When can I play…….?





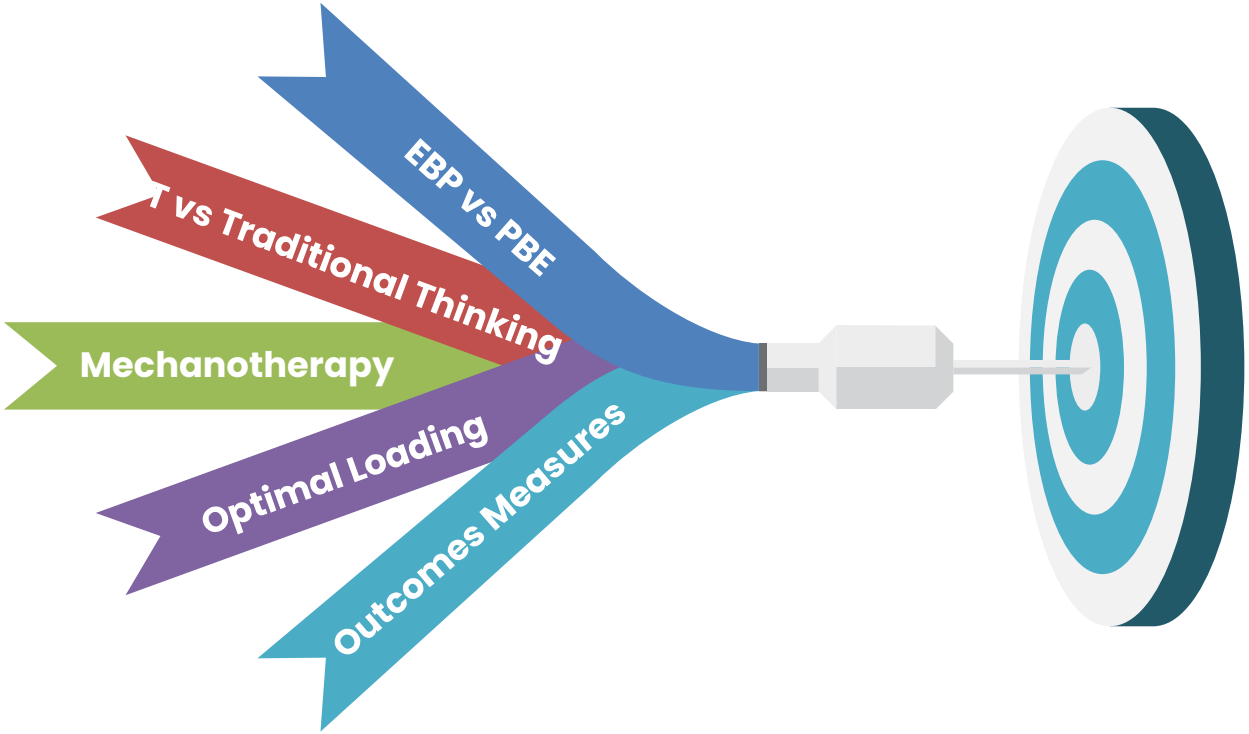


Optimal Movement
Clinical Research Experts

Presenter: Arnold Vlok (PhD Candidate)

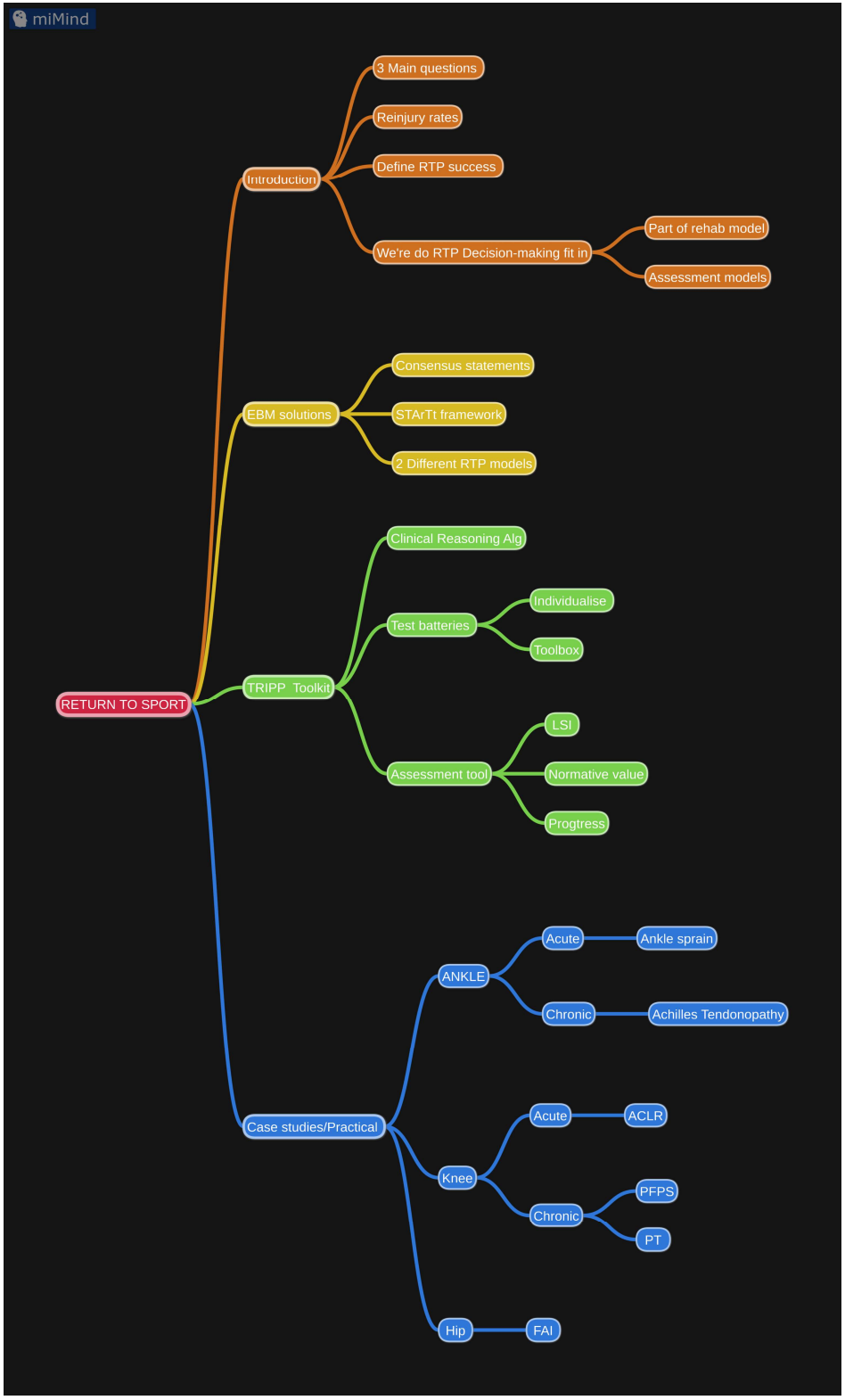
5 Elements in the Conceptual Framework

The why behind our thinking





Optimal CPD
Clinical Research Experts

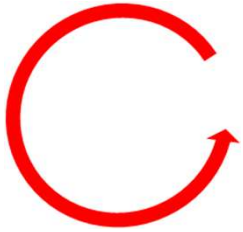




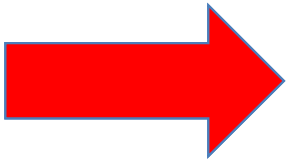
Optimal Movement
Clinical Research Experts

Optimal Movement ©

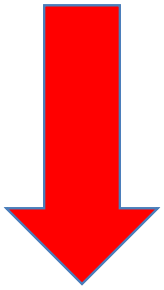
House Rules



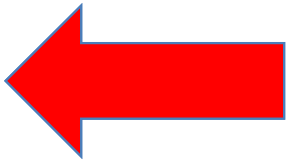
STAND ALONE CONCEPT



CONTINUE TO NEXT SLIDE



END OF CONCEPT



REFFERE TO PREVOUIS CONCEPT

Optimal Movement
Clinical Research Experts

Optimal Movement ©

Aim of workshop-G

Provoke the implementation of an EBM

Return to Sport Model in Clinical Practice





Context and perspective

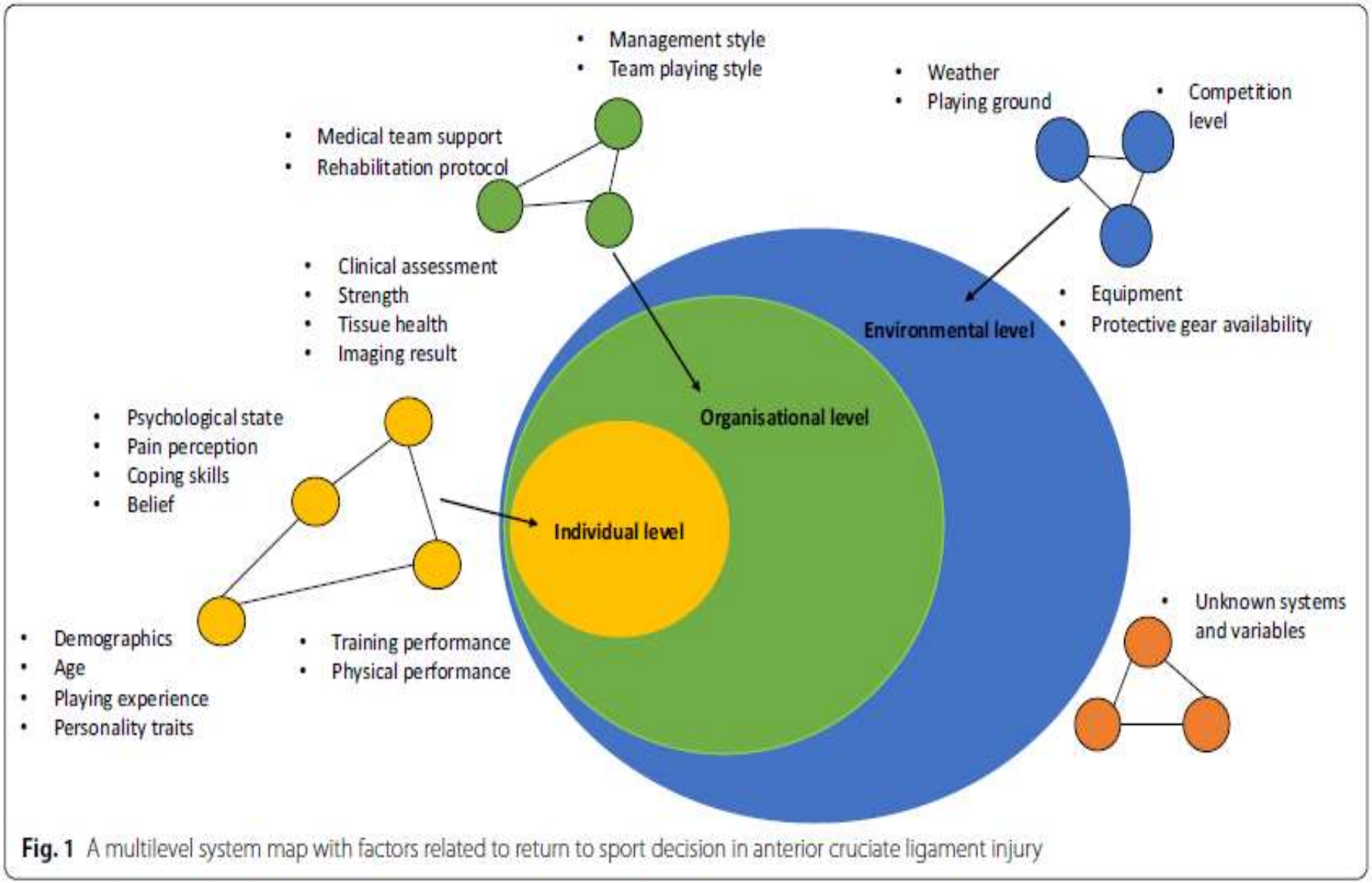
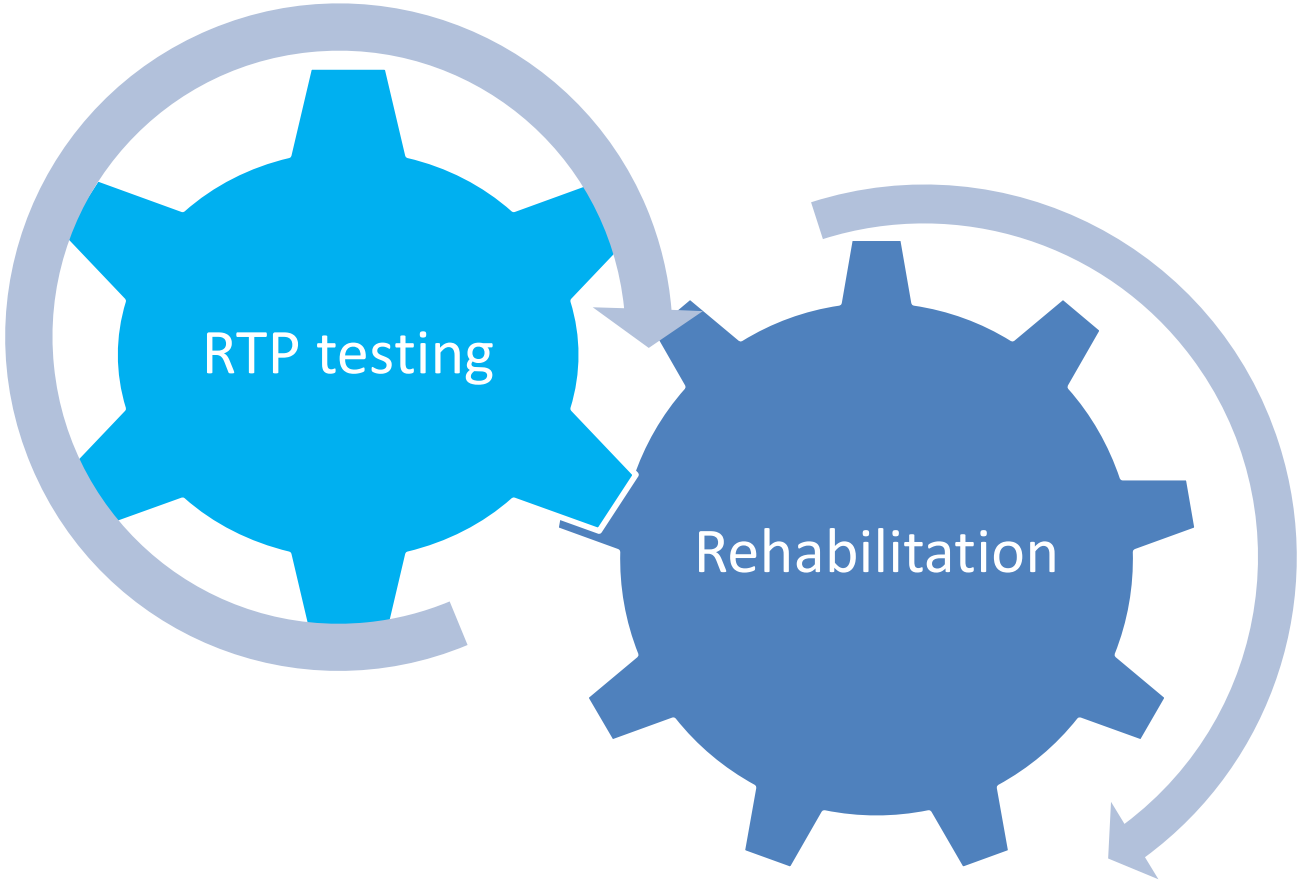


Fig. 1 A multilevel system map with factors related to return to sport decision in anterior cruciate ligament injury

Same, same BUT different!!



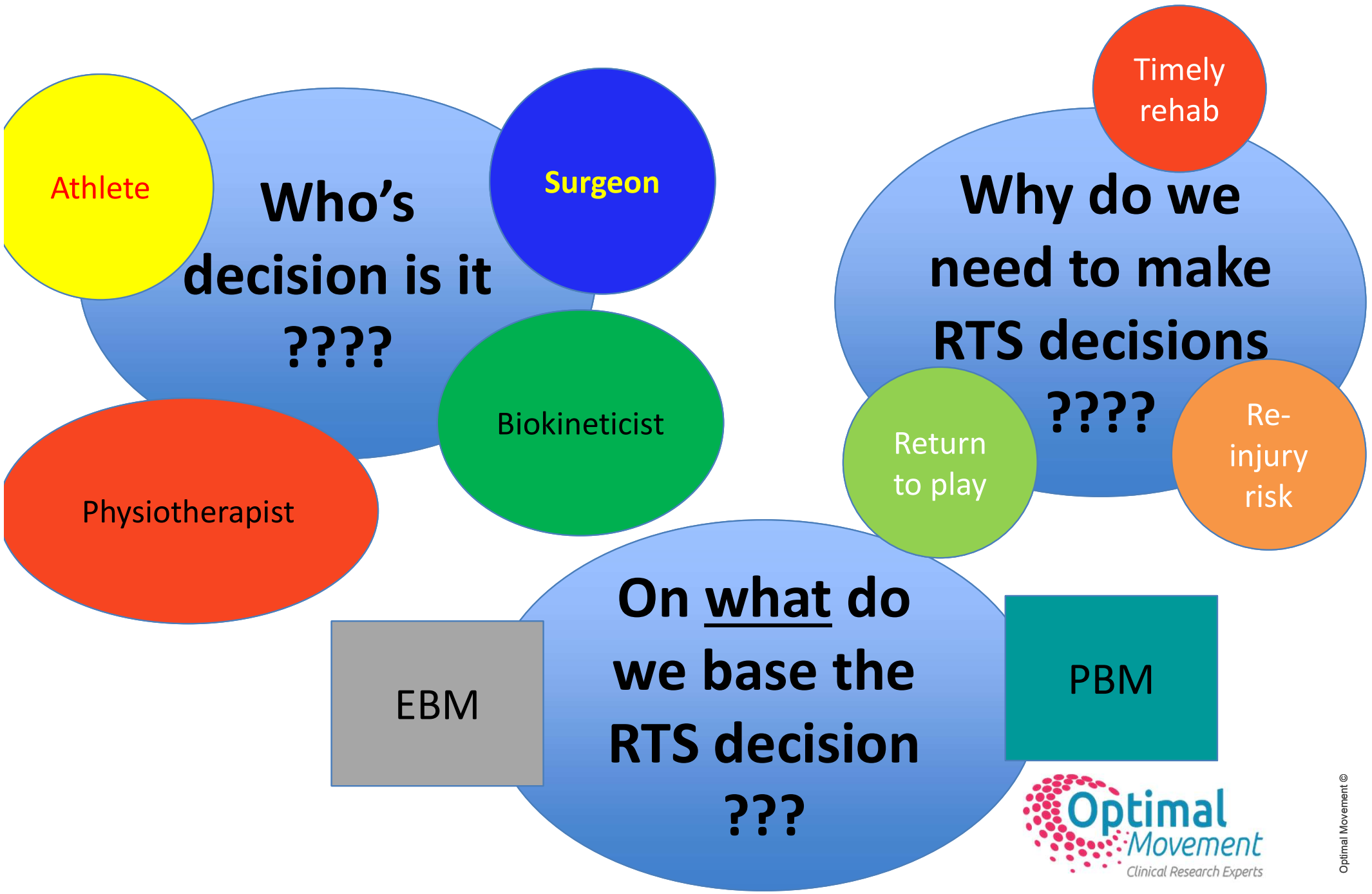
Optimal Movement
Clinical Research Experts

Optimal Movement ©

THREE MAIN QUESTIONS



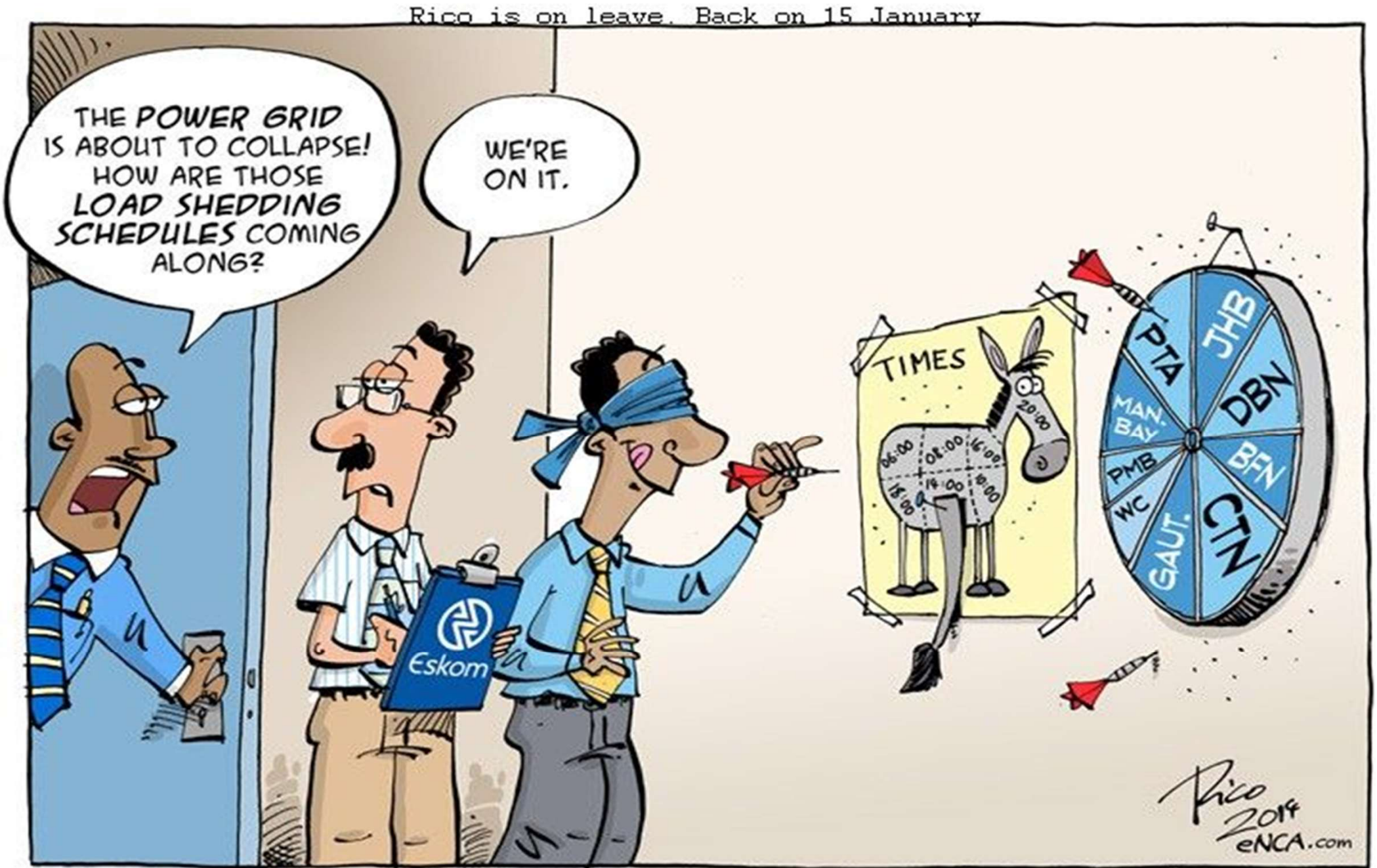
Return to Sport Decision-Making



Optimal Movement
Clinical Research Experts

Optimal Movement ©

Return to Sport Decision-Making
(Current Status in Clinical Practice)



Reinjury Rates and Subsequent Injuries

Is subsequent lower limb injury associated with previous injury? A systematic review and meta-analysis

Liam A Toohey,[1,2,3] Michael K Drew,[2,3] Jill L Cook,[1,3] Caroline F Finch,[1,3] Jamie E Gaida[4,5]

Injuries impair the chance of successful performance by sportspeople: a systematic review

Michael K Drew,[1,2] Ben P Raysmith,[1] Paula C Charlton[1]

Optimal Movement
Clinical Research Experts

Optimal Movement ©

Only 4 things can happened after Acute/Overuse injuries

- X% Return to Sport
- Y% Chronic Rehabber
- Z% Re-injury or subsequent injury
- W% Never go back to preferred levels of play pre-injury level

Optimal Movement
Clinical Research Experts

Optimal Movement ©

Common pitfalls in the return to sport decision-making process

- One size fits all

  “Start the biodex, my shoulder patient is coming”

- No Testing at all

  “ Am I better, yes for sure!

- Guessing

  When can I play again,



1.Definition on RTS success

2. Different Perspectives

3. Gap between rehabilitation and RTS



Optimal Movement
Clinical Research Experts

Define RTS success

(Glasgow, Optimal Loading 2017)

Athlete's performance on return

(**Performance Focus**)



Phil Glasgow Optimal Load Belfast 2017



Context

Outcome

Return to sustained participation in the shortest possible time

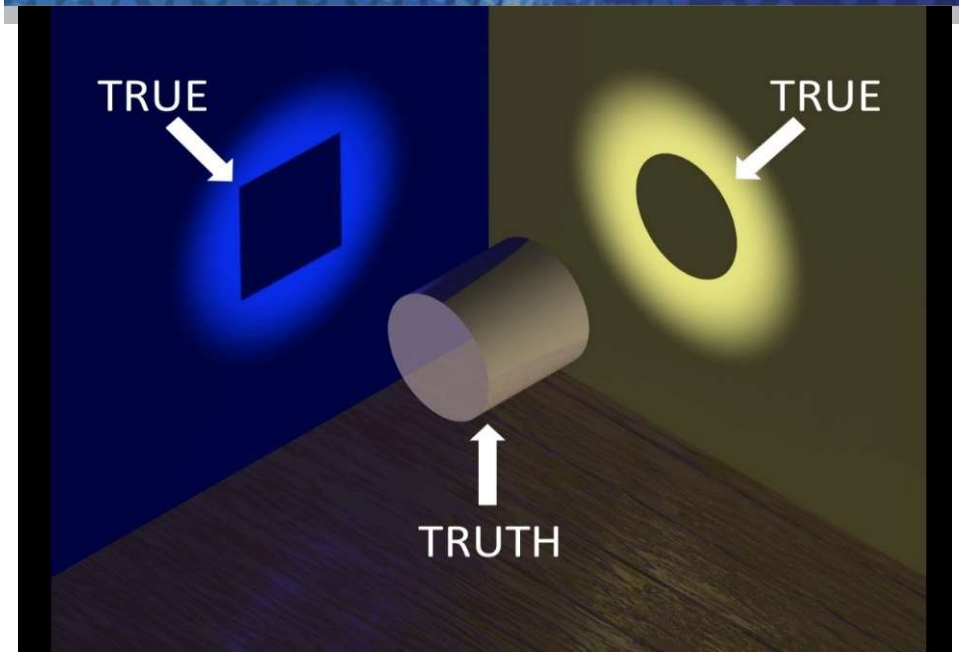
(**Goal Focus**)



Prevention of new (or recurring) injuries

(**Outcome Focus**)

Different Perspectives within Clinical Community





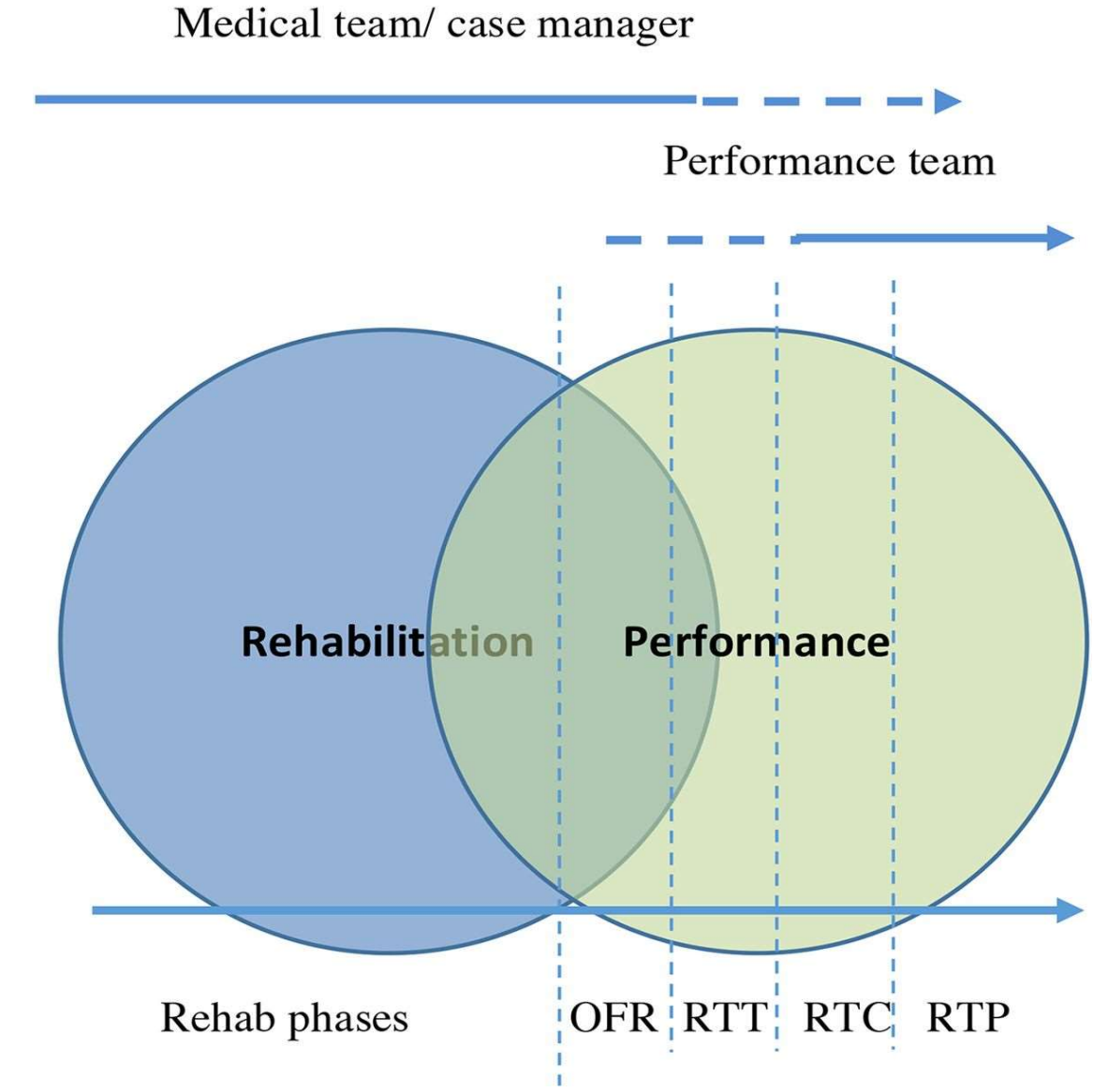


Optimal Movement
Clinical Research Experts

Optimal Movement ©

Functional Recovery Model

(Buckthorpe et al.,2019)





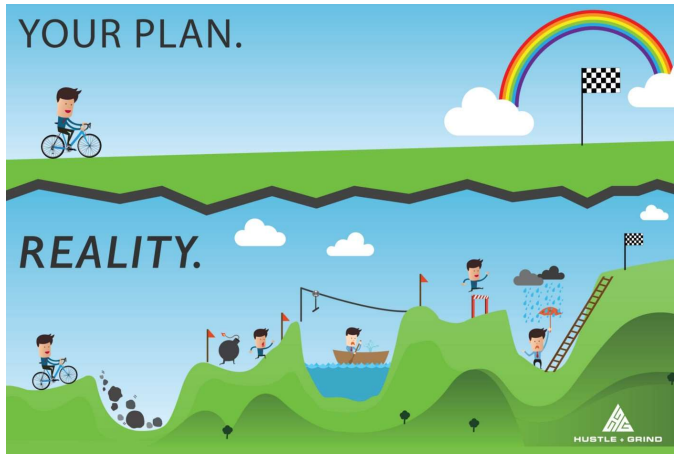


Optimal Movement
Clinical Research Experts

Optimal Movement ©

Mismatch = GAP

RTP testing



Rehabilitation

Optimal Movement
Clinical Research Experts

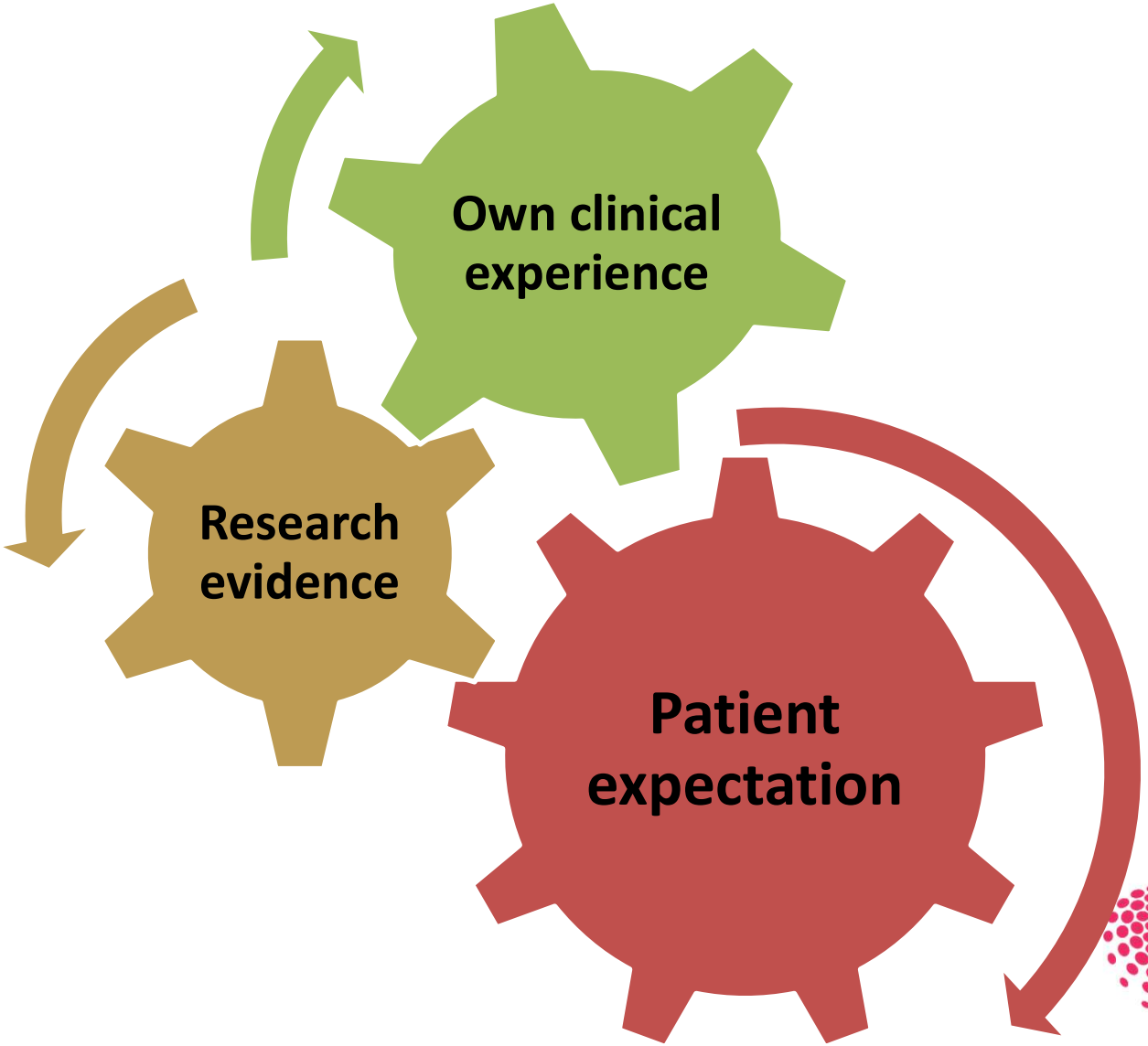
Optimal Movement ©

EBM SOLUTION



EBM DEFINED

(Sacott et al., 2008)



Optimal Movement
Clinical Research Experts

Optimal Movement ©

Consensus statement for RTS

(Ardern et al ., 2016)

2016 Consensus statement on return to sport from the First World Congress in Sports Physical Therapy, Bern

Clare L Ardern,[1,2,3] Philip Glasgow,[4,5] Anthony Schneiders,[6] Erik Witvrouw,[1,7] Benjamin Clarsen,[8,9] Ann Cools,[7] Boris Gojanovic,[10,11] Steffan Griffin,[12] Karim M Khan,[13] Håvard Moksnes,[8,9] Stephen A Mutch,[14,15] Nicola Phillips,[16] Gustaaf Reurink,[17] Robin Sadler,[18] Karin Grävare Silbernagel,[19] Kristian Thorborg,[20,21] Arnlaug Wangensteen,[1,8] Kevin E Wilk,[22] Mario Bizzini[23]

RETURN TO PARTICIPATION → **RETURN TO SPORT** → **RETURN TO PERFORMANCE**



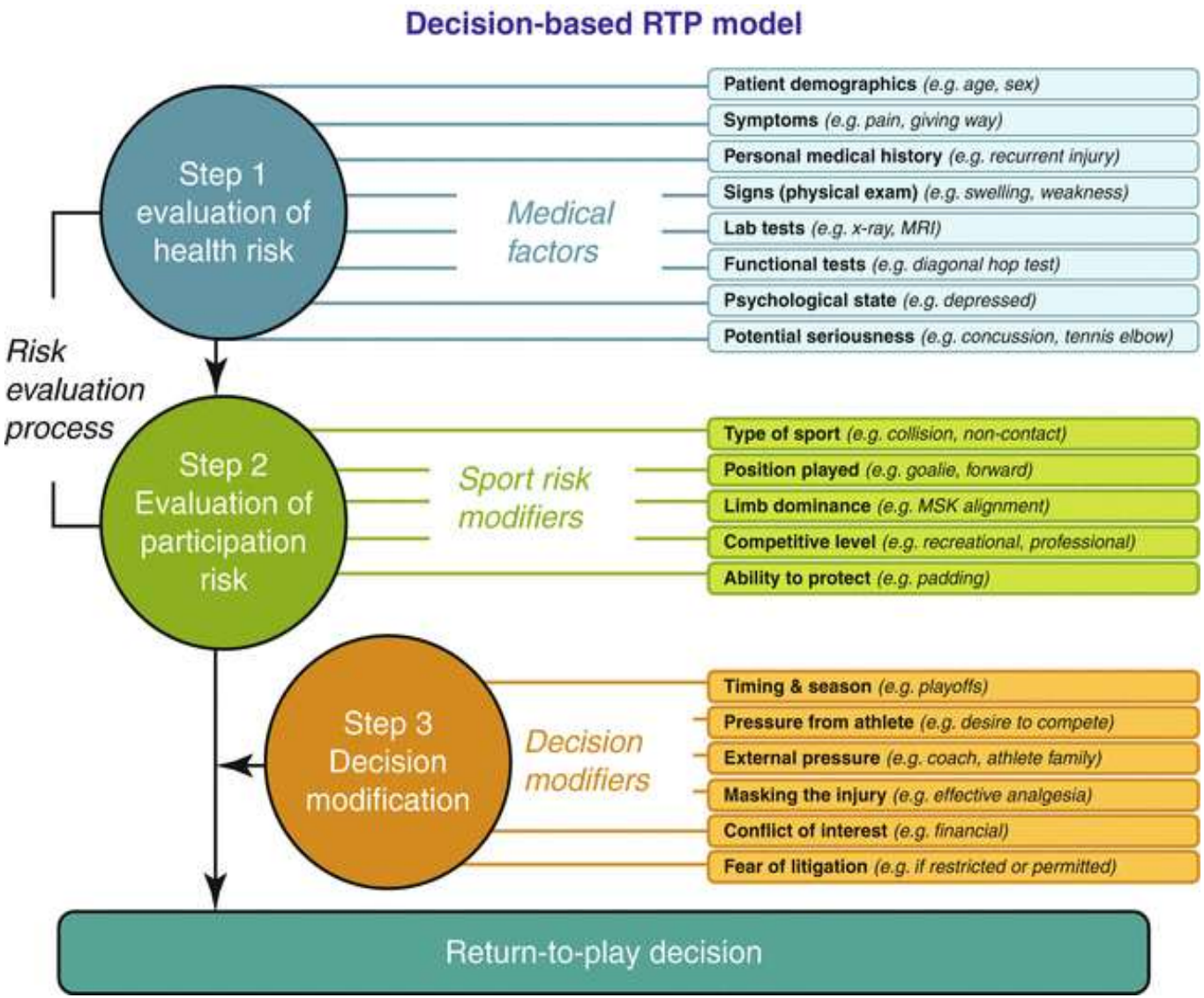
© Can Stock Photo

Optimal Movement
Clinical Research Experts

Optimal Movement ©

Decision-Based RTP Model

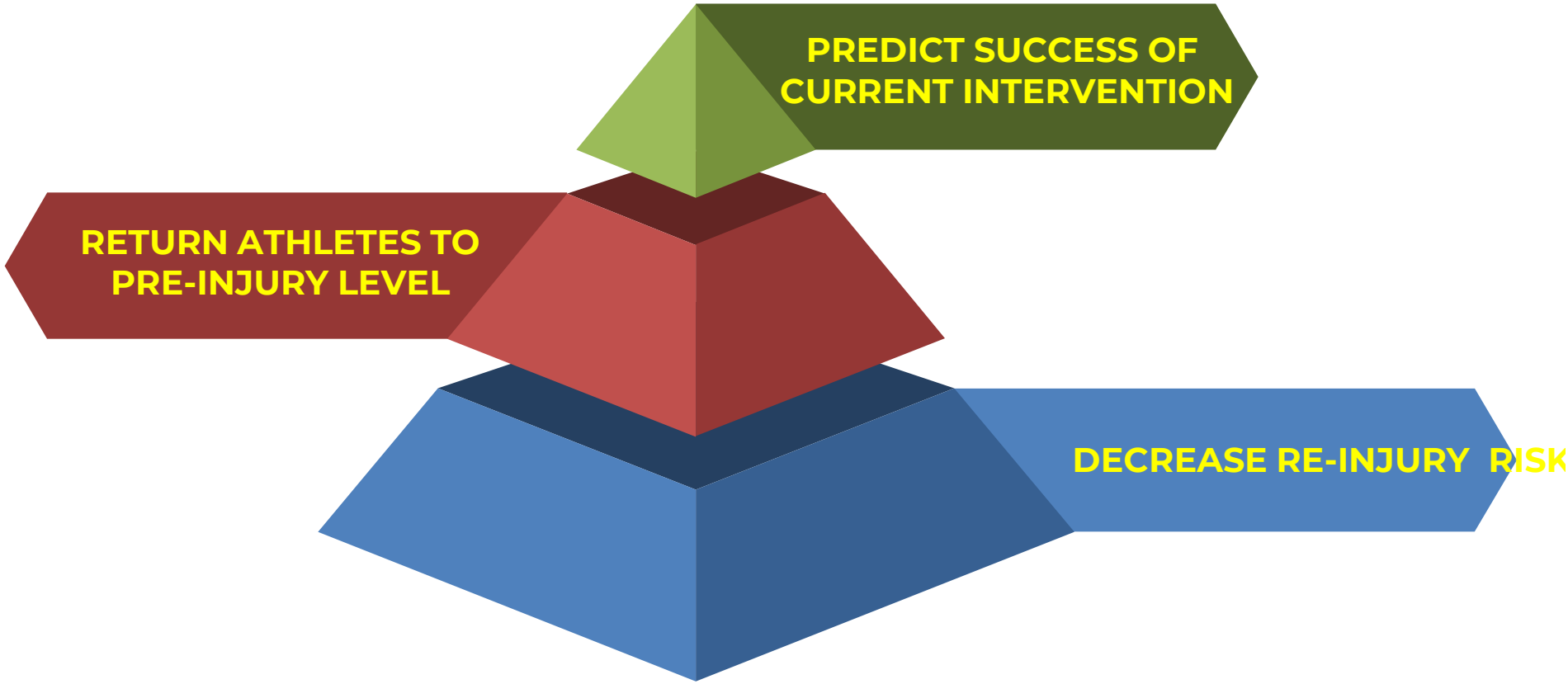
(Creighton et al ., 2010)



Optimal Movement
Clinical Research Experts

Optimal Movement ©

One Common Goal

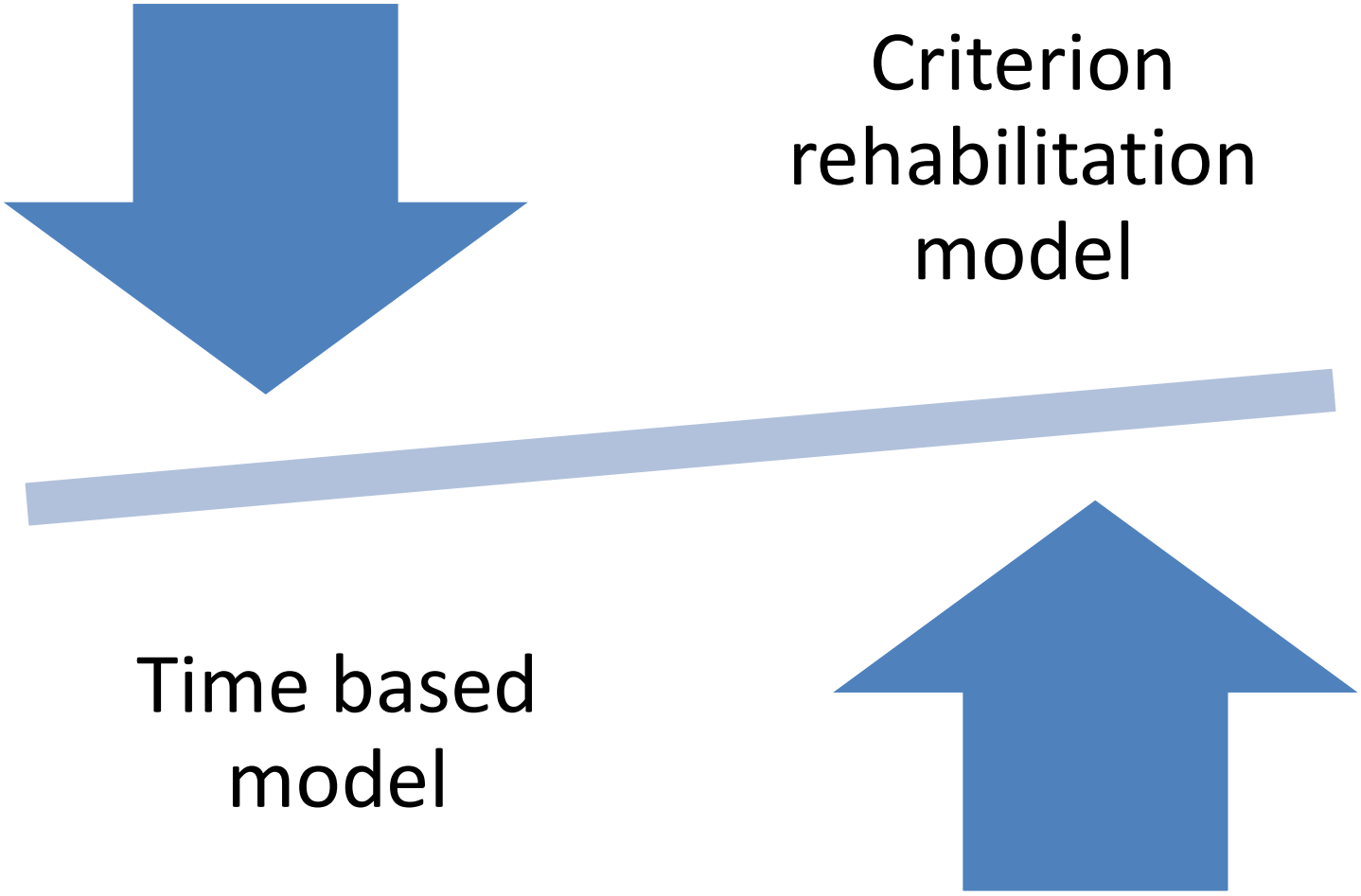


Optimal CPD
Clinical Research Experts

Different Return to Sport Models



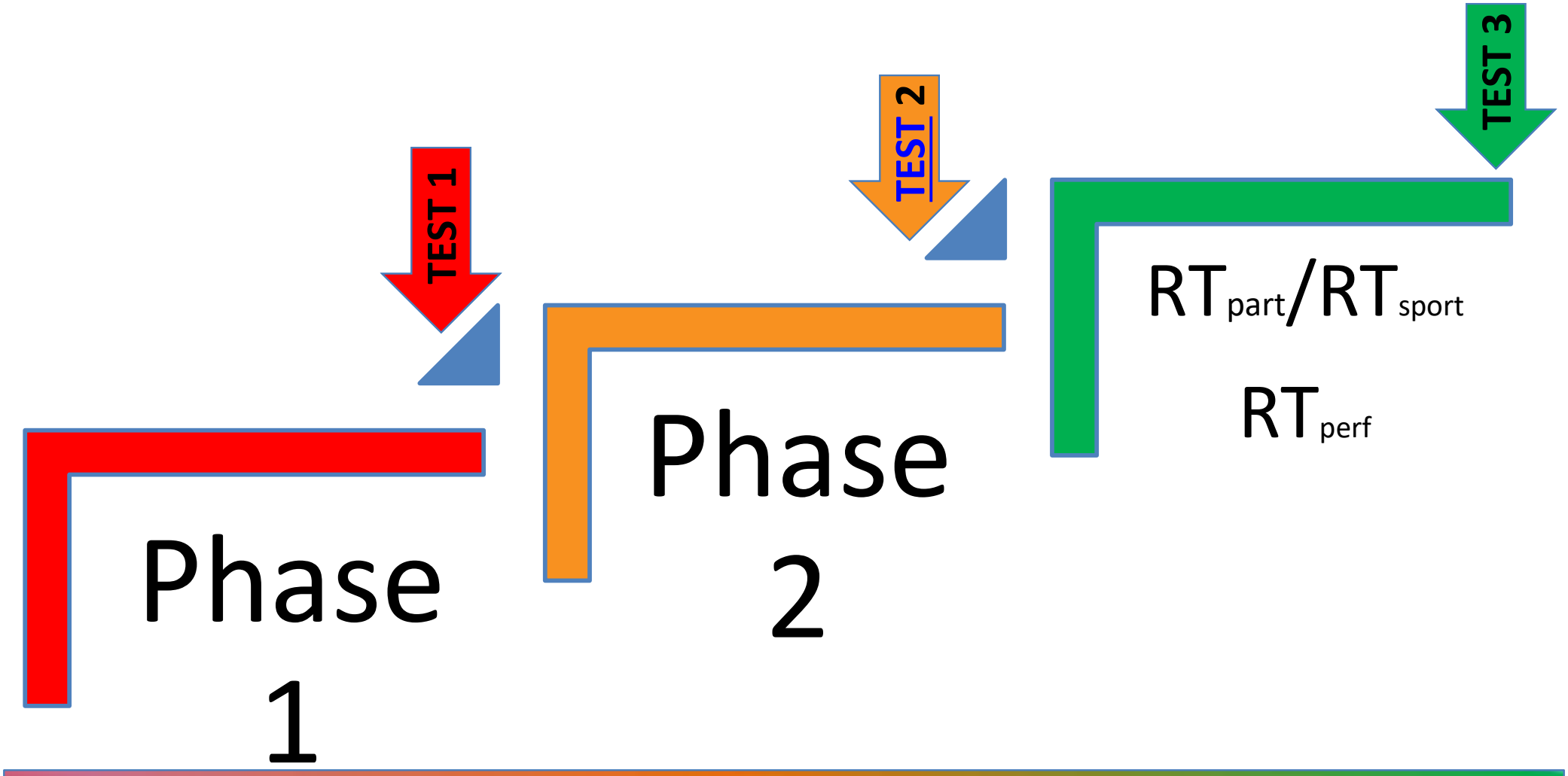
Two models for RTS decision-making



Optimal Movement
Clinical Research Experts

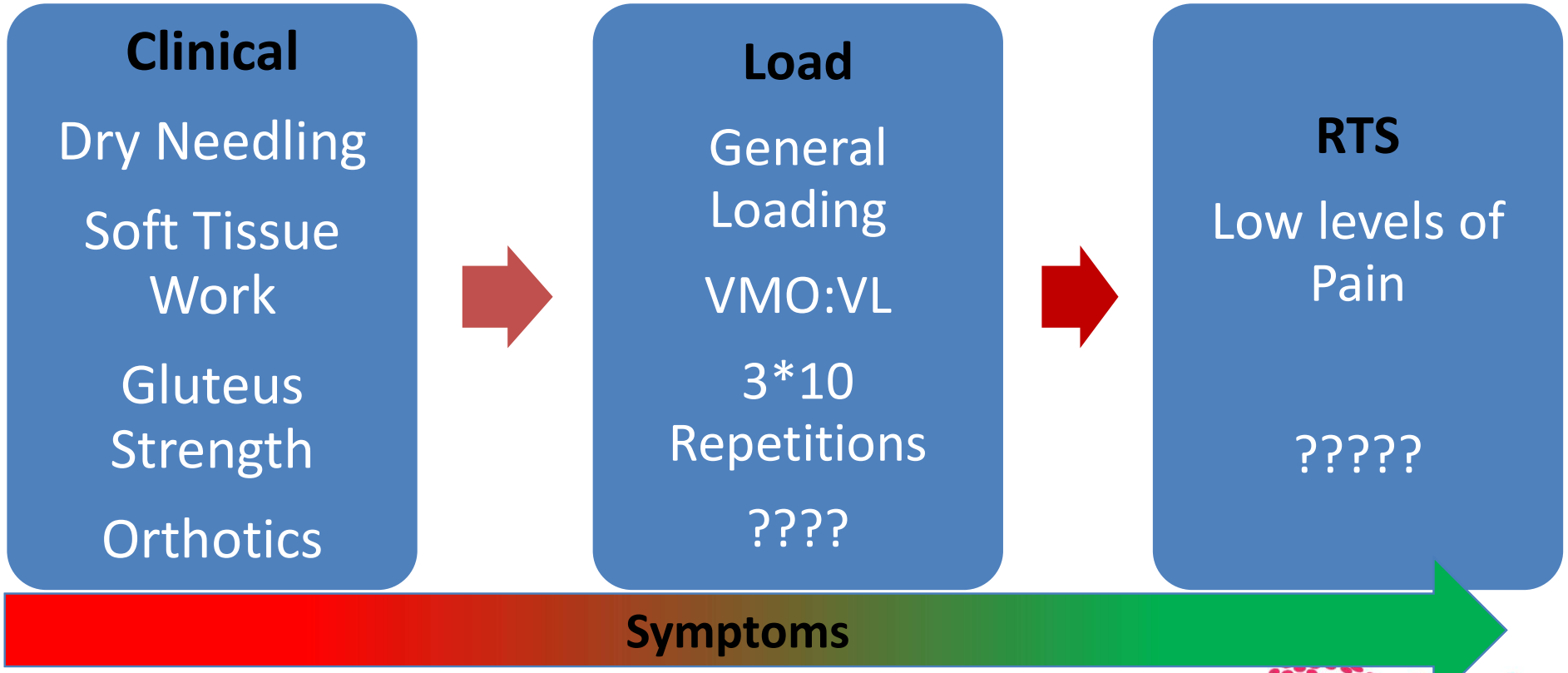
Optimal Movement ©

Criterion based Rehabilitation Model (Systemic Algorithm)



Time Based Rehabilitation Progression (Open Loop Clinical Assessment)

Primarily based on the healing responses of structure/tissue



Optimal Movement
Clinical Research Experts

Optimal Movement ©

If you can’t measure you can’t manage

1.Methodes to express outcomes measures

2. Force velocity curve

3.TRIPP Assessment tool



Define the purpose of testing

WHY

- Timely rehab
- RTP
- Re-injury risk

What

- Peak Force
- Strength Endurance
- Lower limb/upper limb biomechanics



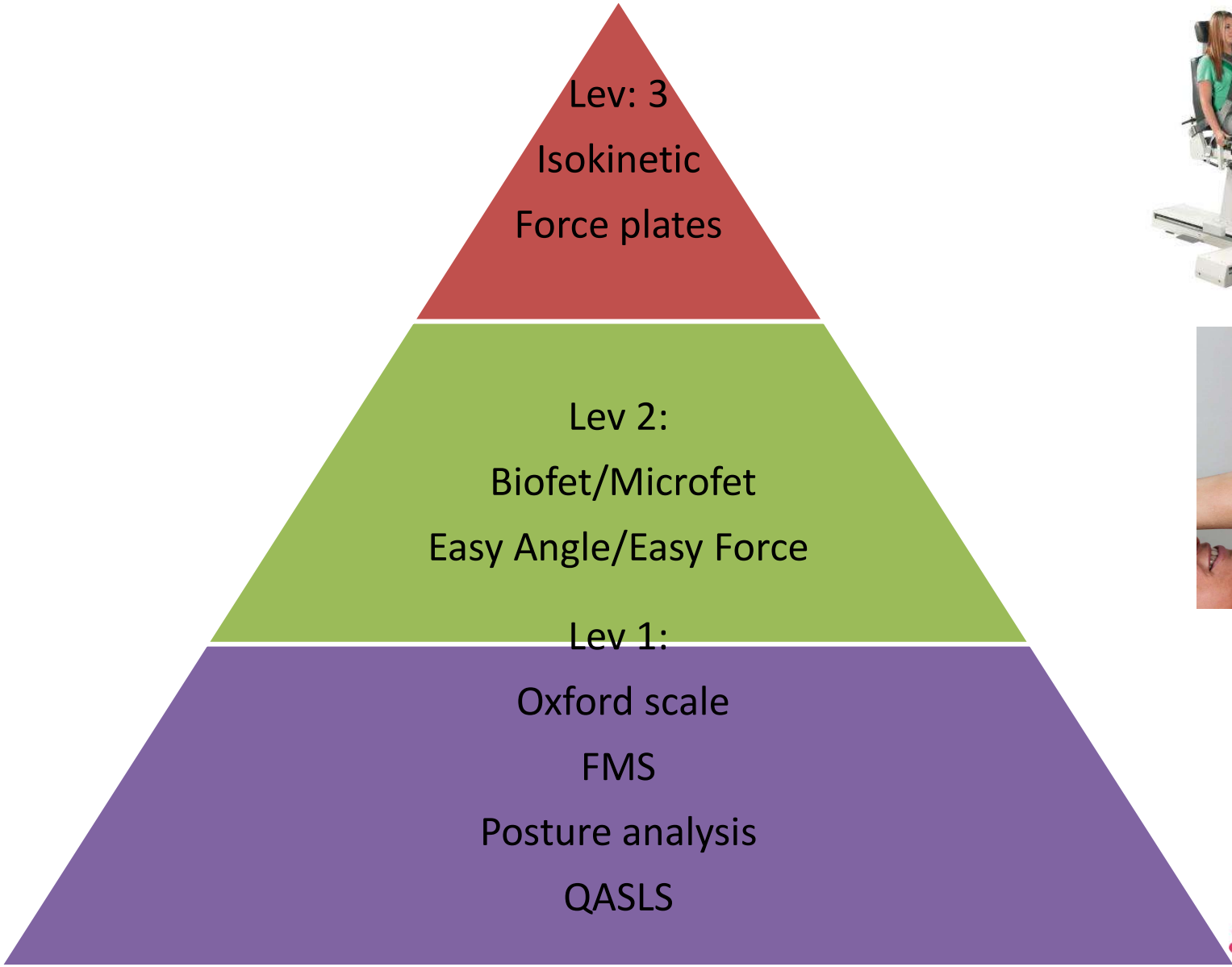
HOW

- Equipment???
- Focus points of the test

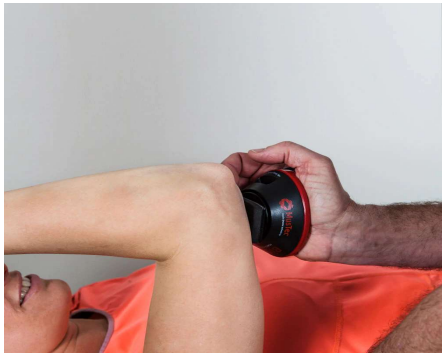
Optimal Movement
Clinical Research Experts

Optimal Movement ©

Validity and level of testing





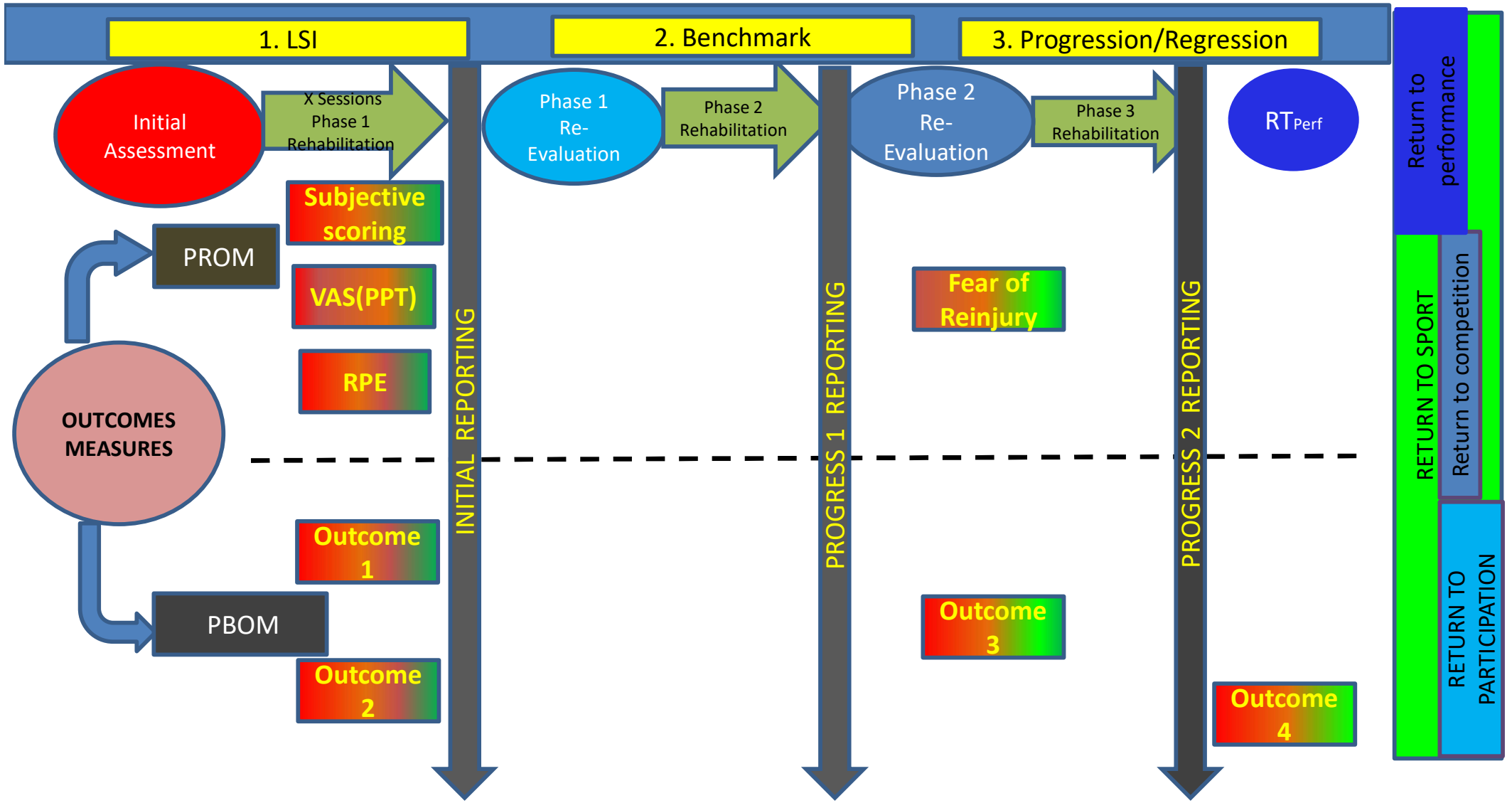




Movement
Clinical Research Experts

Optimal Movement ©

TRIPP ASSESSMENT TOOL FOR RETURN TO SPORT CONSIDERATIONS



Healing Responses of Particular Structure

Different methods to express outcomes measures

1

LEG SYMMETRY INDEX(LSI)

Difference between Injured and Uninjured

Formula: Symmetry is 100%

Involved/Uninvolved*100%/1

2

BENCHMARK

Compare current status to normative values for specific demands

Formula:

Benchmark – Current value

3

PROGRESSION/REGRESSION

Indicate the progress or regression been made within a specific timeframe

Formula:

Current value – Previous Value

Optimal CPD
Clinical Research Experts

Preparation for Practical:

1. Patho-Physiology of AT
2. EBM Rehabilitation Considerations
3. Return to sport test battery



Stress-Strain

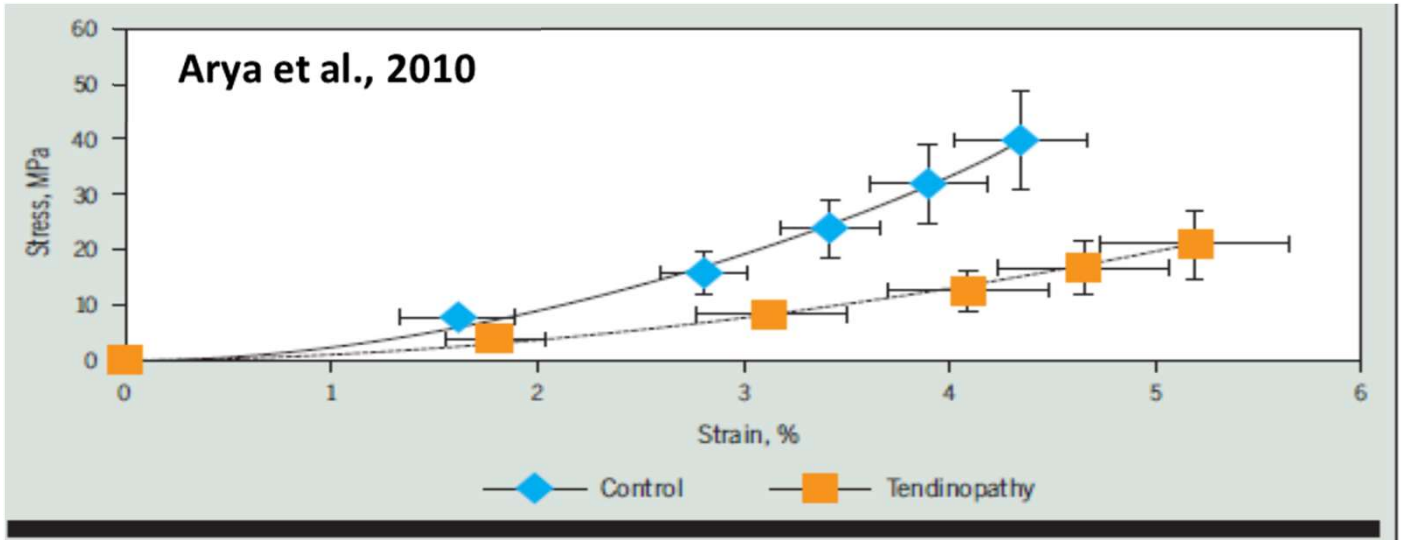
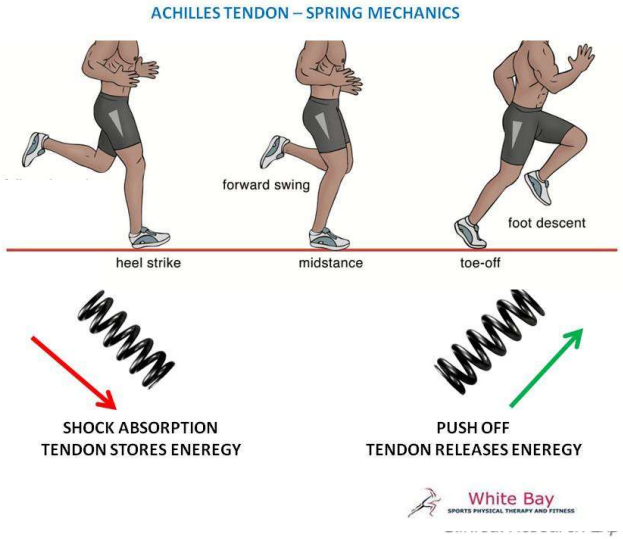


FIGURE 2. Functional impairment in chronic human Achilles tendinopathy. The average stress-strain curve of tendinopathic Achilles tendons indicates a decline in material properties, including modulus and energy storage, compared to normal tendon. Reprinted from Arya and Kulig.[8] Reproduced with permission of the American Physiological Society.







Optimal Movement ©

Pathological cascade with possible solutions

Decrease in tendon mechanical properties

Pathological changes on fibril structure (Macro Structural level)



Separation of collagen fibres

Increase in collagen type 3 formation and decrease in Fibril density

Decrease in tendon tensile stiffness and CSA

Tendon lose capacity to transfer mechanical load

Load the tendon through mechanotherapy

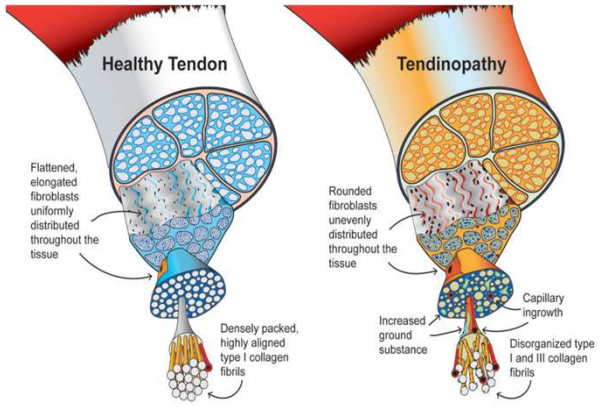
(Isom, HSR(Ecc), SSC)

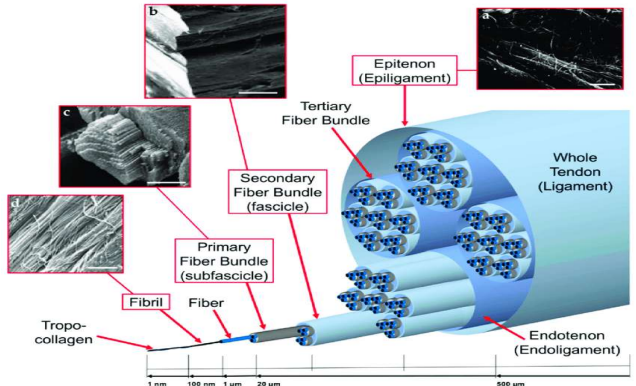
Right exercises lead to development of type 1 collagen

Formation of Type 1 Collagen- increase tendon fibril morphology and CSA

Intensity and Time under Tension seems to be the important modifiers

Goal: Produce tendons that can withstand the demand





Patho-aetiology of Achilles Tendinopathy



Altered Strength Profile in Achilles Tendinopathy: A Systematic Review and Meta-Analysis

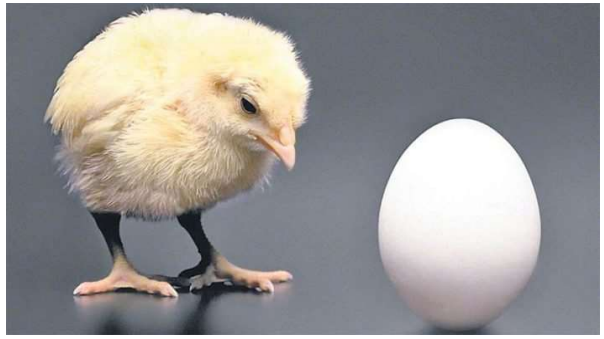
Seán McAuliffe, PhD, BSc*; Ariane Tabuena, BSc†; Karen McCreesh, PhD, BSc†; Mary O'Keeffe, PhD, BSc†; John Hurley, BSc†; Tom Comyns, PhD, BSc‡; Helen Purtill, PhD, BSc§; Seth O'Neill, PhD, BSc‖; Kieran O'Sullivan, PhD, BSc*†

Functional/ Structural changes caused…

Altered Kinematics (Hopping) (AT)

Altered Functional Performance (AT)





- **G-Max & G-Medius activation**
- **Ankle DF velocity; Knee flexion**
- **Reactive strength (16%-35%) Hop Height**
- ***Weighted*** **Maximal Strength 16-28%**

Optimal Movement
Clinical Research Experts

Optimal Movement ©

Patho-aetiology of Achilles Tendinopathy/ATR

A new measurement of heel-rise endurance with the ability to detect functional deficits in patients with Achilles tendon rupture

Karin Grävare Silbernagel · Katarina Nilsson-Helander · Roland Thomeé · Bengt I. Eriksson · Jón Karlsson





Altered Strength Profile in Achilles Tendinopathy: A Systematic Review and Meta-Analysis

Seán McAuliffe, PhD, BSc*; Ariane Tabuena, BSc†; Karen McCreesh, PhD, BSc†; Mary O'Keeffe, PhD, BSc†; John Hurley, BSc†; Tom Comyns, PhD, BSc‡; Helen Purtill, PhD, BSc§; Seth O'Neill, PhD, BSc||; Kieran O'Sullivan, PhD, BSc*†

CONCLUSIONS

Individuals with AT displayed deficits in maximal, reactive, and explosive strength compared with the uninjured side or asymptomatic controls. Our focus on maximal strength during assessments and rehabilitation, with little emphasis on explosive or reactive strength, possibly did not optimally match the entire strength spectrum. This could also explain why strengthening

Recreational runners with Achilles tendinopathy have clinically detectable impairments: A case-control study

Igor Sancho [a, b, *], Dylan Morrissey [a, c], Richard W. Willy [d], Abdulhamit Tayfur [a, c], Ion Lascurain-Aguirrebeña [e], Christian Barton [f, g, h], Peter Malliaras [i]

Optimal Movement
Clinical Research Experts

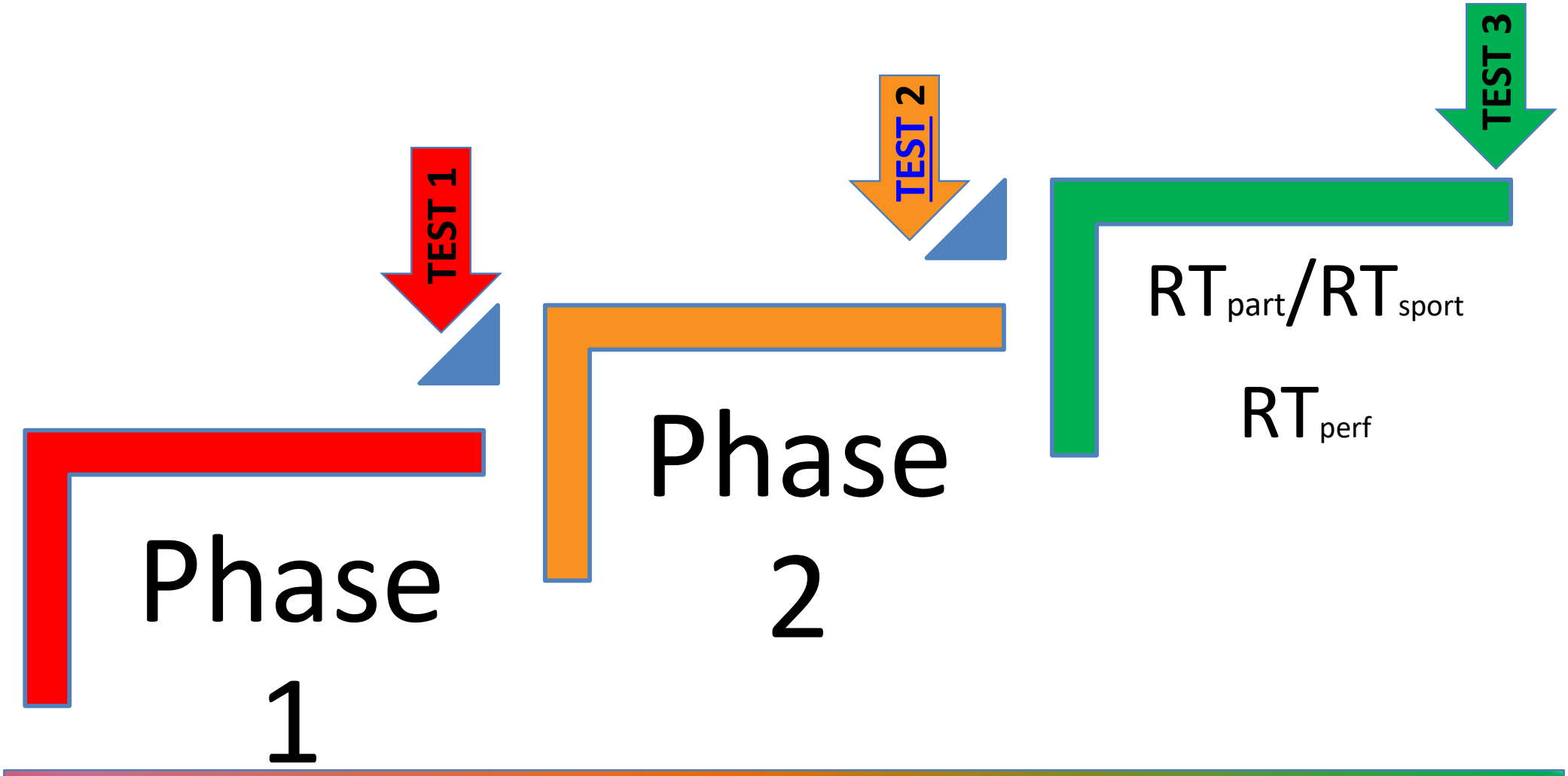
Optimal Movement ©

PRACTICAL : Achilles tendinopathy
(Graded test battery)

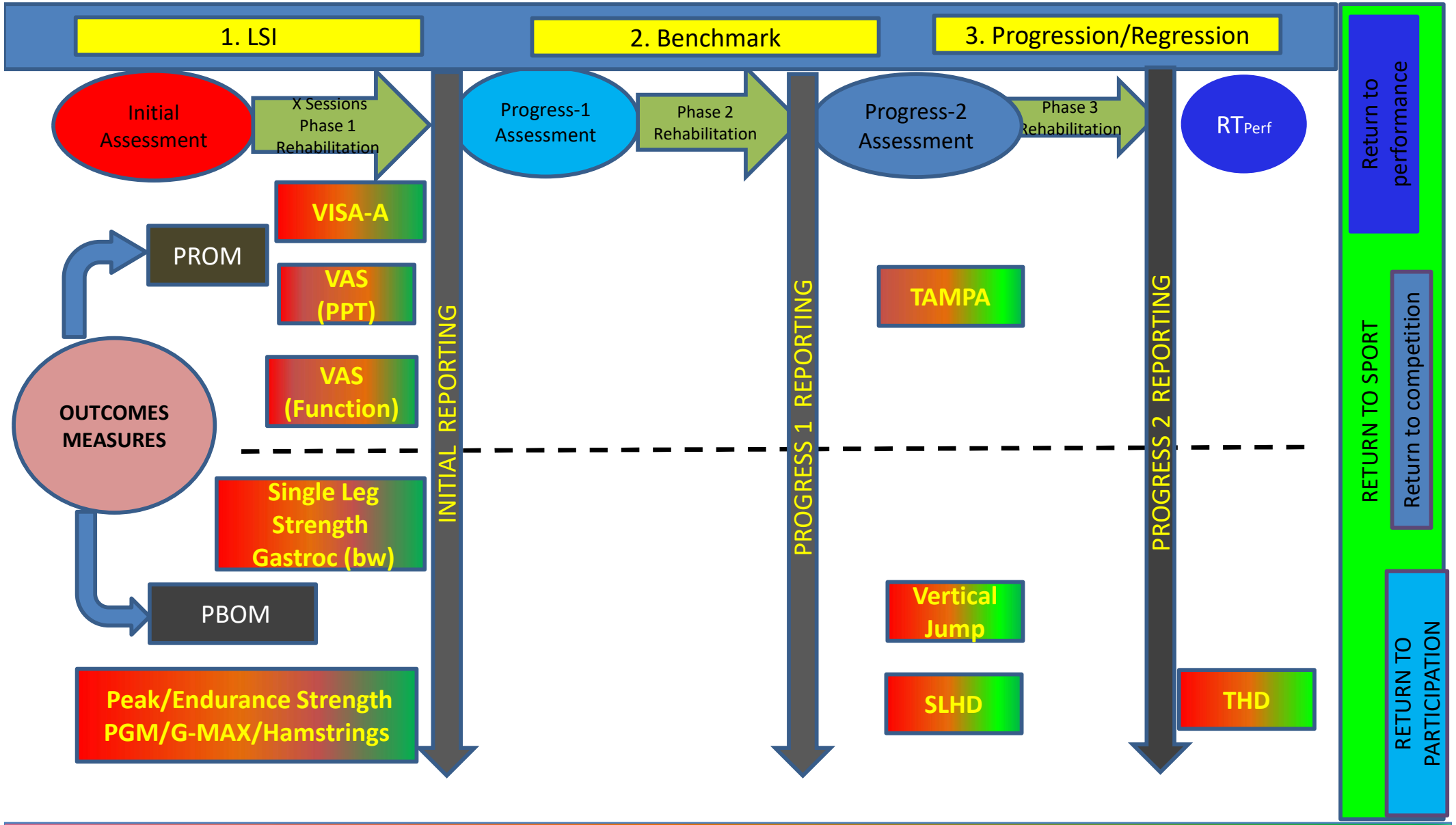


Optimal Movement
Clinical Research Experts

Criterion based Rehabilitation Model (Systemic Algorithm)

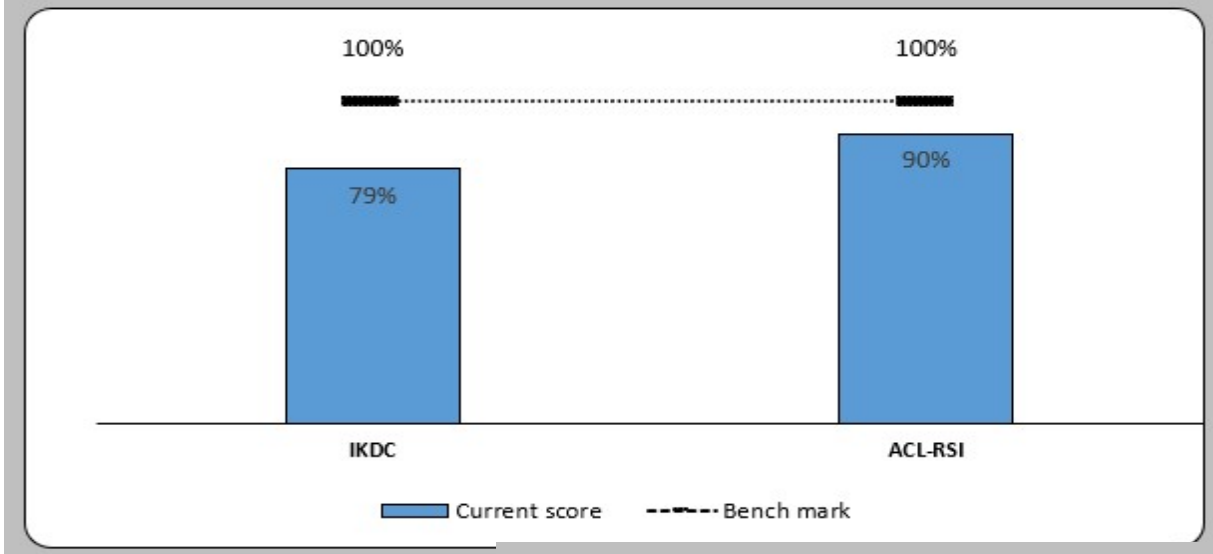


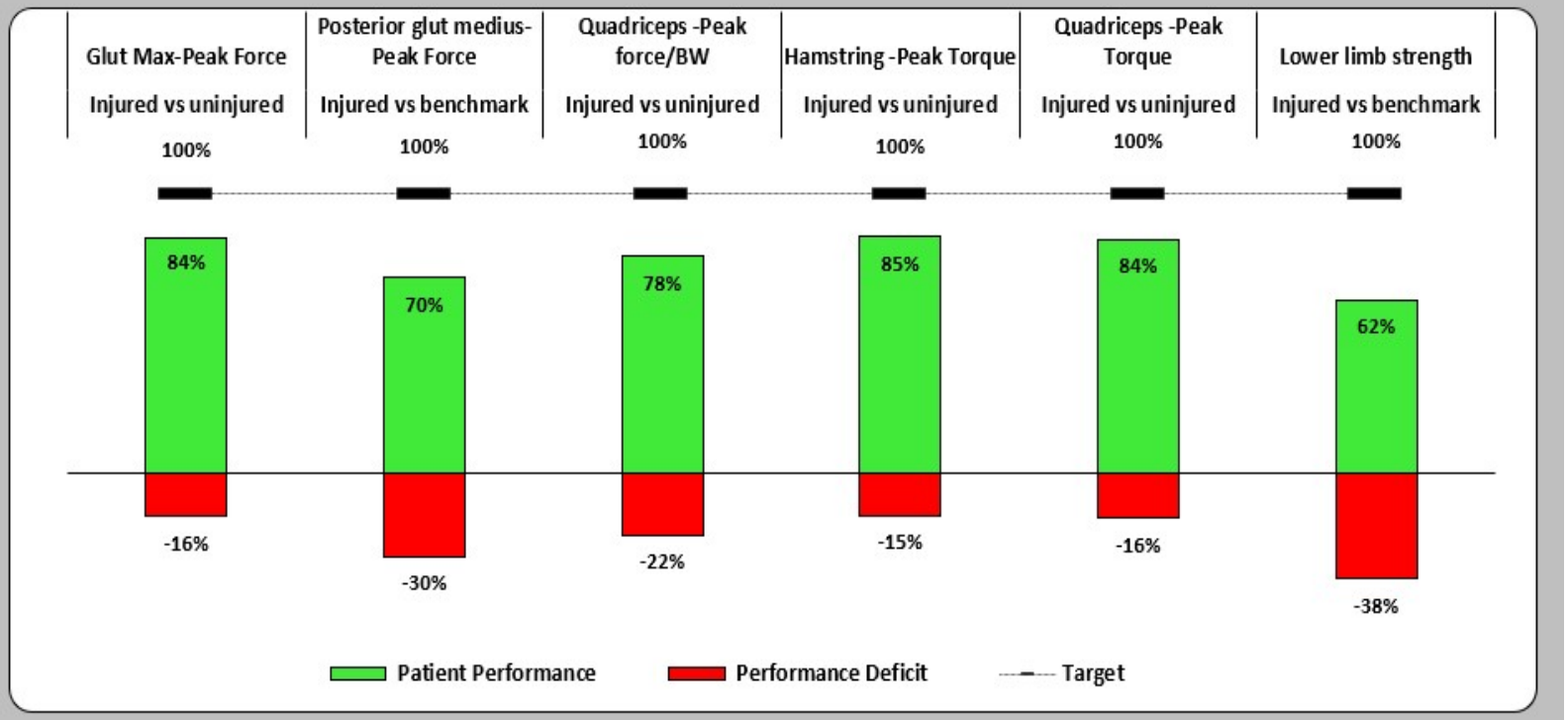
TRIPP ASSESSMENT TOOL FOR Achilles tendon RETURN TO SPORT TEST BATTERY



Healing Responses of Particular Structure

Bring it together in EXCELL reporting sheet



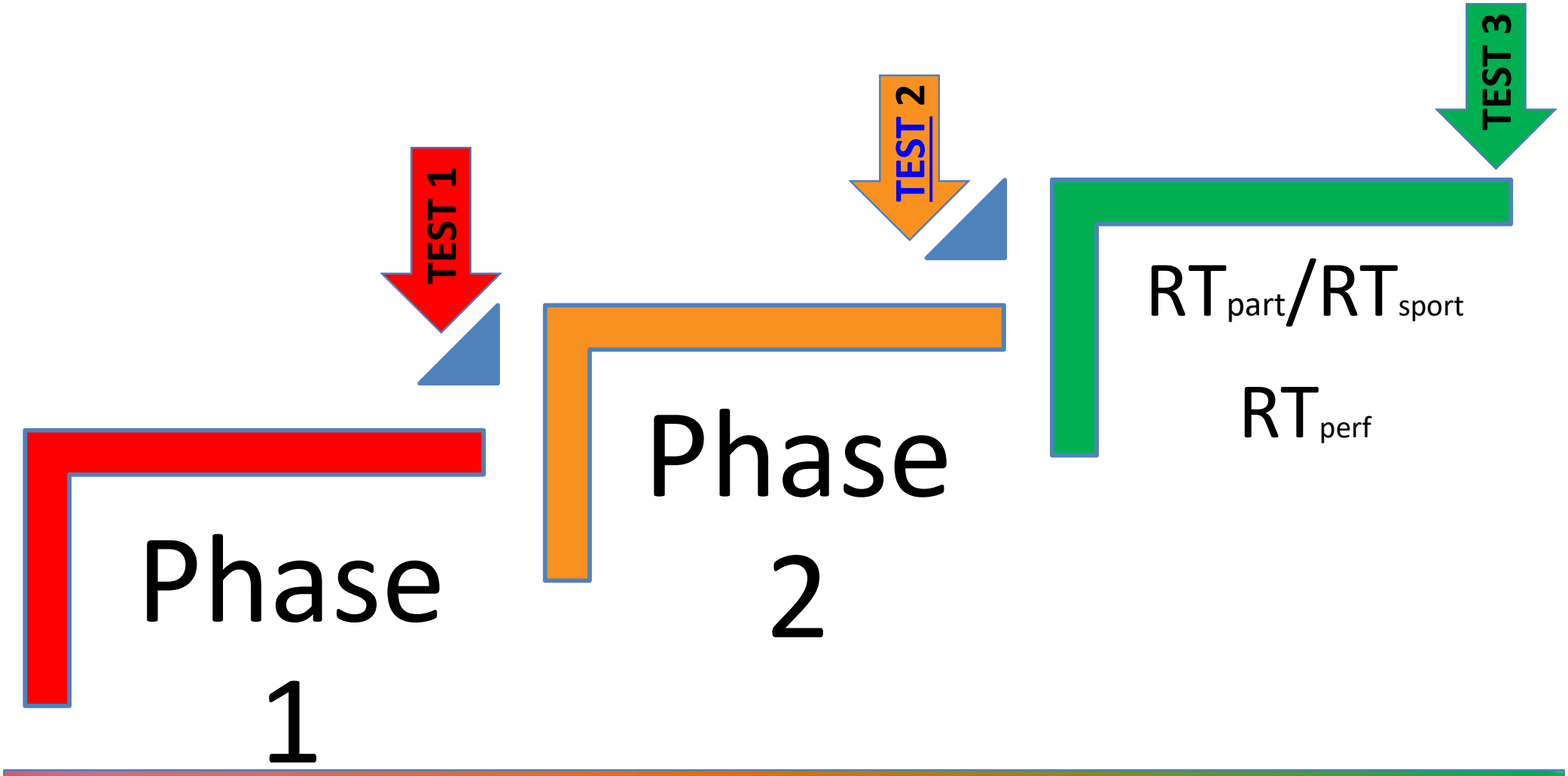


Preparation for Practical:

1. Patho-Physiology of PFP/ITB
2. EBM Rehabilitation Considerations
3. Return to sport test battery



Criterion based Rehabilitation Model (Systemic Algorithm)



Contributing effectively to shared RTS decisions relies

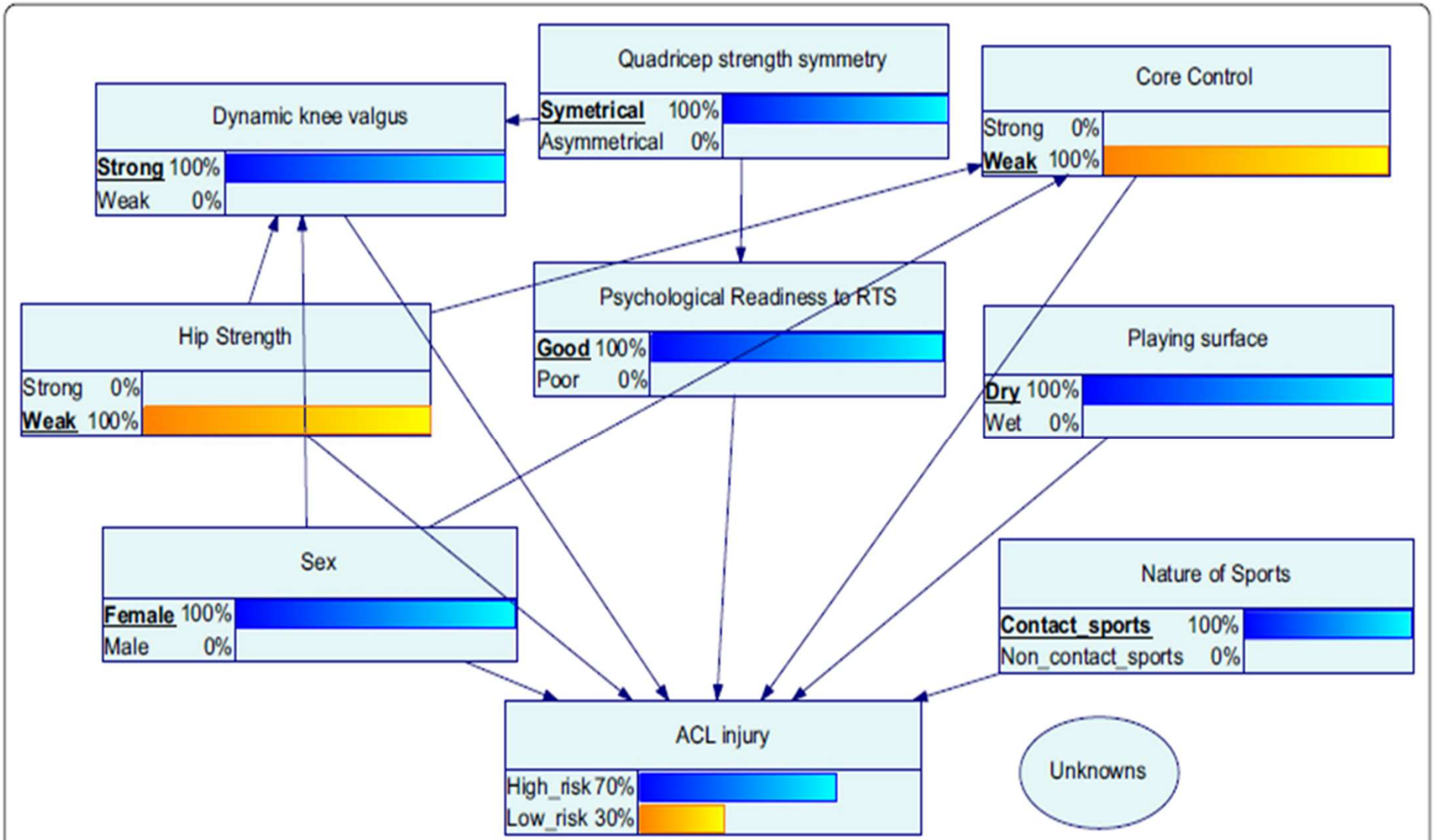
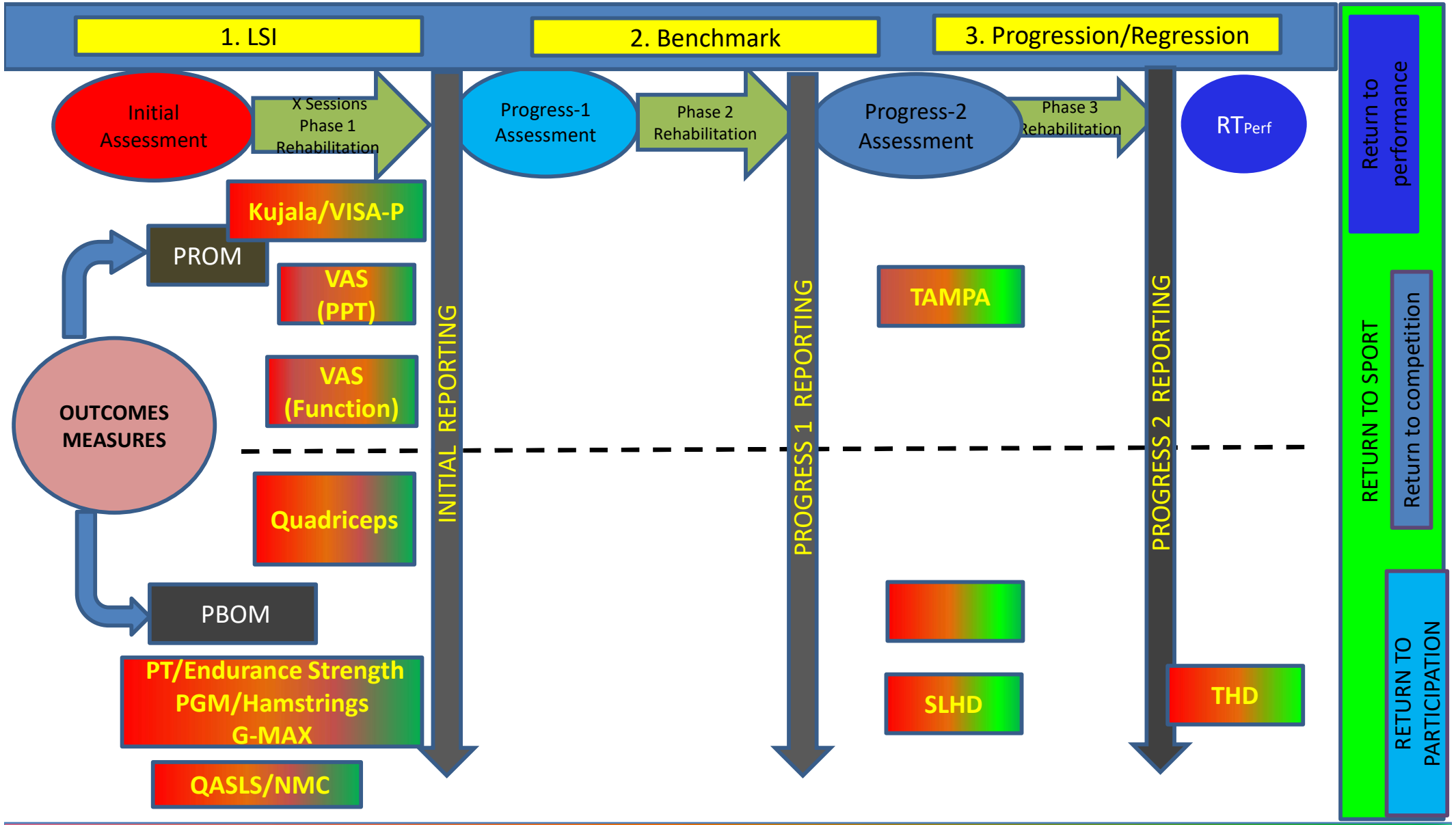


Fig. 3 A hypothetical example of a Bayesian network with multiple priors for ACL injury risk

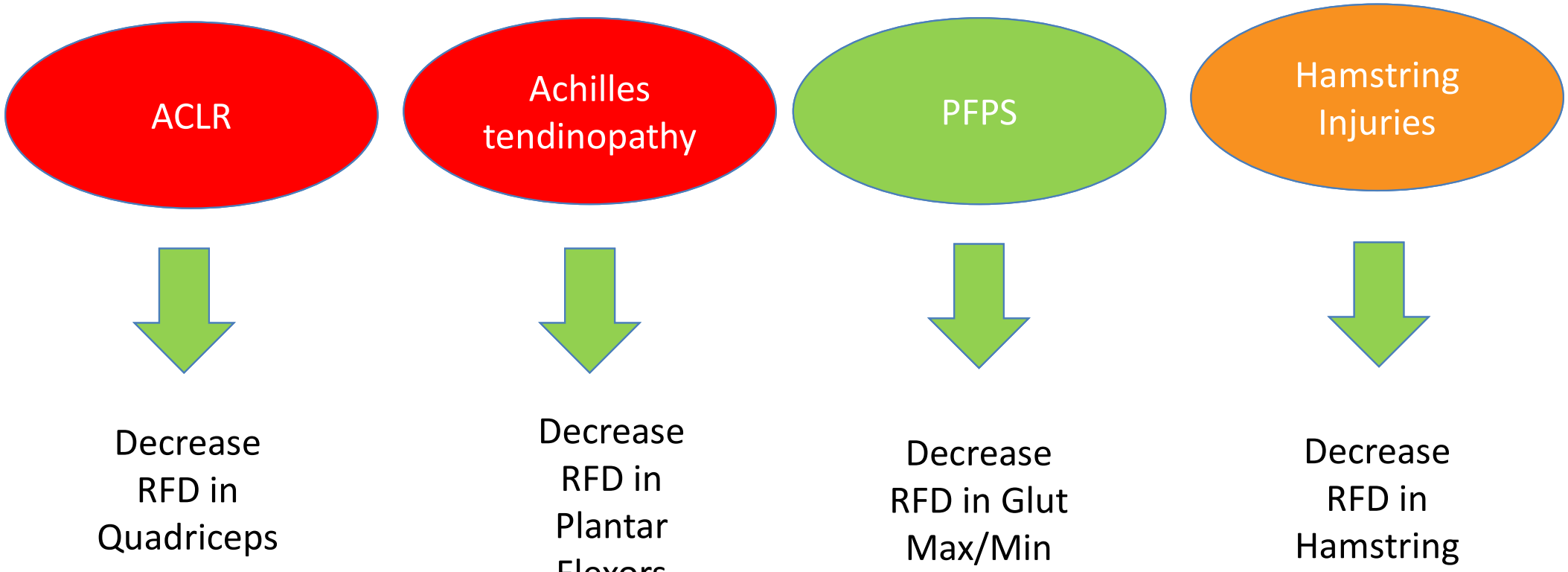
TRIPP ASSESSMENT TOOL FOR PFPS/ACLR/PT RETURN TO SPORT TEST BATTERY



Healing Responses of Particular Structure

Strength (RFD) deficits after injury

Rate of Force Development (RFD) is defined as the ability of the neuromuscular system to produce a high rate of rise in muscle force per unit of time during the initial phase following contraction onset (Rodríguez-Rosell et al., 2018)



Optimal Movement Clinical Research Experts

Optimal Movement ©

Contributing effectively to shared RTS decisions relies on:

1) Practitioner's knowledge of the health of the athlete's injured tissue or body part (Test)

2) The stress that the injured tissue or body part needs to be able to withstand (Hopping and Agility)



3) The context of sports participation

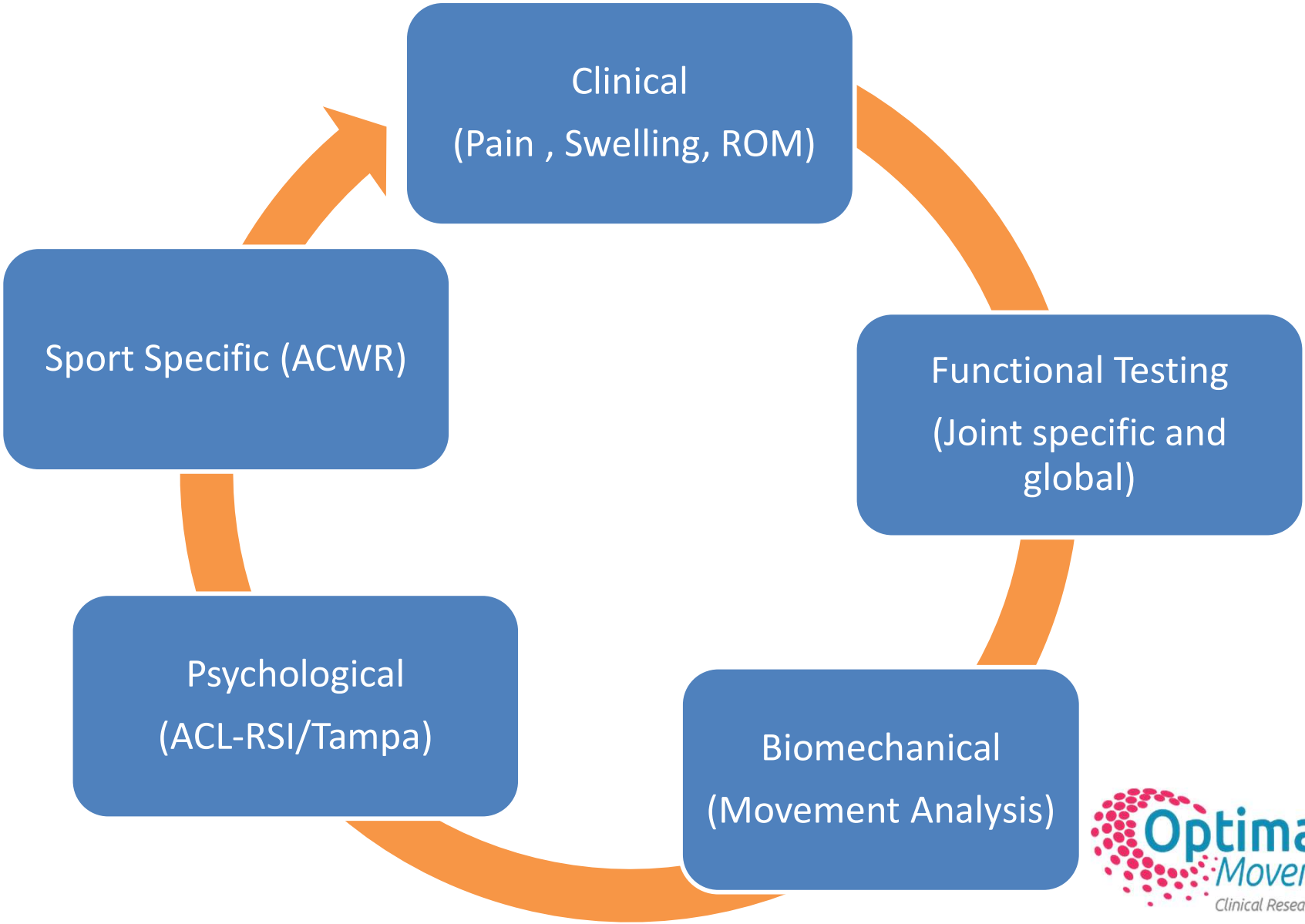
Burgi et al., 2019

Optimal Movement
Clinical Research Experts

Optimal Movement ©

Elements in a proposed RTS model

(Buckthorpe et al.,2019)



Optimal Movement
Clinical Research Experts

Optimal Movement ©