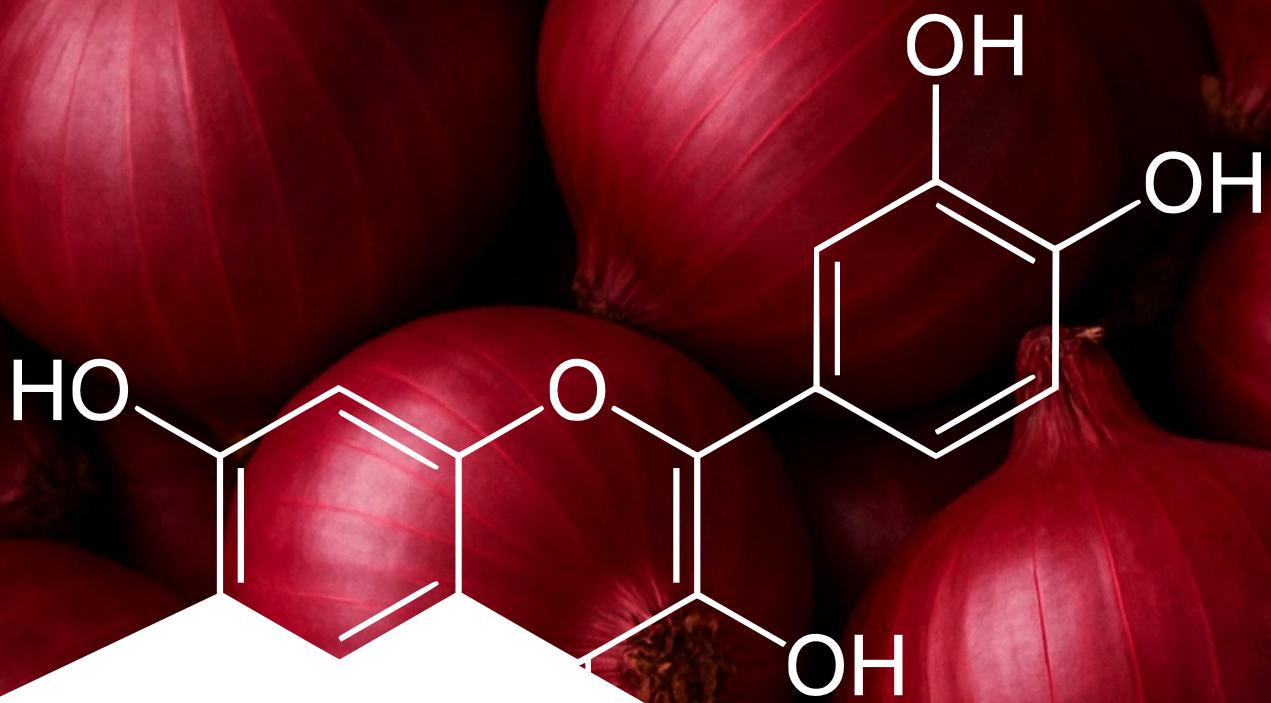


# Next-Gen Chelated Quercetin\*



# How does quercetin work?

Quercetin is a plant-based flavonoid that quenches reactive oxygen species and calms NF- $\kappa$ B-driven inflammation, shielding cells from oxidative and metabolic stress. Our chelated delivery system improves solubility and absorption, so more quercetin reaches circulation to reinforce immune balance and vascular function.



Immune & Respiratory Health



Anti-Allergy Activity



Cardiovascular Health



Skin & Anti-Aging



Metabolic & Blood Glucose Support

## What is Chelaes Quercetin?

CHELAES is an innovative antioxidant complex that fortifies quercetin by chelating it with zinc. Our proprietary technology boosts quercetin's water solubility and cellular uptake, delivering bioavailability up to 4–5 times higher than standard quercetin.\*

By pairing quercetin's ROS-scavenging power with zinc's immune support, CHELAES provides dual-action benefits:

- Robust defense against oxidative stress
- Balanced inflammation and resilient immunity
- Greater energy and metabolic vitality

Superior absorption translates to bigger results with fewer capsules, making CHELAES ideal for daily protection, demanding lifestyles, and healthy ageing goals.

\*Based on *in-vitro* intracellular uptake studies comparing chelated versus free quercetin.

**Chelated Quercetin.  
Superior Absorption.  
Proven Results.**

### PURE

≥95% chelated quercetin (HPLC)

### SAFE

Free of pesticides, heavy metals, PAHs & onion allergens

### RELIABLE

Tight batch-to-batch specs

### ALL-ROUNDED

Pale-yellow, neutral taste, excellent flowability

### MEASURABLE

+50t annual capacity in EU cGMP plant

### DOSAGE

Intracellular uptake & anti-ox capacity ≈ 3-5 fold increase (*in-vitro*) \*

500 mg / 3-5 ≈ 100-165 mg OptiChela Q-Zn

\*Nakamura M et al. *Int J Mol Sci.* 2023; 24:17457 DOI: 10.3390/ijms242417457

## How can Chelaes Quercetin be used?



Capsules



Tablets



Chewing Gum

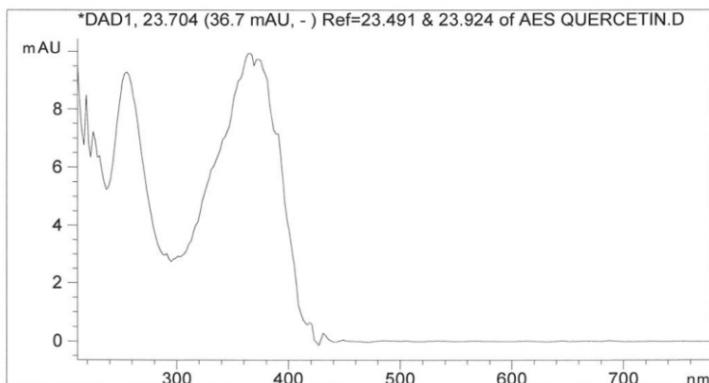
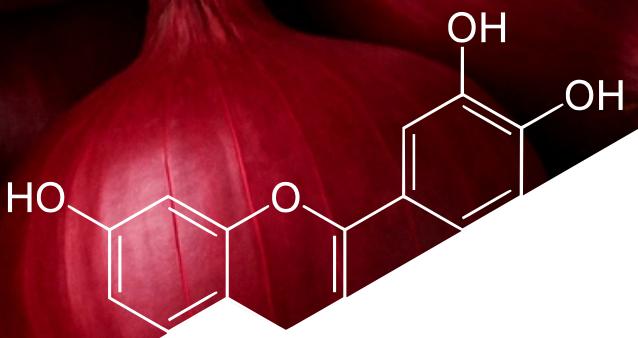


Liquid Shots

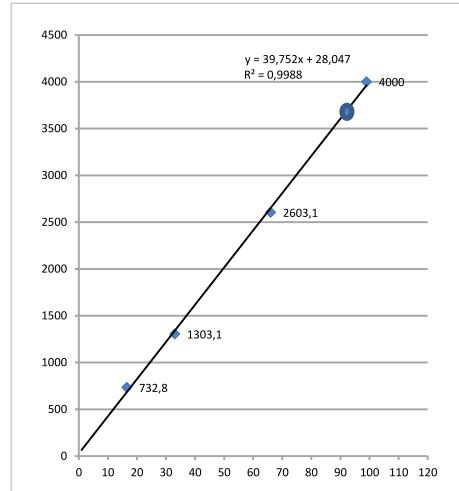


Softgels  
Sachets  
Effervescent Tablets  
Functional Beverages

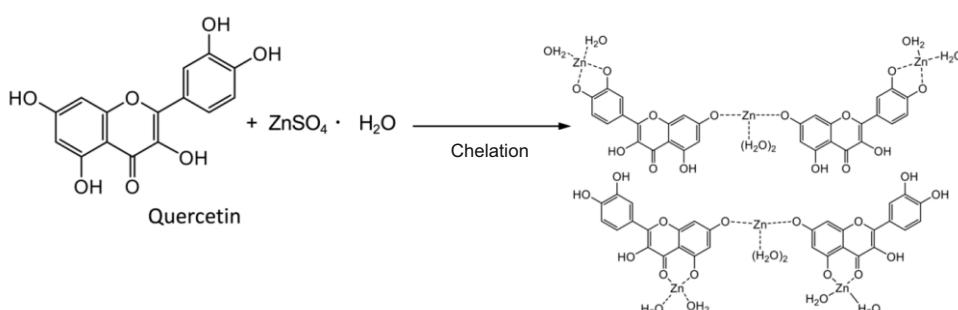
# What Makes Chelaes Quercetin Stand Out?



Chelaes Quercetin Zinc Chelation - HPLC Test Result



Chelaes Quercetin-Zinc Chelate HPLC Calibration Curve ( $R^2 = 0.9988$ )



Chelaes Quercetin Zinc Chelation - Formation Reaction

## Zn-Quercetin Complex

Complex Purity: 98 %

Composition (w/w):

• Elemental Zn	6,62 %
• Elemental Ca	1,42 %
• Quercetin (free + bound)	91,96%

## How to source effective and pure quercetin



Innovative Technology



Reliable: Consistent quality & purity  $\geq 95\%$  chelated quercetin



Sustainable: Clean and nature-based process appreciated by customers



Customer Focus: Formulation, stability and regulatory support from AES technical team



Certified: Halal & Kosher



Ensuring food safety through cGMP adherence

# How Does Quercetin Work?

## Complementary functions on cellular and systemic level

### 1 Antioxidant capacity

What are ROS?

Reactive Oxygen Species comprise highly reactive molecules such as superoxide ( $O_2^{\cdot-}$ ), hydrogen peroxide ( $H_2O_2$ ) and hydroxyl radicals ( $\cdot OH$ ). They arise naturally from mitochondrial respiration, UV light, pollution or chronic inflammation. When their production exceeds the cell's own defences, "oxidative stress" damages lipids, proteins and DNA.

**How quercetin helps**

Direct scavenging: Multiple hydroxyl groups donate electrons to neutralise ROS before they attack cellular targets.<sup>6,7</sup>

Up-regulating defence enzymes: Quercitrin increases the gene expression or activity of: SOD (Superoxide Dismutase) – converts  $O_2^{\cdot-}$  to  $H_2O_2$ .

Catalase – breaks  $H_2O_2$  down to water and oxygen. HO-1 (Heme-oxygenase-1) – generates bilirubin and ferritin, both secondary antioxidants.<sup>8,9</sup>

**Net effect:** Lower oxidative stress, protection of mitochondrial DNA and cell membranes, and a reduced risk of inflammation-driven ageing and disease.

### 2 Activating AMPK

AMP-activated protein kinase is the cell's energy sensor. When ATP levels dip (or AMP rises), AMPK switches on catabolic pathways to make more ATP and switches off energy-wasting processes.

Quercitrin's actions

Provokes a mild, transient ATP drop or stimulates upstream kinases (LKB1 / CaMKK $\beta$ ), leading to AMPK phosphorylation.

Drives PGC-1 $\alpha$  signalling – more mitochondria (better endurance and energy output).

Promotes GLUT-4 translocation in muscle and liver – faster glucose uptake and improved insulin sensitivity.<sup>10</sup>

**Clinical relevance:** Supports healthy weight management, metabolic-syndrome protection and exercise performance.

### 3 Mast-cell Stabilisation

Mast cells are "first-responder" immune cells that release histamine and pro-inflammatory cytokines (IL-6, TNF- $\alpha$ ) during allergic reactions.

Mechanisms:

Blocks calcium influx or phospholipase-C signalling, preventing granule release.

Reduces histamine and cytokine release—often as effectively as classical cromolyn-type stabilisers.<sup>11,12</sup>

**Benefits:** Eases symptoms of allergic rhinitis, urticaria and may improve respiratory comfort in asthma-prone individuals.

### 4 Nrf2 Pathway Activation

Nrf2 is the master transcription factor for antioxidant and detox genes. Normally, it is tethered in the cytoplasm by Keap1.

Quercitrin's role

Its oxidised metabolites modify critical cysteines on Keap1. Nrf2 is freed, migrates to the nucleus and binds Antioxidant Response Elements (ARE). Up-regulates HO-1, NQO1, GCL, Ferritin and other cytoprotective genes.<sup>13,14,15</sup>

**Outcome:** Stronger cellular defence against xenobiotics, heavy metals, UV radiation and chronic oxidative stress—contributing to lower inflammation and neuro-degeneration risk.

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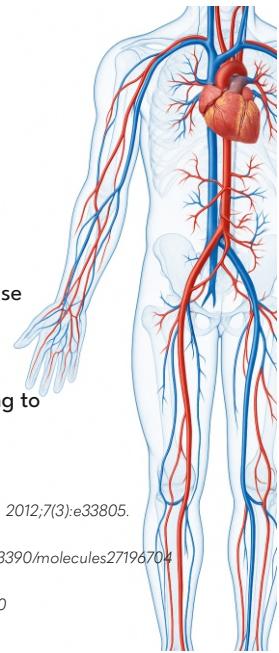
11 Weng Z, Zhang B, Asadi S, Sismanopoulos N, Butcher A, Fu X, et al. *PLoS One*. 2012;7(3):e33805. DOI 10.1371/journal.pone.0033805

12 Alam SB, Wagner A, Willows S, Kulka M. *Molecules*. 2022;27(19):6704. DOI 10.3390/molecules27196704

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15 Bayazid AB & Lim BO. *Nutrients*. 2022;14(23):5132. DOI 10.3390/nu14235132



# What Makes Chelaes Quercetin Stand Out?

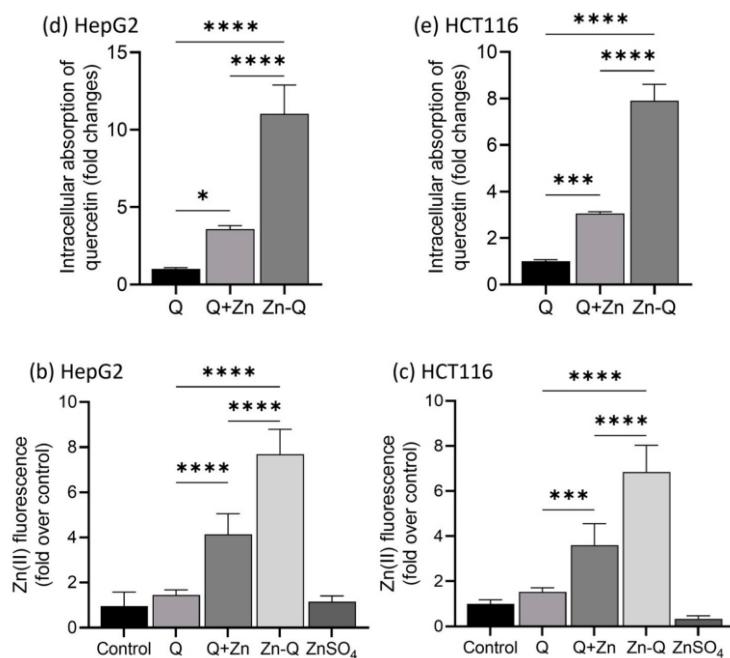
Why is oral bioavailability increased when flavonoids are chelated with minerals?

Mechanism	How does it work?	Flavonoid sample	Result
Water Solubility	The flat, lipophilic flavonoid ring becomes ionic/hydrophilic when coordinated to metal; more easily soluble in the intestinal lumen.	Quercetin-Zn(II) complex	It dissolves better in water and is easily absorbed in the intestines. <sup>16</sup>
Carrier Shortcut	Mineral transporters recognize divalent cations; the complex participates in active transport thanks to the “mineral tag”.	Zn-quercetin	Mineral carriers attract the complex into the cell, increasing absorption. <sup>17</sup>
Nano-colloidal structure & ionophore effect	Most metal-flavonoids self-assemble into nanoscale aggregates or act as “ionophores” and pass through the membrane together with the metal.	Zn-quercetin nano-complex	Its nanostructure facilitates entry into the cell. <sup>17</sup>

16 Xu D, Hu M.-J., Wang Y-Q., & Cui Y-L. *Molecules*. 2019;24(6):1123. DOI 10.3390/molecules24061123

17 Nakamura M et al. *Int J Mol Sci.* 2023;24(24):17457. DOI 10.3390/ijms242417457

## Scientific Data



### Intracellular quercetin increase: (Zn-Q > Q)

**HepG2 (liver cell model) 11x,**

**HCT116 (bowels cell model) 8x**

Amount of intracellular quercetin (HepG2 and HCT116)

by HPLC Zn-Q induced 11x more quercetin

accumulation in HepG2 and 7.9x more in HCT116

compared to free quercetin; Q + Zn remained intermediate\*

### Free Zn<sup>2+</sup> increase: (Zn-Q > Q)

**HepG2 5.3x, HCT116 4.5x**

Intracellular free Zn<sup>2+</sup> intensity by ZnAF-2 DA fluorescent probe

(HepG2 and HCT116) Zn-Q treatment resulted in 5.28 × more

zinc transport in HepG2 and 4.48 × more in HCT116 than free

quercetin; it also produced significantly higher values than Q + Zn\*



## About AES Biotechnology

Headquartered in Turkey, we are a biotechnology company specializing in sustainable chelation technologies under our Chelora brand. By upcycling botanical side-streams, we manufacture high-value quercetin, resveratrol and a wide spectrum of flavonoids in their superior chelated forms. Produced in a certified facility, our Chelora portfolio delivers enhanced bioavailability, stability and efficacy—meeting the rigorous demands of modern nutraceutical and pharmaceutical applications.

## Need More Information?

AES Biotechnology technical team helps with formulation, stability and regulatory dossiers, while our marketing specialists assist with positioning quercetin for your target markets. Sample requests are welcome—let's innovate together!

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