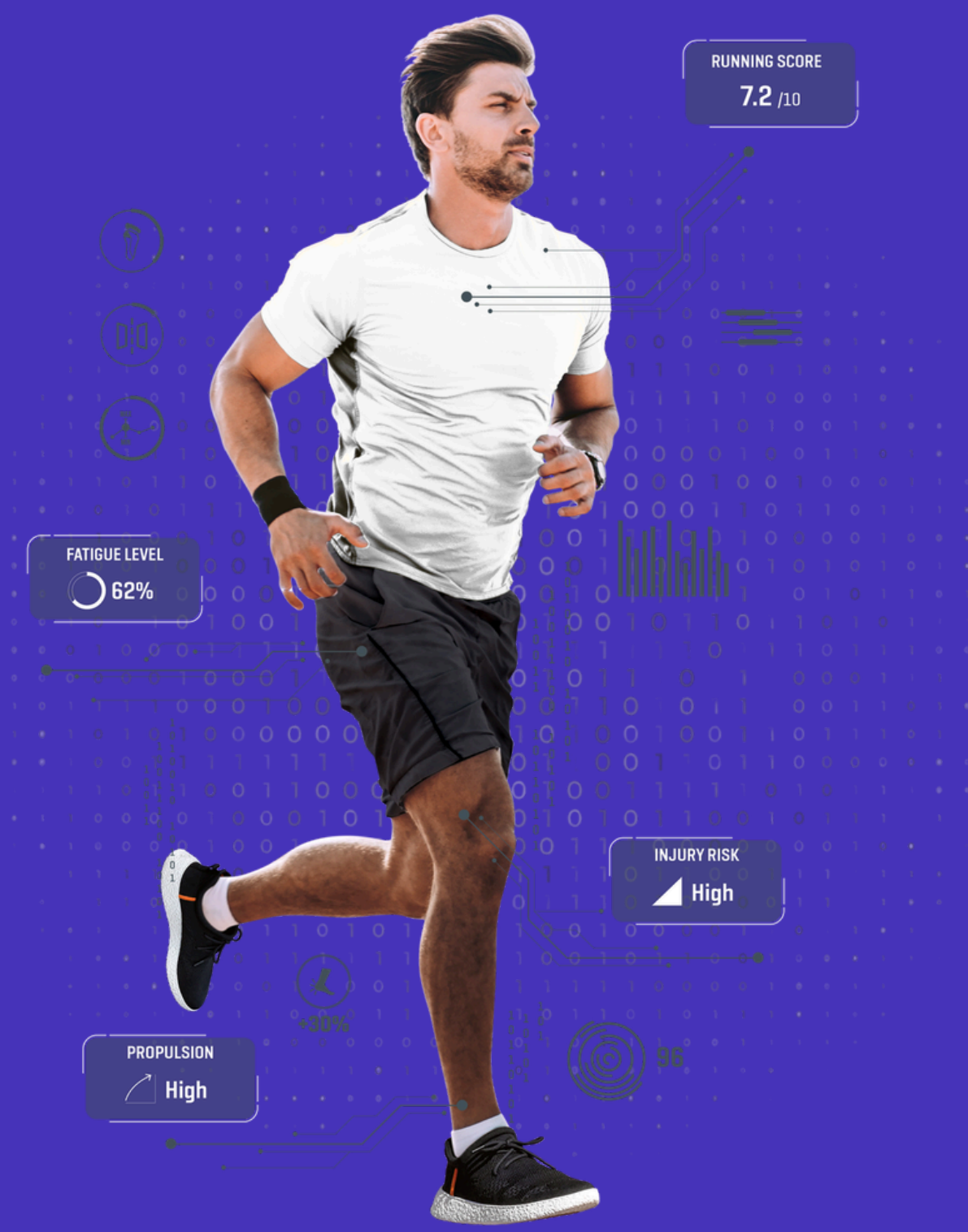
BALISTON HEALTH



RUNNING INTERPRETATION GUIDE

MOVSCAN

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1.Purpose of this Manual

This guide is designed to help healthcare professionals understand and interpret the results generated by a Baliston Health running analysis.

It explains how to analyze the data captured with the Mov-Scan® kit, how to navigate the results displayed on the Baliston Health platform, and how to use the Balia Movement Assistant as part of the interpretation process.

The information provided in this guide is intended to support clinical reasoning, patient monitoring, and the assessment of patient progress. It does not constitute a medical diagnosis and should not replace professional clinical judgment.

For information regarding device setup, charging, safety, maintenance, troubleshooting, and technical specifications, please refer to the complete Baliston Health User Manual.

1.1. How to Use This Guide

Use this guide as a reference when reviewing running analysis results on the Baliston Health platform.

1.The guide is structured to follow a typical interpretation workflow:
2.Understand the system terminology.
3.Review the role of the Balia Movement Assistant.
4.Follow the running analysis workflow.
5.Review the patient status.
6.Interpret the overall results.
7.Interpret the detailed results.
8.Review parameter definitions and clinical considerations.
9.Use workflow examples to support a structured interpretation process.

Practitioners may read the guide from beginning to end during onboarding or use individual sections as a quick reference when reviewing results.

For optimal use, review the patient status before interpreting the results, then progress from the overview view to the detailed view. The Balia analysis notes included in this guide indicate when the Balia Movement Assistant can support the interpretation process.

1.2. Scope of the Running Analysis

The running analysis is designed to capture and display objective information about movement patterns during a recorded running session.

Depending on the analysis performed and the available results, the Baliston Health platform may display information related to:

- Analysis duration;
- Running speed;
- Cadence or pace;
- Stride length;
- Contact and flight phases;
- Foot strike type;
- Asymmetry;
- Propulsion;
- Maximum stride height;
- Pronation and supination angles;
- Left-right differences;
- Changes occurring throughout the running session.

These results are intended to help practitioners analyze running mechanics, monitor changes over time, and support patient follow-up.
The analysis should be interpreted in consideration of the patient's reported symptoms, pain location, footwear, activity level, medical history, and physical examination findings.

1.3 Note on Clinical Use and Interpretation

TheBalistonHealth platformprovides objective movement information to support healthcare professionals during clinical assessments.

These results may help identify running patterns, asymmetries, variations in parameters, or areas requiring further evaluation. However, they do not constitute a medical diagnosis and should not be used as the sole basis for clinical decisions.

All results, including data generated by the Balia Movement Assistant, must be reviewed and interpreted by a qualified healthcare professional.

Clinical decisions, diagnoses, and treatment plans remain the responsibility of the practitioner. Results should always be interpreted in consideration of the patient's medical history, reported symptoms, physical examination findings, health status, and any other relevant clinical information.

2. Definitions

Acquisition duration (min): Duration of the acquisition.

Running speed (km/h): Average running speed during the acquisition.

Cadence (steps/min): Average number of steps per minute (right + left) during the acquisition.

Stride duration (ms): Time period between two consecutive contacts of the same foot with the ground.

Contact time (ms and %): Average duration during which the foot is in contact with the ground. It can be expressed as a percentage of the stride duration.

Swing time (ms and %): Duration during which the foot is not in contact with the ground. It can be expressed as a percentage of the stride duration.

Double flight time (ms and %): Duration during which neither foot is in contact with the ground. It can be expressed as a percentage of the stride duration.

Stride length (m): Distance covered during one stride, between two consecutive contacts of the same foot with the ground.

Foot strike type: Indicates the predominant foot strike pattern during the acquisition, either heel strike or forefoot strike.

Symmetry: Indicates the consistency between the contact times of the two lower limbs.

3.Results Overview

Thissection presentsthe informationdisplayed once the running analysis has been completed. It is intended to help clinicians move from the patient's pre-analysis context to key performance indicators, and then to more detailed biomechanical results.

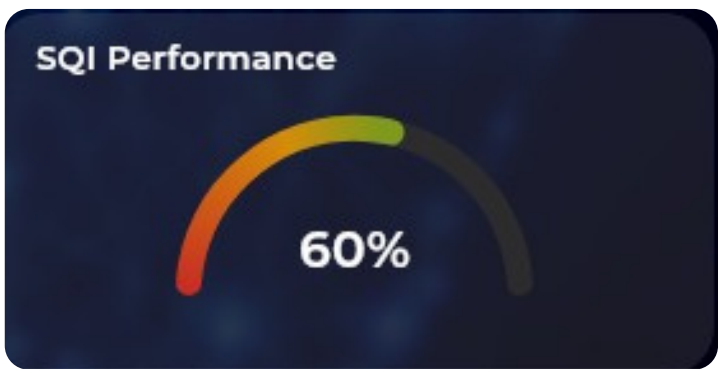
The results are organized into three sections:

1. **Pathologies:** Information entered before the analysis to provide clinical context.
2. **General Parameters:** A summary of the main running performance indicators.
3. **Detailed Parameters:** A more in-depth analysis of biomechanical parameters and their evolution over time.

3.1 General Scores

This first section presents the general scores of the running analysis. These scores provide a summary of the overall quality of the running gait by combining several key parameters related to movement efficiency, stability, and running control.

The Baliston **Stride Quality Index (SQI),** scored out of 100, reflects movement patterns that may be associated with increased physical load or less optimal stride control. It provides an initial indication of stability, consistency, and movement quality during running.



You can click the arrow next to the score to display the specific parameters used in the calculation. A color-coding system allows for quick interpretation: green indicates an optimal result, orange indicates a result slightly outside the expected range, and red indicates a result significantly outside the expected range.



The Injury Prevention SQI evaluates the safety profile of your gait on a scale of 100. A score closer to 100 indicates a better result, suggesting that your movement patterns are associated with a lower risk of injury.

You can click the arrow next to the score to view the specific risk factors used in the calculation. A color-coding system facilitates assessment: green indicates low risk, orange indicates moderate risk, and red indicates high risk.

3.2 Duration, Speed, Cadence

The interface on this screen displays the general acquisition parameters:

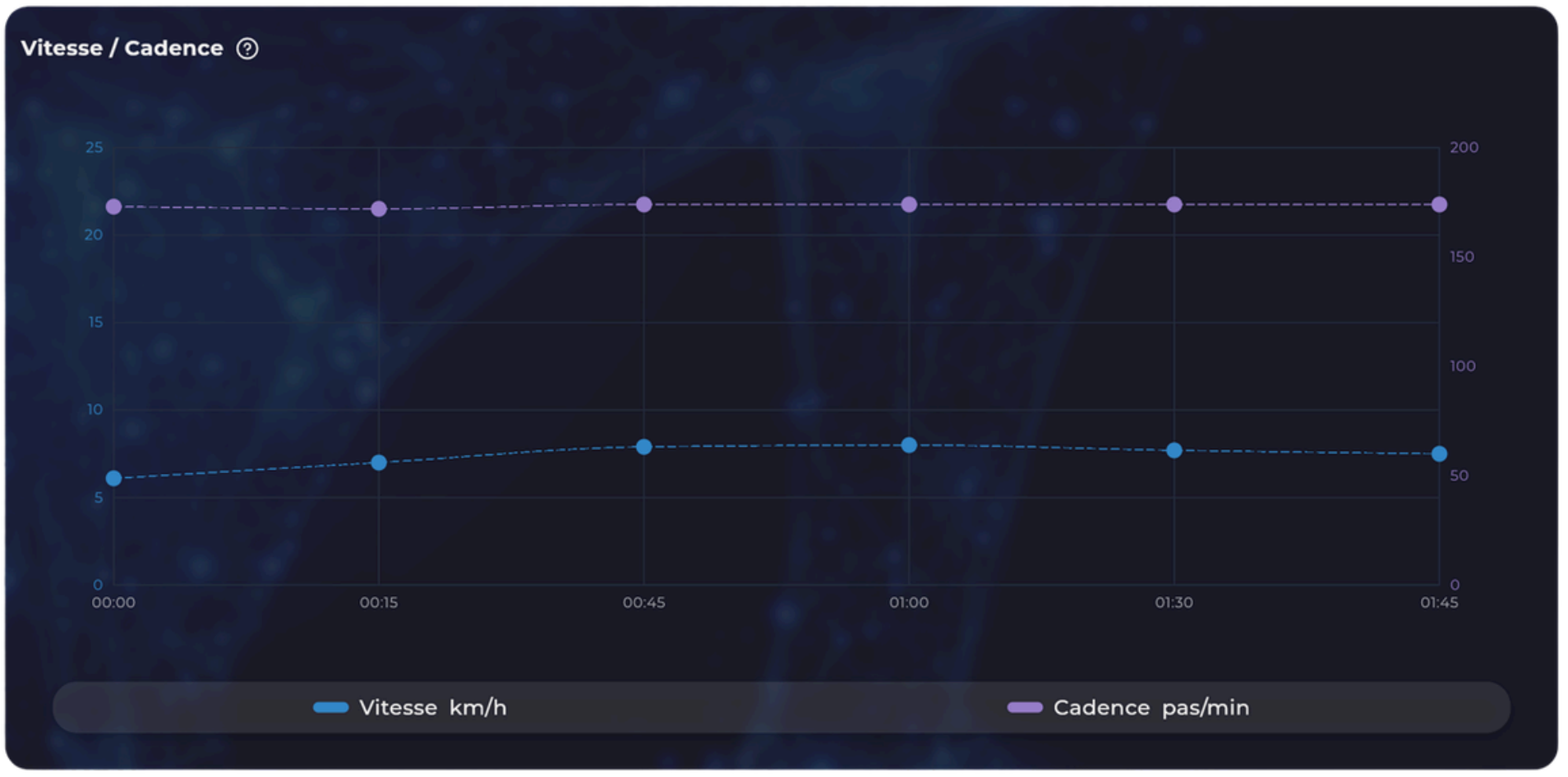
- Acquisition duration
- Average speed
- Cadence

Running Speed:

An increase in cadence should not be confused with acceleration. While increasing running speed and cadence can provide several benefits, it is ten times less effective than increasing stride length.



Speed / Cadence Graph:



This graph provides a dynamic overview of the average running speed and cadence throughout the session.

The purpose of this graph is to provide an overall view of running evolution. It helps identify potential disruptions in the running pattern by analyzing:

- Timing: The moment at which a disturbance appears during the session.
- Type of evolution: Whether the change is continuous (a sustained evolution of the disturbance) or acute (a sudden break or shift in the curve), as well as the magnitude of the disturbance.

3.3 Asymmetry

In this first section, a **contact phase symmetry** index is displayed, highlighting the level of asymmetry between the two lower limbs, as well as **identifying the limb that appears to be stronger.**



There is a natural level of asymmetry between the two lower limbs, which is more pronounced during running than walking, including among healthy runners.

It may be influenced by differences in limb length, muscle strength, or variations in running patterns between the two legs.

However, there is no correlation between mild (natural) asymmetry and an increased risk of injury.

Conversely, very low or no asymmetry may be considered problematic, as it can indicate a certain level of lower-limb rigidity.

On the other hand, excessive asymmetry, when repeated over time during activity, may have detrimental effects on the more heavily loaded limb, increasing stress on anatomical structures and potentially contributing to injuries.

3.4 Foot Strike Type

Foot strike type refers to the way the foot contacts the ground, beginning either with the heel, **the midfoot (flat-foot landing), or the forefoot.** Please note that this represents the **average** foot strike pattern observed throughout the acquisition.



Impact force is the deceleration force experienced by the foot at the moment of initial ground contact during each stride.

This force depends on the patient's body weight, pelvic elevation during the stride, stride length, and running speed. The risk of traumatic injuries may increase with higher impact forces; however, this relationship is not universally supported across the scientific community.

IThere are three types of foot strike patterns:

- **A heel strike** occurs with a rear-to-front movement, with the knee and hip flexed and the pelvis in a posterior tilt position. This type of strike is more energy-efficient; however, it generates higher loading rates and greater impact forces, which may increase the risk of injuries affecting the tibia, knee, hip, pelvis, and back. Due to the repeated impact forces, this type of foot strike may also contribute to the development of heel pain (talalgia) (8;11).

- **A midfoot strike** represents a middle ground between heel strike and forefoot strike. During a midfoot strike, the foot lands flat on the ground, without a rear-to-front or front-to-rear motion, but rather through a downward movement. This strike pattern produces very limited braking forces (associated with the rear-to-front movement) and is therefore less stressful for the lower limb. It allows better engagement of the elastic components of muscles and tendons to store and return energy compared with a heel strike, while remaining less efficient than a forefoot strike.

- **A forefoot strike** involves a “gripping” motion from front to back. It is more efficient and makes greater use of the elastic components of muscles and tendons, with a more extended leg position and a higher pelvis position. However, this type of strike is more energy-demanding, although it has the advantage of being less traumatic. Excessive impact forces may nevertheless lead to foot or ankle injuries. A transition toward a forefoot strike pattern may indicate a possible compensation mechanism for heel pain (talalgia) (8;11). In general, impact forces are not considered the primary cause of injuries, but they may amplify existing weaknesses and vulnerabilities, thereby increasing the severity of certain conditions.



By clicking on one of the two images, an animation illustrating the patient’s foot strike type will appear. You can also enlarge the animation or open it in a new tab for better viewing.



3.5 Running Profile

This graph displays all the average spatiotemporal parameters recorded during the acquisition. It shows the average stride length, as well as the distribution of the contact, swing, and double flight phases for each limb.



Stride Length: There are two types of stride patterns:

- **Long strides** improve recovery, as gas exchange occurs only during the swing phase, but they require more energy. They increase vertical displacement (reducing running efficiency) and increase muscular work during the landing and propulsion phases, making them less efficient.

- **Short strides** are more efficient and economical because they reduce vertical oscillations and decrease muscular demands during landing and propulsion, as the foot is positioned closer to the projection of the center of gravity. Additionally, as they are associated with an increased cadence, they promote greater use of the elastic components of muscles and tendons.

Stride length is considered appropriate when it does not cause a reduction in speed during the landing and propulsion phases and when vertical displacement and loading rate are minimized.

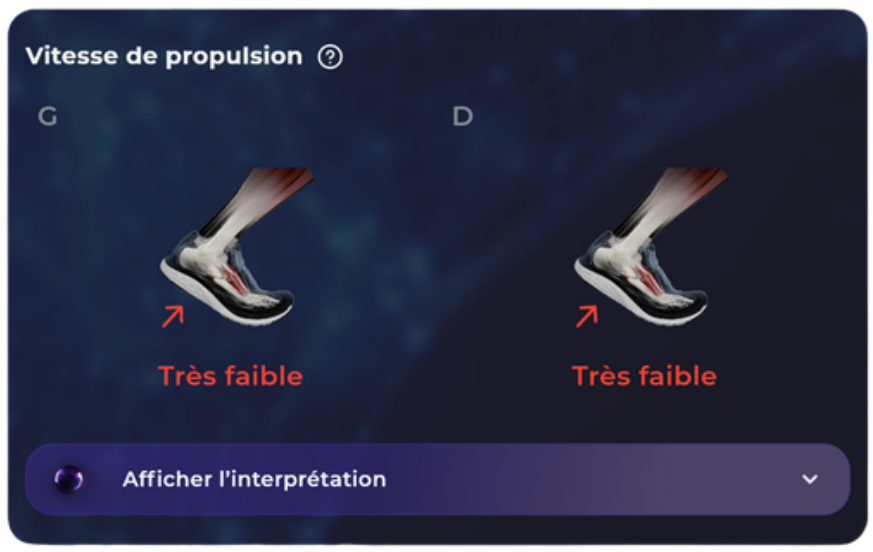
- **Contact time** represents approximately 40% of the stride duration during normal running and decreases as speed increases, reaching approximately 25% in sprinters. This parameter is useful for comparing both lower limbs and identifying the stronger limb (the one with the longer contact time).
- **Swing time** represents approximately 60% of the stride duration during normal running and increases with speed or stride length. This results in greater kinetic energy during landing and propulsion, leading to a higher loading rate.
- **Double flight time** represents approximately 10% of the stride duration, occurring at the beginning and end of the swing phase. Its duration tends to increase with running speed.

3.6 Propulsion Speed

Propulsion speed evaluates the runner's ability to generate an effective push-off during the stance phase. It provides information about the foot's propulsion dynamics at the moment when the runner leaves the ground.

A high value generally indicates a faster and more dynamic push-off, while a low value may indicate less efficient propulsion, reduced impulse generation, or a more economical but less performance-oriented running strategy.

This parameter also allows comparison of the contribution of the left and right feet in order to identify potential propulsion asymmetries.



3.7 Maximum Stride Height

Maximum stride height evaluates the maximum elevation of the foot during the swing phase of running. It provides information about stride dynamics, the runner's ability to efficiently bring the foot forward, and the quality of foot clearance from the ground.



A higher value generally indicates a larger and more dynamic swing phase, while a lower value may indicate a lower foot trajectory, reduced propulsion, or protective strategy related to pain or muscle fatigue.

This parameter also allows comparison between the left and right feet to identify potential asymmetries in movement.

3.8 Pronation / Supination Angles

These are the pronation/supination angles measured at different phases of the running cycle:

- At foot contact with the ground (strike angle): The angle measured at the moment the foot lands.
- At the moment when the foot is fixed: Either when the foot is on the ground during a heel or midfoot strike, or in the air when the heel has stopped lowering but has not yet started rising during a forefoot strike (transition angle).
- At toe-off (propulsion angle): The angle measured when the toes leave the ground.This parameter helps assess the quality of the foot's plantar progression from initial contact to propulsion and can highlight certain potentially risky movement patterns or indicators of underlying conditions.



By clicking on any point along the stride line, you can view a 3D animation of the foot. This animation illustrates the precise position and rotation of the foot at that specific moment of the stride, allowing you to connect the graph data with the actual movement patterns.

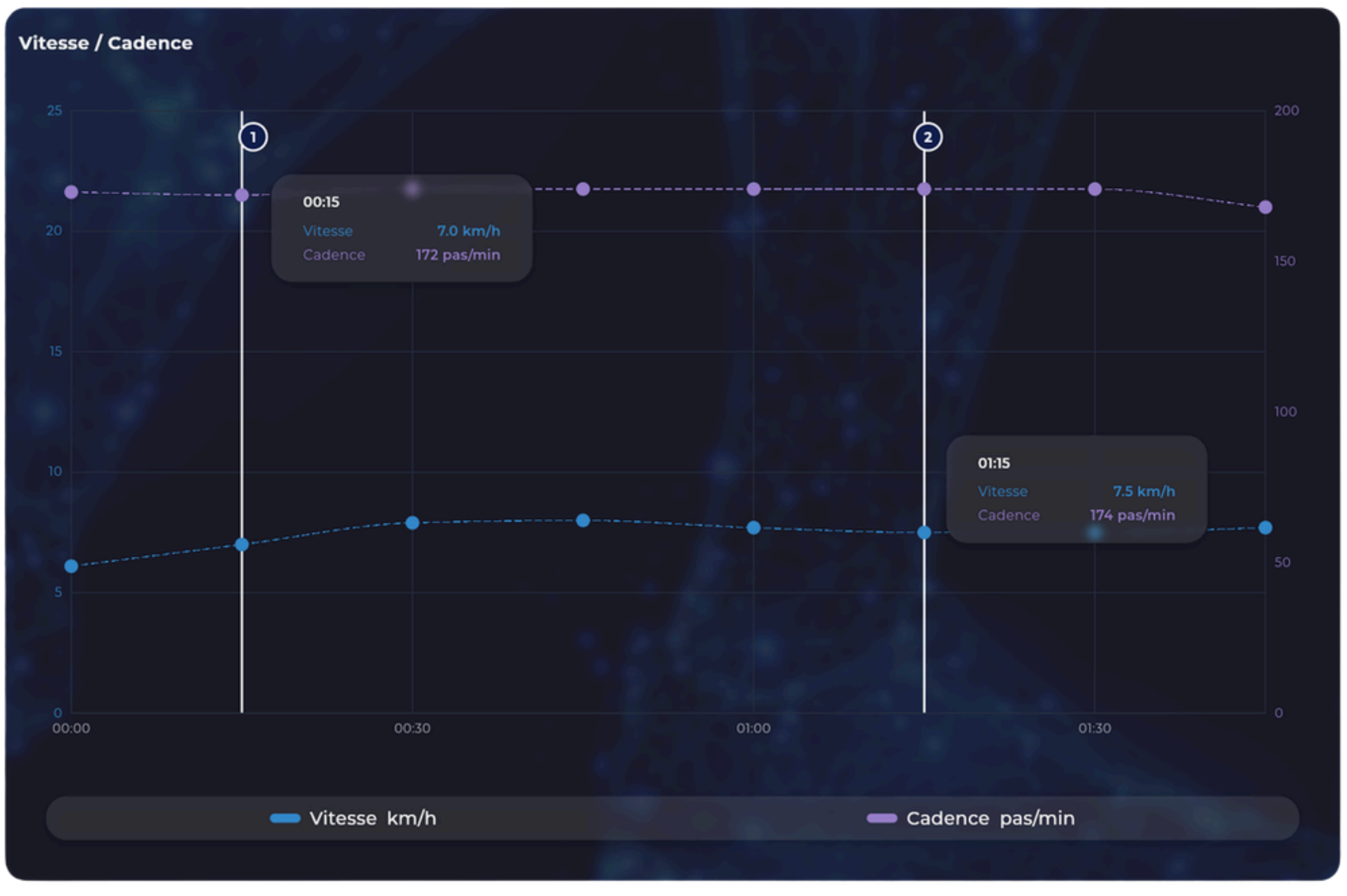
These angles are relevant when investigating movement patterns that may contribute to the development of certain running-related conditions, particularly due to repetitive movements and the mechanical load applied during running.
They may help identify movement patterns potentially associated with conditions such as:

- Iliotibial band syndrome (1;2;3): A pronation-dominant foot progression pattern (strike, foot-flat, and propulsion phases), or at least a supinated foot strike pattern.
- Achilles tendinopathy (4;5;6;7): A supinated or pronated foot strike pattern, particularly during the propulsion phase.
- Pes anserine tendinopathy (9;10): A pronation-dominant foot progression pattern.

3.9 Temporal analysis

Once the general page has been reviewed, you can access the detailed page.

By selecting two different moments on the speed and cadence graph, you can compare all spatiotemporal and kinematic parameters corresponding to these specific points in the running session.
The purpose of this analysis is to identify one or more events or disruptions that occurred during the acquisition and compare running parameters before and after the event. This helps understand the consequences, identify the potential origin of the disturbance, and provide an objective explanation of the observed changes.



4. Balia Practitioner Assistant

The Balia Movement Assistant is the practitioner's AI-powered right-hand assistant within the Baliston Health platform.

Balia helps clinicians review movement analysis results by providing summaries, interpretation support, potential implications, examination recommendations, and interactive chat assistance.

4.1 Getting to Know Balia

Balia is available wherever the Balia Orb appears on the platform.

When clinicians see this logo, they can select it to access Balia's assistance for that specific section of the analysis.

The Balia Orb indicates that AI-powered assistance is available.

When the orb appears in the results interface, clinicians can select it to access Balia. Balia can:

4.2 Possible Uses of Balia

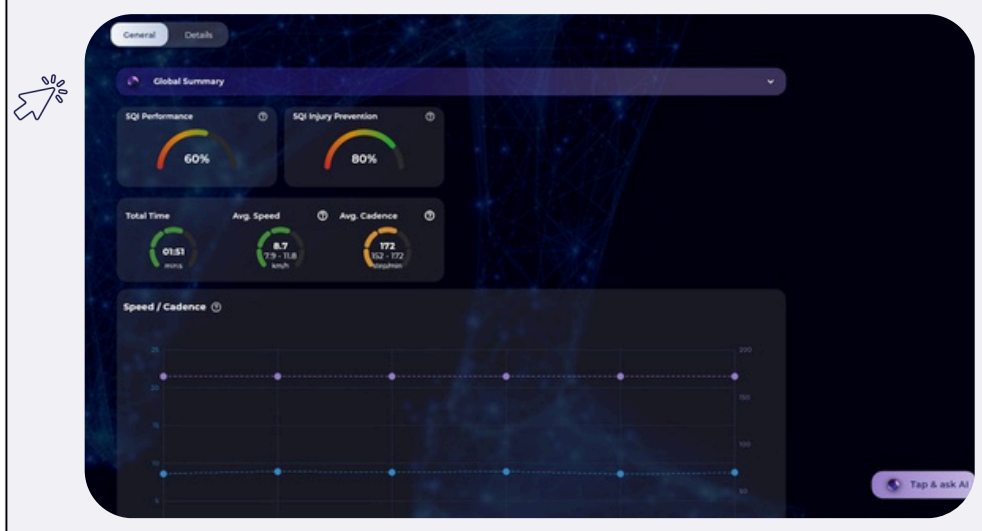
Balia consists of three main components:

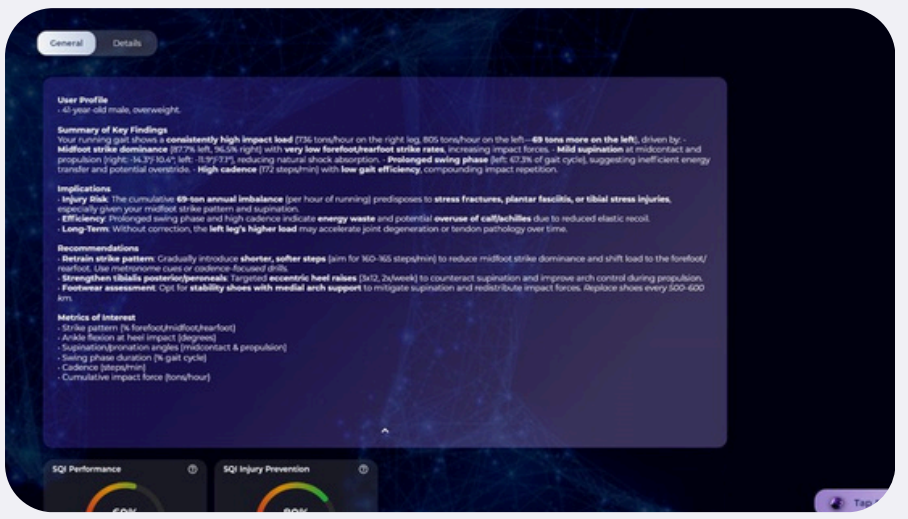
- **Global Summary**
- **Parameter Interpretation**
- **Chatbot**

Global Summary

By clicking on Global Summary, you will find a comprehensive overview of the patient's analysis, divided into several sections:

- **User Profile:** Basic patient information and medical history.
- **Summary of Key Findings:** The main results and biomechanical observations identified by the system.
- **Implications:** An explanation of the possible effects, risks, or impacts of these findings on performance.
- **Recommendations:** Personalized advice and corrective measures to improve performance and reduce injury risk.
- **Key Tracked Metrics:** The main parameters analyzed, such as cadence, foot strike pattern, swing phase, and impact force.





Interpretation

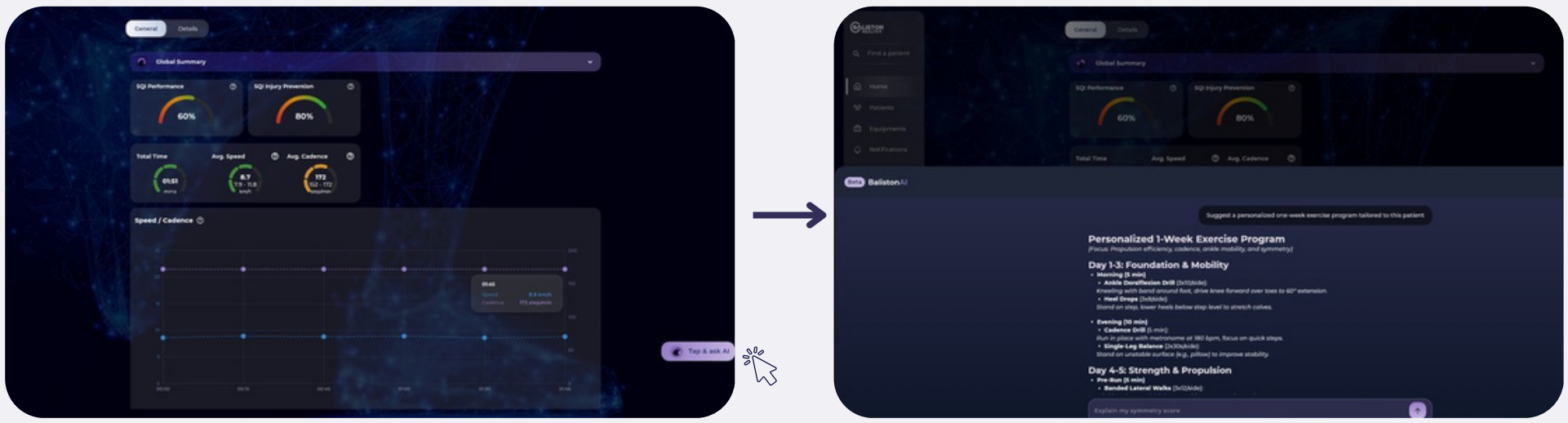
By clicking on "Show Interpretation", you will access a detailed explanation of the analysis results. This section translates technical data into clear clinical insights by explaining the meaning of the results in relation to the patient's movement patterns, performance, and potential injury risks.





ChatBot

When you click on “Tap and ask the AI a question”, you can interact directly with the chatbot.
The AI assistant is designed to provide clear explanations, practical guidance, and personalized recommendations to help you better understand the analysis and support clinical decision-making.



4.3Clinical, Regulatory, and Safety Considerations

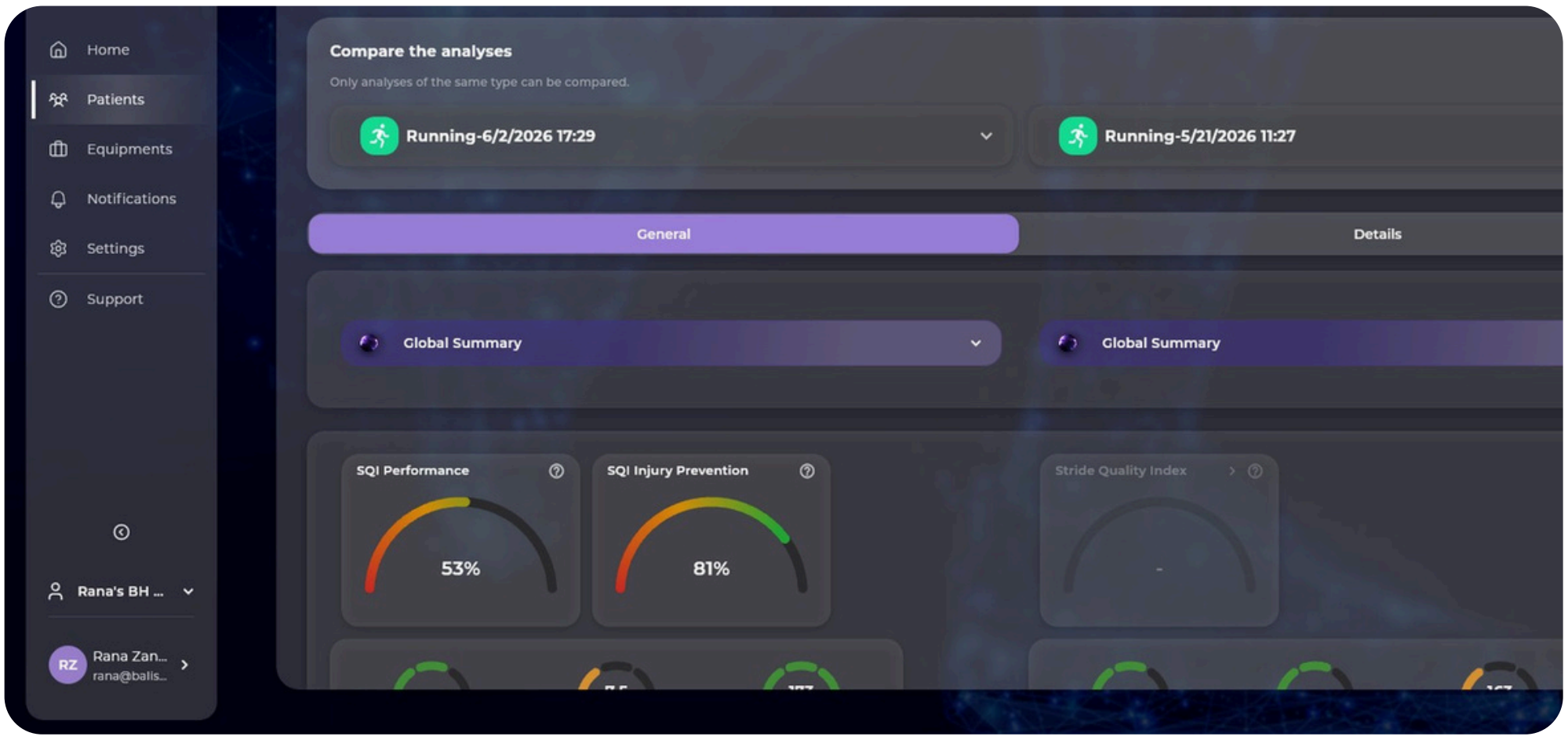
Balia is designed to support the clinical interpretation of movement analysis results. It does not provide a medical diagnosis and should not be used as the sole basis for clinical decisions.

Clinical decisions, diagnoses, treatment plans, rehabilitation progressions, return-to-play decisions, and patient recommendations remain the responsibility of the practitioner.

Balia’s results should be interpreted in consideration of the patient’s clinical history, reported symptoms, physical examination findings, patient status, previous analyses, clinical objectives, and any other relevant clinical information.

5.Comparison and Progression

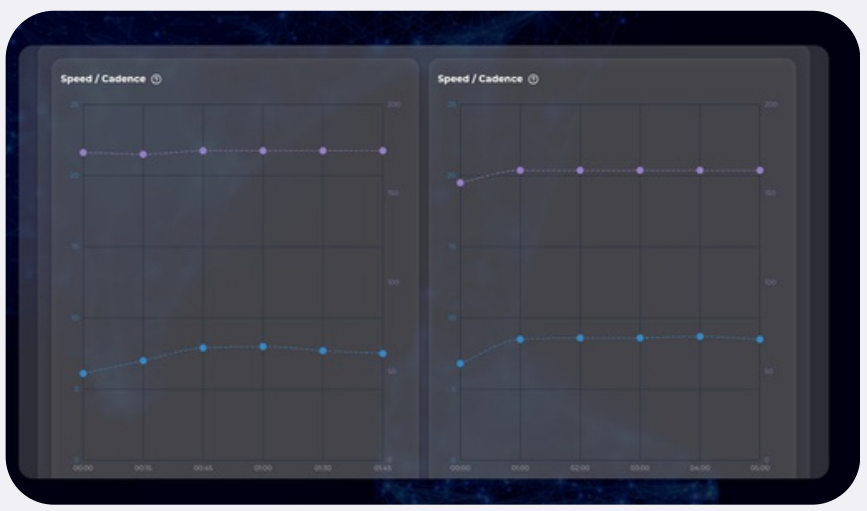
5.1 Comparison

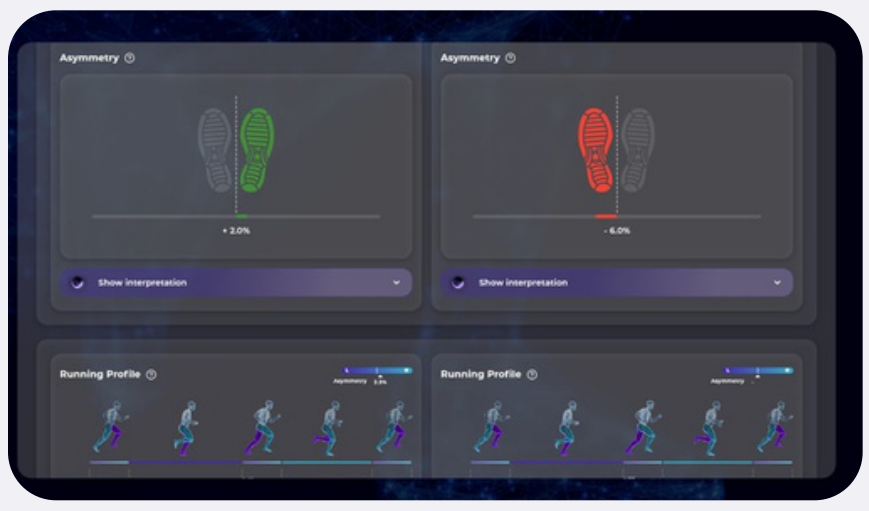


The platform also includes a comparison feature that allows two running sessions to be analyzed side by side in a clear and structured view.

The comparison displays all key measurements and biomechanical information without the need for filtering, including:

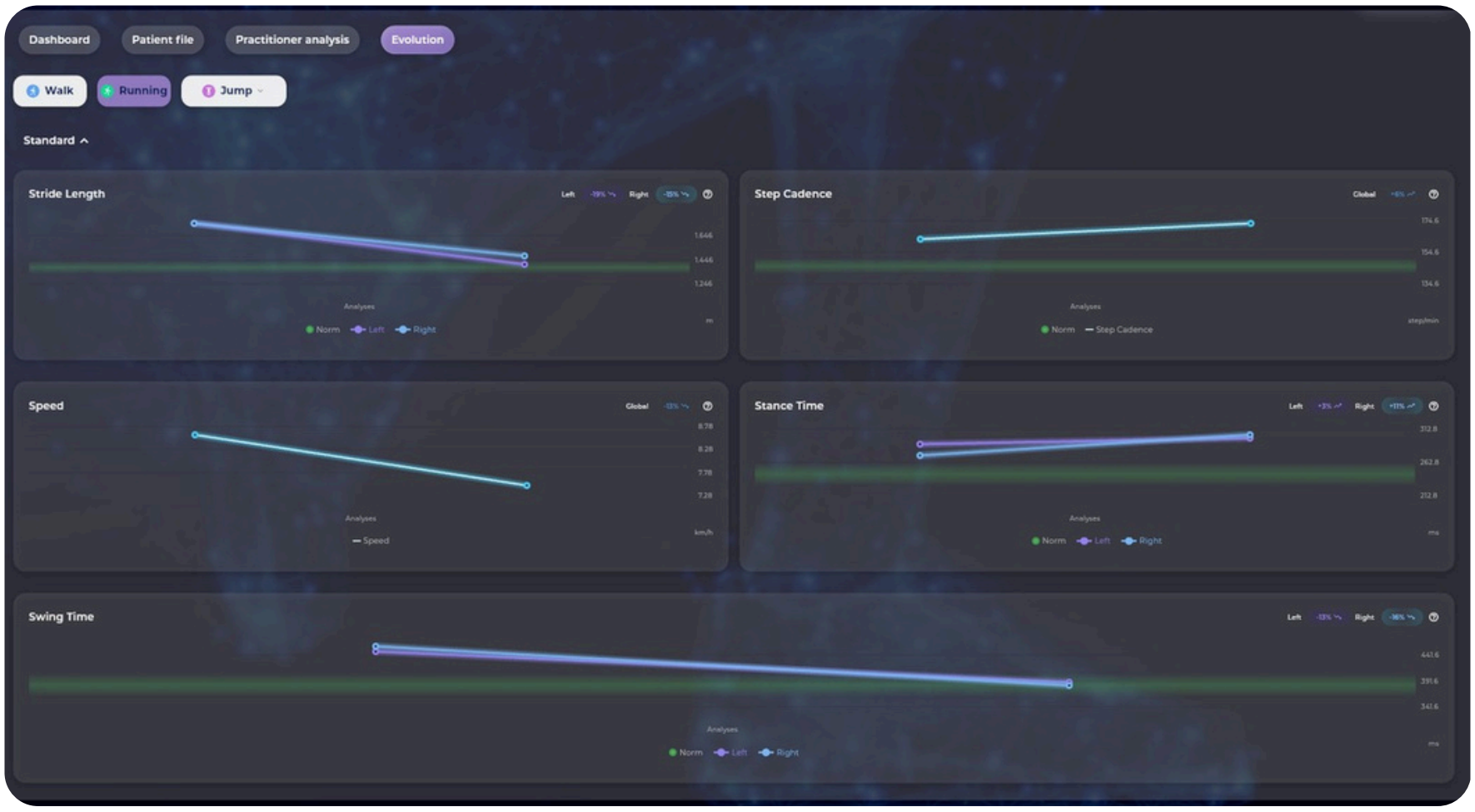
- SQI injury risk score
- Asymmetry
- Changes in speed and cadence
- Propulsion speed
- Pronation and supination angles
- Global Performance and Fatigue Indicators





5.Comparison and Progression

5.2 Progression



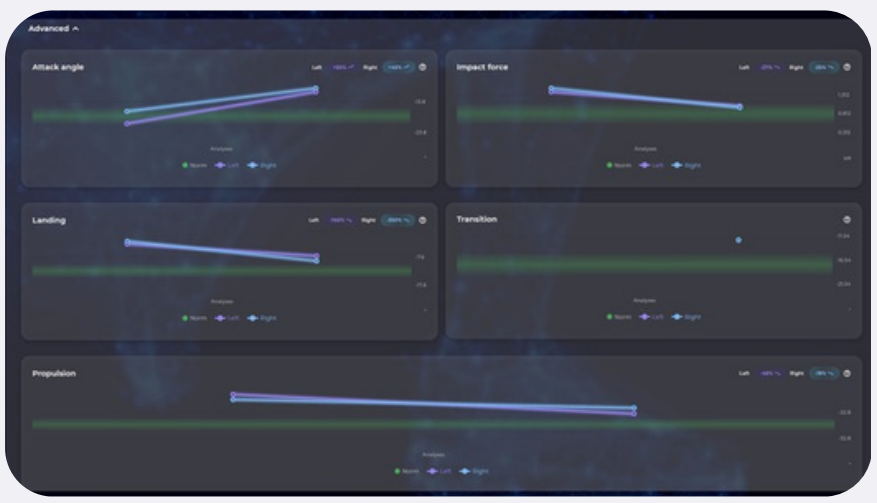
The Evolution feature of the platform allows clinicians to track a patient's biomechanical progress over time through successive assessments.

Standard indicators include:

- Stride length
- Step cadence
- Speed
- Stride cycle
- Double flight time

Advanced indicators include:

- Strike angle
- Impact force
- Landing
- Transition
- Propulsion



9.References

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10. Assistance

Youcanfindcompleteinformation and support resources at: https://www.baliston-health.com/customer-support

10.1 Contact

For any technical assistance or product-related questions:

Baliston Health

France: +33 (0)3 55 40 91 55

United States: +1 720 798 4452

Email:
contact@baliston-health.com

Incident and vigilance reporting:
Vigilance@baliston-health.com

10.2 Marquage CE

CEmarkingdate: To be determined Reference: BAHE001-FPT00

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