Cantron™: Its Beneficial Role Against Health Damaging Free Radicals

A study and comprehensive discussion of the antioxidant power of Cantron™ including all versions and variations such as Entelev, Cancell and Protocel.

All tests performed at Brunswick Laboratories and Cayman Laboratories.

Original Research Project overseen by Daniel Hetrick, PhD in 2003. The new "Advanced Scientific Version" of Cantron™ was tested in July 2007.

Research report and discussions compiled by Jerome Godin.
Revised September 2008

DANIEL L. HETRICK Ph.D.
NUTRACEUTICAL CONSULTANT
P.O. BOX 3556
LANTANA FL 33465
Phone 561 533 8000
Fax 533 6638

Mr. Jerome Godin
Medical Research Products Inc.
3960 NW 167 Street
Miami Fl 33054

December 15, 2003

RE: Antioxidant Activity of Cantron : Project Summary

The recently completed *in vitro* tests of Cantron & related products for antioxidant properties clearly show a high level of activity against both the formation and the scavenging of free radicals. These tests include activity versus both water soluble and lipid soluble peroxy radicals, hydroxy radicals, and superoxide anions. These radicals are believed to be responsible, in part for many of the major diseases, including Alzheimer's, Atherosclerosis, and Cancer, and in part, for the natural ageing process.

The 'reactive oxygen scavenging' (ROS) activity is compared with that of Vitamins C and E as the standards. Cantron has many times as much activity, unit for unit, as the standards, and is active against all 4 types of radicals.

The tests used were developed for the determination of antioxidant activity of vegetables under the aegis of the USDA, and then formatted to the COBAS analyser as high throughput automated procedure. They are widely accepted as 'state of the art' for the study of antioxidant properties of foods and nutraceuticals.

Cantron is unusual in having high overall ROS activity and being effective against at least 4 of the six major free radical groups.

Note: Since this letter was written, the new & improved Cantron™, Advanced Scientific Formula has been tested. Additional tests have also been conducted on peroxynitrite and superoxide radicals.

Cantron™ is the World's Most Effective Antioxidant Compound

Independent laboratory tests demonstrate that Cantron™ has superior efficacy in regard to scavenging all health damaging species of free radicals including:

- **Hydroxyl Radicals**
- **Peroxyl hydro Radicals**
- **Peroxyl lipo Radicals**
- **Peroxynitrite Radicals**
- **Superoxide Radicals**

The results of recent studies conducted by Brunswick Laboratories – the world's leading testing facility of antioxidants- demonstrate that Cantron™ is the planet's most potent free radical scavenger. This is great news for those who wish to prevent or reverse serious health conditions. It is head and shoulders above all other antioxidants in its ability to scavenge a wide range of the dangerous "Reactive Oxygen Species" of free radicals that are responsible for multitudes of diseases in mankind. It is, in fact, 522 times more effective than the vitamin E test standard on peroxyl radicals, 417 times more effective than the vitamin C standard and 282 times more effective than orange juice. On hydroxyl radicals it is 52 times more effective than the Caffeic acid test standard, and 68 times more effective than green tea.

What Are Free Radicals?

In the most simplistic terms, free radicals are unstable molecules inside the body that attack stable molecular structures. When chronic and in the absence of sufficient defenses, these attacks cause damage to healthy tissues, organs, cell membranes, blood vessels, proteins, fats, carbohydrates and even DNA strands within the cell. This resultant damage has a cumulative effect and can lead to many disease states. Degradation of DNA in cells caused by free radicals has serious biological consequences such as mutation, carcinogenic transformation, pathologies and cellular aging. It is even reported that free radicals may lead to programmed cell death (apoptosis).

According to the National Cancer Institute (http://www.cancer.gov): "Free radicals are molecules with incomplete electron shells which make them more chemically reactive than those without incomplete electron shells. In humans the most common form of free radicals is oxygen. When an oxygen molecule (O2) becomes electrically charged or "radicalized" it tries to steal electrons from other molecules, causing damage to the DNA and other molecules. Over time, such damage may become irreversible and lead to disease including cancer."

Note: If you read our last antioxidant report, you may notice that many things have changed. Tests for peroxynitrite radicals and scores for superoxide radicals were not available at that time and are now included in this new report. Regarding the HORAC scores, the standard has changed from Gallic acid equivalent to Caffeic acid equivalent. The conversion is the Gallic acid score times 1.5. All previous scores have been converted accordingly. Dr. Hetrick, who has passed away since his initial work on this project adjusted the different scores for formula density. Our current team of scientists believed it was better to record the raw scores and not adjust for density. Most importantly, the new Cantron™ ASV version has been tested and it dramatically outperforms all other versions and variations of this formula with "off the chart" results.

Brunswick Biomedical Technologies Lab- who tested our formulations- describes the effects of free radical damage accordingly: "Overall, free radicals have been implicated in the development of at least 50 diseases! A partial list includes arthritis and other inflammatory diseases, kidney disease, cataracts, inflammatory bowel disease, colitis, lung dysfunction, pancreatitis, drug reactions, skin lesions and aging to mention a few. Heart disease and cancer are two of the most widespread diseases associated with free radical damage. Heart disease is the leading cause of death in America today, killing an estimated one in every three Americans. Literally, free radicals are the major factor of aging."

Other disease states of which free radicals are responsible for are Parkinson's disease, Alzheimer's disease, lupus, atherosclerosis, strokes, rheumatoid arthritis, age-related hearing loss, liver disease, age associated

neurological disorders, retinopathy, macular degeneration, TMJ symptoms, cerebral palsy, Down's syndrome, ALS, sepsis, Huntington's disease, loss of skin elasticity (breakdown of collagen), and the list is still growing as ongoing research continues.

There are more than 300 theories to explain the aging phenomenon. Among all theories, the free radical theory of aging, postulated first by Dr. Denham Harman at the University Of Nebraska, is the most popular and widely tested. Aging is thought to occur as a result of constant exposure to Reactive Oxygen Species of free radicals with a cumulative damage, through the entire life, along with the gradually decreasing repair capacity and increasing degenerative changes in the organs, tissues and individual cells. The body has enzymes, which can repair much of the damaged proteins, but when these enzymes become damaged themselves, repair processes are compromised.

"It is difficult these days to open any medical journal and not find some paper on the role of "Reactive Oxygen Species" or "free radicals" in human disease. The species have been implicated in over 50 diseases. This large number suggests that radicals are not something esoteric, but that they participate as a fundamental component of tissue injury in most, if not all, human diseases." ...from the American Journal of Medicine, Sept 30, 1991 v91 n3C p12S (9); Oxidants and Antioxidants: Pathophysiologic Determinants and Therapeutic agents, Author: Halliwell, Barry.

What Causes Free Radicals?

There are many internal and external factors which form free radicals: tobacco smoke, excessive alcohol, radiation including ultraviolet radiation from the sun, auto exhaust, pesticides, herbicides, pollution, prescription drug use, chemotherapy, surgery, breakdown of bacteria by white blood cells, microbial or viral infections, metabolism of toxins, inflammatory processes, byproducts of oxygen metabolism, stress, shock, trauma, hypoxia, enzymatic reactions, calorie consumption, poor diet and many food materials especially oxidizing hydrogenated oils.

A single free radical can destroy an enzyme, a protein molecule, a strand of DNA, or an entire cell, but even worse, in a nano-second it can unleash torrential chain reactions in our bodies. Each free radical can initiate and perpetuate millions of other free radicals, setting off chains of biologically damaging reactions. This damage is at the molecular and cellular levels. Ironically, the underlying mechanisms that most chemotherapeutic agents and ionizing radiation have is not to neutralize free radicals but to produce more free radicals which leads to irreversible tissue injury.

What Are Antioxidants?

In the most simplistic terms, the role of antioxidants is to interact with free radicals and "quench" them or render them harmless. Researchers believe that increased dietary intake of antioxidants can slow the process of free radical damage and associated disorders. By removing free radicals, antioxidants help to: protect against DNA damage in cells, protect cell membranes, protect against all forms of cancer, protect the brain against various forms of dementia, protect against the harmful cross-linking of proteins with sugars that cause cell damage and may help slow the aging process. Antioxidants have been shown to provide: blood vessel strength and protection, enhanced memory and learning function, healthy lung function, bone and joint flexibility.

According to the National Cancer Institute, "Antioxidants are substances that may protect cells from the damage caused by unstable molecules known as free radicals. Free radical damage may lead to cancer. The antioxidants interact with and stabilize free radicals and may prevent some of the damage free radicals otherwise might cause. Considerable laboratory evidence from chemical, cell culture, and animal studies indicate that antioxidants may slow or possibly prevent the development of cancer. Antioxidants are often described as "mopping up" free radicals, meaning they neutralize the electrical charge and prevent the free radical from taking electrons from other molecules."

US Federal Courts have recently instructed the FDA to allow the claim that antioxidants may prevent cancer (Whitaker vs. Thompson {2002}, Pearson vs. Shalala {1999} and Pearson vs. Shalala 2 {2001}). These landmark rulings benefit the general public, which now has access to this extremely important health information that may help millions of people reduce the risk of this dreaded disease and live longer as a result of using antioxidants in their diet.

Two principal mechanisms of action have been proposed for antioxidants, first is stabilizing free radical present in the system, and the second mechanism involves the removal of chain initiating catalysts. Furthermore, antioxidants can act by scavenging biologically important reactive oxygen species, by preventing their formation, or by repairing the damage that they do. Antioxidants can suppress apoptosis (programmed cell death), act as reducing agents, chelate metal compounds and affect directly or indirectly the expression of genes in tissues. A diet high in antioxidants may even bolster the body's own defenses against biological invaders transmitted by germ warfare, mosquitoes or other delivery methods.

The body's arsenal of antioxidants appear to be sufficient for keeping oxidation in check in children and in youths, but once we reach our 20's, the effectiveness of the body's antioxidants defense mechanisms lessen and free radicals are given greater rein to do damage. For example, the antioxidant enzyme, superoxide dismutase, appears to diminish with age and the antioxidant capacity in human plasma decreases. While the body's antioxidant defenses are reduced, the number of free radicals in the body rises dramatically. Studies also show that cells from old individuals are more susceptible to oxidative damage than cells from younger donors and that some of this damage can actually be prevented by antioxidants.

Researchers found that cancer patients with small cell lung cancer who used antioxidants showed increased long-term survival rates as compared with previously published studies. It was also noticed that patients receiving antioxidants were able to tolerate chemotherapy and radiation treatment well. It was concluded that antioxidant treatment could potentiate orthodox cancer treatments by decreasing the likelihood of side effects and increasing the host immune defense. Ralph Moss, PhD, author of the best selling book, "The Cancer Industry," former assistant director of public affairs at Memorial Sloan-Kettering Cancer Center, and producer for several documentaries, including, "The Cancer War," stated in his newsletter of 8/17/2003; "I would argue that the preponderance of evidence already suggests that antioxidants reduce the side effects of chemotherapy and radiation, without, however, interfering with their effectiveness.

As the body's own antioxidant defenses are gradually overwhelmed by the aging process or disease or both, fruits, vegetables, herbs, spices, and concentrated dietary supplements should be consumed as they contain the largest amounts of antioxidants to help replenish and augment the system.

Various Forms of Free Radicals and Antioxidants

There are many common reactive species of free radicals existing in the body. Radicals of oxygen compromise the variety of reactive molecules that can constitute oxidative stress to the cells. The reactive oxygen species include the peroxyl radical, hydroxyl radical, peroxynitrite radical and the superoxide ion.

As free radicals are all different, likewise, all antioxidants are not alike. Not only do antioxidants differ in their potency but also on what type of free radicals they work upon. For example, Vitamin C only works on water-soluble peroxyl radicals, vitamin E scavenges fat-soluble peroxyls, superoxide dismutase and catalase is only effective on superoxide radicals, etc. It is rare to find an antioxidant that can work effectively on more than one type of radical let alone all 5 forms of the harmful reactive oxygen species. To properly understand the significance of our independent study, a brief discussion of the reactive oxygen species that Cantron™ was tested on is necessary.

The Peroxyl Radical

Peroxyl radicals are the most abundant free radicals in the human body and have been suggested as a major cause of atherosclerosis, cancer, liver disease, Alzheimer's disease, hearing loss and the aging process. There are two types: water-soluble and lipid (fat) - soluble.

Free radicals attack all major classes of bio-molecules, but lipids are the most susceptible and the easiest to damage. The peroxyl radical species is reasonably stable and not very reactive but they are reactive enough, however, to attack adjacent fatty acid side chains, as well as enzymes, receptors, and other structures found in cell membranes. The cell membrane is a rich source of polyunsaturated fatty acids, which are easily attacked by oxidizing radicals including the peroxyl radical. The destruction of polyunsaturated fats causes damage by unleashing a chain reaction of chemical events that can collapse cell membranes. Once one peroxyl free radical forms and an appropriate antioxidant is not available to stop the process, the chain of events keeps occurring until the cell membrane literally collapses. As the cellular membrane becomes

compromised, the cell bursts open, spews its contents and dies. This series of damaging breaks in the cellular membrane can be prevented by antioxidant defenses and the cells can remain intact. However, it has been demonstrated that total peroxyl radical scavenging antioxidant capacity (TRAP) in human plasma decreases with age.

Peroxyls are formed by several routes especially during the breakdown of organic peroxides, oxidation of lipids or other organic molecules in oxidative stress. They are formed within the delicate cellular membrane. If a free radical within or on the outside of a cell attacks the fatty acid cell membrane structures, they create peroxyl free radicals. These radicals are also formed as a byproduct of the clash between hydroxyl radicals and polyunsaturated fatty acids derived from vegetable oils.

The Hydroxyl Radical

Of all the reactive oxygen species (ROS), the hydroxyl reactive oxygen species is the most reactive. It is, in fact, the most reactive radical known to chemistry and the most physiologically harmful, being suspected in such pathologies as atherosclerosis, oncogenesis, cataractulargenesis and DNA mutation.

These dangerous radicals can attack and damage almost every molecule found in living cells because they react as soon as they come in contact with another molecule. Since it is so reactive, hydroxyl radicals generated in vivo do not persist for even a microsecond as they rapidly combine with molecules in their immediate vicinity as fast as they collide. Hydroxyl radicals can be produced at an enormous rate, have easy access to every portion of the cell, are capable of causing great damage within a small radius of their site of production and are highly carcinogenic. In addition to damaging unsaturated fats in cell membranes, hydroxyls are reactive enough, aggressive enough, and persist long enough to damage the less susceptible proteins (including the fragmentation of vital proteins in plasma), nuclear acids, enzymes and carbohydrates.

Russell Reiter, PhD, professor of neuroendocrinology at University of Texas Health Center has highlighted the dangers of the hydroxyl radical; "If the function of radicals is to destroy molecules and tissues, then the hydroxyl radical would be the radical's radical. It reacts at diffusion rates with virtually any molecule found in its path including macromolecules such as DNA, membrane lipids, proteins and carbohydrates. In terms of DNA, the hydroxyl radical can induce strand breaks as well as chemical changes in the dioxyribose and in the purine and pyrirnidine bases. Damaged proteins, many of them crucial enzymes in neurons lose their efficiency and cellular function wanes. Protein oxidation in many tissues, including the brain, has been proposed as an explanation for the functional deficits associating with aging."

In addition to the direct damage caused by hydroxyls, they play a major role in forming peroxyl radicals and stimulating the free radical chain reaction known as lipid peroxidation. Peroxyl radicals are formed when oxygen combines with the hydrogen radical. One hydroxyl radical can result in the conversion of many hundred fatty acids side chains into lipid hydroperoxides. As hydroxyl radicals react with carbohydrates it leads to chain breaks in important molecules in a process involving the peroxyl radical as an intermediate. Since hydroxyls do such direct damage, work in conjunction with and create harmful peroxyl radicals, then supplementation of hydroxyl scavenging antioxidants may be extremely important.

The Peroxynitrite Radical

Peroxynitrite is a strong oxidant that attacks proteins, cysteines and methionines. It is an especially dangerous type of free radical consisting of both oxygen and nitrogen. It plays a role in the development of diabetes, atherosclerosis, lung disease, chronic inflammation, neurological disorders, peripheral neuropathy- a common complication of diabetes, multiple sclerosis, erectile dysfunction, hypertension, BPH, ischemic heart disease, depression and rheumatoid arthritis. Several years ago there was a public scare about consuming foods with nitrites like bacon because they cause cancer.

Peroxynitrite is a potent oxidant formed by the rapid reaction between nitric oxide and superoxide radical. The peroxynitrite anion is relatively stable, but they can rapidly potentate to peroxynitrous acid an unstable species, which decomposes with a half-life about one second at pH 7.4. Peroxynitrite can serve as a precursor for other potent reactive species, including nitrogen dioxide and is one of the potent reactive metabolites for the initiation of lipid peroxidation.

The Superoxide Radical

The Superoxide Radical can cause damage to the hereditary material (DNA) and propagate cancer cells. It is implicated in cataracts, macular degeneration, atherosclerosis, rheumatoid arthritis and joint inflammation. In the presence of superoxide anions, Low Density Lipoprotein (LDL) deposited on arterial cell walls undergo peroxidation, become fibrous, then calcified, thereby, blocking blood flow. Synovial fluids in joints are oxidized by superoxide; unfortunately joint fluids lack sufficient superoxide dismutase.

Superoxide is the most important source of initiating radicals in vivo. Once you get a superoxide radical you are going to have radicals propagating damage throughout the biological system until you have a termination-that is-until that superoxide radical and all resultant radicals are quenched. Therefore in biological systems, the superoxide anion is a very important free radical. The superoxide anion is not a particularly reactive molecule and it can diffuse considerable distances from its site of production. The greatest danger from superoxide is that these radicals can be converted to more damaging radicals by a chain reaction. They combine with other reactive species such as nitric oxide to yield more reactive species such as peroxynitrite radicals and they give rise to the highly reactive hydroxyl radical species. As previously mentioned the hydroxyl is the most reactive and physiologically harmful free radical.

The body utilizes important antioxidants to deal with superoxide radicals, in particular the enzyme Superoxide Dismustase (SOD). Decreased SOD favors Superoxide anion formation. This antioxidant is so necessary that its very absence would be lethal. The problem is that SOD levels in the body decline with age and supplementation with SOD tablets is not that effective because they are poorly absorbed into the bloodstream.

To Recap

* It is a well-established fact that free radicals have been implicated in over 50 degenerative diseases including heart disease, cancer and aging.

* Consumption of antioxidants may eradicate dangerous free radicals and help prevent disease.

* The federal court has forced the FDA to allow the claim that antioxidants may prevent cancer.

* The body's storehouse of antioxidants diminish with age and leads to the onset of disease and premature aging.

* There are many forms of free radicals. Peroxyl radicals are the most abundant, hydroxyl radicals are the most dangerous, peroxynitrite attacks proteins, and superoxide anions are the greatest initiator of other dangerous free radicals.

* One free radical engenders many other free radicals, causing a chain reaction of biological events.

* Cantron™ is not only the most potent antioxidant known to man, but works against a number of radicals that are responsible for multitudes of diseases in men.

* To obtain the equivalent antioxidant protection of just one daily dose of Cantron™ (1 ½ teaspoons or 6 capsules), one would have to consume megadoses of vitamin C or E for it peroxyl scavenging activities, many cups of concentrated green tea with 95% polyphenols for its hydroxyl radical scavenging ability, megadoses of alpha-lipoic acid for its peroxynitrite scavenging ability and mega-doses of superoxide dismutase and/or catalase tablets for its superoxide scavenging ability.

* Supplementation of antioxidants, along with a healthy diet of antioxidant foods and beverages should be exercised by anyone who values good health or who is seeking "Wellness." A wide variety of antioxidant substances are recommended in our "Cantron™ Total Wellness Program" and our "Cantron™ Total Wellness Diet."

Cantron™: Laboratory Studies of its Scavenging Abilities against the Reactive Oxygen Species of Free Radicals (peroxyl radical hydro and lipo, hydroxyl radical, peroxynitrite radical and superoxide anion)

Cantron™ has been known to be a powerful antioxidant. Research was needed, however, to determine just how potent Cantron™ is in relation to other powerful antioxidants and to ascertain which types of Reactive Oxygen Species (ROS) it works upon. Most antioxidants usually scavenge only one specific type of radical species; for example, vitamin C only works upon water-soluble peroxyl radicals and has no effect upon fat-soluble peroxyl radicals, hydroxyl radicals, or superoxide radicals.

Nutraceutical chemistry consultant, Daniel Hetrick, PhD., was originally commissioned to design, implement and oversee this project. Tests were conducted on 4 separate versions of the CantronTM formula and 5 other known variations:

- 1. The brand new Cantron™ Advanced Scientific Formula (ASV)
- 2. Cantron™ New Millennium Formula (October 1999 to present)
- 3. Cantron™ Original Formula (Cancell equivalent - July 1984 to October 1999)
- 4. Cantron™ Experimental Formula (2003- never introduced to public)
- 5. Entelev - 1982 vintage - (manufactured by Jim Sheridan)
- 6. Cancell – 1988 vintage- (manufactured by Ed Sopcak)
- 7. Protocel – JVS-23 Formula (2000 to present)
- 8. Protocel – EJS-50 Formula (2002 to present)
- 9. Pre- Protocel (manufactured by Protocel chemist and partner- TB)

Before the original tests were conducted, the results of the different variations were not expected to vary widely, if at all, because all versions and variations have the same ingredients. Only the quantities and ratios of those ingredients varied slightly.

All formulas were tested for their activity on peroxyl and hydroxyl radicals. Cantron™ ASV was also tested for its activity on peroxynitrite and superoxide radicals.

- Peroxyl radical scores are measured in the ORAC test (Oxygen Radical Absorption Capacity)
- Hydroxyl Radicals are tested in the HORAC test (Hydroxyl Radical Absorption Capacity)
- Peroxynitrite Radicals are tested in the NORAC test (Peroxynitrite Radical Absorption Capacity)
- Superoxide Radicals are measured in the SOD test (Superoxide Radical Absorption Capacity)

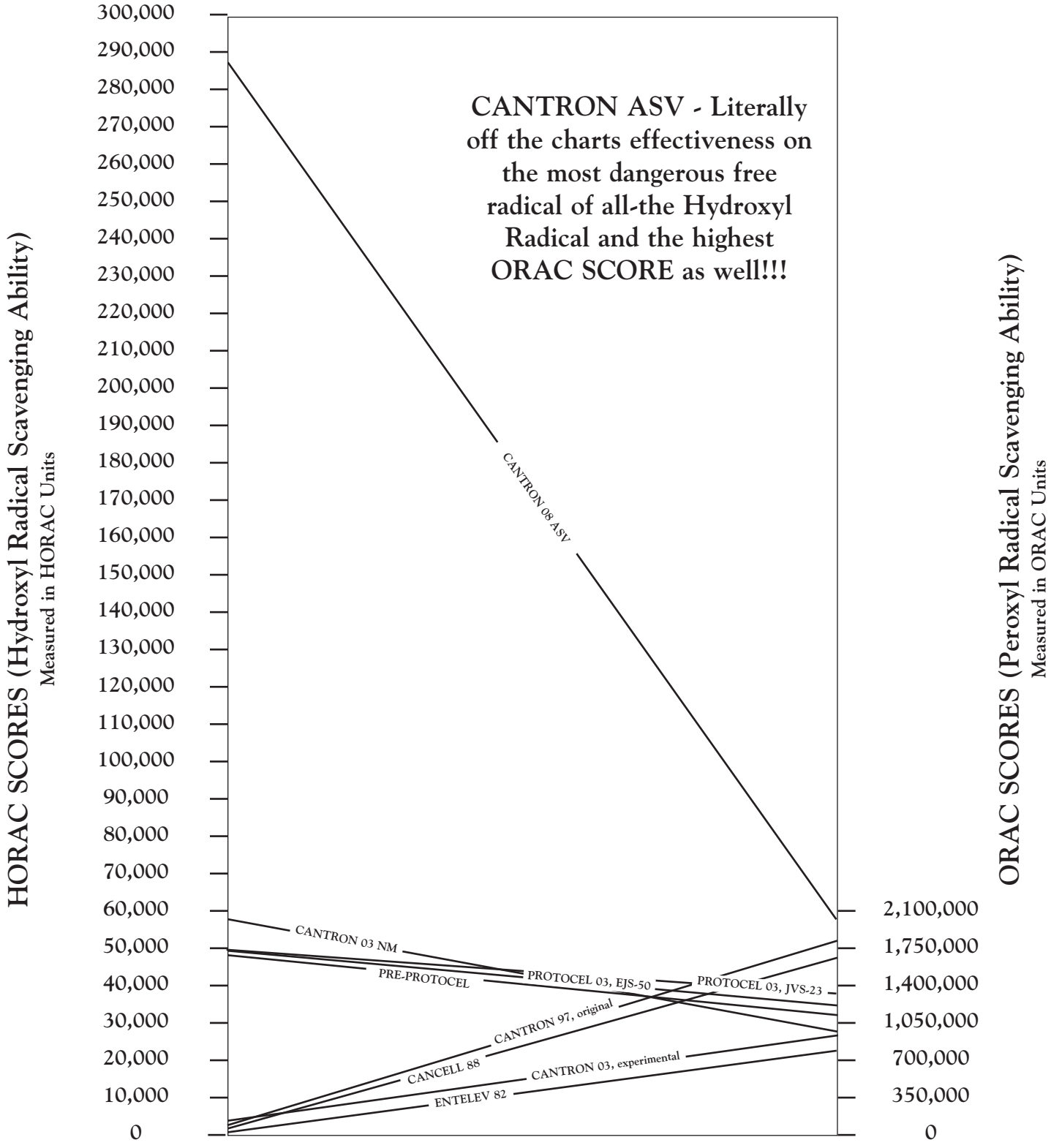
In 2003 samples of all products except Cantron ASV were sent to Brunswick Laboratories in Wareham, MA. Samples of ASV were sent in September 2007. Brunswick Laboratories maintains a state of the art facility with highly skilled scientists. Brunswick serves the nutraceutical, pharmaceutical, food and cosmetic industries. Their antioxidant team developed proprietary high throughput technologies in antioxidant screening and has accumulated the world's largest antioxidant database on a wide variety of natural product compounds. Their expertise has made them a leader in antioxidant activity profiles. Brunswick Labs is the inventor of the improved and automated ORAC assay (US patent Pending). This assay is the second generation of the ones used by the National Institute of Health and US Department of Agriculture and is more accurate than its predecessors. Brunswick screens natural products, antioxidant supplements, beverages, pure chemicals, plasma, serum, and urine in their antioxidant assays.

Enetelev/Cantron Variations

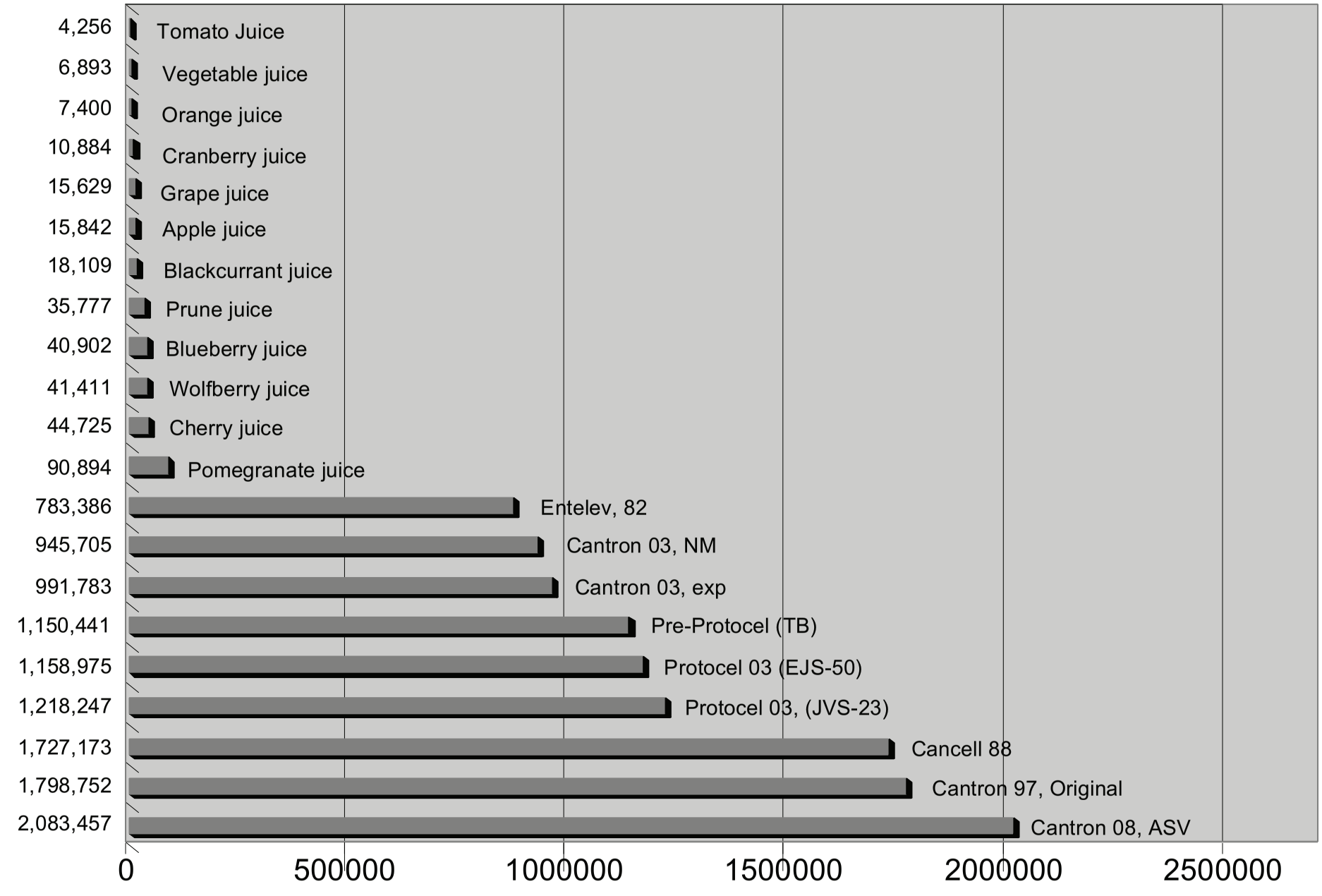
Graph Of Combined ORAC/HORAC Scores

HORAC SCORE
(Hydroxyl Radical Scavenging Ability)
HORAC UNITS*

ORAC SCORE
(Peroxyl Radical Scavenging Ability)
ORAC UNITS*



ORAC VALUES OF VARIOUS ANTIOXIDANT JUICES & LIQUID CANTRON
(ORAC VALUE PER LITER)



Total ORAC Scores

Cantron™
All Versions and Other Variations
ORAC is a measure of free radical scavenging potential of dangerous peroxyl hydro and peroxyl lipo radicals

Version/Variation (Ranking from Highest to Lowest)	**Brunswick ID #**	**ORAC Score TE/L**	**# Times More Potent Than the Vitamin E Standard (3995)**	**#Times More Potent Than the Vitamin C (5000)**	**# Times More Potent Than OJ (7400)**
Cantron™, Advanced Scientific Version Lot # 05020124008	07-2806	2,083,457	522	417	282
Cantron™ Original Version 1997 vintage Lot # 61797	03-709	1,798,752	450	360	243
Cancell, 1988 Vintage Sopcak No Lot #	03-710	1,727,173	432	345	233
Protocel JVS-23	03-1251	1,218,247	305	244	165
Protocel EJS-50	03-1252	1,158,975	290	232	157
Pre-Protocel (TB)	03-1253	1,150,441	288	230	155
Cantron™, Experimental Version Lot # 322363E	03-223	991,783	248	198	134
Cantron™, New Millennium Version Lot # 322363	03-222	945,705	237	189	128
Entelev, 1982 Sheridan, Lot #102-L	03-708	783,386	196	157	106

Evaluation of the ORAC Scores

The ORAC test measures the antioxidant activity against peroxyl radicals by determining how many peroxyl free radicals can be absorbed by a given antioxidant as compared to the vitamin E analog- Trolox and is expressed as micromoles of Trolox equivalent per liter (TE/L). The ORAC score for the Trolox vitamin E equivalent is 3995 TE/L.

The different versions and variations had a wide divergence of scores, which was quite unexpected at that time the original samples were sent in 2003. Samples of ASV were sent in July 2007.

Of all the samples sent in 2003, Cantron™ original version scored the highest with an ORAC score of 1,798,752. Cancell scored a virtually identical 1,727,173 as was expected because of its chemical equivalence. All three Protocel formulas scored virtually the same indicating that they are chemically equivalent to each other, not separate formulas as they are promoted. Their scores were also significantly lower Cancell and the original Cantron formula. Protocel JVS-23 is promoted as the original Entelev formula, but its scores are markedly different than the Entelev score in this test. Furthermore, Protocel EJS-50 is promoted as the original Cancell formula but its scores are well below the Cancell ORAC scores. The new Cantron™ ASV scored the highest of all versions and variations. It scored a whopping 2,083,457-virtually twice as much as the Protocel formulas and three times as much as the original Entelev.

How Effective is Cantron ASV on Peroxyl Radicals?

Cantron™ ASV with its score of 2,083,457 is 522 times more effective than the score of 3,995 for the vitamin E equivalent standard (Trolox). When compared to other liquid antioxidants in Brunswick's database, its scores are "off the charts." For example, orange juice-a well-known antioxidant-has a score of 7,400 (see the chart of ORAC values for various antioxidant juices). The highest score for a liquid antioxidant in Brunswick's database is pomegranate juice which scored 90,894. Cantron ASV scores are therefore 282 times higher than that of orange juice, 133 times higher than grape juice and 23 times higher than pomegranate juice.

Evaluation of the HORAC Scores

Whenever an antioxidant product is marketed, the manufacturer/distributor refers to the ORAC score; and scores against other free radicals are rarely published or mentioned. Since the hydroxyl radical is the most dangerous radical of all, an antioxidant that can scavenge hydroxyl radicals is the most important tool one can utilize to protect against a multitude of associated diseases.

The HORAC test measures the activity of a given antioxidant against hydroxyl radicals. Cantron™ and related formulations were tested and compared to the test standard, Caffeic Acid, which has a score of 5,551. Unexpectedly, as with the ORAC scores, the HORAC scores of the various versions and variations differed widely. Of all versions and variations that were tested in 2003, the New Millennium Version was the superior scavenger of hydroxyl radicals, scoring 59,085 CAE/L (11 times the Caffeic Acid standard).

Unexpectedly, Cantron™ *original version* and Cancell, which had the highest ORAC scores among that group, had very little effect on hydroxyl radicals, in fact, their scores were actually less than the Caffeic Acid standard. We observed what I coined as a see-saw effect, that is, the higher the ORAC score the lower the HORAC score and vice versa. Like a see-saw, when one side went up the other went down. There was one prior exception to the see-saw effect. Entelev, which had the lowest ORAC score also had little effect on hydroxyl radicals – in fact, it had the lowest HORAC score. The Cantron™ ASV version; however, solves the problem of the "see-saw effect." Not only does ASV have the highest ORAC score of all versions and variations, it also has the highest scores by a wide margin on hydroxyl radicals. The new version has "off the chart" HORAC scores as compared to the other versions and variations. In fact, ASV is 580% more effective than Protocel and 488% more effective than the Cantron "*New Millennium Version*," which previously scored the highest of all versions and variations. The actual HORAC score for ASV is 288,325 CAE/L.

Just like the ORAC scores, the HORAC scores on all 3 Protocel variations were virtually identical. Despite how that product is advertised, these HORAC scores for these formulas bear no resemblance to the Cancell or Entelev scores, and is further proof that these are all the same formula with different names and not what they are advertised to be.

How Effective is Cantron ASV on Hydroxyl Radicals?

Brunswick Laboratories has compiled a vast and comprehensive antioxidant database. Green Tea was by far the greatest hydroxyl radical scavenger on their chart; in fact, it is 9.2 times more potent than the next highest

antioxidant on their chart-elderberry extract. Volume for volume; however, Cantron™ ASV is 52 times more powerful than the Caffeic acid standard, 68 times more powerful than Green Tea and 625 times more powerful than elderberry extract, which demonstrates its vast superiority to all other hydroxyl radical scavengers. Ingestion of this powerful hydroxyl radical scavenger is highly recommended in order to prevent or reverse serious health conditions.

HORAC Scores

Cantron™

All Versions and Other Variations

The Hydroxyl Radical is the most dangerous of all radicals. HORAC measures Hydroxyl Radical Scavenging Ability

Version/Variation (Ranking from Highest to Lowest)	**Brunswick ID #**	**HORAC Score** CAE/L	**# Times More Potent Than Green Tea** (Score of 4219 CAE/L)	**# Times More Potent Than the Caffeic Acid Standard** (Score of 5551 CAE/L)
Cantron™, Advanced Scientific Version Lot # 05020124008	07-2806	288,325	68	52
Cantron™, New Millennium Version Lot # 322363	03-222	59,085	14	11
Protocel JVS-23	03-1251	50,963	12	9
Protocel EJS-50	03-1252	49,734	12	9
Pre-Protocel (TB)	03-1253	49,718	12	9
Cantron™, Experimental Version Lot # 322363E	03-223	43,659	10	8
Cantron™ Original Version 1997 vintage Lot # 61797	03-709	308	<1	<1
Cancell, 1988 Vintage Sopcak No Lot # provided	03-710	281	<1	<1
Entelev, 1982 vintage Sheridan Lot #102	03-708	210	<1	<1

Evaluation of the SOD Scores

Very few substances are effective upon the extremely dangerous superoxide radicals - the greatest initiator of other dangerous free radicals; therefore, a substance that can quench superoxide radicals is absolutely necessary for good health. The enzymes superoxide dismutase (SOD) and catalase are the body's own natural defense mechanisms to protect against superoxide radicals. Without these enzymes in the system we would all die – that is how important it is to quench this dangerous radical specie. Unfortunately, however, the amount of these enzymes in the system diminishes markedly as we age or when we experience challenging health conditions. Supplementation of SOD is problematic because it does not absorb well.

In 2003, Brunswick Laboratories did not have an assay to quantify the activity of an antioxidant on superoxide radicals. Therefore, we sent samples of all the versions and variations to Cayman Laboratories in Ann Arbor Michigan. They had an assay to measure whether or not an antioxidant substance destroyed superoxide radicals by inserting the test samples after the generation of superoxide anions, but before the addition of SOD. Thus if the test samples inactivated the superoxide anion, activity of SOD would be less than the untreated controls. This assay did not have a quantitative assay that provided a score, but the test determined whether there was: no blocking effect, a partial blocking effect or a complete blocking effect of the superoxide radical. The reduction in SOD activity occurred with the Cantron samples and was the measure of Cantron's ability to destroy the superoxide anions. All of the Cantron formulas completely blocked the formation of superoxide anions in that study.

In 2007 Brunswick Laboratories had already developed a quantitative assay to measure activity against Superoxide radicals. The calibration standard was SOD and was expressed as a unit SOD equivalent per liter (unitsSODeq/L). Cantron ™ ASV scored an amazingly high 7,331,000 unitsSODeq/L. This means that it is many times more effective than the SOD- the body's own defense mechanism. ASV is also very readily absorbed into the bloodstream, where SOD is not. No other versions or variations were tested.

SOD Scores
Cantron tm
Advanced Scientific Version

Version/Variation (Ranking from Highest to Lowest)	**Brunswick ID #**	**SOD Score unitSODeq/L**
Cantron™, Advanced Scientific Version Lot # 05020124008	07-2806	7,331,000

Evaluation of the NORAC Scores

The NORAC test measures the activity of a given antioxidant against peroxynitrite radicals. NORAC scores are expressed in micromoles of trolox equivalent per liter and the score for the calibration standard is 3995. In 2003 the NORAC assay was not available. In 2007 the Cantron tm Advanced Scientific Version was sent to Brunswick. No other versions or variations were tested.

Peroxynitrite is a strong oxidant that attacks proteins, cysteines and methionines and can serve as a precursor for other potent reactive species, including nitrogen dioxide. Peroxynitrite is one of the potent reactive metabolites for the initiation of lipid peroxidation. Very few substances scavenge peroxynitrite radicals – alpha-lipoic acid being one of the few.

Just like the other free radical species that it was tested upon, ASV had extremely high scores against the peroxynitrite radical. The score for Cantron ASV is 129,664 TE/L – 33 times more effective than the trolox equivalent standard.

NORAC Scores
Cantron™
Advanced Scientific Version

Version/Variation	Brunswick ID #	NORAC Score TE/L	# Times Better Than the Trolox Equivalent Standard (3995)
Cantron™, Advanced Scientific Version Lot # 05020124008	07-2806	129,664	33

Measure of Phenolic Content

Brunswick also conducts an assay that measures the number of phenolic compounds in a formula. These are compounds that have antioxidant activity and are some of the active ingredients in the Cantron formula. The phenolic compounds are expressed in milligrams of gallic acid per liter (mgGA/L). The phenolic content of Cantron NM was measured at an incredibly high 86,659.24 mgGA/L and the results of *Cantron ASV is an even higher 134,676.20*. mgGA/L. ASV therefore has 155% of the amount of phenolic compounds as NM and likewise of other versions and variations.

Discussion of the Results-

The most puzzling question is why the various formulations other than ASV-*which is so much more concentrated than other formulas* - differ so widely in their ORAC and HORAC scores. As the components are the same and the ratios and concentrations of the ingredients are not that different, results were expected to be similar or the same. With only one exception (1982 Entelev), an inverse relationship or "seesaw" effect was manifested, i.e., whenever the HORAC went up, the ORAC simultaneously went down and vice versa.

As expected, because the 1997 Cantron™ *original version* and the 1988 Cancell utilized the same manufacturing procedure, their performance was virtually the same, albeit, 97 Cantron™ was slightly but not significantly more effective. Before ASV, these two samples had the highest ORAC scores (Cantron™ *original version* 1,798,752 to Cancell's 1,727,173), but were among the lowest HORAC scores (Cantron™ 308, Cancell 281), and they were equally effective against superoxide anions (Cantron™ -.66, Cancell -.67) in the Cayman Laboratories assay. The similar behavior of these two samples on all 3 radicals certainly proves that they are virtually identical, with 97 Cantron™ being slightly superior in its scavenging abilities to the Cancell.

The biggest surprise was how vastly different the Cancell formula was from Protocel EJS-50 which is advertised to be the Cancell equivalent. Cancell's HORAC is 281 vs. 49,718 for the EJS-50 while Cancell's ORAC is 1,727,173 to EJS-50's 1,158,975. If these were equivalent formulas, they would behave the same. Therefore, it is apparent from these studies that EJS-50 is not Cancell. Likewise, despite being promoted as the Entelev equivalent, JVS-23 behaved much differently than Sheridan's Entelev. All 3 Protocel formulas behave exactly the same on *both peroxyl and hydroxyl radicals* and therefore the only logical conclusion that can be made is that they are chemically identical- not different formulas as they are promoted.

Conclusion-

Cantron™ has an extremely high phenolic content and all versions and variations of the formula have astonishingly high antioxidant activity against a wide variety of free radicals. Some of the formulas were more

active on peroxyl radicals, while others were more effective against hydroxyl radicals. Cantron ASV had the highest values across the board on all radical species and is by far the best antioxidant product of the group. Furthermore, by quenching the initiating radicals ASV may also help prevent the formation of other dangerous radicals such as, hydrogen peroxide and singlet oxygen, which were not tested.

ASV scored well on both types of peroxyl radicals (hydro and lipo) something that is extremely rare and the total ORAC score is 23 times higher than the next best peroxyl radical scavenger in Brunswick's data base (pomegranate juice).

Also this "Advanced Version" had "off the charts" scores on hydroxyl radicals - the most dangerous radicals known to chemistry and an initiator of peroxyl radicals. In fact it is 5 times more effective than the second best hydroxyl scavenger Cantron NM.. One could argue that by scavenging more hydroxyl radicals, Cantron ASV will also prevent further peroxyl radicals from forming (hydroxyls create peroxyls). Each hydroxyl radical that is allowed to exist without being scavenged can cause chain reactions and propagate thousands or even millions of additional peroxyl radicals.

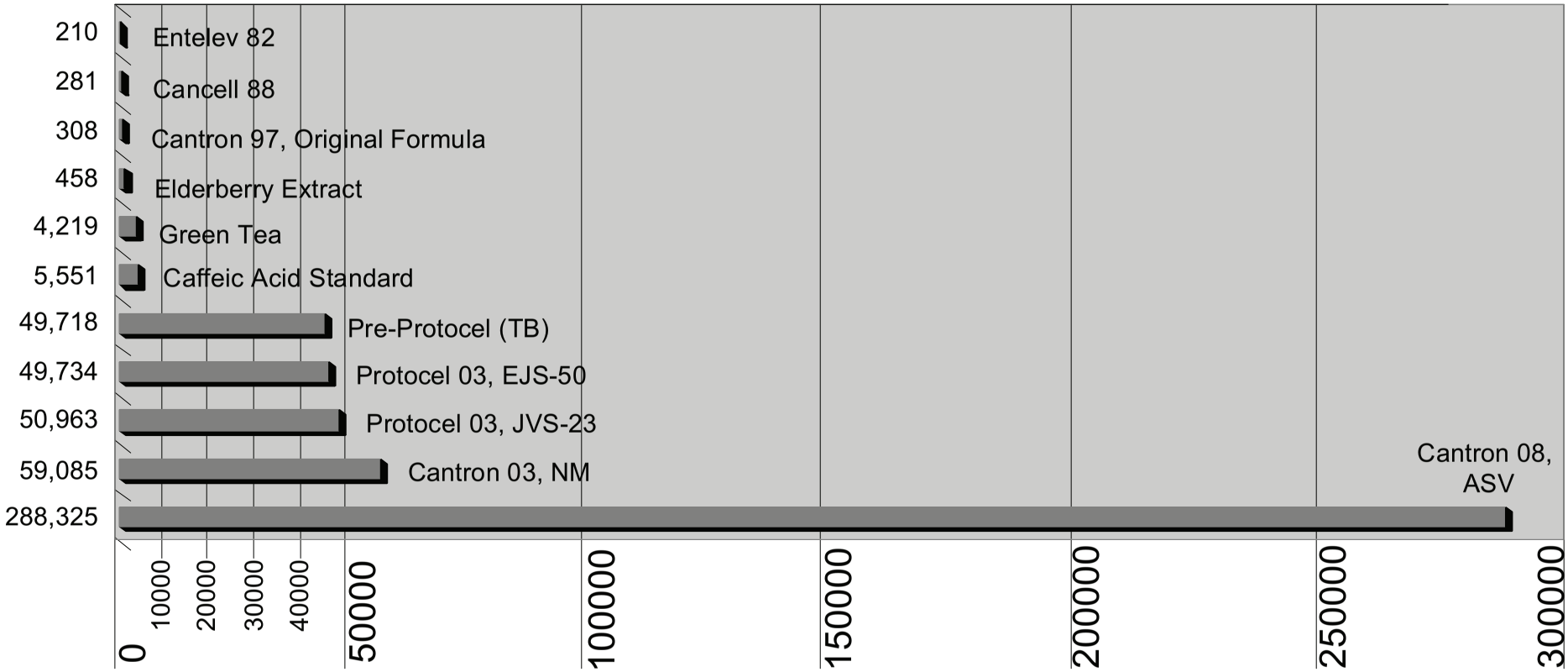
Superoxide anions also create other dangerous radicals and propagate a chain of dangerous free radicals such as peroxynitrite radicals. They also give rise to the highly reactive hydroxyl radical species. In fact superoxide is the largest initiator of other free radicals. The body's defense mechanism - SOD - greatly diminishes with age, and with severe health challenges. SOD supplementation is problematic as it does not absorb well. ASV is much more effective than SOD and absorbs well also.

Peroxynitrite radical scavengers are rare and ASV fits the bill. It is 33 times more effective than the test standard. It is important to scavenge nitrite radicals because they attack proteins, cysteines and methionines and can serve as a precursor for other potent reactive species, including nitrogen dioxide. Peroxynitrite is one of the potent reactive m.
etabolites for the initiation of lipid peroxidation.

Accumulation of damaged, mutated and foreign proteins in the tissues, organs, joints and bloodstream are also a result of free radicals. Removing and scavenging these bad proteins from the system allows healing and reversal of severe health conditions.

Cantron ASV is the world's most effective and versatile antioxidant in the world. It should be taken by anyone who wishes to prevent or reverse damage caused by free radicals and damaged, mutated and foreign proteins.

HORAC VALUES OF VARIOUS LIQUIDS



Bibliography

NCI Fact Sheet: Antioxidants and Cancer Prevention, National Cancer Institute, cancer.gov, posted date Wed Jan 08, 2003

Brunswick Laboratories, www.Brunswicklabs.com

Nutritional Antioxidants: Mechanisms of Action, Analyses of Activities and Medical Applications. Jacob Vaya and Michael Aviram. Laboratory of Natural Medicinal compounds, Migal-Galilee Technological Center, Kiryat Shmona 10200, Israel and the Lipid Research Laboratory, Rambam Medical Center, Technion Faculty of Medicine and Rappaport Institute for Research in the Medical Sciences, Haifa, 31096 Israel.

National Library of Medicine, PubMed, Biochem J 224 (3): 697-701 (Dec 15 1984), Ferrous ion-EDTA- Stimulated Phospholipid Peroxidation. A Reaction Changing from Alkoxyl-Radical- to Hydroxy-lRadical Dependent Initiation., Gutteridge JM

Reactive Oxygen Species I n Living Systems: Source, Biochemistry, and Role in Human Disease. (Oxidants and Antioxidants: Pathophysiologic Determinants and Therapeutic agents) Authors:Halliwell, Barry:American Journal of Medicine, Sept 30, 1991 v91 n3C p12S (9)

Free Radicals as the Main Cause of Aging: Age-Associated Changes of Superoxide Dismutase and Catalase Activities in the Brain. J Biomed Sci 2000 Nov;7(6):466-474 Tsay H, Wang P, Wang S, Ku H, Institute of Neuroscience, National Yang-Ming University, Taiwan, ROC.

J AOAC Int 2000 jul-aug;83(4):950-6, Analysis of Botanicals and Dietary Supplements for Antioxidant Capacity: a Review. Prior RL, Cao G, U.S. Department of Agriculture, Agricultural Research Service, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA 02111, USA.

Brain Res 2000 June 2;866(1-2);211-7, Antioxidant Rich Diets Improve Cerebellar Physiology and Motor Learning in Aged Rats. Bickford PC, Gould T, Briederick L, Chadman K, Pollock A, Young D, Shukitt-Hale B, Joseph J, Department of Pharmacology, Boston, Massachusetts, U.S.A.

Int J Dev Neurosci 2000 Jul-Aug;18(4-5);367-81, Neurobehavioral Aspects of Antioxidant in Aging. Cantuti-Castelvetri I, Shukitt-Hale B, Joseph JA

Laryngoscope 2000 May;1 10(5 pt 1):727-38, Effects of Dietary Restrictions and Antioxidants on Presbyacusis, Department of Otolaryngology -Head and Neck Surgery, Henry Ford Health System, West Bloomfield, MI 48323, USA

Panminerva Med 1999 Dec;41(4):335-9, Free Radicals: Important Cause of Pathologies Refer to Aging. Venarucci D, Venarucci V, Vallese A, Batilla L, Casado A, De la Torre R, Lopez Fernandez ME, Center of Clinical Chemistry, I.N.R.C.A., Scientific Institute for Hospitilization and Therapy, Fermo, Italy

Endocrine 1999 Aug;11 (1):41-8, Antioxidative Mechanisms and Plasma Growth Hormone Levels: Potential Relationships in the Aging Process. Brown-Borg HM, Bode AM, Bartke A, Department of Physiology, University of North Dakota School of Medicine and Health sciences, Grand Forks 58203-9037, USA.

Life Science 1999;65(18-19):1883-92, E levated Oxidative Stress in Models of Normal Brain Aging and Alzheimer's Disease. Butterfield DA, Howard B, Yatin S, Koppal T, Drake J, Hensley K, Aksenov M, Aksenova M, Subramaniam R, Varadarajan S, Harris-White ME, Pdigo NW Jr, Carney JM, Department of Chemistry, Center of Membrane Sciences, University of Kentucky, Lexington 40506-0055, USA.

Mutat Res 1999 Jul 16;428(1-2):17-22, Reactive Oxygen Species: The Unavoidable Environmental Insult? Gracy RW, Talent JM, Kong Y, Conrad CC, Molecular Aging Unit, Department of Molecular Biology andlimmunology, University of North Texas Health Sciences Center, Fort Worth, Texas, USA

Exp Gerontol 1999 June;34(3):293-303, The Aging Paradox: Free Radical Theory of Aging, Department of Biochemistry J.N. Medical College, Aligarh Muslim University, UP, India.

The Peroxyl Radical; Michael L. Ott, Department of Chemistry, University of Iowa, Iowa City, IA, 7. February 2001

Med Hypotheses 1998 Nov;51(5):405-9, Antioxidant Inhibitors for Cancer Therapy, Kong Q, Lillehei KO, Department of Surgery, University of Colorado Health Sciences Center, Denver A. 0262, USA.

Oxygen Radicals, Pro-Oxidants and Antioxidant Nutrients. Health World Online, Interview with Dr. Lester Packer, interviewed by Richard A. Passwater, Ph.D.,

Mr. Sc. Suzana Borovic, Department of Molecular Medicine, Ruder Boskovic Institute, Zagreb, Croatia, Monitoring Influence of Surgical Stress on Formation of Hydroxyl Radicals in Tumor Bearing Rats by Measuring Salicylic Acid Metabolites.

Life Extension Magazine, December 1995: The Dangerous Hydroxyl Radical

Involvement of Free Radicals and Dementia of the Alzheimer's type: a Hypothesis, Volicer L, Crino PB, Neurobiological Aging 1990 Sep-Oct;11(5):567-71.

Evaluation of Hydroxyl Radical Scavenging Abilities of Two Dietary Antioxidant Supplements, Microhydrin and MegaHydrin by Fe-EDTA Induced 2-hydroxyterephthalate Flourometric Analysys, Cory J. Stephanson, Department of Chemistry, University of Minnesota, Twin Cities G. Patrick Flanagan, Flantech Group, Cottonwood, AZ

Free Radicals and Antioxidants by Brenda Mitus,http:/faculty.gvsu.cdu/gillesr/HS495-1.html.

The Moss Reports Newsletter, 8/17/03, Ralph moss

Drug discovery V.6 #1 Jan 2003, Industry Insider, Alzheimer's disease: When Free Radicals Run Amok, D. Allan Butterfield, Professor of Chemistry, Director of the Center of Membrane Sciences, and Faculty Associate at the Sanders-Brown Center on Aging, University of Kentucky, Lexington, KY

Substance May Lessen Hearing Loss From Noise, By Malcolm Ritter: The Associated Press 10/12/2003

Oxidative Stress Including Glutathione, A Peptide For Cellular Defense Against Oxidative Stress: James A. Thomas, Department of Biochemistry and Biophysics, Iowa State University, Ames IA 50011

Free Radicals and Antioxidants; Brenda Mitus, http://faculty.gvsu.cdu/HS495-1.html

TMJ Pain May Be Aggravated by Free Radicals, Relieved Partly by Antioxidants; Jack Challem, The Nutrition Reporter, www. Nutritionreporter.com/tmj disease.html.

Melatonin in the Prevention and Control of Cancer, Russel Reiter, PhD, Endocrinology, Wake Forest College

Propofol is a Peroxynitrite Scavenger; Anesth Analg 1997; 84:1127-9; Sibel Kahraman, MD, and Abdullah T. Demiryurek, PhD; Department of Anesthesiology and Reanimation, Hacettepe University Medical School; and Department of Pharmacology, Faculty of Pharmacy, Gazi University, Anarka, Turkey.

Medical Research Products
3960 NW 167th St.,Miami, FL 33054, USA
Local 305/628-0981 Toll-Free 800/443-3030
Website Address: WWW.Cantron.com
e-mail: gpg911@cantron.com