XION

BORN TO RUN

REWIRE YOUR MOVEMENT SYSTEM

Dr. Junggi Hong

WHAT IS RUNNING ?

- **Running** is a method of terrestrial locomotion allowing humans and other animals to move rapidly on foot.

- **Running** is a type of gait characterized by an aerial phase in which all feet are above the ground

XION

WHY DID WE HAVE TO RUN?

- The prey was too strong and dangerous for humans to hunt.
- Humans put together a team and used hunting strategies to keep the heavy and large animals moving in the hot weather.
- Humans cooled their heat by sweating or drinking water, but animals could not.
- Humans ran continuously so that animals could not cool off or rest.
- Humans ran about 40km at a time for hunting.
- Humans ran at least 2 to 7 hours when they were hunting.

9 REASONS HUMANS WERE BORN TO RUN

1) Short strong toes
2) The Windlass Mechanism
3) The Calf-Achilles Complex
4) Big, Powerful Glutes
5) Slow Twitch Muscle Fibers
6) Independent Breathing
7) Nuchal Ligament
8) Sweating & Hairless Bodies
9) The Runners high

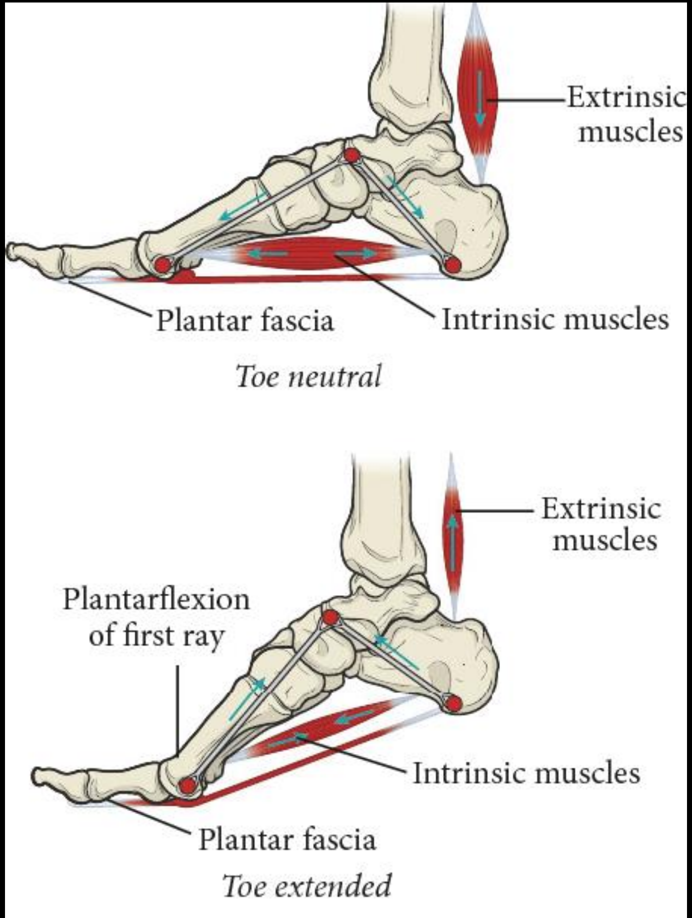
9 REASONS HUMANS WERE BORN TO RUN

1) SHORT STRONG TOES

- Shorter toes create better leverage and allow us to generate incredible forces and push off the ground when running at high speeds as well as efficiency when running distances

9 REASONS HUMANS WERE BORN TO RUN

2) THE WINDLASS MECHANISM



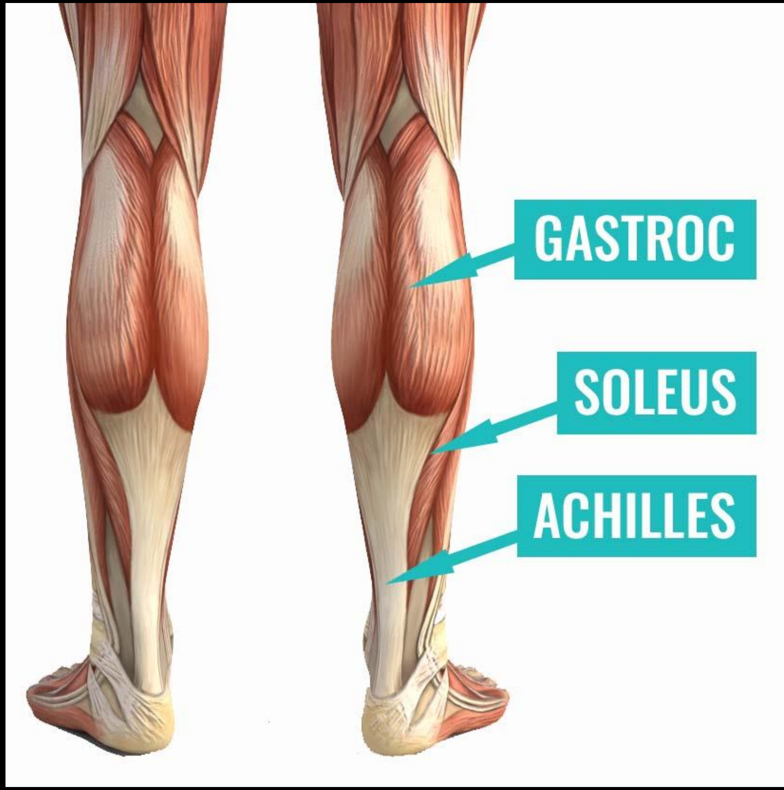
- It pulls on the plantar fascia locking the arches of the foot into position helping to create a rigid stable foot.

- The foot can be both a rigid propulsion device and a flexible absorbing device switching back and forth in only fractions of a second during the gait cycle

XION

9 REASONS HUMANS WERE BORN TO RUN

3) THE CALF-ACHILLES COMPLEX

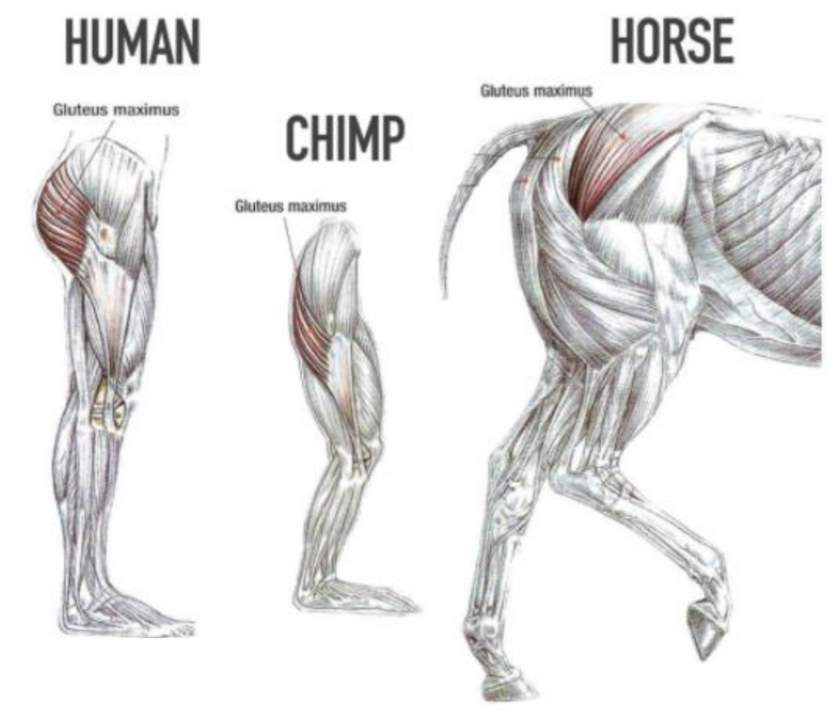


- Strong and efficient calf muscle can work eccentrically to absorb the force of impact.

- The Achilles is the strongest, thickest tendon, It`s built for high speed, high force and endurance.

9 REASONS HUMANS WERE BORN TO RUN

4) BIG, POWERFUL GLUTES

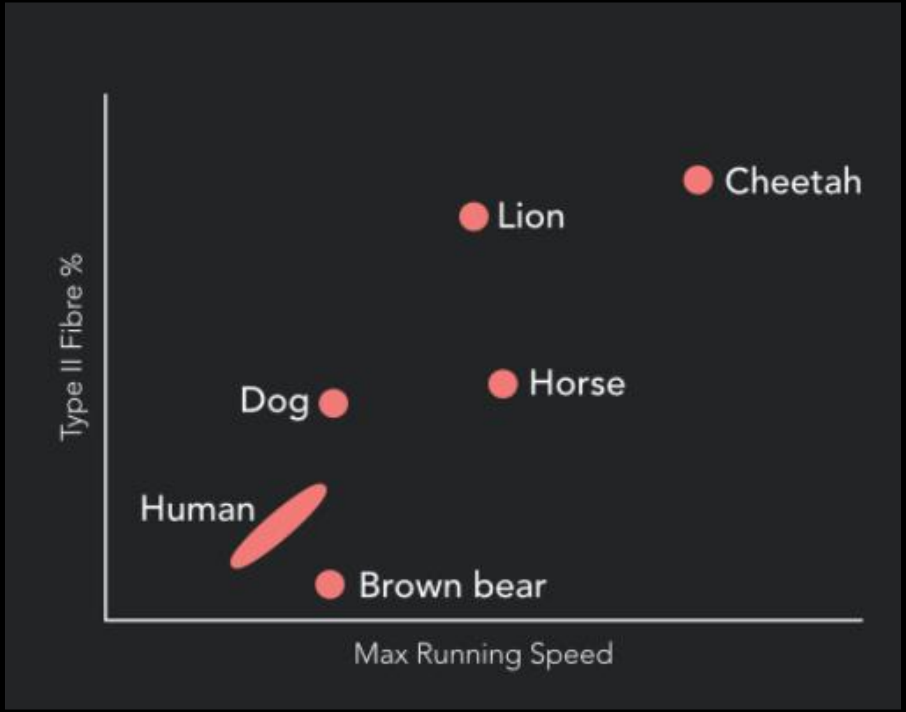


- Gluteus maximus is the biggest muscle and because of its position, it is suited perfectly to running more than any other activity.

XION

9 REASONS HUMANS WERE BORN TO RUN

5) SLOW TWITCH MUSCLE FIBERS

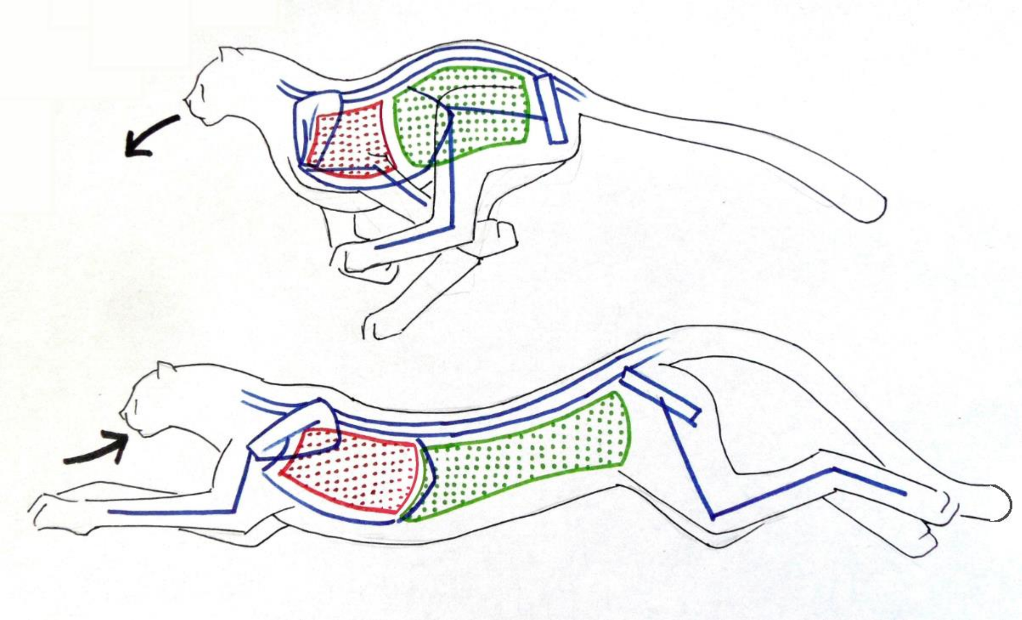


- Compared to the rest of the large mammals, humans are on the slower end of the continuum. So humans hunted by chasing wild animals by grinding them into exhaustion over many hour.

XION

9 REASONS HUMANS WERE BORN TO RUN

6) INDEPENDENT BREATHING



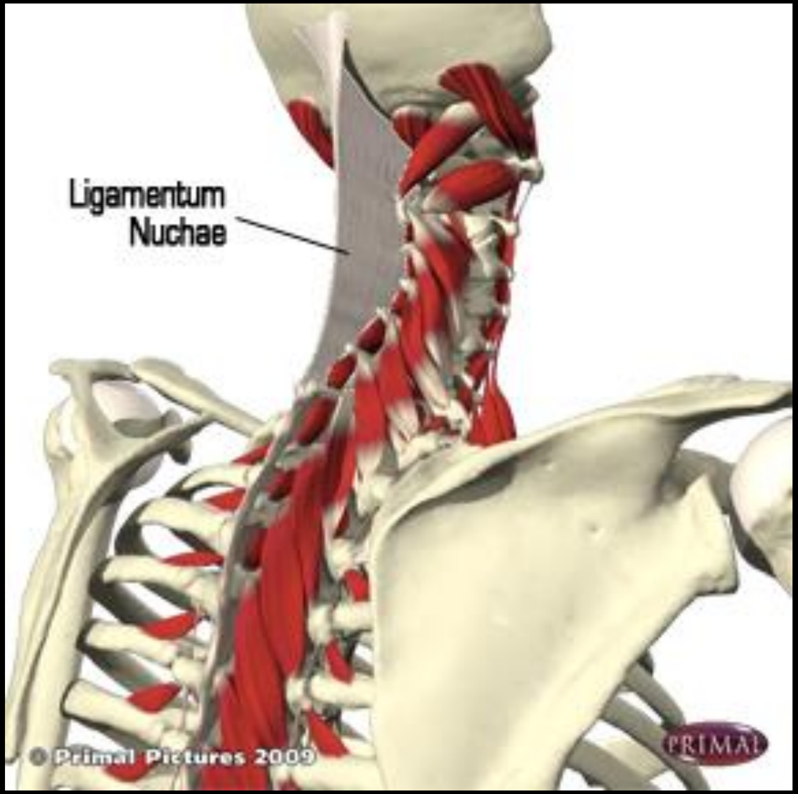
- When the Cheetah runs, it`s whole body works like a pump stretching and compressing on the diaphragm and ribs pushing air in and out of the lung. This is a major part of the reason Cheetah have no stamina.

- Human can breathe at a rate completely independent to running speed, this allows us to maintain a steady oxygen intake without hyperventilation

XION

9 REASONS HUMANS WERE BORN TO RUN

7) NUCHAL LIGAMENT



- This structure provides passive support and stability to the head and neck.

- humans are the only primates to have it

9 REASONS HUMANS WERE BORN TO RUN

8) SWEATING & HAIRLESS BODIES

- This ability to tightly control and regulate temperature through evaporative cooling directly from the skin gives humans a huge endurance advantage.

XION

9 REASONS HUMANS WERE BORN TO RUN

9) THE RUNNERS HIGH

- A runner's high is a brief, deeply relaxing state of euphoria. it occurs after intense or lengthy exercise

- This positive vibe can be put down to endorphins. These hormones produces feelings of euphoria and reduces feeling of pain

WHY DO WE RUN?

Review

Is running associated with a lower risk of all-cause, cardiovascular and cancer mortality, and is the more the better? A systematic review and meta-analysis

Zeljko Pedisic,[1] Nipun Shrestha,[1] Stephanie Kovalchik,[1] Emmanuel Stamatakis,[2,3] Nucharapon Liangruenrom,[1,4] Jozo Grgic,[1] Sylvia Titze,[5] Stuart JH Biddle,[6] Adrian E Bauman,[3] Pekka Oja[7]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bjsports-2018-100493).

[1]Institute for Health and Sport, Victoria University, Melbourne, Victoria, Australia
[2]Charles Perkins Centre, University of Sydney, Sydney, New South Wales, Australia
[3]Prevention Research Collaboration, School of Public Health, Faculty of Medicine and Health, University of Sydney, Sydney, New South Wales, Australia
[4]Institute for Population and Social Research, Mahidol University, Nakorn Pathom, Thailand
[5]Institute of Sport Science, University of Graz, Graz, Austria
[6]Institute for Resilient Regions, Centre for Health, Informatics, and Economic Research, University of Southern Queensland, Springfield Central, Queensland, Australia
[7]UKK Institute for Health Promotion Research, Tampere, Finland

Correspondence to
Professor Zeljko Pedisic, Institute for Health and Sport, Victoria University, Melbourne, VIC 8001, Australia; Zeljko.Pedisic@vu.edu.au

Accepted 1 April 2019

Check for updates

To cite: Pedisic Z, Shrestha N, Kovalchik S, *et al*. *Br J Sports Med* Epub ahead of print: [*please include* Day Month Year]. doi:10.1136/bjsports-2018-100493

ABSTRACT

Objective To investigate the association of running participation and the dose of running with the risk of all-cause, cardiovascular and cancer mortality.

Design Systematic review and meta-analysis.

Data sources Journal articles, conference papers and doctoral theses indexed in Academic Search Ultimate, CINAHL, Health Source: Nursing/Academic Edition, MasterFILE Complete, Networked Digital Library of Theses and Dissertations, Open Access Theses and Dissertations, PsycINFO, PubMed/MEDLINE, Scopus, SPORTDiscus and Web of Science.

Eligibility criteria for selecting studies Prospective cohort studies on the association between running or jogging participation and the risk of all-cause, cardiovascular and/or cancer mortality in a non-clinical population of adults were included.

Results Fourteen studies from six prospective cohorts with a pooled sample of 232 149 participants were included. In total, 25 951 deaths were recorded during 5.5–35 year follow-ups. Our meta-analysis showed that running participation is associated with 27%, 30% and 23% lower risk of all-cause (pooled adjusted hazard ratio (HR)=0.73; 95% confidence interval (CI) 0.68 to 0.79), cardiovascular (HR=0.70; 95% CI 0.49 to 0.98) and cancer (HR=0.77; 95% CI 0.68 to 0.87) mortality, respectively, compared with no running. A meta-regression analysis showed no significant dose–response trends for weekly frequency, weekly duration, pace and the total volume of running.

Conclusion Increased rates of participation in running, regardless of its dose, would probably lead to substantial improvements in population health and longevity. Any amount of running, even just once a week, is better than no running, but higher doses of running may not necessarily be associated with greater mortality benefits.

INTRODUCTION

Global and national public health authorities recommend that adults take part in 150 min of moderate to vigorous physical activity (MVPA) each week.[1–5] The epidemiological literature strongly supports the beneficial associations of the total amount of MVPA with health outcomes.[6–10] Several systematic reviews and meta-analyses have summarised the evidence for the association between MVPA and the risk of disease-specific and all-cause mortality.[11–16] For example, one meta-analysis found that insufficient MVPA (defined as not meeting the current World Health Organization (WHO) guidelines for MVPA[1]) is associated with a 28% higher risk of all-cause mortality, compared with sufficient MVPA.[15] Considering the high levels of physical inactivity globally, Lee and colleagues estimated that more than 5 million premature deaths a year would be prevented if physically inactive people became sufficiently active.[15] Considerable interest has also been shown in the effects of different types of physical activity (eg, walking, cycling, running, swimming) on health and risk of premature mortality.[17–24] In other words, for a given amount of MVPA, does the type of physical activity matter?

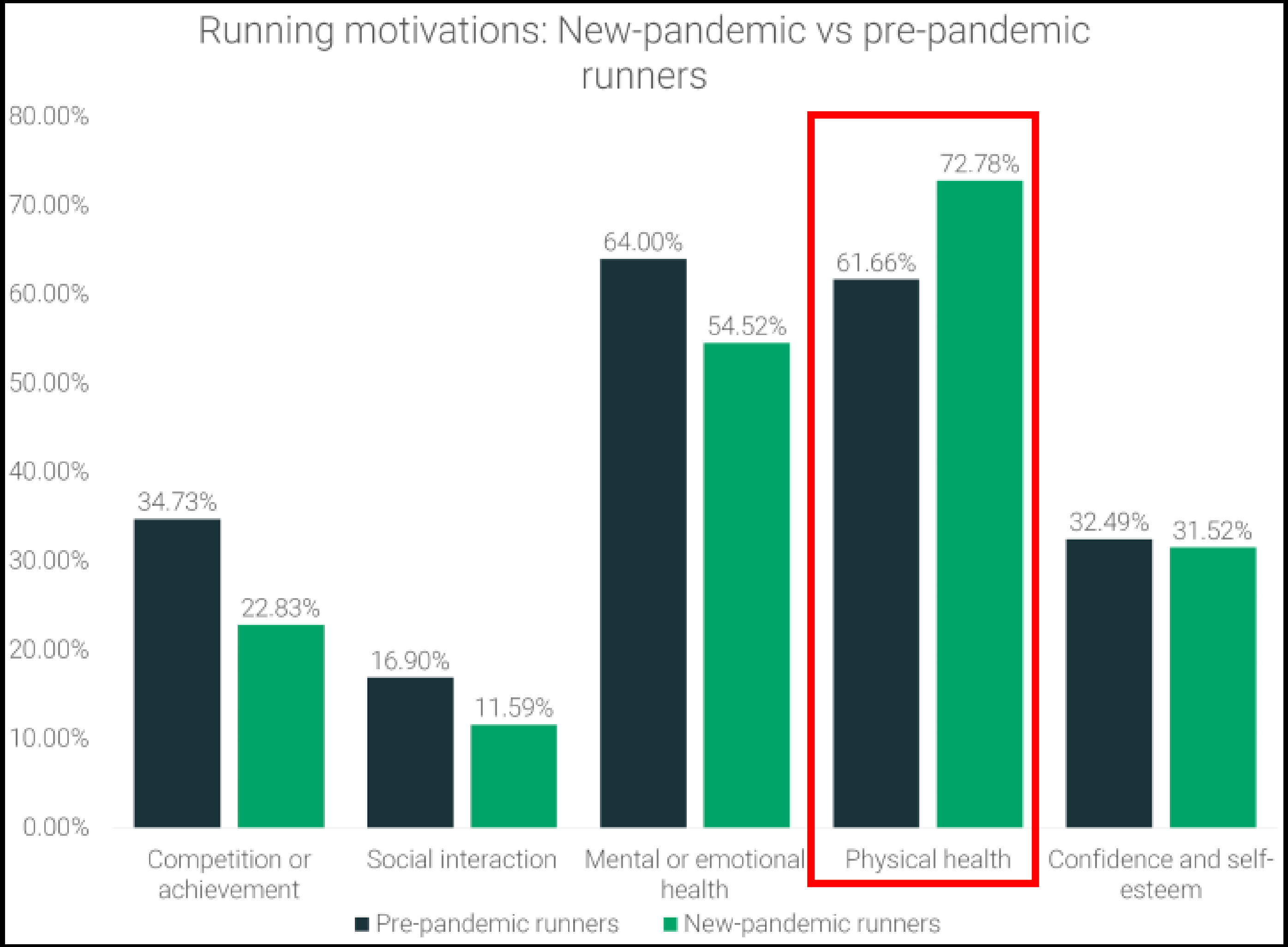
Running is among the most popular types of physical activity. It has been estimated that each month around 3.7 million (8.5%) English adults take part in running as a sport or recreational activity.[25] Other countries, such as Australia[26] and the USA,[27] also have high participation rates. The 2017 Physical Activity Council's survey ranked running in the top 10 preferred activities in which inactive 25–44-year-old US adults wished to take part.[28] Given its popularity, running has great potential for improving population health. The Royal College of General Practitioners (RCGP) has acknowledged this potential by partnering with the *parkrun* UK initiative, to promote the uptake of running and walking among general practitioners and their patients.[29]

In a systematic review, Oja *et al*[17] concluded that the evidence for health benefits is scarce for participation in all sports except for running and football. The authors concluded that there is (i) moderate evidence for the associations between running and improved aerobic fitness, cardiovascular function and running performance; (ii) limited evidence for associations of running with improvements in metabolic fitness, adiposity status and postural balance; and (iii) inconclusive evidence for the associations of running with cardiac adaptation, muscular strength and disease-specific and all-cause mortality.[17] Oja *et al*[17] identified only one study on running participation and the risk of mortality. A subsequent, comprehensive narrative review summarised the evidence for the association of running and a range of health outcomes, including major cardiometabolic outcomes, bone and respiratory health, disability and disease-specific and all-cause mortality.[22] The strength of the association between running participation and the risk of all-cause and disease-specific mortality varied

XION

COVID-19 LED TO RUNNING BOOM

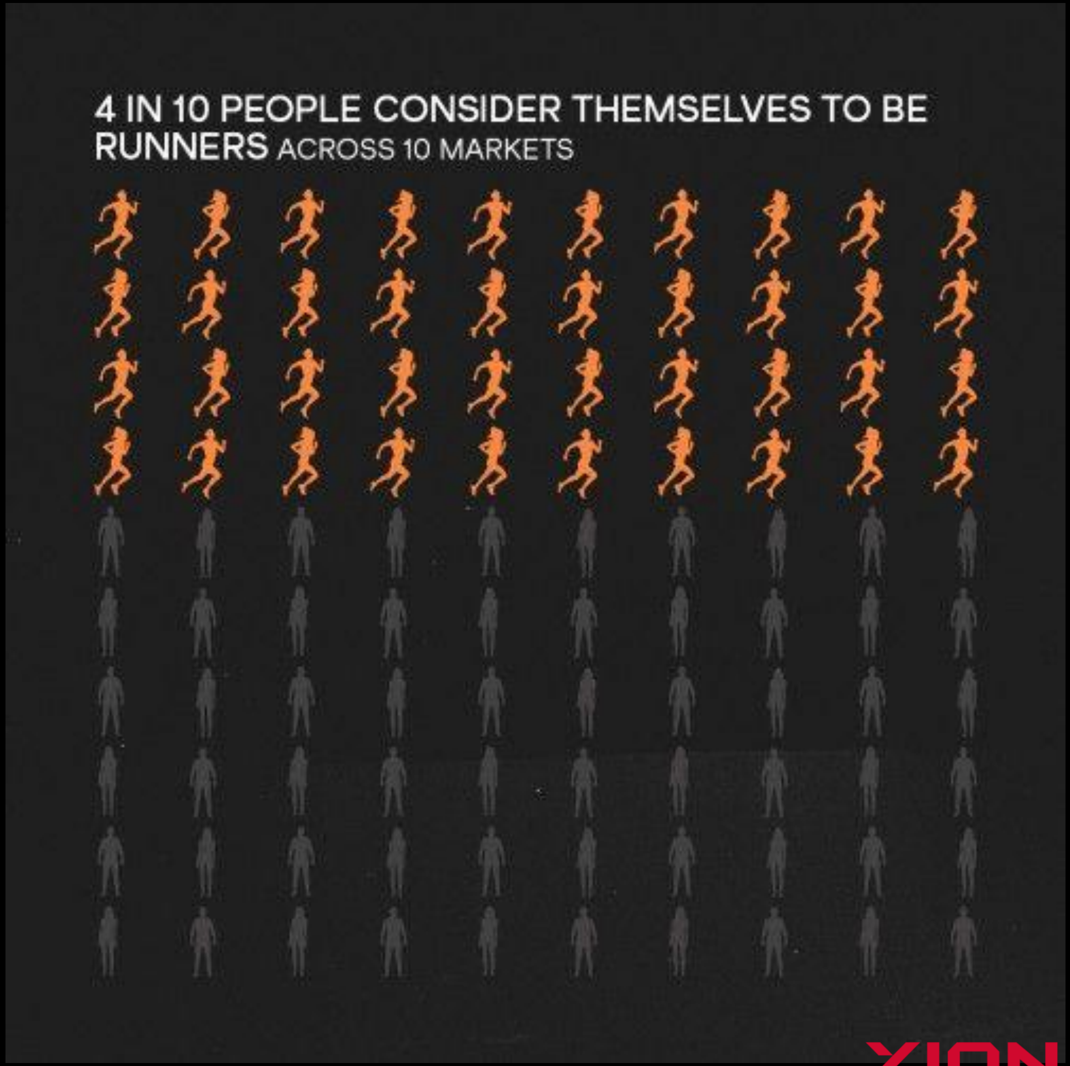
Running Boom: 28.76% of runners started during the pandemic



XION

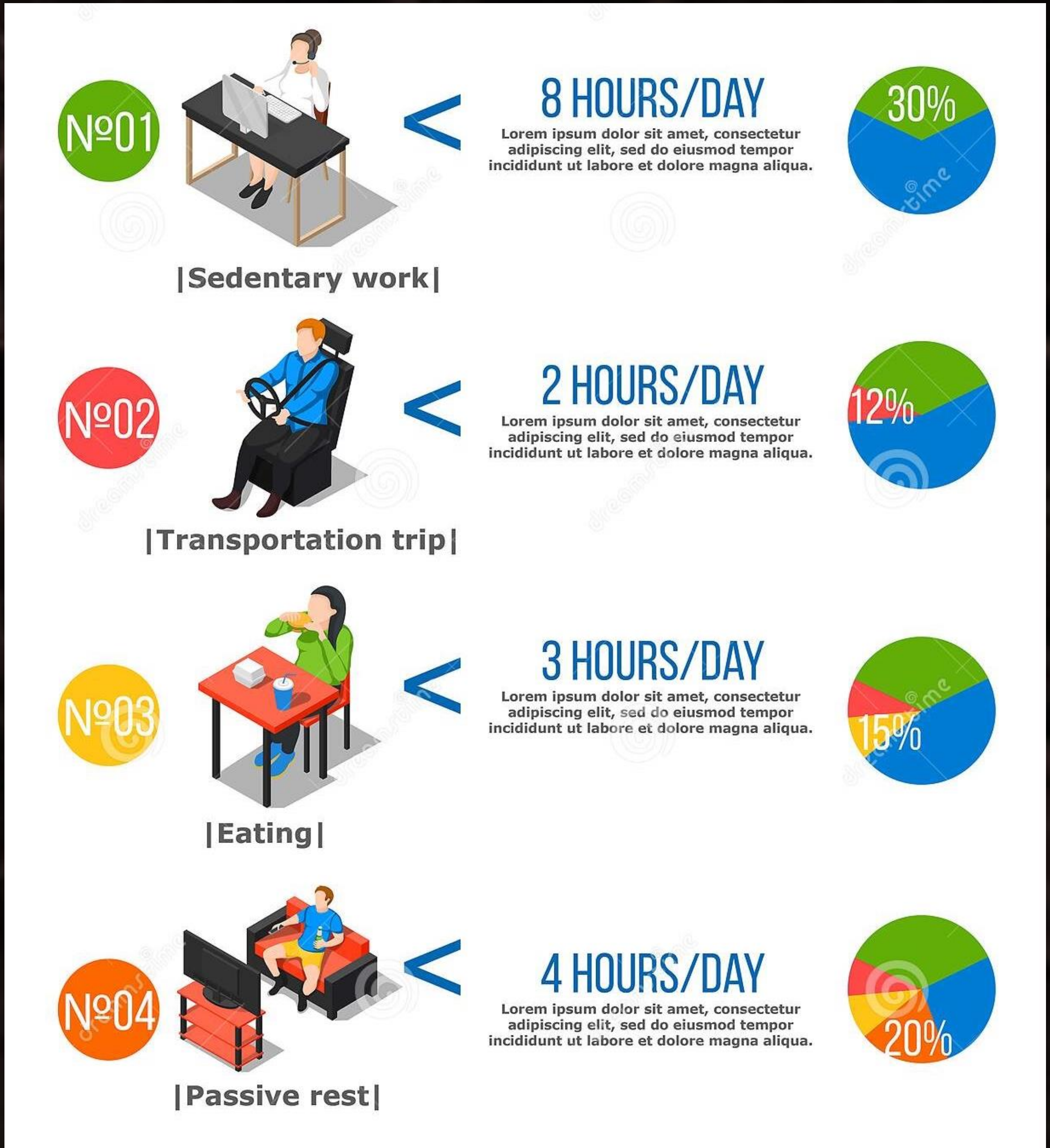
COVID-19 LED TO RUNNING BOOM

- Data is based on 8414 interviews collected across 10 countries:
  - Australia, Colombia, France, India, Japan, Kenya, Mexico, South Africa, UK, USA
- Data collected between 26th March – 15th April 2021

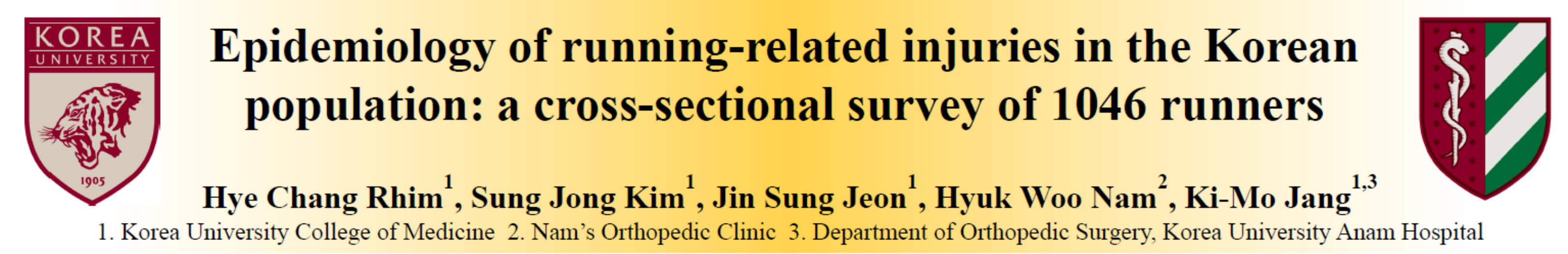


XION

PASSIVE LIFESTYLE



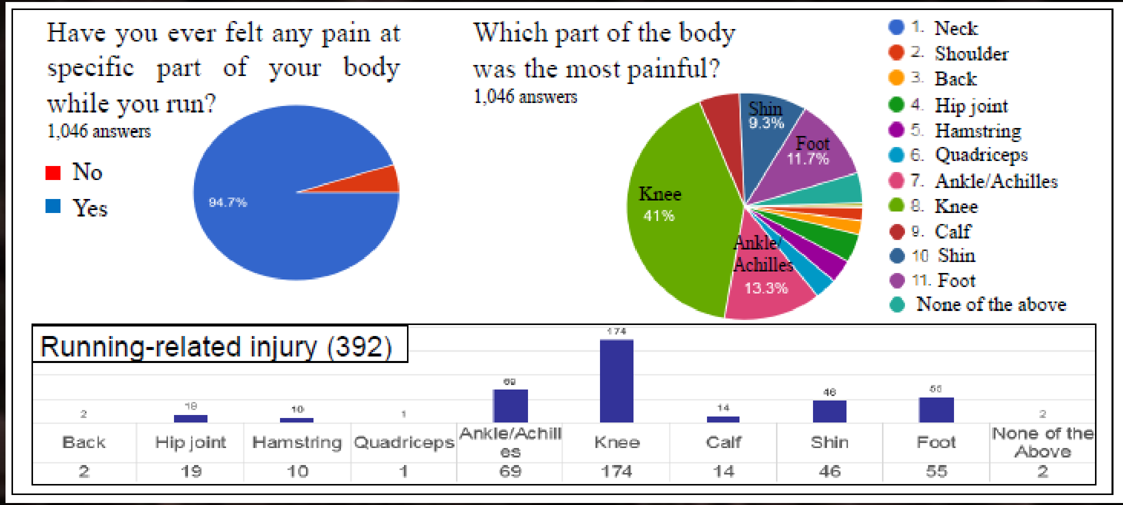
XION

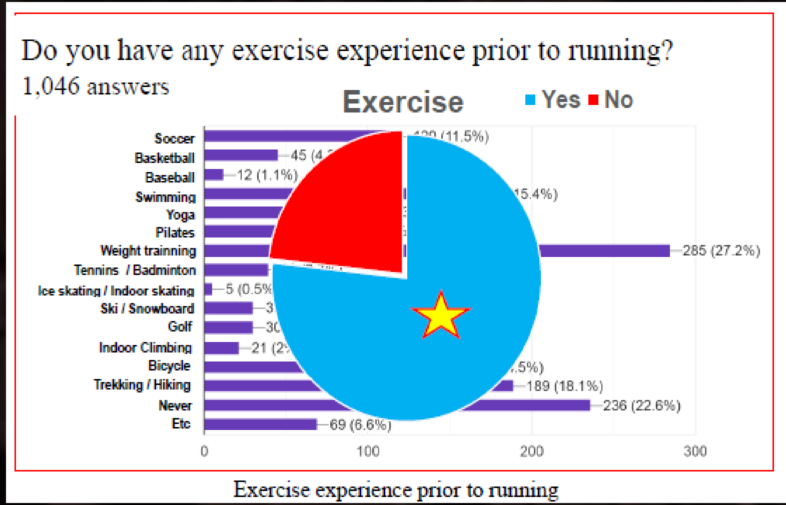


Epidemiology of running-related injuries in the Korean population: a cross-sectional survey of 1046 runners

Hye Chang Rhim[1], Sung Jong Kim[1], Jin Sung Jeon[1], Hyuk Woo Nam[2], Ki-Mo Jang[1,3]
1. Korea University College of Medicine 2. Nam's Orthopedic Clinic 3. Department of Orthopedic Surgery, Korea University Anam Hospital

RISK OF INJURY IN RUNNERS





· 94.7% of runners experienced some kind of pain while running. 61% of runners experienced pain in the same area more than once.

· Increase in mileage from 20-30 km to 30-40 km was associated with running related injury.

· Runners should be careful in increasing weekly mileage. Moreover, runners with previous exercise experience may need to approach running more cautiously.

WHAT DOES IT MEAN TO US?

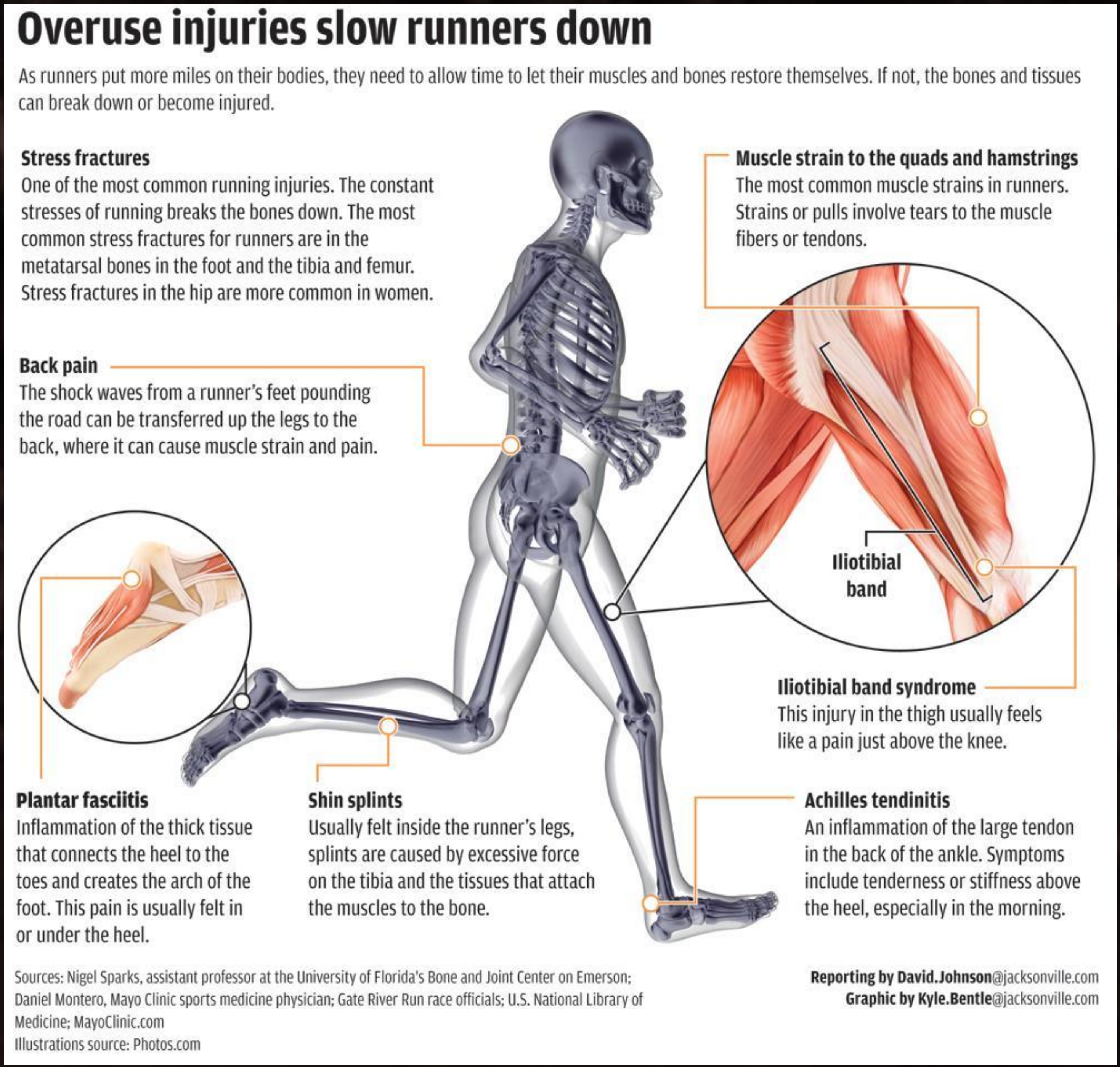
It takes time for your body to increase running distance.

Previous exercise experience does not mean that you are ready to run.

PREPARE YOUR BODY TO RUN FIRST!

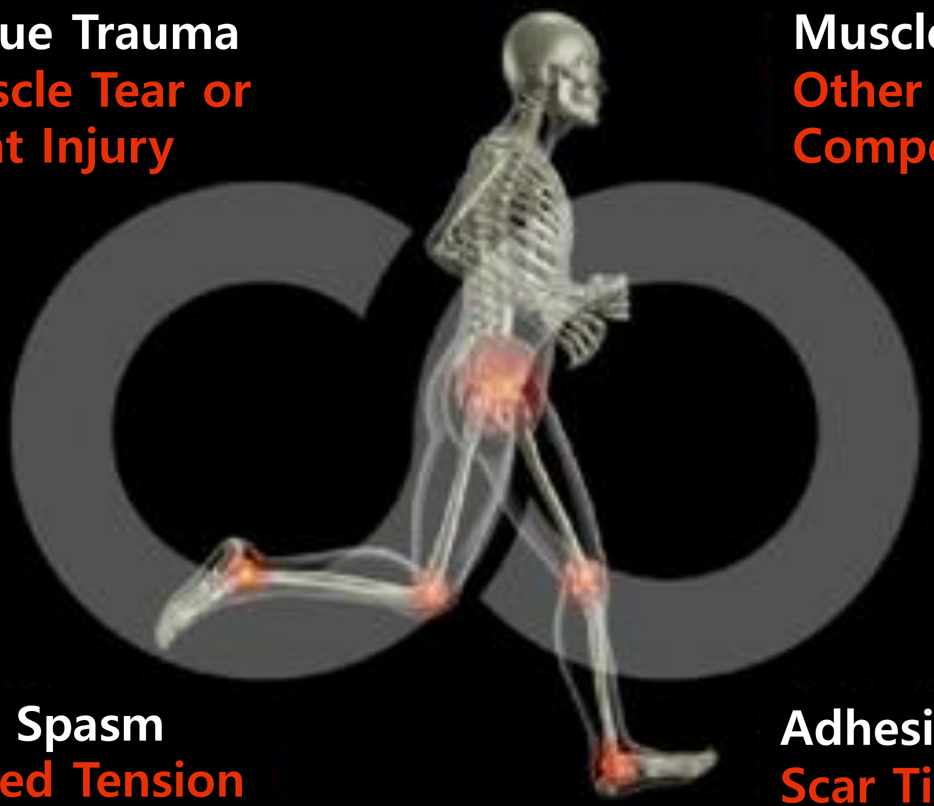
XION

COMMON INJURIES



XION

CUMULATIVE INJURY CYCLE

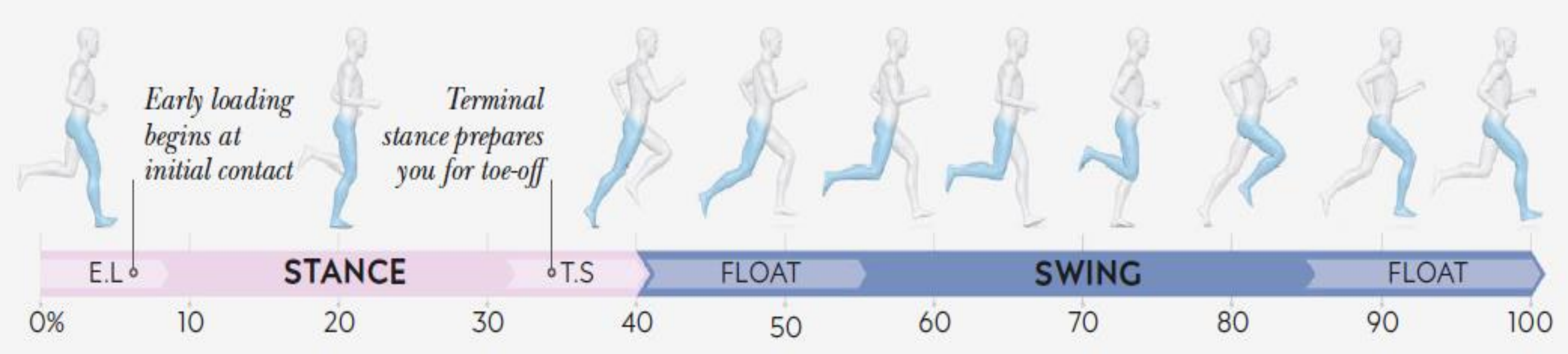


XION

BREAK TIME

RUNNING CYCLE

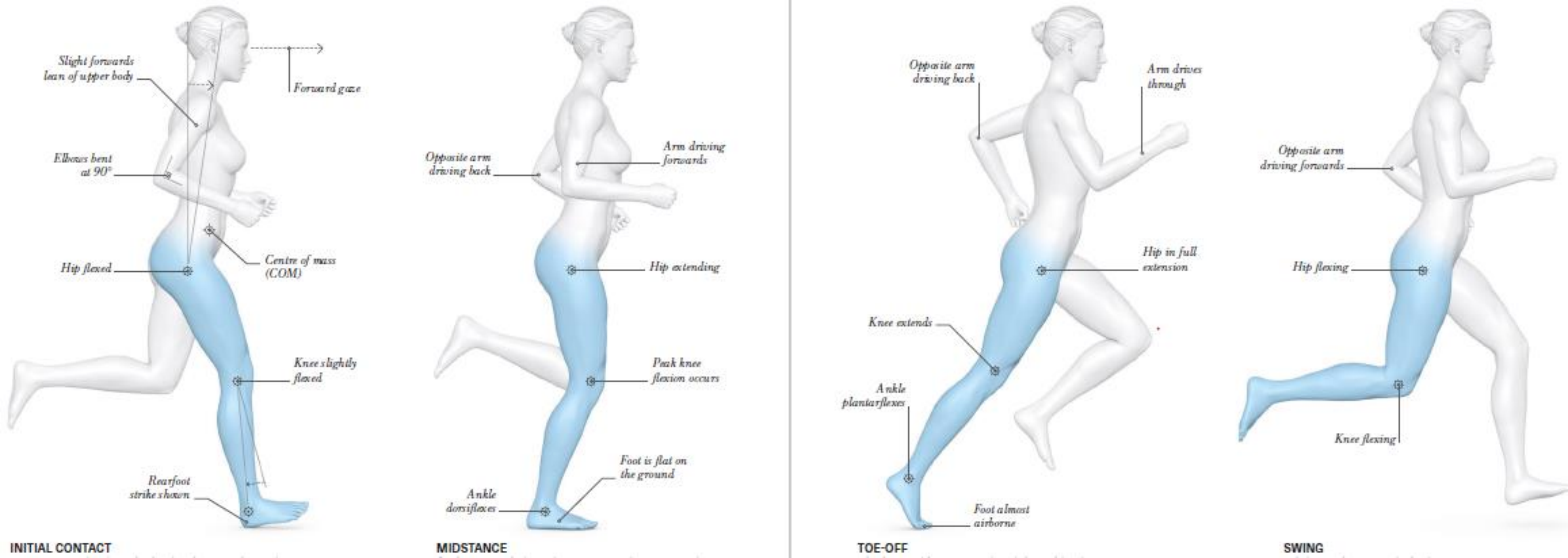
STANCE PHASE(40%), SWING PHASE(60%)

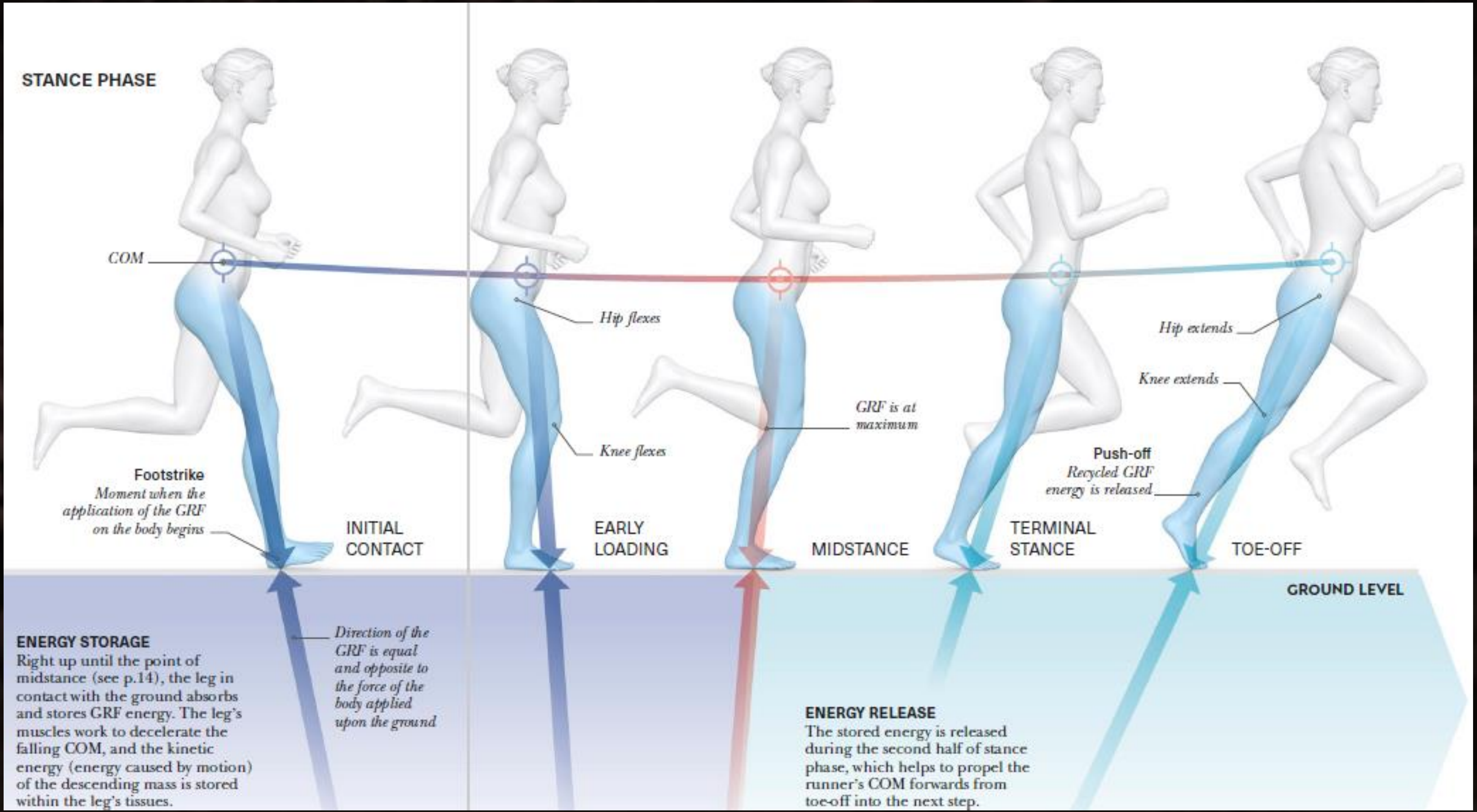


XION

RUNNING CYCLE

STANCE PHASE AND SWING PHASE

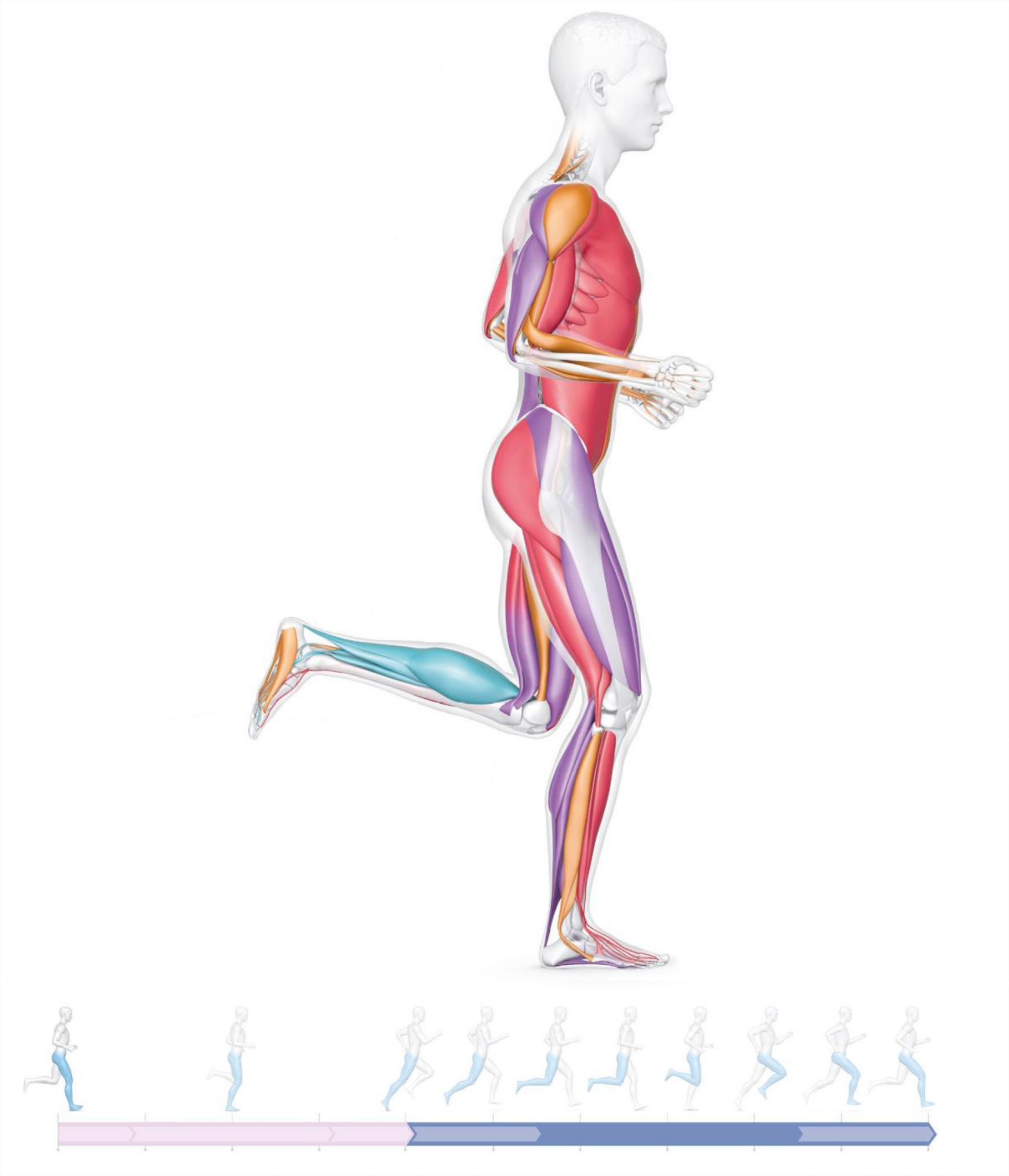



STANCE PHASE
COM
Hip flexes
Knee flexes
GRF is at maximum
Hip extends
Knee extends
Push-off
Recycled GRF energy is released
Footstrike
Moment when the application of the GRF on the body begins
INITIAL CONTACT
EARLY LOADING
MIDSTANCE
TERMINAL STANCE
TOE-OFF
GROUND LEVEL
Direction of the GRF is equal and opposite to the force of the body applied upon the ground
ENERGY STORAGE
Right up until the point of midstance (see p.14), the leg in contact with the ground absorbs and stores GRF energy. The leg's muscles work to decelerate the falling COM, and the kinetic energy (energy caused by motion) of the descending mass is stored within the leg's tissues.
ENERGY RELEASE
The stored energy is released during the second half of stance phase, which helps to propel the runner's COM forwards from toe-off into the next step.

XION

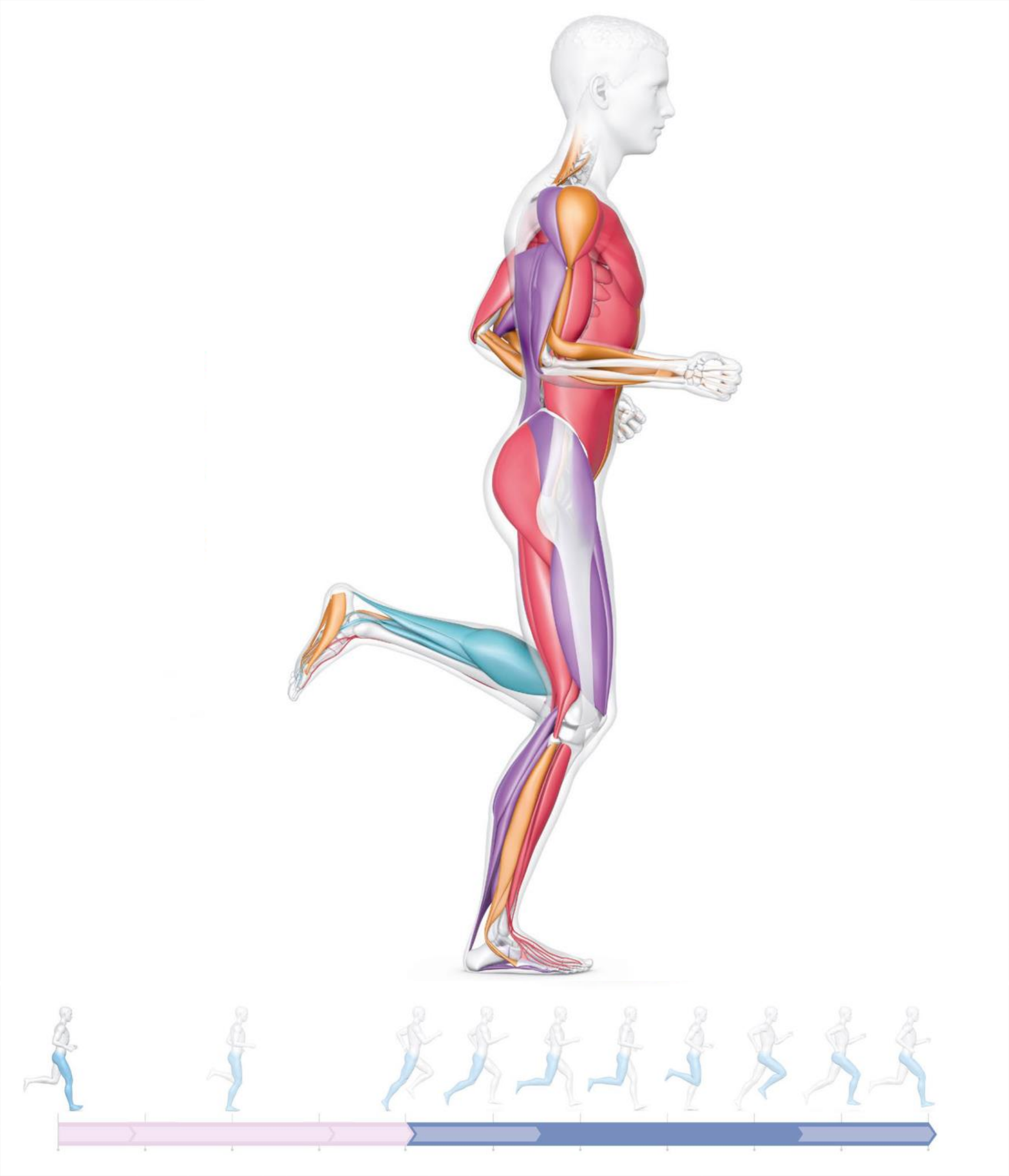
EARLY LOADING PHASE

As the leading foot makes initial contact with the ground, the body decelerates in the vertical direction and significant muscle contributions are needed to control and attenuate the ground reaction force(GRF). As the foot flattens, tendons and connective tissues within muscles store elastic energy to be used later for propulsion.



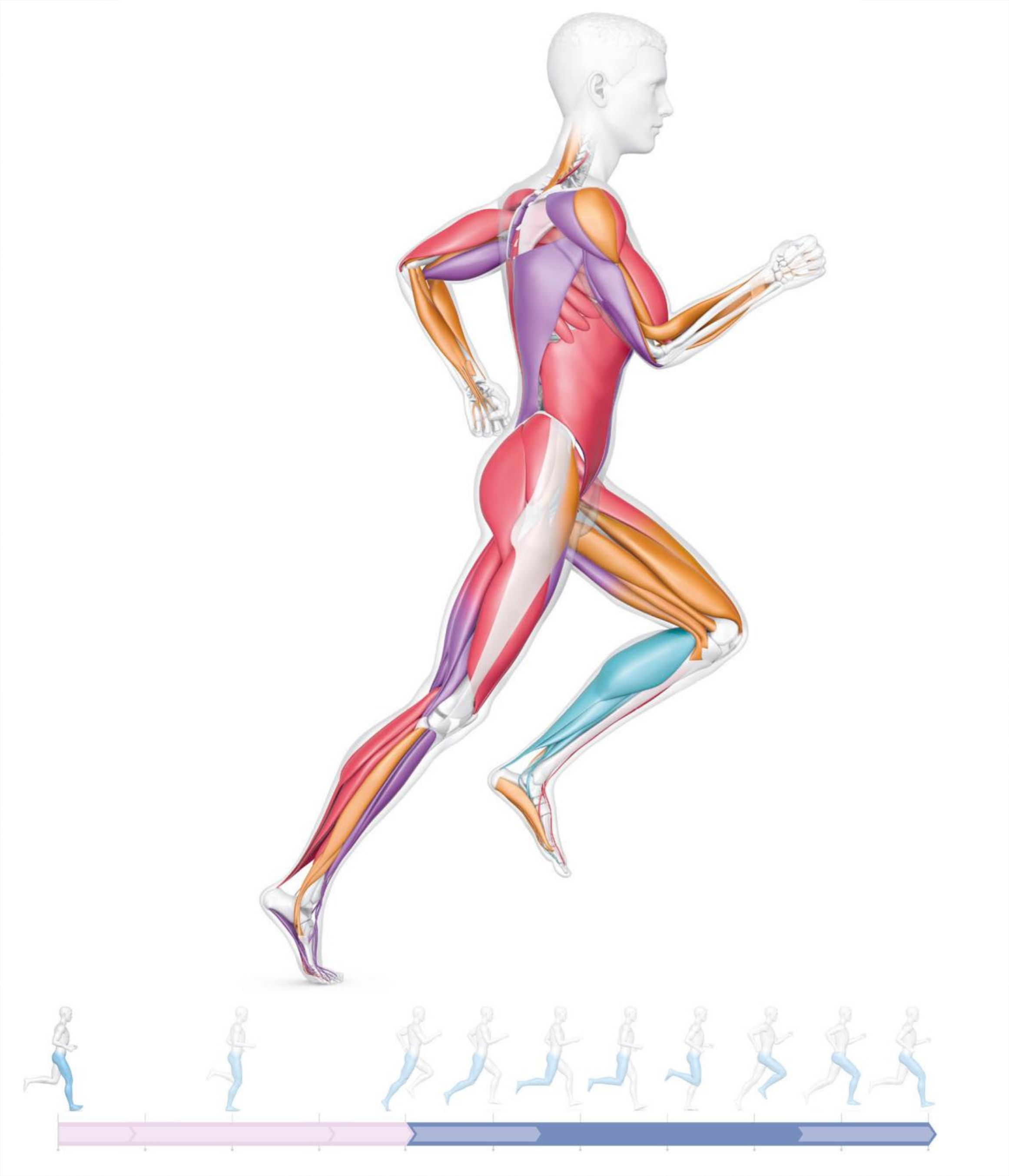
MIDSTANCE PHASE

In midstance, the body transitions from absorbing GRF to releasing recycled GRF energy. As the body passes over the top of the supporting leg, it must be dynamically stabilized to cope with maximal loading through the limb.



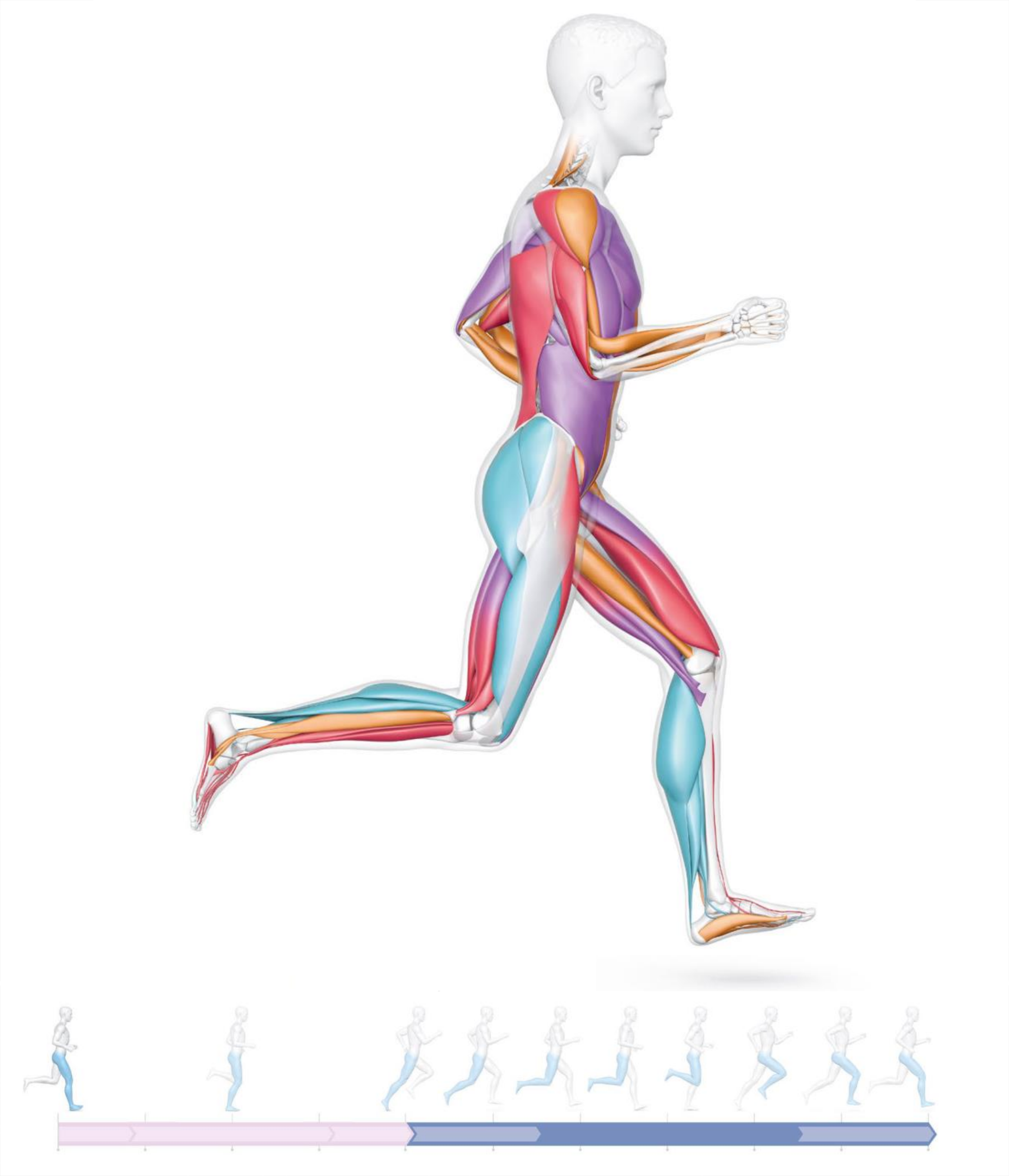
TERMINAL STANCE PHASE

This final sub-phase culminates in toe-off, when the hip, knee, and ankle are in maximal extension to propel the body forwards. Immediately after toe-off, the hip and knee begin to move into flexion and the ankle starts to dorsiflex, preparing for the swing phase.



SWING PHASE

Comprising approximately 60 per cent of the running cycle, swing phase is when the hip flexes rapidly to swing the leg through until it recovers its starting position, ready to power another step. During late swing, the knee begins to extend and prepare again for stance.

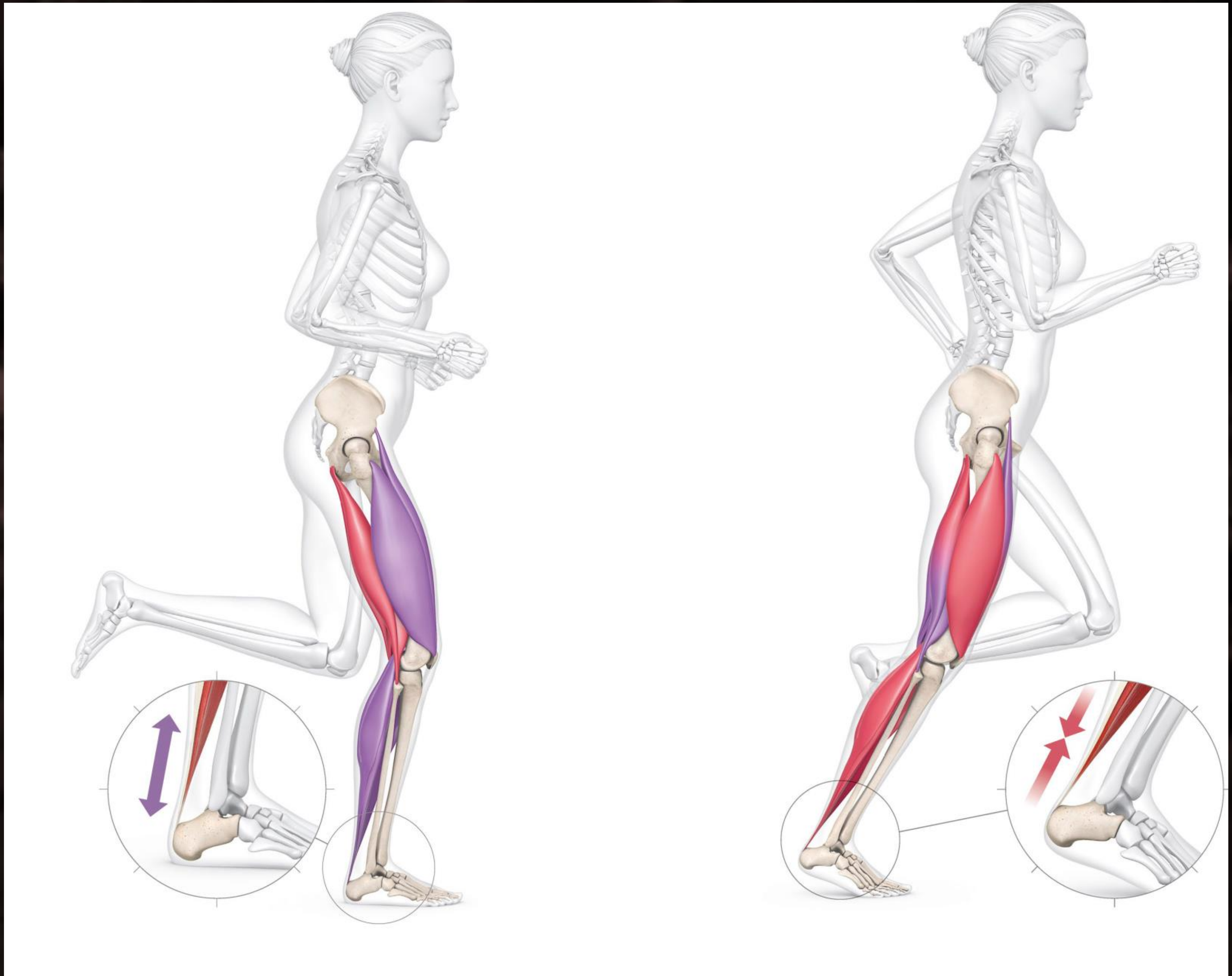


3 MAIN PARAMETERS OF RUNNING

- Running Speed
- Running Cadence
- Running Step length

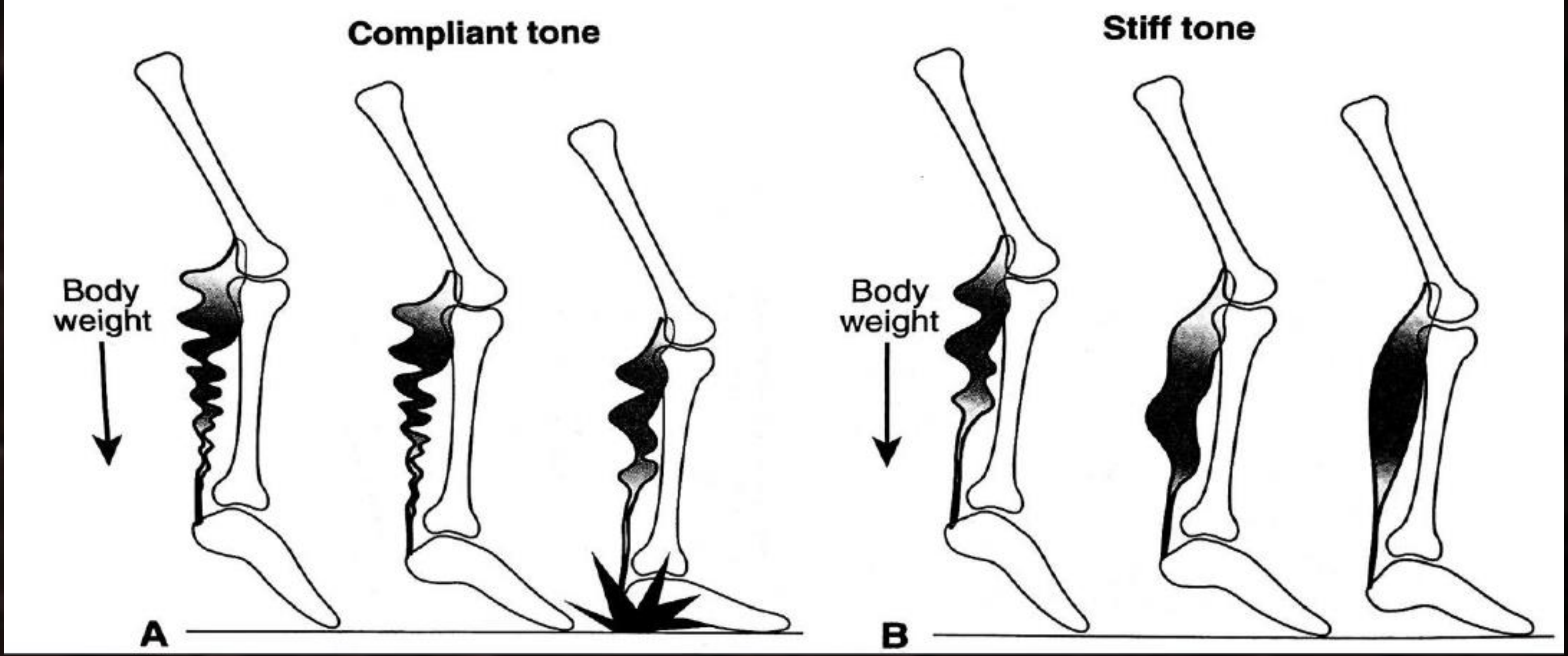
(Not Running Stride length)

MUSCLE AND TENDON ACTION



XION

MUSCLE AND TENDON ACTION



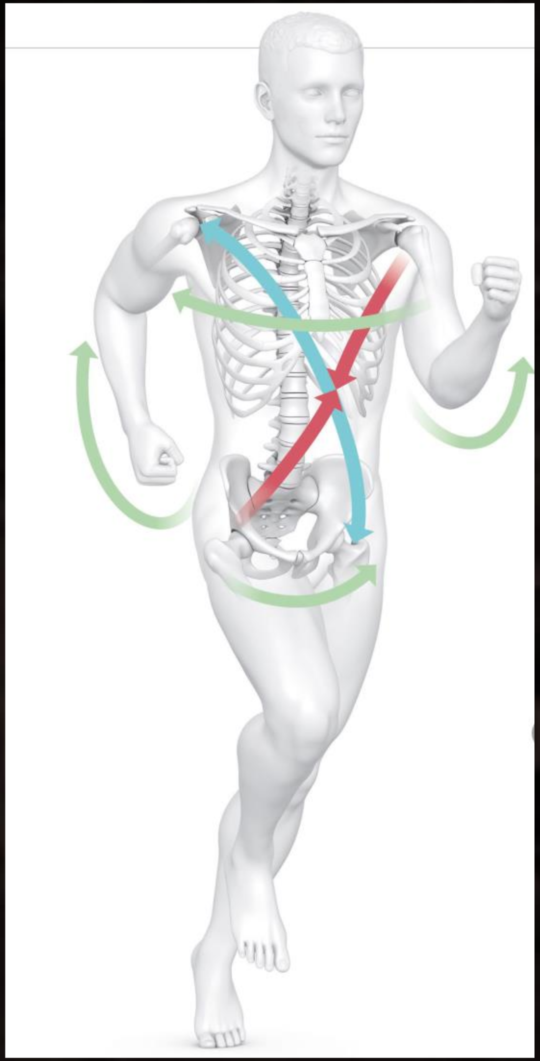
XION

MUSCLE TENDON ACTION AND MOVEMENT PATTERNS

XION

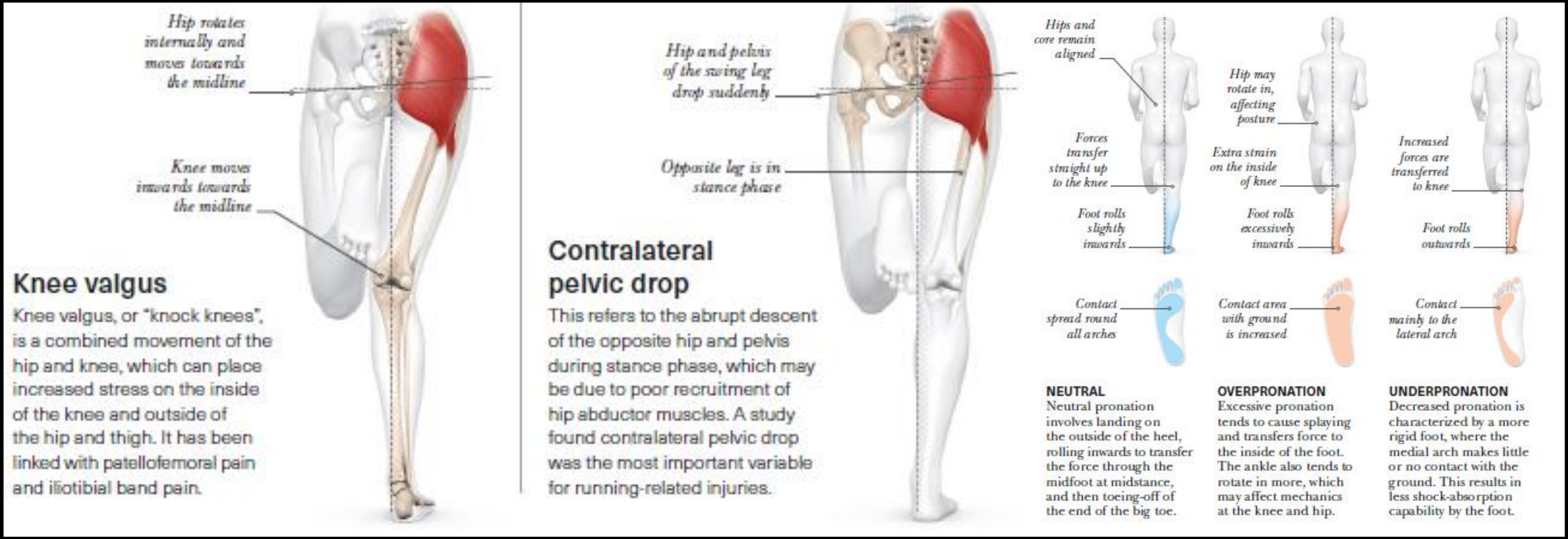
KINETIC CHAIN

Rotation through kinetic chain
Multiple counter-rotations
Diagonal elastic support

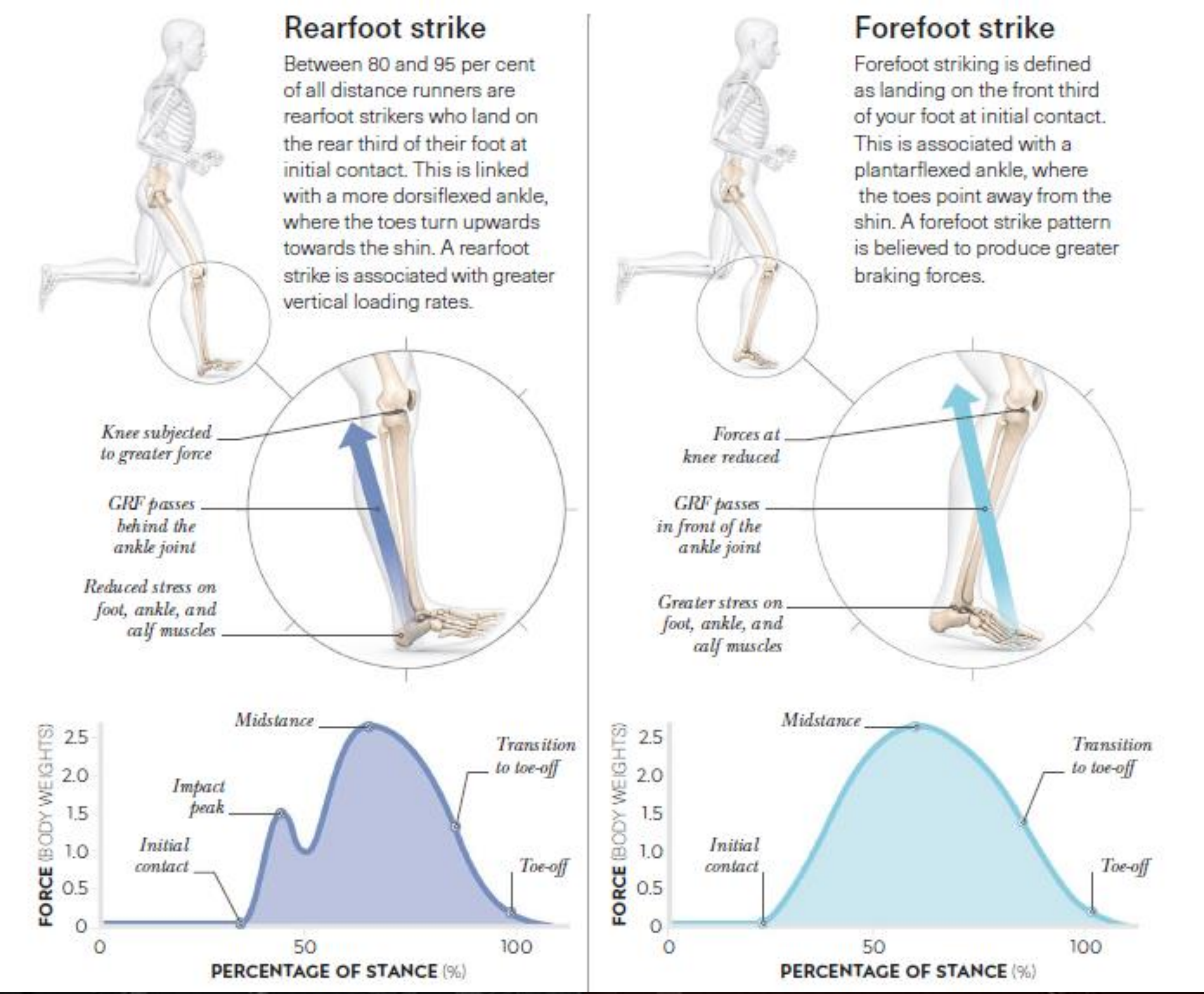


XION

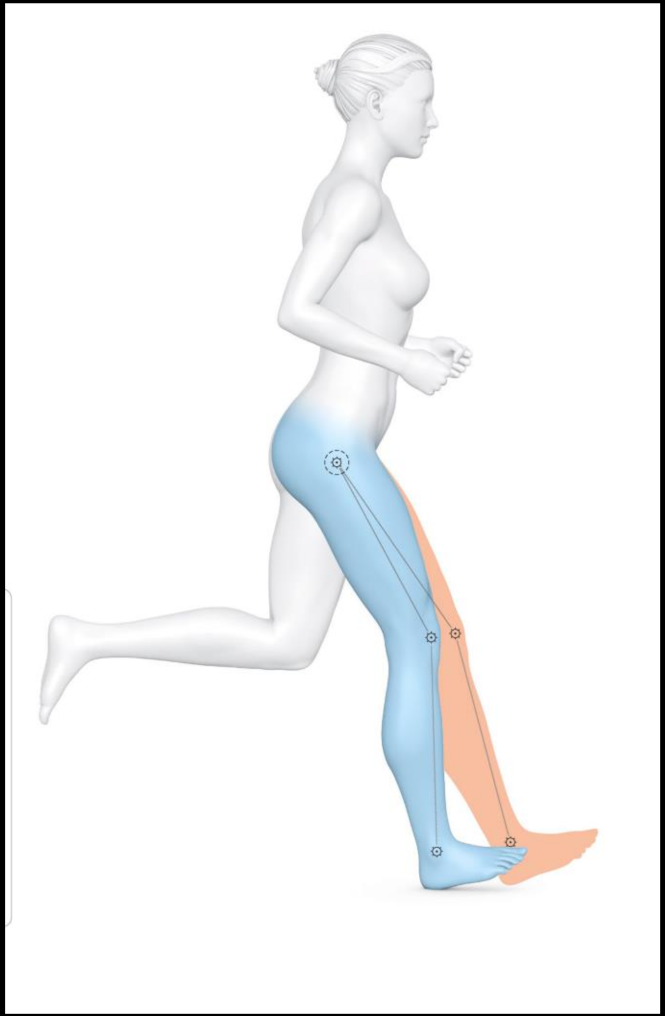
PELVIC, HIP, KNEE AND FOOT COMPLEX

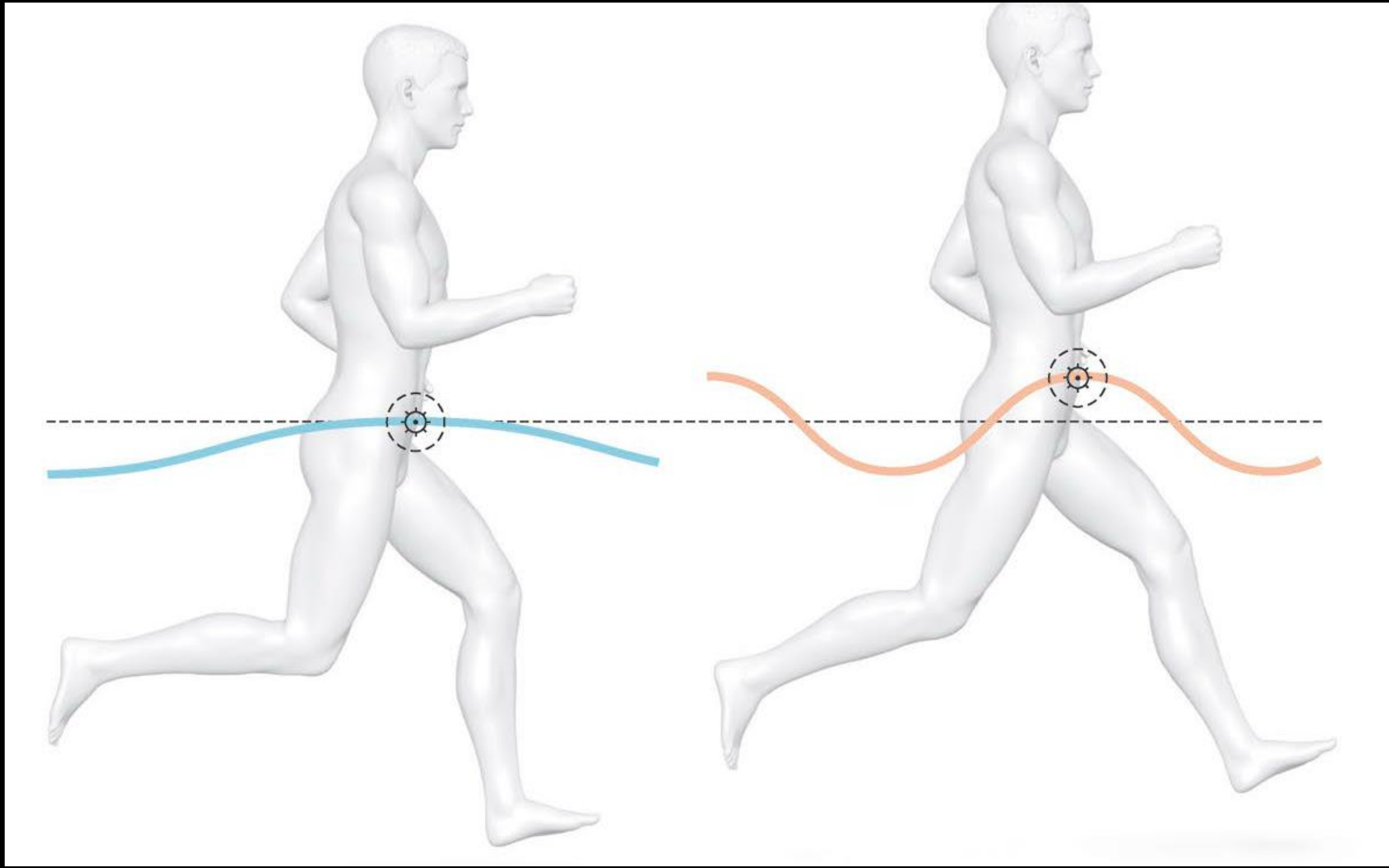


FOOT STRIKE PATTERNS



STRIDE PATTERN: GOOD VS OVERSTRIDE





XION

RE-WIRE REFLEXIVE MOVEMENT

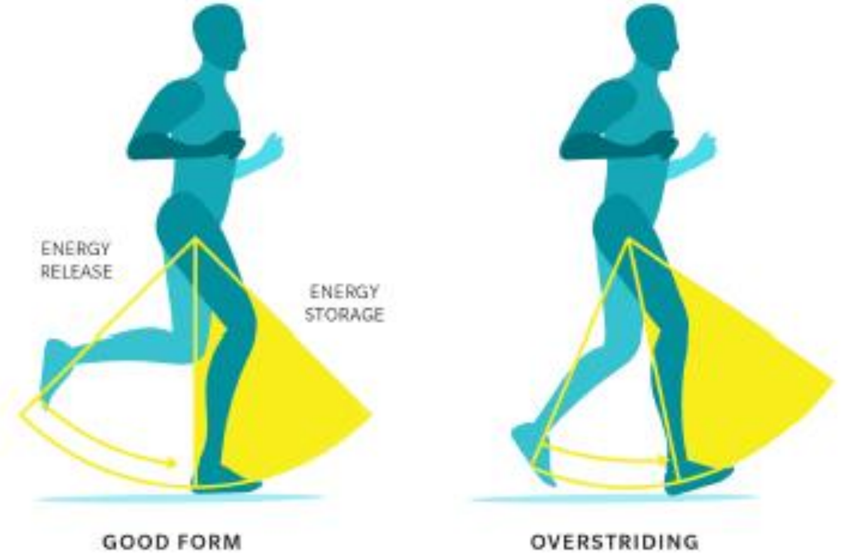


FIGURE 4.2: Pendulum shift

With good form, you encounter minimal stress-per-stride and optimal economy. When you make contact too far in front of the body, or overstride, it requires that you lift the body up and down more, overloading the muscles on the front side of the legs and increasing the stress-per-stride. A symmetric pendulum builds a successful stride.

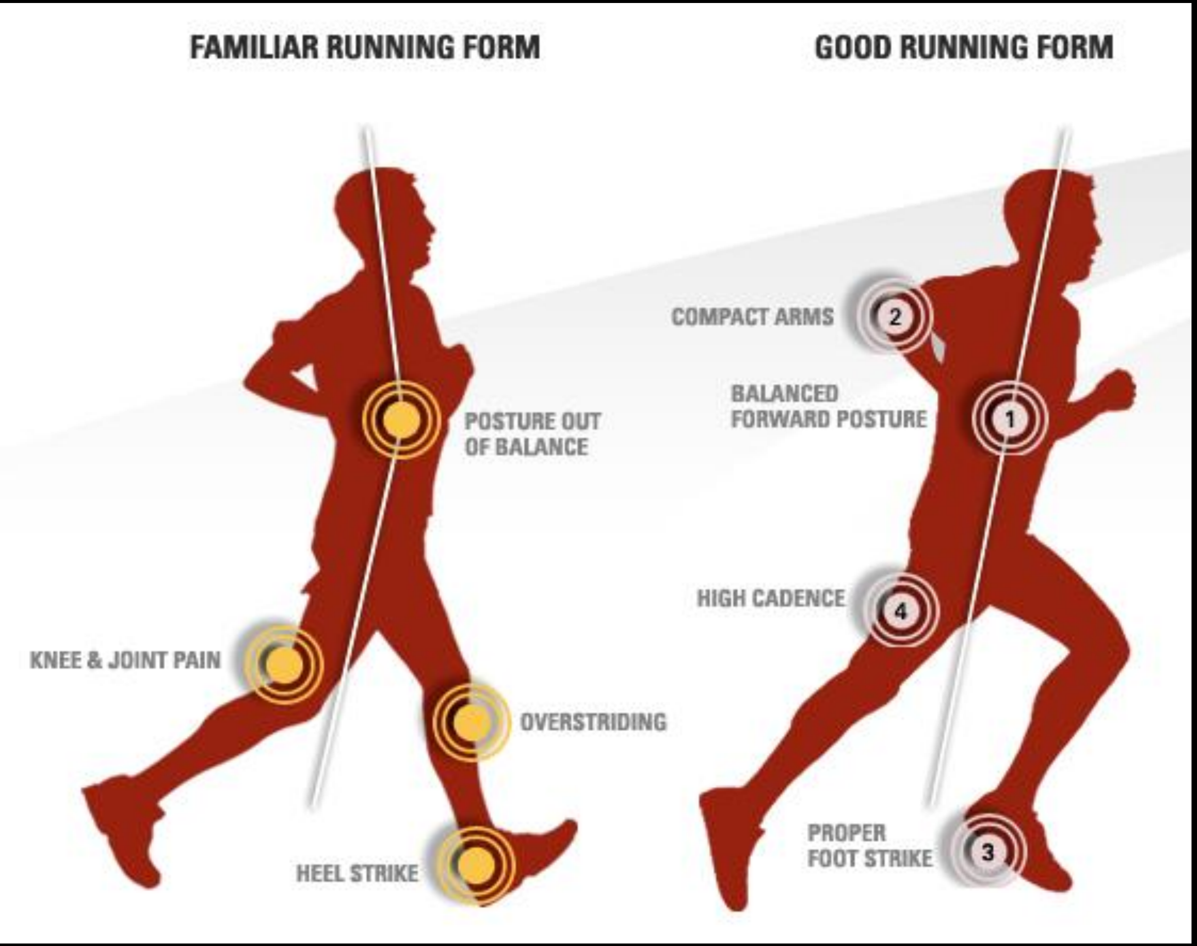
TABLE 4.1 Effects of Footstrike and Foot Placement

	Stress	Economy
If you overstride, landing on your heel	High stress because the foot makes contact too far in front of the body.	Extra work is required to lift the body up and down more, overloading the muscles on the front side of the legs.
If you run with a pendulum-like stride	Low stress, ideal load.	Optimal elastic recoil makes for more efficient running.
If you overstride, landing on your forefoot	Low stress because the ankle muscles are absorbing the load.	Ankle muscles work overtime to maintain forefoot position. Excessive acceleration and deceleration with each stride compromise efficiency.

RULE #1: MAINTAIN GOOD POSTURE

- Muscles, tendons, ligaments, and fascia are used more efficiently when the posture is correct.
- Proper posture makes you breathe better.
- The stepping position get better during running

< Bad posture >



RULE #1: MAINTAIN GOOD POSTURE

XION

RULE #2: USE YOUR ARMS CORRECTLY

Why is it important to move your arms?

- Optimize the movement of lower limb
- Optimize the movement of the scapula
- Improve energy efficiency

< Bad posture >

XION

RULE #2: USE YOUR ARMS CORRECTLY

RULE #3: USE YOUR LEGS EFFICIENTLY

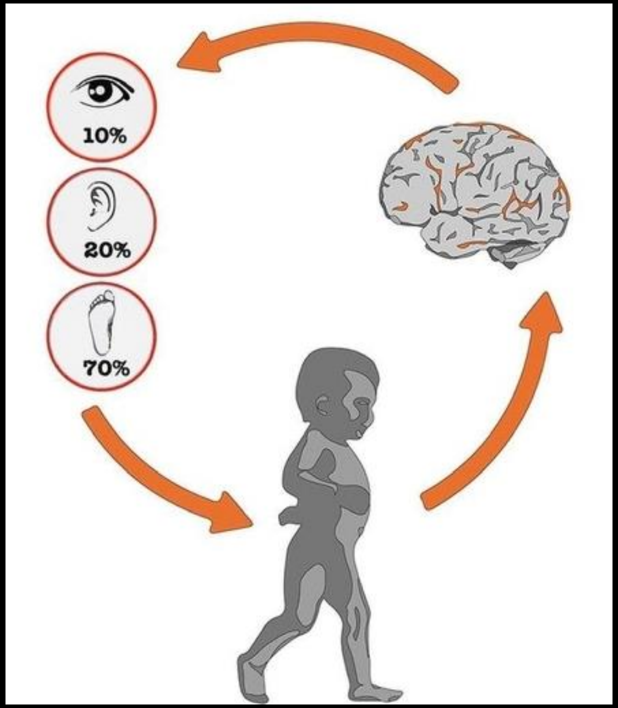
Why is leg movement important?

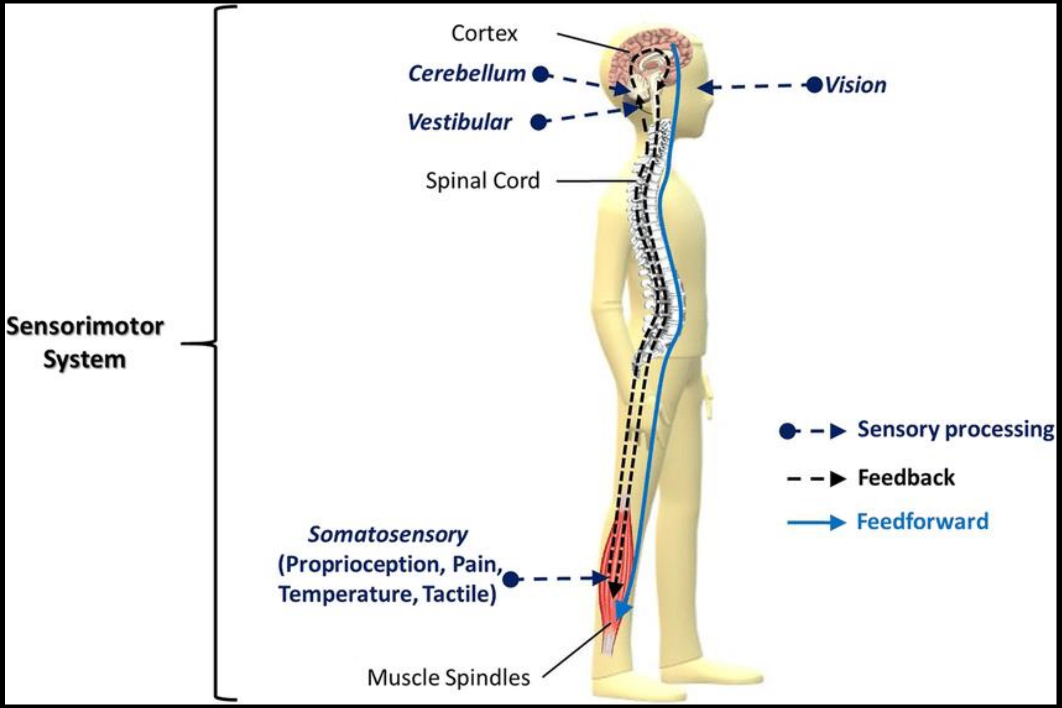
- When each joint moves organically together, elastic energy can be used more efficiently.
- To produce an optimized force vector
- Injury prevention

< Bad posture >

XION

RULE #4: DEVELOP THE SENSES OF THE EYES AND FEET





- Muscles, tendons, ligaments, and fascia are used more efficiently when the posture is correct.
- Proper posture makes you breathe better.
- The stepping position get better during running

RULE #5: BREATHE EFFECTIVELY

- Good breathing can improve energy efficiency and reduce fatigue by affecting the nervous system.
- Incorrect running posture interferes with normal diaphragm movement and chest expansion.
- Inhale and exhale through your nose, during low and medium intensity running.

Easy paced run	3:3 / 4:4
Moderate paced run	2:2
Hard paced run	1:2 / 2:1

3 STRATEGIES TO TRAIN FOR RUNNING



1) ASSESSMENT
2) SPECTRUM OF RUNNING STRENGTH
3) RUNNING ROUTINE

9 MOVEMENT ASSESSMENTS FOR RUNNING

- ✓ Posture

1. Toe-touch
2. Back Extension
3. T-Spine Rotation / lateral flexion
4. 6-way of hip
5. Toes up, Toes down
6. Overhead Squat
7. Single leg Squat
8. Single leg wall calf raise
9. Jump Landing

XION

9 MOVEMENT ASSESSMENTS FOR RUNNING

- Posture

9 MOVEMENT ASSESSMENTS FOR RUNNING

1. Toe-touch

XION

9 MOVEMENT ASSESSMENTS FOR RUNNING

2. Back Extension

9 MOVEMENT ASSESSMENTS FOR RUNNING

3. T-Spine Rotation / lateral flexion

XION

9 MOVEMENT ASSESSMENTS FOR RUNNING

4. 6-way of hip

XION

9 MOVEMENT ASSESSMENTS FOR RUNNING

5. Toes up, Toes down

9 MOVEMENT ASSESSMENTS FOR RUNNING

6. Overhead Squat

XION

9 MOVEMENT ASSESSMENTS FOR RUNNING

7. Single leg Squat

XION

9 MOVEMENT ASSESSMENTS FOR RUNNING

8. Single leg wall calf raise

9 MOVEMENT ASSESSMENTS FOR RUNNING

9. Jump Landing

SPECTRUM OF RUNNING STRENGTH

- ✓Optimal stress distribution
- ✓Development of running techniques
- ✓Running Economy

Tendon / Elastic Strength

Muscular Strength Joints /
Force absorption / Propulsion capacity

Mobility & Stability

MOBILITY AND STABILITY WORKS

1. Foot and Ankle
2. Knee
3. Hips
4. Lumbo-pelvic
5. Spine
6. Shoulder

MOBILITY AND STABILITY WORKS

1. Foot and Ankle

XION

MOBILITY AND STABILITY WORKS

1. Foot and Ankle

XION

MOBILITY AND STABILITY WORKS

1. Foot and Ankle

XION

MOBILITY AND STABILITY WORKS

1. Foot and Ankle

MOBILITY AND STABILITY WORKS

1. Foot and Ankle

MOBILITY AND STABILITY WORKS

1. Foot and Ankle

XION

MOBILITY AND STABILITY WORKS

2. Knee

XION

MOBILITY AND STABILITY WORKS

2. Knee

MOBILITY AND STABILITY WORKS

2. Knee

MOBILITY AND STABILITY WORKS

3. Hips

MOBILITY AND STABILITY WORKS

3. Hips

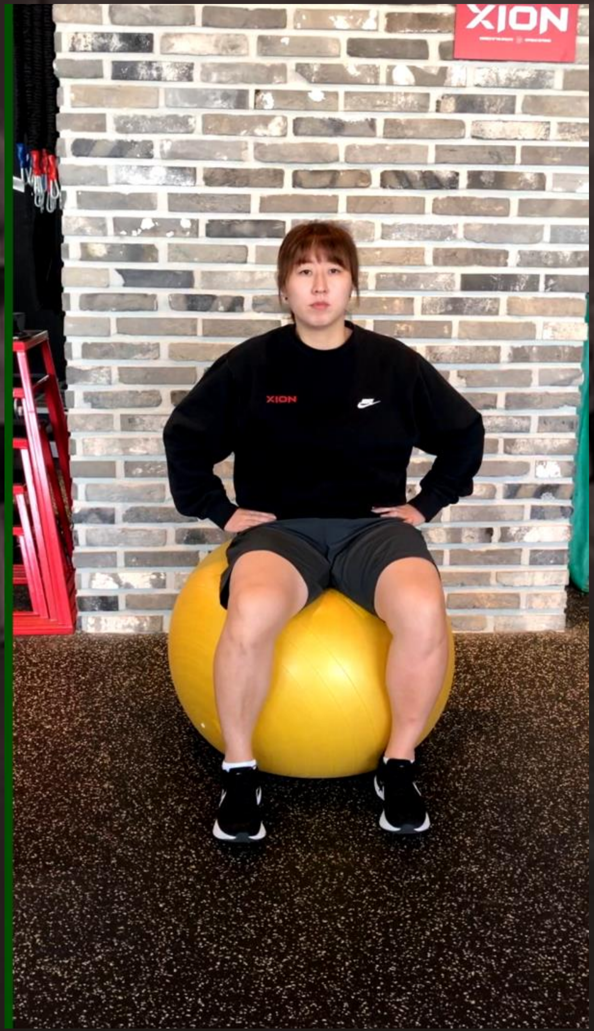
MOBILITY AND STABILITY WORKS

3. Hips

XION

MOBILITY AND STABILITY WORKS

4. Lumbo-pelvic



XION

MOBILITY AND STABILITY WORKS

4. Lumbo-pelvic

MOBILITY AND STABILITY WORKS

5. Spine

MOBILITY AND STABILITY WORKS

5. Spine

MOBILITY AND STABILITY WORKS

5. Spine

MOBILITY AND STABILITY WORKS

6. Shoulder

MOBILITY AND STABILITY WORKS

6. Shoulder

MOBILITY AND STABILITY WORKS

6. Shoulder

STRENGTH WORK : ABSORPTION AND PROPULSION

Propulsion Capacity

1. Hip Extension
2. Step Up
3. Hamstring Ball Roll-in

1. Lunge
2. Single leg ball squat
3. Deadlift: Both, Single
4. Heel Drop
5. Box Jump
6. Side Jump
7. Hop: Both, Single leg

Absorption Capacity

1. Hip Hike
2. Step Down

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

Propulsion Capacity

1. Hip Extension

STRENGTH WORK : ABSORPTION AND PROPULSION

Propulsion Capacity

2. Step Up

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

Propulsion Capacity

3. Hamstring Ball Roll-in

STRENGTH WORK : ABSORPTION AND PROPULSION

Absorption Capacity

1. Hip Hike

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

Absorption Capacity

2. Step Down

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

1. Lunge

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

2. Single leg ball squat

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

3. Deadlift: Both

STRENGTH WORK : ABSORPTION AND PROPULSION

3. Deadlift: Single

STRENGTH WORK : ABSORPTION AND PROPULSION

4. Heel Drop

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

5. Box Jump

XION

STRENGTH WORK : ABSORPTION AND PROPULSION

6. Side Jump

STRENGTH WORK : ABSORPTION AND PROPULSION

7. Hop: Both

STRENGTH WORK : ABSORPTION AND PROPULSION

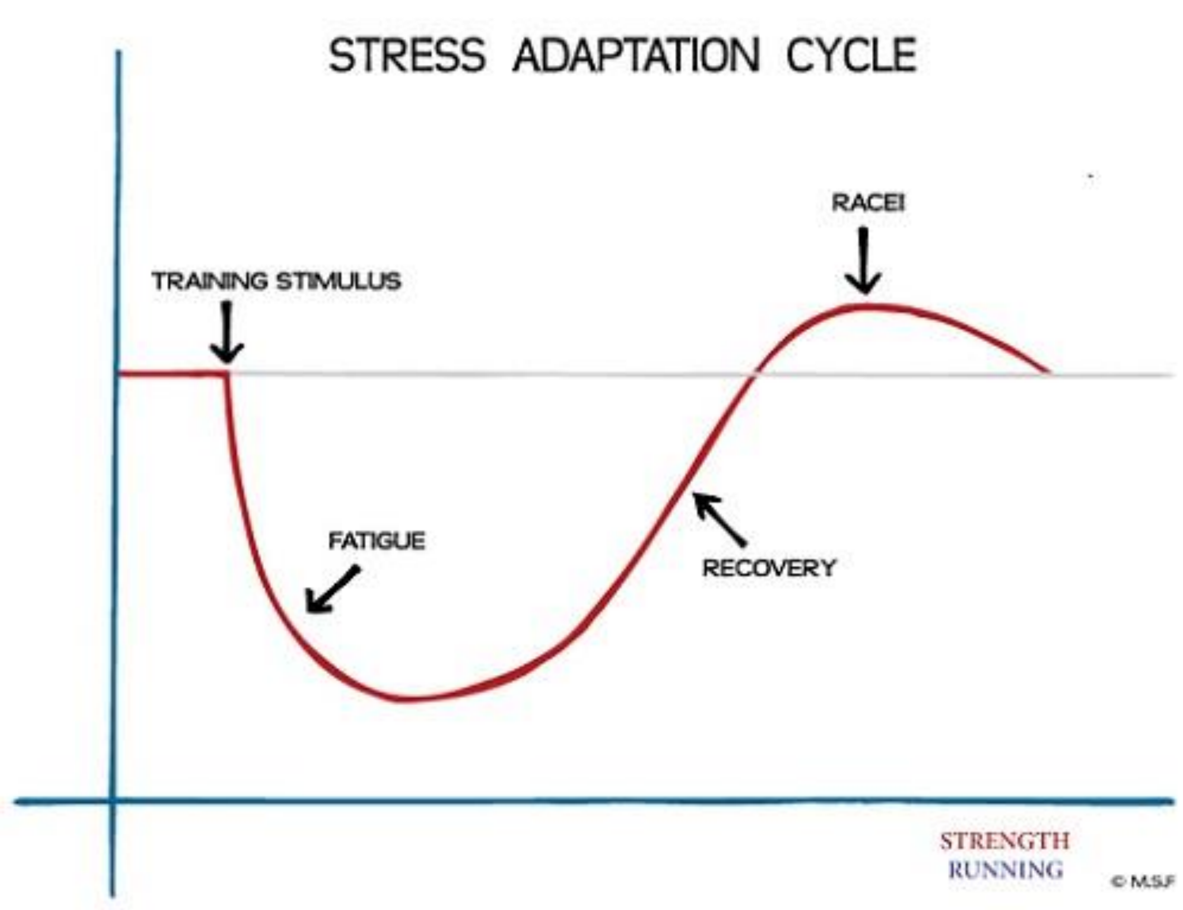
7. Hop: Single leg

XION

RUNNING ROUTINE

50% REDUCTION IN RISK OF OVERUSE INJURY IS POSSIBLE FROM A WARM-UP PROGRAM

WHY WE NEED TIME? SUPER-COMPENSATION!



Training Stimulus is not only about running, but also strength and power training as well !


WE WERE ALL BORN TO RUN
TRAIN SMART.
RUN SMART.
XION