INTERNATIONAL
IV NUTRITIONAL THERAPY
GLOBAL PHYSICIAN EDUCATION

CoQ10, Alpha Lipoic Acid and Lipoic-Mineral Complex

(Poly MVA)

Advanced IV Therapy: Chronic Disease and Infections
by
Virginia Osborne, ND, Brenden Cochran, ND and Shawna Kiker, ND

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CoQ10 (Ubiquinone)

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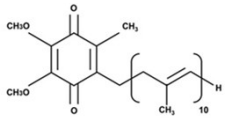
CoQ10
(Ubiquinone))



Structure of CoQ10

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CoQ10 (Ubiquinone)

- 20 mg/ml
- Anti-oxidant and mitochondrial support
- Intravenously delivered like alpha-lipoic acid
- Give alone in non-ionic D5W, cover the bag (light sensitive)
- Use filtered lines
- Dosage: 100 – 600 mg
- 250 – 500 ml D5W
- Slow infusion time of 90 – 120 minutes to minimize side effects.

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CoQ10 (Ubiquinone)

Think mitochondrial support
- Heart Disease
- Huntington's Disease
- Infertility
- Migraine Headaches
- Statin myopathy
- Cancer
- Parkinson's

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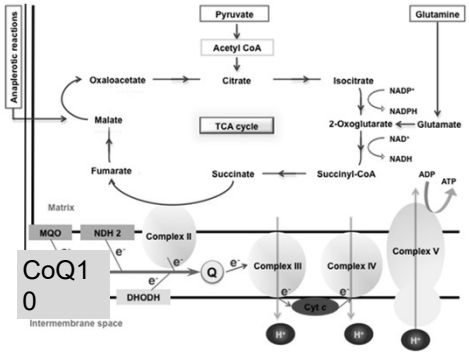

CoQ10

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CoQ10 (Ubiquinone)

Interactions

Caution with patients on warfarin. Has the potential to inhibit warfarin effects. Similar structure to vitamin K

*Wyman M, Leonard M, Morledge T (July 2010). "Coenzyme Q10: a therapy for hypertension and statin-induced myalgia?". Cleve Clin J Med. **77** (7): 435–42.*

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Alpha Lipoic Acid

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ALA Indications

- Diabetes mellitus
- Diabetic neuropathy
- Glaucoma
- Hepatitis, Liver regeneration
- Burning mouth syndrome
- Mushroom poisoning
- Toxic metal poisoning
- Any mitochondrial diseases
- Cancer support
- Increasing intracellular glutathione

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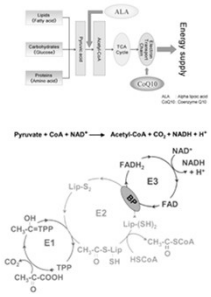
Mechanisms of Action

- ALA is the oxidized from of dihydrolipoic acid (DHLA)
- Functions as a potent antioxidant and cofactor for various enzymes (pyruvate dehydrogenase and alpha-ketoglutarate dehydrogenase) in energy production.



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Mechanisms of Action

Improves recycling of other antioxidant compounds.

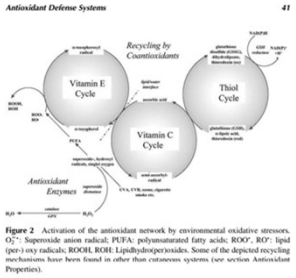

Figure 2 Activation of the antioxidant network by environmental oxidative stressors. $O_2^{\bullet-}$: Superoxide anion radical; PUFA: polyunsaturated fatty acids; ROO$^{\bullet}$, RO$^{\bullet}$: lipid (per-) oxy radicals; ROOH, ROH: Lipidhydroxperioxides. Some of the depicted recycling mechanisms have been found in other than cutaneous systems (see section Antioxidant Properties).

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Mechanisms of Action: Heavy Metal Toxicity Support

- Grunert RR. The effect of DL-alpha-lipoic acid on heavy metal intoxication in mice and dogs. Arch Biochem Biophys 1960; 86: 190-194.
- Muller L, Menzel H. Studie on the efficacy of lipoate and ihydrolipoate in the alteration of cadmium2+ toxicity in isolated hepatocytes. Biochem Biophys Acta 1990; 1052(3): 386-391.
- Gurer H, Ozgunes H, Oztezcan S, et al. Antioxidant role of alpha-lipoic acid in lead toxicity. Free Radic Biol Med 1999; 27(12): 75-81.
- Keith RL, Setiarahardjo I, Fernando Q, et al. Utilization of renal slices to evaluate the efficacy of chelating agents for removing mercury from the kidney. Toxicology 1997; 116(13): 67-75.
- Y Yuan, J Yang, et al. Alpha-Lipoic acid protects against cadmium-induced neuronal injury by inhibiting the endoplasmic reticulum stress eIF2a-ATF4 pathway in rat cortical neurons in vitro and in vivo. Toxicology, 2019; 414: 1-13.

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Diagnosis and Treatment of Amanita Phalloides-Type Mushroom Poisoning

Use of Thioctic Acid

CHARLES E. BECKER, MD; THEODORE G. TONG, PharmD; UDO BOERNER, DSc; ROBERT L. ROE, MD; ROBERT A. T. SCOTT, MD, and MICHAEL B. MacQUARRIE, MD, San Francisco; and FREDERIC BARTTER, MD, Bethesda

The number of cases of mushroom poisoning is increasing as a result of the increasing popularity of "wild" mushroom consumption. Amanitin and phalloidin cytotoxins found in some Amanita and Galerina species produce the most severe and frequent life-threatening symptoms of Amanita phalloides-type poisoning. Delay in onset of symptoms, individual susceptibility variation and lack of rapid and reliable identification have contributed to the significant morbidity and mortality of this type of poisoning.

A rapid chromatographic assay for identifying the potent cytotoxins and apparently successful management using thioctic acid of two cases of A. phalloides-type mushroom poisoning are reported. All known cases of A. phalloides-type mushroom poisoning treated with thioctic acid in the United States are summarized.

ongtime picker meets match in mushroom patch

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February 15, 1979 N Engl J Med 1979; 300:371

THIOCTIC ACID IN TREATMENT OF HEPATOTOXIC MUSHROOM (PHALLOIDES) POISONING

To the Editor: I have used thioctic acid to treat six patients over the past year who suffered the hepatotoxic effects of mushroom poisoning. Some of them had liver enzymes over 4000 μU per milliliter. The patients were admitted to the medical intensive-care unit. Intravenous glucose was supplied, and blood levels were carefully followed. Every patient survived, and each walked out of the hospital, feeling well, within three weeks. Not one patient had signs of hypoglycemia while being treated with thioctic acid.

I believe that physicians should be encouraged to try thioctic acid for any patient who is unfortunate enough to have ingested a hepatotoxic mushroom.[1,4]

B. M. BERKSON, M.D., M.S., PH.D.
Cleveland, OH 44106 Mount Sinai Hospital

1. Alleva F: Thioctic acid and mushroom poisoning. Science 187:216, 1975
2. Bartter FC: Thioctic acid and mushroom poisoning. Science 187:216, 1975
3. Bartter FC, Berkson BM, et al: Thioctic acid in the treatment of poisoning with alph-amanitin, International Symposium on Amanita Toxins and Amanita Poisoning, 1978 (in press)
4. Berkson BM: Treatment of four delayed mushroom poisoning patients with thioctic acid, International Symposium on Amanita Toxins and Amanita Poisoning, 1978 (in press)

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Med Klin (Munich). 1999 Oct 15;94 Suppl 3:84-9

A conservative triple antioxidant approach to the treatment of hepatitis C. Combination of alpha lipoic acid (thioctic acid), silymarin, and selenium: three case histories.

Berkson BM[1]

@ Author information

Abstract

BACKGROUND: There has been an increase in the number of adults seeking liver transplantation for hepatitis C in the last few years and the count is going up rapidly. There is no reliable and effective therapy for chronic hepatitis C since interferon and antivirals work no more than 30% of the time, and liver transplant surgery is uncertain and tentative over the long run. This is because, ultimately, residual hepatitis C viremia infects the new liver. Furthermore, liver transplantation can be painful, disabling and extremely costly.

TREATMENT PROGRAM: The author describes a low cost and efficacious treatment program in 3 patients with cirrhosis, portal hypertension and esophageal varices secondary to chronic hepatitis C infection. This effective and conservative regimen combines 3 potent antioxidants (alpha-lipoic acid (thioctic acid), silymarin, and selenium) that possess antiviral, free radical quenching and immune boosting qualities.

CONCLUSION: There are no remarkably effective treatments for chronic hepatitis C in general use. Interferon and antivirals have less than a 30% response rate and because of the residual viremia, a newly transplanted liver usually becomes infected again. The triple antioxidant combination of alpha-lipoic acid, silymarin and selenium was chosen for a conservative treatment of hepatitis C because these substances protect the liver from free radical damage, increase the levels of other fundamental antioxidants, and interfere with viral proliferation. The 3 patients presented in this paper followed the triple antioxidant program and recovered quickly and their laboratory values remarkably improved. Furthermore, liver transplantation was avoided and the patients are back at work, carrying out their normal activities, and feeling healthy. The author offers a more conservative approach to the treatment of hepatitis C, that is exceedingly less expensive. One year of the triple antioxidant therapy described in this paper costs less than $2,000, as compared to more than $300,000 a year for liver transplant surgery. It appears reasonable, that prior to liver transplant surgery evaluation, or during the transplant evaluation process, the conservative triple antioxidant treatment approach should be considered. If these is a significant betterment in the patient's condition, liver transplant surgery may be avoided.

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INTEGRATIVE CANCER THERAPIES 5(1); 2006 pp. 83-89

Intravenous α-Lipoic Acid/Low-Dose Naltrexone

The Long-term Survival of a Patient With Pancreatic Cancer With Metastases to the Liver After Treatment With the Intravenous α-Lipoic Acid/Low-Dose Naltrexone Protocol

Burton M. Berkson, Daniel M. Rubin, and Arthur J. Berkson

The authors describe the long-term survival of a patient with pancreatic cancer without any toxic adverse effects. The treatment regimen includes the intravenous α-lipoic acid and low-dose naltrexone (ALA/N) protocol and a healthy lifestyle program. The patient was cited by a reputable university oncology center in October 2002 that there was little hope for his survival. Today, January 2006, however, he is back at work, free from symptoms, and without appreciable progression of his malignancy. The longevity protocol described in this article may have the possibility of extending the life of a patient who would be customarily considered to be terminal. The authors believe that life scientists will one day develop a cure for metastatic pancreatic cancer, perhaps via gene therapy or another biological platform. But until

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Revisiting the ALA/N (α-Lipoic Acid/Low-Dose Naltrexone) Protocol for People With Metastatic and Nonmetastatic Pancreatic Cancer: A Report of 3 New Cases

Integrative Cancer Therapies
8(3) 416-422
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DOI: 10.1177/1534735409353883
http://ict.sagepub.com
SAGE

Burton M. Berkson, MD, MS, PhD,[1,2] Daniel M. Rubin, ND, FABNO,[3] and Arthur J. Berkson, MD[1]

Abstract

The authors, in a previous article, described the long-term survival of a man with pancreatic cancer and metastases to the liver, treated with intravenous alpha-lipoic acid and oral low-dose naltrexone (ALA/N) without any adverse effects. He is alive and well 78 months after initial presentation. Three additional pancreatic cancer case studies are presented in this article. At the time of this writing, the first patient, GB, is alive and well 39 months after presenting with adenocarcinoma of the pancreas with metastases to the liver. The second patient, JK, who presented to the clinic with the same diagnosis was treated with the ALA/N protocol and after 5 months of therapy, PET scan demonstrated no evidence of disease. The third patient, RC, in addition to his pancreatic cancer with liver and retroperitoneal metastases, has a history of B-cell lymphoma and prostate adenocarcinoma. After 4 months of the ALA/N protocol his PET scan demonstrated no signs of cancer. In this article, the authors discuss the poly activity of ALA; as an agent that reduces oxidative stress, its ability to stabilize NF-B, its ability to stimulate pro-oxidant apoptotic activity, and its discriminative ability to discourage the proliferation of malignant cells. In addition, the ability of lowdose naltrexone to modulate an endogenous immune response is discussed. This is the second article published on the ALA/N protocol and the authors believe the protocol warrants clinical trial.

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2009

Contents lists available at ScienceDirect

European Journal of Pain

journal homepage: www.EuropeanJournalPain.com

Lack of efficacy of alpha-lipoic acid in burning mouth syndrome: A double-blind, randomized, placebo-controlled study

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Burning mouth syndrome
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Therapy

ABSTRACT

Background: A systematic review from the Cochrane Collaboration stated that alpha-lipoic acid (ALA) may help in the management of burning mouth syndrome (BMS), because all of the data on ALA came from a single group. It has been stressed that its effectiveness should be reproduced in other populations.

Aim: A double-blind, randomized, placebo-controlled study, including two test groups (Group A and Group B) and one control group (Group C), was carried out to evaluate the efficacy of systemic ALA (600 mg) and ALA (400 mg) plus vitamins in the treatment of BMS.

Methods: Sixty-six patients (54 females and 12 males) were included in an 8-week trial. Symptoms were evaluated using a visual analogue scale (VAS) and the McGill Pain Questionnaire (MPQ) at 0, 2, 4, 8 and 16 weeks.

Results: Fifty-two patients (43 females and 9 males, aged 67.3 ± 11.9 years) completed the study. All three groups had significant reductions in the VAS score and in the mean affective/evaluative subscale of the MPQ; the responders' rate (at least 50% improvement in the VAS score) was about 30%. No significant differences were observed among the groups either in the response rate or in the mean latency of the therapeutic effect.

Conclusions: The fairly high placebo effect observed is very similar to data obtained from patients affected by atypical facial pain. This study failed to support a role for ALA in the treatment of BMS, and further investigations are needed to identify the cause of BMS in order to develop efficacious therapies.

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Capasso et al. Trials 2013, 14:273
http://www.trialsjournal.com/content/14/1/273

TRIALS

RESEARCH Open Access

Combination of inositol and alpha lipoic acid in metabolic syndrome-affected women: a randomized placebo-controlled trial

Immacolata Capasso[1*], Emanuela Esposito[1], Nicola Maurea[2], Maurizio Montella[3], Anna Crispo[3], Michelina De Laurentis[1], Massimiliano D'Aiuto[1], Giuseppe Frasci[1], Gerardo Botti[4], Maria Grimaldi[4], Ernesta Cavalcanti[4], Giuseppe Esposito[5], Alfredo Fucito[1], Giuseppe Brillante[1], Giuseppe D'Aiuto[1] and Gennaro Cilliberto[1]

Conclusions: Inositol combined with alpha lipoic acid can be used as a dietary supplement in insulin-resistant patients in order to increase their insulin sensitiveness. Daily consumption of inositol combined with alpha lipoic acid has a significant bearing on metabolic syndrome. As metabolic syndrome is considered a modifiable risk factor of breast tumorigenesis, further studies are required to assess whether inositol combined with alpha lipoic acid can be administered as a dietary supplement in breast cancer primary prevention.
Trial registration: Current Controlled Trial ISRCTN74096908.

inositol and alpha lipoic acid (77 pts) or placebo (78 pts) for six months. Primary outcomes we wanted to achieve were both reduction of more than 20% of the HOMA-IR index and of triglycerides serum levels. Secondary outcomes expected were both the improvement of high-density lipoprotein cholesterol levels and the reduction of anthropometric features such as body mass index and waist-hip ratio.

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DMI

Effects of 3-week oral treatment with the antioxidant thioctic acid (α-lipoic acid) in symptomatic diabetic polyneuropathy

K. -J. Ruhnau†, H. P. Meissner‡, J. -R. Finn‡, M. Reljanovic‡‡, M. Lobisch¶, K. Schütte¶, D. Nehrdich**, H. J. Tritschler††, H. Mehnert§ and D. Ziegler*

Conclusions These preliminary findings indicate that oral treatment with 600 mg of TA *t.i.d.* for 3 weeks may improve symptoms and deficits resulting from polyneuropathy in Type 2 diabetic patients, without causing significant adverse reactions.

Diabet. Med. 16, 1040–1043 (1999)

(pain, burning, paraesthesias, and numbness) in the feet were scored at weekly intervals and summarized as a Total Symptom Score (TSS). The Hamburg Pain Adjective List (HPAL) and the Neuropathy Disability Score (NDS) were assessed at baseline and day 19.

Results At baseline the TSS, HPAL, and NDS were not significantly different between the groups. The TSS in the foot decreased from baseline to day 19 by −3.75 ± 1.88 points (−47%) in the TA group and by −1.94 ± 1.50 points

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Clinical Report

Journal of INTERNATIONAL MEDICAL RESEARCH

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DOI: 10.1177/0300060516656240
journals.sagepub.com/home/imr
SAGE

Effect of α-lipoic acid on symptoms and quality of life in patients with painful diabetic neuropathy

Evangelos Agathos, Anastasios Tentolouris ©, Ioanna Eleftheriadou, Panagiota Katsanoni, Ioannis Nemtzas, Alexandra Petrou, Christina Papanikolaou and Nikolaos Tentolouris

Abstract
Objective: To examine the effect of α-lipoic acid on neuropathic symptoms in patients with diabetic neuropathy (DN).
Methods: Patients with painful DN were treated with 600 mg/day α-lipoic acid, orally, for 40 days. Neuropathy Symptom Score (NSS), Subjective Peripheral Neuropathy Screen Questionnaire (SPNSQ) and douleur neuropathique (DN)4 questionnaire scores were assessed at baseline and day 40. Quality-of-life treatment effects were assessed by Brief Pain Inventory (BPI), Neuropathic Pain Symptom Inventory (NPSI) and Sheehan Disability Scale (SDS). Changes in body weight, arterial blood pressure, fasting serum glucose and lipids were also assessed.
Results: Out of 72 patients included, significant reductions in neuropathic symptoms were shown by reduced NSS, SPNSQ and DN4 scores at day 40 versus baseline. BPI, NPSI, and SDS in terms of work disability, social life disability, and family life disability scores were also significantly reduced. Moreover, 50% of patients rated their health condition as 'very much better' or 'much better' following α-lipoic acid administration. Fasting triglyceride levels were reduced.

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OLD Formulations IV ALA

- 2000mg of the OLD formulation has been infused for DM peripheral neuropathy with favorable results. Newer formulations appear to be more potent so this dose may not be practical.
- Known to be metabolized in 2-4 hours

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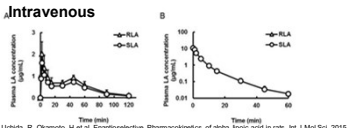
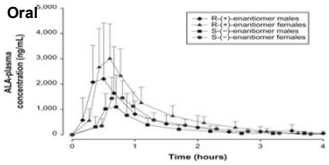
Racemic Mixtures and Bioavailability

- R vs S: NO difference in intravenous metabolism and blood plasma concentrations.
- Oral: significantly increased concentrations are detected in the plasma when R form is used



Uchida, R, Okamoto, H et al. Enantioselective Pharmacokinetics of alpha lipoic acid in rats. Int J Mol Sci. 2015 Sept; 16(9): 22781-22794



Hermann, R, Mungo, J et al. Enantiomer-selective pharmacokinetics, oral bioavailability, and sex effects of various alpha-lipoic acid dosage forms. Clin Pharmacol. 2014; 6: 195-204.

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IV Alpha Lipoic Acid

- Administer in D5W or Normal Saline
- Use 250 ml solution to prevent phlebitis and more tolerable.
- Use glass or the hard plastics bags.
- NEVER PUSH
- ALWAYS USE FILTERED LINES
- COVER THE BAG as light sensitive
- Start low (40-80 mg) and work up slow.
- Most will not be able to exceed 300 mg.
- Top dosage is 600 mg
- Infusion rate is 60-90 minutes or slower depending on the patient.

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Cover the bag

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NEVER MIX ANYTHING IN THE SAME BAG WITH ALA!!

- Precipitates with other minerals and can also cause thrombus when mixed with other nutrients.
- You may run other nutrients in the same day or a series of infusions. Make sure to change for flush the line between ALA and the nutrients.

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Cautions and Side Effects

Caution: Thiamine

May lead to thiamine deficiency

Note: blood sugar requires the utilization of thiamine during metabolism

ALA causes an increase in the metabolism of glucose/blood sugar.

During exercise, dieting, energy requirements

Check blood sugar of diabetics on ALA

If you administer too rapidly it will cause phlebitis (warm painful vein)

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IV Alpha-Lipoic Acid

- Frequency per B.Berkson MD, PhD
  - Every day for the first and second week.
  - Continue for a week or two of therapy every 2 or 3 months.

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IV Alpha-Lipoic Acid

- Not available commercially in the United States.
- Available from compounding pharmacies
  - Lipoic acid 25 mg/ml or 40 mg/ml

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More ALA Research

A PubMed search adds credence to an anti-tumor MOA and its use to decrease chemo side effects:

1. Ho YS, et al. Dihydrolipoic acid inhibits skin tumor promotion through anti-inflammation and anti-oxidation. Biochem Pharmacol. 2007 Jun 1;73(11):1786-95. Epub 2006 Dec 10.
2. Mythili Y, et al. Cytoprotective role of DL-alpha-lipoic acid in cyclophosphamide induced myocardial toxicity. Mol Cell Biochem. 2005 Aug;276(1-2):39-44.
3. Filatova NA, et al. Decrease in tumorigenic activity of murine hepatoma cells after treatment with antioxidants and melatonin. Tsitologiia. 2011;53(5):404-10.
4. Kennedy AR, et al. Suppression of the later stages of radiation-induced carcinogenesis by antioxidant dietary formulations. Radiat Res. 2011 Jul;176(1):62-70. Epub 2011 Apr 26.

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More ALA Research

Abstract
Lipoic acid is a disulfhydryl-containing compound used in clinical medicine and in experimental models as an antioxidant. We developed a stable isotope dilution capillary gas chromatography/mass spectrometry assay for lipoic acid. We assayed a panel of the metabolites of transmethylation and transsulfuration 30 min after injecting 100 mg/kg lipoic acid in a rat model. Lipoic acid values rose 1000-fold in serum and 10-fold in liver. A methylated metabolite of lipoic acid was also detected but not quantitated. Lipoic acid injection caused a massive increase in serum S-adenosylhomocysteine and marked depletion of liver S-adenosylmethionine. Serum total cysteine was depleted but liver cysteine and glutathione were maintained. Serum total homocysteine doubled, with increases also in cystathionine, N,N-dimethylglycine, and alpha-aminobutyric acid. In contrast, after injection of 2-mercaptoethane sulfonic acid, serum total cysteine and homocysteine were markedly depleted and there were no effects on serum S-adenosylmethionine or S-adenosylhomocysteine. We conclude that large doses of lipoic acid displace sulfhydryls from binding sites, resulting in depletion of serum cysteine, but also pose a methylation burden with severe depletion of liver S-adenosylmethionine and massive release of S-adenosylhomocysteine. These changes may have previously unrecognized deleterious effects that should be investigated in both human disease and experimental models.
Ref: Free Radic Biol Med. 2009 Oct 15;47(8):1147-53. Epub 2009 Jul 17.

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Poly MVA

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Poly – MVA

Composition of POLY-MVA*.

Palladium α-lipoic acid complex (1:1)	3.72×10^{-2} mmol/L
Thiamine	2.17×10^{-3} mmol/L
N-acetyl cysteine	1.13×10^{-3} mmol/L
Riboflavin	4.62×10^{-4} mmol/L
N-formyl methionine	1.46×10^{-4} mmol/L
Cyanocobalamin (Vitamin B12)	1.37×10^{-4} mmol/L
Rhodium	1.34×10^{-4} mmol/L
Molybdenum	4.63×10^{-4} mmol/L
Ruthenium	1.42×10^{-5} mmol/L
Sodium chloride	2.64×10^{-1} mmol/L

* Data supplied by manufacturer of POLY-MVA, El-Gen LLC, 7 Shirley Street, Bohemia, NY 11716-1735, USA.

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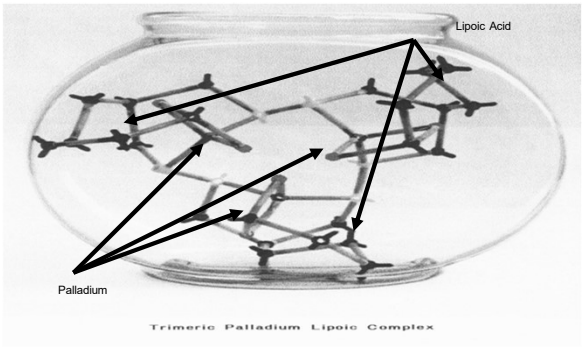

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LAMC

- Notice no free palladium and no free alpha lipoic acid. This enhances solubility in fat and water.
- Palladium bound is non toxic and a novel way of using a transition mineral to serve as a very efficient catalyst in aerobic respiration.
- More efficient redox since it is a polymer, rather than a single molecule.
- LAMC provides cellular energy by facilitating aerobic metabolism

- Krishnan and Garnett, M. "Passivation of Metals and Semiconductors, and Properties of Thin Oxide Layers", 2006, P.Marcus and V. Maurice (Editors), Elsevier, Amsterdam, p 389-394
- Janardhanan et al., 2008 udheesh, et al., *Food Chem Toxicol.* 2009 Aug; 47(8): 2124 -8.
- Menon, et al., *Int. J. Low Radiation.* 2009 Vol. 6 (3): 248-262.
- Sudheesh, et al., *Food Chem Toxicol.* 2010 Jul;48(7):1858-62.
- Ramachandran et al., *Cancer Biother Radiopharm.* 2010 Aug; 25(4): 395-9.

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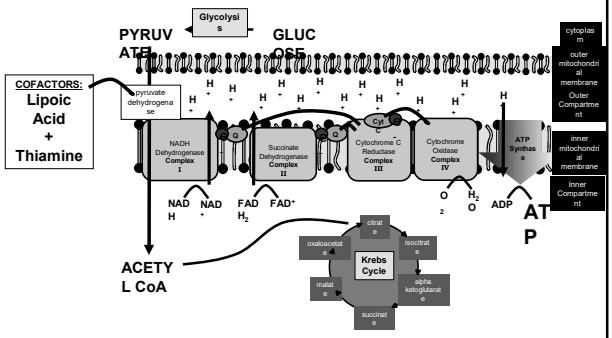

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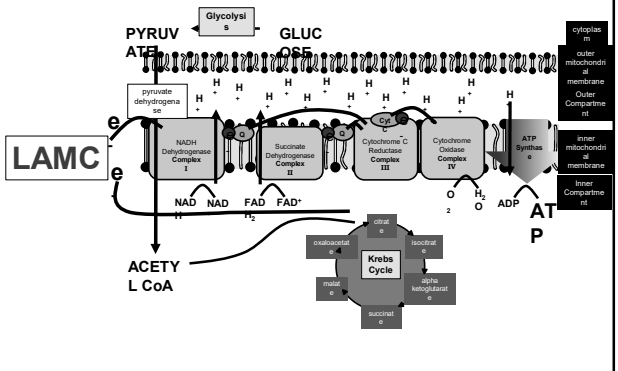

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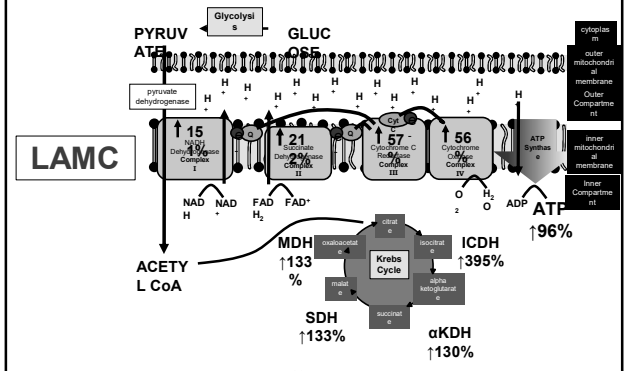

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Poly – MVA
(Internal AMARC Document)

Benefits of Lipoic Acid Palladium Complexes include:

- Discourages abnormal cell growth
- Supports normal metabolism
- Slows the aging process from cellular breakdown
- Supports cellular function and raises energy levels
- Supports appetite
- Protects cellular DNA
- Converts free radicals into an energy source
- Has many mineral, vitamin, and antioxidant functions

*These statements have not been evaluated by the Food and Drug Administration.
This product is not intended to diagnose, treat, cure or prevent any disease.

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Anti-Oxidant Activity

- Published studies on liver, kidney and brain tissue have demonstrated that LAMC:
  - Significantly reduced lipid peroxidation of membranes
  - ELEVATED glutathione levels
  - Enhanced the levels of endogenous anti-oxidant enzymes, superoxide dismutase and glutathione peroxidase

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Menon, A., Krishnan, C.V., Nair, C.K.K. (2009) Protection from gamma-radiation insult to antioxidant defense and cellular DNA by POLY-MVA, a dietary supplement containing palladium lipoic acid formulation. *Int. J. Low Radiation*, Vol. 6, No.3, 248-262

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Anti-Oxidant Activity

Groups	Lipid peroxidation, nano moles of MDA formed/mg protein	GLUTATHIONE GSH (nanomoles/ mg protein	Super oxide dismutase U/mg protein	Glutathione Peroxidase U/mg protein
1) Liver with radiation	4.65±0.86	15.28±1.73	8.36±0.63	14.07±2.87
With LAMC complex & with radiation	1.82±0.36	21.46±3.30	10.90±0.50	22.44±2.40
2) Kidney with radiation	8.62±0.76	21.19±7.25	0.45±0.09	24.48±2.30
With LAMC complex & with radiation	5.44±0.98	42.61±4.61	0.98±0.29	39.28±10.28
3) Brain with radiation	16.94±2.04	55.60±14.58	0.68±0.10	32.68±2.90
With LAMC complex & with radiation	11.42±0.79	126.81±9.43	1.08±0.09	44.10±2.90

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DNA Protection

- DNA damage was significantly reduced following daily administration of LAMC formulation for 7 days (human equivalent dose of 4 tsp/day), prior to mice being exposed to lethal dose of radiation.
  - a COMET assay was used to measures DNA nicks in bone marrow, spleen and leukocytes.

Ramachandran, L., Krishnan, C.V., Nair, C.K.K. (2010) Radioprotection by α-lipoic acid palladium complex formulation, (POLY-MVA) in mice, *Cancer Biotherapy and Radiopharmaceuticals*, Vol. 25, No.4, 395-399.
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Poly – MVA: Research Areas

- Chronic Neurological Disease
  - Mitochondrial support
  - Cell support
- Fatigue States
  - Mitochondrial energy / repair support

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Food and Chemical Toxicology 48 (2010) 1858–1862

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journal homepage: www.elsevier.com/locate/foodchemtox

Effect of POLY-MVA, a palladium α-lipoic acid complex formulation against declined mitochondrial antioxidant status in the myocardium of aged rats

N.P. Sudheesh [a], T.A. Ajith [b], K.K. Janardhanan [a], C.V. Krishnan [c,d,*]

Results of this study reveal that palladium α-lipoic acid formulation is an effective agent to protect the age-linked decline of myocardial mitochondrial antioxidant status and thus is capable to enhance the energy production of normal cell mitochondria.

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Poly – MVA

- Oral form available
- Given without other additives
- Generally added to a small normal saline (NS) bag
  - (See protocol section)

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LAMC

- Oral form available
  - Orally given 2-4 tsp/day often for fatigue, neurological, mitochondrial issues.
  - Up to 8 tsp per day in oncology support
- Intravenous form available
  - Given without other additives (Up to 40 ml)
  - Generally added to a small normal saline (NS) bag

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NEVER MIX ANYTHING IN THE SAME BAG WITH LAMC!!

•Precipitates with other minerals and can also cause thrombus when mixed with other nutrients.

•You may run other nutrients in the same day or a series of infusions. Make sure to change for flush the line between LAMC and the nutrients.

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Lipoic-Mineral Complex

Nutrient	mg/ml	mL	mOsm/ml	mOsm*vol
1. LAMC		5 - 40		
2. D5W or 0.9% Saline		100 - 250		

Est. Treatment time: 0.5 – 1.5 hours **Desired drip rate: 3-4 mL/min**

Final osmolarity: Approx. Iso-osmolar

Technical notes:

1. DO NOT add any other nutrients or injectables to this solution.
2. Can be used in series with other nutrients
3. The **first treatment dose** should be 5 – 10 mL
4. LAMC may be increased to 40 mL with successive treatment if the first IV is well tolerated.

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Poly-MVA

Poly-MVA for IV Use:

1 – No oxidative therapies / HDIVC within 12 hours of Poly-MVA IV

2 – Infuse Poly-MVA per protocol over 30-90 minutes

3- Infusion Frequency: Two IV's weekly for six weeks then re-evaluate

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Sequencing in Cases:

- Often we will sequence IV's on the same day to increase synergy and speed healing. (see case in the PTC notes).
- Often this is some or all of the following:

1. Vitamin-Mineral IV
2. Glutathione
3. ALA or LAMC
4. Phospholipids (often added once the patient is past an acute phase)

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Poly-MVA Research Areas:

- Corduneanu O1, Chiorcea-Paquim AM, Garnett M, Oliveira-Brett AM. Lipoic acid-palladium complex interaction with DNA, voltammetric and AFM characterization. Talanta. 2009 Mar 15;77(5):1843-53. doi: 10.1016/j.talanta.2008.10.046. Epub 2008 Nov 6. PMID: 19159808
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- Sudheesh NP1, Ajith TA, Janardhanan KK, Krishnan CV. Palladium-α-lipoic acid complex attenuates alloxan-induced hyperglycemia and enhances the declined blood antioxidant status in diabetic rats. J Diabetes. 2011 Dec;3(4):293-300. doi: 10.1111/j.1753-0407.2011.00142.x.PMID: 21679354
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- Ajith TA, Nima N, Veena RK, Janardhanan KK, Antonawich F. Effect of palladium α-lipoic acid complex on energy in the brain mitochondria of aged rats. Altern Ther Health Med. 2014 May-Jun;20(3):27-35. PMID:24755568
- Sudheesh NP1, Ajith TA, Janardhanan KK, Krishnan CV. Effect of POLY-MVA, a palladium alpha-lipoic acid complex formulation against declined mitochondrial antioxidant status in the myocardium of aged rats. Food Chem Toxicol. 2010 Jul;48(7):1858-62. doi: 10.1016/j.fct.2010.04.022. Epub 2010 Apr 20. PMID: 20412826
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