Iron, Cancer, Chelators and Rice Bran

by Bill Sardi

Age is the primary risk factor for cancer. Most skin cancers occur after age 50. Most cases of prostate and breast cancer occur after age 65. The Merck Manual says that "although cancer occurs in persons of every age, it is fundamentally a disease of aging. Sixty percent of new cancer cases and two-thirds of cancer deaths occur in persons over 65 years of age."

Aging is accompanied by an accumulation of iron in the body. Eighty percent of iron in the body resides in the red blood cells. During childhood, iron is being utilized to make new red blood cells. Red blood cells are dying and being replaced at a rate of 2 million per second in adults. In growing children the demand to make new red blood cells is greater than in adulthood and all available iron is used to produce new blood cells. The risk for cancer is low during the growth years.

The demand for iron, to make new red blood cells, slows once full growth is achieved. Women delay the accumulation of iron by virtue of the fact they lose iron during monthly menstrual flow, or donate iron to their unborn babies. The slow accumulation of iron, after full growth in males (after age 18 or so), or when menstruation ceases in females (menopause or early hysterectomy), gradually increases the risk of cancer. More specifically, females dump about 30 milligrams of iron per month through menstruation, whereas males accumulate about 1 milligram of iron per day after they reach full growth (after about age 18). By middle age men have an excess of 3000-5000 milligrams of iron compared to women and experience twice the rate of cancer, diabetes, heart disease and infections. Tumor cells, bacteria, viruses and fungi all depend upon iron as their primary growth factor. The accumulation of iron in non-menstruating women either from early hysterectomy or menopause increases the risk of cancer.

The prominent role of iron in cancer

Eugene D. Weinberg has written an extensive description of the prominent role of iron in the development of cancer. Loss of iron control is a hallmark of cancer. Here is just a smattering of the expansive list of reports that link iron with cancer:

- Tumors grow better in an iron-rich environment. In an animal study conducted in 1989, 19 rats were injected with iron daily for 3 months. Nine animals produced tumors while all animals in a control group that received no iron remained free of malignancy.
- Alcohol consumption (with the exception of moderate red wine intake) increases the risk of cancer. Alcohol increases iron absorption from foods.
- Cigarettes are widely known to increase the risk of lung cancer. Cigarette smoke contains high quantities of polyhydroxybenzenes that can mobilize iron from its storage protein, ferritin. Tobacco and cigarette paper contain significant amounts of iron. A one-pack a day smoker might inhale enough iron to promote tumors in the lung.
- Calorie-restricted diets are gaining attention for their ability to extend the lifespan. In a controlled animal study, a calorie restricted diet reduced the risk for breast tumors, whereas a calorie-restricted but iron-sufficient diet, did not.
- Red meat consumption is linked with colon, breast, bladder, endometrial, ovarian and other cancers. Red meat provides highly absorbable heme iron.
- Leukemia is cancer of the blood. Eighty percent of iron is stored in red blood cells. A pint of whole blood carries 200-300 milligrams of iron. So it is no coincidence that disturbed iron metabolism is a major cause of leukemia. Iron chelators are used to treat leukemia, a disease that occurs more frequently in males who have higher iron stores than females.
- If iron is a major factor in the onset of cancer then iron overloaded individuals (hemochromatosis) would experience a high risk for cancer. Indeed, iron overloaded individuals are at 200-times greater risk to develop liver cancer. The liver is the organ where excess iron is stored.
- Bloodletting, which is a method of reducing iron stores in the body, is used as a treatment for liver cancer.
- Cancer often spreads (metastasizes) to the iron-rich liver.
- Those individuals who repeatedly donate blood, and thus reduce iron stores in their body, are at less risk for cancer.
- Daily intake of 1.3 grams of aspirin can cause fecal blood loss approximately equivalent to donation of a pint of blood every 12 weeks. Aspirin is known to reduce the risk of cancer, likely via its ability to slowly reduce stored iron levels in the body.
- High-fiber diets are not always correlated with low frequency of colon cancer. Only whole grains that contain the iron-binder IP6 phytic acid appear to inhibit colon cancer. Whole grains, but not refined cereals that have the bran removed, reduce the risk of cancer.
- Adults who consume the most iron and copper more than double their risk for colon cancer.
- The administration of iron Dextran intravenous solution increases the risk of cancer.
- Exposure to inhaled asbestos fibers is related to lung cancer. The most carcinogenic forms of asbestos, crocidolite and amosite, contain up to 27% iron by weight as part of their crystal structure.
- Iron overload causes chronic vitamin C deficiency since excess iron accelerates the oxidative catabolism of ascorbic acid. Low vitamin C levels are linked with high cancer mortality rates.
- Breast cancer after the onset of menopause begins when estrogen, released from adipose (fatty) cells in the breast, sends a signal to release iron.
- Traditional Chinese medical doctors report when they mix herbal decoctions in metallic pots (aluminum, iron, copper) their herbal remedy is less likely to inhibit gastric cancer. Glass vessels are superior.
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- Iron foundry workers are at increased risk to develop cancer.²⁴

Many cancer treatments control iron

Many of the conventional or alternative treatments to prevent or treat cancer involve the control of iron.

- Aspirin — causes small amount of blood loss which in turn causes loss of iron
- Vegetarian/macronutrient diet — limits iron supply; provides non-heme iron which is not as readily absorbed as iron from meat
- Exercise — sweats out iron
- High fiber diets (seeds, bran) — binds iron to phytic acid (IP6)
- Bioflavonoids — Green tea, quercetin, grape seed, others — iron binding
- Colostrum — contains iron binder (phytic acid-IP6)
- Fasting — no iron consumption
- Wormwood (Artemisia) — chelates iron
- Adriamycin cancer drug — iron binding/releasing
- Soy — contains iron binder (phytic acid-IP6)
- Gallium, indium, cisplatin — bind to iron transfer protein, transferring

The use of iron chelators for cancer treatment

Iron chelators are useful as anti-tumor agents. Researchers indicate “The development of chelators as anticancer agents is...one with extraordinary potential to impact human cancer.” Iron chelators have been tested in lab dish studies of cancer cells, in animal and human studies, so one cannot say iron chelators are unproven. They are widely used.

The primary iron chelator used in anti-cancer treatment, Desferal (desferrioxamine), can retard tumors.²⁵ However, Desferal has a modest effect because of its poor ability to permeate cell membranes and chelate iron pools within the cell.²⁶

Adriamycin (doxorubicin), an antibiotic drug often used for cancer treatment, is an iron binder. One of the major drawbacks of Adriamycin is that it often results in severe damage to the heart. In certain circumstances this drug can release iron from its storage protein, ferritin, resulting in the heart damage.²⁷ The beating force of the heart is reduced by 50% with the anti-cancer drug Adriamycin, but only 18% when the drug and iron-binding bioflavonoids are used together.²⁸

Ferriprox (deferiprone) is the world’s first and only orally active iron chelating drug, which is effective and inexpensive to produce, but has similar toxicity to other chelating drugs.²⁹ “There is therefore an urgent need for an orally active, inexpensive iron chelating drug, because desferrioxamine, the only currently widely available iron chelator, must be given parenterally and is expensive. Deferiprone has emerged as an orally active iron chelator with comparable efficiency to desferrioxamine but side effects have raised doubts about its safety.”³⁰

IP6 phytic acid (inositol hexaphosphate); one molecule of inositol, 6 molecules of phosphate.

IP6 (phytic acid, or phytate, or inositol hexaphosphate) and cancer

The obvious choice among available iron chelators is phytic acid (inositol hexaphosphate or IP6). IP6 phytic acid as a dietary supplement, usually extracted from rice bran, is widely available, inexpensive, and largely without toxicity. Its problem is that it is not a drug. It is a dietary supplement and has no pharmaceutical company to promote its use by oncologists.

IP6 phytic acid, the iron chelator found in seeds and bran, is unique among antioxidants because it both binds to iron and reduces the affinity of oxygen to hemoglobin. There is no other antioxidant like it. It is the only antioxidant that can completely quench the hydroxyl radical.³¹

The safety record of IP6 is long standing. First, it is a normal dietary component and is found in every living cell of the body. Second, extensive studies have been conducted to confirm the lack of toxicity of IP6. In 1987 phytic acid researcher Ernst Graf reported that only 4 of 22 chelating agents studied, including IP6, block hydroxyl radical production. Only phytic acid IP6 was found to be economical, nontoxic, and effective.³² In 2001 Food and Drug Administration researchers reported that 8 of 12 chelating agents tested were mutagenic. Among the four nontoxic chelators were EDTA and IP6 phytic acid.³³

IP6 phytic acid enhances the anticancer effects of Adriamycin and Tamoxifen.³⁴ But for unexplained reasons, IP6 phytic acid is not commonly used with these medications. Unlike chemotherapy or radiation therapy that damages both healthy and tumor cells, IP6 is a selective agent against cancer cells. Because cancer cells are high in iron and copper content, IP6 phytic acid directs more of its attention to abnormal cells. Healthy cells are not affected.³⁵

IP6, DNA repair and gene-controlled cancer inhibition

DNA damage is intimately linked to the onset of cancer.³⁶ DNA damage typically occurs on only one strand of the double-helix molecule. But when a double-strand DNA break occurs there is no scaffold to hold the DNA together, which becomes the basis for chromosomal breaks. In the year 2000 researchers found the molecule required for double-strand DNA repair — IP6.³⁷

Of interest, free unbound iron can interfere with the p21 gene which regulates dozens of other genes involved in cell mitosis, cancer, etc. The use of an iron chelating drug (desferrioxamine) alters the expression of DNA controlled proteins, and thus could be a weapon against cancer.³⁸ As an alternative to chelating drugs, IP6 phytic acid has been shown to desirably alter the expression of proteins by the p21 and p53 genes, but goes unused as a cancer treatment.³⁹

Synergistic factors

Other synergistic factors that appear to increase the anti-cancer properties of IP6 include green tea and vitamin D.⁴⁰ IP3, a breakdown molecule of IP6, is believed to be an active agent against cancer. The release of calcium from tumor cells is believed to trigger
their maturation and death. Vitamin D raises calcium levels inside tumor cells which helps to form IP3 which in turn triggers a signal to release calcium from tumor cells, which then results in tumor cell death. IP6 phytic acid plus vitamin D may also help with the over-accumulation of calcium inside tumor cells, a condition called hypercalcemia. Therefore, vitamin D is considered to be a synergistic companion to IP6 phytic acid in treating cancer.

**IP6 as a dietary supplement**

About 70% of the IP6 made by Tsuno Foods and Rice Company of Wakayama, Japan, is available to chelate (attach) to iron, copper and heavy metals. Most American brands of IP6 emanate from this pioneering supplier in Japan. The remaining 30% is calcium bound to IP6 phytate. IP6 phytic acid as an extract from rice bran is a far more effective anti-cancer agent than whole rice bran or bran cereal alone, or soy or colostrum which contain small amounts of IP6. Therapeutic doses are in the range of 2000-4000 milligrams per day. IP6 phytic acid should be taken with water on an empty stomach so as not to limit needed minerals available from foods. IP6 phytic acid is a selective mineral chelator that attaches to high valence metallic minerals such as copper, iron, mercury, lead, cadmium, but not to non-metallic electrolyte minerals such as sodium, potassium and magnesium.

**Case reports**

Since writing a book about iron and IP6, I have received numerous reports of dramatic cancer remissions involving this dietary supplement. Some of them notably stand out:

- An 80-year old man with terminal liver cancer who took IP6 for a few weeks and was scheduled for a rescue procedure where an anti-tumor drug was to be injected directly into the liver. A cat scan performed just prior to the procedure revealed the liver tumor was completely necrotic - the tumor was a ball of dead cells.
- A middle-aged woman whose husband worked for a prominent member of Congress, who had stage 4 breast cancer, experienced a rapid and complete remission following the consumption of IP6.
- A man with recurrent bladder tumors submitted to surgical removal in 1999, 2000 and 2001. He then embarked upon the use of IP6 as a dietary supplement and has not experienced a return of bladder tumors over a 38-month period. Despite the overwhelming evidence that IP6 phytic acid is a safe, economical and effective treatment and preventive agent for cancer, worthy of human clinical trials, the National Cancer Institute has not funded one.

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human study of this natural cancer fighter. It is often said that there are no human studies to validate the use of IP6 for cancer treatment. But for unexplained reasons, far more toxic iron chelators like Adriamycin and tamoxifen are used without hesitation in the treatment of cancer.

Tumor iron dynamics

While iron is a growth factor for tumor cells, it can also be used as a weapon against cancer. In rodents, the provision of iron supplements combined with fish oil conditioned tumor cells to die off more readily than with fish oil alone. Iron can be used to kill as well as promote tumor growth.

Anemia of malignancy

A prevalent problem is that anemia as well as infection or chronic inflammation, causes the body to sequester iron with binding proteins (ferritin, transferring, lactoferrin) so efficiently as to prevent the growth of tumors or pathogenic organisms, so that little of it can reach the bone marrow to produce new red blood cells. A condition called anemia of chronic disease results. When this occurs cancer patients will naturally become pale, fatigued, and have cold hands and feet. The provision of supplemental iron may elevate hemoglobin levels and remedy the anemia, but lead to the demise of the patient since iron accelerates tumor growth. Furthermore, the use of IP6 phytic acid in a cancer patient who is anemic is likely to cause faintness, sleepiness, and a further drop in hemoglobin. Some instruction on how to handle cases like this is explained by Eugene D. Weinberg, a renowned researcher in iron metabolism. Possibly iron supplements interspersed between courses of oral IP6 phytic acid could remedy the anemia and inhibit tumor growth.

Modern medicine continues to ignore IP6 phytic acid as a treatment for cancer. In recent years the public has embarked upon their own unguided use of IP6 rice bran extract for cancer prevention and treatment, oftentimes with great success.

References

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