

Diseases Preventable by Routine Vaccination • Sexually Transmitted and Bloodborne Pathogens • Diseases Transmitted by Direct Contact and Respiratory Routes • Enteric, Food and Waterborne Diseases • Vectorborne and Other Zoonotic Diseases • Diseases Preventable by Routine Vaccination • Sexually Transmitted and Bloodborne Pathogens • Diseases Transmitted by Direct Contact and Respiratory Routes • Enteric, Food and Waterborne Diseases • Vectorborne and Other Zoonotic Diseases •

A National Centre for Disease Control in British Columbia

Building on an Excellent Foundation of Knowledge and Experience



Canada's Best Defence



Expertise, Infrastructure and Information



1. Executive Summary	4
2. Proposal	6
3. National Centre for Disease Control	11
Functional Requirements	
4. Summary of Additional Requirements	24
5. Summary	25

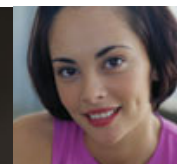
A National Centre for Disease Control in British Columbia



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“Our successful response to the recent SARS epidemic made it clear that BC’s disease control strategies are working. Canada’s only centre for disease control has been operating in Vancouver since 1996 and British Columbians have developed the public health expertise, infrastructure and experience necessary to establish a National Centre for Disease Control. We want to share our knowledge and leadership as Canada builds its capacity to respond to public health threats.”

BC Premier Gordon Campbell





1. Executive Summary

The Naylor Report, “Learning from SARS: Renewal of Public Health in Canada” stated that ...“The evidence of actual and potential harm to the health of Canadians from the weaknesses in public health infrastructure has been mounting for years without a truly comprehensive and multilevel government response ...at a minimum Canadians expect that the nation’s public health system should be fully prepared to deal with emergencies caused by infectious diseases ...” The report went on to recommend ...“the government of Canada should move promptly to establish a Canadian agency for public health ...and give it the appropriate and consolidated authorities necessary to take action on public health matters ...” The report also stated that “the new Canadian Agency for Public Health should strongly ensure that its structure follows a hub and spoke model where the links are made to existing regional centres with particular strengths in public health specializations”. This recommendation was fully supported by the November 2003 Senate Report of the standing committee on Social Affairs, Science and Technology – “Reforming Health Protection and Promotion in Canada”.

British Columbia is proposing to partner with the Federal Government and offer the resources of the BC Centre for Disease Control in order to fast track the development of the proposed Canadian Public Health Agency through the creation of a National Centre for Disease Control. Our partnership will demonstrate a positive new approach to federal/provincial/territorial collaboration in health. By starting in the west, building on the strength of a well established and functioning centre for disease control, Canada can quickly escalate national public health capacity while proceeding with the more complex restructuring of existing federal public health resources, and building the needed network of public health surveillance and outbreak management expertise from coast to coast.

The following outlines why British Columbia is a superb site for the initial step in the development of a National CDC, the essential first step in re-building Canadian’s confidence in the public health system.

- The BC Centre for Disease Control (BCCDC) provides an established foundation for a national centre. The BCCDC already has a national and international profile and substantial experience, track record and capacity.
- With BCCDC as its foundation, a National CDC can be operationalized quickly – within a year. British Columbia offers research capacity, administrative excellence and fast response in disease response where such essential attributes are seldom found together.
- BCCDC has strong links with key federal, provincial and municipal health organizations in Canada. In an interdependent world, BCCDC provides unique opportunities for new relationships with Asia, Europe and the United States.
- In addition to the anchor of the BCCDC, Vancouver offers an impressive research capacity and public health expertise with interdependent hospitals, research institutes, private sector and the University of British Columbia.
- A British Columbia based National CDC offers substantial opportunities for the fulfillment of important national policy goals including the improvement of Aboriginal health, promotion of the life sciences industry and the endorsement of preventative health care. It will reflect and strengthen the existing economic base of Canada’s dynamic western provinces.



BCCDC's foundation should be strategically scaled up to provide national coverage of public health threats. Essential additions to enable the expansion of a National CDC in BC will include:

- Strengthening the level 3 bio-safety laboratory, environmental health, epidemiology and emergency management capacity.
- Developing an Emerging Infectious Diseases Institute, capacity in vaccine development, real time research and microbial genomics.
- Exploring areas of global health, national vaccine and high-risk population collaborations in prevention and control measures.
- Increasing infrastructure and training capacity by investing in surveillance systems and informatics, communications, capacity for national collaboration and training programs.

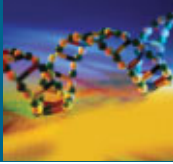
British Columbia's strategic location on the Pacific Rim and its solid track record in disease control and prevention offers Canada an unparalleled opportunity to establish a world-class National Centre for Disease Control and Prevention.

The Government of British Columbia proposes that it work closely with the Government of Canada to bring BC's aspirations for Canadian leadership in disease control to fruition. An initial federal contribution of \$129.5 million and BC's present commitment of \$73.5 million will allow for the prompt start up of an essential national institution.

British Columbia boasts a comprehensive platform of credibility and expertise that will prove essential for a national public health institution. A national CDC, located in Vancouver, will reflect and strengthen the diversified economic base of Canada's dynamic new west. A BC-based National CDC would clearly signal federal support for economic diversification in the western provinces. With adequate resources, we can make a difference in preventing and controlling existing and emerging diseases across Canada and throughout the world.

This document provides background to British Columbia's impressive case. It first outlines British Columbia's proposal for a major national initiative. It then describes British Columbia's track record in infectious diseases control and the province's substantial research capacity. Lastly, background materials provide finer details to the additional requirements that are needed to transform BCCDC into a National CDC.





A National
Centre for
Disease
Control in
British
Columbia

2. Proposal

British Columbia is proposing to partner with the Federal Government and offer the resources of the BC Centre for Disease Control to fast track the development of the proposed Canadian Public Health Agency through the creation of a National Centre for Disease Control. Our partnership will demonstrate a positive new approach to federal/provincial/territorial collaboration in health. By building on the strength of a well-established and functioning centre for disease control, Canada can strengthen its national public health capacity.

The Naylor Report, *Learning from SARS: Renewal of Public Health in Canada*, will act as a catalyst for significant resource investment in Canada's public health capacity. The report argues for due diligence in protecting the health of Canadians from weaknesses within public health infrastructures. Establishing truly collaborative frameworks to provide seamless public health systems across the country is the goal. This recommendation was fully supported by the November 2003 Senate Report of the standing committee on Social Affairs, Science and Technology, *Reforming Health Protection and Promotion in Canada*.

A BC-based National CDC will provide an ideal platform for the development of a complex regional network of disease control institutions as envisioned by the Naylor Report. A BC-based National CDC will work collaboratively with Health Canada, the National Microbiological Laboratory, and the provinces and territories to implement national public health strategies.

The key functions and additional resources needed to efficiently create a National CDC can be based on the BCCDC's well-developed paradigms for the detection and control of infectious diseases.

These include:

- Surveillance and Response;
- Applied Research;
- Prevention and Control;
- Infrastructure and Training.

Using the BCCDC as a base, within a year Canada could have a vanguard National CDC to provide effective response to major communicable disease challenges that affect Canadians. The Provincial Government of British Columbia will work closely with the Government of Canada to facilitate the rapid start up of this essential national institution. An initial federal contribution of \$129.5 million and BC's existing commitment of \$73.5 million will bring the total investment to \$203 million for the National CDC.

Vancouver offers experience, credibility and extensive, internationally recognized expertise that provide an almost complete platform for an essential national institution. Using British Columbia as a base, Canada can have an operational national infrastructure within a year. Canada could have a vanguard National CDC on alert to provide an effective Canadian response to major infectious diseases challenges that affect Canadians.



Track Record

A National Centre for Disease Control can be established quickly by building on the strong foundation of the BC Centre for Disease Control. The Government of Canada can rely on BC's proven infrastructure. The BC Centre for Disease Control is Canada's only comprehensive centre for disease control. Its substantial capacity allows BC to play a major national role in the coordinated, rapid and effective response to public health issues. For example, WHO and Health Canada alerts, picked up and disseminated by the BCCDC, led to BC being among the first provinces to approve a plan for pandemic influenza. This action permitted the prompt isolation of the first SARS case in Vancouver and demonstrated BC's rapid and effective response to SARS. The capacity for BC Centre for Disease Control's rapid response accounts for the remarkably moderate impact of SARS in BC despite the province's closeness to the source of this disease.

Through the established BC Centre for Disease Control, BC is able to offer a unique contribution toward a national initiative in creating a Canadian public health agency. Since its establishment in 1996, the BCCDC has built an extensive network of public health expertise.

At present, BCCDC undertakes twelve of the twenty functions identified in the Naylor Report as elements of an ideal National Centre for Disease Control.

The US Centres for Disease Control performs thirteen of the twenty functions. In other words, BC Centre for Disease Control already provides a comprehensive set of essential public health functions comparable to those of the US CDC. These include: infectious disease prevention and control, microbiology public health laboratories, chemical exposures, poison control, environmental health, drug control, food and water quality protection, radiation protection, emergency response planning, research and international collaboration.

BC's existing public health support structure offers Canada substantial capacity that, with federal support, can quickly become a major national asset. BCCDC's infrastructure, with an annual budget of \$73.5 million and over 300 staff, offers a nucleus of intertwined administrative, research and clinical organizations supported by the public health delivery structure, major hospitals and the world class research capabilities of the University of British Columbia and Simon Fraser University. The existing infrastructure includes policy networks and public health officials at the provincial and regional levels and specialists and departments in such key areas as: epidemiology, laboratory science, clinical disease control, infection control, virology and vaccinology and biotechnology.



A National
Centre for
Disease
Control in
British
Columbia

BCCDC physical proximity to major acute care hospitals – Vancouver General Hospital, St. Paul’s Hospital, the BC Cancer Agency and the Children and Women’s Health Centre – are critical to handling a major disease outbreak. Affiliation with the BC Centre for Excellence on HIV/AIDS adds to the disease control expertise BCCDC brings to the table. The Provincial Health Services Authority, unique in Canada, has oversight for the BCCDC and collaborates with the Ministry of Health in the development of a population health and wellness framework, which includes chronic disease and other non-communicable disease prevention programs. Other foci of non-communicable disease control activity that also exist in BC include the BC Injury Prevention Research Unit which like BCCDC lies within the Provincial Health Services Authority, the Centre for Health Promotion at UBC and the BC Consortium for Addiction Research whose administrative hub is housed at the University of Victoria.

Outstanding researchers and excellent research infrastructure are integral to an effective national response. BC offers both outstanding researchers and research infrastructure. Key scientific links to laboratories in the research community such as the UBC Departments of Medicine, Microbiology and Immunology, Biotechnology and Health Care and Epidemiology and the Michael Smith Centre for Genomics provide access to advanced research infrastructure and skilled researchers.

In the fast moving field of disease control, highly qualified people make the difference. Vancouver is a dynamic, cosmopolitan city, that already boasts a wealth of required talent. BC’s substantial current research infrastructure in life sciences and infectious diseases makes recruitment relatively easy.



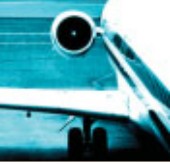
Greater international mobility of citizens accelerates the spread of emerging infectious diseases as evidenced by the SARS crisis. Canada must therefore have the capacity to quickly undertake a coordinated national and international response. Within Canada, BC's Centre for Disease Control has strong links with the National Microbiological Laboratory in Winnipeg, the Centre for Infectious Disease Prevention and Control in Ottawa as well as other relevant programs within Health Canada's Population and Public Health Branch.

BC's position on the Pacific Rim and its established linkages to Singapore provide unique opportunities for close collaboration between Canada, the United States and Singapore. BCCDC already has collaborative linkages with Guang Dong, China and is forging new linkages with Hong Kong. A Pacific Region Surveillance Collaborative encompassing Singapore, Hong Kong, Guang Dong and BCCDC is in the formative stages.

The location of a National CDC in British Columbia will significantly strengthen Canada's capacity to commercialize research results. British Columbia has already contributed to the development of new treatments for infectious diseases including a cattle vaccine for hamburger disease E. coli. and is currently developing several vaccine candidates for SARS. British Columbia has one of North America's fastest growing biotechnology sectors. The further development of this industrial base is essential to British Columbia's economic future. The province's resource based economy must be complemented by, and linked to, new industries and activities.

A Vancouver based National Centre for Disease Control would clearly signal federal support for economic diversification in BC. Early in the new federal government's mandate, a key element of western Canada's "new economy" would be visibly bolstered by decisive federal action to establish the National CDC in BC.





A National
Centre for
Disease
Control in
British
Columbia

Research

The Greater Vancouver area has substantial infectious disease research capacity that is acknowledged internationally as a Canadian powerhouse. With the leadership of UBC, affiliated hospitals and the BCCDC, scientific excellence, innovative approaches to problem solving, and collaboration across disciplines are the hallmarks of infectious disease research in British Columbia. Most researchers are already linked through membership in the Centre for Microbial Diseases and Immunity Research at UBC. The location of a National CDC in Vancouver will benefit from this research climate and strengthen Canada's innovative capacity in a vital area.

Vancouver already hosts world famous infectious disease researchers including two winners of the world's premier award in antimicrobial research, two Howard Hughes International Scholars, two CIHR Distinguished Scientist award winners, and many others. Superior accomplishment is evident in areas spanning basic biomedical, clinical, translational, health systems and services, policy and applied research. It was Vancouver that founded the Canadian Bacterial Diseases Network (one of Canada's original and arguably its most successful Network of Centres of Excellence), the Canadian HIV Trials Network, the Canadian Food and Water Safety Network, and numerous other national and international initiatives. For example, the relationships between the BC Centre of Excellence for HIV/AIDS and AIDS provides a model for making relevant research quickly available to patients most in need of it. Additional research strengths in areas of international health, community health, health evaluation and outcomes, health services and policy research, and aboriginal health will assist in expanding understanding and solutions.

Excellence in research is also translating into solutions for infectious disease problems, through the vibrant biotechnology community in BC. The aggressive promotion of the movement of technology from the lab bench into industry by the UBC University Industry Liaison Office have spawned several spin-off companies in the area of infection and immunity including Micrologix Biotech, ID Biomedical, GeneMax Pharmaceuticals and Inimex Pharmaceuticals to name a few.

The BC research community also boasts world leading genomics research, strongly supported by the BC government, as attested by the recent success in which the BC Genome Sciences Centre in collaboration with the BCCDC was first to sequence the SARS virus, despite intense international competition. The presence of three of Canada's leading bioinformaticists (including one of MIT's top 100 innovators under 40) and UBC's ability to attract the largest Genome Canada grant for research on immunity to infectious diseases are also worthy of note.

UBC and affiliated hospitals are also leading the way in translational research, as recognized by the recent award of a CIHR training grant in this area. A powerful example of a BC initiative was provided by a BC-led coalition of researchers who are leading the world in developing a human SARS vaccine. The provincial commitment of \$2.6 million has demonstrated that emergency management and rapid response research are viable solutions to infectious diseases as they emerge. Within 6 months of beginning work this team has produced three SARS vaccines that are being tested in primates, and human trials are anticipated within a year. Similar research approaches and solutions are applicable to a wide variety of infectious problems.

3. National Centre for Disease Control Functional Requirements

The following outlines the functional requirements for the proposed national centre. BC's contribution is described and a proposed federal investment in the National CDC is offered for consideration.

3.1 Surveillance and Response

Surveillance involves the systematic and aggregated collection of clinical and laboratory data on cardinal diseases of public health importance. Its purpose is to detect changes in disease rates, perform analysis and develop response options that result in control of a disease. Surveillance systems depend on various reporting processes that are substantially enhanced by common information systems. Epidemiology and laboratory services are core components of an integrated surveillance system. Surveillance systems capable of detecting disease outbreaks at the earliest possible stage substantially contribute to disease control.

Within the current global environment, a surveillance unit needs to be able to detect and respond to both natural disease outbreaks and possible terrorist attacks. To ensure this capacity for the nation, dangerous pathogens (e.g. smallpox) must be handled in a laboratory environment with at least an enhanced level 3 containment laboratory. For an effective response to new disease outbreaks, epidemiology capacity must be strong and have a mobile investigation team. A readily available emergency operations centre is required for the proper management of a large-scale outbreak, with effective emergency response technology and processes. The National CDC must have the capacity to detect and respond appropriately to all hazards – biological, chemical and radiation.

BC's Contribution

BCCDC has a well-developed epidemiology and laboratory surveillance and detection capacity, including a basic level 3 laboratory. Epidemiology has 18 staff and a budget of over \$2 million, with all professional staff holding University appointments. Laboratory Services has 150 staff and a budget of \$17 million, with senior staff and scientists also holding University research and teaching appointments.



A National
Centre for
Disease
Control in
British
Columbia





A National
Centre for
Disease
Control in
British
Columbia

Specific disease-focused programs in the areas of hepatitis, STD/AIDS and tuberculosis also provide provincial disease detection and response capacity. These programs account for a budget of approximately \$10 million and 100 staff. In addition, BCCDC has environmental health programs in the areas of risk assessment, toxicology, food and radiation protection with 10 staff and a budget of \$1.5 million. There is already a measure of integration of these efforts into the BC research community but more can be done and the formation of a formal Emerging Infectious Diseases Institute (see Affiliated Research) would permit more rapid translation of these epidemiological discoveries into downstream benefits (e.g. diagnostics and vaccines), especially for newly emerging diseases. At the same time research into the nature and diagnosis of diseases is a critical component of a sophisticated surveillance system.

Two of BCCDC's six strategic goals relate to surveillance and response; various strategies and objectives are articulated in the attached 2003/04 Performance Plan.

BCCDC Goal – Detect and Respond to New Disease Threats

Enhance and apply mechanisms to rapidly recognize and respond to emerging microbial and non-microbial disease threats to human health, including water and food borne disease outbreaks, pandemic influenza, Bioterrorism, SARS, West Nile and Norovirus, and other new unknown emergent infectious disease agents.

BCCDC Goal – Prevent, Control and Eliminate Disease

Sub Goal A – Elimination

Through the application of evidence-based public health policies, eliminate endemic transmission of communicable diseases, such as diphtheria, measles, mumps, polio, rubella, haemophilus influenzae type B, hepatitis B and syphilis.

Sub Goal B – Reduction and Control

Through the application of evidence-based public health policies achieve effective control for diseases such as, tuberculosis, HIV, hepatitis A and C, Chlamydia, gonorrhea, influenza and pertussis.

Sub Goal C – Environmental Hazards

Through the application of evidence-based public health policies reduce the adverse impact of environmental hazards on human health.



Additional Requirements

Enhanced Level 3 bio-security laboratory

(Estimated cost \$15,000,000)

Experience with bioterrorism and SARS indicates that additional security is required in Level 3 laboratories for unknown agents prior to and in preparation for transmittal to the National Microbiological Laboratory's Level 4 capacity. It is proposed that an Enhanced Level 3 Laboratory Unit be incorporated into the National CDC.

Enhanced Epidemiology

(Estimated cost \$10,000,000)

The monitoring and analysis of disease trends and the creation of a mobile field investigation and response team will require an enhanced epidemiology capacity for the National CDC. A highly mobile multi-disciplinary team will be established to work closely with provincial and international surveillance entities and databases.

Emergency Management Capability

(Estimated annual cost \$6,000,000)

A comprehensive all-hazards emergency management capability needs to be established to address preparedness, mitigation, response and recovery requirements. A secure emergency operations centre will be developed. Training and support for the nation will be provided.

Enhanced Environmental Health Capacity

(Estimated annual cost \$10,500,000)

The environmental health capacity will be expanded to include expertise in additional environmental science disciplines. This will include additional resources in surveillance of health outcomes related to environmental hazards, toxicology, risk assessment, human exposure assessment, engineering and communication. The resulting expanded capacity will provide a pool of expertise for policy makers and public health staff in the field. This will allow early recognition and control of environmental hazards as well as timely and effective issue response. The expansion will be coordinated with the academic institutions of UBC and SFU.





3.2 Applied Research and innovation

New diseases require new research to develop and examine evidence-based control and prevention options. Epidemic disease investigation is in fact accelerated, “real time” research, which involves the time-series analysis of disease outbreak patterns and identification of its etiology and risk factors for transmission. Science is underlying organizing principle in epidemic disease investigation and research has emerged as a core public health function. Research on new diseases results in new diagnostic tests, identification of treatment modalities and containment strategies and provides leads on vaccine and other prevention options. As discussed above, the SARS outbreak and BC initiatives in sequencing the SARS-virus genome and the SARS Accelerated Vaccine Initiative (SAVI) have provided a real-time demonstration of what can be done. Thus it is proposed to develop both internal research capacity within the National CDC as well as establishing an affiliated Emerging Infectious Diseases Institute that is capable of drawing on the world-class research assets available in Vancouver and translating research into products and solutions.

Emerging Infectious Diseases Institute

Building upon the UBC CDC component of the BCCDC it is proposed to establish an Emerging Infectious Diseases Institute (EIDI) as a not-for-profit virtual Institute, linking laboratories throughout BC and Canada and located primarily at the BCCDC, UBC and its Affiliated Hospitals. It is proposed to establish it with a physical presence at UBC, with adequate dedicated space for core administrative functions as well as meetings, seminars, and workshops. The core capability of this Institute will be to provide the underlying research capacity permitting rapid response to health crises involving emerging infectious diseases. The primary activities of the Institute will include:

- Working closely with the National Centre for Disease Control
- Promotion and funding support for research on emerging diseases of current or predicted importance to Canadians
- Establishment and management of teams of researchers to tackle such problems
- Administration and promotion of a training program in emerging infectious diseases
- Ensuring an interdisciplinary approach to emerging infectious diseases that meets public health needs
- Promoting International relationships
- Promoting the commercialization of new ideas, products and solutions

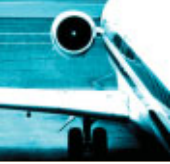


A Senior Institute Director will direct EIDI, and will report to an Institute Advisory Board, that will include prominent participation from senior individuals from Health Canada, the proposed National CDC, Industry and UBC. A steering committee of 7-10 individuals, chaired by the Director and including National CDC representation, will assist in making rapid decisions and longer-term decisions concerning research directions, interdisciplinary, and collaborations. The steering committee will meet monthly in person or by telephone conference. They will assist in overseeing the activities of the Institute, and recommend to the Board such issues as budget allocation, the location at which specific studies will be performed, the initiation of new studies, and the termination or wrap-up of non-performing or completed experiments and research projects. Finances will be managed centrally and distributed to the various physical Centres that will report back to a central controller. All collaborating researchers and project managers on a given project will meet at least bi-weekly to review the progress of on-going studies. Regular seminar series and periodic workshops will run at the Institute's UBC facilities. It is proposed to recruit 5 to 10 high quality individuals to UBC and affiliated hospitals, to add relevant needed expertise to the already impressive list of talented individuals in BC.

The major principles for on-going research activities of the Institute will include:

1. **Response capabilities.** BC already has substantial capabilities and expertise in the development of innovative vaccine, immunotherapeutic and therapeutic strategies for diseases. Each of these approaches to dealing with an infectious agent has its own challenges and can be somewhat agent-specific, e.g. antibiotic resistance. The EIDI must be able to apply these approaches to engage emerging diseases with rapid response research. Importantly, this will generate new intellectual property and build commercial infrastructure, with linkages to burgeoning biotechnology sector in BC.
2. **Preparation.** The EIDI will respond rapidly and flexibly in scientific and human terms. The Institute must develop ways to move rapidly, by-passing the traditional structures and barriers of scientific research. Different strategies will be applicable to different diseases. Thus rapid response must be appropriate, effective, and be mobilized locally, nationally, and internationally. Preparation also involves predicting the contours of the next crisis. Integral and seamless links with the National CDC will ensure initial clinical samples are supplied early in an outbreak.





3. **Recognition.** In the recent SARS epidemic those regions that were able to respond rapidly and in a coordinated manner were able to contain the disease (as in the case of BC); other regions suffered substantial problems, triggered in part by delayed recognition of the problem and lack of a coordinated response. Thus, recognition strategies ranging from public health and surveillance measures to superior epidemiology and diagnoses which permit the early recognition of an emerging disease will be a key capability for the Institute.

4. **Understanding.** Understanding a disease and its etiological agent is key to appropriate responses. The Institute must be able to apply multiple strategies to investigate a newly emerging infection and develop concomitant protocols for institutional and population management and knowledge transfers. Certain new and traditional technologies lend themselves to such investigations, including diagnostics, immunology/serology, genomics (proteomics/microarrays/sequencing), and development of tissue culture and animal models. The Institute must have guaranteed access to each of these technologies and to skilled experts in their application.

5. **Internationalism.** Emerging diseases by definition do not respect international borders and some of the key players in this research arena are international agencies. It will be key for the EIDI to deal effectively with this. Successful international response to emerging infectious diseases requires considerable political cooperation as well as expertise in international relations and law.

6. **Interdisciplinary Research.** Health emergencies are human emergencies, the effective management of which requires significant expertise, not only in the biology of disease but also in conveying reliable information to the public, and managing human behaviour. Therefore the Institute will utilize expertise from all disciplines of scholarly research, including the humanities and social sciences.

Thus, the Emerging Infectious Diseases Institute, working together with the National CDC will address emerging infections in several strategic and unique ways, becoming a world leader in emerging infectious disease research of relevance to Canada and the world.



A National
Centre for
Disease
Control in
British
Columbia

In addition to the EIDI, the National CDC will require in-house research capacity in three additional areas. To respond to the research needs and opportunities posed by emerging diseases, the National CDC's research capacity must be able to rapidly deploy leading scientists to an emerging disease crisis, thus the need for a "real-time" research unit. Microbial genomics has transformed microbiology and provides new tools for microbe detection, identification and fingerprinting. A microbial genomic laboratory is therefore an essential internal component of a National CDC, while collaborative links to experts at UBC and affiliated hospitals are critical for appropriate deployment of genomic strategies.

Some of the best prevention strategies for emerging disease threats like SARS and West Nile virus will be based on vaccine research. A National CDC should provide leadership and act as a catalyst for vaccine research in the country in both the public and private sector. It must also act as a catalyst for the commercial development of vaccines.

BC's Contribution

UBC is in the middle of a huge expansion in medical training and life sciences research. The new, state-of-the-art 600,000 sq ft Life Sciences Centre with huge new Specific Pathogen-free and Level 3 rodent facilities, the new Michael Smith Building, the new Bioinformatics Centre, a new centre on proteomics and the well established Genome Sciences Centre adjacent to the BCCDC all provide remarkably modern infrastructure. They will enhance the outstanding research in infectious diseases already occurring, support the work of new research faculty and joint appointees with the National CDC, and provide outstanding facilities for training of highly qualified personnel at all levels.





A National
Centre for
Disease
Control in
British
Columbia

Research in the Vancouver area is well funded with more than \$377 million in externally funded research and \$46 million in Industry sponsored research. Of great importance to this proposal is that UBC is the leading public institution in Canada in the generation of intellectual property. Thus this applied research component will be building on tremendous expertise in basic research and the applications thereof. BCCDC has similarly demonstrated a strong commitment to applied research, with a research and teaching arm affiliated with UBC and an annual research budget of \$5.1 million. Seventeen staff hold university appointments, and in addition many residents and other students receive educational placements at BCCDC. Of particular note, the Medical Director of BCCDC co-leads the research function of the SARS Accelerated Vaccine Initiative.

One of six BCCDC's goals relate to applied research and innovation.

BCCDC Goal – Create Knowledge Through Applied Research and Innovation

Discover research findings of international significance that contribute to evidence based policy and practice that results in improved health for British Columbians.

Additional Requirements

Vaccine Research and Development Unit

(Estimated cost \$7,500,000)

Many existing and emerging infectious diseases are best prevented through immunization. To stimulate the development of new and improved vaccines by the private sector, a Vaccine Research and Development Unit needs to be incorporated into the National CDC. The unit will be composed of scientists with expertise in molecular microbiology, immunology, veterinary medicine, clinical trials and immuno-epidemiology. Such a unit would work closely with other academic units, regulatory agencies, the private sector and the global community.

Deployable Real Time Research Unit

(Estimated cost \$5,000,000)

As disease emerges, it is necessary to reassign epidemiologists and scientists to the field site for disease investigation. Such a unit would respond to requests by regional or provincial health units for assistance and would provide investigative research results to support the control and response capability of the local public health and clinical unit.



Microbial Genome Laboratory

(Estimated cost \$10,000,000)

As new diseases emerge, identification of the etiologic agent is greatly augmented through the application of genomic and bio-informatic technologies. The unit is proposed to support the national need and is built on unique expertise found in B.C. at the Michael Smith Genome Sciences Centre. Both genomic scientists as well as bio-informatic scientists will staff the unit. The unit will work closely with the Epidemiology and Laboratory departments of the National CDC.

Institute for Emerging Infectious Diseases

(Estimated cost \$19,500,000)

The Emerging Infectious Diseases Institute (EIDI) will be a not-for-profit virtual Institute, linking laboratories throughout BC and Canada and located primarily at the UBC, affiliated hospitals and BCCDC. It will work in close support of the National CDC.

3.3 People, Infrastructure and Training

Outstanding personnel and state-of-the-art resources are key to a robust system for disease control. People make the difference: trained personnel at all levels are required to support effective responses. Particular areas of need are epidemiologists, microbiologists, technologists, informaticians, clinicians genomic, scientists immunologist and public health administrators. With a location in Vancouver, one of the world's most liveable cities, and close association with the outstanding and highly respected infectious diseases community at UBC, recruitment of top personnel is assured. The investment in life sciences and infectious disease-related professionals at UBC is enormous. Hence shared appointments for National CDC personnel at UBC or close collaborations are sure to be fruitful. At both the National CDC and UBC, the environment for training and commitment to teaching ensure the best and brightest are available for a centre of international stature.

In addition to human resources, an appropriate physical environment and information systems are needed for a National CDC. A centralized facility at the service of the nation supports advanced epidemiology, data analysis, microbial and genomic studies and science-based investigation of new disease agents. A common information network that spans the nation is essential to the timely collection of data and cross-jurisdictional information sharing.





A National
Centre for
Disease
Control in
British
Columbia

BC's Contribution

BCCDC has made a substantial investment in infrastructure. With a state-of-the-art building that houses all key disease control functions in one location, in particular the provincial public health laboratory and the provincial epidemiology service, BCCDC's infrastructure clearly contributed to the effectiveness of BC's detection and successful response to the recent SARS outbreak. BCCDC's management and clinical structure provide senior medical, policy planning and coordinated operational capacity.

Traditional support services in the area of finance, human resources, administration and building infrastructure are provided at an annual cost of over \$10.5 million. BCCDC also provides information management resources of \$1.5 million and has led the country in developing the Public Health Information System which is currently being introduced in many provinces. BCCDC contributes to Canada's public health policy infrastructure through active leadership and participation on all relevant federal/provincial/territorial policy committees.

Teaching also takes place at the BCCDC and outreach education occurs throughout the province. BCCDC maintains a well-used Website, which provides additional education and training to health professionals as well as the public. In addition, UBC and the Medical Director for BCCDC collaborated on a successful CIHR training program grant entitled, "Translational Research in Infectious Diseases".

Three of BCCDC's six strategic goals support the infrastructure and training function.

BCCDC Goal – Develop and Apply Advanced Informatics

Develop and apply advanced surveillance systems for alert and performance monitoring purposes in public health.

BCCDC Goal – Advance Public Health Excellence

Attract, develop and retain highly qualified persons to sustain and support state-of-the-art public health services throughout the province.

BCCDC Goal – Provide Leadership and Create Partnerships

Provide provincial/national leadership and create alliances in order to facilitate the development of an effective integrated public health system for British Columbia and Canada.



Additional Requirements

Surveillance Systems and Informatics

(Estimated cost \$10,000,000)

Based on British Columbia's experience with the development of the national public health information systems and leadership in the Canadian Integrated Public Health Surveillance Collaborative, it is clear public health surveillance systems must be strengthened across the country. It is proposed that leadership for this development be established at the National CDC.

Enhanced Communications

(Estimated cost \$5,000,000)

Recent experience with SARS, West Nile virus and bio-terrorism indicates a dedicated professional communications resource that combines content knowledge with communications expertise is essential for both public and professional communication. Communications is perhaps the most essential component of an effective disease management and response capacity. A communications function will need to be built into the National CDC.

National Collaboration and Planning Capacity

(Estimated cost \$4,000,000)

A National CDC must have the capacity to collaborate effectively, in a variety of dimensions with a variety of individuals, organizations and governments. To be effective in the Canadian context, policy development and planning needs to be collaborative. The key to crisis management is having effective relationships and response plans in place ahead of the emergence of disease threat. The National CDC must have an active collaborative presence across the country.

Training, Education & Consultation Unit

(Estimated cost \$10,000,000)

The strengthening of Canada's public health infrastructure and response capacity will need a long-term investment in human resource development. Provinces and territories are at varying levels of readiness. The National CDC can facilitate the development of a high standard of evidence-based practice across the country through a dedicated capacity to share knowledge and promote best practice.





A National
Centre for
Disease
Control in
British
Columbia

3.4 Prevention and Control

The ultimate goal of all public health efforts is disease prevention and control based upon a sound understanding of disease epidemiology and etiology.

Prevention and control strategies can involve disease-specific initiatives such as immunization, screening and treatment programs. They can also involve community and societal changes through public education and health promotion programs or through legislated regulation.

Global mobility has accelerated the spread of emerging infectious diseases as evidenced by the SARS crisis.

The best defence is a well-coordinated effort that is national and international in scope. The importance of international linkages has been recognized by the U.S. Government and is leading to the establishment of a Regional Emerging Diseases Intervention Centre in Singapore in collaboration with the Singapore government. This Centre will link with the U.S. Centres Disease Control and Prevention and its National Institutes of Health.

British Columbia, with its strategic location on the Pacific Rim, offers Canada a unique advantage in participating in this global initiative, which will strengthen Canada's national defence against emerging infectious diseases. It will also allow researchers to participate in cutting edge research in infectious diseases in which Canada has significant strengths. UBC is currently engaged in discussions with National University of Singapore to establish a strong relationship in this area.

BC's Contribution

All of BCCDC's communicable disease control and environmental health divisions are involved with disease prevention. In particular, more than \$25 million is committed to preventive vaccine programs. A further \$1 million is directed at harm-reduction initiatives and supplies. UBC has a broad range of on-going clinical programs in vaccines and hosts the Vaccine Evaluation Centre at the Children's and Women's Hospital, as well as being involved in outlicensing of successful vaccines such as for hamburger disease E. coli 0157.

All of BCCDC's six goals support the prevention function.



Additional Requirements

Global Health Initiative

(Estimated cost \$5,000,000)

Based on B.C.'s experience with global health initiatives (e.g. Guangdong, China and Vietnam), it is clear that a National CDC must have effective collaborative relations worldwide. As demonstrated by SARS, emerging disease threats have worldwide infection patterns. No country has the capacity to manage pandemic outbreaks alone and a threat that emerges in one country can easily pose a threat to others. A capacity to develop and maintain effective international disease detection and control strategies is also an essential component of the National CDC and linkage will be established with the U.S. Centres for Disease Control and Prevention and the newly formed Regional Emerging Infectious Diseases Intervention Centre in Singapore.

National Vaccine Unit

(Estimated cost \$7,000,000)

Vaccines are the cornerstones of effective strategies to prevent and control communicable diseases. Using B.C.'s experience with the B.C. Vaccine Evaluation Centre, it is proposed that the National CDC will provide leadership in strengthening the development, availability and deployment of vaccines in Canada. As a complement to the recently approved National Immunization Strategy, the National CDC for public health will be in a position to promote

the introduction of new vaccines into prevention practice across the country. The National CDC will facilitate the creation of a National Vaccine Unit, which will link the National Immunization Strategy to academia and the private sector. This Unit will be able to link late-phase vaccine clinical trials to immunization practices and ensure comprehensive post-market surveillance to detect rare vaccine-induced adverse events and the emergence of antigenic variants escaping vaccine control. Ultimately, the National CDC in B.C. would be in a position to assist in funding and managing a universal supply of vaccines for Canada.

High Risk Populations

(Estimated cost \$5,000,000)

Health status is not equitably distributed in the Canadian population. Contemporary approaches to health improvement and experience with social network analysis demonstrate the need for the health system to reach out and work collaboratively with citizens who for one reason or another are at higher risk, or have difficulty accessing disease prevention and control resources. A National CDC must develop the institutional mechanisms to work with and engage the diversity of the Canadian population. Multicultural resources, education and community development resources need to be provided. Funding to support collaboration with at-risk groups will be provided in support of the National CDC's efforts to strengthen the public health social safety net.





A National
Centre for
Disease
Control in
British
Columbia

4. Summary of Additional Requirements

Surveillance and Response

- Enhanced Level 3 Bio-defense Laboratory \$15 million
- Enhanced Epidemiology \$10 million
- Emergency Preparedness Unit \$6 million
- Enhanced Environmental Health Capacity \$10.5 million

Research

- Vaccine Research and Development \$7.5 million
- Deployable Real Time Research Unit \$5 million
- Microbial Genome Laboratory \$10 million
- Emerging Infectious Diseases Institute \$19.5 million

Infrastructure and Training

- Surveillance Systems and Informatics Unit \$10 million
- Communications Unit \$5 million
- National Collaboration and Planning Capacity \$4 million
- Training, Education & Consultation Unit \$10 million

Prevention

- Global Health Initiative \$5 million
- National Vaccine Unit \$7 million
- High-Risk Populations \$5 million

Fiscal Summary

Function	British Columbia Contribution	Proposed Federal Contribution	Total
Surveillance and Response	\$30,500,000	\$41,500,000	\$72,000,000
Applied Research	\$5,000,000	\$42,000,000	\$47,000,000
Infrastructure and Training	\$12,000,000	\$29,000,000	\$41,000,000
Prevention	* \$26,000,000	\$17,000,000	\$43,000,000
Total	\$73,500,000	\$129,500,000	\$203,000,000

* B.C.'s "Prevention Contribution" reflects provincial vaccine supply costs.

5. Summary

British Columbia is proposing to partner with the federal government to expedite the establishment of the first National Centre for Disease Control in Canada by building on the foundation of Canada's only established provincial Centre for Disease Control. With the support of the Government of Canada, it would be possible to have a National CDC protecting the health of Canadians within one year. Over the longer term, the National CDC in British Columbia would evolve to become a key component in a network of regionally distributed centres, which together would form Canada's National Centres for Public Health and Disease Control.

The concept of the National CDC outlined in this proposal is based on the province's experience in pioneering the British Columbia Centre of Disease Control. Costs identified for the proposed components of the National CDC are estimates and would require further refinement subsequent to the approval in principle by the interested parties.



A National
Centre for
Disease
Control in
British
Columbia



