



Why There Has Been an Increase in Cardiovascular Disease Mortality in Young People Over the Past Decade in the USA: Unrecognized Roles of Alcoholism, Drug Abuse, Illegal Migrants and Hypomagnesemia

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Editorial

Over the past decade, according to recent CDC mortality statistics, there is a growing number of cardiovascular deaths in the USA among young people (i.e. 16-55 years in age) [1]. This turn of events, among the younger people, is being attributed to obesity, type 2 diabetes, suicide, and bad diets, whereas the elderly population, i.e. those over age 70, appear to be living into their 90's. Several well-known supposedly healthy Broadway and Hollywood actors below age 55 (e.g., Luke Perry, Brittany Murphy, Heather O'Rourke, Alex Haley, among others) died of heart attacks/cardiac arrest recently [1]. Among these deaths, in the younger people, there appear to be deaths caused by strokes, although a number have been attributed to congestive heart failure. All three, namely heart attacks, strokes and congestive heart failure, among men younger than 55 years of age, are unusual, despite many of these subjects being on statins and high-blood pressure medications with normal or only slightly elevated triglyceride and cholesterol levels [1].

Unless there is a suspicion of "foul-play", none of these deaths are ever autopsied or are blood samples taken for toxicology analyses. Since the third leading cause of death, after cancer in the USA, today appears to be overdose from alcohol, cocaine,

amphetamines, and fentanyl-heroin combinations or polydrug use (mixed with marijuana) [2-4], we believe many of the deaths in the younger people today are a direct result of substance abuse superimposed upon obesity, type 2 diabetes, and poor diets. Today, alcohol is still the leading abused drug, in the world.

Analyses of blood samples taken from numerous subjects who were admitted into the ERs in our hospitals, after falls or battering, often indicated elevated blood levels of alcohol, cocaine, psychedelics, amphetamines, marijuana, and/or fentanyl-heroin [2-4].

Hypomagnesemia Found in Subjects Ingesting Alcohol and Substances of Abuse: An Underlying Potential Relationship to Heart Disease and Strokes

Random laboratory studies of young people (i.e., 30-55 years of age) admitted to the ERs in our hospitals, after falls, car accidents and/or battering, demonstrated ionized hypomagnesemia in most of these subjects [2-4], as ascertained with specially-designed electrodes which accurately measures ionized magnesium (Mg²⁺) [7-11]. Many of these subjects, on careful serum drug analysis, were found

to exhibit elevated levels of alcohol, various psychedelic drugs, cocaine, amphetamines, heroin-fentanyl and/or marijuana [2-4] unpublished studies. Several recent studies, including our own, demonstrate that many heart attack victims, subjects with myocardial infarctions, congestive heart failure and/or strokes exhibit similar reduced serum levels of Mg²⁺ when looked for [7-20]. We do not believe these findings are mere coincidences. In addition, it is important to point out that drug addiction is now known to make such subjects very susceptible to multiple infectious diseases [21] which perform would drive these young people towards high risks for MIs, CHF, strokes and SCD.

Is Obesity, Type 2 Diabetes and Poor Diet Major Causes of Heart Attacks, Cardiovascular Diseases and Strokes in The Observed Increases in Morbidity and Mortality Recently Being Observed in Young People?

Although it seems now clear that obesity, Type 2 diabetes, suicide, and poor diet are contributing factors to the recently observed increases in morbidity and mortality in young people, it must be stated that many of these victims often present with near-normal blood levels of lipids and are on statins and blood pressure medications [1]. Moreover, most of the victims we have observed coming to our ERs were not obese [unpublished findings] but nevertheless exhibited ionized hypomagnesemia together with elevated blood levels of alcohol and the substances of abuse.

Mg is essential for all carbohydrate, protein, lipid, and nucleic acid metabolism, and cell membrane structures and functions, including regulation of cardiac functions, vasomotor tone, capillary blood flows and nutrition, brain synaptic functions, brain metabolism and oxygenation [11,18,22]. Deficiency of Mg will cause disruption in all these bodily functions, unless proper daily intake of Mg is sustained [11,18,22].

Why Ionized Hypomagnesemia Can Cause Increased Morbidity and Mortality: Relationship to DNA Damage, Cellular Oxidation and Genotoxicity

Does hypomagnesemia frequently contribute to Myocardial Ischemia (MI), Congestive Heart Failure (CHF), strokes and Sudden Cardiac Death (SCD)? Will increased dietary intake of Mg lower the risk of ischemic heart disease (IHD) and strokes? Does Mg have a therapeutic value in preventing IHD, MI, CHF and SCD? All these questions are critical in determining whether our hypothesis has any validity.

Our studies on experimental animals, isolated blood vessels, human subjects, and vascular smooth muscle and endothelial cells in primary cell cultures have provided considerable insights into these important questions. Our work dating back to 1970 [22-29] has provided important information on this topic and has stimulated numerous clinical trials around the globe that support

roles for increased dietary Mg in both the prevention/amelioration of IHD, MI, SCD, and strokes as well as the use of Mg therapeutically [30-36]. Experimental studies on numerous mammalian species demonstrate that hypomagnesemia can produce coronary and cerebrovascular arterial and arteriolar vasoconstriction, decreased capillary blood flows, inflammations, atherogenesis, increased vascular reactivity, and release of cytokines and chemokines resulting in continuous coronary and cerebrovascular vasospasms, and, over a period of time, atherosclerosis, IHD, MI, strokes and SCD [2,11,18,35,36]. This evidence demonstrates that Mg supplementation reduces ischemic events and that an increase in dietary intake would reduce the incidences of atherosclerosis, inflammations, coronary diseases, cerebrovascular diseases and improve the quality of life [11,18,22].

Examination of the sera of approximately 35 cardiac patients with Prinzmetal-variant angina [8], 105 stroke patients [25], and over 150 patients with diverse substances of abuse brought into our ERs [2-4], unpublished findings, and using specifically-designed electrodes for measurement of serum ionized Mg levels [7-11] revealed that, on average, there was a 35-45% decrease in the ionized Mg. Measurement of interleukin 1a, TNF-alpha, and c-reactive protein indicated a strong correlation ($r < 0.001$) to the serum ionized Mg level [37,38] unpublished findings.

Extensive laboratory studies, performed by our group, on CV tissues and cells from animals fed daily diets low in Mg intake has clearly shown that these excised CV tissues and cells demonstrate considerable membrane damage, formation of reactive oxygen species (ROS), fragmentation of DNA and oxidation of DNA [17-19,35-48], all of which would perform induce potential alterations in cell integrity, cell functions and alterations in cell phenotypes. We have termed such a state "genotoxicity" [48]. Genotoxins are, thus, mutagens [49,50]. The result of genotoxins induces modifications in gene expression. We, thus, believe that dietary deficiency in Mg intake will result in chromosomal aberrations which would produce early deaths from MIs, CHF, IHD, and/or strokes.

Young Cancer Patients Given Chemotherapeutic Drugs and/or Radiation and Subjects Taking Proton-Pump Inhibitors Exhibit Severely Decreased Serum Levels of Mg

Interestingly, we and others have found that young cancer patients taking diverse chemotherapeutic agents and/or given radiation treatments exhibit 35-45% reductions in serum ionized Mg levels and demonstrate coronary insufficiency and/or cerebrovascular insufficiency and die of MIs, strokes, CHF, or SCD [51]. The exact numbers of these subjects appear to be increasing due to better laboratory analyses. Recently, it has been reported by several groups that patients taking proton-pump inhibitors often exhibit decreases in serum Mg coupled to cardiac problems [52].

Growing Numbers of Illegal Migrants Who are Infected with Deadly Diseases and Underfed Could be Expected to Present with Mg Deficiencies: Probable Relation to Increased Morbidity and Mortality Among Native-born Young Citizens and Legal Residents

Currently, Western societies are under a clear assault from the migration of undocumented illegal people, many of whom are young men, who are bringing, in many cases, contagious diseases that were eliminated in their countries until very recently (e.g., last 10 years) [53]. This migration of diseased individuals to the USA and elsewhere has overwhelmed the healthcare systems, infected thousands of people and their children, and cost millions of dollars per year. It has been suggested that such a situation, with people carrying deadly pathogens will increase susceptibility for citizens for development of several types of cardiovascular diseases (i.e., IHD, CHF, strokes and SCD) [54]. Although actual careful laboratory studies have not yet, to our knowledge, examined illegal migrants for their ionized Mg levels, we would be surprised if their serum levels were not, on average reduced more than 50%.

Conclusions and Future Thoughts

Over the past decade, there has been an unexpected rise in the number of cardiovascular disease (CV) deaths in young people (i.e., 16-55 years of age) in the USA. Epidemiologists and physicians have speculated that this increased number of CV deaths is due to obesity, diabetes type 2, and poor diets, despite the fact that most of the victims were taking statin drugs, anti-diabetic drugs, lipid-lowering medications and/or high- blood pressure lowering-medications. In contrast to these CV deaths, among the young, people over the age of 70 appear to be living longer than a decade ago which presents somewhat of a paradox. We and others have found that many of the younger people exhibit low serum levels of ionized Mg. Many young patients brought into our ERs, who experienced falls, battering, or car accidents exhibit sera containing numerous substances of abuse, which we have reported to cause reductions in cardiac, vascular, and brain levels of ionized Mg. Low levels of Mg²⁺ have been found to be associated with higher risks for CV diseases, including MIs, CHF, strokes and SCD. Young cancer patients treated with numerous chemotherapeutic drugs exhibit low ionized Mg levels and increased risks for CV diseases, including MIs, CHF, strokes and SCD. Added to these risk factors, we must take into consideration the huge numbers of illegal adults and children who have been admitted into the USA over the past 10 years, who are carrying multiple deadly diseases (e.g., tuberculosis, measles, and plagues, among many others) which are known to be high- risk factors for development of CV diseases. It is our belief that the numerous risk factors enumerated in the present report, when taken together with obesity, type 2 diabetes and poor diets among the young can explain most of the increased number of CV deaths seen in young people in the USA over the past ten years.

Increased dietary intake of Mg should be very helpful in reducing CV morbidity and mortality in the younger population when taken together with proper medical care and nutrition of the migrants coming into the USA.

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