Toxic mechanics and solutions: heavy metals, ionizing radiation and compensatory antioxidants

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It is important to acknowledge the facts concerning exposure to toxins and various radiations which affect human health. To do so, allows us to address the situation in specific ways. Ionizing radiation is radiation which has sufficient energy to liberate electrons from atoms and molecules, creating ions, hence its name. Heavy metals, are metals with high atomic weights which can, if inculcated into the bodily system at sufficient concentrations, bind to and interfere with cellular and other biological operations in many different ways.

Some few of the very many sources of heavy metals and ionizing radiation:

Coal fly ash cloud formation. Click here for Dr. Herndon's paper and detail:
http://nuclearplanet.com/ijerph-original.pdf

UVC reading approaching winter in southern Oregon. There should be no UVC ionizing radiation on the Earth's surface.

These facts indicate two distinct, current unhealthy conditions. 1. Heavy metals and toxins directly absorbed into the body, some of nano-scale which pass directly along olfactory nerve tracts into the brain, and may also bypass the BBB; 2. Exposure to ionizing radiation such as UVA, B and now also type C.

The pertinent questions are: What damage do we expect to receive from these administrations?—and—How to avoid such damage?

With those questions in mind, let us examine how we are being harmed, and see if any recourse offers itself to us.

Free radicals are produced by both ionizing radiation and heavy metals.

See: **Heavy Metals and Human Health: Mechanistic Insight into Toxicity and Counter Defense System of Antioxidants**
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4691126/

See: http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch23/radiation.php

Ionizing radiation creates free radicals from the water within the body itself, by the

reaction:

~3-4 water molecules are ionized for every 1.6 x 10^{-17} joules of energy absorbed of ionizing radiation: $H_2O \rightarrow H_2O^+ + e^-$

The free radical formed, H_2O^+ (as others from other sources), is an oxidizing agent which may damage the cellular membrane, nucleus, chromosomes, or mitochondria. Think of a free radical as a free floating piece of a molecule which has an unpaired valence shell electron, making it reactive.

Reactive oxygen species include super-oxide anion $O_2^{\cdot -}$, and peroxides amongst others.

See: http://www.vivo.colostate.edu/hbooks/pathphys/topics/radicals.html

Peroxides, have two oxygens bonded into the peroxide anion $\mathbf{O_2^{2-}}$: Simply put, think of an extra oxygen over the expected oxide. Think of H_2O_2. Note the O_2, instead of the expected H_2O. Although involved in cellular signaling, mitogenic and phagocytic protective functions, such radicals if produced or inculcated indiscriminately cause severe harm.

Antioxidants often become radicals themselves, but are regenerated in turn by other antioxidants which work together as complexes: Vitamin E becomes a radical to perform necessary chemistry but then is regenerated by antioxidants vitamin C and glutathione.

Enzymatic Antioxidants include:

Superoxide dismutases (SOD) which converts two superoxides into less toxic hydrogen peroxide and oxygen, is a metal containing enzyme with constituents of bound manganese, copper or zinc; manganese functioning in mitochondria, then the remainder in cytoplasm in mammals respectively.

Catalase converts hydrogen peroxide into water and oxygen, finishing the work of SOD.

Glutathione peroxidase is a group of enzymes most of which contain selenium which reduce hydrogen peroxide and other such oxidants.

Glutathione transferase, ceruloplasmin, hemoxygenase and others also control the proliferation of radicals.

Non-enzymatic Antioxidants include:

Vitamin E protects membranes by trapping peroxy radicals;

Vitamin C reduces radicals, recycles E radicals, and acts as an oxidant in some circumstances;

Glutathione: a tripeptide (three amino acids joined by peptide bonds) [glutamyl-cysteinyl-glycine]. Cysteine gives an exposed reactive free sulphydryl group (SH) for radical combination/reaction, then, once oxidized, it is regenerated via redox cycle involving glutathione reductase and the electron acceptor NADPH.

Flavonoids and carotenoids also act in these roles.

From: **Heavy Metals and Human Health: Mechanistic Insight into Toxicity and Counter Defense System of Antioxidants**
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4691126/

"Antioxidants that act at different levels of the oxidative sequence act by depleting molecular oxygen, quenching singlet ($^1O_2$) oxygen species, trapping aggressive reactive species such as superoxide radical ($O_2^{\bullet -}$) and hydrogen peroxide (H_2O_2), scavenging chain initiation reactants such as hydroxyl ($^{\bullet}OH$), alkoxyl ($RO^{\bullet}$) or peroxyl ($ROO^{\bullet}$) radicals, and breaking the chain reaction sequence by decomposing products of oxidation to non-radical species so as to prevent hydrogen abstraction from different substrates."

(Singlet oxygen species referred to above are *energetic oxygen forms* with high reactivity).

Heavy metals and associated toxicity to DNA and other biological targets can be ameliorated with antioxidants, as can the oxidative damage caused by ionizing radiation.

Free radicals that damage cell structure are created by ionizing radiation. To prevent DNA damage the antioxidant must be near the DNA itself so it may react with oxygen-related free radicals and detoxify them to other forms and/or, compete with oxygen reactivity and repair damage chemically; peroxidation of membrane lipids may be prevented; mitochondria may be saved, melatonin playing a major role; apoptosis may be prevented by inhibiting proteins in the apoptotic cascade or modification of gene expression (Okunieff et al).

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So in order to survive in this day of radiation and toxic metals, I suggest a regimen of oral chelation (cilantro and chlorella) after ascertaining if more serious measures are needed

with a DMSA challenge test. You will be amazed at the improvement if full chelation is indicated. Then, a lifelong regimen of high levels of antioxidants including glutathione precursors [glutamate, glycine and cysteine], glutathione co-factors [vitamin C, vitamin E, vitamins B1, B2, B6, B12, folate (B9), minerals selenium, magnesium and zinc, and alpha lipoic acid], liposomal glutathione, melatonin, and green tea polyphenol (−)-epigallocatechin, make a good start.

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