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In the IHN October 2019 issue (see online archives) the evidence was examined for the danger presented by our modern environment. Many homes and public places are saturated with radiofrequency radiation, i.e. electromagnetic fields (EMFs) from Wi-Fi, cell phones, tablets TVs, "smart" appliances, etc. Wi-Fi has become essential for everyone from children to adults to businesses to either efficiently function or be content. Consider shutting down Wi-Fi in a home with four children ranging from say six to 16 years. Instead, use only Ethernet outlets and cable. Imagine severely restricting cell phone use and not allowing cell phones in bedrooms.

Many who have heard suggestions that this exposure to electromagnetic radiation carries health risks probably prefer believing experts and industry representatives who say this exposure is completely safe and there is no scientific evidence to the contrary. Reminds one of the natural history of the tobacco industry.

*If one wishes to examine the case for risk, including unacceptable risk, the task has just been made easier with the publication this month of a comprehensive book accessible to those not scientifically or medically trained, but nevertheless potentially of interest to a broad audience including professionals. This is partly due to the extensive documentation and making complex issues more easily understandable. The book has the odd title "EMF*D" which appears left unexplained but perhaps equates electromagnetic fields (radiation) to death. The book might be subtitled "everything you wanted to know about radiation exposure but did not know who to ask". The actual subtitle is "5G, Wi-Fi, Cell Phones: Hidden Harms and How to Protect Yourself". It is written by a well-known medical practitioner, also a New York Times bestselling author, Dr. Joseph Mercola.*

He also has a daily online free newsletter which is well documented and discusses an amazing range of important health topics. Eight to ten pages daily with documentation must require considerable skilled assistance.

In the introduction the author outlines his goals:

- *Just what EMFs are and how they work.*

- *How the science proves that EMFs are dangerous, as well as how companies and government agencies have conspired—and continue to conspire to keep the science hidden.*
- *Exactly how EMFs damage your body.*
- *How to repair the damage that has already occurred.*
- *How to curb your EMF exposure and reduce your risk of incurring future damage.*

This book is particularly timely since implementation of the 5G (5th generation) of wireless transmission has already started, which has many individuals and even whole countries up in arms or even banning this new development. Chapter 2 is devoted to this subject, which Mercola calls "The Single Biggest Health Experiment Ever." 5G is being added to current transmission systems, thus increasing not only bandwidth and speed but also the radiation burden. However, it requires millions of small transmitters which mean that individual homes may have one focused directly into the windows. The wavelength/frequencies being used do not penetrate through walls. Thus like shooting ducks in a pond, they have to shoot from close range.

Effective opposition will be difficult. Large corporations have great experience and vast resources to devote to opposing attacks and lobby governments. Opposition movements are like throwing stones at an oncoming so-called steamroller. In addition, the playbook has already been written and the contents perfected, especially by Big Pharma, Big Agriculture, Big Food, Big Chemical, and now it is Big Wireless, the new kid on the block. Infiltration of regulatory agencies and other government organizations, academia and the media is now a well-developed art benefiting from almost unlimited financial resources and a public that is significantly uneducated in science. The claim that there is no evidence of harm is contradicted by considerable evidence, as Mercola documents. Obviously, it is not possible to carry out experiments on humans such as one can do when the subjects are laboratory animals. However, the risks of 5G are totally unknown. It involves exposure to a new spectrum of frequencies. Remember, we evolved being exposed only to visible light, ultraviolet and infrared radiation, cosmic radiation and radiation from naturally present radioactive substances. These sources are completely different from that to which we are exposed today. However, that has not stopped the start of installations and potentially much heavier exposure than encountered in Wi-Fi.

Dr. Mercola brings up an important aspect of the risk problem in Chapter 8. He points out that starting in 1990 Lloyd's of London refused to cover cell phone manufactures for customer claims of health harms. This is now a common qualification in insurance policies, partly inspired by the growing number of lawsuits. He points out that outstanding lawsuits total almost $2.0 billion in claimed damages. He speculates that insurance companies might put a harness on wireless companies. They are required to disclose this

liability in stockholder reports. There is a message here to which readers should pay attention.

Wishing you and your family good health,

William R. Ware, PhD, Editor

Highlights

Health care costs – Comparison with US p. 5
Breast cancer screening debate continues p. 9

EFFECT OF THERAPIES AND INTERVENTIONS

QUITTING SMOKING

Cigarette smoking is a risk factor for a variety of diseases. Cardiovascular and other vascular diseases and cancer are prominent. It is estimated that it is responsible for 20% of CVD deaths in the US. Smokers are quite rightly advised by their physician to quit. The patient probably does not need a lecture on the risks although knowledge of all the disease risks is probably quite rare. However, there might be some curiosity regarding how long it takes to return to the risk profile of never smokers.

Smoking is responsible for widespread damage throughout the body and obviously cessation merely removes a cause but to return to the state of a non-smoker would be expected to take time. This has been carefully studied, especially in the context of cardiovascular disease.[1] The observational cohort consisted of about 8800 former heavy smokers. Evaluation was every 2 years and the median was 11 examinations. Thus they were able to present event data for 25 years comparing heavy smokers who had quit vs. never smokers. Smoking cessation among heavy smokers was associated with lower CVD risk within 5 years of cessation but subsequently there was only a slow decrease in risk over decades. Compared with never smokers, it took 10-15 years from cessation to not have elevated CVD risk but for some risk was elevated even after 25 years. The conclusions were based on data corrected for confounding by other risk factors. Thus the assumption that former smokers achieved the same CVD risk as never smokers within 5 years of quitting was not supported in this large study.

Another study found that to achieve health benefits of never-smokers after 15 or years of abstinence, it was necessary that smokers were not heavy smokers and quit early.[2]

Another very large study which reported in 2013 found that individuals that had quit smoking at 25-34, 35-44, and 45-54 years of age gained about 10, 9 and 6 years of life respectively compared with those who continued smoking. The study also confirmed the magnitude of the health risk. Compared with current smokers, never smokers had twice the probability of surviving to 79 years of age with a larger effect seen in women.[3]

Coronary artery calcification (CAC), i.e, calcified coronary plaques visible in a CT heart scan, is well known to be strongly associated with heart attack risk. Smoking increases markers of inflammation and subclinical coronary atherosclerosis as indicated by plaque burden. There is a correlation with duration of smoking.[4,5] Time since cessation of smoking was shown to be associated with lower burdens of all atherosclerosis markers including plaque burden.[5] However, with coronary plaques, this indicated a slower rate of progression rather than repair. When smokers who quit achieved cardiovascular event risk equivalent to a non-smoker, many still had greater than baseline plaque, but it was progressing more slowly. Thus the effect of quitting is presumably due to the additive modification of a number of factors but lowering inflammation is no doubt a major factor.

These studies help quantify what can be viewed as the time line of elimination of the influence of the damage induced by smoking. It seems clear that this is a slow process which is not surprising considering that the damage involves increased risk of a number of disorders.

The impact of cessation is also seen in the risk of cancer incidence, but this is much more complex since smoking increases the risk of cancer not only in the lungs but also at a number of other sites. These include the esophagus, bladder, larynx, stomach, pancreas, and liver. While the literature was limited, it was found that the reduction of cancer risk typically depended on length of smoking history, age, and the duration of quitting. However, there are variations in benefit with age, gender, nationality, type and even subtype of cancer. Nevertheless, a strong case can be made for cessation being an important approach to preventing tobacco related cancers.[6]

TREATING ELEVATED BLOOD PRESSURE

Blood pressure lowering is well established as an approach to reducing the risk of cardiovascular disease (CVD), and the higher the risk, the higher the absolute residual risk which indicates a failure of the lowering treatment. The best results are obtained with low-to-moderate cardiovascular risk individuals.[7] At similar blood pressure levels, treated hypertensives had higher subclinical CVD burden than those not on treatment and thus this burden has been hypothesized to be a significant component driving this residual risk and supported by a study reporting in 2015.[8]

Anyone who has used online cardiovascular risk assessment programs will have noticed two questions, use of lipid lowering medications, and use of blood pressure medication. One might suppose that if the answer is no, one gets a lower risk compared to the answer yes. The opposite is true. In these two examples those taking medication have a higher CVD risk than those who do not. The short explanation is that taking these medications implies significant long-term presence of the disorder for which the medication is targeted, and even if the intervention has normalized either LDL levels or blood pressure levels, there is still an elevated risk. This can be interpreted as the medication not reversing the damage that has occurred due to the presence of the

disease. It has only lowered a surrogate marker which when high indicated elevated event risk. The same phenomenon was seen above with smoking cessation.

RESIDUAL RISK AFTER LONG-TERM STATIN THERAPY

Absolute risk reduction is calculated by the numerical difference between the rate of specific events in untreated and treated groups, generally expressed as percentages. First consider studies involving individuals that do not have cardiovascular disease. There have been countless studies of statin therapy and the indisputable outcome is an absolute risk reduction that rarely exceeds 2%. An absolute risk reduction of 2% or less indicates that 98% failed to benefit from treatment, typically over 5-6 years. This can be viewed as a measure of residual risk. Typically about a 1% absolute risk reduction is found in secondary prevention trials where all the subjects have experienced a cardiovascular event. It makes little difference whether it is 2% or even 5%. It implies serious residual risk, and suggests that the pathophysiological processes causing the outcome, for example fatal or nonfatal heart attack and stroke are only slightly modified by the treatment and at the end of 5 years the problem has merely been very modestly addressed. Coronary atherosclerosis which is a necessary but not sufficient cause of the coronary outcome and is the major contributor to the cardiovascular events depends on not only the presence of coronary artery plaque but mostly on the so-called vulnerable plaque. These plaques are only mildly calcified. Heavily calcified plaques are much more resistant to rupture and in fact statin treatment increases the burden of heavily calcified plaques, See IHN, May 2019, for a discussion of a protocol for lowering risk of coronary heart disease. Included is information on natural approaches for decreasing coronary plaque burden.

WHY ARE HEALTH CARE COSTS SO HIGH AND SUCCESS SO LOW IN THE US?

INTRODUCTION

Here we are using as comparison other developed countries. The health care sector in the US is valued at over $3 trillion US. If this amount of money were the GDP of a country, it would be the fifth largest economy. Nevertheless, among developed countries, the success of the US system in delivering good health care is the lowest among these countries. Worldwide, the US health care system is ranked by the World Health Organization as 37 and among the top 11 industrialized countries it is 11th. Yet this is a country that is a major factor in medical research, has world renowned medical schools and excellent universities that supply their medical doctors. Individuals (with money) come from around the world to take advantage of this. What is the explanation for this anomaly? The following are common explanations seen on the internet and in published commentaries.

- Administrative costs. In the US these are astronomical. According to Harvard economist David Cutler, about one-quarter of the costs of running health care

are administration. For example he cites Duke University Hospital which has 900 beds and a staff of 1300 “billing specialists” to deal with multiple insurers.

- Drug costs. In most developed countries the government negotiates prices with pharmaceutical companies. The US Medicare is exactly the opposite. By law, Medicare is denied the right to do this (chalk up one for the lobbyists). Canada sees the effect in prescription tourism. Insulin is one-tenth the cost across the border. Insulin is a prime target because type 1 diabetics cannot live without it. In addition, the US is toying with the idea of buying drugs from Canadian distributors. Canadians worry that this will cause drug shortages or intentional limitation of drug stocks.
- Branding. In this context, branding involves an outstanding reputation of a healthcare provider which allows charging all the market will tolerate for the presumed level of excellence. Prestigious medical institutions can name their price and it appears that prices are even made up depending on the payer. Some providers such as hospitals are even specifically excluded from use by the insured due to outlier costs.
- Unnecessary treatments and drug prescriptions. There is considerable evidence that practice guidelines and physician-prescribing practices are strongly influenced by drug companies and professional societies that depend on Big Pharma for support. Patients are sometimes put on drugs for life when there is no evidence of benefit beyond a certain age. Over-treatment and over-diagnosis can have a large impact.
- Fear of litigation and thus defensive medicine. The US is well known for being prone to litigation, and this is a big risk to health care providers, institutions and individual practitioners. Add to this jurisdictions where lawsuits are allowed on the basis of no results, no legal fees. In addition, very large settlements encourage fear. Thus there is a strong incentive to over-diagnose and over-treat which translates into higher costs. It is called practicing defensive medicine and it is understandable.

COMPARISONS BY COUNTRY

Recently a study was published that sheds more light on the unique position of the US in health care and provides an up-to-date evidence base for the generalizations given above. It compares the US with 10 countries based on health status and cost of health care practices and availability of resources. Japan Australia, Canada, and 7 European countries similar to the US are compared (Germany, France, Denmark, Sweden, Switzerland, the Netherlands, and the UK).[9] Among these countries, the US is the only one with what is termed private employer-based and individual insurance. The other countries have either national health care or mandatory health insurance.

In the table below are presented the data significant to this discussion. The presentation is adjusted for population (per capita, per million, per 1000 etc. to permit country comparisons). In order to keep the table simple, the Netherlands was chosen as the comparative country since it is typical of developed European countries. Canada is

included for interesting comparisons. The average values for the studied countries are also shown.

The data on spending suggest that the US is indeed an outlier in total health care spending. Pharmaceutical spending is a big component. In addition, the amount spent on procedures is dramatically higher, and the authors found that it is not due to an excessive number of procedures. Note the big difference in administrative costs. The authors suggest that this is inherent in the US private system because of the multiplicity and diversity of payers. Note the comment above concerning huge staffs of billing specialists.

Poor health outcomes for the US system compared to other countries is illustrated in lower life expectancy, and much higher maternal, infant and neonatal mortality and high prevalence of obesity. However, health care resources are not strongly implicated. As the table indicates, the differences in resources are not that striking although it is not surprising that expensive equipment such as MRI and CT scanners would be more common in the US with their system of many independent clinics, and managed consortiums and similarly structured organizations such as Kaiser Permanente and Intermountain Health Care which function as insurers and providers.

A significant component of health care cost is not mentioned in the study we have been discussing. It is waste. A recent study quantified this aspect.[10] Waste factors included failure of care delivery and care coordination, over treatment or expensive but poor care, aggressive and unrealistic pricing, administrative complexity, fraud and abuse. Together these were estimated to constitute about 25% of the total health care cost in the US. The largest component was administrative complexity.

The US system with multiple insurance issuers with different rules concerning what is covered, and the common requirement of preapproval turns out to place a considerable paperwork burden on physicians. In addition, attempts to regulate the amount of time that can be spent with each patient have a negative psychological effect. Dissatisfaction with this and other limitations affects their ability to practice medicine based on their own knowledge, experience, and preferred clinical practices. Electronic record keeping also soak up significant time. While non-medical employees can take up some of the paper work burden, in view of many complaints one sees in the medical news services, the problem remains. All this combines to a high level of burnout, career dissatisfaction, and suicide. It is common to read about a physician who admits unwillingness to recommend a career in clinical medicine to his or her children. Others turn to non-clinical medical jobs.

The growing importance of guidelines in gauging physician performance by measuring compliance raises the issue concerning this evaluation process depending mostly on bureaucrats using guidelines and standards of best practice based controversial industry financed studies which some view as seriously biased. The guideline indications for prescriptions can be controversial. Critics claim systemic overtreatment. Statins are the poster child.

Canada appears to compare well with the European countries but it is poorly supplied with MRI facilities. Waiting times for an MRI in some places can be long, prompting patients near the US border to seek generally next day service and suffer out of pocket expenses. Wait times for surgeries can be excessive to unbelievable, but this sometimes can be blamed on government cost saving maneuvers such as capping the number of health service supported surgeries or underfunded hospitals. The Canadian medical system, while national, nevertheless is administered by each province. Thus there can be significant disparities in health care. Actually, the annual per capita health care expenditure is below average for the countries used for comparison.

The measures of health status seem rather approximate but appear to be the best that can be done given available data. Recent comparative data of prevalence of say chronic or infectious diseases appears to be lacking and attempts to rectify this are just now being undertaken.[11] In addition, life expectancy, while frequently highlighted, includes non-disease causes such as accidents, drug overdose, homicides, poor access to health care, poverty, and severe income inequality. Life expectancy is actually constantly changing at different rates depending on the country.[12]

Canada with its universal health care system appears for the items in the comparison to be quite similar to European countries. This is not to say there are not some problems, but these appear to be partly related simply to cost control and priorities as to federal and provincial funding.

There is probably considerable variation in how well the countries we have been discussing are prepared for the coming increase in demand for health care due to the rapid growth of the elderly population and their multiple health problems and increasing need for 24/7 care. It makes the widespread use of therapies frequently used in this age group that only benefit 1-3% of those treated an area of real concern. It is far from clear when this will change.

CONCLUSION

The problems of extraordinary per capita health care costs in the US appear not to be that mysterious. In fact they appear mostly systemic. The “outlier” cost of drugs and setting prices by what can be gotten away with involve corporate behavior that in general is far from unusual. Thus fundamental cultural change would be necessary—something few would bet on. Finally, compared to the other countries in the study, the US has a uniquely structured and fragmented private health care system whereas the others have universal or mandatory systems.

Metrics (US$)	US	NLD	CDN	Mean
Spending (per capita)				
Total health care costs	$9400	$5200	$4600	$5419
Pharmaceutical spending	$1450	$470	$631	$749
Angioplasty	$69	$13	NA	NA
Knee replacement	$57	$15	NA	NA
C-section delivery	$62	$9	NA	NA
Coronary bypass surgery	$60	$11	NA	NA
CT scan	$220	$23	NA	NA
MRI	$135	$24	NA	NA
Administration costs	$750	$210	NA	NA
Salaries – specialists	$470	$360	NA	NA
Salaries – generalists	$470	$180	NA	NA
Indicators of Health Status				
Life expectancy (years)	79	83	82	82
Maternal mortality/100K live births	26	9	7.3	8
Infant mortality/1000 live births	5.8	2.5	5.1	3.6
Neonatal mortality/1000 live births	4	2.5	3.2	2.6
Low birth weight (total live births)	8%	7%	6%	7%
Smokers (age >15 years)	11%	19%	14%	17%
Alcohol consump. (age >15 years)	9 liters	10 liters	6 liters	9 liters
Obesity/overweight (age >15 years)	70%	47%	60%	49%
Health Care Resources				
Physicians per 1000	2.6	3.5	2.6	3.3
Nurses per 1000	11	12	10	12
MRI units per million	38	13	9	22
CT scanners per million	41	13	13	37
Hospital beds per 1000	2.8	3.3	2.7	4.8
Long-term beds per 1000	39	66	54	54

TABLE. Comparison of health and health care costs. US vs. Netherlands (NDL) and Canada. The mean is for all eleven European countries included in the study. Based on recent data from key international organizations. Table adapted from Papanicolas *et al*.[9]

BREAST CANCER SCREENING DEBATE CONTINUES

A study which has just been published examines the question of continuing annual screening mammography in women older than 70 years.[13] The endpoint was breast cancer mortality. Data was from the US Medicare program, 2000-2008. One million beneficiaries aged 70-84 years with no previous breast cancer diagnosis were followed for 8 years for breast cancer mortality, incidence and treatments. For breast cancer mortality there was no significant difference in death rate for the age range of 75-84 when continuing vs. stopping mammography were compared. For the age group 70-74, the death rate per 1000 ranged from -2.3 to 0.1. The negative rate favors continuing. However, this is another example of very old data.

A new study is being undertaken concerning the great breast cancer screening debate. Most of the 30 investigators are at one of several University of California medical schools. The study is called WISDOM. A paper published in *Breast Cancer*[14] which outlines the study provides a very informative review and analysis of the breast cancer screening debate which has been ongoing for years and relies, interestingly, on data three or four decades old which has been reanalyzed in various ways to support opposing views. The twenty-year-old debate centers on two questions:

- Is it better to screen annually or bi-annually?
- Is it best to begin at age 40 or later?

It is clear from major current guidelines that there remains disagreement regarding these two views. However there are other issues all related to more general aspects of the screening debate and in particular whether to screen or not to screen and the middle ground where screening decisions should be personalized. These include disagreement over the view that screening reduces mortality, results in over diagnosis and unnecessary diagnostic procedures which can have adverse effects, including very serious ones, and unnecessary treatment, sometimes radical and severely impacting the patient's quality of life. In short, for issues of risk vs. benefit, professional views tend to be highly polarized. Nevertheless, when guidelines come out against screening, the recommendation is generally based on this risk/benefit analysis. The PSA test for prostate cancer is also a good example.

Interest in mammography started with studies carried out between 1986 and 1993. These reported large decreases in mortality when screened groups were compared to the general populations. Reductions were about 30%. However most of the randomized studies were judged by some to be of poor quality and systematic reviews up to the early 2000s found mortality reductions of only 10—15%. However, a 25-year Canadian study published in 2014 gathered more recent data. Deaths from breast cancer were the main outcome measured and no decrease in mortality due to screening was found.[15] It also provided the first-ever estimates of over-diagnosis. Half of all screen-detected abnormalities were non-palpable (no lump found), were estimated to be indolent, and would never have roused clinical suspicion. However, whether or not one believes this result, the fact remains that we are probably in for an endless cycle of academic debates arguing over conflicting very old data, most of which has little relevance due to the evolution of modern treatments and new data.[14]

Mammography offers the possibility of early detection, hopefully in many cases before metastasis has occurred. Metastasis of course changes the therapeutic challenge dramatically. It is silent until a new location clinically manifests and targeted treatment becomes possible. It can take years. Systemic preventive measures over a number of years do not seem feasible. Furthermore, it is generally the metastatic cancer that eventually kills. Thus the attractiveness, especially for high risk women, of the double mastectomy early enough such that the tumor is localized and hopefully there is no metastasis.

About a quarter of mammography diagnosed cancer is early and non-invasive, and is called low-grade ductal carcinoma *in situ* (DCIS). Some argue that this is misnamed since it is non-invasive and therefore not cancer. It should not be treated, especially aggressively (mastectomy with chemotherapy and radiation) but watched for signs of progression to invasive cancer. After all, some mammography results are actually false positives. It appears generally accepted that one in 10 (100 per 1000) positives are in fact false. This can be compared with breast cancer rates which are approximately 5 per 1000 women.[14] Watchful waiting prevents treating false positives. However, the natural history of DCIS has been studied carefully and it has been found that there is a very large individual variation in when progression yields cancer that carries the risk of concurrent metastasis.[16] Some DCIS does not progress but remains an indolent lesion. For some it regresses,[17] while for others it progresses rapidly to invasive cancer. Thus those that do not believe in the watch and wait view may take the aggressive option and treat all DCIS aggressively. This qualifies as over-treatment. It appears that there is no simple way out of this dilemma. Frequently discussions of this end up stating the need for better characterization of DCIS lesions in order to make watchful waiting less prone to error.

It is safe to assume that what women want is better, more definitive screening and guidelines based on modern studies. Knowledge of the risk of false positives has great power to dampen enthusiasm and expectations. We await the results of the WISDOM trial. This trial, which will involve a randomized and an observational cohort, started recruiting in late 2016. The primary endpoint is to determine which is better – annual screening vs. a personalized screening schedule; the latter based on each woman's personal risk of breast cancer. Risk assessment will involve the use of an assessment tool (model) and genetic testing. The outcomes tracked will include the number of late stage cancers found and the morbidity associated with personalized vs. annual screening will be determined on the basis of the number of biopsies performed. Additional secondary objectives are other measures of morbidity such as rates of systemic therapy, rates of DCISs, and use of chemoprevention. Each screening protocol will be examined for adherence, anxiety, and regret of the decision. The estimated completion date is the end of 2020. A much longer follow-up would be required to examine the mortality question. The study It is sponsored by the University of California.[14]

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