

The 2nd Annual CCNM Research Day: Student Research & Innovation in Naturopathic Medicine



Monique Aucoin, BMSc ND [1]*, Joy Dertinger BA ND (student) [1], QingPing (Amanda) Zheng MSc ND [1], Kieran Cooley BSc ND [1,2]*

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K 1E2

[2] University of Technology, Australian Research Center in Complementary and Integrative Medicine, Ultimo, Australia

*Corresponding Authors: maucoin@ccnm.edu and kcooley@ccnm.edu



Abstract

The following are abstracts from the research competition at the 2nd annual CCNM Research Day hosted by the Canadian College of Naturopathic Medicine in Toronto, ON, Canada. The conference celebrates high quality student-faculty research collaborations, showcased as poster presentations.

Keywords: naturopathy; research; naturopathic medicine; complementary medicine; integrative medicine; undergraduate research competition; innovation; mentors

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Conference Abstracts

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Poster Abstracts

Oral supplementation of *Cimicifuga racemosa* (black cohosh) with clomiphene citrate in unexplained infertility and polycystic ovarian syndrome (PCOS)

Shreya Batra, HBSc, ND Student [1], Zeynep Uraz, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Infertility (IF) is defined as the inability to become pregnant after unprotected intercourse for one year and affects approximately 16% of all couples in Canada. Although there are many causes of IF, two common etiologies include ovulation dysfunction/anovulation and unexplained IF. Although anovulation has various underlying causes, hormone levels (such as LH, FSH and estrogen) are all consistently affected. Often, dietary and lifestyle factors can restore ovulation in some women, however pharmaceutical options can also be effective for inducing ovulation. Pharmaceutically, clomiphene citrate (CC) has been commonly used for polycystic ovarian syndrome (PCOS) to induce ovulation. CC is also used in unexplained IF. Although it is often found effective, side effects are common. *Cimicifuga racemosa* (black cohosh) is an herbal supplement often used for menopausal symptoms. Its positive influence on hormone levels in menopausal women has sparked interest for its effect on ovulation and unexplained IF. Four studies have assessed the impact of *C. racemosa* as an adjunct therapy to CC and have shown promising results. The outcomes that were assessed include: endometrial thickness, luteal phase progesterone, LH levels on day of HCG injection, and pregnancy. Preliminary results show that women with infertility (either unexplained infertility or PCOS) may benefit by adding *C. racemosa* to their oral drug regimen (with clomiphene citrate) to improve pregnancy rates. This may be especially of benefit to women with a diagnosis of PCOS, or unexplained infertility with a history of failed CC cycles. Due to recent supply issues with CC, we recommend further research focus on RCT trials that combine *Cimicifuga racemosa* with letrozole. The authors declare that they have no conflict of interests.

The effects of mistletoe therapy on various quality of life measures in patients with solid tumour malignancies

Sukriti Bhardwaj, BHSc, ND Student [1], Monique Aucoin, BMSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

In 2017, approximately 206 200 new cases of cancer and 80 000 deaths from cancer will occur in Canada. An estimated 1 in 2 Canadians are at risk for the development of cancer within their lifetime and 1 in 4 Canadians will succumb to the disease. While the primary role of cytotoxic therapies is the prolongation of life, the maintenance of quality of life is also significant. Thus, there exists a need for adjunctive therapies such as mistletoe to improve patients' quality of life during anti-cancer treatment. Trials that assessed the impact of mistletoe therapy on quality of life recruited patients with various cancer types and utilized the following mistletoe formulations: Helixor, Isorel, and PS76A2. Bussing et al published a 2011 meta-analysis on quality of life in patients treated with mistletoe extract and concluded that treatment with Iscador therapy has a short term, moderately positive influence on QoL related dimensions and psychosomatic self regulation. Three separate trials studying the addition of mistletoe therapy to conventional cancer treatment in breast cancer patients demonstrated positive results in favour of the experimental group versus conventional therapy alone. Surgical oncology patients with various malignancies receiving perioperative treatment with Isorel demonstrated significant improvements on the Karnofsky performance status and the anxiety scale. The increasing incidence of various malignancies in Canada warrants further research into therapies that may be utilized to support the cancer patient population. Mistletoe therapy is a promising approach in enhancing patients' quality of life and has demonstrated positive results on a number of quality of life measures amongst different cancer types. Larger and well-designed trials are warranted. The authors declare that they have no conflict of interests.

Naturopathic cancer research in human controlled studies: Focused mapping of evidence signals for treatment endpoints

Elise Cogo ND [1], Peter Papadogianis ND [1], Sukriti Bhardwaj, BHSc, ND Student [1]

[1] Patterson Institute for Integrative Cancer Research, Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

The first phase of our Guidelines research agenda was a large exploratory map of positive-focused evidence "signals" to stratify the potential efficacy of natural health products (NHPs) on primary outcomes in cancer care. The NHPs with the best evidence from human controlled studies will subsequently inform the production of evidence-based clinical practice guidelines. This exploratory project is not a detailed overview of systematic reviews and is explicitly NOT intending to provide conclusions but rather to explore which NHPs warrant detailed evaluation and further knowledge synthesis. A MEDLINE search was conducted based on PubMed's Dietary Supplements subset. In order to obtain the highest level of evidence for both efficacy and safety, the Primary outcomes of interest are the following hard endpoints of cancer treatment: survival/mortality, treatment response, recurrence/remission, disease progression/ metastasis, stable disease. Secondary outcomes include: treatment side effects, cancer symptoms (pain, fatigue, appetite, quality of life, etc.), immune variables, biomarker levels among others. To identify our "signals" we selected systematic and comprehensive reviews of randomized and non-randomized controlled clinical trials, observational cohort and case-control study designs on any NHP or combination of NHPs. All active treatments must have been compared to a control group in cancer patients (not primary prevention), and administered by any route. We subsequently reviewed, abstracted and collated data from those NHP-related, human controlled cancer studies that were both positive and significant. Note that this exploratory focused mapping project did not summarize adverse events data or non-significant results. Study quality was not appraised in this review. We screened 1949 search records and included 218 systematic reviews of NHPs which reviewed over 1000 human controlled studies. Key results for Primary outcomes are - leading Nutraceuticals: Melatonin, Vitamin K, and Thymus extract; leading Botanical & Fungi preparations: Coriolus versicolor (PSK/PSP), Mistletoe, P. ginseng; leading Chinese & Asian Medicine formulations: Kangai, Aidi, and Shenqi Fuzheng injections - (all three of these combinations contain Astragalus). For Secondary outcomes - fish oil (including fish oil + arginine + glutamine/RNA), Probiotics, Vitamin E, Ginger, Brucea javanica (oil emulsion), and Cannabinoids. Details of the abstracted studies in terms of context, population and design will be presented in our related publications. With an emphasis on treatment endpoints, our focused evidence maps stratified signals of efficacy and safety of potential therapeutics in integrative oncology. This data will facilitate the completion of clinical practice guidelines in integrative oncology and guide the production of future systematic reviews. The authors declare that they have no conflict of interests.

Successful therapy of vulvodynia with acupuncture: A case report

Stephanie Ko, BSc, MSc, ND Student [1], Qingping Zheng, MSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Vulvodynia often presents with unexplained vulvar pain, hyperesthesia, and sexual dysfunction, lacking gross anatomic or neurologic findings. It is a disorder that can lead to mental emotional disorder and affects relationships with partners as well. Current therapeutic options including analgesic drugs, anticonvulsive drugs, and surgical excision lack satisfying outcomes. In this case report, we performed an acupuncture protocol in a patient with vulvodynia. A 29-year-old female presented with pain during penetration since age 12 when she had tried to insert a tampon into her vagina. She was officially diagnosed with vulvodynia at age 28. The patient was also diagnosed with general anxiety disorder and major depressive disorder when she was 20 years old. The patient was assessed for a traditional Chinese medicine diagnosis and presented with liver blood deficiency and kidney yin deficiency with damp heat in the liver channel. Six weekly sessions of an acupuncture intervention were administered including the following points: lv5, lv8, kd12, kd3, kd6, ht7, pc6, cv14, and yintang. We observed a decrease in self-rated intensity of pain on the Short-Form McGill Pain Questionnaire 2 (SF-MPQ-2) from a pre-treatment score of 8 to a post-treatment score of 5, and a self-rated decrease in quality of pain from “horrible” to “discomforting” after intervention. No major adverse events were observed. Pain has both psychological and physical factors. For this patient, pain related to vulvodynia improved after an acupuncture protocol. This may be due to the effects of acupuncture treatment, the effects of the patient-clinician interaction during the acupuncture treatment, or may be from a synergistic effect of both. Overall, acupuncture treatments were able to induce a change in pain perception for this patient. Acupuncture can be a useful treatment in vulvodynia. Further studies with a bigger sample size on the effectiveness of acupuncture should be performed. The authors declare that they have no conflict of interests.

A review of acupuncture (and related approaches) for chemotherapy-induced peripheral neuropathy

Vivian Liang, ND Student [1], Ehab Mohammed, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Chemotherapy-induced peripheral neuropathy (CIPN) is common side effect that heavily impacts patients' quality of life and their response to and compliance with their chemotherapy regimens. It is important that patients with cancer optimize their health and minimize or prevent potential side effects that may reduce their chances of success with chemotherapy. This review will be investigating the efficacy of acupuncture and related approaches such as, electro-acupuncture and acupuncture-like transcutaneous nerve stimulation, for reducing and preventing CIPN. There is evidence that these modalities, when used adjunctively with chemotherapeutics, may reduce CIPN and thus, improve the response and compliance to chemotherapy. There are conflicting conclusions within the literature. Case studies and prospective cohort studies have shown a positive benefit and improvement in CIPN with acupuncture-treated groups compared to placebo groups. However, due to the heterogeneity of clinical studies, 1 systematic review concluded it was difficult to confirm whether acupuncture would improve symptoms. Although case reports, prospective cohort studies, and clinical trials have all demonstrated improvement in CIPN, it is difficult to make the conclusion that acupuncture definitively improves CIPN symptoms because of the heterogeneity of the studies. The lack of consistent results can be attributed to the variation of methodology, acupuncture points chosen, and confounding factors such as practitioner-patient interaction. The lack of randomized controlled trials with consistent results combined with a plethora of case studies, clinical trials that have indicated positive outcomes suggest that there is potential for acupuncture to improve symptoms of CIPN. Additional factors such as choosing specific acupuncture points for the individual rather than a protocol of points and practitioner-patient interaction may prove to have a synergistic effect to the intervention. The authors declare that they have no conflict of interests.

Sun exposure practises, Vitamin D status and melanoma risk

Vivian Liang, ND Student [1], Athanasios Psihogios, ND Student [1], Adam Gratton, MSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

The consensus among health experts and physicians as to how much sun exposure constitutes as “safe” has not been firmly established, and is furthermore a topic of active debate. Findings in the literature demonstrate that the relationship between UV-radiation exposure and melanoma risk to be complex and multifactorial. This narrative review investigates the association between melanoma risk and sun exposure trends, and potential influence of vitamin D status on melanoma risk and prognosis. Generally, increased melanoma risk has been consistently associated with recreational sun exposure (intense and intermittent) and sunburn risk. In terms of other sun exposure trends, occupational and total sun exposure appears to be pre-

dictive of melanoma risk at only low latitudes. High chronic UV radiation can be protective against melanoma but increase risk of basocellular carcinomas compared to high intermittent UV radiation. Five studies found an association between 25(OH)D serum levels and tumor thickness, with a general trend among studies to show higher levels associated with thinner tumors, while lower/deficient levels were associated with thicker lesions. A general trend was seen for improved survival associated with more adequate 25(OH)D levels. vitamin D levels under 16 ng/ml were 2.0x more likely to die as a result of all-cause disease, 1.76x more likely to die as a result of melanoma and 1.62 times more likely to have disease recurrence. Contradicting results from studies makes it difficult to tease apart the role that sun exposure has on melanoma genesis and prognosis, especially when factoring in variables such as country of origin/latitude, time of exposure, skin type, and occupation. Ensuring sufficient vitamin D status and maintaining serum levels in the higher quartiles is associated with improved melanoma prognosis. Future well designed studies assessing vitamin D status and insufficiency are warranted. It is difficult to make a definitive conclusion regarding *healthy* sun exposure, with over and under exposure being associated with unique health risks. The authors declare that they have no conflict of interests.

Yoga for improving symptoms of multiple sclerosis: A narrative review

Catherine Multari, BEd, ND Student [1], Maria Shapoval, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Multiple Sclerosis (MS) is a chronic inflammatory disease of the CNS affecting over 2.3 million people worldwide. MS presents itself with a variety of symptoms including fatigue, imbalance, spasticity, chronic pain, cognitive impairment, bladder and bowel dysfunction, visual and speech impairments, depression, sensory disturbance and mobility impairment. There is no known cause or cure for MS, therefore current therapies aim to manage symptoms and slow disease progression. Since MS is a disease affecting both the sensory and motor components of the body, mind-body therapies such as yoga, meditation, breathing and relaxation are being explored. The purpose of this paper is to summarize the most relevant literature on yoga to treat MS symptoms and provide direction for future research. In a review of 8 papers from 2012 to 2016, yoga therapy ranging in duration of 3 weeks to 6 months was shown to be efficacious in improving MS symptoms of neurogenic bladder dysfunction, pain, quality of life, physical activity, sexual satisfaction, postural balance, audiovisual reaction time, anxiety, depression, fatigue and spatiotemporal parameters. There were no safety concerns monitored or reported. Several medications currently used for MS result in adverse effects such as nausea, allergic reactions, skin cancer and cardiac toxicity. Given the complexity and uncertainty of MS to date, alternative therapies seem suitable to explore. The ancient science of yoga specifically seems appropriate, as the practice unites the body and mind. Overall, the findings from the 8 papers reviewed provide optimistic data for treating symptoms in MS patients. Research with small sample sizes and short study duration seem to be the most limiting factors of research conducted to date. Future trials should focus on recruiting a large patient population, which includes a control group and evaluates the long-term effect of yoga as a treatment for the symptoms of MS patients. The authors declare that they have no conflict of interests.

Daily consumption of pure medium chain triglycerides and metabolic syndrome

Mohamed Omar, ND Student [1], Monique Aucoin, BMSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Metabolic syndrome is an epidemic and clinical challenge worldwide. It has a direct influence on cardiovascular mortality in humans through increasing the process of atherosclerosis. Abdominal obesity is a cardinal clinical presentation of metabolic syndrome in association with insulin resistance. Most research recommends that reduction of body fat content is the primary goal of treatment for metabolic syndrome. The recent guidelines of the treatment of obesity recommend a pharmaceutical intervention of weight loss for the individuals with a BMI of at least 30 kg/m² or for those with a BMI higher than 27 kg/m² with other associated co-morbidity. Medium Chain Triglyceride (MCT) oil - which is a purified type of capric acid and caprylic acid (40% /60%) - seems to be significantly effective when introduced in body weight reduction programs, but there is not enough data about its effect on other metabolic syndrome associated criteria. S.P. is a 74 years old hypertensive male patient who has attended RSNC, because of erectile dysfunction for more than two years with a history of stroke 8 years ago. Clinically, he was found to have metabolic syndrome including central obesity, hypertension, hypertriglyceridemia, low HDL, elevated HbA1c, fatty liver and abdominal aortic atherosclerosis. He started a trial of daily consumption of 10 ml of purified type of MCT oil for 21 weeks. During this period, he showed a significant reduction of all criteria of metabolic syndrome: body weight decreased by 5%, BMI by 5%, waist circumference by 3 inches, lipid profile normalized, and percentage of body fat decreased by >7%. Ultrasounds revealed improvements in fatty liver and atherosclerotic changes. In this case, MCT oil seems to be effective as adjunctive therapy for all clinical components of metabolic syndrome and some of its com-

plications such as fatty liver and atherosclerosis. These significant adjustments in body weight, BMI, waist circumference, lipid profile, and percentage of body fat composition may be attributed to its effect on leptin and PYY levels. Further research is needed. The authors declare that they have no conflict of interests.

Magnesium administration for the prevention and management of cisplatin-induced nephrotoxicity (CIN)

Athanasios Psihogios, ND Student [1], Adam Gratton, MSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Cisplatin chemotherapy has been reported to cause direct nephrotoxicity in more than 1/3 of patients receiving treatment, with a relative risk of 1.75 ($p=0.005$), compared to non-cisplatin based chemotherapeutics. Cisplatin chemotherapy results in significant magnesium-depletion, which in turn has been shown to worsen cisplatin-induced-nephrotoxicity (CIN), with hypomagnesemia exacerbating toxicity and cisplatin-induced apoptosis. Magnesium has been proposed as an addition to conventional prevention protocols for managing CIN, based on clinical results and pharmacological studies. Administration of magnesium varied among clinical trials, with one study providing it orally, four intravenously, one both orally & intravenously and two not specifying. Intravenous dose varied between 8 mEq-20mEq. Oral magnesium supplementation (500 mg/TID) maintained GFR significantly better than control in epithelial ovarian cancer patients receiving paclitaxel + cisplatin ($p=0.0069$). Magnesium sulphate (20 mEq) administered before cisplatin + 5-FU treatment significantly reduced the incidence rate of nephrotoxicity ($p=0.038$). Hydration therapy + magnesium supplementation reduced the frequency of nephrotoxicity compared to hydration therapy alone ($p=0.01$). All clinical studies, regardless of dose and administration heterogeneity, showed positive results for magnesium preventing CIN. An *in vivo* study observed that magnesium deficiency significantly induced basal and cisplatin-mediated oxidative stress, with magnesium administration attenuating these effects. Magnesium deficiency was observed to significantly increase renal cisplatin accumulation, whereas magnesium administration blocked/reduced it. A separate study found that the renal cisplatin accumulation regulation mechanism of action is due to the influence on renal transporter (rOct2 and rMate1) expression. Clinical results show a general trend to improved outcomes for patients receiving cisplatin with regards to the risk and degree of nephrotoxicity. Trials have been conducted in a multiple of different cancer populations (lung, head & neck and gynecological), inferring a possible wide range of benefit for multiple groups. While benefit was shown across multiple studies, the sample sizes were relatively small and there was heterogeneity among study designs. Both intravenous and oral magnesium supplementation reduce the risk and degree of CIN. Magnesium administration as part of a typical CIN prevention and management plan warrants future, large scale and blinded-randomized clinical trials, to assess magnitude of effect and safety. The authors declare that they have no conflict of interests.

The therapeutic effect of ketone bodies in Alzheimer's disease: A narrative review

Yevgenia Jane Sagura, ND Student [1], Adam Gratton, MSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Alzheimer's Disease (AD) is an irreversible neurodegenerative disease of progressive cognitive impairment. 5 million Americans are living with AD, and the incidence is estimated to reach 16 million by 2050. The annual costs AD is 256 billion and 1.5 trillion respectively, making AD a major public health and economic concern. AD related cognitive decline is preceded by brain glucose hypometabolism. When consuming the Standard American Diet (SAD), the brain derives its energy almost exclusively from glucose, thus, this leaves the most metabolically active organ in chronic energy deficit. Ketone bodies can serve alternative fuel for the brain, helping offset the energy debit and can provide neuroprotection. Understanding the relationship between hypometabolism and amyloid plaque, neurofibrillary tangles formation and neuronal damage can help determine if ketones can hinder progression and prevent AD. Various mechanisms for AD evoked brain glucose hypometabolism have been proposed including insulin resistance, low circulating lipids and mitochondrial damage. These pathologies lead to impaired availability of energy in various areas of the brain including the posterior cingulate, parietal, and temporal lobes, the prefrontal cortex and the locus ceruleus of the pons, which provides all adrenergic supply to the brain. Impaired adrenergic signalling has been linked to oxidative stress, soluble b-amyloid peptide (Ab) production, tau protein phosphorylation, inhibition of neuroprotection, impairment of nerve function and further inhibition of glycolysis. These events have been shown to further inhibit glucose metabolism and the development of cognitive impairment, b-amyloid plaques and tau tangles which serve as clinical features of AD. Ketone bodies have been shown to inhibit several of these pathophysiological events. While clinical diagnosis of AD is based on the presence of cognitive impairment, b-amyloid plaques and tau tangles, glucose hypometabolism likely contributes the initial presentation of the disease and creates a vicious cycle following clinical diagnosis. Ketone supplementation is a promising option because it can target the most probable initial pathology as well as other damage seen in the progression of the disease. The neurodegeneration in AD is multifactorial and highly complex. Ketones

can have significant benefit in some aspects of the disease, especially in reduction of energy deficit, suggesting greatest benefit in early stages and disease prevention. The authors declare that they have no conflict of interests.

Pediatric secondary amenorrhea—an opportunity to address the foundations of health

Shreya Soni, ND Student [1], Caroline Meyer, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Secondary amenorrhea affects 4% of women in the general population. Functional hypothalamic amenorrhea is a frequent cause of secondary amenorrhea. It occurs as an adaptive mechanism to chronic stress, which may occur from emotional, and or physical causes such as food restriction and exercise. The consequences of untreated secondary amenorrhea, such as heart disease, osteoporosis and endometrial hyperplasia, are only beginning to be understood. This case report describes a 17 year old patient with a chief concern of secondary amenorrhea lasting five months. Secondary amenorrhea can indicate a deficiency of hormones such as progesterone and estrogen produced by the ovaries. These hormones promote healthy development of sex characteristics during puberty to promote fertility. Additionally, estrogen plays a key role in bone acquisition. The teenage years are especially a critical time for bone mass acquisition, with menarche closely linked to the peak age for bone mass accrual. Without treatment, adolescents with menstrual irregularities may miss a key developmental period for maximal bone ossification. The patient eats a vegan diet bi-weekly and had recently made restrictions to her diet resulting in the loss of 30 pounds over the previous 10 months. Her BMI was 20.95. The patient was prescribed seed cycling, a dietary intervention which integrates different seeds at different times in the menstrual cycle. Eight days later, the patient menstruated. Active constituents in the seeds prescribed include fats, vitamins and phytoestrogens which may have been responsible for the resolution of this patient's concern. Seed cycling in this case represented a creative way to increase our patient's total caloric and fat intake enough to support her menstrual cycle. Although the mechanism of action is unclear, seed cycling appears to correct potential nutritional deficiencies, rebalance the HPA axis, reduce inflammation, and provide healthy essential fatty acids. The rapid improvement seen in this case is a reminder in naturopathy that often the simplest solution can be the most effective. The authors declare that they have no conflict of interests.

Attitudes and knowledge regarding interprofessionalism among naturopathic students before and after a year of clinical internship education: A mixed-methods study

Laura Tummon Simmons, ND [1], Kieran Cooley, ND [1,2]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

[2] Australian Research Centre in Complementary and Integrative Medicine, University of Technology, Sydney

Attitudes among health care practitioners have been shown to impact their effectiveness in collaborative practice. Naturopaths in Canada have a scope and interest conducive to collaboration, however there is a lack of quantitative evidence evaluating their attitudes towards interprofessional care. Understanding attitudes, as well as knowledge of other health care providers, may assist in future integrative practice or education and training for healthcare professionals, including naturopaths. In order to begin to understand the topic, a two-phase mixed methods study was proposed to 1) assess baseline attitudes amongst naturopathic students at the beginning of their internship year 2) follow-up with these students at the end of their internship year to assess for change and conduct qualitative assessment of attitude development through additional questioning. Naturopathic interns from the 2017 graduating class of CCNM were surveyed before and after internship. Demographic and qualitative questionnaires and copies of the validated 'Attitudes to Health Professionals Questionnaire (AHPQ) (20 item visual analogue scale summarized as 2 aggregate subscales, "caring" and "subservient") were distributed to all interns (n=131). Consenting interns completed surveys which were hand-scored using a standardized process. Attitudes relating to nine healthcare professions frequently encountered by naturopaths were evaluated. Descriptive statistical analysis was conducted on demographic and qualitative questionnaires, paired t test and ANOVA were used to assess differences across healthcare professionals. 88 surveys were returned initially, and 77 of those responded in the second round of collection. Of these 46 were completed adequately in both rounds for analysis. 87% of these respondents identified as female with an average age of 28.8 years. Naturopaths were labelled the most "caring" profession by interns in both rounds of data collection ($p < 0.05$). Massage therapists and nurse/nurse practitioners were seen as the next most caring by naturopathic students overall while medical doctors and pharmacists were seen as the least. Naturopaths, massage therapists, dieticians and nurses were seen as the most "subservient" professions ($p > 0.05$) while chiropractors and medical doctors were seen as the least ($p < 0.05$). Very few attitudes significantly changed within the 1 year of internship. Primarily, interns indicated that they interacted with medical doctors (85%) in collaborative care, and 91% indicated that letter was the primary form of communication. The majority of interns (89%) indicated their personal experiences contributed to their established attitudes. There was very little

change in the attitudes of naturopathic interns over their clinical training. Further investigation and development of IPE is warranted to improve collaboration of naturopathic doctors. The authors declare that they have no conflict of interests.

Utilizing physical activity monitors as a clinical tool to motivate individuals with knee osteoarthritis to be more physically active

Ju Young Yoo, BSc, ND Student [1], Adam Gratton, MSc, ND [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Osteoarthritis (OA) is the most common form of arthritis and affects more than 10% of Canadians aged 15 years or older. First-line treatment for knee OA is physical activity and it has been shown to decrease pain and improve quality of life. The Canadian Physical Activity Guidelines recommends at least 150 minutes of moderate-to-vigorous physical activity per week in bouts of 10 minutes or more for people with arthritis to maintain good health. However, only 13% of patients with hip and knee OA met this guideline. Physical activity monitors (PAM) are equipped with clinical behavior interventions that may improve physical activity for patients with knee OA. Analysis of 13 wearable monitors showed that monitors allowed users to track their own behavior, set goals and compare their behaviors to their goals. Their most common behavior change interventions were goal setting, self-monitoring of activity, reviewing past activity histories, and optional interaction with other users for social support. It also provide visualization of the physical activity levels that may facilitate the patient's disease management, and are also equipped with gamification techniques, which include rewards, praise, and reminders, that help motivate users to reach their daily goal. PAM have been shown as a positive behavior modification tools to promote physical activity for older adults with chronic illness, including arthritis. In addition to the behavior tools, when a physical therapist supplemented the PAM with activity counseling for patients with knee OA, a trend of improvement in moderate-to-vigorous physical activity was noted. PAM cannot solve the personal barriers related to the knee OA. However, naturopathic doctors can begin to address many of the psycho-emotional factors rooted from the disease allowing them to practice missing behavior changing techniques from PAM, such as stress management or emotional control training, and relapse prevention or coping planning. By supplementing PAM with lifestyle and motivational counseling, naturopathic doctors can provide many behavior changing strategies to increase the physical activity levels of their patients. PAM are programmed with behavior changing techniques that provide opportunities for naturopathic doctors to promote healthy and active lifestyle to individuals living with knee OA to be more physically active. The authors declare that they have no conflict of interests.

Improvement in chronic osteoarthritis pain with use of arnica oil massage, therapeutic ultrasound, and acupuncture: a case report

Michelle Jackson, BMSc, ND [1], Laura Tummon Simmons, ND [1], Christine Cheung, ND Student [1]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

Chronic pain is a prevalent condition affecting millions of Canadians and is associated with low quality of life. Acupuncture has been a widely used treatment strategy in Asia for thousands of years, and its use in Canada is on the rise. Research on acupuncture is increasing, however, no study exists on the efficacy of acupuncture in combination with therapeutic ultrasound, arnica oil massage, dietary counselling, and nutritional supplementation. This case report describes MK, a 82 year-old Caucasian female who presented in June 2016 with extreme pain in her left shoulder. She rated the pain as "11/10" (10=worst) and reported significant functional limitations. MK had been a bowler for the last 51 years and one of her goals was to bowl for at least one more year. X-rays showed extreme deterioration of the left shoulder due to osteoarthritis and a total shoulder arthroplasty was scheduled for October 2016. She was taking 3g Acetaminophen and 400mg Celecoxib daily to manage the pain. Initial treatment consisted of arnica oil massage to shoulders, elbows and knees bilaterally, followed by acupuncture. MK reported a decrease in pain to 7/10 after 1 treatment and 5/10 after 3 weekly treatments. By week 6, she proudly reported that she postponed her surgery until March 2017 since she was feeling so well. Therapeutic ultrasound was initiated at that time (in combination with acupuncture and massage) and her pain further reduced to 3/10 after 2 weeks of its initiation. Throughout this time, she began reducing her pain medications and she was also regaining functionality around the home. Currently, after a total of 36 treatments, her pain remains at 3/10, she has reduced Acetaminophen to 500mg nightly (~84% reduction), Celecoxib has reduced to 200mg on bowling days (50% reduction) and not required on non-bowling days (100% reduction), and she has cancelled the surgery. This case demonstrates how naturopathic medicine, through its use of multiple modalities, may alleviate pain, improve functional abilities, reduce medication-use and prevent surgery. This treatment strategy shows promise and potential to treat those suffering with degenerative, chronic pain conditions. Further, higher quality research such as an RCT is warranted in order to fully understand this approach. The authors declare that they have no conflict of interests.

Preliminary results from the Integrative Pediatric Oncology Program (IPOP) survey of OncANP members to determine clinical trends in naturopathic pediatric cancer care

Athanasios Psihogios BA [1], Julie Ennis PhD [1], Dugald Seely ND, MSc[1]
[1]Ottawa Integrative Cancer Centre, Ottawa, Ontario, Canada K1Y2E5

The majority (61.0%) of pediatric oncology patients report use of complementary and alternative medicine (primarily self-directed). The high prevalence of use demonstrates the need for clinical information regarding safety and efficacy of integrative pediatric cancer care. In order to assess trends in naturopathic/integrative pediatric cancer care, a survey was created and disseminated among OncANP members. Data retrieved from the survey will be used to guide the creation of a hospital based pediatric oncology program. Total number of respondents was 99, with the majority having 11-19 years of clinical experience (37.0%). Nearly half (47.5%) self-identified as caring for children with cancer, with the other half (52.5%) reporting they do not. The three primary reasons for not seeing pediatric cancer patients were *Absence of Public Interest* (45.1%), *Institutional Restriction* (21.6%) and *Personal Reasons/Comfort* (19.6%). Based on 84 respondents, the top ten natural health products (NHP) recommended include *Fish Derived Omega-3 Fatty Acid* (83.3%), *Vitamin D* (83.3%), *Probiotics* (82.1%), *Melatonin* (73.8%), *Vitamin C/Absorbic Acid* (72.6%), *Homeopathic Arnica* (69.0%), *Turmeric/Curcuma longa* (67.9%), *Glutamine* (66.7%), *Astragalus membranaceus* (64.3%) and *Coriolus versicolor/PSK extracts* (61.9%). Based on 68 respondents, the top five nutritional counselling recommendations include *Anti-inflammatory Diets* (76.5%), *Dairy restriction* (64.7%), *Mediterranean Diet* (64.7%), *Gluten Restriction* (60.3%) and *Ketogenic Diet* (57.4%). Based on 68 respondents, the top five physical modality interventions include *Exercise* (94.1%), *Acupuncture* (77.9%), *Acupressure* (72.1%), *Craniosacral Therapy* (69.1%) and *Yoga* (69.1%). Based on 68 respondents, the top five mental/emotional interventions include *Meditation* (79.4%), *Art Therapy* (77.9%), *Mindfulness Based Stress Reduction* (70.6%), *Music Therapy* (70.6%) and *Visualization Therapy* (67.6%). There appears to be variance between intervention choices among respondents, possibly associated with years of clinical practice and self-identification as treating or not treating pediatric cancer cases. Reasons for this variance warrant further investigation and statistical analysis. The primary reason that naturopathic doctors are not seeing pediatric cancer cases is lack of public interest. There appears to be an even split between naturopaths who do and do not treat pediatric cancer. The results highlight naturopathic interventions across four domains with a high level of practical usage in childhood cancers which may be considered for inclusion in an integrative pediatric oncology program. The authors declare that they have no conflict of interests.

Vitamin D and progression of carotid intima-media thickness in HIV-positive Canadians

Harold Huff, BA, ND, MSc [1,2], Anwar Merchant [2,3], Eva Lonn, [2,4] Eleanor Pullenayegum [2,5], Fiona Smaill [6], Marek Smieja, [2,6]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

[2] Department of Clinical Epidemiology and Biostatistics, Health Research Methods, McMaster University, Hamilton, Ontario, Canada

[3] Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

[4] Faculty of Health Sciences, Department of Medicine, Cardiology, McMaster University Hamilton, Ontario, Canada

[5] SickKids Research Institute, Hospital for Sick Children, Toronto, Ontario, Canada

[6] Department of Pathology and Molecular Medicine, McMaster University Faculty of Health Sciences, Hamilton, Ontario, Canada

Based on evidence implicating vitamin D deficiency in the development of cardiovascular disease (CVD) we hypothesized that in HIV-positive Canadians, low 25-hydroxyvitamin D (25(OH)D) concentration would be associated with increased progression of vascular disease. Vitamin D deficiency represents a unique problem in the HIV context. The antiretroviral drug efavirenz may impair vitamin D metabolism, and deficiency has been associated with increased HIV progression, all-cause mortality and carotid artery intima-media thickness (CIMT)—a measure of subclinical vascular disease. We prospectively studied the relationship between baseline 25(OH)D (continuous) and CIMT progression (as CIMT change per year) between 2002 and 2011 in the multicentre Canadian HIV Vascular Study. Linear regression models were adjusted for Framingham risk, ethnicity, CD4 count and nadir, and years since HIV diagnosis (parsimonious model; variables included if $P \leq 0.20$ in univariable associations). Full models were adjusted for age, sex, smoking, total cholesterol-to-HDL ratio (TC:HDL), ethnicity, BMI, antiretroviral therapies, CD4 nadir, lipid medications, physical activity, years since HIV diagnosis, kidney disease, and season (full model variable selection facilitated by construction of directed acyclic graphs). Of the 128 participants, 89.1% were men, mean age (SD) was 46.5 (8.2) years, 93.8% were white, and 36.7% were smokers. Mean (SD) annual CIMT follow up was 5.7 years (2.0; min 1.5, max 8.5). Mean CIMT progression (SD) was 0.027 mm/year (0.030 mm/year).

Mean (SD) 25(OH)D was 95.0 (46.9) nmol/L. Only 13.3% were vitamin D deficient (25(OH)D <50 nmol/L), whereas 61.7% met sufficiency status (75 nmol/L). Vitamin D quartiles were inversely associated with BMI (ANOVA, $P = 0.034$), TC:HDL ($P = 0.001$), parathyroid hormone ($P = 0.003$), but not efavirenz exposure (chi-square, $P = 0.141$). In linear regression analyses, baseline 25(OH)D was inversely associated with CIMT progression in all models (Table 1). Plasma 25(OH)D is associated with CIMT progression in this relatively vitamin D replete, predominately white and male, Canadian HIV positive population. Future research needs to establish causality as this could warrant more targeted screening and/or supplementation. The authors declare that they have no conflict of interests.

Adjunctive vitamin D in the treatment of non-remitted depression: Lessons from a failed clinical trial

Monique Aucoin [1], Kieran Cooley [1,2], Leena Anand [3], Melissa Furtado [3], Alex Canzonieri [3], Alexa Fine [3], Kathryn Fotinos [3], Ranjith Chandrasena [4], Larry J. Klassen [5], Irvin Epstein [3], Wende Wood [3], Martin A. Katzman [3,6,7,8]

[1] Canadian College of Naturopathic Medicine, Toronto, Ontario, Canada M2K1E2

[2] University of Technology, Australian Research Center in Complementary and Integrative Medicine, Ultimo, Australia

[3] START Clinic for Mood and Anxiety Disorders, Toronto, Ontario, Canada

[4] Chatham-Kent Health Alliance, Chatham, Ontario, Canada

[5] Eden Mental Health Centre Winkler, Manitoba, Canada

[6] Department of Psychology, Adler Graduate Professional School, Toronto, Ontario, Canada

[7] Northern Ontario School of Medicine, Sudbury, Ontario, Canada

[8] Department of Psychology, Lakehead University, Thunder Bay, Ontario, Canada

Many patients with depression fail to achieve remission after several consecutive treatments. Vitamin D deficiency is prevalent and new research suggests that it may have an impact on mood, primarily through an effect on neurotransmitters. Numerous observational studies suggest a relationship between low levels of vitamin D and increased incidence and severity of mood disorders. A small number of pilot studies have been undertaken but lack rigorous methodology required to draw conclusions about a clinical role for this nutrient in treatment resistant depression. This study was designed as a randomized, double-blind, placebo controlled intervention study administering a weekly (bolus) dose of 28 000IU of Vitamin D3 or placebo to 125 patients with non-remitted depression adjunct to current antidepressant medication. Patients were followed weekly for eight weeks plus a one month follow up. Outcomes measured included depression severity, serum vitamin D levels and safety. Due to slow recruitment during the first season, amendments were made. These included extending the age range to 18–75 and removing the requirement for failing to respond to one pharmacologic antidepressant agent. The protocol was amended to reduce the burden on participants by changing the in-office visits to bi-weekly. Three additional tertiary psychiatric clinics were also added as trial sites. Over three recruitment period years (fall/winter), a total of 148 participants completed screening, 24 (16.2%) of whom qualified to participate in the study. Use of too many or no psychiatric medications, comorbid exclusionary psychiatric conditions, current use of a vitamin D supplement, and lack of participant compensation were the predominant reasons for ineligibility or unwillingness to participate. 9 participants were successfully enrolled in the study, 7 (77.8%) of whom completed the trial as per the protocol. After the third season, futility was declared based on inability to enroll participants. The sample size of enrolled participants (7/125, 5.6%) lacks power to conduct a full assessment of findings. High accessibility of vitamin D, as well as a growing lack of equipoise in patients and clinicians about the potential ubiquitous benefits of vitamin D for Canadians, not just for mood disorders, resulted in a large proportion of ineligible potential participants. Limited funding provided to studies on natural health products hampered recruitment. The labile and fluctuating nature of non-remitted depression as well as frequent co-morbid conditions creates additional challenges for conducting trials in this population. Future studies assessing vitamin D in depression should consider our experiences in design and conduct of research. Innovations in clinical trial design such as preference trials or accepting patients already using vitamin D but not achieving an optimal target value are potential solutions to some of these challenges. The authors declare that they have no conflict of interests.

Conflicts of Interest

The authors declare that they have no conflict of interests.

Authors' Contributions

MA and KC co-founded the first CCNM Research day.

MA, JD, QZ and KC contributed equally to planning of the research competition, assisted in the collection and review of the abstract submissions, as well as support for authors selected for the competition while producing their posters.

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