BIOGRAPHICAL SKETCH

NAME: Halperin, Scott A.

POSITION TITLE: Professor of Pediatrics and Microbiology & Immunology; Director, Canadian Center for Vaccinology (CCfV), Dalhousie University, Halifax, NS, Canada

EDUCATION/TRAINING:

Institution and location	Degree	Completion Date	Field of study
Cornell University, New York, NY	MD	1977	Medicine
University of Virginia, Charlottesville, VA	Residency	1977–80	Pediatrics
University of Virginia, Charlottesville, VA	Fellowship	1980–81	Pediatrics/Allergy & ID
University of Minnesota, Minneapolis, MD	Fellowship	1981–84	Pediatrics/ID

A. POSITIONS AND AFFILIATIONS

Selected former appointments

2004–2009 CIHR/Rx&D Research Program and Wyeth Pharmaceuticals Clinical Research Chair in Vaccines

1991–2017 Head, Division of Pediatric Infectious Diseases, IWK Health Centre

Selected awards and honours

2009 Max Forman Senior Research Prize, Dalhousie Medical Research Foundation

2013 Fellow, Canadian Academy of Health Sciences

2014 Distinguished Lecture in Canadian Immunization, 11th Canadian Immunization Conference

2015 Life Member, Canadian Paediatric Society

2019 Stanley A. Plotkin Lecture in Vaccinology, Pediatric Infectious Diseases Society

Selected national and international committees and research networks

As Nominated Principal Investigator (NPI) of the Canadian Immunization Research Network (and its predecessor, the PHAC/CIHR Influenza Research Network), Co-PI of the Immunization Monitoring Program–Active, and Executive Committee member of the Canadian Association for Immunization Research and Evaluation, I have played a foundational role in the establishment of these Canadian collaborative research networks undertaking evaluative vaccine research that informs public health policy.

I have contributed my expertise in pediatric infectious diseases, in particular vaccine-preventable diseases and the evaluation of vaccines and vaccine technologies, to governmental advisory committees on the international level (Pertussis Vaccines Working Group of the Strategic Advisory Group of Experts on Immunization, WHO), national level (Pertussis Vaccines Working Group of the US Advisory Committee on Immunization Practices, CDC; Influenza and Pertussis Working Groups of the National Advisory Committee on Immunization; and the Leadership Group of the COVID-19 Immunity Task Force), and provincial level (Infectious Diseases Expert Group, NS Dept.

of Health and Wellness). These committees provide fora for the dissemination of research findings to policy- and decision makers, assess existing and proposed vaccine programs, and make recommendations on the prioritization of these programs. I have also served on numerous ad hoc scientific advisory groups for industry.

B. PEER-REVIEWED PUBLICATIONS AND PRESENTATIONS (trainees underlined)

I am an established pediatric infectious diseases clinician scientist. My research contributions have focused on pertussis and other vaccine-preventable diseases and have encompassed laboratory-based research, evaluative research using randomized, controlled clinical trials, and health policy and social science research.

My early laboratory-based research made valuable contributions to the development and evaluation of acellular pertussis vaccines that are used worldwide through the characterization of virulence factors and the immune response to infection with *Bordetella pertussis* in a mouse model of pertussis. With my longstanding collaborator, Dr. Song Lee, I have explored the use of commensal bacteria such as *Streptococcus gordonii* as vaccine delivery vehicles for pertussis antigens.

As founding Director of the Clinical Trials Research Center and the Canadian Center for Vaccinology (CCfV), I have built a seasoned research team to conduct evaluative industry-sponsored or investigator-initiated research. Our team has conducted more than 250 Phase I–IV clinical trials across the age spectrum, of which more than 20 were Phase I studies. We have recently been awarded funding by the CDC to conduct the first pertussis human challenge study in North America, in CCfV's inpatient isolation unit purpose-built for these types of studies.

Lastly, my research has expanded to the interface of biomedical and social sciences, to understand the knowledge, attitudes, beliefs, and behaviors of the general public and health care providers with regard to vaccines, vaccination, vaccine programs, and program delivery including the use of alternative health care providers (pharmacists). In collaboration with the Nunavut Department of Health, I am currently studying the acceptability of maternal immunization in Inuit populations. Recently funded COVID-19 research will examine the cultural dimensions of the pandemic. Using qualitative and quantitative methodologies, we will examine public health policy and implementation from the public health/policy perspective as well as from the perspectives of the media, communities, healthcare providers, patients and their caregivers, not-for-profit/nongovernmental organizations, and members of the general public. These data will be used to improve the process by which public health policies are created and implemented.

Selected publications arising from this range of research collaborations are listed below:

Perrett KP, **Halperin SA**, Nolan T, Martínez Pancorbo C, Tapiero B, Martinón-Torres F, et al. Immunogenicity, transplacental transfer of pertussis antibodies and safety following pertussis immunization during pregnancy: Evidence from a randomized, placebo-controlled trial. Vaccine. 2020;38:2095–2104.

Halperin SA, Das R, Onorato MT, Liu K, Martin J, Grant-Klein RJ, et al. Immunogenicity, lot consistency, and extended safety of rVSVΔG-ZEBOV-GP vaccine: A phase 3 randomized, double-blind, placebo-controlled study in healthy adults. J Infect Dis. 2019;220:1127–1135.

Halperin SA, Donovan C, Marshall GS, Pool V, Decker MD, Johnson DR, et al. Randomized controlled trial of the safety and immunogenicity of revaccination with tetanus-diphtheria-acellular pertussis vaccine (Tdap) in adults 10 years after a previous dose. J Pediatric Infect Dis Soc. 2019;8:105–114.

Ghandora H, Halperin DM, Isenor JE, Taylor BA, Fullsack P, Di Castri A, **Halperin SA**. Knowledge, attitudes, behaviours, and beliefs of healthcare provider students regarding mandatory influenza vaccination. Hum Vaccin Immunother. 2019;15:700–709.

Halperin SA, Langley JM, Ye L, MacKinnon-Cameron D, Elsherif M, Allen VM, et al. A randomized, controlled trial of the safety and immunogenicity of tetanus, diphtheria, and acellular pertussis vaccine immunization during pregnancy and subsequent infant immune response. Clin Infect Dis. 2018;67:1063–1071.

Cutland CL, Nolan T, **Halperin SA**, Kurugol Z, Ahmed K, Perrett KP, et al. Immunogenicity and safety of one or two doses of the quadrivalent meningococcal vaccine MenACWY-TT given alone or with the 13-valent pneumococcal conjugate vaccine in toddlers. Vaccine. 2018;36:1908–1916.

Shi Y, **Halperin SA**, Lee SF. Expression, purification, and functional analysis of an antigen-targeting fusion protein composed of CD40 ligand and the C-terminal fragment of ovalbumin. Protein Expr Purif. 2018;142:37–44.

Halperin SA, Arribas JR, Rupp R, Andrews CP, Chu L, Das R, Simon JK, Onorato MT, Liu K, Martin J, Helmond FA; V920-012 study team. Six-month safety data of recombinant vesicular stomatitis virus–Zaire Ebola virus envelope glycoprotein vaccine in a phase 3 double-blind, placebo-controlled randomized study in healthy adults. J Infect Dis. 2017;215:1789–1798.

MacDougall DM, Halperin BA, Langley JM, MacKinnon-Cameron D, Li L, **Halperin SA**; Maritime Universal Rotavirus Vaccination Program. Knowledge, attitudes, beliefs, and behaviors of parents and healthcare providers before and after implementation of a universal rotavirus vaccination program. Vaccine. 2016;34:687–695.

Davey L, **Halperin SA**, Lee SF. Mutation of the *Streptococcus gordonii* thiol-disulfide oxidoreductase SdbA leads to enhanced biofilm formation mediated by the CiaRH two-component signaling system. PLoS ONE. 2016;11(11):e0166656.

I have co-authored 70 peer-reviewed original research publications, 19 book chapters and editorials, 111 abstracts/presentations and 37 invited presentations in the last five years. A comprehensive list of my peer-reviewed publications (h-index of citations = 64) is available in My Bibliography:
https://www.ncbi.nlm.nih.gov/labs/bibliography/1HM0nLfgGcZAW/bibliography/public/

C. RESEARCH SUPPORT, LAST FIVE YEARS

Selected current grants (18 not listed)

1. *Intersectoral evaluation of the effects of public health outbreak control policies and implementation on individuals and communities: a supplemental study*
   Research Nova Scotia 04/2020–04/2022
   Role: Nominated Principal Investigator $154,010

2. *Understanding the effects of public health outbreak control policies and implementation on individuals and communities: a path to improving COVID-19 policy effectiveness* (CI2001)
   Canadian Institutes of Health Research (CIHR)/ 03/2020–03/2022
   New Frontiers in Research Fund
   Role: Nominated Principal Investigator $499,904

3. *Canadian Immunization Research Network* (CI1302, CI1701 renewal)
   CIHR (in partnership with the Public Health Agency of Canada) 06/2014–12/2021
   Role: Nominated Principal Investigator $10,083,334

4. *Rapid prototyping and deployment of a therapeutic pan-coronavirus Fusogenix DNA vaccine engineered to eliminate antibody-dependent enhancement*
   CIHR 06/2020–06/2021
   Role: Co-Investigator $4,225,000

5. *A phase 2 randomized, multi-center double-blind, placebo-controlled study to evaluate the safety and immunogenicity of the V920 (rVSVΔG-ZEBOV-GP) Ebola virus vaccine candidate in HIV-infected adults and adolescents (ACHIV)* (CT14B)
   International Development Research Centre (IDRC) 03/2016–12/2020
   Role: Co-Investigator $3,562,200

Selected current contracts (12 not listed)

6. *A randomized, observer-blind, dose-escalation phase I/II clinical trial of Ad5-nCoV vaccine in healthy adults from 18 to <85 years of age in Canada* (CS2001)
   CanSino Biologics 05/2020–05/2025
   Role: Principal Investigator $909,497

7. *Establishing a safe and controlled* Bordetella pertussis *human challenge model to enhance the study of pertussis disease and support next generation vaccine development* (CD2001)
   Centers for Disease Control and Prevention 08/2020–07/2022
   Role: Principal Investigator US$1,224,290 (~CAN$1,628,306)

8. *A phase 3 safety study of 2 formulations of GSK's human rotavirus vaccine in healthy infants starting at age 6–12 weeks* (GS1806)
   GlaxoSmithKline Biologicals 05/2019–03/2024
   Role: Principal Investigator $119,025

9. *A phase 3 multicenter active comparator-controlled study to evaluate the safety and tolerability of V114 (pneumococcal vaccine) in healthy infants* (MK1801)
   Merck & Co. 01/2019–03/2022
   Role: Principal Investigator $618,761

10. *A phase 1 study of the safety and immunogenicity of an investigational tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis adsorbed (Tdap) vaccine in young adults* (SP1901)
    Sanofi Pasteur 06/2019–01/2021
    Role: Principal Investigator US$74,850 (~CAN$98,800)

In the last five years, studies/programs with which I have been involved have been awarded $65.9 million and $17.6 million in research grant and contract funding,

respectively. Forty of those studies are currently held and 51 were completed within the last five years. I am NPI, PI, or Co-PI on 26 of those studies and Co-Investigator on the remaining 65 studies.

D. CONTRIBUTIONS TO HIGHLY QUALIFIED PERSONNEL (HQP) TRAINING

I am currently co-supervising three trainees (one Master's and two BScN Honours) and, during the last five years, have co-supervised an additional 15 trainees. Over the course of my academic career, I have supervised approximately 130 research trainees at all levels of training, from summer students (41), undergraduate Honours students (28), and graduate (14 MSc and 4 PhD) students to postdoctoral fellows (15) and medical students and residents conducting research projects (27). In addition, I have also served on thesis supervisory committees for 7 graduate students (two PhD students currently) at Dalhousie University and the University of Toronto. These trainees have obtained (or are currently working towards) degrees in Microbiology and Immunology, Biology, Biochemistry and Molecular Biology, Community Health & Epidemiology, Nursing, and Medicine.

Research collaborations with Drs. Song Lee and Jun Wang link basic biomedical science to translational research in microbiology and infectious disease, with the goal of understanding microbial pathogenesis in order to develop new and improved vaccines. These collaborations have encompassed the co-supervision of trainees who have been interested in translational science and who have, under our direction, learned essential laboratory, research, and, in the case of senior trainees, leadership skills while advancing their research projects.

Collaborations with Dr. Donna Halperin have led to the co-supervision of trainees undertaking research projects with a more interdisciplinary focus spanning the social sciences and the health professions.

My trainees have succeeded in obtaining summer research studentships, undergraduate and graduate awards, and travel awards to present their research from local, provincial, and national organizations. In the last five years, more than 13 scholarships/ awards have been granted, including two research awards for the graduating Honours nursing student with the highest grade and two McCarlie Awards for the highest ranking applicant to the IWK Graduate Studentship competition. Successful renewals of the graduate studentships speak to the high caliber of the trainees and the training environment we have provided.

Our trainees are encouraged to publish their research and have first-authored or co-authored articles in peer-reviewed journals. They have pursued further education as graduate students, postdoctoral fellows, and medical students, and have gone on to careers in clinical and academic medicine, nursing, dentistry, academic basic science, industry, and government.

In conjunction with four investigators, I am responsible for the ongoing training and supervision of CCfV research staff. The current complement of these 22 HQP includes Research Nurses and Coordinators, Research Assistants, Data and Statistical staff, and Laboratory Technicians who are essential to advancing our research programs.