Oleaphen

High-Oleocanthal Extra Virgin Olive Oil in Sports Medicine

A clinical evidence dossier

Mechanisms, human evidence, and applications for athletic recovery, performance and long-term health.

Prepared for sports physicians, team doctors and performance nutritionists.

Executive summary

High-phenolic extra virgin olive oil is a food, not a pharmaceutical. What distinguishes it as a clinical tool is the concentration and the verification: it delivers a defined, laboratory-confirmed dose of oleocanthal, the olive polyphenol whose anti-inflammatory mechanism overlaps with ibuprofen, at levels ordinary oil cannot reach.

- Oleaphen's current harvest is independently verified at 1,248 mg/kg oleocanthal and 2,236 mg/kg total polyphenols by LC-MS/MS at the IOC-accredited laboratory of the Universidad de Córdoba. Oleocanthal is reported as its own analyte, not folded into a total.
- Oleocanthal inhibits COX-1 and COX-2 through the prostaglandin pathway, with potency comparable to ibuprofen and greater inhibition than ibuprofen at matched concentrations in cell assays. It also suppresses NF-κB and MAPK signalling and lowers pro-inflammatory cytokines, giving it a broader anti-inflammatory footprint than a single-target NSAID.
- Meta-analyses of polyphenol-rich nutrition report accelerated recovery of muscle function (up to roughly 13%) and reduced soreness (up to roughly 29%) after exercise-induced muscle damage, concentrated at 48 to 72 hours.
- Human randomised trials show olive polyphenols improve running economy and recovery kinetics (Roberts et al., 2023), and that extra virgin olive oil improves blood-brain barrier function and brain connectivity over six months (Kaddoumi et al., 2022, conducted with Yale School of Public Health).
- Season-long supplementation reduced athlete sick days by 28% (Somerville et al., 2019).
- The constituent polyphenols are naturally occurring food compounds and are not on the WADA Prohibited List. Batch-level documentation is provided.
- A randomised, double-blind, placebo-controlled trial in professional footballers begins September 2026 with the University of Cyprus, CYENS, and the University of Nicosia.

1. The compound that matters: oleocanthal

Most high-phenolic olive oils are marketed on a single figure, total polyphenols in mg/kg. For a clinical audience that figure is close to uninformative, because it does not specify which compounds are present. The molecule carrying the strongest anti-inflammatory evidence, oleocanthal, is not present in the olive fruit at all. It is formed during crushing and malaxation

by the sequential action of two enzyme classes (β-glucosidase, then a methylesterase) on the precursor ligstroside. The conditions of that step, temperature, time, oxygen exposure and cultivar enzymology, determine whether the finished oil contains 50 mg/kg or over 1,000 mg/kg of oleocanthal.

The practical consequence is that two oils with identical total polyphenols can differ by an order of magnitude in oleocanthal. A certificate that reports only total polyphenols tells a clinician nothing about oleocanthal exposure. The relevant question is always the individual compound, measured by LC-MS/MS, reported as its own line.

Oleaphen's process is engineered to maximise oleocanthal specifically. The current harvest, verified by LC-MS/MS at the IOC-accredited Universidad de Córdoba laboratory under the ARISTOIL protocol:

- Oleocanthal: 1,248 mg/kg (around 55% of total phenolic content, where most high-phenolic oils sit at 10 to 25%)
- Total polyphenols: 2,236 mg/kg
- Total bioactive compounds (full secoiridoid family plus tocopherols): 11,636 mg/kg

LC-MS/MS, following IOC method COI/T.20/Doc. No 29, is the reference standard recognised by the IOC and EFSA.

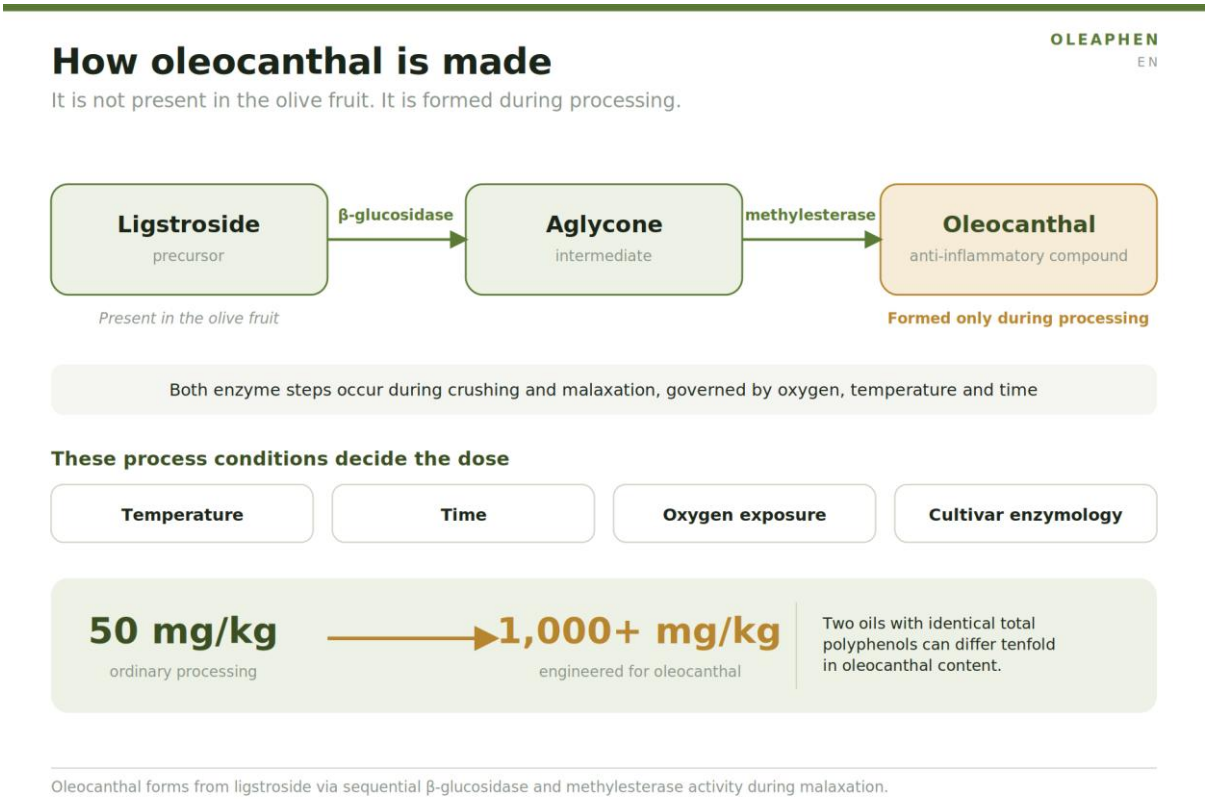

Figure 1. Oleocanthal is formed during processing and is not present in the olive fruit.

2. Mechanisms of action

2.1 COX-1 and COX-2 inhibition

The foundational finding, published in Nature by Beauchamp and colleagues in 2005, is that oleocanthal inhibits the cyclooxygenase enzymes COX-1 and COX-2 through the same prostaglandin pathway as ibuprofen, despite being structurally unrelated.

At equivalent concentrations, oleocanthal is substantially more potent: at a matched 25 µM, oleocanthal inhibited COX activity by 41 to 57%, against just 13 to 18% for ibuprofen, a roughly three-fold greater inhibition at the same molar concentration. Subsequent work in chondrocyte models (Iacono et al., 2010; Scotece et al., 2018) confirmed dose-dependent inhibition, with oleocanthal again achieving greater enzymatic inhibition than ibuprofen at matched concentrations. Unlike chronic NSAID use, this occurs through a food, without the gastrointestinal and renal burden associated with sustained pharmacological COX inhibition.

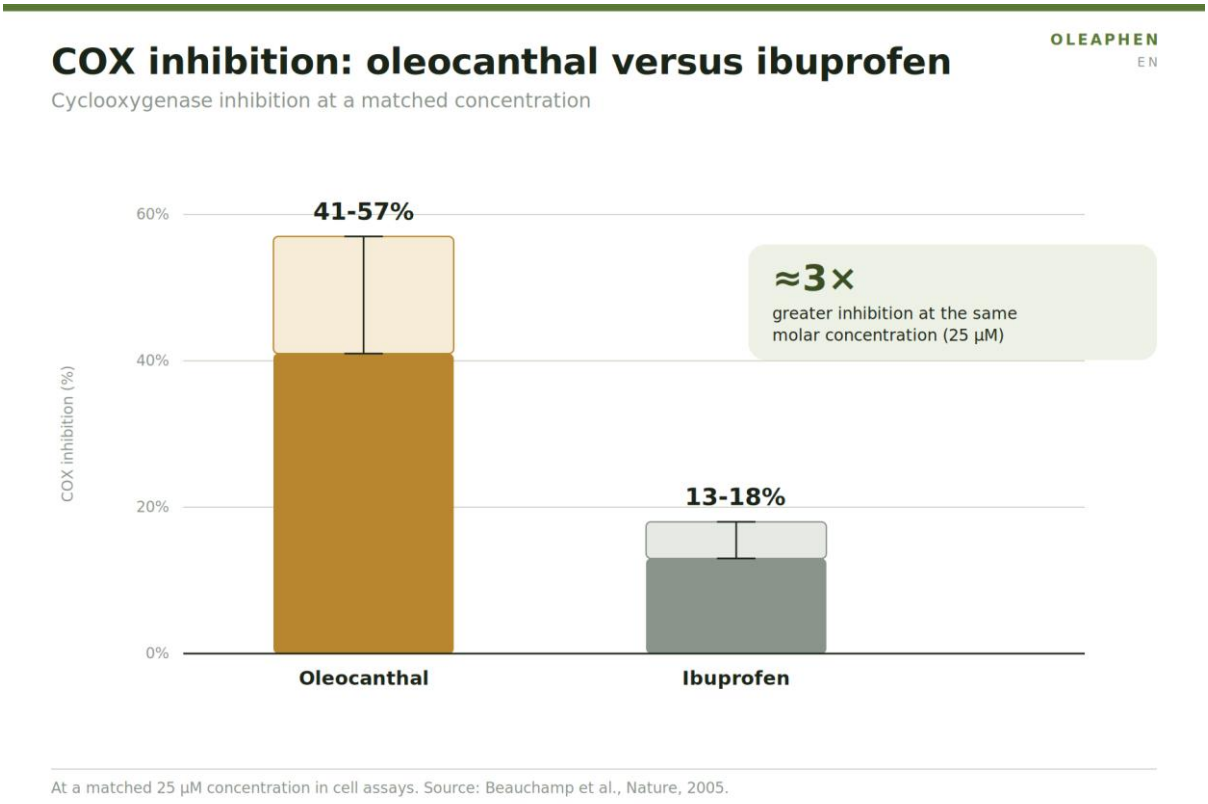

Figure 2. COX inhibition by oleocanthal versus ibuprofen at a matched concentration.

2.2 NF-κB and MAPK pathway suppression

Oleocanthal acts well beyond COX. In human primary osteoarthritis chondrocytes activated by lipopolysaccharide, oleocanthal reduced phosphorylation of ERK1/2 and p38 MAP kinases, increased cytoplasmic retention of IκB, and prevented nuclear translocation of NF-κB p65 (Scotece et al., 2018). The downstream effect was reduced expression of IL-6, IL-8, COX-2, NOS-2, MIP-1α, TNF-α, MMP-13 and ADAMTS-5. The reduction in matrix metalloproteinases is directly relevant to cartilage preservation under repeated mechanical load.

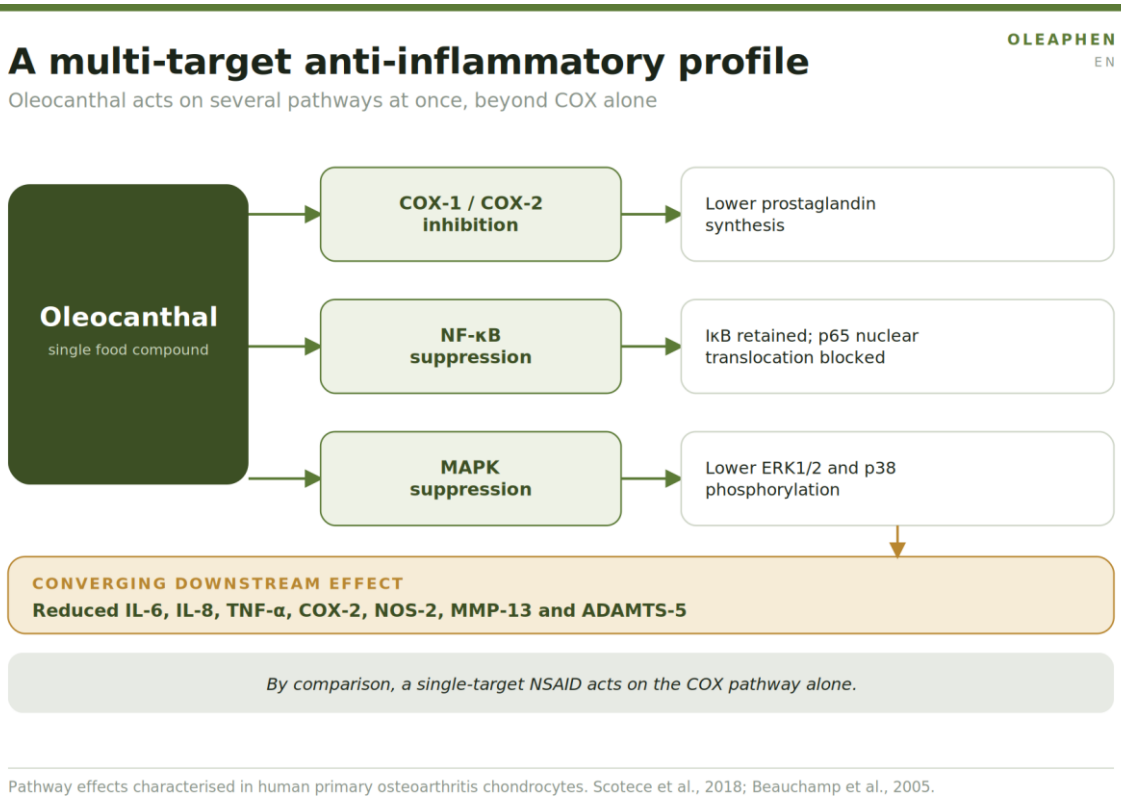

Figure 3. A multi-target anti-inflammatory profile, beyond COX alone.

2.3 Antioxidant activity

Hydroxytyrosol and oleacein are among the most potent antioxidant compounds characterised in the human diet. This is mechanistically relevant to the oxidative stress generated by high training loads. In the randomised APRIL crossover trial, an oleocanthal- and oleacein-enriched EVOO improved antioxidant status and reduced lipid and organic peroxides and interferon-γ in humans (Ruiz-García et al., 2023). The EFSA health claim under EU Regulation 432/2012 is anchored to this antioxidant activity: olive oil polyphenols contribute to the protection of blood lipids from oxidative stress, at an intake of 5 mg hydroxytyrosol and derivatives per day. Oleaphen exceeds this threshold by close to nine times per 20 g serving.

2.4 Anti-platelet and vascular effects

A randomised trial in healthy adult men showed that oleocanthal-rich EVOO acutely modulated platelet aggregation in a manner consistent with COX-mediated thromboxane suppression (Agrawal et al., 2017). This is the same pathway through which low-dose aspirin reduces cardiovascular event risk, and it supports healthy blood flow and oxygen delivery to working tissue.

3. Evidence by clinical domain

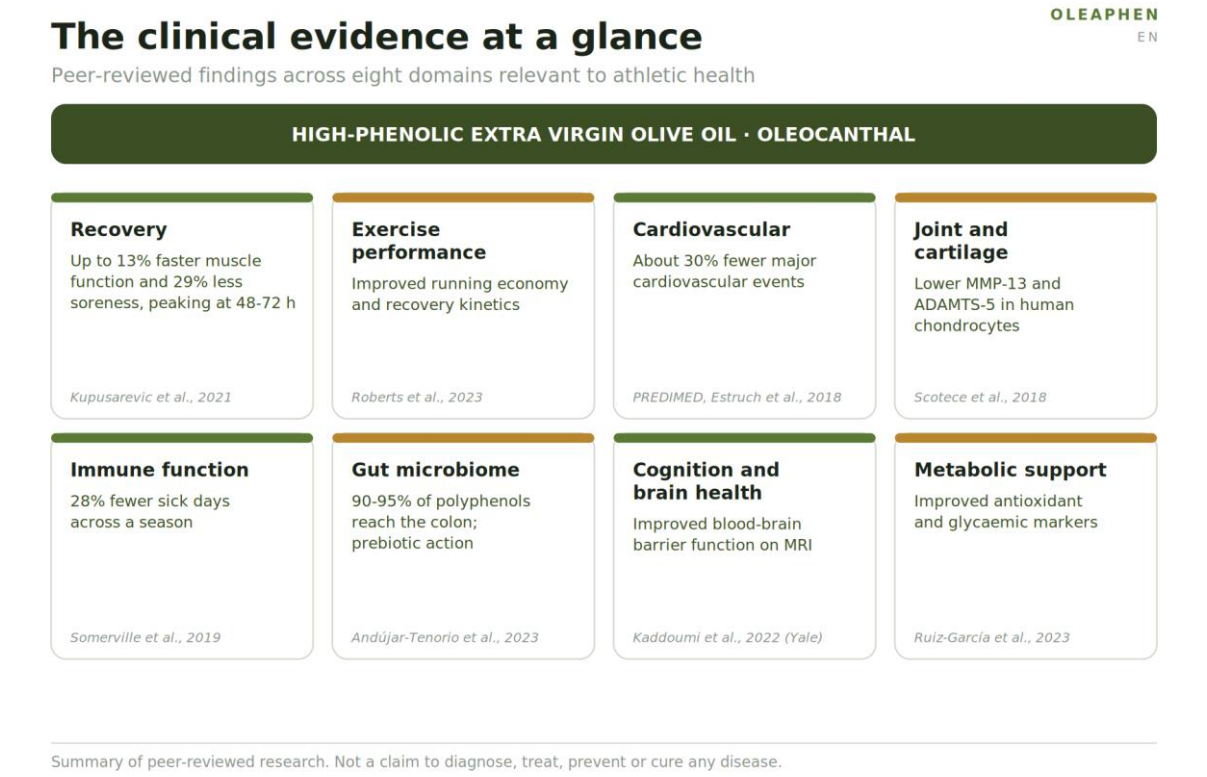

Figure 5. The clinical evidence across eight domains relevant to athletic health.

3.1 Recovery and exercise-induced muscle damage

Two systematic reviews anchor this area. Kupusarevic and colleagues (2021) found that polyphenol-rich foods accelerated recovery of muscle function and reduced soreness following exercise-induced muscle damage, with the maximal benefit at 48 to 72 hours post-exercise. Carey, Lucey and Doyle (2021) found that flavonoid-containing polyphenols improved recovery of muscular strength and reduced soreness over the four days after damage. These analyses are the source of the frequently cited figures of up to 13% faster recovery of muscle function and up to 29% reduction in soreness. The interventions span several polyphenol sources; the relevance to olive oil is mechanistic, through the shared COX and NF-κB pathways, and the practical value is greatest where recovery time between efforts is short.

3.2 Olive-specific exercise evidence

A randomised, double-blind trial of a hydroxytyrosol-rich olive phytocomplex over 16 days improved running economy and oxygen consumption at submaximal intensity, lowered rating of perceived exertion near threshold, and shortened post-exercise oxygen recovery kinetics (Roberts et al., 2023). An acute study found that a single dose of extra virgin olive oil improved cardiorespiratory coordination during a progressive exercise test (Garcia-Retortillo et al., 2019). A 2025 scoping review of olive-derived polyphenols and exercise-induced inflammation concluded that the anti-inflammatory effects are most consistent with two or more weeks of supplementation, supporting a loading rather than single-dose model (Roberts et al., 2025).

3.3 Cardiovascular and endurance support

The cardiovascular evidence base for olive oil polyphenols is among the strongest for any food. The PREDIMED randomised trial in 7,447 participants at high cardiovascular risk found that a Mediterranean diet supplemented with extra virgin olive oil reduced major cardiovascular events by approximately 30% versus a control diet (Estruch et al., 2018). The EUROLIVE study established a dose-dependent relationship between olive oil polyphenol content and protection of LDL from oxidative modification (Covas et al., 2006). Within PREDIMED, higher EVOO consumption was associated with lower cardiovascular disease risk and mortality (Guasch-Ferré et al., 2014). Mechanistically, polyphenols stimulate nitric oxide production and support endothelial function, with measurable effects on blood pressure (Moreno-Luna et al., 2012). For the endurance athlete, the relevant translation is vascular efficiency and oxygen delivery.

3.4 Joint and cartilage protection

Beyond COX inhibition, the reduction of MMP-13 and ADAMTS-5 and the suppression of catabolic mediators in human chondrocytes (Scotece et al., 2018) provide a mechanistic basis for cartilage protection under the repeated high-impact and eccentric loading characteristic of collision and high-impact sport. This remains cell-model evidence, but it is consistent and mechanistically coherent with the broader anti-inflammatory profile.

3.5 Immune function and availability

In a randomised controlled trial in 32 competitive adolescent athletes across a season, olive polyphenol supplementation did not change the incidence of upper respiratory illness but reduced the number of sick days by 28% (Somerville et al., 2019). For a clinician managing a squad, availability across a congested calendar is often the outcome that matters most, and a reduction in days lost has direct competitive value.

3.6 Gut microbiome

Roughly 90 to 95% of ingested olive polyphenols reach the colon intact, where resident bacteria metabolise them into bioactive secondary compounds. They act as prebiotic substrate, promoting Bifidobacterium, Lactobacillus and butyrate-producing species (Andujar-Tenorio et al., 2023). A 2026 prospective study in Microbiome tracked 656 adults over two years and found that virgin olive oil, not refined, was associated with improved cognitive performance and greater microbial diversity, with the polyphenol-metabolising genus Adlercreutzia statistically mediating around half the cognitive benefit (Ni et al., 2026). This positions the gut as both a route of action and a target, relevant to nutrient absorption, immune regulation and the gut-brain axis.

3.7 Cognition and brain health

Oleocanthal is among the most studied compounds in neurodegeneration research. It enhances clearance of beta-amyloid across the blood-brain barrier by upregulating the P-glycoprotein and LRP transporters (Abuznait et al., 2013; Qosa et al., 2015), inhibits tau aggregation, and suppresses neuroinflammation through COX inhibition. The human evidence is not only mechanistic: a 2022 randomised controlled trial conducted with Yale School of Public Health gave 30 ml of olive oil daily for six months to patients with mild cognitive impairment and found that only the extra virgin group improved blood-brain barrier function and functional brain connectivity on MRI (Kaddoumi et al., 2022). PREDIMED cognitive sub-studies showed improved global cognition with EVOO versus control (Valls-Pedret et al., 2015; Martínez-Lapiscina et al., 2013), and a 92,000-person cohort linked daily olive oil intake to 28% lower dementia-related mortality (Tessier et al., 2024). For the athletic population this

carries two implications: cognitive function and decision-making in competition, and long-term neuroprotection, a consideration of growing importance in contact and collision sport.

3.8 Metabolic support

Olive polyphenols act on glucose and lipid metabolism. The randomised APRIL trial in people with obesity and prediabetes showed improvements in antioxidant and inflammatory status with an oleocanthal- and oleacein-rich oil (Ruiz-García et al., 2023). A clinical study of high-polyphenol EVOO found reduced glycated haemoglobin (HbA1c), a marker of long-term glycaemic control, alongside favourable microbiome shifts. Proposed mechanisms include slowed carbohydrate absorption, improved insulin sensitivity, and modulation of GLP-1 signalling. For the athlete, the practical relevance is more stable glucose handling around training and competition and support for healthy body composition.

4. Bioavailability and why format matters

Olive oil polyphenols are well absorbed within their natural lipid matrix. Hydroxytyrosol appears in plasma within 30 to 90 minutes of ingestion, and urinary recovery is markedly higher from olive oil (44%) than from water-based preparations (23%) or food matrices such as yoghurt (5.8%). This matrix effect is one reason the evidence base supports whole oil over isolated polyphenol capsules, where bioavailability and the synergy of the full secoiridoid family are not replicated.

Format also governs the dose actually delivered. Oleocanthal oxidises rapidly once oil is exposed to air. A bottle that tested high at filling can lose a substantial fraction of its oleocanthal within weeks of daily opening, so the certified value reflects the day of bottling rather than the day of consumption. Nitrogen flushing has been shown to confer roughly a tenfold protective effect on phenolic stability (Romero et al., 2024). Oleaphen ships in nitrogen-flushed monodoses kept cold through the supply chain, so the concentration on the certificate is close to what reaches the athlete. Heat also degrades oleocanthal, which is why the oil is taken cold.

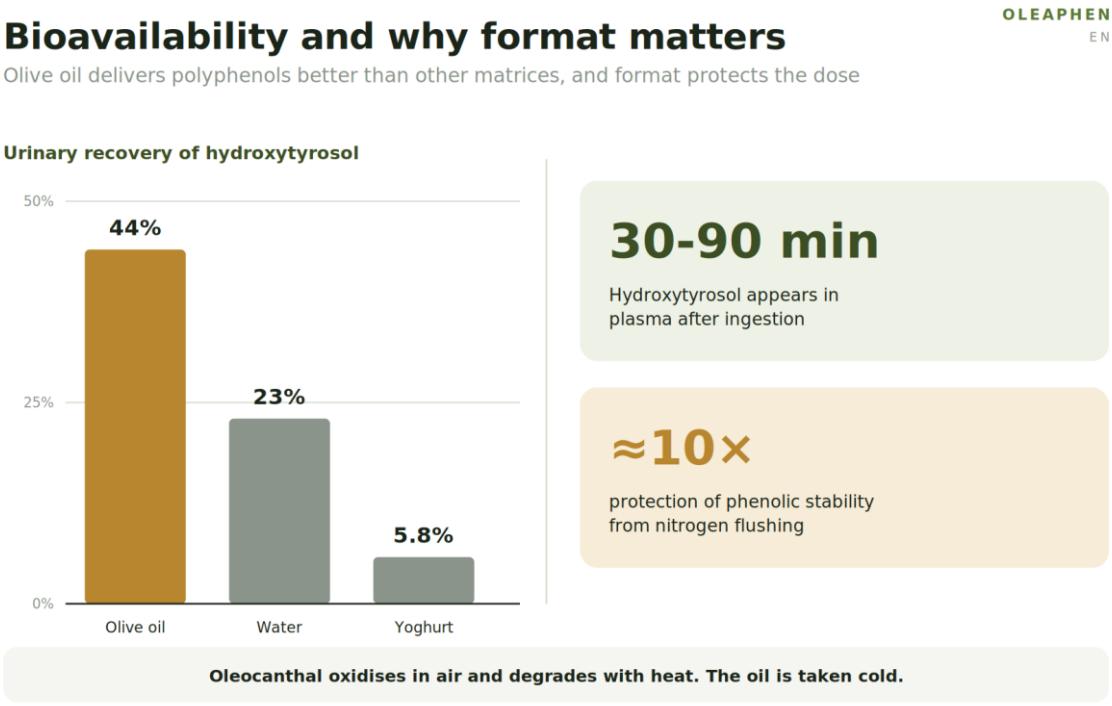

Figure 4. Bioavailability by matrix and the role of format.

5. Dosing and integration

Rather than a fixed consumer dose, intake for an athletic programme is best set with the performance and medical team against the athlete's goals and competition schedule, using three levers: a daily baseline through the training block to build and maintain tissue exposure; a higher intake around heavy-load or short-turnaround periods when recovery demand peaks; and a targeted serving ahead of competition. The oil is taken cold.

Once a protocol is agreed, Oleaphen supplies monodoses dosed to specification so that each serving carries a known, repeatable oleocanthal content.

One physiological consideration is worth raising with performance staff: as with any antioxidant and anti-inflammatory intake, timing relative to key adaptive sessions can be planned deliberately, since the goal is to manage excess inflammatory burden without unnecessarily blunting the adaptive signalling that drives training response.

6. Safety, contraindications and interactions

Olive oil holds GRAS status with the US FDA and is consumed at 30 to 50 g daily by entire Mediterranean populations without incident. At dietary doses there are no documented adverse effects. The peppery throat sensation from oleocanthal is a sensory response mediated by the TRPA1 receptor, not tissue irritation.

The team physician should be consulted in the following cases:

- Athletes on anticoagulant or antiplatelet therapy, given the anti-platelet activity of oleocanthal (monitor for additive effects)
- Athletes scheduled for surgery, where bleeding time is a consideration
- Athletes on blood-pressure or glucose-lowering medication, where additive effects are possible
- Known olive allergy
- Total caloric contribution of the oil within the athlete's energy plan

7. Anti-doping status

The constituent polyphenols of olive oil, including oleocanthal, oleacein and hydroxytyrosol, are naturally occurring food compounds and are not listed in any category of the WADA Prohibited List. For an elite programme the meaningful assurance is supply-chain integrity and batch-level testing rather than a general statement that the product is a food, and Oleaphen provides batch documentation to support anti-doping compliance.

8. Confidentiality and working with elite programmes

We are accustomed to working with high-level professional athletes and teams, and we understand that any nutritional or recovery edge is competitively sensitive. We treat the relationship accordingly. We work discreetly, do not disclose the identity of the athletes, clubs or staff we supply without their explicit agreement, and are routinely happy to sign non-disclosure and confidentiality agreements before any detail of a programme is discussed. Trial protocols, internal performance data and any results generated within your squad remain yours. The intention is a quiet, professional supply relationship that protects your competitive position, not a marketing exercise conducted at your expense.

9. Ongoing clinical trial

A randomised, double-blind, placebo-controlled trial in professional footballers begins in September 2026, registered on clinicaltrials.gov. It is run with the University of Cyprus and the CYENS Centre of Excellence, the University of Nicosia, and Yale School of Public Health, with statistical analysis by the Yale Center for Analytical Sciences. Over a 28-day supplementation period, the trial evaluates recovery, cognitive function, reflex and reaction performance, and hormonal response, measured around the competitive match schedule.

10. Quality specifications

- Oleocanthal: 1,248 mg/kg, LC-MS/MS, reported as an individual analyte
- Total polyphenols: 2,236 mg/kg
- Total bioactive compounds: 11,636 mg/kg
- Method: LC-MS/MS, IOC COI/T.20/Doc. No 29, IOC-accredited laboratory, Universidad de Córdoba (ARISTOIL protocol)
- Format: nitrogen-flushed monodoses, cold chain maintained to dispatch
- EFSA 432/2012: exceeds the 5 mg hydroxytyrosol per 20 g threshold for the authorised blood-lipid claim by 9 times
- Batch-level certificates available on request

Oleaphen

References

Beauchamp GK, Keast RSJ, Morel D, et al. Phytochemistry: ibuprofen-like activity in extra-virgin olive oil. Nature. 2005;437(7055):45-46. doi:10.1038/437045a

Iacono A, Gómez R, Sperry J, et al. Effect of oleocanthal and its derivatives on inflammatory response induced by lipopolysaccharide in a murine chondrocyte cell line. Arthritis & Rheumatism. 2010;62(6):1675-1682. doi:10.1002/art.27437

Scotece M, Conde J, Abella V, et al. Oleocanthal inhibits catabolic and inflammatory mediators in LPS-activated human primary osteoarthritis chondrocytes through MAPKs/NF-κB pathways. Cellular Physiology and Biochemistry. 2018;49(6):2414-2426. doi:10.33594/000000102

Parkinson L, Keast R. Oleocanthal, a phenolic derived from virgin olive oil: a review of the beneficial effects on inflammatory disease. International Journal of Molecular Sciences. 2014;15(7):12323-12334. doi:10.3390/ijms150712323

Agrawal K, Melliou E, Li X, et al. Oleocanthal-rich extra virgin olive oil demonstrates acute anti-platelet effects in healthy men in a randomized trial. Journal of Functional Foods. 2017;36:84-93. doi:10.1016/j.jff.2017.06.046

Ruiz-García I, Ortíz-Flores R, Badía R, et al. Rich oleocanthal and oleacein extra virgin olive oil and inflammatory and antioxidant status in people with obesity and prediabetes. The APRIL study: a randomised, controlled crossover study. Clinical Nutrition. 2023;42(8):1389-1398. doi:10.1016/j.clnu.2023.06.027

Kupusarevic J, McLeod K, Roberts JD, et al. Effect of polyphenol-rich foods, juices, and concentrates on recovery from exercise-induced muscle damage: a systematic review and meta-analysis. Nutrients. 2021;13(9):2988. doi:10.3390/nu13092988

Carey CC, Lucey A, Doyle L. Flavonoid-containing polyphenol consumption and recovery from exercise-induced muscle damage: a systematic review and meta-analysis. Sports Medicine. 2021;51(6):1293-1316. doi:10.1007/s40279-021-01440-x

Roberts JD, Lillis JB, Pinto JM, et al. The effect of a hydroxytyrosol-rich, olive-derived phytocomplex on aerobic exercise and acute recovery. Nutrients. 2023;15(2):421. doi:10.3390/nu15020421

Esquius L, Garcia-Retortillo S, Balagué N, et al. Physiological and performance-related effects of acute olive oil supplementation at moderate exercise intensity. Journal of the International Society of Sports Nutrition. 2019;16(1):12. doi:10.1186/s12970-019-0279-6

Roberts JD, et al. The application of olive-derived polyphenols on exercise-induced inflammation: a scoping review. Nutrients. 2025;17(2):223. doi:10.3390/nu17020223

Estruch R, Ros E, Salas-Salvadó J, et al. Primary prevention of cardiovascular disease with a Mediterranean diet supplemented with extra-virgin olive oil or nuts. New England Journal of Medicine. 2018;378(25):e34. doi:10.1056/NEJMoa1800389

Covas MI, Nyyssönen K, Poulsen HE, et al. The effect of polyphenols in olive oil on heart disease risk factors. Annals of Internal Medicine. 2006;145(5):333-341. doi:10.7326/0003-4819-145-5-200609050-00006

Guasch-Ferré M, Hu FB, Martínez-González MA, et al. Olive oil intake and risk of cardiovascular disease and mortality in the PREDIMED study. BMC Medicine. 2014;12:78. doi:10.1186/1741-7015-12-78

Moreno-Luna R, Muñoz-Hernandez R, Miranda ML, et al. Olive oil polyphenols decrease blood pressure and improve endothelial function in young women with mild hypertension. American Journal of Hypertension. 2012;25(12):1299-1304. doi:10.1038/ajh.2012.128

Somerville V, Moore R, Braakhuis A. The effect of olive leaf extract on upper respiratory illness in high school athletes: a randomised control trial. Nutrients. 2019;11(2):358. doi:10.3390/nu11020358

Andujar-Tenorio N, Cobo A, Martínez-Rodríguez AM, et al. Intestinal microbiota modulation by olive oil polyphenols. Frontiers in Nutrition. 2023;10:1272139.

Ni J, Nishi SK, Babio N, et al. Total and different types of olive oil consumption, gut microbiota, and cognitive function changes in older adults. Microbiome. 2026;14(1):68. doi:10.1186/s40168-025-02306-4

Abuznait AH, Qosa H, Busnena BA, El Sayed KA, Kaddoumi A. Olive-oil-derived oleocanthal enhances β-amyloid clearance as a potential neuroprotective mechanism against Alzheimer's disease: in vitro and in vivo studies. ACS Chemical Neuroscience. 2013;4(6):973-982. doi:10.1021/cn400024q

Qosa H, Batarseh YS, Mohyeldin MM, El Sayed KA, Keller JN, Kaddoumi A. Oleocanthal enhances amyloid-β clearance from the brains of TgSwDI mice and in vitro across a human blood-brain barrier model. ACS Chemical Neuroscience. 2015;6(11):1849-1859. doi:10.1021/acschemneuro.5b00190

Kaddoumi A, Denney TS Jr, Deshpande G, et al. Extra-virgin olive oil enhances the blood-brain barrier function in mild cognitive impairment: a randomized controlled trial. Nutrients. 2022;14(23):5102. doi:10.3390/nu14235102

Valls-Pedret C, Sala-Vila A, Serra-Mir M, et al. Mediterranean diet and age-related cognitive decline: a randomized clinical trial. JAMA Internal Medicine. 2015;175(7):1094-1103. doi:10.1001/jamainternmed.2015.1668

Martínez-Lapiscina EH, Clavero P, Toledo E, et al. Mediterranean diet improves cognition: the PREDIMED-NAVARRA randomised trial. Journal of Neurology, Neurosurgery and Psychiatry. 2013;84(12):1318-1325. doi:10.1136/jnnp-2012-304792

Tessier AJ, Cortese M, Yuan C, et al. Consumption of olive oil and diet quality and risk of dementia-related death. JAMA Network Open. 2024;7(5):e2410021. doi:10.1001/jamanetworkopen.2024.10021

Wei L, Li Z, Shi M, et al. Neuroprotective properties of extra virgin olive oil polyphenols in Alzheimer's disease: a multi-target mechanistic review. Frontiers in Nutrition. 2025;12:1736633. doi:10.3389/fnut.2025.1736633

Lozano-Castellón J, Vallverdú-Queralt A, Rinaldi de Alvarenga JF, et al. Domestic sauteing with EVOO: change in the phenolic profile. Antioxidants. 2020;9(1):77. doi:10.3390/antiox9010077

Romero C, Medina E, Mateo MA, Brenes M. New by-products rich in bioactive substances from the olive oil mill processing. Sustainable Food Technology. 2024;2:386-405. doi:10.1039/D3FB00220A

European Commission. Commission Regulation (EU) No 432/2012 establishing a list of permitted health claims made on foods. Official Journal of the European Union. L 136/1.

This dossier summarises peer-reviewed research on olive oil polyphenols and their constituent compounds for the information of qualified sports medicine and nutrition professionals. It is not a claim that the product diagnoses, treats, prevents or cures any disease.