關節保護 - 優化動作質量;

提升運動效能

原理篇

梁達強先生

- 美國運動醫學學會（*ACSM*）*臨床運動生理學家Clinical Exercise Physiologist*
- 美國運動醫學學會（*ACSM*）運動是良藥第3級專業認證 EIM level 3

目標：

了解

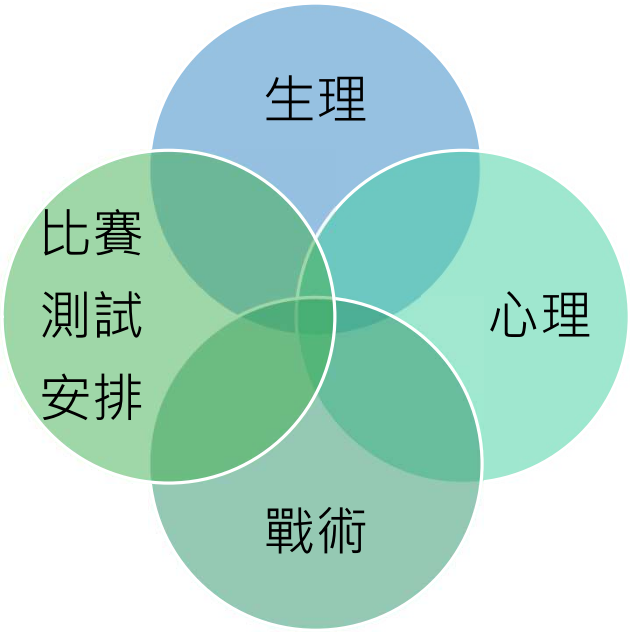
- 了解個別運動員關節獨特情況
- 運動能力/功能發展層次
- 常見運動障礙問題，制定合理的訓練策略

教練工作的不同

- 技術指導
- 體能訓練
- 策略規劃
- 發掘人才
- ……



教練主要工作



X

訓練原則

- 超載
- 循序漸進
- 特殊性(專項)
- 可逆性

≠

不能保證一帆風順

可能出現

- 樽頸
- 倒退
- 傷患

訓練上有否出現以下問題？

- 運動效率下降
- 傷患增加 - 例如身體局部位置過度負荷
- 肌肉失衡
- 技術提升受限制
- 長期錯誤動作形式訓練 Practice make perfect應該係 Perfect practice make perfect





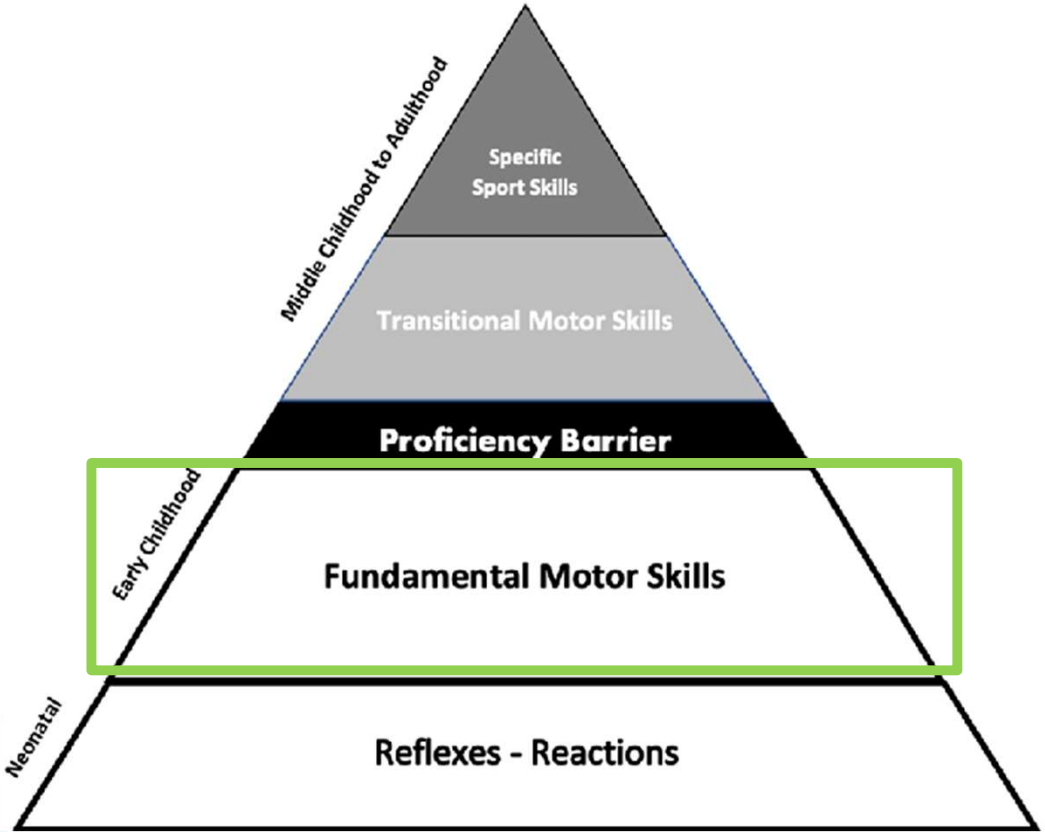




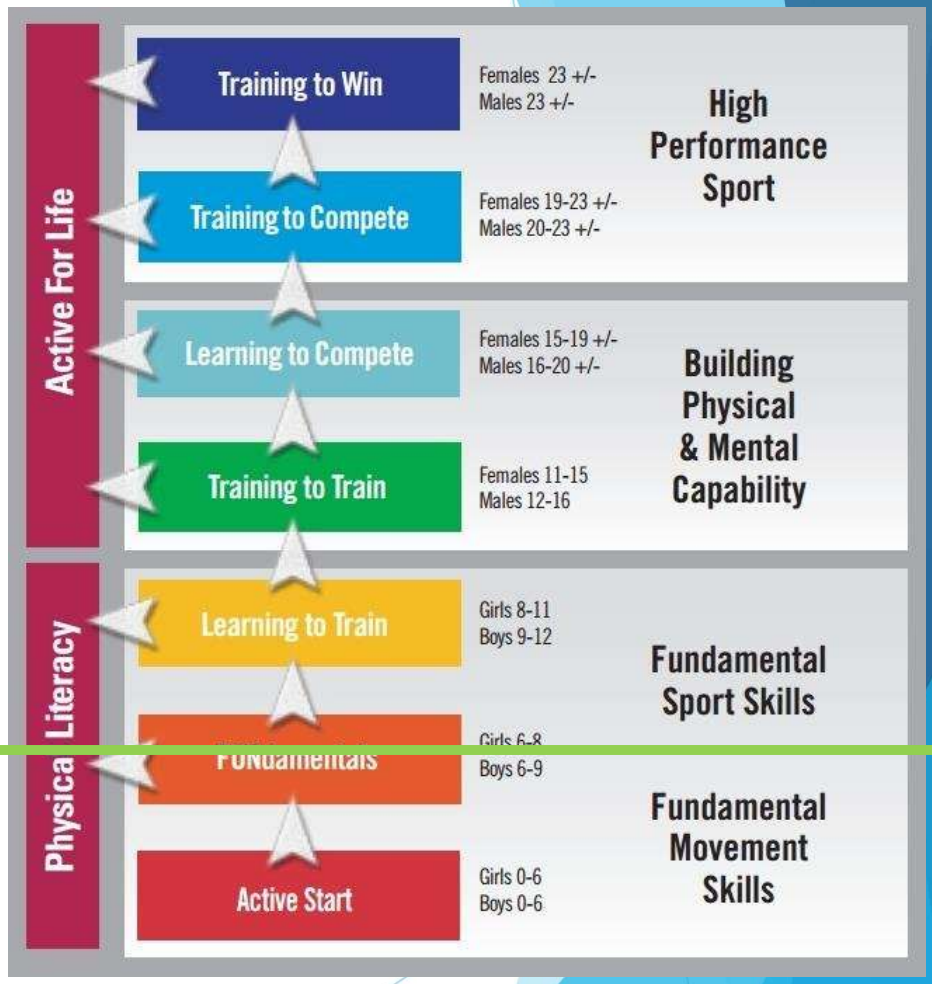
分析運動員技術/動作

- Biodex電腦等速收縮數據
- Force plate力量感測版
- Video (one dimension)錄像
- Vertical jump垂直跳測試....

動作與運動表現的關係



西菲爾特Seefeldt 於1979 提出經典運動發展金字塔模型



長期運動員發展路徑Long Term Athlete Development Pathway, Dr Istvan Balyi (九零年代)

Balyi 如何定義基本運動技能
Fundamental movement skills

ABCs

- (敏捷性、平衡性、協調性、速度) 。

KGBs

- (運動感覺kinesthetics、滑行、浮力、擊打) 。

RJT

- (跑、跳、投擲) 。

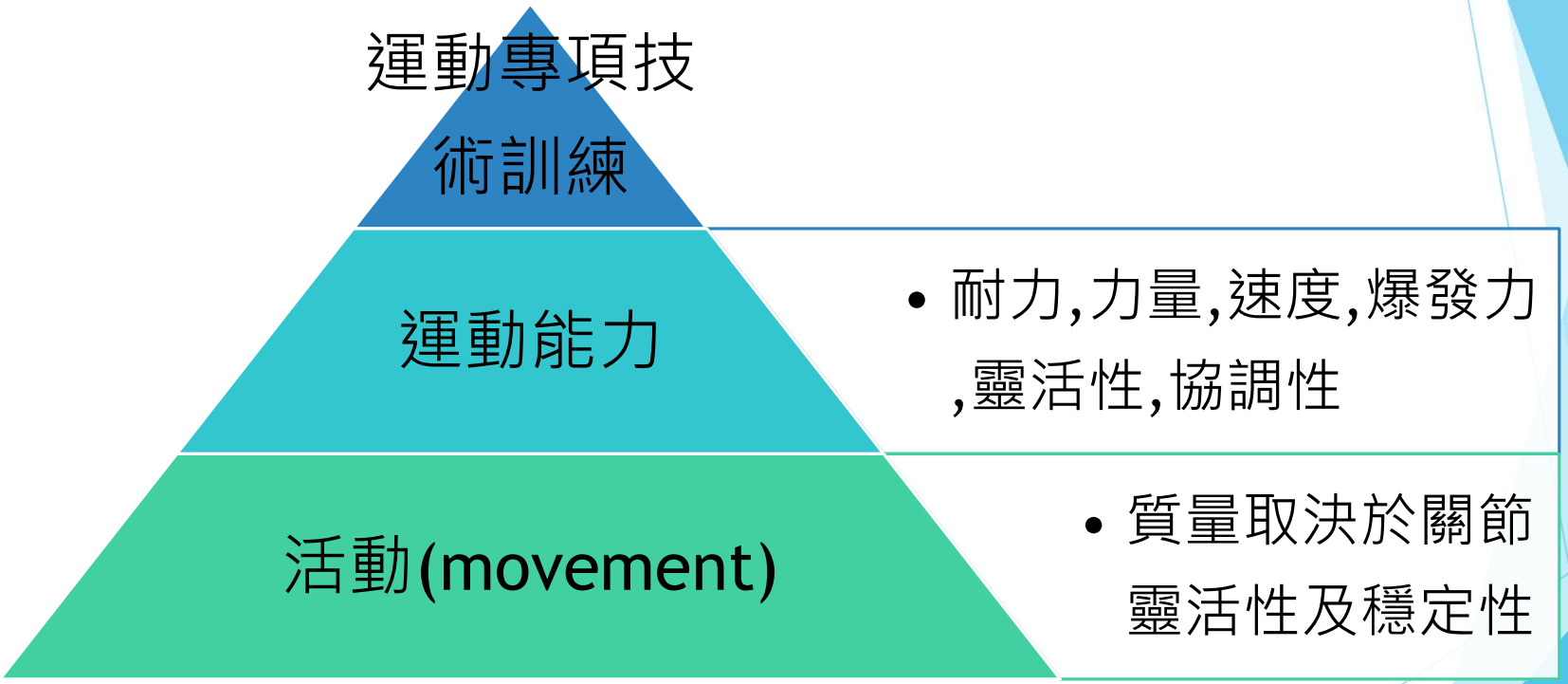
CKs

- (接球、踢球、擊球)

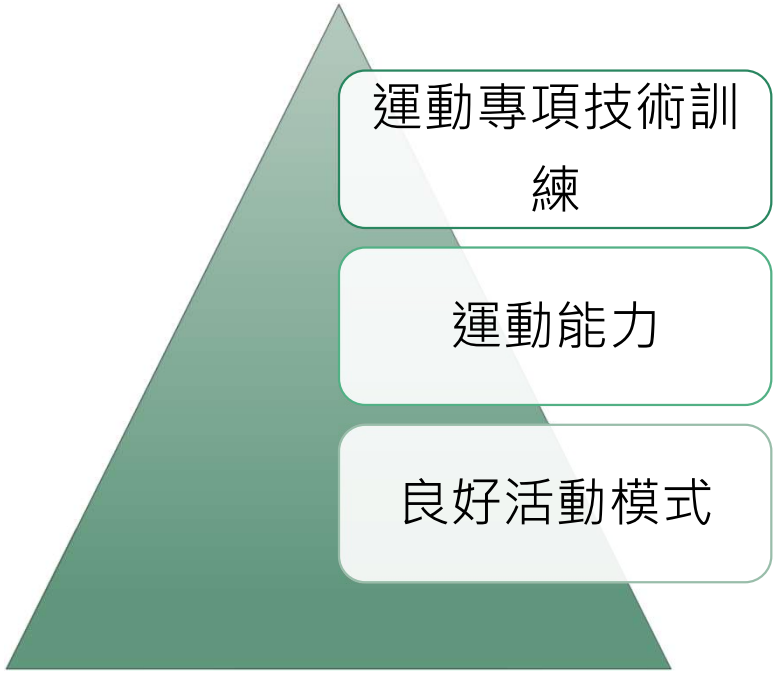


相關概念1 -最佳表現金字塔

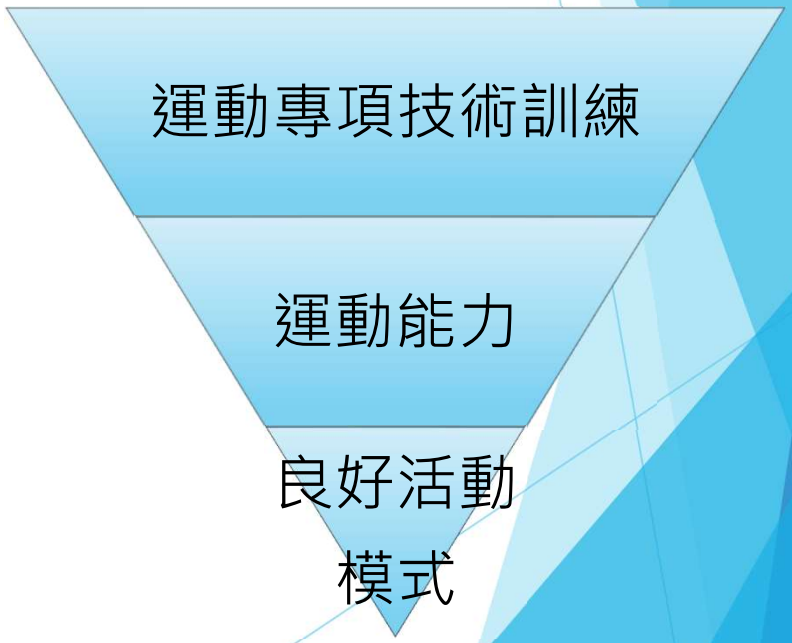
Gray Cook



最佳表現金字塔 - Gray Cook



普遍的訓練模式



活動的”質” 與”量”

97 (73.5%) 人在 CrossFit 訓練期間受傷

跑手 - 1049 跑手的觀察研究, 在將 比賽前的業餘跑手中, 出現肌肉骨骼疼痛很普遍 (Lopes 2011)

20% 的男性和 27% 的女性業餘跑手, 在比賽開始時仍然感到疼痛

阻力訓練造成的肩傷
（ Kolber et al. 2010 ）

36% 阻力訓練相關創傷發生在肩部

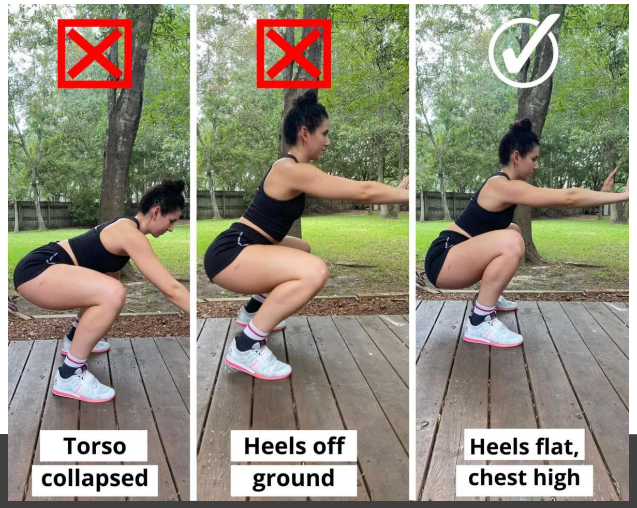


X

量 質

低效 - 不自然活動方式 - 代償

代償 - 微創傷 / 重複性勞損。



✓

技術

動作表現

良好的動作型態

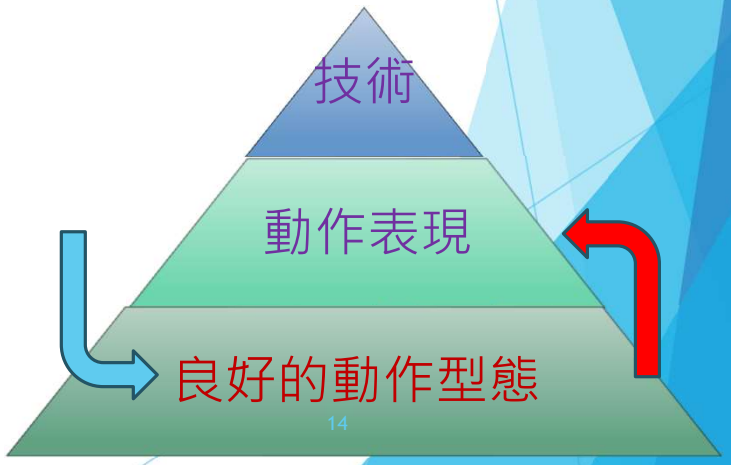
正確活動能力(movement)的重要性

重新審視運動能力發展層次

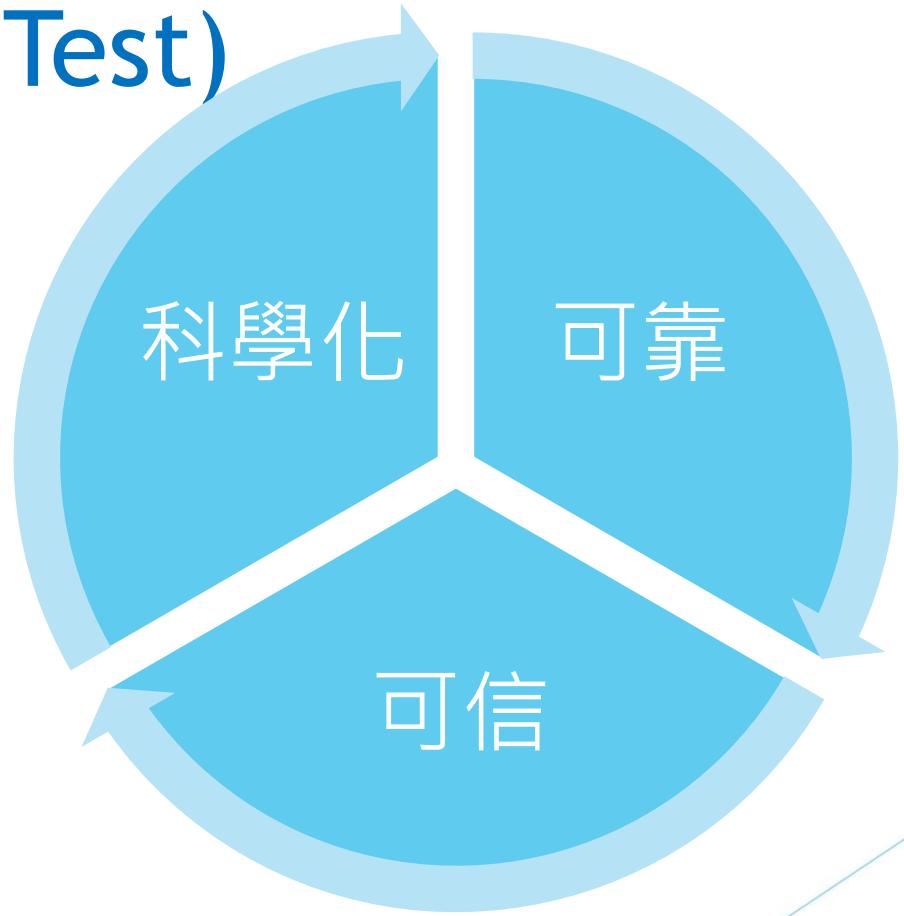
確認問題原因和處理方案

保護和糾正

神經肌肉再訓練



實際環境中進行關節功能性測試 (Field Test)



初步動作分析（關節活動情況）

一般關節評估



- 局部 vs 整體

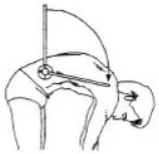
Department of Social & Health Services

RANGE OF JOINT MOTION EVALUATION CHART

NAME OF PATIENT | SOCIAL SECURITY NUMBER

INSTRUCTIONS: For each affected joint, please indicate the existing limitation of motion by drawing a line(s) on the figures below, showing the maximum possible range of motion or by notating the chart in degrees. Provide a complete description of all affected joints in your narrative summary. If range of motion was normal for all joints, please comment in your narrative summary. If joints which do not appear on this chart are affected, please indicate the degree of limited motion in your narrative.

1. Back



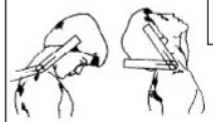
Extension 25°	Flexion 90°
Degrees	Degrees

2. Lateral (flexion)



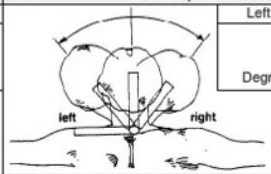
Left 25°	Right 25°
Degrees	Degrees

3. Neck



Extension 60°	Flexion 50°
Degrees	Degrees

4. Neck (lateral bending)



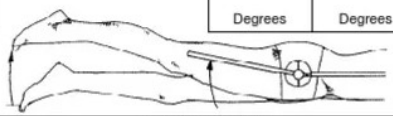
Left 45°	Right 45°
Degrees	Degrees

5. Neck (rotation)



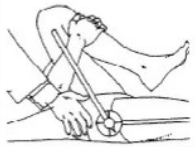
Left 80°	Right 80°
Degrees	Degrees

6. Hip (backward extension)



Left 30°	Right 30°
Degrees	Degrees

7. Hip (flexion)



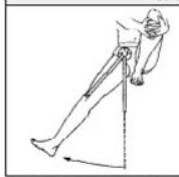
Left	
Knee Flexed 100°	Knee Extended 100°
Degrees	Degrees
Right	
Knee Flexed 100°	Knee Extended 100°
Degrees	Degrees

8. Hip (adduction)



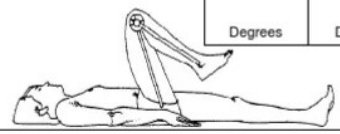
Left 20°	Right 20°
Degrees	Degrees

9. Hip (abduction)



Left 40°	Right 40°
Degrees	Degrees

10. Knee (flexion)



Left 150°	Right 150°
Degrees	Degrees

DSHS 13-585A (REV. 08/2002) (AC 01/2003)

動作形態檢測
Functional Movement Screen (FMS)

IJSPT

INVITED CLINICAL COMMENTARY

FUNCTIONAL MOVEMENT SCREENING: THE USE OF FUNDAMENTAL MOVEMENTS AS AN ASSESSMENT OF FUNCTION - PART 1

Gray Cook, PT, OCS[1]
Lee Burton, MS, ATC[2]
Barbara J. Hoogenboom, PT, EdD, SCS, ATC[3]
Michael Voight, PT, DHsc, OCS, SCS, ATC, FAPTA[4]

ABSTRACT

To prepare an athlete for the wide variety of activities needed to participate in or return to their sport, the analysis of fundamental movements should be incorporated into screening in order to determine who possesses, or lacks, the ability to perform certain essential movements. In a series of two articles, the background and rationale for the analysis of fundamental movement will be provided. The Functional Movement Screen (FMS™) will be described, and any evidence related to its use will be presented. Three of the seven fundamental movement patterns that comprise the FMS™ are described in detail in Part I: the Deep Squat, Hurdle Step, and In-Line Lunge. Part II of this series which will be provided in the August issue of IJSPT, will provide a detailed description of the four additional patterns that complement those presented in Part I (to complete the seven total fundamental movements): Shoulder Mobility, the Active Straight Leg Raise, the Trunk Stability Push-up, and Rotary Stability, as well as a discussion about the utility of functional movement screening, and the future of functional movement.

The intent of this two part series is to present the concepts associated with screening of fundamental movements, whether it is the FMS™ system or a different system devised by another clinician. Such a functional assessment should be incorporated into pre-participation screening and return to sport testing in order to determine whether the athlete has the essential movements needed to participate in sports activities at a level of minimum competency.

Key Words: Function, movement screening, performance testing

基本動作形態檢測 (FMS)

第一部份 - 功能性動作:	第二部份 - 關節靈活度:	第三部份 - 核心穩定性:
1.深蹲(deep squat), 2.跨欄 (hurdle step), 3.直線前蹲(in-line lunge)	4.肩膊活動範圍 (shoulder mobility), 5.主動直腳抬腿 (active straight lift)	6.軀幹穩定俯臥撐 (stability push up) 7.旋轉穩定性 (rotary stability)

測試評分

3	動作形態沒有問題
2	有少許代償但還是能完成動作
1	不能完成所有動作
0	出現疼痛

動作觀察準則

- 適當觀察距離
- 所有動作需做三次，觀察員應四處走動，以不同的觀察角度，相對客觀證實評估結果。
- 沒有硬性測試次序規定

基本動作形態檢測 (FMS) 目的

了解運動員

- 可能導致受傷或影響運動表現的限制範圍
- 可能出現不對稱
- 活動障礙

1. 深蹲測試目的

- video 1

測試臀部，膝，腳踝的雙側，對稱活動能力,下肢穩定性

及

核心(包括盆骨)穩定性及姿勢控制

2.跨欄測試目的

- video 2

在跨欄動作中, 突顯動作補償或不對稱性. 臀, 膝和踝的雙側相對靈活, 穩定性, 雙側對稱性, 盆骨和核心穩定性和控制能力

3.直線弓步前蹲測試目的

video 3

下肢處於分開站立姿勢, 而上肢則處於相反或交替動作模式 (reciprocal pattern), 這獨特自然互補的平衡模式, 需適當脊柱穩定性維持.

弓步挑戰髖, 膝和踝關節的靈活性和穩定性，同時挑戰了橫跨多關節的肌肉, 如: 背闊肌和股直肌等

4.肩膊活動範圍測試目的

video 4

上臂 (肩屈曲, 外旋和外展;
下臂 (肩伸展, 內旋和內收).

重點主要放觀察胸腔靈活性，
然後是肩胛穩定性等

5.主動直抬腿測試目的

video 5

測試腸繩肌，比目魚肌/腓腸肌影響下的主動關節活動度，同時盆骨保持穩定及另一腿主動臀伸展能力

6.軀幹穩定俯臥撐測試目的

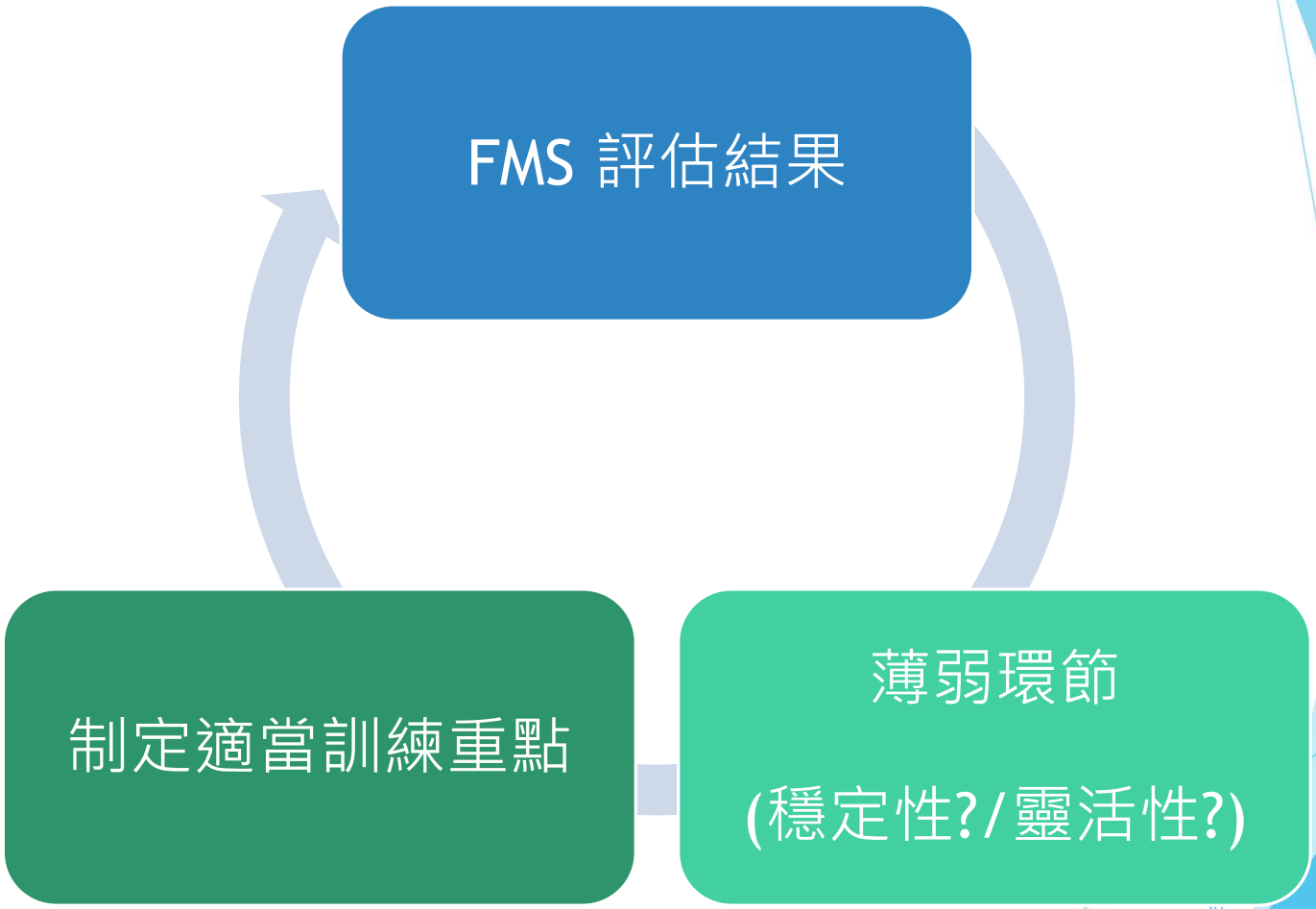
video 6

測試俯臥撐啟動時，脊柱和盆骨在矢狀面保持穩定的能力

7.旋轉穩定性測試目的

video 7

上下肢綜合運動中，盆骨，核心肌肉和肩膊的多方向穩定性

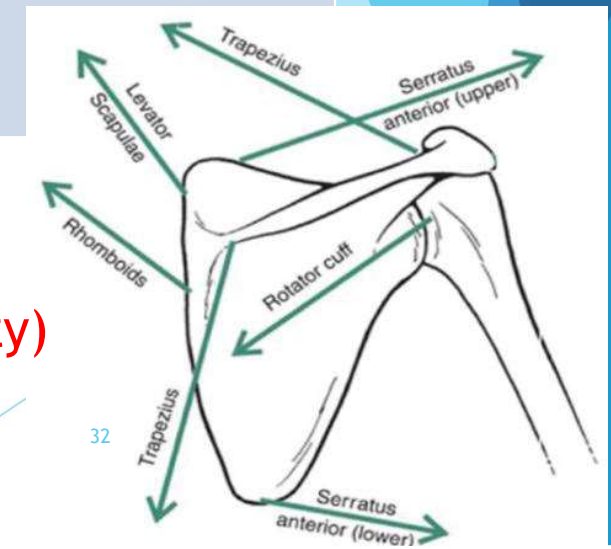

FMS 評估結果
薄弱環節
(穩定性?/靈活性?)
制定適當訓練重點

根據關節特徵發展運動能力/功能

相關概念2

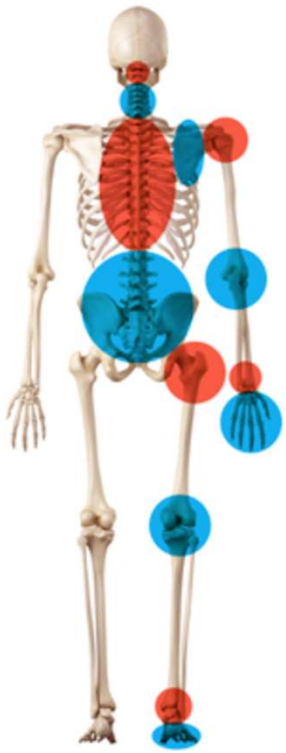
- 關節交替功能理論 (joint by joint approach)

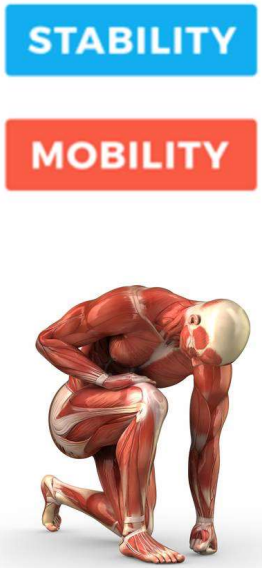
靈活性(mobility)	穩定性(Stability)
允許單一關節或一連串關節, 進行完整, 不受限，無痛的活動範圍 • 沒有障礙 • 不受外界影響的自主關節活動	在正常的柔韌性和關節靈活情況下, 肌肉對關節以重新力量定向, 施加主動控制 • 保持姿勢和/或在不同環境下運動控制的能力



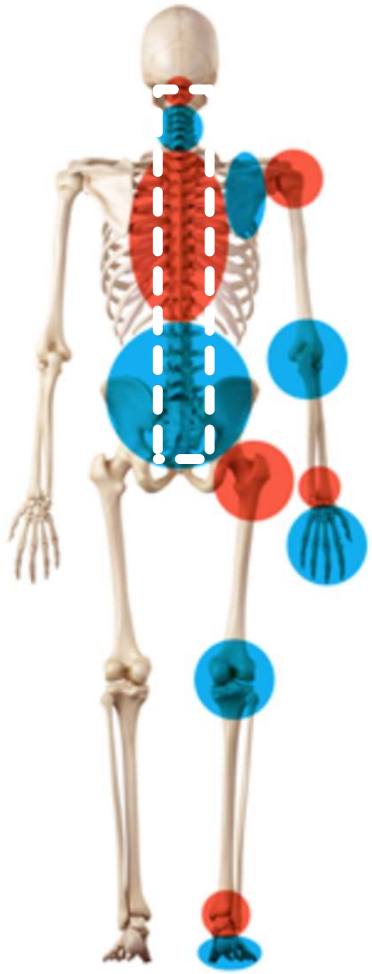
示範1: 椅上轉身, 彎身 vs 中立腰椎
示範2: 局部穩定(local stability)及整體穩定(global stability)

相鄰關節理論
(Cook/Boyle)

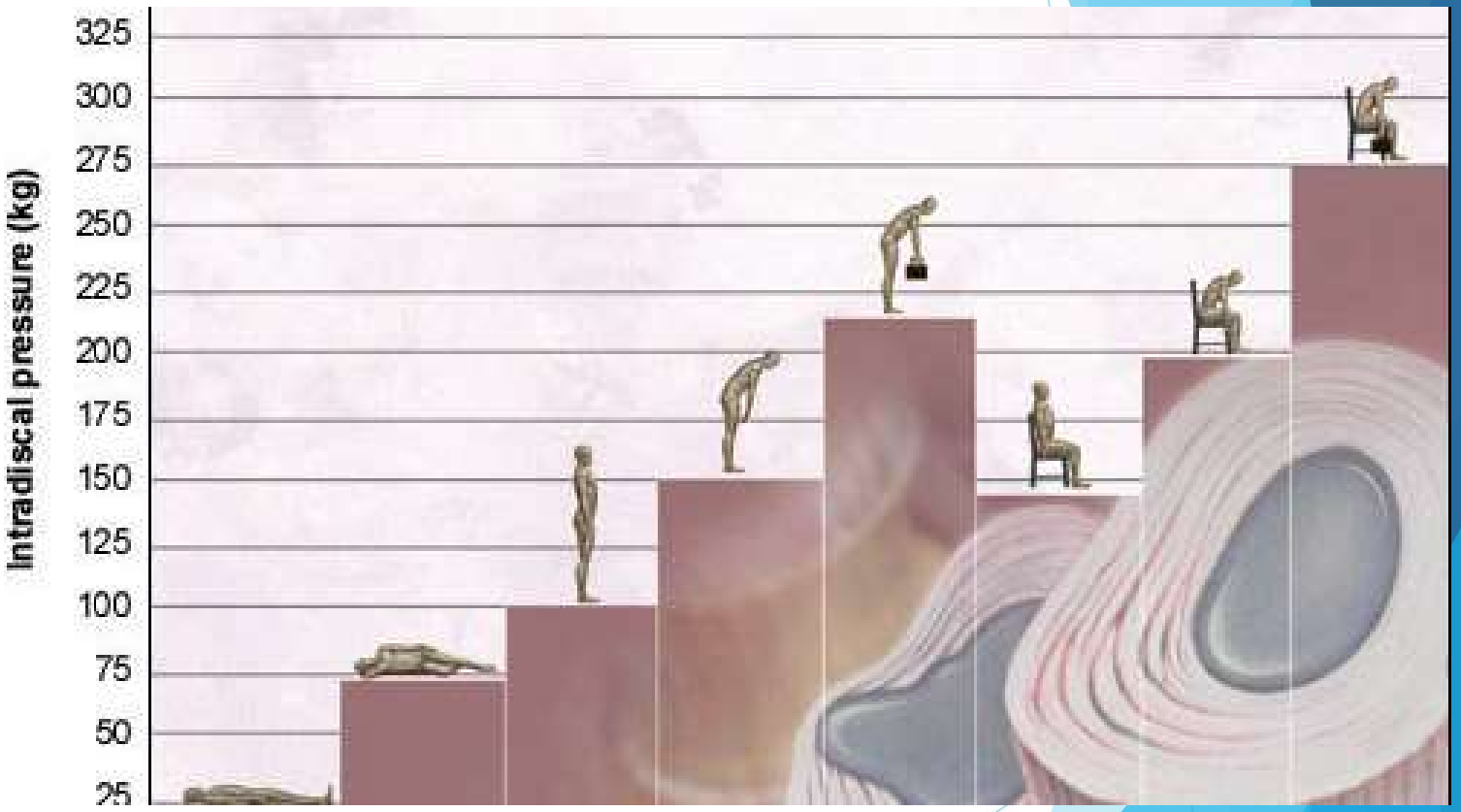


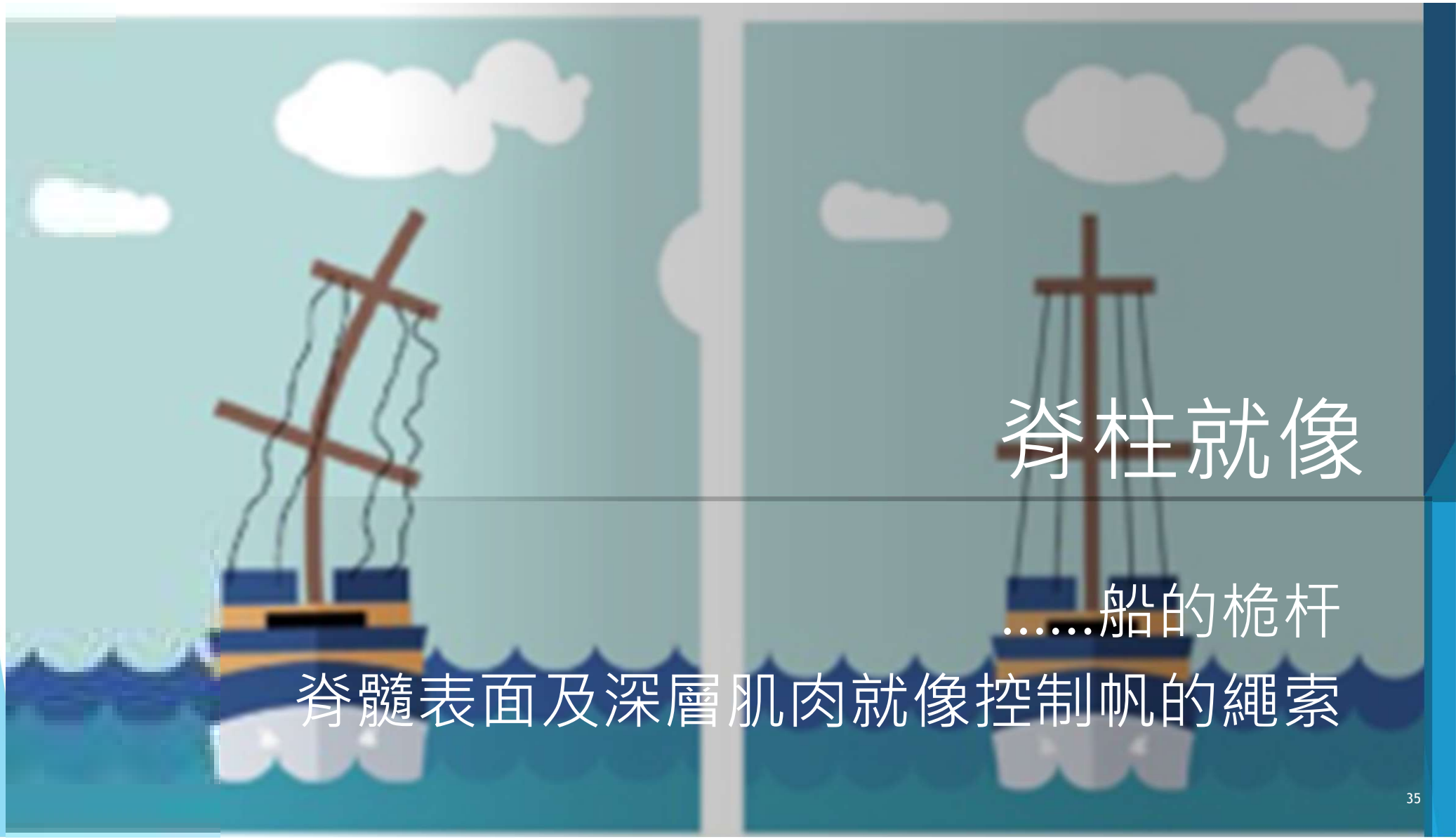


- 盂肱關節 – 靈活性
- 肩胛胸壁關節 - 穩定性
- 胸椎 - 靈活性
- 腰椎 – 穩定性
- 髖關節 – 靈活性
- 膝蓋 – 穩定性
- 腳踝 - 靈活性
- 中腳掌 - 穩定性



不同體位椎間盤壓力


Intradiscal pressure (kg)
325
300
275
250
225
200
175
150
125
100
75
50
25

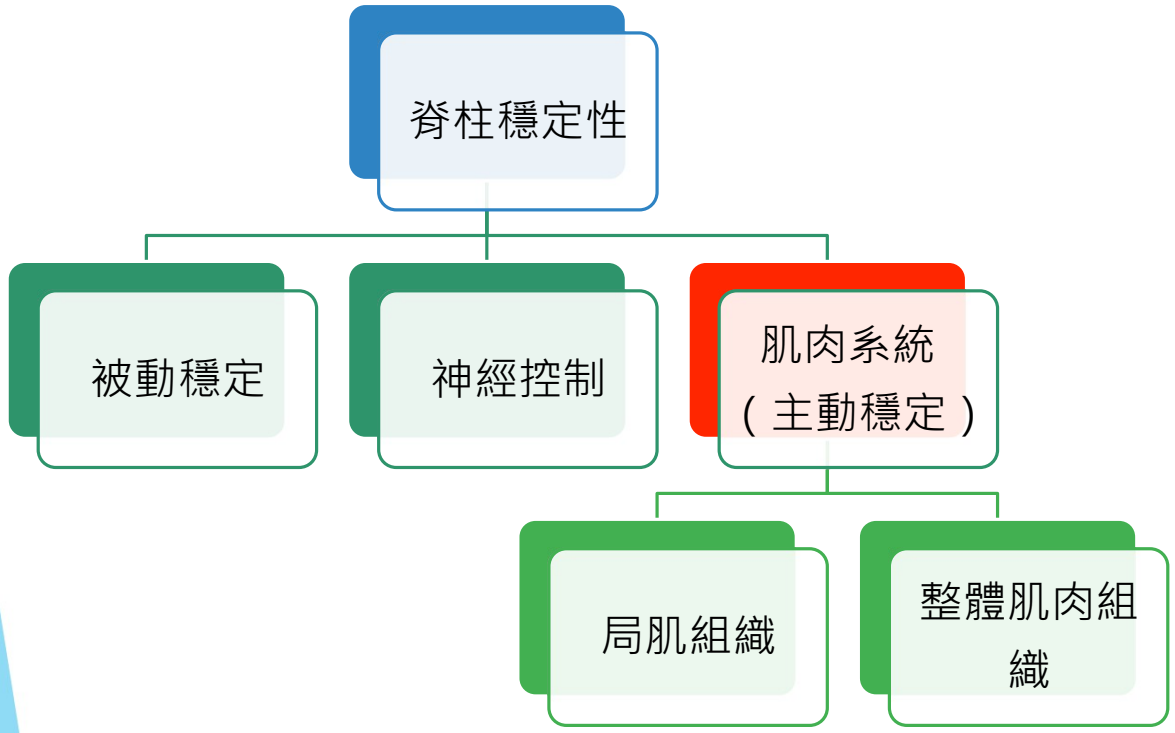


脊柱就像

……船的桅杆

脊髓表面及深層肌肉就像控制帆的繩索

Panjabi (2003)脊椎穩定的概念



Panjabi,1992脊柱穩定性模型

組成部分:

1. 被動穩定骨骼, 關節與韌帶
2. 神經控制單元 (Neural mediation)
   根據運動需要調整脊柱穩定性
3. 肌肉系統 (主動穩定器), 由廣泛Global和局部Local肌肉組成

脊柱中立位置和完全彎曲之間的負載比較（N）

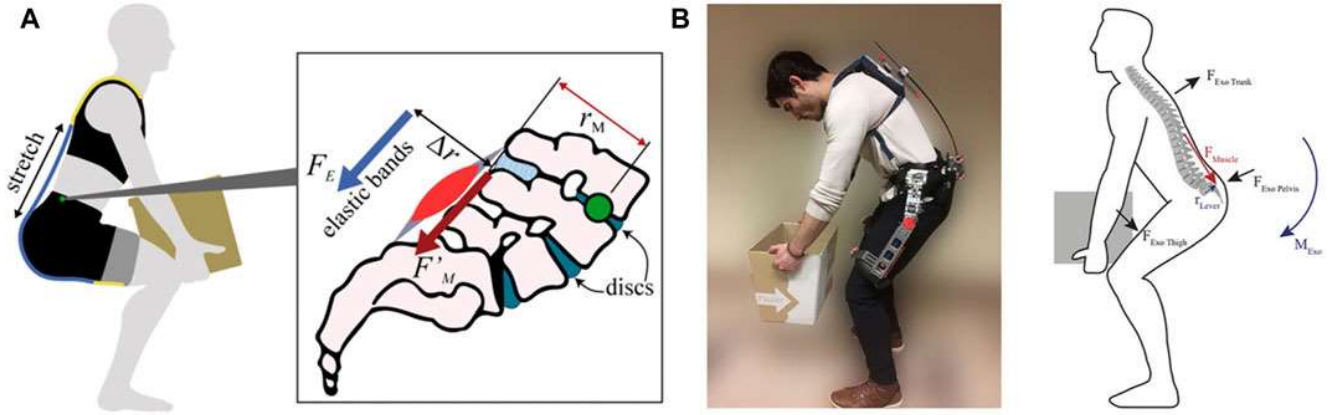
	完全彎曲(N)	中立位置(N)
Anterior longitudinal	0	0
Posterior longitudinal	86	0
Ligamentum flavum	21	3
R intertransverse	14	0
L intertransverse	14	0
R articular	74	0
L articular	74	0
R articular 2	103	0
L articular 2	103	0
Interspinous 1	**301**	0
Interspinous 2	**345**	0
Interspinous 3	**298**	0
Supraspinous	**592**	0
R lumbodorsal fascia	122	0
L lumbodorsal fascia	122	0

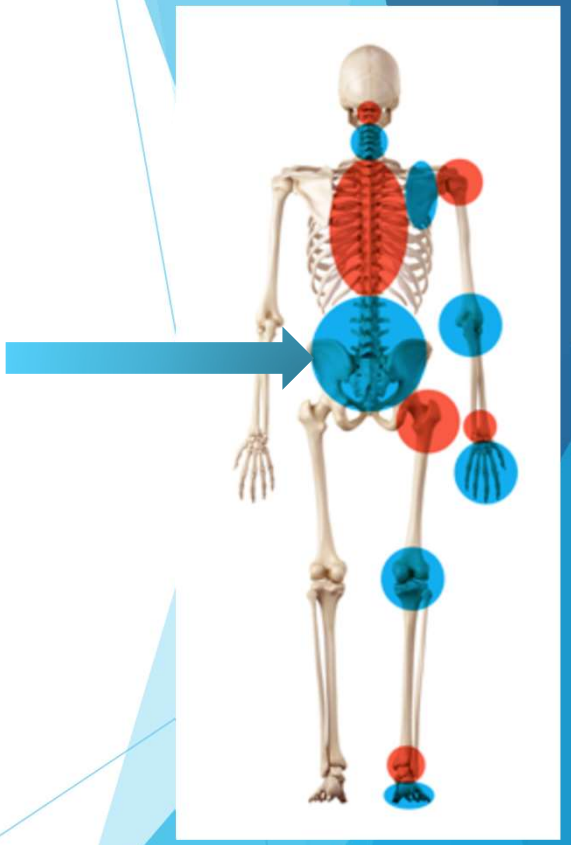
重新定義肌肉平衡

Video!!!

腰椎位置穩定性

侍應生的鞠躬 (視頻)

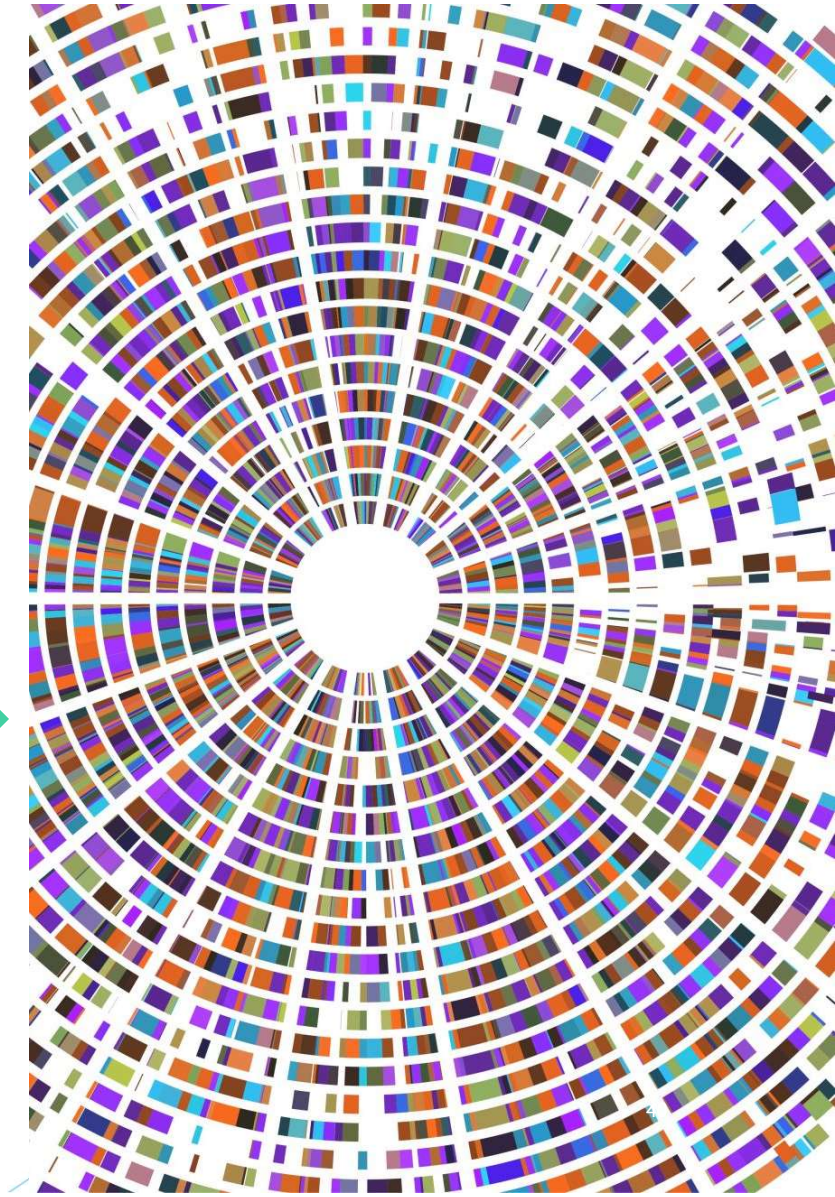




Video skinfold at lumbar region – neutral spine

訓練次序

改善靈活性 → 增加穩定性



Motor re-learning?

重新學習 - 基本動作模式

基本動作模式概念





蹲

- 髖、膝、踝三關節同時屈/伸 (triple flexion/extension)

STABILITY

MOBILITY



上下樓梯



坐下和站起



搬運



彎腰撿東西



運動和消閑活動



家務



日常行走



鉸鏈動作

以髖關節主導的屈伸動作



站立平衡



坐下和站起



搬運



彎腰撿東西



運動表現



家務



日常行走



弓步

要求單腿力量、平衡及髖部穩定



上下樓梯



坐下和站起



搬運



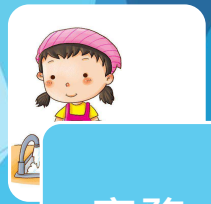
走路跑步



平衡能力



運動表現



家務



推

分為水平推(肩胛穩定)和

垂直推(核心收緊)



移動物件



坐下站起



推門



改善姿勢



平衡能力



運動表現



家務



拉

分為水平拉(肩胛骨後收)和

垂直拉(肩胛骨下沉)



移動物件



坐下站起



拉門/抽屜



改善姿勢



平衡能力



運動表現



家務



核心肌肉穩定支撐和平衡控制

- 穩定脊柱, 有效力量傳遞



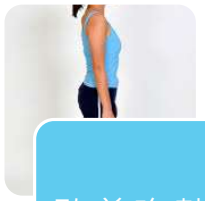
轉身和側向移動



坐下站起



彎腰撿東西



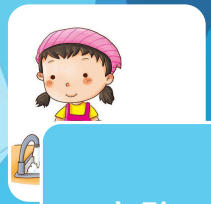
改善姿勢



提高平衡能力



運動表現

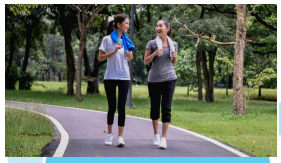


家務



旋轉

分為抗旋轉和旋轉



轉身和回頭



執物件



社交互動



提高平衡能力



運動表現



家務

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謝謝