

VACCINE RESEARCH, DEVELOPMENT AND AWARENESS



With a proud history of health research and promotion, and ongoing contributions to the development and distribution of disease-fighting vaccines, Canada is well positioned to put our health innovation and expertise to even fuller benefit for the world and our society and economy. **Could this be just the shot in the arm Canada needs?** Proponents say yes, and are encouraging the public to tune into the benefits.

Front Line Medicine

Despite Canada’s history of contributing to life-saving vaccines, most Canadians have been slow to recognize our nation’s prowess in the field.

Recent developments, however, suggest that Canada is getting more serious about putting our immunological know-how to work – for the sake of world health, including our own, and the advancement of a knowledge-based economy in Canada.

The outcome of Canada’s historic contribution to the polio vaccine offers a glimpse at the potential.

Not only has that vaccine spared countless people worldwide from polio’s crippling effects, eventually the University of Toronto’s Connaught Laboratories, which played a critical role in the vaccine’s development, grew into pharmaceutical giant Sanofi Pasteur.

“Historically, we’ve been very successful in nurturing vaccine companies,” says Lorne Babiuk, vice president,

Research, at the University of Alberta. “The early vaccines, such as polio and smallpox, have saved millions of lives and millions of dollars in health care costs. These and other developments have come out of our universities and the National Research Council.”

The outcomes are as numerous as they are impressive.

In March 2009, a research team led by Frank Plummer, director of the National Microbiology Lab in Winnipeg, announced an Ebola vaccine proven effective on primates even when administered after exposure to the disease.

Other recent Canadian contributions to vaccine technologies include more effective adjuvants (compounds mixed with vaccines to make them more effective), animal models that allow researchers to better test vaccine efficacy, and even a vaccine for cattle designed to protect humans from E. coli, says Dr. Babiuk. “It’s a totally novel approach,

vaccinating an animal to protect a human.”

To help leverage Canada’s health research prowess, the federal government recently invested \$25.5 million in the Pan-Provincial Vaccine Enterprise (PREVENT), a Centre of Excellence for Commercialization and Research administered by Canada’s Networks of Centres of Excellence program.

PREVENT is designed to speed vaccine development

for potentially devastating diseases such as pandemic influenza, whooping cough, bovine spongiform encephalopathy (‘mad cow’ disease), respiratory diseases and severe diarrheal diseases.

“There is a gap between research in universities and government labs and downstream development and commercialization by companies. PREVENT is designed to bridge it,” says PREVENT CEO Andrew Potter, who is

also director of the University of Saskatchewan Vaccine and Infectious Disease Organization (VIDO), where PREVENT is headquartered.

“We will invest the money and time required to move vaccine candidates through the higher-risk phases of the clinical trial process, adding significant value with a minimal investment.”

As vaccines are the most cost-effective way of controlling disease, investing in their development is essential, says Dr. Potter, noting that the completion of the International Vaccine Centre – the largest ‘level three’ bio-containment facility in Canada – later this year, will enable VIDO and PREVENT researchers to expand their work on emerging diseases.

“It will take Canadian vaccine research to the next level and allow us to proactively address the issues facing us today. We’ve tended to react very well – to SARS, the flu, BSE – but we haven’t been as effective at finding future solu-

tions. That’s what this facility is all about.”

Beyond research and infrastructure investments, however, in order for Canada to continue to benefit from vaccine research, Dr. Babiuk says Canada needs more public education about the value of preventative medicine.

“I think the HPV vaccine is one of the best vaccines that has been developed, but a large percentage of the population that could benefit is not going to be immunized just because of the concerns of anti-vaccine lobby groups.”

Despite the efficacy of vaccines, the fact that preventative medicines are given to healthy individuals presents an education challenge.

“If you have a potentially terminal disease, you’re willing to do everything you possibly can. But if there is any reaction to a preventative drug, even a sore arm for a day, some people will conclude that vaccines are bad. We need education to help change that,” says Dr. Babiuk.



The completion of the International Vaccine Centre – the largest ‘level three’ bio-containment facility in Canada – later this year, will enable Canadian researchers to expand their work on emerging diseases. PHOTO: SUPPLIED

BEYOND CHILDHOOD

Adults advised to keep immunizations up to date

For most parents, having their children vaccinated against potentially deadly diseases is a no-brainer. Yet scores of those same parents give little thought to having themselves vaccinated either to boost their own immunity to diseases for which they were immunized as children, or to gain protection against a wide range of other vaccine-preventable infections.

A recent report by the Infectious Diseases Society of America and the Robert Wood Johnson Foundation stated that 40,000 to 50,000 Americans

die each year from diseases that could have been prevented by vaccination.

Though equivalent data is not available in Canada, some doctors believe the number is about 10 per cent of the U.S. figure, with most of the deaths occurring due to influenza and pneumococcal infections.

While many people seem to think that they only need to get their “shots” when they travel to exotic locations, Dr. Tony Mazzulli, a microbiologist and infectious disease consultant at Mount Sinai Hospital in Toronto, says adults need to

ensure that their routine immunizations are also up to date.

Hepatitis B, for example, can be picked up as easily in Canada as it can in other countries. And while a disease like tetanus may be uncommon in Canada, the consequences of a tetanus infection can be devastating, so prevention through immunization is recommended, says Dr. Mazzulli.

The current edition of the Canadian Immunization Guide published by the Public Health Agency of Canada, says the

See **Grown-ups** Pg.3

IMMUNIZATION AVAILABLE TO SCHOOL GIRLS – FROM GRADE 4 TO GRADE 8

HPV vaccine transforms fight against cervical cancer

In the fall of 2007, Kathy Smith was a 41-year-old mother of three young boys working hard to keep fit and healthy. She ran marathons and played tennis, and made sure to get regular Pap tests.

She wasn’t too concerned when she learned her latest Pap result showed abnormalities and she would need further testing. Then, in October, she received the news – she had developed cancer of the cervix and needed a radical hysterectomy.

“I never expected to be facing cancer, especially when

I felt that I was doing everything within my power to take care of myself,” says Ms. Smith. “I think that’s what really caught me off guard.”

Surgery at Sunnybrook Health Sciences Centre on Christmas Eve wasn’t the end of this difficult journey; the cancer had spread to her lymphatic system. Beginning in February 2008, she underwent five weeks of concurrent chemotherapy and radiation.

Two years later, Kathy Smith is cancer-free and on the road back to her former level of physical fitness. On

the other side of a serious illness, she is a strong advocate of HPV vaccination against cervical cancer.

“What a gift it is to have a vaccine that can help prevent women from going through what I went through,” says Ms. Smith. “I want to send the message that young women should get vaccinated to protect themselves against cervical cancer.”

In early February, Health Canada approved Cervarix – providing Canada with a

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365 DAYS FOR HAITI

unicef

IMMUNIZATION CAMPAIGN IN HAITI

In the aftermath of emergencies, childhood diseases can run rampant. In Haiti, this risk is compounded by the fact that thousands of children have never been vaccinated against potentially life-threatening diseases. UNICEF and its partners in Haiti have begun an immunization campaign targeting children that will immunize against measles, rubella, diphtheria, tetanus and whooping cough.

UNICEF will be on the ground in Haiti over the next 365 days and beyond to help build a brighter future for all Haiti’s children. Join us by becoming a monthly supporter of the 365 DAYS FOR HAITI campaign.

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Front Line Medicine

PREVENTING STRAINS A, Y AND W-135

Advanced vaccine guards against lethal meningitis

On April 24, 2007, 15-year-old Brodie Campbell's flu-like symptoms worsened during the night, and his parents took him to the hospital. One thing they weren't worried about, though, was meningitis. "We were under the impression that he was protected," says his father, Colin Campbell.

Although Brodie was up to date on all his immunization program shots, it didn't include the one that could have saved his life. He had been immunized against strain C meningitis; he died of meningococcal meningitis caused by strain Y.

"We arrived at emergency about 2:30 a.m., and he was dead by 5:30 in the morning," says Mr. Campbell.

Meningococcal bacteria is the most common cause of meningitis today, says pediatrician Dr. Taj Jadavji, a professor in the Department of



Fifteen-year-old Brodie Campbell died of meningitis caused by meningococcal strain Y, a disease that is now vaccine-preventable. PHOTO: SUPPLIED

Microbiology and Infectious Diseases at the University of Calgary.

"In Canada, in almost all the provinces, infants are given the meningococcal C vaccine, which has markedly decreased the infection rate," he says. "But parents need to understand that there are

other strains that can cause exactly the same disease. It is very important for them to know that even if their children have received the strain C vaccine, there are gaps in protection. Their children may still be at risk."

As meningitis moves so quickly, prevention is vital,

says Dr. Jadavji. "Early diagnosis is very difficult, because the disease can mimic a viral infection. It presents very suddenly and can be fatal. Children die of this disease, but four of the five most common types are now 100 per cent preventable."

In June 2009 the government of Ontario announced that "In the school-based program, Menactra, which provides protection against four strains of IMD (A, C, W-135 and Y), replaces the current vaccine which guards against only the C strain." New Brunswick, Newfoundland, Prince Edward Island and the Northwest Territories have also implemented adolescent immunization programs with the vaccine.

The Ontario decision followed a recommendation by the National Advisory Committee on Immunization that meningococcal conjugate vac-

cine be offered in early adolescence to all children, including those previously vaccinated for strain C.

But there is still a lot of confusion, says Mr. Campbell. "Even in the aftermath of our son's death, when I talk to the parents of his friends, they say they haven't talked to their doctor about the Menactra vaccine, because their children were vaccinated in school. That is not true here in B.C."

Kathryn Blain, who founded the Meningitis Research Foundation to raise awareness about meningitis after losing her son Michael Longo to the disease 15 years ago, says, "No child should suffer from a disease that is vaccine-preventable.

According to The Meningitis Research Foundation of Canada, statistics show that the vaccine which protects against all four vaccine-pre-

ventable strains of IMD, has the potential to prevent an additional 71 per cent more cases of meningococcal disease in adolescents, the population at highest risk.

"When I talk to other parents who have lost a child to meningitis, they tell me how much they would have welcomed this vaccine. It's essential that parents be aware of the risks of this disease and speak to their family physicians. This vaccine offers so much hope – when you consider the decreased infection rate following the implementation of the strain C vaccine, it is very exciting to think about what this vaccine can do."

"In Canada, infants are given the meningococcal C vaccine, which has markedly decreased the infection rate.

But parents need to understand that there are other strains that can cause exactly the same disease." ■

"In Canada, infants are given the meningococcal C vaccine, which has markedly decreased the infection rate. But parents need to understand that there are other strains that can cause exactly the same disease."

Defending against IMD

Invasive meningococcal disease (IMD) is an aggressive, often fatal disease that strikes about 200 Canadians – mostly healthy children and teens – each year. One out of 10 people infected will die. Of those who survive, one in five will be permanently disabled. Knowing the facts can help you ensure your loved ones are protected.

- The symptoms of meningococcal meningitis often mimic those of the flu until it is too late.

Seek medical attention immediately if babies or toddlers demonstrate any of these symptoms: fever with

- cold hands and feet; refusal of food when normally hungry; vomiting; fretfulness without wanting to be held; pale, blotchy skin; blank, staring expression; drowsy, difficult to wake; stiff neck and arched back; and high pitched cry.

- **Seek medical attention immediately** if children or adults have some or all of these symptoms: vomiting; fever with cold hands and feet; headache, especially combined with stiff neck; joint stiffness and muscle pain; aversion to bright lights or noise; drowsy, difficulty waking, confusion or delirium.

- IMD is contagious, and can be spread from one person to another through close contact involving secretions

- from the nose or throat, such as sharing drinks, water bottles or eating utensils, or by kissing.

- Children who have received meningococcal conjugate C vaccine are still vulnerable to the other vaccine-preventable strains until they receive the vaccine that protects against all four vaccine-preventable strains.

- Parents of children and teens who have not received the vaccine that protects against the four vaccine-preventable strains, should to talk their child's doctor about broad protection against IMD.

To learn more, visit the Meningitis Research Foundation at meningitis.ca.

VACCINE TECHNOLOGY

Advances in adjuvant technology adding fuel to vaccine efficacy

Most Canadians likely hadn't heard about adjuvanted vaccines until mass public immunizations began last fall against the H1N1 influenza virus.

Those who were paying attention, however, learned an important lesson during the rollout of the Arepanrix vaccine to combat H1N1: that the adjuvant component of the pandemic flu vaccine improved its effectiveness.

An adjuvant is a compound added to a vaccine to increase the immune response against the antigen – the target molecule that triggers protection against a specific disease. The term comes from the Latin word *adjuvare*, meaning "to help."

Despite a lack of public awareness of adjuvants, these substances have been boosting the power of vaccines for more than 80 years. Recent advances in molecular science, however, have led to development of a new generation of more powerful and targeted adjuvants, as well as adjuvant systems that combine two or more adjuvants.

These innovations are pushing the frontiers of vaccination – opening the door to preventing and even treating difficult diseases that couldn't previously be targeted by vaccines.

GlaxoSmithKline (GSK), developer of Arepanrix, has been working to break new ground in adjuvant technology for many years, says Dr. Thomas Breuer, head of global clinical development and chief medical officer of GSK Biological. Its adjuvanted vaccine products also include Cervarix, recently approved in Canada as a vaccine against viruses causing cervical cancer.

"Traditional adjuvants are made of aluminum salts and these compounds are sufficient for a number of vaccines, but there are limitations," says Dr. Breuer. "GSK has been

researching innovative adjuvants and adjuvant systems for close to 20 years, and we are now in the forefront of using these new adjuvants in our vaccines."

As head of GSK's adjuvant program, Dr. Natalie Garçon has been leading this intensive research and development over the past two decades. While the role of conventional adjuvants has been to boost the immune response, some of GSK's new adjuvant systems are accomplishing much more, she explains.

"These newer systems are giving vaccines the power to induce a stronger immune response, to increase protection for a longer period and to broaden the immune response for people who have weakened immune systems," says Dr. Garçon, adding that extensive clinical trials have demonstrated the safety of these new adjuvants.

"These newer adjuvants are also allowing us to develop and make available vaccines that address unmet medical needs, diseases that we weren't able to target before," she says. For example, the GSK team is in the final stages of confirming the efficacy of a new vaccine to protect against malaria – a goal that has previously eluded vaccine developers.

Innovative adjuvant systems are also leading to groundbreaking therapeutic vaccines – vaccines that treat disease. GSK has two such vaccines under development, for lung cancer and for melanoma.

"These vaccines are designed to slow the progression of cancer," says Dr. Breuer. "There is potential to open up a completely new pathway in the treatment of cancer. Clearly, adjuvants are taking the old technology of vaccination to a new level, where we can target diseases we couldn't have imagined just a few years ago." ■



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EXPERT OPINION

Public health, prevention and vaccines

By Russell Williams
President, Rx&D
Canada's Research-Based
Pharmaceutical Companies

Over the past 30 years, we've seen incredible advances in medicine and health outcomes. Average life expectancy has increased from 74 to 81 years. Death and hospitalization rates have been reduced significantly for a number of diseases including breast cancer, cardiovascular disease, HIV/AIDS and child leukemia.

Somewhat overlooked in this progress has been the amount of lives saved and diseases averted by vaccines. Vaccination is regarded by



many as the 20th century's greatest public health achievement. Each year, vaccines prevent three million deaths worldwide and save another 750,000 from disability. The recent success in Canada to control the H1N1 pandemic clearly illustrates vaccination's value. GlaxoSmithKline's domestic manufacturing capac-

ity contributed to Canada leading the world in terms of global H1N1 vaccination rates.

Over the past century, vaccines have helped defeat some of humanity's worst scourges. Smallpox vaccine was first introduced in Canada in the late 1800s. Once a parent's nightmare, smallpox was eradicated within Canada by 1962 and globally by 1979. In the first quarter of the 20th century, rabies, tuberculosis, tetanus, yellow fever, influenza and whooping cough vaccines were introduced. The 1950s brought a second wave of vaccines for measles, mumps, rubella, and meningitis. Rubella, which caused thousands of infants to be born with deafness, blindness and other birth defects in the 1960s is no longer endemic.

Twenty-six diseases are now vaccine preventable. Polio, diphtheria and tetanus – to name a few – are no longer the death threats they once were, having been effectively eliminated. The number promises to grow with the research being undertaken by research organizations, academia and our member companies.

Canadian researchers, companies and governments have played a much larger role than one would suspect in the past century's success in preventing and eliminating infectious diseases not only here, but around the world.

In the 1950s, Toronto's Connaught Laboratories built on its experience supplying smallpox vaccine with a vital contribution to the development of the polio vaccine. Connaught supported Dr. Jonas Salk's research by supplying one of history's largest international vaccine clinical trials involving nearly two million children. Canada was also one of the first countries to successfully eliminate polio.

Rx&D members such as Merck, GlaxoSmithKline, Pfizer and sanofi-aventis are world leaders in vaccine development, each possessing research presence in Canada. Over the past decade, Health Canada has approved vaccines developed by these companies for chicken pox, pneumococcal meningitis, rotavirus for children, shingles and cervical cancers caused by the human papillomavirus (HPV).

Canadians have a lot to be proud of when it comes to preventive health. These examples make us leaders: the University of Saskatchewan's Vaccine and Infectious Disease Organization (VIDO); the pan-Canadian "PRE-VENT Centre of Excellence for Commercialization and Research," which focuses on strengthening Canada's vaccine industry; the University of British Columbia's Centre for Disease Control; the University of Alberta's Institute for Viral Immunology; Winnipeg's Level 4 laboratory (one of 15 in the world, formally known as the Canadian Science Centre for Human and Animal Health); and Dalhousie University's Canadian

Centre for Vaccinology.

Over the last five years, the Government of Canada has invested in excess of \$800 million to support domestic immunization programs and global partnerships to increase access to vaccines in the developing world. Within Canada, the lion's share of this investment has gone to ensuring that all Canadians can be routinely vaccinated with five new vaccines against chickenpox, HPV-related diseases, meningitis, invasive pneumococcal disease and whooping cough. Canada's \$160-million donation to the Global Alliance for Vaccines and Immunization (GAVI) has contributed to saving over five million lives (and counting) over the last 10 years.

Canada can continue its proud heritage of addressing preventable diseases by implementing regular and predictable funding support for immunization research and development programs across Canada.

Why? Over the next few years, new vaccines will fundamentally change not only how physicians prevent but also how they treat disease, bringing with it substantial impact on public health.

Harnessing the advances of biologic and genetic research, the medicines and vaccines of tomorrow will be utilized with better knowledge of how disease works with greater predictability of which therapies will work for which patients. This personalized medicine will improve health outcomes and ultimately increase hope for patients and their families.

Grown-ups cont'd from Pg. 1

prevention of infection by immunization is a lifelong process.

"Childhood immunization programs have significantly reduced vaccine-preventable diseases among children, but Canada's population has an increasing number of adults who remain vulnerable to these diseases," states the Guide.

For example, the guide notes that a random telephone survey in 2002 among Canadians over 18 found that only 54 per cent had adequate coverage for tetanus, and that the rate was lowest among people over 60.

Dr Mazzulli believes the main reason why more adults aren't vaccinated is simply a

lack of awareness.

"Unlike childhood vaccines, which many people recognize as part of routine childhood care, the same understanding regarding adult vaccinations does not exist. There is much misinformation about vaccine safety and effectiveness spread via the Internet and other means, which has caused some people to become skeptical of the benefits of vaccines. Others have become complacent and do not recognize the threat that is posed to them by vaccine-preventable diseases," says Dr. Mazzulli.

Addressing the issue of awareness among Canadian adults of the need to be vaccinated remains a challenge. While there is a vigorous campaign to encourage people to



Too many Canadian adults do not recognize the threat that is posed to them by vaccine-preventable diseases, say health experts. PHOTO: ISTOCKPHOTO.COM

get a flu shot, not much is being done to make adults aware of other vaccines they should receive.

"Simply put, we need more public campaigns to make adults aware of what vaccines they should be receiving and when they should receive them," says Dr. Mazzulli.

"The campaigns should also publicize the benefits of vaccination: prevention of disease is far better than treatment. Medical professionals also need better training in understanding which vaccines are indicated for adults and when to administer them."

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GlaxoSmithKline is a pioneer in the development of innovative vaccines to help prevent potentially serious diseases such as influenza, hepatitis, malaria, melanoma and cervical cancer.

In 2008 alone, the company invested more than \$156 million in Canadian research and development, and is at the forefront of vaccine innovations such as adjuvant and biotherapeutic technologies. GlaxoSmithKline is also the leading Canadian manufacturer of influenza vaccines, with an advanced manufacturing facility right here at home.

As the search continues for vaccines that will lessen the spread of cancer and other diseases of concern, GlaxoSmithKline remains committed to working closely with Canadian researchers, academic institutions and government agencies to protect the future of all Canadians.

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Front Line Medicine

EXPERT OPINION

Increased investment needed to achieve goal

By Meg French
Director, International Programmes, UNICEF Canada

To vaccinate or not to vaccinate? This is a question that has been in the public eye a lot these days. We have likely all participated in discussions with colleagues, friends and families about the pros and cons of getting the H1N1 vaccine, weighed the likelihood of severe illness or death as a result of the flu, and contemplated how much time we were prepared to spend in line waiting for a shot. The challenge Canada faced in getting the H1N1 vaccine out to all Canadians who needed it in a timely manner – no matter where in this vast country they live – paralleled the challenges governments around the world face every



day in trying to immunize all children against preventable deaths from diseases like measles, tetanus and whooping cough. The fact is that immunization has been one of the most effective public health interventions in the world. More children than ever before are being immunized and as a result, an estimated two million lives are saved annually and countless disabilities are prevented. In 2008, four out of five

children around the world were reached with a basic set of vaccines – amazing progress that as a global community we should be proud of. However, the question it raises is, what about that fifth child? What can be done to reach that child? It is on that child and the 24 million others who are not immunized that we now must focus our attention. In 2000, the international community committed itself to a series of goals – The Millennium Development Goals. The fourth goal aims by 2015 to reduce child mortality by two-thirds from its 1990 levels – a goal that will not be achieved without increased investment and concerted effort. With funding and support from the Government of Canada, UNICEF has been



The Canadian International Immunization Initiative has been critical in helping developing nations build capacity for immunization and other health initiatives. PHOTO: SUPPLIED

Reaching the children

Many challenges have to be overcome to bring immunization to children living in the hardest-to-reach communities. When children live in remote areas of the country, their villages can be several days from health centres or far from any roads. Some children are also continuously on the move, as is the case with nomadic tribes or people displaced by conflict. In these cases, mobile teams will travel by bike, boat, camel or donkey to remote sites and often enlist the help of community leaders to motivate parents to bring children for vaccination. In conflict situations, UNICEF collaborates



with others to negotiate temporary cease-fires to give health workers access to children. Political or rebel leaders are encouraged to sign a “Days of Tranquility” agreement for all vaccination days in their regions.

working on a number of programs to help end the preventable deaths of children. The Canadian International Immunizations Initiative is one such program. This initiative has been critical in helping developing nations build the capacity to implement an immunization program that can reach children in all parts of a country. By focusing on the hardest-to-reach people, the initiative has helped immunize children who in the past may have died from disease such as measles or been paralyzed by polio. Today, global deaths from measles have dropped by 78 per cent since 2000, and last year there were fewer than 1,600 cases of polio compared to 350,000 cases in 1988. Parallel to this work, the scientific community has been developing new vaccines to further help protect children against the two main killers of children under five years of age – pneumonia and diar-

rhea. As more and more vaccines are introduced to address major killers of children, the challenge is ensuring that all children have access to these lifesaving interventions. The Canadian International Immunization Initiative is key to building up many countries’ ability to bring those new vaccines to every child in the country. Our experience has shown us that a holistic package of interventions – including immunization, nutrition and treatment for diarrhea, pneumonia and malaria – is critical to reducing the number of children who die from preventable causes. Canada has taken a leadership role in supporting community-level health workers in delivering these health interventions through a UNICEF program called the Catalytic Initiative to Save a Million Lives. What governments have learned from immunization programs

is critical to being able to deliver these multiple health interventions. By building strong immunization programs, they have developed the capacity to deliver other life-saving supplies to children, such as Vitamin A tablets and bednets to protect against malaria. A month ago, Prime Minister Harper announced that he would make maternal and child health a priority issue at this year’s G8 Summit in Muskoka. Immunization is an important part of any initiative to improve the health of women and children. It is programs like the Canadian International Immunizations Initiative and the Catalytic Initiative – both of which are complimentary and have benefited from Canadian leadership – that will play important roles in helping to end the deaths of almost nine million children who die every year from preventable causes. ■

In 2008, four out of five children around the world were reached with a basic set of vaccines – amazing progress that as a global community we should be proud of. However, the question it raises is, what about that fifth child? What can be done to reach that child? It is on that child and the 24 million others who are not immunized that we now must focus our attention.

SHINGLES

New vaccine offers protection against disabling, common disease

For almost all of the 95 per cent of Canadians who get chickenpox before they turn 15, it is an uncomfortable but otherwise harmless childhood rite of passage. Most, however, are unaware they may experience the reactivation of the chickenpox virus as a much more burdensome disease – shingles – later in life. Dr. Alison McGeer, one of Canada’s foremost infectious disease specialists, says, “About a third of us will have an episode of shingles at some time in our life. While it is very rarely life-threatening, it can be extraordinarily painful and can wreak havoc with your life for many months. You only have to have met a few people with shingles to understand how bad it is.” Both forms of the virus are contagious, but while it is possible to get chickenpox from someone who has shingles, it is not possible to get shingles from someone who has chickenpox. Early symptoms of shingles include itching, tingling, burning or pain, typically on one side of the body or face. A rash with fluid-filled blisters appears within a few days. Incidence rates increase with age; two of every three cases of shingles



It is important for people with shingles to know that the pain will go away eventually, says infectious disease specialist Allison McGeer. PHOTO: SUPPLIED occur in people 50 years of age and older. Pain is a common and disabling symptom of shingles, occurring in 90 per cent of people 60 years of age or older, and in 60 per cent to 90 per cent of those with impaired immune systems. The most common complication of shingles, post-herpetic neuralgia (PHN) is acute pain that occurs as a result of nerve damage, usually appearing within six months

of the initial outbreak and sometimes lingering for months or years. About 50 per cent of people over 60 who get shingles will experience PHN. People with shingles or PHN report difficulty performing activities of daily living, fatigue, disrupted sleep, social withdrawal and depression. “There are periods of time when it feels as if the pain is never going to get better,” says Dr. McGeer. “But it is important for people who have it to know that it will go away eventually.” Fortunately, there is now a vaccine available in Canada that significantly reduces the risks. In the Shingles Prevention Study, the vaccine reduced the risk of developing shingles by 51 per cent and the incidence of severe, long-lasting pain by 73 per cent compared with placebo. “It’s a bit more complicated than most vaccines in that it has to be kept frozen until used, so it may not be available in public programs for some time,” says Dr. McGeer. As a result, she says, “It is something you should speak to your family doctor about.” She adds the Canadian National Advisory Committee on Immunization guidelines

and the Advisory Committee on Immunization Practices both say that anyone turning 60 – with the exception of people who have had allergic

reactions to vaccine components or are seriously immunocompromised – should get a dose of this vaccine.

“It significantly reduces both the chances that you’ll get shingles and the chances that you will experience severe pain if you do.” ■

Living with shingles

On an otherwise ordinary morning in 2001, Ontario engineer Barrie Morrissey developed a searing, indescribably acute pain in his left eye. He went straight to his doctor, who diagnosed a migraine headache. “The following day, my wife took me to the hospital, and they diagnosed migraine as well,” says Mr. Morrissey, now retired. Although the pain continued to be excruciating, he flew to Ireland for a reunion. “I was in agony, even with the Tylenol 3 that had been prescribed. When I landed back in Canada three days later, my wife took me straight back to the hospital. By that time, some spots had appeared; the doctor looked at it and said, ‘You’ve got shingles.’” While he knew shingles was quite common, says Mr. Morrissey, “I always

thought it was sort of a minor irritation, a rash.” He deeply regrets that lack of awareness today and urges both individuals and physicians to be on the lookout for shingles symptoms. If diagnosed within 72 hours of onset, retroviral medications may reduce the severity of symptoms. But in Mr. Morrissey’s case, too much time had passed. “I just lived on [prescription pain medication] and went from doctor to doctor to doctor, from hospital to hospital. I tried acupuncture and pain management specialists,” he says. “I was bedridden for three months.” While shingles outbreaks typically subside after three to four weeks, Mr. Morrissey has been plagued with the most common complication, continued pain known medically as post-herpetic neuralgia. “It has now been almost 10 years, and I still rely on prescription pain killers to make it through each day,” he says.

People with shingles or post-herpetic neuralgia (PHN) report difficulty performing activities of daily living, fatigue, disrupted sleep, social withdrawal and depression. Fortunately, there is now a vaccine available in Canada that significantly reduces the risks. In the Shingles Prevention Study, the vaccine reduced the risk of developing shingles by 51 per cent and the incidence of severe, long-lasting pain by 73 per cent compared with placebo.

EXPERT OPINION

Despite vaccine benefits, public needs convincing

By Dr. David Butler-Jones
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When I was a child in the 1950s, hospitals in Canada were filled with kids suffering the complications of polio and other infectious diseases. Parents greatly feared this and other serious illnesses affecting thousands of Canadians. To the relief of these same parents only a few years later, polio was eradicated in our country with the vaccine developed by Jonas Salk.

The concept of eliminating a disease so successfully was a somewhat foreign concept at the time. A little shot in the arm, a few drops in the mouth or on a sugar cube, and we were suddenly and miraculously immune.

Despite the clear benefits that vaccines have brought our society, it is still often an uphill battle to convince some of the benefits of immunization. Vaccines are the most effective and practical public health intervention we have. They are also one of the safest – adverse events following immunization are rare, and vaccines are vigorously tested and monitored in Canada.



In the last century, immunization has transformed childhood and greatly improved the chances of growing up healthy. The World Health Organization estimates that every year, immunization prevents more than two million deaths worldwide. Where previous generations of Canadians were threatened by a range of serious diseases, we now have easy access to vaccines that have eradicated smallpox globally and eliminated polio in our part of the world, and greatly reduced the number of cases of other diseases like whooping cough and measles, rubella, diphtheria, meningitis and hepatitis B.

Vaccines are also one of the key reasons we may never see another flu pandemic on the scale of what the world saw in 1918. A case in point: before the end of the second wave of the H1N1 pandemic in 2010, approximately 45 per cent of Canadians had rolled up their sleeves for the vac-

cine. This was one of the highest percentages globally, and the first time in history we've benefited from this type of intervention. We can't predict exactly how many deaths we prevented, but we know the vaccine reduced the impact of the disease and has served our country well.

The benefits of immunization far outweigh the risks and go beyond disease prevention.

Imagine if the country were trying to cope without vaccines. If we weren't spending \$60 million annually to immunize kids against polio, the cost would be around \$2.5 billion just to maintain all the iron lungs we'd need. Financial modelling also suggests that, in a worst-case pandemic flu scenario, the impact to our GDP could be as much as minus five per cent. Without

vaccines – a safe, effective way to prevent many illnesses in the first place – where would that leave us?

The benefits and impact of preventive medicine practices make working in the health sector a tremendous privilege. One of the greatest sources of satisfaction I have had in my career is witnessing the differences immunization makes – to the people who are immu-

nized, and as a cost-effective and very successful public health measure that benefits us all.

I encourage all Canadians to visit the Public Health Agency of Canada website at publichealth.gc.ca for more information on immunization, the H1N1 vaccine, vaccine safety and immunization schedules for infants and children. ■



Immunization has greatly improved the chances of growing up healthy, says Canada's Chief Public Health Officer Dr. David Butler-Jones. PHOTO: ISTOCKPHOTO.COM

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second vaccine against strains of human papillomavirus (HPV) that cause cervical cancer, as well as precancerous cervical lesions.

The vaccine, made by GlaxoSmithKline (GSK), protects females from ages 10 to 25 against the HPV types responsible for up to 80 per cent of cervical cancer cases. Approved in over 100 countries, Cervarix has the longest duration of protection reported for any licensed cancer vaccine.

“There are certain landmarks that happen in a cancer specialist's career and having a vaccine available to prevent cancer of the cervix will probably be one of the big landmarks in mine,” says Dr. Laurie Elit, a gynecologic oncologist at the Hamilton Health Sciences Juravinski Cancer Centre.

Every year in Canada, close to 1,500 women are diagnosed with cervical cancer and 500 women die from the disease. It is the second leading type of cancer among women

in the 20 to 44 age group.

“We started to see a decrease in the rate of cervical cancer around 50 years ago, when the Pap test came into widespread use,” says Dr. Elit. “But the Pap test cannot detect all cervical cancers, so adding the HPV vaccine to our prevention efforts is a massive step forward.”

Today, every province and territory offers publicly funded HPV vaccination for elementary school girls – from Grade 4 to Grade 8, depending on jurisdiction. However, Dr. Elit notes that the uptake in these programs varies widely.

The oncologist urges parents to ensure their daughters access the school-based programs and encourages young women up to age 25 to get vaccinated.

It is estimated that more than two million women who fall outside the school programs could benefit from the vaccine. “I want to see all girls and women take advantage of this important advance. The HPV vaccine has the potential to have a real impact on the future health of Canadians.” ■



Every province and territory in Canada now offers publicly funded HPV vaccination for girls from Grade 4 to Grade 8, depending on jurisdiction. PHOTO: ISTOCKPHOTO.COM

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Front Line Medicine

Immunizations – get the facts

According to the Canadian Coalition for Immunization Awareness & Promotion (CCIAIP), immunization ranks among the 20th century’s most important public health triumphs.

Further, the World Health Organization (WHO) notes that while immunization saves three million lives each year, world-wide, almost three million more lives are lost due to diseases that

are preventable with existing vaccines.

Here are some facts provided by the CCIAP worth knowing about vaccines:

FACT 1
The MMR vaccine **does NOT** cause autism

Evidence-based reviews have rejected any causal associations between the measles-mumps-rubella (MMR) vaccine and autism spectrum disorders in children, according to the U.S. Institute of Medicine. A Montreal study of 27,749 children born from 1987 to 1998 also concluded there was no relationship between pervasive developmental disorder (autism) rates and a one- or two-dose measles-mumps-rubella immunization schedule. In addition, a large Danish study of all children born in Denmark between 1991 and 1998 (537,303 children) concluded there was no difference in the rates of autism between vaccinated and unvaccinated children.


Some speculation has tried to link thimerosal in the MMR vaccine to autism, but the MMR vaccine routinely used in Canada has never contained thimerosal. DTaP, polio and Hib vaccines have not contained this preservative since 1997-98.

Although the reason for the increase in autism is not yet conclusively known, one explanation may be the broader definition and inclusion of many more behaviours and learning disorders within autistic spectrum disorders.

FACT 2
Multiple injections **do NOT** overwhelm the immune system

Every day, our bodies come into contact with millions of germs, causing our immune system to work continuously to protect us. So exposure to a few antigens (parts of weak or dead viruses or bacteria) in vaccines is easily handled by our immune systems. In fact, our immune system needs to be challenged continually to stay vigorous.

Modern biotechnology has actually reduced the number of antigens in today’s vaccines. For example, in 1980 the DTaP vaccine alone had 3,017 antigens. Today, at the two-month visit, there are a total of 34 antigens in all the recommended vaccines for that age – just 34 antigens, among the millions handled every day by our immune systems.



FACT 3
Vaccines **do NOT** contain cells from aborted fetuses

Vaccines do not contain human cells or tissue. During purification of the vaccine, all cells are removed. Human cell lines are used in the early stages of production of some vaccines* because viruses need a living cell to grow.

The virus for the vaccine is grown in a human cell line, then killed or damaged so it cannot cause disease. This cell line comes from legal abortions in the early 1960s and continues today from the original source. The abortions were not conducted for the purpose of vaccine discovery or vaccine production.

No new fetal tissue is required in the ongoing production of vaccines because cell lines can reproduce themselves in culture and can be used for a very long time.

Vatican documents confirm that “in the absence of effective alternatives, individuals may use the morally tainted vaccines,” and assert that it is necessary to “provide for the good of one’s children,” including the prevention of disease where possible.

*MMR, varicella, hepatitis A, rabies, Quadracel and TdP

FACT 4
Vaccines **do NOT** contain harmful additives

Some vaccines contain...

Formaldehyde
Formaldehyde may be used early in the manufacturing process to inactivate some viruses and toxins. Purification removes almost all of the formaldehyde. Formaldehyde occurs naturally in the human body and helps with metabolism. There is approximately 10 times the amount of formaldehyde in a baby’s body at any time than there is in a vaccine.

Aluminum
Aluminum salts (aluminum hydroxide, aluminum phosphate, or potassium aluminum sulfate) are used as adjuvants, substances added to a vaccine to enhance and strengthen the immune system’s response.

Adjuvants used today make it possible to reduce the amount of antigens (parts of weak or dead viruses or bacteria) in a vaccine. Monitoring of vaccines over seven decades has proven adjuvants are safe. Aluminum is the most abundant element in the Earth’s crust and is found in air, food and water. Aluminum is present in breast milk and infant formula in similar amounts as in vaccines.

About the CCIAP

The Canadian Coalition for Immunization Awareness & Promotion (CCIAP) is a partnership of national non-governmental, professional, health, consumer, govern-

ment and private sector organizations
with a specific interest in promoting the understanding and use of vaccines
recommended by the National Advisory Committee on Immunization.

The goal of the CCIAP is to contribute to the control/elimination/eradication of

vaccine-preventable diseases in Canada
by increasing awareness of the benefits and risks of immunization for all ages via education, promotion, advocacy and media relations.

To learn more, visit immunize.ca

Thimerosal
An ethyl mercury derivative called thimerosal is used as a preservative. No vaccine made in Canada since March 2001 for routine use in children contains thimerosal, with the exception of the influenza vaccine. DTaP, polio and Hib vaccines have not contained this preservative since 1997-98. The MMR vaccine used in Canada has never contained thimerosal. Low doses of thimerosal have not been shown to damage the nervous systems in humans.

UPDATE

Study linking MMR vaccine to autism retracted

A controversial study that linked autism with the mumps, measles and rubella (MMR) vaccine has been officially retracted by its original publisher, the British medical journal Lancet.

The 1998 study, conducted by researchers at the Royal Free Hospital and School of Medicine, sparked worldwide controversy in the scientific community after it suggested the MMR vaccine caused autism.

Among its impacts, the study dissuaded parents worldwide from having their children receive the otherwise widely advised MMR vaccine.

In 2004, 10 of the paper’s 13 authors retracted the paper. However, the study’s lead author, Andrew Wakefield, did not follow suit.

According to a recent Wall Street Journal article, Lancet editor in chief Dr. Richard Horton said Dr. Wakefield went on to lead “a one-man campaign” against vaccination.

Recently, the U.K.’s General Medical Council refuted Dr. Wakefield’s original findings, prompting Lancet to officially retract the study.

While many in the health care field are breathing a sigh of relief, others say public education is needed to ensure parents understand the safety, efficacy and importance of immunizations, including the MMR vaccine.

“Unfortunately, much of the damage related to the Wakefield autism study has already been done,” said Mark Lievonen, the Toronto-based president of Sanofi Pasteur Limited.

“A lot of energy will still have to be put into education so that Canadians understand that measures that prevent illness are safer, more effective and less costly than treating diseases,” said Mr. Lievonen. “People today just don’t realize that infectious diseases prevented by today’s vaccines were once the main cause of death worldwide.” ■



We salute Canada's health-care professionals and volunteers — the front line in the fight against H1N1

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As H1N1 remains a significant concern for thousands of Canadians, we acknowledge and congratulate Canada's health-care workers — our first line of defence. Dedicated people doing an extraordinary job.