Wild oregano oil
Nutritional therapy

SYNONYMS
Wild marjoram, Origanum, Oregano

EFFECT
Introduction
Wild oregano (Origanum vulgare) belongs to the Lamiaceae family (also known as Labiatae), which also includes rosemary, thyme and mint. Origanum is the classical Greek name derived from the words ‘oros’ (Mountain) and ‘ganos’ (Joy), which refer to the plant’s beautiful appearance in the mountains or from ‘origanon’, which means bitter herb.

Wild oregano (Origanum vulgare), also confusingly named ‘wild marjoram’, is a herb that is rich in the phenol carvacrol (also known as cymophenol), which is characterised by a spicy and bitter taste with a light sensation of heat. This is in contrast to Origanum majorana or sweet marjoram, which is often used in the kitchen but is less rich in therapeutic substances. To distinguish sweet or real marjoram, this article uses the commonly used term ‘wild oregano’ for the bitter tasting (and carvacrol-rich) Origanum vulgare.

The most potent wild oregano varieties grow in mountainous East Mediterranean areas in chalk-rich soils. Carvacrol is the most researched substance and synthetic carvacrol has been used for over fifty years in cleaning agents such as Lysol and Listerine to disinfect work surfaces. Modern interest in the original plant substances has been revived again because the resistance of bacteria and fungi against modern remedies such as antibiotics is forcing us to look for new solutions. Many vegetable-based substances turn out to have broad-spectrum therapeutic effects to a lesser or greater extent against bacteria, yeasts, fungi and parasites as well as against viruses. Wild oregano oil seems to be an all-round remedy in this respect. Veterinary research carried out for dairy and poultry farmers points to possibilities for reducing the use of antibiotics by putting wild oregano oil into fodder and forage. The human foods industry is more interested in using wild oregano oil as a natural preservative. Oregano was already used in ancient Egypt to conserve food and to clean wounds. In ancient Greece it was used against headaches, ulcers, lung disease, asthma and spasms. In modern Greece, oregano is used in teas as a folk remedy against colds, sore throats, influenza, stomach ulcers and other stomach and intestinal complaints.

The carvacrol-rich essential oil in wild oregano turns out to have excellent properties as regards versatility and efficiency. The effects depend on the dose; until now every microbe exposed to essential wild oregano oil has been killed or its growth has been slowed.

Wild oregano oil exhibits a broad anti-microbial effect when used against food pathogens and contains potent anti-oxidants which have been shown during research to have therapeutic value for both the cardio-vascular and nervous systems. Wild oregano acts like a brake on infection and regulates glucose and cholesterol metabolism. In spite of the increasing number of in vivo studies, there has still not been a proper placebo-controlled clinical trial in humans. The rich history and positive anecdotal evidence are also representative for the potential clinical value of wild oregano oil.

Properties:

Constituents
The essential oil in wild oregano varieties principally consists of carvacrol followed by its precursors p-cymene and gamma-terpinene. These are also precursors for thymol, which is an isomer of carvacrol, but which represents only a small percentage of the wild oregano oil that originates in the East Mediterranean mountains in comparison with carvacrol. Variations in concentration occur naturally. Semi-finished products made from the essential oil can be standardised for further processing.

Active effects:

Reduction of stress in cells
In vitro research shows that, up to now, carvacrol is the most potent modulator of TRP channels in mammal cells. Other substances such as cinnamaldehyde (cinnamon), eugenol (incl. clove), thymol (incl. thyme) and menthol (incl. mint) exhibited a similar but weaker effect. Transient Receptor Potential (TRP) channels are cell parts that have been preserved during evolution. They constitute the biological sensors which perceive ambient changes as a response to stimuli such as heat or cold, mechanical forces and natural chemical substances. TRP channels are ion channels which are permeable to cations; they are Ca 2+ permeable and are of great importance in the sensory transduction of visual light and sound stimuli, pheromone effects, taste and temperature sensations, pain perception, perception of corrosive excitatory substances, renal Ca2+/Mg2+ regulation, smooth muscle tone, blood pressure regulation and maintaining cell redox potential. Modulation of these channels by on the one hand retarding and on the other activating different types of TRP channels, which carvacrol is able to do, results in reduced cell stress, which in vitro leads to a higher survival rate of hippocampal neurones under anoxic
conditions (ischaemia). More specifically, carvacrol inhibits the TRPM-7 channel (TRPMelastatin7) which shows increased activity during ischaemia (hypoxia). Synthetic anti-excitatory remedies and NMDA receptor antagonists have proven to be of little clinical value until now in preventing ischaemic damage to the brain. Researchers suggest that carvacrol is a potential candidate for limiting brain damage as a result of ischaemia.

Carvacrol and thymol exhibit a blood vessel relaxant effect on the aorta tissue in rats. This effect is not dependent on the endothelial cells and possibly occurs via the modulation of Ca2+ release by the sarcoplasmatic reticulum on the one hand and/or by controlling the susceptibility to Ca2+ of the contractile system of the blood vessel on the other. It is plausible that carvacrol in low concentrations inhibits the influx of Ca2+ and thus relaxes the smooth muscle tissue of the blood vessel.

**Infection inhibiting and anti-oxidative properties**

Oral administration of water-ethanol extract of wild oregano in mice significantly prevents the occurrence of gastritis within the cold-restraint stress model. Higher doses of 100 mg/kg and 200 mg/kg of bodyweight hardly resulted in any additional therapeutic benefit compared with the lowest used dosage of 30 mg/kg.

There was a clear correlation between the gastritis caused by stress and the degree of oxidative stress in laboratory animals. The anti-oxidative properties of wild oregano oil contribute to its preventive characteristics to a significant degree.

The anti-oxidative substances in wild oregano oil such as rosemary acid, coffee acid and various flavonoids therefore function directly as anti-oxidants as well as ion donors to tissue-protecting peroxidases (POD) in saliva (sPOD) and the mucous membrane (mPOD) in the alimentary canal.

Percutaneous administration of oregano oil also prevented contact hyper-susceptibility to the test substance oxazolone, often used for this purpose. The infection inhibiting properties are nevertheless less effective than those of hydrocortisone.

Cyclooxygenase-2 (COX-2) is the dominant enzyme in determining the biosynthesis of prostaglandins. It plays a key role in infections and in circulatory homeostasis including glucose and fat metabolism. COX-2 expression is controlled by ligand-dependent transcription factors such as PPARs (Peroxisomal Proliferator-Activated Receptors) which belong to a group of nuclear cell receptors. PPARs control the COX-2 expression and vice versa. Carvacrol turns out to be a powerful suppressor of the COX-2 expression and an activator of PPAR-alpha and -gamma. These characteristics of carvacrol are representative of its infection inhibiting and lifestyle compensatory effects and may potentially reduce the metabolism-disrupting effects caused by stress on humans.

In rats, carvacrol strongly reduces the toxic effect of D-galactosamine on the liver. As a result of D-galactosamine, the asat (aspartate-amino-transferase), alat (alanine aminotransferase) and ggt (gamma glutamyltranspeptidase) levels in VLDL and LSL cholesterol and liver enzymes increase. The HDL cholesterol is lowered at the same time while the total cholesterol, triglycerides and free fatty acids increase. However, if D-galactosamine is combined with carvacrol for a period of 21 days, all these parameters improve towards normal levels.

It is interesting to note that in order to generate lethal hepatitis for research purposes, D-galactosamine is combined with LPS (lipopolysaccharide of a pathogenic type), which is a constituent of the cell wall of pathogenic intestinal bacterial. D-galactosamine increases the susceptibility of the liver to LPS, which releases large quantities of TNF-alpha causing lethal hepatitis.

Anticipating the following description of the properties of carvacrol-rich oregano oil, this oil could, in the case of a highly permeable intestine, also potentially decrease the susceptibility of the liver and the portal vein system as regards LPS, which would modulate the inflammatory response as a result. As can be further deduced from the properties of oregano oil, this throws a hypothetical light on the therapeutic approach to many western health issues such as metabolic syndrome, heart and vascular disease and type 2 diabetes.

**Metabolism of glucose and fat**

Oregano oil and its constituent substances, such as gamma-terpinene and carvacrol, have demonstrated in various in vitro studies that they have the ability to inhibit the aggregation and adhesion of blood platelets and cholesterol synthesis, whereas a decline was observed in vivo in total cholesterol, triglycerides and both the systolic and diastolic readings in hypertension.

**DNA protection**

Carvacrol was added to the drinking water of rats for a period of 7 or 14 days during a research study, which resulted in reduced DNA damage in both groups compared to the control group which drank untreated tap water. The lowest dosage was 15 mg of carvacrol per kilogram per day. The isolated liver and testis cells of animals that were given carvacrol, turned out to be less susceptible to DNA damage when they were exposed to hydroperoxide. The researchers assume that carvacrol causes the anti-oxidative capacity of the liver and testes cells to increase.

**Antibacterial and antymycotic properties**

Research into preventing food decay and growth of pathogens in particular has shown that carvacrol is effective in killing or decimating bacteria, yeasts, fungi, insects and mites. In one pilot in vitro study, carvacrol also killed the corona virus, which is often involved in colds and influenza.

The bactericidal effect of carvacrol is based on enhanced proton and ion permeability in the cell membrane, which makes the cell lose its integrity so the essential cell elements such as nucleid acid and ATP leech away. It has in addition been shown that in the case of Escherichia coli, carvacrol inhibits the ATPase enzyme and induces the heat shock proteins Hsp60 and Hsp70. This results in a decrease in motility which inhibits the development of flagella.

The anti-microbial effect has been demonstrated in vitro against dozens of micro-organisms and has again recently been confirmed through in vitro research for four Gram positive bacteria.


Both in vitro and in vivo research shows that wild oregano oil has a curative effect on mice that have been injected with Staphylococcus aureus. Untreated mice died within a week, but when oregano oil was administered, one-third of the animals survived. Treatment with
monolaurin from coconut fat resulted in 50% survival, which is at a level equal to that of animals treated with the antibiotic Vancomycin. The combination of wild oregano oil with monolaurin that is created in the body from lauric acid (coconut oil) exhibits a superior effect with a survival rate of over 60%. In humans, wild oregano oil and/or monolaurin could act both preventively and curatively against Staphylococcus aureus infections, because resistant MRSA bacteria are also susceptible to wild oregano oil. In vitro research shows that a natural mix of phenols from oregano has an anti-bacterial effect on Helicobacter pylori, which is held to be responsible for many types of stomach complaints and infections.

In vitro, the fungistatic and fungicidal effect of wild oregano oil is comparable to that of synthetic carvacrol, olive oil, amphotericin B and nystatin. The latter two were effective in lower concentrations. However, the minimum concentration required to kill Candida albicans in vitro was twice as high for pure carvacrol as it was for wild oregano oil. In vivo, the oral administration of wild oregano oil is as effective as synthetic carvacrol in fighting systemic candidiasis in mice. Mice infected with five times the lethal dose of candida albicans died within 10 days if they were not treated with carvacrol or wild oregano oil. A daily dose of wild oregano oil of 17.33 mg/kg of bodyweight resulted in 100% survival after 30 days. Cosmetically, the mice which were treated with the natural wild oregano oil looked the best. In vitro research shows that even low concentrations of wild oregano oil will inhibit growth of pseudohyphae or germ tubes. By way of explanation, the growth of germ tubes is generally considered to be the phenotypic plasticity whereby Candida start to exhibit invasive characteristics.

**Inhibition of elastase**

It appears that wild oregano oil, and carvacrol in particular, inhibit the activity of HLE (Human Neutrophil Elastase) when used in low doses, which is why wild oregano oil could potentially be a phytotherapeutic in diseases such as COPD and emphysema.

**Inhibiting acetylcholinesterase**

In vitro, carvacrol exhibits a cholinesterase inhibiting effect that is ten times stronger than that of its thymol isomer. The cholinesterase inhibiting property may be useful in combating cognitive deterioration as found, for example, in dementia.

**Anxiolytic and antidepressant properties**

Tests and research into the behaviour of mice show an anxiolytic effect as regards one-off administration of carvacrol. The effects of both carvacrol (12.5; 25 and 50 mg/kg) and diazepam (1 and 2 mg/kg) were cancelled out by flumazenil (benzodiazepine antagonist). Carvacrol administered in the same dosage resulted in an antidepressant effect when mice were exposed to stressful tests. The effect was attributed to an interaction with the dopaminergic system but not to the serotonergic or the noradrenergic systems.

**Intestinal cleansing effect**

Piglets which are given feed mixed with carvacrol or thymol after weaning, exhibit a higher villus to crypt ratio in the entire small intestine than the control group which was not given the supplement. This was demonstrated by the use of several experimental feeds. The experimental fodder contained 500 and 2000 mg carvacrol or thymol per kilogram of feed. In this research programme, carvacrol and thymol improved the health of the intestine, which was confirmed by a histological investigation. However, in no part of the intestines was the number of bacteria reduced by carvacrol or thymol. As a result of the ingestion of food with 2000 mg carvacrol per kilogram of feed, the carvacrol concentration in the stomach and the top of the small intestine was respectively 521 and 5 mg per kilogram of chyme. The reabsorption of carvacrol therefore appears to be more than 90%.

**Anti-parasitic**

An emulsion of wild oregano oil at 600 mg per day for 6 weeks given to patients with intestinal parasites (Blastocystis hominis, Entamoeba hartmanni and Endolimax nana) resulted in complete elimination of Entamoeba hartmanni (4 patients), Endolimax nana (1 patient) and Blastocystis hominis (8 patients). The Blastocystis hominis score diminished in 3 other patients. In 7 of these 11 patients with Blastocystis hominis the stomach and intestinal symptoms improved.

In vitro research further shows that carvacrol-rich wild oregano oil can be clinically useful in the treatment of Giardia lamblia. The concentration of carvacrol-rich wild oregano oil of two different kinds ranged from 71 to 85 microgram/ml and blocked the adhesive characteristics of the parasite, whereby during the following period half of the number of parasites were also killed. A single in vitro study which compared wild oregano oil with Tinidazole, an existing anti-giardia remedy, even showed that wild oregano oil was more effective.

**INDICATIONS**

On contemplating wild oregano oil and the effects and mechanisms observed so far, it would be possible to represent the therapeutic bandwidth of wild oregano oil among other things by the inhibiting effect on provocations by bacterial LPS from the human intestine via the portal vein system in the liver. Such provocations via the human intestine form part of an explanatory model of the persistence of a low-grade infection syndrome as a causal mechanism for many pathologies such as metabolic syndrome, heart and vascular disease, type 2 diabetes and various ageing related (neuro-)degenerative diseases. If we also take the observations on board which indicate an improvement in health of the small intestine and the villi, as well as the property of decimating opportunists such as Candida and other intestinal pathogens, one cannot deny that wild oregano oil has great clinical potential. Moreover, its specific infection inhibiting and PPAR-gamma activating features contribute to the reduction of insulin resistance and the normalisation of glucose and fat metabolism. Additional in vivo studies and clinical research into the use of wild oregano oil in humans will be needed in order to determine its further medical significance.

**Candidiasis and parasitic infections**

Wild oregano oil has so far been prescribed by many therapists for treatment of gastrointestinal candidiasis (GIC). This kind of application is based on clinical experience. For example, in cases of patients with chronic fatigue syndrome, an oral caprylic acid preparation was prescribed as an initial treatment for GIC. Administration was then changed to oral administration of a vegetable oil such
as wild oregano oil, to fight excess Candida growth in skin folds, nails, ears and sinuses. In vitro research shows that caprylic acid in high doses works quickest against Candida, but that lauric acid in low doses is superior. The minimal growth-inhibiting concentration against Candida is however the lowest for oregano oil, while a convincing systemic anti-Candida effect has only been demonstrated in vivo in mice for wild oregano oil.

Besides this, wild oregano oil could be of use in the treatment of a number of intestinal parasites such as Blastocystis hominis, Entamoeba hartmanni and Endolimax nana. In vitro research also shows that wild oregano oil has anti-parasitic properties against Giardia lamblia. The research into the anti-parasitic effect of wild oregano oil is rather meagre so far. In short, in line with traditional uses, wild oregano oil appears to show its value in interventions for cleansing the alimentary and immune systems. Furthermore, wild oregano oil is traditionally used against mental exhaustion and has a calming and strengthening effect.

### SIDE EFFECTS

Oregano and wild oregano oil are considered a safe food additive in America and Europe. Moreover, no undesirable side effects from wild oregano oil are known. Wild oregano oil with carvacrol as the major constituent proves to be non-toxic in acute and chronic pre-clinical toxicity models. Carvacrol (5-isopropyl-2-methylphenol) is not hepatotoxic to rats. Research into separate oil fractions of oregano showed that carvacrol, in contrast to thymol, is not an irritant to the skin. There are a few known cases of a systemic allergic reaction as the result of ingestion of oregano. The pure essential oil of wild oregano can also cause irritation of the mucous membranes. That is why a concentration of 1% is recommended for direct application to the mucous membranes. Given that the internal as well as the oral therapeutic application of wild oregano oil in humans has hardly been researched, it is not recommended to use the oil in pregnancy. The German E-Commission does not publish any advice on therapeutic use because it feels that the effects have been insufficiently documented.

### SYNERGISM

Lauric acid from coconut oil breaks down in the body into monolaurin, which in vitro exhibits a similar effect to that of wild oregano oil on micro-organisms and works synergistically against Staphylococcus aureus, as demonstrated in vivo. In vitro research also shows an anti-bacterial synergy as regards phenols from oregano and cranberries against Helicobacter pylori. There is in addition a potential synergy with the use of probiotics, because clinical studies and in vivo research into rats show that probiotics (Lactobacillus acidophilus) appear to be effective against fungal mucosal colonisations by Candida glabrata and Candida albicans in the digestive tract. In these cases, probiotics demonstrably help to heal ulcerations and infections. It has also been shown that Lactobacillus acidophilus reduces the duration of a fungal colonisation.

### REFERENCES

1. Pharmacognosie/Ernst Steingegger; Rudolf Hänsel; Springer 1992.


