BCMJ
BC Medical Journal

November 2020:62:9
Pages 309–356

Fertility theme issue

Donor eggs for the treatment of infertility

Optimizing fertility 1: Lifestyle changes

Optimizing fertility 2: Environment toxins

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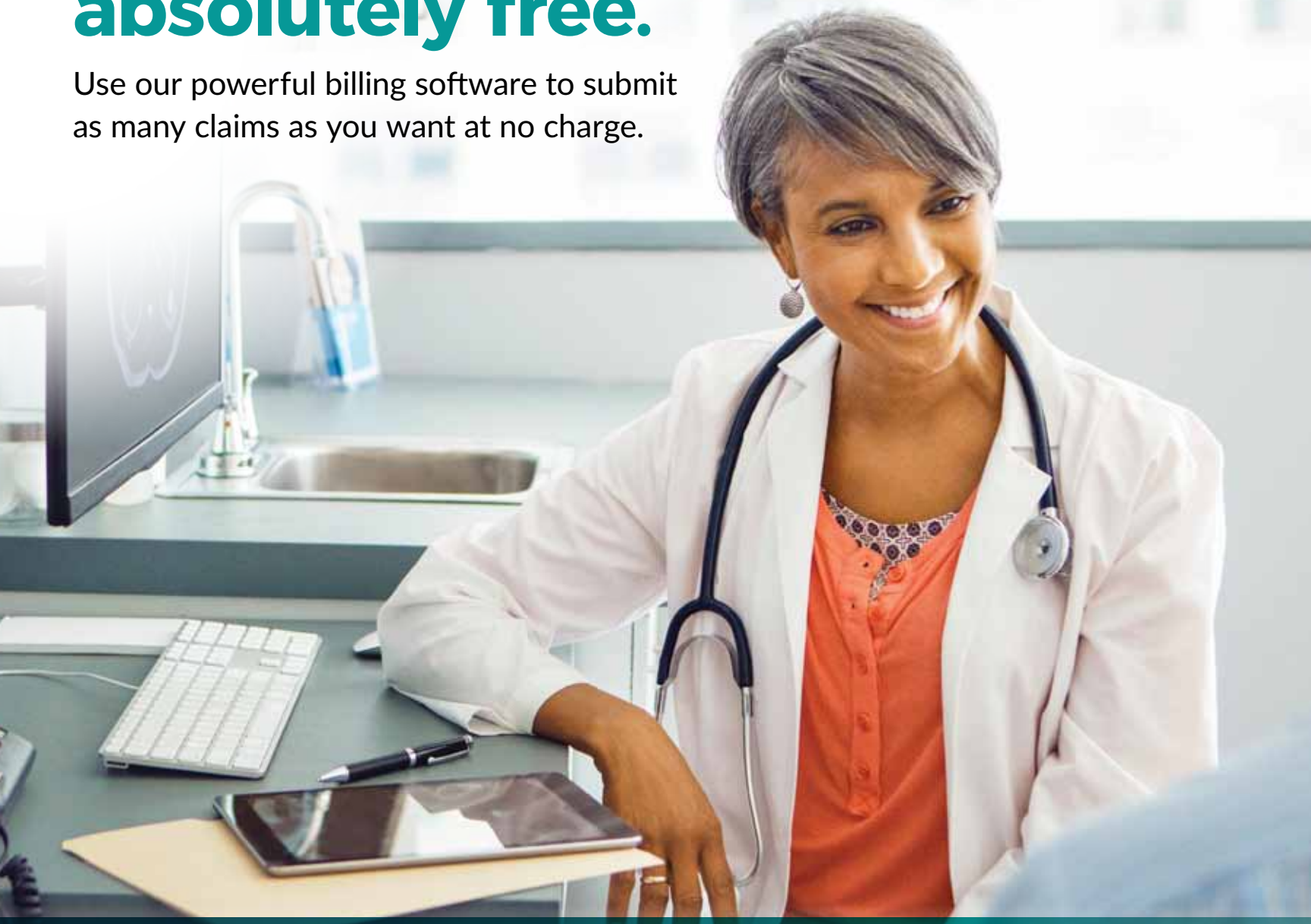

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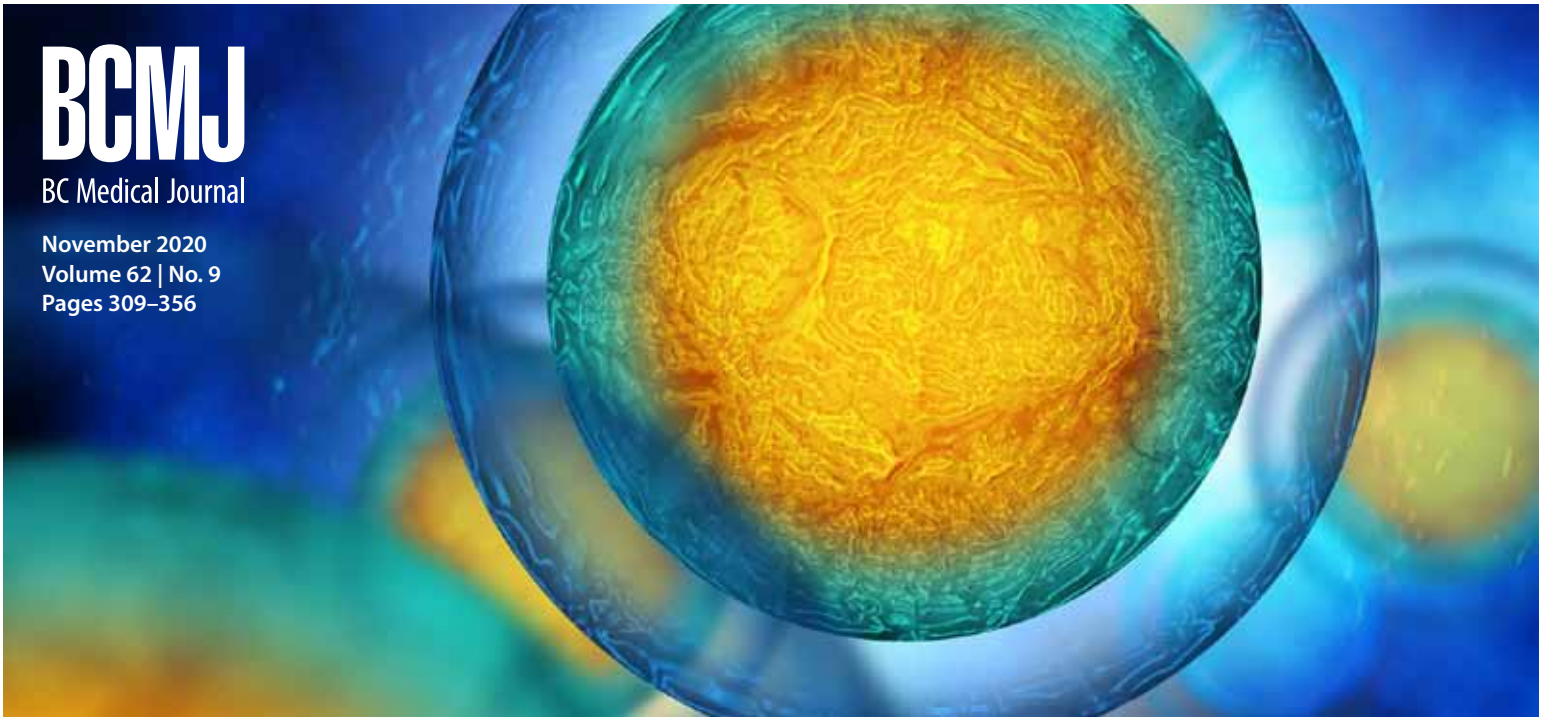
BC Medical Journal
November 2020
Volume 62 | No. 9
Pages 309–356



Using donated eggs can be a remarkably successful fertility treatment in the right circumstances. See article beginning on page 328, one part of our theme issue on fertility.

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Postage paid at Vancouver, BC. Canadian Publications Mail, Product Sales Agreement #40841036. Return undeliverable copies to *BC Medical Journal,* 115–1665 West Broadway, Vancouver, BC V6J 5A4; tel: 604 638-2815; email: journal@doctorsofbc.ca.

ON THE COVER
Fertility theme issue
In our special issue on fertility, authors cover egg donation and patients' most common questions about optimizing natural fertility, addressing both lifestyle changes and environmental toxins. Theme issue begins on page 318.

The *BCMJ* is published by Doctors of BC. The journal provides peer-reviewed clinical and review articles written primarily by BC physicians, for BC physicians, along with debate on medicine and medical politics in editorials, letters, and essays; BC medical news; career and CME listings; physician profiles; and regular columns.

Print: The *BCMJ* is distributed monthly, other than in January and August.

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doctors of bc

ISSN: 0007-0556
Established 1959

Electric bikes have given riders who are injured or older a new lease on cycling, allowing them to once again enjoy a treasured outdoor activity. See page 314.

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Virtual reality

Telehealth is a broad term defined as serving patients remotely or at a distance, and it can encompass different types of technology, including telephone, texting, emailing, and videoconferencing. Virtual visits fall under the umbrella of telehealth and have been defined by some as a secure two-way Internet-based communication between physicians and patients, and this would include emailing and videoconferencing.

Since COVID-19 announced itself to my practice in March 2020, I have "seen" a few thousand patients, and of those visits, 20% were office visits, 80% were via telephone, and one was a videoconference visit. This does not capture the numerous emails that have been sent, but the emailing was done only between my staff and my patients.

In my opinion, the office visit has always been the gold standard for assessing a patient's physical and mental well-being. The office visit encompasses seeing the patient's expression (may it be of happiness or pain), hearing the joy or anguish in their voice, and making that ever-so-essential eye contact. COVID-19 changed all of that. Although I do still see patients in the office, it is a different interaction. The eye contact is through my sometimes fogged-up glasses, the examination is with a latex-free gloved hand, and the smiles and frowns are now masked.

I have realized that although the office visit remains essential for any symptom that requires an examination, the telehealth visit has come to play a very important role. Whether it be to avoid a Handy Dart or taxi ride, missing work, or having to drag young kids along, I find that the telehealth visit is the obvious choice for most of my patients. For those who are immunocompromised, it decreases exposure to COVID-19, influenza, and other communicable diseases. For me and my staff, it saves greatly on the oh-so-scarce personal protective equipment and time spent disinfecting the clinic after each patient interaction. The telehealth visit is convenient, accessible, and less costly.

Patients are more than ready to come into the office if an examination is necessary, but otherwise they always choose the telephone visit over the videoconferencing visit, which I will refer to as the virtual visit. The virtual visit seems to be the most comprehensive option during this pandemic but the least desired by my patient population. I have offered virtual visits to patients and only a few have accepted the idea, and of those who did, one patient forgot about the appointment and another had a failed Internet connection. I had one virtual visit regarding acne and, unfortunately, I couldn't see the patient's skin very well at all. When asked why they refuse the virtual visit, some say they feel self-conscious, others say that it is easier for them to talk on the phone while at work rather than setting up for a virtual visit, and some just don't have the technology or are intimidated by the thought of what's involved.

Patients are more than ready to come into the office if an examination is necessary, but otherwise they always choose the telephone visit over the videoconferencing visit.

A drawback of the telephone visit is that occasionally it lacks the patient's focus on the seriousness of the issues at hand. Some of my patients are busy doing other things (e.g., driving, shopping, hiking) during the telephone visit. And sometimes I feel that the message isn't getting across; it becomes just a formality. A patient's lack of interest could lead to potential for the physician to become less meticulous with the telephone visit, thereby compromising the quality of care to the patient.

Telephone visits are also touted to provide more timely care, and although this is true for the patient, it has put added pressures on my schedule. My patients now expect a return phone call within a few days for non-urgent medical issues that normally would have been addressed within a few weeks.

I have asked many of my family physician colleagues about their patient-visit preferences, and most of them have adjusted to this new norm and are quite satisfied with delivering health care via office visits or by telephone. Some of them have tried virtual visits but just didn't find any added benefit at this time.

A recent study published by the BC College of Family Physicians in their Tools for Practice resource states, "diagnostic accuracy/agreement of virtual care seems similar to in-person visits."[1] They defined virtual care as videoconferencing and telephone visits. The study had a small sample size and many limitations so we can't draw any definitive conclusions from it, but I'm sure it will spark other studies on this topic.

How can we entice physicians to do more virtual visits? Currently the remuneration for office visits and telehealth visits is fairly equal. Should we reevaluate how physicians are compensated for the different types of visits? Compensation for a telephone visit could stay the same as it is currently, compensation for a virtual visit could be somewhat higher due to the time required for the setup, and compensation for an office visit could be the highest as it requires the use of PPE and also poses a higher risk for the patient, staff, and physician.

Yes, the virtual visit is more time consuming for everyone involved, but overall I think it would be a more thorough and rewarding interaction for the patient and for me compared to the telephone visit. My electronic medical record offers a simple and inexpensive option to book and start a virtual visit from within a patient's chart. And on the patient's end, it is also only a few clicks away.

Continued on page 314

E-bikes keep it rolling

As a cyclist, I always enjoy catching up to and passing another rider. My identity does not depend on this occurrence, but having a carrot to chase is a great motivator and leads to a better workout. One ride a few years ago occurred on an undulating route, and as I crested the first hill, I spied an old guy topping the next roller. I realize that by most accounts I am also old, but this guy appeared to be in his 60s, and unlike me he wasn't decked out in Lycra. He was wearing a bulky coat and was sporting what looked to be dress socks—he even had one of those side-view mirrors that attaches to your helmet.

Easy picking, I thought, as I barreled down and then up the hill, only to see him cresting the next one. Puzzled, I descended like a demon then stamped on the pedals as I climbed, only to see him disappearing over the subsequent incline. Calling for maximal effort, my legs were burning and my tongue was dragging as I powered over the next mound only to watch him disappear once more. Defeated, I soft pedaled home with my tail between my legs (to clarify, I do not really have a tail).

I spent a few days mourning the loss of my youth and fitness, trying to convince myself that a retired former pro Tour de France rider could have moved to Langley—stranger things have happened. This is when I stumbled upon an article about e-bikes. That old guy had known all along that I was behind him and was just messing with me by turning on his motor.

For those of you unaware of this new trend, e-bikes have an electric motor that the rider can activate to increase speed and reduce the work required to climb hills. Using the motor is optional, so the cyclist can pedal with or without the mechanical assist.

Initially, as somewhat of a purist, I was against e-bikes. It seemed like cheating and defeating the purpose of cycling in the first place (I was probably still bitter from getting my clock cleaned). Since that time, I have met so many people who love their e-bikes. Some are long-time cyclists who now have an ailment, such as knee or hip arthritis, that interferes with their ability to climb or ride for extended periods. The e-bike has given them a new lease on riding and they are once again able to enjoy a treasured activity. For others, who do not quite have the fitness or physique to ride, the e-bike is a great compensator. Pedal when you want and have the motor as a backup for hills or to get home if you are overextended.

The e-bike allows many more people to get outside and feel the wind on their face while they exercise and move their bodies.

The e-bike allows many more people to get outside and feel the wind on their face while they exercise and move their bodies. Previously inaccessible roads and trails are now a possibility for more to enjoy. Isn't this a goal that we as physicians should be promoting? Anything that increases participation in a healthy activity should be encouraged.

I have learned to be less of a cycling snob and more inclusive of my e-bike cycling colleagues. However, if the old guy with the side-view mirror ever reads this, I want a rematch. I promise not to use an e-bike, but I am not making any promises when it comes to performance-enhancing drugs or sabotage. ■

—David R. Richardson, MD

Virtual reality *Continued from page 313*

Many of my elderly patients find technology inaccessible or intimidating, but I think they are the ones who would benefit the most from the virtual visit, especially during a pandemic. I have proposed a quality improvement project with the help of the Practice Support Program through the General Practice Services Committee. I plan to educate my patients on virtual visits. For patients who have the technology, I am going to host a webinar on virtual visits. For patients who do not have access to the Internet, I plan to use the concept of patient partners. Patient partners may be able to present themselves to my patient's home with a laptop and help conduct the virtual visit. In future, virtual visits may also be incorporated for patients who already receive home care visits.

Pandemics may come and go, but telehealth is becoming an integral part in the standard of care in my practice. ■

—Jeevyn K. Chahal, MD

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Letters to the editor

We welcome original letters of less than 300 words; we may edit them for clarity and length. Letters may be emailed to journal@doctorsofbc.ca, submitted online at bcmj.org/submit-letter, or sent through the post and must include your mailing address, telephone number, and email address. Please disclose any competing interests.

Re: Evidence-based opioid sparing approaches to pain management

We would like to express our concern regarding the article "Think twice: Evidence-based opioid sparing approaches to pain management."[1] We share the authors' concern with the current increasing death toll from poisoning of the illicit drug supply and the desire to minimize the harms from prescribed opioids. We are fearful, however, that this article will have unintended consequences for people who *should* be receiving opioid-based therapy.

Despite the abstract specifying that the suggestions were not directed at cancer pain, we have learned from experience that this important distinction is often unappreciated by readers. It is important not to just briefly mention this population in passing, but to be very clear that the suggestions offered in the article *do not apply* to a significant number of people. The figure in the article is titled only "acute and chronic pain" and doesn't specify what group it is intended for. The title also is not specific. The authors and the *British Columbia Medical Journal* are only a few of many who have allowed this oversight, but it needs to stop.

We and many colleagues in palliative care and oncology are seeing more and more patients with cancer pain who are being stigmatized in their search for a primary care provider and being refused opioid prescriptions by their established family doctor. Pain is prevalent in 30% to 50% of people who receive cancer-directed treatments and over 70% of people with advanced cancer.[2] Opioids remain the treatment of choice for moderate to severe cancer pain.[3] It was reported that the morphine equivalent daily dose (MEDD) prescribed by oncologists before referral to palliative care decreased between 2010 and 2015 to 40 mg from 78 mg at the MD Anderson Cancer Center in Texas.[4] We feel the same is happening here in BC.

The Canadian Institute for Health Information was pleased to announce in 2019 that there had been a steady decline in the proportion of people over 65 who were started on opioids from 2013 to 2018, as well as in the proportion on long-term opioid therapy.[5] Considering the growing numbers in this age group due to our aging population, the drop in opioid prescribing in older adults is concerning. Chronic, disabling pain is more common in older adults and increasing comorbidities increases the prevalence of pain. The American Geriatrics Society, in its publication *2020 Geriatrics at Your Fingertips*, still recommends opioids for persistent "moderate to severe pain (6–10), and pain not alleviated by non-opioid therapies that is severe enough to impact function and quality of life."[6] Frail seniors, particularly those in long-term care, are not a demographic that has experienced serious harms from poisoning of the illicit supply, yet they also have had significant reductions in access to opioid-based analgesia.

We believe that messaging about opioids needs to be balanced and urge colleagues who see only the dark side of opioids to more clearly define situations to which the available evidence applies. Regarding publication style, headings are important, as sometimes they are the only parts of an article that are read. Images (such as the figure in the article) should not sacrifice subtlety in favor of simplification.

The two sides of opioids—reliever of pain and dyspnea and demon of addiction—will never be eliminated, but opioids would be used less with access to evidence-based nonpharmacological treatments that are funded as adequately as medications so that physicians have more to offer their pain patients, no matter what kind of pain they have. One hopes that any future provincial or national pain strategy mandates the funding for these therapies.

—Romayne Gallagher, MD, CCFP(PC), FCFP

—Philipa Hawley, BMed, FRCPC

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Re: Anti-Black racism in medicine

Dr Dixon's essay in the July 2020 issue of the *BCMJ*[1] is a powerful reminder of our need to consistently reflect on our positionality in the field of medicine and, more importantly, as part of our overall moral compass. The challenges she discusses both as a Black physician and through witnessing the care of Black women in the Canadian health care system cannot be tolerated.

A key point is the critical need for more Black physicians, so that Black patients feel that their physicians represent them and can understand their unique cultural values and

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Systemic bias: Breaking down barriers and improving our health care processes

"Remember, upon the conduct of each depends the fate of all." – Alexander the Great

Over the past several months, the unrest across the globe has pushed us to look deep within ourselves and acknowledge that we all carry certain opinions and prejudices about others that influence our behavior. Unconscious biases are what we think or believe based on color, race, gender, culture, age, physical appearance, and much more. Discrimination is when we act on those biases. No one is immune, because in many ways we define ourselves by our differences, our individual history, and our lived experiences.

Nowhere is bias more apparent than in the historical experiences of our First Nations, Inuit, and Indigenous peoples, alongside other racial minorities. I can trace my ancestry in Canada to White settlers who came north with the Loyalists in the War of 1812. My relatives were involved in homesteading, farming, fishing, logging, providing medical care, and engineering our cities across Canada. This is a very brief parallel history compared to those who inhabited the land for centuries before us. While there are many examples of my family's shared work on food security, watershed protection, fisheries protection, and respectful cultural engagements, we were far from truly integrated. I acknowledge this disparity—and my own privilege—up front, as it colors my own perspectives and biases.

When reports of systemic racism were first brought to light this year regarding the allegations of discriminatory games played in some emergency rooms in BC, the majority of us recoiled in shock, disbelief, and dismay. Many could not believe this practice existed in today's world. My response was clear: there is no place for racism in our communities, profession, or health care system. We can do better, and we need to be better for our patients. Basic respect and dignity should be a given, and should not have to be earned by anyone when seeking health care.

We are fortunate in Canada that our modern medical profession is composed of a diverse group of physicians from a multitude of cultures, each with characteristics and human fallibilities reflective of our population. We are ready to make that tremendous leap forward, openly acknowledging that prejudice and biases exist in our professional culture and training. We are prepared to begin the hard road toward improvement.

Recently, it was my very great pleasure to participate in the BC Physician Integration Program orientation for practice-ready international medical graduates organized by UBC CPD for both specialists and family physicians. The agenda introduced many aspects of health care delivery here in BC, including an introduction to Indigenous health, cultural considerations in communication, and physician health and wellness. While cultural considerations in communicating effectively with patients are not unique to BC, or global health care delivery, emphasizing this important aspect of care at the outset of our medical careers is critical to our success.

Early introduction to resources such as the San'yas Indigenous Cultural Safety Training (www.sanyas.ca) and Trauma-Informed Practice Guide (https://bccewh.bc.ca/wp-content/uploads/2012/05/2013_TIP-Guide.pdf) has the potential to significantly increase awareness of our own internal biases and help us to make conscious decisions to address these biases.

As well, in 2018 Doctors of BC signed the Declaration of Commitment on Cultural Safety and Humility in Health Services (www.doctorsofbc.ca/news/supporting-cultural-safety-first-nations). This declaration is our commitment to partner with the First Nations Health Authority to advance cultural safety and humility, which in turn is based on mutual respect, understanding, and reciprocal accountability during every encounter with our First Nations patients.

It is incumbent on us to understand the traumatic past that Indigenous peoples survived, including residential schools, the sixties scoop, malnutrition studies, and so much more. In many cases, this trauma manifests itself as mistrust of the health care system. These resources should assist in ensuring practitioners can approach patients from a place of appreciative enquiry. It is important to remember the multitudes of experiences that exist in BC, and how these experiences and cultures may affect how health care is accessed and delivered. While I completely respect that breaking down long-held, often unconscious, prejudice is difficult, naming and owning the disconnection is an important step toward respect, inclusion, and optimal patient care. We begin at the beginning.

For our part, Doctors of BC's Board of Directors accepted all 57 recommendations of the Diversity and Inclusion Barrier Assessment Report (www.doctorsofbc.ca/advocacy-and-policy/advocacy/hot-topics/diversity-and-inclusion) and is currently establishing the best approaches to implement them. But some of this important work has already begun. The Diversity and Inclusion Working Group has been formed; its role is to provide input into implementing recommendations from the Barrier Assessment report and to develop a high-level diversity vision statement for Doctors

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Anti-Black racism *Continued from page 315*

experiences.[1] Recent research[2] highlights the enormous benefits of patient-physician concordance on health care outcomes for minority populations and shows that it can reduce widely held biases, boost effective communication, and increase trust. More importantly, this research found that when Black physicians cared for Black newborns, the newborn mortality rate can be reduced by half.[2]

While creating greater support for Black students to enter medical school is just a small part of our collective battle against racism, it is a clear step in the right direction. Thus, medical schools in Canada have a responsibility to ensure that Black students have the best opportunity to matriculate and be successful in medicine. It is important to recognize that the lack of equitable representation among medical trainees is a huge barrier to building an efficient and inclusive health care system in Canada.

We must acknowledge and reflect on previous barriers that have been set up by Canadian medical schools against Black students. An example of a direct barrier in Canadian history is Queen's University's official ban preventing the admission of Black students that was enforced from 1918 to 1965.[3] However, it was not until very recently, in autumn 2018, that this ban was officially revoked.[3] This example provides a sense of the discrimination that Black students have faced and continue to face when entering medical school. Additionally, some of the barriers described in the literature for Black applicants entering medicine include enormous financial difficulties, the complex nature of admissions, and unsupportive advisors.[4] Hence, we can understand that there are plenty of challenges that Black applicants face when applying to medical school. Moreover, evidence[5] from examining the bias of medical school admissions committees shows statistically significant ($p < 0.05$) race bias among admissions committee members favoring White applicants. Long-standing racism, significant barriers, and the bias of admissions committees underscore the need for alternative pathways that minimize negative biases to successfully admit Black students into medical school.

Of the 17 medical schools in Canada, only four have optional entry paths that separate Black medical students from the general stream **[Table]**: the University of Toronto, the University of Western Ontario, the University of Calgary, and the University of Alberta. These separate entry pathways are important to ensure that Black students are evaluated in a holistic manner free from negative biases,[5] as evaluators are composed of Black community members and faculty. It is important for these pathways to be expanded to all 17 Canadian medical schools. Canadian medical schools should take a collaborative approach, developing programs among each other and in consultation with Black applicants, community members, and faculty, so that we can truly listen and support Black applicants in the best way possible. It should be a responsibility of all medical schools in Canada to ensure that they create and consistently evaluate programs that allow Black applicants to become successful in entering medicine.

Alternative entry pathways are important to support Black students matriculate into medical schools. However, we must remind ourselves that these pathways constitute only a small part of our overall approach in dismantling the systemic racism that is present in Canada; it is necessary to bring innovative and forward-thinking solutions to this long-neglected health care disparity. Much larger systems-level changes tackling racism are needed as well.[1]

—Nilanga Aki Bandara, BSc, Vancouver

—Vahid Mehrnoush, MD, Vancouver

—Ricky Jhauj, BKin, Vancouver

TABLE. List of Canadian medical schools and whether or not they have separate entry pathways for Black students.

Canadian medical school	Separate entry path for Black applicants (Yes or No)
University of Alberta	Yes
University of Calgary	Yes
University of British Columbia	No
University of Manitoba	No
University of Newfoundland	No
Dalhousie University	No
McMaster University	No
Northern Ontario	No
Queen's University	No
Western University	Yes
University of Ottawa	No
University of Toronto	Yes
Université Laval	No
McGill University	No
Université de Montréal	No
Université de Sherbrooke	No
University of Saskatchewan	No

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PRESIDENT'S COMMENT

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of BC. As well, unconscious bias training for members of our governance structures, including the Board, statutory and standing committees, the Joint Collaborative Committees, and the Representative Assembly, will take place over the next year. It is part of our commitment to support greater cultural diversity and inclusion, and our efforts to combat racism and support cultural safety within our membership.

Doctors of BC is collaborating with all of our partners, government, and health authorities, including the First Nations Health Authority, to break down barriers and improve our health care processes. This cannot be done in a vacuum. Only together can we reach our full potential. We will collectively strive to find our similarities, that common ground of humanity and respect that links us together. Only then will we be at our best as a society, and as a profession, best equipped to meet the needs of all our patients. ■

—Kathleen Ross, MD
Doctors of BC President

Physicians suffer infertility too

Dr Caitlin Dunne

During residency, my colleagues and I used to joke about the fact that a full maternity leave was not supported by our benefits; however, neither were birth control pills. In retrospect I wonder if we joked because, like our benefits providers, we too did not want to acknowledge that fertility is a serious issue for female physicians. Turns out that our benefits providers were right—if you just ignore fertility, it *will* go away.

Because residency overlaps with most women's prime years for egg quality, we finish our training with tens, or hundreds, of thousands fewer eggs than we started with. This loss has significant consequences for our future family lives and emotional well-being. In an American study of 600 female physicians, 24.1% of those who had tried to conceive had been diagnosed with infertility, at an average age of 33.7 years.[1] The diagnosis and subsequent treatment of infertility is another potential stressor for female physicians, who are already at higher risk of burnout than their male colleagues as a result of challenges with work–life integration and gender bias.[2]

And it's not only the time lost and stressful working conditions that might harm female physicians' fertility. An article published in *JAMA Surgery* earlier this year highlighted the increased rates of infertility (32.0% versus 10.9%) and pregnancy complications (35.3% versus 14.5%) that affect female surgeons compared to the general population.[3,4] These rates were attributed to the reproductive hazards encountered in the operating room, including sharps injury, intraoperative use of toxic agents, and exposure to radiation, surgical smoke, and anesthetic gases.[4] The authors concluded that remediation of this issue should focus on "controlling exposure rather than restricting surgeons' activity."[4]

In another recent article, "Physician fertility: A call to action," a group of female physicians with personal experiences of infertility decried the lack of institutional policies, insurance coverage, and leave for female physicians seeking fertility treatment.[5] "Fertility should not be a factor that limits women's engagement in the medical workforce," they wrote, pointing out the critical importance of women in medicine, a fact supported by a study of 1 583 028 hospitalizations in which female internists had better mortality and readmission outcomes than their male counterparts.[5]

So, data show that infertility is prevalent—in both our practices and personal lives. We can take steps to address this by raising awareness, educating our trainees, and working to reduce the societal stigma of infertility.

This is the third issue of the *BC Medical Journal* in which I have had the privilege of being guest editor to discuss fertility. In May and June 2018, the journal published articles on infertility, polycystic ovary syndrome, fertility preservation, diabetes in pregnancy, prenatal screening, and recurrent miscarriage. This month's issue contains a two-part review of optimizing natural fertility, which addresses some of patients' most common fertility questions pertaining to lifestyle (exercise, weight, coital practices, pesticides) and environmental toxins (plastics, smoking, cannabis, caffeine, alcohol). The third article in this issue reviews donor egg pregnancy, which is becoming an increasingly popular choice for women who cannot conceive with their own eggs. Thank you to all our readers for caring about the issue of infertility and participating in the conversation. ■

—Caitlin Dunne, MD, FRCSC
Co-Director, Pacific Centre for Reproductive Medicine

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Lisa J. Zhang, Jeffrey Roberts, MD, FRCSC, Caitlin Dunne, MD, FRCSC

Optimizing fertility Part 1: Evidence-based lifestyle changes

This first article in a two-part series examines how coital practices, diet, body weight, and exercise can affect natural fertility.

ABSTRACT: Infertility is a common condition that is associated with significant psychological burden. Many couples will seek to increase their fertility with lifestyle changes before consulting a specialist. This article is Part 1 of a two-part review of the current literature on optimizing natural fertility. Engaging in intercourse during one's fertile window is the most effective intervention, but diet modifications such as avoiding foods with high pesticide exposure can also make a significant difference. Folic acid supplementation is recommended preconception and during pregnancy, whereas there is poor evidence of fertility benefit from antioxidants. Obesity is associated with both male and female infertility, and moderate exercise is recommended for all patients.

Ms Zhang is a medical student at the University of British Columbia. Dr Roberts is a clinical assistant professor in the Department of Obstetrics and Gynaecology at the University of British Columbia and a co-founder/director of the Pacific Centre for Reproductive Medicine. Dr Dunne is a clinical assistant professor in the Department of Obstetrics and Gynaecology at the University of British Columbia and a co-director of the Pacific Centre for Reproductive Medicine.

This article has been peer reviewed.

Infertility is defined as the inability to conceive after 1 year of unprotected intercourse, and it affects approximately 12% to 15% of couples.[1] Given that most couples achieve pregnancy within the first 3 to 6 months of trying to conceive, it is understandable that some patients become discouraged when they encounter unanticipated difficulties with the process.[1] Many couples will go online to find information on how to boost their natural fertility even before meeting with a community physician, and will often do so much earlier than the 12-month mark. Initiating a dialogue with patients about making healthy lifestyle choices to optimize conception may help avert frustration and misinformation. Here in Part 1, we review the current literature on how coital practices, diet, body weight, and exercise can affect a couple's natural fecundability. In Part 2, we review the available evidence on the effects of lifestyle risk factors and environmental toxins on natural fertility.

Initiating a dialogue with patients about making healthy lifestyle choices to optimize conception may help avert frustration and misinformation.

Coital practices

Planning intercourse based on a woman's ovulatory cycle is likely the most effective intervention known to optimize her chances of conception. Pregnancy rates are the highest when intercourse occurs within the "fertile window": the 6 days leading up to and including the day of ovulation.[1] One prospective study of 221 healthy women found that the probability of achieving pregnancy ranged from 10% when intercourse occurred 5 days prior to ovulation up to 33% when it occurred on the day of ovulation.[2] The recommendation of the American Society for Reproductive Medicine is to engage in intercourse every day, or every other day, during this period to maximize the chances of conception.[1]

There are a variety of methods to help patients identify their fertile window, including the use of ovulation predictor kits, cervical mucus scores, or basal body temperature. Ovulation predictor kits have a control line and a test line, similar to a urine pregnancy test, and they detect a woman's mid-cycle surge of luteinizing hormone (LH), which is the stimulus for oocyte maturation (resumption of meiosis I to meiosis II) and oocyte release. Follicle rupture occurs 34 to 36 hours after the beginning of the LH surge, and the hormone is detectable in the urine for most of that time. Most digital ovulation kits also detect a urinary metabolite of estrogen, estrone-3-glucuronide (E3G). Popular brands of kits use a smiley face to indicate when E3G levels are high (correlating with a growing dominant follicle), which indicates the fertile window leading up to its

peak—the LH surge and ovulation. The cervix responds to high levels of estrogen by producing clear, slippery "egg-white" cervical mucus that is permeable to sperm movement. After ovulation, the presence of progesterone changes the cervical mucus to a thicker, yellow texture to prevent further access of sperm. Basal body temperature charting is based on the physiological 0.5 °C increase that occurs after ovulation due to progesterone. It is not useful for timing intercourse in a given month because once a woman's temperature rises, her most fertile days have passed. Temperature charting can be reassuring for some women to confirm ovulation and inform future cycles.

With recent advancements, fertility tracking applications for mobile phones have undergone a surge in popularity, with several receiving high-quality scores when critically appraised by clinicians. The best apps according to a 2019 Canadian review were Glow Ovulation, Fertility Friend FF App, Clue Health & Period Tracker, iPeriod Period Tracker Ultimate, and Kindara Fertility Tracker.[3] However, evidence suggests that these applications may be up to only 21% accurate and that using the calendar method to approximate ovulation as 12 to 18 days prior to the next menstrual period may be just as effective.[4] Alternatively, patients may choose to have regular intercourse throughout the month, as there is still considerable variation in peak fertility, even with regular cycles.

There is no scientific basis for engaging in intercourse at any particular time of the day to maximize fecundability or the probability of having a child of a certain sex, nor is there any evidence to suggest that coital or postcoital position affects fertility.[2] Remaining supine does not facilitate sperm transport because sperm have been found within the cervical canal within seconds of ejaculation and in the fallopian tubes within minutes.[5] Sexual arousal stimulates the release of oxytocin from the posterior pituitary, a hormone shown to increase the number of transported sperm; however, there is no known association between orgasm and fertility.[5]

Lubricants have been implicated in decreasing fecundability because in vitro studies have demonstrated possible toxicity of certain substances. In particular, Astroglide, K-Y products, and saliva were detrimental to sperm motility, whereas baby oil, canola oil, and hydroxyethylcellulose-based lubricants were not observed to have an effect and were deemed safe.[6,7] Clinical studies on lubricants do not corroborate this effect, however, and in at least one study, women who used lubricants had similar fecundability to those who did not.[8] Although evidence is limited, it seems reasonable to recommend products with lower levels of toxicity to sperm in vitro.

Dietary recommendations for women who are planning pregnancy may differ from those suggested for the prevention of chronic disease.

Diet

Numerous diet studies have highlighted key recommendations for improving fertility for both women and men. A variety of diets have been associated with improved natural and in vitro fertilization (IVF) pregnancy rates as well as sperm quality. Most "fertility diets" are similar in composition to the Mediterranean diet, which favors seafood, poultry, whole grains, fruits, and vegetables.[9] A recent prospective study of 357 women undergoing IVF showed the best results were achieved with a "pro-fertility" diet, which consisted of folic acid, non-dietary fatty acids (> 800 ug/day), vitamin B12 (> 15.8 ug/day), vitamin D (> 843 IU/day), low-pesticide fruits and vegetables, whole grains, seafood, dairy, and soy foods.[10] This diet was unique because it minimized the intake of fruits and vegetables with known high pesticide exposure: tomatoes, blueberries, kale, chard greens, fresh apples and pears, and potatoes. The proportions of implantation, clinical pregnancy, and live birth were greater in the upper quartile of adherence to the pro-fertility diet than in the upper quartile of adherence to the Mediterranean diet. This suggests that dietary recommendations for women who are planning pregnancy may differ from those suggested for the prevention of chronic disease.

Although there is less literature on diets and male fertility, some studies have raised concern about the effects of soy products on sperm. Higher intake of soy foods and soy isoflavones has been associated with lower sperm concentrations. One study found that men in the highest category of soy food intake (≥ 2 servings per week) had on average 41 million sperm/mL less than men who did not consume soy foods.[11] Yet, among couples who presented to an infertility clinic, soy food intake in men was not correlated with the likelihood of pregnancy.[12] The current research is too limited to make definitive conclusions, but men might choose to minimize their soy consumption while trying for pregnancy.

Nutritional supplementation is also a popular but controversial topic among women who are attempting to conceive. A study conducted on mice demonstrated that lifelong consumption of omega-3 fatty acids prolonged reproductive function into advanced maternal age.[13] Furthermore, even short-term dietary treatment with omega-3 fatty acids was associated with improved oocyte quality. However, these results have yet to be reproduced in human studies.

Folic acid is essential to DNA synthesis, and supplementation is known to reduce the risk of neural tube defects. The Society of Obstetricians and Gynaecologists of Canada recommends 0.4 to 1 mg of folic acid per day, beginning 3 months prior to conception, for women at low-to-moderate risk of having a child with a neural tube defect. Women at higher risk, such as those with a personal or family history of having a child with a neural tube defect, should take 4 mg of folic acid per day.[14] Doses of more than 0.8 mg of folic acid per day have also been associated with lower risk of infertility and pregnancy loss, and higher pregnancy rates with medical fertility treatments.[9]

There is conflicting evidence regarding the effects on fertility of taking antioxidants such as N-acetyl-cysteine, melatonin, L-arginine, myo-inositol, D-chiro-inositol, carnitine, selenium, vitamin E, vitamin B, vitamin C, vitamin D and calcium, CoQ10 (ubiquinol), and

pentoxifylline. A Cochrane review found very low-quality evidence that taking antioxidants improves female fertility, and there is no evidence to suggest that CoQ10 increases the likelihood of pregnancy.[15,16] In a study on subfertile males in couples that were attending fertility clinics, another recent Cochrane review found low-quality evidence that taking antioxidants may improve live birth rates.[17] Overall, there is no clear consensus regarding the effects of antioxidants on fertility given the difficulty encountered when studying micronutrients that are rarely used in isolation.

Body weight

There is a curvilinear relationship between body weight and fecundability, as both underweight and overweight women face greater difficulties conceiving than women of normal weight. One prospective study reported a hazard ratio of body mass index on the probability of conception per cycle of artificial insemination.[18] The authors determined that both very lean and obese women trended to have a lower chance of becoming pregnant, although the effect was greater in obese women. Women with a BMI < 20 kg/m^2 had a hazard ratio of 0.837 (95% CI, 0.662-1.058), while those with a BMI of 25 to 30 kg/m^2 and ≥ 30.0 kg/m^2 had ratios of 0.939 (95% CI, 0.775-1.139) and 0.431 (95% CI, 0.171-1.087), respectively, when compared to the reference group, which had a BMI between 20 and 25 kg/m^2.[18] A North American preconception cohort study found similar results, with decreased fecundability associated with female obesity; however, it did not show evidence that underweight women experienced this same issue.[19] The fecundability ratio of the group of women with a BMI < 18.5 kg/m^2 was 1.05 (95% CI, 0.76-1.46) when compared to women with a BMI between 18.5 and 24.0 kg/m^2.[19]

Obesity is associated with ovulatory dysfunction (RR 3.1, 95% CI, 2.2-4.4) via disruption of the hypothalamic-pituitary-gonadal axis from sex hormones accumulated in adipose tissue.[20] It is believed that this abnormal endocrine environment affects oocyte maturation, which results in poorer oocyte quality and embryo implantation.[21] Overweight women (BMI ≥ 25 kg/m^2) have significantly lower clinical pregnancy (RR 0.90, P < .0001) and live birth rates (RR 0.84, P = .0002) and a significantly higher miscarriage rate (RR 1.31, P < .0001) than women of normal weight.[21] Obesity in males is linked to lower sperm concentrations and abnormal sperm morphology.[22]

Women with a BMI ≥ 25 kg/m^2 should be encouraged to lose weight in order to reduce morbidity and pregnancy complications. This requires a combination of dietary modification, physical activity, and behavioral interventions. A large multicentre randomized trial showed that rates of natural conception were significantly higher in a group of obese women who had undergone a 6-month structured lifestyle intervention compared to those who underwent immediate ovulation induction with letrozole or clomiphene (RR 1.61; 95% CI, 1.16-2.24).[23] And while the lifestyle intervention group was less likely to require fertility treatment, the overall live birth rate at the end of the 24-month trial was similar between the "lifestyle" group and the "immediate fertility treatment" group. The Society of Obstetricians and Gynaecologists of Canada recommends a weight-management strategy focused on appropriate dietary adjustments, increased physical activity, and reduced sedentary behavior.[14]

In the context of improving fertility, exercise appears to have conflicting effects depending on the intensity and a woman's BMI.

Exercise

Exercise is widely known to have numerous health benefits and is often recommended by physicians to reduce morbidity and improve overall wellness. However, in the context of improving fertility, exercise appears to have conflicting effects depending on the intensity and a woman's BMI. A prospective cohort study followed 3628 women of various body habitus, their reported hours of vigorous activity, and their time to pregnancy.[24] It found an inverse association between vigorous physical activity and fecundability among women with a BMI < 25. Those who engaged in ≥ 5 hours of vigorous activity per week had a fecundability ratio of 0.58 (95% CI, 0.45-0.75) when compared to those who did not engage in any vigorous physical activity. Conversely, the study did not find any evidence of an inverse association between fecundability and vigorous physical activity among overweight or obese women; there was actually a weak positive association in this group. Another prospective study found that among women with a BMI ≥ 25, fecundability was 27% higher in those who engaged in vigorous physical activity for ≥ 5 hours per week than in those who exercised < 1 hour per week (95% CI, 1.02-1.57).[19] The American College of Obstetricians and Gynecologists recommends 30 minutes of moderate exercise per day, at least 3 to 4 times per week, both preconception and during pregnancy.[25] Competitive athletes seeking to optimize their fertility should avoid hyperthermia and dehydration and maintain adequate caloric intake to avoid excessive weight loss preconception.

In regard to male fertility, exercise does not appear to affect sperm parameters. In an observational study of men at a fertility clinic, semen volume, sperm concentration, sperm motility, sperm morphology, and total motile sperm were not associated with regular exercise. The exception appeared to be bicycling ≥ 5 hours per week, which was associated with lower sperm concentration (OR 1.92; 95% CI, 1.03-3.56) and total motile sperm (OR 2.05; 95% CI, 1.19-3.56).[26]

Summary

There are many evidence-based methods for optimizing fertility based on lifestyle changes. Patients should understand their individual fertility window, and if possible, have intercourse every 1 to 2 days during that time. If desired, hydroxyethylcellulose-based lubricants can be used in place of other lubricants to minimize the sperm toxicity of other lubricants. Patients should be encouraged to consume fresh fruits and vegetables as a part of a well-balanced diet, and the importance of washing their produce

thoroughly and considering organic options should be discussed. Taking 0.4 to 1 mg of folic acid per day is advised, beginning 3 months prior to conception. A BMI ≤ 25 kg/m^2 is ideal for maximizing fecundability, and there are efficacious lifestyle interventions for overweight women who are experiencing difficulty with achieving pregnancy. Exercise should be regular and moderate, averaging 30 to 45 minutes per day, if possible.

Part 2 of this review provides more information on lifestyle changes that can optimize natural fecundability; it focuses on the effects of caffeine, alcohol, smoking, electronic cigarettes, cannabis, and environmental toxins on fertility. ■

Competing interests

Dr Dunne is a member of the *BCMJ* Editorial Board but did not participate in the review or decision making regarding this article. No competing interests have been declared.

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Optimizing fertility Part 2: Environmental toxins

This second article in a two-part series examines how exposure to caffeine, alcohol, tobacco, vaping, cannabis, pesticides, plastics, and mercury can affect natural fertility.

ABSTRACT: Environmental toxins have the potential to damage sperm, eggs, and the developing fetus. Exposure to common substances like alcohol, tobacco, cannabis, caffeine, and plastics, for example, can be controlled prior to conception to mitigate their negative effects on fertility. There is conflicting literature on caffeine and alcohol, including the recommendation that patients should limit their consumption of each to two servings per day. Evidence suggests that patients should avoid smoking and using electronic cigarettes and cannabis when trying to conceive. Environmental toxins such as plasticizers and mercury appear to have a negative effect on fertility and should also be avoided. Couples who are considering pregnancy should limit their exposure to toxins and follow evidence-based recommendations that optimize their fertility.

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Infertility is defined as the inability to conceive after 1 year of unprotected intercourse, and it affects approximately 12% to 15% of couples.[1] Given that most couples achieve pregnancy within the first 3 to 6 months of trying to conceive, it is understandable that some patients become discouraged when they encounter unanticipated difficulties with the process.[1] Many couples will go online to find information on how to boost their natural fertility before meeting with a community physician, and will often do so much earlier than the 12-month mark. Initiating a dialogue with patients about making healthy lifestyle choices to optimize conception may help avert frustration and misinformation. In Part 1, we reviewed the current literature on how coital practices, diet, body weight, and exercise can affect a couple's natural fecundability. Here in Part 2, we review the available evidence on the effects of lifestyle risk factors and environmental toxins on natural fertility.

Moderate caffeine consumption of one to two cups of coffee per day before or during pregnancy does not have any apparent adverse effects on fertility or pregnancy outcomes.

Caffeine

Caffeine is a pharmacologically active substance that is widely consumed by many individuals as part of their daily routine. It is considered to be relatively harmless, and its consumption has even been associated with numerous health benefits, including reduced all-cause mortality and reduced cancer risk.[2] However, in the context of fertility, there are contradicting results. An excess of caffeine (> 500 mg/day) has been related to reduced fertility, with a significantly increased odds ratio of 1.45 (95% CI, 1.03-2.04) for subfecundity.[3] A prospective study demonstrated that women who consumed > 200 mg of caffeine had a greater than double risk of miscarriage than women who did not consume caffeine (RR 2.23; 95% CI, 1.34-3.69).[4] In contrast, a recent prospective cohort study of 1708 women found that women who were undergoing intrauterine insemination treatment and who drank one to five cups of coffee per day were more likely to achieve clinical pregnancy (RR 1.49; 95% CI, 1.05-2.11) and live birth (RR 1.53; 95% CI, 1.06-2.21) than were coffee abstainers.[5] Furthermore, a randomized controlled trial that assigned decaffeinated and caffeinated beverages to pregnant women did not show a significant difference in the length of gestation or infant birth weight between groups.[6] Given the current literature, the American Society for Reproductive Medicine states that moderate caffeine consumption of one to two cups of coffee per day before or during pregnancy does not have any apparent adverse effects on fertility or pregnancy outcomes.[1]

The literature on caffeine's effect on male fertility is inconsistent and inconclusive. Caffeine has been theorized to increase the risk of aneuploidy and DNA breaks in sperm, but clinical results contradict this.[7] Men's consumption of coffee has been associated with prolonged time to pregnancy in some studies, but no associations were found in others.[7] One systematic review reported potential negative effects of caffeine-containing soft drinks on semen volume, count, and concentration, but the authors also presented studies that did not find any evidence to support this claim.[7]

Alcohol

Alcohol has clear deleterious effects on many aspects of health. Excessive use of alcohol is well known to increase the risk of cancer, stroke, heart failure, and death, but the effects on fertility are less conclusive. Some studies have reported no relationship between alcohol consumption and fecundability, whereas others have shown evidence of a significant association. A prospective study that examined 6120 women who were not receiving fertility treatments did not find evidence of a relationship between moderate alcohol consumption and fecundability.[8] Another recent study of 1708 women showed that low to moderate weekly alcohol intake was not significantly associated with achieving clinical pregnancy or live birth following infertility treatments.[9]

Conversely, some studies have demonstrated significant declines in fertility associated with alcohol consumption. A prospective survey of 7393 women found that heavy alcohol consumption (> 140 g of alcohol per week) was associated with a higher risk of infertility when compared with moderate consumption (50 to 140 g per week) (RR of 1.59, 95% CI, 1.09-2.31).[10] Women who consumed less than 50 g of alcohol per week had a significantly lower risk of infertility than women who were heavy consumers (RR 0.64, 95% CI, 0.46-0.90).[10]

Even low levels of alcohol consumption have been shown to reduce fertility. In a study of couples who were trying to achieve their first pregnancy, women who consumed one to five alcoholic drinks per week had an odds ratio of 0.61 (95% CI, 0.40-0.93) of achieving pregnancy when compared with women who did not consume alcohol.[11] The effects were even more significant in women who consumed more than 10 drinks per week (OR 0.34, 95% CI, 0.22-0.52).[11]

A study that examined the intake of various alcohols and time to conception among 29 844 women found that those who preferred wine had a shorter wait time to conception than non-wine drinkers, while there was no relationship between beer consumption and time to conception.[12] There was a weak J-shaped relationship associated with the consumption of spirits and wait time to conception: the moderate intake group had shorter wait times, while the higher intake group had longer wait times.

There is substantial evidence of the pernicious effects smoking has on both the female and male reproductive organs.

The American Society for Reproductive Medicine recommends no more than two drinks of alcohol per day when trying to conceive, but it is important to note that there is no safe level of alcohol consumption when pregnant.[1]

There is no strong evidence that alcohol affects men's sperm. No significant association has been found between alcohol and seminal volume, sperm concentration, or percentage of motile spermatozoa.[13]

Smoking

Cigarette smoke contains numerous toxic components, including nicotine, carbon monoxide, and cyanide.[14] The effects of smoking are not limited to the oropharynx and lungs. There is substantial evidence of the pernicious effects smoking has on both the female and male reproductive organs.

A meta-analysis found a significant association between smoking and infertility (OR 1.60; 95% CI, 1.34-1.91).[15] Among those who conceived, smokers experienced substantial delays in conception of 12 months or more compared to nonsmokers (OR 1.54; 95% CI, 1.19-2.01).[16] This delay was even evident in women who were exposed to secondhand smoke, although it was of a lesser magnitude (OR 1.14; 95% CI, 0.92-1.42).[16] There is good evidence to suggest that nonsmokers who have excessive exposure to tobacco smoke may experience reproductive consequences as significant as those experienced by smokers.[17] Smokers also have a higher risk of miscarriage (OR 1.8; 95% CI, 1.3-2.6), as well as an earlier onset of menopause by 1 to 4 years and a diminished ovarian reserve.[14] The impact of smoking on the ovaries appears to be transgenerational, as the effects have been seen in the mother, fetus, and fetal gametes.[18] Male offspring of female smokers have lower sperm concentrations.[19]

Smoking appears to have some repercussions on spermatogenesis. Genetic and epigenetic changes that are associated with smoking lead to reduced sperm function and subsequently fertility.[20] Sperm concentration is reduced on average by 22%, and sperm motility and morphology have also been found to be abnormal in smokers.[16,21] The effects on the male reproductive system are dose-dependent, but overall, there is still limited evidence of clinical infertility given that most affected parameters remain within the normal range.[16] Even so, smoking cessation and elimination of secondhand exposure should be encouraged among both men and women who are seeking to maximize their fecundability. Smoking cessation agents, including bupropion, varenicline, or combination nicotine therapy, appear to be safe as a first-line therapy for those who are ready to quit.[16]

Electronic cigarettes and vaping

Vaping and the use of electronic cigarettes or "e-cigs" are marketed as a safe alternative to smoking, and their use is increasing rapidly, especially among the younger generations. Electronic cigarettes supposedly contain fewer chemicals than cigarette smoke, but they also contain unique and novel chemicals. Diacetyl is used for flavoring purposes and has been associated with the chronic lung disease bronchiolitis obliterans.[22] The lung condition was observed in popcorn plant workers, where diacetyl is used to give popcorn its butter-like flavor; hence, the condition was coined "popcorn

lung."[22] Propylene glycol and/or glycerol functions as the smoke, "throat hit," and vehicle for nicotine.[23] It is used for ketosis in cows and appears to have limited reproductive effects, none of which have been studied in humans.[24,25]

Nicotine is the stimulant and addictive component of tobacco and electronic cigarettes; it works through the nicotinic acetylcholine receptors to increase blood pressure and heart rate and stimulate the central nervous system. It is a known teratogen and carcinogen and is highly addictive. During pregnancy, nicotine concentrates in the fetus and placenta due to its lipophilic nature.[26] It has been associated with multiple medical comorbidities in offspring, including sudden infant death syndrome, attention deficit hyperactivity disorder, substance abuse disorders, and aggressive behaviors.[27]

Given the novelty of electronic cigarettes, the literature on their effects on the reproductive system is scant and limited to animal models. One study on mice found that exposure to electronic cigarette smoke prior to conception significantly reduced fertility by causing delayed implantation of the fertilized embryo to the uterus.[28] Furthermore, exposure during pregnancy affected the growing fetus and led to significant weight reductions in female offspring. A study on rats revealed that exposure to electronic cigarette smoke induced significant malformations in spermatozoa and accelerated the degeneration of the testes.[23] More research is needed before definitive conclusions can be made, but given the current evidence, vaping should not be used as an antismoking treatment by men or women of reproductive age.

Cannabis

Since Canada's recent legalization of recreational *Cannabis sativa*, its use is now more popular than ever.[29] Whether cannabis is smoked or refined into other products, tetrahydrocannabinol (THC) is its most psychoactive component and attaches to cannabinoid receptors within the endocannabinoid system. These receptors are present in many organ systems, including both the male and female reproductive systems.[30] There is speculation that cannabis use interferes with the hypothalamic-pituitary-ovarian axis, but currently, the evidence linking its use to infertility is limited. A study published in 1990 reported that women who smoked cannabis had a slightly elevated risk of infertility due to ovulatory abnormality (RR 1.7; 95% CI, 1.0-3.0).[31] However, more recent large-scale cohort studies have failed to demonstrate an association between cannabis use and a prolonged time to pregnancy. A retrospective review found that the time ratio to pregnancy for women who never used cannabis compared to daily users was 1.08 in men (95% CI, 0.79-1.47) and 0.92 in women (95% CI, 0.43-1.95).[32] Similarly, a preconception study that tracked fertility rates and self-reported cannabis use did not find a significant relationship between female or male cannabis use and fecundability.[33]

Given the current literature it is reasonable to recommend that both male and female patients abstain from using cannabis when attempting to maximize fecundability.

One meta-analysis found that cannabis use during pregnancy was associated with an increased risk of low birth weight (RR 1.43; 95% CI, 1.27-1.62) and preterm delivery (RR 1.32; 95% CI, 1.14-1.54).[34] However, after controlling for confounding factors such as tobacco use, those risks were no longer statistically significant. The authors concluded that "the association between maternal marijuana use and adverse outcomes appears attributable to concomitant tobacco use and other confounding factors."

The literature on cannabis use and male fertility is conflicting. An in vitro study showed that sperm motility decreased dose-dependently by 2% to 21% when samples were exposed to varying concentrations of THC.[35] However, there is no evidence of an effect on clinical outcomes. A recent longitudinal study of 662 subfertile men found that men who had smoked cannabis had significantly higher sperm concentrations than men who had never smoked; however, both concentrations were within the normal reference range, and cannabis smoking was not associated with alterations in the integrity of sperm DNA.[36]

There is sufficient evidence about the effects of cannabis use for the Society of Obstetricians and Gynaecologists of Canada to advise women to avoid using cannabis when pregnant or breastfeeding. Although the effects of cannabis use on fertility are more ambiguous, given the current literature it is reasonable to recommend that both male and female patients abstain from using cannabis when attempting to maximize fecundability. A more thorough review of cannabis effects on male and female reproduction is available in the September 2019 issue of the *BC Medical Journal*.[37]

Environmental toxins

Certain environmental toxins contain endocrine-disrupting chemicals that can interfere with female and male fertility by acting on steroid receptors as both agonists and antagonists, thus disrupting hormone biosynthesis, signaling, and metabolism. Exposure to these highly persistent toxic chemicals should be avoided, especially by those trying to conceive.

Pesticides contain organochlorine compounds that are known to disrupt reproductive function. Their effects have been highlighted in agricultural workers who have had high-risk occupational exposures to these compounds. A pooled estimate from eight studies showed that the likelihood of pregnancy among this population was lower than among non-exposed populations, and was 0.89 for women (95% CI, 0.82-0.97) and 0.95 for men (95% CI, 0.84-1.08).[38] A recent prospective cohort study demonstrated that reducing dietary intake of pesticides can improve outcomes of in vitro fertilization.[39] The study classified fruits and vegetables into groups with low and high concentrations of pesticide residues. Strawberries, kale, apples, grapes, tomatoes, and green peppers were considered to have the highest concentrations. Compared to women in the lowest quartile of high-pesticide intake (< 1.0 servings/day), women in the highest quartile (2.3 servings/day) had an 18% (95% CI, 5%-30%) lower probability of clinical pregnancy and a

26% lower probability of live birth (95% CI, 13%-37%).[39] The effects of pesticides on sperm parameters have also been established: decreases in sperm concentrations and effects on sperm motility and morphology have been recorded in numerous studies.[40,41] One meta-analysis found an odds ratio of 1.98 (95% CI, 1.34-2.62) for abnormal sperm quality due to exposure to organochlorines.[41]

Another common household source of endocrine-disrupting chemicals is plasticizers. Phthalate esters are used mainly as spacers between polycarbons to make plastics soft and pliable, and they are the source of the "new car smell." However, they can also be found in cosmetics, fragrances, sunscreen, laundry detergent, bar soap, shampoo, conditioner, lotions, and toothpaste. Some phthalates have a low molecular weight and can act as endocrine disruptors. Similar to organochlorines, phthalates have been associated with a consistently increased risk of compromised sperm quality (OR 1.52; 95% CI, 1.09-1.95).[41] The use of plastics, especially #3 and #7, should be minimized, and the use of phthalate-free or alternative household products are preferred.

Bisphenol A (BPA), another frequently used plasticizer, is used in the polycarbonate plastics of bottles and sports equipment, and the coating of metal food containers such as cans and lids. BPA disrupts meiotic maturation of oocytes in mature animals, which leads to higher levels of aneuploidy.[42] BPA can have an effect at very low concentrations, and one study found detectable concentrations of BPA in most IVF patients.[43] These concentrations appeared to be consequential because they were inversely associated with the number of oocytes retrieved and peak estradiol levels.

Finally, mercury is a chemical contaminant that bioaccumulates in humans and has the potential to act as a reproductive toxin. Its widespread presence is attributable mainly to seafood consumption, although coal-burning power plants are another source. Given that there are many health benefits associated with the high consumption of a seafood diet, namely from omega-3 fatty acids like docosahexaenoic acid and eicosapentaenoic acid, the benefits may counter mercury toxicity to some degree. There is a provisional tolerable intake, which is lower in reproductive-age women than in other women. Health Canada recommends limiting servings of high-risk fish such as tuna, shark, marlin, and swordfish to 150 g or 5 oz per month.[44] The effects of mercury on the male and female reproductive systems are not directly known, but one study found that compared to fertile control subjects, higher mercury levels were recorded in both infertile males with abnormal sperm and infertile females with unexplained infertility.[45] The blood mercury concentrations of the infertile subjects were positively correlated with their seafood consumption, and the authors concluded that "higher blood mercury concentration is associated with male and female infertility."

Bisphenol A (BPA) can have an effect at very low concentrations, and one study found detectable concentrations of BPA in most IVF patients.

Summary

There are many evidence-based lifestyle changes that can optimize natural fecundability. Moderate caffeine consumption (two cups per day) and moderate alcohol consumption (one to two drinks per day) are considered safe during the preconception period. Patients should abstain from smoking, vaping, or using cannabis products in any capacity given evidence in the current literature. Patients should consider organic food options or thoroughly wash their produce before consumption. Canned food, bottled water, and fish with high mercury content should be avoided. The use of plastics should be minimized, and the use of phthalate-free or alternative household products are preferred. Part 1 of this review provides more information on lifestyle changes that can optimize natural fecundability; it focuses on the effects of coital practices, diet, body weight, and exercise on fertility. If the recommendations provided in this review fail and patients 35 years and younger are still experiencing difficulty conceiving after 12 months (or 6 months in women over 35 years), infertility investigations should be initiated and consultation with a gynecologist or fertility specialist should be considered. ■

Competing interests

Dr Dunne is a member of the *BCMJ* Editorial Board but did not participate in the review or decision making regarding this article. No competing interests have been declared.

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Caitlin Dunne, MD, FRCSC

Donor eggs for the treatment of infertility

Using donated eggs can be a remarkably successful fertility treatment in the right circumstances. Though donor egg pregnancies may carry some increased obstetrical risks, the risks are manageable and can offer women a chance at pregnancy when there is no other option.

ABSTRACT: Egg donation is a common treatment for infertility. It is most often used for women with premature menopause, advanced reproductive age, or a history of unsuccessful in vitro fertilization attempts. Because egg donors are generally in their 20s, pregnancy success rates are high. In many cases, donor eggs give women a chance at pregnancy when there would be no other option. Donor egg pregnancies may carry some increased obstetrical risks related to preeclampsia and advanced maternal age. Community physicians are well positioned to counsel women on donor eggs as well as to care for women with a donor egg pregnancy.

Background

Egg donation involves using eggs from a fertile woman to create a pregnancy in an infertile woman by means of in vitro fertilization (IVF). The woman receiving the egg will not be genetically related to the child but will be considered the birth mother.[1]

The first birth from a donor egg was reported in 1984, and the egg was fertilized in vivo.[2] An anonymous egg donor was inseminated, and then uterine lavage was performed at precisely the right time to recover the resulting embryo, which was transferred into the intended mother's uterus.[2,3]

In the early 1980s, assisted reproductive technology was developing rapidly in Canada and around the world.[4] Fertility pioneers used laparoscopy to retrieve donor eggs for fertilization in vitro.[3,5,6] These early "third-party reproduction" techniques were groundbreaking at the time, given that the world's first IVF baby, Louise Brown, had been born in 1978.[7]

Today, the use of donor eggs is an increasingly common fertility treatment.[8] According to the Canadian Fertility and Andrology Society, some form of donor eggs were used in more than 10% of all fertility treatment cycles in 2018. Their use nearly doubled in 5 years: 3055 cycles involved donor eggs in 2018 compared with 1587 treatment cycles in 2013.[9]

Indications for donor eggs

The indications for donor eggs include advanced reproductive age, diminished ovarian reserve, poor oocyte or embryo quality in prior attempts at IVF, hypothalamic hypogonadism, and the possibility of passing on a significant genetic defect. In practice, the most common indication is age-related fertility decline. Often, a woman's choice to use donor eggs comes after failed attempts at IVF with her own eggs. In these cases, donor eggs offer a chance at pregnancy when there is no other option.

Advanced female age is an increasingly prevalent cause of infertility. Women are waiting until later in life to have children. British Columbia has the highest age of first birth in Canada at 30.5 years versus 30.3 years in Ontario.[10] According to Statistics Canada, 2010 marked the first time that more women in their 30s were having children compared to women in their 20s.[11]

The possible consequences of delaying childbearing are infertility, embryo aneuploidy, and miscarriage. These are largely attributed to aging oocytes with failing meiotic spindles and other ooplasm deficiencies such as mitochondrial dysfunction.

Unlike sperm, which are constantly regenerated by the billions in a 70-day cycle,[12] eggs are not replenished. Women are born with all their eggs. A female attains her lifetime maximum number of oocytes, 6 to 7 million, around 20 weeks gestational age in utero.[12] By puberty she has about 300 000 oocytes remaining, arrested in primordial follicles at the diplotene stage of meiosis 1.[13] The eggs stay dormant and continue to age with the woman until they become hormonally responsive for 14 days during a menstrual cycle. At ovulation, half the chromosomes are supposed to migrate into the first polar body. When the egg is fertilized, the sister chromatids separate and half of them should end up in the second polar body. If either division does not occur correctly, aneuploidies such as trisomy or monosomy are the result. Older eggs are much more prone to errors. A 41-year-old woman undergoing IVF should expect nearly 70% of her embryos to be aneuploid compared to just over 20% in a 29-year-old woman.[14] At age 44, almost 90% of a woman's embryos would be

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This article has been peer reviewed.

expected to be abnormal, and live birth rates, even with IVF, are less than 2%.[15,16] Conversely, advancing paternal age has not been associated with higher miscarriage risk when studied in an egg donor cycle.[17-19]

Aneuploidy rates, combined with physiological decline in ovarian reserve, are the main reasons pregnancy can be difficult to achieve in women of advanced reproductive age. Hence, when it comes to the problems of poor egg quality or early menopause, donor eggs are a cure for the incurable.

Donor eggs are not exclusively for infertile women. They are also important for same-sex male couples and single men who lack the requisite gamete. These situations also require a uterus to gestate the pregnancy, which can take one of two forms. When the woman donating the egg is also the one to carry the pregnancy, it is referred to as *traditional surrogacy*. In contrast, a *gestational carrier* is a woman who carries a pregnancy derived from an egg that is not her own (i.e., she is not genetically related to the fetus).[20]

Lesbian couples or trans men can undergo "directed" egg donation, whereby eggs from one partner are used to create an embryo for the other to carry. Reciprocal IVF, or "egg-sharing" as it is commonly called, is usually performed in a similar fashion to traditional IVF.

This article focuses on anonymous frozen donor eggs, which are currently the most prevalent type of egg donation.[3]

Donor eggs in fertility treatment

The most accessible source of donor eggs for Canadians is a frozen donor egg bank in the United States. Clients (aka intended parents) browse online profiles of donors, which include photos of the donor as a child and/or adult, a personal statement, her medical history, and genetic carrier screening results.

Prior to the existence of commercial frozen donor egg banks, patients had to find an altruistic family member or friend to act as a fresh egg donor. The donor would then undergo IVF at a local fertility clinic, which was often synchronized with the intended mother's menstrual cycle to accommodate a fresh embryo transfer. The challenges of finding and coordinating altruistic donors could be burdensome and, in many cases, prohibitive. In Canada, compensation for gamete donation and surrogacy services is regulated by federal law under the Assisted Human Reproduction Act.[21] Donations made in Canada must be altruistic, meaning that only out-of-pocket expenses can be reimbursed. New regulations made under the Act came into force in February 2020; they further specify the types of reimbursements that egg donors may receive.[22] The penalty for contravention of the Act is up to 10 years in prison and/or a $500 000 fine. These laws were designed to limit the exploitation of women's reproductive capacity for profit,[23] but one consequence is that donor sperm and egg banks in Canada are almost nonexistent. Hence, most donor eggs used in Canada originate from Americans.

This article focuses on anonymous frozen donor eggs, which are currently the most prevalent type of egg donation.

The American Society for Reproductive Medicine (ASRM) has published an Ethics Committee opinion that justifies financial compensation of donors in the US.[24] The logistics of obtaining frozen donor eggs are similar to those of frozen donor sperm, which has been a thriving industry in the US since the 1970s.[25] Frozen donor sperm was available nearly a half-century before frozen donor eggs, probably because of the ease of obtaining a sperm sample and the huge biological redundancy in the number of sperm per sample. The first pregnancy from frozen sperm was reported in 1953.[25] Comparatively, the use of frozen donor eggs has become popular in Canada only over the past 5 to 8 years. The technology for freezing eggs successfully took much longer to develop than for sperm, in part because of an egg's fragile nature. The female egg (ovum) is the largest cell in the human body. Spherical and composed largely of water, the egg is vulnerable to ice crystal formation, which can damage the lipid membrane, microtubules, and meiotic spindle during freezing–thawing. For years, the embryo freezing technique called "slow freezing" was adapted to eggs, with little success. In 2004, however, changes in Italian reproduction laws made it illegal to freeze embryos, which left clinics with no other option but to cryopreserve supernumerary eggs.[26,27] Those laws sparked the development of a new, more efficient method of "flash-freezing" eggs, called vitrification.[26,28] The technique uses ultra-rapid cooling rates and high concentrations of cryoprotectants to preserve the eggs in liquid nitrogen.

Vitrification proved so effective that in 2012 the ASRM removed the "experimental" label from egg freezing. Shortly after, the ASRM published a guideline stating that, in summary, frozen eggs work as well as fresh ones.[29-31] That guideline reviewed four randomized controlled trials, two of which involved egg donor/recipient cycles and the other two involved infertile couples with supernumerary oocytes after IVF. Egg freezing was performed using vitrification. Egg survival rates after freezing ranged from 90% to 97%, and fertilization rates after intracytoplasmic sperm injection (ICSI) were 71% to 79%. The clinical pregnancy rates ranged from 36% to 61% and were not significantly different than pregnancy rates with fresh eggs.[29] The guideline also stated that "Although data are limited, no increase in chromosomal abnormalities, birth defects, and developmental deficits has been reported in the offspring born from cryopreserved oocytes when compared to pregnancies from conventional IVF/ICSI and the general population."[29,30,32] Subsequent studies, including one analysis of 105 517 fresh autologous cycles compared to 2223 frozen donor egg cycles, have confirmed that success rates of frozen donor egg are equivalent to those of fresh eggs.[31,33]

In 2018, the Canadian average pregnancy rate for the first donor egg embryo transfer was 48%.[9] Because reproductive aging affects mainly a woman's eggs and not her uterus, donor eggs from women in their 20s provide consistent pregnancy rates regardless of the recipient's age group. For example, the 2018 Canadian data revealed an average success rate of 50.0% per embryo transfer in women younger than 35 years, and 47.4% in women 43 to 50 years of age.[9]

The proven efficacy of frozen eggs led to a substantial increase in social egg freezing for

women wishing to delay childbearing. It also paved the way for commercial egg banks to recruit healthy young women to donate their eggs for purchase by infertile women.[33] The compensation paid to donors varies widely in the US and internationally, ranging from US$5000 to US$10 000 per donation. The ASRM guideline states that compensation should be a reflection of the donor's time, discomfort, and inconvenience, and not proportionate to the number of eggs obtained.[24] Although US egg banks do not publish their average number of eggs retrieved per egg donation cycle, obtaining 10 or more eggs per cycle is likely a reasonable estimate.[33] Repetitive egg donation does not reduce serum levels of anti-Müllerian hormone, which is a validated marker of ovarian reserve. This has been taken to indicate that egg donation does not lead to premature depletion of a donor's ovarian reserve, even after five cycles.[34]

Egg banks typically sell frozen eggs in lots of six. The total cost to the patient for donor eggs, including the creation and transfer of embryos, is usually $20 000 or more, depending on the egg bank and fertility clinic.

Pregnancy considerations after donor egg IVF

The protocol for IVF with donor eggs is very similar to that of a frozen embryo transfer. The intended mother (recipient) is prescribed exogenous estrogen (17β estradiol tablets), which both stimulates endometrial growth and simultaneously suppresses her natural cycle of folliculogenesis and ovulation. Having a normal menstrual cycle is not a prerequisite, however, because even in menopause the endometrium will grow in response to estrogen. Once a sufficient endometrial thickness is confirmed by transvaginal ultrasound (usually after 14 days), the woman is instructed to start transvaginal progesterone; this simulates a luteal phase and prepares the endometrium for implantation. Simultaneously, the donor eggs are carefully thawed in the embryology laboratory, and each is injected with a single sperm from the intended father. Therefore, a future genetic test would show that the child is biologically related to the father but not to the birth mother. (It is also possible to fertilize donor eggs with donor sperm for single women or in the case of male infertility.) Embryo transfer occurs after 5 days of development, at the blastocyst stage, when the embryo is almost ready to hatch and adhere to the appropriately synchronized endometrium. If a pregnancy results, it is essential that the woman remain on progesterone because the placenta does not start to produce it until 7 weeks gestation or later.

Egg donation pregnancies may have some increased risks.

Egg donation pregnancies may have some increased risks. Egg donor recipients tend to be older. Although there is no law governing the upper age limit, Canadian clinics generally allow embryo transfer up until age 50, while the American guideline extends to age 55.[35] Fertility care providers should consider a multidisciplinary approach to preconception planning for women over 45 years of age. This may include the family physician, obstetrical internist, maternal fetal medicine specialist, and other members of the patient's health care team. The list of additional screening considerations can be individualized to each patient but may include screening for cardiovascular disease, diabetes, and mammography (which might otherwise be delayed by a year or more due to pregnancy and lactation). The Canadian Fertility and Andrology Society guideline also recommends that all couples who are using donor gametes should undergo assessment by a psychologist who is experienced in third-party reproduction counseling.[35]

Independent of age, egg donor pregnancies also appear to be at higher risk of gestational hypertension and preeclampsia.[36-40] In a large comparative cohort study, 217 egg donation pregnancies were matched for age with 363 autologous egg pregnancies. Pregnancy-induced hypertension occurred in 17.8% of the egg donor group compared to 5.3% of the autologous egg group ($P < .001$).[38] Preeclampsia was also more common in the egg donor group (11.2%) than the autologous group (2.8%, $P < .001$), and eclampsia was not recorded at all in the autologous group, whereas there were three cases (1.8%) in the egg donor group ($P < .05$).[38] The proposed pathophysiology is an immunologic intolerance between the mother and fetus leading to placental maladaptation.[37] In one systematic review of egg donor pregnancies, the authors explored the possible placental pathologies related to adverse pregnancy outcomes such as preeclampsia. They noted that egg donor pregnancies are different from solid organ transplant, as any pregnancy must be able to survive in a semi-allogeneic environment. Pregnancy itself requires a "complex interaction between hormones, cytokines, immune and nonimmune cells [to permit] fetus tolerance."[37] Egg donor pregnancies may require a higher degree of downregulation from the maternal immune response to allow for more mismatches in the human leukocyte antigen system.[37]

Conversely, it has also been proposed that the increased preeclampsia risk in donor egg pregnancies may be attributable to confounding risk factors. Despite statistical techniques to control for covariates, it is possible that advanced reproductive age, the baseline patient characteristics that necessitated IVF, or even the use of IVF itself cannot be adequately separated in studies on donor egg pregnancies.[37] In vitro fertilization is also associated with multiple pregnancies, which are well known to be higher risk.[41,42] A pilot randomized clinical trial attempted to compare pregnancy rates and twin rates after elective single embryo transfer versus double embryo transfer of embryos made from donor eggs. The study was terminated early when the authors found that both groups had an equally high cumulative pregnancy rate (73.5% single embryo, 77.4% double embryo), but the double embryo group had a 47.7% twin rate.[41] Fortunately, the current clinical trend is heavily in favor of single embryo transfer for egg donation cycles, specifically to avoid the risk of multiple gestation.

Obstetrical care providers should continue to offer prenatal screening to women with donor egg pregnancies. Most types of prenatal screening are valid in this setting, including integrated prenatal screening, serum integrated prenatal screening, first-trimester screening, and the quadruple marker screen.[43] The requisition will often request the birth date of the egg donor because a test's positive predictive value varies with the prevalence of

a given disorder. Noninvasive prenatal testing, which sequences fragments of placental DNA circulating in the woman's blood, can also be used for donor egg pregnancies. Most commercially available brands of noninvasive prenatal testing are valid in singleton donor egg pregnancies. Twin donor egg pregnancies contain too many DNA profiles for some single nucleotide polymorphism microarray platforms. Advice from a genetic counselor may be required to select the appropriate type of noninvasive prenatal testing in donor egg pregnancies of multiple gestation.

Summary

Egg donation is a fertility treatment that is quickly rising in popularity. The most common indications are premature menopause, advanced reproductive age, or previous unsuccessful IVF cycles. Frozen eggs are typically shipped in lots of six from commercial egg banks in the United States. Each egg is fertilized with a single sperm from the intended father, which means that the resulting offspring will be genetically related to the father but not the mother. Donor egg pregnancies may carry some increased obstetrical risks such as preeclampsia and those related to advanced maternal age. Obstetrical care providers should continue to offer appropriate prenatal screening to women with donor egg pregnancies. ■

Competing interests

Dr Dunne is a member of the *BCMJ* Editorial Board but did not participate in the review or decision making regarding this article. No competing interests have been declared.

Acknowledgments

Dr Dunne would like to recognize the librarians and the technician team at the College of Physicians and Surgeons of BC. She is grateful to them for sharing their literature search capabilities for this and many others articles.

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For questions or concerns about COVID-19, contact us directly at **covid19@doctorsofbc.ca**

doctors of bc

COVID-19, animals, and enlightened self-interest

When accidents happen it is human nature to question: Why did this happen? Could it have been prevented?

Jan Hajek, MD, FRCPC, DTMH

The COVID-19 pandemic was probably caused by our use of animals. Although the precise origins are unclear, the evidence we have to date indicates that the virus likely originated in wild animals that were brought to a market to be sold and used as meat or traditional medicine.[1] The risks of this happening again have been widely recognized, and there has been public outcry against live animal markets in China. The Chinese government has responded and cracked down on these markets and passed legislation prohibiting some aspects of the wild animal industry.[2]

Although many Canadians have been quick to call attention to live animal markets in China, we have not paid enough attention to what is happening in Canada. For example, behind closed doors, away from public and government scrutiny, millions of mink are raised in miserable conditions.[3] In a society that values compassion and recognizes the need to avoid unnecessary suffering, keeping intelligent and sensitive animals in small wire-bottom cages to be used to make luxury coats has long been an ugly spot—and morally unjustifiable.

Mink and COVID-19

Recent outbreaks of COVID-19 on large mink farms in the Netherlands have called attention to another reason for alarm.[4] Workers who were infected with COVID-19 spread the infection to the mink. The virus then spread like wildfire among the mink that, in turn, infected other workers.

COVID-19 spreads readily from person to person, and secluded mink farms are not predicted to be a major source of community spread. But large dense populations of animals on mink farms provide favorable conditions for viruses to evolve toward more virulent forms and present an unnecessary risk. In response, for ethical and public health reasons, the Netherlands parliament voted to permanently shut down all mink fur farms in the country this year and to compensate farmers to help them transition.[5] Over the last few years, many countries, ranging from the UK to Austria to Japan, have also banned mink farms. Canada has fallen behind.[6]

Although many Canadians have been quick to call attention to live animal markets in China, we have not paid enough attention to what is happening in Canada.

COVID-19 emerged in China, but other viruses with pandemic potential could emerge on farms here in Canada. To understand the risk, we only have to look back to the 2009 H1N1 influenza pandemic, a disease outbreak that had its origins traced back to pig farms in North America.[7]

Swine and other animal influenza viruses

When viruses replicate, errors or mutations often occur, especially in RNA viruses like influenza. With influenza, as well as small mutations during replication, on rare occasions larger mutations and adaptations can occur when different strains are mixed together. For example, if a pig with swine flu is infected by a duck with bird flu, or a farmer with human flu, the mixed viruses can combine together (called reassortment). In 2009, a novel strain of swine flu emerged in North America that probably occurred due to spread between pigs and farmers mixing together and creating the new virus that caused the 2009 H1N1 pandemic.[7]

Experts agree it is a question of when, not if, another pandemic influenza virus will emerge, and how severe the next pandemic will be. To mitigate this risk, there are calls for much-needed surveillance of influenza viruses among animals and workers on farms.[8]

Animal agriculture

Over the years, animal agriculture has become increasingly industrialized and intensified. Large factory farms (where most of the meat in Canada comes from) are profit driven, operate on narrow margins, and are almost entirely self-regulated. There are no required third-party or government inspections of animals on factory farms in Canada. Under these conditions, animal welfare issues can be inadvertently sidelined. Costly infection control and public health practices are also vulnerable to cost-cutting measures.

Consider the use of antibiotics on factory farms in Canada. In hopes of maintaining high

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This article has been peer reviewed.

growth rates, animals on factory farms were given antibiotics in their feed. For years, and despite knowledge of risks and protestations from organizations like the Ontario Medical Association, the government of Canada refused to regulate antibiotic use on farms.[9] To save costs, farmers could buy whatever antibiotic they wanted, from anywhere in the world, and give it to animals to promote their growth on industrialized farms. As a result of widespread antibiotic use, resistant bacteria emerged, entered our food supply, and made people sick.[10] It took years of international and public pressure before the Canadian government introduced regulation to seriously address these risks.

As well as the conditions for animals on farms, a key factor that contributes to our increased risk for pandemic diseases is the sheer number of animals that are now raised for meat. In 2019, there were over 830 million farm animals killed for food in Canada.[11] The scale is staggering. To meet the current demands, every year 20 farm animals are killed for each man, woman, and child.

Carefully considering our relationship to animals and the risks of pandemic diseases, one of the most important ways to effectively reduce our risk is to seriously reduce eating animals, and for those who can, to stop eating animals altogether.[12]

Enlightened self interest

Reducing or stopping eating animals has other obvious benefits. We are faced with an existential climate crisis. If we joined others in choosing a plant-based diet, we would dramatically reduce deforestation and greenhouse gas emissions.[13]

Our understanding of an animal's capacity to feel pain and suffering has also changed. In the 1600s, philosopher René Descartes theorized that animals were just like machines, that they did not feel pain, and he proceeded to nail a dog's feet to a board and dissect it alive while it only appeared to be in pain. We now cringe at the thought of someone being so callous. But while we would now rightfully prosecute someone who mistreated a dog, we have normalized and justified relatively brutal farming practices, which are generally exempt from anti-cruelty laws.[14,15]

We have an animal use disorder. We have become used to eating animals and socialized to accept or deny some of the avoidable harms of massive factory farms. Big businesses have promoted a notion that we are part of a food chain in which might makes right, and have worked to equate meat with protein and good health. But this advertising has been misleading. Documentaries like *Earthlings*, which examines the exploitation of animals for economic purposes, paint a much different picture. Thankfully, public attitudes are increasingly shifting away from the harms and brutal scale of industrial animal farming.

Carefully considering our relationship to animals and the risks of pandemic diseases, one of the most important ways to effectively reduce our risk is to seriously reduce eating animals.

Conclusion

As a society, we need to address the risks that our current levels of animal consumption pose for global heath security. We need to provide more support for farmers seeking to transition away from animal agriculture, and promote plant-based foods and cell-cultured meat and dairy products.[16]

As physicians, as well as ordering the right blood test and choosing the right antibiotic, we have an obligation to speak up and help address social justice issues, the root causes of diseases, and the underlying causes of poor health outcomes. We need to be clear about the health and societal benefits of reducing meat in our diets.[17]

It can be seen as a matter of enlightened self-interest. Our health is dependent on the health of the other animals that share this world with us. Being compassionate and taking animal welfare seriously will ultimately help us as well. ■

Competing interests
None declared.

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Vaping-associated lung illness in BC

An outbreak of severe pulmonary illness associated with vaping (the act of inhaling an aerosol produced by an electronic cigarette or related product) was first reported in the United States in August 2019, and a retrospective review has identified cases as early as April 2019.[1] To determine if vaping was associated with lung illness in British Columbia, in September 2019, the Provincial Health Officer declared "severe pulmonary disease associated with vaping or dabbing," generally referred to as vaping-associated lung injury, or VALI, a reportable illness. This order was part of a national surveillance system under which a confirmed VALI case has a history of vaping in the 90 days prior to symptom onset, pulmonary infiltrates, and no plausible alternative diagnosis. A probable case has a similar presentation but pulmonary infection cannot be excluded.[2] The BC Centre for Disease Control has coordinated surveillance of VALI in BC.

By February 2020, 2807 hospitalizations and 68 deaths due to VALI had been reported to the US Centers for Disease Control and Prevention (CDC).[3] As for Canada, by April 2020, 20 cases and no deaths had been reported to the Public Health Agency of Canada.[4]

Five VALI cases were reported in BC: one confirmed and four probable. Cases were identified in both urban and rural areas. Age range of cases was 16 to 31 years; three were male and two female. Cases related using a variety of vaping products including tetrahydrocannabinol (THC) wax, shatter (a highly concentrated THC product), e-liquid, and flavored nicotine. Vitamin E acetate was detected in both broncho-alveolar lavage[5] (BAL) and vaping products[6] used by some US cases. In Canada, vitamin E acetate has not been detected in products tested by Health Canada, and no BAL samples from VALI cases have been tested (written communication, T Procter, Public Health Agency of Canada, September 2020).

In response to the increased prevalence of vaping, especially among youth, BC has implemented several vaping control measures.

In the US, numbers of VALI cases peaked in December 2019,[7] and by February 2021 the CDC discontinued nationwide case reporting.[3] A reasonable interpretation of the surge in cases is that the temporary use of an adulterant, likely vitamin E acetate, caused pulmonary injury; cases declined as these adulterated products made their way through the supply chain. Still, a June 2020 CDC report described eight VALI cases hospitalized in California in April 2020.[8] It has been suggested that VALI is not a distinct illness, but a spike of acute illness on a background of more heterogeneous harmful effects of vaping.[9]

VALI remains reportable in BC and Canada, and the most recent case in BC was notified in February 2020. Given the low number of cases and the absence of vitamin E acetate in case-related vaping products, cases here may represent background pulmonary illness. The COVID-19 pandemic may have contributed to more recent cases not being detected.

In response to the increased prevalence of vaping, especially among youth, BC has implemented several vaping control measures. Notably, the sales tax on vaping products was raised from 7% to 20% on 1 January 2020. Other changes include regulations on nicotine content, packaging, advertising, and access to vaping products for persons under 19 years of age. Though these measures are meant to address nicotine dependency, nicotine destigmatization, and mental health effects of vaping, they may also reduce the incidence of VALI, whether due to adulterants or otherwise. ■

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This article is the opinion of the Environmental Health Committee, a subcommittee of Doctors of BC's Council on Health Promotion, and is not necessarily the opinion of Doctors of BC. This article has not been peer reviewed by the BCMJ *Editorial Board.*

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Impact of school closures on learning, and child and family well-being

As the COVID-19 pandemic surged in the spring, BC proactively suspended in-class instruction for kindergarten to grade 12 (school closures) to delay and flatten the outbreak peak, reduce the burden on the health care system, and protect high-risk populations.[1,2] School closure is an intervention for influenza outbreaks based on evidence that children are more infectious and susceptible to influenza than adults.[3] However, the effectiveness of school closures for influenza outbreaks is not clear, and schools are not routinely closed in practice.

Current evidence suggests that illness susceptibility and transmission dynamics of SARS-CoV-2 in children differ from influenza. Children are less susceptible to SARS-CoV-2 than adults. As of 24 September, children under 19 years accounted for approximately 9% of total BC cases (but 20% of the population) and no deaths.[4] If children are infected, they usually have no or mild symptoms and mortality is rare.[5] Children also do not tend to spread SARS-CoV-2 widely, particularly younger children, including in school and home settings.[6] As a result, the effectiveness of school closures as a prevention measure against COVID-19 has been questioned.

Experiences globally and within BC suggest that schools can be opened safely without substantial increases in COVID-19 transmission when school-based prevention measures are in place, along with strong control of community transmission.[6] Moreover, the potential benefits of school closures must be weighed against the detrimental effects of prolonged absences from school. The vast majority of families responding to the BC COVID-19 survey reported impaired learning, increased child stress, and decreased connection with friends.[7] Increased loneliness in youth is correlated with anxiety and depression, which are predictors of poor future mental health outcomes if not identified early and treated. With a loss of supportive routines and structures, health behaviors declined dramatically during the pandemic, with only 5% of Canadian children meeting 24-hour guidelines for physical activity, sleep, and sedentary behavior.[8] School closures may particularly affect families of children with disabilities and mental and behavioral health needs, while existing geographic and socioeconomic disparities in educational attainment may expand.

With a loss of supportive routines and structures, health behaviors declined dramatically during the pandemic, with only 5% of Canadian children meeting 24-hour guidelines for physical activity, sleep, and sedentary behavior.

Interrupted access to school-based resources may compound the broader societal impacts of the pandemic, making intervention more difficult. While federal reports indicate domestic violence has intensified during COVID-19, child protection reports from BC schools decreased by 75% with closures (electronic communication from Steven Yong, executive director, Modelling, Analysis and Information Management Branch, Ministry of Children and Family Development, 11 September 2020). One in seven Canadian households reported food insecurity during the pandemic, while the number of BC families accessing ongoing school food programs expanded considerably.[9] Adverse effects related to extended school closures accumulate over time and are likely to be experienced disproportionately by families experiencing social inequities (i.e., single-parent families, families in poverty, those with unstable employment and housing, and racialized groups).

COVID-19 is likely to be a fact of life for the foreseeable future. School closures have a significant societal cost and are unsustainable in the long term. Return to school, while posing some risk of COVID-19 transmission, offers greater societal, family, and individual benefits than continuing to keep schools closed. Importantly, schools are not at higher risk of COVID-19 transmission than community settings. Attention to prevention measures within schools and maintenance of strong control of community transmission can further reduce the risk of transmission in school settings. Keeping our schools open is essential for the learning and well-being of children and their families, now and for their future. ■

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Meaningful community collaboration in research

Practicable methods to overcome barriers to effective collaboration during a pandemic.

Shayda A. Swann, BSc, Amber R. Campbell, MSc, Valerie J. Nicholson, Melanie C.M. Murray, MD, PhD, FRCPC

Meaningful community collaboration in research, as we know it today, started during the HIV/AIDS pandemic as a grassroots movement to gain an equal voice at the table of scientific discovery. Today, participatory health research, community advisory boards, and knowledge translation are common buzzwords that look attractive to grant reviewers and journal editors. However, community partnerships cannot be reduced to mere tokenism or committee meetings. Meaningful community engagement involves lasting partnerships, a willingness to consider differing opinions, and elevation of lived experience to the level of academic credentials. It requires authentic collaboration at all stages, from generating research questions to translating findings into action, including community members in leading roles, building capacity, and providing ownership. Importantly, it is not a unidirectional process, but an interactive effort to embrace community wisdom, values, and priorities. Now, in the context of another infectious disease pandemic, lessons learned from engagement with the HIV community are more relevant than ever.

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This article has been peer reviewed.

Barriers to community collaboration

Connections with community members are often initiated at conferences or local gatherings. When such events are canceled or altered, it can be challenging to establish these crucial relationships. Even when these connections have already been made, barriers to maintaining collaborations abound. For instance, research teams may use a kitchen-table style of consultation, which begins with a shared meal, opening ceremonies such as gifting tobacco ties or smudging when collaborating with Indigenous partners, and respectful conversation where each member literally has an equal seat at the table. This format creates a physical space that exemplifies equity and dissolves traditional hierarchies. With physical distancing mandates during a pandemic, this becomes seemingly impossible.

When community members are hired as formal peer researchers, rigorous training is often undertaken. Once again, this typically takes place in person, where learners can discuss complex research principles and share personal challenges and triumphs. To move these essential workshops to virtual platforms may exclude community members with limited resources. Equally challenging is hosting vibrant and animated knowledge translation events. Many of us can relate to the awkwardness of trying to ask a question during an online webinar, only to be cut off when another person unwittingly starts speaking. These barriers are formidable and may lead researchers to postpone community collaborations. We aim to provide practicable methods to address these challenges **[see Box]**.

How to creatively collaborate with community members

Nurturing meaningful relationships

An essential component of community collaboration is allowing time and space to nurture connections between researchers and community partners; this includes having informal, agenda-less conversations. This can be achieved by hosting virtual meetings that create space for introductions, icebreakers, and collaborative games. Discussion-based meetings, with reflection activities and polls, serve to make gatherings more engaging and inclusive, reinforcing that everyone has something to learn from one another. Plainly stated, researchers acknowledge that they can and would like to learn from the strengths that community members bring. Asking community partners if they would like to lead any online sessions further empowers them to take on larger or other roles. A who's who document describing the roles of all team members (investigators, clinicians, research staff, students, community partners, etc.) can help community partners become more familiar with the team, feel included, and know whom to approach with questions. This practice is important whether meetings are held in person or online. These efforts empower community partners and amplify capacity in all members of a research team.

Addressing barriers to collaboration

It is imperative to understand the unique barriers to participation that each partner may

have and to work collaboratively to address them. Barriers could include a lack of access to technology, shifting schedules, or child care needs. A respectful, private conversation with each community partner can elucidate their specific needs and open the door for dialogue as to how to navigate them. For instance, supporting partners to overcome technological barriers could include providing computers, Internet access, cellular data, webcams, etc.; funding these purchases when needed; and guiding partners in how to use them. Another critical aspect of honoring community partners' importance and mitigating potential financial barriers is through remuneration. Community partners are often reimbursed for travel costs, but even if they are participating via videoconference, it is important to value and compensate their time and knowledge. This can be achieved by setting aside funding in grants to allow time, resources, and remuneration for community partners.

Learning from existing community leaders

Existing leaders in the community, such as with Indigenous Elders or leaders of community organizations, are valuable resources. They may have strategies in place that work well in their communities, so it is important to listen, learn, and incorporate their feedback. Additionally, when certain research activities are put on hold, it creates an opportunity to check in with community leaders to ask if there are other research topics they would like to explore. This offers an opportunity for meaningful community-based research where academics, clinicians, and community members develop research projects together from the beginning, stemming from the needs of the community.

Translating knowledge

Knowledge translation and exchange is a critical component of research that brings study findings back to the community. Virtual meetings can be held with community members to discuss how results should be interpreted and shared. Online resources, such as web-based pamphlets and fact sheets, can be created together to disseminate results on the websites of clinics and other organizations. Hosting discussions, such as community forums, focus groups, or sharing circles, could be done virtually or in outdoor spaces. These gatherings create spaces for community members to learn about results, ask questions, and provide feedback. Community partners can be invited to participate in writing abstracts and manuscripts, with the opportunity to learn more about the writing process. Here, it is important to recognize once again that community leaders have much to teach academics about the respectful and intentional use of language. This exemplifies meaningful collaboration through to the end of a study.

Conclusion

Researchers can interweave community partnership, equity, and respect into research practice. Community engagement leads to more equitable and applicable research—the community knows best what the community needs. We have learned the immense benefit of meaningful community collaboration from HIV research; the current pandemic provides a rich opportunity to grow and learn with our community partners how to navigate the challenges of working together, but from a distance. ■

Competing interests

None declared.

Acknowledgments

Authors respectfully acknowledge the ancestral, traditional, unceded territory of all the Coast Salish Peoples, their lands and waters, including the territories of the Səl̓ílwətaʔ/Selilwitulh (Tsleil-Waututh), xʷməθkwəy̓əm (Musqueam), and Skwxwú7mesh (Squamish) Nations where we have learned, worked, and collaborated. They would like to honor, thank, and acknowledge all community members and researchers who are leading the way in community-based research. To their mentors and collaborators, they honor and thank you for everything they have learned from you, and they look forward to continuing your journey together.

Suggested reading

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10 tips for engaging community members

1. Allocate time and space to nurture meaningful connections with community partners.
2. Be open to ideas that may be different from your own.
3. Understand the unique barriers to participation that each member may have and work collaboratively to address them.
4. Reimburse community partners appropriately for their time as a symbol of respect and to honor the value of their knowledge.
5. Genuinely listen to and incorporate community partners' feedback.
6. Give opportunities for community partners to build on their strengths and be in leadership roles. Know when to step aside and embrace their expertise.
7. Engage natural leadership that is already present in a community.
8. Provide a who's who document with photos and descriptions of the team members and their roles and responsibilities.
9. Use mindful and intentional language. Consider the many meanings that each word can hold.
10. Be adaptable, inventive, and resourceful in creating engaging opportunities to collaborate and share knowledge.

SPREADING THE WORD

On behalf of the profession, Doctors of BC is encouraging all British Columbians to protect their health and the health of others during the COVID-19 pandemic.

Find our posts on Twitter, Facebook or Instagram and repost to help spread the word.

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@DoctorsOfBC

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Better. Together.

News

We welcome news items of less than 300 words; we may edit them for clarity and length. News items should be emailed to journal@doctorsofbc.ca and must include your mailing address, telephone number, and email address. All writers should disclose any competing interests.

Diversity Working Group members selected

At its meeting held 10–11 September 2020, the Doctors of BC Board of Directors approved appointments to the new Diversity Working Group created to provide input into implementation of recommendations from the *Doctors of BC Diversity and Inclusion Barrier Assessment* report and develop a high-level diversity vision statement for Doctors of BC.

Members of the working group are:

- Dr Derek Chang
- Dr Simone Cowan
- Dr Ahmer Karimuddin
- Mr Jatinder Khatra (medical student)
- Dr Caroline Lohrisch
- Dr Rola Masri
- Dr Olutoyese Oyelese
- Dr Kellie Whitehill

Creation of this working group was one of the key recommendations of the *Barrier Assessment* report. For more information, please visit www.doctorsofbc.ca/advocacy-and-policy/advocacy/hot-topics/diversity-and-inclusion.

Pandemic report from BC Family Doctors

A report from BC Family Doctors, *Reimagining Family Medicine: Learning from the COVID-19 Experience*, tells the story of the impact the pandemic has had on family doctors' professional and personal lives—how COVID-19 shone a light on the cracks of a fragile primary care system. As well, it demonstrates how family physicians and the health system can be nimble when faced with a crisis.

BC Family Doctors brought together a group of family physician leaders to explore the potential to accelerate some of the positive changes that have emerged during the pandemic and shine a spotlight on the existing challenges aggravated by it. The report offers a comprehensive approach to supporting physicians' needs both as health care providers and human beings. Read the report at https://bcfamilydocs.ca/pandemic-report.

BC Family Doctors advocates for family physicians across BC, working to ensure the fundamental role of family doctors is seen, heard, and valued.

New contract options for BC physicians

Following a year of consultations between Doctors of BC and the Ministry of Health, the ministry is now offering BC doctors a number of new contract options for interested physicians to help provide greater freedom of choice in the way they practise. The new contract options address a number of key points of interest raised by doctors, including the desire of some established and new-to-practice family doctors to move away from the fee-for-service (FFS) model toward an alternative compensation model, and the needs of doctors whose FFS practices have been significantly destabilized due to conditions resulting from COVID-19.

The contract options are:

- Group contract for practising family physicians.
- Individual contracts for new-to-practice family physicians.
- Simplified temporary COVID-19 service contracts through to 31 December 2021.

Group contracts will also continue to be offered to anesthesiologists and ER physicians.

These new contracts are part of a suite of available compensation options that may be attractive to doctors, depending on their personal circumstances.

The ministry consulted with Doctors of BC during the development of the contracts. For detailed information visit www.doctorsofbc.ca/managing-your-practice/compensation/contract-offerings (member login required). If you have questions after reading the material provided online, contact Doctors of BC staff at negotiations@doctorsofbc.ca.

Online training for women's support workers to recognize brain injury in survivors of intimate partner violence

A free e-learning course from UBC researchers provides education for staff at women's shelters to recognize signs and symptoms of brain injury in survivors of intimate partner violence. According to the World Health Organization, one in three women will experience intimate partner violence; most will also suffer a brain injury. COVID-19, and the fact many women were forced to self-isolate with their abuser, has only heightened the need for the training.

To tackle this issue and explore the intersection of brain injury in intimate partner violence, Paul van Donkelaar, professor of health and exercise sciences at UBC Okanagan and the principal researcher on the project, together with Karen Mason, former executive director of the Kelowna Women's Shelter, formed the Supporting Survivors of Abuse and Brain Injury through Research (SOAR) initiative, based at UBC Okanagan. Through a collaboration with Shelina Babul, clinical associate professor in the Department of Pediatrics at UBC, SOAR launched a novel version of the Concussion Awareness Training Tool (CATT)—an online training system developed to standardize concussion recognition, diagnosis, treatment, and management.

CATT for Women's Support Workers is a 45-minute video-based interactive course that features a series of online educational

modules and resources, including the voice of a real survivor of violence. The course is available nationwide in English and French. View the course at https://cattonline.com/womens-support-workers.

The project is funded by Women and Gender Equality Canada and the Max Bell Foundation. For more information about SOAR, visit www.soarproject.ca or follow @CanadaSoar on Twitter or @SoarProjectCanada on Facebook.

Inhaled drug cocktail could block COVID-19, temporarily

Immunotherapy based on antibody research being developed by Vancouver Coastal Health Research Institute researcher Dr Horacio Bach could provide short-term protection against the novel coronavirus, SARS-CoV-2. Dr Horacio Bach and his team hope a temporary antibody-based treatment will help the immune system clear the COVID-19 virus from the body without inducing inflammation or a cytokine storm. Dr Bach, study co-lead Dr Ted Steiner, and their team are developing single-chain antibodies that would neutralize proteins the COVID-19 virus employs to infiltrate cells. Though there are millions of potential antibodies to choose from, Bach and his team have already identified over 20 hopefuls since beginning their research in April.

The researchers are using a novel approach involving a bacterial system to screen the antibodies. An antibody attached to a noninfectious virus is injected into a bacterium, and after a processing step, researchers check whether that blocks viral proteins used by COVID-19 to infiltrate host cells. Several protective antibodies against COVID-19 are being sought, as the virus possesses a multitude of protein keys to unlock the body's cells. The ideal therapy would contain an antibody cocktail that can guard against multiple lines of viral attack.

The therapy may be delivered via an inhaler for short-term security from the virus, with the goal being for a dose to shield against the virus for several hours or more until protective antibodies are processed and expelled from the body—long enough to catch a flight, go to an appointment, or see a loved one.

The novel coronavirus infects mostly primary airway epithelial cells. Once these cells are infected, white blood cell antibodies (macrophages) attack the virus-containing cells and internalize them. Problematically, COVID-19 also infects macrophages with its protein key, which can lead to a heightened and potentially deadly cytokine storm. Bach's therapy could sidestep this problem by encapsulating COVID-19 with antibodies that would not infect macrophages, giving the body a leg up on slowing and stopping the disease.

Dr Bach is an adjunct professor in the Division of Infectious Diseases at the University of British Columbia and manager of the Immunity and Infection Research Centre Proteomic and Antibody Engineering Facility. He anticipates that this approach will enter human trials by spring 2021.

CIHR childbearing and pregnancy survey

The Research Examining the Stories of Pregnancy and Childbearing in Canada Today (RESPCCT) study invites people across Canada to share their stories of pregnancy and childbearing by participating in an online survey. Information gathered will improve understanding of how people experience health care during pregnancy and childbirth throughout Canada, and will be used to improve care for all types of communities. A diverse group of people who had recent pregnancy experiences created or chose the survey questions, working with researchers and numerous community-based organizations. For more information or to take the survey, visit https://respcct.ca.

Infant immunity, gut health, may be compromised with fish oil supplementation during breastfeeding

According to researcher Deanna Gibson, an associate professor of biology in the Irving K. Barber Faculty of Science, UBC Okanagan, taking fish oil supplements while nursing may not be beneficial and may even negatively impact babies' immunity. A study published in the *ISME Journal* is the first to investigate the impacts of fish oil supplementation on the composition of breast milk and infant gut bacteria.

Researchers demonstrated that supplementation corresponded with an increase in breast milk fats but a decrease in the immune-protective components of the milk, and observed a change in infant gut microbiology—away from the bacteria normally present.

For the study, senior author Gibson and the research team evaluated 91 women and their babies; half took daily doses of fish oil while the other half did not supplement. Breast milk samples, infant stools, and immune function markers were compared between the two groups.

Women who took supplements had a higher ratio of omega-3 fatty acids but lower protective molecules, such as antibodies, in their breast milk. The supplemented infants had a lower diversity of bacteria in their stools, considered a negative. Researchers warn that this is a change that could result in infection risk for the infant. With these findings in mind, Gibson cautions that the practice of prenatal fish oil supplementation may induce long-term dysfunctional gut immunity. Further large-scale studies will clarify whether early fish oil exposures alter infectious disease susceptibility, including persistent asymptomatic chronic infections.

For more information about this study, visit https://rdcu.be/b37ri.

Guidelines for authors (short form)

The *British Columbia Medical Journal* welcomes letters, articles, and essays. Manuscripts should not have been submitted to any other publication. Articles are subject to copyediting and editorial revisions, but authors remain responsible for statements in the work, including editorial changes; for accuracy of references; and for obtaining permissions. Send submissions to: The Editor, *BC Medical Journal*, journal@doctorsofbc.ca.

For all submissions

- Avoid unnecessary formatting.
- Double-space all parts of all submissions.
- Include your name, relevant degrees, e-mail address, and phone number.
- Number all pages consecutively.

Clinical articles/case reports

Manuscripts of scientific/clinical articles and case reports should be 2000 to 4000 words in length, including tables and references. Email to journal@doctorsofbc.ca. The first page of the manuscript should carry the following:

- Title, and subtitle, if any.
- Preferred given name or initials and last name for each author, with relevant academic degrees.
- All authors' professional/institutional affiliations, sufficient to provide the basis for an author note such as: "Dr Smith is an associate professor in the Department of Obstetrics and Gynecology at the University of British Columbia and a staff gynecologist at Vancouver Hospital."
- A structured or unstructured abstract of no more than 150 words. If structured, the preferred headings are "Background," "Methods," "Results," and "Conclusions."
- Three key words or short phrases to assist in indexing.
- Name, address, telephone number, and e-mail address of corresponding author.

Authorship, copyright, disclosure, and consent form

When submitting a clinical/scientific/review paper, all authors must complete the *BCMJ*'s four-part "Authorship, copyright, disclosure, and consent form."

1. Authorship. All authors must certify in writing that they qualify as an author of the paper.

Order of authorship is decided by the co-authors.

2. Copyright. All authors must sign and return an "Assignment of copyright" prior to publication. Published manuscripts become the property of the BC Medical Association and may not be published elsewhere without permission.

3. Disclosure. All authors must sign a "Disclosure of financial interests" statement and provide it to the *BCMJ*. This helps reviewers determine whether the paper will be accepted for publication, and may be used for a note to accompany the text.

4. Consent. If the article is a case report or if an individual patient is described, written consent from the patient (or his or her legal guardian or substitute decision maker) is required.

Papers will not be reviewed without this document, which is available at www.bcmj.org.

References to published material

Try to keep references to fewer than 30. Authors are responsible for reference accuracy. References must be numbered consecutively in the order in which they appear in the text. Avoid using auto-numbering as this can cause problems during production.

Include all relevant details regarding publication, including correct abbreviation of journal titles, as in Index Medicus; year, volume number, and inclusive page numbers; full names and locations of book publishers; inclusive page numbers of relevant source material; full web address of the document, not just to host page, and date the page was accessed. Examples:

1. Gilsanz V, Gibbons DT, Roe TF, et al. Vertebral bone density in children: Effect of puberty. Radiology 2007;166:847-850.

(NB: For more than three authors, list first three, followed by "et al.")

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4. Health Canada. Canadian STD Guidelines, 2007. www.hc-sc.gc.ca/hpb/lcdc/publicat/std98/index.html (accessed 15 July 2018).

(NB: The access date is the date the author consulted the source.)

References to unpublished material

These may include articles that have been read at a meeting or symposium but have not been published, or material accepted for publication but not yet published (in press). Examples:

1. Maurice WL, Sheps SB, Schechter MT. Sexual activity with patients: A survey of BC physicians. Presented at the 52nd Annual Meeting of the Canadian Psychiatric Association, Winnipeg, MB, 5 October 2008.
2. Kim-Sing C, Kutynec C, Harris S, et al. Breast cancer and risk reduction: Diet, physical activity, and chemoprevention. CMAJ. In press.

Personal communications are not included in the reference list, but may be cited in the text, with type of communication (oral or written) communicant's full name, affiliation, and date (e.g., oral communication with H.E. Marmon, director, BC Centre for Disease Control, 12 November 2017).

Material submitted for publication but not accepted should not be included.

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It is the author's responsibility to obtain written permission from both author and publisher for material, including figures and tables, taken or adapted from other sources. Permissions should accompany the article when submitted.

Tables and figures

Tables and figures should supplement the text, not duplicate it. Keep length and number of tables and figures to a minimum. Include a descriptive title and units of measure for each table and figure. Obtain permission and acknowledge the source fully if you use data or figures from another published or unpublished source.

Tables. Please adhere to the following guidelines:

- Submit tables electronically so that they may be formatted for style.
- Number tables consecutively in the order of their first citation in the text and supply a brief title for each.
- Place explanatory matter in footnotes, not in the heading.
- Explain all nonstandard abbreviations in footnotes.
- Ensure each table is cited in the text.

Figures (illustrations). Please adhere to the following guidelines:

- Send scans of 300 dpi or higher.
- Number figures consecutively in the order of their first citation in the text and supply a brief title for each.
- Place titles and explanations in legends, not on the illustrations themselves.
- Provide internal scale markers for photomicrographs.
- Ensure each figure is cited in the text.
- Color is not normally available, but if it is necessary, an exception may be considered.

Units

Report measurements of length, height, weight, and volume in metric units. Give temperatures in degrees Celsius and blood pressures in millimetres of mercury. Report hematologic and clinical chemistry measurements in the metric system according to the International System of Units (SI).

Abbreviations

Except for units of measure, we discourage abbreviations. However, if a small number are necessary, use standard abbreviations only, preceded by the full name at first mention, e.g., in vitro fertilization (IVF). Avoid abbreviations in the title and abstract.

Drug names

Use generic drug names. Use lowercase for generic names, uppercase for brand names, e.g., venlafaxine hydrochloride (Effexor).

Full guidelines

Please see www.bcmj.org/submit-article for the full Guidelines for Authors.

Questions about treatment recommendations?

If you're looking for straightforward, evidence-based recommendations on diagnosis and treatment, practice guidelines may be for you. Produced by knowledgeable members of relevant fields, guidelines offer informed recommendations. They are available for a wide range of conditions and situations, including COVID-19.

COVID-19 guidelines may answer a broad scope of questions (e.g., "How do I treat a patient with COVID-19?") or focus more on specific patient groups (e.g., "Should I take my vulnerable patients off immunosuppressants?"). Many organizations devoted to specific conditions or populations have posted new or updated guidelines on their websites covering treatment in the context of COVID-19, including for the community or hospital setting, as well as practice management.

An efficient approach to locate guidelines from multiple organizations is by searching guideline databases.

An efficient approach to locate guidelines from multiple organizations is by searching guideline databases. Several guideline databases have created COVID-19 resource collections, allowing for easier location of COVID-19-related information. The following COVID-19 guideline databases from Canada, the United States, and the United Kingdom are relevant to Canadian clinical practice.

- CPG Infobase, Clinical Practice Guidelines: https://joulecma.ca/cpg/homepage/browse-by/category/conditions/id/488
- ECRI, COVID-19 Clinical Guidelines: www.ecri.org/covid-19-clinical-guidelines
- National Institute for Health and Care Excellence (NICE): www.nice.org.uk/guidance/conditions-and-diseases/respiratory-conditions/covid19/products?ProductType=Guidance&Status=Published
- ECRI and NICE, which have published the standards they use to appraise guidelines. For works without grading included, evaluation tools such as the Appraisal of Guidelines for Research and Evaluation Global Rating Scale may assist with critical appraisal: www.agreetrust.org/wp-content/uploads/2017/11/AGREE-GRS.pdf.

Clinical information changes quickly, especially with regard to COVID-19. It's important to check back regularly for guideline updates.

If your guideline search does not give you the information you're looking for, the College Library can help you with a deeper search. Contact us at medlib@cpsbc.ca. ■

—Chris Vriesema-Magnuson
Librarian

This article is the opinion of the Library of the College of Physicians and Surgeons of BC and has not been peer reviewed by the BCMJ Editorial Board.

Specialist Services Committee backs expansive strategy for improving cystic fibrosis patient care

Cystic fibrosis treatment has changed drastically in the last 50 years, and as a result, the median age of survival has risen from 4 years in 1960 to 52 years in 2018. In BC in 2020, 62% of residents with cystic fibrosis (CF) are adults, requiring treatment for issues like metabolic bone disease, diabetes, and depression. An effort by CF Canada to coordinate and streamline patient care has finally borne fruit in three significant projects supported by the Specialist Services Committee (SSC).

The first of these projects began in 2015 when Dr Pearce Wilcox, medical director of the Adult Cystic Fibrosis Program at St. Paul's Hospital, undertook a Specialist Services Committee quality and innovation (Q&I) project called Cystic Fibrosis in BC: Optimizing care across the age continuum. I was part of his team, and for more than 3 years, alongside BC CF representatives, PHSA administrators, specialists, and allied health professionals, we carved out the building blocks of integrated CF care from childhood to adulthood.

As part of this effort, we developed a sustainable planning platform for adults and children, called Tiers of Cystic Fibrosis Service in BC.[1] The framework we wrote features the first made-in-Canada CF Standards of Care[2] and identifies who is responsible for delivering every kind of health care to those with CF.

Adults with CF, for example, are at increased risk of bowel cancer because of the involvement of the gastrointestinal tract with the disease. They require screening beginning at 40 years of age, but because of the effects of CF on their bowel tracts, colonoscopies can be especially difficult. In addition, the sedation that might ease a colonoscopy may not be appropriate because of lung issues caused by CF. While CF specialty clinics can't offer colonoscopies themselves, Tiers of Service recommends involving the family physician, who would detail the particular patient's issues in advance to the gastroenterologist conducting the screening for a smoother process.

I was the Q&I physician lead on the second of the projects, created to support the screening and treatment of mental health by BC's CF clinics. This project helped inform the Anxiety and Depression pathway[3] of the Tiers of CF Service platform. Already being implemented, it recommends that CF clinics regularly screen patients and their caregivers to identify anxiety and depression needs and risks, recommend support services, and make referrals to psychiatrists or emergency assessors.

In September 2019, Dr Wilcox's team presented the results of the third of these projects, the Cystic Fibrosis Provincial Initiative, to PHSA, which will soon initiate a BC Cystic Fibrosis Health Improvement Network (HIN). The network will facilitate the standards of care we established. Starting this September, it will determine how the best patient care can be achieved by bringing together the specialists, primary physician, and allied health workers each patient needs, whatever their age.

Sixty-two percent of residents with CF are adults, requiring treatment for issues like metabolic bone disease, diabetes, and depression.

The physicians on the HIN working group, of which I may be a member, will be supported by the Health System Redesign Initiative, which supports time-limited system redesign projects.

This HIN represents at least 10 years of unwavering effort by many, including the CF community, BC's Ministries of Health and Mental Health and Addictions, the PHSA, the Joint Clinical Committees, and allied health providers. Over the course of my 30-year career, I've watched BC residents with CF struggle every day. I'm grateful that we're doing what we can to ensure that individuals with Canada's most common fatal genetic disease, and their caregivers, get the very best quality of care. ■

—Ian Waters, MD (retired)
Provincial Quality & Innovation Project Lead

This article is the opinion of the Specialist Services Committee and has not been peer reviewed by the BCMJ *Editorial Board.*

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Obituaries

We welcome original tributes of less than 300 words; we may edit them for clarity and length. Obituaries may be emailed to journal@doctorsofbc.ca. Include birth and death dates, full name and name deceased was best known by, key hospital and professional affiliations, relevant biographical data, and a high-resolution head-and-shoulders photo.

Dr Marianne Russell 1963–2020

After a 16-year courageous battle with breast cancer, Marianne left the world on her own terms peacefully at the Henrico Doctors' Hospital on Wednesday, 26 August 2020, at 1:30 a.m. with her family by her side.

Born 3 August 1963 in Saskatoon, Saskatchewan, she was the daughter of the late Thomas and Josephine (McEachern) Russell. Surviving Marianne is her wife, Joy Russell; children, Hannah and Ryan; and her beloved dog, Griffin. Marianne was compassionate and devoted to her profession, touching many lives, and she left a deep impression on those for whom she cared.

Marianne began her university training as a biochemistry major in 1981 at the University of Saskatchewan. She attended medical school at the University of Saskatchewan Faculty of Medicine from 1983–88, obtaining her medical doctorate with distinction. After her rotating internship at Dalhousie University in Halifax, Marianne did locum and emergency room work in Saint John, Greater Toronto, Regina, and Vernon. In 1991–92, Marianne completed her first year of a pathology residency before deciding to focus on a career in family medicine. After long-term locum work in Swift Current and Enderby, Marianne settled into a full-service family practice in Westbank (now known as West Kelowna) with active privileges at Kelowna General Hospital from 1994–2003.

In 2003 she relocated to practise in Coquitlam until 2014, and then moved her practice to East Burnaby and subsequently to New Westminster. She was first diagnosed with stage III breast cancer in 2004, but continued to work part-time through her initial treatment. She resumed full-time practice in 2005 and continued caring for patients, teaching residents and medical students, and maintaining associate privileges at Royal Columbian Hospital until taking a medical leave in 2016 with her first recurrence of breast cancer. Marianne was a clinical instructor from 2009 to 2014 in the Department of Family Medicine at the University of British Columbia. In 2010, Marianne decided she wanted to fulfill her goal of certification with the College of Family Physicians of Canada, and following the completion of her practice eligibility requirements, she successfully took the CCFP certification examination.

After relocating to Virginia in 2017 with her wife and kids, she obtained certification as a North American Menopause Society Certified Menopause Practitioner in May of that year. Marianne was able to resume part-time practice after obtaining licensure in Virginia in January 2018 until 2019, when she was unable to continue due to complications of her cancer and treatment.

As with many transplanted Saskatchewanians, Marianne remained a staunch member of Rider Nation, supporting her home team throughout her life. Wearing green in a sea of orange at games in Vancouver, her cheers were heard by all around.

Marianne was beloved and well respected by her patients, students, friends, family, and colleagues. She will be forever missed and always in our hearts. A celebration of Marianne's life will be held in British Columbia at a later date. In lieu of flowers, Marianne's family would ask for donations to be made to CancerLINC or the Canadian Cancer Society.

—Cathy Clelland, MD
Maple Ridge

Dr Chava Eve Rotem 1928–2020

We are deeply saddened to announce the passing of Dr Chava Eve Rotem, at age 92, on 15 August 2020. Eve was born in Berlin, Germany, on 15 January 1928, and at age 5 left Germany with her parents to begin a new life in Palestine (Israel). Eve would begin charting her own course in life, unaware of being a pioneer and role model for many women to follow.

Eve enrolled in the Faculty of Medicine at the University of Geneva, Switzerland (1946), learning French in order to pass her first exams. In 1947, she returned to Switzerland after marrying in Palestine to continue her medical studies in Lausanne. In May 1948, when Palestine gained its independence to become the State of Israel, she and her husband, Zeev, were asked to volunteer with the Haganah (the Jewish Defence Organization) assisting refugee survivors of the Nazi camps who were being transported from southern France to Israel. Despite limited medical training, Eve was assigned as the ship's "doctor."

Back in Israel, Eve was assigned to the Medical Service, first practising minor surgery and

emergency medicine then joining with other students in opening the Faculty of Medicine in Jerusalem. She returned to Switzerland in 1949 to complete her medical studies, then later she and Zeev immigrated to England with their first daughter (born 1953), to continue their respective careers. Eve secured a position at the Leicester Chest and Isolation Unit as a house surgeon heading two wards for tuberculosis patients. It was in Leicester that a colleague persuaded Eve to specialize in cardiology. She participated in the first cardiac catheterizations at the hospital in 1957. A year later, Eve qualified as a consultant in the Royal College of Physicians (Edinburgh and London). In 1959, continuing as senior registrar, Eve gave birth to her second daughter. In 1960, she returned to Israel, where Zeev was working, to work herself at the Medical Missionary Hospital in Nazareth. However, the allure of pursuing their professions further took the family to the United States in 1964, where Eve accepted a research position in surgery at Stanford University, California. A year later, it was her husband's pursuit of professional growth that moved the family once again, this time to Canada. Zeev became a professor at UBC while Eve accepted a position at St. Paul's Hospital in cardiology. At St Paul's she participated in planning and developing the first intensive care unit; however, it was a position at Shaughnessy Hospital in cardiac catheterization, coupled with the completion of her FRCP in 1968, that marked her final move. Eve remained at Shaughnessy until its closure in 1992. In 1974 she had opened her own cardiology practice, joined later by her colleagues, Dr K. Booromand and Dr B. BarShlomo, and developed lifelong friendships. A well-respected clinical professor at UBC, publishing numerous journal articles throughout her career, Eve displayed a passion for her profession, and her willingness to share her professional journey made her an active lecturer and teacher, colleague, and friend, not soon forgotten.

Eve's interests and energy were not limited to medicine; her pursuit of knowledge and understanding of the world guided her additional pursuits. Archaeology was her second passion, and learning Spanish (her fifth language) enhanced her studies. If there was spare time it was spent reading or in the outdoors: cross-country skiing, hiking (the Annapurna circuit at age 60), trekking in Patagonia, and exploring multiple regions of South America to name a few. But it was not only her energy, drive, and achievements that made her who she was, it was her integrity and honesty, passion, dedication, and work ethic that formed the hallmarks of her character as well as the cornerstones of her career. Her compassion, openness, and willingness to help anyone in need, her friendship, zest, and unwavering curiosity for life, and her love of animals and their love for her are the things everyone will remember.

Predeceased by her husband in 1973, Eve was a loving and caring single mother, grandmother, great-grandmother, and mother-in-law. She is survived by her two daughters and son-in-law, four grandchildren, and two great-grandchildren. She was loved and respected by everyone who came into her life. A pioneer to the end, she will be missed immensely.

—Dina Collins
Vancouver

Dr John Jeremy Lewis Crosby 1936–2020

Dr John Crosby was born in Nuneaton, England, and attended medical school at St. Thomas' Hospital in London, graduating in 1961. Following house surgeon positions in London and Leister, and a period of time as an anatomy lecturer, John came to Canada, where he spent some happy years as a full-service family physician on the Sunshine Coast in Gibsons. He did additional training in anesthesia at Vancouver General Hospital and achieved his Royal College Fellowship in Anesthesia in 1974.

John worked at St. Paul's Hospital until 1977, then moved to a position at Royal Columbian Hospital in New Westminster. He had a long and fruitful career there as a general anesthesiologist and, midway through his career, an interest in chronic pain led him to co-found the Diagnostic and Therapeutic Nerve Block Clinic at Royal Columbian and Eagle Ridge hospitals.

During his career he held the title of clinical associate professor of medicine in anesthesia at UBC, served the community as head of the Department of Anesthesia at Royal Columbian Hospital from 1984–86, sat on the executive of the BC Anesthesiologists' Society from 1982–87 (including as chair from 1984–86), was a member of council of the Canadian Anesthesiologists' Society from 1983–86, and served as a member of the Standards Committee from 1985–87. John retired from anesthesia practice in 1997 but continued treating patients with chronic pain until 2002. He was consistently described by his patients and colleagues as a gentleman, a dedicated physician, and a great mentor.

John was also very musically talented, writing and performing music often in the form of skits. He was a dedicated member of the Vancouver Welsh Men's Choir for 28 years, serving on the music committee as well as arranging music that the choir still sings to this day. When not in song or "passing gas," John could be found in his garden getting incredible satisfaction from each flower and plant while raging against each weed and slug. He loved spending time with friends and family, whether it was on the tennis court or golf course, gathered around a piano, in raucous debate, or sharing a naughty joke, always with a twinkle in his bright blue eyes.

(Continued)

Recently deceased physicians

If a BC physician you knew well is recently deceased, please consider submitting an obituary. Include the deceased's dates of birth and death, full name and the name the deceased was best known by, key hospital and professional affiliations, relevant biographical data, and a high-resolution photo. Please limit your submission to a maximum of 500 words. Send the content and photo by e-mail to journal@doctorsofbc.ca.

He is survived by his wife, Marijke; his two daughters, Mariette White (Ed) and Michelle Crosby (Joel Bridle); and four grandchildren.

—R. L. Moore, MD, FRCPC
Vancouver

—Richard Merchant, MD, FRCPC
Burnaby

Dr Stanley Basil Briggs 1940–2020

Stan passed away peacefully at home with his best friend, confident, colleague, and wife, Dr Jean Mercer, by his side.

Stan was born in Prince Albert, Saskatchewan, where he completed his formal years of school. Following graduation, with his 6 ft 10 in frame, he was scouted by the University of Idaho with a scholarship to play basketball. His basketball career was shortened by injury.

He returned to the University of Saskatchewan, where he completed his MD in 1967. At the time, the University of Saskatchewan Medical School had the smallest enrollment in North America. The student-to-professor ratio was close to one to one. He had an excellent basic medical education, which stood him well throughout his career as a primary care physician.

Stan interned at the Royal Columbian Hospital, followed by a long career in White Rock. Most of those years were spent with Hilltop Medical Clinic where he was one of the original six physicians in that group. Stan practised full-service family practice, including hospital privileges. Besides delivering babies, he worked in the ER, assisted in the OR, and cared for his patients on the medical wards. Stan was an active member of the hospital staff committees, also participating in the hospital board before regionalization. With his tall stature came a very gentle demeanor and a heart of gold. He was loved by his patients, staff, and colleagues.

Despite his basketball career ending early, Stan's enthusiasm for the sport never faltered. March Madness was etched in stone as a must in his life. His love for the Saskatchewan Roughriders was never in question, and he was part of the great green-and-white wave at BC Lions games. He never forgot his Saskatchewan roots.

Stan also loved the water; a swimming pool or ocean waves were never far from his recreational rests. And he loved travel; he enjoyed experiencing a significant portion of the world on his explorations.

Stan's love of life, appreciation of close friendships, and dedication to the medical community was a paramount quality. He will be missed by his many friends and colleagues in Saskatchewan, Newfoundland, Ontario, Australia, and British Columbia.

In addition to his wife of 32 years, Dr Jean Mercer, he leaves to mourn his children, Shannon and Blair (Caroline), and grandchildren, Mikaela and Nathan. He is entitled to be proud of all of them.

In lieu of flowers, Stan would appreciate donations to the Peace Arch Hospital Foundation in his memory.

—Grant Gibbings, MD
White Rock

CME calendar

Rates: $75 for up to 1000 characters (maximum) plus GST per month; there is no partial rate. If the course or event is over before an issue of the *BCMJ* comes out, there is no discount. **Deadlines:** ONLINE: Every Thursday (listings are posted every Friday). PRINT: The first of the month 1 month prior to the issue in which you want your notice to appear; e.g., 1 February for the March issue. The *BCMJ* is distributed by second-class mail in the second week of each month except January and August. **Planning your CME listing:** Advertising your CME event several months in advance can help improve attendance; we suggest that your ad be posted 2 to 4 months prior to the event. **Ordering:** Place your ad at www.bcmj.org/cme-advertising. You will be invoiced upon publication. Payment is accepted by Visa or MasterCard on our secure online payment site.

PSYCHOLOGICAL PPE: PEER SUPPORT BEYOND COVID-19

Online (Wednesdays)

In response to physician feedback, the Physician Health Program's online drop-in peer support sessions, established 7 April, are now permanently scheduled for Wednesdays at 12 noon. The weekly sessions are cofacilitated by psychiatrist, Dr Jennifer Russel, and manager of clinical services, Roxanne Joyce, and are drop-in with no commitment required. The focus is peer support, not psychiatric care. All participants have the option to join anonymously. To learn more about the sessions and the program, visit www.bcmj.org/news-covid-19/psychological-ppe-peer-support-beyond-covid-19. Email peersupport@physicianhealth.com for the link to join by phone or video.

CME ON THE RUN

Online, 2 October 2020 to 4 June 2021 (Fridays)

The CME on the Run sessions are offered online. Registrants will receive links to go online before each session. Each program runs on Friday afternoons from 1–5 p.m. and includes great speakers and learning materials. Topics and dates: 20 November, 2020 (Diagnostics/Radiology). Topics include Investigating COVID-19, What Is the Real Deal?, Is My Heart Broken Doc? Medical Imaging for the Heart, Navigating NASH Diagnostic Tools, Point-of-Care Ultrasound—Practical Applications for In-Office Use, Detecting the Smoker's Time Bomb with Low Dose CT, ABCDs of Dense Breasts, Health Technologies that Help Our Patient Help Us, Back Troubles—Is Imaging for Lumbar Pain Syndromes Useful? The next sessions are: 29 January 2021 (Therapeutics), 5 March 2021 (Ophthalmology/ENT), 7 May 2021 (Geriatrics), and 4 June 2021 (Internal Medicine). To register and for more information visit https://ubccpd.ca/course/cme-on-the-run-2020-2021 or email cpd.info@ubc.ca.

SKIN CANCER: INTERACTIVE SCENARIOS & PRACTICAL APPROACHES FOR PRIMARY CARE

Virtual conference, 13 November 2020, 1–4 p.m.

Plan to join us for an afternoon of case-based oncology learning focusing on prevention, diagnosis, and management of both common skin cancers and melanoma. Led by outstanding dermatologist and surgical oncologist speakers, this next-level learning opportunity is presented by BC Cancer's Family Practice Oncology Network. Register today at fpon.ca. Cost: $50. For more information, email dilraj.mahil@bccancer.bc.ca.

GP IN ONCOLOGY EDUCATION

Vancouver, 1–12 February and 13–24 September 2021 (Mon–Fri)

BC Cancer's Family Practice Oncology Network offers an 8-week General Practitioner in Oncology education program beginning with a 2-week introductory session every spring and fall at BC Cancer–Vancouver. This program provides an opportunity for rural family physicians, with the support of their community, to strengthen their oncology skills so that they can provide enhanced care for local cancer patients and their families. Following the introductory session, participants complete a further 30 days of clinic experience at the cancer centre where their patients are referred. These are scheduled flexibly over 6 months. Participants who complete the program are eligible for credits from the College of Family Physicians of Canada. Those who are REAP-eligible receive a stipend and expense coverage through UBC's Enhanced Skills Program. For more information or to apply, visit www.fpon.ca, or contact Jennifer Wolfe at 604 219-9579.

Classifieds

Advertisements are limited to 700 characters. Rates: Doctors of BC members: $50 + GST per month for each insertion of up to 350 characters. $75 + GST for insertions of 351 to 700 characters. Nonmembers: $60 + GST per month for each insertion of up to 350 characters. $90 + GST for insertions of 351 to 700 characters. **Deadlines:** Ads must be submitted or canceled by the first of the month preceding the month of publication, e.g., by 1 November for December publication. Visit www.bcmj.org/classified-advertising for more information. **Ordering:** Place your classified ad online at www.bcmj.org/classified-advertising. Payment is required at the time that you place the ad.

PRACTICES AVAILABLE

KELOWNA—GP REQUIRED

Small solo practice in newer building with a mountain view from the many large windows looking for family doctor to replace one retiring after 40 years. Low overhead, no files, Med Access EMR, and very nice MOA and patients. For more info email lianne.lacroix@shaw.ca.

SURREY—FP ASSOCIATE/LOCUM

Well-established family physician looking for a part-/full-time associate/locum for a very busy clinic in Fleetwood Surrey. OSCAR EMR, telemedicine integrated, experienced staff, competitive split, flexible hours. Excellent location close to all the amenities. Can start ASAP. Punjabi speaking an asset. Email drsohal@shaw.ca. Phone 604 585-9696.

VICTORIA—FP/WALK-IN

Well-established fee-for-service walk-in practice in the centre of James Bay, Victoria. Varied demographics and many long-term patients as we have been part of this community for 30 years. Looking to transfer ownership before retirement in December 2020, able to stay on longer for smooth transition. Office uses OSCAR EMR, has two exam rooms, and is equipped for minor procedures. Contact Dr Michael Greenwood at 250 388-9934 or email jbcentre@telus.net.

VICTORIA—VANCOUVER ISLAND PHLEBOLOGY/VEIN CARE PRACTICE

Very successful, well-established practice, large referral network and waitlist, great add to cosmetic practice or stand alone. Email mediquest@telus.net for more information.

EMPLOYMENT

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A bright and modern medical clinic with seven exam rooms is looking for GPs. Join a team of two physicians and expert MOAs. Clinic is open 7 days a week; you choose your schedule, working days, and practice (family, walk-in and/or telemedicine options).Oscar EMR. Busy practice. Competitive billing split. Contact Mo at 778 888-3747 or pharmasavegladwin@gmail.com.

BURNABY—FT OR PT FP OPPORTUNITY

An opportunity exists for a part-time or full-time family physician to join a turnkey practice/walk-in clinic in Burnaby. The group consists of three other family physicians in a shared office environment on OSCAR EMR, located on the 2nd floor of a busy, business plaza. Parking is free, please inquire with clinic coordinator Richard at rw@bcdrug.com.

BURNABY/METROTOWN—SPECIALISTS TO JOIN OUR RAPIDLY GROWING TEAM

Join our eight GPs and two internists at Imperial Medical Clinic. Flexible F/T or P/T schedules to suit your needs with in-person and/or virtual consults. Patient base of over 15 000 and growing. Young, progressive, collegial team. Brand new clinic. Great place to start practice without cost of opening your own office. All specialties considered. Call Dr Pav Kaliray at 778 822-1981.

CANADA—ARE YOU A PHYSICIAN LOOKING FOR A NEW ROLE?

Locum, long-term, city, or rural—we have it all. Whether you are a physician looking for work across Canada, or a medical facility requiring physicians, the team at Physicians for You can help. Your time is valuable. Let our 10 years of experience in Canada, extensive knowledge of the processes for licensure, and personalized, friendly service work for you. Our strong reputation is built on exceptional service and results. Check out our current job postings on our website and call the trusted recruitment team today. Visit us online at www.physiciansforyou.com, email info@physiciansforyou.com, or call 1 778 475-7995.

KELOWNA—LOOKING FOR A CHANGE?

Seeking a cosmetic physician. A well-established Kelowna clinic is looking to expand and add another physician at their brand new location. Cosmetic and medical work is available with excellent support staff and a variety of laser technologies at your disposal. The ideal candidate will already be familiar with and have worked in the cosmetic field including but not limited to injectables, laser treatments, minor skin surgery, body contouring treatments, and more. Please send your resume to craig@dermmedica.ca and a cover letter outlining your interest in this amazing opportunity for the right individual.

NANAIMO—GP

General practitioner required for locum or permanent positions. The Caledonian Clinic is located in Nanaimo on beautiful Vancouver Island. Well-established, very busy clinic with 26 general practitioners and two specialists. Two locations in Nanaimo; after-hours walk-in clinic in the evening and on weekends. Computerized medical records, lab, and pharmacy on site. Contact Lisa Wall at 250 390-5228 or email

lisa.wall@caledonianclinic.ca. Visit our website at www.caledonianclinic.ca.

NORTH VAN—FP LOCUM
Busy, established physicians with stellar support staff seek part-time or full-time associates. Doctors currently needed to fill very busy telemedicine and in-office shifts. Oscar EMR with technical support. Part-time associates will be on a 70/30 split for weekend and evening shifts. Option of working from home. For further information contact Kim at 604 987-0918 or kimgraffi@hotmail.com.

PORT COQUITLAM—FULL-TIME FP, WALK-IN CLINIC SHIFTS
An opportunity exists for two family physicians/GPs to join a two-physician managed overhead turnkey newly renovated medical clinic in the bustling Fremont Village area of Port Coquitlam. Join our team of seven physicians on PLEXIA/OSCAR EMR. Experienced staff, competitive overhead, telemedicine integration, and prime location. Contact Richard rw@bcdrug.com.

POWELL RIVER—LOCUM
The Medical Clinic Associates is looking for short- and long-term locums. The medical community offers excellent specialist backup and has a well-equipped 33-bed hospital. This beautiful community offers outstanding outdoor recreation. For more information contact Laurie Fuller: 604 485-3927, email: clinic@tmca-pr.ca, website: powellriver medicalclinic.ca.

RICHMOND—PRACTICE OPPORTUNITY
Practice opportunity available at busy, well-established two-physician family practice office in Richmond, BC. Fluency in Cantonese and/or Mandarin is an asset. EMR, flexible scheduling, and negotiable terms. Please reply to allantsang999@gmail.com.

SOUTH SURREY/WHITE ROCK—FP
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VICTORIA—GP/WALK-IN
Shifts available at three beautiful, busy clinics: Burnside (www.burnsideclinic.ca), Tillicum (www.tillicummedical clinic.ca), and Uptown (www.uptownmedicalclinic.ca). Regular and occasional walk-in shifts available. FT/PT GP post also available. Contact drianbridger@gmail.com.

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ABBOTSFORD—OFFICE SPACE FOR SPECIALISTS
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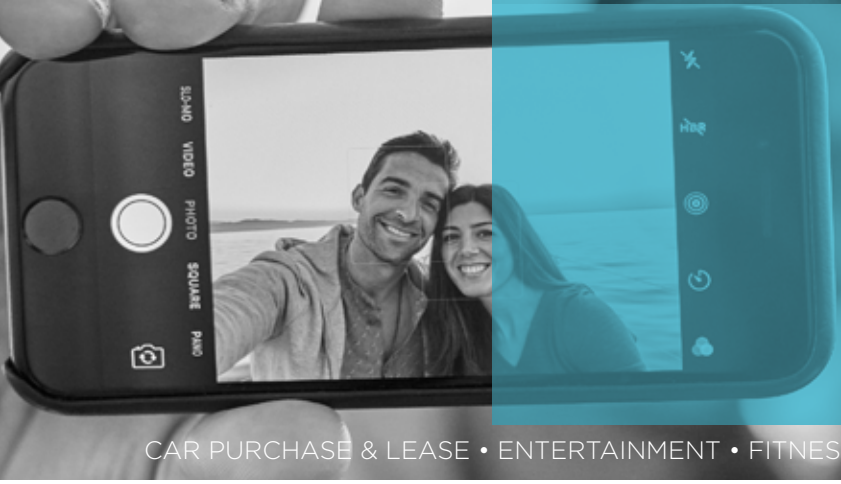

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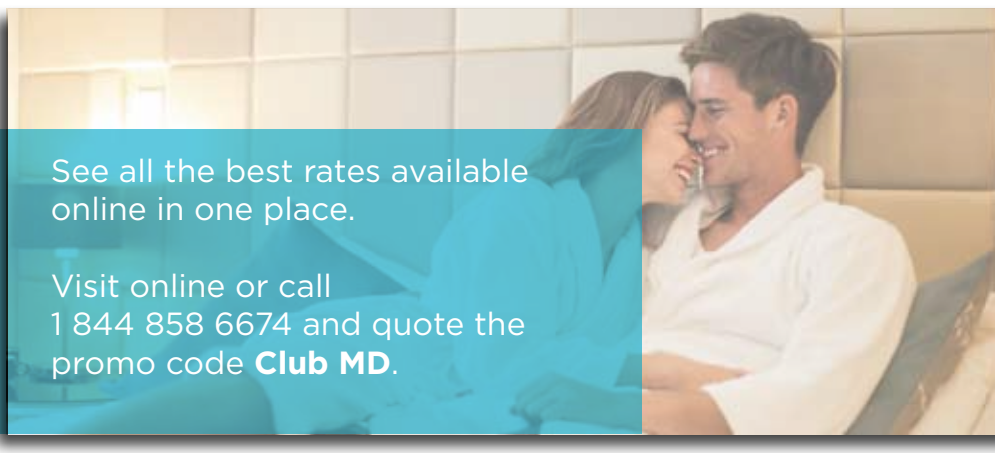

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