

Appendix 1: core strength exercises with their estimated activation intensities

Display of the activations performed on session 1.

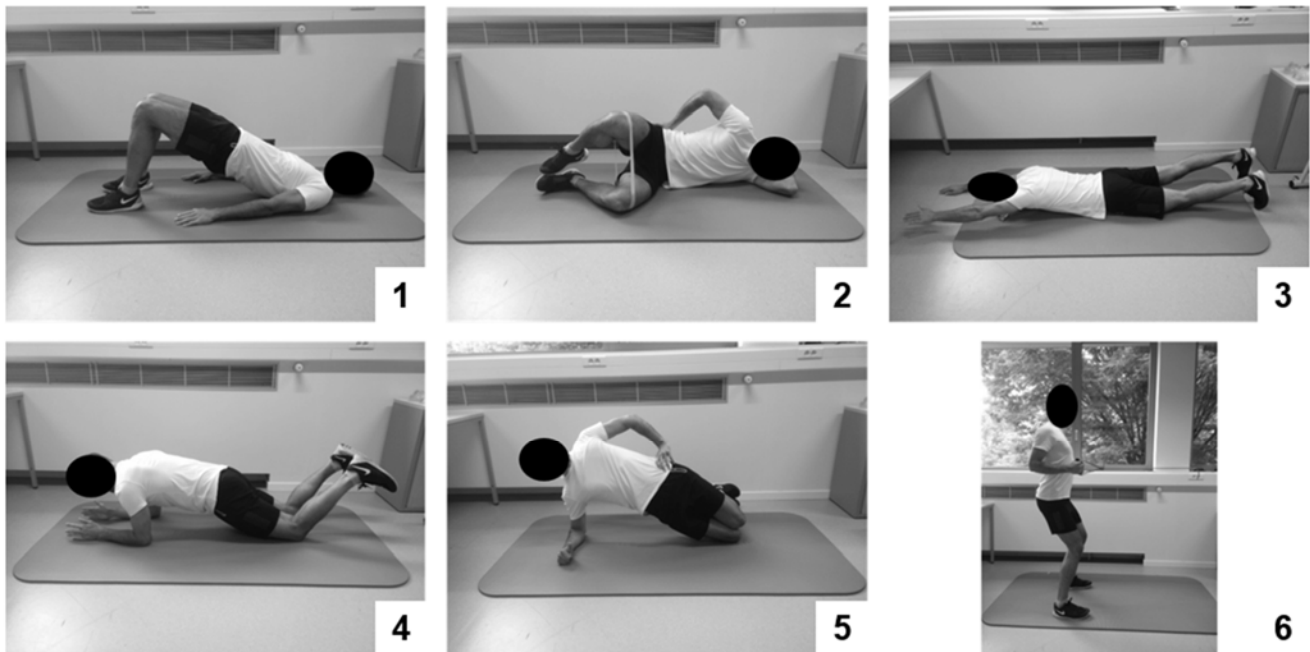
Isolated muscle to be tested	Activation test used
m. transversus abdominus	Abdominal drawing in manoeuver in crook lying ¹
m. multifidus	Prone posterior pelvic tilting ²
mm. gluteus medius & maximus	Prone isolated contraction by squeezing of the buttocks ³

General therapeutic principles used during these activations⁴:

- Oral feedback on movement by the therapist
- breathing pattern optimization
- palpation feedback (assisted by therapist & introspective by participant)
- symmetry and co-contraction evaluation

Note: These activation exercises were also repeated in sit and while standing.

Display of the primary muscles trained & starting exercises and progressions performed in the core strength protocol.



Exercise number	Primary muscle trained	Starting exercise	%MVC activation	Progressions (Activation %MVC)	%MVC activation
1	m. gluteus maximus	Glute bridge	17 ⁵	1. Quadruped hip extension with knee extended 2. Unilateral glute bridge 3. Unilateral squat & wall squat	1. 28 ⁵ 2. 35 ⁵ 3. 57 & 86 ⁵
2	m. gluteus medius	Resistance band glute clam	47 ⁶	1. Resistance band side lying hip abduction	1. 81 ⁷
3	mm. multifidi & m. erector spinae (lumbar part)	Lying diagonal extension	36 & 46 ⁸	1. Prone extension on bosu ball 2. Lying superman extension 3. Weighted superman extension	1. 56 & 50 ⁸ 2. 81 & 77 ⁸
4	m. rectus abdominus	Adapted knee plank (with posterior tilt)	>27 ⁹	1. Adapted whole body plank 2. Long lever whole body plank	1. 54 ^{9,10} 2. >100 ⁹
5	mm. obliqui	Adapted knee side plank	37	1. Whole body side plank	1. 69 ¹⁰
6	m. erector spinae (thoracic part)	Elastic band shoulder retraction with hip hinge	No data	1. Resistance pulley shoulder retraction with hip hinge	1. 60 ¹¹

Progression of exercises when 60%MVC is reached

Participants were trained to achieve the exercises with a minimal MVC of $>60\%$ as soon as possible. Thereafter, exercises were made more difficult intrinsically by:

1. Increasing the static hold time from ten to twelve seconds
2. increasing the body weight bearing (e.g. full plank position instead of kneeling position)
3. using different kinds of elastic resistance bands (e.g. clam exercise)¹²
4. performing unilateral positions (e.g. unilateral bridge exercise)¹³
5. adding additional weights (e.g. weight supported superman exercise)¹⁴

References

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