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Marco Blogsite: marco-ltd.blogspot.com
"listserve": <http://googlegroups.com>

Web Site: <http://www.marco-ltd.org>
Internet address: warren.brown1924@gmail.com

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THE CUTTING EDGE: TREATING AGING INSTEAD OF DISEASES

THE TIME HAS COME TO STOP TREATING INDIVIDUAL DISEASES AND START TREATING AGING ITSELF; IS IT POSSIBLE? A NEW TRIAL MAY HELP.

(As reported on MARCO Grand Rounds of the Air.)

Research has found that the drug **metformin** (*Glucophage*) used to treat diabetics has target effects against senescent cells—normal cells that stop dividing that produce toxic substances damaging to the cells around them. Senescent cells usually develop as people age or/and at sites of age-related chronic diseases, such as the brain in Alzheimer's patients or around the plaques that lead to heart attacks and strokes. It isn't proven if senescent cells actually cause the diseases however. Some say the first person to reach the age of 150 has already been born.

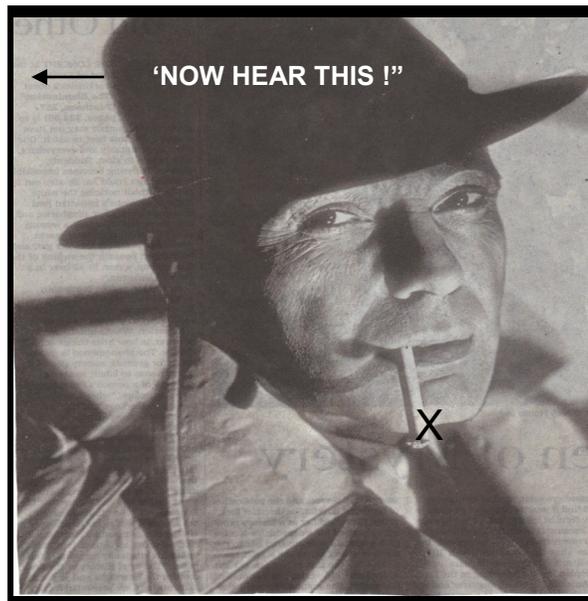
Now, some of the top researchers on aging in the country are trying to get an unusual clinical trial up and running. They want to test a pill that could prevent or delay some of the most debilitating diseases of old age, including Alzheimer's and cardiovascular disease. The focus of the project isn't to prolong life, *although that could occur*, but to make the last years of people's lives more fulfilling by postponing the onset of many chronic diseases.

There are about a dozen drugs that appear to delay the aging process in lab experimental animals & actual observational studies of people.

"*Aging is the major risk factor for all these diseases—heart disease, cancer, diabetes and Alzheimer's,*" said Nir Barzilai, director of the Institute of Aging Research at Albert Einstein College of Medicine who is leading the proposed study. Dr Barzilai expects to start a randomized controlled clinical trial to be conducted at multiple research centers and take 5 to 7 yrs. The trial aims to test the drug **metformin** to see if it can delay or prevent other chronic diseases besides diabetes. The project is being called "Targeting/Taming Aging With Metformin, or **TAME**. Metformin isn't necessarily more promising than other drugs that have shown signs of extending life and reducing age-related chronic disease, but metformin has been widely and safely used for more than 60 years, and has very few side effects and is inexpensive.

A study that helped convince the gerontologists to pursue the TAME project was done in the U.K. and published last year in the journal *Diabetes, Obesity & Metabolism*. Researchers used data from a national registry of more than 180,000 people, comparing the treatment of metformin with that of earlier sulphonylureas (*Orinase, Diabinese*), other drugs used for diabetes. People who took metformin lived longer than those taking 1st generation sulphonylureas, the study found. In addition the people with diabetes who were 71 to 75 years old at baseline and took metformin outlived their nondiabetic controls with a 15% greater survival rate. It was studies like this that gave reason that certain pharmacological interventions, like metformin, may have broad effects in improving health and increasing health span. (*Perhaps the appetite depressing effect of the drug helped prevent metabolic syndrome.*)

Investigators also found metformin and lifestyle change were both effective in staving off diabetes in people at high risk for the disease for at least 10 years. Data from the study which followed more than 3,000 adults for 15 years, are



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LATE BREAKING NEWS

Recently 80% of younger people polled indicated they would prefer to die before the painful debilitating age of 75. Modern medicine now has the potential for changing that providing we push rather than discourage aging research. Discussing a subject such as this is loaded with land mines partially due to indiscriminant people out for monetary gain. The "Shysters" are out there with phony supplements looking for a fast buck; they will end up only hurting themselves. The day is coming when we will all, more or less, live to a happy healthy 150th birthday—let's try and make it sooner rather than later.

The names of companies offering direct-to-consumer genome sequencing are: 23andMe, Navigenics, Life Genetics and Illumina. Check for prices.

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<u>DAY</u>	<u>EASTERN</u>	<u>FREQ.</u>	<u>NET CONTROLS</u>
Any Day	On the Hour	14.342	Hailing Frequency
Sunday	10:30 a.m. Eastern	14.140	CW Net, Chip, N5RTF
Sunday	11 a.m. Eastern	14.342	Warren, KD4GUA

(Alternate confidential Grand Rounds frequency—
 on or about 14.344 or as announced on the air.)

**MARCO'S CW
 NET IS NOW
 CALLED THE
 "Bob Morgan
 Memorial
 Net"
 Sundays, 10:30 am,
 14.140 MHz**

Page 2

MARCO Grand Rounds is held Sunday at 11 a.m. Eastern Time; 10 a.m. Central; 9 a.m. Mountain, and 8 a.m. Pacific Coast time on 14.342. You qualify for one hour Category II CME credit with your check-in.

now being analyzed to see whether long-term use of metformin prevented the development of cardio-vascular disease, cancer, cognitive decline and physical-function decline.

Metformin appears also to slow the development of age-related symptoms by increasing the enzyme AMP kinase, which normally declines with age, and decreasing the protein mTOR, which helps to regulate cell growth.

Several other drugs also have shown life-extension properties in mice, which showed that a combination of two drugs—dasatinib, a cancer drug, and quercetin, a supplement—were potentially effective.

"There's more and more evidence that by targeting aging itself we might be able to target these age-related chronic diseases that have been so intractable for us to try to come up with a cure for," one of the doctors stated. *"Fighting each major disease of old age separately isn't winnable,"* said another. *"We lower the risk of heart disease, somebody lives long enough to get cancer. If we reduce the risk of cancer, somebody lives long enough to get Alzheimer's disease. We are suggesting that the time has arrived to attack them all by going after the biological process of aging."* An FDA spokeswoman, said the agency's perspective has long been that "aging" isn't a disease. "We clearly have approved drugs that treat consequences of aging," she said. Although the FDA currently is inclined to treat diseases prevalent in older people as separate medical conditions, "if someone in the drug-development industry found something that treated all of these we might revisit our thinking."

Other experts agree with the goal of delaying chronic disease for the elderly, but question whether medication is the best way to do that. *"Aging is a very complex condition and it's probably going to take a multifaceted approach to help people delay or ensure that they age in a healthy way. Effective interventions to delay aging already exist, such as exercise, nutrition, social engagement, stress reduction and getting adequate sleep. These are reliable and effective ways to keep people healthy as they age, the problem is they're not as easy as taking a medication."*

(Information for above was taken from Sumathi Reddy's fine article in the WSJ 3/17/15)

LIFE-LINE STATISTICS

**Life expectancy for U.S. men...76 years; U.S. Women...81 years
 Number of years curing cancer adds to life expectancy...3.5 yrs.
 Number of years curing heart disease adds...10 to 15 years.**

WHAT ABOUT RAPAMYCIN ?

Rapamycin, (*Streptomycin hygrosopicus*) also called "Sirolimus" was discovered on Easter Island in the Pacific some 50 years ago. It was first shown to extend lifespan in yeast cells. Building on this and other work, in a 2009 study, the life spans of mice fed rapamycin were increased between 28 and 38% from the beginning of treatment, or 9 to 14% in total increased maximum lifespan. Of note, the treatment began in mice aged 20 months, the equivalent of 60 human years. This suggest the possibility of an effective anti-aging treatment for humans at an already-advanced age, as opposed to requiring a lifelong regimen beginning in youth.

Rapamycin has subsequently been shown to extend mouse lifespan in several separate experiments, and is now being tested in the marmoset monkey.

It is not known whether rapamycin will have lifespan-lengthening effects in humans, and study authors caution that the drug should not be used by the general population for this use.



"Hurry up boys, I'm not getting any younger !"

WHAT ABOUT NAD?

NAD (*Nicotinamide Adenine Dinucleotide*), also known as Vitamin B-3 is the oxidizing agent that gets reduced to NADH which is then used to make energy by oxidative phosphorylation in the Krebs Cycle.

Companies are now selling supplements to augment the body's own production of NAD and selling it for "energy, memory restoration, and to slower aging" when it is **not** NAD but supposedly the ingredients used to make it. Another scam?

WHAT ABOUT HUMAN GROWTH HORMONE?

Growth hormone (GH or HGH) also known as somatotropin is a hormone that stimulates growth, cell reproduction and regeneration in humans. It is made & stored in the anterior pituitary gland. It is used as a prescription drug in medicine to treat children's growth disorders and adult growth hormone deficiency. In the U.S., it is only available legally from pharmacies, by prescription from a doctor. It has serious side-effects.

In its role as an anabolic agent, HGH has been abused by competitors in sports at least since 1982, and it has been banned by the IOC and NCAA. Traditional urine analysis could not detect doping with HGH, so the ban was unenforceable until the early 2000s when blood tests that could distinguish between natural and artificial HGH were starting to be developed.

Use of GH as an anti-aging treatment date back to 1990 when the *New England Journal of Medicine* published a study wherein GH was used to treat 12 men over 60. At the conclusion of the study, all the men showed statistically significant increases in lean body mass and bone mineral density, while the control group did not. This was later speculated to be fluid retention. The authors of the study noted that these improvements were the opposite of the changes that would normally occur over a 10 to 20 year aging period. Despite the fact the authors at no time claimed that GH had changed the aging process itself, their results were misinterpreted as indicating that GH is an effective anti-aging agent. This has led to organizations such as the controversial American Academy of Anti-Aging Medicine to promoting the use of this hormone as an "anti-aging agent."

To capitalize on the idea that GH might be useful to combat aging, companies selling dietary supplements have websites selling products linked to GH in the advertising text, with medical-sounding names described as "HGH Releasers." Typical ingredients include amino acids, minerals, vitamins and/or herbal extracts, the combination of which are described as causing the body to **make more** GH with corresponding beneficial effects. In the U.S., because these products are marketed as dietary supplements it is illegal for them to contain GH, which is a drug. Also, under U.S. law, products sold as dietary supplements cannot have claims that the supplement treats or prevents any disease or condition, and the advertising material must contain a statement that the health claims are not approved by the FDA.

NOTE: In a recent magazine there is an ad which states "Grow Young with HGH." The full page ad never mentions the product does **NOT** contains HGH until the bottom of the page where it states, "Release your own growth hormone and enjoy!" thus indicating it contains only vitamins, amino acids only & maybe "fly specks."

PERSONALIZED MEDICINE

Personalized medicine proposes the customization of one's health—with medical decisions, practices, and/or products being tailored to the individual patient. Diagnostic testing is employed including appropriate therapies based on the context of a patient's genetic content or other molecular or cellular analysis. **SOUND COMPLEX?** *It doesn't have to be!*

The use of genetic information has played a major role in certain aspects and the term was coined in the context of genetics, though it has since broadened to encompass all sorts of personalization measures.

Basics: Every person has a unique variation of the human genome. Although most of the variation between individuals has no effect on health, an individual's health stems from genetic variation with behaviors and influences from their environment. One way that biological variation makes itself clear, is responsiveness to drugs: ADHD medicine only works for 1 in 10 preschoolers, cancer drugs are effective for 25% of patients, and depression drugs work with 6 of 10 patients. Will your patients waste their money in the future on drugs that don't work for them???

For example, personalized medicine techniques such as genome sequencing can reveal mutations in DNA that influence disease ranging from cystic fibrosis to cancer. Another method, called RNA-seq, can show which RNA's are involved with specific diseases.

Unlike DNA, levels of RNA change in response to the environment. Therefore, sequencing RNA can reveal a broader understanding of a person's state of health. Methods of RNA-seq are very similar to genome sequencing.

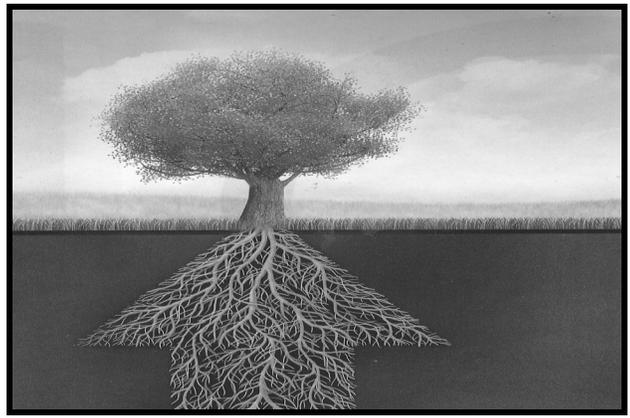
Method: In order for doctors to know if a mutation is connected to a certain disease, researchers often do a study called a "**Genome-wide association study**" (**GWAS**) A GWAS study will look at one disease, and then sequence the genome of many patients, say 1,000 persons with that disease to look for shared mutations in the genome. Mutations that are determined to be related to a disease by a GWAS study can then be used to diagnose that disease in future patients, by looking at their genome sequence to find that same mutation.

The first GWAS, conducted in 2005, studied patients with age-related macular degeneration (**ARMED**). It found two different mutations, each containing only a variation in only one nucleotide which were associated with **ARMED**. GWAS studies like this have been very successful in identifying common genetic variations associated with diseases. As of early 2014, over 1,300 GWAS studies have been completed.

Disease Risk Assessment: Multiple genes collectively influence the likelihood of developing many common and complex diseases. Personalized medicine can also be used to predict a person's risk for a particular disease, based on one or even several genes. This approach uses the same sequencing technology to focus on the evaluation of disease risk, allowing the physician to initiate preventative treatment before the disease presents itself in their patient. For example, if it is found that a DNA mutation increases a person's risk of developing Type 2 Diabetes, this individual can begin lifestyle change that will lessen their chances of developing Type 2 Diabetes later in life.

Advances in personalized medicine will create a more unified treatment approach specific to the individual and their genome. Personalized medicine may provide better diagnoses with earlier intervention and more efficient drug development and therapies.

Having the ability to look at a patient on an individual basis will allow for a more accurate diagnosis and specific treatment plan. Genotyping is the process of obtaining an individual's DNA sequence by using biological assays. By having a detailed account of an individual's DNA sequence, **their genome can then be compared to a reference genome**, to assess the existing genetic variations that can account for possible diseases. A number of private companies, such as 23andMe, Navigenics, LifeGenetics, and Illumina, have created Direct-to-Consumer genome sequencing accessible to the public. Having this information from individuals can then be applied to effectively treat them. An individual's genetic makeup also plays a large role in how well they respond to a certain treatment, and therefore, knowing their



FROM LITTLE ACORNS MIGHTY OAK TREES GROW

genetic content can change the type of treatment they receive.

An aspect of this is pharmacogenomics, which uses an individual's genome to provide a more informed and tailored drug prescription. Often, drugs are prescribed with the idea that it will work relatively the same for everyone, but in the application of drugs, there are a number of factors that must be considered. The detailed account of genetic information from the individual will help prevent adverse events, allow for appropriate dosages, and create maximum efficacy with prescriptions.

Many women are already being genotyped for certain mutations in the BRCA1 and BRCA2 gene if they are predisposed because of a family history of breast or ovarian cancer. When picked up on genotyping it is easier to identify an individual. Measures can then be taken to prevent a disease from developing.

Today in medicine, it is common that doctors often use a trial-and-error strategy until they find the treatment therapy that is most effective for their patient. With personalized medicine, these treatments can be more specifically tailored to an individual and give insight into how their body will respond to the drug and if that drug will work based on their genome—in other words "therapy with the right drug at the right dose in the right patient.

For instance, Tamoxifen used to be a drug commonly prescribed to women with e-receptor + breast cancer, but 65% of women initially taking it developed resistance. After some research, it was discovered that women with a certain mutation in the CYP2D6 gene, a gene that encodes the metabolizing enzyme, were not able to efficiently break down Tamoxifen, making it an ineffective treatment for their cancer. Since then, women are now genotyped for those specific mutations, so that immediately these women can have the most effective treatment.

Over recent decades cancer research has discovered a great deal about the genetic variety of types of cancer that appear the same in traditional pathology. Thus arises the possibility of finding drugs that have not given good results applied to a general population but may yet be successful for a proportion of cases with particular genetic profiles.

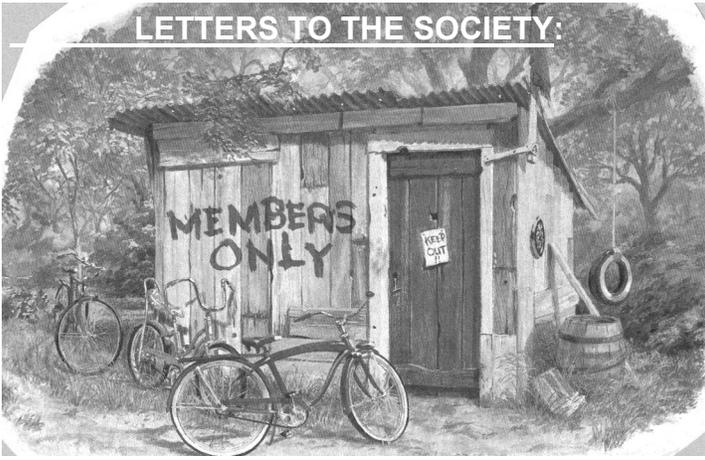
Since 2008, it has been illegal for health insurance companies to kick people off the roster because they took genetic tests that imparted bad news BUT, life insurance and disability insurance companies are under no such obligation. Thus, this is health medicine, making you aware of upcoming problems so you can steer away from them.

WHAT ARE TELOMERES

Telomeres are the caps at the end of each strand of DNA that protect our chromosomes, like the plastic tips at the end of shoelaces. Without the coating, shoelaces become frayed until they can no longer do their job, just as without telomeres, DNA strands become damaged and our cells can't do their job.

DNA makes up all of the cells in our body. It is the genetic material that makes us who we are. Our cells replenish by copying themselves. This happens constantly and telomeres get shorter each time a cell copies itself, but the important DNA stays intact. Eventually telomeres get too short to do their job causing our cells to age and stop functioning. Therefore, telomeres act as the aging clock in every cell. **(Continued on Page 10 →)**

LETTERS TO THE SOCIETY:

**Kudos from:** None

From **Keith Adams N3IM, Pennsylvania**...Well, another Dayton Weekend has come and gone....these observations: The bathrooms were clean this year. People are still ignorant of blocking the aisles, hitting you with their backpacks and turning to go somewhere they obviously just thought of right in front of you. One hopes they don't drive like that...and last but not least it rained. I have to commend DARA on their always fantastic job. If you have a chance look at the large number of committees they have set up.

Chip N5RTF, Bruce, KM2L and Jeff K6JW and myself were there and a number of members stopped by. Jeff and Bruce also had their XYL's with them. There was an emphasis on SDRs at this Hamfest. There seemed to be an attempt to place small like minded vendors in certain areas as most of the custom keys were near us in the same room. Only Virgoplex and March weren't in the Ball Arena.

Arnold Kalan, WB6OJB, Pacific Palisades, CA. Writes..."I lost propagation with Warren (June 13th Grand Rounds) so my MediShare report will be by email...all is well on the West Coast. Joan is in Borneo this morning with her traveling friend. Duke (*the dog?*) and I are holding down the fort in the Palisades. After a long 6 weeks recuperating from the colon surgery, I'm going back to work next week. Stay well and 73."

WHEN HUMANS MOVE TO SPACE, WE ARE THE ALIENS

Did you know that it costs \$350,000 an hour to keep the space station flying, which makes astronauts' time an exceptionally expensive resource and explains their relentless scheduling. They never tire of watching the Earth spin below—one wrote of stopping at a window and being so captivated that he watched an entire orbit without even reaching for a camera. *"I have been looking at the Earth, from the point of view of a visiting extraterrestrial—where would I put down, and how would I go about making contact—the excitement of being in space never fades."*

"What's it like to live in zero-G?" asks Sandra Magnus, who took three space-flights, including 130 days on the station, before her recent retirement from the astronaut corps. *"It's a lot of fun,"* she says, then bursts out laughing. *"When you're in zero-G, all the fluids in your body are in zero-G too, so astronauts often have a stuffy-head feeling, from fluid migrating to their sinuses; some end up literally puffy-faced. And zero-G causes the nausea and space sickness that many astronauts have quietly suffered during the first day or two in orbit."* *"A little push with your big toe will take you halfway across the station. It's like being Superman."*

Zero-G doesn't make sweating anymore pleasant. On the ground, the sweat drips off you. Up there, the sweat sticks to you—you have pools of sweat on your arms, your head, around your eyes. Once in a while, a glob of it will go flying off."

You eyesight might change as zero-G increases intracranial pressure, flattening-out your retina making you far-sighted

The astronauts may be rocketing around Earth at 17,500 miles an hour, 10 times faster than the average bullet leaving a gun and although they lie and work in the Space Station, they don't fly it or otherwise control it. That's all done from Houston and Moscow. A vast team on the ground supports the Station—more than 1,000 people for every astronaut in orbit.

EDITOR'S NOTE: Walter Winchell began broadcasting in 1933 to an audience of 25 million people. The Winchell style was unmistakable. He talked rapidly at 197 words per minute...the voice was high-pitched and not pleasant to the ear; but it was distinctive. The staccato quality made every item compelling. He claimed he talked so fast because if he talked more slowly people would find out what he was saying...he began his radio program with a series of dots and dashes operating the key himself. Telegraphers throughout the country complained that what Winchell tapped out made no sense. He realized he hadn't the faintest knowledge of Morse code but he refused to have an experienced telegrapher provide the sound effects for him. He wrote like a man honking in a traffic jam.



Drug "super spending" soars...The number of Americans with an annual drug costs of at least \$50,000 jumped by 63% last year to 575,000, in a survey, as costly new drugs, like the \$1,000-per-day Sovaldi hepatitis C treatment from Gilead went into widespread use. About 139,000 patients used \$100,000 or more in medication up from 47,000 in 2013. (*Kalydeco, Vertex Pharmaceuticals, new drug for Cystic Fibrosis costs \$312,000/year...best to stay healthy!*)

The grizzly bear is the official state animal of California...*but no grizzly bears have been seen there since 1922!*

Frederick Kempe in his book "Berlin 1961," reports "Between the late summer and early autumn of 1945, a minimum of 110,000 women between the ages of 12 and 88 had been raped in Germany by Russian soldiers—some 40% repeatedly. One in five of the victims became pregnant, roughly half of these gave birth and the rest had abortions, often without anesthesia. Thousands of women killed themselves for the shame of having been raped or out of fear of being the next victim. Some 5% of all Berlin newborns in the following year (1946) would be "*Russenbabys*." Across Germany, the number would be 150,000, to 200,000 children." Berliners had responded with either hostility or silence. The world still felt little sympathy for any pain inflicted on a German people who had brought the world so much suffering. Berlin men, what was left of them, found it too painful to be reminded of their failure to protect their wives and daughters. Germany's Aryan population with its British, French, English, American, Russian troop presence would no-longer be Aryan as 40% of eligible German fathers had been killed.

A robot can build the brick framework of a house in just 2 days, 20 X's faster than human bricklayers. "*Hadrian*," built by engineers in Australia, can lay up to 1,000 bricks per hour, equating to 150 homes per year as it doesn't need to stop for a lunch break. "*Fastbrick Robotics*" is ready to debut the 1st commercial version of the robot in the next year. (According to a study conducted by economists, 47% of the jobs in the US could soon be lost to computers, robots and other forms of technology—maybe you will be retired earlier than you planned!)

Sign in a pub window, "Come in and meet your future ex-wife." Another pub bragged, "*Helping ugly people have sex since 1864!*" Another, "*Drink Triple, see Double, act Single!*"

A boy asks his granny, "Have you seen my pills, they were labeled LSD?" Granny replies, "*To heck with the pills, have you seen the dragons in the kitchen?*"

Duke University hooks up brains...the first brain-to-brain interfaces, arrays of tiny wires implanted in the brains of rats that allowed real-time transfer of data. In tests, as 1 set of rats learned to solve certain problems their brain activity was recorded as electrical patterns that were transferred to the brains of a 2nd set, which showed improvement in solving those problems. The scientists have also begun to create what they call "brain networks" that together complete simple tasks.

FDA beefs up warnings on NSAIDS, such as Celebrex, Advil, Motrin IB and Aleve. Reason due to increased evidence that these drugs, usually in larger doses, increases risk of heart attack and stroke even in the first weeks of use.

REPLACING YOUR HEART

At a recent **chew-the-rag session** at Clearwater, Florida's Morton Plant Hospital the topic of total artificial heart replacement arose.

Most of us were aware of the ventricular assist devices used to cover the "waiting period" for a total heart transplant but few of us had heard of the **AbioCor** until Art Larson KK1Y brought it up....here is an update:

AbioCor is an artificial heart developed by the Massachusetts-based company AbioMed. It is fully implantable within a patient, due to a combination of advances in miniaturization, biosensors, plastics and energy transfer. The AbioCor runs on a rechargeable source of power. The internal battery is charged by a transcutaneous system, meaning no wires or tubes penetrate the skin and therefore there is less risk of infection. Because of its size, this heart is only compatible with men who have a large frame. It has a product life expectancy of 18 months. **However, now, the *SynCardia Total Artificial Heart.*** (*HQ, Tucson, AZ*) a smaller version is available for smaller patients. with end-stage heart failure along with the **newer** AbioCor II version.

The **AbioCor** was approved by the FDA on Sept. 5, 2006 as a "Humanitarian Use Device" because of its limited market. As of Sept. 2004, 14 patients have been implanted with the AbioCor heart. The study showed the device is safe and has likely benefit for people with severe heart failure whose death is imminent and for whom no alternative treatments are available. In some cases the device extended survival by several months. In two cases life was extended to 10 and 17 months. For a patients to be eligible for implantation the person must have severe heart failure (with failure of both ventricles) and must be likely to die within two weeks without transplantation.

The **AbioCor II**, is a totally implantable artificial heart based upon the AbioCor ventricles and the Penn State energy converter. It is expected to last for 5 years, more than triple the life expectancy of AbioCor. It is also 30% smaller than the current model, and can be implanted in smaller people. Also, modifications have been made to this model in order to reduce the patient's risk of stroke, which was a concern of the FDA.

How many patients could potentially benefit from the AbioCor II? More than 700,000 Americans die each year from heart failure, making it the number one cause of death in the US. About half of these are sudden cardiac deaths, which occur so quickly that there is not enough time for intervention with a cardiac assist or replacement device. For the remaining half, heart transplantation is one of the few options available today. Though hundreds of thousand are in need, only about 2,000 in the US will be able to receive donor hearts every year. This consistent shortage in the supply of donor hearts in the US demonstrates the need for an alternative to heart transplantation. AbioMed believes that currently more than 100,000 in the US could benefit from the AbioCor II each year.

How does AbioCor II work? The AbioCor is designed so that a patient can remain mobile and continue a productive lifestyle. Equipped with an internal motor, the AbioCor is able to move blood through the lungs and to the rest of the body, simulating the rhythm of a heartbeat. The AbioCor consists of an internal thoracic unit, an internal rechargeable battery, an internal miniaturized electronics package and an external battery pack.

The thoracic unit, weighing about two pounds, includes two artificial ventricles with their corresponding valves and a motor-driven hydraulic pumping system. The implantable electronic package monitors and controls the pumping speed of the heart based on the physiologic needs of the patient. The AbioCor operates on both internal and external lithium batteries. The internally implanted battery is continually recharged from an external console or from a basic patient-carried external battery pack. This is achieved with an energy transfer device called TET (transcutaneous energy transmission) The TET system consists of a set of coils, one internal and one external which transmits power across the skin without piercing the surface.

How long do the batteries last? The internal batteries are sized for a one-half hour operation at implant, allowing patient to conduct activities, such as taking a shower without an external powered source or battery pack. External battery packs can be used for many hours depending on the number of battery packs carried.

The **new SynCardia Total Artificial Heart** was used to bridge for an awaiting heart. After a minimum of one year of support, 34 patients

5

(72%) were successfully transplanted, 12 patients (24%) died while on

An electromechanical device implanted in patients that partially or completely replaces the function of a failing heart.

VADs

Left side battery omitted for illustration purposes

External battery pack

System controller

Vent adapter and vent filter

Heart

Aorta

device support and one patient is still supported. The mean age of patients was 51. Of those who died, only two were from device failure. It utilizes a 13.5 lb **external** power pack and has a life expectancy of about **5 years**. Recent studies conclude by stating that "*The SynCardia has emerged as a robust form of mechanical circulatory support for patients with biventricular failure. Use beyond one year has acceptable outcomes, but further improvements in the device, patient selection and long-term management need to be achieved to further reduce the major complications of infection, thromboembolic and haemorrhagic events.*"

What about ventricular assist devices? In today's world heart transplantation rules. In Florida there are about 250 Floridians waiting for a heart transplant with the sickest candidates going to the top of the list.

Hearts for transplantation can't be taken from patients after they've been declared dead—only from those who are technically alive but have been declared brain dead and are no longer on life support. Once removed from the donor, a heart is immediately chilled in solution, placed in a cooler and rushed by a special transfer team to an airplane or ground transportation.

The durability of a heart once it's outside a body is 200 minutes or less.

Demand for hearts outstrips the supply. Some heart transplant candidates especially those with rare blood types like AB negative, remain on the list for months. About 8% of the 3,000 patients awaiting transplants at any given time in the US die while waiting for a donor heart. That mortality rate is down from 17% a decade ago.

Dr. Christian Barnard performed the world's first heart transplant in South Africa in 1967. In the 48 years since, the science of heart transplantation has made enormous strides, with an average of 2,100 procedures annually in the US and some 5,000 worldwide. The number of people living with a transplanted heart nearly doubled between 1998 and 2009 to more than 20,000.

New drugs that suppress the body's efforts to reject the new heart, along with advances in mechanical heart-assist devices, have improved post-operative survival rates significantly. Today, the one-year survival rate is at 90% and after surviving the first year, an adult patient's survivability goes way up to 14 years and beyond.

Advances in Ventricular Assist Devices, or VADs, have had the biggest impact on the field. Once the size of a dishwasher, today's battery powered VADs, basically mechanical heart pumps, have been miniaturized to the point where they will fit into a fanny pack. The devices are used to help very sick patients get healthy enough to withstand the transplant procedure.

Another advance is the "Berlin Heart," a mechanical device for infants with congenital heart disease. This prolongs a baby's life so that they can withstand future heart transplantation.

The 1st implantable heart was developed by a Utah student, Robert Jarvik with his "Jarvik 7" in 1982, which was implanted for 620 days. It is now called the "SynCardia Temporary Total Heart" & has been used in successfully in over 1,400 people awaiting transplant.

WHY NOT SEND A HAM FRIEND

A MEMBERSHIP IN MARCO

NOT RESTRICTED TO MEDICS. ANY HAM WHO IS A POTENTIAL PATIENT IS ELIGIBLE. *Keep MARCO vibrating!*

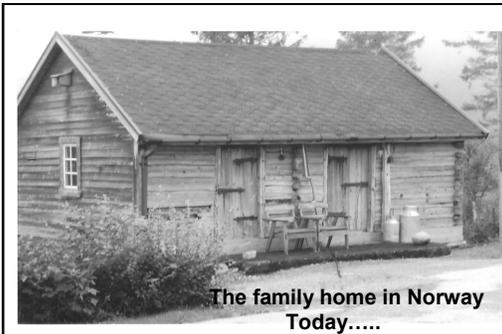
By Dr. Mary Kaye Favaro, AE4BX, Marco
Treasurer & former President.

Last summer I made a long awaited trip to Norway and found my grandfather's home. I went with my son and his family, actually on a Disney tour that followed the path of the movie "Frozen." The tour had about a dozen children from ages 6-17 so my grandchildren, ages 6 and 10, had plenty of playmates, and there were many activities especially for them. They are already accomplished travelers which I marvel at as my children couldn't ride in the back of the station wagon across town without a significant war involving looking, poking and snatching of possessions. I guess this is more evidence of the ongoing evolution that we hear about.

My grandparents came to the US on the ship Stjerne Linien from Bergen in 1880. My grandfather, Soren Asperheim, was 25, and his wife 20, who was from the neighboring farm. They had a son, Sjur who was 18 months old at the time. After arriving in Wisconsin my grandfather purchased a dairy farm and proceeded to raise nine children, my father the youngest born when his mother was in her middle 40's.

The tour guides helped me find a car and driver to leave the tour for a day to go over the mountains and visit the village of Ardal to find the Asperheim farm. The village is near the tip of the Sogne fjord, the longest fjord in Norway. Actually now you go through the mountains not over them, as they have used their oil money to dig tunnels through the mountains and improve the roads throughout the country. The tunnel we took under the coastal mountains was 27 miles long. They found people got sleepy when driving the tunnel so halfway through was an enlarged room and a very bright area of "daylight" to wake up the drivers.

In Norway you took the last name of your farm, hence my family name of "Asperheim" was the farm name. My grandmother's last name was taken from the neighboring Seim farm. The family farm is on a mountainside; now they raise Christmas trees as a cash crop, but in the old days they had food crops and raised goats for milk, meat and cheese. Goats were just allowed to run up the mountainside and care for themselves in the summer. It was the responsibility of the girls in the family to find them and milk them each day and bring the milk to the family. A



The family home in Norway Today.....

field of hay was allowed to grow tall during the summer, this would be cut and stored for food for the goats in the winter.

A family lives there now, also named "Asperheim," but of course, no relation. Their family just purchased the farm and changed their name accordingly. The home and barn are now modern and well made, all freshly painted white. They the original shingled cabin

have preserved where the family resided, and the stone building with sod roof possibly used for storage and the foundations of a few other buildings.

Norway has profited greatly from the oil found off its shores. It is ruled by a parliament, but they have a king and royal family. The oil money is kept in trust by the government to maintain Norway's status after the oil runs out. The people don't seem to question this, they are a happy lot, educated, many have traveled in the US or came over as exchange students. They learn English beginning in grade school through 12th grade. They communicate readily and well. Education is free, but you have to take exams to attain higher levels of education. Medical care is also free and they are satisfied with it. We socialized with many Norwegians in the restaurants or the outdoor beer gardens during the trip. They were happy to welcome us.

They are an industrious people, even people temporarily on assistance or welfare are required to do work each month for their check. They state that there is no abuse of the welfare system such as occurs in the US. Wages are high, taxes are also high, approaching 60%. Goods and services are expensive for tourists throughout the country. Sales taxes were about 18%, but if you presented your goods and receipts when leaving the country the sales taxes were reimbursed at the airport.

We took a train down central Norway to Oslo prior to departure. You can see how the Norwegians would have felt at home in Wisconsin as the terrain looked just like southern Wisconsin with rolling hills and dairy farms. It must have been hard for the immigrants to know they would most likely never see their homeland again.



Mary Favaro AE4BX

Upon receiving my med-school class reunion report and reading some of the entries I notice in general that most of my classmates felt fulfilled by family, friends, and the considerable achievements of their professional lives. **But there was an undercurrent of deep disappointment, almost demoralization**, with what medical practice had become.

The complaint was not financial but vocational—an incessant interference with their work, a deep erosion of their autonomy and authority, a transformation from physician to "provider."

As one of them wrote, "My colleagues who have already left practice all say they still love patient care and being a doctor. They just couldn't stand everything else." By which he meant "a never-ending attack on the profession from government, insurance companies and lawyers...progressively intrusive and usually unproductive rules and regulations," topped by an electronic health records (EHR) mandate that produces nothing more than "billing and legal documents"—and degraded medicine."

I hear this everywhere. Virtually every doctor and doctors' group cites the same litany, with particular bitterness about the EHR mandate. Another classmate wrote, "The introduction of the electronic medical record into our office has created so much more need for documentation that I can only see about three-quarters of the patients I could before, and has prompted me to seriously consider leaving for the first time."

You may have zero sympathy for doctors, but think about the extraordinary loss to society—and maybe to you, one day—of driving away years of irreplaceable clinical experience.

And for what? So far, it has cost us \$27 billion spent. It's 2015 and what have we achieved? The \$27 billion is gone. The \$77 billion in savings hasn't materialized and the Health and Human Services inspector general in 2014, said, "EHR technology can make it easier to commit fraud," as in Medicare fraud, the copy-and-paste function allowing the instant filing of vast data fields, facilitating billing inflation.

That's just the beginning of the losses. Consider the myriad small practices that, facing ruinous transition costs in equipment, software, training and time, have closed shop, gone bankrupt or been swallowed by some larger entity.

This hardly stays the long arm of the health care police, however. As of Jan. 1, 2015, if you haven't gone electronic, your Medicare payments will be cut, by 1% this year, rising to 3% (potentially 5%) in subsequent years.

Then there is the toll on doctors' time and patient care. One study in the American Journal of Emergency Medicine found that emergency-room doctors spend 43% of their time entering electronic records information, 28% with patients. Another study found that family practice physicians spend on average 48 minutes a day just entering clinical data.

Forget the numbers. Think just of your own doctor's visits, of how much less listening, examining, even eye contact goes on, given the need for scrolling clicking and box checking.

The geniuses who rammed this through undoubtedly thought they were rationalizing health care. **After all, banking went electronic.** Why not medicines?

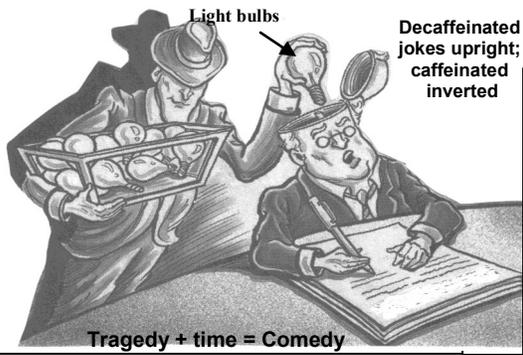
Because banks deal with nothing but data. They don't listen to your heart or examine your groin. Clicking boxes on an endless electronic form turns the patient into a data machine and cancels out the subtlety of a doctor's unique feel and judgment.

Why did all this happen? Because some were in a hurry and who refused to trust the self-interested wisdom of individual practitioners, who were already adopting EHRs on their own, but gradually as the technology became ripe and the costs tolerable. Instead, the officials picked a date out of a hat and decreed: Digital by 2015.

The results are not pretty. EHR is health care's Solyndra. Many, no doubt, feasted nicely on the \$27 billion, but the rest is waste, money squandered, patient care degraded, good physicians demoralized.

It is always darkest before dawn!

LIGHTEN UP...



MARCO OFFICERS, 2015

President:

Jeffrey Wolf, M.D., K6JW
46-E Peninsula Center Dr., #393, Rolling Hill Estates,
Palos Verdes Peninsula, CA 90274
E-mail: k6jw@arrl.net, Phone: 310 373 5970

President-Elect:

Richard Lochner, M.D., K9CIV,
1635 N. Hwy 35, Knox, IN 46534
Phone: 574 772 4115; E-mail drlochner@gmail.com

Secretary:

Marcia Lochner, 1635 N. US Hwy 35, Knox,
IN 46534, lochner.marcia5@gmail.com
Phone: C. 574 249 2994 H 574 772 4115

Treasurer: Mary Favaro M.D., AE4BX

1407 Southwood Dr.,
Myrtle Beach, SC 29575;
E-mail: Maryfav@aol.com
Phone: 843 267 6879; 843 215 6992

Web Master: Bruce Small, M.D., KM2L

10540 Stoneway, Clarence, N.Y., 14031-
2100. Phone: 716 759 8459
E-mail: BruceSmall73@gmail.com

Radio-Internet Coordinator:

T. "Chip" Keister, M.D., N5RTF
1000 Jefferson Ave.,
New Orleans, LA. 70115, phone: 504 899 3486
E-mail: tkeister@bellsouth.net

MediShare Director:

Arnold Kalan, M.D., WB6OJB
16690 Charmel Lane,
Pacific Palisades, CA 90272,
E-mail: wb6ojb@yahoo.com
Phone: 310 459 2495

Newsletter Office:

Warren J. Brown, M.D., KD4GUA
P.O. Box 127, Phone 727 595 2773
Indian Rocks Beach, FL., 33785
E-mail: warren.brown1924@gmail.com



Brenda and Steve took their 6-year old son to the doctor. With some hesitation, they explained that although their little angel appeared to be in good health, they were concerned about his rather small organ. After examining the child the doctor confidently declared, "Just feed him pancakes. That should solve the problem." The next morning when the boy arrived at breakfast, there was a large stack of warm pancakes in the middle of the table. "Gee, Mom," he exclaimed, "for me?" "Just take two," Brenda replied, "the rest are for your father."

Groups of Americans were traveling by tour bus through Holland. As they stopped at a cheese farm, a young guide led them through the process of cheese making, explaining that goat's milk was used. She showed the group a lovely hillside where many goats were grazing. "These" she explained, "Are the older goats put out to pasture when they no longer produce..." She then asked, "What do you do in America with your old goats?" A spry old gentleman answered, "They send us to Holland on bus tours!"

Who says men don't remember! A couple were Christmas shopping. The shopping center was packed and as the wife walked around ping. She was surprised to discover that her husband was nowhere to be seen. She was upset because they had a lot to do and hence, she became so worried that she called him on her mobile phone to ask him where he was. In a quiet voice he said, "Do you remember the jewelryers we went into about five years ago, where you fell in love with that diamond necklace that we couldn't afford, and I told you that I would get it for you one day?" The wife choked up and started to cry and said: "Yes, I do remember that shop." He replied: "Well, I'm in the door next and

Ole lived across the Minnesota River from Clarence Bunsen, whom he didn't like at all! They were yelling across the river at each other all the time. Ole would yell to Clarence, "If I had a way to cross dis river, I'd come ofver and beat you up good, yeah sure ya betcha by golly!" This went on for years. Finally the state built a bridge. Ole's wife, Lena, says, "Now is yer chance, Ole. Vhyronyeha go over dere and beat up dat Clarence like you said you vud?" Ole replied, "OK, by yimmy, I tink I vill do yust dat!" Ole started for the bridge, but he saw a sign on the bridge and stopped to read it, then turned around and came back home. Lena asked, "Vhy did you come back?" Ole said, "Lena, I tink I changed my mind bout beatin up dat Clarence. You know, when I yell at him from across da river he don't look so big, but dey put a sign on da bridge dat says, "Clearance is 13 ft. 6 In.

A doctor on TV said to have inner peace we should always finish things we start and we all could use more calm in our lives. I looked around my house to find things I'd started & hadn't finished., so I finished off a bottle of Merlot, a bottle of Chardonnay, a bodle of Baileys, a butle of wurn, tha mainder of Valiiuminun scriptions, an a box of chocletz. Yuhaf no idr how fablus I feel rite ow. Sned this to all who need inner piss...An telum u luvum.

Did you hear about the French groom who was so exhausted by the elaborate wedding reception that he fell asleep the minute his feet hit the pillow.

BUMPER STICKER: Irishmen know the power of "Positive Drinking."

REGIONAL DIRECTORS:

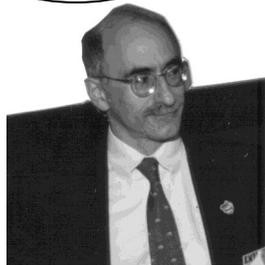
- Robert A. Nevins, M.D., KF1J (1st)** robert.nevins@gmail.com
Phone: 203 259 8923.
- Bruce Small, M.D., KM2L (2nd)**, Phone 716 713 5597 cell
BruceSmall73@gmail.com
- Keith Adams, M.D., N3IM (3rd)** docadams@hughes.net
Phone: 570 295 0629 cell; 570 748 5118 home
- Bobbie Williams, P.A., W1BEW**, bobbie@usit.net
Phone: 865 983 0055, cell 865 254 3067.
- Tom Reilly, M.D. W3GAT (5th)**, w3gat@nwlagardner.org.
Phone: 318 222 8187.
- Paul Lukas N6DMV (6th)**, dmvpalko@yahoo.com; 310 370 9914
- Albert Breland, M.D., KA7LOT (7th)**, Phone: 858 793 6887
- Roger M. Higley, D.D.S., W8CRK(8)** rhigley599@aolcom
Phones: 513 451 1096, 513 481 5885
- Bill T. Hargadon, WA9HIR (9th)**, Phone: 708 341 2338
- Frederic M. Simowitz, M.D., K0FS (0)** Fredsimo@aolcom,
Phone: 314 872 9070

DIRECTORS AT LARGE:

- Harry Przekop, PA-C WB9EDP**, hprzekop@aol.com; 312 829 8201
- Arnold Kalan, M.D., WB6OJB** wb6ojb@yahoo.com
- Linda Krasowski, R.N., KE5BQK**. bkrasowski@elp.rr, 915 857 5933
- Mary Favaro, M.D., AE4BX**
- Danny Centers, W4DAN**

In a little New Mexico town, a pretty young tourist overheard a virile Navajo saying "chance" to every passing female. Finally, her curiosity got the best of her and she walked up to him and said, "Hello." To which he answered "Chance." "I thought all Indians said "How!" "I know how—just want chance," he replied.

Hello, I'm Bruce



MEMORIES OF YEARS AGO

IN MARCO

Our History Book

Bruce Small, KM2L

Marco Webmaster

25 YEARS AGO IN MARCO

The August-September 1990 edition of the Marco Newsletter mentioned that the 3rd Annual Eastern Meeting was scheduled for October 6 in Norristown, PA.

The 25th Annual Marco Meeting was planned for the *Mississippi Queen*, traveling between Pittsburgh, PA and Wellsburg, W.VA.

TWENTY YEARS AGO IN MARCO

In the August 1995 MARCO Newsletter, KM2L outlined Marco's progress in cyberspace. We had a grand total of 20 member with email capability, and our Gopher site continued to add information and interesting links (raise your hand if you remember Gopher)!

In a letter to the Editor, Fred K0FS apologized for his spotty participation in Marco nets, citing work and his new-found love for golf. Chuck N8CL was looking for QSO's on RTTY. The passing of member Harry WA9KIT was reported by his son-in-law.

Bud KE2DT provided a narrative summary of MediShare activities from 1993 to 1995.

FIFTEEN YEARS AGO IN MARCO

The August 2000 Marco Newsletter led with a fascinating account of the evolution of cataract surgery, written by member Gerry Bellehumeur KC9BK.

We announced that the annual meeting would be held in June 2001 at the Holliday Inn Resort in Clearwater Beach, FL.

There was a page of barely-recognizable photos from the Dayton meeting. The rogues gallery included Christine WA2YBA, Bruce KM2L, Warren KD4GUA, Robin K3FP, Fred K0FS, John WD8NMV, Poly KZ4P, Roger WBCRK, Jeff K6JW and Keith N3IM.

TEN YEARS AGO IN MARCO

The August 2005 issue of the Marco Newsletter led off with a discussion of the question "Is Weight a Factor in Determining Drug Dosage?"

This issue announced the birth of Marco's blog, still operating at marco-ltd.blogspot.com, and also offered a primer on digital communications via radio.

Smitty W6CS contributed a iTales from the Logi column in which he related the story of member Ed Wescott W4UVS and his involvement with the development of the atomic bomb.

HISTORY'S BEST.... Discover Magazine had a poll in which they asked readers "What scientific advancement are you most thankful for today?"

The answers: Surgery/Organ transplants 23%; Anesthesia, 16%; Antibiotics, 16%; Running water/sewer systems, 14%; The Internet, 10%; Birth Control, 9%; Electricity, 6%; Hubble Space Telescope, 4%; Fire and Plastic, 1%. **What would YOU vote for?**

HUMAN EVOLUTION... The behavior that really distinguishes humans from other primates is that we can sit quietly in a theater full of strangers—dozens or even hundreds of us—and not fight or impregnate anybody by the end of the show. If you put a hundred strange chimps in a room, there would be bloodshed! The ability to put up with each other and even cooperate when necessary was a key development in the evolution of our species. It allowed our ancestors to share knowledge which allowed them to make elaborate tools and eventually build entire civilizations.

BOB CURRIER MARCO GRAND ROUNDS OF THE AIR.

14.342, Sundays, 11 a.m Eastern, One Hour Cat. II CME

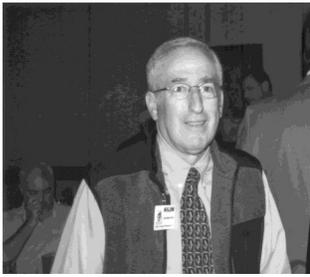
CALL	HRS.	NAME	QTH
KD4GUA	25	Warren	Largo, FL.
KC9CS	25	Bill	Largo, FL.
NU4DO	24	Norm	Largo, FL.
N6DMV	24	Paul	Torrance, CA
N2JBA	24	Ed	Amenia, NY
N9RIV	22	Bill	Danville, IL
W6NYJ	22	Art	Beverly Hills, CA
KNOS	21	Dave	Virginia
W5AN	21	Bud	Lavayette, LA
WB60JB	20	Arnold	Pac.Pal., CA
W3PAT	20	Marv	S. Carolina
N5RTF	20	Chip	New Orleans, LA
KM2L	20	Bruce	Clarence, NY
N2OJD	19	Mark	Sidney, Ohio
KD5QHV	19	Bernie	El Paso, TX
N4TSC	18	Jerry	Boca Raton, FL
W1BEW	18	Bobbie	Tennessee
KK1Y	18	Art	Seminole, FL.
N4MKT	18	Larry	The Cottages, FL
WB9EDP	18	Harry	Chicago, IL
WB1FFI	17	Barry	Syracuse, NY
KE5SZA	17	John	Marietta, OK
K6JW	17	Jeff	Palos Verges, CA
W8LJZ	16	Jim	Detroit, MI
W3MXJ	16	Joe	New Orleans, LA
K9CIV	16	Rick	Knox, IN
K4JWA	14	Jim	W. Virginia
W4DAN	14	Danny	Cleveland, TN
K9YZM	14	Mike	Crystal Lake, IL
W4MEA	14	Max	Hixson, TN
W1HGY	13	Ted	Mass.
K0FS	13	Fred	St. Louis, MO.
KD8IPW	13	Mary	W. Virginia
KE5BQK	13	Linda	El Paso, TX
K4RLC	10	Bob	Raleigh, NC
N0ARN	10	Carl	Colorado
N9GOC	10	Pat	Champagne, IL
N7NLN	9	Mort	Grand Canyon, AZ
W1RDJ	9	Doug	Cape Cod., Mass.
WA3QWA	9	Mark	Chesapeake, VA
W8EYE	9	Darryl	New Phila., Ohio
WA1EXE	8	Mark	Cape Cod, Mass.
W0RPH	8	Tom	Denver, CO
N4DOV	8	David	Ft. Lauderdale, FL
AE4BX	7	Mary	Myrtle Beach, SC
KE3XB	7	John	Nashville, TN
W9JPN	6	Wally	Champagne, IL
WB5BHB	5	John	Vancleave, MS

YEAR	TOTAL CHECK-INS	AVERAGE PER SUNDAY
1998	694	14.46
1999	766	15.95
2000	1,035	20.29
2001	1153	22.60
2002	1383	26.15
2003	1489	28.63
2004	1534	29.50
2005	1517	29.17
2006	1531 (one extra Sunday)	28.89
2007	1591 (one extra Sunday)	30.02
2008	1524 (Only 46 nets)	33.14
2009	1533 (46 nets)	33.32
2010	1591 (44 nets)	36.22
2011	1514 (44 nets)	34.41
2012	1602 (44 nets)	36.41
2013*	1400 (44 nets) (New Freq)	31.82 (Year of Terrorist)
2014	1756 (47 nets)	37.36
2015	868 (25 nets)	34.72

Record number of stations checked-in was 51, on Feb. 24, 2013

*This was the year we had to change frequency due to the terrorist, thus losing a lot of stations in the freq. shift.

Jeff Wolf, K6JW



Another Dayton Hamvention has come and gone. As always, I had a great time. In attendance were four of us Keith N3IM, Bruce, KM2L, Chip N5RTF and me K6JW. Between the four of us, booth coverage was continuous, and we had quite a few folks stop by to say hello, chat, and/or find out a bit about MARCO. We even had a few

folks pay dues. On Saturday, I gave a short interview to a reporter for a local publication.

I'll have to wait to see what the attendance numbers were, but my general impression was that attendance was down somewhat from prior years. Still, there were lots of people, including folks like us, folks with antennas on their heads and the "shack-on-a-belt" crowd.

The biggest news involved two companies: Elecraft and RKR. Elecraft debuted its new K3S, an incremental improvement on the K3. It has generated much interest and about equal parts enthusiasm and cynicism. On the other hand, they also showed their new transmit monitor for the P3. Yes, after all these years, we finally have a unit that does what the Heath kit station monitor did years ago! You may never have heard of RKR, but it has purchased Ten-Tec and RF Concepts (Alpha). Those of us with Alpha amps have been nervous about this, but I'm delighted to let you know that Brad Fockert, KOHM, who left the company, has returned. This is MOST Reassuring especially to those of us with Alpha 9500s, since Brad is co-designer of the amplifier and has been our main support person there for the unit.

The number of attendees riding scooters continues to increase, and several years from now the whole Hamvention may be massively gridlocked with these things running around Hara.

Of course, the deals were there to be made both inside and at the swap meet, and I confess to dropping a fair bundle of cash on stuff.

This was the first time my wife, Rowie, came with me, and she had a great time with Bruce's wife. Terry doing some exploring of a non-radio type in Cincinnati while we guys played radio.

Will I be there again next year? Absolutely! Even if I weren't MARCO's President, I wouldn't miss it. FYI, the hotel (*Clariton Inn, Dayton Airport*) began taking reservations for next year's Hamvention immediately on Sunday, so I took the initiative and reserved our usual block of rooms, our conference room, and the room for our Saturday banquet. This means you've been given fair notice—hope to see you next year! (Clayton Inn Dayton Airport, 844 764 0420, ask for Judy and mention MARCO. 73—

Jeff K6JW

STELLAR ENERGY

Nowhere on Earth does the sun shine as brightly as it does in geosynchronous orbit, that parking space 22,236 miles up where a satellite can keep a spot on Earth in steady view all day, every day.

Placed high above the atmosphere, solar panels can intercept rays 35 to 70% more intense than midday sunlight on the ground. In high orbit, there is no cloud cover, no twilight, no winter sun. And a cleverly designed and positioned solar satellite can avoid the shadow of night for all but 44 hours a year, so there is no need to store energy to keep the electrons flowing almost continuously.

Dream-eyed physicists have effused about the potential of stellar power. They have sketched out preliminary designs that would bring that power from orbit to the grid—a giant engineering challenge but one that now has plausible solutions. What they haven't been able to do is make it affordable.

Now that stumbling block may be cleared. Entrepreneurs are reporting flickers of interest among investors and potential customers.

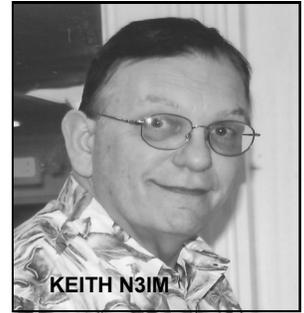
The electrical current generated by an orbiting array can be sent to Earth in one of two forms. It could be converted into a broad infrared laser beam, or it could come down as a wider cone of microwaves, which pass through clouds unimpeded. In either case, the satellite would focus its transmitter on a large receiving station on the ground.

NASA, the U.S. Departments of Energy & Defense, the European

Submitted by Keith Adams, N3iM

Atlanta, GA,—Seeking reliable backup communication in a crisis, emergency managers are finding new solutions in an old technology: ham radio.

It's just another avenue, another opportunity for us to be able to communicate, "Said Herb Schraufnagel, public safety captain with Emory University Hospital Midtown. Emory HealthCare is among a growing number of hospital systems to adopt ham radio. Hospital administrators and government officials took a lesson from Hurricane Katrina, which left some Gulf Coast medical centers isolated from the outside world, as landlines and cell towers failed.



When power, phone and internet services go down, a battery-powered amateur radio and portable antenna can provide that crucial link to the outside world. *"Ham radio will never die,"* said Barry Thomas, Sr., a ham radio enthusiast and employee at Emory. *"The quickest means of communication is Morse Code. It'll get out when none of this will,"* Thomas said, referring to a room filled with computers and smart phones. *"It is interesting that some of the technology that has been around for 80, 90, 100 years is still relevant,"* said another ham. *"In addition to major hurricanes the terrorist attacks of September 11, 2001 rekindled interest in ham radio as a public safety tool. The Georgia Emergency Management Agency has set up a permanent ham radio station in its command center."*

The number of ham radio licenses is at an all-time high in the U.S. (723,182, as of April, according to FCC data compiled by Joe Speroni of the Amateur Radio Education Web Site, ah0a.org.)

Editor's Note: Several hospitals in Pinellas County, FL. Have ham radio stations as do most VA hospitals. They are usually manned by on-call local radio club members.

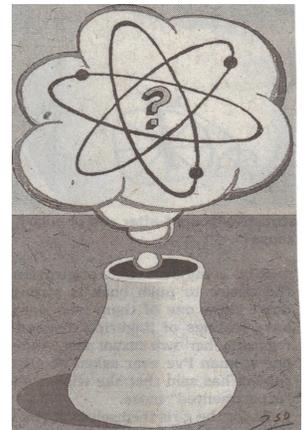
Space Agency, the Japanese Aerospace Exploration Agency and a handful of companies and a gaggle of academic scientists all have taken hard looks at stellar power, and they concluded that, from a technical point of view, it is feasible.

Yet one obstacle has seemed insurmountable: the cost to get up to 10,000 tons of components all the way to geosynchronous orbit. Rockets today are not reusable, and that makes them so expensive—currently around \$4,600 for each kg of payload lofted into low orbit—that the economics of putting solar modules in space just don't figure out, even if the modules use solar-electric propulsion to lift themselves into their final orbit.

A tenfold drop in price and a manifold increase in launch frequency might seem like wishful thinking. But SpaceX, a private company whose Falcon rockets now resupply the Space Station, recently announced ambitious plans to make that happen.

Geothermal energy is another alternative in the war against carbon dioxide excess. Underground heat is utilized in Iceland and New Zealand. **Fusion energy**, the same process that heats the sun, is being tested but is awaiting Congress to bankroll the effort. **Gravity-driven**, known as *"hydropower in a pipe"* is being utilized successfully in Portland, Oregon by taking advantage of gravity-driven sewage & water flow to turn the turbines.

Electrical generation is also being produced by tidal flow, wind power, and Earth-bound solar panels. One fellow generates enough power by putting electrodes in his pants and as he walked he was able to generate enough electricity to run his smart phone.



MODERN DEVELOPMENTS IN REJUVINATION 10

Rejuvenation is distinct from **life extension**. Life extension strategies often study the causes of aging and try to oppose those causes in order to slow aging. Rejuvenation is the reversal of aging and thus requires a different strategy, namely repair of the damage that is associated with aging or replacement of damaged tissue with new tissue. Rejuvenation can be a means of life extension, but most life extension strategies do not involve rejuvenation.

Aging is an accumulation of damage to macromolecules, cells, tissues and organs. If any of that damage can be repaired, the result is **rejuvenation**.

There have been many experiments which have been shown to increase the maximum life span of lab animals, thereby achieving life extension. A few experimental methods such as replacing hormones to youthful levels have had considerable success in partially rejuvenating lab animals and humans. A recent experiment involved breeding genetically manipulated mice that lacked an enzyme called telomerase, causing the mice to age prematurely and suffer ailments. When the mice were given injections to reactivate the enzyme, it repaired the damaged tissues and reversed the signs of aging. There are at least 8 important hormones that decline with age: 1. Human Growth Hormone; 2. The sexual hormones; 3 Erythropoietin; 4. Insulin; 5. DHEA; 6 Melatonin; 7. Thyroid; 8. Pregnenolone. In theory, if all or some of these hormones are replaced, the body will respond to them as it did when it was younger, thus repairing and restoring many body functions.

Most attempts at genetic repair have traditionally involved the use of a retrovirus to insert a new gene into a random position on a chromosome. But by attaching zinc fingers (*which determine where transcription factors bind*) to endonucleases (*which break DNA strands*), homologous recombination can be induced to correct and replace defective or undesired DNA sequences. The first applications of this technology are to isolate stem cells from the bone marrow of patients having blood disease mutations, to correct those mutations in lab dishes using zinc finger endonucleases and to transplant the stem cells back into the patients.

Stem cell Regenerative medicine uses three different strategies

1. Implantation of stem cells from culture into an existing tissue structure.
2. Implantation of stem cells into a tissue scaffold that guides restoration.
3. Induction of residual cells of a tissue structure to regenerate the necessary body part.

A salamander can not only regenerate a limb, but can regenerate the lens or retina of an eye and can regenerate an intestine. For regeneration the salamander tissues forms a blastema by de-differentiation of mesenchymal cells, and the blastema functions as a self-organizing system to regenerate the limb.

There are also, as commonly found throughout history, many fake rejuvenation products that have been shown to be ineffective. Chief among these are powders, sprays, gels and homeopathic substances that claim to contain growth hormones. Authentic growth hormones are only effective when injected, mainly due to the fact that the 191-amino acid protein is too large to be absorbed through the mucous membranes, and would be broken up in the stomach if swallowed.

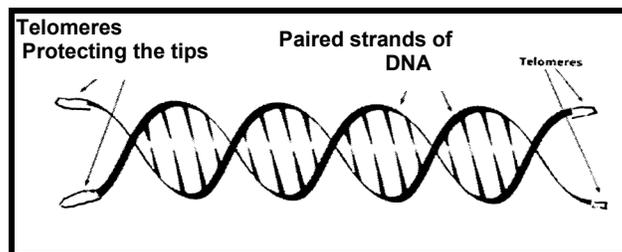
STRATEGIES FOR ENGINEERED NEGLIGIBLE SENESENCE

The project to reverse the damage we call aging "SENS" (*Strategies for Engineered Negligible Senescence*). It has been proposed that there are seven strategies for what are called the "seven deadly sins of ageing."

1. Cell loss can be repaired (reversed) just by suitable exercise in the case of muscle. For other tissues it needs various growth factors to stimulate cell division, or in some cases it needs stem cells.
2. Senescent cells can be removed by activating the immune system against them. Or they can be destroyed by gene therapy to introduce "suicide genes" that only kill senescent cells.
3. Protein cross-linking can largely be reversed by drugs that break the links. But to break some of the cross-links we may need to develop enzymatic methods.
4. Extracellular garbage (like amyloid) can be eliminated by vaccination that gets immune cells to "eat" the garbage.
5. For intracellular junk we need to introduce new enzymes, possibly enzymes from soil bacteria, that can degrade the junk (*lipofuscin*) that our own natural enzymes cannot degrade.

6. For mitochondrial mutations the plan is not to repair them but to prevent harm from the mutations by putting suitably modified copies of the mitochondrial genes into the cell nucleus by gene therapy. The mitochondrial DNA experiences a high degree of mutagenic damage because most free radicals are generated in the Mitochondria. A copy of the mitochondrial DNA located in the nucleus will be better protected from free radicals, and there will be better DNA repair when damage occurs. All mitochondrial proteins would then be imported into the mitochondria.
7. For cancer (*the most lethal consequence of mutations*) the strategy is to use gene therapy to delete the genes for telomerase and to eliminate telomerase-independent mechanisms of turning normal cells into "immortal" cancer cells. To compensate for the loss of telomerase in stem cells we would introduce new stem cells every decade or so.

QUESTION: If anti-cancer drugs can prolong the life of a cancer victim can those same drugs prolong the life in a non-cancer individual? Write "Aether" if you have an opinion.



Telomeres are an essential part of human cells that affect how our cells age...note their protective location of the telomere at the end of each DNA strand, preventing it from damage. Telomeres are shortened with stress, smoking, obesity & aging.

TELOMERES (continued from Page 3)

Telomere shortening is involved in all aspects of the aging process on a cellular level. Telomere length represents our *biological age* as opposed to our *chronological age*. Many studies have shown a strong connection between short telomeres and cellular aging. Telomeres can also be shortened by stress, smoking, obesity, lack of exercise and a poor diet.

For example, the immune system, which normally weakens as we age, is highly sensitive to shortening of telomeres. In addition, a 2007 study found that short telomeres were associated with decreases in bone mineral density in women.

A 2010 study from Harvard Medical School showed telomere shortening to be a root cause of cellular aging.

Today, an ever increasing number of scientists continue to study telomeres and benefits of stopping or possibly reversing the telomere shortening that results with aging.

WHAT IS "TELOMERASE?"

The enzyme **telomerase** allows for replacement of short bits of DNA known as **telomeres**, which are otherwise shortened when a cell divides via mitosis.

In normal circumstances, without the presence of **telomerase**, if a cell divides recursively, at some point all the progeny will reach their Hayflick limit, which is the number of times a cell can divide, usually around 50-70 cell divisions until the cells become senescent and cell division stops. With the presence of **telomerase**, each dividing cell can replace the lost bit of DNA and any single cell can then divide unboundedly. While this unbounded growth property has excited many researchers, caution is warranted as it this same unbounded growth that is a crucial step in enabling cancerous growth.

Some experiments have raised cautions on whether **telomerase** can be used as an anti-aging therapy, namely the fact that mice with elevated levels of telomerase have higher cancer incidences and hence do not live long. Certain premature aging syndromes have been associated with telomere shortening. But, **telomerase** also favors tumor genesis, which tends to question about its potential as an anti-aging therapy.

BACKGROUND: At a recent Marco meeting in Myrtle Beach, SC., Wayne Rosenfield, K1WDR came to the Aether News Editor with a wonderful story of the heroism by a ham operator named Capt. Kurt Carlsen W2ZZM of the “*Flying Enterprise*,” a ship caught in a hurricane in the North Atlantic in 1951. Ironically, the News Editor, at the time, was a Navy medical officer aboard the USNS General Leroy Eltinge that stood by to possibly rescue passengers aboard that very ship. On top of that, the News Editor’s “Elmer” was a South African ham, Olliver Pierce WU4i, who at that time was corresponding by radio with Carlsen. Below, is this wonderful story, “*Simple Courage*,” written by Frank Delaney, ISBN 1-4000-6524-0, available at Amazon.com

In late December 1951, Capt. Kurt Carlsen, 37, had run into a hurricane off the South English coast aboard his cargo vessel *Flying Enterprise*. The Captain ordered “abandon ship” and a line was passed from a rescue lifeboat and passengers and crew were ordered to jump into the raging waters with lifelines attached, but the Captain remained on board. Prior, by the time she was ready to return to New York from Hamburg, *Flying Enterprise* was loaded with consignments of which have contributed to the half century of questions hanging over her—just why did *Flying Enterprise* become a mystery ship and why did her Captain refuse to leave his ship. The ship left Hamburg on Dec. 21, 1951 for New York and the unexpected. A storm soon arose and in the midst of the storm the *Flying Enterprise* snapped open amidships and was quickly strapped and cemented back in place. Meanwhile the storm raged....a huge wave finally sent the ship listing 25 degrees on the left side....and the crew and passengers prepared to abandon ship—but not the Captain.....

Brown, testified at the hearing, that Captain Carlsen told him, “Well all right, Chief wait until this boat comes in. “So I got this one girl and I tied her lifejacket on tighter than it was and we stood at the rail ready to go. So then, the last thing the Old Man said to me was: *O.K. Chief, God bless you. Go ahead.* So I went over the side of the ship with her.

Today, the “one girl” in Brown’s evidence, Mrs. Leanne Muller Smith, lives in Sandy, Utah. A devout woman with a doctorate in education who spent 16 years as a high school principal; she speaks perfect English, with an undertone of her German birth accent. Her memory seems generally dustless. She recalls the texture of the weather, the temperature of the sea, the stench of the oil.

“When you jumped in the water,” I asked her, “do you today have a memory of how you reacted?”

She paused, then said, “*I struck the water and I laughed. I remember laughing. Yes, I laughed.*”

I thought “Not too much to laugh about in forty-foot-high freezing waves?”

She continued: “*It felt like being freed. You see, I was so glad to leave the ship. The ship was by then a greater danger to us. It had become a dangerous place. Now God had given me the chance to get out of that danger, and I would respond to His will. It was amazing, knowing what I know today,*” she said. “*The sea was freezing. I might have died of hypothermia. And I remember how devastating it was to worry so much about my little brother. And about my father.*”

Curt Muller, her father, remained among the passengers on the weather deck, watching the attempted rescue of his wife and daughter and awaiting his turn. His son, Lothar, had yet to jump, a fact uppermost in Leanne’s head—and heart.

“*That was when I cried, at the thought of my little brother. I cried much harder about him. My nonpanic came from my Heavenly Father. That is why I laughed when I struck the water. The oil totally covered my coat—I must have swallowed some of it; I do not recall, but the reason I laughed was, I thought, “I am more in control now” and then I cried for my little brother. The cold—oh, the sea was so cold, I was gasping.*”

Her voice, has scarcely changed since she spoke to the world’s media when she eventually landed at Rotterdam. George Brown had taken her hand, shown her how to be courageous, jumped over the side of the ship with her, and quite possibly saved her life. “*We were not roped together, we did hold hands, we did make an attempt at swimming. The men in the lifeboat, we saw them off and on, but there was calm, no panic.*”

When Carlsen watched George Brown and Leanne Muller jump, he made an important modification to his rescue plan. He recognized that two people in such a sea would be easier for a lifeboat to find than a lone

head bobbing in the high waves. Now a crewman would jump with each passenger, two by two; this tactic would also reduce the great fear among the passengers.

John Crowder also saw Brown’s jump with Leanne Muller.

“After the lifeboat picked them up,” he reported, “they gave the signal from the boat for the next two to go. We went one passenger to one crew member, right over.” Next went Robert Lumpkins, the cook, with young Lothar Muller. And after that John Drake jumped with 45-year old Marie Duttenhofer.

So that the lifeboats would see them, everyone who went into the sea that day was instructed to raise a hand and gesture with each rise of the swell. Harold Gleaves, the crew pantryman from Boston, went over with Leonore Von Klenau, the photographer, who was also Gleave recalled, comforted by Carlsen. “He spoke in German to these people. And he gave this lady I was with a pair of woolen socks to put on.”

All in all, *Southland’s* lifeboat rescued eleven people.

Meanwhile, Commander Olsen on the *General Greely* troopship was being informed of his ship’s contribution to the rescue. It proved initially problematic, and then astonishing.

The first officer took seven crewmen with him, launched a lifeboat, and headed toward *Flying Enterprise*. When the gray navy transport appeared through the waves, John Crowder told Carlsen that he possibly knew somebody aboard this boat and asked whether he might be allowed to jump for it. Carlsen agreed—he had by now, seen his women and children safely off. He directed Crowder to twin with a passenger: the young German, Rolf Kastenholz. Crowder jumped behind Kastenholz and swam with him to the *Greely* lifeboat. Kastenholz, Croser recalled, “didn’t seem hysterical or anything. In fact, he was telling me in German that he was seasick and he hadn’t eaten for five days.”

With several rescued crewman safely aboard the *Greely* lifeboat their engine cut out. No amount of effort would restart it, so the men began rowing. They found that they couldn’t make it back to the ship under oars; the swells proved too enormous and rough. *Southland* seemed nearer, and they opted to row to her.

Now the *Greely* lifeboat arrived alongside *Southland*—and alongside *Southland’s* lifeboat. The waves bounced the *Greely* boat off *Southland’s* hull and holed the *Greely* lifeboat, which then collided with *Southland’s* lifeboat and ripped off its rudder. This meant that the only two active lifeboats in the rescue operation so far had been taken out, bringing the total of lifeboats damaged to four. A few minutes later, that number rose to five: *Westfal Larsen* launched its lifeboat which promptly capsized. Five lifeboats launched, five lifeboats gone; from these smaller but no less dangerous catastrophes we may judge the chaos of the seas on that Saturday afternoon.

Someone needed to do something. *Southland* had had enough; *Westfal Larsen* was still trying to pluck her lifeboat crew from the sea. The German freighter *Arian* stood by. *Sherborne* and *War Hawk* had left the area, licking their wounds and with no rescues achieved. Thirty-five people still had to be saved along with Carlsen.

Enter now a 25-year old U.S. Navy officer whose skills of seamanship and almost casual heroism seem to have gone unnoticed by the world—and yet, besides Carlsen, he proved the most significant participant in this rescue. His name was Robert Husband and my last possible trace of him—and I don’t even know that it was the same man—led me fruitlessly to Sulphur Springs, Texas. There, the trail that had wound for years through service records, Navy pension archives, contacts with veterans, and old comrade organizations, reaching from WW II to Vietnam and after, finally died on the spike of a telephone that had been disconnected.

At a quarter to one on the freezing Saturday afternoon of vicious waves and howling winds, Robert Husband launched a lifeboat from *General A. W. Greely*. Taking no chances, he manned it with a crew of nine. His report follows: “*I crossed the bow of the Enterprise and proceeded along her port side checking her drift and set. As our boat came abreast of her midships house, four figures jumped into the water. I saw that they were being tossed forcefully by the action of the sea.*” (Continued next issue.)



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