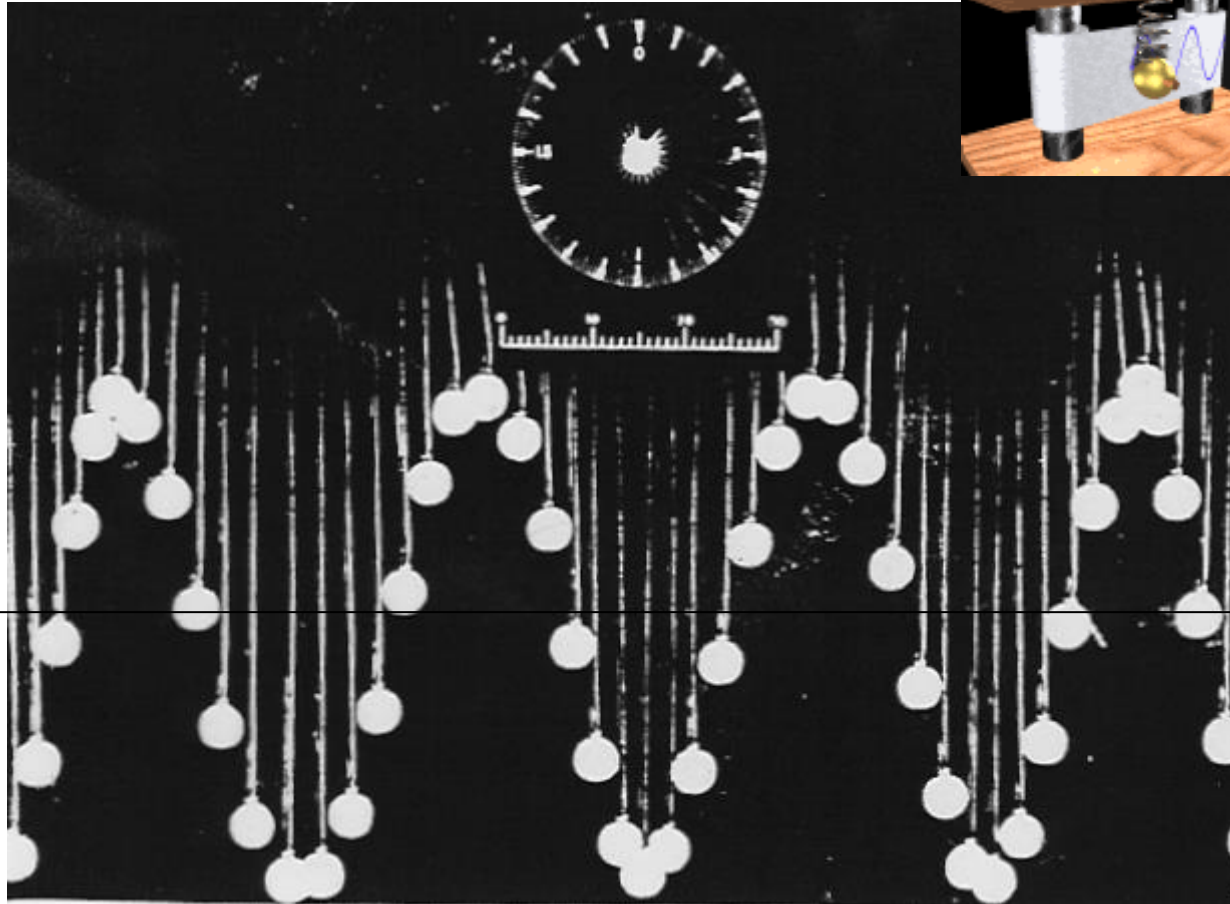


# Spring- energy

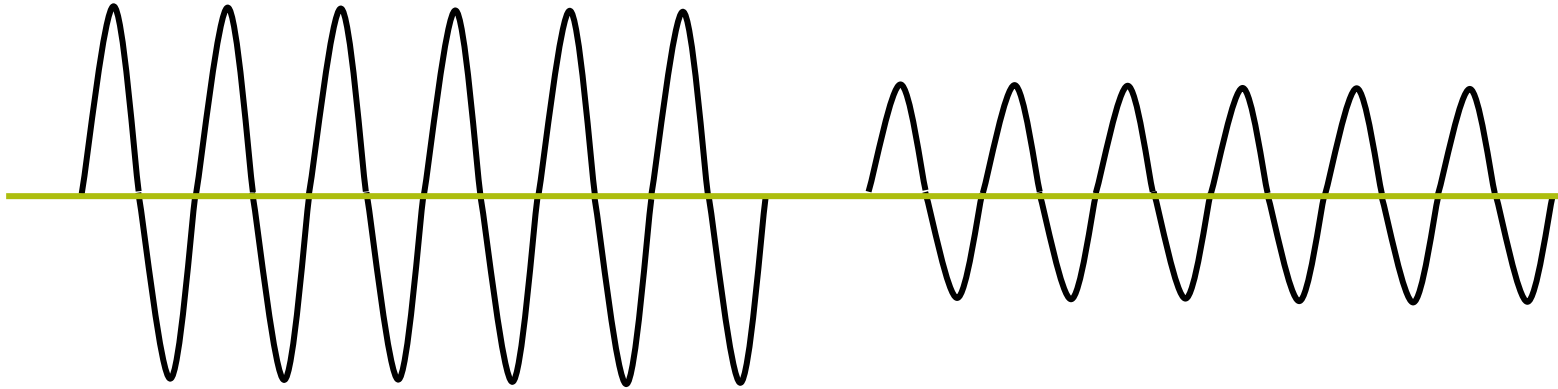
Potential

Kinetic

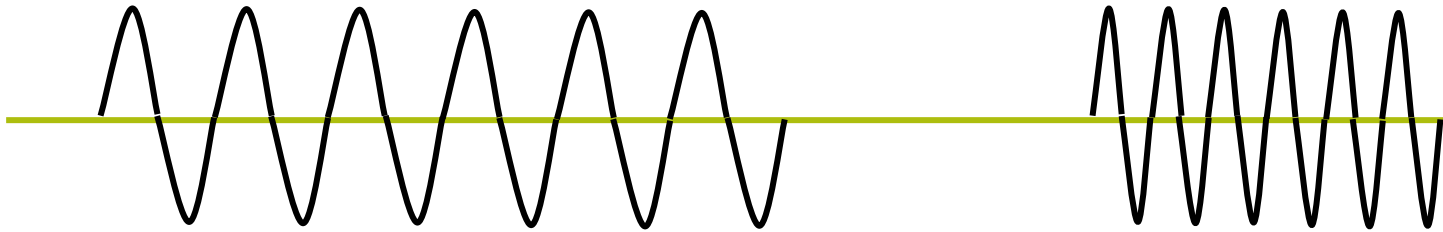
Potential



# Amplitude & frequency

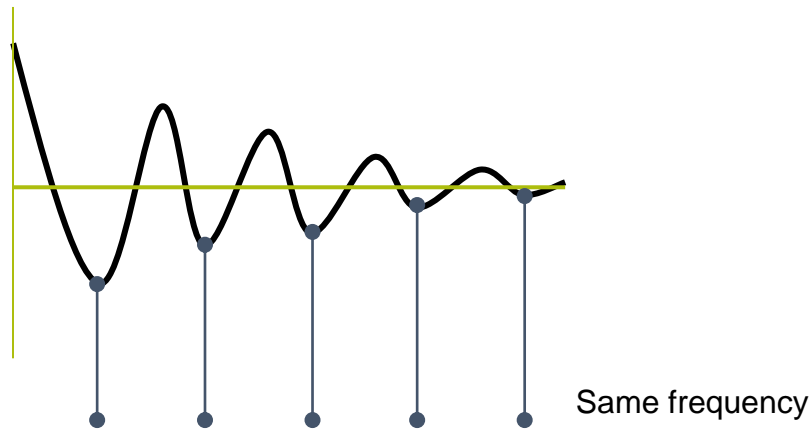
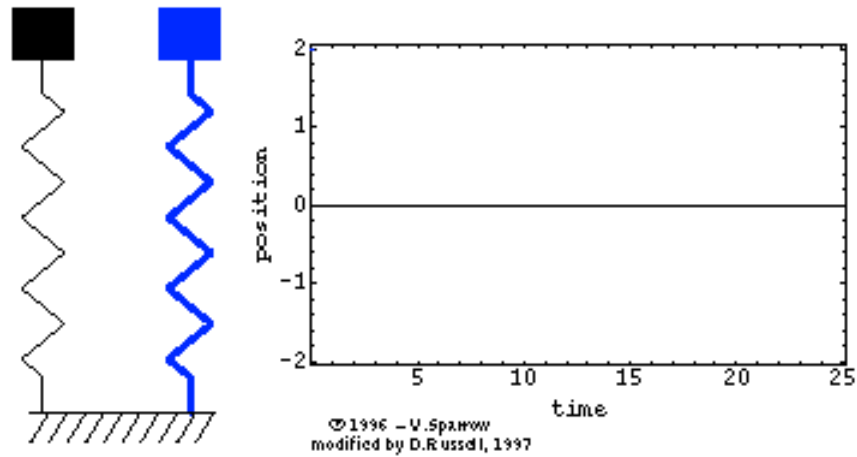


Amplitude change

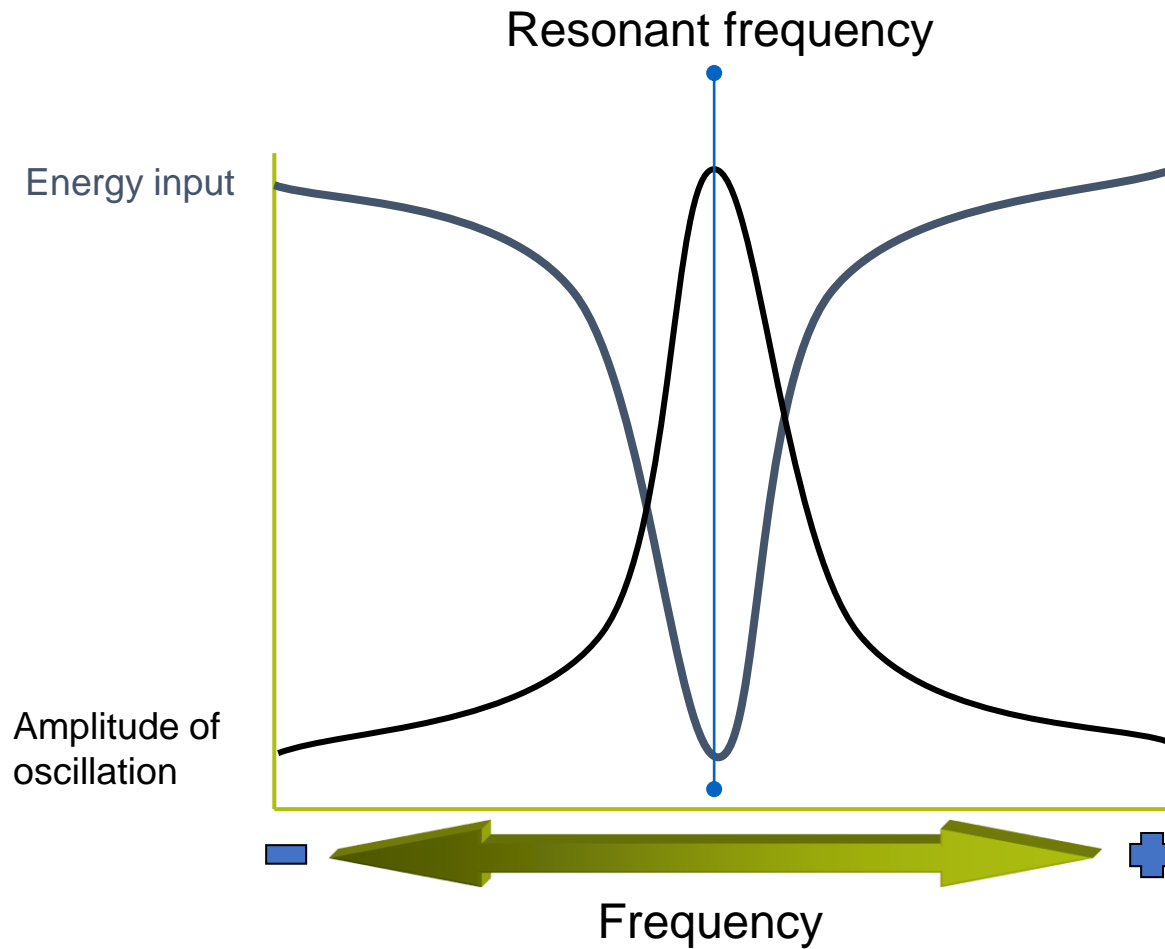


Frequency change

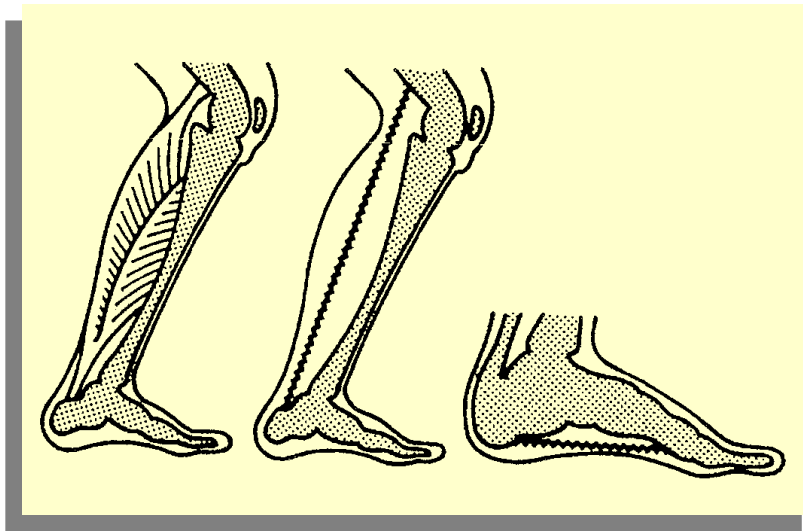
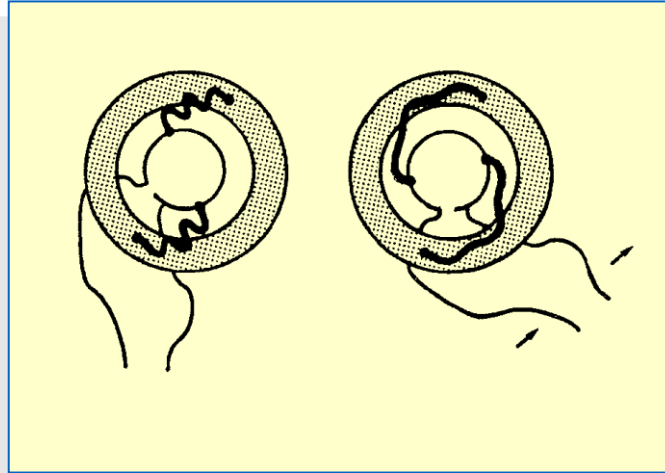
# Dampened oscillation



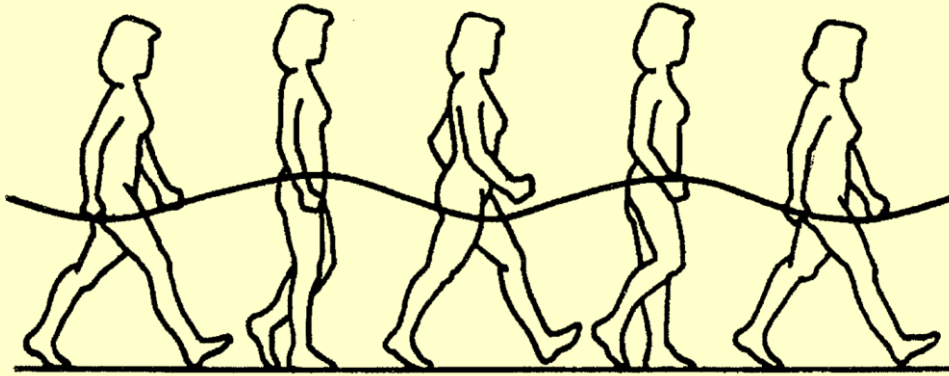
# Resonant frequency



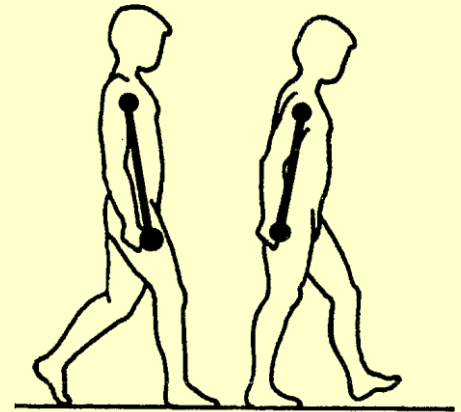
# Springs in the body



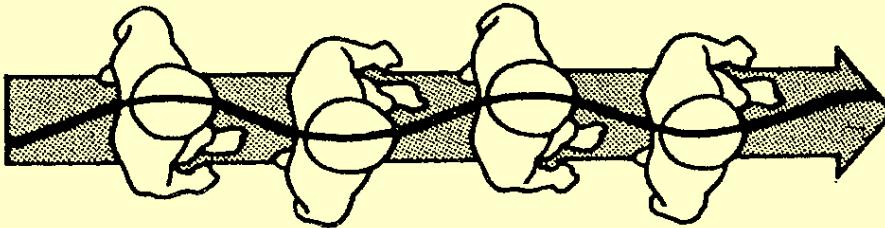
# Pendulums in the body



Along Y axis

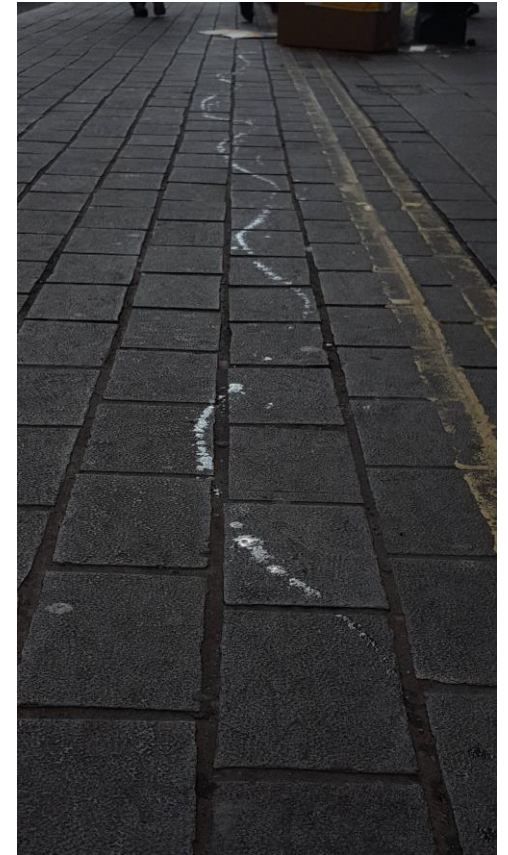
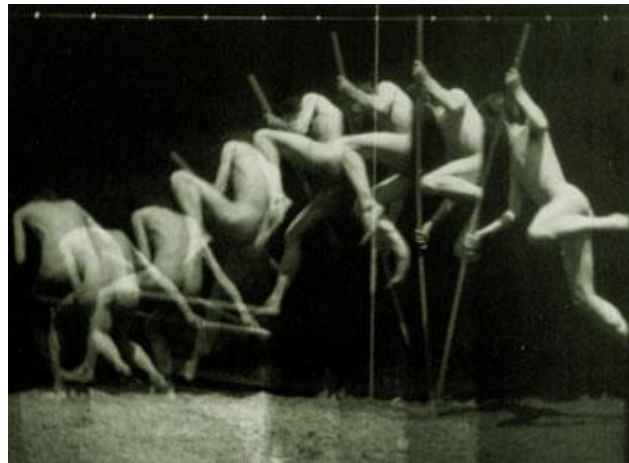
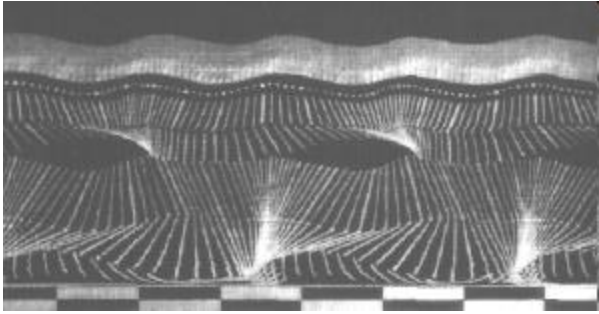


Along X axis



Along Z axis

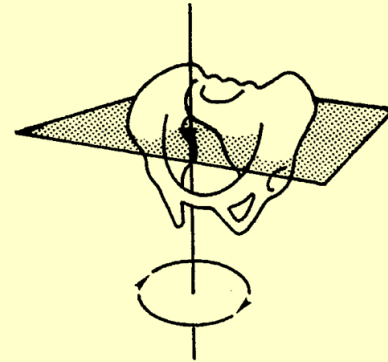
# Harmonic in motion



# Rotational pendulums

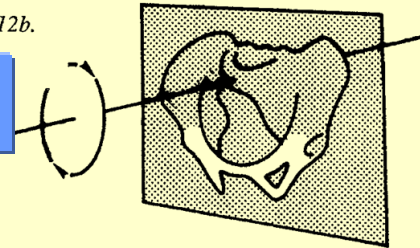
Rotation around Y axis

12a.



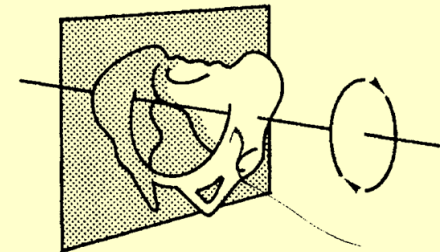
Rotation around X axis

12b.

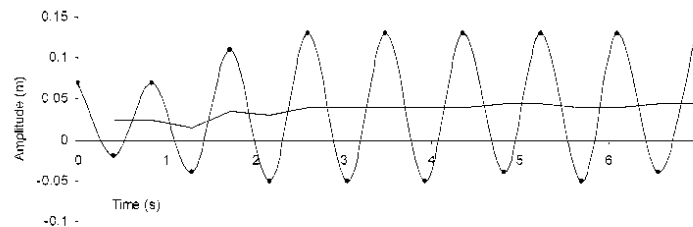


Rotation around Z axis

12c.

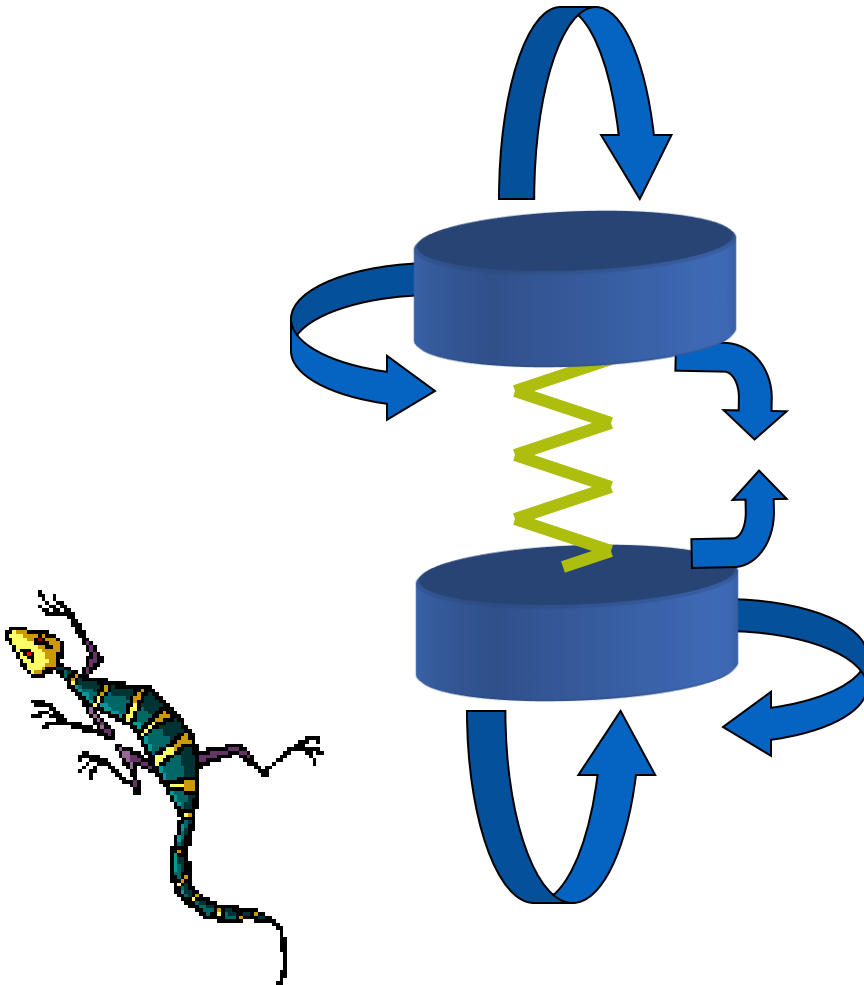


# Is harmonic technique harmonic?

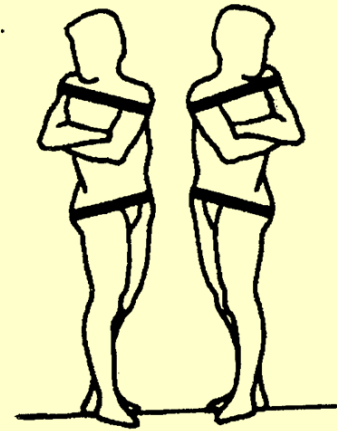


Waugh J 2006 An observational study of motion induced in the lumbar pelvic complex during a harmonic technique: a preliminary investigation. Masters of Osteopathy, Unitec NZ

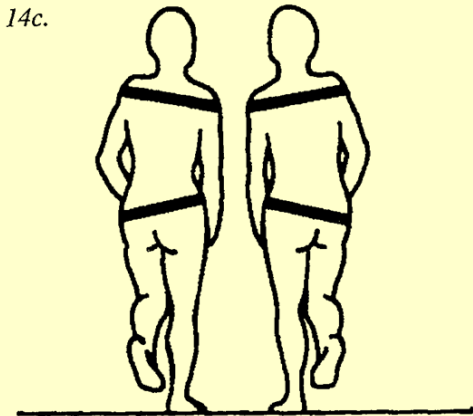
# Coupled motion



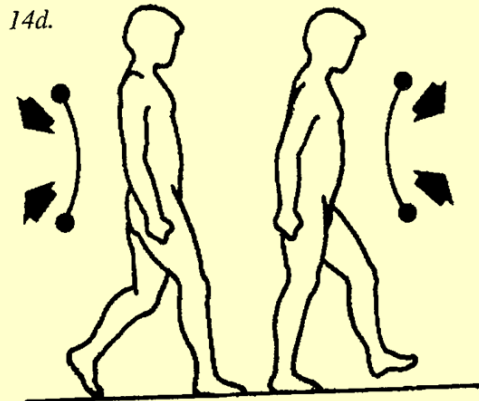
14b.



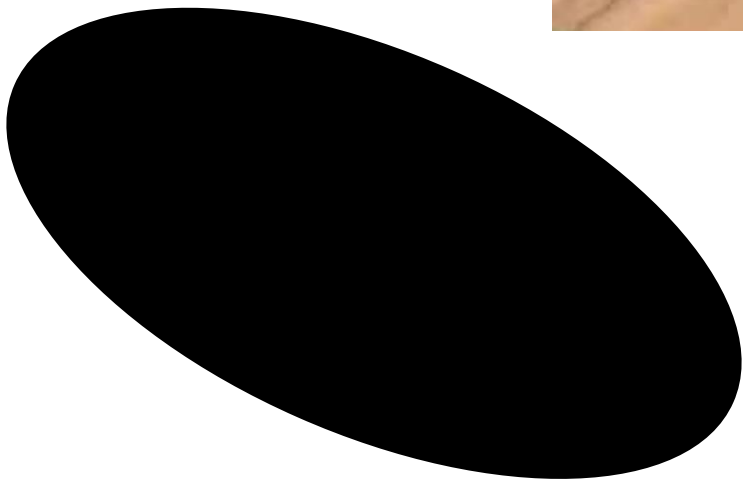
14c.



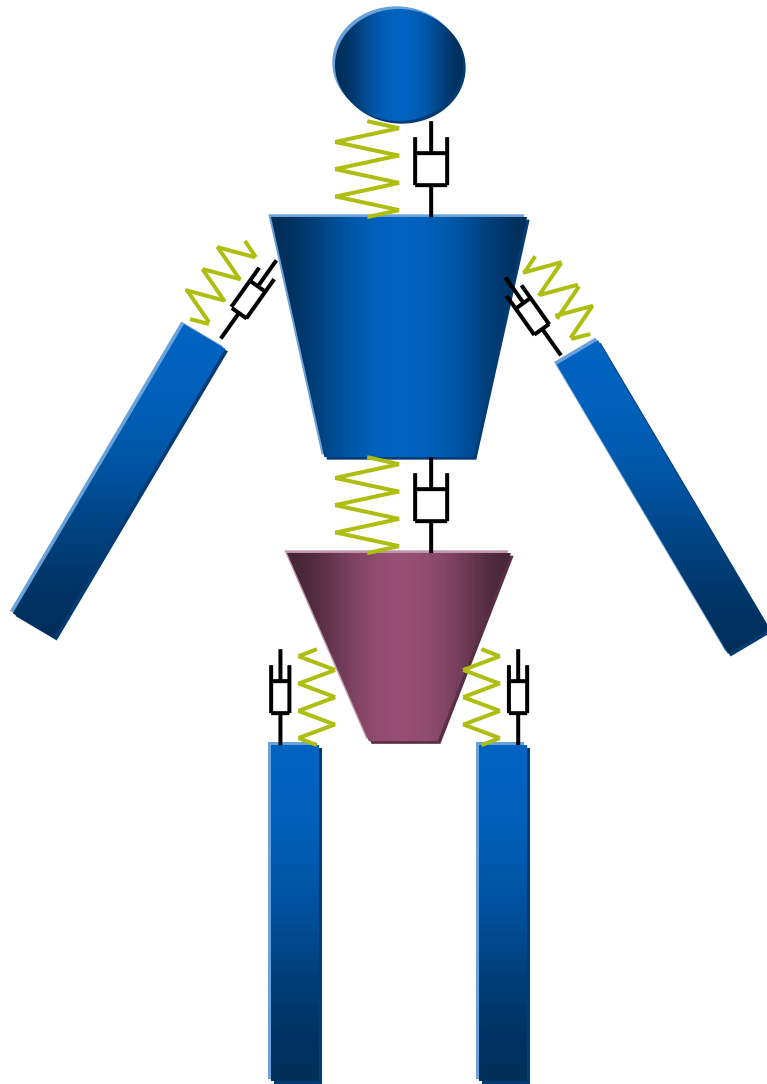
14d.



# Coupled motion

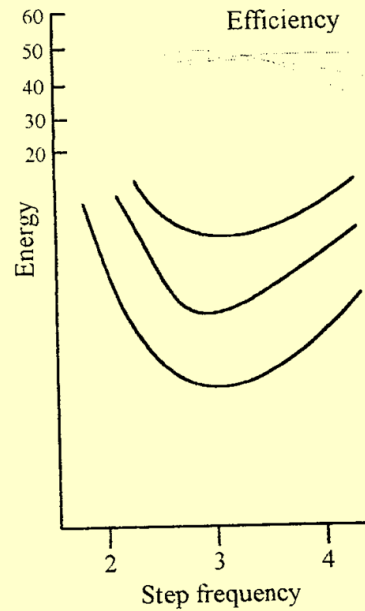


# Free vibrating humans

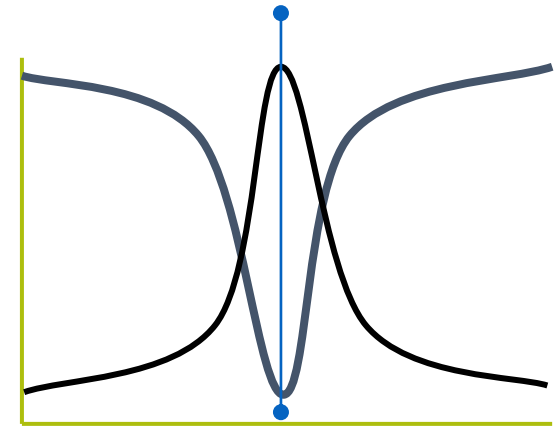
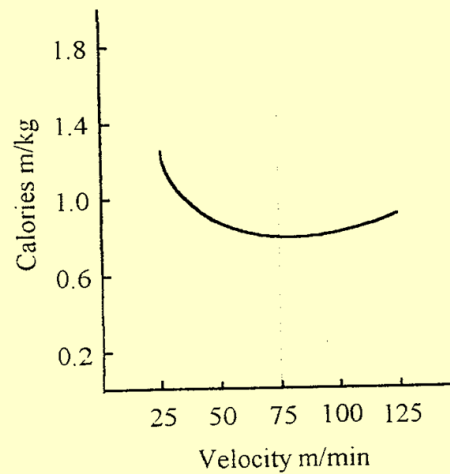


# Resonant frequency in human movement

In running



In walking



# Getting it right

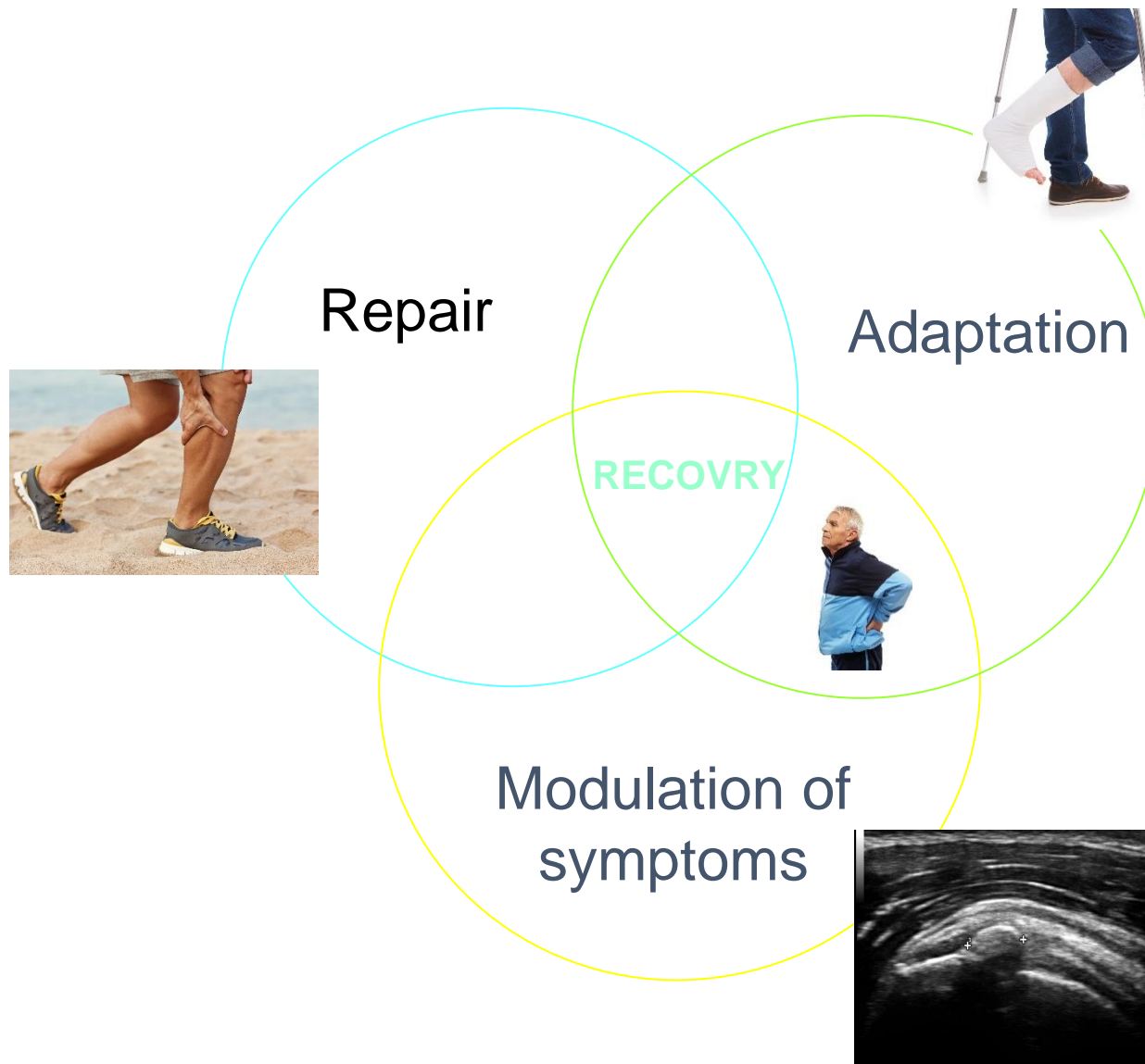
- The body masses have individual resonant frequency
- Each mass has up to six different patterns of oscillation
- Harmonic Technique is about amplifying these patterns
- If its not easy it can't be Harmonic

# Therapeutic role of Harmonic Techniques

# Process Approach

Create with the patient environments in which their recovery can be optimised.

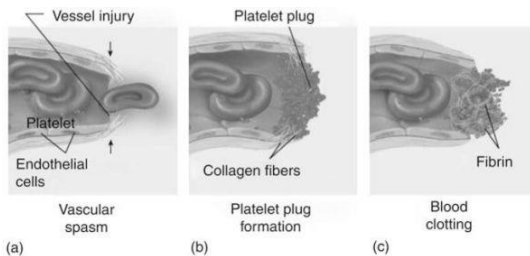
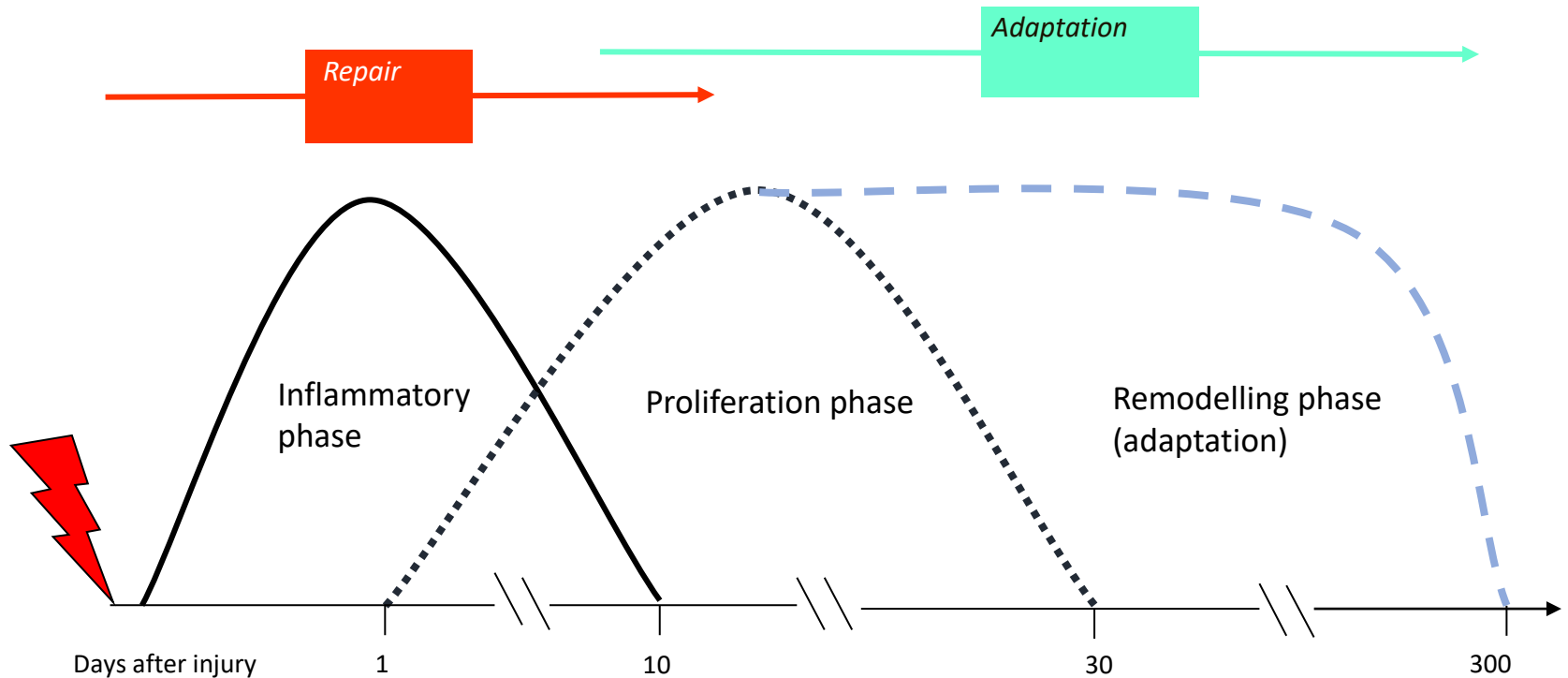
# Recovery processes



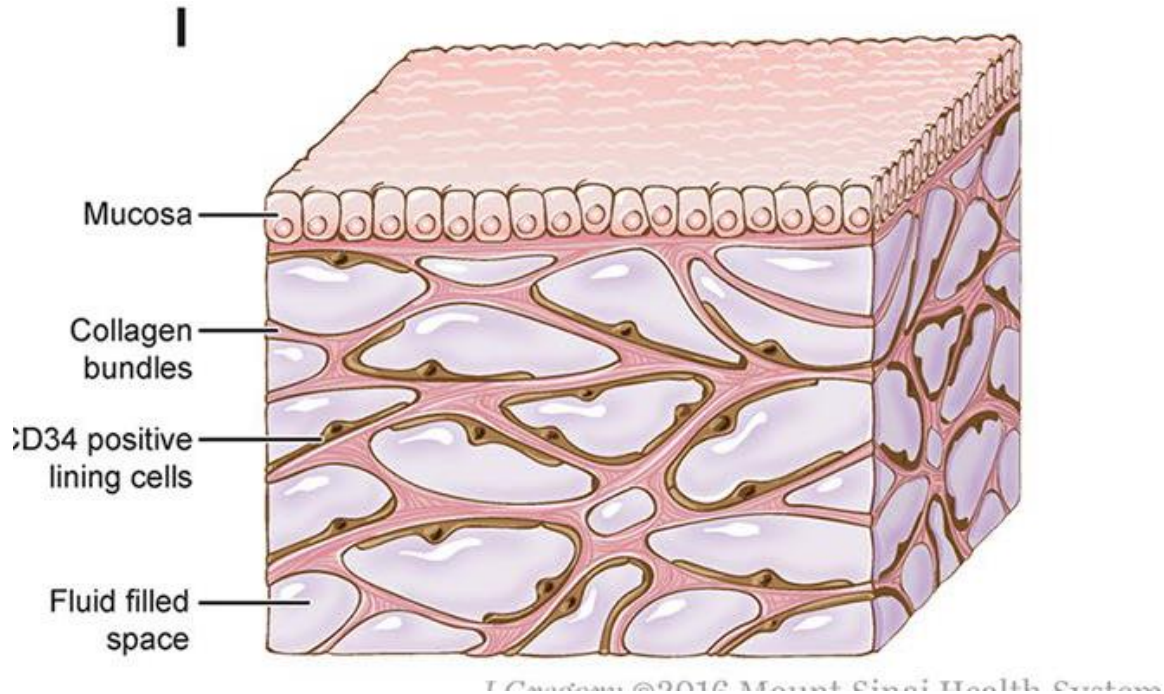
# Recovery environments: management considerations

<i>Process</i>	<i>Condition</i>	<i>Specific management</i>	<i>Shared management</i>
<i>Repair</i>	All acute conditions, max 8 weeks: All tissue damage, Joint & muscle sprains, post surgery, blunt trauma, first phase of frozen shoulder,	Moderate cyclical and repetitive loading Applied locally to affected area Gradual loading Pain-free / tolerable movement Can be either active or passive Any movement pattern but preferably functional. Extra-functional is OK	<b>Psychological</b> Ease movement pain related anxieties, catastrophising, support, reassure, comfort, Sooth and calm Therapeutic relationship - trust, non-judgmental, empathic.. Contextual factors <b>Cognitive</b> Inform Plan Set goals Provide choice <b>Behavioural</b> Support recovery behaviour Raise awareness to avoidance behaviour  <b>Physical</b> Functional movement Frequent exposure to activity
<i>Adaptation</i>	All chronic conditions: Post immobilisation contracture, ROM rehab, postural and movement re-education/rehab, CNS damage/rehab, structural/biomechanical change, enhance/recover human performance	Active Task specific whole and goal movement Functional Repetition Overloading Discomfort likely and generally OK	
<i>Alleviation of symptoms</i>	Acute/Chronic pain/discomfort Acute/chronic stiffness	Many treatment modalities may be beneficial depending on patient expectations.. Sleep & relaxation Physically: Active may be better than passive movement Cyclical movement may be better than static approaches Functional or extra-functional	

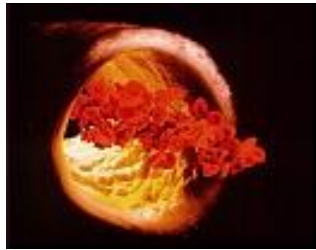
# Repair phases



# Interstitialium and transinterstitial pump

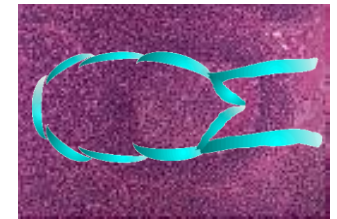


# The transsynovial pump



Increased blood flow  
around the joint

Alteration in intra-  
articular pressure



Increase lymphatic flow &  
drainage around the joint





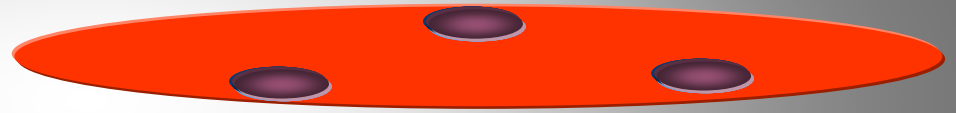
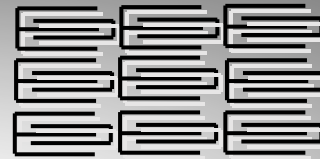
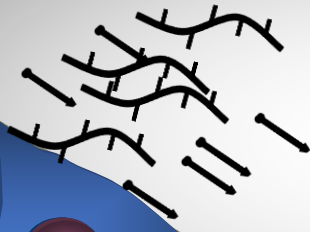
Manual  
technique

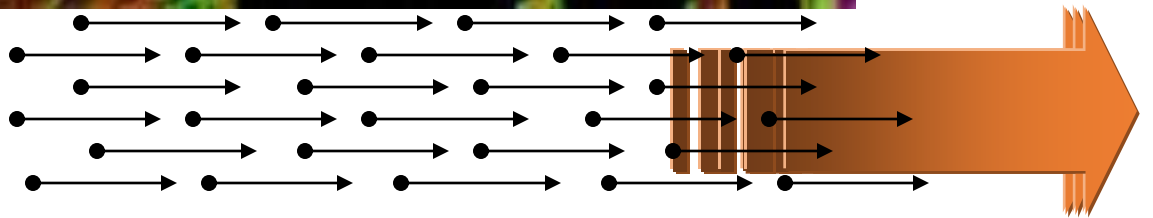
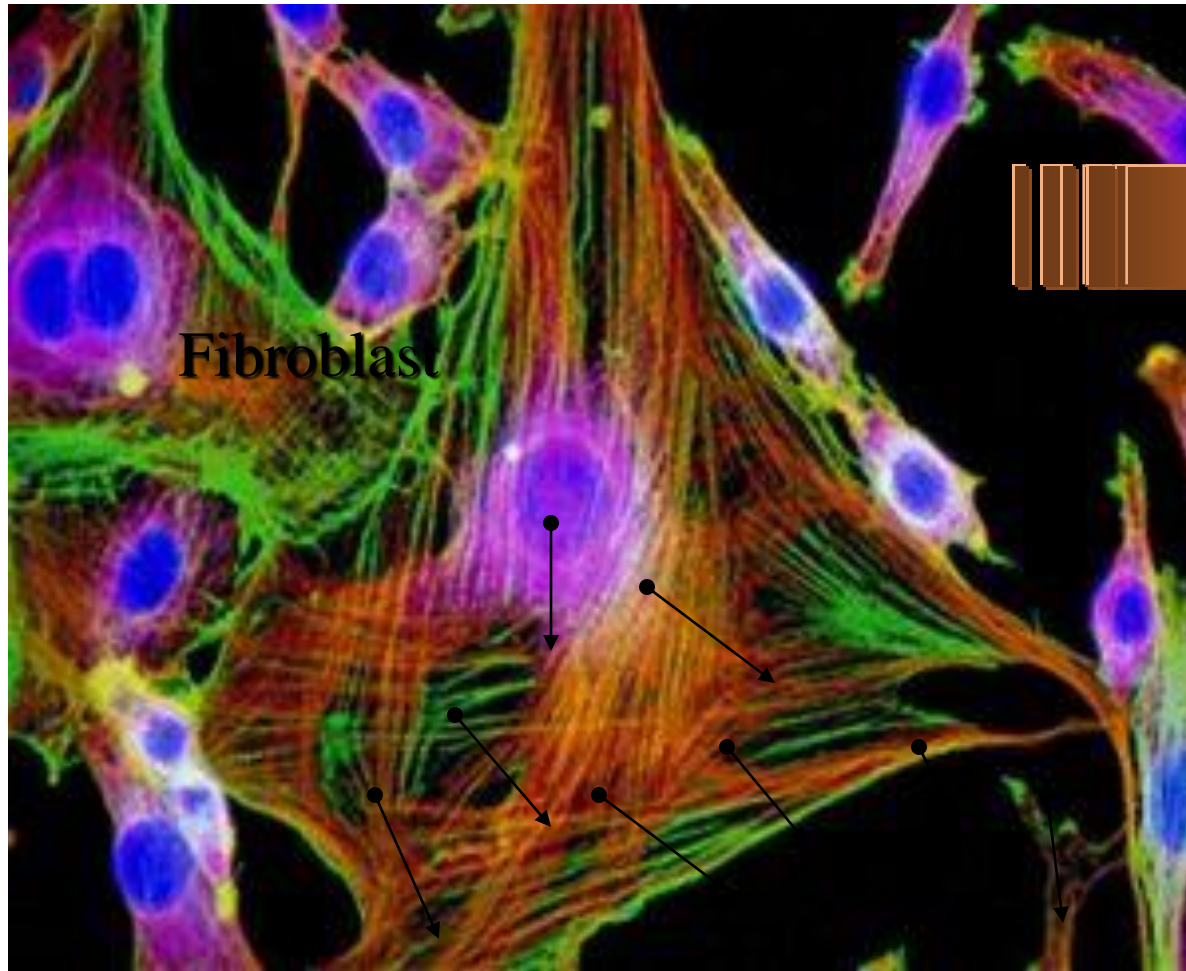
# Mechanotransduction

Change in physical environment

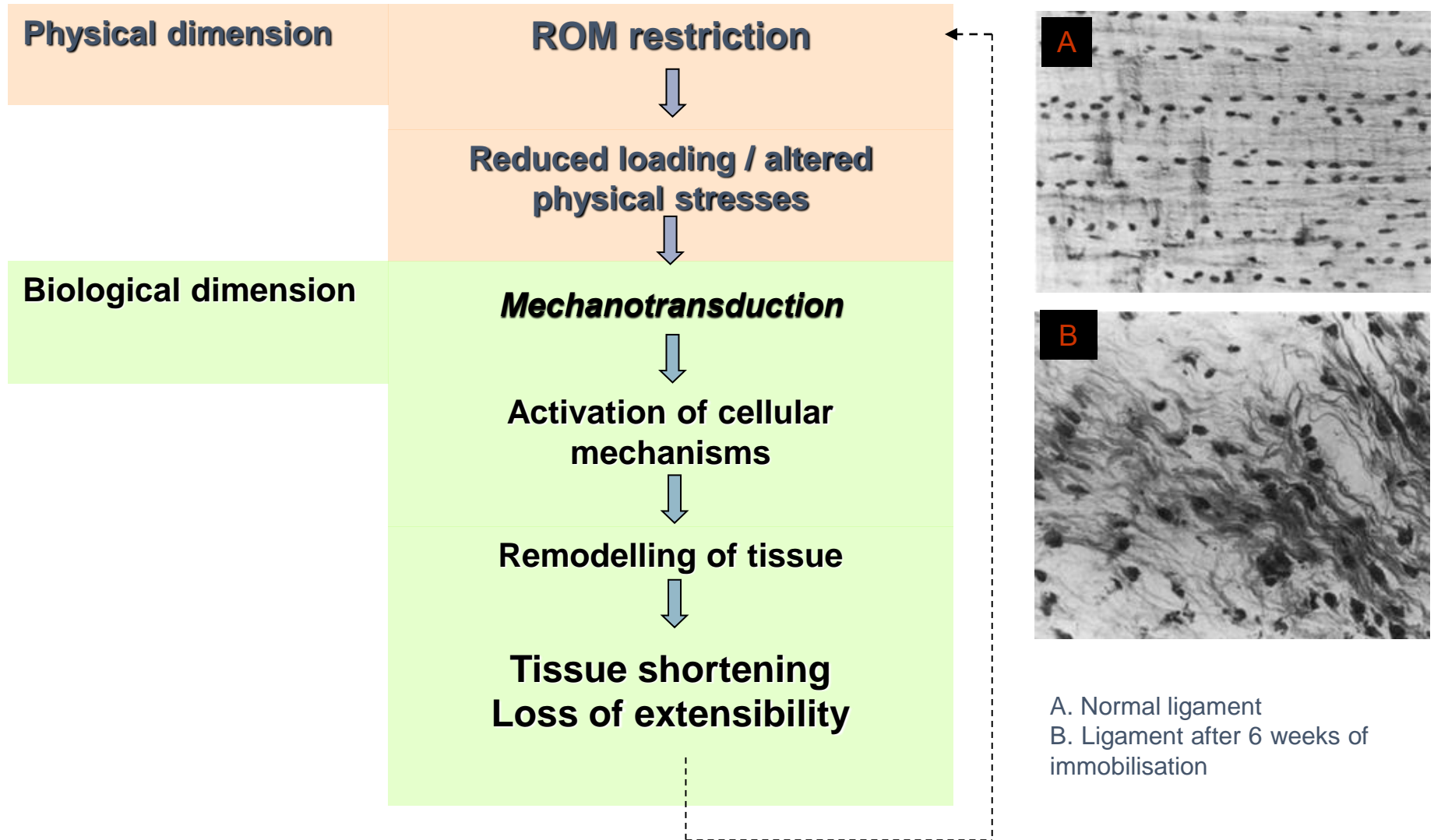
Fibroblast

Myocyte

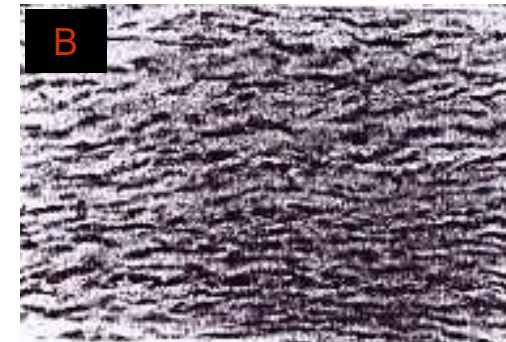
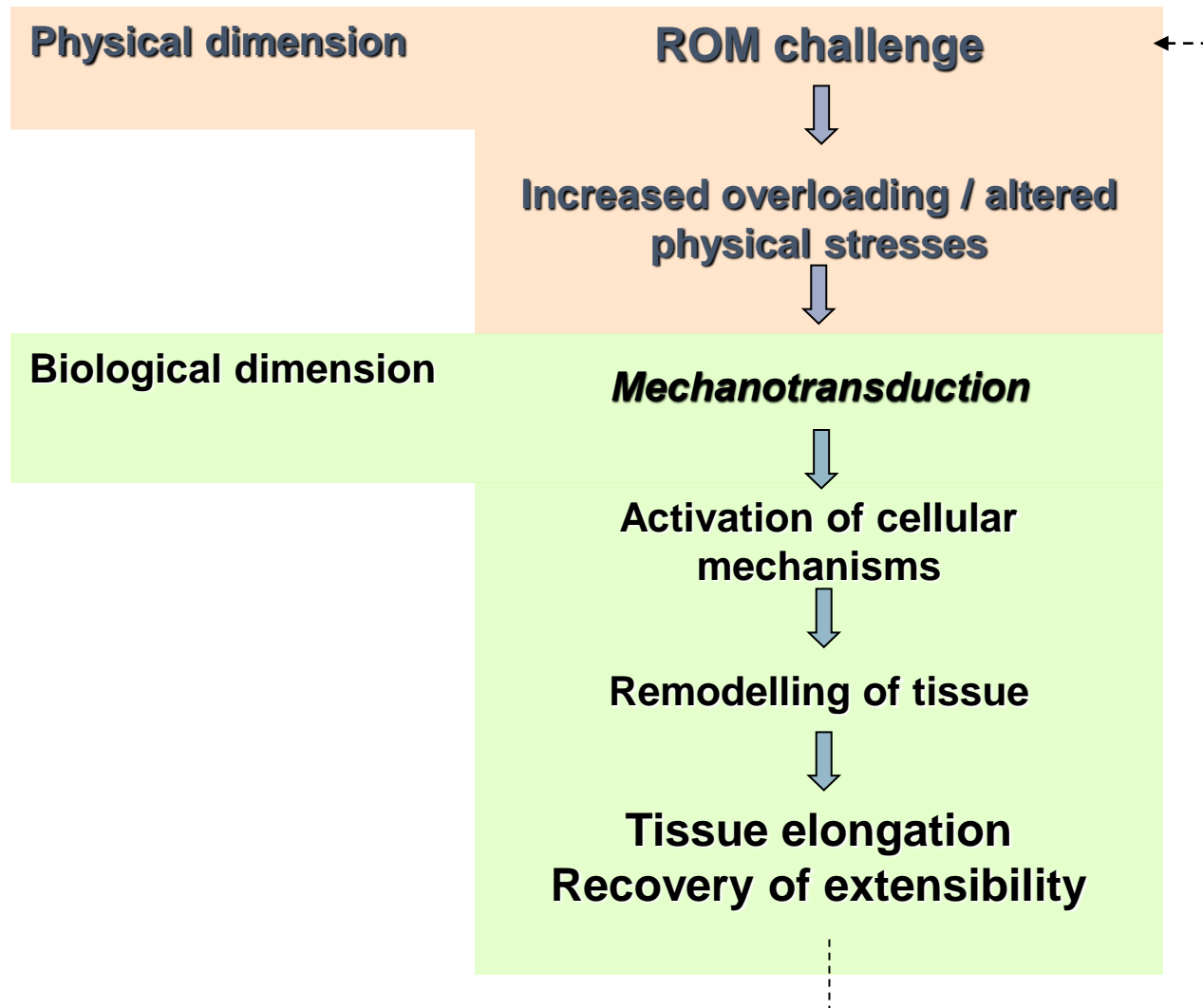




# From the physical to the biological dimension

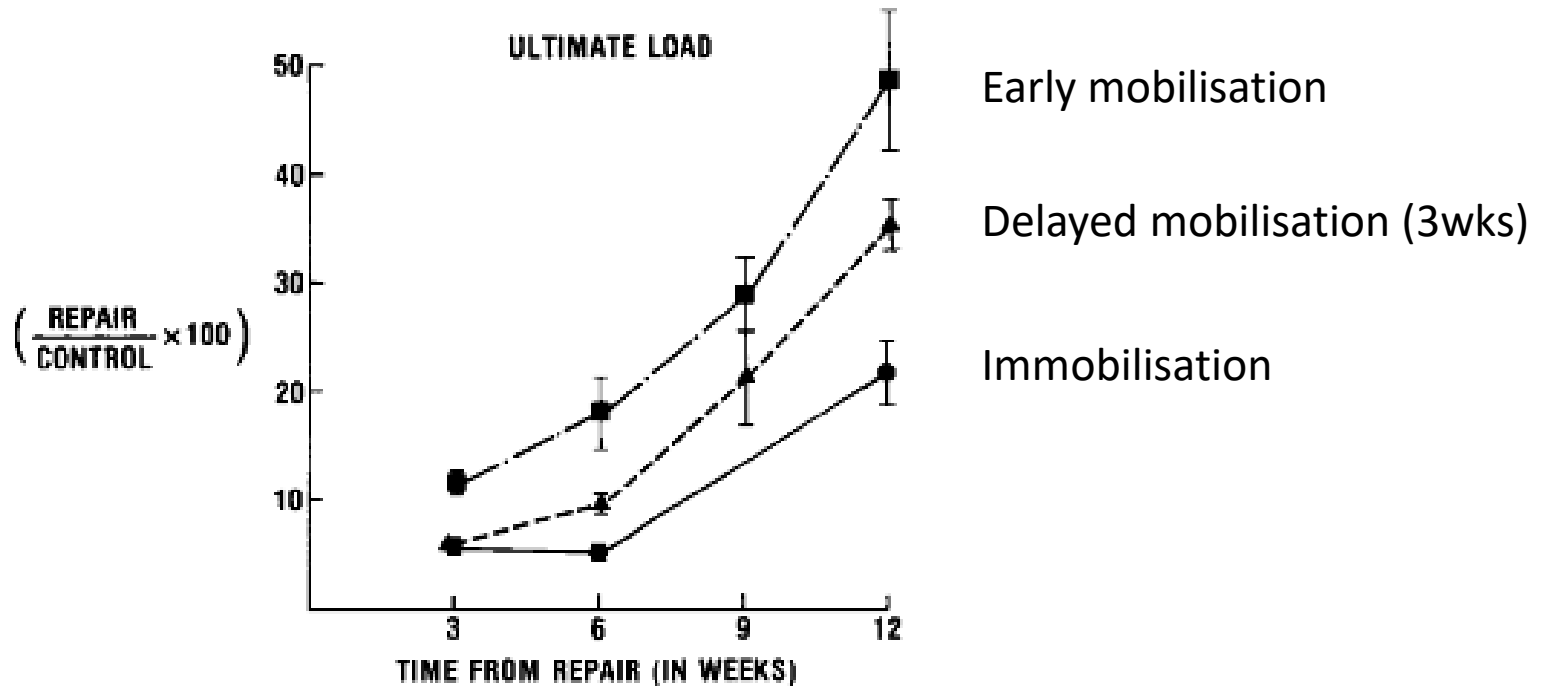


# Recovery: from the physical to the biological dimension



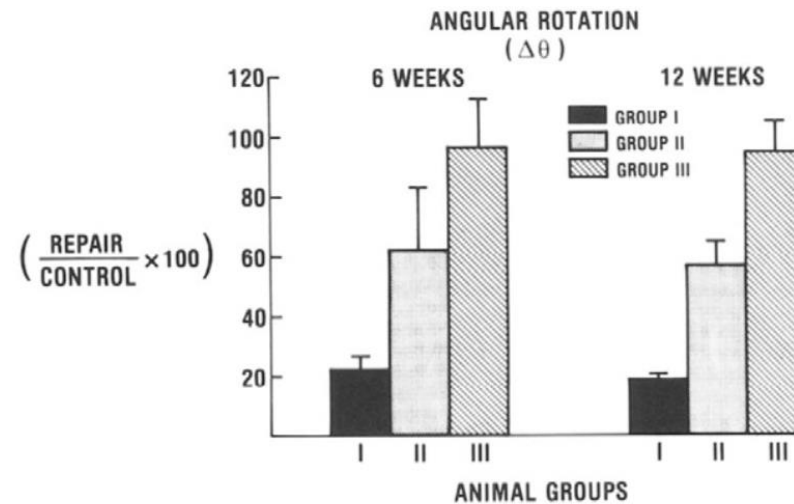
A. Effects of immobilisation  
B. Effects of 6 weeks of passive movement

# Effects on tensile strength



**Fig. 4.** Comparison of ultimate tensile load values of repaired tendons of all experimental groups. Higher values were seen at each interval with early mobilization.

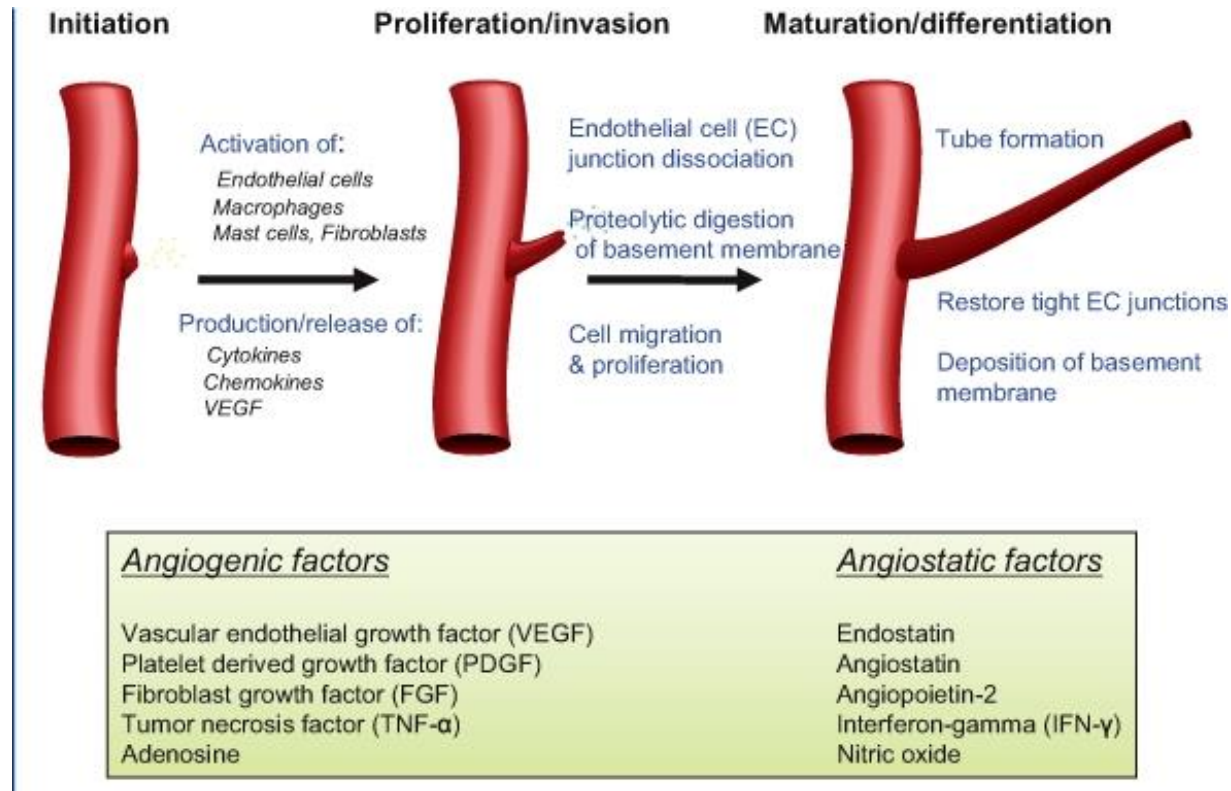
# Mobilisation and ROM



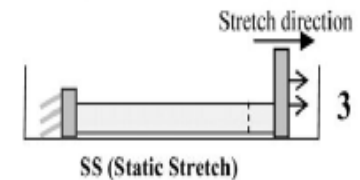
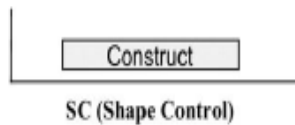
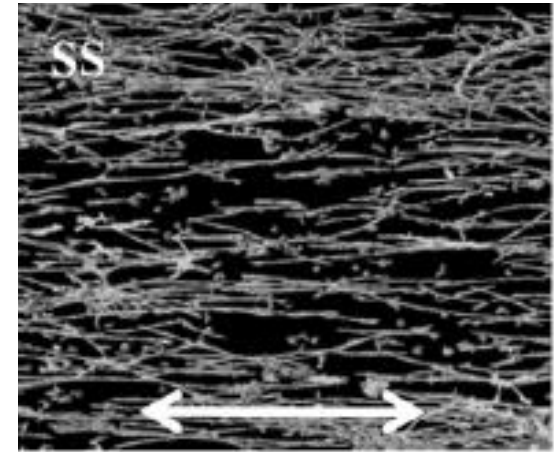
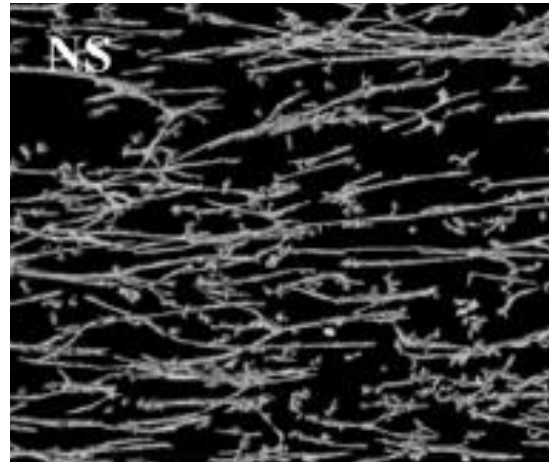
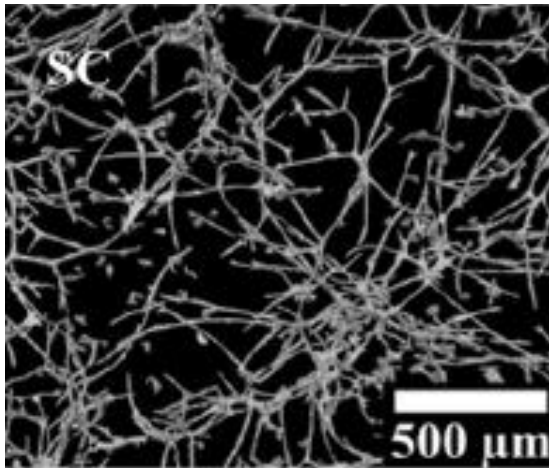
**Fig. 6.** Histogram showing differences in angular rotation ( $\Delta\theta$ ) of repaired tendons from immobilization, delayed mobilization, and early mobilization groups.

GROUP I - Immobilisation  
GROUP II - Delayed mobilisation  
GROUP III - Early mobilisation

# Angiogenesis



# Tension and angiogenesis



## Role of mobilisation and pumping

Tissue	Events during inflammation and proliferation	Effects of movement	Immobility
Interstitial space (Oedema)	Medium for repair Transport of nutrients and drainage metabolic by-products and Removal of debris Medium for cell migration Medium for cell communication	Regulate extent of oedema Facilitate flow and supply of nutrients Facilitate drainage Guides migration and movement of interstitial and immune cells	If excessive interfere with repair
Vascular	Supply route nutrients + energy Oxygen for fibroblast – synthesis of collagen	Facilitate flow Direct angiogenesis along force vectors	Reduced flow, affect repair rate and quality Disorganised vascular architecture
Lymphatic	Drainage of interstitium: Metabolic by-products and cell debris	Facilitate drainage Directs lymphangiogenesis by directing flow dynamics	Lymphoedema, poor repair Disorganised lymphangiogenesis
Connective tissue	Building materials for damaged tissues (by fibroblasts), including the interstitial matrix itself	Effect synthesis by fibroblast Effect & normalise deposition in extracellular space Restore biomechanical properties of tissues (tensile strength, stiffness) Reduce potential for abnormal cross-links and adhesions	Opposite effects
Muscle	As in connective tissue + regeneration and proliferation by satellite cells	Better myofibril regeneration and orientation. Helps formation of attachments between the myofibers and extracellular collagen matrix Helps satellite cells differentiation (to myoblasts) Direct formation and alignment of the myotubes along the force transmission vectors within the muscle	Increased potential for scarring Reduced contractile and passive properties of muscle Longer recovery
Joints	As in interstitial space	As in interstitial space Support transport to cartilage & intracapsular structures, e.g. meniscus	Longer recovery Joint contractures and adhesions Reducing biomechanical properties of intra- and extracapsular structures

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[www.cpdo.net](http://www.cpdo.net)

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