1 PATIENT & ASSESSMENT DETAILS

ATHLETE **Mr. Sample Landing**	AGE **19 yrs**	SEX **Male**	HEIGHT / WEIGHT · BMI **172 cm / 68 kg · 23.0**
CONSENT **Obtained – 01/08/2026**	ASSESSMENT DATE **01/08/2026**	CLINICIAN **Dr. A. Sample (PT)**	ASSESSMENT **LESS jump-landing assessment**
FRAMES ANALYSED **6 of 6**	REPORT ID **RX-L20260801-SL-102933**	CHIEF COMPLAINT **Pre-season screening, right knee ACL reconstruction 2 years ago**	

2 CLINICAL IMPRESSION

MOVEMENT FINDINGS (FOR CLINICAL INTERPRETATION)

Excellent landing – LESS 3/19

No screened landing error pattern was matched; see the LESS items and measurements.

LESS SCORE	LANDING QUALITY	LESS CUT-OFF OF 5
3 / 19 17 of 17 items scored	**Excellent** Padua 2009 categories	**Below 5** Padua 2015 (elite-youth soccer)

3 FINDINGS AT A GLANCE

No landing error pattern identified.

27 measurements



Normal 22 · Minor 3 · Major 2

This report is generated from 2D video / photographic measurements and rule-based interpretation against published reference values. Marker placement: manual selection by the assessor (6 frames). Generated by Rollaxis Research & Education Edition for teaching, learning and research only – not for clinical diagnosis or treatment.

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4 LANDING ERROR SCORING SYSTEM (LESS)

3
/ 19 points

Excellent Score below the LESS cut-off of 5

0 4 5 6 19

Excellent ≤ 4 · Good > 4–5 · Moderate > 5–6 · Poor > 6 (Padua 2009). A score of 5 or more was the cut-off associated with non-contact ACL injury in one cohort of elite-youth soccer players (sensitivity 86%, specificity 64%; Padua 2015); the LESS does not predict injury in an individual. 17 of 17 items could be scored from the captured frames. * Item measured with a 2D approximation of the Padua criterion (see LESS scoring in Rollaxis in the user manual).

#	ITEM	ERROR IF...	MEASURED	SCORE
1	**Knee flexion at initial contact**	Knee flexed ≤ 30°	L 24.0° · R 26.0°	1
2	**Hip flexion at initial contact**	Hip not flexed (≤ 10°)	L 30.0° · R 33.0°	0
3	**Trunk flexion at initial contact**	Trunk not flexed (≤ 5°)	L 8.0° · R 9.0°	0
4	**Ankle plantarflexion at initial contact**	Flat-foot or heel-to-toe landing	L (+) 14.0° · R (+) 13.0°	0
5	**Medial knee position at initial contact**	Knee medial to midfoot (> 5°)*	L (+) 3.6° · R (+) 3.6°	0
6	**Lateral trunk flexion at initial contact**	Trunk not vertical (> 5°)	0.0°	0
7	**Stance width – wide**	Ankle width > 1.15 × shoulder width*	0.79	0
8	**Stance width – narrow**	Ankle width < 0.70 × shoulder width*	0.79	0

Items 9–17 and the total continue on the next page.

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5 LESS ITEMS 9–17 AND TOTAL

#	ITEM	ERROR IF...	MEASURED	SCORE
9	**Foot position – toe-in**	Estimated toe-in > 30°*	L (+) 5.0° · R (+) 5.0°	0
10	**Foot position – toe-out**	Estimated toe-out > 30°*	L (+) 5.0° · R (+) 5.0°	0
11	**Symmetric initial foot contact**	Ankle height difference at contact > 8% of shank length*	0.0%	0
12	**Knee flexion displacement**	Displacement ≤ 45°	L 54.0° · R 54.0°	0
13	**Hip flexion at maximum knee flexion**	Hip not more flexed than at contact	L (+) 50.0° · R (+) 51.0°	0
14	**Trunk flexion at maximum knee flexion**	Trunk not more flexed than at contact	L (+) 12.0° · R (+) 13.0°	0
15	**Knee valgus displacement**	Knee medial to midfoot at max flexion (> 5°)*	L (−) 3.0° · R (+) 3.0°	0
16	**Joint displacement (sagittal)**	Soft 0 · average 1 · stiff 2	knee disp 54°, knee max 78°, hip disp 50° → average (software estimate – confirm clinically)	1
17	**Overall impression**	Excellent 0 · average 1 · poor 2	average (0 frontal/transverse errors, average landing; software estimate – confirm clinically)	1
	Total LESS score			**3**

Items 1–15 score 0 (absent) or 1 (present); item 16 (soft / average / stiff) and item 17 (excellent / average / poor) score 0–2, as defined by Padua et al. 2009. In Rollaxis items 1–15 are estimated from the marked frames; items 16–17 are software estimates derived from the measured joint displacement and frontal-plane errors and must be confirmed by the clinician. Each bilateral item counts as an error if it occurs on either captured side. The standard protocol scores three trials. Automated LESS scoring in Rollaxis has not been validated against expert raters.

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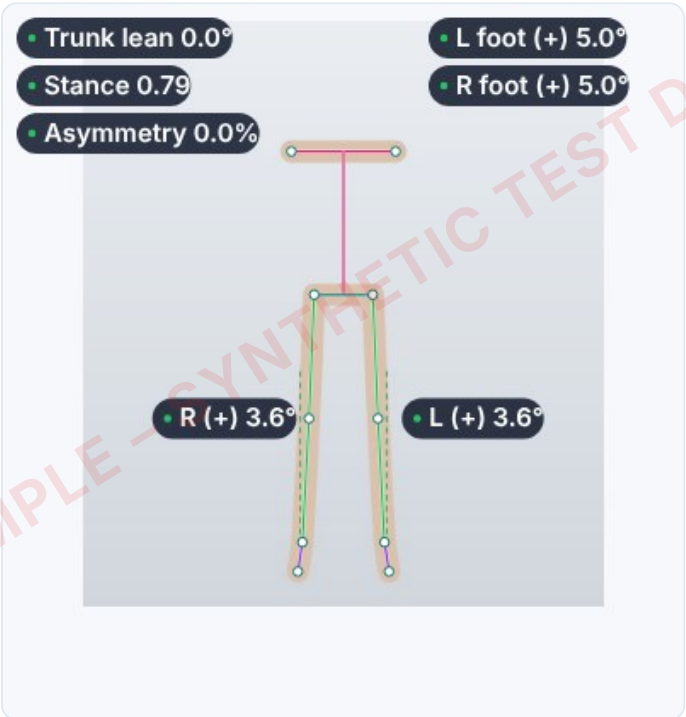
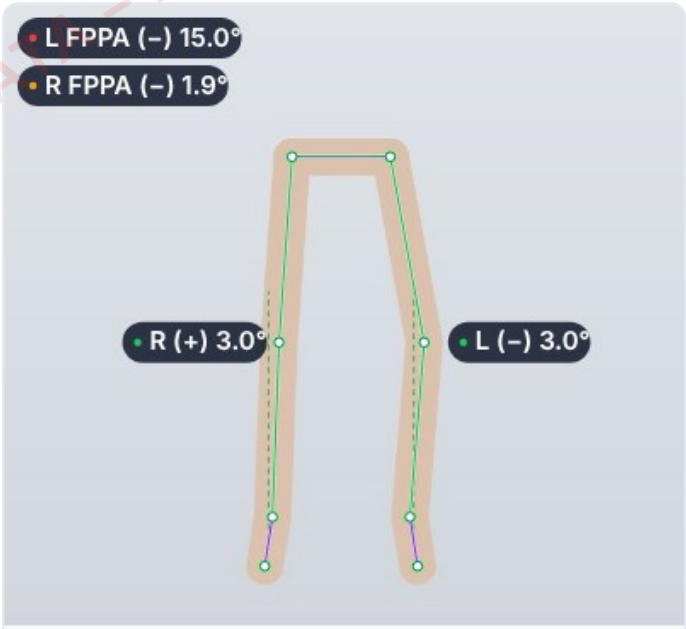
6 FRONT (ANTERIOR) VIEW

MEASURE	MEASURED		REFERENCE RANGE	RESULT
Knee position vs midfoot at contact	L: (+) 3.6°	R: (+) 3.6°	≤ (+) 5° (knee over midfoot)	L Normal R Normal
Lateral trunk flexion at contact	0.0°		(−) 5° to (+) 5°	Normal
Stance width (ankles ÷ shoulders)	0.79		0.7 to 1.15	Normal
Estimated foot rotation (toe-out +)	L: (+) 5.0°	R: (+) 5.0°	(−) 30° to (+) 30°	L Normal R Normal
Ankle height difference at contact (asymmetry proxy)	0.0%		≤ 8% of shank length	Normal
Knee position vs midfoot at max flexion	L: (−) 3.0°	R: (+) 3.0°	≤ (+) 5° (knee over midfoot)	L Normal R Normal
Knee FPPA at max knee flexion	L: (−) 15.0°	R: (−) 1.9°	0° to (+) 10°	L Major 15.0° R Minor 1.9°

INITIAL CONTACT



MAXIMUM KNEE FLEXION



Left knee is over the midfoot at initial contact.
Right knee is over the midfoot at initial contact.
Trunk is vertical in the frontal plane at contact.
Stance width is about shoulder width.
Left foot position is within 30° of straight.
Right foot position is within 30° of straight.
Both feet contact the ground together.
Left knee stays over the midfoot at maximum flexion.
Right knee stays over the midfoot at maximum flexion.
Left knee varus at maximum flexion (Major Deviation).
Right knee varus at maximum flexion (Minor Deviation).

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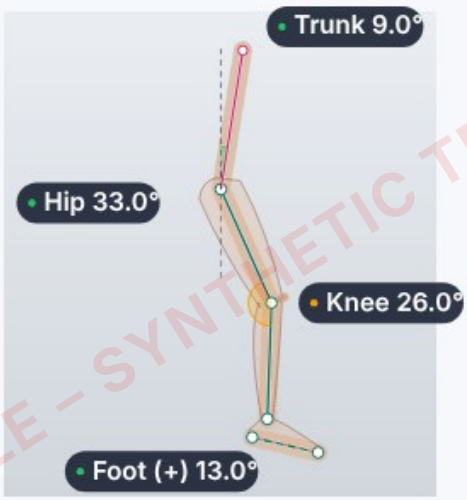
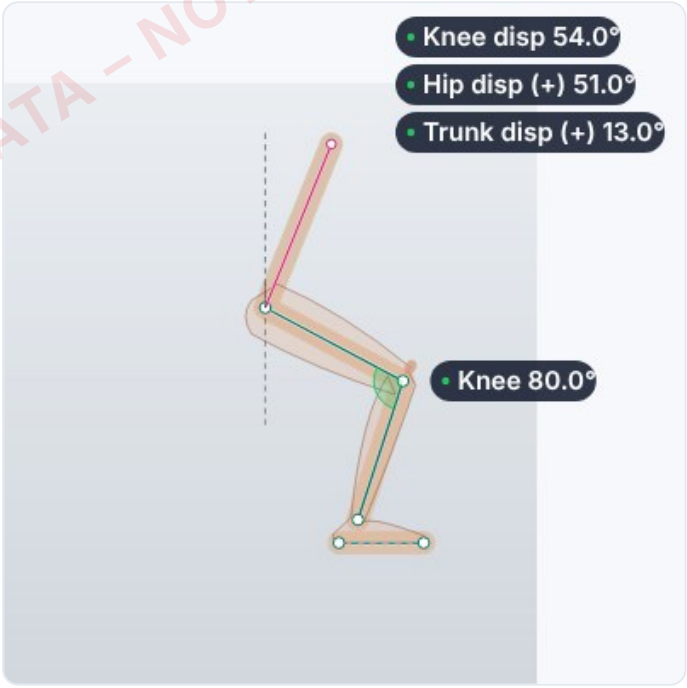
7 RIGHT SIDE VIEW

MEASURE	MEASURED	REFERENCE RANGE	RESULT
Knee flexion at initial contact	26.0°	> 30°	Minor 4.1°
Hip flexion at initial contact	33.0°	> 10° (hip flexed)	Normal
Trunk flexion at initial contact	9.0°	> 5° (trunk flexed)	Normal
Foot-to-floor angle at contact (+ toe first)	(+) 13.0°	> (+) 5° (toe-to-heel)	Normal
Knee flexion at maximum knee flexion	80.0°	≥ 80°	Normal
Knee flexion displacement	54.0°	> 45°	Normal
Hip flexion displacement	(+) 51.0°	> 0° (more flexed at max knee flexion)	Normal
Trunk flexion displacement	(+) 13.0°	> 0° (more flexed at max knee flexion)	Normal

INITIAL CONTACT



MAXIMUM KNEE FLEXION



SAMPLE – SYNTHETIC TEST DATA – NOT A PATIENT RECORD

Right knee too straight at initial contact (≤ 30°) (Minor Deviation).

Right hip is flexed at initial contact.
Trunk is flexed at initial contact (right view).
Right foot lands toe-to-heel.
Right knee reaches deep flexion during landing.
Right knee flexion displacement exceeds 45°.
Right hip flexes further after contact.
Trunk flexes further after contact (right view).

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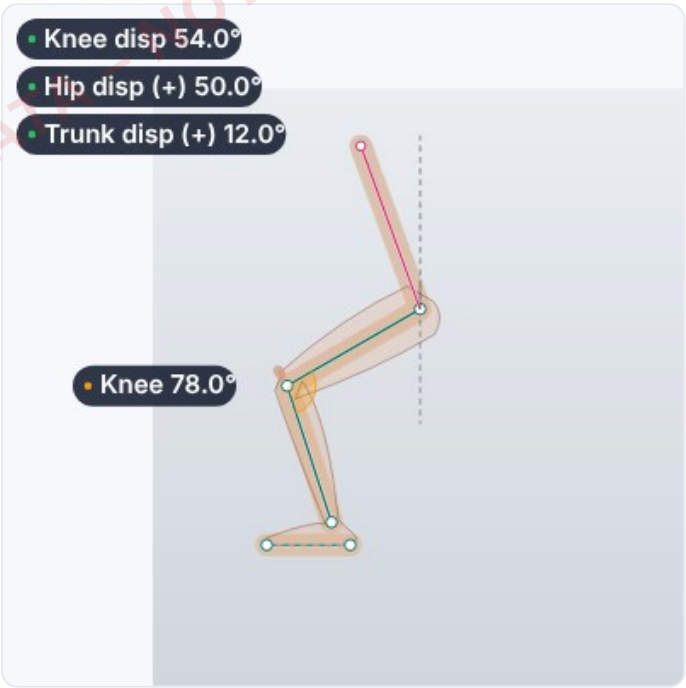
8 LEFT SIDE VIEW

MEASURE	MEASURED	REFERENCE RANGE	RESULT
Knee flexion at initial contact	24.0°	> 30°	Major 6.1°
Hip flexion at initial contact	30.0°	> 10° (hip flexed)	Normal
Trunk flexion at initial contact	8.0°	> 5° (trunk flexed)	Normal
Foot-to-floor angle at contact (+ toe first)	(+) 14.0°	> (+) 5° (toe-to-heel)	Normal
Knee flexion at maximum knee flexion	78.0°	≥ 80°	Minor 2.0°
Knee flexion displacement	54.0°	> 45°	Normal
Hip flexion displacement	(+) 50.0°	> 0° (more flexed at max knee flexion)	Normal
Trunk flexion displacement	(+) 12.0°	> 0° (more flexed at max knee flexion)	Normal

INITIAL CONTACT



MAXIMUM KNEE FLEXION



SAMPLE – SYNTHETIC TEST DATA – NOT A PATIENT RECORD

Left knee too straight at initial contact (≤ 30°) (Major Deviation).
Left hip is flexed at initial contact.
Trunk is flexed at initial contact (left view).
Left foot lands toe-to-heel.
Shallow left knee flexion during landing (Minor Deviation).
Left knee flexion displacement exceeds 45°.
Left hip flexes further after contact.
Trunk flexes further after contact (left view).

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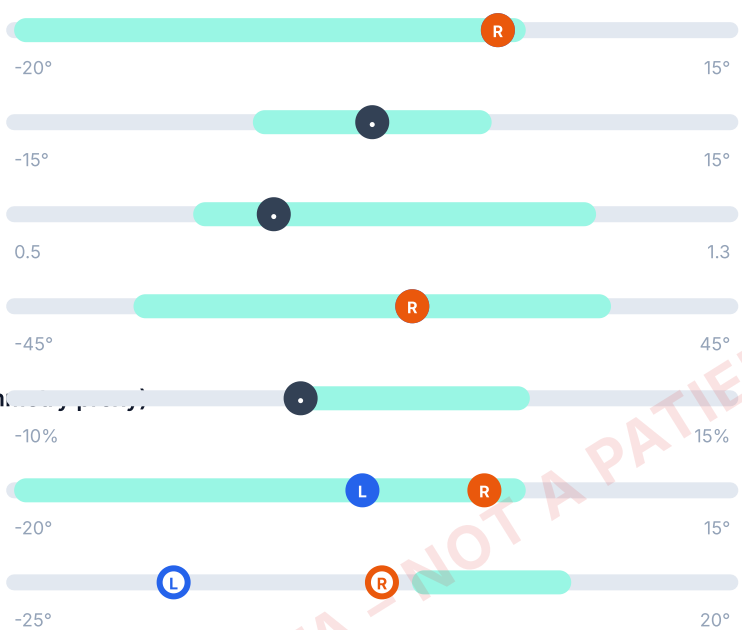
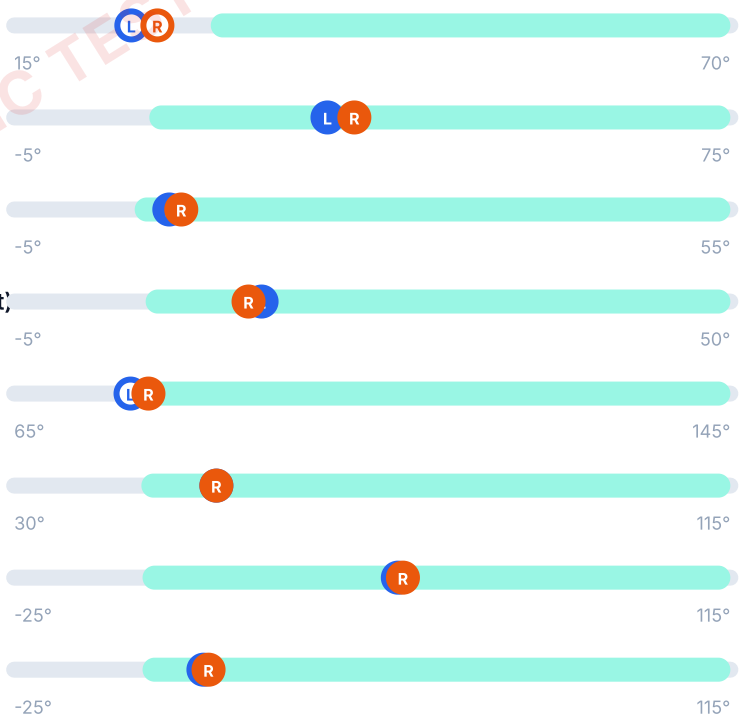
9 ALL MEASUREMENTS AGAINST NORMAL

Anterior



Lateral



● Left ● Right ● Single value Normal range ○ outside normal

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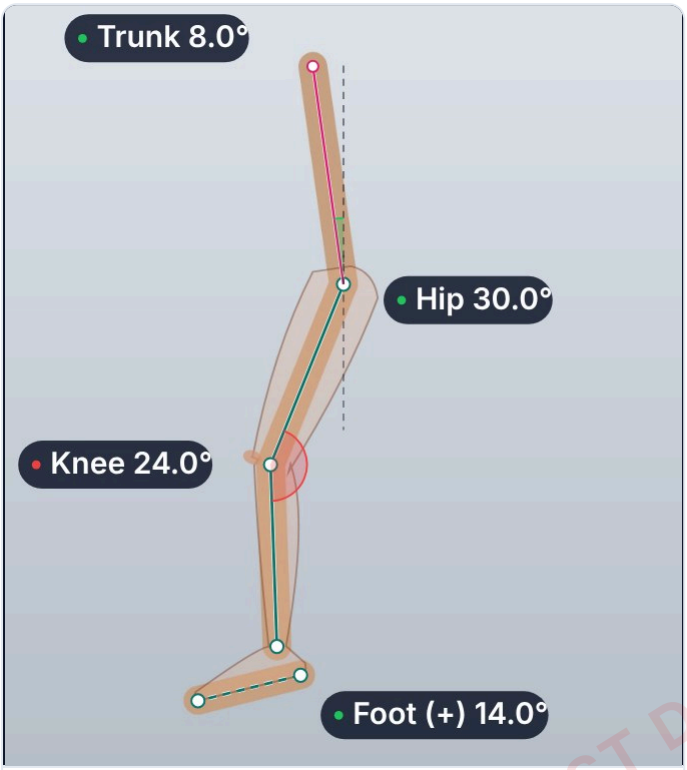
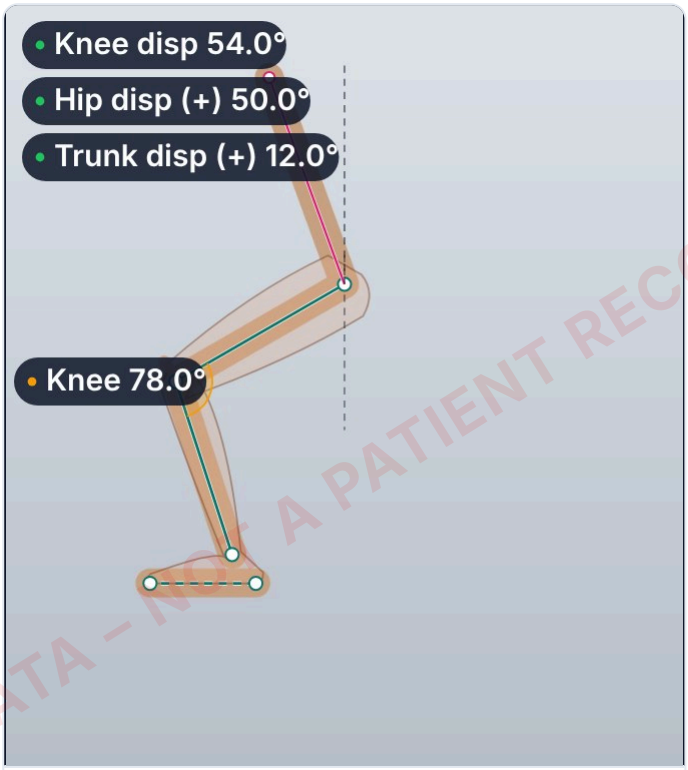
10 PATIENT PHOTOGRAPHS

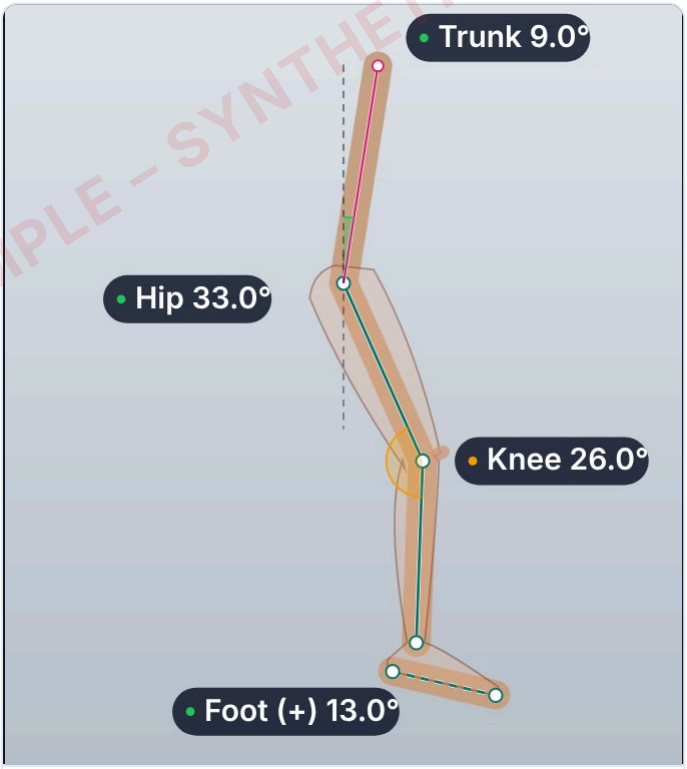
Original frames with the analysis markers, lines and angles drawn on the photograph.



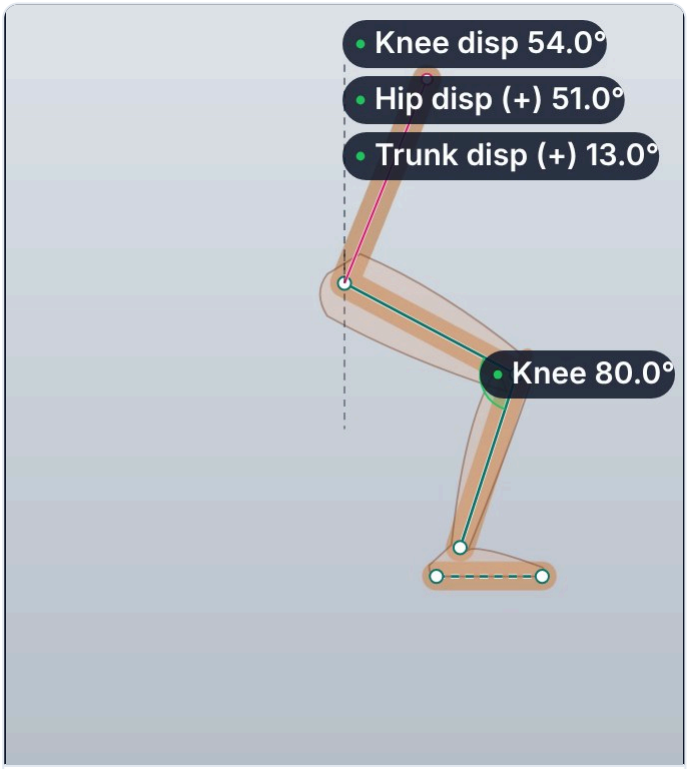
Lateral – Left · Left side – initial contact ANNOTATED t = 0.00 s (real time)



Lateral – Left · Left side – maximum knee flexion ANNOTATED t = 0.00 s (real time)



Lateral – Right · Right side – initial contact ANNOTATED t = 0.00 s (real time)



Lateral – Right · Right side – maximum knee flexion ANNOTATED t = 0.00 s (real time)

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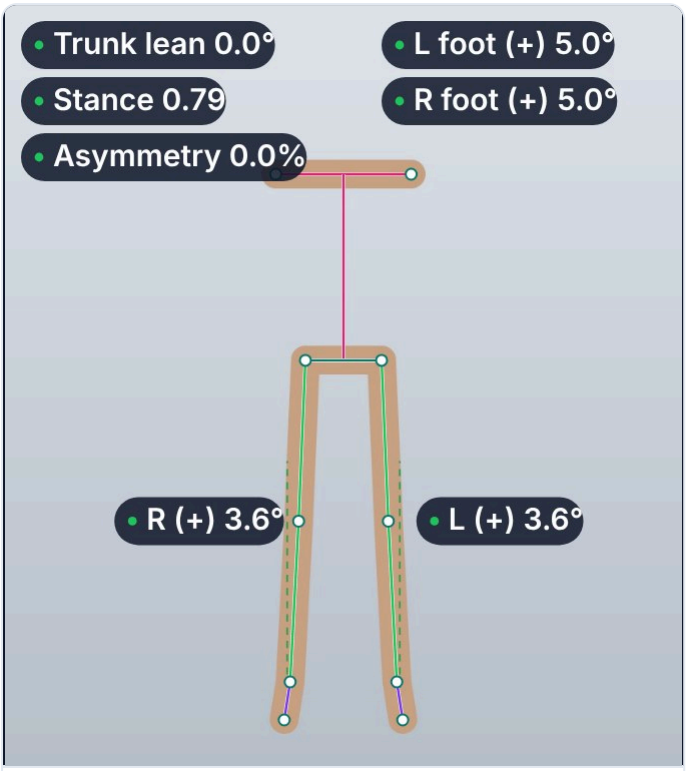
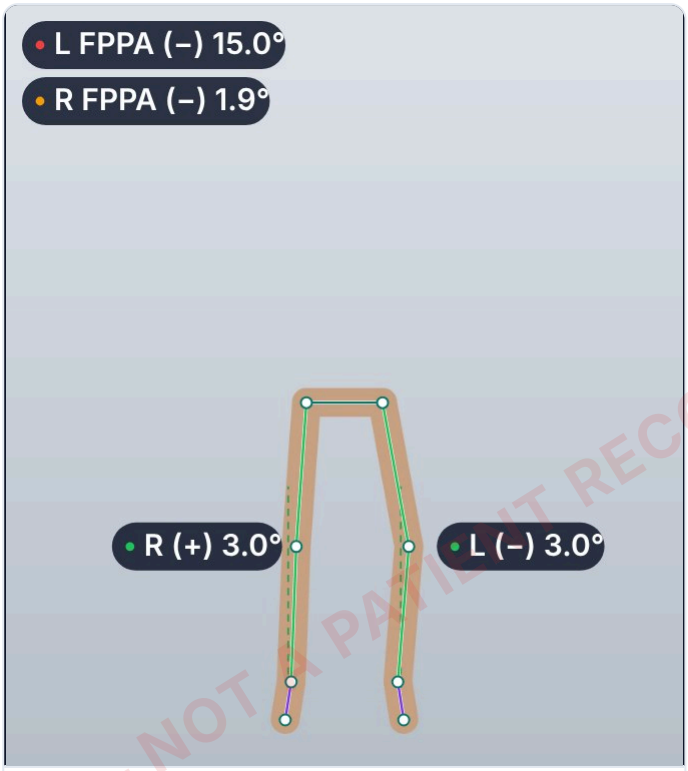


Anterior · Front – initial contact ANNOTATED t = 0.00 s (real time)



Anterior · Front – maximum knee flexion ANNOTATED t = 0.00 s (real time)

SAMPLE – SYNTHETIC TEST DATA – NOT A PATIENT RECORD

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11 SCREENED AND NOT PRESENT

Stiff (sagittal-plane) landing · Upright trunk / hip-extended landing · Flat-foot or heel-first landing · Dynamic knee valgus on landing · Excessive foot rotation on landing · Lateral trunk flexion on landing · Abnormal landing base width · Asymmetric initial foot contact

12 NOT ASSESSABLE WITH THIS PROTOCOL

Transverse-plane hip and knee rotation (3D) · ground-reaction force and loading rate · knee abduction moment · single-leg landing · fatigue effects

13 HOW TO READ THE ANGLES

Knee and hip flexion: 0° = straight, larger = more flexed. Trunk flexion: forward lean from vertical. Foot at contact: (+) heel above toe (toe-to-heel landing). Displacement = value at maximum knee flexion minus value at initial contact. Knee vs midfoot: (+) knee medial to the midfoot (valgus). Lateral trunk flexion (+) toward the right. Stance width = ankle distance ÷ shoulder distance. Foot rotation (+) toe-out / (−) toe-in. FPPA (+) valgus.

14 METHOD

Drop vertical jump: from a 30-cm box placed at half the athlete's height from the landing area, the athlete jumps forward to land on both feet and immediately jumps up as high as possible. Front and side cameras at about 3.5 m, hip height, 60–120 fps. Frames at initial contact and maximum knee flexion; markers placed and verified by the assessor; LESS items 1–15 estimated from the measured angles, items 16–17 software estimates confirmed by the assessor; one trial scored.

15 REFERENCES

1. Padua DA et al. The Landing Error Scoring System (LESS) is a valid and reliable clinical assessment tool of jump-landing biomechanics: the JUMP-ACL study. Am J Sports Med 2009;37:1996-2002.
2. Padua DA et al. The Landing Error Scoring System as a screening tool for an anterior cruciate ligament injury-prevention program in elite-youth soccer athletes. J Athl Train 2015;50:589-95.
3. Smith HC et al. A prospective evaluation of the Landing Error Scoring System (LESS) as a screening tool for anterior cruciate ligament injury risk. Am J Sports Med 2012;40:521-6.
4. Hanzlíková I, Hébert-Losier K. Is the Landing Error Scoring System reliable and valid? A systematic review. Sports Health 2020;12:181-8.
5. Hewett TE et al. Biomechanical measures of neuromuscular control and valgus loading of the knee predict ACL injury risk in female athletes. Am J Sports Med 2005;33:492-501.
6. Zazulak BT et al. Deficits in neuromuscular control of the trunk predict knee injury risk. Am J Sports Med 2007;35:1123-30.
7. Webster KE, Hewett TE. Meta-analysis of meta-analyses of anterior cruciate ligament injury reduction training programs. J Orthop Res 2018;36:2696-708.

Evidence labels: **STRONG EVIDENCE** systematic review / RCTs · **MODERATE EVIDENCE** smaller trials or consistent studies · **EXPERT OPINION** clinical consensus.

SAMPLE – SYNTHETIC TEST DATA – NOT A PATIENT RECORD

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16 SUMMARY AND CONCLUSION

Mr. Sample Landing, a 19-year-old male athlete, underwent LESS jump-landing assessment on 01/08/2026 with a chief complaint of “Pre-season screening, right knee ACL reconstruction 2 years ago”. Of 27 measurements, 22 (81%) were within normal limits, 3 showed minor and 2 showed major deviation from the reference values. No clearly abnormal pattern was identified.

17 REGIONAL SUMMARY

REGION	STATUS	KEY DEVIATIONS	MEASURES
Trunk	Normal	Within normal limits	5/5 normal
Hip	Normal	Within normal limits	4/4 normal
Knee	Major	Knee (L/R) · FPPA (L/R) · Knee max (L)	7/12 normal
Ankle & foot	Normal	Within normal limits	4/4 normal
Base of support	Normal	Within normal limits	2/2 normal

18 KEY TAKE-HOME POINTS

- No screened movement pattern was matched; 5 measurements are outside the reference range (see Measurements).
- 2 major deviations should be reviewed clinically first.

19 FURTHER ASSESSMENT & FOLLOW-UP

SUGGESTED CLINICAL EXAMINATION
No specific examination suggested from this analysis.

RE-ASSESSMENT
Repeat if symptoms change or as part of routine monitoring.

This conclusion is generated from the measured data and must be reviewed and confirmed by the treating clinician.

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20 PHYSICAL EXAMINATION & HISTORY

21 FINAL DIAGNOSIS

22 MANAGEMENT PLAN & FOLLOW-UP

RE-ASSESSMENT DUE

REFERRAL TO

Assessed by (name, qualification)

Signature & date

Reviewed by

Signature & date

SAMPLE – SYNTHETIC TEST DATA – NOT A PATIENT RECORD

23 PATIENT CONSENT RECORD

Consent given by	Mr. Sample Landing
Date & time recorded	01/08/2026, 09:05:00
Recorded by	Dr. A. Sample (PT)
Purpose	Video / photographic recording and computer-assisted analysis of movement and posture for teaching, learning and research.
Use of anonymised data in teaching materials / publications	Not agreed

24 INTENDED USE

For research and education use only. Rollaxis is not a medical device. Its measurements, interpretations, provisional diagnoses and management options are teaching and research examples and must not be used to diagnose or treat any person.

Rollaxis Research & Education Edition is software for teaching, learning and research in human movement science. It measures two-dimensional (2D) joint and segment angles, timing and alignment from video recordings and photographs of posture, walking, running, a bodyweight squat and the Landing Error Scoring System (LESS) jump-landing task, using skin markers placed and confirmed by the user, and compares the measurements with published reference values. To support teaching, its reports also show worked examples of clinical reasoning – interpretation of the findings, provisional diagnoses and management options with their published evidence – generated by fixed rules from the literature. It is intended for students, educators and researchers in physiotherapy, sports science and medicine, in teaching laboratories, classrooms and approved research studies. It is not a medical device and is not intended for the diagnosis, prevention, monitoring, treatment or alleviation of any disease, injury or disability in an individual; its output must not be used as the basis for clinical decisions.

25 WARNINGS AND LIMITATIONS

Measurements are 2D projections of 3D movement and are affected by camera position, height, distance and tilt, lens distortion, patient rotation, clothing, frame rate and marker placement; rotations about the long axis of the limb are not measured. Check every marker, including automatic suggestions, before using a value. Differences smaller than the measurement error should not be interpreted as change. Reference values come from published adult populations and may not apply to every patient; they are not paediatric values. Stop the test if the patient reports pain, dizziness, chest discomfort or instability. Rule-based interpretations, provisional diagnoses and management options are teaching examples, not clinical advice. Use only the version supplied by the publisher on a computer protected as described in the user manual.

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26 PERSONAL DATA PROTECTION (DIGITAL PERSONAL DATA PROTECTION ACT, 2023)

Sample Physiotherapy Clinic is the **Data Fiduciary** for the personal data in this report, including images and health information. The data were collected with the consent recorded above, for the specified purpose only, and are stored on the institution's computer. Rollaxis does not transmit patient data; licence activation sends only the licence key, a computer identifier, the computer name and the software version to the publisher's licence server. The data principal (patient) may withdraw consent at any time, and may request access to, correction of or erasure of their personal data, or raise a grievance, by contacting Sample Physiotherapy Clinic. Withdrawal does not affect processing done before it. Data are kept only as long as needed for this purpose or as required by law for clinical records. For a child (under 18 years), verifiable consent of the parent or lawful guardian is required.

27 RESPONSIBILITIES

The publisher provides Rollaxis Research & Education Edition for teaching, learning and research. It is not a medical device. The user is responsible for safe conduct of the task, correct marker placement, review of every measurement, approval of the study or teaching activity where required, and for ensuring that this report is not used to diagnose or treat the participant. Anyone with symptoms should be referred to a qualified healthcare professional. Report software problems to the publisher (rollingjointsacademy@gmail.com).

28 USER DECLARATION

I confirm that the participant gave consent, that I have reviewed the measurements in this report, and that this report was produced for teaching, learning or research and will not be used as the basis for diagnosis or treatment of the participant.

Name, designation & institution

Signature & date

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