The article evolves in four steps:

1 - the assignment
2 - check PubMed
3 - call NIH
4 - let the interviews determine the news hook

The Washington Post

HEALTH

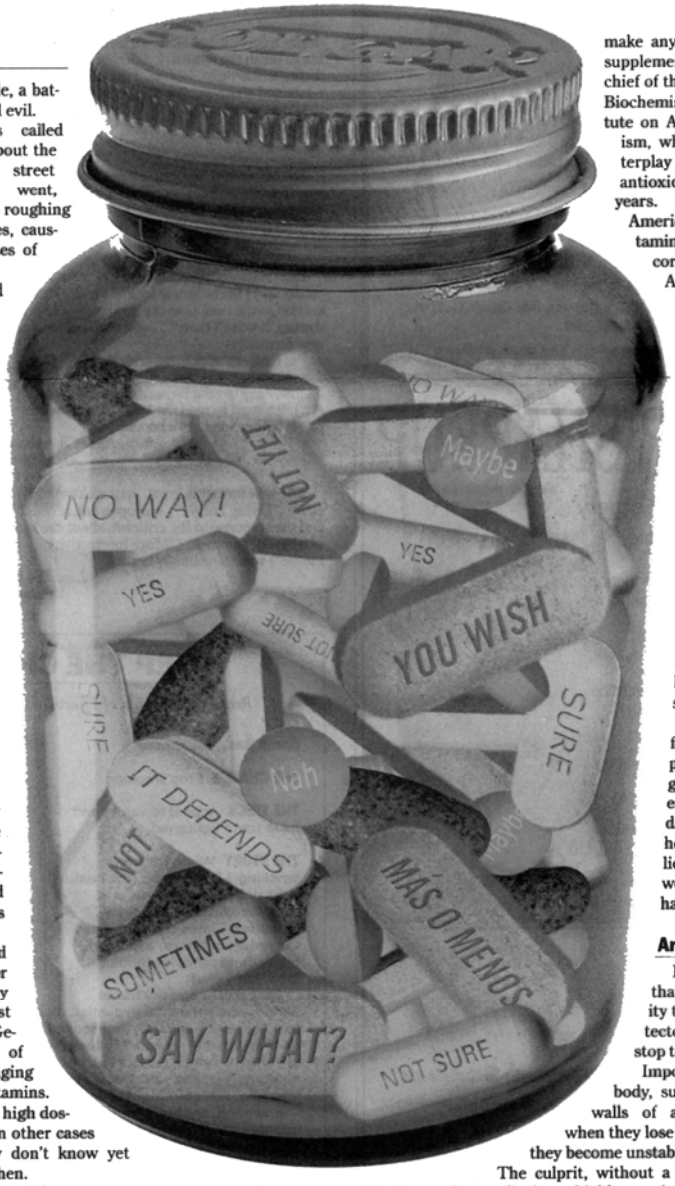
Tuesday, August 7, 2001

Antioxidants Fight Disease (Except When They Make It Worse). They Support Immunity (Except When They Don't). And They Help Fight Aging (But Not If You're Getting Older). Can Someone Please Explain What's Going On?

MIXED MESSAGES

The first of many great quotes from a NIH scientist

By Christopher Wanjek
Special to The Washington Post



It used to be so simple, a battle between good and evil.

Rogue chemicals called free radicals roam about the body like brazen street punks, the story went, smashing cellular walls and roughing up innocent DNA molecules, causing cancers and the diseases of middle and old age.

Their flagrant disregard for the law would continue unchecked if it weren't for swashbuckling antioxidants swooping in on the wings of dietary supplements, disarming the free radicals of their menacing electrons and converting them into respectable molecular citizens.

At least that's how the theory went. And the public bought it—both the story and millions of doses of antioxidant supplements, which they believed would reduce disease, boost system performance and maybe even slow the aging clock. But as a bewildering cascade of contradictory, inconclusive and outright negative research reports over the past several years suggests, the human body isn't governed by a B-movie script. The antioxidant story isn't as simple as some—largely, those who make and sell them—would have us believe.

"Free radicals are as good as they are bad," says Walter Bortz of Stanford University Medical School. He is a past president of the American Geriatric Society and author of several popular books on aging and scientific articles on vitamins. He says that antioxidants in high doses may do the body harm; in other cases they may help. We simply don't know yet which ones do which and when.

The quote that led to the theme of the article

"It's a very complicated story," he says.

You know many antioxidants by name, whether you take them or not: vitamins C and E, beta carotene and selenium are just the most common. Their purported health benefits adorn the packaging for everything from cereals to cosmetics. One can easily walk through the aisles of any grocery, drug or vitamin store thinking that antioxidants are scientifically validated wonder pills. They're not, "although the data don't seem to make any difference to the sales of supplements," says Richard Veech, chief of the Laboratory of Membrane Biochemistry at the National Institute on Alcohol Abuse and Alcoholism, who has reported on the interplay of free radicals and antioxidants for more than 30 years.

Americans spent $31 billion on vitamin supplements in 1999, according to the U.S. General Accounting Office. Nearly $2 billion of that was for vitamins E and C, beta carotene and selenium, according to Nutrition Business Journal. Up to 30 percent of the population is taking antioxidant supplements regularly, according to the American Heart Association.

While the efficacy of antioxidant supplements remains gospel in the health-marketing community, Bortz says the accumulating scientific record does not verify it. For every study that shows benefits, he says, there is another study that doesn't.

So with antioxidants and free radicals now seen as playing dual roles of good guys and bad guys, just what exactly is the state of antioxidant research? And what health claims can you believe? The experts—you were about to guess this—have a variety of opinions.

Armor All for the Body

It's generally recognized that antioxidants have the ability to serve as sort of a rust protector for the body, putting a stop to a process called oxidation. Important molecules in the body, such as those that form the walls of arteries, become oxidized when they lose an electron. Once oxidized, they become unstable and easily break apart.

The culprit, without a doubt, is the free radical, Veech says. Free radicals are highly reactive molecules, or single atoms with unpaired electrons, looking for a mate. So they steal an electron from the first thing they encounter, perhaps a cell wall or a strand of DNA. As free-radical damage mounts, cells can no longer perform properly. Tissues degrade. Disease sets in. An excess of free radicals has been cited in the development of cardiovascular disease, Alzheimer's disease, Parkinson's disease and cancer. Aging itself See ANTIOXIDANTS, Page F4

FOR RESEARCH SUMMARIES ON VITAMINS A, C AND E AND SELENIUM, SEE PAGE F4.

The Washington Post

HEALTH

F

TUESDAY, SEPTEMBER 17, 2002

DM VA

BY DOUG STEVENS—THE WASHINGTON POST

Tales About Rampant Toxic Mold Get Plenty of Attention, but Science Tells a Less Dramatic Story

By CHRISTOPHER WANJEK
Special to The Washington Post

In the fictitious horror movie "Attack of the Killer Mold," a creeping pathogen that starts out as a little dot in the corner of the utility room turns into a seething green-black slime that soon consumes the entire house. Hapless householders who breathe in the killer's spores collapse into paroxysms of wheezing and spend the rest of their shortened lives in intensive care.

Brave men in protective moon suits cart away mold-laden rugs and floorboards before crews begin rebuilding the house, brick by brick, plank by plank. And before the credits roll, the evil corporation responsible for the mold is brought to justice and made to pay not only punitive damages but the plaintiffs' legal costs, too.

Like most Hollywood creations, this is a story based more on hype and fantasy than fact. Nevertheless, it's playing in a courtroom near you.

Several things about molds and health are well-known. Some molds growing in homes and buildings trigger allergic reactions and asthma symptoms in some people. A smaller group of people, including those with compromised immune systems, are susceptible to lung infections caused by inhaling mold spores.

And a small group of molds does produce toxins.

But the impression that toxin-producing molds are rampant and more virulent than ordinary molds—an impression created by some news reports and on the Internet, often on sites operated by companies that sell mold tests, cleanup systems or legal services—is not supported by evidence. In fact, according to those who have studied the issue, there is little conclusive evidence that mold toxins in the home or office (as opposed to an overabundance of ordinary mold) can cause serious harm to humans.

"Mold is everywhere," said Gailen Marshall, director of the Division of Allergy and Clinical Immunology at the University of Texas Medical School at Houston. "For most, mold is a mostly ignored part of their lives. For some with mold allergies, the smell can cause nasal allergy or even asthma symptoms. Yet what is increasingly clear is that their mold-related illness has nothing to do with toxic substances produced by molds."

That is, airborne mold spores, much like pollen, dust or animal dander, trigger allergic reactions. But mold toxins, however potentially harmful, never get into the body in high enough levels to cause harm.

See **MOLD**, *Page F4*

Anatomy of a Hokey Science Column

armchair astrophysics

Losing and Finding Half the Matter

Never mind dark energy and dark matter. Scientists can't keep track of the ordinary stuff.

by Christopher Wanjek

Astronomers would make poor shopkeepers. How's this for a bungled inventory: they don't have a clue as to what 96 percent of the Universe is made of; and as for the remaining 4 percent…well, they don't know where half of it is. It all adds up to the worst accounting scandal since Enron.

What a relief, then, that at least some of the missing matter may have been found. A group led by Fabrizio Nicastro of the Harvard-Smithsonian Center for Astrophysics has identified two, warm, wispy gas clouds that they say is part of a "cosmic web" that is hiding ordinary matter. The group reported this finding in the 3 February issue of *Nature*.

Here's what we know—or don't know—about the Universe's mass-energy budget. About 73 percent of the Universe is an enigmatic force that scientists call dark energy. This is the force behind the current, rapid, universal expansion. About 23 percent of the Universe is dark matter, which doesn't radiate or reflect light like the atoms that make up paper, people, and planets. Dark matter seems to provide the gravitational glue holding galaxies and galaxy clusters together.

Dark energy is an utter mystery, identified only a few years ago. Scientists still need to measure its strength more accurately before even guessing at what it could be. Dark matter has existed in our collective psyche for several decades now. Some scientists theorize dark matter particles might be found in the next few years. But direct detection, albeit tantalizing, is a long shot.

You would think that scientists at least had a grip on the remaining 4 percent of the Universe. Nope. Stars and galaxies account for about 0.5 percent, and intergalactic gas makes up another percent or so. The remaining 2 percent, or half the ordinary matter, seems to have slipped detection.

Specifically, scientists are looking for baryons, such as protons and neutrons—particles that are made of quark triplets. (Electrons and neutrinos are leptons, elementary particles with no internal structure.) Big-bang theory and observations of the cosmic microwave background, the big-bang afterglow, both indicate that there are about twice as many baryons out there than we see directly.

The search for missing baryons is more than a bookkeeping exercise. "If you want to know how the Universe came to be as we see

Chandra X-ray Observatory image of Markarian 421, a quasar located 400 million lightyears from Earth, was taken with the High Resolution Camera on 1 July 2003. Image courtesy of NASA/SAO/CXC/F. Nicastro et al.

it today, you need to know all three things," said NASA's Ann Hornschemeier, acting deputy project scientist for the Constellation-X mission. That is, although dark energy and dark matter are major players, the number and distribution of baryons "fundamentally affect the way in which galaxies form," she said.

Computer simulations of the early universe reveal a cosmic web of matter that scientists call the warm-hot intergalactic medium, or WHIM. The WHIM is tenuous and ionized, which makes for difficult detection. Highly ionized atoms, stripped of most of their electrons, do not absorb light very well. Moreover, the gas is too hot for powerful optical telescopes to see.

Nicastro's team searched for a distant x-ray lighthouse powerful enough to illuminate the WHIM. Using NASA's Chandra X-ray Observatory, they studied a quasar-type object named Markarian 421, which has been particularly active for the past several years. Sure enough, the x-ray light from this quasar is plowing through two gas clouds never before detected.

When the scientists analyzed the quasar light reaching Earth, they saw that oxygen, nitrogen, and neon atoms in these invisible clouds were absorbing some of the x rays. The detection demonstrates that missing matter could, indeed, be hiding out in invisible WHIM clouds. Next came the extrapolation. Using a sample size of one quasar and two clouds, Nicastro's team speculated that the Universe could contain enough clouds to account for the missing baryons.

This is a solid observation, according to Michael Shull of the University of Colorado, who found evidence of additional, somewhat cooler WHIM clouds with an ultraviolet telescope called FUSE. We need better statistics, however, to make broader claims. "To do the census properly we need many more observations," Shull said. "You would never do a census of the United States with two people."

Unfortunately, most quasars aren't bright enough to serve as x-ray lighthouses for the current generation of space observatories. Constellation-X, now in development, will be 100 times more sensitive than Chandra and ESA's XMM-Newton and will detect these weak absorption lines from WHIM clouds.

After that, it will be 4 percent down and 96 percent to go.

CHRISTOPHER WANJEK of SP Systems supports NASA's Beyond Einstein roadmap. He recently discovered missing matter of a mysterious form in his basement.

The intro joke

The news summary

The background science

The actual result

The "yeah, but…" quote

The future

The closing joke

The scientist who backs up what I said, in case you don't believe me