Scientists cure cancer, but no one takes notice

Canadian researchers find a simple cure for cancer, but major pharmaceutical companies are not interested.

Researchers at the University of Alberta, in Edmonton, Canada have cured cancer last week, yet there is a little ripple in the news or in TV. It is a simple technique using very basic drug. The method employs dichloroacetate, which is currently used to treat metabolic disorders. So, there is no concern of side effects or about their long term effects.

This drug doesn't require a patent, so anyone can employ it widely and cheaply compared to the costly cancer drugs produced by major pharmaceutical companies.
Canadian scientists tested this dichloroacetate (DCA) on human's cells; it killed lung, breast and brain cancer cells and left the healthy cells alone. It was tested on Rats inflicted with severe tumors; their cells shrank when they were fed with water supplemented with DCA. The drug is widely available and the technique is easy to use, why the major drug companies are not involved? Or the Media interested in this find?

In human bodies there is a natural cancer fighting human cell, the mitochondria, but they need to be triggered to be effective. Scientists used to think that these mitochondria cells were damaged and thus ineffective against cancer. So they used to focus on glycolysis, which is less effective in curing cancer and more wasteful. The drug manufacturers focused on this glycolysis method to fight cancer. This DCA on the other hand doesn't rely on glycolysis instead on mitochondria; it triggers the mitochondria which in turn fights the cancer cells.
The side effect of this is it also reactivates a process called apoptosis. You see, mitochondria contain an all-too-important self-destruct button that can't be pressed in cancer cells. Without it, tumors grow larger as cells refuse to be extinguished. Fully functioning mitochondria, thanks to DCA, can once again die.

With glycolysis turned off, the body produces less lactic acid, so the bad tissue around cancer cells doesn't break down and seed new tumors.

Pharmaceutical companies are not investing in this research because DCA method cannot be patented, without a patent they can't make money, like they are doing now with their AIDS Patent. Since the pharmaceutical companies won't develop this, the article says other independent laboratories should start producing this drug and do more research to confirm all the above findings and produce drugs. All the groundwork can be done in collaboration with the Universities, who will be glad to assist in such research and can develop an effective drug for curing cancer.

You can access the original research for this cancer [here](#).

This article wants to raise awareness for this study, hope some independent companies and small startup will pick up this idea and produce these drugs, because the big companies won't touch it for a long time.

**Dichloroacetic acid**, often abbreviated DCA, is the chemical compound with formula CHCl
2COOH. It is an acid, an analogue of acetic acid, in which two of the three hydrogen atoms of the methyl group have been replaced by chlorine atoms. The salts and esters of dichloroacetic acid are called dichloroacetates. Salts of DCA have been studied as potential drugs because they inhibit the enzyme pyruvate dehydrogenase kinase.

Although preliminary studies have shown DCA can slow the growth of certain tumors in animal studies and in vitro studies, there is currently insufficient evidence to support the use of DCA for cancer treatment.

**Chemistry and occurrence**

The chemistry of dichloroacetic acid is typical for halogenated organic acids. It is a member of the chloroacetic acids family. The dichloroacetate ion is produced when the acid is mixed with water. As an acid with a pKₐ of 1.35, pure dichloroacetic acid is very corrosive and extremely destructive to tissues of the mucous membranes and upper respiratory tract via inhalation.
DCA has been shown to occur in nature in at least one seaweed, *Asparagopsis taxiformis*. It is a trace product of the chlorination of drinking water and is produced by the metabolism of various chlorine-containing drugs or chemicals. DCA is typically prepared by the reduction of trichloroacetic acid. DCA is prepared from chloral hydrate also by the reaction with calcium carbonate and sodium cyanide in water followed by acidifying with hydrochloric acid.

**Research**

**Lactic acidosis**

A randomized controlled trial in children with congenital lactic acidosis found that while DCA was well tolerated, it was ineffective in improving clinical outcomes. A separate trial of DCA in children with MELAS (a syndrome of inadequate mitochondrial function, leading to lactic acidosis) was halted early, as all 15 of the children receiving DCA experienced significant nerve toxicity without any evidence of benefit from the medication. A randomized controlled trial of DCA in adults with lactic acidosis found that while DCA lowered blood lactate levels, it had no clinical benefit and did not improve hemodynamics or survival.

Thus, while early case reports and pre-clinical data suggested that DCA might be effective for lactic acidosis, subsequent controlled trials have found no clinical benefit of DCA in this setting. In addition, clinical trial subjects were incapable of continuing on DCA as a study medication owing to progressive toxicities.

**Cancer**

Although preliminary studies have shown DCA can slow the growth of certain tumors in animal studies and in vitro studies "Available evidence does not support the use of DCA for cancer treatment at this time." Physicians warned of potential problems if people attempt to try DCA outside a controlled clinical trial. "If it starts going badly, who is following you before it gets out of control? By the time you realize your liver is failing, you’re in big trouble", said Laura Shanner, Associate Professor of Health Ethics at the University of Alberta. Notably, at least one fraudster, Hazim Gaber, has been convicted and sentenced to 33 months jail for selling fake DCA to cancer sufferers.

The only monitored in vivo dosage of five human patients suffering from glioblastoma with DCA was not designed to test its efficacy vs. their cancer, but rather to ascertain whether it could be given at a specific dosage safely without causing e.g. neuropathy. All 5 patients were receiving other treatments during the study. Observations in vitro and of tumours extracted from those 5 patients suggest that DCA might act against cancer cells by depolarising abnormal mitochondria found in glioblastoma cancer cells – allowing the mitochondria to induce apoptosis (cell death) of the malignant cells. However, in vitro work with DCA on neuroblastomas (which have fewer
recognised mitochondrial abnormalities) also showed some activity against very malignant, undifferentiated cells.


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Abstract The uptake of fluorodeoxyglucose Positron Emission Tomography in the tumors of various cancer types demonstrates the key role of glucose in the proliferation of cancer. Dichloroacetate is a 2-carbon molecule having crucial biologic activity in altering the metabolic breakdown of glucose to lactic acid. Human cell line studies show that dichloroacetate switches the metabolonics of the cancer cell from one of glycolysis to oxidative phosphorylation, and in doing so restores mitochondrial functions that trigger apoptosis of the cancer cell. Reports of dichloroacetate in human subjects are rare. The authors contacted individuals from Internet forums who had reported outstanding anti-cancer responses to self-medication with dichloroacetate. With informed consent, complete medical records were requested to document response to dichloroacetate, emphasizing the context of monotherapy with dichloroacetate. Of ten patients agreeing to such an evaluation, only one met the criteria of having comprehensive clinical records as well as pathology, imaging and laboratory reports, along with single agent therapy with dichloroacetate. That individual is the focus of this report. In this case report of a man with documented relapse after state-of-the-art chemotherapy for non-Hodgkin’s lymphoma, a significant response to dichloroacetate is documented with a complete remission, which remains ongoing after 4 years. Dichloroacetate appears to be a novel therapy warranting further investigation in the treatment of cancer.

Keywords Dichloroacetate • DCA • non-Hodgkin’s lymphoma • NHL • PET • PET/CT • Glycolysis • Metabolomics • Warburg
Phase 1 trial of dichloroacetate (DCA) in adults with recurrent malignant brain tumors

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Summary Background Recurrent malignant brain tumors (RMIBTs) carry a poor prognosis. Dichloroacetate (DCA) activates mitochondrial oxidative metabolism and has shown activity against several human cancers. Design We conducted an open-label study of oral DCA in 15 adults with recurrent WHO grade III–IV gliomas or metastases from a primary cancer outside the central nervous system. The primary objective was detection of a dose limiting toxicity for RMIBTs at 4 weeks of treatment, defined as any grade 4 or 5 toxicity, or grade 3 toxicity directly attributable to DCA, based on the National Cancer Institute’s Common Toxicity Criteria for Adverse Events, version 4.0. Secondary objectives involved safety, tolerability and hypothesis-generating data on disease status. Dosing was based on haplotype variation in glutathione transferase zeta 1 (mantle/acetonecotetase isomerase, GSTZ1/MAAI), which participates in DCA and tyrosine catabolism. Results Eight patients completed at least 1 four week cycle. During this time, no dose-limiting toxicities occurred. No patient withdrew because of lack of tolerance to DCA, although 2 subjects experienced grade 0–1 distal paraesthesias that led to elective withdrawal and/or dose-adjustment. All subjects completing at least 1 four week cycle remained clinically stable during this time and remained on DCA for an average of 75.5 days (range 26–123). Conclusions Chronic, oral DCA is feasible and well-tolerated in patients with recurrent malignant gliomas and other tumors metastatic to the brain using the dose range established for metabolic diseases. The importance of genetic-based dosing is confirmed and should be incorporated into future trials of chronic DCA administration.

Keywords Dichloroacetate · Malignant (high grade) glioma · Warburg effect · Pyruvate dehydrogenase complex · Pyruvate dehydrogenase kinase · Phase I trial

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Dichloroacetate (DCA) enhances tumor cell death in combination with oncolytic adenovirus armed with MDA-7/IL-24

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Abstract Dichloroacetate (DCA) is a metabolic modulator for the treatment of lactic acidosis and inherited mitochondrial diseases. A recent study showed that DCA treatment could induce apoptosis in many kinds of tumor cell lines via mitochondrial apoptotic pathway while sparing normal cells. ONYX-015 (dl 1520) is one of the oncolytic adenoviruses developed by the deletion of E1B-55KD gene of type 5 adenoviral DNA, and it replicates efficiently and selectively in tumor cells. ZD55-IL-24, an E1B-55KD deleted oncolytic adenovirus carrying interleukin-24 (IL-24), also called melanoma differentiation associated gene-7), had showed potent antitumor efficacy in a variety of tumor cells and exerted no apparent toxicity on normal cells. Given both the good therapeutic effect and low toxicity of these agents, here we investigated whether DCA in combination with ZD55-IL-24 or ONYX-015 could have more efficient antitumor activity in vitro experiments. Therefore, we tested the cytotoxicity of combination therapy in normal hepatic cells L-02 and QSG-7701 using the MTT assay. Our results showed that DCA combined with ONYX-015 or ZD55-IL-24 exhibited more potent antitumor activity than DCA or virus alone, and the combination treatment did not have superimposed toxicities in normal cells. Thus, a novel combination therapy associating oncolytic adenoviruses with relatively low toxic drug without severe side effects was proposed.

Keywords Dichloroacetate • ONYX-015 • ZD55-IL-24 • Combination therapy

Introduction

The generic drug dichloroacetate (DCA), which is usually used as a metabolic modulator for treatment of human hereditary mitochondrial metabolic diseases, such as congenital lactic acidosis and hyperlactatemia, has a great potential to become a promising anti-cancer agent. Bonnet et al. [1] found that the small molecule DCA could induce apoptosis in lung, breast and glioblastoma cancer cell lines by reversing the suppressed mitochondrial apoptosis in cancer cells but exerted no apparent toxicities on normal cell lines. The researchers also showed that the unique metabolism of most solid tumors as their target and thereby reactivated the suppressed mitochondrial apoptosis in cancer and resulted in decreased tumor growth in vitro and in vivo [2].

Dichloroacetate could also effectively make human prostate cancer cells more sensitive to radiation by regulating the expression levels of key members of the Bcl-2 family [3]. Wong et al. [4] demonstrated DCA effectively promote apoptosis in most endometrial cancer cell lines via mitochondrial, NFAT-Kc1.5, and PUMA-mediated mechanisms. Unlike other chemotherapeutic agents, such as cis-diamminedichloroplatinum (DDP), cytoxan (CTX), and methotrexate (MTX), the small molecule DCA does not have severe side effect and drug resistance. Given these results, DCA may potentially usher in a new era of combating cancer by metabolic targeting [5].

ONYX-015, an oncolytic adenoviral agent developed by ONYX Pharmaceuticals, Inc. (Richmond, CA) and designed to selectively kill tumor cells, did not show potent antitumor efficacy as expected in Phase I and II clinical trials [6, 7]. However, many studies found that ONYX-015 could effectively induce tumor cell death in combination with several chemotherapeutic agents, such as cisplatin and...
Dichloroacetate (DCA) as a potential metabolic-targeting therapy for cancer

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The unique metabolism of most solid tumours (aerobic glycolysis, i.e., Warburg effect) is not only the basis of diagnosing cancer with metabolic imaging but might also be associated with the resistance to apoptosis that characterises cancer. The glycolytic phenotype of cancer appears to be the common denominator of diverse molecular abnormalities in cancer and may be associated with a (potentially reversible) suppression of mitochondrial function. The generic drug dichloroacetate is an orally available small molecule that, by inhibiting the pyruvate dehydrogenase kinase, increases the flux of pyruvate into the mitochondria, promoting glucose oxidation over glycolysis. This reverses the suppressed mitochondrial apoptosis in cancer and results in suppression of tumour growth in vitro and in vivo. Here, we review the scientific and clinical rationale supporting the rapid translation of this promising metabolic modulator in early-phase cancer clinical trials.


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Keywords: mitochondria; metabolism; apoptosis; potassium channels; positron emission tomography; glycolysis.

A PARADIGM SHIFT IS NEEDED IN CANCER THERAPEUTICS

Although some battles have been won since the declaration of the ‘war on cancer’ in 1971 in the United States, the war is ongoing. Despite enormous investments from industry and the public, oncology has not seen the expected increase in the clinical development of effective investigational drugs less than a third of that in cardiovascular or infectious diseases (Kamb et al., 2007). Drug development in oncology has typically focused on targets essential for the survival of all dividing cells, leading to narrow therapeutic windows. Non-essential targets offer more selectivity but little efficacy. It is extremely rare to find an essential target that is unique to cancer cells. The dependence of CML cells on Abl kinase is only induced by a chromosomal translocation in the malignant clone, making the efficacy and selectivity of imatinib for CML an exception in cancer therapy (Kamb et al., 2007). The most important reason for the poor performance of cancer drugs is the remarkable heterogeneity and adaptability of cancer cells. The molecular characteristics of histologically identical cancers are often dissimilar and molecular heterogeneity frequently exists within a single tumour. The view that ‘there are many different types of cancers’ is increasingly shared by scientists and clinical oncologists. This has important implications, including the realisation that specific drugs have to be developed and tested for molecularly defined tumours and effects in one might not necessarily be relevant to another cancer.

The biggest challenge remains the selective induction of cell death (mainly apoptosis) in cancer but not normal cells. Pragmatically, an ideal anticancer therapy would be easily administered (possibly an orally available small molecule) and affordable. Most new anticancer drugs are prohibitively expensive not only for millions of patients from developing countries, but also for many patients without strong medical insurance in developed countries.

One way that the problem of heterogeneity of ‘proximal’ molecular pathways in cancer can be addressed is by targeting more ‘distal’ pathways that integrate several proximal signals, as long as the common distal pathways remain essential and specific to cancer cells. The unique metabolism of most solid tumours integrates many proximal pathways and results in a remodeling of mitochondria (where the regulation of energy production and apoptosis converge), to produce a glycolytic phenotype and a strong resistance to apoptosis. There is now growing evidence that the mitochondria might be primary targets in cancer therapeutics instead of simple bystanders during cancer development. This cancer-specific metabolic remodeling can be reversed by dichloroacetate (DCA), a mitochondria-targeting small molecule, that penetrates most tissues after oral administration (Bonnet et al., 2007; Pan and Mak, 2007). The molecular and direct metabolic response to DCA can also be followed by measuring glucose uptake in tumours by positron emission tomography (PET) imaging, non-invasively and prospectively. Such metabolic strategies might be able to shift the paradigm of experimental therapeutics in oncology.

The preclinical work on DCA (showing effectiveness in a variety of tumours and relatively low toxicity) (Bonnet et al., 2007), its structure (a very small molecule), the low price (it is a generic drug) and the fact that DCA has already been used in humans for more than 30 years, provide a strong rationale for rapid clinical translation. Here, we expand the scientific rationale and discuss several practical points that will be important in the clinical evaluation of DCA as anticancer therapy.
Bioenergetic modulation with dichloroacetate reduces the growth of melanoma cells and potentiates their response to BRAFV600E inhibition

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Abstract

Background: Advances in melanoma treatment through targeted inhibition of oncogenic BRAF are limited owing to the development of acquired resistance. The involvement of BRAFV600E in metabolic reprogramming of melanoma cells provides a rationale for co-targeting metabolism as a therapeutic approach.

Methods: We examined the effects of dichloroacetate (DCA), an inhibitor of pyruvate dehydrogenase kinase, on the growth and metabolic activity of human melanoma cell lines. The combined effect of DCA and the BRAF inhibitor vemurafenib was investigated in BRAFV600E-mutated melanoma cell lines. Vemurafenib-resistant cell lines were established in vitro and their sensitivity to DCA was tested.

Results: DCA induced a reduction in glycolytic activity and intracellular ATP levels, and inhibited cellular growth. Co-treatment of BRAFV600E-mutant melanoma cells with DCA and vemurafenib induced a greater reduction in intracellular ATP levels and cellular growth than either compound alone. In addition, melanoma cells with in vitro acquired resistance to vemurafenib retained their sensitivity to DCA.

Conclusions: These results suggest that DCA potentiates the effect of vemurafenib through a cooperative attenuation of energy production. Furthermore, the demonstration of retained sensitivity to DCA in melanoma cells with acquired resistance to vemurafenib could have implications for melanoma treatment.

Keywords: Dichloroacetate, Melanoma, BRAF, Bioenergetics, Metabolism, ATP

Background

A hallmark of cancer is the reprogramming of cellular metabolism towards aerobic glycolysis. This metabolic pattern is characterized by increased glucose uptake and highly up-regulated glycolytic activity with fermentation of glucose into lactic acid instead of complete aerobic decomposition in the mitochondria. Aerobic glycolysis, also referred to as the Warburg effect, resembles the anaerobic metabolism of normal cells, but occurs in the context of an inadequate oxygen supply [1]. The reprogramming of metabolism in cancer cells is a highly complex and heterogeneous process, which is driven by a wide variety of genetic and non-genetic strategies to overcome energy restriction [2-4].

The BRAFV600E oncogene, present in more than 50% of melanomas [5], has been directly implicated in the reprogramming of cellular metabolism. The constitutive activity of mutant BRAF reduces the expression of oxidative enzymes and the number of mitochondria, while increasing the expression of glycolytic enzymes and lactic acid production [6,7]. Furthermore, a molecular link was recognized between the RAS-RAF-MEK-ERK-MAPK pathway and the energetic-stress check-point mediated by the liver kinase B1 (LKB1)-AMP activated protein kinase (AMPK) pathway, suggesting a role for BRAFV600E in mediating resistance to energetic stress [8,9]. BRAF affects oxidative metabolism through microphthalmia-associated transcription factor (MITF)-dependent control of the mitochondrial master regulator PGC1α [7]. Previous studies have shown that melanomas expressing PGC1α have a more oxidative phenotype than PGC1α-negative melanomas [4,7]. In addition, BRAFV600E was shown to mediate...
DICHLOROACETATE

• Dichloroacetate (DCA) is an activator of pyruvate dehydrogenase.

• It can lower concentration of lactic acid in patients by improving the lactate utilization but when used in large clinical trial it did not show any effect on mortality.

• DCA, however, may be helpful in lactic acidosis in children with severe malaria.
Neuropathy

Neuropathy has been a problem in some clinical trials with DCA causing them to be effectively halted, but a review found that it has not occurred in other trials. The mechanism of DCA induced neuropathy is not well understood. On the one hand in vitro work with nerves has suggested a mechanism for the neuropathic effect of DCA; with DCA showing a dose and exposure dependent demyelination of nerves (stripping of the nerve 'sheath'), which demyelination was partially reversible over time, following washout of DCA. On the other hand, a review in BJG states "This neurotoxicity resembled the pattern of length-dependent, axonal, sensorimotor polyneuropathy without demyelination." with regard to the 2006 study by Kaufman et al.

References

5. [1]
11. [2]
13. [3]
Apple Cider Vinegar Cure

Apple Cider Vinegar is probably the most well-known and popular natural cure in existence. People even write entire books about health benefits of apple cider vinegar!

The first thing to consider with apple cider vinegar is the type. It should be raw, unfiltered, organic, unpasteurized apple cider vinegar (sometimes referred to as mother). This type of apple cider vinegar is unfortunately probably not what your going to find in a supermarket, so you will probably have to purchase this at a natural food store or online (Spectrum and Bragg are popular brands). The unfiltered stuff may look 'dirty' or 'cloudy' but this is a good thing because it means all the good nutrients and enzymes haven’t been removed. The filtering done by so many producers is done solely for cosmetic reasons. A number of filtered apple cider products are actually just regular vinegar flavored with apples, so yet another reason to buy unfiltered apple cider vinegar. Many health sites claim only unfiltered or 'mother' will work as a cure.

For a complete list of what apple cider supposedly cures see the list at the bottom.

One of the major benefits of apple cider vinegar is that it makes your body alkaline (as opposed to acidic). There is a significant inverse correlation between one's health and their acidity (which can be measured). Certain foods make you acidic (sugars, alcohol simple carbs, artificial sugar, peanuts, most oils except olive, meat, dairy and smoking (more of a habit than a food)) and certain foods help turn your body alkaline (melons, dates, lemons, grapes, and apple cider vinegar). Interestingly enough even though apple cider is obviously acidic the digestive 'ash' residue from digestion has a alkalinizing affect on the body. In fact many argue a key cure to cancer is to alkalize the body. This will be expanded on

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17. [4][dead link]

later in another article. Interestingly enough regular vinegar has a neutral PH ash factor. Some suggest taking baking soda with the apple cider vinegar (it’s going to be neutralized anyways) because this will cut down on the bicarbonates the pancreas has to produce (meant to neutralize acid) which should further help to alkalize and oxygenate the body.

Another reason raw apple cider vinegar may be so beneficial is its mineral content. Besides being rich in nutrients and enzymes, apple cider vinegar is rich in calcium, chlorine, copper, fluorine, iron, magnesium, phosphorous, potassium, silicon, sodium, sulfur and many other minerals in trace amounts. Apple cider vinegar is best known for its potassium content which many people are deficient in and is a powerful agent against high blood pressure. For vitamins, apple cider vinegar is a source of Vitamin A, Vitamin B1, Vitamin B2, Vitamin B6, Vitamin C, Vitamin E, beta-carotene, and Vitamin P. It is also rich in pectin which I wrote an entire page about.

Apple cider vinegar is a natural blood thinner (think aspirin or advil but without the dangerous side effects for joint, circulation, mental and nervous system issues). It is also a natural chelator (this means it can remove heavy metals from your system) but there are probably plenty better (like cilantro). I’ll touch more on chelation later...

Apple cider vinegar commonly comes in pill form, but most sources I've read discourage apple cider vinegar pills because they say the processing completely changes the essence of what apple cider vinegar is and nullifies the health benefits.

Apple cider vinegar is a great anti-fungal, anti-bacterial, and anti-viral agent especially as a topical agent. Particularly it is popular against candidiasis (fungal growth in your intestines which almost everybody has),

Apple cider vinegar jumped into the national spotlight when Megan Fox proclaimed she used to it to lose weight, counteract the sweets she ate, and to counteract water retention following menstrual periods. While quickly scoffed at in the mainstream media there is some validity to what she is arguing (except eating sweets which acidify the body, feed your cancer cells, and cause candida/digestive issues). What happens is apple cider vinegar is stored as glycerin in the body which scrubs fat from the cells. It also speeds up one's metabolism and accelerates the oxidation process required to flush fats out of the system. The potassium then does a great of job reducing water retention in the body.
Many toxic substances can be rendered less toxic because apple cider vinegar can change many toxins into an acetate compound which is less toxic (means this can be a cure for insect bites and skin allergies).

Be careful when consuming apple cider vinegar as it can cause tooth damage. Try to to dilute it, drink it with a straw and rinse your mouth after consuming it.

Also be careful what type of container you purchase apple cider vinegar in. Apple cider vinegar being very acidic leaches more toxins out the plastics then most foods. Avoid plastic #1,#3,#6, and #7. Best yet avoid plastic altogether and get glass.
One of the most traditional cures for almost anything is apple cider vinegar. Over the centuries, the ancient folk remedy is touted to relieve just about any ailment you can think of including diabetes, obesity and even cancer. Here's what science has found.

Apple cider vinegar (ACV) became well known in the U.S. in the late 1950s, when it was promoted in the best-selling book Folk Medicine: A Vermont Doctor’s Guide to Good Health by D. C. Jarvis. During the alternative medicine boom of recent years, apple cider vinegar and apple cider vinegar pills have become a popular dietary supplement.

Unpasteurized or organic ACV contains mother of vinegar, which has a cobweb-like appearance and can make the vinegar look slightly congealed. It's the only way apple cider vinegar should be consumed.

ACV is used in salad dressings, marinades, vinaigrettes, food preservatives, and chutneys, among other things. It is made by crushing apples and squeezing out the liquid. Bacteria and Yeast are added to the liquid to start the alcoholic fermentation process, and the sugars are turned into alcohol. In a second fermentation process, the alcohol is converted into vinegar by acetic acid-forming bacteria (acetobacter). Acetic acid and malic acid give vinegar its sour taste.

Apple cider vinegar is purported to treat numerous diseases, health conditions, and annoyances. To name a few, it kills head lice, reverses aging, eases digestion, prevents flu, prevents acne, lowers blood pressure, reduces inflammation, kills fungus, regulate pH balance, dissolves kidney stones and helps relieve allergies, migraines, asthma, nausea, heart burn and wash toxins from the body. Can it really do
all these things? You bet it can and more! But what does science say?

**Diabetes.** The effect of apple cider vinegar on blood sugar levels is perhaps the best researched and the most promising of APV’s health benefits. Several studies have found that vinegar may help lower glucose levels. For instance, a study (White, A. Diabetes Care, November 2007) of 11 people with type 2 diabetes found that taking two tablespoons of apple cider vinegar before bed lowered glucose levels in the morning by 4%-6%. In another study from Arizona State University, subjects took a drink of 20 grams of apple cider vinegar and 40 grams of water. Those with insulin resistance who drank the vinegar had 34% lower postprandial (after-meal) glucose compared to controls. Vinegar may be the most cost-effective medicine in history, but most people with diabetes still aren’t taking it.

**High Cholesterol.** A 2006 study reported in Medscape General Medicine, showed evidence that ACV could lower cholesterol. In a study published in a foreign medical journal, scientists found an apple cider vinegar-enhanced diet may increase in HDL (good cholesterol), and reduce levels of triglycerides. Research in rats suggests that apple-cider vinegar can help control triglycerides and cholesterol (Journal of Agricultural and Food Chemistry, June 22, 2011).

**Blood Pressure and Heart Health.** Another study in rats found that vinegar could lower high blood pressure. A large observational study also found that people who ate oil and vinegar dressing on salads five to six times a week had lower rates of heart disease than people who didn’t. Researchers have suggested that ‘this reduction in blood pressure may be caused by the significant reduction in renin activity and the subsequent decrease in angiotensin II’. Potassium in the vinegar ‘balances sodium levels in the body, which aids in maintaining blood pressure within healthy limits’ and ‘apple cider vinegar also contains magnesium, a mineral that works to relax blood vessel walls and thus lower high blood pressure’.

**Cancer.** A few laboratory studies have found that vinegar may be able to kill cancer cells or slow their growth. One study found that eating vinegar was associated with a decreased risk of esophageal cancer. Another associated it with an increased risk of bladder cancer. In recent trials, pectin, which can be found in ACV, has shown promise in helping to slow the growth of cancerous cells within the prostate (http://www.news-medical.net/news/20100702/Modified-Citrus-Pectin-holds-promise-against-prostate-cancer.aspx). In addition, apple cider vinegar’s acidity aids in detoxifying and cleansing the digestive tract and cleaning out the colon, which supports the health of the prostate as well.

**Weight Loss.** For thousands of years, vinegar has been used for weight loss. White vinegar (and perhaps other types) might help people feel full. A study (Ostman, E. European Journal of Clinical Nutrition, 2005) of 12 people found that those who ate a piece of bread along with small amounts of vinegar felt fuller and more satisfied than those who just ate the bread. A 2009 study on mice showed that consuming acetic acid (the active component in ACV), upregulates the expression of genes for fatty acid oxidation enzymes in the liver causing a suppression in body fat accumulation. In a double-blind experiment, obese Japanese were assigned to three different groups based on similar body weights, body mass indexes (BMI), and waist circumference. Each group drank a 500 ml drink containing either 30ml, 15ml, or 0ml of vinegar daily for 12 weeks. Those in the 30ml and 15ml groups had lower BMI, visceral fat area, waist circumference, serum triglyceride, and body weight to the control group of 0ml. The 12-week weight losses were modest: 1.2kg in the 15ml group and 1.7kg in the 30ml group. These two groups consumed a similar number of calories to the control group and also performed a similar amount of exercise, so the effect is not likely to have been due to an impact on appetite or other lifestyle changes. It was concluded that consumption of vinegar might reduce obesity.
Apple cider vinegar is chosen over white vinegar for many processes involving the elimination of fungus. Although they both have highly acidic properties; apple cider also contains detoxifying qualities that will clear up other skin allergies. No side effects have been found when treating the skin with apple cider vinegar, making it a cost effective and safe remedy.

Here are many other benefits of apple cider vinegar that can be applied to your lifestyle. Read the list below.

**Hair:** It is widely known that apple cider vinegar can be used as a rinse for your hair after shampooing to add healthy body and shine. Recycle an old shampoo bottle and fill it with 1/2 a tablespoon of apple cider vinegar and a cup of cold water. Pour through your hair after shampooing several times a week.

**Face:** Did you know that apple cider vinegar can help regulate the pH of your skin? Dilute apple cider vinegar with two parts water, and spread the concoction over your face with a cotton ball as a toner. You can do this at night after washing, and in the morning before you apply your moisturizer. You can also dab apple cider vinegar directly onto age spots and leave them on overnight to lighten their color.

**Hands and Feet:** Are your hands and feet feeling tired and swollen after a long day? Treat yourself to a personal spa massage by rubbing apple cider vinegar onto them.

**Sunburn:** Suffering from a bad sunburn? Add a cup of apple cider vinegar to your bath and soak for 10 minutes.

**Teeth:** Did you know that apple cider vinegar can help remove stains from teeth? Rub teeth directly with apple cider vinegar and rinse out.

**Aftershave:** Fill a bottle with equal parts apple cider vinegar and water and shake to blend.

**Detox:** Add 2 tablespoon of apple cider vinegar to a 1 or 2 liter filtered water bottle. Drink this throughout the day to cleanse your body and kidneys all day long.

**Drain Cleaner:** Baking soda and apple cider vinegar is an amazing bubbly combination that has many uses. As a drain cleaner, sprinkle baking soda down the drain then add apple cider vinegar and let it bubble for 15 minutes, then rinse with hot water. This is a safer alternative to dangerous drain cleaners.

**Digestion:** A small amount of apple cider vinegar, taken just prior to a meal, will stimulate production of digestive juices.

**Dandruff:** A home remedy for dandruff is to mix 1/4 cup apple cider vinegar with 1/4 cup water. The vinegar solution is thought to restore the pH balance of the scalp and discourage the overgrowth of malassezia furfur, the yeast-like fungus thought to trigger dandruff.

**Mosquito and Insect Bites:** Using as little as 1/4 teaspoon of apple cider vinegar will relieve insect bites instantly.

**Stomach Aches:** Mix 1 tablespoon of organic apple cider vinegar with 12 ounces of warm water, and drink in the morning on empty stomach. Feel free to add a little honey or maple syrup.

**Alkaline Acid Balance:** Some alternative practitioners recommend using apple cider vinegar to restore
alkaline acid balance. The theory behind the alkaline diet is that our blood is slightly alkaline (with a normal pH level of between 7.35 and 7.45) and that our diet should reflect this pH level. Proponents of the alkaline-acid theory believe that a diet high in acid-producing foods leads to lack of energy, excessive mucous production, infections, anxiety, irritability, headache, sore throat, nasal and sinus congestion, allergic reactions, and increased risk of conditions such as arthritis and gout.


4 benefits of apple cider vinegar:

1) Diabetes - acetic acid inhibits the activity of several carbohydrate-digesting enzymes, including amylase, sucrase, maltase, and lactase. As a result, when vinegar is present in the intestines, some sugars and starches temporarily pass through without being digested, so they have less of an impact on blood sugar.

2) Weight Loss - Most apple cider vinegar weight loss home remedies call for the taking of one or two teaspoons of apple cider vinegar in a glass of water before each meal. Patricia Bragg recommends adding 1 or 2 teaspoons of raw honey to this mixture.

3) Blood Pressure & Cholesterol - High blood pressure can lead to major health problems including heart attack, stroke, aneurysms. A normal blood pressure reading is considered to be 120/80. If yours is higher, consider apple cider vinegar as a normalizing agent. Studies found that acetic acid may help lower blood pressure and cholesterol.

4) Alkaline Acid Balance - Despite being an acidic solution, it is believed that apple cider vinegar has an alkalinizing effect on the body. One to two teaspoons of apple cider vinegar in water as a daily is recommended.

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