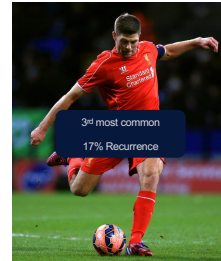


Michael
Giakoumis

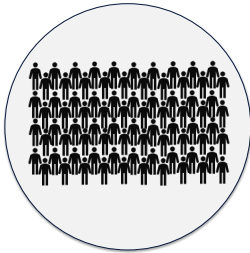
Head of Athlete Injury Management City Football Group
Sports Physiotherapist at Marylebone Health Group
(Hip & Groin and Muscle Injury Clinic)
MG Health & Performance (Consultancy + Mentorship)

1



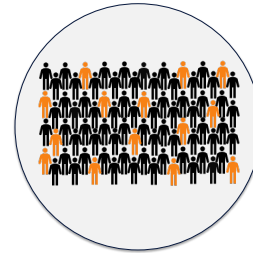
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83 injuries (index)



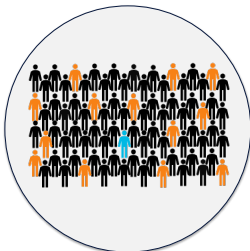
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83 injuries (index)
17 re-injuries (17%)
Recurrence rate = 1 in 5



5

83 injuries (index)
17 re-injuries (17%)
Recurrence rate = 1 in 5
1 person. 4 re-injuries



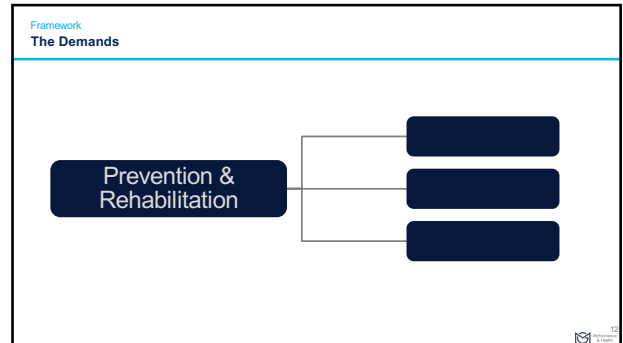
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The problematic child:
Solving for the recurrent rectus femoris injury

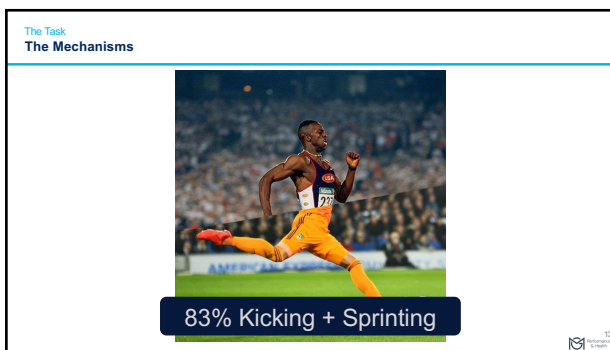
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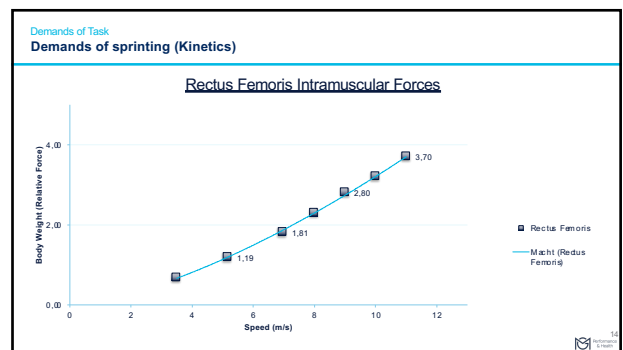
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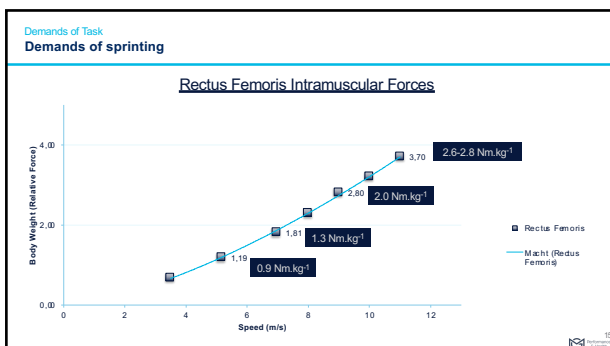
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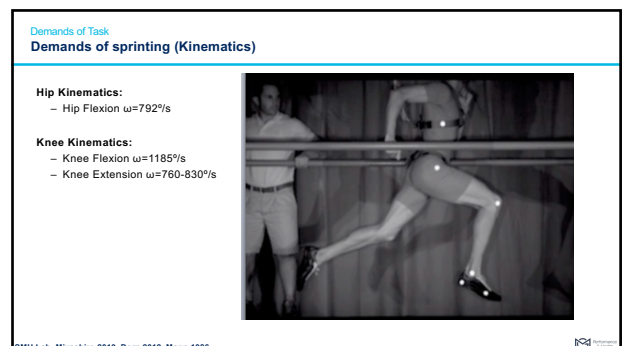
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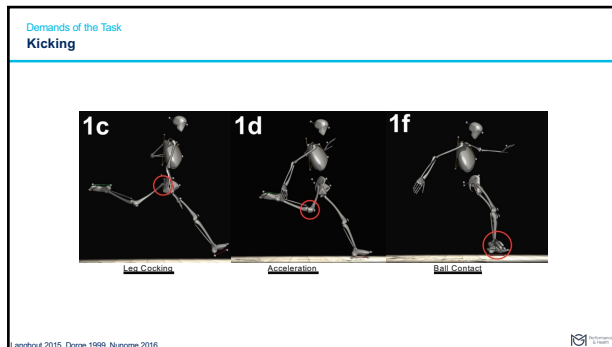
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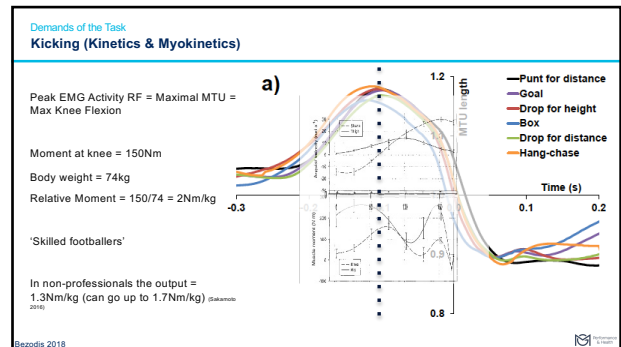
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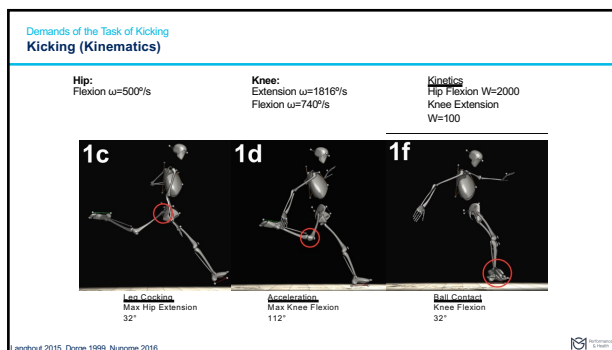
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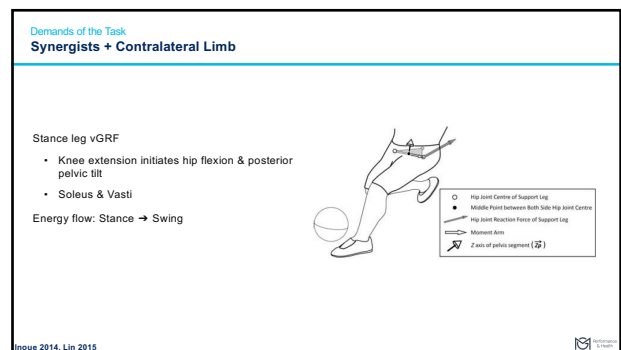
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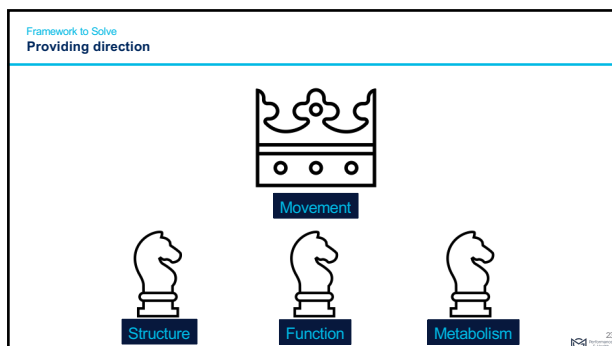
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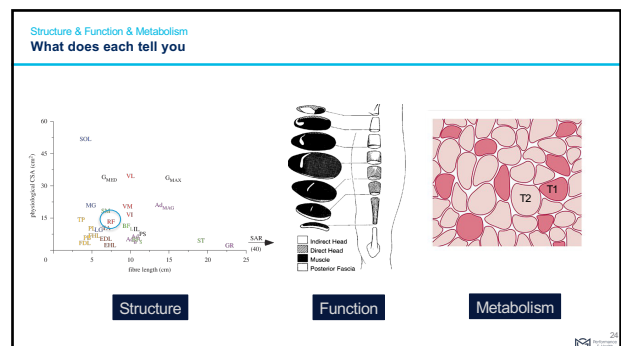
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23



24

Muscle	Muscle Length (cm)	Fibre Length (cm)	Pennation (degrees)	PCSA (cm ²)	Tendon Slack (cm)	Peak Force (N)
Psoas	24.25	11.69 – 10.4	10.6 – 8.0	7.7 – 14.8	9.7	370 – 479.7
Iliacus	20.61	10.66 – 10.0	14.3 – 7.0	9.9 – 17.2	9.4	430 – 621.9
Sartorius	44.81	40.30 – 57.9	1.3 – 0	1.9 – 1.7	11	105
Rectus Femoris	36.28	7.59 – 8.4	13.9 – 5.0	13.9 – 12.8	34.6	780 – 848.8
Vast Lateralis	27.34	9.94 – 9.9	18.4 – 18.4	35.1 – 37.0	13	2255.4
TFL		9.5	3	2.5	42.5-45	155
Vast Intermedialis	41.2	9.93 – 9.9	4.5 – 5.5	16.7 – 16.8	10.6	1024.2
Vast Medialis	43.9	9.68 – 9.7	29.6 – 29.6	20.6 – 23.7	11.2	1443.7

25

Muscle	Muscle Length (cm)	Fibre Length (cm)	Pennation (degrees)	PCSA (cm ²)	Tendon Slack (cm)	Peak Force (N)
Psoas	24.25	11.69 – 10.4	10.6 – 8.0	7.7 – 14.8	9.7	370 – 479.7
Iliacus	20.61	10.66 – 10.0	14.3 – 7.0	9.9 – 17.2	9.4	430 – 621.9
Sartorius	44.81	40.30 – 57.9	1.3 – 0	1.9 – 1.7	11	105
Rectus Femoris	36.28	7.59 – 8.4	13.9 – 5.0	13.9 – 12.8	34.6	780 – 848.8
Vast Lateralis	27.34	9.94 – 9.9	18.4 – 18.4	35.1 – 37.0	13	2255.4
TFL		9.5	3	2.5	42.5-45	155
Vast Intermedialis	41.2	9.93 – 9.9	4.5 – 5.5	16.7 – 16.8	10.6	1024.2
Vast Medialis	43.9	9.68 – 9.7	29.6 – 29.6	20.6 – 23.7	11.2	1443.7

26

Muscle	Muscle Length (cm)	Fibre Length (cm)	Pennation (degrees)	PCSA (cm ²)	Tendon Slack (cm)	Peak Force (N)
Psoas	24.25	11.69 – 10.4	10.6 – 8.0	7.7 – 14.8	9.7	370 – 479.7
Iliacus	20.61	10.66 – 10.0	14.3 – 7.0	9.9 – 17.2	9.4	430 – 621.9
Sartorius	44.81	40.30 – 57.9	1.3 – 0	1.9 – 1.7	11	105
Rectus Femoris	36.28	7.59 – 8.4	13.9 – 5.0	13.9 – 12.8	34.6	780 – 848.8
Vast Lateralis	27.34	9.94 – 9.9	18.4 – 18.4	35.1 – 37.0	13	2255.4
TFL		9.5	3	2.5	42.5-45	155
Vast Intermedialis	41.2	9.93 – 9.9	4.5 – 5.5	16.7 – 16.8	10.6	1024.2
Vast Medialis	43.9	9.68 – 9.7	29.6 – 29.6	20.6 – 23.7	11.2	1443.7

27

Muscle	Muscle Length (cm)	Fibre Length (cm)	Pennation (degrees)	PCSA (cm ²)	Tendon Slack (cm)	Peak Force (N)
Psoas	24.25	11.69 – 10.4	10.6 – 8.0	7.7 – 14.8	9.7	Force
Iliacus	20.61	10.66 – 10.0	14.3 – 7.0	9.9 – 17.2	9.4	Hip Flexion
Sartorius	44.81	Speed	1.3 – 0	1.9 – 1.7	11	105
Rectus Femoris	JACK OF ALL TRADES, MASTER OF NONE					
Vast Lateralis	27.34	9.94 – 9.9	18.4 – 18.4	35.1 – 37.0	13	Force
TFL		9.5	3	2.5	Elastic	155
Vast Intermedialis	41.2	9.93 – 9.9	4.5 – 5.5	Synergist	10.6	1024.2
Vast Medialis		Stiffness	29.6 – 29.6	20.6 – 23.7	11.2	1443.7

28

Rectus Femoris
Function - What does each tell you

Long IMA = ?Elastic

Stability on hip & influence on pelvis

More than just knee extensor/hip flexor

Reproduced 1995, Knapik 2012, Sling 2015

29

Structure & Function & Metabolism
Metabolism - What does each tell you

Rectus Femoris: 66% Fast Twitch

High Rate of Force Development

30

30

Structure & Function & Metabolism

What does each tell you

The image displays three different representations of muscle tissue, each highlighting a different aspect of its structure and function:

- Left:** A graph showing the relationship between fiber length (cm) on the x-axis and physiological cross-sectional area (cm²) on the y-axis. The curve shows a peak in PCSA at intermediate fiber lengths, indicating a trade-off between fiber length and PCSA. Key points labeled include SOL, VL, ED_LB, MD, TP, and ST. A red circle highlights the region around the peak, labeled "Jack of all trades".
- Middle:** A diagram of a muscle fiber showing the internal head, external head, and fascicle. The diagram illustrates the trade-off between fiber length and PCSA, with the internal head being the primary source of force and the external head being the primary source of speed. A red circle highlights the region around the peak, labeled "Pelvis, Hip & Elasticity".
- Right:** A histological cross-section of muscle tissue showing individual muscle fibers. The fibers are labeled T1 and T2, indicating different fiber types. A red circle highlights the region around the peak, labeled "High RFD".

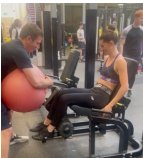
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Structure & Function & Metabolism

What does each tell you











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Testing Process

Layered approach

A stack of several waffles, illustrating a layered approach. The waffles are golden-brown and have a classic grid pattern. They are stacked on top of each other, with some filling visible between the layers. The stack is positioned on the left side of the slide, and the rest of the slide is white.

33

Musculoskeletal Assessment

Physiotherapy Assessment – Key Findings

- Key points:**
 - Overly compliant muscle-tendon unit on right hand side leading to increased demand on tendon and muscle
 - Microinstability LHS hip
 - Subtle grade 1+ PCL laxity
 - Instability LHS SIJ
 - Poor lumbo-pelvic capacity



Joint	Periarticular	Muscular
Just right	Loose	Too loose



34

Strength Assessment
Two components

Strength

2

35

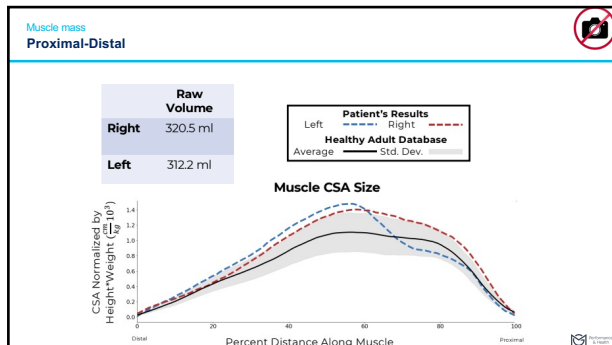
Strength Assessment
Muscle volume

Springbok Score

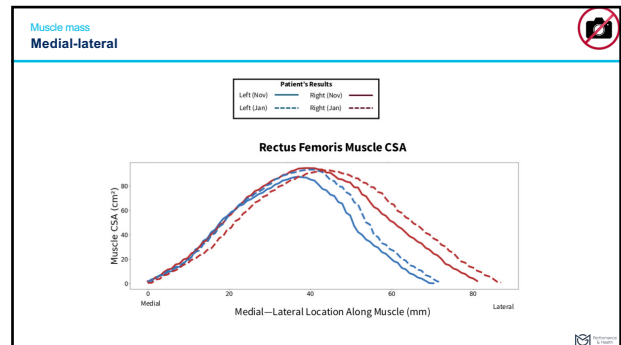
15.0 30.0 45.0 60.0 75.0 85.0

Group	L	R
Hip & Trunk		
Lumbar Spine	34.6	37.6
Erectors	32.8	33.4
Extensors	38.0	38.7
Abductors	38.0	38.7
Adductors	38.0	38.4
Internal Rotators	38.0	38.7
External Rotators	38.0	38.7
Knee		
Erectors	48.8	47.3
Extensors	37.7	38.8
Ankle		
Dorsiflexors	34.0	34.7
Plantar Flexors	37.0	38.0
Evertors	31.7	34.2
Invertors	35.0	34.7

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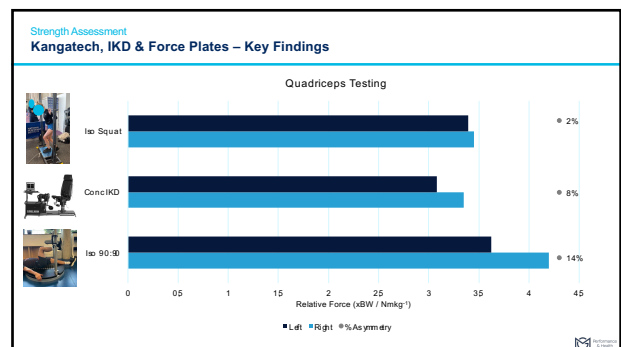
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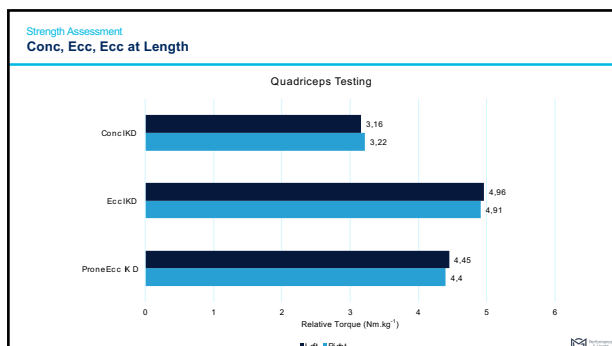
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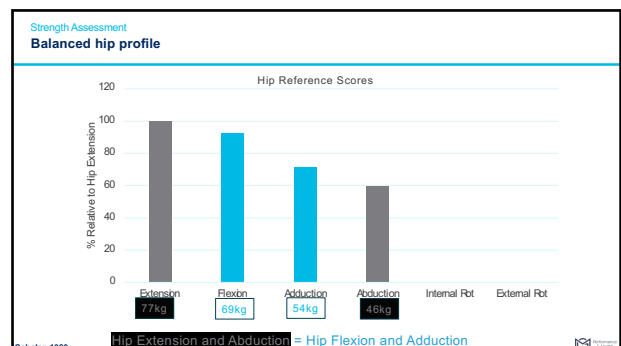
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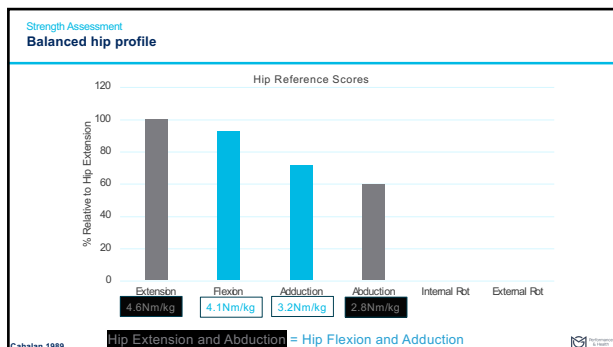
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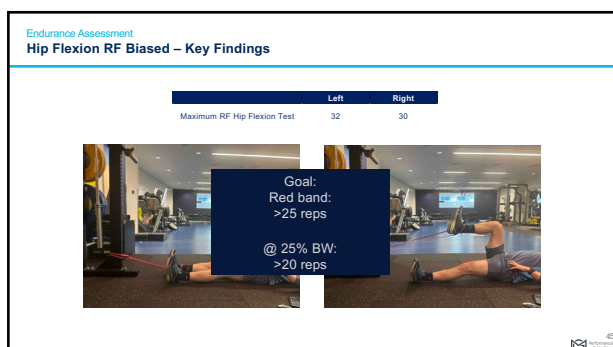
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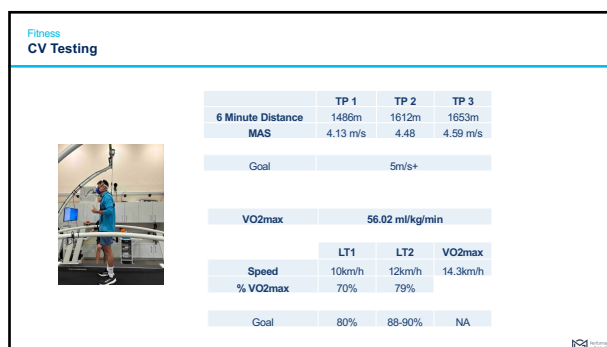
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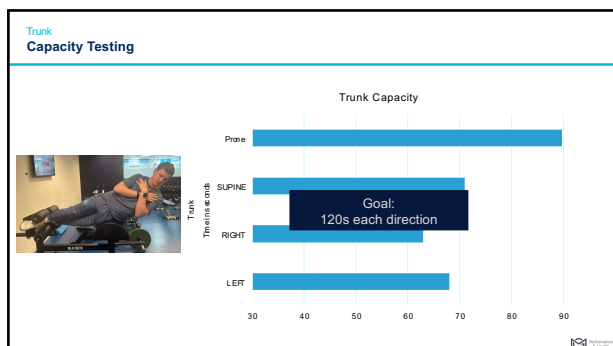
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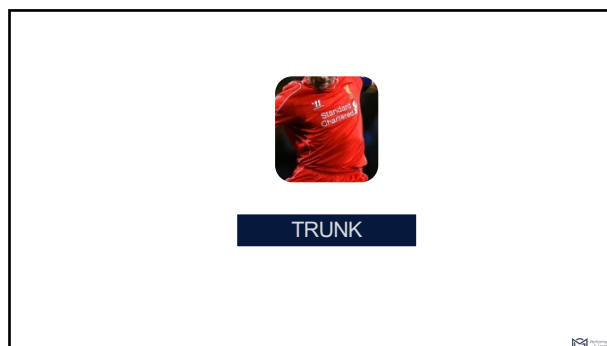
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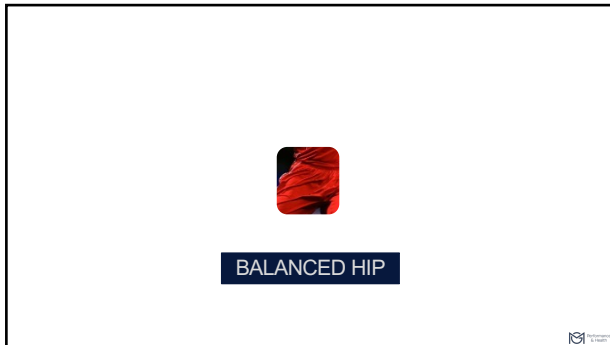
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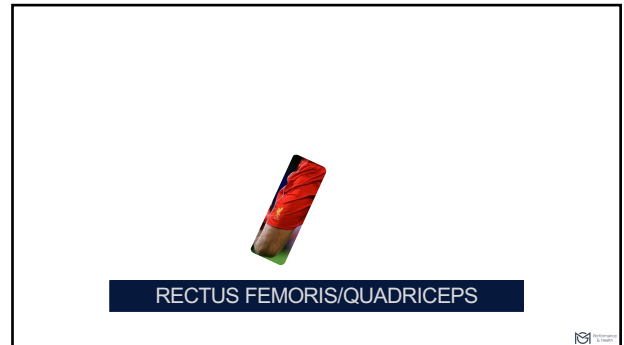
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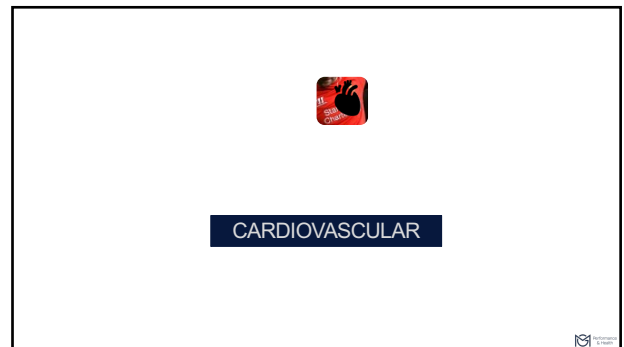
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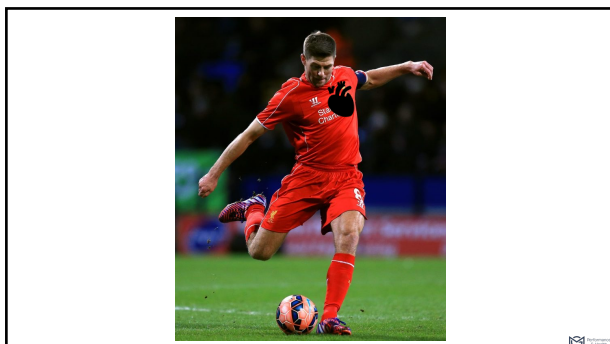
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