

**SM\_6. Use of assessments (CPG vs. rehabilitation algorithm): Similarities and differences**

Level	Assessment	Assessment (Rehab. algorithm)	CPG recommendations <sup>8</sup>	Evidence		Justification for use		Explanatory notes	
				CPG <sup>8</sup>	Rehabilitation algorithm	CPG <sup>8</sup>	Rehabilitation algorithm		
RTA (acute and subacute phase)	Questionnaire	AFS	Use of validated patient-reported outcome measures: - PROMIS PF - PI scales - FAAM - LES before and after interventions	Strong evidence	<p>criteria validity: conflicting evidence</p> <p>For prognosis: sensitivity: 76% specificity: 63%<sup>89</sup></p>	To assess alleviations of impairments	<ul style="list-style-type: none"> <li>- evaluative rather than discriminative instrument<sup>70</sup></li> <li>- process evaluation</li> <li>- simple to use instrument</li> <li>- recommend for daily practice<sup>71</sup></li> <li>- prognostic tool<sup>34</sup></li> <li>- progression control<sup>37,36</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Integration of questionnaires recommended<sup>11,13,24,38</sup></li> <li>- There is a lack of evident evaluative questionnaires to guide rehabilitation</li> <li>- Advantage of questionnaires: enable standardised communication with injured player</li> </ul>	
	Clinical examination	ROM	Goniometer	Weight bearing lunge test (WBLT)	Recommended, lack of evidence	<ul style="list-style-type: none"> <li>- Good to high reliability</li> <li>- Inter-rater: ICC 0.72-0.97</li> <li>- Intra-rater: ICC 0.85-0.96</li> </ul>	Lack of justification for use	<ul style="list-style-type: none"> <li>- Easy to assess</li> <li>- Goniometers commonly used in daily practice</li> </ul>	<ul style="list-style-type: none"> <li>- CPG do not report evidence for the use of WBLT</li> <li>- CPG do not specify the methods of measurements</li> <li>- recommendations for ROM measurements are still lacking</li> <li>- goniometry is inexpensive and commonly used in clinical settings</li> </ul>
		Swelling / effusion	Measures of circumference (tape measure)	Lack of recommended methods	Lack of statement	Lack of evidence	Lack of statement	<ul style="list-style-type: none"> <li>- Tape measure for pragmatical use (daily practice)</li> <li>- the assessment of ankle joint swelling is advocated<sup>74</sup></li> <li>- To control rehabilitation progression</li> <li>- No increase of swelling (max.+1%) provided</li> </ul>	<ul style="list-style-type: none"> <li>- Standardised measurement (Malleolus)</li> <li>- Swelling may influence joint sensation and afferentiation<sup>43</sup></li> <li>- Lack of validated measurements of swelling (expect Figure of 8)</li> <li>- Figure of 8 method is not practicable for low effusion conditions</li> <li>- 1% rule (reference value)</li> </ul>
		Ligament stability and integration	ADT and TLT	RALDT and APT in addition to ADT recommended	<ul style="list-style-type: none"> <li>- RALDT superior to both the ADT and ALDT (sensitivity, accuracy)</li> <li>- ADT provides limited ability to laxity</li> </ul>	<p>ADT: Sensitivity (0.50-0.96); Specificity (0.67-1.00)<sup>15,38,51,53</sup></p> <p>TLT: sensitivity: 49% specificity: 78-88%<sup>90</sup></p>	RALDT superior to the ADT and ALDT	<ul style="list-style-type: none"> <li>- ADT and TLT are easy to use</li> <li>- Familiarisation (most common used tests)</li> </ul>	<ul style="list-style-type: none"> <li>- ADT recommended (CPG 2013) as rehabilitation algorithm was developed in 2017</li> </ul>
		Strength	Manual muscle strength test	Lack of recommendation	Lack of recommendation	<ul style="list-style-type: none"> <li>- Manual muscle testing is standard test of muscle strength<sup>528,39,40</sup></li> </ul>	Lack of recommendations = lack of justification	<ul style="list-style-type: none"> <li>- muscular activation crucial for joint function (activation, stability)</li> <li>- strength is needed for stance phase during running</li> </ul>	<ul style="list-style-type: none"> <li>- Adequate strength is necessary for normal movement patterns<sup>14</sup></li> <li>- Even though dynamometers are recommended<sup>15</sup>, they are expensive and not available in each clinic</li> </ul>

	Performance Test	Level 1	Mod. Stork Balance Test (static)	Static single limb balance on a firm surface with eyes closed	- No specific test recommended	- No evidence (due to its modification)	Lack of justification	- Modification of the Stork Balance test includes eyes-closed variation	- Eyes-closed conditions both in CPG and rehabilitation algorithm
			Y-Balance Test (dynamic)	SEBT	Reliable and valid method	- strong reliability - good validity		- Common and evident test - Familiar in clinicians (football) - Easy to use	
		Level 2	Heel Rise Test	Lack of recommendation	Lack of recommendation, no evidence provided	- High reliability <sup>61</sup> - ICC>.90 (.96) - SEM 2.07	Lack of recommendations = lack of justification	- Calf muscle activity is crucial for movement (walking, jogging) <sup>62</sup>	
			Running analysis	Lack of recommendation	Lack of recommendation, no evidence provided			- Recommend for lower limb injury assessment (ACL) <sup>11</sup>	
		Level 3	Side Hop Test	Lack of recommendation	- Lack of specific recommendation: Inclusion of measures of single-limb hopping (under timed conditions) recommended, without further specification	- good reliability (r>0,85); - heightened sensitivity (77%) <sup>58</sup>	- from closed-chain exercises (level 2) to dynamic / reactive impacts in level 3 - SHT assesses reactive impacts - frontal plane prior to sagittal plane (ATFL in sagittal direction; talus translation) test forces lateral stress to the joint <sup>28,82</sup>	- Hop Tests mostly evaluated with ACL patients or healthy persons - There is a lack of normative hop test (values) for professional football players after LAS - Need to assess ankle loading of specific hop tests in future studies	
			Triple Hop test	Lack of recommendation		- reliability: ICC 0.94-0.95 <sup>29</sup>	- isolated test in sagittal jump direction - enforces explosive strength of the thigh <sup>26</sup>		
		Square Hop Test	Lack of recommendation	- good reliability ICC 0.90 <sup>83</sup> ICC 0.83 <sup>64</sup>		- individual assessment of both planes under controlled conditions - reactive impacts on the fore foot (skills trained in level 3)			
		Crossover Hop Test	Lack of recommendation	- reliability: ICC 0.85-0.96 <sup>29</sup>		- motor control through landing task - jumps across the line enforces stress to the lateral ligaments			
		Level 4	Mod. 6m timed Crossover Hop Test	Lack of recommendation	- reliability: ICC 0.66-0.97 <sup>13</sup>	- further progression to CHD (additional time component)			

								- final test both of the level and the entire rehabilitation progression	
<b>RTS</b>	Mod. Intervall Kicking Progression plus clinical examination	Lack of recommendation	Lack of recommendations = lack of evidence	Lack of evidence; practical experience	Lack of recommendations beyond the acute / subacute phase; no evidence			<ul style="list-style-type: none"> <li>- lack of football-specific tests adaption of the Intervall Kicking Program</li> <li>- football is played with the feet; ball training directly impacts the injured structure (ankle sprain region)</li> <li>- special attention should be devoted to ankle sprain injuries in ball training. Impacts of several thousand Newtons can be generated on the foot/ankle during kicks<sup>66,67,68</sup></li> <li>- lack of ankle and football-specific tests for readiness</li> <li>- difficulty of objectification beyond this phase is made evident by the lack of Clinical Practice Guidelines beyond the subacute phase</li> </ul>	<ul style="list-style-type: none"> <li>- clinical examination is all the more important</li> <li>- sports physiotherapists may carry out a pain assessment on the pitch during training. This information can massively be biased by external influences. An assessment with a sufficient time interval (approx. 30 min.) after the rehabilitation training, comparable to the assessment of the session RPE<sup>91,92</sup> is recommended</li> </ul>
<b>RTP / RTC</b>	Application of the German test battery (VBG) is recommended	Lack of recommendation		<ul style="list-style-type: none"> <li>- no evidence for the entire test battery</li> <li>- only single tests of the battery are evaluated</li> </ul>			<ul style="list-style-type: none"> <li>- The use of the VBG test battery may give additional safety for RTC</li> <li>- required to pass the test battery for RTC (Germany)</li> </ul>	<ul style="list-style-type: none"> <li>- Meanwhile some RTC test batteries established and recommended<sup>16,17</sup>; not yet validated</li> </ul>	

*ACL*, Anterior Cruciate Ligament; *ADT*, Anterior Drawer Test; *ATFL*, Anterior Talo-Fibular Ligament; *CHD*, Crossover Hop Test for Distance; *CPG*, Clinical Practice Guidelines; *ICC*, Intra Class Correlation; *LAS*, Lateral Ankle Sprains; *RALDT*, Reverse Anterolateral Drawer Test; *ROM*, Range of Motion; *RPE*, Rate of perceived exertion; *RTC*, Return to Competition; *RTP*, Return to Play; *RTS*, Return to Sport; *SEBT*, Star Excursion Balance Test; *TLT*, Talar Tilt Test; *VBG*, Verwaltungs-Berufsgenossenschaft (German elite sports insurance)