



DIGITSOLE®
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Case Study

Analysis of different strikes in runners using Digitsole Pro

The practitioner

Fabrice Millet has been a sport podiatrist since 2003, specialising in running and cycling, and is an instructor in the Sport Podiatry D.U. in Lyon.

He has a highly varied patient clientele, including athletes and ranging from children to the elderly. In an ad hoc manner, he uses a pressure platform as well as a video device to analyse running for athletes.



Since November 2019, Fabrice Millet has used DigitsolePro for all of his podiatry consultations, which allows him to detect problems with mobility in both walking and running, and to obtain a better evaluation of his patients by measuring objective biomechanical data that cannot be observed with the naked eye.



Comparative study of 3 runners

- **Runner 1:** sprinter specialising in the 400m, 186cm, 80kg, Nike shoes
- **Runner 2:** trail runner, 182cm, 72kg, Ascis trail shoes
- **Runner 3:** marathon runner, 188cm, 77kg, Ascis Nimbus

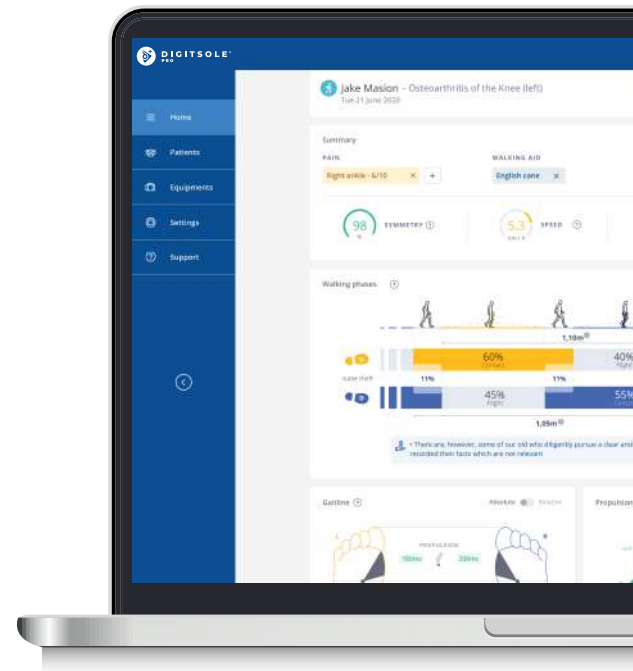
3 runners with 3 different profiles and pathologies:

- **Runner 1:** Achilles' tendonitis
- **Runner 2:** ext right knee pain with the start of a meniscal lesion
- **Runner 3:** left knee pain (ITBS)

What information was collected during the clinical examination?

Each runner came in following pain that occurred during running. Some were forced to stop running.

- **Runner 1:** inflammation of the Achilles tendon, daily discomfort, pain increases when running. Upon examination we found hollow feet and varus (deformation increased on the left)
- **Runner 2:** meniscal lesion on the right knee combined with the beginning of an external arthrosis, no specific misalignment detected in the examination, but a slight collapse of the midfoot is observed.
- **Runner 3:** pain on the external face of the left knee, suspected iliotibial band syndrome. Upon examination we observe a calcaneus valgus combined with a midfoot collapse



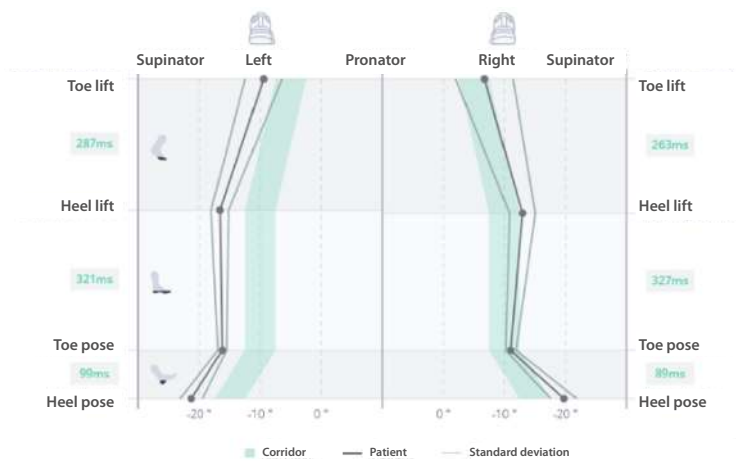
Information collected using DigitsolePro during the walking examination.

Fabrice Millet uses DigitsolePro® for dynamic analysis (walking and running for these patients). He collects data on the patient's walking and running activity using the web interface available online at <https://app.DigitsolePro.com>. The results are then presented to the patient, medical staff and loved ones, allowing the patient to integrate them into the treatment process and facilitating acceptance.

Different parameters will be used to complete the clinical examination:

To complete the clinical examination, a walking and running examination will be done using DigitsolePro. The walking examination will allow us to better understand the data from the running. Based on the pathologies, certain parameters will be looked at in a more in-depth manner.

For the patient with Achilles' tendonitis, we can see the consequences on walking and thus evaluate the pain (contact time compared with the healthy side), but also determine whether certain factors may be the cause of the inflammation (deviation of the foot when running and walking, type of running strike, force of impact).



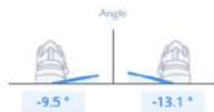
When walking, equal contact time, slight pain at the time of the analysis
Deviation of the left foot and varus increase the tension on the Achilles tendon.

Attack type ②

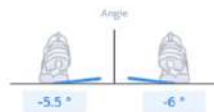


When running, forefoot strike with the tendency to increase the tension on the Achilles tendon.

Angle of attack

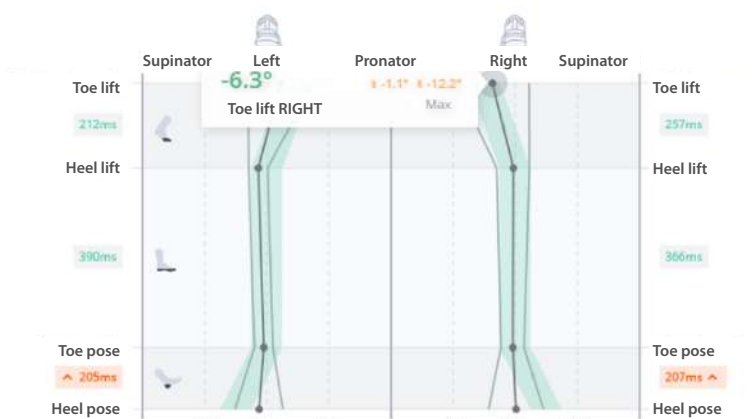


Propulsion Angle



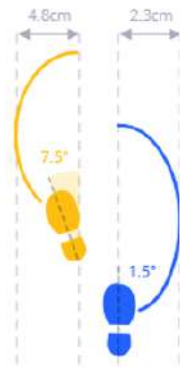
More external strike on the right side, supinator when running.

For the patient with the meniscal lesion, verify what could tend to overload the external compartment (deviation of the foot when walking and running, type of strike, force of impact) and look at the consequences on walking and running.

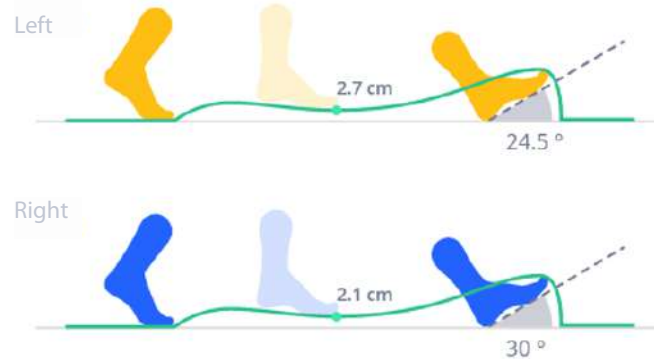


When walking, strike in valgus then compensation, which is reinforced by the very closed Fick angle on the right side (1.5 instead of 9.6) and the higher strike angle (normally 20-23°)

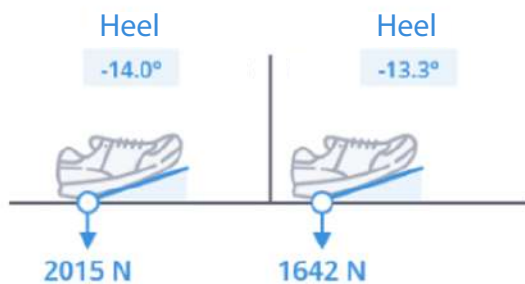
Opening angle ?



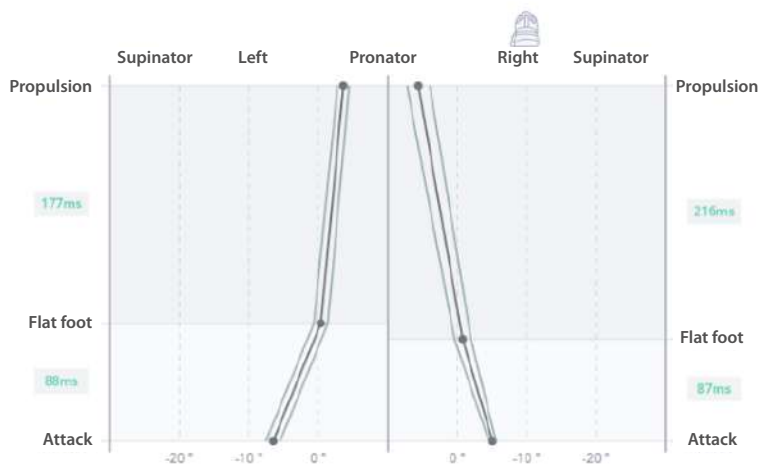
Clearance - Steppage ?



Attack type ?

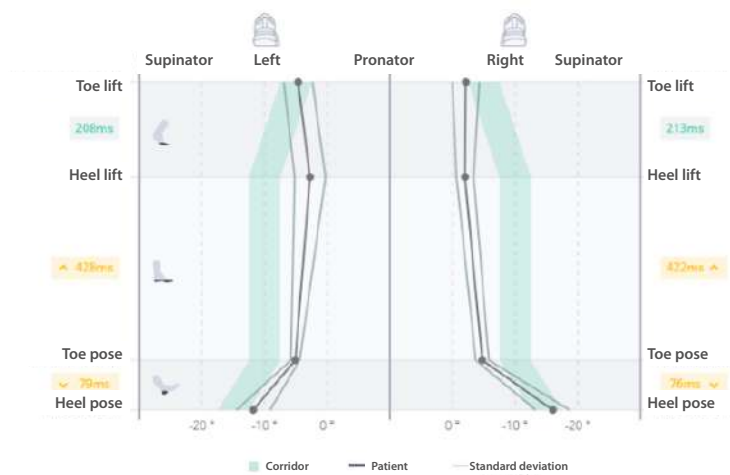


When running, pronounced heel strike, promoting joint pain, force of impact less on the side experiencing pain, a sign of significant pain

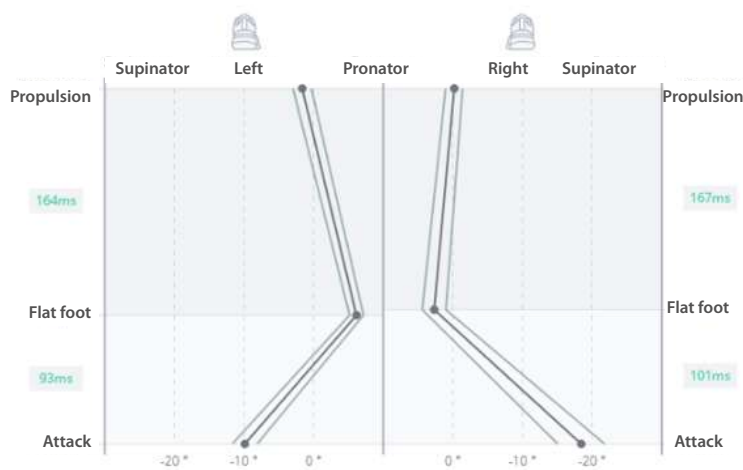


Rolling of the step-in pronation increases the constraints in the external compartment of the knee

For the patient with ITBS, the aim is to understand the cause of the appearance of this pathology (pronation or supination) and the significance of the deformations in order to propose the most suitable treatment. But it is also to advise the patient on their running in order to minimise deformations.

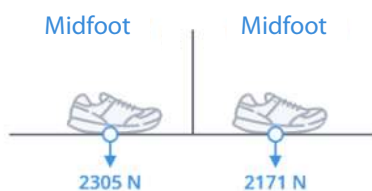


When walking, left side strikes slightly in valgus and the step rolls in pronation on both sides, light pronation when walking



When running, neutral strike on the left side, right side supinator (compensating considering the walking) and significant collapse in the flat foot phase

Attack type

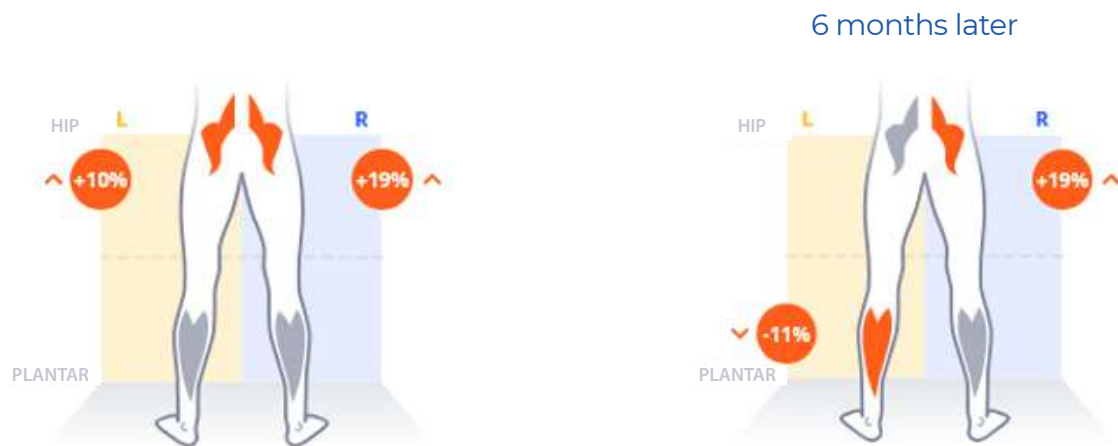


Midfoot strike with a good force of impact with respect to the weight of the patient

Proposed treatment

- **Runner 1:** correction of stationary and dynamic deformations using orthopaedic soles, lifting of the heel with heel pieces which will be used for a short period of time (1 to 2 months) and implementation of the Stanish protocol by the physical therapist, which the patient will then practice on their own at home.

Walking and running test repeated after 6 months, no more pain, resumption of sprinting practice. The only problem is that the patient only rehabilitated the side experiencing pain and created a difference in the moment of propulsion, with muscles used differently on the two sides.



- **Runner 2:** the aim is to rebalance the support, which will be done using orthopaedic soles, and the physical therapist will also propose a proprioceptivity programme. He can also change his stride using a less pronounced heel strike, and also by choosing shoes that encourage a midfoot strike.
- **Runner 3:** a strength training program will be proposed, combined with the creation of orthopaedic soles, advice regarding running shoes for pronators (e.g., Asics Kayano) will also be given

Conclusion

Each runner has a different strike and way of running and can develop pathologies based on that.

The advantage of DigitsolePro is to complete the clinical data and allow for specific treatment. It allows us to follow the evolution over time.

There is no strike that is preferred and recommended but depending on the runner and his or her pathologies, we can help them change their way of running in order to eliminate injury.

The great “method” of being aerial/airborne is not recommended to everyone and as we can see (runner 1) can also provoke pathologies. If there is a change to propose to the runner, it should be done in a progressive manner and based on the runner’s profile.

Digitsole Pro, an international Establishment



ISO 27001 : 2017

International standard for information security. It's a requirement for establishing, implementing, maintaining and continually improving an information security management system (ISMS) -We make the information assets we hold more secure.



ISO 13485 : 2016

Regulatory requirements are increasingly stringent throughout every step of a product's life cycle, including service and delivery. Increasingly, organizations in the industry are expected to demonstrate their quality management processes and ensure best practice in everything they do. This internationally agreed standard sets out the requirements for a quality management system specific to the medical devices industry.



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