Volume 15, Issue 2, Summer 2008

VitaLink

The professional journal of the Canadian Association of Naturopathic Doctors

Environmental Medicine

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Inside

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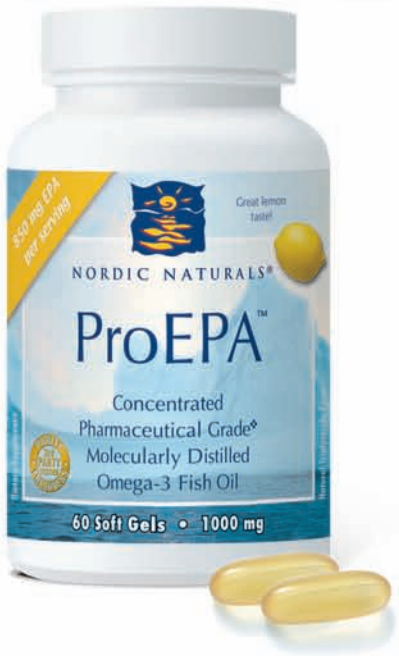

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1. *Surgical Neurology* 2006:65;326–331

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Vital Link

Volume 15, Issue 2, Summer 2008 – Environmental Medicine

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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 peer-to-peer research-based articles, relevant naturopathic information and news and events that affect CAND members and the naturopathic profession in Canada. The *Vital Link* has an outreach to other health care professions and promotes licensed naturopathic doctors to corporations, insurance companies and the Canadian government.

Circulation
The *Vital Link* is published three times per year and is distributed to more than 1,100 licensed Canadian NDs; over 600 students of CNME accredited naturopathic programs in Canada and the U.S., and the CAND corporate partners. 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 licensed Canadian naturopathic doctors.

Cover designed by Jesse Edwards

Upcoming Themes:
Fall 2008 – Identifying the Root Cause of Disease
Winter 2009 – Stimulating the Healing Power of Nature
Summer 2009 – Treating the Whole Person
Fall 2009 – Nature Cure
Winter 2010 – Environmental Medicine Part II

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 Previously unpublished material is preferred.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.

PRESIDENT'S CORNER

Dr. Iva Lloyd, BScH, RPP, ND, CAND Chair

I am excited about this edition of *Vital Link*. The impact of environmental chemicals and toxins continues to be a major factor in disease and chronic illness. With the focus of a naturopathic assessment being on identifying the causal factors of disease it is becoming increasingly important for naturopathic doctors to be aware of the impact of environmental factors on health and to address their impact as part of the assessment with most patients.

Over the last year the CAND has been asked on a couple of occasions to meet with 'conventional' manufacturers of personal care products to review the launching of new products. These meetings have demonstrated that current research indicates that consumers will be looking to naturopathic doctors for direction on the types of products that are best suited for them. Furthermore, consumers view naturopathic doctors as the experts on products that are healthy and safe. Our aim in this edition of the *Vital Link* is to provide NDs with the most relevant information and resources to assist them in understanding the impact of chemicals and toxins, how to appropriately assess for them during an intake and how to effectively provide treatment strategies. In conjunction with this edition, the CAND has updated the members-only section of the website to include key references and resources that will assist NDs in staying current on environmental issues. I encourage you to check them out.

The CAND has received feedback from members requesting that articles in the *Vital Link* include more practical information for naturopathic doctors. Over the last couple of years the focus of the *Vital Link* has been to publish articles from a peer-to-peer perspective. In response to the request from members we are also ensuring that articles capture our principles and are applicable to the practice of naturopathic medicine. We welcome your continued feedback with respect to the quality and applicability of *Vital Link* articles.

The first half of 2008 has been a very busy time for the CAND. Most recently, the introduction of Bill C-51 has resulted in a lot of attention from many groups. The CAND has a strong government relations committee and continues to work cooperatively with all naturopathic stakeholders (CAND, provincial associations, regulatory boards and schools) to establish a strategy and key messaging to ensure that the concerns that affect our profession are addressed. Bill C-51 marks the first time in our history when a significant concern relating to health care has been raised and the CAND and naturopathic doctors have been interviewed and quoted on all major television networks. The ability to ensure consistency in messaging is very important in issues such as this and we thank the members and other stakeholders for supporting the CAND.

This is a very active and positive time for the profession. There are initiatives that are focused on increasing public awareness of naturopathic medicine; the CAND this year is increasing its attendance at a number of conferences in order to build stronger alliances with other health care professionals and is continuing to develop and offer tools and resources that support naturopathic doctors in their practices. I encourage you to read the monthly e-Link newsletter and stay informed about all the new initiatives. We also encourage you to continue to provide feedback to the CAND. We welcome your recommendations, ideas and participation in any of the CAND's initiatives or on any of its committees.

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SUMMER 2008

GOVERNMENT RELATIONS REPORT

Shawn O'Reilly, CAND Executive Director, Director of Government Relations

This spring Bill C-51 has been, and continues to be, the dominant issue for the Government Relations Committee. The response this Bill has garnered rivals that which resulted in the Standing Committee on Health's 53 recommendations for natural health products back in 1998. Bill C-51 may in fact be the vehicle that finally implements a separate category for Natural Health Products.

The amount of information – both accurate and inaccurate – circulating on the Bill demonstrates just how much influence the Internet has on our personal and professional lives as information is disseminated almost instantaneously.

We have two key concerns with Bill C-51: 1) the definition of Practitioner excludes NDs as it is limited to an individual who is authorized under the law of a province to prescribe or dispense prescription therapeutic products, and 2) the Bill gives the Minister the power to designate any therapeutic product as a prescription therapeutic product.

While Health Canada has assured everyone that they do not intend to make any natural health product (as defined under the NHP regulations) a prescription therapeutic product, natural products that are not NHPs could become prescription therapeutic products, taking them out of the hands of NDs who are the experts in natural therapeutics.

The CAND has provided members with several updates on the Bill, posted letter templates on the website for use in advising MPs of your concerns and engaged in numerous interviews with the print, online, radio and television media. We will continue to update members as the Bill progresses through the House. The Bill is expected to complete debate following second reading and be sent on to the Standing Committee on Health before the House rises on June 20th for the summer recess. The CAND continues to engage in ongoing dialogue with government, opposition MPs, the NHPD and other stakeholders regarding our concerns. In order to effect change you must first be at the table where the discussion is taking place. We are at the table and actively involved in the discussion on behalf of our members and their patients.

In January, the CAND, along with representatives from all regulatory colleges and the provincial associations in unregulated jurisdictions, participated in a two day workshop to update the Mutual Recognition Agreement first established in 2001. All provinces are required to have labour mobility agreements in place by 2009 and while other professions are rushing to implement MRAs, we are ahead of the game. Government representatives who attended the session were impressed with the ease in which the profession worked together. A second meeting is scheduled for the fall where we expect to complete and sign the updated document.

I would like to end on a positive note, and this news certainly qualifies. On May 20, 2008, Bill 177, a private members bill entitled "the Naturopathic Doctors Act" was tabled in the Nova Scotia legislature. Second and Third reading followed very quickly and on May 27, 2008 the Bill received Royal Assent. The Bill makes Nova Scotia the sixth province, and the first Atlantic province, to regulate naturopathic medicine!

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MANAGING YOUR INSURANCE RISKS: INFORMED CONSENT

Partners Indemnity Insurance Brokers is pleased to provide the following article on Informed Consent, by Lorne Folick and Kathleen Duffield of the Vancouver based law firm of Dolden Wallace Folick LLP.

What is "informed consent"?

- A legal concept that describes the process of dialogue involving ongoing, full and complete discussions between a health care practitioner and a patient.
- The patient must be educated by the health care practitioner to make a reasoned choice.
- In addition to the common law duty to disclose, a majority of Canadian provinces have passed legislation that outlines the requirements of obtaining informed consent. Please review your provincial legislation to ensure that you are complying with provincial requirements.

Why is it important?

- The patient has a right to make reasoned and informed decisions regarding their health care.

What information needs to be disclosed?

- All material information relating to a proposed treatment or procedure, including any material, special or unusual risks and alternatives available.

What would the Court consider when determining whether "informed consent" has been given?

- Inherent risks of treatment;
- Whether the ramifications of treatment are serious;
- The frequency of the risk;
- The information normally given to patients undergoing the same procedure;
- The gravity of the patient's condition;
- The importance of the benefit of the treatment;
- Any need to encourage the patient to accept treatment;
- The intellectual and emotional capacity of the patient;
- The information the doctor knows or should know that the patient deems relevant to the patient's decision to choose a treatment; and
- Evidence from the patient and his/her family, as to the information the patient would have wanted to be provided with prior to the election or refusal of treatment.

Best practices tips:

- Establish a consistent practice of obtaining "informed consent". For example, this may mean that all invasive procedures regardless of the frequency or severity of risk will require "informed consent". You may want to make a checklist to ensure that you provide consistent information each time you seek "informed consent".
- Record the discussion relating to the disclosure of material information, risks and alternatives by taking detailed notes in the patient's file.
- Ensure that your records are dated, accurate, legible, current and organized.
- Referring a patient to a book or website is not, by itself, informed consent. For example, referring a patient to literature that does not discuss the material risks will not be "informed consent" or referring a patient to a medical textbook that the patient cannot understand will not be "informed consent".
- Be current with new findings of science. For example, there may be an obligation to inform a patient where there is some body of evidence to suggest a remote injury.
- Know the patient's history. By knowing the patient's history, you may find that a "non-material" risk is really a material risk. For example, where a risk is rare there may not be a legal obligation to inform the patient of the risk. However, if this risk is no longer rare due to a patient's unique circumstance, the risk now is material and must be disclosed.
- Request the patient to sign an "informed consent" form. It is important to note that the patient's signature, by itself, is not evidence of "informed consent". The patient still needs to understand and appreciate the nature of the treatment or procedure despite signing the form.

continued on next page

Naturopathic Association and Academic Updates

Saskatchewan Association of Naturopathic Physicians – www.sanp.ca

The Saskatchewan Association of Naturopathic Physicians enjoyed another productive quarter. This Spring saw a successful Naturopathic Medicine Week, as Dr. Wendy Presant-Jahn was featured in a Regina news publication, Drs. Jonathan Bablad and Julie Zepp saw great turnouts for their lectures at Chapters in Regina. In Swift Current, Dr. Leshia Ferguson hosted an open house in her clinic. Regina and Saskatoon mayors both officially declared May 4-11 Naturopathic Medicine Week, showing the province's continued support of our medicine.

We also held our AGM in May and an SANP student representative – ND candidate Christian Gleisburg – will now be representing SANP at CCNM. We look forward to growing our student membership in the years to come as a way to entice new grads to set up practice in this growing province where naturopathic medicine is in great demand. Dr. Alana Barmby will remain as president, Dr. Tim Mrazek as vice president, Dr. Jacquie Fleury as treasurer, Dr. Tanya Gokavi as secretary. We are pleased to welcome Dr. Vanessa DiCicco into the position of registrar.

Canadian College of Naturopathic Medicine – www.ccnm.edu

CCNM Open House
Saturday, October 25
12:00 – 4:30 pm
1255 Sheppard Avenue East
– Public information sessions, clinic tours, prospective student information.

Farewell to the Class of 2008
On Friday, May 23, CCNM honoured its 2008 graduating class at the College's 28th convocation at the University of Toronto's Convocation Hall.

"The individuals who sit in their gowns before us have the knowledge, skills and abilities to profoundly improve the lives of their patients, and of society," says President and CEO Bob Bernhardt.

"I have never been prouder to be associated with any institution than I am with CCNM, and these graduates are the best prepared that CCNM has ever produced. I believe they will change the future of health care and I am very proud to be associated with them, and feel so blessed to have interacted with them."

Graduates and guests were treated to an address by Susan Langley, M.S.Ed., who received the Honorary Doctor of Naturopathic Diploma. Susan sat on the CCNM Board of Governors for six years and was Chair of the Board during her last two years.

Mary Choi, this year's valedictorian, delivered a heartfelt speech that had all in attendance laughing as well as shedding a few tears. Dr. Daria Love, DC, ND, vice-chair of the CCNM Board of Governors, served as the master of ceremonies.

The following associations did not submit an update: BCNA, CNPBC, AANP, MNA, OAND, BDDT-N, QANM, NSAND, NBAND, PEIAND, NLAND, YNA, NSA, BINM

continued from page 11

For more information about informed consent policy in your province, link to the corresponding website below:

BC: www.qp.gov.bc.ca/statreg/stat/H/96181_01.htm
AB: www.qp.gov.ab.ca/Documents/acts/H05.CFM
SK: www.qp.gov.sk.ca/documents/english/Statutes/Statutes/H0-021.pdf
MB: http://web2.gov.mb.ca/laws/statutes/ccsm/p033-5ei.php
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QC: www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_96h02_e.htm
NL: www.health.gov.nl.ca/health
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NS: www.gov.ns.ca/legislature/legc/statutes/medcons.htm
YT: www.gov.yk.ca/legislation/acts/Bcaco.pdf
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Environmental Creed: an ND's perspective

Dr. Sat Dharam Kaur, ND

In the face of climate change and massive species extinction, a shift in consciousness as well as action is required in humanity's relationship with the environment. Consciousness precedes action. As our personal belief systems are drivers of how we take care of ourselves and influence the types of illness we manifest, so too our collective relationship with the earth influences our health and the health of future generations and all species. The current degradation of the air, water, forests, habitat, soil, weather patterns, other species and food undermines that health.

To become stewards of the earth, we need to internalize a new set of values and beliefs congruent with sustainability. Naturopathic doctors can play an important role in ushering in this new set of values, firstly by living them, and secondly by passionately sharing them with our patients. Outlined below is an Environmental Creed which can help guide our individual and group actions to encourage a sustainable future for humans, other species and our home, Earth.

The Environmental Creed

1. I recognize the interconnectedness of all life and acknowledge the consequences of my actions in affecting other species and humans in locations near and distant.
2. I realize that human well-being is derived from the well-being of the earth and its elements – soil, trees, food, water, air, weather patterns and biodiversity of species.
3. As I coexist with other species, I have a responsibility to protect their habitat and survival. In considering the welfare and survival of other species and how my actions impact them, I protect our collective future.
4. I practice conservation and take only what I need of the earth's finite resources in a sustainable way, keeping in mind the needs and rights of other humans and species.
5. I recognize the need for population control, which is dependent upon the education and opportunities available to women and men, as well as the availability of safe, natural birth control methods.
6. I actively promote peaceful cooperation between neighbours, cities, regions and countries to maintain the earth's well-being and resources as our common goal and sacred duty.
7. I choose raw materials that are natural, non-toxic, recyclable, renewable and biodegradable. I take responsibility for the waste I generate, and encourage individuals, industries, municipalities, and nations to do the same. I promote the use of waste as food for another product or living process.
8. I choose food that is organically grown, not genetically modified, and adopt a primarily vegetarian diet, supporting local farmers and food production to decrease carbon emissions caused by deforestation (from animal grazing) and transportation of goods.
9. I help to preserve our forests and urban trees, recognizing their value as the lungs of the earth. I commit to using less paper and choose recycled paper whenever possible.
10. I practice energy conservation and support renewable energy (wind, solar, geothermal) to minimize global warming.
11. I protect the integrity and health of the earth's rivers, lakes, groundwater, forests, land masses, natural geography, ecosystems and inhabitants.
12. I believe the ultimate goal of individuals and nations is to have basic needs of food, shelter, clothing, health and education met, so that attention can be paid to right livelihood, spiritual practices, self-realization, inner joy and peace, cooperation, sharing, equality and service.
13. I believe that progress is measured by the well-being of the earth and all of its inhabitants as a whole, not simply by the well-being of the human to the detriment of other species.
14. I uphold the Precautionary Principle: When an activity raises threat of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof.
15. I live simply.

Compiled and presented by Sat Dharam Kaur, ND at the United Nations NGO conference on Climate Change in New York, Sept. 2007. www.trilliumhealingarts.ca

The CAND is committed to reducing its environmental impact and continuously providing its employees with a healthier working environment. To date our efforts include:

- The Vital Link journal is printed on FSC-certified paper.
- The CAND office uses only 100% recycled paper.
- We've reduced the frequency of our print mailings, focusing on electronic communication with our members.
- We've switched to glass jugs of spring water as an alternative to plastic jugs that contain bisphenol A.
- Our office uses a high efficiency air purifier from IQAir that requires little energy and doesn't off-gas.
- Our staff use reusable eating wares for all in-office meals and snacks. When lunching off site we pack reusable plates and cutlery as necessary.
- Our staff do not purchase morning beverages in disposable cups.
- Three of our four staff take public transit to work (one of whom cycles part way) and the fourth staff member carpools.

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Zyflamend®-Mediated Inhibition of Human Prostate Cancer PC3 Cell Proliferation: Effects on 12-LOX and Rb Protein Phosphorylation. Peiying Yang, Carrie Cartwright, Diana Chan, Mary Vijjeswarapu, Jibin Ding and Robert A. Newman Cancer Biol Ther. 2007 Feb 25;6(2)

Zyflamend regulates expression of gene products that are activated by NF-kB. These include genes control ling or inflnencing tumor cell invasion, proliferation, angiogenesis and metastasis .

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- Zyflamend induces expression of heme-oxygenase-1 (HO1)
  - HO1 is a key cellular defense enzyme in the heart and lungs
  - Generally considered to be protective against cancer
  - Statin drugs exert anti-inflammatory effects through induction of HO1
  - This effect is not involved in apoptosis of glioblastoma cell line U87
- Zyflamend was also shown to decrease expression of two proteins, namely tublin and actin, required for cancer cell replication.

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PubMed

Zyflamend, a unique herbal preparation with nonselective COX inhibitory activity, induces apoptosis of prostate cancer cells that lack COX-2 expression. Bemis DL, Capodice JL, Anastasiadis AG, Katz AE and Buttyan R. Nutr Cancer. 2005;52(2): 202-12. PMID: 16201851.

COLUMBIA UNIVERSITY CENTER FOR HOLISTIC UROLOY

Men in the Columbia University Center for Holistic Urology PIN study are given a specific protocol of dietary supplements from NewChapter, that they are told to take daily to help maintain healthy inflammation levels, while providing antioxidant and nutritional support. Because of the early interest in our study, I have detailed the complete daily nutritional supplement protocol.

Aaron Katz, M.D., Director,
Center for Holistic Urology, Columbia University

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BUSINESS TIPS

REALIZING MY VISION OF AN 'ECO-CLINIC'

Dr. Elizabeth Storjohann, ND, Woodside Clinic

My vision for the Woodside clinic was to build a structure using materials and design that would inherently provide a healthy internal environment. The clinic would need to include non off-gassing materials, use little energy, be easy to clean and maintain, provide good quality water and air and low electromagnetic radiation. Having used the building for two years, my colleagues, staff and patients are all very satisfied with the results.

The planning and design criteria followed very closely to the International Institute for Bau-Biologie and Ecology (www.buildingbiology.net). "Bau-Biologie" is a coined term used to describe the movement of healthy building principles for working and living spaces.

We chose architect David McAuley (www.jdm-arch.com) who was familiar with these goals and whose architectural design has a contemporary look. The clinic is situated well away from the road and is surrounded by trees to reduce road noise and pollution.

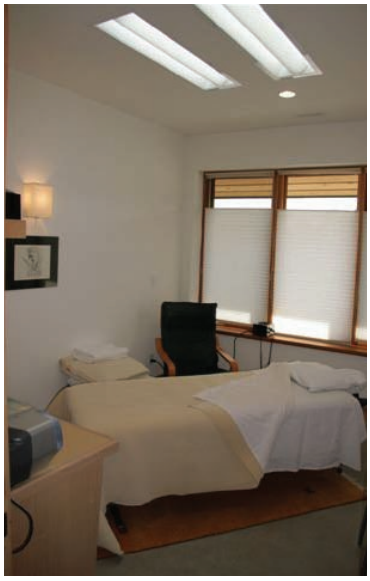
The structure was built using dry stacked insulated concrete forms (www.durisolbuild.com). The stacked forms were filled with concrete and reinforced with fibreglass rebars. The fiberglass rebars were chosen in favour of steel rebars in order to avoid the steel's electromagnetic netting effect. No vapour barrier was installed allowing moisture to be absorbed and released freely by the building's "breathing walls". The free movement of moisture prevents mould from growing. The internal moisture environment becomes moderated (fewer peaks of dry and moist) with respect to the external air. This in turn creates a working environment that is moisture-moderated, but not moisture-eliminated (a characteristic of closed ventilation systems). The 12-inch thick wall mass inherently stores warmth and coolness that is released back into the building to help lower the cost of heating and cooling. During cool nights of the hot summer, the walls are cooled. The coolness is then released back into the building during daytime. The walls perform the opposite temperature controlling actions during the cooler months. The 12-inch walls also allow for deep windowsills used as extra shelf space as needed.

The exterior walls are made of cedar board and baton with natural resins that further enhance the building's ability to "breathe" (www.cbrproducts.com). The internal walls are natural stucco with silicate paint (www.eco-house.com) that also "breathe".

Heating is propane in-floor radiant heating with an electrical heating and cooling backup (for hot muggy days). The high capital cost of a geo-thermal system (chosen for my home) was not in my construction budget for the clinic. The geo-thermal system takes heat from the soil via a maze of water pipes dug four feet deep, exchanges the heat to the in-floor pipes of the house and pre-warms the water heater. Conversely, the system collects coolness in the soil and exchanges the coolness to the air to cool the house through ductwork situated high on the walls and ceilings. This relies on the convection laws: hot air naturally rises from the floors evenly and cold air naturally drops

from the high points thus, reducing the energy required to heat and cool compared to a forced air system.

The clinic's floors are polished concrete for durability and easy cleaning and maintenance. Wool rugs are used throughout the clinic to absorb sound and moderate internal moisture. A large cistern was installed to collect water from the metal roof of the building that is used to flush toilets and provide water for clinic laundry. A dug well supplies drinking water.



The architect designed the clinic to allow for natural ventilation, cooling and heating from the external environment. The south side of the clinic has longer overhangs to prevent the sun from entering the building in the summer when it is higher on the horizon and allows direct sunshine into the clinic in the winter that warms the interior cement floors, a mass that can store heat and release it back into its environment after the sun goes down. Clerestory windows (high wall with a band of narrow windows along the very top) allow for high level ventilation. In the summer, the hot air escaping from the top of the clinic through the clerestory windows creates a suction of cooler air in through the ground floor windows via a chimney effect. Windows can be opened in every room for fresh air.

The clinic has an abundance of natural lighting to reduce the need for electricity, but relies on full spectrum fluorescent lighting (magnetic ballast) when required. Fluorescent lighting that has an electronic ballast is not recommended because of the electromagnetic radiation pollution. Electromagnetic radiation has been minimized by running electrical wires through conduits. One of the treatment rooms has a kill-switch to cut all power in and around the room for electrically sensitive patients. High speed Internet is routed from the top of a silo 600 ft away via fibre optics to maintain Internet speed without the radiation of the antenna. There is no wireless technology in the clinic. Electric, magnetic and radio frequencies can have detrimental health effects. You can learn more and have your environment surveyed for electromagnetic frequency risks by contacting the people at www.safelivingtechnologies.ca.

Finishes used inside the clinic on the woodwork include oils and waxes. No lacquers were used in the clinic. The woodwork near windows and exterior doors were oiled to give the wood increased durability. The baseboards and interior doors were waxed to give a lighter colour to the interior living space (www.eco-house.com). The cabinets were made from plywood with no off-gassing glues. We special ordered the interior doors made of the highly renewable material: compressed wheat core with a Douglas fir veneer. These doors are free of the VOC synthetic formaldehyde (www.humabuilt.com).

Maintenance of the building continues with natural cleaners for the floor, windows, toilets and surfaces. We frequently wipe down door handles with a Sani-cloth to prevent transmission of bacteria. We encourage patients to use cloth hand towels that are used and washed after each use. Examination tables use cotton/polyester sheets that are washed after each treatment/examination. We reuse plastic/paper/cloth bags for supplements and serve water in a jug that comes from the well (no bottled water) and serve it in a glass as opposed to disposable cups. We use Nutribiotic soap that is effective and biodegradable for the septic tank. We also have an air cleaner system that ensures the air inside the building is free of mold, viruses, bacteria and pollens. Gardens around the clinic are perennial beds to minimize the work every spring.

I feel that we have successfully created the first clinic that is designed and built from the ground up to fit the healthy workspace paradigm. This is truly a building designed and built for the health of the people who occupy it. You are welcome to come and visit our eco-clinic or contact us for further information.

You don't have to build an eco-clinic to make a difference: any steps you take to make your space more environmentally sound are a good starting point for reducing energy consumption and/or waste production.

About the author

Dr. Elizabeth Storjohann, ND studied chemistry at the University of Waterloo and then completed the ND program at CCNM in 1996. Until 2005 Elizabeth had operated her clinic out of her Cambridge home. In 2006 the new eco-clinic near Brantford was occupied. Elizabeth works full time and has 3 children under 5 years of age (1 set of twins) and loves every minute of it. E-mail drliz@woodsideclinic.com.

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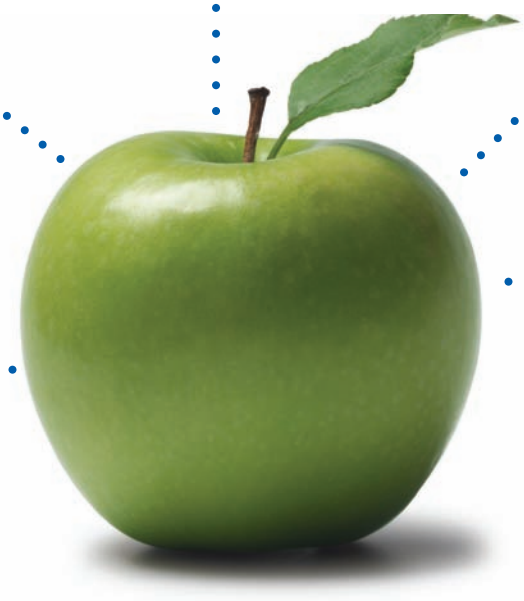

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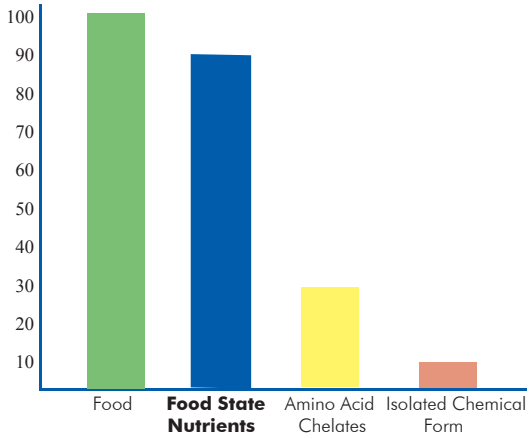

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Tips for environmentally conscious shopping

Alex McKenna, CAND Marketing Director

Naturopathic doctors possess the ability to guide Canada in becoming a nation of environmental stewards. The naturopathic patient demographic has a growing awareness of the direct relationship between their health and the condition of the Earth. Patients expect NDs, the experts in natural health care, to have an understanding of environmental issues and to provide them with ways of becoming more environmentally conscious. Provided below are some basic ideas that will assist NDs and their patients in making an environmental impact through their everyday shopping choices.

For detailed information on a wide spectrum of environmental toxins and their potential health effects, please read naturopathic doctor JJ Dugoua's paper, *A Heavy Load – An overview of the toxic burden of the average Canadian* on page 44, explore the links at the end of this paper and also link to the CAND's guide, *Chemicals to Avoid in Personal Care Products* under the *environmental resource* tab in our members-only section at www.cand.ca.

Tips for selecting healthier products

If a retailer cannot provide clear answers to your questions contact the manufacturer/producer directly. If your local retailers don't offer environmentally/socially conscious products and services, ask them to start.

Clothing

1. Buy locally manufactured products to support your local economy and reduce the use of fossil fuels.
2. Choose a manufacturer that follows ethical and earth-friendly manufacturing standards and provides safe working conditions and fair wages for its employees.
3. Consider clothing made from sustainable material, for example bamboo, hemp or organic cotton/wool.
4. Avoid toxic dyes and other common chemicals used to treat garments and make them wrinkle-free, fire resistant, or anti-bacterial.

Personal care/household cleaning products

1. Read labels and choose products free of toxins and synthetics.
2. While terms such as "natural", "organic", "biodegradable" and "volatile organic compound (VOC)-free" are important, products with these claims may also contain toxins such as parabens, phthalates or other synthetics.
3. Choose products with reusable/no packaging, products that are refillable or available in bulk and/or those made of recycled material.
4. Select glass packaging over plastic (glass does not leach chemicals into the product).
5. Check out Toxic Nation's guides: *Make Your Home a Healthy Home* and *Guide to Spring Cleanin*g at www.toxicnation.ca/go-toxic-free/toxicnation-guides.

Household items

Furniture

1. Buy locally manufactured products to support your local economy and reduce the use of fossil fuels.
2. Consider purchasing furniture made of recycled/reclaimed or sustainable material; for example, Forest Stewardship Council (FSC)-approved wood, and avoid foam stuffing.
3. Choose non-off-gassing products that do not contain VOCs such as formaldehyde or flame retardants. "Off-gassing" is the evaporation of volatile chemicals from non-metallic materials, a process that can last for years. Common off gassing household items include: foam fillers, plastic, most paints, wood preservatives, chemically treated fabrics and adhesives.

Electronics

1. Buy a more energy efficient model/brand if it is available. According to Adria Vasil's book, *Ecoholic*, (check out our contest on the adjacent page), a 32-inch LCD HDTV may use close to 400 kilowatt-hours (kw/h) of energy per year, while a 52-inch model uses 600 kw/h. Honestly consider how large you really need Spiderman, Larry King and Archie Bunker to appear in your TV den.
2. Consider whether an item can be disposed of safely through a recycling/refurbishing/manufacturer's take back program.
3. Avoid electronics coated with PBDE flame retardants, as these lead to toxic dust in your home/office.
4. Read Greenpeace's concise report, *Switching on to Green Electronics*, updated quarterly at www.greenpeace.org/international/press/reports/Switching-on-Green-Electronics.

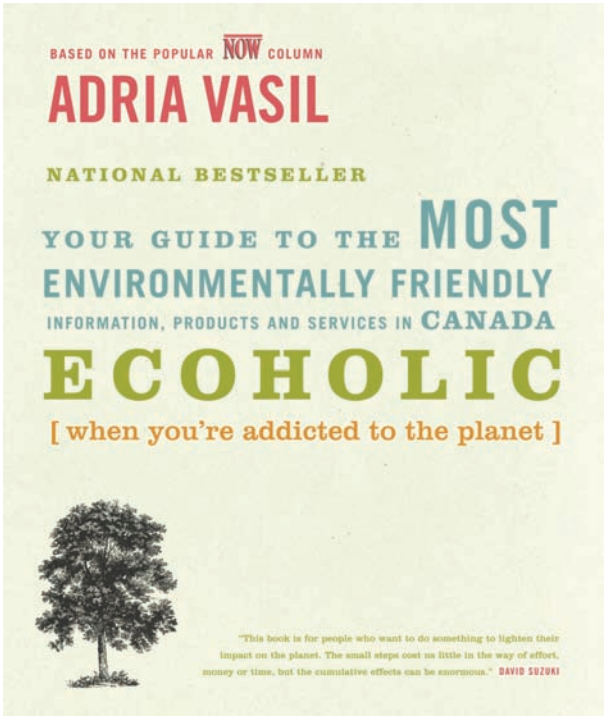
Food

1. Buy locally-grown/manufactured foods to support your local economy and reduce the use of fossil fuels.
2. Certified organic foods support pesticide/herbicide/insecticide-free agriculture, are more nutritious, are not genetically modified ("non-GMO") and have less of an environmental impact than non-organics.
3. Select unprocessed foods free of preservatives, hormones and antibiotics. Some of the long-term health impacts of exposure to foods containing these offenders have yet to be determined.

Considerations for eco-friendly shopping

Is the item you're looking for available second-hand, locally or online? Before setting off to the shops, first consider whether the item you need (you do need it, right?) could be found on a local Internet classified, such as Craigs List (craigslist.org), Kijiji (kijiji.ca) or Freecycle (freecycle.org). From chic homeware to guitars and cars, online classifieds can provide a simple solution to find-

WIN A COPY OF *ECOHOLIC*



The CAND and Random House Canada are offering CAND members an opportunity to win one of five copies of NOW Magazine columnist Adria Vasil's important book, *ECOHOLIC [when you're addicted to the planet]*.

ECOHOLIC is Canada's top resource for the best green products and most helpful 'eco' services available. The guide offers readers up to date information and is bursting with practical suggestions on reducing one's ecological footprint and living a more Earth-friendly existence. This book will be useful both in your home and clinic and can benefit each of your patients.

How to enter the contest

It's simple: send us either your top five recommendations for encouraging patients to become more environmentally conscious OR the top five things you're doing to make your clinic or workspace more environmentally sound. Our top five selections will each win a copy of *ECOHOLIC*.

Submission details

Send your submission to info@cand.ca. No mail- or fax-in entries, please. If you don't use e-mail please call us at 1.800.551.4381.

Submission deadline: August 15, 2008. Winners will be announced in the September e-Link and in our fall issue of the Vital Link.

"Everything you need to know to make green, non-toxic, Earth-friendly consumer choices – and to be a bang-up planetary citizen – is in this book. Its comprehensiveness is mind-boggling! My fondest hope is that a well-thumbed copy becomes a fixture in every Canadian Home."

- Rick Smith, Executive Director, Environmental Defence

ing small- and even big-ticket items. Remember, 'second hand' doesn't necessarily mean a product has been used and abused. If you can't find a second-hand item online, consider checking local vintage or antique shops.

Buying used items locally will allow you to: avoid the packaging of new items and spare pre-existing, useful items from ending up in the landfill; reduce fossil fuel emissions; beat the stress of mall life and out-of-stock woes and finally, save your money.

Support retailers carrying ethically manufactured, toxin-free products. See previous page.

Knowledgeable staff and product research. Look for products that have been selected based on their low environmental/social impact. Question the retailer about the environmental or social advantages their products provide. A retailer's long-term commitment to researching eco products indicates a commitment to carrying reputable brands and not just any attractively packaged 'green' product.

Bulk buying and waste reduction. Bringing reusable bags to the shops is an automatic move for most of us. More retailers are providing consumers with token rewards for actions like this; however, reward or no reward, over time you'll spare a lot of plastic from ending up in landfill: in 2007 the Green Party estimated that Canadians alone use 10 billion plastic shopping bags per year and that most end up in landfill after one use.

Support retailers offering container recycling programs and the safe disposal of hazardous consumer waste (e.g. batteries, ink cartridges, electronics). Ask for products that are refillable, contain reusable packaging and are available in bulk or a larger size. Encourage businesses to support carbon-free biking/walking/public transit campaigns. Don't be shy to ask retailers about their long-term environmental strategy.

Quality of retail environment. Low-impact facility. When assessing a retailer's environmental impact, consider energy efficiency, physical construction (interior & exterior) and retail atmosphere. Retailers should also be working to reduce their energy consumption and carbon footprint as Toronto's Grassroots Environmental Products (grassrootsstore.com) has done. They were Canada's first retailer to switch to Bullfrog Power (green, carbon-free power supplier – bullfrogpower.ca) a move that has inspired some larger retailers to sign on with Bullfrog, too. One of Grassroots' stores also uses solar power to illuminate store signage at night. This eco retailer's online shoppers can even top off their Earth-friendly purchases with carbon-neutral shipping! Carbon offset credits are purchased automatically for every order shipped, ensuring that the CO2 produced during delivery is counterbalanced by tree planting or the support of renewable energy projects.

Other interesting eco-friendly building features to look for include: maximizing use of natural light, be it harnessed for solar electricity or used to heat the storefront and using low-VOC paints and reclaimed building material, such as recycled cork or wood flooring. A farmer's market arguably provides the most natural, eco-friendly

retail environment. Casually perusing fresh, fairly–priced products in the glorious outdoors also makes for a pleasant, stress-free shopping experience.

Summary

A wide and growing array of socially responsible and environmentally safe products, services and retailers is available to the mass market, including, but not limited to the food, health, lifestyle, fashion and financial categories. Becoming environmentally aware is a process that can be overwhelming at times; however, every small step helps. NDs are in a unique position to play an integral role in educating and supporting patients to make informed, responsible decisions.

An abundance of online and print resources are available to assist you and your patients in locating Earth-friendly products and services. Check out the links below as well as Elizabeth Storjohann, ND's article on building an 'eco-clinic' (page 19). Additionally, we encourage you to visit the members-only section at www.cand.ca for environmental documents and more links, which will be refreshed and expanded on an ongoing basis.

Environmental resources and links

Ecoholic: Your guide to the most environmentally friendly information, products and services in Canada (Random House 2007) by Adria Vasil – *www.ecoholic.ca*

Clean Production Action (guide to lower impact products) – *www.cleanproduction.org*

Ecoportal Canada (environmental directories, portals and networks) – *www.planetfriendly.net/ecoportal.html*

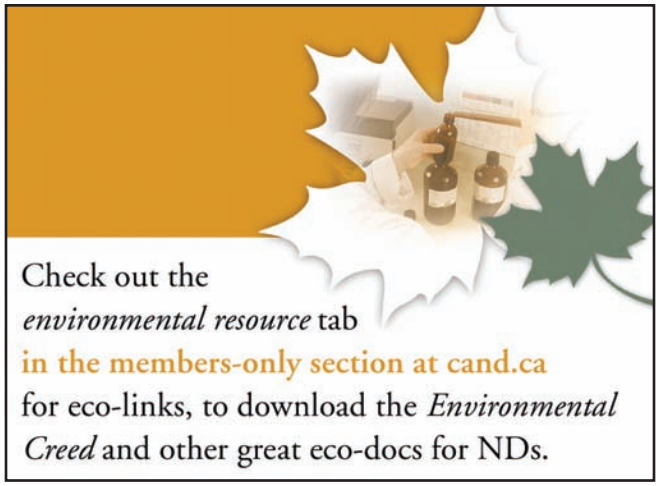
Environment Canada (federal government resource) – *www.ec.gc.ca*

Environmental Working Group (educates on toxins and how to avoid them and has a great e-newsletter) – *www.ewg.org*

Pollution Probe (dedicated to achieving positive, tangible environmental change) – *www.pollutionprobe.org*

Toxic Nation (tracks the toxic load of Canadians) – *www.toxicnation.ca*

Zerofootprint (dedicated to minimizing carbon footprint) – *www.zerofootprint.net*



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1. Desai A, Konda VR, Hall A, Bland J, Tripp M. Comparison of anti-inflammatory activity of two selective kinase response modulators (SKRMs), *rho*-iso-alpha acids (RIAA) and tetrahydro-iso-alpha acids (THIAA), in lipopolysaccharide (LPS) mediated inflammation in RAW 264.7 macrophages. *The FASEB Journal* . 2007;21:702.
2. Lerman RH, Liska D, Tripp M, et al. Summary of effects of a reduced iso-alpha acid (RIAA) rosemary extract, and oleanic acid supplement on parameters of cardiovascular health. *Proprietary Clinical Research Report*. Gig Harbor, WA: Functional Medicine Research Center;2004.
3. Minich DH, Bland JS, Katke J, et al. Clinical safety and efficacy of NG440: a novel combination of *rho* iso-alpha acids from hops, rosemary, and oleanolic acid for inflammatory conditions. *Can. J. Physiol. Pharmacol.* 2007;85:872-883.

†U.S. Patent nos. 7,195,785; 7,205,151.

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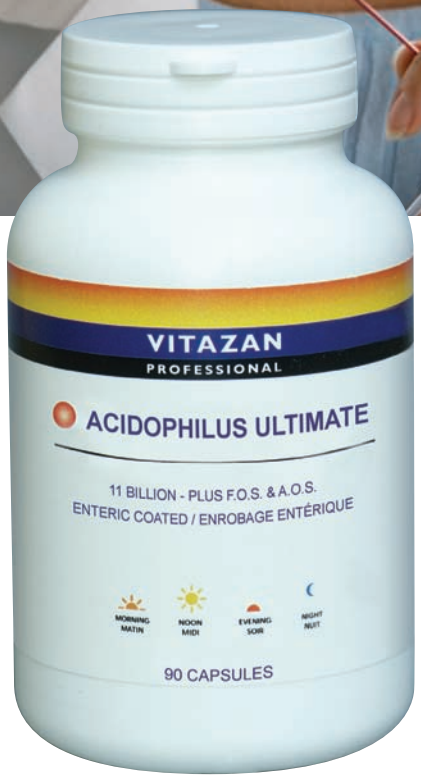

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Links between ADHD and environmental pollutants

Dr. Dugald Seely, ND, MSc, Dr. Kieran Cooley, ND, MSc (cand.), Dr. Heidi Fritz, ND, MA (cand.)

ADHD

Attention deficit hyperactivity disorder (ADHD) is a chronic neurobehavioral mental health disorder with functional impairments as a result of concentration/attention or impulsivity/hyperactivity[1]. ADHD affects one in every 20 Canadian children, and is thought to be multi-factorial, resulting from interactions of early childhood learning, genetic expression, dietary intake, and neurotoxic pollutant exposure during development. Diagnosis as per the *Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition* (DSM-IV) criteria includes the presence of six of nine characteristic behaviors which significantly impact at least two areas of the patients' life for a period greater than six months[2]. DSM-IV criteria identify three sub-types of ADHD: ADHD primarily of the inattentive subtype (ADHD/I); ADHD primarily of the hyperactive-impulsive subtype (ADHD/HI); and ADHD combined subtype (ADHD/C). New developments in the understanding of ADHD show not only the need to diagnose, but also to treat ADHD based on the identification of these separate subtypes of the disorder[3, 4]. While the etiology of ADHD is not clearly understood, it is believed that environmental pollutants may be contributing to a potentially increasing incidence of this debilitating disease[5].

Diagnosis of ADHD is often first made in school-aged children (age 6-9 years), with prevalence rates ranging from 4%-12% of all school-aged children[6]. In the United States, 4.2% of children ages 4-15 years, equivalent to 1.8 million children in the US alone, have ADHD and are treated with stimulant medications[7]. Among school children, males show predominance with a diagnostic prevalence ratio of between 2:1 and 4:1 over females[8].

Naturopathic treatment seeks to identify the root cause of disease and ADHD is no exception. Food sensitivities are addressed through the elimination of common allergenic foods and food additives ubiquitous in processed foods. Genetic methylation deficits can be addressed by administration of methylcobalamin and folic acid. Identification and treatment of increased heavy metal burden is clinically more challenging, due in part to the lack of standardized diagnostic testing and well-defined reference ranges. However, given that an increasing volume of evidence implicates heavy metals and environmental pollutants as a contributing factor in ADHD, it is important that NDs consider this in their assessment and treatment plan.

Studies on the etiology of ADHD reveal an inheritable component related to neurobiological deficits in the prefrontal cortex and related subcortical regions, resulting in the dysregulation of dopaminergic, serotonergic, and noradrenaline neurotransmitter systems[9-11]. There are a number of pharmacological treatment options based on the effects of the release/inhibition of neurotransmitters including: stimulants (methylphenidate, amphetamine, modafinil, pemoline), selective norepinephrine/serotonin reuptake inhibitors (atomoxetine), anti-depressants (bupropion, desipramine), nicotinic agents (nicotine analogs), and antihypertensives (clonidine, guanfacine)[3]. An estimated 30%-50% either do not respond to, or do not tolerate, treatment with these stimulants[12]. In addition, recent pharmaco-epidemiologic studies demonstrate that compliance with stimulants is poor; with less than 10% of patients still taking prescribed medications after one year[13-15]. Both the medical community, as well as the public, have expressed concern about the several-fold increase in prescriptions of stimulant medications for children over the past decade[16,17] and the potentially serious physical and social side-effects of these medications[18-21]. Unquestionably, ADHD is a common disorder in Canada and its negative burden on individuals, their families, and society as a whole is profound. There is a great need for exploration into the elements that contribute to ADHD and into related strategies to prevent and mitigate this disease.

Associations between environmental pollutants and ADHD

An expert committee from the US National Research Council found that 3% of developmental disabilities are a direct result from exposures to environmental pollutants and a further 25% extend from genetic susceptibilities to environmental factors[22]. Currently, there is no comprehensive analysis on the role of environmental pollutants and ADHD. There is a wide base of evidence linking environmental toxins with ADHD and we believe that there are causal associations between certain pollutants and the development, prognosis, and treatment of ADHD. The following discussion on two heavy metals and exposure to tobacco smoke serves to provide preliminary evidence signifying the importance of these associations and highlight specific exposures to consider in the assessment and treatment of ADHD.

Heavy Metals and ADHD:

Aside from a semi-questionable worldwide music phenomenon, the term *heavy metal* is currently used to describe metals (and by extension, metalloids) commonly associated with contamination and potential toxicity or ecotoxicity. Lead, mercury, arsenic, cadmium, and manganese are examples of highly toxic heavy metals[23]. Two neurotoxic metals, lead and manganese, are associated with ADHD and are discussed below to elucidate some of the evidence regarding the risk that heavy metals pose to children and their neurological development.

Lead: Evidence is building that links exposure to lead with the development of ADHD. In a recent cross-sectional study of 150 children from Michigan aged 8 to 17, blood lead levels were found to be significantly higher in ADHD-combined type than in non-ADHD control children[24]. Of note is the fact that this was demonstrated amongst a subject population with lead levels still defined as "low" by the Centers for Disease Control (<5 µg/dL). This is the first study to correlate ADHD with 'low' blood lead levels (<5 µg/dL) comparable to those of the general population (1-2µg/dL). The study also supports previous findings that have confirmed a linear association between higher blood lead

levels >10 µg/dL and symptoms of ADHD[24]. While higher lead levels have been shown to correlate with lower IQ, the apparent link to ADHD and lead appeared independent of this effect on IQ. This study also found that there was no correlation of maternal blood lead levels and child ADHD diagnosis or symptoms, indicating that critical exposure was likely to have occurred postnatally[24]. Potential sources of lead include paint from toys, enameled or ceramic pots, dishware that may be improperly glazed, drinking water from pipes of old houses, as well as paint from old houses, fertilizers, fungicides, and herbicides (in the form of lead arsenate). It should be noted that renovation work, especially where floors, walls, and ceilings are torn up, may provide a source of lead exposure in older homes.

Konofal and Cortese have hypothesized that iron supplementation may be beneficial in cases of lead toxicity due to a neuroprotective role of iron[25]. When researchers gave 80mg/d ferrous sulfate to 23 non-anemic children (with ferritin levels <30 ng/mL) who met DSM IV criteria for ADHD, there was a progressive and significant decrease in symptoms of ADHD as measured by the ADHD Rating Scale[26]. The iron hypothesis is supported by the fact that lead in the central nervous system contributes to a dopaminergic dysfunction, which may also disrupt the structure of the blood-brain barrier. However, iron supplementation protects the integrity of the blood-brain barrier against lead insult implying that iron deficiency could potentiate the toxic effects of lead[27]. Alternately, it is hypothesized that lead may also contribute to iron deficiency by reducing iron's bioavailability. Lead also affects neurotransmitter pathways via decreased heme synthesis and consequent increased levels of the precursor, δ-aminolevulinic acid (ALA), which in turn suppresses GABA-mediated neurotransmission[28]. Regardless of the mechanism, given the potential impact of iron status on ADHD, these children ought to be screened for iron deficiency.

Manganese: In trace amounts manganese is an element required for proper physiological function via its role as an enzymatic co-factor. At higher doses, however, manganese can become highly toxic. Although the evidence for lead is much stronger, it is important to consider the potential for this lower profile element to be a contributing factor in a child's diagnosis of ADHD. Current knowledge of manganese neurotoxicity is based on occupational inhalation exposure, resulting in an extrapyramidal syndrome, characterized by symptoms of gait dysfunction with a propensity to fall backward, postural instability, bradykinesia, rigidity, micrographia, masked facies, speech disturbances, and muscle tremors. Clinical and sub clinical effects of intoxication have also been implicated and involve the striatal dopaminergic system, although GABA-ergic and serotoninergic imbalances. In a Quebec community, a pilot study of 46 children ranging from 6 to 15 years old found that higher exposure to manganese in well water, reflected by higher manganese levels in hair, was positively correlated with hyperactive behaviors[29]. It is interesting to note that girls had significantly higher levels than boys (mean 6.3 +/- 4.4 µg/g vs 4.0 +/- 4.0 µg/g).

Manganese also exerts a strong inhibitory effect on iron absorption. As iron deficiency is correlated with ADHD symptoms, the possible confounding effect by iron also deserves examination for investigating the impact of manganese in children with ADHD. As with lead, toxic metal induced decreases in iron absorption may also represent an indirect mechanism by which manganese exerts its deleterious effects.

Assessment of Heavy Metal Status

In addition to direct blood testing of lead levels, lead may be assessed through provocative urine testing with DMSA and EDTA and potentially hair mineral analysis[30]. Reference ranges for hair lead in adults is 0-7.2 nmol/g; however, no ranges are given for children, since no lead level is considered safe in children[31]. There are currently no established reference ranges for provocative urine testing; ranges depend on the laboratory used and appear based on normal (i.e. unchallenged urine levels). Blood tests are recommended for lead in children, with alert levels being >0.12 µmol/L for whole blood samples in children under 16 years of age. Alert level for erythrocyte lead concentration is >0.27 µmol/L. Urine is not recommended for manganese testing; however, there are no current reference ranges for manganese in blood or hair measures[31].

Tobacco Smoke and ADHD:

In a cross-sectional analysis, the National Health and Nutrition Examination Survey found that exposure to prenatal tobacco, as well as environmental lead, was a clear risk factor for ADHD[7]. In this study, a representative sample, 4.2% of 4704 children (ages 4-15), were reported to have ADHD. While the highest levels of lead were shown to be linked to ADHD incidence, prenatal exposure to tobacco smoke was also significantly associated with ADHD.

The heritability of genetic factors contributing to the ADHD phenotype is considered to be 65-90% and interactions between the genotype and the environment can be decisive[32]. In a prospective longitudinal study of 305 subjects from birth to age 15, it was confirmed that children homozygous for the 10-repeat allele of the common dopamine transporter (DAT1) polymorphism, who were also exposed to prenatal tobacco smoke, had much higher hyperactivity-impulsivity than children without this combination of environmental and genetic risk factors[32]. Maternal prenatal smoking was assessed during a standardized interview when infants were three months, and postnatal smoking was assessed periodically during child development via interview. At 15 years of age, subjects were genotyped for the DAT1 40bp polymorphism variable, and assessed for inattention, hyperactivity-impulsivity, and oppositional defiant/conduct disorder symptoms. There was a significant interaction between the DAT1 genotype and prenatal smoke exposure as well as an association in males with prenatal smoke exposure who were homozygous for the DAT1 10r allele and with higher hyperactivity-impulsivity levels ($p = 0.012$)[32]. This supports the hypothesis of environmentally moderated risk for ADHD, and that effects can be dependent on genetic susceptibility operating through gene-environment interactions.

Pediatric Vulnerability to Environmental Pollutants

Children at all stages of growth and especially during fetal development are uniquely vulnerable to toxins in the

environment[5]. Not only are they more physiologically susceptible to the effects of pollutants, but the rate of uptake of these agents can be greatly increased as well. More important than increased exposure levels, however, is the developmental heterogeneity that exist in children and their potential vulnerability at critical junctures in neurological development[33,34]. Rapid and profound physiological changes are experienced by the growing child and this is greatly magnified in utero. The potential for environmental pollutants or other xenobiotics to cause irreversible damage upstream in a child's neurological development is a risk much greater than that for a fully grown adult. The effects of exposure to toxins on early embryological development from well-established examples like alcohol and thalidomide are well known and acknowledged. An, understanding of the health impacts from the myriad chemicals synthetically produced and in the environment, however, is still grossly inadequate.

In general, the increased understanding of epigenetics and ontogeny are clarifying the ways in which our chemical environment might influence early development through gene-environment interactions. The role of such factors as heavy metals and environmental tobacco smoke in this interaction and subsequent disease evolution deserves much further consideration, particularly with respect to ADHD, which has clear links to environmental toxins. The role of NDs is to identify and address the root cause of disease. Whether the root cause is dietary, genetic, environmental, or a combination thereof; the ability possessed by naturopathic doctors to assess and influence contributing factors will translate into a more effective and truly holistic approach to care.

NB: The Canadian College of Naturopathic Medicine is looking to begin recruitment for a pilot study to assess the impact of nutrient status and heavy metals in children age 6-12 with attention deficit/hyperactivity disorder. The research will take place at the Robert Schad Naturopathic Clinic beginning mid-summer 2008 and will involve the use of a combination natural health product as well as ongoing assessment of ADHD symptoms, nutritional status and heavy metal burden. For more information, please contact trial co-ordinator Kieran Cooley at kcooley@ccnm.edu.

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Electromagnetic Fields and Human Health

Dr. Sat Dharam Kaur, ND

What are Electromagnetic Fields?

Electromagnetism is a force that exists between objects composed of atoms with electrical charge. It holds the atoms together that make up our bodies and objects in the visible world of form, governs the interaction of molecules and is necessary for all chemical reactions to occur.

The movement of electrons generates an electrical field, measured in voltage. When there is a flow of electrons through a conducting material (such as the human body), an electrical current is produced, which then generates a magnetic field in the space that surrounds the conducting material. The rate and amount of current flow through the conducting material determines the strength of the magnetic field. Magnetic fields can attract and trap charged particles. Amazingly, the magnetic field produced by the flow of current through a conductor is infinite, is not easily shielded, passes through objects and walls, and travels at the speed of light. Much like sound waves that become larger as they move through space, magnetic fields weaken as they expand outward and mix with background fields, but in theory never end.[1]

Life on earth has evolved in relationship to and with a dependence upon the electromagnetic frequencies in the infrared, visible and ultraviolet spectrum – the light from the sun, as well as the natural frequencies generated by the earth. Electromagnetic radiation connects everything in the universe, forming a vast pulsating field of different frequencies, and we vibrate within that field. We receive the information present in this field both through our senses (which our brains translate into apparent reality) and on a cellular level.

Our Bodies are Receivers, Generators, Conductors and Transmitters of Electromagnetic Energy

The electrical activity that occurs in our bodies produces magnetic fields, termed biomagnetic fields. The heart produces the strongest electrical and magnetic activity of any tissue in the body, and its biomagnetic field extends indefinitely in front of and behind the body. The electrical activity of the heart is generated from the continuous rhythmic movement of positively and negatively charged sodium, potassium, chloride, calcium and magnesium ions across each heart cell membrane. The heart's magnetic field measures at 10^{-3} gauss, which is one millionth the strength of the earth's magnetic field and about one-thousandth of the background magnetic field in a city environment. Brain activity also produces an electromagnetic field, hundreds of times weaker than the heart's field. Each of our muscles produces a small magnetic pulse when it contracts, which it radiates into surrounding space.[2] The measurable biological electricity generated by the body in each of these cases arises from the passage of charged ions across cell membranes, and the ability of these membranes to temporarily depolarize and repolarize.

All living cells and chemical processes rely on electromagnetic interactions between molecules, responsible for the making and breaking of chemical bonds, the release of energy from food, the production of cellular energy and the transport of minerals, nutrients, hormones, neurotransmitters and neuropeptides across cell membranes. Just as we use electromagnetic frequencies to communicate with one another via radio, the internet or by telephone, electric and magnetic fields generated by our bodies' tissues and organs are part of its own complex and rapid internal communication system. When those electromagnetic frequencies are insufficient or disrupted, illness can occur.

James Oschman, in his important book, *Energy Medicine: The Scientific Basis*, suggests that our entire body can conduct electrons, and transmit energy in a precisely controlled fashion, acting as a semi-conductor for the spectrum of electromagnetic energy and frequencies traveling at the speed of light.[3] In recent years, scientists have determined that the hollow, spaghetti shaped microtubules present in all our cells act as miniature fiber optic cables capable of transmitting electromagnetic frequencies.[4] (Not unlike the fiber optic cables that carry high speed information to us through the Internet). The water in and around the cell and within the microtubules "records" the information or "consciousness" contained in frequencies and photons (and homeopathic remedies).[5] This information is then communicated through the microtubules nearly simultaneously to all parts of the body.[6] In effect, the water and matter of the body continually download and transmit information or "consciousness" coming from the interaction of the magnetic fields within us and around us. Our body is our personal computer, linked with the living computer that is the universe.

The body generates many different vibratory frequencies, primarily in the ranges of near infrared, visible light and the ultraviolet spectrum.[7] These vibrations are transmitted within the organism at the speed of light, and are radiated into the environment. They serve as signals that regulate processes of growth, repair, defense, co-ordinating cellular activity and the function of the individual as a whole.[8] In short, they regulate body chemistry.[9] In 1988, the scientist Albert Szent-Gyorgyi theorized that, "molecules do not have to touch each other to interact. Energy can flow through … the electromagnetic field …The electromagnetic field, along with water, forms the matrix of life. Water … can form structures that transmit energy."[10]

The Earth's Magnetic Field

The earth's magnetic field fluctuates when the electrical charges from clouds and the surface of the earth build to generate lightning, which occurs about 200 times every second. The space between the surface of the earth and the ionosphere (the atmospheric layer that is ionized by solar radiation and forms the inner layer of the magnetic field) creates a cavity in which electromagnetic pulses from lightning bounce around the earth. Lightning pumps energy into this cavity, causing it to resonate at frequencies between 1-40 Hz, with an average frequency of 7-10 Hz. This is known as Schumann resonance, after the German atmospheric physicist who discovered it in

the 1950s. These frequencies are similar to those produced by our hearts and brains, and emitted from the hands of healers, although the Schumann resonance is thousands of times stronger. Our health and function are affected by whether we are synchronized with the pulsations of the Schuman resonance or not. When shielded from the earth's magnetic field in underground rooms, subjects developed irregular and chaotic biological rhythms with disturbances in sleep, body temperature, and urination. Normal rhythms were restored when they were exposed to a weak electromagnetic field of 10 Hz, which mimicked the earth's field.[11] Studies demonstrate the effectiveness of pulsed magnetic field therapy using 10 Hz and other frequencies in the treatment of pain, bone fractures, sprains, Alzheimer's Disease, venous insufficiency, epilepsy and depression.[12]

One part of our body that is particularly sensitive to magnetic fields is the pineal gland, located in the centre of the brain. Between 20 to 30 percent of pineal cells are magnetically sensitive, and they can respond to magnetic field changes with fluctuations in the production of melatonin, which helps to regulate body rhythms. [13]

Brain wave patterns and bodily symptoms are affected by the frequencies produced by the Schumann resonance. In a controlled setting, subjects exposed to frequencies of 3 Hz experienced headaches, tightness in the chest, sweating palms and a slower reaction time, while subjects exposed to fields of 8-10 Hz had faster reaction times.[14] The space between the surface of the earth and the ionosphere is higher at night, and as the resonant cavity increases, the frequency of the Schumann resonance decreases, just as a stringed instrument such as a cello (with a larger resonant cavity) produces a lower sound than a violin, which has a smaller resonant cavity. This nighttime change in the Schumann resonance causes a slowing down in the activity of our brainwaves, helping us to sleep. Once we fully recognize our ties to the magnetic field of the earth, we can be more careful about minimizing electromagnetic interference patterns that undermine our health and sleep.

Geopathic Stress as a Health Risk

Geopathic stress refers to external electromagnetic energy generated by the earth itself or by artificially produced fields (such as those coming from cell phone towers, hydro lines, or underground subways), that disturb the frequencies directing the body's cellular processes, and may contribute to chronic illness. These fields disturb the body's electromagnetic field, its electrical system (the brain, heart and muscles) or may disrupt the conduction of energy and information through the chakras, meridians and bioelectronic network, interfering with healing.[15]

When water flows underground in streams, springs or in metal pipes, it generates an electric and a magnetic field. If waterways cross one another underground, interfering magnetic field patterns are created above the crossing that may affect us as we sleep. Health practitioners have observed that serious illnesses, including cancer, can occur in clusters over areas of geopathic stress.[16]

In the mid 1900s a German medical doctor, Ernst Hartmann, discovered an intersecting grid of magnetic field lines just over eight inches thick that lace the earth in a north-south and east-west direction every 6-8 feet and hold either a negative or positive charge. These are called Hartmann lines. Areas where these grid lines cross can create energetic disturbance patterns above them. Dr. Hartmann documented many cancer patients who were exposed to geopathic stress, and was convinced that there was a connection.[17] A 2003 Russian study determined that in utero and early infancy exposure to geopathic stress could predispose an individual to cancer later in life – specifically cancers of the breast, ovary, lung, bladder, prostate, liver, Hodgkin's disease and lymphoma.[18]

A second set of electromagnetic lines emanating from the earth was found that travel diagonally to the poles and are about 3 meters apart, although this can vary. This is called a Curry net after one of the men who discovered them. Disturbance patterns may be created where these intersect as well.[19]

If you or a patient has been feeling unwell since a move, or since sleeping in a new location, or if one has cancer or any neurological condition, investigate geopathic stress. Sites can be assessed by experienced dowsers or with sensitive magnetometers (available from Alphalab Inc in the U.S.). Vega testing, or other forms of electrodermal testing, may be able to assess whether one is affected by geopathic stress. Experiment by moving the bed to the other side of the room or by sleeping in a different location for a time while observing symptoms.

Electromagnetic Pollution

Human activities generate extremely low-frequency electromagnetic fields (ELFS), radio waves, microwaves, X-rays and gamma rays, contributing to electromagnetic "pollution", which undermines our health. Some of the documented effects of long term exposure to artificial electromagnetic fields (EMFs) in the extremely low frequency, radio wave and microwave frequencies are:

- increased incidence of breast cancer in women and men[20] exposed occupationally to extremely low-frequency electromagnetic fields.[21, 22] 60 Hz magnetic fields enhance breast cancer cell proliferation by blocking melatonin, which would ordinarily help protect our breasts from cancer.[23]
- some, though not all studies show a rise in breast cancer risk in women who use electric blankets, proportional to the number of years of use, the number of seasons used and the length of time of use during sleep[24]
- a higher risk of neurological disorders such as amyotrophic lateral sclerosis (ALS) and multiple sclerosis (MS) in employees in the utility industry exposed to extremely low-frequency 50 Hz fields[25]
- female radio and telegraph operators exposed to extremely low-frequency (50Hz) fields and radio frequencies are more susceptible to breast cancer[26]
- increased incidence of childhood leukemia in children exposed to extremely low-frequency electromagnetic fields emanating from the generation, transmission and use of electricity[27]
- increased mortality rates for all cancers and leukemia in certain age groups living within 2 km of an AM radio broadcasting tower of over 100kW[28]

- some, though not all, studies show that microwave exposure from cell phone use increases the risk of tumours in the head, including acoustic neuroma and uveal melanoma[29]
- a slowing down of brain waves as measured by an EEG while individuals were using a cell phone, continuing for 15-20 minutes after the cell phones were turned off[30]
- brain neuron damage in rats that were exposed to 15 min of 900 MHz pulsed microwaves (cell phone frequencies) and immediate changes in neurotransmitter receptors[31]
- increased risk of hematopoietic (related to the production of red and white blood cells), and lymphatic tissue cancer in people living near TV and radio broadcasting transmitters[32]
- people who reside near cell phone towers experience circulatory problems, sleep disturbances,[33] irritability, depression, blurred vision, concentration difficulties, nausea, lack of appetite, headache and vertigo[34]
- interference with the proper functioning of artificial pacemakers in individuals with heart problems[35]
- DNA damage to bone marrow cells in rats that were exposed to 910 MHz fields (in the frequency range of cell phones) for 2 hours a day for 30 days[36]

The Problems with "Dirty Power"

Regular "clean" power or electricity enters our homes through power lines at a frequency of 60 Hz. "Dirty power" occurs when this 60 Hz frequency is polluted with other high frequency signals (from radio waves) flowing through both the wires and through the earth. Over 70 percent of the electrical current returns to the utility power substation through the earth, rather than through wiring as intended, because the wires are overloaded with high frequencies generated by modern electronics, such as computers, VCRs, fax machines, and televisions. Electricity returns to the substation by the path of least resistance, which may be the ground, plumbing, people and animals, and we may unwittingly become part of an electrical circuit when we stand on a lawn or wash dishes in our homes.[37]

Studies on dairy cows have found that they produce less milk when exposed to electrical currents coming from the ground or traveling through their water supply.[38] Increased incidence of disease, low reproductive capability, harmful changes in the composition of the cerebrospinal fluid that nourishes the brain and spinal cord, and increased deaths in cows and calves are common in herds exposed to excessive electricity.[39-41]

In humans, health problems related to "dirty power" have been termed "radio wave sickness". Dr. Magda Havas from Trent University found that many individuals with multiple sclerosis were dramatically improved when filters for dirty power were installed in their homes. Symptoms of dirty power exposure may include:

Neurological: headaches, dizziness, nausea, poor concentration, attention deficit disorder, memory loss, irritability, depression, anxiety, insomnia, fatigue, weakness, tremors, muscle spasm, numbness, tingling, altered reflexes, muscle and joint pain, leg/foot pain, flu-like symptoms, fever, epilepsy, stroke, paralysis, multiple sclerosis, ALS, Alzheimer's disease, Parkinson's disease.

Cardiac: palpitations, arrhythmias, chest pain or pressure, blood pressure irregularities, slow or fast heart rate, shortness of breath.

Respiratory: sinusitis, bronchitis, pneumonia, asthma

Dermatological: skin rash, itching, burning, facial flushing

Eye Symptoms: pain or burning in the eyes, pressure behind the eyes, deteriorating vision, floaters, cataracts

Other: digestive problems; abdominal pain; enlarged thyroid; ovarian pain; dryness of the lips, tongue, mouth and eyes; excessive thirst; dehydration; nosebleeds; internal bleeding; hypoglycemia or diabetes; immune dysregulation; hair loss; teeth pain; poor sense of smell; ear ringing; chronic fatigue; fibromyalgia; cancer.[40]

Although this is a very broad list of symptoms, the susceptibility to radio wave sickness should be taken seriously, and whenever a mix of the above symptoms is present, the home and work environments of the individual should be measured for high frequency waves that overlay the 60 Hz wave form produced by "clean" electrical power.

Detecting Electromagnetic Pollution and "Dirty Power"

Electric fields, magnetic fields and radio/microwave fields can all be measured separately on one instrument called a Trifield Meter, available from Alphalab Inc. in the U.S. at www.trifield.com. I lend these meters out to patients and ask them to record the values in their homes. Prolonged exposure to a magnetic field higher than 2 mG can be detrimental to health, as can chronic exposure to radiowaves or microwaves.

Dirty Power is measured by plugging a specially designed instrument into an electrical outlet. The instrument first filters out the clean 60 Hz wavelength (which may be harmful by itself) and then registers the high frequency fields above 10,000 Hz, which significantly add to the total electrical pollution. This instrument can be ordered from www.bio-ag.com. If both of these devices are used, most of the potentially harmful fields (with the exception of geopathic stress) will be detected.

How to Decrease Electromagnetic Pollution:

Although the electromagnetic pollution around us is invisible, it can cause harm. We are exposed to these fields daily, within our homes and workplaces. Pay attention to the location of hydro lines, cell phone towers and AM radio transmission towers. To decrease your exposure to electromagnetic pollution, consider the following guidelines:

1. Keep a 'safe' distance from the source of electromagnetic fields - at a distance of 2½ feet, the fields are 80% less powerful. Move televisions, power bars, clock radios and lamps at least 2½ feet from your bed or where you sit for long periods of time. Walls do not stop magnetic fields, so be aware of the location of your electric service panel, your electric meter, wiring in your walls, wireless Internet routers/antennae and transformers for electronic gadgets – and place furniture or beds away from these areas.

2. Keep EMFs under 1 mG in the bedroom.
3. Avoid using electric blankets, heating pads and water beds.
4. Sleep in a dark room at night.
5. Do not use a microwave oven. Remove it from your home.
6. Use less electricity, fewer electrical conveniences, and try living without a dishwasher, a clothes dryer, or a television.
7. Turn off or unplug all electrical devices when not in use, including your computer.
8. Use a wind-up watch rather than one with a quartz crystal or battery.
9. Do not buy a house or live within 2 km of a cell phone tower or AM radio transmission tower; 60-200 feet from distribution lines and 300-1,000 feet from transmission lines. Cell tower strobe lights will cause emissions of "dirty power".
10. Use a regular phone, rather than a cordless phone or cell phone. The cordless phone emits a high frequency field. The cell phone exposes your brain to microwaves. Have your phone company install a radio frequency filter on your phone line to cut out these frequencies.
11. Steel belted radial tires can expose car passengers to fields as high as 50 mG, which is too much if you are spending hours a day in a car. Arrange your life so there is less time spent in a car.
12. Do not use touch lamps or halogen lights or the new spiral energy efficient bulbs.
13. Hire an electrician to: a) inspect for and eliminate loose or poor connections; b) replace poorly made switches, fixtures and appliances; c) replace dimmer switches with regular On/Off switches; d) make sure the wire between the meter and your electrical box is wide enough so it doesn't bottleneck high frequencies.
14. Have your utility company trim branches bumping or touching overhead wires; and ask them to replace split-volt connectors with crimp-on connectors if the split-volt connectors are on your line.
15. Design your office so that your exposure to EMFs from computers, photocopiers and printers is less than 2 mG (0.2 microteslas).
16. Purchase high frequency filters from Stetzer Electric (email dave@stetzerelectric.com) and plug these into your electrical outlets to reduce dirty power. You will need about 20 of these for an average house. Educate your neighbours to do the same.
17. Use rubber gloves when washing dishes or stand on a non-conductive rubber or cloth mat to block the flow of electrical current into your body.
18. If you live off the grid and have alternative (solar or wind) power, install filters to clean up the wave form the inverter generates.

For more information on electromagnetic fields, read *Warning: The Electricity Around You May Be Hazardous to Your Health* by Ellen Sugarman and *Crosscurrents* by Robert O. Becker M.D. See www.electricalpollution.com.

About the Author

Sat Dharam graduated in 1989 from the Canadian College of Naturopathic Medicine with awards in homeopathy and psychology. She holds both B.Sc. and B.A. degrees from the University of Guelph and a diploma in fine art from the Ontario College of Art. Sat Dharam was awarded the "Naturopathic Doctor of the Year" award by the Ontario Association of Naturopathic Doctors in 2000 for her work in breast cancer prevention and environmental education.

Sat Dharam developed the *Healthy Breast Program* in an effort to educate women in naturopathic ways to prevent and treat breast cancer. She has taught the *Healthy Breast Program* to patients and the public since 1996 and lectures regularly at the Canadian College of Naturopathic Medicine on breast health and stress management. She presented the *Healthy Breast Program* at the first, second and third world conferences on Breast Cancer in 1997, 1999 and 2002, and at conferences around the world. Sat Dharam's bestselling books include *A Call to Women, The Complete Natural Medicine Guide to Breast Cancer,* and *The Complete Natural Medicine Guide to Women's Health.*

Sat Dharam has been studying Kundalini Yoga with Yogi Bhajan since 1979 and has facilitated teacher training programs in Toronto and New Mexico. She has developed a yoga-based addiction recovery program, as well as a breast health yoga training, designed to help educate women in breast cancer prevention through Kundalini Yoga and lifestyle change. She has been a guest instructor at the summer Kundalini Yoga Festival in France, at 3HO Women's Camps in New Mexico and at the Toronto Yoga Show in 2004. Sat Dharam teaches a popular and transformative 240-hour Kundalini Yoga Teacher Training Program in Toronto annually. www.trilliumhealingarts.ca

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Why it is best to avoid farmed salmon

Dr. Walter Crinnion, ND

Twenty-three years ago, a lead article in the New England Journal of Medicine (NEJM) reported that men in a Danish fishing village who ate at least 30 oz of salmon per week had half the risk of having a heart attack as their bovine-consuming neighbors.[1] Since heart disease was, until very recently, the leading cause of death in this country, physicians have been recommending that everyone eat fish at least once weekly. In addition to its benefit in reducing cardiovascular mortality, fish oils have also been found to reduce arthritis[2] and other inflammatory disorders and to improve cognition (particularly in the offspring of mothers who regularly ate fish)[3]. The NEJM article was published in May of 1985 and between 1987 and 1999 the annual salmon consumption in the United States increased by 23%. During the same time period it increased by 14% in Europe[4].

This increase in fish consumption has unfortunately not proven to be a boon to the hardy fishermen and women of Alaska. In fact, since the Exxon Valdez disaster these hard-working folks are getting far less money per pound for their fish than they were prior to the disaster (which is still not cleaned up). Close to 60% of the salmon now sold is raised in farms located around the globe (British Columbia, Washington State, Chile, and Northern Europe) in which Atlantic salmon (genus *Salmo*) are crowded into pens and fed fish meal pellets. Salmon in the grocery store or at a restaurant that are labelled "salmon" or "Atlantic Salmon" are farmed. What most people don't realize is that the presence of these pens in the Pacific Northwest poses a serious threat to the native runs of pacific salmon (genus *Oncorhyncus*) in those areas[5].

While the health benefits of wild salmon are well understood, the potential toxicity of the farmed salmon needs to be highlighted. Several studies that measure levels of polychlorinated biphenyls, dioxins, and other persistent chlorinated contaminants in farmed salmon have been completed and indicate high level of these persistent environmental pollutants. A study done by the Food Safety Authority of Ireland found that farmed salmon had an average of four times the amount of PCBs and Dioxins as wild salmon[6]. In the United States, the Environmental Working Group (EWG - ewg.org) did a small study on farmed salmon that were purchased at stores in Washington DC, San Francisco, and Portland, OR[7]. They found that seven of the ten farmed salmon purchased had levels of PCB that should raise serious health concerns. The EWG researchers found an average PCB level of 27.3 ppb in these ten fish studied with highest levels in the salmon that was raised in Scotland. It is of note that the average PCB level was over five times higher than the level of PCBs found in a sampling of wild salmon[8].

These studies, conducted on relatively small numbers of fish, had their findings confirmed in a subsequent study in over 700 salmon (totaling approximately 2 metric tons of both farmed and wild salmon) from around the globe[9]. Thirteen persistent chlorinated chemical pollutants were found in significantly higher levels in the farmed salmon than in the wild salmon. The only compound that did not reach statistical significance was lindane, although it was still higher in the farmed versus wild salmon. The four compounds that demonstrated the greatest differences were PCBs, dioxins, toxaphene, and dieldrin. The least contaminated fish samples came from farms in Washington State and Chile yet still had significantly higher levels of PCBs, dioxins and dieldrin than those salmon found wild. The most contaminated farmed salmon came from Scotland and the Faroe islands.

The researchers also tested the fish pellets that these farmed salmon were fed. They looked at samples of salmon feed from global suppliers that account for 80% of all salmon feed sold world-wide, and determined the feed to be the main source of contamination. The levels of the toxins in the fish were directly related to their presence in their feed. Feed pellets are made from smaller fish that have been contaminated with pollutants. Toxins like PCBs then build up in the farmed salmon at levels about 20 to 30 times that of their background environment and feed.

Proponents of aquaculture (fish farming) are ready to point out that these levels are not necessarily a health hazard. However, studies that have looked at the effect of PCB intake on offspring appear to contradict that stance. There have been a number of studies that measure maternal levels of PCBs and then follow the mother's children over a number of years. Findings from these studies indicate that the higher the serum levels of maternal PCBs the greater the neurological deficits in the offspring.

For instance, in 1979 rice bran cooking oil that was contaminated with PCBs was used for a number of months in Taiwan. Children born to exposed mothers (including children born up to six years after the exposure) were then followed for persistent neuro-psychological problems. After six years post exposure the offspring scored an average of 6 IQ points lower than their older siblings who were themselves exposed to the PCBs, albeit at lower levels[10]. In addition they exhibited 23% greater rates of problem behavior and 15% greater levels of hyperactivity than the controls[11]. By age 17, these children still showed significantly greater problems with behavior and had a persistent IQ reduction averaging 3 IQ points. This was true even in children born to mothers up to six years after their exposure[12].

A study done in Michigan, USA followed the development of children born to mothers who had consumed fish from Lake Michigan that were polluted with PCB[13]. These were not farm-raised fish, but still had 4-16 times the level of PCBs found in most wild fish. Even though the average maternal serum levels of PCBs were only mildly higher than US averages, these children did show persistent effects. By age 11 the children had reduced total IQ, especially verbal IQ, that became more pronounced as the maternal

levels of PCBs increased. IQ drops in the group with the highest maternal serum levels averaged 6.2 points. This reduction in IQ is similar to that found in children with elevated blood lead levels. The children with in-utero exposure had poorer verbal and reading comprehension, poor "freedom from distractibility", reduced short and long-term memory, and decreased ability to organize and plan. These children were more than three times more likely to perform poorly on testing and were at least two years behind their controls in reading skills. Fortunately levels of PCB in maternal breastmilk had absolutely no association with these neurotoxicity effects. It appears that these defects are developed secondary to PCB exposure in utero, not so much after delivery.

The alarming point of the ongoing Michigan study is that the mothers had blood PCB levels only slightly above the US average. Persons that regularly eat farmed fish are likely to have much higher than normal PCB levels. Even though no federal agency has put out a warning (although there are warnings to avoid PCBs in other products), I think it would be prudent to let all women for whom pregnancy is possible know that they should avoid all exposure to farmed salmon. Fortunately every grocery store seems to have cans of Alaskan Salmon that are readily available for use. With the highest EPA/DHA levels of any fish and very low mercury and PCB levels, it provides one of the best sources of fish in the diet.

The question remains, what does a person do with elevated PCB levels in their blood? As shown in the Taiwan study, children born up to six years after the mother's exposure still had problems. PCBs are fat-soluble and tend to stay in the body for a long time after having been redistributed throughout adipose stores. The human body is not designed to easily get rid of fats or oils and these compounds tend to bioaccumulate. Supplementation that helps to produce and dump bile (i.e. cholagogues and cholaretics) and support bile excretion from the body should be beneficial. Psyllium is still the only fiber that is known to actually increase fecal bile content[14]. Having patients undergo a program that combines low temperature dry sauna (infrared or radiant heat units) and colonic irrigation may be one of the best protocols to reduce levels of PCBs.

PCBs have also been associated with different cancers. One of my cancer patients had his PCB levels tested prior to going through our intensive cleansing program for a period of four weeks. He was retested twice as he continued to do a maintenance cleansing protocol. His initial program included three hours of low temperature sauna five days weekly for 20 sessions. Each session was also followed by constitutional hydrotherapy and colonic irrigation. Supplementation was included as part of his cleansing program along with dietary changes. After the initial 20 sessions he did one colonic irrigation weekly for the following 18 months. Prior to starting his cleansing program he had 3 (out of 10 tested) PCBs present in his blood totaling 2.5 ng/ml (ppb). Eleven months later only 2 were present for a level of 1.4 ng/ml. Seven months after that none were detected! This rate of decline far outpaces the normal glacial reduction of PCBs in the serum (as highlighted in the Taiwan spill studies[15]), showing that this cleansing method was clearly effective for this individual in reducing his body burden of PCBs.

While such cleansing programs are available to reduce the body burden of persistent chemical pollutants, it would be wiser to avoid exposures to them in the first place. For the sake of the children-to-be, the intake of all Atlantic salmon should be avoided.

About the Author

Dr. Crinnion received his Naturopathic degree from Bastyr University (1982). He developed an emphasis in environmental medicine and operated a comprehensive cleansing center in the Seattle area for twenty years. His main concentration is in environmental medicine and he utilizes several types of therapies when treating patients, including IV therapy, hydrotherapy, and botanicals. In addition to directing SCNM's Environmental Medicine Center of Excellence, he is an adjunct faculty member at NCNM, Bastyr University, and University of Bridgeport, teaching environmental medicine at all four of the Naturopathic medical schools in the United States.

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A heavy load: an overview of the toxic burden of the average Canadian

Dr. Jean-Jacques Dugoua, HBSc, ND, PhD (Cand.)

Throughout 2006 and 2007 I was involved in a project with the Artist Health Center, in association with the Ontario College of Art and Design (OCAD) and a non-governmental organization called Environmental Defence, on educating artists on safe studio practices and the risks their art could have on their health. The project was funded through a Trillium grant. We gave presentations throughout Ontario, e.g. Timmons, Thunder Bay, Toronto, Ottawa, etc. The first half of the seminar was on health and safety and was conducted by a colleague from OCAD. Based on my experience as an environmental consultant for a number of years and as a naturopathic doctor (ND), I was invited to give the second part of the lecture on environmental medicine and detoxification.

In one of my slides, I discussed that the average North American has a certain toxic load. Many studies have shown that we contain toxins that are unlikely to have been from industrial exposure. How many of us have directly handled polychlorinated biphenyls (PCBs)? Next to none, yet we seem to find these in 4-year old children in Michigan[1]. This likely reflects the bio-persistence and poor biodegradability of many chemicals released into the environment. The purpose of this article is to discuss the toxic load present in all of us.

National Human Adipose Tissue Survey

In 1967, the United States (US) Environmental Protection Agency (EPA) established the National Human Monitoring Program (NHMP) to assess human exposure to toxic substances. Its primary component was the National Human Adipose Tissue Survey (NHATS), an annual survey conducted from 1970 to 1989 to collect and chemically analyze human adipose tissue specimens for the presence of toxic chemicals[2]. Fat samples were collected from cadavers and individuals undergoing elective surgeries throughout the US2.

The NHATS is the main reference in the scientific literature for assessing the toxic load in the US. Their results showed that:

- 100% of the samples contained octachlorodibenzodioxins (OCDD), styrene, 1,4-dichlorobenzene, xylene and ethylphenol2;
- 91-98% of the samples contained benzene, toluene, chlorobenzene, ethylbenzene, DDE, dioxins (3), furan (1);
- 87% of the samples contained beta-Benzenehexachloride (beta-BHC);
- 83% of the samples contained PCBs; and
- 76% of the samples contained 20 or more chemicals.

Although many of you are familiar with some of the chemical names listed above, you may be surprised to see how so many are found in common household items (please see table 1).

Canada

Unfortunately the vast majority of data on human chemical load comes from the US. Currently, there are limited biomonitoring data for the general Canadian population. In response to this knowledge gap, Health Canada is collaborating with Statistics Canada in the Canadian Health Measures Survey (CHMS). A biomonitoring component was added to the CHMS to measure human levels of environmental chemicals in a sample that represents the overall Canadian population.

The CHMS began during winter 2007 in Newfoundland and will be carried out over 24 months throughout 15 randomly selected sites across the country; representing approximately 97% of the population. The survey will involve a sample of 5,000 Canadians, both male and female, from each of the following age groups: 6-11, 12-19, 20-39, 40-59 and 60-79 years. Blood and urine specimens will be collected in a mobile clinic and analyzed for a number of different classes of substances (metals, phthalates, PCBs, brominated flame retardents, organochlorine pesticides, organophosphate insecticide metabolites, phenoxy herbicides, cotinine, perfluorinated compounds, and bisphenol-A). There will also be a questionnaire for each respondent to allow for the analysis of risk factors related to exposure to these environmental chemical substances.

To learn more go to www.statcan.ca/english/concepts/hs/measures.htm#3.

Toxic politics

Although we're lacking population-based data on the toxic load of Canadians, Environmental Defense has conducted a very interesting study on politicians. In 2006, four federal politicians volunteered to be tested for 103 different chemicals[3]. The participating politicians included Rona Ambrose (Minister of the Environment), Tony Clement (Minister of Health), Jack Layton (Leader of the NDP), and John Godfrey (Liberal Environment Critic). Each politician was tested for 103 chemicals that fall under the groups listed below. Table 4 summarizes the common sources of these chemicals.

- PBDEs (polybrominated diphenyl ethers),
- PFCs (perfluorinated chemicals),
- PCBs,
- PAHs (polycyclic aromatic hydrocarbons),
- OPIMs (organophosphate insecticide metabolites),
- OCPs (organochlorine pesticides), and
- Heavy metals such as lead and mercury.

Of the 103 chemicals tested, a total of 61 were detected (59%) in the four volunteers, including 18 PBDEs, five PFCs, 13 PCBs, three OPIMs, 10 OCPs, seven PAHs and five metals (Table 2)[3]. The number of chemicals detected in each volunteer ranged from 49 to 55 (Table 2)[3]. Many

Table 1: Sources of common toxins found in humans

Dioxins	One of the most toxic substances.
Octachlorodibenzodioxins (OCDD)	**Sources:** chlorine bleaching process at pulp and paper mills, chlorination at waste and drinking water treatment plants, contaminants in the manufacture of certain organic chemicals, emissions from municipal solid waste and industrial incinerators, metal smelting and cement kilns
Styrene	Styrene is widely used to make plastics and rubber. **Sources:** insulation, fiberglass, plastic pipes, automobile parts, shoes, drinking cups, food containers and carpet backing.
1,4-dichlorobenzene	1,4-Dichlorobenzene is a colorless to white solid with a strong, pungent odor. **Sources:** toilet bowl deodorants, garbage deodorants, moth balls and flakes
Xylenes	Xylenes occur naturally in petroleum and coal tar, and are highly flammable. They are one of the top 30 chemicals produced in the US. Sources: chemical and petroleum industries, solvent (printing, rubber and leather industries), cleaning agent, paint thinner, paints, varnishes, airplane fuel and gasoline
Ethylphenol	**Sources:** decaying manure
Benzene	Benzene is a natural part of crude oil and is highly flammable. Natural sources of benzene include emissions from volcanoes and forest fires. It is one of the top 20 chemicals produced in the US. **Sources:** industries (plastics, resins, nylon and other synthetic fibers), rubbers, lubricants, dyes, detergents, drugs, pesticides, crude oil, gasoline and cigarette smoke
Toluene	Toluene occurs naturally in crude oil and in the tolu tree. **Sources:** gasoline and other fuels from crude oil, making coke from coal, paints, paint thinners, fingernail polish, lacquers, adhesives, rubber, printing and leather tanning
Chlorobenzene	Chlorobenzene was used in the past to make other chemicals, such as phenol and DDT. **Sources:** solvent for some pesticide formulations, automobile parts degreaser, and a chemical intermediate to make several other chemicals
Ethylbenzene	Ethylbenzene smells like gasoline and is naturally found in coal tar and petroleum. Ethylbenzene is used primarily to make styrene. **Sources:** inks, pesticides, paints, solvent, fuels, and other chemicals
Dichlorodiphenyltrichloroethane (DDT) dichlorodiphenyldichloroethylene (DDE) Dichlorodiphenyldichloroethane (DDD)	DDT is a pesticide once widely used to control insects in agriculture and insects that carry diseases such as malaria. In 1972, DDT was banned in the US because of damage to wildlife, but is still used in some countries. DDE and DDD are chemicals similar to DDT that contaminate commercial DDT preparations. DDE has no commercial use. DDD was also as a pesticide, but its use has also been banned. DDD has been used medically to treat cancer of the adrenal gland.
beta-Benzenehexachloride (beta-BHC)	Formerly used as an insecticide.
Polychlorinated biphenyls (PCBs)	PCBs are mixtures of up to 209 individual chlorinated compounds. There are no known natural sources of PCBs. In 1977, the manufacture of PCBs was stopped in the US because of evidence they build up in the environment and can cause harmful health effects. **Sources:** coolants and lubricants (transformers, capacitors and other electrical equipment), old fluorescent lighting fixtures and electrical devices, old microscopes and hydraulic oils.

Source: www.atsdr.cdc.gov

of the chemicals detected in the politicians are associated with adverse health effects[3]. In total, 54 carcinogens, 37 hormone disruptors, 16 respiratory toxins, 54 reproductive/developmental toxins, and 33 neurotoxins were detected in the study volunteers (Table 3)[3].

Table 2: Comparison of politician's test results: number of chemicals detected[3]

Chemical group	Number of compounds tested	Number of compounds detected				
		In all 4 people	Jack Layton	Rona Ambrose	Tony Clement	John Godfrey
PBDEs	40	18	17	17	18	18
PCBs	16	13	12	12	13	12
PFCs	13	5	5	4	4	4
OCP	13	10	10	9	10	9
OPIM	6	3	2	1	3	3
PAHs	10	7	4	1	1	4
Metals	5	5	5	5	5	5
Total	103	61	54	49	54	55

Table 3. Number of chemicals detected in the politicians that are linked to a listed known or suspected health effect[3]

Chemical's effect on health	Total detected	Number of chemicals detected that are linked to a listed known or suspected health effect			
		Jack Layton	Rona Ambrose	Tony Clement	John Godfrey
Carcinogen	54	45	42	47	47
Hormone disruptor	37	34	35	37	37
Respiratory toxin	16	11	8	9	9
Reproductive/Development toxin	54	45	42	47	47
Neurotoxin	33	29	29	33	33
No data on health effects	3	3	2	2	2

Table 4: Common sources of the chemicals analyzed in four Canadian politicians[3]

PBDEs (polybrominated diphenyl ethers)	PBDEs are used in flame retardants, which are applied to upholstered furniture, mattresses, curtains, carpets and electronics to slow the spread of fire. PBDEs can migrate from products, and have been detected in house dust, human blood and breast milk.
PFCs (perfluorinated chemicals)	Precursors chemicals widely used in a range of consumer products for their resistance to environmental breakdown. PFCs are used to make non-stick coatings on items such as cooking pans, and stain repellent coatings on everything from carpets and furniture to microwave popcorn bags and fast-food packaging.
PAHs (polycyclic aromatic hydrocarbons)	PAHs come from both natural and human-made sources, and are formed during the incomplete burning of coal, oil, gas, garbage, or other organic substances; some PAHs are manufactured. Forest fires are the largest natural source of PAHs in Canada. The greatest human-made sources of PAHs in air, water and soil are aluminum smelters, coking plants, creosote-treated products, spills of petroleum products, and transportation.
OPIMs (organophosphate insecticide metabolites),	Dialkyl phosphate metabolites are breakdown products of organophosphate insecticides, which have a variety of applications for lawns, agricultural crops, and mosquito and pest control.
OCPs (Organochlorine pesticides)	OCPs are mainly used on agricultural crops.

Your load and the dirt from your neighbours

As we patiently wait for the results from the CHMS, there are other ways to estimate our toxic load. You can assess urine, hair and blood heavy metal (Hg, Pb, As, Cd, Al, U, Ni, Sn, Ag, Be, Ba, Tl, Sb) levels through the London Laboratory Services group (www.lhsc.on.ca/lab) in London (Ontario) or Doctors Data (www.doctorsdata.com) in the US. For the majority of the organic, non-organic and pesticide-related chemicals discussed above, you can assess blood, urine and tissue levels through Accu-Chem Laboratory (www.accuchem.com) in Texas.

Another way to estimate your toxic load is to investigate what your neighbors are doing in their backyard. PollutionWatch (www.pollutionwatch.org), a collaborative project of Environmental Defence and the Canadian Environmental Law Association is a database that provides information on the polluters in your community. Visit this site and simply enter your postal code and it gives you the major polluters in your neighborhood. You are provided with the name of the facility and the owner, the total yearly amount of toxins released in kilograms, the National Pollutant Release Inventory (NPRI) rank, the total yearly amount in tons of CO_2 of greenhouse gases released and the Greenhouse Gas National Rank. For example, when I punch in my postal code, the major polluter in my area is the Toronto plant of Houghton Canada. They release 54 kg of pollutants annually and are ranked 6,430th in the country as polluters. Hardly an organic farm, but I've seen far worse. Maybe it's time to move…

The solution: Avoidance and Detoxification

Once you've identified your toxic load, the next step is to minimize your exposure to chemicals as much as possible. This may involve a number of steps, such as encapsulating areas of your home that may be out-gassing volatile chemicals, using skin barrier creams and breathing devices when handling certain chemicals, looking into non-mercury amalgams for your fillings, avoiding large predatory fish such as kingfish, shark, tilefish, and swordfish that are known to be high in mercury and more.

As NDs, I believe we are very familiar with detoxification. Vitamins, minerals, supplements, herbal medicines, homeopathic remedies and many other modalities can be included in a detoxification plan. Lifestyle changes are key to effective detoxification, including but not limited to, exercise, hypoallergenic organic diet, moderate alcohol consumption, being a non-smoker, avoiding recreational drugs, stress management, proper sleep hygiene, drinking water, and more. There are also adjunct modalities that are of benefit to detoxification: infrared sauna, hydrotherapy, lymphatic drainage, dry skin brushing, and therapeutic fasting are some examples.

About the Author

Dr. Jean-Jacques Dugoua, or Dr. JJ as he is affectionately known, is a researcher at the Motherisk Program at Sick Kids Hospital. He is a licensed naturopathic doctor and the Clinic Director of the Liberty Clinic in downtown Toronto. Dr. JJ is the first Naturopathic Doctor to practice at the Toronto Western Hospital in the Artist Health Center. Dr. JJ is a co-author of "Herbal Medicines in Pregnancy and Lactation – An Evidence-based Approach First Edition" (Taylor & Francis, 2006). Dr. JJ has over a dozen peer-reviewed scientific publications published or in press. He is a leading expert on natural health products pharmacology and pregnancy safety.

Dr. JJ is an avid public speaker. He has given over two-dozen presentations to pharmacists, medical professionals, government, academics, artists and musicians, students, teachers and the general public. Dr. JJ has also given presentations internationally, including presentations at the World Health Organization in Washington DC. Dr. JJ is currently working on his PhD in Pharmacy Sciences at the University of Toronto.

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American ginseng (*Panax quinquefolius*) root extract (std. to 5% ginsenosides)	37.5 mg
Zinc (as zinc gluconate)	5.25 mg

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Environmental medicine – a clinical perspective

Dr. Chris Spooner, BSc, ND

From 2003 to 2006 I had the opportunity to work with Dr. Walter Crinnion, ND in establishing the Environmental Center of Excellence at Southwest College of Naturopathic Medicine in Arizona. The center was created to develop and integrate environmental medicine into medical education, while conducting research and treating patients with chronic diseases linked to environmental factors. During that time I had the opportunity to establish a clinic in the Phoenix Fire Department medical center for the purpose of testing firefighters for environmental pollutants and heavy metals and providing detoxification programs. While the firefighters are a remarkable group of individuals and they have obvious exposures, it was working with the general public that began to truly reveal to me the extent of health issues related to chronic exposure to low levels of everyday toxins. This article will provide some basic tools and questions that will enable you to begin to identify those patients whose health issues may be related to an overload of environmental pollutants.

Low level, chronic exposure to environmental contaminants and toxic compounds is fast becoming a major public health issue. Numerous physician groups and environmental groups have voiced significant concerns over the impact of these compounds on the health and well being of humans and animals.

The Canadian government, following in the footsteps of groups such as the Environmental Defence in Canada, the Environmental Working Group in the U.S. and the World Wildlife Fund in the U.K. have all committed to surveying their respective populations to determine the level of toxic body burden, that is the level of contaminants and toxic compounds that exist in the body. In Canada this is being done through the Canadian Health Measures Survey (CHMS – http://www.statcan.ca/english/concepts/hs/measures.htm). The conclusion that is surely to be reached by all these studies is that the entire population carries some level of toxic burden. It's not really a question of whether a patient is toxic, but rather to what degree are these toxins causing disease or an obstacle to cure.

As a naturopathic physician, the question then becomes one of identifying the degree of toxic burden for each patient. This article outlines a process for identifying whether or not toxic burden is a factor in your patient's illness via a combination of patient history and laboratory diagnosis.

Identifying the clinical signs and symptoms of toxic exposures can be a difficult task. The nature of these chemicals and their effects in the body is pervasive as every organ system and tissue in the body can be affected.

The effects on the body can occur at the time of initial exposure or can occur decades later. Furthermore, not all individuals are affected equally. Factors such as gender, age, nutritional status, organ function, frequency of exposure, concomitant exposures and genetics all affect the degree to which an individual will be affected. This leaves the physician with the disconcerting fact that not all individual are affected equally, however, using a systematic approach that is based on a sound understanding of toxicology and the physiology and biochemistry of the major eliminatory routes out of the body, it is possible to identify and treat these patients.

Where to start

First and foremost is critical for the physician to understand that accumulation of these toxins is a result of an imbalance in the relative rates of assimilation and excretion. Exposure to environmental contaminants occurs on a daily basis. For any individual, toxicity symptoms are only apparent when the level of exposure exceeds the body's ability to excrete them. The efficiency of excretion is highly variable and determined by the rates of expression of proteins such as metallothionein, glutathione, and heat shock proteins; nutritional status, use of antibiotic and other pharmaceuticals, total toxic burden, (total metals, chemicals, gut-derived toxins) and genetic polymorphisms in cytochrome p450, and conjugation enzymes. While there will be cases where exposure is obvious, an individual does not have to work in a chemical manufacturing plant, industrial site or be a pesticide applicator to develop symptoms associated with chemical exposure. In fact, overt toxicity or poisoning, while 'accepted', is rare. A much more elusive beast is the 'sub-clinical' exposure. Ultimately, environmental illness is about retention of toxins, and a physician must evaluate exposure as well as the patient's ability to excrete toxic compounds.

Finding (some of) the culprit(s) – hopefully!

According to the Environmental Protection Agency, there are over 80,000 chemicals presently in use in North America. Less than 10% have been partially evaluated for safety and of those approximately 7,500 have been tested for health effects in health young males only. The task of identifying the specific toxin causing a problem is like finding a needle in a haystack.

Although contaminants can affect any system of the body, with toxic exposure immune system dysfunctions tend to appear first followed by neurological symptoms (or vice versa) and then endocrine disruption. Below are some of the more common conditions associated with sub-clinical toxin exposure:

- ***Reproductive system:*** abnormal development of the unborn leading to miscarriages, stillbirths, birth abnormalities, delays in normal development, sexual problems and infertility
- ***Immune function:*** increased tendency to allergies and recurrent respiratory or lung infections as well as increased risk of cancer
- ***Nervous system:*** headaches, difficulty in concentration and memory, emotional lability, depression, irritability, hyperactivity, aggression and extreme fatigue
- ***Endocrine system:*** imbalances and dysfunction of any of the glands especially the thyroid, adrenal, gonads, and pancreas

- ***Musculoskeletal system:*** twitches, pain, weakness, chronic swelling and stiffness, and joint deformities
- ***Cardiovascular system:*** hyper or hypotension, arrhythmias and abnormal bleeding

Immune dysfunction and history

Immunological dysfunction due to environmental toxins typically has a biphasic effect; reductions of cell-mediated immunity and natural killer (NK) cell function and increases in the humoral system with an increase in lymphocyte proliferation and function. These alterations give rise to a paradoxical situation where the humoral system is up-regulated, resulting in allergies and autoimmunity while the cell mediated immune system is down-regulated resulting chronic infections and cancers.

Generally speaking, allergy symptoms – either food or environmental – typically show first, followed by sensitivity to chemicals. The number of chemical sensitivities increasing is often a prelude to what is referred to as the 'spreading phenomenon' in which more organ systems are becoming compromised. The increase in chemical sensitivities is followed by chronic viral or fungal infections, due to diminished cell mediated immunity (CMI) manifest. Rarely does low CMI result in frequent colds or flu, it is more likely to involve more exotic organisms such as ebstein barr virus, human herpes virus 6, aspergillus and other fungal infections. The up-regulation of the humoral system can lead to the development of numerous autoantibodies such as, anti-thyroid, anti-myelin, anti-parietal, anti-brush border, anti-striated muscle, anti-smooth muscle, and anti-cardiac muscle. Diminished NK cell activity can lead to certain cancers. Lymphomas and other B-Cell Malignancies are most strongly correlated with environmental toxins in the literature.

Neurological toxicity

Some of the most commonly encountered toxins and solvents are fat soluble and easily absorbed through the respiratory system and can cross the blood brain barrier. In many cases of exposure, neurological symptoms are the first to show; for example, toxic encephalopathy either acute or chronic, selective or diffuse, and neuronopathies, axonopathies, myelinopathies or vasculopathies ensue resulting in chronic neurological and psychological problems.

Neurological symptoms manifest as alterations in cognitive abilities ("brain fog"), sensory changes (paresthesias, numbness, tremor and fine motor difficulties), mood alterations, and coordination changes. Taking a history from patients with neurological toxicity is very often challenging and somewhat diagnostic in itself, as the impairment in cognitive abilities make it difficult for them to recall pertinent history and place it in proper context.

Endocrine dysfunction

One of the most disconcerting aspects of the recent work on toxic burden is the prevalence of endocrine disrupting chemicals and toxins. These chemicals affect the production, transport, acceptance, activity and metabolism of hormones, they also mimic hormones resulting in multi-endocrine difficulties. Examples of hormone disrupting toxins include dioxin, pthalates and bisphenol A.

Common signs and symptoms associated with disruption of endocrine function include changes in sleep, energy, mood, weight, appetite, bowel function, sexual interest and function, menstrual cycle, temperature regulation, hair growth and skin texture.

Generally speaking, endocrine symptoms tend to manifest after immune and neurological changes. As such, it is useful to construct a timeline of a patient's complaints. The classic presentation includes as history of progressive immune problems such as allergies, infections or autoimmunity followed by neurological symptoms (or vice versa) followed by endocrine problems. The onset of problems almost always coincides with increased chemical exposure such as: a new home, renovations or changes in office environment during times of high stress.

Red Flags

Certain symptoms can be very helpful in helping to identify those patients in which toxic burden is compromising their health.

Adverse physical or mental reactions from exposure to ambient levels of chemicals. Questions about common exposures such as reactions to fragrances such as those found in perfumes, detergents, air fresheners or scented candles and how they tolerate paint fumes or 'new car smell' can often be helpful. Patients that react strongly to occasional exposure often have a high toxic burden and have difficulty excreting toxins.

A history of adverse reactions to medications. This information can be used to identify specific abnormalities in cytochrome function. The website www.drug-interactions.com provides useful information on inducers and inhibitors of many substances. By further inquiring about when symptoms started the physician can get an approximation of the timing of the initial exposures surpassed excretion capabilities. Information about other members of the family can provide valuable information as to whether this is a genetic polymorphism or the result of toxin-induced changes in cytochrome expression and function. Other symptoms that can be used to further evaluate cytochrome p450 (phase 1) and conjugation (phase 2) pathways include a sensitivity to caffeine that inhibits the patient from drinking it after noon or has insomnia and an inability to handle medications, with the patient reporting that they are "***very sensitive***" and must take very small doses of meds.

Other red flags are patients who are non-responsive to therapies that have a high degree of effectiveness for their diagnosis, have a history of asthma or have and obvious occupational, hobby or living exposures prior to illness.

History taking

When taking the histories of these patients, begin with when they last felt well. Inquire about residential and occupational timeline along with symptom timeline. Identify the type and age of dwelling, age of carpeting and furnishings, heat source, presence of an attached garage and chemical use in and around home. Occupations/ hobbies of patient and parents are often overlooked sources of exposure. Inquire about other obvious environmental exposures including tobacco smoke, recreational drug use history, mercury fillings and surgical implants. The

website www.pollutionwatch.org can be used to identify local sources of pollution that the patient may or may not have been aware of.

There is a wide range in individual's ability to metabolize and excrete environmental toxins. Genetic differences in phase one and phase two enzymes (polymorphism) are a significant factor: genes "load the gun", but environment "pulls the trigger". Combine genetic susceptibility with poor diet and lifestyle choices and the conditions are ripe for toxin accumulation.

There are a number of other specific modifiable factors that contribute to a high total toxic burden that should be assessed as part of the history taking including:

1) Nutrient deficiencies especially Mg, Se, and B6
2) High sugar, low protein diet
3) Hi saturated and trans fat and low unsaturated fat intake
4) Stress, emotional stuffing, trauma
5) Heavy metal presence, especially Hg
6) Increased exposure

Laboratory Testing for Toxins

Laboratory testing provides useful information, however it is important to recognize that testing is available for less than 100 of over 70,000 chemicals present in the environment. Lab testing for toxic metals has proven clinically useful, but trying to identify other industrial toxins is costly and in the end may be of little value due to the presence of low levels of numerous compounds. In the end the most useful tool is a detailed history that creates a timeline for the development of symptoms in conjunction with detailed history of exposure. Furthermore, toxins are stored in different 'storage sinks' within the body and no lab test can fully assess total body burden. The following provides an overview of the laboratory testing available:

- ***Adipose tissue.*** Primarily used for pesticide and solvent residues. Fat soluble compounds such as solvents, PCBs, dioxins and organochlorine pesticides require a fat sample though some is present in the lipid component of blood.
- ***Hair.*** Commonly used to assess heavy metals. It should be noted that it not all individuals excrete metal equally in their hair.
- ***Blood and serum.*** Used to assess the physiological effects of toxins.
- ***Urine.*** Used to test for toxin metabolites. Urine testing for metabolites holds the promise of quantifying increased rates of elimination thereby helping to determine if treatment regimens are effective.
- ***Stool.*** Can be useful for testing for heavy metals particularly in pediatric cases.

Another method is to test for the smoking gun. These methods include immunological testing to evaluate cell mediated immunity (lymph sub-populations, NK activity, lymphocyte proliferation), auto-antibodies and chemical antibodies. Certain markers for toxins such as carboxyhemoglobin for carbon monoxide exposure and acetylcholinesterase for organophosphate and carbamate pesticides provide concrete information only if taken within a relatively short time after exposure. These are commonly used in acute poisonings. Genomic profiles for polymorphism of phase 1 and phase 2 enzymes have the potential to identify potential weaknesses in the eliminatory pathways and may provide useful proactive information.

Provocation testing for toxic metals is a valuable assessment tool as it is a relatively safe, accessible and inexpensive form of testing. When performing a provocation test it is important to recognize that different chelating agents have different affinities for the various heavy metals and also appear to access different storage sites. EDTA binds strongly to lead and cadmium while DMSA and DMPS have greater affinities for organic and inorganic mercury in addition to lead. EDTA has been found to access stores of lead in the bones and may be a better indicator of overall lead body burden while DMSA appears to access lead stores predominantly in soft tissues

Conclusion

There is never a question of whether a patient is toxic. The reality is that environment pollutants are ubiquitous and every individual on the planet has some degree of toxic burden. The question is whether an individual's ability to metabolize and excrete toxins is compromised, resulting in a net retention of these compounds. While identifying the specific compound can help clarify the situation, it is more useful to identify and treat the weaknesses in the excretion pathways.

Check out the members-only site at www.cand.ca for Dr. Spooner's recommendations on further reading on this subject.

About the Author

Dr. Spooner received a B.Sc. in Biology from the University of Victoria in 1991 and his ND from the Canadian College of Naturopathic Medicine in 1998.

In 2003 Dr. Spooner applied for and was accepted to the position of Post Doctoral Fellow in Environmental Medicine at the Southwest College of Naturopathic Medicine Environmental Medicine Center of Excellence under the directorship of Dr. Walter Crinnion. After completing the fellowship in 2005 he continued instructing at SCNM as an Assistant Professor, teaching courses in toxicology, environmental medicine, nutrition and supervising student clinical rotations at the Southwest Naturopathic Medical Center.

He has been an advisor on CAM therapies to the board of directors of the American Association of Occupational Health Nurses. In addition he worked at the Phoenix Fire Department Medical Center where he was responsible for creating depuration programs and providing naturopathic health care the 3000 firefighters of the greater Phoenix area.

Currently, Dr. Spooner is in private practice in Vernon, BC. He continues to lecture across North America at naturopathic colleges and medical conferences.

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