The Dental Amalgam Issue "a terrible sin against humanity" - Dr. Alfred Stock, 1926

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Ever since dentists first started installing amalgams in patients' teeth there has been an issue as to whether mercury is released from them and causes health (pathophysiologic) problems. This web page presents information pertaining to the dental amalgam issue. Subjects presented in the contents list are linked to subsequent portions of the web page.

Mercury in Dental Filling Disclosure and Prohibition Act

I) Introduction

Ever since dentists first started installing amalgams in patients' teeth there has been an issue as to whether mercury is released and causes health (pathophysiologic) problems. Then in 1984 a group of conscientious dentists formed the International Academy of Oral Medicine and Toxicology (IAOMT). One of their objectives was to scientifically explore the safety of amalgam restorations. Since 1984, members of the IAOMT have inspired many renowned medical scientists at universities around the world to research possible pathophysiologic effects associated with mercury leaking from amalgam restorations. Consequently, there are a growing number of scientific studies that document pathophysiologic effects associated with amalgam mercury.

I a) Fundamental Health Flaws

A "silver filling" is a euphemism for an amalgam restoration, which a dentist places in a patient's tooth after a cavity is created by drilling out decay. Amalgam restorations consist of mercury, silver, tin, copper, and a trace amount of zinc. The dental amalgam has two fundamental flaws that adversely effect a patient's health. The first fundamental flaw is that all amalgam metals are cations. The net result of the tendency for covalent, ionic and metallic bonding and van der Waals forces between amalgam cations is a weak repulsion. So there is a sustained release of mercury and other metals from the amalgam into the body. Researchers have measured a daily release of mercury on the order of 10 micrograms from the amalgam into the body. Mercury is a toxic metal; the most minute amount damages cells.

The second fundamental flaw is that there are five dissimilar metals in the amalgam. Galvanic action between these metals in inevitable (the dissimilar metals form a battery). Galvanism produces electricity that flows through the body. The electric currents produced by the amalgam typically are between 0.1 and 10 microamps, compared to the body's natural electric current of 3 microamps.

The mercury challenges systemic functions of every individual and of developing fetuses, so it can lead to health problems and fetal malformations. Mercury leakage and its subsequent pathophysiologic effects are most often slow, insidious processes. So health problems caused by dental mercury poisoning are perceived many years after the amalgams are placed.

I b) The Truth and the Hippocratic Oath

Arthur Schopenhauer, 19th Century Philosopher ..."All truth passes through three stages: first it is ridiculed, second it is violently opposed, and third it is accepted as self-evident."

"...I will prescribe regimen for the good of my patients according to my ability and my judgment and never do harm to anyone. To please no one, will I prescribe a deadly drug nor give advice which may cause his death. If I keep this oath faithfully, may I enjoy my life and practice my art, respected by all men and in all times; but if I swerve from it or violate it, may the reverse be my lot."

I c) Historical Overview of Mercury Use in Dentistry

Lorscheider, F.L., Vimy, M.J., and Summers, A.O. "Mercury Exposure from Silver Tooth Fillings: Emerging Evidence Questions a Traditional Dental Paradigm." FASEB Journal (April 1995).

As early as the 7th century, the Chinese used a "silver paste" containing mercury (Hg) to fill decayed teeth. Throughout the Middle Ages, alchemists in China and Europe observed that this mysterious silvery liquid, extracted from cinnabar ore, was volatile and would quickly disappear as vapor when mildly heated. Alchemists were fascinated that at room temperature Hg appeared to "dissolve" powders of other metals such as silver, tin, and copper. By the early 1800's, the use of a Hg/silver paste as a tooth filling material was being popularized in England and France and it was eventually introduced into North America in the 1830s. Some early dental practitioners expressed concerns that the Hg/silver mixture (amalgam) expanded after setting, frequently fracturing the tooth or protruding above the cavity preparation, and thereby prevented proper jaw closure. Other dentists were concerned about mercurial poisoning, because it was already widely recognized that Hg exposure resulted in many overt side effects, including dementia and loss of motor coordination. By 1845, as a reflection of these concerns, the American Society of Dental Surgeons and several affiliated regional dental societies adopted a resolution that its members sign a pledge not to use amalgam. Consequently, during the next decade some members of the society were suspended for the malpractice of using amalgam. But the advocates of amalgam eventually prevailed and membership in the American Society of Dental Surgeons declined, forcing it to disband in 1856. In its place arose the American Dental Association, founded in 1859, based on the advocacy of amalgam as a safe and desirable tooth filling material. Shortly thereafter, tin was added to the Hg/silver paste to counteract the expansion properties of the previous amalgam formula.

There were compelling economic reasons for promoting dental amalgam as a replacement for the other common filling materials of the day such as cement, lead, gold, and tinfoil. Amalgam's introduction meant that dental care would now be within the financial means of a much wider sector of the population, and because amalgam was simple and easy to use, dentists could readily be trained to treat the anticipated large number of new patients. By 1895, the dental amalgam mixture of metals had been modified further to control for expansion and contraction, and the basic formula has remained essentially unchanged since then. Scientific concerns about amalgam safety initially surfaced in Germany during the 1920's, but eventually subsided without a clear resolution. At the present time, based on 1992 dental manufacturer specifications, amalgam (at mixing) typically contains approximately 50% metallic Hg, 35% silver, 9% tin, 6% copper, and a trace of zinc. Estimates of annual Hg usage by

U.S. dentists range from approximately 100,000 kg in the 1970's to 70,000 kg today. Hg fillings continue to remain the material preferred by 92% of U.S. dentists for restoring posterior teeth. More than 100 million Hg fillings are placed each year in the U.S. Presently, organized dentistry has countered the controversy surrounding the use of Hg fillings by claiming that Hg reacts with the other amalgam metals to form a "biologically inactive substance" and by observing that dentists have not reported any adverse side effects in patients. Long-term use and popularity also continue to be offered as evidence of amalgam safety.

Id) Has the US Food and Drug Administration Approved the Mixed Dental Amalgam?

The simple answer is NO! What the FDA has done is to approve the two components that make up amalgam i.e, mercury and dental alloy, but have not seen fit to approve "mixed amalgam," which is what is actually used as the filling material placed in your teeth. Yes, that is correct. Although charged by law to evaluate and classify every medical or dental device to be used on or in humans, the FDA has not evaluated or>

II) Paramount Scientific Documents

The amalgam has two fundamental health flaws: 1) it has a sustained release of mercury and other toxic metals into the body, and 2) galvanic action produces electricity that flows through the body. Since pathophysiologic effects that toxicity has on the body can be objectively measured, scientific research pertaining to the amalgam's fundamental health flaws have been focused on the sustained mercury release. Abstracts to some of the more paramount scientific documents pertaining to pathophysiologic effects of the released mercury are presented below.

II a) Review

Lorscheider, F.L., Vimy, M.J., and Summers, A.O. "Mercury Exposure from Silver Tooth Fillings: Emerging Evidence Questions a Traditional Dental Paradigm." FASEB Journal (April 1995).

SUMMARY: This document reviews results of animal and human studies of pathophysiologic effects related to mercury leaking from amalgam restorations. Some pertinent points presented include:

- every amalgam daily releases on the order of 10 micrograms of mercury into the body (i.e. 3,000,000,000,000,000 mercury atoms per day),
- more than 2/3 of the excretable mercury in humans is derived from amalgams,
- mercury crosses the maternal placenta into the tissue of a developing fetus,
- mercury is capable of inducing auto immunity,
- mercury immediately and continually challenges the kidney's functioning,
- mercury can enhance the prevalence of multiple antibiotic resistant intestinal bacteria, and
- people exposed to mercury on a sustained basis are at risk to lowered fertility.

II b) Dental Mercury Impairs Kidney Function

Boyd, N.D., H. Benediktsson, M.J. Vimy, D.E. Hooper, and F.L. Lorscheider, "Mercury From Dental "Silver" Tooth Fillings Impairs Sheep Kidney Function", Am.J. Physiol. 261, Regulatory Integrative Comp. Physiol. 30: R1010-R1014, (1991).

ABSTRACT: In humans Hg vapor is released from "silver" amalgam fillings that contain 50% Hg by weight. Previous studies show that when 12 such fillings are placed in sheep teeth, the kidneys will concentrate amalgam Hg at levels ranging from 5 to 10 ug Hg/g renal tissue 4 to 20 weeks after placement. In the present study 12 occlusal fillings were placed in each of six adult female sheep under general anesthesia, using standard dental procedures. Glass ionomer occlusal fillings (12) were inserted in two control sheep. At several days before dental surgery, and at 30 and 60 days after placement of fillings, renal function was evaluated by plasma clearance of inulin and by plasma and urine electrolytes, urea, and proteins. An average plasma inulin clearance rate of 69.5 +/- 7.2 ml/min before amalgam placement was reduced to 32.3 +/- 8.1 ml/min by 30 days and remained low at 27.9 +/- 8.7 ml/min after 60 days. Inulin clearance did not change in controls. After amalgam placement urine concentration of albumin decreased from 93.0 +/- 20.5 to 30.1 +/- 15.3 mg/l and urine Na concentrations increased steadily from 24.8 +/- 7.7 to 82.2 +/- 20.3 mmol/l at 60 days. Concentrations of K, urea, Y-glutamyl transpeptidase, alkaline phosphatase, and total protein did not change significantly form 0 to 60 days in urine. Plasma levels of Na, K, urea, and albumin remained unchanged form 0 to 60 days after amalgam. Renal histology remained normal in amalgam-treated animals. It is concluded that amalgam Hg levels in kidney are sufficient to significantly reduce the rate of inulin clearance by non defined mechanisms and that electrolyte patterns in urine are consistent with impaired renal tubular reabsorption.

II c) Dental Mercury Provokes an Increase in Oral and Intestinal Floras

Summers, A.O., J.Wireman, M.J. Vimy, F.L. Lorscheider, B. Marshall, S.B. Levy, S. Bennett, and L. Billard, "Mercury Released form Dental "Silver" Fillings Provokes an Increase in Mercury- and Antibiotic-Resistant Bacteria in Oral and Intestinal Floras of Primates", Antimicrobial Agents and Chemotherapy, (April 1993), pages 825 - 834.

ABSTRACT: In a survey of 640 human subjects, a subgroup of 356 persons without recent exposure to antibiotics demonstrated that those with a high prevalence of Hg resistance in their intestinal floras were significantly more likely to also have resistance to two or more antibiotics. This observation led us to consider the possibility that mercury released from amalgam ("silver") dental restorations might be a selective agent for both mercury- and antibiotic-resistant bacteria in the oral and intestinal floras of primates. Resistances to mercury and the several antibiotics were examined in the oral and intestinal floras of six adult monkeys prior the the installation of amalgam fillings, during the time they were in place, and after replacement of the amalgam fillings with glass ionomer fillings (in four of the monkeys). The monkeys were fed an antibiotic-free diet, and fecal mercury concentrations were monitored. There was a statistically significant increase in the incidence of mercury-resistant bacteria during the 5 weeks following installation of the amalgam fillings and during the 5 weeks immediately following their replacement with glass ionomer fillings. These peaks in incidence of mercury-resistant bacteria correlated with peaks of Hg elimination (as high as 1mM in the feces) immediately following amalgam placement and immediately after replacement of the amalgam fillings. Representative mercury-resistant isolates of three selected bacterial families (oral streptococci, members of the family Enterobacteriaceae, and enterocaocci) were also resistant to one or more antibiotics, including ampicillin, tetracycline, streptomycin, kanamycin, and chloramphenicol. While such mercury- and antibiotic-resistant isolates among the staphylococci, the enterococci, and members of the family Enterobacteriaceae, have been described, this is the first report of mercury resistance in the oral streptococci. Many of the enterobacterial strains were able to

transfer mercury and antibiotic resistances together to laboratory bacterial recipients, suggesting that the loci for these resistances are genetically linked. Our findings indicate that mercury released from amalgam fillings can cause an enrichment of mercury resistance plasmids in the normal bacterial floras of primates. Many of these plasmids also carry antibiotic resistance, implicating the exposure to mercury from dental amalgams in an increased incidence of multiple antibiotic resistance plasmids in the normal floras of nonmedicated subjects.

II d) Dental Amalgam Mercury in the Human Population

II d2) Neurological Behavaioral Effects from Exposure to Dental Amalgam Mercury (focuses on dental personnel)

D. Echeverria, H.V. Aposhian, J.S. Woods, N.J. Heyer, M.M. Aposhian, A.C. Bittner Jr., R.K. Mahurn, and M. Cianciola, "Neurobehavioral effects from exposure to dental amalgam Hg: new distinctions between recent exposure and Hg body burden," FASEB Journal 12, 971-980 (1998).

ABSTRACT: Potential toxicity from exposure to mercury vapor (Hg) from dental amalgam fillings is the subject of current public health debate in many countries. We evaluated potential central nervous system (CNS) toxicity associated with handling Hg-containing amalgam materials among dental personnel with very low levels of Hg exposure (i.e., urinary Hg < 4 ug/l), applying a neurobehavioral test battery to evaluate CNS functions in relation to both recent exposure and Hg body burden. New distinctions between subtle preclinical effects on symptoms, mood, motor function, and cognition were found associated with Hg body burden as compared with those associated with recent exposure. The pattern of results, comparable to findings previously reported among subjects with urinary Hg > 50 ug/l, presents convincing new evidence of adverse behavioral effects associated with low Hg exposures within the range of that received by the general population.

II e) Mercury Exposure via Breast Milk

Vimy, M.J., Hooper, D.E., King, W.W., Lorscheider, F.L., "Mercury from Maternal "Silver" Tooth Fillings in Sheep and Human Breast Milk: A Source of Neonatal Exposure" Biological Trace Element Research, 56:143-52, (1997).

ABSTRACT: Neonatal uptake of Hg from milk was examined in a pregnant sheep model, where radioactive mercury (Hg203)/silver tooth fillings (amalgam) were newly placed. A crossover experimental design was used in which lactating ewes nursed foster lambs. In a parallel study, the relationship between dental history and breast milk concentration of Hg was also examined.

Results from the animal studies showed that, during pregnancy, a primary fetal site of amalgam, Hg concentration is in the liver, and after delivery the neonatal lamb kidney receives additional amalgam Hg from mother's milk. In lactating women with aged amalgam fillings, increased Hg excretion in breast milk and urine correlated with the number of fillings or Hg vapor concentration levels in mouth air.

It was concluded that Hg originating from maternal amalgam tooth fillings transfers across the placenta to the fetus, across the mammary gland into milk ingested by the newborn and ultimately into neonatal body tissues. Comparisons are made to the U.S. minimal risk level recently established for adult Hg exposure. These findings

suggest the placement and removal of "silver" tooth filings in pregnant and lactating humans will subject the fetus and neonate to unnecessary risk of Hg exposure.

II f) Infertility

Gerhard, I., Monga, B., Waldbrenner, A., Runnebaum, B., "Heavy Metals and Fertility" Journal of Toxicology and Environmental Health, Part, A, 54:593-611, (1998).

Heavy metals have been identified as factors affecting human fertility. This study was designed to investigate whether the urinary heavy metal excretion is associated with different factors of infertility. The urinary heavy metal excretion was determined in 501 infertile women after oral administration of the chelating agent 2,3-dimercaptopropane-1-sulfonic acid (DMPS). Furthermore, the influence of trace element and vitamin administration on metal excretion was investigated. Significant correlations were found between different heavy metals and clinical parameters (age, body mass index, nationality) as well as gynecological conditions (uterine fibroids, miscarriages, hormonal disorders). Diagnosis and reduction of an increased heavy metal body load improved the spontaneous conception chances of infertile women. The DMPS test was a useful and complementary diagnostic method. Adequate treatment provides successful alternatives to conventional hormonal therapy.

II g) Mercury Associated with Cardiac Dysfunction

Frustaci A, Magnavita N, Chimenti C, Caldarulo M, Sabbioni E, Pietra R, Cellini C, Possati GF, Maseri A. Department of Cardiology, Catholic University, Rome, Italy. "Marked elevation of myocardial trace elements in idiopathic dilated cardiomyopathy compared with secondary cardiac dysfunction." From: J Am Coll Cardiol 1999 May;33(6):1578-83

OBJECTIVES: We sought to investigate the possible pathogenetic role of myocardial trace elements (TE) in patients with various forms of cardiac failure.

BACKGROUND: Both myocardial TE accumulation and deficiency have been associated with the development of heart failure indistinguishable from an idiopathic dilated cardiomyopathy.

METHODS: Myocardial and muscular content of 32 TE has been assessed in biopsy samples of 13 patients (pts) with clinical, hemodynamic and histologic diagnosis of idiopathic dilated cardiomyopathy (IDCM), all without past or current exposure to TE. One muscular and one left ventricular (LV) endomyocardial specimen from each patient, drawn with metal contamination-free technique, were analyzed by neutron activation analysis and compared with 1) similar surgical samples from patients with valvular (12 pts)and ischemic (13 pts) heart disease comparable for age and degree of LV dysfunction; 2) papillary and skeletal muscle surgical biopsies from 10 pts with mitral stenosis and normal LV function, and 3) LV endomyocardial biopsies from four normal subjects.

RESULTS: A large increase (>10,000 times for mercury and antimony) of TE concentration has been observed in myocardial but not in muscular samples in all pts with IDCM. Patients with secondary cardiac dysfunction had mild increase (< or = 5 times) of myocardial TE and normal muscular TE. In particular, in pts with IDCM mean mercury concentration was 22,000 times (178,400 ng/g vs. 8 ng/g), antimony 12,000 times (19,260 ng/g vs. 1.5 ng/g), gold 11 times (26 ng/g vs. 2.3 ng/g),

chromium 13 times (2,300 ng/g vs. 177 ng/g) and cobalt 4 times (86,5 ng/g vs. 20 ng/g) higher than in control subjects.

CONCLUSIONS: A large, significant increase of myocardial TE is present in IDCM but not in secondary cardiac dysfunction. The increased concentration of TE in pts with IDCM may adversely affect mitochondrial activity and myocardial metabolism and worsen cellular function.

III) Fetal Malformations

James Paget Lancet 2:1017, 1882

We ought not to set them aside with idle thoughts or idle words about "curiosities" or "chances." Not one of them is without meaning; not one that might not become the beginning of excellent knowledge, if only we could answer the question—why is it rare or being rare, why did it in this instance happen?

McKeown T., "Human Malformations: Introduction" British Medical Bulletin Vol. 32 Number 1 (January 1976).

"...it is a sobering thought that after several decades of research, a number of international conferences and many other meetings, seminars and symposia, the problem of human malformations remains essentially unchanged." "...at least in the immediate future, it seems likely that the problem of human malformations will continue at about the present level (27 per every 1000 births)."

Weiss, B; Landrigan, PJ. "The Developing Brain and the Environment, An Introduction." Environmental Health Perspective, 108(3):373-4, June 2000.

EXCERPTS: We have come to understand that chemicals in the environment can cause a wide range of develpmental disabilities in children, and that anatomic malformations are only the most obvious. Current concerns especially focus on the concept that certain chemicals can cause clinical and subclinical deficits in neurobehavioral development through injury to the fetal brain. The implications of small shifts in intelligence quotient score and a slighlty increased tendency to aggression are not so easilly conveyed or grasped as a picture of deformed limbs. However, recognition of the importance of such changes is gathering momentum and is documented in this monograph.

A prime motivating force is the realization that we know the cause of fewer than 25% of neurodevelopmental disabilities. These disabilities including dyslexia, attention deficit hyperactivity disorder (ADHD), intellectual retardation, and autism, affect an estimated 3 to 8% of the 4 million babies born each year in the United States.

For most neurodevelopmental disabilities, the cause remains unknown. A diverse assortment of toxic chemicals in the environment is capable of causing neurodevelopmental disabilities. Organic mercury compounds are among the most potent developmental neurotoxicants. In the words of pediatrician Herbert L. Needleman: "We are conductiong a vast toxicologic experiment in our society in which our children and our children's children are the experimental subjects."

The American Academy of Pediatrics has just publiched its Handbook of Pediatric Environmental Health, the "Green Book," which is available to pediatricians

throughout the Americas. Children's environmental health has climbed to a critical position as we launch the new millennium. This monograph marks a significant milestone in the evolution of this emerging discipline.

When dental mercury crosses over the placenta into the tissue of the developing fetus, does it cause fetal malformations? These studies answer that question.

III a) Sheep Study

Vimy, M.J., Y. Takahashi, and F.L. Lorscheider "Maternal-fetal distribution of mercury (203Hg) released from dental amalgam fillings." Am. J. Physiol. 258 (Regulatory Integrative Comp. Physiol. 27): R939-R945 (1990).

ABSTRACT: In humans, the continuous release of Hg vapor from dental amalgam tooth restorations is markedly increased for prolonged periods after chewing. The present study establishes a time-course distribution for amalgam, Hg in body tissues of adult and fetal sheep. Under general anesthesia, five pregnant ewes had twelve occlusal amalgam fillings containing radioactive 203Hg placed in teeth at 112 days gestation. Blood, amniotic fluid, feces, and urine specimens were collected at 1- to 3-day intervals for 16 days. From days 16-140 after amalgam placement (16-41 days for fetal lambs), tissue specimens were analyzed for radioactivity, and total Hg concentrations were calculated. Results demonstrate that Hg from dental amalgam will appear in maternal and fetal blood and amniotic fluid within 2 days after placement of amalgam tooth restorations. Excretion of some of this Hg will also commence within 2 days. All tissues examined displayed Hg accumulation. Highest concentrations of Hg from amalgam in the adult occurred in kidney and liver, whereas in the fetus the highest amalgam Hg concentrations appeared in the liver and pituitary glands. The placenta progressively concentrated Hg as gestation advanced to term, and milk concentration of amalgam Hg postpartum provides a potential source of Hg exposure to the newborn. It is concluded that accumulation of amalgam Hg progresses in maternal and fetal tissues to a steady state with advancing gestation and is maintained.

III b) Rat Studies

Fredriksson, A., Dencker, L., Archer, T., Danielsson, B.R. "Prenatal Coexposure to Metallic Mercury Vapor and Methyl Mercury Produce Interactive Behavioral Changes in Adult Rats." Neurotoxicol Teratol., 18(2): 129-34, (1996).

ABSTRACT: Pregnant rats were either 1) administered methyl mercury (MeHg) by gavage, 2 mg/kg/day during days 6-9 of gestation, 2) exposed by inhalation to metallic mercury (Hg) vapor (1.8 mg/m3 air for 1.5 hours per day) during gestation days 14-19, 3) exposed to both MeHg by gavage and Hg vapor by inhalation (MeHg + Hg), or 4) were given combined vehicle administration for each of the two treatments (control). The inhalation regimen corresponded to an approximate dose of 0.1 mg Hg/kg/day.

Clinical observations and developmental markers up to weaning showed no differences between any of the groups. Testing of behavioral functions was performed between 4 and 5 months of age and included spontaneous motor activity, spatial learning in a circular path, and instrumental maze learning for food reward.

Offspring of dams exposed to Hg vapor showed hyperactivity in the motor activity test chambers over all three parameters: locomotion, rearing and total activity; this effect

was potentiated in the animals of the MeHg + Hg group. In the swim maze test, the MeHg + Hg and Hg groups evidenced longer latencies to reach a submerged platform, which they had learned to mount the day before, compared to either the control or MeHg group. In the modified, enclosed radial arm maze, both the MeHg + Hg and Hg groups showed more ambulations and rearings in the activity test prior to the learning test. During the learning trial, the same groups (i.e., MeHg + Hg and Hg) showed longer latencies and made more errors in acquiring all eight pellets.

Generally, the results indicate that prenatal exposure to Hg causes alterations to both spontaneous and learned behaviors, suggesting some deficit in adaptive functions. Coexposure to MeHg, which by itself did not alter their functions at the dose given in this study, served to significantly aggravate the change.

S. Soderstrom, A Fredriksson, L. Dencker, T. Ebendal, "The effect of mercury vapour on cholinergic neurons in the fetal brain: studies on the expression of nerve growth factor and its low- and high-affinity receptors," Developmental Brain Research 85, 96-108 (1995)

ABSTRACT: The effects of mercury vapour on the production of nerve growth factor during development have been examined. Pregnant rats were exposed to two different concentrations of mercury vapour during either embryonic days E6-E11 (early) or E13-E18 (late) in pregnancy, increasing the postnatal concentration of mercury in the brain from 1 ng/g tissue to 4 ng/g tissue (low-dose group) or 11 ng/g (high-dose group). The effect of this exposure in offspring was determined by looking at the NGF concentration at postnatal days 21 and 60 and comparing these levels to age-matched controls from sham-treated mothers. Changes in the expression of mRNA encoding NGF, the low- and high-affinity receptors for NGF (p75 and p140 trk. respectively) and choline acetyltransferase (ChAT) were also determined. When rats were exposed to high levels of mercury vapour during early embryonic development there was a significant (62%) increase in hippocampal NGF levels at P21 accompanied by a 50% decrease of NGF in the basal forebrain. The expression of NGF mRA was found to be unaltered in the dentate gyrus. The expression of p75 mRNA was significantly decreased to 39% of control levels in the diagonal band of Broca (DB) and to approximately 50% in the medial septal nucleus (MS) whereas no alterations in the level of trk mRNA expression were detectable in the basal forebrain. ChAT mRNA was slightly decreased in the DB and MS, significantly in the striatum. These findings suggest that low levels of prenatal mercury vapour exposure can alter the levels of the NGF and its receptors, indicating neuronal damage and disturbed trophic regulations during development.

Aschner M, Lorscheider FL, Cowan KS, Conklin DR, Vimy MJ, Lash LH "Metallothionein induction in fetal rat brain and neonatal primary astrocyte cultures by in utero exposure to elemental mercury vapor (Hg0)." Brain Res 1997 Dec 5;778(1):222-32

ABSTRACT: Brain metallothionein (MT) protein and mRNA levels were determined in the fetal rat following in utero (gestational days 7-21) exposure to elemental mercury vapor (Hg0; 300 microg Hg/m3; 4 h/day). Total RNA was probed on Northern blots with [alpha-32P]dCTP-labeled synthetic cDNA probes specific for rat MT isoform mRNAs. The probes for MT-I and MT-II mRNA hybridized to a single band of approximately 550 and 450 nucleotides, respectively. Expression of whole brain MT-I mRNA in full-term fetal rats (day 21) was significantly increased ($P < 0.03$) by in utero exposure to Hg0 compared to nonexposed controls. This corresponded to a 14-fold increase ($P < 0.001$) in fetal brain Hg concentration after in utero Hg0 exposure. In

addition, astrocytes from both control and in utero Hg0-exposed fetuses were isolated, and neonatal primary astrocyte cultures were established and maintained in vitro for up to 3 weeks without additional experimental intervention. Astrocyte monolayers derived from in utero Hg0-exposed fetuses consistently expressed increased abundance of MT-I mRNA transcripts after 1, 2, and 3 weeks in culture ($P < 0.03$, $P < 0.01$, and $P < 0.03$, respectively) compared with controls. The abundance of astrocyte MT-II mRNA was unchanged at 1 and 2 weeks in culture, but was significantly increased at 3 weeks in cultures derived from brains of Hg0-exposed fetuses ($P < 0.04$). Consistent with the increase in MT mRNA, an increase in astrocytic levels of MT proteins was noted by Western blot analysis and MT-immunoreactivity. These studies suggest that in utero exposure to Hg0 induces brain MT gene expression, and that MT mRNAs and their respective proteins are useful quantitative biochemical markers of intrauterine exposure to Hg0, a potentially cytotoxic challenge to astrocytes in the developing brain. It is concluded that induction of MT by fetal/neonatal astrocytes represents an attempt by these glial cells to protect against Hg cytotoxicity in maintaining cerebral homeostasis.

III c) Human Study

Drasch et. al. "Mercury Burden of Human Fetal and Infant Tissues" European Journal of Pediatrics (August 1994).

ABSTRACT: The total mercury concentrations in the liver (Hg-L), the kidney cortex (Hg-K) and the cerebral cortex (Hg-C) of 108 children aged 1 day- 5 years, and the Hg-K and Hg-L of 46 fetuses were determined. As far as possible, the mothers were interviewed and their dental status was recorded. The results were compared to mercury concentrations in the tissues of adults for the same geographical area. The Hg-K (n=38) and Hg-L (n=40) of fetuses and Hg-K (n=35) and Hg-C (n=35) of older infants (11-50 weeks of life) correlated significantly with the number of dental amalgam fillings of the mother. The toxicological relevance of the unexpected high Hg-K of older infants from mother with higher numbers of dental amalgam fillings is discussed. Conclusion: Future discussion on the pros and cons of dental amalgam should not be limited to adults or children with their own amalgam fillings, but also include fetal exposure. The unrestricted application of amalgam for dental restorations in women before and during the child-bearing age should be reconsidered. Abbreviations: Hg-C total mercury concentration in the cerebral cortex (ng/g wet weight). Hg-K total mercury concentration in the renal cortex (ng/g wet weight). Hg-L total mercury concentration in the liver (ng/g wet weight).

Kenny S. Crump, Tord Kjellstrom, Annette M. Shipp, Abraham Silvers, Alistair Stewart "Influence of Prenatal Mercury Exposure Upon Scholastic and Psycholgical Test Performance: Benchmeark Analysis of a New Zealand Cohort" Risk Analysis, Vol.18, No. 6, 1998.

This paper presents benchmark (BMD) calculations and additional regression analyses of data from a study in which scores from 26 scholastic and psychological tests administered to 237 6- and 7- year old New Zealand children were correlated with the mercury concentration in their mothers' hair during pregnancy. The original analyses of five test scores found an association between high prenatal mercury exposure and decreased test performance, using category variables for mercury exposure. Our regression analyses, which utilized the actural hair mercury level did not find significant associations between mercury and children's test scores. However, this finding was highly influenced by a single child whose mother's mercury hair level (86 mg/kg) was more thatn four times that of any other mother. When that

child was ommited, results were more indicative of a mercury effect and scores on six tests were significantly associated with the mothers' hair mercury level. BMDs calculated from five tests ranged from 32 to 73 mg/kg hair mercury, and corresponding BMDs (95% lower limits on BMDs) ranged form 17 to 24 mg/kg. When the child with the highest mercury level was omitted, BMDs ranged from 13 to 21 mg/kg, and corresponding BMDLs ranged from 7.4 to 10 mg/kg.

IV) Alzheimer's Disease Studies

Many on-going studies have linked many aspects of amalgam mercury to brain tissue damage found in patients with Alzheimer's Disease. Abstracts from these on-going studies are presented below.

IV a) Trace Elements in Alzheimer's Disease Brains

Wenstrup, D., Ehmann, W.D., and Markesbery W.R., "Trace Element Imbalances in Isolated Subcellular Fractions of Alzheimer's Disease Brains" Brain Research, 533 125-131 Elsevier Science Publishers (1990).

ABSTRACT: Concentrations of 13 trace elements (Ag, Br, Co, Cr, Cs, Fe, Hg, K, Na, Rb, Sc, Se, Zn) in isolated subcellular fractions (whole brain, nuclei, mitochondria, microsomes) of temporal lobe from autopsied Alzheimer's disease (AD) patients and normal controls were determined utilizing instrumental neutron activation analysis. Comparison of AD and controls revealed elevated Br (whole brain) and Hg (microsomes) and diminished Rb (whole brain, nuclear and microsomes), Se (microsomes) and Zn (nuclear) in AD. The elevated Br and Hg and diminished Rb are consistent with our previous studies in AD bulk brain specimens. Comparison of element ratios revealed increased Hg/Se, Hg/Zn and Zn/Se mass ratios in AD. Se and Zn play a protective role against Hg toxicity and our data suggest that they are utilized to detoxify Hg in the AD brain. Overall our studies suggest that Hg could be and important toxic element in AD. Whether Hg deposition in AD is a primary or secondary event remains to be determined.

Basun H, Forssell LG, Wetterberg L, Winblad B. "Metals and trace elements in plasma and cerebrospinal fluid in normal aging and Alzheimer's disease." J Neural Transm Park Dis Dement Sect 1991;3(4):231-58

ABSTRACT: Cerebro-spinal fluid (CSF) and blood levels of aluminum, cadmium, calcium, copper, lead, magnesium, and mercury were studied in 24 subjects with dementia of the Alzheimer type (DAT) and in 28 healthy volunteers. Furthermore, arsenic, bromine, chrome, iron, manganese, nickel, rubidium, selenium, strontium, and zinc were measured only in blood. There were significant changes in the DAT group when compared to the controls. The plasma levels of aluminum, cadmium, mercury and selenium were increased and the contents of iron and manganese were lower in the DAT group as compared to control subjects. In CSF there were low levels of cadmium and calcium and increased content of copper in DAT cases. Iron and zinc levels in blood and calcium in both blood and CSF of DAT patients correlated with memory and cognitive functions. Iron, manganese and strontium levels of DAT sufferers in blood and aluminum in CSF were related with changes in behavior.

C.R. Cornett, W.R. Markesbery, and W.D. Ehmann, "Imbalances of Trace Elements Related to Oxidative Damage in Alzheimer's Disease Brain" NeuroToxicology 19(3): 339-346 (1998).

ABSTRACT: Four elements that have been implicated in free radical induced oxidative stress in Alzheimer's Disease (AD) were measured by instrumental neutron activation analysis (INAA) in seven brain regions from 58 AD patients and 21 control subjects. A statistically significant elevation of iron and zinc was observed in multiple regions of AD brain, compared with controls. Mercury was elevated in AD in most regions studied, but the high variability of mercury levels in both AD and control subjects prevented the AD-control difference from reaching significance. Selenium, a protective agent against mercury toxicity, was significantly elevated only in AD amygdala. The elevation of iron and zinc in AD brain has the potential of augmenting neuron degeneration through free radical processes.

IV b) Mercury Vapor Inhalation Inhibits Tubulin in Rat Brain

James C. Pendergrass, Boyd E. Haley, Murray J. Vimy, Stewart A. Winfield and Fritz L. Lorscheider, "Mercury Vapor Inhalation Inhibits Binding of GTP to Tubulin in Rat Brain: Similarity to a Molecular Lesion in Human Alzheimer Brain." NeuroToxicology 18(2): 315-324, 1997.

ABSTRACT: Mercury (Hg) interacts with brain tubulin and disassembles microtubules that maintain neurite structure. Since it is well known that Hg vapor is continuously released from "silver" amalgam tooth fillings and is absorbed into brain, rats were exposed to Hg 4 hr/day for 0, 2, 7, 14, and 28 days at 250 or 300 mcg Hg/m3 air, concentrations present in mouth air of some humans with many amalgam fillings. Average rat brain Hg concentrations increased significantly (11-47 fold) with duration of Hg exposure. By 14 days of Hg exposure, photoaffinity labeling of the B-subunit of the tubulin dimer with (a32P)8N3GTP in brain hamogenates was decreased 41-74% , upon analysis of SDS-PAGE autoradiograms. The identical neurochemical lesion of similar or greater magnitude is evident in Alzheimer brain homogenates from approximately 80% of patients, when compared to human age-matched controls. Since the rate of tubulin polymerization is dependent upon binding of GTP to tubulin dimers, we conclude that chronic inhalation of low-level Hg can inhibit polymerization of tubulin essential for formation of microtubules.

IV c) HgEDTA Complex Inhibits Tubulin

E.F. Duhr, J.C. Pendergrass, J.T. Slevin, and B.E. Haley, "HgEDTA Complex Inhibits GTP Interactions with the E-Site of Brain B-Tubulin," Toxicology and Applied Pharmacology 122, 273-280 (1993).

We have found that EDTA and EGTA complexes of Hg2+, which conventional wisdom has assumed are biologically inert, are potentially injurious to the neuronal cytoskeleton. Tubulin, a major protein component of the neuronal cytoskeleton, is the target of multiple toxicants, including many heavy metal ions. Among the mercurials, inorganic mercuric ion (HG2+) is one of the most potent inhibitors of microtubule polymerization both in vivo and in vitro. In contrast to other heavy metals, the capacity of Hg2+ to inhibit microtubule polymerization or disrupt formed microtubules cannot be prevented by the addition of EDTA and EGTA, both of which bind Hg2+ with very high affinity. To the contrary, the addition of these two chelating agents potentiates Hg2+ inhibitiion of tubulin polymerization. Results herein show that HgEDTA and HgEGTA inhibit tubulin polymerization by disrupting the interaction of GTP with the E-site of brain B-tubulin, an obligatory step in the polymerization of tubulin. Both HgEDTA and HgEGTA, but not free Hg2+, prevented binding of (32P)8N3GTP, a photoaffinity nucleotide analog of GTP, to the E-site and displaced bound (32P)8N3GTP at low micromolar concentrations. This complete inhibition of

photoinsertion into the E-site occured in a concentration and time dependent fashion and was specific for Hg2+ complexes of EDTA and EGTA, among the chelating agents tested. Given the ubiquity of Hg2+ in the environment and the widespread use of EDTA in foodstuffs and medicine, these mercury complexes may pose a potentially serious threat to human health and play a role in diseases of the neuronal cytoskeleton.

IV d) Increased Blood Mercury Levels in Patients with Alzheimer's Disease

C. Hock, G. Drasch, S. Golombowski, F. Muller-Spahn, B. Willershausen-Zonnchen, P. Schwarz, U. Hock, J.H. Growdon, R.M. Nitsch "Increased Blood Mercury Levels in Patients with Alzheimer's Disease" Journal of Neural Transmission, 105: (1998).

SUMMARY: Alzheimer's disease (AD) is a common neurodegenerative disorder that leads to dementia and death. In addition to several genetic parameters, various environmental factors may influence the risk of getting AD. In order to test whether blood levels of the heavy metal mercury are increased in AD, we measured blood mercury concentrations in AD patients (n=33), and compared them to age-matched control patients with major depression (MD) (n=45), as well as to an additional control group of patients with various non psychiatric disorders (n=65). Blood mercury levels were more than two fold higher in AD patients as compared to both control groups (p=0.0005, and p=0.0000, respectively). In early onset AD patients (n=13), blood mercury levels were almost three fold higher as compared to controls (p=0.0002, and p=0.0000, respectively). These increases were unrelated to the patients' dental status. Linear regression analysis of blood mercury concentrations and CSF levels of amyloid B-peptide (AB) revealed a significant correlation of these measures in AD patients (n=15, r=0.7440, p=0.0015, Pearson type of correlation). These results demonstrate elevated blood levels of mercury in AD, and they suggest that this increase of mercury levels is associated with high CSF levels of AB, whereas tau levels were unrelated. Possible explanations of increased blood mercury levels in AD include yet unidentified enviromental sources or release from brain tissue with the advance in neuronal death.

IV e) Mercury Induces Cell Cytotoxicity and Oxidative Stress and Increases ß-Amyloid Secretion and Tau Phosphorylation in SHSY5Y Neuroblastoma Cells

G. Olivieri, Ch. Brack,, F. Müller-Spahn, H. B. Stähelin, M. Herrmann, P. Renard, M. Brockhaus and C. Hock. "Mercury Induces Cell Cytotoxicity and Oxidative Stress and Increases ß-Amyloid Secretion and Tau Phosphorylation in SHSY5Y Neuroblastoma Cells." Journal of Neurochemistry, Vol. 74, No. 1, 2000 231-236.

ABSTRACT: Concentrations of heavy metals, including mercury, have been shown to be altered in the brain and body fluids of Alzheimer's disease (AD) patients. To explore potential pathophysiological mechanisms we used an in vitro model system (SHSY5Y neuroblastoma cells) and investigated the effects of inorganic mercury (HgCl2) on oxidative stress, cell cytotoxicity, ß-amyloid production, and tau phosphorylation. We demonstrated that exposure of cells to 50 µg/L (180 nM) HgCl2 for 30 min induces a 30% reduction in cellular glutathione (GSH) levels ($n = 13$, $p < 0.001$). Preincubation of cells for 30 min with 1 µM melatonin or premixing melatonin and HgCl2 appeared to protect cells from the mercury-induced GSH loss. Similarly, 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) cytotoxicity assays revealed that 50 µg/L HgCl2 for 24 h produced a 50% inhibition of MTT reduction ($n = 9$, $p < 0.001$). Again, melatonin preincubation protected cells from the deleterious effects of mercury, resulting in MTT reduction equaling control levels. The

release of ß-amyloid peptide (Aß) 1-40 and 1-42 into cell culture supernatants after exposure to HgCl2 was shown to be different: Aß 1-40 showed maximal (15.3 ng/ml) release after 4 h, whereas Aß 1-42 showed maximal (9.3 ng/ml) release after 6 h of exposure to mercury compared with untreated controls ($n = 9$, $p < 0.001$). Preincubation of cells with melatonin resulted in an attenuation of Aß 1-40 and Aß 1-42 release. Tau phosphorylation was significantly increased in the presence of mercury ($n = 9$, $p < 0.001$), whereas melatonin preincubation reduced the phosphorylation to control values. These results indicate that mercury may play a role in pathophysiological mechanisms of AD.

IV f) Retrograde degeneration of neurite membrane structural integrity of nerve growth cones following in vitro exposure to mercury.

Christopher C. W. Leong, Naweed I. Syed, Fritz L. Lorscheider. "Retrograde degeneration of neurite membrane structural integrity of nerve growth cones following in vitro exposure to mercury." NeuroReport 12 (4) pg 733-737, March 2001.

Inhalation of mercury vapor (Hg0) inhibits binding of GTP to rat brain tubulin, thereby inhibiting tubulin polymerization into microtubules. A similar molecular lesion has also been observed in 80% of brains from patients with Alzheimer disease (AD) compared to age-matched controls. However the precise site and mode of action of Hg ions remain illusive. Therefore, the present study examined whether Hg ions could affect membrane dynamics of neurite growth cone morphology and behavior. Since tubulin is a highly conserved cytoskeletal protein in both vertebrates and invertebrates, we hypothesized that growth cones from animal species could be highly susceptible to Hg ions. To test this possibility, the identified, large Pedal A (PeA) neurons from the central ring ganglia of the snail Lymnaea stagnalis were cultured for 48 h in 2 ml brain conditioned medium (CM). Following neurite outgrowth, metal chloride solution (2 ml) of Hg, Al, Pb, Cd, or Mn (10–7 M) was pressure applied directly onto individual growth cones. Time-lapse images with inverted microscopy were acquired prior to, during, and after the metal ion exposure. We demonstrate that Hg ions markedly disrupted membrane structure and linear growth rates of imaged neurites in 77% of all nerve growth cones. When growth cones were stained with antibodies specific for both tubulin and actin, it was the tubulin/microtubule structure that disintegrated following Hg exposure. Moreover, some denuded neurites were also observed to form neurofibrillary aggregates. In contrast, growth cone exposure to other metal ions did not effect growth cone morphology, nor was their motility rate compromised. To determine the growth suppressive effects of Hg ions on neuronal sprouting, cells were cultured either in the presence or absence of Hg ions. We found that in the presence of Hg ions, neuronal somata failed to sprout, whereas other metalic ions did not effect growth patterns of cultured PeA cells. We conclude that this visual evidence and previous biochemical data strongly implicate Hg as a potential etiological factor in neurodegeneration.

V) Amalgam Removal

V a) Patient Preparation for Amalgam Removal

AMALGAM REMOVAL PREPARATION WARNING: When the body is exposed to amalgam mercury it has an on-going need for detoxification and healing processes. If you have a medical condition, then hormones and enzymes the body needs to heal have likely been depleted by this on-going detoxification and healing process. So before your amalgam restorations are removed, blood testing should be performed to determined what hormones and enzymes are deficient. Based on the blood test

results a medical doctor can evaluate what nutritional and hormonal supplements are needed to prepare the body. After amalgams are removed, the healing usually accelerates, so there will be an even greater demand for the hormones and enzymes that were depleted. So a patient with a medical condition should take nutritional and hormonal supplements before, during and after amalgam removal.

V b) Dental Procedures for Patient Protection During Amalgam Removal

IAOMT Standards of Care, Preferred Procedure, "Reducing Mercury Vapor Exposure for the Patient During Amalgam Removal." (September 1992)

The IAOMT has currently established the following amalgam removal protocols. If these protocols are followed, the amount of mercury released into the body during amalgam removal is reduced.

- place a rubber dam around the tooth to isolate it from the body,
- provide an alternative source of air to the patient,
- place a saliva ejector under the dam to remove mercury vapor that penetrates the latex,
- use high volume evacuation with isolate attachment,
- section amalgams and remove in as large pieces as possible,
- remove and properly dispose of rubber dam and mercury after amalgam removal.

Other amalgam removal precautions in addition to the protocols listed above include:

- remove no more than two amalgams per appointment,
- time amalgam removal appointments at least one month apart,
- administer intravenous Vitamin C before removal (Hg has a greater affinity to Vitamin C that is present in the blood than it does for body tissue),
- don't remove amalgams from a pregnant woman.

Further information pertaining to proper amalgam removal can be found on the web page http://www.holisticmed.com/dental/amalgam/iaomt.txt.

V c) Amalgam Removal without Patient Protection

This study measures the mercury level when amalgams are removed not following the protocols presented above.

Molin, M., Bergman B., Marklund, S.L., Schutz, A., Skerfving, S., "Mercury, Selenium, and Glutathione Peroxidase Before and After Amalgam Removal in Man" Acta Odontal Scandinavia; 48:189-202. Oslo. ISSN 0001-6357 (1990).

ABSTRACT: In 10 healthy persons all amalgam fillings were replaced with gold inlays. Blood and urinary levels were measured on 10 occasions during a 4-month period before and a 12-month period after amalgam removal. These variables were also measured three times in 10 healthy controls. A strong statistically significant relation was found between plasma mercury values and both the total number of amalgam surfaces ($r=0.71$, $p=0.0006$) and the total surface area of the fillings ($r=0.73$, $p=0.004$). In the immediate post removal phase plasma mercury rose three- to four-fold, whereas the urinary and erythrocyte mercury rose about 50%. These peak values declined to the pre-removal level at about 1 month after removal. Twelve

months after the removal plasma and urinary mercury levels were reduced to 50% and 25%, respectively, of the initial values for the experimental group. Apart from the significantly lower plasma selenium values 5 and 10 days after removal no significant differences were found with regard to plasma selenium or erythrocyte glutathione peroxidase either within or between the experimental and the control groups. A large number of supplementary biochemical analyses did not show any influence on organ functions or any differences between the groups before or after the amalgam removal. Amalgam fillings considerably contributed to the plasma and urinary mercury levels.

V d) Amalgam Removal with Patient Protection

This study measures the mercury level when amalgams are removed following the IAOMT protocols presented above.

Molin, M., Berglund, J.R., Mackert, J.R., "Kinetics of Mercury in Blood and Urine after Amalgam Removal." J. Dental Research, 74:420,IADR abstract 159, (1995).

ABSTRACT: Even through a number of studies have not been able to reveal any correlation between subjective symptoms and amalgam load there still are speculations whether patients with subjective symptoms related by the patients themselves to their amalgam fillings could have a changed pattern of elimination of mercury. The aim of the present investigation was to study the elimination half-time of mercury in plasma, erythrocytes and urine over an extended period of time after amalgam removal in a group of 10 patients with subjective symptoms by the patients themselves referred to their amalgam fillings and a group of 8 healthy subjects. The average number of occlusal and total amalgam surfaces in the patient group were 13.0 (range 4-20) and 44.4 (range 24-68), respectively. Corresponding figures in the control group were 12.9 (range 10-16) and 40.9 (range 24-63).

The amalgam removal using rubber dam, water spray cutting and high volume vacuum evacuator, was carried out at one and the same time. Blood and urine samples were collected at two occasions before the amalgam removal, then blood was collected at thirty two occasions and urine at forty three occasions during the following year. The mercury content was analyzed by CVAAS technique.

The measured P-, Ery- and U-Hg concentrations before amalgam removal were slightly higher in the control group 6.43.3 nmol/L, 19.46.6 nmol/L, and 2.71.3 nmol/nmol creatinine respectively than in the symptom group 5.61.8 nmol/L, 14.88.8 nmol/L, and 1.60.9 nmol/nmol creatinine respectively.

The Hg-concentrations did not significantly increase in the two groups after amalgam removal. Six days after the removal the plasma mean concentration was significantly decreased at P level and ten days after the decrease was at a permanent P level. The mean Ery-Hg level was significantly decreased after eleven days (p), a level that remained stable for the rest of the year. The mean U-Hg level was significantly decreased one month after the removal and after six months the mean level was reduced with 80 % compared to the initial level in both groups.

The conclusion to be drawn for the present study is that the symptom group did not have a changed pattern of elimination of mercury compared to the healthy group.

Begerow, J., Zander, D., Freier, I., Dunemann, L. "Long-Term Mercury Excretion in Urine After Removal of Amalgam Fillings" International Arch. Occupation Environmental Health 66:209-212 (1994).

ABSTRACT: The long-term urinary mercury excretion was determined in seventeen 28- to 55-year old persons before and at varying times (up to 14 months) after removal of all (4-24) dental amalgam fillings. Before removal the urinary mercury excretion correleated with the number of amalgam fillings. In the immediate post-removal phase (up to 6 days after removal) a mean increase of 30 percent was observed. Within 12 months the geometric mean of the mercury excretion was reduced by a factor of five from 1.44ug/g (range: 0.57 to 4.38ug/g) to 0.35 ug/g (range: 0.13 to 0.88 ug/g). After cessation of exposure to dental amalgam contributes predominatly to the mercury exposure of non-occupationally exposed persons. The exposure from amalgam fillings thus exceeds the exposure form food, air and beverages. Within 12 months after removal of all amalgam fillings the participants showed substantially lower urinary mercury levels which were comparable to those found in subjects who have never had dental amalgam fillings. A relationship between the urinary mercury excretion and adverse effects was not found. Differences in the frequency of effects between the pre- and post-removal phase were not observed.

DISCUSSION: The initial urinary mercury concentations (before amalgam removal) were similar to those found in previous studies in people with amalgam fillings while the final values (12 months of ter amalgam removal) were comparable to those for people who have never had amalgam fillings.

Our results are in excellent agreement with those of Molin et. al., who found a 75 percent reduction in urinary mercury levels within 12 months after amalgam removal. In accordance with the findings in this study, Molin also found a 50 percent increase in the urinary mercury excretion in the immediate post-removal phase.

Elligsen et. al. and Roels et. al. monitored the urinary mercury excretion after cessation of occupational exposure in a chloralkali plant. The biological half-life was calculated to be 91 days and 90 days, respectively. Both groups of authors concluded that the elimination rate after cessation of mercury exposure seems to be monophasic. This is in agreement with the results of this study based on dental exposure levels.

The present study indicates that in persons with amalgam fillings on an average about 80 percent of the urinary mercury excretion is caused by the release from dental amalgam. Thus the inorganic mercury exposure form this source far exceeds the exposure from all other enviornmental sources (food, water, beverages, air).

V e) Pregnancy Precaution

The formation of a fetus is very much at risk to mercury in its mother's blood, so the continuous release of mercury from amalgam restorations may be responsible for a portion of the birth defects seen in our society today. When an amalgam filling is removed or an amalgam-filled tooth is extracted, a surge of mercury may be released into the bloodstream. Women should have their amalgam fillings removed at least one year in advance of when they intend to become pregnant and discuss the risk with an informed medical doctor or dentist. Women should never have amalgam fillings removed during a pregnancy.

V f) Patient Reports

Siblerud, R.L. "Health Effects After Dental Amalgam Removal" Journal of Orthomolecular Medicine. Vol. 5, No. 2, (1990).

SUMMARY: A Utah dentist provided the names and addresses of approximately 300 people who had their amalgams removed. A health questionnaire was sent to these people; 86 subjects responded. Eighty (80) % of the subjects reported that they felt better following amalgam removal. Nearly all of the subjects 91% said they were glad their amalgams had been removed and 88% said they would do it again. An increase in happiness and peace of mind was experienced by 58% of the subjects. This evidence suggests that the well being of these subjects improved immensely after amalgam removal.

Mary Davis editor "Solving the Puzzle of Mystery Syndromes" Hot Off the Press Printing Co. 2000

SUMMARY: This book presents patient-reported case histories, where they associate their health problems to dental amalgam mercury. Case histories include: Chronic Fatigue Syndrome, Seizures, Memory Loss, Migraines, Multiple Allergies, Multiple Sclerosis, Depression, Lupus, Maldigestion, Chemical Sensitivities, Insomnia, Miscarriages, Paralysis, Sinus Problems, Emotional & Mental Disorders, Infertility, Endometriosis, Crohn's Disease, Rashes, Anxiety, Tremors & Spasms, Amyotrophic Lateral Sclerosis, Universal Reactor and many others.....

V g) Chronic Disease a Big Financial Burden, and Growing

Associated Press WASHINGTON (November 29, 2000)

Nearly half of Americans suffer at least one chronic disease, everything from allergies to heart disease—20 million more than doctors had anticipated this year, researchers say.

And they warn that the fast-growing toll, now at 125 million among a population of 276 million, will reach 157 million by 2020. One-fifth of Americans have two or more chronic illnesses, complicating their care and making it more expensive.

The nation is unprepared to cope with the growing burden of chronic disease, with annual medical bills alone expected to almost double to $1.07 trillion by 2020. It's the major public health challenge that could affect all Americans.

While doctors have made major advances in treating certain chronic illnesses, they cause 70 percent of all U.S. deaths, reports the federal Center for Disease Control and Prevention, which convened the meeting to explore ways to better prevent and fight long-term illness.

It's a difficult subject partly because so many different diseases qualify. Simple allergies may not kill someone, but require a lifetime of medication and doctor visits. Heart disease can require even more complex drug therapy, surgery and testing. At the other extreme is Alzheimer's disease, eventually requiring round-the-clock care.

Preventive care—weight management, disease screening, nutrition, exercise, geriatric assessments for the elderly—can stave off many chronic diseases. But it takes longer than writing a prescription, and few insurers reimburse fully.

An overweight, diabetic farmer has insurance to pay for a 20-minute physicians office visit, just enough time to have his blood sugar tested so an adjustment to the medication can be made. The physician says helping the man lose weight would do more good, but he is not paid to recommend that.

Already 60 million Americans suffer multiple chronic illnesses, a number expected to reach 81 million by 2020 as the population ages.

Someone without a chronic illness pays an average of $182 a year in out-of-pocket health expenses, compared with $369 in out-of-pocket payments by patients with one chronic illness and $1,106 for someone battling three or more.

Total annual health costs for someone with one chronic illness are more than five times higher than for a healthy person—$6,032 vs. $1,105—and rise even higher the more disabling the chronic illness.

VI) Dental Mercury a Source of Air and Water Pollution

A report released on December 19, 1997 titled "Mercury Study Report to Congress" by the Environmental Protection Agency has estimated that human caused emissions of mercury in the U.S. total 158 tons. The researchers estimated 33 percent of that 158 tons comes from coal-fired utility boilers, 19 percent from municipal incinerators, 18 percent from industrial boilers, and 10 percent from medical incinerators.

The EPA researchers apparently were unaware of another pollution source: dental mercury. Each year in the U.S. an estimated 40 tons of mercury are used to prepare mercury-amalgam dental restorations. Scientific studies have concluded that the amalgam is the source for more than two thirds of the mercury in our human population. Each amalgam, which is commonly called a "silver filling" by its installers, daily releases on the order of 10 micrograms of mercury into the body. This mercury either accumulates in the body or gets excreted via urine and feces into our wastewater systems. After a person dies, the mercury that has accumulated in the body is released to the environment via either cremation or burial.

Another source of mercury pollution is dental office disposal. Most dental offices without a metal separator dispose of their waste mercury into municipal wastewater systems. Municipal treatment plant processing separates wastewater into water and sludge. Mercury does not disappear during this processing. Both treated water that is discharged into waterways and sludge that is land-farmed contain mercury. Mercury is also contained in air discharged from dental offices into the atmosphere. The wastewater, sludge and dental office air are another source of mercury pollution.

VI a) Mercury in Dental Clinic Wastewater Discharge

This study measures the level of mercury discharged to the public waste water systems by dental offices.

Arenholt-Bindslev, D.; Larsen, A.H. "Mercury Levels and Discharge in Waste Water from Dental Clinics" Water Air Soil Pollution, 86(1-4):93-9, (1996).

ABSTRACT: Data was obtained on the amount of Hg discharged with the wastewater from dental clinics. Waste water from 20 Danish dental clinics was collected during one working day and analyzed for the amount of Hg using the technique of cold vapor atomic absorption spectrophotometry (CVAAS). From clinics without amalgam separator mean value was 270 mg Hg per dentist per day (range 65 to 842), from clinics equipped with amalgam separator mean value was 35 mg Hg per dentist per day (range 12 to 99).

It was concluded that Hg is released with the waste water from dental clinics. Several hundred grams of Hg per clinic may be discharged annually with the waste water. Installation of efficient amalgam separators may reduce the Hg outlet markedly.

COMMENT: Very few dental offices in the United States have amalgam separators. Taking the mean daily level of 270 milligrams times 200 (working) days per year yields an annual value of 54 grams of Hg per dental office per year. Utilizing a conservative figure of 100,000 dental offices in the United States, a total of 5400 kilograms (12,172 pounds) of mercury exits U.S. dental offices in waste water each year.

VII) American Dental Association's Position

The American Dental Association has taken the following positions about "the dental amalgam issue."

VII a) Journal of the American Dental Association

Journal of the American Dental Association (April, 1990).

The strongest and most convincing support we have for the safety of dental amalgam is the fact that each year more than 100 million amalgam fillings are placed in the United States. And since amalgam has been used for more than 150 years, literally billions of amalgam fillings have been successfully used to restore decayed teeth.

VII b) Superior Court Demurrer

The Superior Court of the State of California Case No. 718228, Demurrer (October 22, 1992).

The American Dental Association (ADA) owes no legal duty of care to protect the public form allegedly dangerous products used by dentists. The ADA did not manufacture, design, supply or install the mercury-containing amalgams. The ADA does not control those who do. The ADA's only alleged involvement in the product was to provide information regarding its use. Dissemination of information relating to the practice of dentistry does not create a duty of care to protect the public from potential injury.

VII c) ADA's Code of Ethics

The American Dental Association's (ADA) code of ethics makes the removal of serviceable mercury amalgam restorations an issue of ethical conduct. In the ADA's

point of view, it is ethical for a dentist to place mercury amalgam restorations in a patient and claim their safety. However, according to the ADA's code of ethics a dentist who acknowledges that mercury amalgam restorations are toxic and recommends their removal has acted unethically ("...the removal of amalgam restorations from the non-allergic patient for the alleged purpose of removing toxic substances from the body when such treatment is performed solely at the recommendation of the dentist is improper and unethical...." ADA Resolution 42H-1986. Transaction 1986:536) On the basis of the ADA's code of ethics, state dental boards have taken disciplinary action against mercury-free dentists who have practiced their profession in accordance with current scientific knowledge and their conscience. The disciplinary action has ranged from restrictions placed on their practice to the loss of license.

VII d) ADA's Internet Site

Additional information about the ADA's position on the dental amalgam issue can be found on the web page: http://www.ada.org/topics/amalgam.html

VIII) Composite Restoration Material

An alternative to the mercury dental amalgam is composite restoration material. Composite restoration material has a white appearance.

Richardson,G.M., "An Assessment of Adult Exposure and Risks from Components and Degradation Products of Composite Resin Dental Materials," human and Ecological Risk Assessment: Vol. 3, No.4, pp. 683-697 (1997)

ABSTRACT: Concerns have been expressed regarding the health risks posed by chemical exposures from dental restorative materials. Dental materials are exempted from the pre-market review provisions for medical devices in Canada; therefore, information on the risks of potential chemical exposures arising from such material is lacking. An assessment of components and degradation products of the>

A probabilistic assessment was undertaken of adult exposures to two principal components of composite resins - silica, bisphenol-A glycidylmethacraylate (BIS-GMA) and two degradation products of BIS-GMA; formaldehyde and methacrylic acid. Assuming that the Canadiam adult population with fillings had only composite resin materials, results indicated that average exposures to formaldehyde and methacrylic acid were 10,000 times and 1,600,000 times lower, respectively, than relevant reference doses. Worst case exposures were also well below applicable reference levels. Risks posed by exposures to BIS-GMA and silca could not be assessed due to a lack of published ingestion reference doses for these substances.

Gaps in the data base relating to the risks posed by composite resin dental materials were discussed, particlularly in reference to the recently reported estrogenic postential of other degradation products of BIS-GMA.

IX) State Statute

IX a) Colorado Statute

Nothing in this section shall be construed to deprive any dental patients of the right to choose or replace any professionally recognized restorative material, nor to permit

disciplinary action against a dentist solely for removing or placing any professionally recognized restorative material.

IX b) The Need for "Reputable Disclosure"

According to USA government records, in 1995 about 80 tons of mercury went into dentistry to make the amalgam. In 2000 about 40 tons of mercury went into dentistry to make the amalgam. That is a 50 percent phase out. Even though the American Dental Association (ADA) does not acknowledge the health hazards caused by the amalgam, many individual dentists are doing so in private. This amalgam phase out is occurring on a volunteer basis because the truth about the amalgam is being disclosured by science, conscientious dentists, social activists and secondary media (web sites, letters to the editor, ect.).

To succeed at ending amalgam use the focus of action needs to be on realities of human nature and government. Realities that will end amalgam use have been revealed to us by what is occurring; that is an amalgam phase out will occur on a volunteer basis when disclosure is present.

The key action to end amalgam use is taking away the "organizational grip." The organization is the ADA. They keep a grip on dentistry by making a discussion of health hazards associated with the amalgam by dentists an unethical act. When state statutes allow for open discussion of documented amalgam health hazards the ADA will loose their organizational grip. Conscientious dentists will then be able to disclose the truth to patients in a reputable manner (i.e. reputable disclosure).

The only fear of amalgam installing dentists is reputable disclosure. They are not going to disclose themselves in a reputable manner. State statutes have been proposed that require mandatory action by dentists, such as: 1) informed consent, 2) posting of warning signs, 3) distribution of brochures and "fact sheets," and the 4) banning of amalgam use in woman and children. State governments do not have a way of enforcing this action because the amalgam has a sustained and widespread use. And dentists like all people have free will. Also these proposed state statutes do not take away the ADA's organizational grip.

The amalgam is a sustained and not an immediate problem. To succeed at putting an end to amalgam use a sustained message about its associated hazards always needs to be present. That message can only be produced by reputable disclosure. Reputable disclosure can be obtained by moving the amalgam issue from the social to professional arena. That will happen when the threat of dental and medical licensing boards is removed by state statutes. All dentists are very image contentious. As reputable disclosure grows, dentists will less likely install amalgams and more likely properly remove them.

The Food and Drug Administration (FDA) will ban the amalgam when either: 1) enough dentists believe the amalgam should be banned (the jury on the amalgam is dentists), or 2) the FDA looks as if they are "sleeping on the job." State statutes that allow for reputable disclosure will: 1) increase the number of dentists who believe that the amalgam should be banned, and 2) make the FDA look as if they are "sleeping on the job." Also the FDA ban will only be effective if reputable disclosure is present.

Amalgam use will not end with a single event or mandatory action. Amalgam use will only end with a sustainted adverse message that is allowed by reputable disclosure.

Suggested State Statute: "A patient may be informed of dental restorative material content and scientific documentation that pertains to it. A patient may have dental restorative material removed in accordance with professionally recognized techniques."

The purpose of this proposed statute is to move the dental amalgam issue from the social arena to the professional arena. The American Dental Associations code of ethics forces the amalgam issue into the social arena. ("...the removal of amalgam restorations from the non-allergic patient for the alleged purpose of removing toxic substances from the body when such treatment is performed solely at the recommendation of the dentist is improper and unethical...." ADA Resolution 42H-1986. Transaction 1986:536) A dentist has to agree to the resolution when applying for and renewing a license. On the basis of this resolution, other state dental boards are taking disciplinary action against dentists who inform their patients that they are receiving a toxic insult from the amalgam. The proposed statute will pre-empt the ADA's resolution and allow a dentist to inform a patient that they are receiving a toxic insult from the amalgam. A dentist will then be able to remove the amalgam in accordance with professionally recognized protection techniques if the patient concurs.

Dental amalgam restorations consist of 50% mercury, 35% silver, 13% tin, 2% copper, and a trace amount of zinc. After an amalgam is installed in a tooth it slowly releases mercury and the other metals into the body. Every amalgam daily releases on the order of 10 micrograms of mercury into the body. Mercury is the single most toxic non radioactive metal; the most minute amount damages human cells. This challenges systemic functions of every individual and of developing fetuses and can lead to health problems and fetal malformations. Some scientific documentation pertaining to the mercury dental amalgam is presented on the web page www.amalgam.org.

Mercury released into the body during an amalgam removal process when professionally recognized protection techniques are followed is about the same level as that from the sustained threat from an amalgam left in a tooth. A year after removal the body's mercury level is about 25 percent of its initial value.

We encourage you to vote for the proposed statute in order to protect dentists who want to practice their profession in accordance with their knowledge and conscience. It will guarantee patients the right to be informed of toxic metals in their teeth by a professional then make personal decisions about health care. Voting for the statute will be a first step towards putting an end to what Dr. Alfred Stock in 1926 referred to as "a terrible sin against humanity." Our society will be healthier and long term medical cost reduced.

IX c) The Fallacies of Informed Consent
(pertaining to amalgam installation)

By G. Scott Crowther (A personal perspective and not an official position of DAMS) June 2001

Dental amalgam restorations consist of 50% mercury, 35% silver, 13% tin, 2% copper, and a trace amount of zinc. After an amalgam is installed in a tooth it slowly releases mercury and the other metals into the body. Every amalgam daily releases on the order of 10 micrograms of mercury into the body. There is a growing body of scientific documentation that indicates mercury released from the amalgam does

great harm to the body. The amalgam has been used to restore patients teeth for more than 160 years. It has both widespread and systematic use by dentistry.

With a state statute that requires some form of informed consent before an amalgam is installed, it becomes appropriate for a dentist to install it if the patient concurs with information presented. I believe that a state statute requiring informed consent be obtained before amalgam installation is inappropriate in the anti-amalgam movement because of the following fallacies:

1) It is contrary to tradition "I will give no deadly medicine to anyone if asked, nor support any such counsel. While I continue to keep this Oath unviolated, may it be granted to me to enjoy life and the practice of the art, respected by all men, in all times! But should I trespass and violate this Oath, may the reverse be my lot!" Oath of Hypocrites, 500 BC

Informed consent for the installation of any harmful product, such as the amalgam, does not adhere to the timeless principles of the Hippocratic Oath, taken by Western physicians for nearly 2,500 years. Dentists take the Hippocratic Oath upon graduating. Because of the 2500 year tradition of the Oath our society assumes that dentists will abide by it. So it is my belief that statutory informed consent, which permits the installation of a harmful product such as the amalgam, does not adhere to Western tradition, and our societies assumption.

Requiring informed consent pertaining to the placement of a harmful product, which is a standard of industry, into a healthy person by a health care professional is contrary to Western tradition.

2) It originally was meant for experimental purposes

"The voluntary consent of the human subject [for an experiment] is absolutely essential. This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, overreaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision." The Nuremberg Code, 1947

Informed consent, which became formalized per the Nuremberg Code, was meant for voluntary, experimental purposes. It was not meant as an approach to health care for procedures and products that have widespread and systematic use. The amalgam is a standard product that has widespread and systematic use by the dental profession. It is placed in the teeth of many patients on a routine and not an experimental bases.

Two purposes of informed consent, per the Nuremberg Code, are to: 1) provide the patient with complete information on which to make a decision prior to an experiment, and 2) protect the physician from liability (provided that the procedure is properly executed according to the prevailing standard of care and without negligence). In general the experiment should: 1) yield fruitful results for the good of society, unprocurable by other methods, and 2) not be conducted where there is a reason to believe that death or disabling injury will occur.

3) It usurps government responsibility

The patient, who probably is a voter and taxpayer, has participated in developing a government system that today has legal authority and responsibility to police the products and material used in medicine and dentistry. Most patients trust this system to watch out and protect them from harmful products and material. In the USA the Food and Drug Administration (FDA) has this responsibility.

The FDA has not approved the combined constituents of the amalgam for use as dental restorative material. The amalgam is truly a rogue product. Informed consent gives personal approval for amalgam installation and usurps government responsibility. When it comes time to push the FDA to review amalgam safety, they may be more reluctant to do so if state informed consent statutes exist that justify amalgam installation. That is state informed consent statutes indicate that dentist can use the amalgam is a patient concurs.

4) It ruins professionalism

"The difference between a professional person and a technician is that a technician knows everything about his job except its ultimate purpose and his place in the scheme of things." Richard W. Livingston

"The patient may doubt his relatives, his sons and even his parents, but he has full faith in his physician. He gives himself up in the doctor's hands and has no misgivings about him. Therefore, it is the physician's duty to look after him as his own." Charaka, circa 78

A dentist completes a graduate school curriculum that educates him in the science pertinent to his profession. He then becomes licensed to perform a service as a professional. With true professionalism the fundamental decisions of a practice, such as proper material to use, are made by the dentist. The fees a patient pays for this service is reimbursement for these professional decisions.

If a dentist is required to inform a patient of the products and material used and does so, the first responsibility for their choice is then on the innocent and trusting patient. The amalgam then becomes a consumer product instead of a professional product. Thus professionalism is ruined by statutory informed consent.

5) It provides statutory permission for a dentists to use the amalgam

"A prince never lacks legitimate reasons to break his promise." Machiavelli

The amalgam is a rogue product that does not have institutional approval to be placed as restorative material in patients teeth. If the dentist did not inform a patient that the amalgam contains mercury, then he is responsible for placing the amalgam into a patients tooth. Statutory informed consent requires that a dentist inform a patient about amalgam contents (depending on how the statute is written). A dentist is then given statutory permission to install an amalgam if consent is given by the patient.

6) If done it will be biased information

"Bias and impartiality is in the eye of the beholder." Lord Barnett

There is a tremendous amount of information pertaining to the amalgam. The amalgam is a standard product and the complete amount of information pertaining to it will never be presented to the uninformed patient during the short time of a dental visit. If the dentist follows through with informed consent, before installing an amalgam, there is going to be a bias with the limited amount of information that can be presented. This bias will be favorable to amalgam installation.

7) It will be rarely if ever done

"The more I study the world, the more I am convinced of the inability of brute force to create anything durable." Napoleon Bonaparte

Dictation of a certain bias won't be performed through a person who does not have it.

A dentist, who knowingly performs a harmful act by installing an amalgam is rarely if ever going to adhere to informed consent with the patients being effected just because a statute exists. The greatest fear of amalgam installing dentists is disclosure; they will not disclose themselves. Denial of sin is simple human nature.

8) It may make amalgam removal unethical

Most patients may agree to amalgam installation because they don't understand science and trust the government and their dentist to watch out for them based on the age old traditions. Also the immediate cost of an amalgam is much less than a composite restoration.

The decision of the majority of patients will set the morality. If a majority of patients agreed to amalgam installation based on information provided during informed consent then amalgam removal may be become an unethical act. Thus patients may become locked into a harmful situation based on informed consent.

9) Changing the health care system approach will cause confusion for generations

"Scientists had another idea which was totally at odds with the benefits to be derived from the standardization of weights and measures. They adopted to them the decimal system on the basis of the meter as a unit; they suppressed all complicated numbers. Nothing is more contrary to the organization of the mind, of the memory, and of the imagination. The new system of weights and measures will be a stumbling block and a source of difficulties for several generations. It's just tormenting the people with trivia." Napoleon Bonaparte

Changing from a parochial to a rationally based measurement system has been a source of difficulties for more than 200 years. Changing from a professionally based to a consumer based health care system will also cause difficulties and confusion for several generations.

10) Setting a liability trap may harm innocent patients

"He who digs a hole for somebody to fall into usually falls into it himself." Russian Proverb

A dentist will not be liable if an innocent patient gives consent to amalgam installation based on information provided. That does not make mercury inert; it is still harmful. And the patient does not have a legal recourse.

So why do anti-amalgam people ask for a system of informed consent pertaining to installation of a harmful product like the amalgam?

A Solution: Allow Neo-Orthodox Dentistry to Exist

I believe that human outreach, which is in accordance with Western tradition, is appropriate in the anti-amalgam movement. That can be obtained by allowing the proper removal of all amalgams for scientific reasons.

"It is better to light a candle than to curse the darkness." Chinese Proverb

"You must be the change you wish to see in the world." Mahatma Gandhi

"Unless we put medical freedom into the constitution, the time will come when medicine will organize itself into an undercover dictatorship. To restrict the art of healing to one class of men and deny equal privileges to others will constitute the Bastille of medical science. All such laws are un-American and despotic." Benjamin Rush, Revolutionary war hero, physician, and signer of the Declaration of Independence

"The transfer of concepts as models from one field to another requires intimacy, informality, and friendliness because the transfer usually is not a conscious process." Edwin Land

A people which is able to say everything becomes able to do everything. Napoleon Bonaparte

"In the course of treatment, the physician is obligated to the patient and to no one else. He is not the agent of society, nor of the interests of medical science, the patient's family, the patient's co-sufferers, or future sufferers from the same disease. The patient alone counts when he is under the physician's care." H. Jonas, 1969

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accordance with professionally recognized protection techniques if the patient concurs.

IX d) Mandatory Labeling of "The Other"

On May 23rd 2001 the Taleban authorities in Afghanistan confirmed that all Hindus will be required to wear a strip of yellow cloth sewn onto a shirt pocket in order to identify themselves. They claim that the measure is for their "protection." The world has faced this before. In 1939 the world was required, at great cost, to rid itself of Hitler's tyranny, it is not hard to spot his child. Those who fail to learn from history are condemned to relive it. The Taleban's record on respecting other religions gives great cause for concern that their ultimate aim, upon which they are intent, is "religious cleansing." They have already demonstrated their disdain and intolerance for other religions and traditions by the desecration and destruction of the ancient Buddhist statues, our collective heritage, within Afghanistan.

Whatever your religion, or even if you have none, we hope that you will agree that this is fundamentally wrong. " All it takes for evil to triumph is for good men to do nothing." An individual's communion with God, however they find him, is a matter of personal conscience and must not be the subject of intimidation or persecution. The right of everyone to worship as they wish is fundamental and inalienable.

The United Nations was founded in order to defeat Hitler and his henchmen who required the same from another religion with all it's horrific consequences. It is completely unacceptable that nearly 60 years later history is repeating itself.

X) Amalgam Lawsuit

Bio-probe Newsletter, Volume 12, Issue 6 (November 1996).

After considering evidence and extensive arguments from attorneys for the plaintiff and defendants, the judge in the California case of Tolhurst vs. Johnson & Johnson Consumer Products, Inc. ruled that it is not generally accepted in the scientific community that mercury from amalgam dental fillings is capable of causing Guillain Barre' Syndrome, the affliction allegedly suffered by plaintiff Tolhurst. The judge therefore suppressed any evidence at the trial demonstrating that mercury was the cause of the plaintiff's illness. The evidentiary hearing was held in response to a defense motion based on the Frye rule. This rule requires a plaintiff to demonstrate that the scientific tests, techniques, and methods on which he/she intends to rely at trial are "sufficiently established to have gained general acceptance in the particular field in which it belongs." The test emphasizes a comparison of the members of the relevant scientific community who do or do not consider the proposed scientific test, method, or technique as valid and reliable.

XI) Notice to Amalgam Manufactures

Reeves & Associates of Lexington, Kentucky sent the following letter on behalf of the IAOMT to amalgam manufactures in May and September of 1992:

The potential for harmful health effects resulting from mercury exposure from mercury/silver amalgam dental fillings is no longer a matter of scientific debate. Such adverse effects have now been documented and reported by qualified medical scientists. Serious questions exist regarding mercury's role in loss of kidney function, Alzheimer's Disease, and a host of neurological disorders. My client, the International

Academy of Oral Medicine and Toxicology (IAOMT) has compiled and reviewed all relevant scientific documentation and has found a total lack of scientific rigor to support statements that chronic exposure to mercury from dental amalgam is harmless to patients. I am sure you and your attorneys are all too aware of the potential for product liability under Restatement of Torts, Section 402A and other relevant law. In view of the totality of the information that is now available, not only does it seem likely that there will be an avalanche of product liability in the future, but that for those companies which continue to market the product, there will be a real potential for the assessment of punitive damages, much as we have seen against the asbestos industry. We believe it in your company's best interest, as well as in the interest of public health, that all use of mercury as a dental filling material cease immediately. The IAOMT has more specific information if you desire.

The above letter was sent to the following amalgam manufactures:

- CHIEF EXECUTIVE OFFICER, ADEC, 2601 CRESTVIEW DR, NEWBERG, OR, 97132
- CHIEF EXECUTIVE OFFICER, BUFFALO DENTAL MFG CO INC, 575 UNDERHILL BLVD, SYOSSET, NY, 11791
- CHIEF EXECUTIVE OFFICER, CRESCENT DENTAL, 7750 W 47TH ST. LYONS, IL, 60534-1826
- CHIEF EXECUTIVE OFFICER, DARBY DENTAL SUPPLY CO, 100 BANKS AVE, ROCKVILLE CENTRE, NY, 11570
- CHIEF EXECUTIVE OFFICER, EASTERN SMELTING & REFINING CORP, 37 39 BUBIER ST, LYNN, MA, 01901
- CHIEF EXECUTIVE OFFICER, G HARTZELL & SON, 2372 STANWELL CIRCLE, CONCORD, CA, 94520
- CHIEF EXECUTIVE OFFICER, GARFIELD REFINING CO, 810 T EAST CAYUGA, PHILADELPHIA, PA, 19124-3892
- CHIEF EXECUTIVE OFFICER, HAMMOND DENTAL MFG CO, 4496 INDUSTRIAL DR, SIMI VALLEY, CA, 93063
- CHIEF EXECUTIVE OFFICER, HEALTH CO INTL INC, 25 STUART ST, BOSTON, MA, 02116
- CHIEF EXECUTIVE OFFICER, HENRY SCHEIN, 5 HARBOR PARK DR, PORT WASHINGTON, NY, 11050
- CHIEF EXECUTIVE OFFICER, HU FRIEDY, 3232 N ROCKWELL ST, CHICAGO, IL, 60618
- CHIEF EXECUTIVE OFFICER, INDIUM CORPORATION OF AMERICA, 1676 LINCOLN, UTICA, NY, 13502
- CHIEF EXECUTIVE OFFICER, J F JELENKO, 99 BUSINESS PK DR, ARMONK, NY, 10504
- CHIEF EXECUTIVE OFFICER, KULZER, 10005 MUIRLANDS BLVD, IRVINE, CA, 92718
- CHIEF EXECUTIVE OFFICER, LS PLATE C/O WIRE CORP, 70 17 51ST AVE, WOODSIDE, NY, 11373-0667
- CHIEF EXECUTIVE OFFICER, MERCURY REFINING CO INC, 790 WATER VLIET-SHAKER ROAD, ALBANY, NY, 12110
- CHIEF EXECUTIVE OFFICER, METZ METALLURGICAL CORP, 3900 S CLINTON AVE, SOUTH PLAINFIELD, NJ, 07080
- CHIEF EXECUTIVE OFFICER, MILTEX INSTRUMENT CO, 6 OHIO DR, LAKE SUCCESS, NY, 11042
- CHIEF EXECUTIVE OFFICER, MINIMAX CO, 5905 N CLARK ST, CHICAGO, IL, 60660-3207

- CHIEF EXECUTIVE OFFICER, ORAL B LABORATORIES INC, 1 LAGOON DR, REDWOOD CITY, CA, 64065
- CHIEF EXECUTIVE OFFICER, PARKELL, 155 SCHMITT BLVD BOX S, FARMINGDALE, NY, 11735
- CHIEF EXECUTIVE OFFICER, PATTERSON DENTAL, 1100 E 80TH ST, MINNEAPOLIS, MN, 55420
- CHIEF EXECUTIVE OFFICER, PREMIER DENTAL PRODUCTS, 1710 ROMANO DR, MORRISTOWN, PA, 19404
- CHIEF EXECUTIVE OFFICER, PULPDENT CORP, 80 OAKLAND ST, WATERTOWN, MA, 02272
- CHIEF EXECUTIVE OFFICER, SAFECO DENTAL SUPPLY, 527 S JEFFERSON ST, CHICAGO, IL, 60607-0625
- CHIEF EXECUTIVE OFFICER, SDL GROUP, 742 CENTRAL AVE, DEERFIELD, IL, 60015
- CHIEF EXECUTIVE OFFICER, SS WHITE DTL PROD INT,100 SOUTH STREET, HOLMDEL, NJ, 07733
- CHIEF EXECUTIVE OFFICER, SUREPURE CHEMETALS INC, 23 WOODBINE RD, FLORHAM PK, NJ, 07932
- CHIEF EXECUTIVE OFFICER, THREE M DENTAL PRODUCTS DIV, BLDG 225 45 11 3 M CTR, ST PAUL, MN, 55144
- CHIEF EXECUTIVE OFFICER, ULTRAFINE POWDER TECHOLOGY INC, 500 PARK EAST DRIVE, WOONSOCKET, RI, 02895-6148
- CHIEF EXECUTIVE OFFICER, ZENITH DENTAL, 242 S DEAN, ENGLEWOOD, NJ, 07631

XII) Government Phase Outs

In the interest of protecting their citizens' health, Sweden, Norway, Germany, Denmark, Austria, Finland and Canada have recently taken steps to limit and phase out the use of amalgam restorations.

The United States of America Food and Drug Administration has not recently reviewed the safety of amalgam restorations.

XIII) Organizations

Dental Amalgam Mercury Syndrome (DAMS)

"DAMS Inc. (Dental Amalgam Mercury Syndrome) is a grassroots organization dedicated to educating the public about the health hazards associated with mercury that leaks from amalgam dental restorations, which are known as "silver fillings. There is a growing body of scientific documentation that indicates the mercury leaking out of amalgams is insidiously dangerous to a person's health. Many of our people have had recoveries from serious health problems, which were considered to have an unknown cause and cure, after their amalgams were removed and replaced with non-toxic restorative material. So we feel a calling to educate the public about health hazards associated with the dental amalgam. We are all volunteers. A basic information packet is available from DAMS. A 7$ donation to DAMS is requested for the information packet. Contact:

DAMS, Inc.
P.O. Box 7249
Minneapolis, MN 55407-0249

1-800-311-6265
E mail: dentaltruth@yahoo.com

International Academy of Oral Medicine and Toxicology (IAOMT)

If you are a mercury-free dentist or are contemplating going mercury-free, you need to join the IAOMT. The IAOMT has helped fund or has been the catalyst for much of the current scientific research demonstrating that dental amalgam is not the benign dental material that 150 years of use and the ADA would like you to believe. Furthermore, the IAOMT is doing something about Standards of Care and Protocols that protect you, your staff and the patient. For membership contact:

IAOMT
P.O. Box 608531
Orlando, FL 32860-8531
web page www.iaomt.org

Holistic Dental Association

The Holistic Dental Association is dedicated to expanding the clinical skills of conscientious dentists for the year 2000 and beyond. They have a dentist referral service.

HDA
Box 5007
Durango, Colorado 81301
(970) 259-1091

American College of Advancement in Medicine (ACAM)

An association of doctors who practice alternative or complementary medicine. Most of them also practice chelation therapy, which is used to detoxify the body.

ACAM
P.O. Box 3427
Laguna Hills, CA 92654

American Academy of Environmental Medicine (AAEM)

The American Academy of Environmental Medicine is dedicated to the purpose of recognition, treatment and prevention of illness induced by exposures to biological and chemical agents encountered in air, food, and water. AAEM members recognize that human beings, though marvelously adaptable, must struggle to cope with an often hostile environment. Environmental Medicine is an integration of concepts drawn from both the primary and specialty care medical fields and the basic sciences. Discovering the cause-and-effect relationships of disease allows a physician to initiate treatment protocols that can result in genuine healing.