ekonoke

Hops Beyond Beer

Scientifically Demonstrated Benefits for Pharma, Nutraceuticals, Cosmetics, Veterinary, Functional Beverages, and Food

Reference document with peer-reviewed sources indexed in PubMed, PMC, and international scientific journals

Note: This document exclusively compiles benefits supported by published scientific studies. Every claim includes its source with a direct link. Areas where evidence is insufficient or non-existent have been omitted.

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Why Hops Matter Beyond Beer?

Hops (*Humulus lupulus L.*) is the plant that gives beer its bitterness and flavour. But its flowers contain molecules with remarkable properties for human and animal health. The most studied are:

- **Xanthohumol (XN)**: The most abundant antioxidant in hops. More potent than vitamins C and E.
- **8-Prenylnaringenin (8-PN):** The most potent natural phytoestrogen known to date. Key for women's health.
- **Bitter acids (humulone, lupulone)**: With antimicrobial and sedative properties.
- **Polyphenols and essential oils**: With anti-inflammatory and antioxidant effects.

Executive Summary

Industry	Main compound	Strongest benefit	Level of evidence
Pharmaceutical	Xanthohumol	Hepatoprotection, neuroprotection, antimicrobial	Preclinical + some clinical
Nutraceutical	8-PN / Xanthohumol	Menopause, bone health, antioxidant	Published clinical trials
Cosmetic	Polyphenols / Xanthohumol	Anti-aging, antibacterial, collagen	In vitro + regulatory safety
Veterinary	Xanthohumol / Lupulone	Poultry, porcine antiviral, antimicrobial	Preclinical + *in vitro*
Functional beverages	Bitter acids / XN	Sleep, anxiety, stress	Clinical trials + Commission E approval
Functional food	Xanthohumol / bitter acids	Preservative, glycemic control, appetite	*In vitro* + preclinical

Document compiled with sources indexed in PubMed, PMC, Scopus, and peer-reviewed scientific journals.
All links verified as of February 2026.

1. Pharmaceutical Industry

Brain and Nervous System Protection

Xanthohumol has demonstrated the ability to protect neurons from oxidative damage by scavenging free radicals and activating the body's own antioxidant defenses. Its effects are particularly relevant for diseases such as Alzheimer's, Parkinson's and ALS (Amyotrophic Lateral Sclerosis).

In a study with rats that had brain damage caused by infarction, treatment with xanthohumol (0.2 and 0.4 mg/kg) dose-dependently reduced the area of cerebral infarction and improved movement and behavioral deficits, inhibiting key inflammatory molecules such as TNF-α and iNOS.

- Kuo Y.F. et al. *Journal of Agricultural and Food Chemistry*, 2012. [PubMed: 22300539]

Its neuroprotective and anti-atherosclerotic properties open the door to its use in the prevention of neurodegenerative diseases.

- Liu M., Hansen P.E. et al. *Molecules*, 2015. [PubMed: 25574819] | [Full text PMC]
- Kasica N. et al. *Toxicology and Applied Pharmacology*, 2024. [DOI: 10.1016/j.taap.2024.116809]

Cancer Prevention

Numerous studies have documented the anticancer activity of xanthohumol across multiple types of tumor cells, acting on key cell signaling molecules.

- Girisa S. et al. *IUBMB Life*, 2021. [DOI: 10.1002/iub.2522]
- Full review of XN molecular targets in cancer. [PubMed: 33923053]

In the specific case of chronic lymphocytic leukemia, xanthohumol acts as a potent anti-leukemic agent capable of overcoming the drug resistance that some cancer cells develop to conventional treatments.

- Benelli R. et al. *Biochemical Pharmacology*, 2012. [DOI: 10.1016/j.bcp.2012.03.006]

Liver Protection

Xanthohumol inhibits several key steps in the development of chronic liver diseases: it halts liver inflammation, slows fibrosis (the progressive hardening of liver tissue) and blocks the development of hepatocellular carcinoma (the most common type of liver cancer). It also protects the liver from fat oxidation damage, making it especially promising in non-alcoholic fatty liver disease (NASH), a growing condition linked to obesity.

- Liu M., Hansen P.E. et al. *Molecules*, 2015. [PubMed: 25574819] | [Full text PMC]

In liver transplant studies, xanthohumol suppressed the inflammation produced by oxygen deprivation followed by tissue re-oxygenation (ischemia-reperfusion injury), a frequent problem in hepatic surgery.

- Dorn C. et al. *Experimental and Molecular Pathology*, 2013. [PubMed: 22634733]
- Dorn C. et al. (hepatic fibrosis). *Journal of Hepatology*, 2015. [PubMed: 25999863]
- Dorn C. et al. (acute liver injury).I*nternational Journal of Clinical and Experimental Pathology* , 2012 [PubMed: 22295144]

Cardiovascular Health

Xanthohumol inhibits blood clot formation by blocking several cell signaling cascades and reducing the production of thromboxane A2, a molecule that activates platelets. This mechanism represents high therapeutic potential for the prevention of cardiovascular disease.

- Luzak B. et al. *Archives of Physiology and Biochemistry*, 2017. [PubMed: 27855519]

Metabolic Syndrome (Obesity, Diabetes, Cholesterol)

Animal studies show that xanthohumol improves body weight, lipid profile (cholesterol and triglycerides) and glucose metabolism — all key parameters of metabolic syndrome.

- Gómez-Zorita S. et al. *International Journal of Molecular Sciences*, 2024. [PubMed: 39596505]

Four hop compounds proved more potent than acarbose — a reference antidiabetic drug — in inhibiting the enzyme α-glucosidase, which controls the rate of sugar absorption in the intestine.

- Wang L. et al. *Food Chemistry,* 2022. [PubMed: 34543921]
- Liu M. et al. *Journal of Agricultural and Food Chemistry*, 2014. [PubMed: 24897556]

Natural Antibiotic Against Resistant Bacteria

In a study with anaerobic bacteria — including *Clostridium difficile*, responsible for serious hospital-acquired infections — xanthohumol showed antimicrobial activity comparable to conventional antibiotics in especially resistant strains, making it a candidate as a natural alternative to current treatments.

- Sleha R. et al. *Antibiotics*, 2021. [PubMed: 33917416] | [Full text PMC]

Against Gram-positive bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococcus* (VRE), xanthohumol was the hop fraction with the most potent antimicrobial properties. The authors conclude that hops has potential as a source of antimicrobial agents for both human and veterinary medicine.

- Bogdanova K. et al. *Research in Microbiology*, 2018. [PubMed: 29790489]

Antiviral Activity

Xanthohumol inhibits hepatitis C virus replication, with potential as a natural antiviral agent.

- Sai Lou et al, *Planta Medica,* 2014 [PubMed: 24356905]

Validated Clinical Safety

Human studies confirm that xanthohumol is safe and well tolerated at doses up to 1.35 mg/kg body weight per day for one week, with no observed side effects. In animals, much higher doses (1,000 mg/kg) showed no damage to vital organs.

- Christoph Dorn et al. Oral safety of XN in mice, *Food Chem Toxicol*, 2010 [PubMed: 20427021]
- Liu M. et al. *Molecules*, 2015. [PubMed: 25574819]
- Regulatory status (FDA/USA): [PMC: 10970401]

2. Nutraceutical Industry

Relief of Menopausal Symptoms

8-Prenylnaringenin (8-PN) from hops is the most potent natural phytoestrogen known to date. That is, of all plant-derived substances that mildly mimic the effects of estrogen, the one found in hops is the most active.

- Milligan S.R. et al. *Journal of Clinical Endocrinology & Metabolism*, 2000. [PubMed: 11134162]

A rigorous clinical trial (double-blind, randomized, placebo-controlled) with 36 menopausal women over 16 weeks demonstrated that hop extract standardized to 100 µg of 8-PN per day significantly reduced all measured symptoms: hot flashes, night sweats, irritability, insomnia and joint pain. No adverse effects were identified.

- Heyerick A. et al. *Maturitas*, 2010. [DOI: 10.1016/j.maturitas.2010.01.006]
- Possemiers S. et al. (8-PN bioavailability and estrogenic activity). [Full text PMC: 6017581]

Reference commercial brands:

- **Lifenol™ (Givaudan)** — the most clinically studied 8-PN ingredient on the market. Used in the 48-week bone density clinical trial. Global B2B reference.

Bone Health: Osteoporosis Prevention

A 48-week clinical trial (double-blind, placebo-controlled, 100 women) demonstrated that hop extract standardized in 8-PN increased total bone mineral density by **1.8%** from baseline in postmenopausal women with osteopenia. 8-PN showed better results than genistein (from soy) and resveratrol (from grape), two well-known phytoestrogens.

- Thorisdottir A.V. et al. *Nutrients*, 2023. [DOI: 10.3390/nu15122688]

The reason for its superiority is technical: 8-PN preferentially binds to the ERα receptor, which is the predominant receptor in bone tissue. In animal studies, 8-PN improved the mechanical properties of bone to the same degree as estradiol (the natural female hormone).

- Seidlova-Wuttke D. et al.,*Plant Med*, 2008 [PubMed: 18537073]

Alzheimer's Prevention: Cholinesterase Inhibition

Hop cone extracts showed high inhibitory activity against two key enzymes in Alzheimer's disease (acetylcholinesterase and butyrylcholinesterase). Blocking these enzymes is precisely the mechanism of current Alzheimer's medications (such as donepezil). This opens the door to their use in prevention supplements.

- Kobus-Cisowska J. et al. *Nutrients*, 2019. [PubMed: 31248112]

Antioxidant in Non-Communicable Diseases

A broad scientific review documents the role of hop polyphenols in the primary and secondary prevention of non-communicable diseases such as metabolic syndrome and cancer, through their potent antioxidant activity.

- Albu C.T. et al. *Antioxidants*, 2022. [Full text PMC: 8868281]
- Bioavailability and health effects review. [PubMed: 35204124]

Reference commercial brands:

- **XanoHop® Gold (BetaTec)** — xanthohumol-enriched hop extract in golden powder form, for supplements and functional foods. Global B2B reference ingredient.
- **AltruVita Xanthohumol Hop Extract+** — 70% xanthohumol, the highest concentration available in the UK. Vegan, formulated by a medical team.
- **SuperSmart Xanthohumol** — extract standardized to 10% xanthohumol for hormonal balance, relaxation, and cellular protection.
- **Melcalin HOPs (Biotekna)** — high-titration extract for menopause, anxiety, and insomnia. Approved by the German Commission E.

3. Cosmetic Industry

Safety Certified by the Leading Regulatory Body

The Cosmetic Ingredient Review (CIR) Expert Panel, the reference body in the USA for validating cosmetic ingredients, officially concluded that hop extract and hop oil are safe for cosmetic use at current market concentrations when formulated to be non-sensitizing.

- Becker L. et al. (CIR Expert Panel). *International Journal of Toxicology*, 2024. [PubMed: 38126727]

Antibacterial, Antioxidant, and Anti-inflammatory Action for Skin

Aqueous extracts of hop flowers demonstrated inhibition of *Staphylococcus aureus* and S. epidermidis growth (two bacteria responsible for acne and skin infections), significantly reduced reactive oxygen species (ROS) that age the skin, and slowed cutaneous inflammation markers.

- Rodrigues M. et al. *Phytomedicine*, 2024. [PubMed: 38354824]

Hop extracts showed antibacterial activity against acne-causing bacteria, anti-collagenase activity (protecting skin collagen), and antioxidant properties in vitro.

- Yamaguchi N. et al. *Phytomedicine*, 2009. [PubMed: 19201179]

Stimulation of Collagen, Elastin, and Hyaluronic Acid

Hop extract stimulates the production of the three most important molecules for young, firm skin: hyaluronic acid (hydration), collagen (firmness), and elastin (elasticity). Furthermore, xanthohumol acts as an antioxidant more potent than vitamins C and E. Hop extract also inhibits the enzyme elastase, responsible for degrading elastin with age, thereby delaying the appearance of wrinkles.

- Cosmacon, *Hops Extract Cosmetic Ingredient Review*. [cosmacon.de]

Hair Care Applications

In shampoos and conditioners, hop extract soothes irritated scalp, reduces dandruff, and strengthens hair. Its antioxidant and estrogen-like properties help relieve scalp inflammation and revitalize the connective tissue of the hair follicle.

- Cosmacon, *Hops Extract Cosmetic Ingredient Review*. [cosmacon.de]

Hop By-products as Cosmetic Ingredients (Circular Economy)

A specific scientific review documented the phytochemicals and biological activities of normally discarded hop parts (leaves, stems, small cones, spent hops after the brewing process) for use in skincare products. Results support antioxidant, anti-inflammatory, and antimicrobial activities valid for cosmetic formulations.

- Costa M. et al. *Cosmetics*, 2022. [DOI: 10.3390/cosmetics9060139]

Antioxidant Activity in Cone Extracts

Hop cone extracts (Czech varieties) showed good in vitro antioxidant activity and anti-adipocyte effects, dependent on the polyphenols present, which vary according to harvest time and year.

- Carbone K., Gervasi F. *Plants*, 2022. [PubMed: 36559547]

Reference brands and ingredients:

- **Cosmacon Hops Extract** — European B2B cosmetic ingredient, for anti-aging creams, soothing lotions,and hair care products.
- **Eve Hansen (USA)** — natural cosmetics brand using hop extract in its anti-aging line.

4. Veterinary Industry

Natural Antiviral Against Porcine Virus (PRRSV)

Out of 386 natural products analyzed, xanthohumol was identified as an inhibitor of PRRSV (Porcine Reproductive and Respiratory Syndrome Virus) replication, one of the most devastating viral diseases for the global swine industry. It also reduced the oxidative stress caused by the virus.

- Liu X. et al. *Veterinary Microbiology*, 2019. [PubMed: 31648725]

Natural Alternative to Antibiotics in Poultry

A study published in 2025 evaluated five hop compounds (including xanthohumol, humulone, and lupulone) as **Phytogenic Feed Additives (PFA)**, a natural alternative to antibiotic growth promoters in poultry. Xanthohumol showed the best selectivity index against bacteria (5.5 against Micrococcus luteus) and lupulone even higher (15 against Bacillus subtilis). The authors conclude they are promising candidates as natural substitutes for antibiotics in poultry farming.

- Kober M. et al. *MicrobiologyOpen,* 2025. [DOI: 10.1002/mbo3.70080]

Multi-resistant Bacteria in Veterinary and Human Medicine

The study on hop fractions against Gram-positive bacteria with methicillin and vancomycin resistance explicitly concludes that hops can find use as a source of antimicrobial agents in both **human and veterinary medicine.**

- Bogdanova K. et al. *Research in Microbiology*, 2018. [PubMed: 29790489]

5. Functional Beverages

Official Approval: Sleep, Anxiety, and Mood

The use of hops for treating sleep disorders, anxiety, and mood disturbances is approved in the **German Commission E Monographs** (the European scientific reference body in herbal medicine, equivalent to the EMA for medicinal plants). This approval is based on decades of documented evidence.

- *Drugs.com, Hops monograph, citing Commission E.* [drugs.com]

Scientific Mechanism of the Sedative Effect

Hop compounds act on the central nervous system in several ways:

1. **GABA receptors:** The bitter acids in hops increase the activity of GABA, the brain's main inhibitory neurotransmitter, producing calm and reducing anxiety. This is the same mechanism as anxiolytic medications, but naturally and without risk of dependence.Hop compounds modulate GABAA receptors. [PubMed: 32001220]
2. **Melatonin receptors:** The sleep-inducing effects of hops also appear to be mediated by activation of melatonin receptors, the natural sleep hormone. Animal experiments showed that the soporific effect of hops can be blocked with melatonin antagonists

- Melcalin HOPs, *internal scientific review*, citing *Phytomedicine*, 2006. [melcalin.com]

Clinical Evidence in Humans: Anxiety and Stress

A randomized, double-blind, placebo-controlled clinical trial in healthy young adults demonstrated that daily supplementation with dry hop extract for 4 weeks significantly reduced anxiety, depression, and stress scores compared to placebo.

- Kyrou I. et al. *Hormones*, 2017;16(2):171-180. [DOI: 10.14310/horm.2002.1735]

Clinical Evidence: Sleep Quality

A clinical trial in 17 nurses doing shift work demonstrated that consumption of non-alcoholic beer with hops improved sleep quality, reducing time to fall asleep and nocturnal activity measured by actigraphy.

- Franco L. et al. *PLoS One*, 2012. Cited in Kyrou et al., 2017. [DOI: 10.14310/horm.2002.1735]

A review of 16 studies on the combination of hops and valerian found that 12 of them showed clear improvements in both sleep quality and reduction of time to fall asleep.

- Salter S., Brownie S. *Australian Family Physician*, 2010. [naturalmentalhealth.com]

Reference commercial brands:

- **Melcalin HOPs (Biotekna)** — high-titration extract for insomnia, anxiety, and agitation.
- **Oregon's Wild Harvest Valerian-Hops** — certified organic liquid extract of valerian + hops for sleep.
- **Herbalist & Alchemist Hops Extract** — certified organic and kosher extract for restorative sleep.
- **Nature's Answer Hops** — liquid extract with 2,000 mg dried herb equivalent per dose.
- **EndurElite SleepElite** — hop extract as key ingredient for sleep improvement in athletes.

6. Functional Foods and Snacks

Natural Food Preservative

Hops has high potential as a natural preservative in fresh foods, especially meat products, thanks to its antioxidant action. This allows extending the shelf life of foods without resorting to synthetic chemical preservatives.

- Liu M., Hansen P.E. et al. *Molecules*, 2015. [PubMed: 25574819] | [Full text PMC]
- Sun Y. et al. *Food and Energy Security*, 2022. [DOI: 10.1002/fes3.367]

Appetite and Weight Control

The bitter acids in hops act as a natural activator of GLP-1, the same metabolic pathway used by next-generation obesity medications such as semaglutide. In clinical studies, it reduced cravings by up to 40% and hunger by 30%, opening the door to snacks or functional foods for weight control.

- Review of hop applications in food. Rodrigues Arruda, T, et al. *Food Bioprocess Technol* 15, 275–305 (2022) [DOI: 10.1007/s11947-021-02716-w]

Blood Sugar Control After Meals

Four hop compounds outperformed acarbose — a prescription drug for type 2 diabetes — in inhibiting the enzyme α-glucosidase, which controls the rate at which sugar is absorbed after a meal. This opens the door to the design of snacks or functional foods that help control the glycemic index.

- Wang L. et al. *Food Chemistry*, 2022. [PubMed: 34543921]
- Nicácio K. et al. (inhibition of xanthine oxidase, α-glucosidase and acetylcholinesterase). [DOI: 10.1186/s43094-023-00564-3]

Nutritional Profile of Hop Cones

Hop cones contain resins, essential oils, proteins (~14.5%), fiber (~14.4%), polyphenols (phenolic acids, flavonols), lipids, chlorophylls, and waxes. They are low in calories and rich in micronutrients. Their extracts include all the bioactive compounds documented in this report.

- Kobus-Cisowska J. et al. *Nutrients*, 2019. [PubMed: 31248112]

Reference B2B ingredient:

- **XanoHop® Gold (BetaTec)** — xanthohumol powder for functional foods, supplements, and beverages.

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