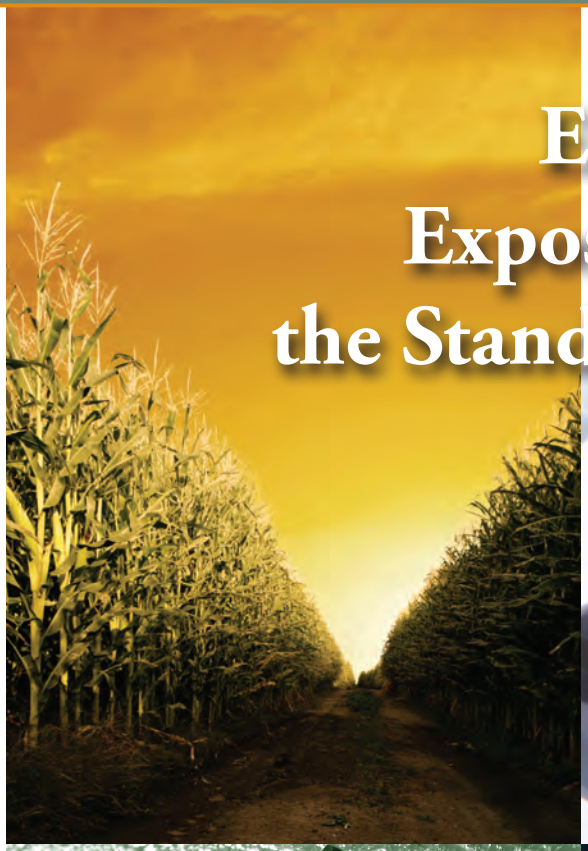
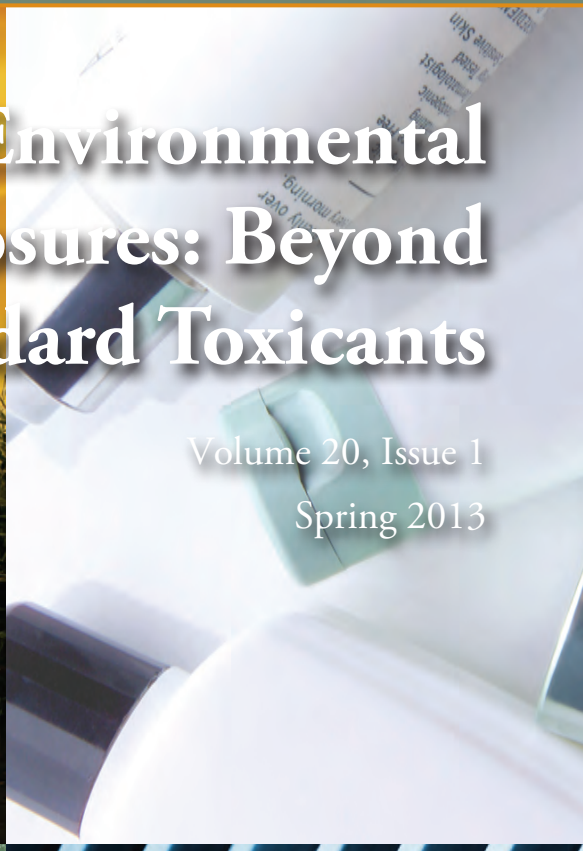
Vital Link

The journal of the Canadian Association of Naturopathic Doctors

Feature Articles





Environmental Exposures: Beyond the Standard Toxicants

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Contents

Volume 20, Issue 1 | Spring 2013

Featured Articles

Plus

Vital Link

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Environmental Exposures: Beyond the Standard Toxicants

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

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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 Previously unpublished material is preferred.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 managing editor for submission guidelines.

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The *Vital Link* is published three times per year and is distributed to over 2000 qualified Canadian NDs and students of CNME-accredited naturopathic programs in Canada and the U.S. The *Vital Link* is also distributed to the CAND's corporate members and in our media kit. The journal is available in print and e-formats, by paid subscription.

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Toxic Chemicals in Personal Care Products

Dr. Jacqueline Cooper, ND, with contributions from **Dr. Andrea Maxim,** ND and **Dr. Daisey Kent,** ND

When assessing a patient and determining the root causes of their symptoms, all patients should be screened for their choice of personal care products (PCPs). The majority of these products on the market contain chemicals that are detrimental to human health.

The David Suzuki Foundation identified twelve of the most dangerous chemical ingredients in PCPs and surveyed Canadians to determine their frequency of exposure. They found 80% of the products being used by consumers contained at least one of the twelve toxic ingredients they had highlighted. While this provides cause for concern, what is even more disturbing is that there are over 10,000 chemicals used in PCPs, many of which have not been tested for human safety.[1]

While the amount of chemical exposure from PCP use may be small, clinical concerns centre on bioaccumulation that occurs due to daily usage. Furthermore, new research shows that current mechanisms for testing the safety of chemicals are insufficient.[2] Currently, regulators use high doses of a chemical to determine its safety. If there are no significantly deleterious health effects at a particular level, all measures below this established amount are deemed safe.[3] The health effects of a high dose exposure do not accurately predict low dose effects.[4] For example, phthalates, commonly found in fragrances added to PCPs, caused allergic reactions upon exposure to a concentration 1000 fold less than the current safety standard established.[5] This reaction would not have been predictable based on studies that only examined high dose exposure to phthalates.[6] Non-monotonic dose-response curves have also been reported for a number of endocrine disrupting chemicals.[7] Thousands more have yet to be analyzed in this manner, thus heightening the importance of avoiding chemically laden PCPs.

Chemical exposure via PCPs has been associated with a host of medical conditions including, but not limited to: contact dermatitis, respiratory irritation, chronic fatigue, mood imbalances, endocrine imbalances, reproductive toxicity, neurotoxicity, infertility and cancer.[8-12]

Health Effects of Endocrine Disrupting Chemicals in PCPs

This article will highlight the clinical effects of exposure to endocrine disrupting chemicals (EDCs) found in personal care products. Chemicals in this category that are of greatest concern include: BHA & BHT, phthalates, parabens, siloxanes and triclosan. EDCs can affect the system in a number of ways. One way they exert an effect is by interacting with hormone receptors; some chemicals acting as agonists, others antagonists.[13] More recent research has been investigating the affect EDCs have on key enzymes involved in steroid hormone synthesis and metabolism, specifically cytochrome P450 enzymes.[14] One example of evidence pertaining to this mechanism of action is the ability of EDCs to inhibit aromatase conversion of testosterone.[15] It is hypothesized that this mechanism of interference could lead to dramatic shifts in endogenous levels of hormones, yielding a greater clinical affect than interactions with receptors.[16]

Listed below are common signs and symptoms that may result from exposure to endocrine disrupting chemicals:[17-20]

TABLE 1

FEMALES	MALES
• Juvenile menstruation • Premature breast development • Premenstrual symptoms (migraines, breast tenderness, low back pain, cramping) • Intermenstrual bleeding • Fibrocystic breasts • Infertility • Miscarriage • Endometriosis • Fibroids • Vaginal dryness • Night sweats • Stubborn weight gain around the hips, buttocks and thighs • Insulin Resistance	• Gynecomastia • Galactorrea • Premature breast development • Loss of muscle tone • Low libido • Erectile dysfunction • Depression • Stubborn weight gain in the hips and thighs • Insulin Resistance

Endocrine disrupting chemicals tend to be lipophilic and can be stored for long periods of time in adipose tissue. They can also alter the distribution of adipose tissue in the body. Women accumulate more adipose tissue around the hips, buttocks and thighs while men typically accumulate fat in the intra-abdominal (visceral) areas. Increased exposure to EDCs can cause males to present with a distribution of adipose tissue that is typically seen in females. In addition to the redistribution of fat, EDCs can make shedding weight difficult as they tend to upregulate the number of subcutaneous adipocytes and prevent lipolysis.[21] Because adipose tissue has the capacity to synthesize biologically active steroids, as EDCs concentrate there they are likely to alter this process via interference with steriodogenic enzymes.

Exposure to EDCs first occurs *in utero* due to maternal exposure endogenously and throughout the pregnancy. Exposure may continue in the post-natal period via breastmilk.[22] In male newborns, it is suspect that endocrine disruption *in utero* may lead to defects of the Sertoli and Leydig cells which contribute to cryptorchidism, hypospadius and increased probability of testicular cancer.[23,24,25] With pediatric patients, one should closely monitor for signs of abnormally rapid tissue growth and development, particularly around puberty. Young females are entering puberty as early as 7 or 8 years-old instead of 11 to 13 years of age.[26] While hormonal disruption may have begun *in utero* it is equally as important to screen for PCP use in younger patients, as products made for infants and children have just as many, or more, dangerous chemicals as those marketed for adults. Also there is concern that the infants and children tend to absorb larger amounts of these chemicals and are less able to neutralize their impact in the body.

The rate of hormone-related cancers is on the rise, with growing evidence connecting the impact of estrogen on carcinogenesis.[27,28,29] Currently there are about 160 xenoestrogens which may be implicated in the development of cancer, with most exposures coming from transdermal absorption.[30] Estrogen receptors are most abundant in the breasts, testes, ovaries and uterus. Estrogen receptors also have relatively high concentrations in the spleen while the lowest levels occur in the kidney, thymus, skin and lung.[31] In addition to mimicking estrogen, EDCs as mentioned previously, can interfere with steroidogenic enzymes which may increase endogenous estrogen.[32] At high enough levels, estrogen can produce reactive oxygen species, decrease glutathione-S-transferases and increase cellular oxidative DNA damage, all of which can precipitate carcinogenesis.[33] Male cancers including testicular and prostate may also be related to xenoestrogen exposure and the disruption of endogenous hormone levels via EDC interference with steroidogenic enzymes.[34,35]

Relevant Lab Tests to Screen for EDC Exposure

Lab tests used to monitor a patient's hormonal health include: fasting blood glucose, fasting insulin, HBA1C, SHBG, complete thyroid panel (TSH, free T3 and free T4), serum or salivary levels of total and free testosterone, progesterone, estriol, estrone and estradiol, DHEA and cortisol. There are a number of other tests helpful in assessing pathology due to EDC exposure. An environmental panel will measure urinary metabolites of parabens, phthalates and other chemicals, helping to clarify the source of toxicity. If you suspect excess estrogen, consider a urine steroid hormone test to measure metabolites. In the past, levels of 2-OH and 16-OH estrones were used to determine the liver's ability to break down estrogen. It was thought that an increased ratio of 16-OH-estrone metabolite to 2-OH-estrone metabolite was correlated with various forms of cancer.[36] However, this is now being disputed as newer evidence indicates the ratio is not predicative of risk; measuring the 4-OH estrone metabolite may be a better indicator.

Selecting Healthy Alternatives

In considering alternatives, while there is an ample supply of "natural" personal care products on the market, it is imperative to recognize that despite the marketing messages, these seemingly natural agents may lead to similar toxic exposures as the synthetic commercial products. In determining whether a particular PCP is safe, the physician should take several factors into consideration.

First, plant based extracts may actually contain undisclosed parabens or other preservatives. The initial plant material may have been organic, but chemical preservatives are often added to stabilize the extract. Current labeling regulations do not require individual components of the extract compound to be itemized on ingredient lists.[37,38] Thus, consumers are often misled with statements such as *"made from organic grapefruits."* At this time Canada's protection of organic labelling only applies to food and not PCPs. However, if a product is USDA Certified Organic the consumer can be assured that the product meets standards safe for human consumption. If a product does not carry this certification, the best way to ensure that there are no hidden chemicals is to call the company directly and request information regarding their extraction process and use of preservatives.

As an example, an emerging concern in the realm of natural personal care products involves the use of grapefruit seed extract (GSE) as a preservative. Commercial sources of GSE have been found to have significant anti-microbial properties.[39] However, when analyzed with thin layer chromatography, the commercial sources of GSE were found to differ greatly from ethanol extracts of grapefruit seeds. The majority of commercial GSE samples analyzed contained significant amounts benzethonium chloride, a quaternary ammonium chloride that is used in hospital and laboratory settings as a disinfectant.[40,41,42] The only commercial sample analyzed that was not adulterated with benzethonium chloride, like the ethanol extract did not demonstrate any anti-microbial activity.[43] So while many individuals, including naturopathic doctors, use GSE as a prophylactic anti-infective agent, a review of current literature concludes that the anti-microbial effect of GSE is attributed to the synthetic chemicals acquired in the commercial extraction process.

In addition to concerns regarding its potential as a dermatological irritant, one of the greater concerns regarding benzethonium chloride is its effect on hERG channels. hERG channels are a subtype of potassium channels, predominantly found in cardiac tissue, but also expressed in the brain, kidney, liver and lung. [44] Benzethonium chloride was found to have an inhibitory effect on hERG channels. Clinically, inhibition of the channel manifests in an extended QT interval, which can lead to long QT syndrome (LQTS).[45] Drug induced LQTS is the most common cause of drug induced arrhythmias and sudden death.[46] During the period from 1990-2006, 29% of the drugs withdrawn from market or denied approval were due to their potential to prolong the QT interval or induce fatal ventricular tachyarrhythmia.[47] So while plant based extracts such as GSE may sound safe, its safety is dependent on the method of extraction (many commercial extractions utilize chemicals which leave contaminants in the end product) as well as the preservatives used to stabilize it. Again, the only way for a practitioner or consumer to be sure of the safety is to contact the company directly and request information regarding their manufacturing process.

Replacing toxic PCPs with safer alternatives is imperative to the health of our patients. However, the financial cost of doing a complete overhaul can become high and offputting to the patient. Encouraging a gradual replacement of products is likely to garner greatest compliance. When prioritizing product replacement use the following factors to determine which products must be replaced first.

- Length of time spent on the skin – creams, deodorants and sunscreens stay on your skin throughout the day allowing them to penetrate deeper, thus increasing the likelihood of systemic effects. This effect is amplified by the addition of chemicals designed to enhance absorption. Another major concern is that many moisturizers contain occlusive agents whose purpose is to create a physical barrier that prevents epidermal water loss. This physical barrier inhibits the skin's ability to eliminate waste products. Therefore, removing or reducing the use of products that stay on the skin for an extended period should take precedence over rinse off products like shampoos, conditioners and soaps.
- Area of application – the stratum corneum, which provides the skin's barrier function, varies in thickness regionally throughout the body. The skin on the face, especially around the eyes, and mucosal membranes are more susceptible to penetration of chemicals. While areas less vulnerable, due to increased thickness of the stratum corneum, include the forearm and buttocks.[48]
- Frequency of use – products that are used every day are of far greater concern that those used intermittently or sparsely.
- Chemical content – obviously the more chemicals the product contains the more important it is to find a suitable replacement. Refer to Fig. 2 for a list of the top twelve offenders as identified by the David Suzuki Foundation.

Reading ingredient labels to screen for harmful chemicals can be daunting. A safe way to ensure you are avoiding harmful chemicals is to look for a label that states the product is USDA certified organic. The term organic is not enough, for in Canada the federal regulation of labelling something as organic only applies to food; there is no regulation of personal care products that use the term organic. However, if a product bears the USDA organic label it is at least 95% organic and has been deemed safe for human consumption. The USDA standards for personal care products are the same standards for food.[49] While not as strong as the USDA standards there are other certifications that do distinguish a product as being *significantly* better than the vast majority of PCPs:

- EcoLogo/Environmental Choice ecologo.org
- Green Seal greenseal.org
- National Sanitation Foundation nsf.org

Ultimately, the safest approach to personal care is to use only items you would allow yourself to ingest. It is important to shift patients' thinking toward this philosophy because what we slather on our porous skin ends up in our bloodstreams and can accumulate in adipose tissue and internal organs, similar to what we ingest orally. Furthermore, substances absorbed through the skin pose more of a systemic danger as they bypass the liver and are not broken down.

TABLE 2

CHEMICAL OF CONCERN	ADVERSE REACTION	COMMONLY FOUND IN
BHA & BHT	**Endocrine disrupter**, probable carcinogen, allergies, immunotoxicity, neurotoxicity	lipstick, moisturizers, sunscreen, deodorants, antiperspirants, makeup
Coal Tar Dyes	contaminated with heavy metals, neurotoxicity, contact dermatitis, respiratory toxicity	shampoo, hair dyes, antipruritic creams
DEA (diethanolamine)	**suspected reproductive toxicant**, probable carcinogen, contact dermatitis	soap, shampoo, conditioner, lotions, bubble baths
Dibuytly phthalate	**Endocrine disruptor** and reproductive toxicant	nail polishes
Formaldehyde-releasing preservatives	Carcinogenic, dermatitis, joint pain, chronic fatigue, heart palpitations, respiratory irritant, weakens immune system, neurotoxicity	hair products, sun screen, nail polishes, anti-perspirants
Parabens	**Endocrine disruptor**, carcinogen, neurotoxicity	body washes, cleansers, shampoos, toothpaste, hair products
Fragrance or Parfum	**Endocrine disruptor**, headaches, dizziness, behavioral changes, depression, irritability, asthma	perfumes, colognes, any scented products, often found in 'scentless' products which are then covered with a scent masking agent.
PEG compounds	often contaminated with carcinogenic agents; toxic to kidneys and nervous system; irritant to skin and lungs	hair dye, sunscreen, deodorant, anti-bacterial soap
Petrolatum	Inhibits the skin's ability to excrete toxins; often contaminated with carcinogenic agents	moisturizers, hair products
Siloxanes	**Endocrine disruptor**, **reproductive toxicant**	deodorants, moisturizers, hair products
Sodium laureth sulfate	often contaminated with carcinogenic agents	shampoo, conditioner, soaps, facial cleansers, toothpastes
Triclosan	suspected **endocrine disruptor**, believed to contribute to antibiotic resistance in bacteria	facial cleansers & moisturizers, body wash, anti-bacterial soaps, deodorants, toothpastes

Venturing into the kitchen for materials for personal care is a great idea. Not only is this DIY approach affordable, but using fresh ingredients means greater antioxidant and enzymatic activity, while completely bypassing all preservatives.

For moisturizers, consider edible oils:

- Coconut oil is an excellent facial or body moisturizer with antimicrobial and anti-fungal properties.[50] It is light, does not clog pores, nor does it stain clothes. It also can be used with a Q-tip to remove residues of eye-makeup after washing your face.
- Almond and olive oil are other options for moisturizers (however the yellow/green color discoloration may be off putting for some skin tones).
- Tamanu oil is powerful oil with a particularly therapeutic effect. It has anti-microbial and anti-inflammatory actions. It acts as regenerative serum and improves micro-circulation. It is more expensive so its use can be limited to the face/neck as an anti-aging serum, or applied to prevent scarring.
- Rosehip oil is yet another powerful oil which acts as an intense hydrator and also stimulates keratinocyte differentiation.[51]

Toners

- Green tea has valuable astringent properties that make it a worthwhile toner. Its potent antioxidant profile imparts anti-aging properties. Lastly, it's a valuable resource for protecting against sun damage.[52]

Cleansing Masks

- Yogurt makes a great cleansing mask for those suffering from acne. The probiotics help compete with the offending bacteria (*Propionibacterium* acnes). Note: should not be used by those with dairy sensitivities.
- Honey (unpasteurized) is well-known for its vulnerary and anti-microbial properties[53] and can be mixed with yogurt or oatmeal into a paste for facial masks to treat scars and skin lesions.[54]
- Avocado contains nutrients and fatty acids that make it a great base or addition to a face mask.

Hair Care

- Beer, instead of being ingested, can be used as a shampoo. It helps to strengthen the hair as it is full of B vitamins.[55]
- Apple cider vinegar as a hair rinse is a great conditioner and shine-booster as it helps to remove residues left by conventional hair products.
- Avocado is also a great choice as a conditioner or weekly hair mask, due to the healthy fats it contains.

Detoxifying Options

- Alkaline mineral salts are a versatile item that can be added to baths to draw out acids and toxins and assist in re-establishing a more alkaline pH. These salts can also be moistened and applied to the scalp or rubbed onto skin for exfoliation.
- Clays are helpful in drawing toxins out of the skin. Zeolite is an aluminosilicate, similar to clay. It is particularly powerful at extracting and neutralizing toxins. Its negative charge attracts positively charged toxins, and its honeycomb structure allows it to bind the toxin effectively. Animal studies utilizing clinoptilolite, a particular type of zeolite, showed that topical application to areas afflicted with skin cancer led to improvement in overall health status, prolongation of life-span, and decrease in tumor size.[56]

Deodorants

- Natural options for deodorants include Himalayan salts or oil bases, such as shea butter or coconut oil, combined with essential oils such as lavender, citrus or lemongrass.

Although typically less scrutinized, the PCPs that a patient uses should be analysed as closely as the foods they ingest. This article has highlighted some of the mechanisms of action and clinical effects of the EDCs present in PCPs. However, this only represents a portion of the damaging physiological effects attributed to exposure of chemicals from PCPs. The majority of products on the market contain chemicals which have been identified as toxic to numerous facets of human health. Therefore, a responsible, thorough naturopathic assessment must incorporate screening for chemical exposure via personal care products. And subsequently, a comprehensive treatment plan should include educating the patient on how their use of personal care products can possibly improve health or be a contributing cause of disease.

NATUROPATHIC MAY MEDICINE WEEK 6-12

A national initiative led by the CAND, Naturopathic Medicine Week (NMW) is facilitated by the regional naturopathic associations and schools. Our goals for NMW are to increase the public's awareness of the benefits of naturopathic medicine and drive new patients into ND clinics across Canada. NMW is an excellent opportunity for naturopathic doctors to plan community awareness events, such as presentations at local community venues, and contribute articles to the local press. We encourage you, our members, to be creative when marketing and planning events. Sky's the limit and we are here to assist you!

Need some ideas or support? Contact your regional representative (see www.cand.ca/index.php?id=246#2185). Easy to organize event ideas and support material, such as handouts, posters and PowerPoint presentations can be found on the "NMW tools" page in the CAND's Members Only website.

A variety of community-based promotions are being scheduled to heighten public awareness about NMW and direct the public to event listings on the regional/CAND websites. For example, the CAND and NDO will be attending the Green Living Show in Toronto April 12th to 14th.

Confirm your event details and contact your regional rep or the CAND with the location, presentation date, time and topic. Your event details will shared with the CAND and promoted on the CAND and provincial websites where applicable (see www.naturopathicmedicineweek.ca for details).

Watch for email updates from your regional reps and the CAND. We look forward to working with you to achieve another successful Naturopathic Medicine Week!

About the Authors

Dr. Jacqueline Cooper, BSc, ND practices in Ontario, just outside Toronto in the Markham Unionville area. Jacqueline empowers her patients by helping them identify and address the factors that influence health and disease. She has a special focus on skin and healthy weight management. She can be contacted at jcoopernd@naturopathicfoundations.ca or on Twitter @JCooperND.

Dr. Daisey Kent MSc, ND has recently begun practice in the Cowichan Valley on Vancouver Island, BC. She has a Master of Science in the field of epigenetics. Knowing the importance of lifestyle on our genetic expression led Daisey to study Naturopathic Medicine. Part of her enthusiasm for health, includes the health of our planet. As Doctor as Teacher, she is committed to living in partnership with nature.

Dr. Andrea Maxim, ND is proud to be serving the Haldimand and Oakville community. She has a keen interest in functional medicine, digestive disorders and hormone imbalance. Her treatments focus on using whole foods and high dosed nutrients. As an adjunct, treatment plans include acupuncture, biopuncture, homeopathy and counseling to further bring balance to the body. Dr. Maxim has been awarded Hamilton's Naturopathic Doctor of the Year for 2013.

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