

PRACTICAL SPORTS SCIENCE RECOMMENDATIONS FOR PADEL PLAYERS OF ALL LEVELS

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INTRODUCTION

Padel is a fast-growing sport worldwide experiencing increased recreational level participation from all age groups.

This article uses insights from a leading coach to identify some of the challenges faced by Padel players in this emerging sport. A physiologist, sports nutritionist and sports podiatrist then explore sports science solutions that could be integrated to help performance and reduce the risk of injuries across all levels.

SETTING THE SCENE: THE PADEL COACH INTERVIEW

Why has Padel become a popular sport?

Sandy Farquharson sees two clear reasons for Padel's incredible uptake. "Firstly, many people can just start and play points with no or very little coaching input, so the technical barriers are lower at the entry level compared to other racket sports. This gives an

immediate sense of achievement and some belief it's a natural sport for them to play. Secondly, physically, it is possible to start to play Padel with very little level of physical fitness which could limit participation in other racket sports".

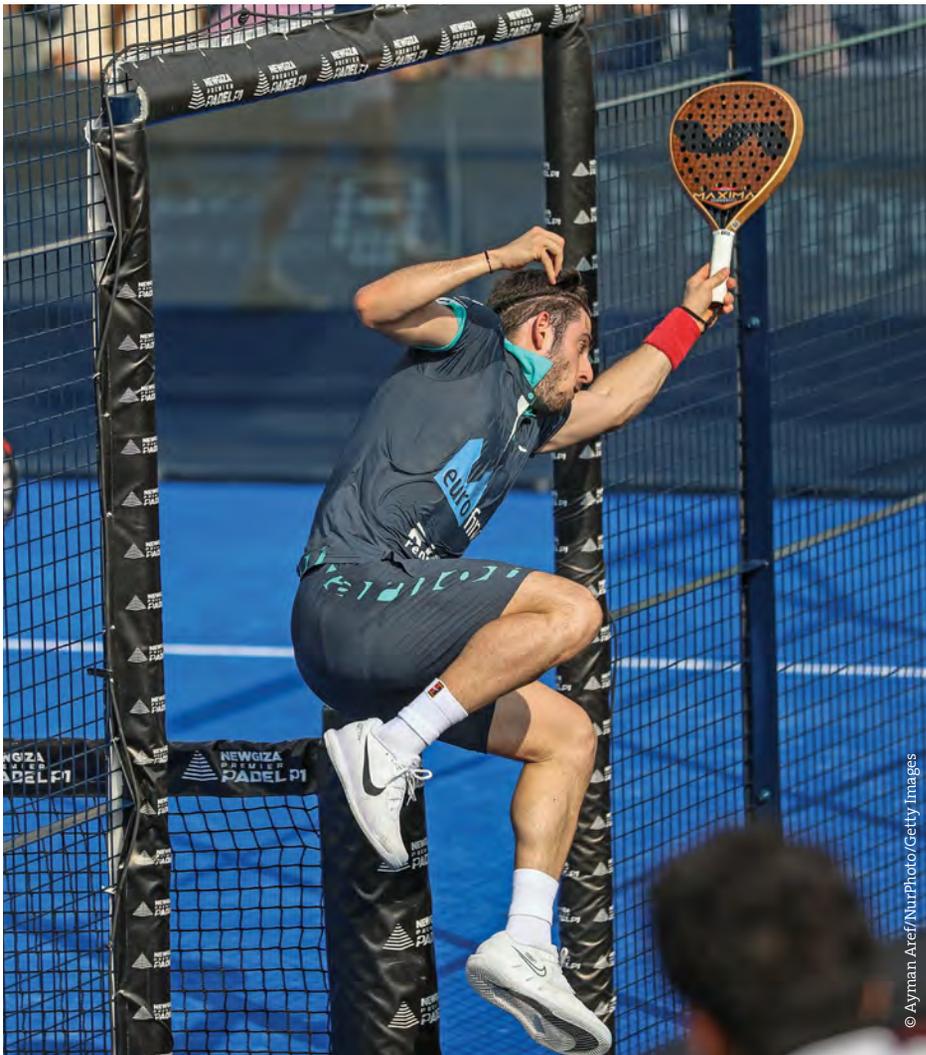
So, it's easy to start playing Padel; but what are the challenges?

A consequence of an enjoyable 'first contact' with the sport, its social elements and easy access is that many people start playing many games very quickly. People can go from zero court time to 6 games per week lasting 2-4 hours each match over a 3-4 weeks' period. As Sandy explains, "this rapid increase in game time from virtually no experience in the sport often results in injuries before people really get going into the sport. The injuries are the result of cumulative fatigue and stress as well as the demand of performing rapid movements

that their bodies are not accustomed to".

Novice Padel players also might not come from a long history of fitness/training and therefore may not be prepared to be safely involved in 12-14 hours per week of intense activities. Therefore, a progressive introduction should be sought to try to enhance fitness levels not only by playing but preparing the body to sustain frequent game time (see the infographic for some guidance).

Observationally, many enter the sport without appropriate equipment. Sandy highlights inappropriate footwear as a cause for concern. "Shoes marketed for Padel are often appropriate for sand-based courts and may not be appropriate for the latest generation of Padel courts which may have different friction properties due to the lower amount of sand used." Finally, there is rarely a culture of warm-up and physical recovery strategies before, during and after



Illustration

the matches and therefore players would benefit from better awareness to prepare them better to enjoy the activity while reducing the risk of injuries.

How do people train for Padel?

“At the recreational level, players train by playing matches. Structured advice is limited to only a few professional players. This approach might be helpful to enhance game-specific endurance. However, lack of attention to strength and mobility-related deficiencies can become a limiting issue impairing performance and exposing the risk for acute chronic injuries”.

For the more serious competitive players coach Sandy goes on to explain the different approach seen between age groups. “Padel training is often a mix of on-court time and physical preparation consisting of different strength and conditioning activities. Players differ in their approaches. In my experience and from what I see on tour, younger players

spend more time on court and less time with activities related to their physical fitness. In contrast, older players tend to do less volume of training on court and spend time performing more strength and conditioning sessions to try and keep up as the game becomes faster and more explosive. There is also an off-season period for international players which is getting shorter and currently lasts from the end of December to end of February”.

What are the challenges for the competitive Player?

There is no doubt that travel is now an additional challenge. Nowadays, competitions are spread across several countries with different temperatures, time-zones and altitudes. Also, tournaments are getting longer. Official tournaments last 1 week. With an increasing level of entrants, lower ranked must go through pre-qualifying involving 2 games per day before

moving through into qualifying rounds to get into the main draw at the latter part of the week. Tennis tournaments have a similar system but as Padel is relatively young, not all players have access to the same level of scientific support to prepare for training after long-haul flights in different time zones.

PERFORMANCE SOLUTIONS

Sports Physiologist: Preparing for the demands of Padel

The patterns of Padel play occur in different parts of the court (net, middle, and baseline) which greatly influence the dynamics of the game.

There are many similarities that exist between Padel and doubles tennis in terms of physiological demands. In a similar manner to doubles tennis, Padel is a sport characterized by accelerations / decelerations, and reactive changes of direction within rallies, all aspects that suggest energy contribution from the complete energy continuum^{1,2}. Although doubles tennis involves a larger court area, greater opportunities for the ball to be kept in play exist during a rally in Padel, meaning intensity can be higher and rally lengths longer than doubles tennis^{3,4}. Metabolic demands are mostly moderate with reported oxygen uptake during the game lower than 45% of VO₂Max⁵.

Cardiovascular demands of Padel games have been studied only recently and on limited abilities. A study conducted on Spanish Players assessed heart rate (HR) responses in 24 players during padel games, reporting intensities between 50% and 70% of the Maximum Heart Rate (HRmax)⁶. Another Spanish study measured the acute effect of a Padel game (1 h 30 m—three sets) on HR responses in four amateur players⁷, and the authors reported an average effort approaching 70% of HRmax, similar to the results of those obtained by other authors⁸.

Cardiovascular demands can be quite high for amateur players with lower levels of fitness. In fact, in a study conducted on amateur players, it was clear that various indices of heart rate variability were severely affected after a 90m game of Padel with an increase in sympathetic drive (and therefore increased stress) observed immediately after the game⁷. An adequate level of fitness is therefore not only relevant

for the performance in the game but also for the ability to recover following games.

Amateur players should therefore be progressively introduced to Padel to increase their endurance capacity and general fitness before playing a high frequency of games to facilitate recovery between games and reduce the risk of injury/excessive fatigue.

Fuelling for the work required

Energy requirements of Padel remain poorly studied. At this time, the generic assumption made is an approximate energy requirement of 500Kcal per hour for a 70Kg player. Since the typical Oxygen uptake recorded in a Padel match is low (around 24 ml/kg/min-1), blood lactate levels are in the range of 2.4 to 3.4 mmol/L-1 and total distance covered is <2000m⁶ it presents intensities that are lower than the demands of Tennis also due to the different court sizes, equipment and regulation.

Therefore, caution should be applied when planning dietary interventions for Padel players. The best practical approach might consist in using heart rate-based determination of energy expenditure using the available wearable technology integrating movement sensors and heart rate to have an individual-specific estimated energy expenditure and develop appropriate plans.

Body Composition

The ratio of fat to muscle (body composition) has an impact on performance. An increase of lean mass correlates with increased strength and power (strength to mass ratio), decreased non-functional mass contributes to reducing cardiorespiratory demand at a given intensity (absolute vs relative oxygen consumption), increases strength to mass ratios and improves muscular economy. Although not the sole determinant of performance, non-functional mass provides a resistance to athletic movement, subsequently requiring the player to increase the force of muscular contraction for a given movement increasing the effort involved for a given task reducing player acceleration and agility and increasing fatigue on court^{9,10}.

Environmental Conditions

Physiological demands are affected by environmental conditions. Padel tennis is played in both indoor and outdoor facilities and specific considerations should

TABLE 1

When	What	Example
Match		
<i>Carb primer Immediately before match start</i>	<ul style="list-style-type: none"> • Fast release carb • Consume immediately on arrival onto court 	<ul style="list-style-type: none"> • 1 gel
<i>During</i>	<ul style="list-style-type: none"> • 45-60g per hour of carbohydrate • 1-2 Litres of fluid per hour (individual requirements) 	<ul style="list-style-type: none"> • 2 gels per hour
Recovery		
<i>Phase 1 Immediately following match</i>	<ul style="list-style-type: none"> • Weigh in - Determine fluid losses • Fast release carbs - Maximise post exercise carb absorption into muscle • 20-30g protein - Begin muscle repair • Begin rehydration 	<ul style="list-style-type: none"> • Recovery drink with water • 1L fluid
<i>Phase 2 1-2 hrs following</i>	<ul style="list-style-type: none"> • Fast release carbs, low fibre, low fat. • Fluids 	<ul style="list-style-type: none"> • White pasta/white rice bowl • 0.5-1L fluid
<i>Phase 3 3-4 hrs following</i>	<ul style="list-style-type: none"> • Slower release carbs • 20 - 30g Protein for ongoing repair • Healthy Fats & Fibre • Fluids 	<ul style="list-style-type: none"> • Brown rice, sweet potato etc. • Salmon fillet, chicken breast, turkey, tuna. • Healthy Fats & Fibre • 0.5-1L fluid
<i>Phase 4 Evening</i>	<ul style="list-style-type: none"> • Carbs • Slow release protein • Fluids 	<ul style="list-style-type: none"> • Greek yogurt with honey and sliced banana • 0.5-1L fluid

If late finish, remove phase 2 and reduce time between remaining phases.

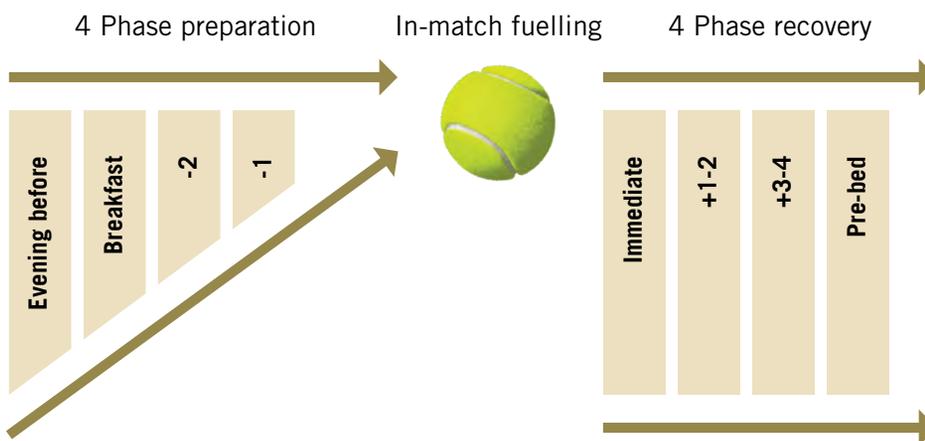


Figure 1: Nutrition planning for Padel players. Timelimes and practical considerations.

be given if matches/tournaments are played in the heat. We know from Tennis that players can sweat >2.5 L/h^{11,12} and can experience cramps during matches in the heat. We also know that fluid intake might be limited during match play in tennis and current recommendations suggest drinking approximately 200mL of fluids (with various formulation to favor fluid absorption and provide energy in prolonged matches) during each change of ends during matches played at temperatures >25 °C WBGT. Playing in the heat increases the demands of match play as evidenced by an increase in heart rate. Players of different levels should acclimatize progressively to playing in the heat and introduce more frequent breaks for fluid intake in the initial exposures to avoid an increase in core temperature and the subsequent higher risk for heat exhaustion. Players preparing tournaments in the heat can benefit from the well reported acclimatization strategies implemented in other sports (e.g. Beat the heat - Athlete365 (olympics.com)) with progressive exposure to heat and humidity parameters expected in the tournament as well as simple guidelines to protect from heat and humidity during match play.

SPORTS NUTRITIONIST: FOOD "POWER PLAYS" TO IMPROVE PADEL PERFORMANCE
 Good nutritional habits offer a simple "quick win" for Padel players of all abilities.

1 Simple dietary changes to increase speed around the court

Improving body composition will improve speed around the court. Positive adjustments to body composition focusing on reducing fat (or increasing muscle) can be initially achieved by simple dietary improvements to daily habits (see Figure 1).

"When preparing meals think; What is the protein source, do the carbohydrates reflect the demands of the day, where are my good fats and do I have a variety of color on my plate?"

If further body composition adjustment is desired, manipulating carbohydrate intake in and around training sessions can be a useful approach to reduce carbohydrate availability and increase lipid oxidation. Here, prioritize carbohydrate intake around important sessions in which performance is key, but then reducing around other sessions,

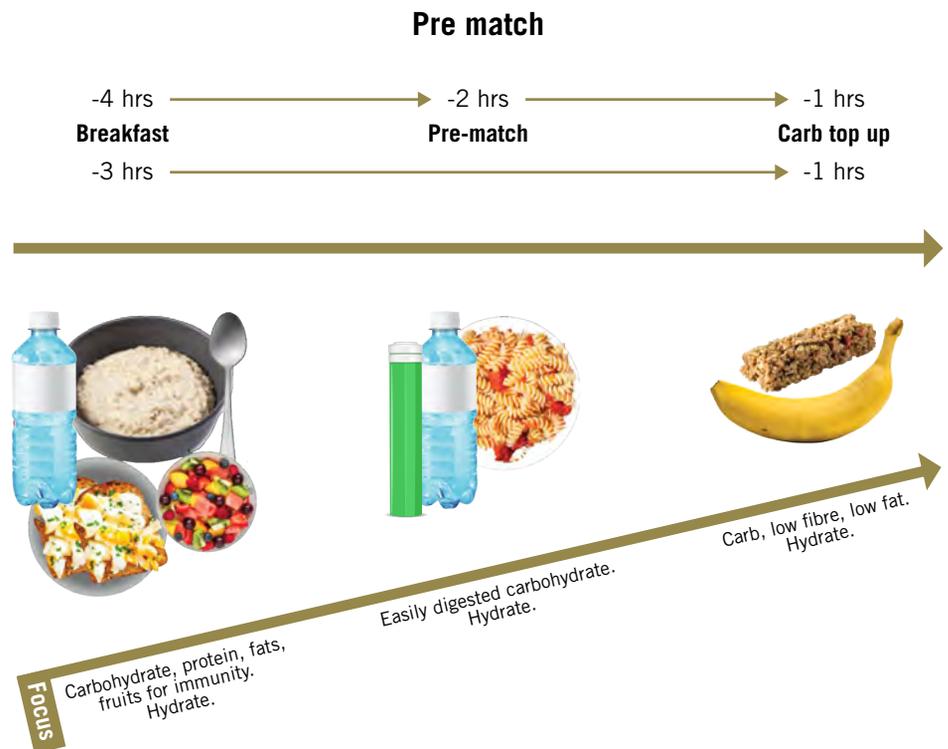


Figure 2: Match day nutrition plan.

a conditioning session for example. This can be achieved simply by having a protein rich meal, and/or snack prior to the session, and perhaps maintaining the approach following the session. Then consider the next session and fuel accordingly. For larger adjustments in body composition, the advice of a qualified nutritionist or sport dietitian is recommended.

#2: Adopt good fundamentals in Sports Nutrition

Ensuring good hydration
 Environmental conditions alone can create challenges when we think about hydration. An additional factor in Padel is the reduced airflow due to the enclosed nature of most of the courts, also reducing sweat evaporation on the skin.

Science FACT A negative hydration status can affect thermoregulation and cardiovascular strain^{33,34} with research also showing that dehydration resulting in as little as ≥ 2% body mass can impair alertness, cognitive performance and other aspects like attention and motor coordination³⁵.

This clearly highlights the need to arrive on-court in a hydrated state. Various techniques are employed to monitor

hydration, however the simple observation of urine colour would be beneficial, maintaining a pale straw or light yellow colour.

Players should always have access to water or other hydration solutions during the games. It is wise to understand personal sweat losses. Understanding the losses encountered during a match or training can inform the on-court strategy and how much needs to be consumed over each hour. Where players experience losses of 3-4L per hour, it becomes impossible to replace that amount during play and the post-match fluid replacement strategy should be priority. Considering the negative effects that dehydration can have on performance, the need to step back on court the following day in a hydrated state is paramount (for players involved in tournaments).

Players performing at international level may benefit from a more formal sweat analysis that can determine not only fluid volume losses, but also help understand sodium losses too. When replacing large amounts of fluid with plain water, a better understanding of individual sodium losses can help the player establish any additional sodium requirements³⁶. This becomes important in challenging environments and during longer matches when sweat losses are high and constitutes the basis

of individualized in-match hydration solutions.

#3 Get Match-day food intake on point

The intermittent activity patterns of competitive Padel indicate that carbohydrate would be the key energy substrate¹⁷ during the high intensity periods across a padel match. Carbohydrate guidelines range in any sport depending on the intensity and duration of exercise (see Figure 2).

Match duration and intensity can vary, largely dependent on the quality and level of the opponent. Like other racket sports, these aspects are not realized until the conclusion of the match and with such variability the challenge lies in knowing how much fuel the player needs on any given day.

Adopting a flexible approach to carbohydrate intake after the match will enable fueling to reflect the demands. This can be done by increasing carbohydrate intake in the day and morning prior to the match to ensure sufficiency, before making any adjustments to the 'refuel' in accordance with the match played and/or the demands of the day. Essentially fueling prior to the match expecting worst case scenario, ie. a lengthy, high intensity match.

Care and consideration should be made to restaurant and food selections, avoiding anything that could create gastrointestinal issues on-court (fatty foods, spices, high fiber options). For the touring professional competing China or Central and South America, an additional consideration is meat contamination due drugs (eg. Clenbuterol) given to livestock to promote growth, traces of which can be detected during an anti-doping test. Therefore, it is always wise to eat at a tournament hotel or recommended restaurant to reduce this risk.

Ideally the player enquire as to the meat source (US sourced is safer) should consider other protein sources (eg. Fish) but if eating meat (pork, beef, chicken, salami, sausages, offal, pate) ensure they eat the same dish with other players (safety in numbers), keep receipts or even photograph food eaten.

#4 Prepare for your next session with good Post training or Match Nutritional Recovery

Science FACT Nutrition can have upon performance and fatigue during exercise^{18,19} and has been postulated to be a cause of central and peripheral fatigue in other racket sports²⁰.

Maintaining a level of energy intake to be able to sustain the repeated high intensity nature of modern Padel is important. Not eating enough over the course of a tournament may prove detrimental to performance²¹ and could be the difference between winning and losing in the latter stages.

During tournaments, daily matches and small recovery windows mean the recovery process should start immediately following the match. At this timepoint higher GI carbohydrates can be beneficial as they are digested and utilized quickly therefore optimizing the opportunity immediately following exercise to begin replenishing glycogen stores. Post-match carbohydrates should be paired with up to 25g protein to support muscle protein synthesis and assist glycogen resynthesis²². Due to ease and convenience, many players opt for a simple recovery powder drink (carbohydrate and protein) straight off court, then a flapjack type energy bar with a ripe banana around an hour later.

A continued flexible approach across the ensuing 24 hours period with carbohydrate intakes should be taken to reflect match durations and demands. The harder the match the greater the carbohydrate across this recovery period and vice versa. As the recovery timeline after the match progresses, attention should start to switch to lower GI carbohydrates. This is usually at +4hrs following the conclusion of the match. Later evening matches reduce the recovery window available and place an increased urgency on refueling. In this scenario, every effort should be made to shorten the gaps between intakes and utilizing higher GI foods and drinks where applicable to maximize the time available before bed.

#5 Eating and drinking (Fuelling) during a match and high intensity training to boost performance

SCIENCE FACT Consumed (exogenous) Carbohydrate can have a significant performance enhancement on endurance activities²³, running speeds in the latter stages of exercise²⁴ squash reaction time²⁵, tennis running speed and stroke quality²⁶.

As match durations are varied it is wise to always maintain a level of carbohydrate intake between 30-60g per hour (Figure 2).

Aside from providing substrate for muscle contraction and enhancing endurance performance²³, improved reaction time²⁷ and running speeds²⁵, carbohydrate ingestion during match play may also support technical aspects with findings of increased stroke quality²⁶ in the latter stages of a prolonged tennis play supporting its inclusion into a match day strategy.



Like other racquet sports, Padel involves high speed change of direction. As a consequence of that, ankle sprains are the most common lesions.



Training durations, intensity and volume can all influence the energy requirement for the day. This will naturally vary from player to player and the level they train at (professional vs recreational). A simple approach is to adopt a flexible carbohydrate intake whilst maintaining a consistent intake of protein and fats. Of course, this additional fueling during the session would be dependent on goals, intensity, and duration meaning it may not always be necessary. For the high-level player with multiple high intensity training bouts through the day, carbohydrate feeding during the session would be beneficial to support performance, although not necessary for the recreational player who may experience lower intensity, shorter sessions.

The modern approach for nutrition in sport is food first not food only. Busy lifestyles and training schedules often mean reduced time. Simple recovery (protein and carbohydrate) powders and functional sports foods can at times offer a helpful on the go solution to support individual needs and goals.

#6 Changing your nutrition during Injury

The majority of Padel injuries concern the lower limbs²⁸, with the nature of the injury influencing energy requirements due to reduced sporting activity and adjusted training load, to complete immobilization. Nutrition has 2 functions during injury. Firstly, adjustments can help accelerate healing of the injury. Secondly, to maintain optimal body mass.

It is not uncommon for athletes to reduce intake to the minimum requirements of

resting metabolic rate in fear of gaining unwanted fat mass during a period of reduced training/competition activities. However, an extreme reduction of intake can result in prolonged or hampered recovery from injury due to these underestimated energy requirements.

In using double labelled water, we recently observed the total daily expenditure of female elite tennis player following ankle ligament surgery to be ~2600kcal per day. For this individual, adjustments in macronutrient intake suggested were 3g×kg⁻¹ carbohydrate with protein increased to 2.2g×kg⁻¹ to support the retention of muscle mass and fat at 1.5g×kg⁻¹ for the initial two-weeks following surgery, similar to that reported in male soccer players (2.5-3g×kg⁻¹; 2-3g×kg⁻¹; 1.5g×kg⁻¹) during early stages of injury^{29,30}.

Once training begins a faded reintroduction, the carbohydrate intake can gradually be increased, and protein intake reduced³⁰. During the rehabilitation process, it may be beneficial to conduct regular body composition assessments to guide any nutritional adjustments needed.

Alongside an increased protein intake, research has found 5 grams of omega 3 fish oil with 3,5 grams of eicosapentaenoic acid (EPA) helped to maintain muscle mass during a period of immobilization³¹.

THE SPORTS PODIATRIST: SHOE SELECTION TO REDUCE INJURIES

Shoe-Surface interaction

Shoes are, together with the Padel racquet, the two most important pieces of equipment needed to play the sport. The perfect Padel

shoe is often an individual choice and strikes that balance between important intrinsic and extrinsic criteria. Intrinsic criteria such as comfort, fit and history of injury all need to be taken into consideration when choosing the right shoe. The most important extrinsic factor is the playing surface.

Internal criteria: Fit, comfort and injury history

Within the existing literature, there are no in-depth studies regarding the proper fit of Padel shoes for recreational or professional Padel players. However, choosing the wrong shoe size significantly affects footwear comfort^{32,33}. Herbaut et al³⁴ found that athletes who regularly play tennis, reported the most comfortable fit when a shoe was +10mm longer and -8mm narrower than the respective foot length and forefoot width. While fit is considered the most important parameter to ensure footwear comfort, several studies reported further increased comfort by customizing the interface between the foot and the shoe, using custom or over the counter foot orthotics (FO)³⁵⁻³⁷.

Like other racquet sports, Padel involves high speed change of direction. As a consequence of that, ankle sprains are the most common lesions³⁸. If a history of lateral ankle sprains is present, certain footwear characteristics should be considered. The lateral stability of a shoe can be improved by combining an outsole with lower lateral friction in combination with a large lateral forefoot flare, this is most important when you have a normal to high foot arch. These features will offer a longer mechanical arm decreasing the chance of spraining



Figure 3: Examples of lateral forefoot flare, needed for extra stability. Shoe a and b show a frontal view, and shoe c and d a top view. The circle indicates the location of the lateral forefoot flare, with shoe (a) having a good flare compared to shoe (b) without flare. The parallel lines indicate the size (or effect) of the lateral forefoot flare. More distance between the lines will result in more stability.



Figure 4: Examples of different sole types.

your ankle. The lateral flare could be best described as an increase sole width at the lateral forefoot. For players with a lower arch, shoes that offer a stiffer midfoot flexibility will help to control excessive arch overload during playing.

External criteria: Playing surface

The official playing surface consist of 13 mm artificial (polypropylene) grass (42,000 to 62,000pts/m²) with white silica sand (32kg/m²) infill over the entire surface (FIP, 2021). Like many other sports multidirectional sports, padel shoes need to have the right amount of grip. Too much and you risk increased strain on foot and lower limb joints, too little, and the ability to respond rapidly during gameplay reduces due to slipping on the court. In general, Padel shoes can be classified into three groups based on their outsole geometry:

1. **Herringbone outsole:** These are currently used the most, easily recognizable by the zig-zag pattern, and have a very good grip on well-maintained artificial grass with silica infill Padel courts. This outsole type is more durable than the omni type. However, not all herringbone patterns offer the same grip. Finer, deeper zig-zag patterns will increase the surface area and thus grip, where thicker, more superficial patterns will reduce friction between the outsole and the court surface.

2. **Omni type outsole:** These shoes can be used both on artificial grass with silica

sand infill and hard courts. Because it is suited for a variety of surfaces, it also allows controlled sliding easier for when you are trying to reach deep balls when compared to herringbone outsole.

3. **Mixed type outsole:** This is a combination of the two other outsoles. Some brands will offer an omni outsole on the inside and more of a herringbone profile on the outside, while others might just do the opposite. Unfortunately, like with the other outsole types, you need to use them to feel which one works best.

References

Available at www.aspetar.com/journal

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