

Noni Juice – Why All the Hype?

Mention “noni juice” and people familiar with the product often express either passionate enthusiasm or doubtful skepticism. Finding the truth about noni presents challenges, since even the scientific literature mirrors this dualistic debate over the safety and effectiveness of this exotic popular beverage. That is, many papers submitted in support and/or defense of the product are often financially affiliated with noni products.^{1 2 3 4 5} As stated by Keith I. Block, MD, editor-in-chief of *Integrative Cancer Therapies*, “A significant trend in contemporary herbal medicine has been the movement of traditional medicines of indigenous peoples directly into international commerce – often with little scientific exploration before widespread marketing.”⁶

On the other hand, representatives from Tahitian Noni International, Inc., the largest noni juice company and research center insist that “not all Noni liquid dietary supplements are created equal”, and that their product is safe.⁷ It is true that the benefits and risks involved with one noni supplement may differ from another, based on manufacturing techniques, growing techniques, and added vitamins, electrolytes, sweeteners, and derivatives.^{8 9} Juice concentrations can vary from ten to ninety-six percent between products.¹⁰ Currently, no means exist by which independent analyzers can determine the quality and authenticity of noni juice.¹¹ Concerns about safety even led the European Union to ban the marketing of Noni because of unknown safety in the late 1990’s.¹²

Fortunately, the buzz about noni has inspired more researchers to respond to the need for rigorous evaluation of noni’s risks and benefits. Brian Issell, MD, an oncologist, internist, and director of clinical sciences at the University of Hawaii’s Cancer Research Center is conducting a Phase I clinical study on noni, funded initially by the National Institutes of Health and then by the Hawaii Community Foundation. Eligible patients have advanced cancer but no suitable conventional treatment options. Issell and his colleagues are working to determine the maximal tolerated dose that can provide anti-cancer effects while optimizing quality of life. Noting the “incredible commercialization” associated with noni products, Issell remarked, “We need to know if it helps more than harms people.”¹³

Issell and his fellow researchers are also tracking interactions and adverse effects from the 500 mg capsules.¹⁴ Early reports suggest that patients may be improving quality of life at higher doses.

The species name for noni is *Morinda citrifolia*. The noni fruit resembles a “grenade”,¹⁵ or a green potato covered with “pineapple-like spots”¹⁶; the mature fruit “has a foul taste and soapy smell”.¹⁷ Known also as “Indian mulberry” this small evergreen tree is a native to Australia and Southeast Asia and was introduced to Hawaii long ago.¹⁸ Pacific Islanders, Australian Aborigines, and Asians regarded noni as both a food and healing remedy for over a thousand years.¹⁹ They sought the plant for its fruit, leaves, bark, and roots for the treatment of diabetes, diarrhea, hypertension, pain, skin wounds, topical infections, and malaria.²⁰

The claims for noni extend to cancer treatment and prevention. Noni polysaccharides reportedly provide immunomodulatory or immune-enhancing benefits when combined with certain chemotherapy preparations (DNA-alkylating agents, DNA-intercalators, topoisomerase inhibitors, mitotic inhibitors, and anti-metabolites).²¹ Antitumor properties deliver a 25% to 45% “cure rate” on the Sarcoma 180 ascites tumor in mice.²² One study suggests that noni demonstrates tumor cell-selective antiproliferative effects.²³

As an antifungal agent, noni interferes with serum-induced formation of filamentous structures in *Candida albicans* and inhibits germination of *Aspergillus nidulans*, yielding potentially effective herbal treatment options in cases of candidiasis and aspergillosis.²⁴

Noni appears to be cardioprotective by reducing risk of atherosclerosis and lowering blood pressure. The extract up-regulates the low-density lipoprotein (LDL) receptor, which leads to accelerated LDL clearance from the circulation.²⁵ Furthermore, a Japanese study indicated that noni juice strongly inhibited the activity of angiotensin I converting enzyme.²⁶

New applications for noni include cancer prevention and even wrinkle protection in human skin.²⁷

Some of the most widely studied noni constituents for cancer prevention include anthraquinones. Both the fruits and root contain an anthraquinone (2-methoxy-1,3,6-trihydroxyanthraquinone) that demonstrates “extremely potent” quinone reductase (QR) inducing activity.²⁸ The capacity of this noni anthraquinone to induce QR activity was almost forty times stronger than a comparison positive control, I-sulforaphane, a cancer chemopreventive compound first isolated from broccoli.²⁹ Some place QR, a phase II enzyme, in the “cancer chemopreventive” category on account of its capacity to readily metabolize and promote excretion of oxidative and electrophilic molecules before they damage cellular macromolecules such as DNA.³⁰ Furthermore, QR helps alpha-tocopherol and coenzyme Q maintain their reduced states and as such has earned QR inducers the title “indirect antioxidants”.

If there is a down side to noni, – Hepatotoxicity?

Three reports in 2005. In all three cases, the authors found a temporal relationship between noni juice ingestion and liver injury.³¹
³² An extensive ruling out process of other potential causes of acute hepatitis led them to the conclusion of herbal hepatotoxicity, associated with noni juice. An additional hepatotoxic effect may have occurred in the first case due to the concomitant administration of Chinese herbs. The authors postulated that the anthraquinones in noni may have contributed to the toxicity.

- (a) In one case, a 29 year old man with previous toxic hepatitis developed sub-acute liver failure necessitating emergency liver transplant. This followed ingestion of a combination of 1.5 liters of Tahitian Noni® over the preceding three weeks, and a 9-day course of a Chinese herbal mixture containing bupleurum, pinellia, scutellaria, codonopsis, licorice, schizonepeta, and peony.³³
- (b) In the second case, a 62 year-old woman with no history of liver disease experienced a self-limiting case of acute hepatitis after consuming 2 liters of Tahitian Noni® juice over three months.
- (c) In the third case, a 45 year-old man, again with no history of liver disease, presented with a 2-week history of malaise, nausea, anorexia, fatigue, and

shortness of breath, which began after ingesting noni juice for 3 weeks preceding presentation. Laboratory evaluation indicated highly elevated transaminases and elevated lactate dehydrogenase. Discontinuation of the product resolved the condition within one month.³⁴

(2) Research and development authorities from Tahitian Noni® International, a 9 year-old multi-level marketing company that in 2005 surpassed \$3 billion in total sales,³⁵ submitted rebuttals to these case reports of toxicity.^{36 37} In their letter to the editor, they defended the safety of noni juice, citing unpublished data from a human clinical study as well as animal toxicity tests in rats. In addition, they question the relevance of anthraquinones insofar as causing liver damage in the three reported cases, claiming that, “*M. citrifolia* anthraquinones occur in quantities too small to be of any toxicological significance. Further, these do not have chemical structures capable of being reduced to reactive anthrone radicals, which were implicated in previous cases of herbal hepatotoxicity.”³⁸

2) Other adverse effects and cautions

- a) Coumadin resistance from one preparation, supplemented with vitamin K.
- b) Hyperkalemia in patients with compromised renal function.³⁹

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² Su B-N, Pawlus AD, Jung H-A, Keller WJ, McLaughlin JL, and Kinghorn AD. Chemical constituents of the fruits of *Morinda citrifolia* (Noni) and their antioxidant activity. *J Nat Prod*. 2005;68:592-595.

³ Pawlus AD, Su B-N, Keller WJ, and Kinghorn AD. An anthraquinone with potent quinine reductase-inducing activity and other constituents of the fruits of *Morinda citrifolia* (Noni). *J Nat Prod*. 2005;68:1720-1722.

⁴ Wang M-Y, West BJ, Jensen CJ, et al. *Acta Pharmacologica Sinica*. 2002;23(12):1127-1141.

⁵ Wang MY and Su C. Cancer preventive effect of *Morinda citrifolia* (Noni). *Ann N Y Acad Sci*. 2001;952:161-168.

⁶ Block KI. Editorial: On psycho-oncology, lycopene and the noni fruit. *Integrative Cancer Therapies*. 2002;1(2):107-109.

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⁸ Carr ME, Klotz J, Bergeron M. Coumadin resistance and the vitamin supplement “Noni”. [Letter]. *American Journal of Hematology*. 2004;77:103.

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