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Solgar Full Spectrum Curcumin Complex

Overview

Curcumin is the principal curcuminoid in turmeric and is responsible for turmeric’s yellow colour. It is a lipophilic (fat-loving) phenolic substance with a characteristic yellow colour derived from the rhizome of the plant turmeric (Curcuma longa).

Curcumin is the most biologically active constituent of turmeric and has attracted a lot of attention due to the large number of scientific studies that have been carried out which suggest it may have numerous health benefits.

One of the challenges when supplementing with curcumin is the issue of bioavailability. Even with high doses of native curcumin, only very small amounts reach the circulation following oral administration due to its fast metabolic turnover in both the liver and intestinal wall. The quantity of curcumin the body absorbs and retains is the true barometer in measuring bioavailability of curcumin.

In recent years various new delivery methods have been developed to try and help improve the uptake and retention of
native curcumin. These include formulas that are emulsified or in the form of micronisates and liposomes and many of these have been the subject of clinical trials.

Curcumin is a fat soluble compound and therefore, like other fat soluble nutrients, when consumed it needs to go through the respective digestive processes. Step one involves the formation of an emulsion. In the stomach, gastric lipases hydrolyze the triglycerides resulting in free fatty acids, monoglycerides and glycerol. However it is important to note that the process of emulsifying the insoluble fat-soluble nutrient in the body is generally inefficient.

Lipolysis is terminated in the small intestine (duodenum and upper part of the jejunum) by the action of pancreatic lipase and colipase. The lipolysis products which are insoluble in water are formed into water-soluble, mixed-micelles which can be absorbed, via the microvilli, by the cells of the small intestine.

Micelles are formed when the concentration of the conjugated bile acids is higher than the critical micelle-formation concentration.

A key property of the micelle is its capability of encapsulating non-polar lipids, antioxidants and fat-soluble vitamins and other micronutrients in order to transport them in an aqueous medium such as gastrointestinal fluid. The physiological micelle facilitates the transport and release of the water-insoluble products from lipolysis and of other fat-soluble molecules via unstirred water layer, which is located on the luminal cell membrane of the small intestine, to the point of absorption. Micelles improve absorption of nutrients by better penetration of the unstirred water layer covering the brush border membrane of microvilli to deliver the nutrient. The nutrient particles must be small enough to fit between the microvilli.

Limiting factors in the efficient formation of a physiological micelle are primarily the availability of conjugated bile acids. If the duodenal concentration of conjugated bile acids is below the critical micelle-formation concentration, substantial disturbance to the micellation occurs.

Solgar Full Spectrum Curcumin contains biomimetic micelles. These preformed micelles are not subject to these physiological variations and thus can be regarded as a natural smart transport and delivery system. They transform fat-soluble
nutrients into ambiphilic ones – nutrients that are soluble in both fat and water by surrounding the fat-soluble nutrients with a water soluble shell called a micelle. The micelles are resistant against the low gastric pH enter the intestine and can easily pass the unstirred water layer without needing pancreatic enzymes or bile. The micelle breaks apart while delivering the nutrient in the unstirred water layer at the brush border membrane. The time-consuming reduction of the diameter which is required for mixed micelles is not necessary.

Bioavailability

There are several different measures of bioavailability and one good indicator is the formation of a dissolution, as a nutrient can only be absorbed if it dissolves at gastric pH.

Unlike the current majority of curcumin products on the market, Solgar Full Spectrum Curcumin provides a clear and homogenous solution at gastric pH.

One way of measuring bioavailability is by looking at Cmax (peak blood concentration), however this only represents one point in time. AUC (Area Under Curve), which measures the entire biological response over time, provides a more accurate picture of bioavailability.

Research

In 2013 a crossover study was conducted on 23 health subjects (13 women, 10 men) who were asked to avoid foods containing curry for one week prior and throughout the entire study. In random order the participants took a single oral dose of 500 mg curcuminoids (410mg curcumin, 80mg demethoxycurcumin, 10mg bisdemethoxycurcumin) following a 12 hour fast as either:

1. Native curcumin extract
2. Curcumin micronisate
3. NovaSOL® Curcumin (liquid micelles) used in Solgar’s Full Spectrum Curcumin.

Blood and urine samples were collected for 24 hours and the following 3 key measurements were monitored:

Cmax = peak blood concentration (used by researchers in some studies to describe the fold increase in bioavailability but as this only measures one point in time it is less robust.)
Tmax = the time to reach the peak concentration.

AUC (24h) = measures the biological availability taking into account the entire response over time.

Results

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC, 24h</td>
<td>185</td>
</tr>
<tr>
<td>Cmax:</td>
<td>453</td>
</tr>
<tr>
<td>Tmax:</td>
<td>6.8 (Novasol 1.1h Vs 7.5h native)</td>
</tr>
</tbody>
</table>

Bioavailability

The liquid micelles provided 185-fold enhanced bioavailability in all subjects which is currently superior to all other enhanced curcumin formulations that are available on the market at present.

Speed of Absorption

The liquid micelles were absorbed 6.8 times more quickly (1.1 hrs) in comparison to native curcumin which is absorbed in 7.5 hrs.

Applications

Anti-inflammatory Activity

A primary mechanism of curcumin relates to its actions as an anti-inflammatory agent. Rather than just influencing one anti-inflammatory pathway, it appears that curcumin has several modes of action, allowing it to deliver broad-spectrum

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protection against inflammation. Many anti-inflammatory agents inhibit either Cyclooxygenase (COX) or Lipooxygenase (LOX) enzymes, whereas curcumin blocks both, which subsequently inhibits both prostaglandin and leukotriene signaling molecules.³

Curcumin also reduces inflammation via the inhibition of inducible nitric oxide (iNOS),² a pro-inflammatory enzyme. Additionally, studies indicate that curcumin exerts anti-inflammatory properties by suppressing the transcription of pro-inflammatory cytokine genes through the NF-kappaB signalling pathway.⁴

Studies show that curcumin blocks arachidonic acid from converting to pro-inflammatory Prostaglandin E2 (PGE2) and Leukotriene B4 (LTB4).²

According to studies, these broader anti-inflammatory actions provide a better therapeutic profile with no side effects when compared to NSAIDs.²⁵

Curcumin has potent antioxidant activity which is contributory to its role as an anti-inflammatory agent.⁶ Pro-oxidants such as superoxide and hydroxyl radicals are scavenged by curcumin’s antioxidant activity and lipid peroxidation (one initiator of inflammation) is also reduced.²

There is a growing consensus among nutritional scientists that low-grade inflammation is a major contributory factor in many common ailments. As such, curcumin’s multi-faceted actions in reducing inflammation means that it has great potential for use in a wide range of health disorders.

Joint Inflammation

By simultaneously working on multiple inflammatory pathways, curcumin’s role in the management of both osteo and rheumatoid arthritis shows promise. Several studies have shown curcumin can offer relief for patients complaining of joint pain, inflammation and tenderness.⁷ In one study, the anti-inflammatory and analgesic effects of curcumin were superior to the NSAID diclofenac sodium in patients with active rheumatoid arthritis.⁸ Another study even suggests that curcumin may inhibit cartilage breakdown by the body, a benefit for osteoporosis patients.⁹

Blood markers of inflammation were noted at the end of the studies observing curcumin’s role in the management of osteo and rheumatoid arthritis. Research studies on joint inflammation have

Curcumin has several modes of action, allowing it to deliver broad-spectrum protection against inflammation.
invariably used forms of curcumin that have advanced delivery systems and therefore better bioavailability than standard (native) curcumin extracts.

Curcumin has been found to have potent anti-inflammatory properties and blocks numerous pro-inflammatory pathways including the COX, 5-Lx, TNF-a, iNOS and NFkB.

Oral administration of curcumin in instances of acute inflammation was found to be as effective as cortisone or phenylbutazone, and one-half as effective in cases of chronic inflammation.10

Gastrointestinal Health

Because of its propensity to accumulate in the tissues of the digestive tract, the therapeutic potential of curcumin has been investigated in several studies of digestive diseases.

The German Commission E, has approved turmeric for digestive problems. One double-blind, placebo-controlled study found that turmeric reduced symptoms of bloating and gas in people suffering from indigestion. This double-blind, placebo-controlled study compared the effects of 500 mg of curcumin 4 times daily against placebo (as well as against an over-the-counter treatment). After 7 days, 87% percent of the curcumin group experienced full or partial symptom relief from dyspepsia as compared to 53% of the placebo group.11

Current scientific literature documents curcumin’s potential role in the management of inflammatory bowel disease (IBD).12-14 IBD is the umbrella term used for ulcerative colitis (UC) and Crohn’s disease (CD). These are serious conditions affecting the small and large bowel. Inflammatory cytokynes that have been associated with IBD include interleukin-1beta (IL-1ß), and interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α). Curcumin has been found to inhibit the activation of these various transcription factors that are involved in inflammation, cell survival and proliferation and angiogenesis (the process through which new blood vessels form from pre-existing vessels).

In clinics, IBD is treated using various drugs including antibiotics, steroids and immunomodulators. Since these medications are associated with side effects when used long term, there is a need for a safe, non-toxic alternative for these patients.

In a small pilot study involving patients with IBD (ulcerative colitis/proctitis or Crohn’s disease), the administration of curcumin resulted in a reduction in markers of inflammation such as erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP). Patients also reported a lessening of symptoms.15
Cardiovascular Health

Inflammation plays a key role in the development of cardiovascular disease, a leading cause of death in the UK. The anti-inflammatory and antioxidant properties of curcumin have created an interest amongst scientists studying cardiovascular disease. As a result, there is now evidence suggesting that curcumin may indeed have protective effects against cardiovascular pathologies, which include atherosclerosis and elevated cholesterol.

Atherosclerosis, a serious and progressive condition, refers to the build-up of fatty deposits (plaques) in the walls of the arteries. Amongst the many causative factors for this condition are inflammation and oxidative stress within the vessel wall. Curcumin’s anti-atherosclerotic actions are wide-ranging, but include anti-inflammatory and antioxidant properties. In addition, studies show that curcumin plays a role in the modulation of cholesterol homeostasis and the inhibition of platelet aggregation.

In a human study (using volunteers), 500mg of curcumin administered daily for 7 days, resulted in a 29% increase in HDL cholesterol, a 12% decrease on LDL cholesterol and a 33% decrease in serum lipid peroxidases.

More recently a study carried out on patients with metabolic syndrome found that 630 mg three times a day significantly increased HDL cholesterol and significantly reduced LDL cholesterol. Triglycerides were also reduced.

In patients with coronary heart disease, the administration of curcumin resulted in a reduction of total and LDL cholesterol. Another study reported that 10mg of curcumin given twice daily for 2 weeks significantly lowered plasma fibrinogen (a blood clotting factor) levels in humans with atherosclerosis.

Recent preliminary (animal) studies suggest that curcumin may play a role in reducing hypertension and in the management of diabetic cardiomyopathy. However further studies are needed in these areas before firm conclusions can be drawn.

Brain Health

In a six week study on 60 patients with depressive disorder, curcumin was found to be an effective and safe modality for treatment for patients and worked as well as the prescription drug fluoxetine in terms of the measurable changes in the HAMD(17) score (Hamilton Depression Rating Scale - a standard diagnostic tool used for
interviewing and screening patients with possible depression).\textsuperscript{24} It has been suggested that it may support mood by playing a role in the production of serotonin, dopamine and norepinephrine.\textsuperscript{25}

Curcumin has also shown promise for those suffering with dementia/Alzheimer’s disease although at present more research is needed to evaluate whether it may be of benefit.\textsuperscript{26, 27}

General Inflammatory Conditions and Wellbeing

The emerging role of chronic inflammation in the major degenerative diseases of modern society (including dementia, diabetes and obesity) has stimulated research into the influence of nutrition on inflammatory indicators. This interest has extended to the exploration of phytochemicals and their effects on inflammation and their potential applications in the management of modern diseases. With the development of enhanced delivery forms of curcumin (offering better bioavailability), the considerable potential for further uses increases.

Other areas of research interest for curcumin

- Gum disease (gingivitis)
- Stomach ulcers caused by Helicobacter pylori (H pylori) infection
- Skin rash (Lichen planus)
- Stomach ulcers (peptic ulcer disease)
- Itchy skin (pruritus)
- Bypass surgery (coronary artery bypass graft surgery)
- Recovery from surgery
- Diarrhoea
- Fibromyalgia
- Liver and gallbladder problems
- Headache
- Menstrual problems
Safety

Clinical trials have demonstrated the safety of curcumin even at high doses (12 g/day) in humans. Turmeric is likely safe when taken by mouth or applied to the skin appropriately for up to 8 months.

Special precaution and warnings

Surgery: Curcumin might increase bleeding if used preoperatively. Patients should discontinue use two weeks prior to elective surgery.

If you are pregnant, nursing, taking any medications or have any medical conditions, please consult your healthcare practitioner before taking.

Food supplements should not be used instead of a varied balanced diet and a healthy lifestyle.

Known contraindications

Concomitant use of curcumin with herbs or medications that may affect platelet aggregation (blood-thinners) could theoretically increase the risk of bleeding in some people. If an individual is pregnant, nursing, taking medication or has a health condition they should consult with their healthcare practitioner before taking supplements.
Further Information

A presentation by Jan Frank PHD, one of the researchers who carried out the human clinical trial on the bioavailability of the curcumin used in Solgar Full Spectrum Curcumin is available at the following link:  https://www.youtube.com/watch?v=Nsmq1olu6Xw

Practitioner Support

Solgar has a friendly, qualified practitioner support team who, as well as offering educational services such as technical monographs, webinars and lectures, are more than willing to help you with your queries. Nicola and David are 2 key members of this team:

Nicola McCusker BSc Dip CNM
Nicola’s early career was as a Publisher of health sciences research. It was during this time that she developed a passion for all things nutrition and studied nutritional therapy at the College of Naturopathic Medicine. She is now involved in Solgar’s educational programme, running the Solgar practitioner newsletter, writing health articles and presenting webinars as well as managing their BTEC Nutrition Course.

David Crooks DipION
David joined Solgar in 2008 and has worked in technical positions for both Solgar UK and Solgar International. Previous to joining Solgar David worked as a field-based Technical Trainer in London for a UK practitioner supplement company. David graduated from Bournemouth University with a degree in Business Studies and went on to study Nutritional Therapy at the Institute for Optimum Nutrition in London, following a lifelong interest in health, wellness and nutraceuticals.

To contact the practitioner support team, email us on practitioner@solgar.com or telephone 01442 890355 and ask for the technical department.
Joint Health Webinar

This webinar, presented by David Crooks, will cover a modern and research based approach to the next generation, innovative joint and anti-inflammatory nutrients. We will discuss the connection between the gut, our immune system and inflammation and how the advanced formulation of Solgar® 7 may modify this process.

Once completed you will have an understanding of how the 7 key ingredients in Solgar® 7 may address systemic inflammation by modulating the immune response starting in the digestive system.

Date and time: Wednesday 1 July 10.00 – 11.00am

Click here to register for this webinar or contact us at practitioner@solgar.com

References


