

Title	The CBRF PRAIRIE Hub: Protecting Canada by Building on Excellence in Pandemic Preparedness	Canada's Immuno-Engineering and Biomanufacturing Hub: Engineering Immunity for Pandemic Responses (CIEBH)	The Eastern Canada Pandemic Preparedness Hub (ECaPPH)	Canadian Pandemic Preparedness Hub (CP2H)	Canadian Hub for Health Intelligence & Innovation in Infectious Diseases (HI3)
Administering Organization	University of Alberta	The University of British Columbia	Université de Montréal (co-led by McGill and Laval Universities)	University of Ottawa (co-led by McMaster University)	University of Toronto
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Major Partners	University of Calgary; University of Manitoba; University of Saskatchewan	AbCellera; Acuitas Therapeutics; adMare Bioinnovations; Amgen British Columbia; British Columbia Institute of Technology; Cytiva; Dalhousie University; Evonik Corporation; Michael Smith Health Research BC; NanoMedicines Innovation Network; Notch Therapeutics; Precision Nanosystems ULC; Sanofi; Simon Fraser University; STEMCELL Technologies Inc; University of Saskatchewan; University of Victoria; University of Waterloo; Vancouver Coastal Health Research Institute	BIOVECTRA; Canadian Alliance for Skills and Training in Life Sciences (CASTL); CERASP – Center of excellence in applied research for the pharmaceutical sciences (CCTT); Dalhousie University; École Polytechnique de Montréal; Fonds de recherche du Québec; Immune Biosolutions inc; IRICoR; McGill University; Medicago; Merck Canada Inc.; Mila; Moderna; Montréal InVivo; National Research Council (NRC); Smokepond biologics; Université de Sherbrooke; Université Laval	adMare Bioinnovations; BioCanRx; Dalhousie University; Elarex Inc; Fedora Pharmaceuticals Inc.; Gowling WLG Canada; JN Nova Pharma; McMaster University; National Research Council (NRC); Toronto Metropolitan University; University of Alberta; University of Saskatchewan; VBI Vaccines	adMare Bioinnovations; Baycrest Centre for Geriatric Care; Centre for Commercialization of Regenerative Medicine (CCRM); Cyclica Inc.; Cytiva; Lunenfeld-Tanenbaum Research Institute – Sinai Health System; National Research Council (NRC); National Resilience, Inc.; Providence Therapeutics; Queen's University; Toronto Metropolitan University; Sanofi; Sartorius Stedim North America Inc; Sunnybrook Research Institute; The Hospital for Sick Children; Western University; Unity Health Toronto; University Health Network; University of Guelph; University of Ottawa; University of Saskatchewan; University of Waterloo; University of Windsor; York University

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Research Summary	<p>The PRAIRIE Hub for Pandemic Preparedness is an alliance of the University of Alberta (lead), the University of Calgary, the University of Manitoba and the University of Saskatchewan to accelerate development and commercialization of vaccine, antiviral and diagnostic countermeasures for potential pandemic pathogens. In parallel, the Hub will strengthen existing and incept new training programs to expand the pipeline of skilled personnel, including in Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP) spaces. We unite the largest consortium of virologists in Canada who have vaccine/antiviral expertise with immunology and infectious diseases experts, including world-leading machine learning (ML) and artificial intelligence (AI) researchers. Indigenous scholars and programs at each institution and our maturing equity, diversity and inclusion (EDI) initiatives further strengthen our Hub. We also have unique strength and capacity in One Health—an interdisciplinary model recognizing interconnections between human, animal and ecosystem health. As zoonotic pathogens spill over from animals to humans, and vice versa, their potential to propagate, mutate and develop resistance is amplified. Thus, our approach enables rapid identification and mitigation of pathogens with pandemic risk through our domestic and global surveillance programs, as well as</p>	<p>The immune system offers complex and powerful mechanisms to prevent and combat infectious diseases in humans, including both natural immunity and by augmenting the immune system through vaccines and other advanced therapeutics. Immuno-engineering offers a unique opportunity for re-programming this system in order to address and respond nimbly to health threats—including epidemics, pandemics and microbial resistance—for the benefit of Canadians.</p> <p>Canada's Immuno-Engineering and Biomanufacturing Hub's (CIEBH) vision is to make Canada a global powerhouse for developing next-generation immune-based therapies in response to pandemics and other health threats—including therapeutics such as lipid nanoparticle-based vaccines, engineered antibodies and cell-based therapies—that can be rapidly produced domestically using the latest innovations in biomanufacturing. Building on provincial ministry priorities and the profound contributions of CIEBH's biotech and life sciences ecosystem to COVID-19, we will align the critical mass of immuno-engineering with biomanufacturing and public health strengths concentrated in academic institutions and industry in British Columbia, with our Pan-Canadian, multi-disciplinary, multisectoral coalition of partner institutions across six provinces (50 total, including UBC). In particular, we actively engage with partners at Dalhousie University, Vaccine and Infectious Disease Organization (VIDO) and the University of</p>	<p>The ECaPH is a unique bio-innovation and biomanufacturing ecosystem co-presented by three Quebec-based universities. With other major partners, universities, private, public and non-for-profit organizations, the resulting environment builds on a long-standing tradition of engagement in a collaborative, complementary and synergistic relationship approach to offer Canada a resilient and agile response to future pandemic and health threats.</p> <p>The strengths and singularities of the ECaPH program rest on three major themes:</p> <ul style="list-style-type: none"> • Genomics-based diagnosis and RNA-based therapies for emerging infections • Small molecules, immunomodulators and cell therapies • Vaccine development, production and evaluation <p>The ECaPH will also benefit from existing cross-cutting infrastructure and expertise:</p> <ul style="list-style-type: none"> • Biomanufacturing, scaled processes and production • Cutting-edge technology platforms directly linked to pandemic and other health threat preparedness • Fully integrated pipeline for drug discovery and development, including preclinical and clinical testing • Worldwide leadership in artificial intelligence-accelerated R&D and manufacturing 	<p>The Canadian Pandemic Preparedness Hub (CP2H) will be the first of its kind to link private and not-for-profit sectors with intellectual capital, research infrastructure and biomanufacturing capacity across six leading Canadian universities / research centres: University of Ottawa (lead) / Ottawa Hospital Research Institute; McMaster University (lead) / Global Nexus; University of Saskatchewan / Vaccine & Infectious Disease Organization; University of Alberta / Alberta Cell Therapy Manufacturing; Dalhousie University / Canadian Center for Vaccinology; and Toronto Metropolitan University. Our vision is to coordinate research, manufacturing, and clinical trials and training of personnel so that, domestically, we can pivot quickly to produce life-saving vaccines, therapeutics and diagnostics, positioning Canada to play a meaningful role within the first 100 days of an epidemic/pandemic or other health emergency.</p> <p>With a strong track record of success, in pandemic and nonpandemic times, CP2H's members lead and collaborate with national research and innovation networks, including BioCanRx (Canada's immunotherapy network), Coronavirus Variants Rapid Response Network (Co-VaRR-Net), Canadian Immunization Research Network (CIRN), and the Canadian Alliance for Skills and Training in Life Sciences (CASTL). The hub boasts over 45 partnerships across all public and private sectors.</p>	<p>The Canadian Hub for Health Intelligence and Innovation in Infectious Diseases (HI3) is a coalition of 80+ partners forming a powerful network to support a robust domestic pipeline of life-saving pandemic-related vaccines and therapeutics, made by Canadian scientists and produced by biomanufacturers in Canada.</p> <p>Led by the University of Toronto and building on long-established partnerships, HI3 will provide the capacity to support high-risk / high-reward research projects that align with Canada's Biomanufacturing and Life Sciences Strategy. HI3 will achieve this by linking the innovation engine and infrastructure of nine Ontario universities and six research hospitals with commercialization and manufacturing partners such as the National Research Council Canada (NRC), Vaccine and Infectious Disease Organization (VIDO), Sanofi and Resilience. Through co-training opportunities with industry and the establishment of biomanufacturing-focused talent programs, HI3 will attract and develop highly qualified research and technical personnel capable of driving innovation and growth in Canada's biomanufacturing and life sciences sectors. With this concerted blueprint in place, HI3 will bring our research innovations to market, and support Canada's bioeconomy with an industry-ready workforce.</p> <p>HI3 will deliver innovations that fall into three research themes: (A) Precision Interventions, like vaccines and therapeutics; (B) Process Innovations, from automation to second-generation biomanufacturing; and (C) Health Intelligence, to evaluate interventions and inform efficient and equitable delivery of pandemic countermeasures.</p>

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	<p>access to pathogen samples for biobanking. These pathogens will be rapidly assessed for development of vaccine, therapeutic and diagnostic countermeasures. AI/ML-based design and screening allow for immediate integration of knowledge derived from structural validation and functional assays. The Hub hosts the largest high-containment space in Canada for infectious disease modeling in small and large animals and will be expanded at partner sites to allow for streamlined toxicity and other pre-clinical assessments. Promising countermeasure leads will be biomanufactured at academically-integrated facilities for early phase evaluations. Downstream production stages will be upscaled at industry and government partner facilities. Our strong track records in start-ups and SME acceleration, along with strategic industry partnerships, will accelerate commercialization timelines. Development, manufacturing and commercialization stages will be integrated with training programs to increase Canada's skilled talent in these spaces. Overall, our Hub will bolster pandemic readiness by uniting expertise in infectious diseases, biomanufacturing and commercialization with a commitment to expand shared infrastructure and training programs across all partners.</p>	<p>Waterloo to develop and produce innovative therapies that target the human immune system's response to pathogens. Specifically, we will establish a rapid pipeline that enables a 100-day response to a range of priority pathogens, from discovery and genomic analyses through design, development, biomanufacturing, bioprocessing, testing and application.</p> <p>Through strong and coordinated governance, the hub will facilitate multidisciplinary applied research, increase specialized infrastructure, and support training and talent development in biomanufacturing in order to accelerate the translation of promising research into commercially viable products and processes. By aligning the science of engineering immune responses to receptor capacity for rapidly developing and manufacturing innovative medical products, the hub will be ready to pivot for addressing emerging health threats, improving the quality of life of patients and populations, and rapidly translating new treatments from discovery science through to biomanufacturing, clinical trials and implementation, with substantial impacts for the knowledge economy.</p>	<ul style="list-style-type: none"> • Strong link to the National Research Council of Canada in biomanufacturing, Public Health Agency of Canada and laboratories in zoonotic health threats • Unique commercialization units with successful track records including significant venture capital, public investments, start-up funding • Internationally recognized public health and social science expertise ensuring robust scientific evaluation of the impact of innovations to support policymakers' decision process and inform the public • A dedicated network of college and university centres for technology transfer <p>The ECaPH encompasses industry-readiness training at multiple levels including requalification of professionals and dedicated programs providing students with experience in all aspects of pandemic preparedness and biomanufacturing, allowing for highly tailored training spanning the entire innovation continuum from R&D to manufacturing. ECaPH's governance and vision will ensure a collaborative and inclusive (EDI-proactive) hub. Scientific, training and commercialization committees comprised of multidisciplinary and diverse representatives to mobilize the broader ecosystem, consolidate and align investments, accelerate translation of knowledge into concrete applications and train a robust and skilled workforce.</p>	<p>CP2H objectives align with BLSS and CBRF priorities to:</p> <ul style="list-style-type: none"> • expand existing research, GMP manufacturing infrastructure and talent investments to develop emerging therapeutic and diagnostic platforms and technologies, including viral vectors, vaccines (protein subunit, mucosal, VLP), RNA therapeutics, small molecules, antivirals, antibodies and immunomodulators; • accelerate translation of our novel platforms/technologies into commercially viable products, and partner to rapidly test in early phase clinical trials; • support uptake of novel CP2H technologies through crosscutting social science strategies; • coordinate, develop and support experiential training programs to address biomanufacturing talent gaps; • embed EDI best practices throughout our program. <p>Collectively, the partners of CP2H will bring a minimum of \$111 million of cash and in-kind support to the goals and objectives of the hub. CP2H will catalyze research and biomanufacturing innovations—and work with other hubs—to position Canada as a global leader in emerging vaccines, therapeutics and diagnostics, enhancing the national capacity to prevent and respond to future pandemics.</p>	<p>Given the unique and synergistic strengths of its coalition partners, HI3 will be an essential and central component of any Canadian pandemic preparedness effort. Our mission is straightforward. HI3 will help Canada to respond more rapidly, effectively and equitably to future pandemics by contributing innovations to the biomanufacturing and life sciences sector that limit the direct clinical, social and economic effects of the infectious threat, as well as any unintended adverse effects of measures adopted to limit its spread.</p>



Eastern Canada
Pandemic
Preparedness Hub
Pôle de préparation
aux pandémies
de l'Est du Canada