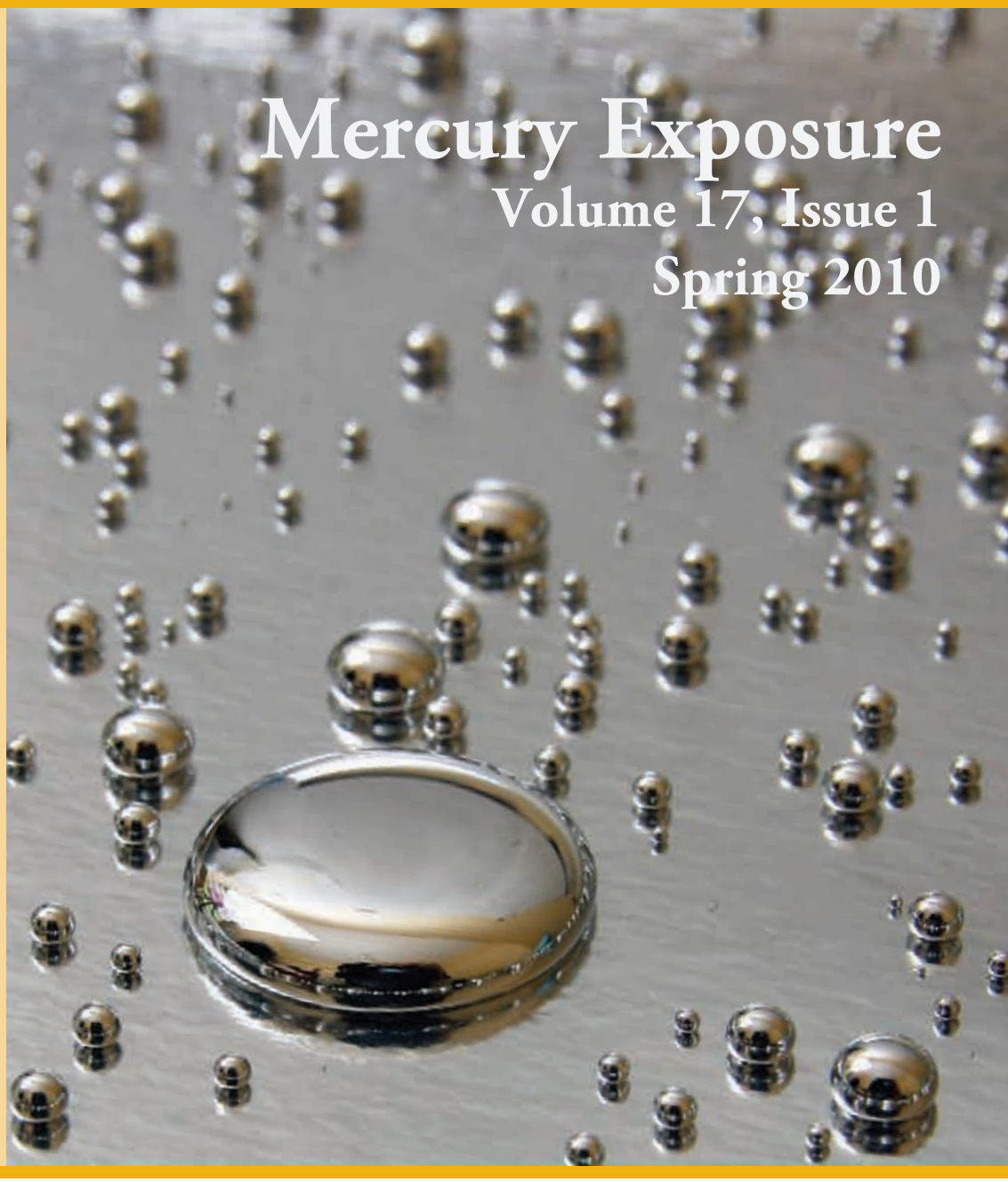
VitalLink

The professional journal of the Canadian Association of Naturopathic Doctors

Feature Articles:



Mercury Exposure

Volume 17, Issue 1
Spring 2010

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Naturopathic Editors
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The *Vital Link* is the professional journal of the Canadian Association of Naturopathic Doctors (CAND). It is published primarily for CAND members and features detailed reviews of specific causal factors: philosophical and research-based papers, clinical practice articles and case reviews, as well as international updates on the profession. The *Vital Link* has an outreach to other health care professions and promotes qualified naturopathic doctors to corporations, insurance companies and the Canadian government.

Forthcoming Themes

Summer 2010
The Effect of Family Dynamics on Health and Healing

Fall 2010
Smart Phone Culture: Technological Advance or Cause of Disease?

Winter 2011
The Missing Ingredient: Posture

Submissions
When writing for the *Vital Link*, keep in mind its broad readership and outreach to other professions. Your contribution to the *Vital Link* will benefit the naturopathic profession as a whole and provide you with personal professional exposure. Previously unpublished material is preferred. Please contact the editor for submission guidelines.

Circulation
The *Vital Link* is published three times per year and is distributed to more than 1,300 qualified Canadian NDs; over 600 students of CNME accredited naturopathic programs in Canada and the U.S., and the CAND corporate members. The *Vital Link* is also distributed in the CAND's media kit.

Advertising
Professional vendors that provide NHPD-compliant products or other services to NDs are encouraged to advertise in the *Vital Link*. The CAND's advertising partners enjoy unequalled exposure to qualified Canadian naturopathic doctors.

NATUROPATHIC NOTES

Dr. Iva Lloyd, RPP, ND, CAND Past-Chair
***Vital Link* Naturopathic Editor in Chief**

The *Vital Link* has been the journal of the CAND since 1993. The journal has been revised and updated as the profession has changed and as the resources available to naturopathic doctors have increased.

The expansion of the naturopathic profession during the last five years has been immense; there has been an explosion of print and online journals and newsletters, databases and other naturopathic medically-focused resources. Our profession is also taking on an international presence with many of the journals and resources representing the voice of naturopathic doctors around the world.

In 2006 the *Vital Link* was modified allowing each edition to highlight a general topic with a focus on referenced papers. Over the years we have received a lot of positive feedback from our readership and some very good suggestions. Based on these suggestions and the results of an analysis of how the profession has changed, we are once again revising the *Vital Link* to ensure it will continue meeting the demands of our growing profession.

The latest update to the *Vital Link*'s format provides an in-depth look at one specific topic per issue, with a focus on causal factors of disease. For example, this edition's focus is on Mercury Exposure, the summer 2010 edition will focus on The Effect of Family Dynamics on Health and Healing and our fall issue on Smart Phone Culture: Technological Advance or Cause of Disease? Our intent is to provide a more extensive look at key factors in health, to provide more opportunities for naturopathic doctors to discuss the philosophical perspective on pertinent issues, to provide case reviews and to discuss the historical approaches and the new research on each topic. Each edition will also provide a detailed review of the assessment, diagnostic considerations, physiological impact and treatments relating to the issue's theme.

The aim of the *Vital Link* is to truly be the journal that links the international profession of naturopathic doctors. The new *Vital Link* will provide stories and updates on those practitioners who are making a difference for the profession, recognizing that, as in any profession, those who are at the heart of the naturopathic profession and their attention to and focus on the profession's principles are the most vital aspects of naturopathic medicine.

The world of naturopathic medicine is becoming more research-based and more mainstream. The *Vital Link* will continue offering articles that are professional and referenced-based, while also providing space for discussion of the philosophical aspects of the profession, linking the old and new approaches to naturopathic treatment and providing an avenue for healthy debate.

Some of the content previously featured in the *Vital Link*, such as the President's Corner, provincial updates, and insurance column have been moved to our monthly e-link. The 2010 editions of the *Vital Link* will implement these changes and include more of a truly international voice. We welcome your feedback, suggestions and opinions, as well as your contributions to forthcoming issues. The *Vital Link* is the journal of the profession – please let us know what you think.

Among all the exciting changes to the journal, one change is bitter-sweet. One of our key editors, Dr. David Lescheid PhD, ND, will be stepping away from the *Vital Link* editorial board to pursue new career goals abroad in Europe. During the past three and a half years David has made a deep and meaningful contribution to the *Vital Link* and has displayed a high level of integrity, insight, strong editing skills and wonderful and warm way of relaying his always-unbiased opinion. David, we thank you for all your vital work.

CAPE newsletter free with this issue

Included in this issue of the *Vital Link* is a copy of the Canadian Association of Physicians for the Environment (CAPE) newsletter.

CAPE's objectives are to:

1. Educate physicians on environmental issues, providing them with both accurate information and a framework for thinking about environmental problems
2. Prepare spokespersons to comment on the health implications of environmental issues in an accurate and rigorous manner
3. Serve as a "think tank" for considering the health implications of environmental issues
4. Provide a forum in which physicians can meet and discuss health issues associated with environmental problems together with non-physician colleagues who have the knowledge and insight they need
5. Advocate certain positions or courses of action

Naturopathic doctors possess an excellent working knowledge of environmental issues. NDs counsel and educate patients on the importance of practicing environmental stewardship and avoiding and where possible eliminating environmental toxins. The CAND is pleased to have partnered with CAPE and sees this as an excellent opportunity for collaboration. We hope that you will enjoy the enclosed CAPE newsletter and, that if you are not already a supporter of CAPE you will seriously consider becoming one.

Note: the Polybag used to include this issue's inserts is corn-based and biodegradable in municipal compost programs.

NATUROPATHIC RESOURCES REVIEW: JOURNALS AND NEWSLETTERS

Dr. Iva Lloyd, RPP, ND, CAND Past-Chair

Thirty years ago naturopathic doctors practicing in Canada and the U.S. had to work hard to find information on the latest products and treatment recommendations. Updates on what was happening in the different associations and schools would also have been a challenge to find as would have research supporting naturopathic medicine.

A lot has changed since then. The challenge now is sorting through a tremendous amount of paper and electronic resources and choosing which journals to read and how to best spend our valuable resource, time.

Between 1900 and about 1945 the naturopathic profession in the U.S. published the monthly journal *The Kneipp Water Cure*, which was later renamed *The Naturopath and Herald of Health* and then *Nature's Path*. The first naturopathic journal in Canada was published between 1935 and 1960 by the Manitoba Naturopathic Association under the name of the *Health Living Digest* and the *Handy Home Doctor.* Even through the difficult period between the late 1950s and 1980s the CAND, Alberta Association and the OAND produced professional journals and newsletters for the public. CCNM, BINM and the CAND have some of the naturopathic journals from the early 1900s and those of the different associations. I encourage you to take the opportunity to read some of the older articles as they are filled with naturopathic wisdom and provide a wonderful example of how naturopathic medicine was originally practiced.

The resurgence of naturopathic medicine in North America started in the late 1970s and since that time the volume of information available to the profession and the general public on natural healthcare has expanded significantly. Started in 1983, *The Townsend Letters* (www.tldp.com) was one of the first 'natural' journals to provide scientific information on a wide range of complimentary medicine topics. Other journals such as *Alternative Therapies in Health and Medicine* (www.alternative-therapies.com) and *ND News and Review* (www.ndnr.com) have been publishing since 1995 and 2005 respectively. In the last few years natural journals have been 'coming out of the woodwork' and information supporting naturopathic medicine and other alternative modalities continues to grow. Many of the manufacturers and distributors of natural health products have also started publishing journals to better inform naturopathic doctors of the advances in NHPs. Publications such as the *Journal of Biomedical Therapies* from Heel Canada, *Natural Therapeutics Quarterly* from Nutritional Fundamentals for Health (NFH), *Alternative Medicine Review* from Thorne and *Advances in Orthomolecular Research* from AOR provide ongoing updates on the research and continuing education. There are also a number of journals that focus on specific modalities or aspects of naturopathic and alternative medicine, such as the *Journal of Bodywork and Movement Therapies* (Elsevier), *Integrated Healthcare Practitioners*, *Integrative Cancer Therapies* and *Journal of Orthomolecular Medicine.*

Our profession is changing at a staggering rate. The schools continue developing, regulation changes are currently affecting most of the provinces, there are ongoing changes in the realm of natural health products and with prescribing rights opening up in British Columbia and Ontario more change is in store. As a profession grows it is critical for its members to stay abreast of the changes. We have compiled a review of the key naturopathic journals (see opposite page). Many of these resources are available for free or for a nominal subscription cost. I encourage you to take the time to ensure that you are receiving these updates. My hope is that by staying up-to-date on the changes and growth you will deepen your respect and love for our great profession.

Stay tuned to the forthcoming editions of the *Vital Link* as we review the emerging databases and electronic applications that are available to our profession.

Journal Title	*Vital Link*	*E-Link*	*Bulletin*	*Your Health*	*Pulse*
Publisher	**CAND**	**CAND**	**BCNA**	**BCNA**	**OAND**
Founded	1993	2001	1994	1994	1995
Issues/year	3x	12x	4x	4x	4x
Format	Hard copy & electronic	Electronic	Hard copy	Hard copy & electronic	Hard copy & electronic
Editorial Board	Yes	no	advisors	no	no
Page count	50-60 pages	10 - 20 pages	28 pages	8 pages	40 pages
Distribution	2,000	2,000	550	2,500	1,100
Advertisements	Yes	Yes	yes	No	Yes
Audience	CAND professional, student, corporate members and other stakeholders	CAND professional, student, corporate members and other stakeholders	BCNA members and students	Public	OAND professional, student and corporate members and stakeholders
Content	Detailed review of specific causal factors: philosophical and research-based papers, clinical practice articles and case reviews, as well as international updates on the profession	National and provincial updates, news and events, calendar (e.g., malpractice renewals), Health Canada Advisories, NDs on the Cutting Edge, affiliate announcements, environmental news, conferences/CE, classifieds and continuing education, insurance articles	BC naturopathic news, articles that highlight issues pertainant to the profession, highlights of events and news across Canada	Profiles BC NDs, provides articles on general health news, provides updates and information on BC scope of practice and government updates	OAND updates, CE and convention updates and reviews, updates on OAND government affairs, member advantage programs, overview of members in the media, and clinical practice and other ND related topics
Classifieds/ Employment	Yes	Yes	Yes	No	Yes
Subscription Cost	Free to members	Free to members	Free to members. $25 for out-of-province membership	Free to members. $25 for out-of-province membership	Free to members or $125 per year
Website	www.cand.ca	www.cand.ca	www.bcna.ca	www.bcna.ca	www.oand.org

Journal Title	*Mind, Body, Spirit*	*Alumni E-Newsletter*	*International Journal of Naturopathic Medicine (INTJNM)*	*Natural Medicine Journal*
Publisher	**CCNM**	**CCNM**	**NDNR**	**AANP**
Founded	2008	2008	2004	2009
Issues/year	2x	12x	2x	12x
Format	Hard copy & electronic	Electronic	Hard copy & electronic	Electronic
Editorial Board	no	no	Yes	Yes
Page count	32 pages	2 - 6 pages	60 pages	25 - 50 pages
Distribution			5,000	100,000
Advertisements	Yes	no	No	No
Audience	Alumni, students and friends of CCNM	Alumni	NDs and Allied health practitioners	All practitioners interested in natural medicine
Content	College and Schad Clinic news, CCNM Press updates and book reviews, CCNM CE, research news, and feature stories highlighting alumni and their practices	Current events, CE courses and research updates and provides a look at CCNM in the News. It also has a Q & A section based on questions from alumni.	The scientific journal of the profession with peer-reviewed articles from NDs, CAM researchers and other alternative practitioners, including editorials, review papers, case-reports, and education and debate articles	Scientifically-valid, patient-centered health care information, clinician interviews, community partner profiles, literature reviews, original research and articles on treatment protocols
Classifieds/ Employment	No - provided on CCNM website	No	No	No
Subscription Cost	Free to alumni and students	Free to alumni	Check website	No charge
Website	www.ccnm.edu	www.ccnm.edu	www.intjnm.org	www.naturalmedicinejournal.com

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Mikhael Adams, B.Sc., N.D. has been involved in the development and formulation of vitamin and mineral supplements for over 20 years. Mikhael lectures throughout North America on a variety of wellness related topics and is the co-founder of the Renascent Integral Health Centre.

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[Note: "USP" stands for United States Pharmacopoeia.]

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GOVERNMENT RELATIONS AND POLICY: CANADA

Shawn O'Reilly
Executive Director, Director of Government Relations

Listed below are some of the highlights of recent work carried out by the CAND Government Relations Committee.

Appointed inaugural member of NHPD Program Advisory Committee (PAC).

- Replacing the Management Advisory Committee PAC is comprised of 12 members selected from a broad range of stakeholders
- Work to date has included review and recommendations on the Standards of Evidence (CAND Co-chair of working group) and Product Testing
- PAC recommendations and NHPD response will be posted on NHPD website mid February along with PAC terms of reference and member bios
- Work will soon commence on review and recommendations on Compliance and Enforcement Policy.

Appeared before the Standing Committee on Health, Health Human Resources Sub Committee.

- Drs Paul Saunders and David Lescheid presented on "The Role of Naturopathic Medicine In the Health Care System"
- Recommendations included asking the federal government to take the lead on ensuring health care professionals are able to practice to their full scope; fund initiatives to remove barriers to truly collaborative, multi disciplinary, integrative care and to ensure Canada's aboriginal, First Nations and Veterans have full access to the health care provider/treatment of their choice
- Work will continue when parliament resumes in March.

Applied for GST/HST Exempt Status under the Excise Tax Act.

- The GST/HST Exempt Status working group was formed by the CNCC in June of 2009
- Based on its work and response from the profession CNCC asked CAND to apply for exemption
- Formal request was submitted to Minister of Finance on November 1, 2009
- Ministry had acknowledged receipt of our request and the application is in process.

Collaborated with Stakeholders on response to NAPRA Position Statement.

- NAPRA issued position advising Pharmacists not to sell products without a DIN, NHN or DIN-HM
- PAC members meeting with NAPRA, NHPD, Health Canada and Minister of Health to address concerns NAPRA position would mean removal of products that have not yet completed NHPD review, impact the economy and cause confusion for the public
- Work on a solution is ongoing.

Prime Minister Harper has prorogued Parliament until after the Olympics. As a result all committee work has been suspended and all bills in process before the House or the Senate have died. This includes Bill C-6, the Consumer Products Safety Act. It is expected that this legislation and proposed legislation to amend the Food and Drugs Act will be brought before parliament at the next sitting.

GOVERNMENT RELATIONS AND POLICY: INTERNATIONAL

GLOBAL MEDICINE, DISASTER RELIEF & THE FUTURE OF NATUROPATHIC MEDICINE

Dr. Tabatha Parker, ND, Executive Director, Natural Doctors International

We live in a global world. Today, you can log onto your computer in Canada and Skype or Facebook your friend half way around the world. Our next generations will be global citizens. But why is this important for the naturopathic profession?

Naturopathic physicians in North America enjoy the best education and the widest scope of practice of natural medicine practitioners in the world, and while the scope of practice varies from province to province, state to state, we are by far, the most highly trained doctors in natural medicine that exist on the planet.

Natural Doctors International (NDI), a small non-profit founded by naturopathic physicians out of Portland, Oregon, is leading a movement of natural medicine in global health. Building off the UN proclamation that, healthcare is a human right, NDI believes that natural medicine is a human right. Our mission: promoting global health and social justice through natural medicine.

Our philosophy of respect, sustainability and social responsibility sets us apart from many international non-profits. We realized that in order to make real change we had to make a long-term commitment whenever possible – actually having NDI staff permanently on the ground working and living side-by-side with the people we serve. In contrast to the more traditional model of international medical aid, the NDI model is giving both patients and practitioners opportunities in global health and natural medicine that have never before been available.

Who are our biggest supporters? Students: Canadian students in particular. Of all the things I enjoy the most, meeting my future colleagues and being inspired by students is at the top of the list. Today's future naturopathic doctor is looking for socially responsible opportunities and already sees their world as a global community.

So what does NDI do? We work in eight main areas essential to global health: primary care health clinics, global health research, policy, education, building an international naturopathic network, honoring & preserving traditional medicine, socially responsible volunteerism, and now, most recently disaster relief coordination.

Why disaster relief coordination?

When Dr. Sabine Thomas, a Haitian-American ND contacted Natural Doctors International (NDI) on December 12, 2010 requesting assistance in helping with a response for the Haiti disaster, NDI responded by coordinating the larger community. Disaster relief is a huge undertaking that has many implications for our profession. While individual doctors may feel drawn to humanitarian work, our profession must develop a strategic response to disaster relief. Our work in long-term international relief, in countries where structural violence is an everyday reality, makes NDI the ideal organization to coordinate these efforts. After Dr. Thomas's call, NDI formed the Haiti Disaster Relief Committee (HDRC) and invited representatives and experts from the naturopathic profession to sit on the committee. Currently that HDRC includes representation from the Canadian Association of Naturopathic Doctors, American Association of Naturopathic Physicians, Boucher Institute of Naturopathic Medicine, Canadian College of Naturopathic Medicine, Bastyr University, National College of Natural Medicine, Southwest College of Naturopathic Medicine, the Institute of Natural Medicine, the North American Board of Naturopathic Examiners and Naturopathic Medical Students Association, as well as experts in disaster relief from within and outside of our community, and other global health organizations.

The team is sending Dr. Sabine Thomas to scout out the on-the-ground situation and inform the committee so that a plan can be put into place to send an ND team as quickly and as safely as possible.

Our goal in disaster relief is not only in Haiti, but to form a permanent standing committee that can aid our community to respond to international disasters of this level. We look forward to keeping you abreast of our progress and our work in NDI through the *Vital Link* journal during the next year. A huge thanks from all of us at NDI for the tremendous outpouring of response from our community – both volunteers and donations. For more info or to make a donation go to www.ndimed.org

Biotics Research Corporation Product Showcase

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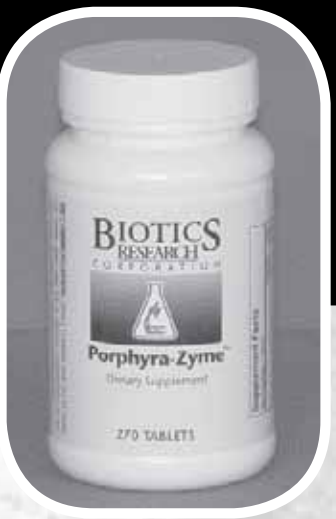

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Cobalt 30 ppm	**3.4 ppm**	**26.6 ppm**	**88%**
Cadmium 15 ppm	**3.6 ppm**	**11.4 ppm**	**76%**
Arsenic 10 ppm	**1.4 ppm**	**8.6 ppm**	**86%**
Aluminum 20 ppm	**7.0 ppm**	**13.0 ppm**	**65%**
Nickel 10 ppm	**3.3 ppm**	**6.7 ppm**	**76%**

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MERCURY AMALGAM: TOOTH SAVIOUR OR TOXIC RESERVOIR?

Dr. Gary Fortinsky, DDS, FCAH, CCH

One of the most controversial areas within dentistry is the concern surrounding mercury-amalgam fillings.[11] Amalgam was first introduced in 1830, to wide acclaim, as it was inexpensive and easily placed in the mouth.

The previous choices had been gold or extractions and eventually dentures. In 1845, The American Society of Dental Surgeons asked its members to sign a document stating that they would no longer use amalgam because of concerns regarding its possible toxicity. However, the public demand for amalgam caused most dentists to abandon their pledge, and the American Dental Society eventually disbanded. In 1859 the American Dental Association (ADA) was founded by a group of pro-amalgamists.[1, 2, 3]

The basic components of amalgams are mercury 50%, silver 35%, copper 6% and tin 9%--along with traces of zinc. The toxicity of mercury was well known by the time amalgam was developed, and initially the dental profession stated that, once set, the mercury did not leach out of the amalgam. However, evidence has proved that amalgam vapourizes mercury 24 hours a day from the moment it is placed in the mouth.[4, 5]

The ADA web site states: "Silver, copper and tin, in addition to mercury, bind these components into a hard, stable and safe substance."[6] The ADA still does not acknowledge the constant release of mercury vapour. In fact, the amount of mercury released increases after drinking hot liquids, chewing, or brushing the teeth, and takes approximately 90 minutes to settle back to the pre-stimulated rate.[7] "The Smoking Tooth" video clearly illustrates this phenomenon.[8]

The amount of mercury an individual with amalgams absorbs is widely debated.[9, 10] Upon release, mercury is inhaled; 80% of it is absorbed through the lungs into the bloodstream.[7] The mercury vapour that is absorbed from the fillings is in the form of elemental mercury, Hg^0. This form has high lipid solubility and therefore can cross cell membranes readily including the blood-brain barrier. Intracellularly catalase oxidation converts Hg^0 to Hg^{2+} and this ionic form is responsible for the adverse effects of mercury.[7] Mercury clings to sulphur molecules (protein cysteine groups), and sulphur exists in almost every protein in the body, so the effects of mercury toxicity can manifest in any bodily system.[7] Concern also exists regarding mercury in conjunction with all the other toxins the body absorbs through food, water and air.

Dentists must recognize the hazards of mercury when working with amalgam. The Ontario Dental Association guide to workplace hazards states[11]: Dentists working with amalgam should not touch mixed amalgam with their hands. Amalgam that has been mixed but remains unused cannot be thrown into the trash as it is considered toxic waste; it must be stored in a container with a solution that prevents its vapours from contaminating the environment—nevertheless, it is safe to place in one's mouth.

Should amalgam be banned? Amalgam is a long-lasting, effective filling material that is inexpensive and easy to work with.[12] On the other hand, since mercury is the most toxic non-radioactive material on earth, and since it is constantly being released from amalgam, its use should be abandoned.[13]

One must therefore choose: the dentist must decide if amalgam is to be placed in patients' mouths, and the patient must decide if they want amalgam in their own mouth or if they have them, that they be removed.

The study of toxicology generally focuses on acute poisoning, not on low, chronic dosing.[14] In and of itself, the dose may seem innocuous, but, over time, that dose can take on a whole new effect on the body. Diagnosis of mercury toxicity is difficult as it can mirror many other diseases.[7, 14] There is not sufficient room in this paper to mention all the conditions found due to inhalation of mercury vapour based on human studies (animal studies have found numerous additional effects) but the following are just a sample; chest pains, cough, elevated blood pressure, palpitations, inflammation of the oral mucosa occasionally accompanied by excessive

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salivation, decreased haemoglobin and hematocrit, tremors, muscle pains, excretion of urinary proteins, erythematous and pruritic skin rashes, and may cause either a decrease in immune activity or an autoimmune response depending on the genetic predisposition of the individual.[23]

Some dentists do not advocate elective removal of amalgam fillings because mercury is released during the removal process. If an amalgam is placed or removed without protective measures (see below), there is an increase in blood mercury levels for approximately three to four days.[15,16] Elective amalgam removal, therefore, is contraindicated during pregnancy or lactation, since mercury crosses the placental barrier and is expressed in breast milk. The American Dental Association web site states: "To pregnant women who may be concerned about receiving amalgam fillings, Dr. Hujoel says they should know there is little reason for anxiety."[17]

If the decision to remove amalgams is taken, precautions are in order. To protect the patient, the tooth to be drilled is isolated with a rubber dam. Some dentists do not use a dam, but try to suction all liquid and debris during the drilling process so that the rest of the mouth is protected. When drilling out the amalgam, copious water spray is used to cool the tip of the drill to minimize vapour production, and a high-volume suction tip removes the water and the debris that is generated. The amalgam should be sectioned so large pieces of the filling can be removed as chunks. Also, a saliva ejector is placed behind the rubber dam to remove vapours and liquids from behind the dam.

Another major concern is the vapour and particulate (sawdust-like particles) ejected at high velocity by the rapidly turning drill that fill the breathing zone.[18] During the removal, the patient is protected by an external source of oxygen through a nose piece. For the dentist/dental assistant, either oxygen or a mask fitted with a filter rated for mercury is utilized. Most conscientious dentists have a room filter that constantly cleans the air to ensure that the mercury vapour in the office air is removed.[19]

The majority of patients do not experience any immediate negative or positive changes after amalgam removal since removal of the filling has not changed the body stores of mercury; rather, the reservoir of mercury has been removed, and chelation/detox is required as the next phase of treatment.

Based on clinical experience some patients feel ill after amalgam removal but it is usually a short lived event. There are rare cases, however, where ill effects have lasted for a number of weeks. Other patients report an improvement almost immediately. This is often explained as being due to the placebo effect, but another phenomenon, galvanic reaction, may be occurring.[20] Metals in a liquid environment will corrode or rust setting up an electrical current. This can manifest in a metallic taste or a shock in the mouth due to the discharge of a filling. Some people's bodies are sensitive to electricity, and this, therefore, affects their physiologic functioning.[21] After the fillings are removed, so is the disruptive current, so certain symptoms can disappear.

Everyone must decide if removal is right for him or her as no treatment is without risk. Whenever a tooth is worked on, it experiences trauma. Generally, the tooth recovers quickly, but sometimes the tooth or nerve dies, leading to abscess formation. If this situation arises there are only two possible treatments: root canal or extraction. Leaving an infected tooth in the body is not an option because, 24 hours a day, the immune system must expend energy to try to control the infection. If immune function drops, for whatever reason, flare-ups can occur. Taking homeopathic Arnica or Hypericum after each appointment can stimulate healing and reduce inflammation. Tooth sensitivity to hot or cold may also occur after removal.

Naturopathic doctors use various approaches to detox/chelate metals in the body, often through professional products at their disposal. The focus is the need to get into the tissues and cells and draw out the mercury so the body can eliminate it. If no active treatment is pursued, the mercury can persist in certain tissues for years.[7] Mercury is excreted through the urine and stool via the bile.[7] Certain practitioners prefer to start treatment aimed at improving liver and kidney function before demanding from these organs the added labour of excreting the mercury through the various detox protocols. Once these organs are stronger, the demands placed on them will not be too onerous. The concern is that, by drawing out the mercury and the toxins that the detox protocol acts on, without the body's ability to eliminate them we inadvertently re-poison ourselves as the tissues reabsorb the circulating substances. Excreting the mercury through a program can be slow; many months may be required for success as certain tissues have retention half-lives that can last days to years[7] and certain chelation protocols are more aggressive than others. Clinical experience reveals that sensitive patients may become ill, so it is prudent to start slowly. If patients can handle the regimen, then the naturopathic doctor can alter the protocol.

According to Health Canada, "Dental amalgam is the single largest source of mercury exposure for average Canadians"; however, the Health Ministry believes that there is not enough evidence to indicate that amalgam is causing illness in the general population.[22] A wise individual once said, "I do not need to prove the toxicity of mercury; we have known this for hundreds of years. Rather, you need to prove that mercury amalgam is safe." (author unknown)

MERCURY AMALGAM: TOOTH SAVIOUR OR TOXIC RESERVOIR? *continued*

About the Author

Dr. Gary Fortinsky DDS, FCAH, CCH is a general dentist in full-time practice in Toronto. He has had an interest in complementary practices for the past 17 years and is a graduate and fellow of the Canadian Academy of Homeopathy and in addition, holds the CCH designation (Certified Classical Homeopath). As well, he is a graduate of the Institute of Creative Therapies as a craniosacral therapist.

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MERCURY: A CASE REVIEW

Dr. John Dempster, ND

Introduction

The topic of heavy metal toxicity and its effect on human health is one met with much discussion, controversy, and often misinformation. Yet, heavy metals have been in close contact to humans for thousands of years. Mercury's effects on human health have been known for centuries especially amongst the ancient Greeks, Romans, Chinese, and Hindus.[1] Although several adverse health effects of heavy metals have been known for a long time, exposure to heavy metals continues, and is even increasing in some parts of the world.

The main threats to human health from heavy metals are associated with exposure to lead, cadmium, arsenic and mercury. These metals have been extensively studied and their effects on human health regularly reviewed by international bodies such as the WHO.[2] Mercury for example, has been linked to a diverse range of chronic diseases, including: neurological disorders, chronic fatigue, auto-immune conditions, heart disease, and even certain cancers.[3] With this knowledge has emerged a stronger belief that Mercury and other heavy metals are indeed the root cause of many types of chronic illness commonly seen in our waiting rooms today. The following case study demonstrates how mercury may be involved in creating neurological symptoms that often fly beneath the traditional medical 'radar'.

Case Presentation

BD is a 63 year old male who first came to my clinic presenting with symptoms of dizziness and fatigue. These symptoms had been constant for the previous two years but had been increasing in consistency. He also had three major bouts of dizziness in the prior eight months where he was affected severely enough that he was unable to get out of bed. He holds a demanding position in a prestigious corporation and has been told stress was the main cause of his symptoms for years (by both his GP and his private medical clinic). He has a history of mild/moderate hypertension and borderline high LDL values. As a result, BD's medical doctors had previously prescribed many medications (see below). He had previously consulted with another ND, a TCM practitioner, and an osteopath all of whom diagnosed BD with 'adrenal fatigue'. While he admits work stress plays a large role in his life, he never believed this was the sole factor manifesting his symptoms and was referred to me to investigate further.

Initial visit vitals: BP 128/70, Pulse 68, Temperature 96.4

Physical exam: within normal limits (WNL), slight nystagmus.

ROS: nervousness/anxiety, frequent headaches, fatigue, stiff neck.

Medications prior to initial visit: Bisprolol (Beta blocker), Norvasc (Calcium channel blocker), Micardis (Angiotensin II receptor antagonist), Clonazepam (Benzodiazepine), Lipitor (Statin).

Supplements prior to initial visit: Juice Plus, 5-HTP, L-Carnitine, L-Arginine, DHEA, Dr. Wilson's Adrenal Support

The DDX list consisted of thyroid imbalance, anemia, hypoadrenia, possible adverse reaction to current Rx medications, cervical spine misalignment/nerve impingement, heavy metal toxicity, food allergy/sensitivity, and stress maladaptation. In order to assess if adrenal insufficiency was a causal factor, an adrenal hormone panel was ordered to confirm. Results revealed cortisol levels normal in AM and PM, but at low end of range during mid-morning and mid-afternoon, DHEA within normal limits. BD had imaging done on his cervical region, all WNL. Blood panels were run on TSH, Ferritin, MCV, MCH, MCHC, and RDW. AST, ALT, GGT, and Creatinine were also tested to establish liver and kidney function – all WNL. An IgG food allergy panel was also run and uncovered a high reaction to eggs, and moderate reaction to sugar and whey.

BD typically enjoys one to two glasses of wine during the week, and often a few more on weekends. He was placed on a diet to remove eggs and whey while reducing his alcohol consumption. A basic adrenal support protocol (B complex, CoQ10) was also implemented. During his first follow-up 30 days later, BD reported a slight change in energy but

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no significant improvement with his dizzy spells. Further investigation revealed a history of multiple mercury fillings that had been getting replaced over the previous few years. In addition BD had received a full vaccination schedule as a child and had been receiving the seasonal flu vaccine from his GP for two years. BD was also an avid consumer of fresh fish averaging four to five meals per week of tuna/cod/salmon. During a brief discussion with BD of the potential links of mercury toxicity, a provocative urine toxic metal screen was ordered. DMSA (750 mg) was used orally as the provocative agent. BD's MD granted this prescription. Results revealed elevated levels of lead (14 ug/g – Normal <5), and highly elevated mercury levels (19 ug/g – Normal <3). Creatinine levels were assessed to be WNL.

BD was then prescribed Metalloclear (3 caps BID), and DMSA capsules (250mg TID) 3 days on, 11 days off. This cycle was repeated 6x for a total of 12 weeks before re-testing. During his second follow up three weeks later, BD reported a remarkable improvement with his dizzy symptoms after one week being on his chelation regimen. He and his wife both agreed that he had not felt this well in months. We continued his Metalloclear and DMSA program as well as further liver, kidney, and lymphatic support. Three months later his metals were re-tested using the same provocative urine challenge and revealed a significant drop in his mercury levels (6.2 ug/g). We set BD to continue his Metalloclear and DMSA program for another six cycles and to re-test in 12 weeks. This test revealed a further decrease in mercury levels (3.8 ug/g) and no return of his dizzy spells.

Discussion

BD's case presents interesting findings employing chelation of mercury using a combination of effective and proven chelating agents. The element mercury exists as inorganic, elemental, or organic species. Routes of exposure and toxicity in humans vary according to the species of mercury involved. Mercury is a proven neurotoxin in very low doses, and has been documented in many cases of persistent dizziness[4] and other chronic concerns. In addition, mercury in combination with other toxic metals can create a synergistic toxic burden resulting in myriad symptoms. Some possible sources include dental amalgams,[5] certain vaccinations, environmental exposure and excessive consumption of fish/shellfish.[6] Measuring heavy metal levels in the urine is an accepted method for assessing the presence of a heavy metal burden in an individual.[7] The prevailing therapeutic option for mercury decontamination is chelation therapy (CT). CT involves the injection or ingestion of a chelating agent which binds with heavy metals, rendering them less chemically active. Once bonded, the metal enters the bloodstream, where it is eventually excreted in the urine. Metallothionein (MT) is a natural chelator and a cellular protein. MT plays a crucial role in the chain of activities leading to the excretion of toxic metals. Metallothionein has been documented to bind a wide range of metals including cadmium, zinc, mercury, copper, arsenic, silver, etc. Metallation of MT was previously reported to occur cooperatively but recent reports have provided strong evidence that metal binding occurs via a sequential, non-cooperative mechanism. The observation of partially-metallated MT (that is, having some free metal binding capacity) suggest that these species are biologically important.[8] MT is the body's natural chelating agent and efficiently binds to several toxic metals, especially cadmium and mercury, for delivery to the liver or kidneys for conjugation and excretion.[9]

Meso-2,3-Dimercaptosuccinic acid (DMSA) is another effective chelator of both mercury and lead and attracts mercury due to its sulfhydryl bond.[10] Dosage of DMSA is based on body weight of patient. Administration of DMSA does require kidney function to be tested and monitored during treatment as the potential for toxicity exists. DMSA has an affinity to bind to certain minerals (i.e., zinc, potassium, magnesium). In order to prevent a mineral deficiency in these areas, BD was prescribed Ortho-Minerals (AOR), 3 caps BID.

Conclusion

Mercury and its compounds are highly toxic at very low doses. Occupational exposure and environmental pollution are the major sources of hazard to human health. Metallic mercury evaporates at room temperature producing inorganic and organic compounds, and forms amalgams with many metals.[11]

Scientific evidence linking long-term exposure to heavy metals with a growing number of adverse health effects has been reported in peer-reviewed literature with increasing frequency. Increasing awareness of the effects of heavy metal toxicity combined with limited therapeutic options has created a market need for a safe and effective method to detoxify heavy metals without significant contraindications or side effects. Metallothionein and DMSA are two proven chelators that can be used safely in the effective removal of mercury and other metals. In the case of BD, these chelators seemed to be clearly helpful in lowering his mercury burden from a toxic level (19 ug/g) to a manageable level (3.8 ug/g). As a result, neurological symptoms associated with these elevated mercury levels diminished as well. Many chelation options exist for removal of mercury and other toxic heavy metals. It is important to assess the elimination pathways of each individual patient before a chelating agent is selected.

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Dr. John Dempster ND is the founder/director of The Dempster Clinic – Center for Integrated Medicine in Yorkville, Toronto. His practice focuses on functional and biological medicine to assess and correct individual terrain imbalances of his patients. John also utilizes parenteral therapy to help accelerate a healing response. He has a special interest in cancer, heart disease, hormonal conditions, and environmental medicine. Visit his website www.drdempster.com if you would like further information on his practice. He can be contacted at 416-551-9577 or drd@thedempsterclinic.com

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BCNA contact: Dr. Caleb Ng ND (drng@mvwc.ca)

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- Free info sessions at ND clinics, health food stores, community groups, public libraries
- Talks at Chapters and Planet Organic stores
- Press releases and articles/interviews in local media, such as CBC, CKUA, Synchronicity, IMPACT, Check Up, Avenue, Alive, FFWD, Eye Weekly, See Magazine, Calgary Herald/Swerve, Edmonton Journal, Calgary Sun, Metro and 24 hours

continued on next page

events, continued

Saskatchewan: SANP

Contact: Dr. Julie Zepp ND (info@drzepp.com)

- ND clinic open houses
- Chapters talk
- Billboard advertising campaign (Saskatoon, Regina, Swift Current) on the difference between NDs and unlicensed natural health care providers

Manitoba: MNA

Contact: Dr. Melanie Leppelmann ND (drleppelmann@gmail.com)

- Two major events: a day of free lectures at McNally Robinson Bookstore on Saturday May 8 and a naturopathic-friendly cooking class for an audience of about 30 people on Sunday May 9
- A number of NDs will be offering free public lectures in their clinics
- Advertising initiatives: posters and postcards listing all events. Posters will be distributed to all naturopathic clinics in MB as well as to a variety of health food stores and other locales
- McNally Robinson will be e-mailing bookclub about the event on May 8 and will also advertise in the Winnipeg Free Press
- An article on the cooking class will be featured in Dish Magazine (local Winnipeg food mag)
- Facebook page created to promote the event and we hope also to get on the local television program "The Big Breakfast"

Ontario: OAND and CCNM

OAND contact: Ronda Parkes (ronda@oand.org)

SNAP Community Newspaper Initiative: OAND has partnered with SNAP to assist members in promoting events with FREE advertising and member profiles for NMW 2010

Public Relations Initiative: will include press release and media call; social media launch, local media blitz

OAND Member Event Resources: NMW 2010 eBlast; branded PowerPoint presentations that can be used for your events locally; downloadable poster to use for your events

OAND Website (www.oand.org): Front page coverage for NMW; provincial events calendar; members only resource page

CCNM

CCNM contact: Catherine Kenwell (ckenwell@ccnm.edu)

- Events will include evening sessions throughout the week and a "Meet the New Interns" night at the RSNC
- Presentation topics: Herb/Drug Interactions and Diabetes, High Cholesterol and Hypertension. Other speakers TBD.

Quebec: QANM

Contact: Dr. Orna Villazan ND (ornavillazan@hotmail.com)

- Holding talks across Montreal: YMCAs, community centres, yoga studios, co-ops, naturopathic clinics
- Distributing Montreal poster, handout and flyer, listing all events offered in the city
- Approaching local media for free publicity and event listings

Nova Scotia: NSAND

Contact: Dr. Bryan Rade ND (bryanrade@hotmail.com)

- Talks held at community venues, such as libraries and ND clinics
- Distributing posters, brochures to all participants

New Brunswick: NBAND

Contact: Dr. Blossom Bitting ND (sagehealthcentre@gmail.com)

Events will include open houses and a public education seminar in the Moncton area

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Course I: Essentials of Acute and Chronic Prescribing — May 29- June 4

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> *"Effective homeopathic training is a rarity in today's world of seminars. In André Saine's course at the NCH Summer School, experienced practitioners who had studied with various teachers reported that they finally found what was missing to be more successful in their practices. I highly recommend anyone who wants to practice homeopathy effectively to take this course."* ***Stephen Messer, ND, Former Dean, NCH Summer School***

Course II: Illustrated Comparative Materia Medica Pura — June 7 - 11

Compares and contrasts ***30 remedies*** this year with a multitude of vivid case illustrations making the remedies easy to assimilate. Dr. Saine's exhaustive research in old journals has unearthed many important symptoms from original provings and cured cases. Experienced practitioners gave this course a standing ovation in Germany, 2009 and many have claimed increased clinical success resulting from the course. A live case with analysis will be taken mid-week.

> *"The course on materia medica was excellent, above all expectations. I came back with a huge motivation to apply myself and the clinical results are much more satisfying. Dr. Saine's incomparable knowledge of the materia medica and the reliability of his immense clinical experience clearly demonstrate how to practice pure homeopathy."* **Beatrix Leifeld, M. D., Germany**

These two courses are offered to physicians and other primary contact health care practitioners and students of these disciplines. Discounted on-campus housing available. CME credits available. Early registration rates until April 6. For more information, visit www.homeopathy.ca or contact us at cah@videotron.ca or 514-279-6629 ext. 221

MERCURY EXPOSED: THE PHYSIOLOGICAL EFFECT OF MERCURY

Dr. Tawnya Ward, BSc, ND

This article will review the extensive breadth of literature pertaining to one of the most neurotoxic and pernicious toxins known to mankind, mercury. The effect of mercury on human physiology will be discussed, including its forms and their differing toxicities, potential exposure, absorption, accumulation, excretion, and treatment options.

Mercury's effect on the nervous, endocrine, immune, cardiovascular and renal systems will be highlighted, as well as its cellular effects and those on the developing fetus. Due to the vastness of this subject and space limitations, this is not meant to be a exhaustive discussion of all of mercury's effects, although every effort has been made to ensure the most salient and clinically relevant information have been included. Priority has been given to human research, although animal or *in vitro* have been included and referenced as such, where adequate human research is lacking.

Forms & Exposure

Mercury, with respect to human health, is either in the form of organic mercury (methyl, ethyl & phenyl mercury) or inorganic mercury (elemental/Hg^0, Hg^+, Hg^{2+}). Exposure to organic forms of mercury can be from a wide variety of sources. Methyl mercury exposure is usually from contaminated fish consumption (shark, swordfish, tuna, marlin, orange roughy and Great Lakes freshwater species).[2, 3, 4] Ethyl mercury in the form of thimerosal is found in some vaccinations (e.g., the 'flu' shot, H1N1 vaccine, TwinRix). Ethyl mercury and phenyl mercury may be found in ophthalmological solutions, skin-lightening creams (as ammoniated mercury), and traditional medicines (e.g., Chinese patents & Ayurvedic medications).[5] Until the 1970s, methyl and ethyl mercury were used in agriculture as an anti-fungal for seed grain.[6] Phenylmercuric acetate was used as a preservative in latex paint up until the late 20th century. Its use as a paint preservative was discontinued as it has been associated with acrodynia (mercury poisoning).[7]

Inorganic mercury exposure may come from dental amalgams, foods, mercury-containing products, and occupational exposure. Elemental mercury vapour (Hg^0) off-gases from dental amalgams, which is the most common route of exposure. Dissimilar metallic dental materials in close proximity (e.g., gold filling adjacent to an amalgam) can cause a galvanic charge, which may have the potential to increase mercury vapour release.[8, 9, 10, 11] Occupations with potential mercury vapour exposure include chlor-alkali workers, goldsmiths, gold miners, dental technicians and dentists, and laboratory-based occupations that work with mercury.[5] Individuals can become exposed to mercury vapour from the accidental or intentional dismantling of liquid mercury containing devices such as some thermometers, fluorescent light bulbs, and the pendulums of grandfather clocks.[12]

Previously, mercurous mercury ($Hg\text{-}Hg^{2,+}$) and mercuris chloride (calomel) could be found in laxatives and teething powders. Mercury in teething powders has been associated with acrodynia in children, also known as "pink disease" due to the presence of painful pink swollen desquamating hands and feet and profuse sweating.[6] Mercury vapor exposure in children, from playing with or around spilled mercury, can also cause "pink disease."[6] Mercuric mercury ($Hg^{2,+}$) is found in some skin lightening creams.[6]

Other Sources of Inorganic Mercury:

High fructose corn syrup can contain inorganic mercury due to the use of mercury grade sodium hydroxide in its manufacture to adjust it's pH.[13] The mercury exposure from this source can range from 0 to 28.4 μg of mercury per day (assuming the average daily intake of 49.8g of high fructose corn syrup). For comparison, children between 3 and 19 years of age with dental amalgams are exposed to between 0.8 and 2.5 μg of mercury per dental amalgam.[14] Sodium hydroxide is also be used in the manufacture of pulp and paper, textiles, soaps, detergents, and used as a drain cleaner.[15] Membrane grade sodium hydroxide does

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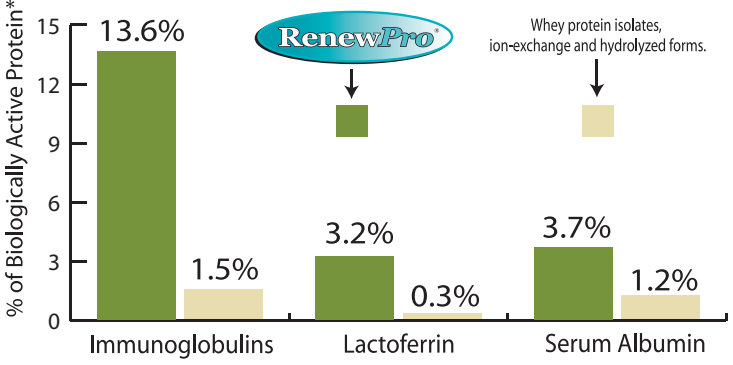

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not contain mercury and is a good alternative. Other products that may contain inorganic mercury include citric acid and sodium benzoate.[13]

Automobiles historically have contained inorganic mercury in their hood-light and trunk-light switches (pre-1998), anti-lock brake systems and active ride control systems.[16] European, Japanese and other foreign manufactures phased out mercury containing switches in 1993, as did American manufacturers in 1998. Even today, high intensity discharge headlamps (usually have a blue tint) contain mercury, as do the fluorescent bulbs in back-lit LCD screens.[17]

In communities with a strong Latino or Caribbean ties inorganic mercury is often sold at 'botanicas' (small community shops) as a health elixir or to sprinkle around one's house for good luck. For example, in Chicago all 16 botanicas investigated visited sold elemental mercury and in New York more than 90% of botanicas visited sold elemental mercury daily.[18] As you can imagine, this may lead to significant mercury vapour exposure, especially when used indoors.

Chemistry

Mercury comes in a number of forms with differing toxicities, many of which are inter-convertible in the body and external environment. Methyl mercury, the mercuric anion (also termed divalent mercury and mercuric mercury) and ethyl mercury have a high affinity for sulfhydryl (thiol) groups and circulate as water soluble complexes or bound to the sulphur atom on thiol ligands.[19] Bound to L-cysteine, methyl mercury readily crosses the blood brain barrier and placental barriers,[19, 20] with fetal brain mercury levels 5-7 times higher that of maternal blood levels.[21] Methyl mercury is pumped out of cells as a complex with glutathione. The mercuric anion has a high affinity for the selenide anion (selenium in its reduced form; Se^{2-}), forming mercuric selenide which is highly insoluble and is long term storage form of mercury in tissues.[6]

Inorganic and organic mercury are converted into each other in the gastrointestinal tract and immune cells. Inorganic mercury can be converted to methyl mercury by intestinal bacteria. Interestingly, homocysteine mildly inhibits this conversion, while methylcobalamin enhances methyl mercury production.[22] Conversely, methyl mercury may be slowly metabolized back to inorganic mercury by the intestinal flora, and demethylation of mercury can occur in phagocytic cells.[19] Thus, not only does mercury affect human physiology, it is also affected by the same.

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Absorption

Mercury circulates widely through the blood, tissue and nervous system after exposure, with its level of absorption dependent on its form. Methyl mercury has the highest gastrointestinal absorption at 94%.[12] Mercury vapour has the highest pulmonary absorption at approximately 80%,[1] with some mercury deposited in the lungs and the rest making its way into circulation. Gastrointestinal absorption of inorganic mercury (mercury chloride) is only about 1% in humans.[12] Other research has shown that gastrointestinal absorption is 0.2% for mercury sulfide (humans) and 15% for mercuric nitrate.[12] Mercury can be absorbed transdermally,[23] with mucosal membrane absorption likely higher (25% vaginal absorption of phenyl mercury in rats within 24 hours).[12] Thus, mercury absorption varies widely depending on its form and route of exposure.

Accumulation

Acute and chronic mercury exposure can lead to tissue accumulation with the primary sites being the central nervous system, glands, kidneys, and liver. The site of accumulation is influenced by the route of mercury exposure. In squirrel monkeys, mercury vapour causes 25% more brain mercury accumulation and 78% less renal mercury than those given the same dose of mercury chloride intravenously.[24]

Inorganic mercury such as elemental mercury vapour from amalgams accumulates in the central nervous system[19] in the form of mercury selenide,[25] as well as in the thyroid, pituitary gland, kidney cortex and nucleus dentatus.[26,27] Mercury vapour may be transported directly from the nasal cavity to the pituitary gland.[28] Over time, about 50% of the mercury vapour burden is localized in the kidneys.[29]

In rodents organic and inorganic mercury accumulates in the hypothalamus[30] and the anterior pituitary gland (methyl mercury and mercury chloride), kidneys, liver, ovaries, blood, uterus, hypothalamus and cerebral cortex.[31,32] The location of mercury accumulation is varied depending on who or what is studied, and not necessarily static over the short term soon after exposure. Long term accumulations of mercury selenide are less likely to shift locations over time.

Excretion

Primary routes of mercury excretion are in the stool and urine. Methyl mercury cycles extensively through the enterohepatic system, being secreted as a glutathione complex into the bile and then partially reabsorbed into the portal circulation.[19] Only approximately 10% of methyl mercury is excreted through the urinary system.[19] N-acetyl cysteine (NAC) enhances urinary methyl mercury excretion in mice from 4-10% to 47-54% 48 hours after acute exposure, with even more profound results when given concurrent with methyl mercury. Unfortunately, inorganic mercury excretion was not effected by NAC in this rodent study.[33] Mercury vapour is excreted mainly through the feces (50%) and urine.[34] Alcohol consumption decreases urinary output of mercury in dentists with relatively low dose exposure,[35] likely increasing mercury retention.

Assessing Exposure

Laboratory testing can help determine the extent of current mercury exposure and retention from previous exposure. Recent or ongoing methyl mercury exposure is best measured in the blood and hair. Urinary levels are the best measure for inorganic mercury exposure.[36] It should be noted that red blood cells and hair concentrate methyl mercury. Red blood cell methyl mercury concentrations are approximately 20 times those found in the plasma and hair mercury levels are approximately 250 times those found in the blood.[19]

Mercury retention (increased body burden) can be assessed using a dimercaptosuccinic acid (DMSA) or 2,3-dimercapto-1-propanesulfonic acid (DMPS) chelation challenge, with a pretreatment and post-treatment urine analysis for mercury content. Pretreatment urinary mercury levels indicate current mercury exposure (especially inorganic mercury) in addition to mercury stores naturally excreted. Post-treatment urinary mercury also includes mercury chelated out of the blood and tissues by the DMSA or DMPS, and hence signifies the presence of an elevated mercury body burden if several times greater than pretreatment levels. Although DMSA and DMPS can assess for mercury retention, the amount of urinary mercury excreted after DMSA or DMPS does not necessarily correlate with the level of mercury retention, it merely signifies the presence of retained mercury.

Symptoms of Mercury Toxicity

All forms of mercury and routes of exposure have the potential to cause toxicity symptoms. Organic and inorganic forms of mercury can both profoundly affect the nervous, immune, hormonal and cardiovascular systems and the kidneys. Inorganic mercury's nephrotoxic effects are more extensive than those of methyl mercury.

Inorganic Mercury

Ingested mercury chloride is highly corrosive to the urinary system, causing renal failure by acting primarily on the

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The course is over ten weekends (1week-end/month)) starting October 16-17,2010. It is also possible to register for selected weekends of this course on a pro-rated basis. Check our website for more details

proximal tubule.[6] Stomatitis and gastroenteritis can also occur from mercury chloride toxicity.[6] Acute mercury vapour exposure is associated with dyspnea, chills, chest pain, nausea and vomiting.[37] Inhaled mercury vapour is highly absorbed and is quickly distributed to all tissues due to its high diffusibility and lipid solubility.[6]

Organic Mercury:
Methyl Mercury Poisoning (Minamata Disease)

Minamata Disease was first described in the fishing villages of Minamata Bay, Japan where acute methyl mercury toxicity resulted from mercury contaminated waste water of a chemical factory entering Minamata Bay. Symptoms included tunnel vision (despite normal visual acuity, optic fundi, ocular movements & pupillary reflexes), bilateral hearing impairment, speech recognition damage,[38,39] olfactory and gustatory disturbances, ataxic gait, clumsiness of the hands, dysarthria, and somatosensory and psychiatric disorders.[40] Maternal exposure resulted in babies born with extensive spongiosis of the cerebral cortex. Tendon reflexes were normal or exaggerated.[40] Paresthesias were likely due to central nervous system damage since the peripheral nerves appeared intact.[41] Psychological effects include mutism, hyperkinesia with severe intellectual and emotional disabilities and ataxia with or without extrapyramidal symptoms.[42] Methyl mercury poisoning can cause extensive neurological symptoms, depending on the degree and age at the time of exposure.

Cellular Effects

One of the primary cellular effects of mercury is its interaction with tubulin causing microtubule disassembly,[43] occurring in the nervous system, platelets and red blood cells.[44] In human cell cultures, microtubule disruption can result in apoptosis in both neuronal and non-neuronal cells, independent of the p53 pathway.[45] Methyl mercury damages DNA and interferes with cell division[46] and migration, both of which require microtubule formation. Since mercury affects this key cellular process, it is no wonder that mercury's effects are so pronounced are widespread.

Oxidative/Antioxidative Balance

Mercury increases oxidative stress by a number of mechanisms, including the promotion of hydrogen peroxide, lipid peroxide, and hydroxyl radical formation. Mercury depletes glutathione reserves,[47,48] and blocks de novo glutathione production by inhibiting glutathione synthase.[49] It also prevents the recycling of oxidized glutathione by irreversibly inactivating glutathione reductase.[50]

By knocking out this important antioxidative pathway, mercury can significantly shift the oxidative/antioxidative balance in the direction of oxidative stress.

Immune System

Mercury has a profound effect on the immune system, generally shifting the immune response in the direction of an inflammatory Th2 type immune response and autoimmunity (especially nephrogenic & Lupus). Mercury induced immune effects include:

- Elevated T-cells, T-helper and T-suppressor cells have been observed in the peripheral blood of individuals with occupational inorganic mercury vapour exposure.[51]
- A 50% reduction in T-cell receptor signal strength was demonstrated in human cell cultures after a 10 minute exposure to 5 mM concentrations of inorganic mercury (Hg^{2+}). T-cell receptor activation by antigen is contingent on this pathway.[52]
- Lymphoproliferation, hypergammaglobulinemia and the development of systemic autoimmunity may occur from divalent inorganic mercury (Hg^{2+}) in genetically susceptible animals and possibly humans.[6]
- Neuronal cytoskeletal protein, neurofilament, and myelin basic protein autoantibodies (primarily IgG) can occur in humans after exposure to mercury (and lead). IgG autoantibody levels correlated to subclinical deficits experienced in mercury exposed workers. In rats, central and peripheral nervous system damage, astrogliosis and IgG concentrated along the blood-brain barrier in mercury exposed rats.[53]
- Elevated antinuclear antibodies (ANA) and antinucleolar auto-antibodies (AnoA) in humans have been associated with environmental mercury exposure (downstream from gold mining).[54,55] Interestingly, there was a positive association between history of malarial infection and mercury levels in the Amazonian population tested, although no explanation was given.
- Autoimmunity similar to Lupus can be induced in genetically predisposed rodents by mercury chloride and organic mercury (methyl/ethyl).[56] Coexposure of lipopolysaccharide (LPS) and mercury chloride can induce autoimmunity in non-genetically predisposed rodents and a more significant autoimmune response in genetically predisposed animals (elevated IgG1, IgE levels, elevated IgG1 anti-nucleolar antibodies).[57] Lipopolysaccharide is found in the outer membrane of gram-negative bacteria, and interacts with toll-like

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receptor 4 on monocytes and macrophages. Molecular mimicry by microorganisms can increase the risk of autoimmune disease in humans.[58]

- Autoimmune thyroiditis patients with concurrent mercury hypersensitivity may benefit from the removal of dental amalgams, which can result in reduced anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin (anti-Tg) levels six months after amalgam removal. It should be noted that anti-TPO and anti-Tg levels did not drop in individuals without mercury hypersensitivity.[59]
- Multiple sclerosis patients may benefit from amalgam removal, especially those demonstrating mercury hypersensitivity.[60]
- Immune glomerulonephritis associated anti-laminin antibodies have been seen in 13% of workers exposed to mercury vapour for an average of 5.5 years.[61]
- Th2 associated cytokine shifts such as increased IL-4 and suppressed interferon-gamma (IFN-gamma) can occur in human peripheral blood mononuclear cell cultures starting at 0.5 and 2 mM concentrations of methyl mercury respectively. Concentrations of inorganic mercury need to be 10-20 times greater to induce human leukocyte IL-4 production.[62]
- Mercury chloride induced glutathione depletion can cause mast cells to degranulate and potentiate the proinflammatory (Th2) cytokine IL-4.[63,64]
- Individuals with mercury hypersensitivity have lower tumour necrosis factor-alpha (TNF alpha) and IL-1 production than controls.[65]
- In human peripheral blood mononuclear cells, mercury chloride exposure (up to 200 nM; equivalent to blood mercury of 37 ug/L) resulted in elevated proinflammatory cytokines IL-1beta and TNF-alpha and suppressed anti-inflammatory cytokines IL-1-receptor antagonist and IL-10. Interleukin-4, IL-17 and IFN-gamma also increased in a concentration-response manner to mercury chloride exposure.[66]
- Methyl, ethyl and phenyl mercury can cause monocyte apoptosis.[67]

Mercury is associated with a number of immunological effects, spanning from inflammatory changes to autoimmune induction. Removal of this offending agent may help reverse some of these effects, although this may not be the case in all instances.

Endocrine System

Mercury's effect on the endocrine system may be caused by its glandular accumulations, direct cytotoxicity, hormone level changes, sex hormones interactions and influencing enzymes in the steroidogenesis pathway.[68] Mercury induced endocrine effects may occur at levels below that required to produce neurobehavioural and intellectual effects.[68]

Thyroid

Mercury appears to have significant effects on the hypothalamus-pituitary-thyroid system. Occupational mercury vapour exposure in chloralkali workers (mean blood mercury of 46 nmol/L) was associated with an increased free T4 to T3 ratio, reduced free T3 levels.[69] T4 to T3 conversion might be prevented due to type 1 iodothyronine deiodinase inhibition. Reverse T3 elevations may also be associated with occupational mercury vapour exposure.[70] These mercury vapour induced changes can be associated with hypothyroidism.

In animals, thyroid peroxidase (TPO) is inhibited by mercury chloride ingestion, but not by methyl mercury (rodent and porcine thyroid gland studies). Thyroid stimulating hormone (TSH) levels were suppressed by methyl mercury, but not by mercury chloride. Thus, methyl mercury may induce central hypothyroidism without affecting TPO, while mercury chloride inhibits TPO causing a hypertrophy of the thyroid due to loss of TPO function.[71]

Reproductive System

Mercury can have a profound effect on the reproductive system and fertility. Serum estrone and estradiol levels may be positively correlated with hair and blood mercury levels in both males and females with mercury levels above the neurotoxic threshold. At this level of exposure, it is plausible that mercury might stimulate estrogen levels.[72] Additionally, mercury chloride has a weak estrogenic effect on the estrogen receptor of MCF-7 human breast-cancer cells *in vitro*.[73,74] This demonstrates that mercury likely has an influence on estrogen related hormonal pathways.

Mercury vapour exposure has been associated with menstrual abnormalities in humans, such as painful menstruation, bleeding pattern and cycle duration abnormalities, possibly due to mercury's effect on the gonadal axis.[75,76,77] Women with uterine fibroids, miscarriages, hormonal disorders and thyroid abnormalities (both hypo and hyperthyroidism) often have elevated mercury excretion with DMPS.[78] Fertility has been demonstrated to improve with the reduction of heavy

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metal load of those with an increased mercury excretion with DMPS.[78]

Male and female infertility has been positively associated with higher blood, hair, and semen mercury levels that generally correlated with seafood consumption (Hong Kong study).[79,80,81,82] Semen mercury levels were positively associated with abnormalities in sperm morphology and motility. This may be partly due to mercury's deleterious effect on microtubule formation, which sperm require for motility. Organic phenyl mercuric acetate was previously used as a spermicide.[83]

In rats, reductions in sperm motility, sperm count and epididymal structure have been noted with early mercury exposure.[84] Decreased adrenal and testicular cell viability, with reductions in corticotropin-stimulated corticosterone (adrenal decapsular cells) and luteinizing hormone-stimulated testosterone production (Leydig cells) were associated with mercury exposure (rats).[85] Mercury-induced hormonal alterations and microtubule disruption may be the attributing factors in infertility.

Nervous System

The nervous system is particularly sensitive to the ill effects of mercury. Methyl mercury bound to L-cysteine appears to be actively transported (by LAT-1 protein) across the blood brain barrier (rat study).[86] Methyl mercury accumulates in mitochondria, endoplasmic reticulum, Golgi complex, nuclear envelopes, and lysosomes of the brain.[49] Once in the brain, methyl mercury may be converted to and stored as inorganic mercury (human family case study).[87]

Psychological symptoms of mercury toxicity seen in clinical practice include irritability, excitability, temper outbursts, quarrelling, fearfulness, restlessness, depression, and insomnia.[49] Occupational exposure of mercury vapour in dentists even after a mere 5.5 years has demonstrable ill effects on their motor speed, visual scanning, visuomotor coordination and concentration, and verbal and visual memory.[88] Dentists and dental staff who work with amalgams can have pituitary mercury levels up to 200 times higher than controls (3 of the 7 dentists studied had this level), in the form of mercury selenide.[27] These mercury accumulations are likely associated with the neurological decline demonstrated in dentists and their staff.

Mercury may be associated with chronic neurodegenerative conditions such as Alzheimer's disease. Alzheimer's patients have four-fold increased mercury levels in the nucleus basalis of Meynert.[89] When rats are exposed

to mercury vapour analogous to levels released by dental amalgams, Alzheimer-like lesions developed, possibly associated with microtubule disruption.[90]

Methyl mercury may cause neuronal death by either inhibiting glutamate transporters, leading to elevated extracellular glutamate levels and over-stimulation,[91,92,93] or by inhibiting cystine and cysteine uptake, compromising synthesis of intracellular glutathione.[94,95] Either way, neuronal death ensues.

Mercury depletes glutathione reserves, reducing sulfhydryl dependent Na+, K+ and Mg++ ATPases, required for proper neurological function (rat).[96] Inorganic mercury and methyl mercury inhibit the synaptic uptake of dopamine (rats),[97,98] serotonin (in rat synaptosomal fractions)[99] and norepinephrine (rat brain synaptosomes), which may be associated with mercury induced Na+ and K+-ATPase inhibition.[98] Rat studies have also demonstrated elevated urinary levels of dopamine, norepinephrine, and epinephrine for up to 50 days following methyl mercury exposure.[100] Mercury's effects on these key neurotransmitters may explain some of the profound psychological changes associated with mercury exposure (e.g., anger and hyper-excitability)

Developing Brain

Mercury exposure has exponentially greater effects on developing brains than those of adults. For example, children can be born with severe neurological disorders to mothers with only mild symptoms of methyl mercury poisoning (Minamata disease).[19] A dose response relationship links maternal hair mercury levels during pregnancy and their child's developmental delays and neurological abnormalities. This measurement is best done using a single strand of hair during pregnancy, and using the part of that strand with the highest mercury concentration,[101] representing the heightened neurological influence of mercury during gestation.

Fish consumption during pregnancy appears to be beneficial, assuming low mercury species are consumed. A mother-child study demonstrated a positive effect of fish consumption during the second trimester of gestation on memory and cognition test results at six months and three years of age respectively, assuming the mother's hair mercury remained low (less or equal to 1.2 ppm). Higher maternal mercury levels despite fish consumption were associated with poorer infant visual recognition and cognition test results.[102] Hence, although essential fatty acids in fish such as DHA may have a profound positive effect on fetal brain development, mothers should make every effort to consume fish or fish oils with minimal mercury content.

Cardiovascular system

Not surprisingly, the cardiovascular system with its high energy requirements does not escape mercury's wrath. A strong positive association lies between mercury accumulation and the acceleration of carotid atherosclerosis.[103] Heart attack risk is associated with toe nail mercury levels in humans.[104] Hair mercury levels are associated with acute coronary events, cardiovascular disease, congestive heart failure, and all-cause mortality in middle-aged men.[105] Patients with idiopathic dilated cardiomyopathy had myocardial mercury concentration biopsy results 22,000 times higher than controls. Increased myocardial trace elements and mercury may have adversely affected their mitochondrial activity, thus worsening cardiac cellular function in these patients.[106]

Kidneys

Although both organic and inorganic mercury can effect the kidneys, the most profound renal effects are associated with inorganic forms of mercury. Nephrotic syndrome due to minimal change disease has been associated with the use of mercury containing skin lightening products.[107] Nephrotic syndrome has been associated with occupational exposures to inorganic mercury vapour (chemical processing plant) and powdered mercuric oxide (battery manufacturing plant).[108]

Mercury chloride is more nephrotoxic to adult male rats than females and neonates.[109] Interestingly, testosterone injections in female rats lead to tubular necrosis with mercury exposure, and estrogen injections reduced the male's level of nephrotoxicity following mercury.[100,111] Inorganic mercury may induce antibodies to the glomerular basement membrane, glomerulonephritis,[112] and deposition of immune complexes in the mesangium and glomerular basement membrane (rabbits, rats, mice).[113,114,115] Lower doses of mercury appear to the S3 segment of the proximal tubule, whereas higher doses will also effect the S2 and S1 segments.[116]

Organic mercury has been associated with potassium-wasting nephropathy, with inappropriately high aldosterone levels.[117] Thus, both organic and inorganic mercury are associated with renal complications, although the localization and extent of damage varies with the form of mercury.

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Mercury's Other Effects

Impaired Joint Repair: In tissue cells cultures, mercury (also lead and cadmium) caused an increase in collagenase-resistant protein formation and a decrease in DNA content. It may be extrapolated that there may be an association between decreased ability to repair joint damage and heavy metal burden.[118]

Antibiotic Resistance: Increased bacterial resistance has been demonstrated to ampicillin, tetracycline, streptomycin, kanamycin, and chloramphenicol in oral streptococci, Enterobacteriaceae family and enterococci in a primate study within five weeks of dental amalgam placement.[119] Researchers concluded that amalgams increased the number of mercury resistance plasmids in the normal bacterial flora, many which also carry multiple antibiotic resistance. In light of the concerns about the development of multiple antibiotic resistance, dental amalgams may be an attributing factor that can be easily avoided by using non-mercury containing dental materials.

Treatments

A number of treatments are available for mercury detoxification. Care should be taken, as current symptoms may be increased and new symptoms may be provoked during mercury detoxification, especially with strong forms of chelation such as DMPS and amalgam removal if done in a manner that exposes the patient to a large bolus of mercury. Mercury detoxification treatments are as follows:

- Mercury chelators such as DMSA and DMPS can help promote mercury excretion.[120,121] Ethylenediaminetetraacetic acid (EDTA) may also help enhance methyl mercury excretion,[122] although evidence is conflicting.[123,124] Calcium EDTA has a higher binding affinity for mercury than DMSA and DMPS.[125] Liposomal EDTA should likely be avoided during acute mercury exposure, as it is more likely to be transported across the blood brain barrier and cellular membranes, possibly bringing mercury with it to areas of greater sensitivity. Due to its low intestinal absorption (~5-10%), oral EDTA taken at the same time as methyl mercury containing seafood may bind methyl mercury in the intestines and lower mercury's absorption.
- Wheat bran can help to bind mercury in the enterohepatic pathway[126,127] enhancing its excretion.

- Anti-yeast compounds such as caprylic acid, oil of oregano, berberine and garlic may help prevent methylation of inorganic mercury by yeast [128,129] preventing the production of highly absorbable methyl mercury.
- Garlic has a protective effect (*in vitro*) on purine metabolism in human leukocytes. Garlic extract and N-acetyl cysteine (NAC) helps prevent methyl mercury induced leukocyte damage (*in vitro*). This may be due to garlic's inherent antioxidant ability and the removal of oxidative species created by the methyl mercury.[130] Garlic is high in sulphur compounds, likely exerting an additional benefit.
- Intravenous glutathione can help replete cellular stores, thus reducing symptoms of mercury toxicity and improving cellular and biliary mercury excretion. Glutathione can recover methyl mercury and mercury chloride inhibited N+, K+, and Mg++ ATPase function (mice).[131] Mercury induced astrocyte death may occur in the absence of sufficient glutathione to repair ATPases.[131,132] N-acetyl cysteine prevents glutamate and mercury induced apoptosis, reactive oxygen species elevations and glutathione depletion (HeLa cell culture).[93]
- N-acetyl cysteine can help replete glutathione stores, promote enterohepatic excretion of mercury, and significantly increase urinary methyl mercury excretion (mice).[33,133] Despite these beneficial attributes, there is concern that NAC (and possibly glutathione) may increase renal retention of mercury.[134,135] Due to molecular mimicry between the amino acid cystine (Cys-S-S-Cys) and structurally similar Cys-S-Hg-S-Cys, the amino acid transporters involved in luminal absorpion (proximal tubulules) may reabsorb cysteine conjugate of mercury instead of cystine.[136] To date, the evidence for the use of NAC for mercury detoxification and symptomatic treatment is conflicting, although it appears to be weighing more strongly in favour of its beneficial effects (assuming the absence of renal mercury accumulation).
- Melatonin may be beneficial due to its ability to stimulate glutathione peroxidase in human erythrocytes[137] and human chorion cells,[138] and glutathione peroxidase and superoxide dismutase in rodent studies.[139,140,141,142] This can help restore the the body's oxidative balance.
- Selenium and vitamin E have higher requirements with mercury exposure, and might help reduce symptoms of methyl mercury toxicity.[143,144] Selenium reacts with mercury to form mercury selenide in the brain, which is insoluble and has long half life.[145] It is speculated that the mercury selenide is less reactive than other forms of mercury, explaining selenium's palliation of mercury associated neurotoxic effects. Mercury toxicity is more prevalent in areas with selenium deficient soil.[146] It should be noted that selenium is probably best used away from acute mercury exposures such as dental amalgam removals, to prevent the retention of mercury that would have otherwise been partially excreted.[147]
- Amalgam removal, if considered, should be completed using the most safe method possible, such as by following the International Academy of Oral Medicine and Toxicology (IAOMT) guidelines. These guidelines recommend 'chunking out' the amalgam, keeping the amalgam cool with running water and using high powered suction and a rubber dental dam, covering the patient's skin, giving the patient supplemental air, having fresh air circulate within the office and preferably having the dental staff wear respirators.[148] A patient handout is available on the IAOMT website (www.IAOMT.org). During acute mercury exposure such as the amalgam removal, DMSA, EDTA (oral/intravenous) and vitamin C (oral/intravenous) are the treatments of choice. Intravenous glutathione and oral NAC may be beneficial.

Conclusion

Mercury is inherently toxic, regardless of its form. Avoidance of predatory fish species such as shark, swordfish, tuna, marlin and orange roughy[2] in addition to freshwater species such as those in the Great Lakes[3, 4] can help reduce methyl mercury exposure. Proper daily dental care, avoidance of dental amalgams, and patient education with respect to the dangers of inorganic mercury found in everyday objects such as thermostats, fluorescent lights and cars can help prevent unnecessary mercury vapour exposure. Treatments such as DMSA, DMPS, selenium, wheat bran and anti-yeast supplements, including garlic can help reduce one's body burden of mercury. Glutathione and NAC may help reduce symptomatic complaints and likely increase mercury excretion. In combination with these mercury detoxification treatments, prevention of further mercury exposure should be the hallmark of a well-rounded patient care model.

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Tawnya Ward received her ND from the Canadian College of Naturopathic Medicine and a BSc in biology from Dalhousie University. Dr. Ward has been trained by the American College for Advancement in Medicine (ACAM/ISCT) for chelation therapy and by International Oxidative Medicine Association for ozone, ultraviolet and peroxide therapies. She has been trained in bio-identical hormones and anti-aging by the International Hormone Society. She has been trained by the American Academy of Environmental Medicine, a specialist organization for allergy, detoxification, and environmental sensitivity. She is licensed through CNPBC in chelation therapy, oxidative medicine and acupuncture. She is Chief Inspector for the Inquiry Committee with CNPBC. Dr. Ward runs her practice at the Pangaea Clinic of Naturopathic Medicine in Richmond, BC.

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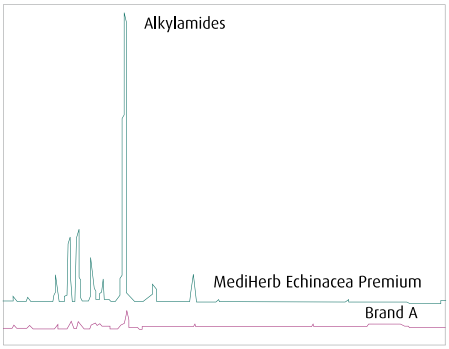

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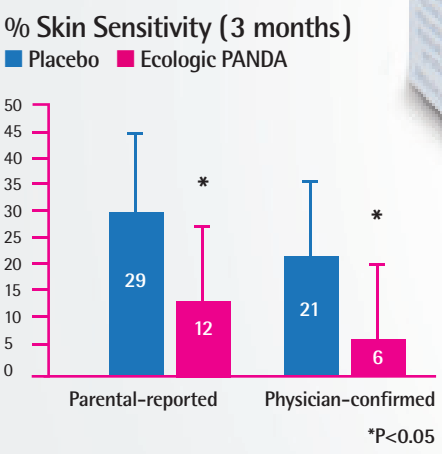

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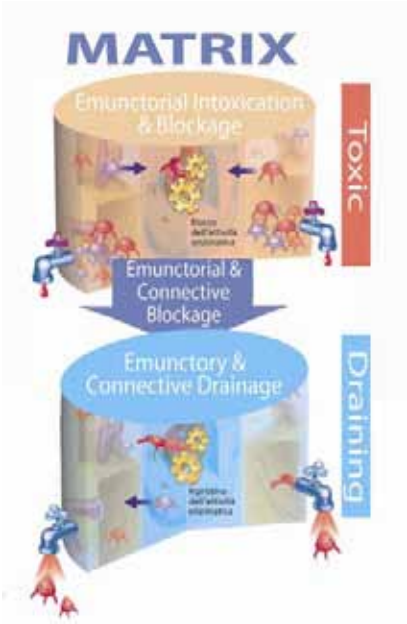


Toxins pass through the connective tissue (Matrix) both on the way in & out of the various organs and systems. Some toxins stays stuck in the matrix. Lymph drainers do not necessarily address toxic build up in the matrix. **GUNA-Matrix** is specific for this environment & **GUNA-Flam** manages the potential inflammatory process & healing crisis, while **GUNA-Cell** increases cellular function & energy.

Standard Protocol

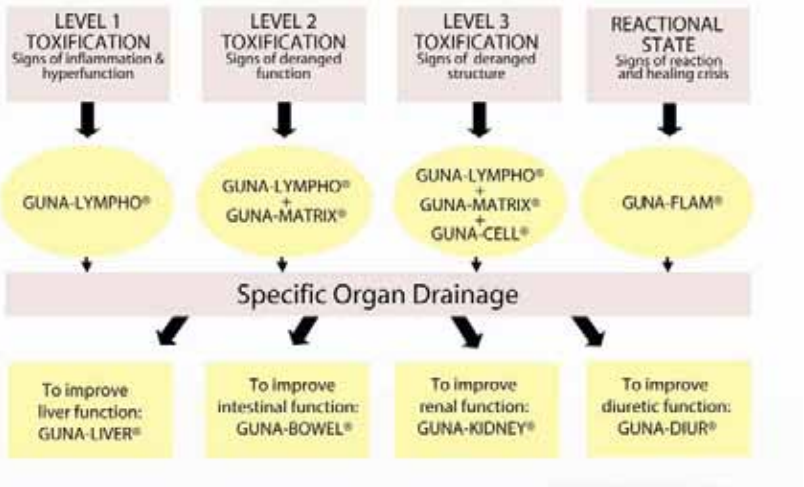
(All remedies, may be combined together, 5 drops, 2 –3 X/day))

Month 1:

Choose toxic level remedy/ies based on your client's disposition

Month 2

Continue with above toxic remedies & add <u>one</u> system specific remedy.



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