



NUTRITION / DETOXIFICATION

What's New in Phytonutrition: *Mangifera Indica*, "The King of Fruits"

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One hundred percent pure Indian green mango fruit (*mangifera indica*), harvested at a special degree of ripeness for efficacy and taste, can now be concentrated as a phytonutrient nutraceutical powder. Multiple scientific studies have demonstrated that such green mango fruit powders:

- Can greatly enhance Sirt 1 (also known as "the longevity gene" and "the skinny gene")
- Can help balance the enzyme AMPK, with an activity level comparable to the diabetes drug metformin
- Can help reduce the level of chronic, low-grade inflammation as measured by COX 1 and IL-6
- Have powerful antioxidant activity
- Play a key role in microcirculation and endothelial function

Sirt 1 Activation

Sirt 1 is normally activated by calorie restriction, but is also activated by the red wine phytonutrient resveratrol.¹ Indian green mango is the newest among the powerful natural stimulators of Sirt 1.² Sirt 1 helps to promote survival by protecting cells during times when food (and therefore energy) is scarce. Sirt 1 then acts as a "rescue gene," repairing the oxidative damage done by free radicals and inflammation, thereby preventing cells from dying prematurely.

While slowing down the pace of structural and metabolic changes related to aging, Sirt 1 also causes the power plants of cells (the mitochondria) to produce energy at levels more typical of younger cells. As a result, Sirt 1 is believed to be a principal regulator of metabolism and lifespan; thus its nickname, "[the longevity gene](#)."³



The Sirt 1 gene also has been dubbed by some as "the skinny gene" because it aids weight loss by inhibiting fat storage and increasing fat metabolism. Sirt 1 activation is associated with improved body composition (via enhanced fat burning, increased muscle mass, increased metabolic rate), less cravings for carbohydrates, improved insulin sensitivity, protection of insulin-producing beta-cells (reduced risk of type 2 diabetes), and both a modulation of cholesterol synthesis and decrease in the chronic inflammation related to obesity and pre-diabetes (cardiometabolic syndrome).⁴

AMPK Activation

AMPK (5' adenosine monophosphate-activated protein kinase) is an enzyme that plays a pivotal role in cellular energy homeostasis. The net effect of AMPK activation is stimulation of hepatic fatty acid oxidation and ketogenesis, inhibition of cholesterol synthesis and triglyceride synthesis, inhibition of adipocyte lipogenesis (new fat formation), stimulation of skeletal muscle fatty-acid oxidation and muscle glucose uptake, and modulation of insulin secretion by pancreatic beta cells.

With a potency comparable to up to 70 percent of that of the diabetes drug metformin, properly harvested and extracted, 100 percent pure Indian green mango fruit helps modulates AMPK, which gives it value in diabetes and metabolic syndrome, cholesterol inhibition, fat burning, and muscle energy production.⁵

Anti-Inflammatory Effects

Adipose tissue is a highly metabolically active tissue that releases pro- inflammatory enzymes such as COX-1, interleukin 6 and TNF-alpha. The latter two increase insulin resistance in the liver, adipose tissue and muscles. They, like COX, also contribute to the development of atherosclerosis (hardening of the arteries) and increase risk for blood clots.

Mangifera indica has been shown to modulate the levels of these enzymes, which are markers of

chronic, low-grade inflammation – a major process of the common diseases of aging.⁶

Oxygen Radical Absorbance Capacity

Mangifera indica is high in antioxidant activity (ORAC); much higher than resveratrol. The ORAC value has been measured at $\text{ORAC} \geq 5,500 \text{ TE} / 100 \text{ mg}$.⁷⁻⁸

Microcirculation and Endothelial Function

Via Sirt 1 and AMPK activation, *mangifera indica* fruit extract preparations play a key role in microcirculation and endothelial function, so important to normal blood pressure and blood flow.

For example, the acute effect of a single dose of a 100 mg or 300 mg *mangifera indica* fruit extract on microcirculation was investigated in a randomized, double-blind, crossover pilot study in 10 healthy women to determine the effective dosage. Ninety percent of all volunteers showed improved microcirculation at a biologically relevant level of more than 50 percent over baseline.

Furthermore, after simulation of digestion, activation of endothelial nitric oxide synthase, an important regulator for endothelial function, was tested *in vitro* in primary human umbilical vein endothelial cells. The *mangifera indica* fruit extract increased the activated form of endothelial nitric oxide synthase dose-dependently by 23% (300 µg/mL), 42% (1,500 µg/mL) and 60% (3,000 µg/mL) compared to the untreated control.⁹

This study suggests moderate beneficial effects of *mangifera indica* fruit extract on microcirculation, which is at least partly mediated by endothelial nitric oxide synthase activation.

The King of Fruits

Mangifera indica extract helps retard cellular aging, promotes optimal cellular energy, healthy inflammation and blood sugar control, as well as healthy body-weight maintenance. Furthermore, it plays a key role in healthy microcirculation and endothelial function, all while delivering the great taste and pleasure of exotic mango fruits. No wonder it has long been known in the East as the "King of Fruits"!

References

1. Borra MT, Smith BC, Denu JM. Mechanism of human SIRT1 activation by resveratrol. *J Biol Chem*, 2005 Apr 29;280(17):17187-95.
2. Soo-Jin Kim, Mi-Sun Sung, Hwan Heo, Jae-Hyuk Lee, Sang-Woo Park. Mangiferin protects retinal ganglion cells in ischemic mouse retina via SIRT1. *Curr Eye Res*, 2015 Jul 22:1-12 (epub ahead of print).
3. Sinclair, DA, Guarente L. "Unlocking the Secrets of Longevity Genes." *Scientific American*, February 2006.
4. Sirtuin 1. Wikipedia: https://en.wikipedia.org/wiki/Sirtuin_1.
5. Winder WW, Hardie DG. AMP-activated protein kinase, a metabolic master switch: possible roles in type 2 diabetes. *Am J Physiol*, 1999 Jul;277(1 Pt 1):E1-.
6. Marquez L, Pérez-Nievas BG, Garate I, et al. Anti-inflammatory effects of *Mangifera indica* L. extract in a model of colitis, *World J Gastroenterol*, 2010 Oct 21;16(39):4922-4931.
7. Anila L, Vijayalakshmi NR. Antioxidant action of flavonoids from *Mangifera indica* and *Emblica officinalis* in hypercholesterolemic rats, *Food Chem*, 2003 Dec;83(4):569-574.
8. Nuñez Sellés AJ, Vélez Castro HT, Aguero J, et al. Isolation and quantitative analysis of phenolic antioxidants, free sugars, and polyols from mango (*Mangifera indica* L.) stem bark aqueous decoction used in Cuba as a nutritional supplement. *J Agric Food Chem*,

2002;50(4):762-766.

9. Gerstgrasser A, Röchter S, Dressler D, et al. In vitro activation of eNOS by *Mangifera indica* (Careless™) and determination of an effective dosage in a randomized, double-blind, human pilot study on microcirculation. *Planta Med*, 2016;82(04):298-304.

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