

Chelation Therapy: Stepping Into the Next 60 Years A Historical Commentary

John Parks Trowbridge M. D., FACAM
Diplomate, American Board of Clinical Metal Toxicology

“Mind-body medicine,” a term well known in medicine, has major roots in observations made in the 1960s by one of my lab directors at Stanford, George Solomon, M.D. Intensive study of the “relaxation response,” “healing touch,” “acupuncture,” and similar “soft science” technologies has led to widespread acceptance in the medical and lay communities. At about the same time, startling observations were being made of reversals of increasingly prevalent coronary and peripheral vascular maladies by chelation therapy with intravenous EDTA. Despite “hard science” showing that these beneficial discoveries have been replicated time and again, chelation remains largely unknown or, at worst, vigorous defiled. Paul Dudley White, M.D., President Eisenhower’s cardiologist, encountered similar resistance for over two decades to his introduction of the EKG. Laënnec was more fortunate in securing wide acceptance of the scientific results available with his new “stethoscope” within a decade in the early 1800s. Given a world increasingly aware of pollution with toxic heavy metals, and given a population with younger onset of serious degenerative diseases, and given 60 years of overwhelmingly successful results, why have conventional medicine and regulatory government tossed chelation aside, onto the trash heap of so-called fraudulent diversions?

Going to the Dogs – and Nowhere Else?

What we now unquestionably call “modern medicine” was largely invented since the late 1940s. Houston cardiovascular surgeon Denton Cooley, M.D., studied pediatric procedures in post-war Europe and his research efforts have saved countless children. Coronary endarterectomy was tried for occlusive disease, but most patients had diffuse involvement and were poorly qualified. Other partners of Houston cardiovascular surgeon Michael DeBakey, M.D., were Ed Garrett, Sr., M.D., and Jimmy Howell, M.D. In the early 1960s, they were in the forefront of perfecting a technique of removing a peripheral vein and inserting it as an aorto-coronary bypass on the heart ... of dogs. Endless hours spent in the dog lab led to skills and procedures hitherto unknown. Other complementary technologies were arising at the same time, including selective coronary angiography (to identify and locate high-grade occlusion), the cardiopulmonary bypass “pump” (“heart/lung” machine), and startling advances in anesthesia and antibiotics. Still, the dogs were their *only* bypass “patients,” and *their* survival was not the object of the research.

Despite sharing with their cardiology colleagues the potential for success of their new surgical approach, *no* patients were forthcoming. Finally, cardiologist Ed Dennis, M.D., endorsed a last-

ditch effort to salvage patients moribund after their infarction. In 1964, Dr. Garrett led the team to perform the first successful coronary artery bypass procedure, at Baylor University. The early patients, already pre-terminal, failed to survive. With the prospect of revascularization too tantalizing to resist, stable patients with severe angina were then referred for surgery. The first two died. The third survived. And a new era of *surgical* success emerged.

But ... Banished Forever to the Pound?

Intravenous EDTA chelation therapy was welcomed directly into patient practice in a most unusual way: in the emergency room. A child presented to the Georgetown University Hospital in 1952, clearly suffering with lead poisoning (from chewing paint off a window sill?). Pediatrician S. P. Bessman, M.D., recalled a recent conference where neurology researcher Martin Rubin, Ph.D., described exchanging lead for calcium by a new “chelating” compound ... in the test tube. “Can I use it in this kid? How do I dose it?” Serendipity led to clinical success and the child recovered. The case was reported in the *Medical Annals, District of Columbia*, later read by Norman E. Clarke, Sr., M.D., a cardiologist in Detroit. He was seeing plumbism (lead intoxication) in battery-factory workers ... and thought to try this new chelation treatment. Soon, his patients were reporting less use of nitroglycerin, fewer angina pains, and increased activity without dyspnea. Why not, he thought, try this on “heart patients” who were *not* suffering with lead toxicity. They, too, *dramatically* improved with chelation. And a new era of *medical* success emerged ... and was soon to be banished like an old dog.

The NIH TACT Results

Almost 60 years after the first discovery that EDTA chelation therapy could be effective in the treatment of heart and blood vessel diseases, results of the first large randomized double-blind trial were reported at the American Heart Association meeting in November 2012. A number of commentaries have identified “problems” with the 7-year-long National Institutes of Health study, under the direction of cardiologist Gervasio Lamas, M.D., of the Mt. Sinai Medical Center, Miami Beach, Florida. An 18% reduction of cardiovascular events in the entire treated group suggests a beneficial effect. However, one cadre accounted for substantial improvements ... diabetic patients enjoyed a 39% decrease in adverse events compared to placebo (usual medical treatment) controls.

Given the increase in diabetes in the American population – including the younger age of onset for many victims – any treatment offering significant benefit *should*, in the best of possible worlds, be readily embraced.

Diabetic Complications

Research at the National Institutes of Health in diabetics during the 1970s showed that normalization of blood sugars preserves endovascular and end-organ tissues, approaching the baseline health seen in normoglycemic populations. Over the past 30 years, there has been an alarming increase of obesity. Enlarging girth is often accompanied by the ominous signs of cardiometabolic syndrome, emphasizing the critical need for early and aggressive control of blood sugar. Nevertheless, ingrained societal patterns – including nutritional debasement in

daily food selections – complicate efforts to achieve the lifestyle changes essential for non-drug hyperglycemic control. Drugs, of course, impose the risk of side effects and even hypoglycemic episodes, so many physicians are comfortable allowing patients to float with higher-than-normal fasting and postprandial patterns ... and thus tolerating the commensurate development of occlusive changes affecting end-organs.

Chronic renal dialysis is one of the most expensive repetitive procedures in modern medicine, and diabetics claim an inordinate volume of these resources. The NIH TACT trial *excluded* renal failure patterns in order to simplify data analysis. A seminal 2003 study by Lin and Lin-Tan, published in the *New England Journal of Medicine*, matched patients developing *non*-diabetic renal failure and carefully treated the intervention group with intravenous EDTA chelation. While the untreated observation group devolved toward dialysis, the treated patients improved toward normal kidney function, presumably due to reduction of lead in the kidneys. Many experienced chelation physicians have seen serum creatinine levels reduce over time in both their diabetic and non-diabetic patients, but a *conclusive* study remains to be done – and is sorely needed and could be done easily with pooled data.

Beyond Diabetes

Reports of chelation improvements in diabetics have been peppered throughout the medical literature over the past 50 years. In 1964, Carlos P. Lamar, M.D., offered his diabetic patients a real chance at a more normal life, saving limbs scheduled for amputation, saving vision in those going blind, and lowering insulin dosages. Kansas City, Missouri, chelation specialists Ed W. McDonagh, D.O., and Charles J. Rudolph, D.O., Ph.D., were joined by research professional Emanuel Cheraskin, M.D., D.M.D., to publish *31* papers documenting their clinical practice experience over the 1980s and -90s. Topics included significant improvements of vital importance to diabetics and non-diabetics alike: blood sugar, cholesterol, HDL cholesterol, triglycerides, kidney function and serum creatinine levels, artery blockage disease (even of the aorta), severe heart artery blockage, blockage of neck carotid arteries, hardening of the arteries, platelet clotting functions, fatigue, pulse rate and blood pressure, serum calcium and iron levels, trace element patterns in degenerative diseases, psychological status, and general “clinical change” (improvements) observed in chelation patients. Perhaps of more interest to many *readers* is the demonstrated *reversal* of *macular degeneration* (commonly seen in diabetics) reported by McDonagh and Rudolph’s group in 1994. Their evidence included retina photographs, documenting improvement consistent with increased circulation to the eyes. Pooled objective data from practicing ophthalmologists could easily document a pattern of improvement, offering hope where this is no *other* treatment.

Coronary Occlusive Disease

The “end organ” of most concern for diabetics and non-diabetics alike is the cardiac muscle. Heart disease “statistics” 60 years ago were generally reported as reduction in symptoms, in angina and infarction, and improvement in EKG patterns. For the past 20 years, we’ve had benefit of the ultrafast CT “heart scan,” helping to outline the anatomy of calcified plaque in coronary vessels and allowing for earlier identification of those at-risk. For over 50 years, selective coronary angiography has provided “a map for surgery” – but its extensive use in post-

operative bypass patients has created an industry ripe for challenge as generally unnecessary and sometimes fallible. For almost 50 years, coronary artery bypass grafting (the “CABG”) has been shown to provide a life-saving alternative for those with significant diffuse disease or “left main” or “left anterior descending” artery occlusion. The 50-year-old technologies of coronary “ballooning” and “stenting” – now impregnated for drug-elution – remain popular despite the frequency of restenosis or other complications. The question of whether ultrafast CT is suitable for documenting improvements with chelation remains elusive, since some symptomatically successful patients continue to show advancing calcium scores. Collateral channels are not readily seen in these pictures or even in angiograms, so perfusion studies with stress-and-rest thallium scans can be more revealing.

Salvage of cardiac muscle is the *sine qua non* of all interventions. Indeed, “kinase” infusions within the early hours of acute infarction have preserved countless organs with minimal or no damage. Various drugs have found popularity in the conventional cardiology community as possibly reducing or delaying development of coronary occlusions. These include, of course, the “statin” drugs and anti-thrombotics such as clopidogrel. A number of concerns have been raised regarding their extensive side-effects, including interruption of physiologic biochemistry (such as, with statins, impaired synthesis of vitamin D, bile acids, coenzyme Q10, and so on). Chelation *avoids* these challenges to normal functions. Further, chelation has greatest success when occlusion has *not* progressed to tight stenosis or to the point where unstable plaque threatens to block distal flow. Coronary angiography is still risky, especially with regard to vulnerable plaque. Additionally, it is limited in not being able to discern plaque reduction that yields very slight increases in cross-sectional vessel caliber, a situation where fluid dynamics produces a much greater increase in flow volumes. Once again, clinical improvement is one of the best measures of success.

So the question remains ... besides lifestyle changes to minimize risks, what actual treatments could enhance myocardial salvage? The almost 60-year history of consistent reports suggests that EDTA chelation has *already* established itself as an unrecognized but viable alternative, with patient satisfaction and clinical improvements *routinely* in the 90% range in published studies.

EDTA Chelation and Cardiac Disease

Beginning with Clarke’s initial reports in 1955, anecdotal papers have repeatedly documented that “heart patients” improve with a wide variety of symptoms. Angina episodes, dyspnea on exertion, blood pressure elevations, rhythm disturbances, electrocardiogram patterns – all these were shown to improve in reports over the first 10 years. Other small group reports over the past 50 years have continued to *confirm* these early findings. The usual critique is that they involve a small number of patients or that double-blinding is absent. These criticisms, of course, ignore that proposed CABG surgery was canceled in the majority as no longer needed, and that people are still walking on limbs scheduled for amputation.

The importance of a non-surgical alternative for coronary disease is highlighted by a recent report on warfighter deaths over 10 years in the Middle East. Autopsies on 3,832 service members, killed at an average age of 26, showed that almost 9% had some blockage forming in

their heart arteries. About a quarter of these had *severe* blockage, yet they were asymptomatic and deployed into combat. As more sensitive diagnostic modalities are developed and widely employed, an increasing percentage of the population will “qualify” for treatment of their clinically silent diseases. In such cases, early and consistent use of chelation might dramatically lower medical care costs while improving overall health outcomes.

Anatomy vs. Microphysiology

Perhaps of greatest interest is the effort to understand why – or *how* – EDTA chelation is responsible for such dramatic cardiac (and other) benefits. Borrowing from the engineering concept of “opening the pipes,” such as with bypass or stenting, early explanations focused on a “roto-rooter” effect of “dissolving” the atherosclerotic blockage. While this effect has been observed and documented in *some* chelation patients over the years, such a view is probably severely limited.

Much more likely is that chelation acts in just exactly the way it is “approved” by the Food and Drug Administration: it reduces the body burden of toxic heavy metals such as lead, arsenic, cadmium, mercury, and so on. Sadly, the conventional medical community sets the standards and those lab parameters are for *acute* intoxication (as reflected in blood levels) rather than for total body *burden* (as reflected in hair or nail clippings or by collecting urine after challenging with a chelating drug). Since the “acute exposure” tests fail to “show toxicity,” insurance carriers decline claims for reimbursement.

The significance of reducing toxic metals cannot be overstated. But the mechanisms by which this result could produce dramatic improvements remain open to rampant speculation.

An early explanation suggested that, in states of impaired anti-oxidant levels, cholesterol serves as an electron sponge to help protect the endothelium. Oxidized cholesterol, being a “sticky” molecule, then deposits along the vessel margin, especially at sites of branching or disrupted flow. Having a weak activity similar to vitamin D, oxidized cholesterol invites calcium to be deposited in a non-covalent binding. Over time, accretion of more cholesterol, calcium, and cellular detritus results in a discrete volume of occlusive plaque, subintimal and medial. Pathologist Rudolph Virchow, M.D., called this “metastatic calcium,” since it was out of the bones and teeth but not bonded in place. Accordingly, EDTA was thought to “pinch” these available calcium atoms and thereby initiate dismantling and dissolution of the plaque. A more sophisticated view might relate to lowering of ionized calcium in circulation, stimulating release of parathyroid hormone, leading indirectly to mobilization of “releasable” calcium in hardened plaque and body tissues.

One fascinating result of such speculation is the inclusion of *calcium* as a “toxic” element when it is abnormally deposited in organs through a variety of “aging and degeneration” mechanisms. While babies are “soft and rubbery,” aging individuals are increasingly hardened and brittle. This one feature – reduction of metastatic calcium depositions, peppered throughout organelles and cells and interstitium as well as in plaque – might be “*the key*” to results with intravenous EDTA chelation. This speculation receives support from the realization that “sick mitochondria” accumulate excessive calcium and swell (especially in magnesium deficiency), disrupting the

stereochemical alignment of the electron transport chain on the cristae shelves, markedly reducing the efficiency of oxidative phosphorylation and, hence, the health of the cell. One way that mitochondria “get sick” is through the selective deposition of lead and other heavy metals, disrupting mitochondrial DNA expression as well as energy production. Reversal of these mitochondrial modifications could explain *many* (if not most) of the clinical improvements demonstrated with EDTA treatments.

Chelation patients often report significant symptom improvement within the *first* half-dozen or dozen treatments, long before a major improvement in blood flow “through the pipes” is likely. When reviewing organ failings – as seen with liver, kidneys, and brain in addition to heart – such mitochondrial inefficiency might be a primary mechanism. Similarly, removal of toxic heavy metals by chelation is much more biologically cost-effective than the body’s detoxification effort that leads to depletion of intracellular glutathione. Thus, chelation can help to preserve cellular anti-oxidant status and a more robust ability to regenerate vitamins C and E as electron donors.

Recall also that all other toxic metals are accumulating throughout the tissues as well – mercury, lead, cadmium, arsenic, and so on – with their separate contributions to free radical production and functional impairment. Iron is an essential element that can be present in excess (iron “storage” disorders, even polycythemia), where it also stimulates the generation of free radicals, which are especially toxic in metabolically active tissues such as liver and heart. Jukka T. Salonen, M.D., Ph.D., M.Sc.P.H., of Finland, reported in 1992 a large prospective study of men with no symptoms of heart disease. Over the next three years, the lifetime total of cigarettes smoked was the primary risk factor in those suffering myocardial infarction. The second factor was an elevated blood ferritin level (possibly correlated with a shift toward tissue acidosis). This provides an easy laboratory test to discover those at higher risk – levels rising higher above 100 ng/ml are directly associated with an increasing incidence of coronary events. The iron story is, however, complicated, and ferritin only slowly declines over dozens of EDTA chelation treatments.

A side issue is coming to the forefront: the expanding use of injectable diagnostic imaging contrast agents, such as gadolinium, iron (Feridex), and manganese (Teslascan). Urinary challenge tests with d-penicillamine in some patients have shown very high excretion levels of gadolinium. The clinical significance of these findings is unclear, but the use of chelation treatments in patients who have had repeated contrast studies might prove valuable. Gadolinium use has been linked to onset of nephrogenic systemic fibrosis.

Another factor deserving study is the effect that chelation might have on the improvement of tissue perfusion by reducing constriction of the tiniest arterioles, which serve as a large bed of peripheral resistance vessels. Where increased arteriolar resistance opposes the systolic pressure, relaxation of these “flow-limiter” muscles can raise tissue perfusion volume considerably. Increasingly sensitive vascular lab studies and digital thermography are two inexpensive and non-invasive methods that can be used to document improved perfusion.

McDonagh and Rudolph, among others, have shown that chelation produces a more normal reduced platelet volume and increased pliability. Ease of flow through capillary beds provides increased perfusion and oxygenation help to maintain normal tissue alkalization. Reduction of

acidotic microenvironments slows the production of free-floating single fibrin fibrils from fibrinogen, further lowering viscosity in the narrow capillaries. Any combination of these microphysiologic changes could explain improved tissue viability and marked improvement in clinical symptoms and organ function.

Peripheral Vascular Disease

Being listed as a “labeled indication” by the Food and Drug Administration usually allows for insurance approval and reimbursement of treatment for a particular condition. Few people know that EDTA was listed in late-1950s editions of the *Physician’s Desk Reference* (PDR) as “indicated” for the treatment of peripheral vascular disease. A study with about half-a-dozen patients showing marked improvement had led to labeling approval. Then came the 1962 Kefauver-Harris Amendment to the Food, Drug, and Cosmetic Act, requiring a review of both safety *and efficacy* in the approval process. When studies were considered insufficient to conform to the new standards, the indication was “dropped” from the label.

While early studies concentrated on cardiac improvements, concurrent benefits for occluding leg arteries attracted attention. Carlos P. Lamar, M.D., in 1964 reported on legs saved from amputation. H. Richard Casdorff, M.D., and Charles H. Farr, M.D., Ph.D., confirmed these improvements in a small series in 1983, as did James P. Carter, M.D., Dr.P.H., and Efrain Olszewer, M. D. in a double-blinded study published in the *Journal of the National Medical Association* in 1990. McDonagh and Rudolph in the 1980s documented marked enhancement of the ankle/brachial index in 117 patients with occlusive disease. Carter and Olszewer reported in 1988 on a 28-month retrospective analysis of 2,870 patients treated with intravenous EDTA: peripheral arterial disease patients showed marked improvement in 91% and good improvement in another 8%. Given that surgical success is lessened with smaller vessels and when near or crossing joints, chelation as a non-surgical alternative offers hope to countless thousands.

Thermography specialist Philip P. Hoekstra, III, Ph.D., reported privately to me in 2009 the results of his thirteen-year study of 19,147 patients with peripheral (leg *and* arm) artery stenosis, not yet severe enough to require amputation. Arterial perfusion of all extremities demonstrated significant “warming” in 86% of chelated patients.

Carotid Arteries

Carotid arteries act as a special case of the peripheral vascular bed – and their improvements with chelation have been documented repeatedly. Rudolph and McDonagh described in 1991 on the striking and highly significant reversal of atherosclerotic stenosis of *both* internal carotid arteries in 30 patients treated with only 30 EDTA infusions over a 10 month period. Ultrasound imaging showed overall obstruction was decreased by 21% -- and those who showed *more severe* stenosis had even *greater reduction* of blockage. Their study had been planned after their 1990 case report of one patient having an original **98** per cent occlusion *reduced to only 33* per cent after just 30 chelation therapy treatments. Given that strokes can occur as a complication of otherwise successful carotid endarterectomy, chelation can reduce such misadventures for many. Where surgical intervention is warranted, pre-treatment with chelation theoretically can improve

the post-operative result. Again, more sophisticated equipment can allow easy, inexpensive, and non-invasive documentation of improvement.

Intracranial circulation responds less well. Casdorff in 1981 documented marked improvement in brain arterial flow in a small series of patients. Carter and Olszewer's 1988 retrospective review showed marked improvement in 24% and *good* improvement in 30% of patients with cerebrovascular and other degenerative brain diseases. Surprising results are possible. One patient presented to me 18 months post-stroke, still severely limited despite constant physical therapy. After 8 chelation treatments, he proudly showed that he could walk down the hall with an assistant holding his belt in the back, and he described having gotten into and out of the tub (with assist) for the first time since his CVA. "Small-vessel ischemic disease," with or without dementia changes, generally shows stabilization or some improvement. Alzheimer's dementia, especially when associated with significant toxic heavy metal patterns, can show encouraging benefits when treated *early* with chelation.

A Potpourri of Problems

Macular degeneration is a special case of vascular supply directly to a central nerve. Direct ophthalmic observation can show gradual deterioration ... *and* gradual improvements. The most rewarding part, though, is having a patient resume reading or once again being able to thread a needle. I asked one patient, who received several dozen chelation treatments, to read this note on a chart cover: PATIENT IS LEGALLY BLIND. I then asked him to read whose chart ... "Why, that's mine!" Without glasses.

Atrial fibrillation is the most common arrhythmia and its frequency elevates with advancing age. The risk of stroke increases considerably, so rhythm control has benefits beyond rising perfusion efficiency. Alfred Soffer, M.D., reported on chelation for various heart rhythm disturbances in his 1964 monograph; results were variable but promising. Long-experienced chelation physicians have their anecdotal stories of patients reverting to and maintaining sinus rhythm.

Cardiac valvular sclerosis, sometimes proceeding to calcific stenosis restricting flow and allowing regurgitation, is a troubling problem. Although new percutaneous operations (using technology similar to angiography) are growing in popularity, their risks and success rates are still being evaluated. Theoretically, the decalcifying effect of EDTA chelation therapy should slow (perhaps even reverse?) sclerotic-to-stenotic change. At the very least, chelation should be expected to aid the intended surgical result by increasing the pliability of tissues. Neither angiography nor echocardiography are yet sensitive enough to detect slight reductions in calcium deposits.

Scleroderma is another special case, where distinctive arteriolar changes (in all organs but especially the skin) are associated with autoimmune patterns. Raynaud's phenomenon appears to be prodromal in many patients. Conventional medications are often frustrating, and the addition of EDTA chelation therapy has been *quite* successful for many patients. Similarly, other autoimmune patterns – rheumatoid arthritis and systemic lupus erythematosus – have shown promising improvements with chelation. Benefits with "fibromyalgia" have routinely been reported by patients. These observations raise speculation that EDTA might be affecting

membrane pathology, possibly related to or amplified by toxic heavy metals – induced through the mechanism of free radical attack? D-penicillamine, loosely called a “chelator” but acting by means of paired thiol groups, has long been used in conventional medicine to help with scleroderma and rheumatoid patterns.

Mitochondrial pathology has been recognized in many forms over the past decade, but the contribution of toxic heavy metals has been poorly appreciated. In the 1990s, laboratory studies by the Environmental Protection Agency showed startling changes in mitochondrial protein production seen in isolated organelles after exposure to “physiologic” levels of lead. Research into toxic heavy metal effects on mitochondria, endoplasmic reticulum, nuclear membranes, and cell-limiting membranes might offer the most fruitful future explanations for pathology and chelation benefits – but the laboratory funding required would be substantial.

Along Came A Spider ...

A little known effect of chelation is to neutralize biological venoms from snakes, spiders, scorpions, and the like. These poisons are a mixture of metalloenzymes, and inactivation occurs with displacement or removal of the critical metal cation. Appropriate research could lead to treatment protocols (intravenous, oral, topical) far more effective – and dramatically less expensive – than current “anti-venom” preparations, which can cost thousands of dollars.

Venoms, as metalloenzymes, bring up a whole realm of possible treatments aimed at specific induction and function of enzymes throughout the body. In perhaps a third of instances, physiologic cations (magnesium, zinc, iron, manganese, molybdenum, copper, others) are positioned in the active site and help establish the functional conformation of the protein. As research shows which enzyme clusters are more sensitive to inhibition by toxic heavy metals displacing the expected cation, the prospect of targeted chelation could become a reality. One factor complicating targeted treatment is that chelators need to penetrate through the interstitial space into the cytoplasm and into mitochondria and even into the nuclear space. Similar concerns arise with penetrating the blood-brain barrier. Nano-particle delivery systems, being developed for targeted chemotherapy, might be designed to enhance chelation efficiency at the “end-organelle” level rather than merely the “end-organ.” Again, laboratory and clinical expenses could be a major barrier.

Nutritional physiology is still poorly understood, and studies might reveal new ways to increase the benefits of chelation treatments. Mildred S. Seelig, M.D., M.P.H., confirmed in the 1980s that higher blood levels of magnesium are correlated with reduced complications of myocardial infarction. Chelation therapists have long added extra magnesium to intravenous EDTA in order to amplify many of the cardiovascular benefits of treatment. Realizing that lower magnesium levels are common in diabetes, hypertension, atherosclerosis, cardiomyopathy, and a panoply of other pathologies opens an interesting door: what minerals (and vitamins), when supplemented specifically, might enhance the effectiveness of chelation treatments in *particular* clinical settings? Incidentally, in patients who appear to have an “allergic” reaction to a chelating drug, supplementation with molybdenum might blunt that response for the future.

Stem cell implants offer special considerations here – could they be more effective when combined with certain minerals ... or after bathing in selective chelation solutions? Rotifers are primitive multicellular microscopic waterborne “animals” that accumulate calcium over their lifespan. Alfred M. Sincock, Ph.D., reported in 1975 on almost doubling the lifespan by bathing the organisms in various calcium-binding chelators. Similarly, the length of DNA telomeres – hence, the potential number of cell replications before genetic losses – might also be preserved by chelation treatments. The possible interactions of hormones and EDTA or other chelators is a field ripe for investigation. These cell physiology studies are technical and expensive, but the benefits might be unexpectedly rewarding.

Cost/Benefit Comparisons

Given the socio-economic impact of medical and health choices, no discussion is complete without highlighting the “competing therapies” for cardiovascular and other diseases. Chelation treatments reasonably cost about \$5-10,000 to produce outstanding benefit for about 90% of patients with coronary, carotid, or peripheral vascular disease. Or all three at the same time. While surgery addresses only a few inches of “blockage” with each operation, chelation works throughout the body – a real bargain for the majority of patients, who have *diffuse* disease. Charges for coronary artery bypass grafting (“CABG”) range about \$75-150,000 – for *each* operation – assuming no serious complications requiring extended hospitalization. A small but certain percentage of bypass patients (perhaps 2-3% or more, depending on many factors, especially comorbidities or more profound blockage) never return home. Many patients suffer with post-operative morbidity, including myocardial infarction, stroke, rhythm disturbances, worsening high blood pressure, and neurocognitive changes (“pump syndrome”). Repeat operations are frustratingly common, often within 10 years. (*If it worked so well the first time, why is another operation needed?*) Aorta and peripheral vascular operations usually cost one-third to one-half of heart bypass procedures. Balloon angioplasty and stenting are increasingly popular (with a failure rate of about 5%), reducing the need for open surgery of the chest or limbs except for those with critical ischemia. Perhaps 20% of patients require repeated angioplasty procedures, dramatically changing the cost profiles with each session ranging from about \$30-50,000. L. Terry Chappell, M.D., and John P. Stahl, M.D., in 1993 published a meta-analysis of 19 carefully qualifying studies, concluding that almost 90% of cardiovascular patients showed objective clinical improvements. The savings possible with the *early* choice of chelation rather than the later choice of repeated operations will become increasingly important for an aging population.

Intracranial small vessel ischemic disease is virtually *untreatable* by conventional means, so even slight improvements with chelation therapy are a bargain at any price. Similarly, degenerative patterns such as scleroderma, rheumatoid arthritis, macular degeneration, distal peripheral arterial occlusion, and non-diabetic chronic renal failure are poorly treated with traditional approaches, making chelation appealing and very cost-effective. Perhaps the “greatest value” is seen in vague or poorly-diagnosable medical conditions – including fatigue, asthenia, delayed healing, a sense of “unwellness,” multiple sclerosis – where chelation can provide benefits not seen with aggressive drug treatments or even surgery. Stubborn infectious diseases, such as Lyme disease or even MRSA, can show improvement with chelation. While the mechanisms of action often remain obscure, the clinical benefits can be quite obvious in

patients' lives. A "chelation registry" might document improvements across a broad range of pathologies, but the effort would be expensive and likely of little value in convincing skeptics.

One other factor should be addressed: cancer prevention. Walter Blumer, M.D., in Switzerland reported his experience in 1980 with *calcium* EDTA intravenous treatments administered over 10 years, showing a 90% reduction in cancer incidence in the 59 patients. His follow-up report showed a 90% reduction in cancer deaths over 18 years, compared to the untreated controls similarly exposed to lead from automobile exhaust, industrial pollution, and other carcinogens. When treating heart and vascular disease, *magnesium* EDTA is preferred, in order to "mobilize calcium and reduce blockage." In a private communication related to me by Garry Gordon, D.O., M.D.(H), Blumer noted that his patients "didn't suffer with heart attacks." These delightful results are most likely related to removal of toxic heavy metals, since *calcium* EDTA does not perturb ionized calcium levels, but unknown effects of EDTA might contribute as well. Considering that cancers of all cell types are the third leading cause of death in the United States, what could be the true prevention benefit when the cost of chelation treatment is compared to that of traditional oncology care?

Any review of environmental toxic metal exposures shows the alarming explosion of pollution concentrating up the food chains in the biosphere. One area where unexpected progress is coming is with mercury exposure from dental amalgams. The just-completed World Mercury Treaty, a three-year project of the World Health Organization, proposes that countries completely phase out their reliance on mercury restorations in both children and adults. Controversial studies have related mercury to autism and Alzheimer's dementia, among other problems. The startling fact is that many adults are unknowingly carrying around their *primary* source of the world's most potent neurotoxin, in their "fillings" or root canals. This raises the specter of worsening *environmental* pollution through the water effluent from dental offices as these restorations are replaced, because mercury scavenging units – to be disposed of as biohazard waste – are not yet in widespread use. Boyd Haley, Ph.D., emeritus chair of chemistry at the University of Kentucky, assures us that newer chelating compounds are in development and that they could be used not only orally in humans but also to remediate mercury-contaminated rivers and bodies of water.

Blumer's study, among others, provokes a critical question: If removal of toxic heavy metals is the *most* important factor in producing clinical results, how much can be accomplished by using oral "chelating" drugs, alone or in combination with intravenous chelation? Oral administration is much easier, has fewer risks, and can be applied across broad populations, especially in a preventive context or to address *early* pathophysiology. Since 1995, I've used customized combined programs of oral chelators along with intravenous EDTA. Our early studies suggested more rapid reductions in the body burden of toxic heavy metals. Further research into dithiol compounds as well as classical chelators might be very cost-effective and exceptionally fruitful. If taste-enhancing technology can mask the noxious sulfur aroma of oral chelators, the potential exists for design of prescription "chelator foods," vastly expanding the access for this treatment approach. These would be "drug-supplemented" foods, not merely sulfur-rich onions and garlic.

Some Final Thoughts

The great majority of our “medical” problems are directly related to “personal health choices,” known as lifestyle issues: tobacco use, alcohol excess, caloric surplus, nutritionally-bereft foods, poor choice of food variety, sedentary habits, dental deterioration, limited sleep, unlimited stress, and so on. Unsuspected toxic heavy metal and chemical exposures challenge our organ performance at a rapidly expanding pace. Where personal responsibility fails to minimize our survival threats, what should be the societal commitment of resources to restore function and comfort?

The future face of medical care is difficult to predict. An enlarging patient base in the United States poses increasing financial demands on already stressed budgets. Technological advances can be expected in virtually every arena, from diagnostic testing through treatment planning. CT scans, MRIs, and PET scans have sharpened our accuracy and understanding to allow earlier diagnosis and treatment, for better outcomes and longer survival. Same-day surgicenters and endoscopic procedures dramatically reduced the costs associated with many common procedures, such as cholecystectomy and most knee repairs. Will the changes still to come bring similar cost-savings or will they, like organ transplant procedures, impose greater economic strains on a nation unprepared to ration “high-tech” care?

Victor Fuchs, Ph.D., in his seminal book, *Who Shall Live?*, claimed in 1974 that we must deliver the very best care to the president because of his critical position in the society – but he cautioned that we simply *cannot* afford to deliver “presidential medicine” to the people. Just because we *can* do it – CABG surgery, angioplasty, total joint replacement, organ transplants – challenges us with the ethical question of whether we *should* do it. Or do it for *some* but **not** for *others*. Or do it for *younger* adults but **not** for “the *elderly*.” The reasonable cost and minimal resources required to offer chelation therapy “to the masses” suggest that this largely-ignored treatment might soon evolve to play central roles in both preventive and therapeutic spheres in our emerging care system.

John Parks Trowbridge M. D., has been certified since 1985 as a chelation specialist by the American Board of Clinical Metal Toxicology, for which he now serves as Secretary. A Fellow of the American College for Advancement in Medicine, he has served as director, officer, or president of a number of professional and public associations. Popular as a professional and public speaker, he co-authored Bantam’s bestselling **The Yeast Syndrome** among several other books and dozens of CDs, and DVDs. His upcoming book, **LIFE LONG HEALTH**, presents chelation perspectives gathered from 30 years of offering this treatment. He provides a broad array of integrative medical therapies at his solo practice, Life Celebrating Health in Humble (Houston), Texas: jptlch@earthlink.net, 1-800-FIX-PAIN. (copyright at common law 2013 John Parks Trowbridge)