



Crohn's and Colitis  
Foundation of Canada

Fondation canadienne des  
maladies inflammatoires  
de l'intestin

# Research Report Card

2009 | 2010

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## EXECUTIVE SUMMARY

The second edition (2010) of the CCFC Research Report Card adds to last year's positive portrait by providing more snap-shots of individuals, institutions, regions and directions enabled by funding from CCFC. The same framework of seven dimensions of accountability is used and includes the following highlights:

### 1 ADMINISTRATIVE AND PROCESS INDICATORS

- From 2005 to 2009, there has been significant growth both in terms of dollars and numbers of research projects funded by the CCFC. A total of approximately \$25 million has funded 200 projects. Most project funding, 85% of it, is focused on cure-directed basic science/ biomedical research
- Regionally, the majority of project funding during the same five year period has been concentrated in Ontario (\$9.8m) and Alberta (\$7.8m). Quebec funding was \$3.9m.
- In 2009, CCFC established three new provincial partnerships (in British Columbia, Nova Scotia and New Brunswick) adding to existing partnerships so that that CCFC's contribution of \$469,785 is expanded to total approximately \$1.5 million this year for IBD-related projects and researchers.

### 2 ADVANCING KNOWLEDGE

- Canada continues to punch above its weight internationally in terms of number of publications and citations. The majority of this contribution is from CCFC-affiliated researchers.
- Eight (8) CCFC-affiliated researchers are in the top 100 of the world's most published authors in the area of inflammatory bowel disease and gastrointestinal inflammation.
- CCFC supports Canadian institutions that are top and budding international contributors in IBD publications. Among them, the University of Calgary had a 57% increase in average citations within two (2) years (2007-2009) surpassing international institutions like Harvard University in United States and the University of Regensburg in Germany.
- CCFC ranks 4<sup>th</sup> in the top 500 funding agencies and private sector organizations for the support of international IBD-related scientific publications in 2007-2009, surpassing Abbott Laboratories in United States and Deutsche Forschungsgemeinschaft (DFG) German Research Foundation in Germany.

### 3 CAPACITY BUILDING

- CCFC funds trainees who serve as hired project staff through GIA funding that represents more than 80 junior researchers. Some will eventually compete in national and provincial competitions where CCFC funding is often ready for IBD researchers through matching-dollar partnerships.
- In Canada, there are 14 universities offering residency programs and research training in adult and pediatric gastroenterology. There are nearly 30 IBD research institutes and hospitals units affiliated with these universities.
- In the history of CCFC, approximately 476 researchers from different specialties and backgrounds were funded; 46.4% of this group as students or postgraduate fellows.
- CCFC has awarded a total of approximately \$61 million to support IBD research since it was founded in 1974. In the last decade, CCFC contributed approximately \$40 million toward projects through the Grants-in-Aid of Research (GIA) program, innovation grants, and the GEM project.
- From 1999 to 2009, \$24.82 million (or 58%) of CCFC project funding attracted approximately \$49.2 million of additional funding for IBD-related research.

- In dollar terms, including only individual IBD-related research projects, CCFC spent roughly \$8.6 million more than CIHR from 2005 to 2009.
- As a percentage of gross revenue spent on research, CCFC comes in first (outperforms Heart & Stroke, Canadian Cancer Society, etc.) when compared with other Canadian national Voluntary Health Organizations (CVHOs).
- Internationally, CCFC is the largest national non-governmental funder of IBD-related research measured in terms of dollars per-capita.

#### 4 HEALTH INDUSTRY

- CCFC-affiliated researchers participated in the invention of approximately 32% of the IBD-related international, U.S. and European patent applications registered by Canadian assignees.
- According to Industry Canada's Canadian Company Capabilities and BioPharma Companies and Products in the Pipeline databases, there are roughly 22 IBD-related companies in Canada. The geographical proximity of IBD-related industries to academic and research institutes reflects the effectiveness of innovation and knowledge transfer in the field.

#### 5 INFORMED DECISION MAKING

- The "Burden of IBD in Canada" (BIBDC) report (2008) continued to attract requests for information used to inform policy decisions.
- The PR campaign launched during Crohn's and Colitis awareness month generated a significant number – over 43 million – of media "impressions", surpassing the 30 million in 2008.
- According to the Dow Jones Factiva database, CCFC-related media coverage experienced a constant annual growth of roughly 20% during 2000-2009.

#### 6 HEALTH IMPACTS

- According to Statistics Canada's CANSIM database (2000-2005), deaths from ulcerative colitis and Crohn's disease have varied between 110 and 130 Canadians per year during this period while death rates for gastrointestinal diseases overall increased from 8100 Canadians in 2000 to over 8900 in 2005.
- The BIBDC report included updated prevalence and incidence rates for IBD in Canada which re-confirm that these are among the highest in the world.
- The total wait time (median) for the clinical features of significant active IBD is 106 days in 2009 (slight decrease from 120 days in 2008). Two thirds of surveyed patients waited longer than a standard of 18-weeks.

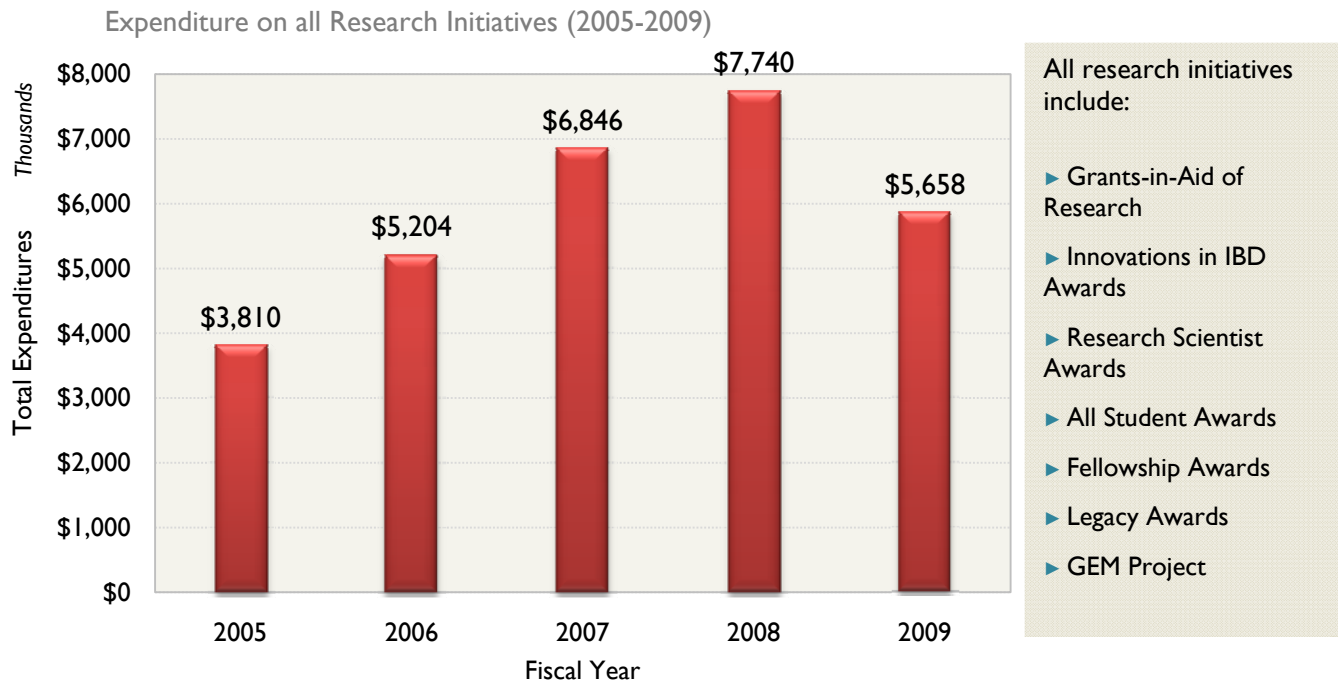
#### 7 ECONOMIC & SOCIAL IMPACT

- In a recent study, adolescents afflicted with inflammatory bowel disease scored significantly lower than healthy controls in self-assessments of their over-all health.
- The BIBDC report included estimates of direct and indirect costs of IBD which totaled \$1.8 billion in 2008.

# ADMINISTRATIVE & PROCESS INDICATORS

## FUNDING

### ► Funding trends from 2005 to 2009

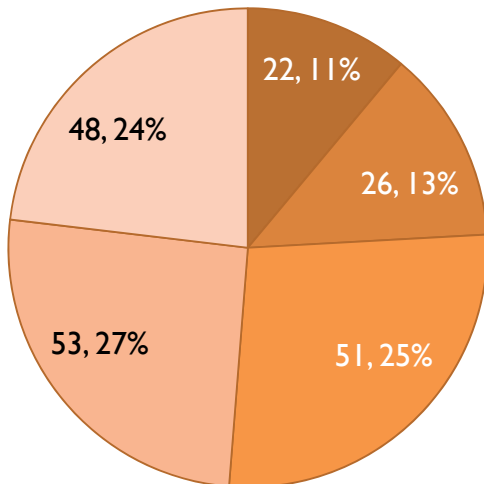


See Appendix A for the overview of CCFC expenditures on research projects.

### ► Categorization of funded research projects (including Grants-in-Aid of Research (GIA) and Innovations Awards)

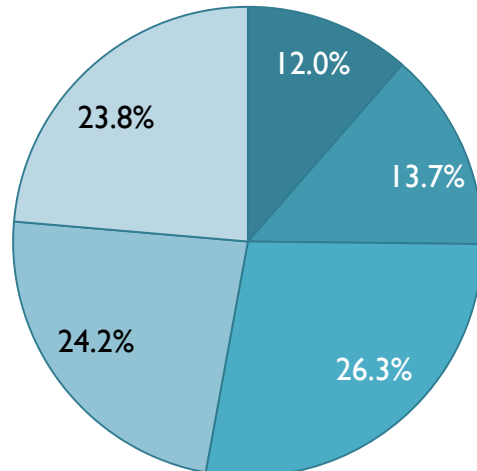
#### Projects by Research Focus 2005-2009 (N, % total)

- Enteric Nervous System
- Gut
- Microbiology
- Genetics
- Immunology



#### Funding by Research Focus 2005-2009 ≈\$25 million

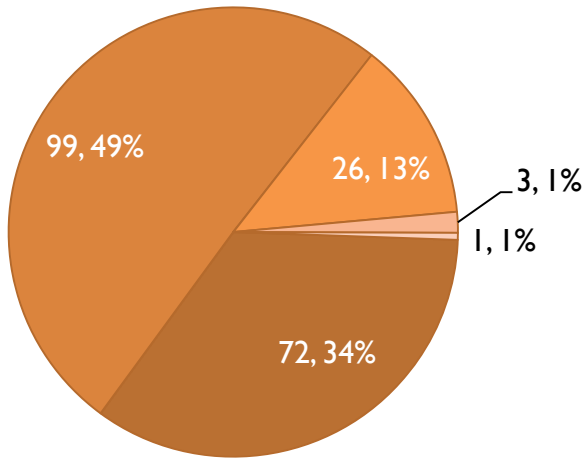
- Enteric Nervous System
- Gut
- Microbiology
- Genetics
- Immunology



► CIHR Research Pillars

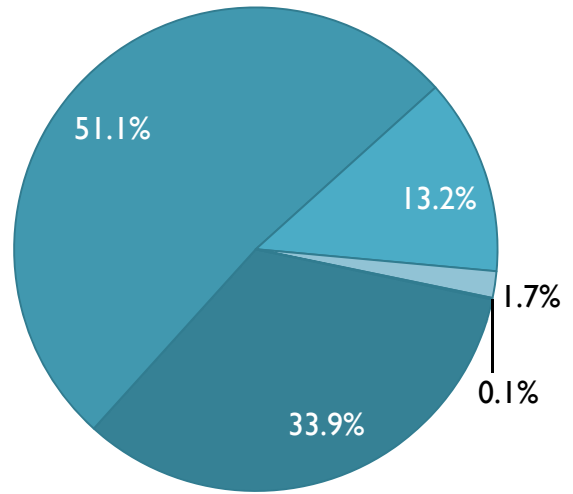
Projects by CIHR Research Pillar  
(N, % Total)

- I. Biomedical Research
- I./II.
- II. Clinical Research
- IV. Social, Cultural, Environmental & Population Health
- III. Health Services/ Systems Research



Funding by CIHR Research Pillar  
≈\$25 million

- I. Biomedical Research
- I./II.
- II. Clinical Research
- IV. Social, Cultural, Environmental & Population Health
- III. Health Services/ Systems Research



## I Basic/Biomedical

The goal of biomedical research is to understand normal and abnormal functioning at the molecular, cellular, organ system and whole body levels. These studies generally do not have a diagnostic or therapeutic orientation.

## II Clinical/Translational

Clinical Research is focused towards improving the diagnosis and treatment of disease and improving the health and quality of life of affected individuals as they pass through normal life stages. This includes research on animal models of the human disease, clinical trials and other therapeutic interventions.

## III Health Services/Systems Research

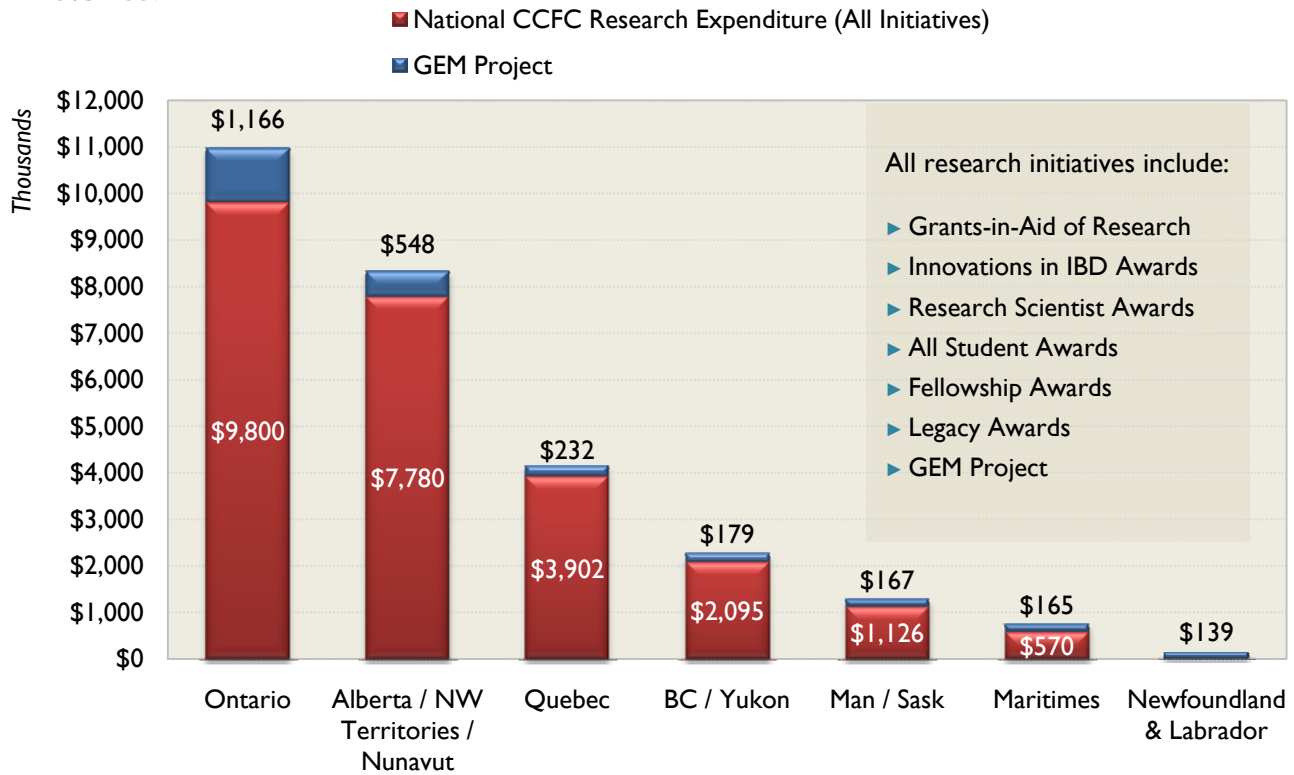
The multidisciplinary field of Health Services/Systems Research seeks to improve the efficiency and effectiveness of health professionals and the health care system through changes to practice and policy.

## IV Social, Cultural, Environmental and Population Health

Pillar IV Research explores the way in which our social and physical environment impacts our health. The ultimate goal is to use this information to improve the health of the population, or defined sub-populations, through a better understanding of the ways in which social, cultural, environmental, occupational, and economic factors determine one's health status.

► Regional Funding Summary

Research Expenditure (All Initiatives) per CCFC Region  
2005-2009



See Appendix A for the regional breakdown of CCFC funding by CIHR-defined research pillars and CCFC-defined subject areas.



# CURRENT FUNDING PROGRAM OVERVIEW

## FUNDING PROGRAMS

### ► CCFC GRANTS IN AID OF RESEARCH

The CCFC Grants in Aid of Research program is the main vehicle through which the CCFC supports research on inflammatory bowel disease. Grants are awarded to investigators working alone or in collaboration with others. For fiscal year 2009/2010 Grants will be awarded for a maximum of three years with yearly allocations up to \$125,000. Previously, the awards were up to \$150,000 per year for a total of three years. One competition is held per year and proposals are ranked by scientific merit and relevance to the mission of finding cures for IBD. In 2007, the largest number of newly awarded GIAs– 19 – was reached.

### ► INNOVATIONS IN IBD RESEARCH (SMALL GRANT PROGRAM)

This small grant program invites applications for proposals that are novel or innovative approaches to IBD research. This grant is intended to stimulate and support research which may not be encompassed within the boundaries of traditional medical research. Innovation grants are funded up to a maximum of \$50,000 for one year. This competition is held twice per year.

### ► CCFC VISITING SCIENTIST PROGRAM

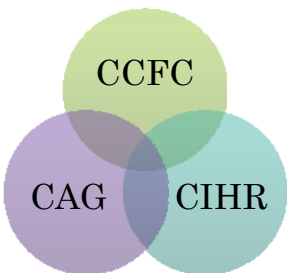
The CCFC Visiting Scientist program is designed to allow Canadian institutions to bring in productive scientists having expertise not available within the institution, and to allow Canadian scientists to visit major international research centers in order to acquire knowledge or new techniques related to IBD research. A research allowance to cover some of the costs of materials, supplies, and expendables deemed essential for their participation in the research program may be applied for to a maximum of \$50,000. The length of visit can range from 1 to 12 months. In 2009, CCFC will support French scientist, Dr. Philippe Langella's one-year visit to McMaster University.

## FEDERAL PARTNERSHIPS

### ► PROJECTS

#### 2009 CIHR Emerging Team: Integrative Biology of Inflammatory Bowel Diseases

This initiative is a part of the CIHR Emerging Grant: From Gene to Proteins, Cells, Tissues and Patients. The overall objective of the program is to enhance the translation of gene and protein research to medicine. Depending on the availability of funds, the CCFC will consider supporting a successful translational research team grant aligned with this aim. The grant will last up to five (5) years.



**\$4.77 mil**  
Current

**\$50,000**  
Current

**\$75,000**  
Current

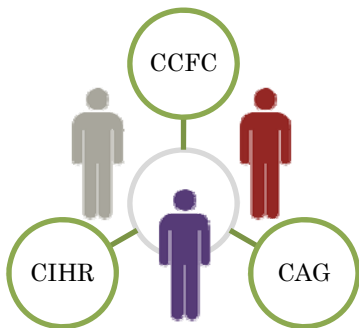
**\$25,000**  
per year for 5  
years

**+\$469,000**  
per year for  
5 years

## 2010 CIHR Emerging Team Grant: Canadian Microbiome Initiative (stay tuned for more)

This emerging team grant will incorporate efforts from four CIHR research institutes and five industrial partners, as part of Canada's contribution to the International Human Microbiome Consortium. To the degree that finances allow, CCFC will partner to support microbiome research that relates to Crohn's disease and/or ulcerative colitis in related areas such as immunology, gut processes, genetics and the enteric nervous system. This grant will last up to five (5) years.

### ► PEOPLE



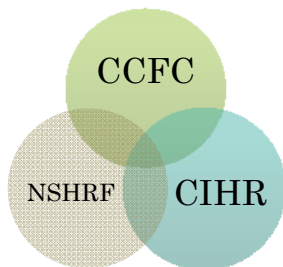
## 2009 CCFC | CAG | CIHR Partnership for Research in IBD

This program was initiated in 2001 and has grown to fund up to 16 new people per year across during the early stages of their careers. Support lasts from four months (Summer Studentships) to three years (New Investigator Awards). This national competition has been supplemented with provincial partnerships recently initiated in Quebec, Alberta and British Columbia (outlined below).

See the section, "Capacity Building" for more details.

### PROVINCIAL PARTNERSHIPS

#### ► PROJECTS



## 2009 CCFC | NSHRF | CIHR Regional Partnership Program: Nova Scotia

The provincial partnership with the Nova Scotia Health Research Foundation (NSHRF) is a project-based program in support of CIHR's Regional Partnership Program in Nova Scotia. CCFC will complement 25% of the CIHR and NSHRF funding in research on IBD.

In 2009, CCFC has also initiated a second project-based partnership in New Brunswick.

PARTNER	MEMORANDA SIGNED ON	CURRENT RECIPIENT(S)	PROJECT TITLE	CCFC FUNDING IN 2009	PARTNER FUNDING IN 2009
NSHRF	June 2009	David Hoskins IWK Health Centre	Treatment of intestinal inflammation with piperine, a dietary phytochemical with immune-modulating activity	\$19,812	\$59,437
		Andrew Stadnyk Dalhousie University	Defining the Roles of the Anaphylatoxins in Colitis	\$31,150	\$93,450

\$ ?

Up to  
**\$500,000**  
per year for  
5 years (per  
award)

**\$358,500**

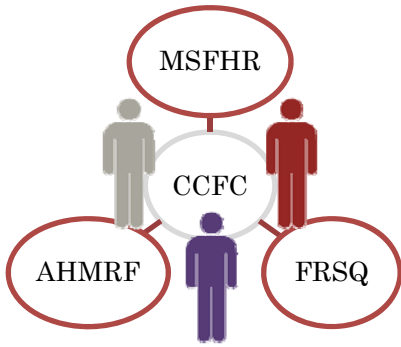
**+\$358,500**  
Current

**\$50,962**

**+\$152,888**

► PEOPLE

**2009 CCFC | AHMRF, FRSQ, and MSFHR: Alberta, Quebec, and British Columbia**



As of 2009, CCFC has begun to fund junior researchers through partnerships with the Alberta Heritage Medical Research Foundation (AHMRF), Fonds de la recherche en santé Québec (FRSQ), and the Michael Smith Foundation of Health Research (MSFHR) in British Columbia. The agreement aims at increasing the research capacity and training in the area of Inflammatory Bowel Disease through the joint funding of up to four (4) highest ranking candidates working on IBD-related topics in each province. CCFC will contribute 50% of the funding up to sixteen (16) students at doctoral and post-doctoral levels.

CCFC is currently forming a similar partnership in Manitoba.

See the section, “Capacity Building: Funding” for more details on CCFC’s current national and provincial partnerships.

**\$8,500**  
(Alberta)

**\$10,000**  
(Quebec) per  
year for 3  
years

.....  
**\$16,823**  
(BC) per year  
for 2 years

## SPECIAL INITIATIVE

### ► CCFC's PAN-CANADIAN GEM PROJECT

Launched in March 2007, the Michael J. Howorth Genetics, Environmental and Microbial (GEM) project is stepping into its fourth year of the project's six year period. The GEM project is a national study that is aiming to improve our understanding of the complex relationships between peoples' genetic makeup, the environment in which they live and the bacteria to which they are exposed. Current knowledge of the intricacies of inflammatory bowel disease (IBD) suggests that, rather than a single factor, a combination of predisposing characteristics and subsequent events combine to trigger the onset of symptoms of IBD.

CCFC funded approximately \$2.5 million to the project since its inception. As of April 2010, the GEM project has enrolled 1021 subjects and 1326 probands, experiencing an average monthly increase of approximately 42 and 55 respectively. In the past year, the number of recruitment centers has increased from 13 to 24 sites as of April 2010. GEM Project Coordinators continue to come up with creative strategies to accelerate the recruitment process (e.g. travel clinics, advertisements, clinic lists, communication with GI clinics, etc.).

The GEM Project is also exploring sites in Connecticut, Rhode Island and Haifa in Israel.

Discoveries made by the GEM project team will advance scientific knowledge about IBD and add to the momentum supporting a multi-faceted approach to treatment and prevention of this chronic disease. With the generous assistance of many individuals, sponsors and donors, GEM will elevate IBD research activity to higher levels and bring the possibilities of a cure within reach.

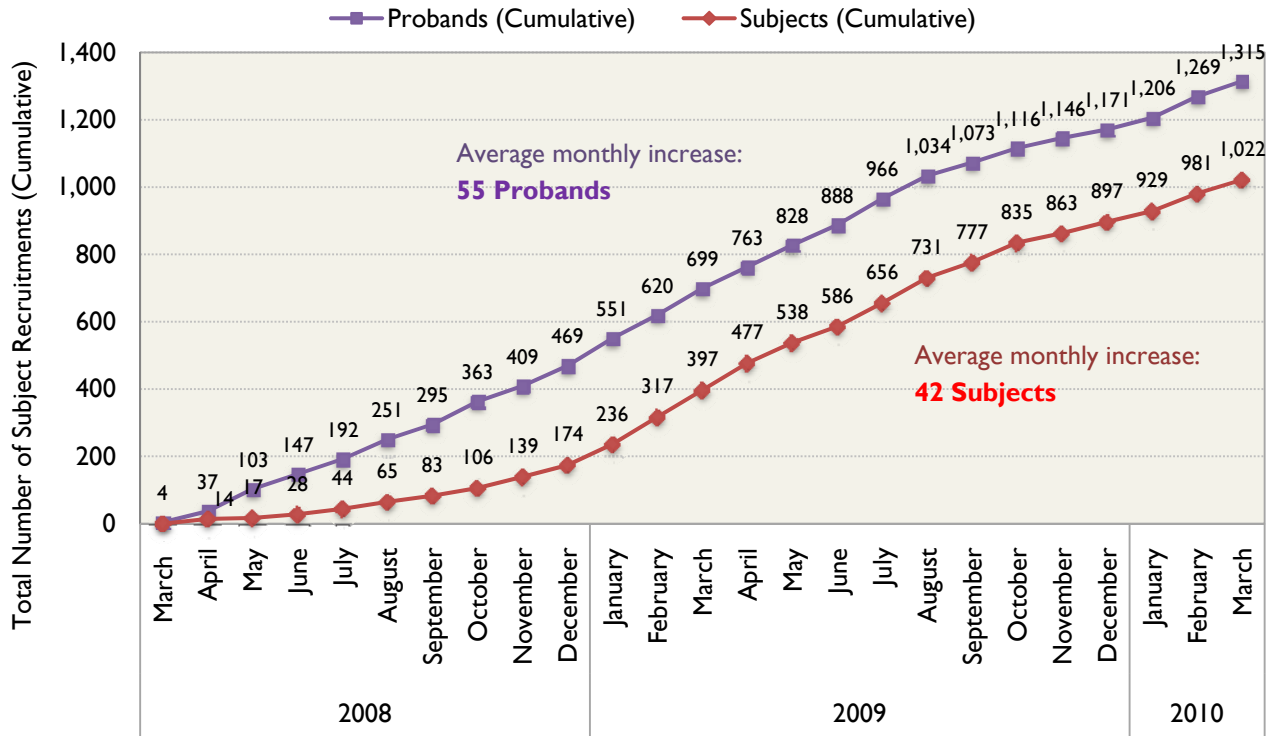
See the section, "Administrative and Process Indicators: Regional Funding Summary" for the regional distribution of GEM funding.

#### ► List of Recruitment Sites

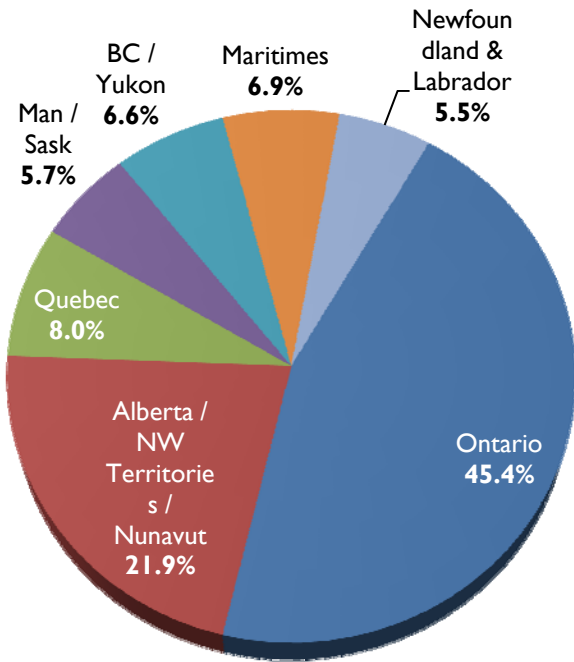
PROVINCE (SITES)	REGION	SITES
Alberta (3)	Calgary	Alberta Children's Hospital (Pediatric) University of Calgary
	Edmonton	University of Alberta
British Columbia (2)	Vancouver	BC Children's Hospital
	Victoria	Vancouver Island Health Authority
Manitoba (1)	Winnipeg	Health Sciences Centre
Maritimes (1)	Halifax	IWK Health Centre
Newfoundland (1)	St. John's	Janeway Health Sciences Centre
Ontario (9)	Hamilton	McMaster University Medical Centre McMaster University Medical Centre (Pediatric)
		Kingston
	London	South Street Hospital University Hospital
		Ottawa
	Toronto	Mount Sinai Hospital Sunnybrook Health Sciences Centre
		Quebec (5)
Quebec City	CHAUQ-Hopital du St-Sacrement	
	Sherbrooke	Centre de Recherche Etienne-Le Bel
Saskatchewan (1)	Saskatoon	Royal University Hospital

► Subject and Proband Recruitment: March 2008 to March 2010

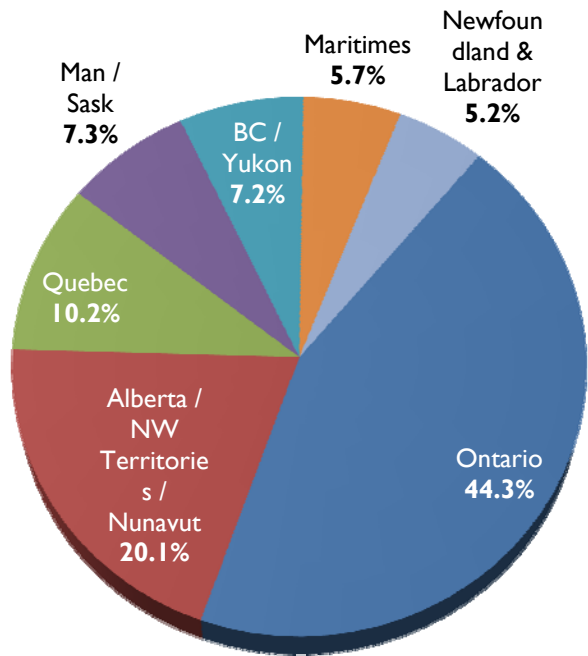
GEM Project Subject and Proband Recruitments (All Sites)



Recruited Probands (up to March 2010)  
1326 Probands



Recruited Subjects (up to March 2010)  
1021 Subjects



## OUTREACH

### ► Speakers at CCFC Regional Events in 2009

In 2009, a total of 72 speakers presented at different CCFC regional events. 23% (or 19 speakers) were IBDR members and medical advisors and 15% (or 12 speakers) were current and former CCFC-funded researchers.

Title	Speaker (IBDR Members)	Institute / Affiliation
A Gut Feeling- the role of naturopathic medicine and complementary forms of healing in co-treating and co-managing IBD	Meghan Walker	Integrative Health Institute
A Naturopathic Approach to IBD	Alana Shaw	Priority Massage and Health
A Naturopathic Approach to Managing IBD	Dr. Farhal Luhar	Naturopathic Doctor
Alberta IBD Consortium: A New Approach to the Study of IBD	<b>Dr. Herman Barkema</b>	University of Calgary
Amanda Holmes Road Show	Amanda Holmes	Motivational Speaker
An Education Evening on IBD and CCFC	Dr. James Culnan	Gastroenterologist
An Evidence Based Update on Complementary Therapies for IBD	Dr. Joe Schurr	University of Saskatchewan
An Informative and Interactive presentation on IBD	Dr. Walter Kutcher	Royal Victoria Hospital
Anxiety and depression in IBD: The role of chronic inflammation and gut bacteria	<b>Dr. Premysl Bercik</b>	McMaster University
CCFC Report Card: Local Giving, Global Impact	<b>Dr. George Tolomiczenko</b> (2 sites)	CCFC Staff
Report Card for IBD		
Comment gérer le stress, le travail, l'école avec une maladie chronique	Dr. Gilles Lapointe	Doctor, Motivational Speaker
Dietary restrictions and IBD	Heather Mileski	McMaster University
Efficiency-Savoir bien s'alimenter avec une MII	Mme Cathy Dion	Nutritionist
Etiology of IBD: Gene, Microbe & Environment Interactions	<b>Dr. Keith Sharkey</b>	University of Calgary
From Woe to Wow	Pat Morgan	Motivational Speaker
GEM Project	<b>Joanna Dionne</b>	Hamilton Health Sciences
	Trish Rawsthorne	IBD Clinical and Research Centre
	<b>Dr. Anthony Otley</b>	IWK Health Centre
	Dr. Daniela Serban	McGill University
Gene, Environment and Microbial Interactions: New Theories in the Search for a Cure for IBD	<b>Dr. Wallace MacNaughton</b>	University of Calgary
Geographic Burden of IBD	<b>Dr. Andrew Stadnyk</b>	Dalhousie University
Get Better Together- Wellness Institute: A program for living better with chronic disease	Caitlin Keyzer	Seven Oaks General Hospital
Glamour Guts- Short film	Jasmine Oore	Volunteer
Gutsy Goals: Bold new initiatives in IBD research	<b>Dr. Laura Sly</b> (2 sites)	BC Children's Hospital
I signed up for the GEM project	Jessica Lafond	CCFC Volunteer
IBD and Exercise	Dr. Brian Timmons	McMaster University
IBD for an Eight Year Old	<b>Dr. John Howard</b>	UWO Children's Hospital

IBD- How Naturopathic Medicine can help your gut	Lori Ferguson	Naturopathic Doctor
IBD Watch	Graduate Students	University of Calgary
IBD: The BC Perspective	<b>Dr. Kevan Jacobson</b>	BC Children's Hospital
Individualizing treatment for Crohn's disease based on predictive	<b>Dr. Ernest Seidman</b>	McGill University
Inflammatory Bowel Disease and Surgery	Dr. G.V. Mapeso	IBD Surgeon
Integrative Medicine	Dr. Meghan Walker	Integrative Health Institute
Introduction to Surgery and IBD	Dr. Chris Kenyon	University of Saskatchewan
Keynote	Marilyn Finkelstein (2 sites)	Motivational Speaker
Keynote- Chronicle Herald	Amanda Holmes	Motivational Speaker
	Laura Stinson-Newman	Personal Keynote
	Joel Jacobson	Chronicle Herald
L'épithélium intestinal et son rôle protecteur dans le contexte des maladies inflammatoires intestinales	<b>Dr. Francois Boudreau</b>	University of Sherbrooke
Les maladies inflammatoires de l'intestin	Dr. Isabelle-Pascale Beaudet	Gastroenterologist
Living with IBD	Dr. Margaret Scheider	Wilfred Laurier University
Living with IBD in the Community	Amin Menhadji, Nancy Lindsay, John Bradley	CCFC Volunteers
Living with IBD: The Patient	Barb St. Cyr	London Children's Hospital
Managing your IBD	Dr. D. Duerksen	Gastroenterologist
New Therapies for IBD- Why, When, How Risky?	Dr. Brian Bressler	BC Children's Hospital
Nutrition and IBD: Before and After Surgery	Andrea Clark (3 sites)	Mount Sinai Hospital
Personal Stories about Living with IBD	Ted Hannah	CCFC Volunteer
Population based Alberta IBD Study: A Study of Novel Environmental Risk Factors	Amanda Boley	YAC Volunteer
	Emma Ferguson	YAC Volunteer
	Courtney Fox Francouer	YAC Volunteer
	Devon Huber	YAC Volunteer
Present and Future of IBD	Amin Menhadji	YAC Volunteer
	<b>Dr. Gil Kaplan</b>	University of Calgary
	Dr. Des Leddin	Gastroenterologist
Searching for a Cure at the new Farncombe Institute	<b>Dr. John Wallace</b>	Farncombe Institute
Self Management for People with IBD	Dr. Fred Saibil	McMaster University
Sensing intestinal bacteria and its role in IBD	<b>Dr. Kathy McCoy</b>	McMaster University
So I have IBD, now what?	Dr. Jennifer Jones (2 sites)	University of Saskatchewan
Stress Management	Lisa Keith	Psychologist
Surgery for IBD	Dr. C. Yaffe	University of Manitoba
Treatment Options for IBD in Children	Dr. Garth Bruce	Pediatric Gastroenterologist
What the GEM Project means to our family	Stacey Amyotte	CCFC Staff
What you need to know about managing IBD	<b>Dr. Hillary Steinhart</b>	Mount Sinai Hospital

Yoga Therapy and IBD	Jesse McCrosky	Volunteer/Yoga Therapist
Youth Voices- Loud and Proud	Janelle Ocrane	YAC Volunteer
	Sue Abrametz	CCFC Volunteer & National VP Saskatchewan
	Dr. Gus Adesanya	Gastroenterologist
	Corrado de Marco	GEM Participant
	Dr. Jerry McGrath (2 sites)	Memorial University
	Jackie Fisher	YAC Volunteer
	Natalie Wells	YAC Volunteer
	Christiane Chabot	CCFC Volunteer & National VP Quebec
	Danielle DesBiens	CCFC Volunteer

See [Appendix B: Outreach](#), for the listing of speakers at CCFC-facilitated regional events in 2007, 2008, and 2009.



# ADVANCING KNOWLEDGE

## QUALITY

► Highly Cited Authors (based on a search filtered by Canadian Institutions)

► The ranking chart was compiled from ISI data of international and national authors of *inflammatory bowel disease-related articles* published during 2004-2009. Out of the total number of authors, cut-offs for were established for the top 100, 300, and 500 international ranks and the top 100 national ranks.

Authors and co-authors of national rank might not receive a world rank, due to their lack of contributions outside of Canada. Contributors receiving a world rank are active in research and scientific publishing in other areas of the world.

The chart only included CCFC-affiliated authors. For those contributors receiving direct CCFC funding, they are further categorized by the fiscal year of the most recent award and the total record of IBD-related publications from 2004-2009.

Research Contributions of Top CCFC Recipients 2004-2009					1011 Records	
		Top 100 Rank of the IBD-Related Authors in the World				
		Top 300 Rank of the IBD-Related Authors in the World				
		Top 500 Rank of the IBD-Related Authors in the World				
National Rank	World Rank	Recent CCFC Grant	Author	Total Publications 2004-2009	As of Oct 9, 2009	As of Dec 31, 2009
1	7	2009	BERNSTEIN, CN	61		12
2	35	2003	FEDORAK, RN	38		5
3	55	2004	FEAGAN, BG	32		8
4	79	2004	SILVERBERG, MS	31		11
6	84	2007	COLLINS, SM	30		2
7	73	2001	GRIFFITHS, AM	30		17
8	97	2007	STEINHART, AH	30		6
9	93	-	PANACCIONE, R	29		7
11	122	2007	SHARKEY, KA	27		3
13	157	1986	FREEMAN, HJ	24		2
16	224	2000	BITTON, A	19		7
17	252	2009	MCKAY, DM	19		2
18	257	2003	PERDUE, MH	19		1
19	266	2009	VERDU, EF	19		3
20	324	2004	GREENBERG, GR	17		3
21	349	2009	SHERMAN, PM	17		3
22	358	2006	WALLACE, JL	17		2
34	427	2009	FINLAY, BB	15		1
35	444	2009	MCLEOD, RS	15		0
41		2009	VALLANCE, BA	14		3
45	340	2007	MAWE, GM	13		1
50		1982	COHEN, Z	12		0
53		2009	DIELEMAN, LA	11		1
54		1995	JACOBSON, K	11		1
55		2009	LEVY, E	11		6
56		2009	MACNAUGHTON, WK	11		2
57		2008	VERGNOLLE, N	11		0
63		2009	KHAN, WI	10		2
72		2004	AMRE, DK	9		6
73		2009	BLENNERHASSETT, MG	9		1
74		2009	CROITORU, K	9		1
75		2009	MADSEN, KL	9		2
76		2007	MARSHALL, JK	9		2
77	464	2007	SEIDMAN, E	9		1
78		2009	SIMINOVITCH, KA	9		1
88	376	2007	FRANCHIMONT, D	8		3
89	499	2009	GIRARDIN, SE	8		2

► Relative Citation numbers and Impact

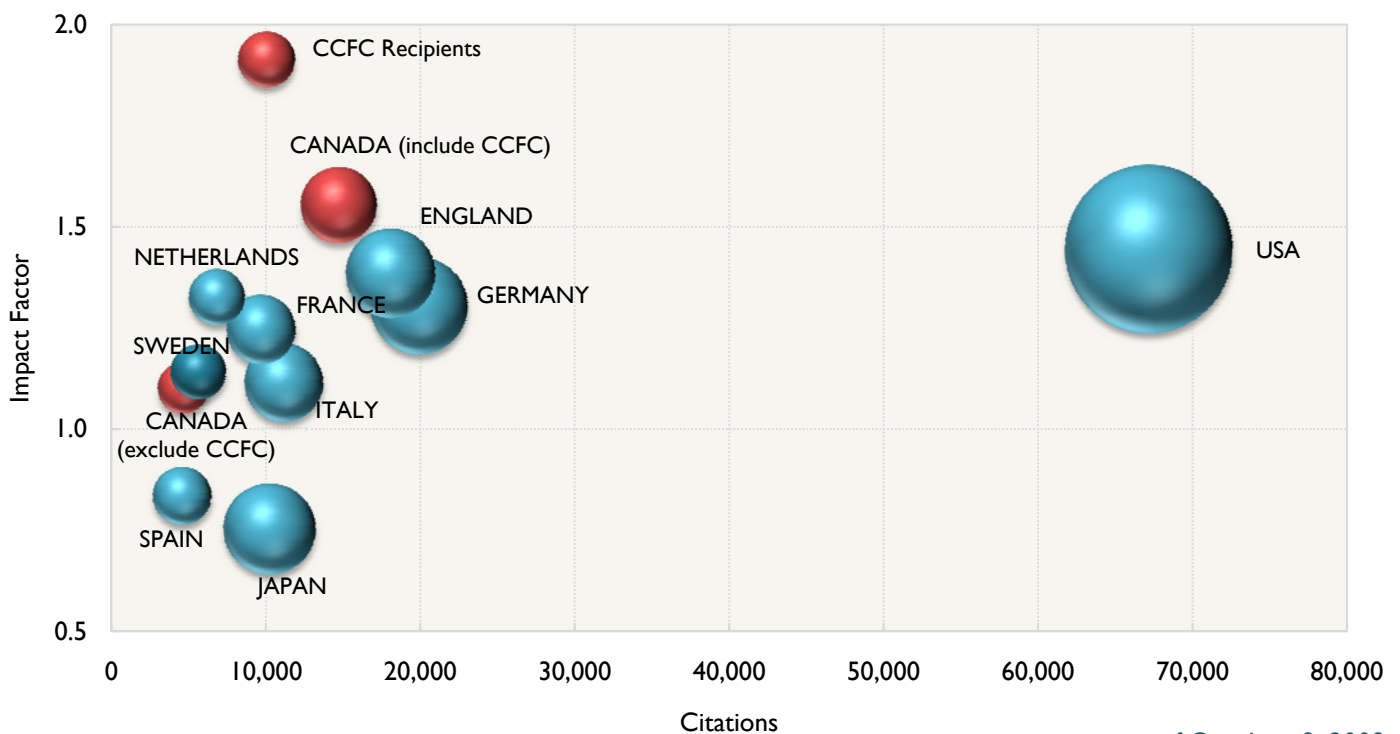
This dimension quantifies knowledge contribution by looking at indicators related to publications. In addition to the number of publications, the quality of a journal is also quantified by how often articles it publishes are cited in other articles. Citation frequency is important since it indicates that other work is building on the prior contribution and, in effect, validating it.

In the figure below, these indicators are combined to compare countries and, in the case of Canada, broken into three separate balloons: Canada without CCFC-affiliated authors, CCFC-affiliated authors alone and Canada including CCFC-affiliated authors. Size of each balloon corresponds to the number of inflammatory bowel disease-related publications published by country 2004-2009. The overall average impact factor for each data point is plotted on the vertical axis while the number of citations for all articles is plotted on the horizontal axis. The *impact factor* is a measure of the citations to science and social science journals. It is frequently used as a proxy for the importance of a journal to its field. These data were compiled using the same screening words and parameters (inflammatory bowel disease, Crohn’s disease, ulcerative colitis, gastrointestinal inflammation) and yielded a total of 15,459 articles published worldwide from 2004 to 2009. Of these, 562 were co-authored by CCFC-affiliated researchers (i.e. funded by the CCFC or members of the CCFC IBDR) and 449 were co-authored by Canadians with no known affiliation with the CCFC.

In the figure below, we see that the output of CCFC researchers in IBD research publications is greater than the rest of Canadian researchers in terms of total number of publications (size of bubble) and the number of citations. In addition, the average impact factor across all journals for the CCFC group is higher than that of non-CCFC funded authors.

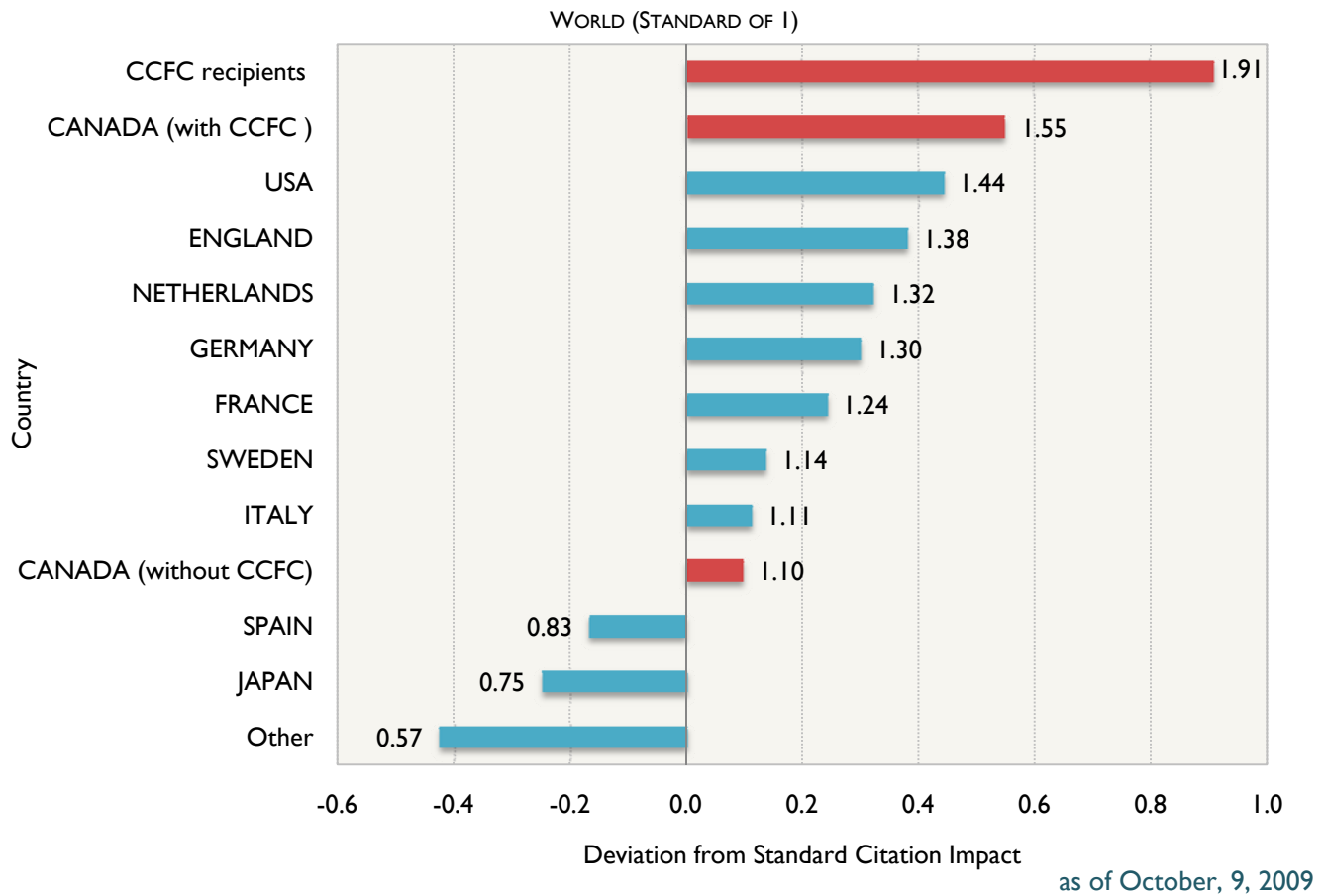
(Authors included in the CCFC totals are all researchers ever associated with CCFC – including Innovation Grant and fellowship recipients).

Citation Impact in IBD (2004-2009)  
Top 10 Countries



as of October, 9, 2009

## IBD Citation Impact in the World (2004-2009)



## IBD-Related Publications in Top Countries (2004-2009)

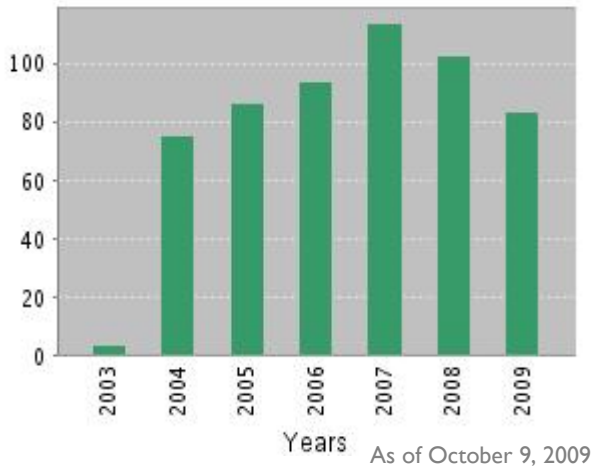
15,459 Publications

<b>World</b>	<b>15,459</b>
USA	4,962
GERMANY	1,634
JAPAN	1,456
ENGLAND	1,393
ITALY	1,067
CANADA (with CCFC recipients)	1,011
FRANCE	829
SPAIN	588
CCFC recipient contributions	562
NETHERLANDS	548
SWEDEN	523
CANADA (without CCFC recipients)	449

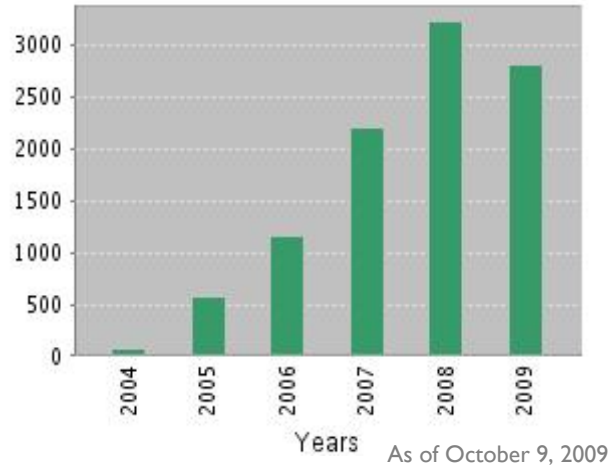
Source ISI

► Trends of CCFC Recipient Contributions in Scientific Publications

**Published Items in Each Year**



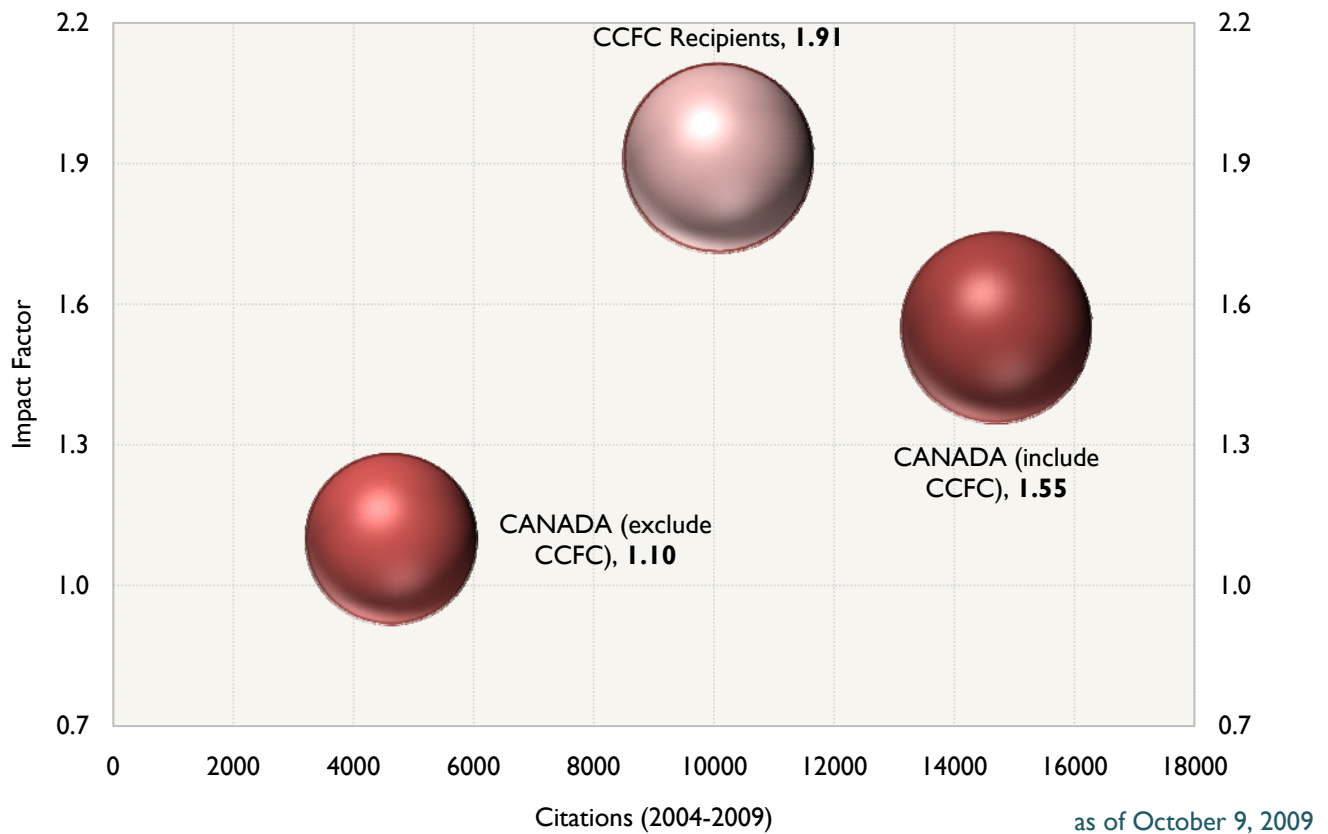
**Citations in Each Year**



Source ISI

The following simplified chart plots a subset of the data on non-CCFC authors and CCFC authors on the number of publications only by average impact factors.

Citation Impact in IBD (2004-2009)  
Canada



In terms of advancing knowledge, CCFC has contributed substantially to IBD research on both national and international levels.

## ► Highly Cited Institutions

IBD International Publications by Top Institutions  
2004-2009 15,459 Records

Institutions that received support from CCFC

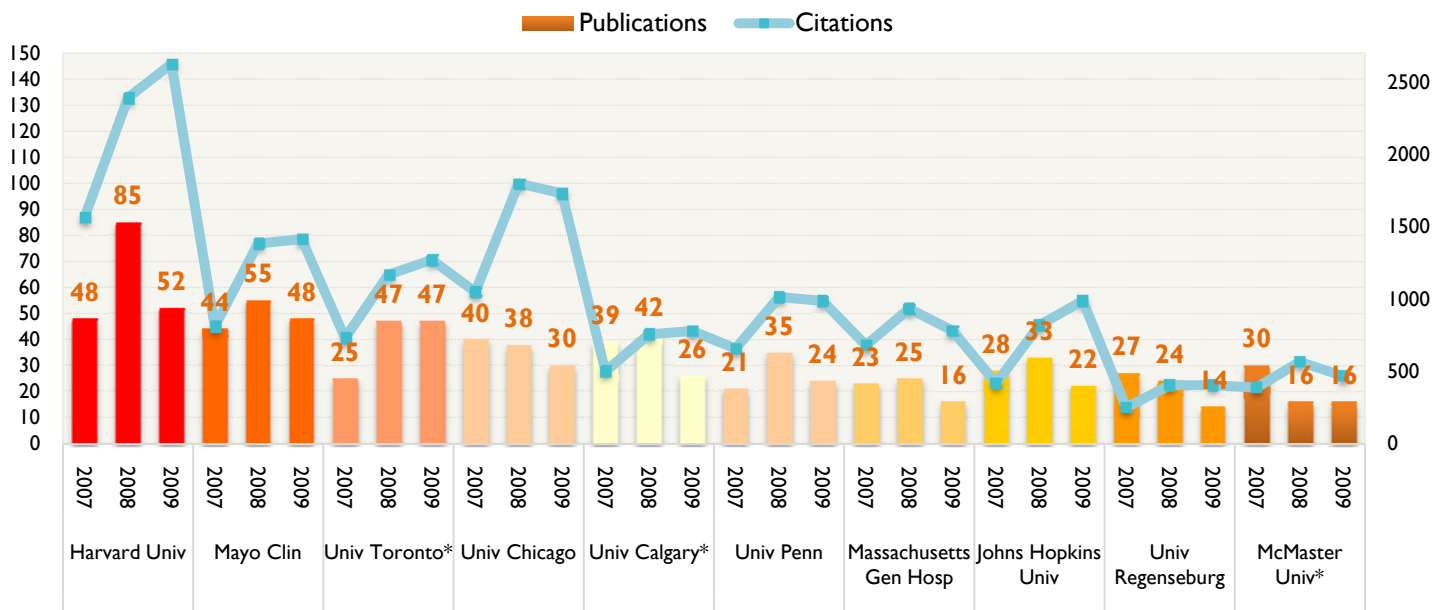
Rank	Institution Name	Record Count	% Increase of Average Citations (2007-2009)
1	Harvard University	397	35.5
2	Mayo Clinic	228	37.6
3	University of Toronto	221	-7.9
4	University of Chicago	204	54.5
5	University of Calgary	172	57.3
6	University of Pennsylvania	150	23.9
7	Massachusetts General Hospital	134	39.4
8	Johns Hopkins University	126	66.7
9	University of Regensburg	123	67.9
10	McMaster University	122	55.8
25	McGill University	102	
33	University of Alberta	91	
50	University of British Columbia	75	
51	University of Manitoba	74	
57	University of Montreal	69	
87	Mount Sinai Hospital	57	
90	University of Western Ontario	55	
105	Hospital for Sick Children	51	
233	Queen's University	27	
308	University of British Columbia Hospital	21	

◀ The international ranking of contributing institutions was compiled from ISI data.

CCFC supports Canadian institutions that are top and budding international contributors in IBD publications. Among them, the University of Calgary had a 57% increase in average citations within 2 years (2007-2009) surpassing international institutions like Harvard University in United States and University of Regensburg in Germany. The University of Toronto, University of Calgary and McMaster University are among the top 10 IBD publication contributors.

As of October 27, 2009

## Trends of Top IBD Publication Institutions



► Top Funding Agencies of IBD-Related Publications

The IBD-related international publications were collected from the ISI Web of Knowledge database using the primary keywords Crohn's disease, Ulcerative Colitis and Inflammatory Bowel Disease (IBD).

As observed in the chart below, CCFC ranks 4<sup>th</sup> in the top 500 funding agencies for the support of international IBD-related scientific publications. CCFC funded 30 publications in 2007 to 2009, 25 of which were published in 2009. Following the Canadian Institutes of Health (CIHR), CCFC is a top contributor of IBD scientific publications in Canada and in the world.

as of April 5, 2010

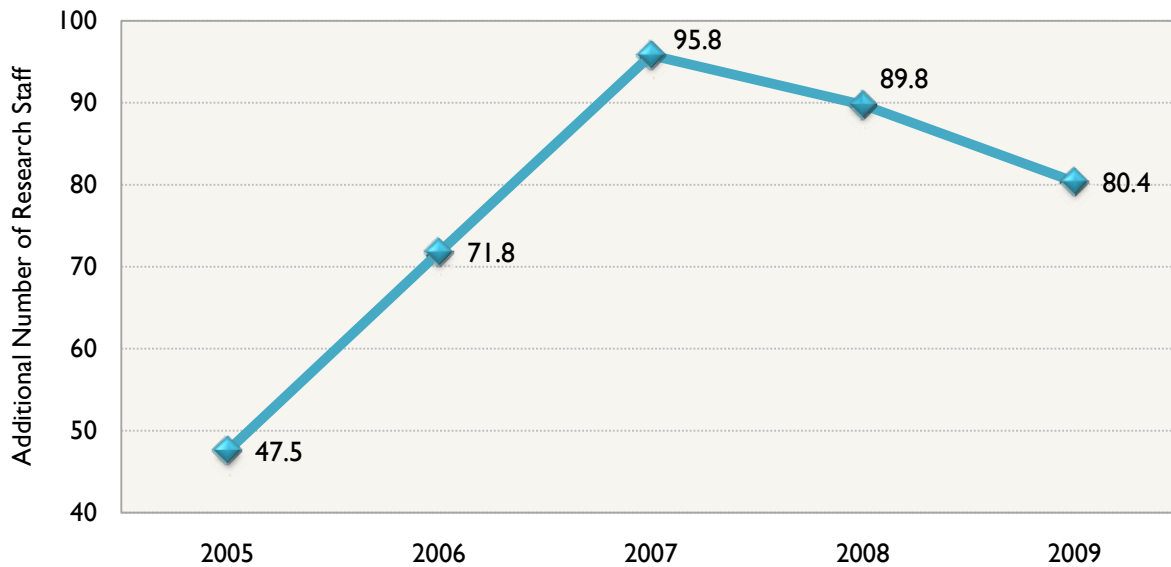
CUMULATIVE RANK	FUNDING AGENCY	SUM (2007-2009)	2007 (2,689 RECORDS)	2008 (2,926 RECORDS)	2009 (2,310 RECORDS)
1	National Institutes Of Health (NIH)	77	0	29	48
2	Crohn's And Colitis Foundation Of America (CCFA)	34	0	11	22
3	Canadian Institutes Of Health (CIHR)	32	0	9	25
4	<b>Crohn's And Colitis Foundation Of Canada (CCFC)</b>	30	0	7	23
5	Abbott Laboratories (Abbott Park Illinois USA)	28	0	3	27
6	Eli And Edythe Broad Medical Foundation	27	3	7	16
7	Centocor Inc	21	0	9	14
8	Deutsche Forschungsgemeinschaft Germany	21	1	6	15
9	Wellcome Trust	18	0	8	11
10	Schering Plough	16	0	10	8
11	UCB Pharma	16	0	4	14
12	AstraZeneca	13	0	4	10

# CAPACITY BUILDING

## PERSONNEL

### ▶ ADDITIONAL RESEARCH STAFF

Additional Research Staff Funded by CCFC through Grants in Aid of Research



In the chart above, the 2005 total reflects only two years of staffing levels. The total does not include staffing on GIAs starting in 2003. For the rest of the years listed, staffing represents GIA staffing for years one through three. The chart illustrates the important role CCFC plays, via GIA funding, in funding a growing number of IBD-focused junior researchers who go on to apply for national and provincial research competitions.

See the sections, “[Current Funding Program Overview](#)” and “[Capacity Building: Funding](#)” for CCFC’s current national and provincial partnerships to build research capacity across the full career trajectory in IBD research.

## ► EMERGING RESEARCH CAPACITY

The future research capacity in IBD research relies heavily on the emerging experts in gastroenterology. In Canada, there are 14 universities that offer residency programs and research training in adult and pediatric gastroenterology. The Gastrointestinal Sciences Graduate Program within the University of Calgary also offers master and doctoral education in gastrointestinal sciences. These programs are accredited by the Royal College of Physicians and Surgeons of Canada (RCPC).

UNIVERSITY	EDUCATION		IBD RESEARCH GROUP(S)
	Adult Gastroenterology	Pediatric Gastroenterology	
Dalhousie University	Residency Training	-	Dalhousie Inflammation Group (DIG)
Laval University	Residency Training	-	-
McGill University	Residency Training, Research Fellowship, Clerkship Elective	Residency Training, Fellowship, Clerkship Elective	McGill Research Group in IBD, McGill University Health Centre
McMaster University	Residency Training	-	Inflammatory Bowel Disease Clinic, Farncombe Family Digestive Health Research Institute
Queen's University	Residency & Research Training	-	Gastrointestinal Disease Research Unit (GIDRU)
University of Alberta	Residency Training, Research Fellowship	Residency Training	Gastrointestinal and Liver Disease Research Group (GILDR), The Centre of Excellence for Gastrointestinal Inflammation and Immunity Research (CEGIIR)
University of British Columbia	Residency Training	Residency Training	-
University of Calgary	Residency Training, Master's and Doctoral Degree in Gastrointestinal Sciences	Residency Training	Gastrointestinal Research Group (GIRG), Inflammation Research Network, Calvin, Phoebe and Joan Snyder Institute of Infection, Immunity and Inflammation
University of Manitoba	Residency Training	Residency Training, Clerkship Elective	IBD Clinical and Research Centre
University of Montreal	Residency Training	Residency Training	Molecular and Genetic Basis for Gut-Associated Mucosal Inflammation Research Unit, Gastroenterology and Nutrition Laboratory, Digestive Pathophysiology Network (VRQ)
University of Ottawa	Residency Training	-	Digestive Diseases Research Group
University of Sherbrooke	Residency Training, Research Fellowship	-	-
University of Toronto	Residency Training	Residency Training	Keenan Research Centre – Clinical Research Program in Gastroenterology
University of Western Ontario	Residency Training	-	Robarts Research Institute

In aims of nurturing the emerging research capacity in Canada, CCFC consistently contributes to IBD-related research training in the above institutions. Through studentship and fellowship programs, CCFC funding facilitated research training in junior, doctoral, and postdoctoral levels. Surgical training related to IBD will be considered for inclusion in future editions of the Research Report Card.



► RESEARCH AND RESEARCH – RELATED STAFF IN CANADA

According to the Canadian Association of Gastroenterology (CAG), there were approximately **550 gastroenterologists** in 2002 or 1.83 specialists per 100,000 population. The 550 included at least 50 hepatologists whose practices include few or no IBD patients. This figure is also relatively low in comparison with the US, France and Australia. Considering the estimated retirement rate of 18% in the next 5 years (33% in the next 10 years) and the current gastroenterologists in training, it is predicted that within 10 years there will be 10% fewer GI specialists. These figures are startling since it influences the adequacy and timeliness in the delivery of gastroenterological health care services to all afflicted Canadians.<sup>1</sup>

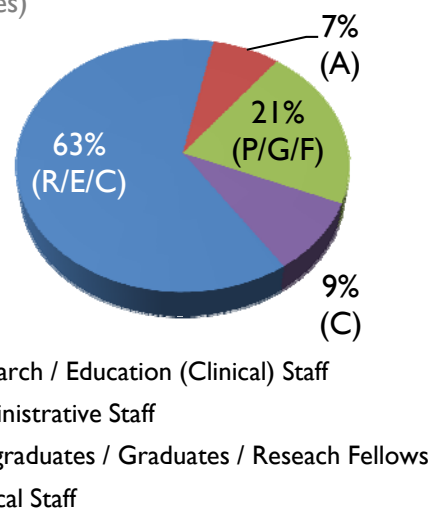
It was reported that there were approximately **64 pediatric gastroenterologists** in 2005 (Morinville, 2007).

Within the education institutes that offer gastroenterology training, there are more than **700 staff** and students in education, research, clinical and administrative roles.

Provincial Distribution of Gastroenterology Staff in Universities (Estimates)

\*\* estimated from university staff listings

PROVINCE	STAFF
Ontario	302
Alberta	154
Quebec	>117
British Columbia	64
Manitoba	42
Nova Scotia	24
Estimated Total	>703



Provincial Distribution of Pediatric Gastroenterologists, 2005

PROVINCE	TOTAL PEDIATRIC GI'S
Ontario	23
Quebec	16
Alberta	11
British Columbia	6
Nova Scotia	3
Manitoba	2
Newfoundland and Labrador	1
New Brunswick	1
Saskatchewan	1
Total	64

► In the history of CCFC, **476** researchers of interdisciplinary backgrounds were funded. **221 (or 46.4%)** of the CCFC funded researchers were *students or postgraduate fellows*.

CCFC's continuing efforts in building the emerging research capacity in IBD, will contribute in averting the crisis of declining GIs in Canada.

<sup>1</sup> Canadian Association of Gastroenterology (CAG), "Access to Digestive Health Care in Canada", 2008

Currently, there are approximately 30 research institutes that conduct IBD-related research in Canada.

Province	Region	University / Hospital Affiliation	Estimated CCFC Amount (99-09)	IBD Research Institutes
Alberta	Edmonton	University of Alberta	\$ 2.6 million	Northern Alberta Clinical Trials and Research Centre
				The Centre of Excellence for Gastrointestinal Inflammation and Immunity Research (CEGIIR) <ul style="list-style-type: none"> <li>Zeidler Gastroenterology Health Centre</li> </ul>
	Calgary	University of Calgary	\$ 8.9 million	Calvin, Phoebe and Joan Snyder Institute of Infection, Immunity and Inflammation; with Calgary Health Region
				GIRG Gastrointestinal Research Group
				Inflammation Research Network (includes the CIHR Proteases and Inflammation Network (PAIN) Group)
University of Alberta / University of Calgary	\$201,000	Alberta Children's Hospital Foundation Research Institute		
		Alberta Health Services		
British Columbia	Vancouver	University of British Columbia	\$ 2.4 million	-
		B.C. Children's Hospital	\$690,000	Child and Family Research Institute
				Children with Intestinal and Liver Disorders Foundation
Saskatchewan	Saskatoon	University of Saskatchewan	\$145,000	-
Manitoba	Winnipeg	University of Manitoba	\$ 1.2 million	IBD Clinical and Research Centre
Ontario	Hamilton	McMaster University	\$ 4.4 million	Farncombe Family Digestive Health Research Institute
				Hamilton Health Sciences - McMaster University Medical Centre
				Inflammatory Bowel Disease (IBD) Clinic - Digestive Diseases Clinic
				McMaster Children's Hospital - Division of Gastroenterology
	Kingston	Queen's University	\$ 3.4 million	Gastrointestinal Diseases Research Unit - Kingston General Hospital
	Guelph	University of Guelph	\$221,000	-
	London	University of Western Ontario	\$576,000	Robarts Research Institute
	Ottawa	University of Ottawa	-	Digestive Diseases Research Group
Toronto	Ryerson University	\$322,000	-	
	Centre for Addiction and	\$224,000	-	

		Mental Health		
		Mount Sinai Hospital	\$1.5 million	Dr. Zane Cohen Digestive Diseases Clinical Research Centre • Inflammatory Bowel Disease Group
		Hospital for Sick Children	\$725,000	Samuel Lunenfeld Research Institute Hospital for Sick Children Research Institute
		University of Toronto	\$2.9 million	University Health Network • Toronto General Hospital
				St. Michael's Hospital • Keenan Research Centre - Clinical Research Programs: Gastroenterology
Quebec	Montréal	University of Sherbrooke	\$1.7 million	-
		McGill University	\$2.2 million	McGill University Health Centre (MUHC) Institute
				Montreal General Hospital
				Montreal Children's Hospital
University of Montréal	\$2.0 million	Sainte-Justine University Hospital Center • Sainte-Justine Hospital Research Centre • Digestive Pathophysiology Network (VRQ) • Gastroenterology and Nutrition Laboratory • CIHR Group on Intestinal Disorders • Molecular and Genetic Basis for Gut-Associated Mucosal Inflammation Research Unit		
Nova Scotia	Halifax	Dalhousie University	\$ 1.8 million	IWK Health Centre

## FUNDING

CCFC has a growing number of partnership agreements at the national and provincial level. These provide greater visibility and prestige for the awardees. To build research capacity across the full career trajectory, CCFC has found partners to fund at increasing higher levels of commitment in both duration and remuneration. The oldest such partnership for the CCFC has been brokered by the Canadian Association of Gastroenterology and matches CCFC funds with funds from the Institute of Nutrition, Diabetes and Metabolism of the CIHR. The following table maps the progress and growth of this partnership which spans all levels of trainees from summer studentships for PhD and MD students under the supervision of an IBD researcher and/or clinician to long-term (maximum of four years) career transition awards crucial to getting new faculty members into faculty positions with protected research time.

YEAR	NUMBER OF AWARDS	AWARDS (MATCHED FUNDING WITH CIHR)	CCFC FUNDS MATCHED 1:1 (APPROX.)
2009	20	8 Fellowships, 12 Summer Studentships	\$358,500
2008	20	8 Fellowships, 12 Summer Studentships	\$283,500
2007	17	5 Fellowships, 12 Summer Studentships	\$300,000
2006	11	5 Fellowships, 6 Summer Studentships	\$230,000
2005	8	2 Fellowships, 6 Summer Studentships	\$150,000
2004	2	Fellowships	\$132,000
2003	2	Fellowships	\$96,000
2002	1	Fellowship	\$62,000
2001	1	Fellowship	\$30,000

CCFC matched funds reported by CAG: nearly *\$2.19 million* in support of IBD investigators.

Currently, Fellowships last two years and New Investigator Awards are also called “Career Transition Awards” lasting up to four years while the investigators are developing a track record of success in receiving peer-reviewed grant funding. The Summer Studentships have served well as a feeder program to attract new people to IBD research. A larger percentage of people applying for CAG-brokered funding (where other organizations such as pharmaceutical companies also co-fund with CIHR) are looking at questions relevant to IBD.

Memoranda of understanding currently exist with the following provincial research funding organizations:

PARTNER	MEMORANDA SIGNED ON	CURRENT RECIPIENT(S)	PROJECT TITLE	CCFC FUNDING IN 2009	PARTNER FUNDING IN 2009
Fonds de la recherche en santé Québec (FRSQ)	June 2008	<b>Isabelle Frechette</b> <i>University of Sherbrooke</i>	Role of isoformes p200 and p110 of Cux1 in the progression of colorectal cancer and the inflammation response of intestinal epithelial cellules	\$10,000	\$10,000
Alberta Heritage Foundation of Medical Research (AHFMR)	October 2008	<b>Marie Claire Arrieta</b> <i>University of Alberta</i>	The Role of Small Intestinal Permeability in the Pathogenesis of Colitis	\$3,500	\$3,500
		<b>Brian Gulbransen</b> <i>University of Calgary</i>	Enteric Glial P2X7 Receptors in Inflammatory Bowel Disease	\$5,000	\$5,000
Michael Smith Foundation for Health Research (MSFHR) in British Columbia	April 2009	<b>Megan Himmel</b> <i>University of British Columbia</i>	Functional characterization of T cells and T regulatory cells in Inflammatory Bowel Disease	\$5,573	\$5,573
		<b>Marta Wlodarska</b> <i>University of British Columbia</i>	The role of microbiota in susceptibility to inflammatory bowel disease.	\$11,250	\$11,250

See the section, “Current Funding Program Overview” for CCFC’s current national and provincial partnerships.

► National Funding in IBD Research (1999-2009)

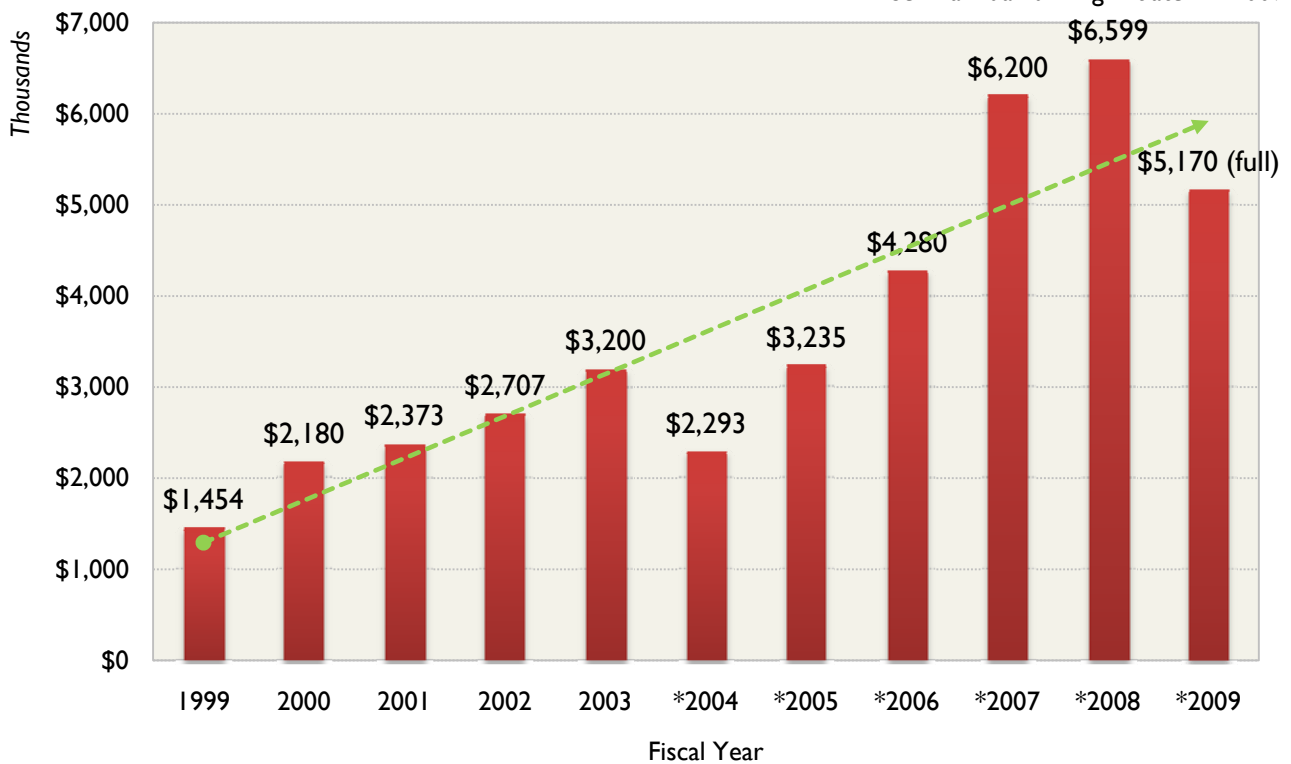
CCFC contributed a total of **\$61 million** in IBD research since it was founded in 1974. In the last decade (1999-2009), CCFC contributed approximately **\$40 million** in IBD-related research through the Grants-in-Aid of Research (GIA) program, innovation grants, and the GEM project. From a funding amount of \$1.45 million in 1999 to nearly \$5.2 million in 2009, CCFC funding increased with an overall growth rate of **13.5%** (assuming compound annual growth). Within the period of 2005 to 2009, CCFC's funding through the three programs has totaled approximately **\$25 million**. This amount constitutes nearly **62%** of the funding in the last decade. CCFC is accelerating efforts enabling IBD-related research to grow in Canada in pursuit of its mission to find the cure.

CCFC Funding Trend 1999-2009

≈ **\$40 million**

\*Grants in Aid of Research, Innovation Grants, GEM Project (excludes personnel awards)

\*\* Semi-annual funding initiated in 2009



► External Funding in IBD Research in Canada (1999-2009)

This dimension illustrated the increasing attention of governmental and scientific agencies in enabling IBD-related research. In addition to funding trends, the contributions from external funding sources are compared to CCFC funding in the last ten years (1999-2009).

The statistics were compiled from the databases of external agencies for IBD-specific funding and interdisciplinary funding with IBD-related research. The table presented below is the summary of the IBD-related funding contributed from external sources in the last decade.

EXTERNAL FUNDING SOURCE	IBD-RELATED FUNDING
<p><b>Canadian Institutes of Health Research (CIHR)</b></p> <p>“CIHR is the Government of Canada’s agency responsible for funding health research in Canada. CIHR is also responsible in administering the Networks of Centers of Excellence and Canada Research Chair Programs. CIHR was created to fund research in priority areas; build research capacity in under-developed areas (population health, health services); train next generation of researchers; and focus on knowledge translation in health research.”</p>	\$52.9 million
<p><b>Canada Research Chairs (CRC)</b></p> <p>“The Canada Research Chairs program is a national strategy to make Canada one of the world’s top countries in research and development. With the establishment of 2000 research professorships, chair holders of degree-granting institutions are nominated in receiving funding to perform research that complements the institution’s strategic plan.”</p>	\$22.0 million
<p><b>Canada Foundation of Innovation (CFI)</b></p> <p>“CFI supports Canadian universities, colleges, research hospitals, and non-profit research institutions in: attracting highly skilled research personnel; training of Highly Qualified Personnel through research; and ensuring the optimal use of research infrastructure. CFI creates the necessary conditions for research innovation, spin-off ventures and commercialization of discoveries.”</p>	\$21.9 million
<p><b>The Broad Foundation [US funding in Canada]</b></p> <p>“The Eli and Edythe Broad Foundation provide 40 percent of all private funding for IBD research in the United States. Our approach is different than many traditional scientific and medical funding organizations. We fund early stage investigation – with the goal that innovative ideas need financial support for early testing to ultimately lead to effective treatment, diagnosis and prevention of IBD.”</p>	\$1.4 million
<p><b>Natural Sciences &amp; Engineering Research Council of Canada (NSERC)</b></p> <p>“NSERC invests in people, discovery and innovation through programs that support both basic university research through discovery grants and partnerships among universities, governments and the private sector. NSERC is the national instrument for making strategic investments in Canada’s capability in science and technology.”</p>	\$885,000
<p><b>National Institutes of Health (NIH) [US funding in Canada]</b></p>	\$510,000

## ► Additional Research Funding

In the past decade, the research activity funded by the CCFC has attracted additional funding from external funding sources. From 1999 to 2009, **\$24.8 million** (or **58%**) of the CCFC funding attracted approximately **\$49.2 million** of additional funding in IBD-related research.

The additional research projects are further classified into the following five (5) categories:

### A Follow-on Funding

Many researchers were able to utilize the conclusions derived from CCFC-funded research in proceeding projects. The external research project must be funded during or after the CCFC funded project. It must also be conducted by the same researcher. However, the researcher could be involved as a principal investigator, co-investigator, or supervisor. In comparison to the content of the CCFC-funded project, follow-on projects should have:

- Identical or similar content
- A specific subcategory with relevancy to IBD
- Continuing content
- A broader or generalized content with relevancy to IBD

*Researcher:* Dr. Arturas Petronis

Dr. Petronis started his research in epigenetic misregulations of genes with the CCFC Grants-in-Aid of Research grant. His succeeding study, funded by CIHR and the Broad Foundation, is an expansion of the CCFC project in identifying more epigenetic differences in Crohn's disease.

*CCFC Project:*

**[2000-2003]** Epigenetic regulation of the tumor necrosis factor alpha gene in Crohn's disease ≈\$150,000

*Attracted Research:*

**[2009-2012]** (CIHR) Epigenomic studies of twins discordant for Crohn's disease - \$107,201

**[2009-2010]** (Broad) Epigenomic studies of twins discordant for Crohn's disease

### B Contributed Funding

Other than the attraction of external funding, CCFC funding contributes in career building of researchers and the increase of research attention in specific IBD-related projects.

*Researcher:* Dr. Derek McKay

Dr. McKay's research in gut inflammation with the CCFC, contributed to his recognized success in the field of gastroenterology. In 2009, he was nominated by the University of Calgary for a Canada Research Chair position in gastrointestinal disease.

*CCFC Project:* **[1996-2006]** Projects in gut inflammation ≈ \$574,000

*Nomination:* **[2009-2012]** (CRC) Canada Research Chair in Gastrointestinal Disease – \$800,000

### C Matched Funding

A matched project from external funding sources has similar content as a CCFC funded project. The projects must start simultaneously in this category of funding. In general, matched funding is not limited to projects or researchers affiliated in a CCFC partnership.



*Researcher:* Dr. Marinieve Montero

*CCFC Project:* [2008-2010] Bacterial activation of toll-like receptors and maladaptive tissue repair – \$62,500

*CIHR Project:* [2008-2010] Modeling intestinal fibrosis in Crohn's disease: Maladaptive tissue repair driven by bacterial activation of toll-like receptors – \$50,000

#### D Support Funding

Support funding complements and provides additional resources for CCFC funded projects. It could be funding for related materials, equipment, and infrastructure.

*Researcher:* Dr. Emma Allen-Vercoe

*CCFC Research:*

[2006-2009] Association of *Fusobacterium nucleatum* infection with IBD: host and bacterial interactions - \$305,000

*Supporting Funding in Infrastructure:*

[2006-2009] (CFI) Infrastructure for the study of gut microbial communities - \$197,533

#### E Attached Thematic Funding

Attached thematic projects refer to projects that migrated from IBD-related research to other fields of study (e.g. acute/chronic inflammation in other systems, autoimmune diseases and etiology). These projects must be funded during or after the CCFC funded project under the same researcher.

*Researcher:* Dr. Patricia Brubaker

*CCFC Research:*

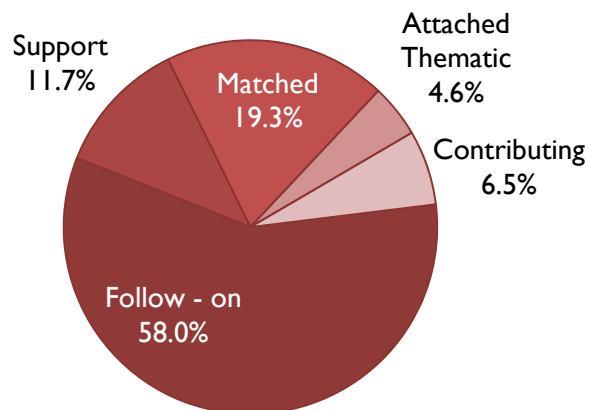
[1999-2002] Role of Glucagon-like Peptide-2 in the Treatment of IBD ≈\$150,000

*Attached-Thematic Research:*

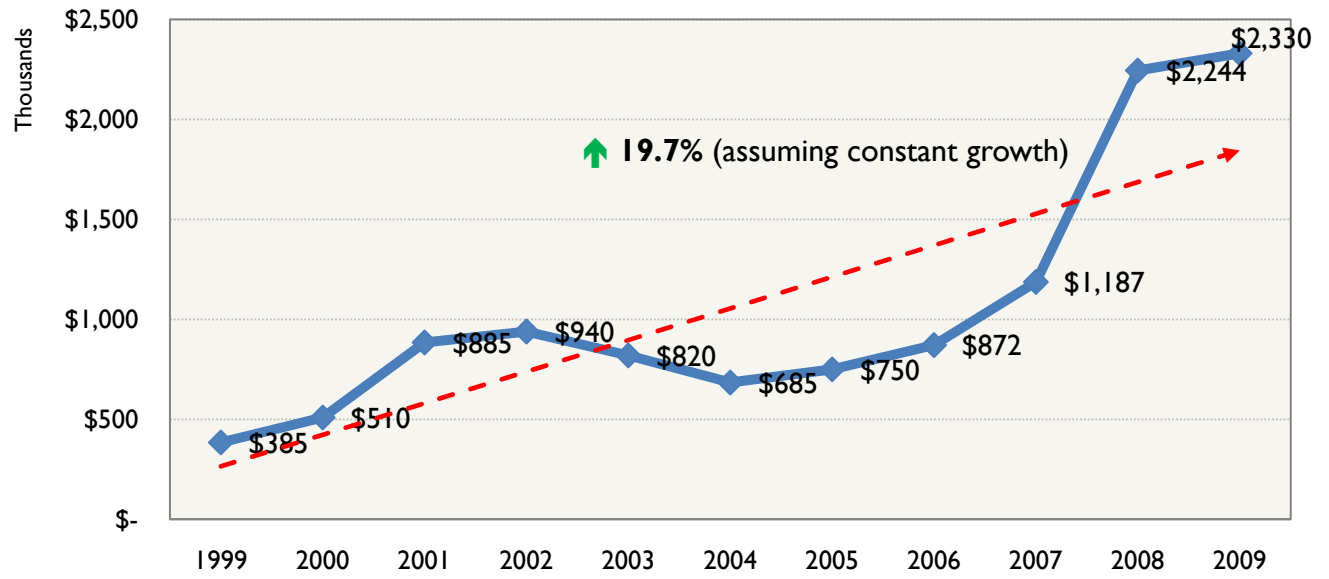
[2009] (CIHR) Role and mechanism of action of the intestinotrophic hormone, glucagon-like peptide-2, in colonic growth and neoplasia - \$99,395

CCFC Funding Categorized by Type of Additional Funding (1999-2009)

\* excluding combined categories



Additional Funding Attracted by CCFC Research (1999-2009)  
\$49.16 million



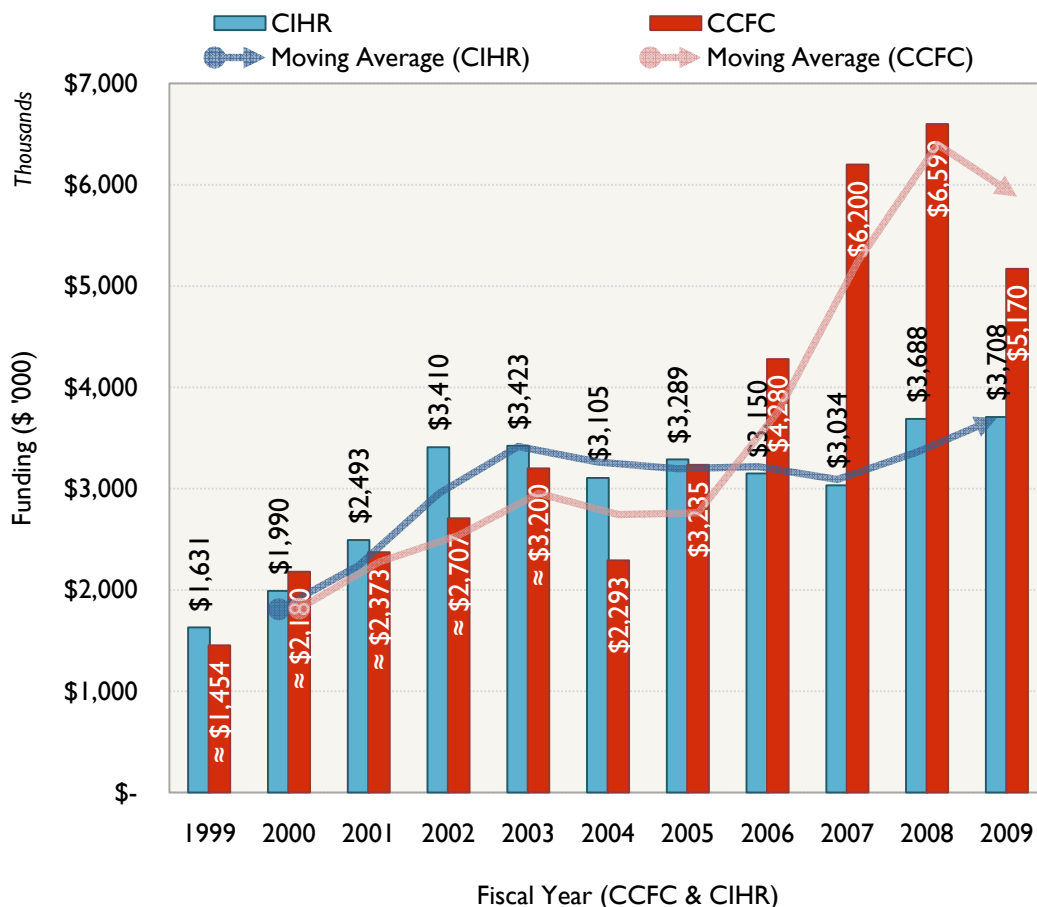
## BENCHMARKING

### ► CCFC vs. CIHR funding

The chart below was constructed using individual project data for both CIHR (operating grants) and CCFC (Grants-in-Aid of Research, Innovations in IBD project awards and the GEM Project). The CIHR data was extracted from the CIHR Research Database and the Canadian Research Information System (CRIS). The raw data was compiled using the screening words: inflammatory bowel disease, Crohn's disease, ulcerative colitis, colitis, intestinal/gastrointestinal/colon/gut/bowel/mucosal inflammation. All CRC awards were excluded from the preliminary search. For the time period between 1999 to 2009, 1772 unique results (projects divided by fiscal year) were collected. The preliminary search summed up to a funding amount of approximately **\$1.46 billion**. The results that did not contain the primary keywords were individually assessed for its relevance to IBD. As a result, 720 unique results (projects divided by fiscal year) were IBD-related research projects. The final results yield approximately **\$61.5 million** of CIHR funding in operating grants, personnel awards, team projects, and equipment/maintenance grants. Operating grants accumulated to nearly **\$32.9 million** of CIHR funding in the past decade.

Beginning in 1999, the funding contributed by CCFC and CIHR (operating grants) in IBD research was similar in magnitude. Up until 2006, CCFC's funding in the Grants-in-Aid of Research program, Innovations in IBD program and the GEM project surpassed CIHR by nearly \$1-3 million per year.

Comparing CCFC and CIHR Funding in IBD Research (1999-2009)



CCFC funding includes:

- Grants-in-Aid of Research
- Innovations in IBD Awards
- GEM Project

CIHR funding includes:

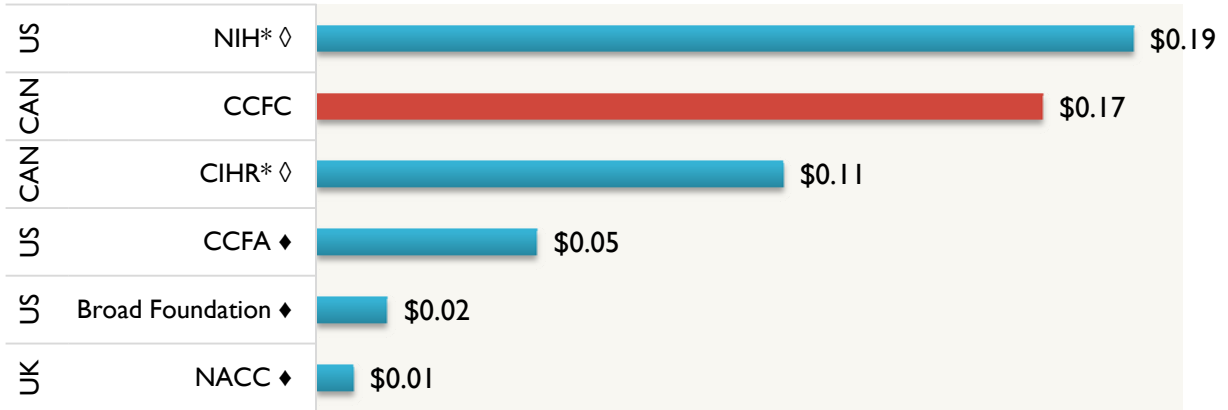
- Operating Grants
- Individual Group Project - Operating
- CIHR/CAG Operating Grants
- CIHR/Regional Partnership Program Operating Grants
- Operating Grant Priority Announcements
- CIHR/Rx&D Research Program Operating Grants

National comparisons using data on total research spending among different governmental (asterisked\*) and non-governmental funders of IBD research show that in 2008/2009, CCFC was the highest non-governmental funder per capital of research in IBD.

Dollars Spent on IBD Research Per Capita (2008-2009)

(♦ 2008 figures)

(◇ funding only in research and operating projects)

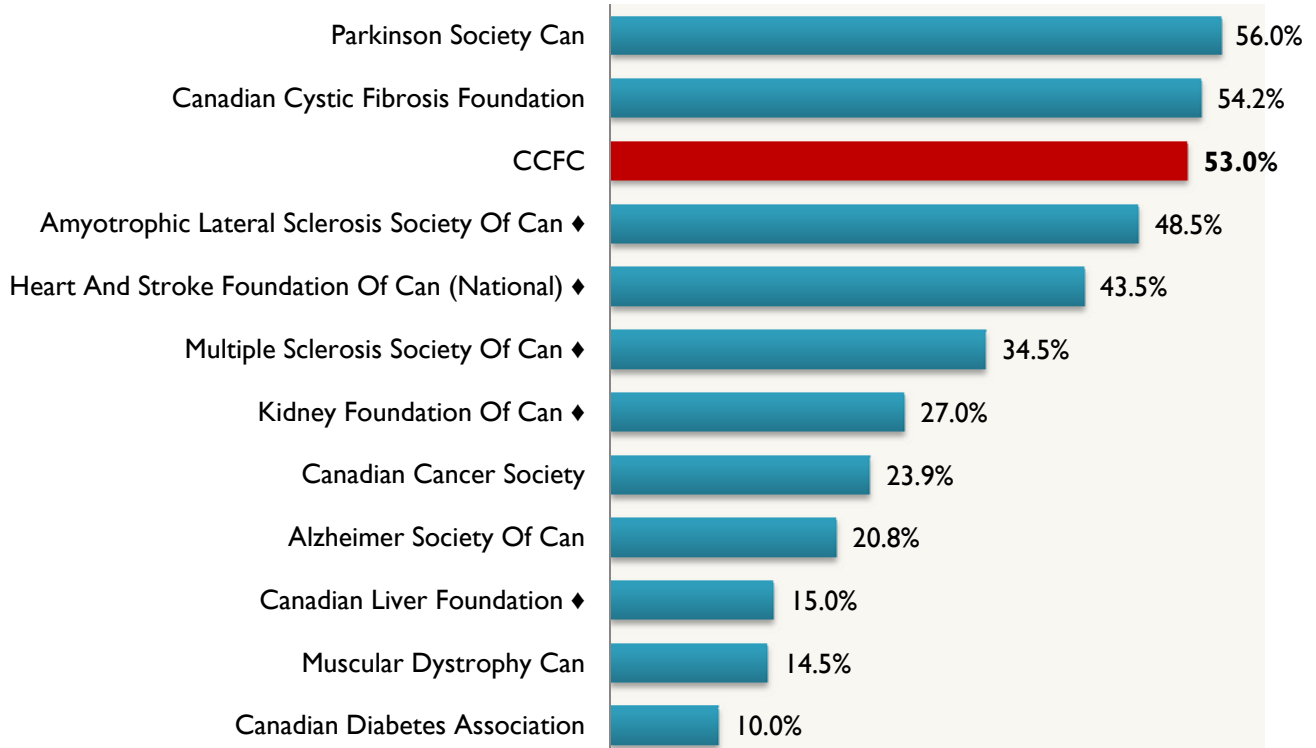


► Benchmarking Against other Canadian National Voluntary Health Organizations

The chart above was created using published data in the annual reports of the listed foundations calculating the percentage of total revenue spent on research. CCFC ranks third on this metric when compared with other Canadian National Voluntary Health Organizations using 2007/2008 and 2008/2009 annual report data.

Percentage of Total Revenue Spent on Research (2008-2009)

(♦2008 figures)



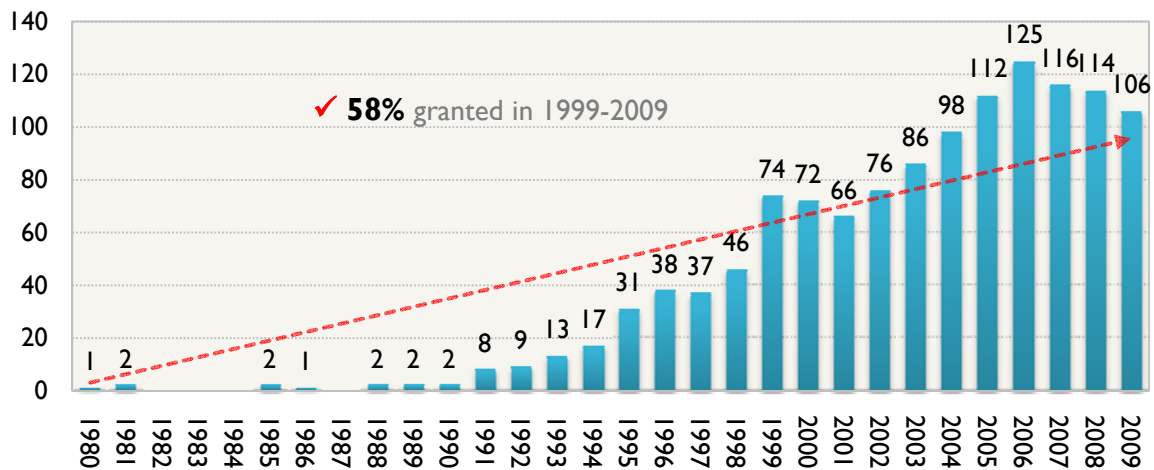
► PATENT ANALYSIS

INTERNATIONAL

This dimension illustrates the level in which research is being used and adopted by the industry for innovation. International applications to patents (IAs) in IBD and gastrointestinal inflammation were compiled from Delphion, the World Intellectual Property Organization (WIPO) and the Canadian Intellectual Property Office (CIPO).

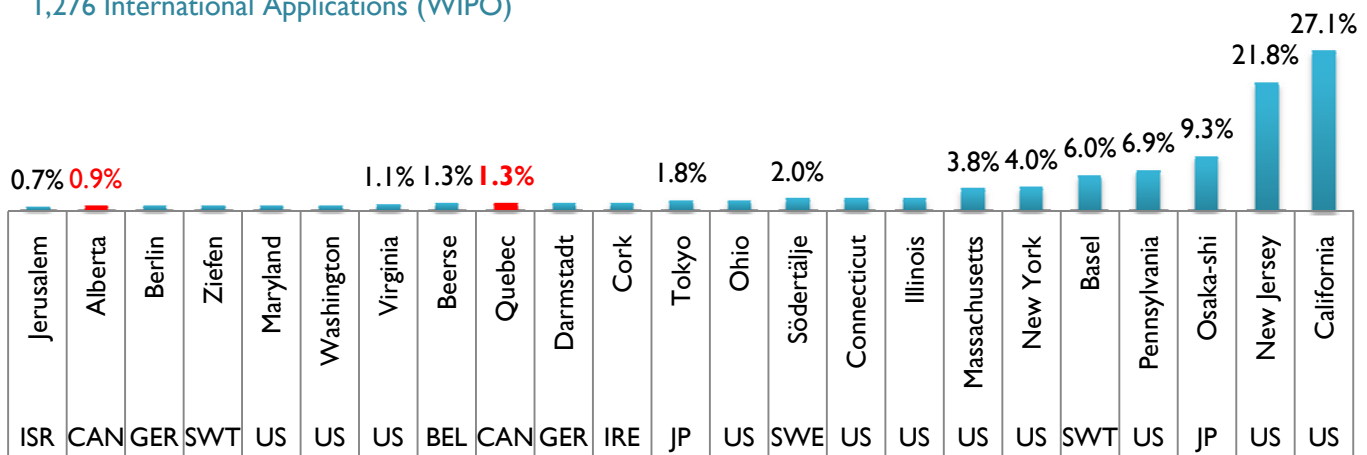
In 1999-2009, there were 3,091 IBD-related IAs worldwide (including WIPO, US and European applications). 1,276 of which were registered on WIPO. Observing the 20-year timeline of the WIPO IAs, the number of IBD-related international patent applications experienced an average annual growth of approximately 18%. In the past decade the transition between biomedical/clinical research to industry innovation became more apparent, approximately 58.3% (or 1,804 patents) of the international applications were granted.

Trend in IBD International Patent Applications (WIPO)



At the international level, California, New Jersey, and Osaka (Japan) are the major regions of the top IBD-related IA applicants registered on WIPO. These regions are, however, home to headquarters of many major pharmaceutical companies. Quebec and Alberta are further down the list behind these major regions.

Top 50 Applicants  
1,276 International Applications (WIPO)



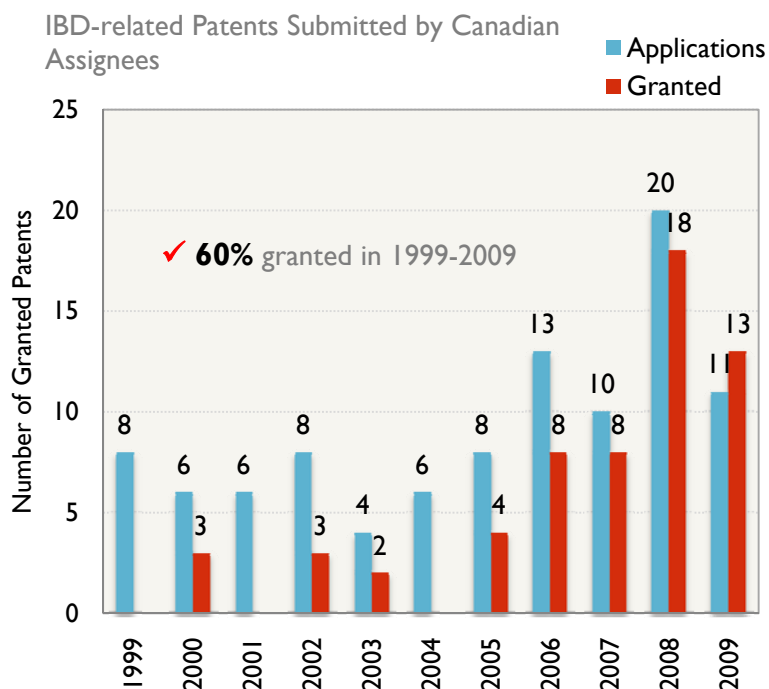
## CANADA

Canada ranks 8<sup>th</sup> in the top 10 countries for IBD-related patent applications registered with WIPO. The titles and abstracts of the international patent applications were screened with the primary keywords: inflammatory bowel disease, colitis, ulcerative colitis, Crohn's disease, gastrointestinal inflammation. Applications assigned by Canadian applicants were further assessed for its relevance to IBD.

In total, there are roughly 100 international, U.S. and European applications submitted by Canadian applicants in the field of IBD and gastrointestinal inflammation. CCFC-affiliated researchers participated in the invention of approximately 32% of these IAs.

APPLICANT	IA	CCFC-AFFILIATED CO-INVENTOR
Hopital Sainte-Justine	Optimized use of 6-mercaptopurine drug in the treatment of immune-mediated gastrointestinal disorders	Seidman, Ernest G.
Antibe Therapeutics Inc.	Derivatives of 4-or 5-aminosalicylic acid	Wallace, John, L.
	Salts of trimebutine and n-desmethyl trimebutine	
McMaster University	Salt of 4- or 5- aminosalicylic acid	Bienenstock, John
	Probiotics to inhibit inflammation	
Ellipsis Biotherapeutics Corporation	Polymorphisms of the octn1 and octn2 cation transporters associated with inflammatory bowel disease	Siminovitch, Katherine, A.
The Hospital for Sick Children	Susceptibility gene for inflammatory bowel disease	Muise, Aleixo
University of Manitoba	Microbial markers of inflammatory bowel disease	Krause, Denis, O. Bernstein, Charles, N.

In the past decade, approximately 60% of the IBD-related international, US and European patent applications submitted by Canadian assignees were granted. CCFC-affiliated researchers (**Dr. Ernest Seidman** and **Dr. John Wallace**) participated in the application and/or invention of approximately 22% (or 13) of the granted patents. Dr. Seidman is also the Canadian inventor with the most granted patents in the past decade.



INVENTOR CITY	GRANTED PATENTS IN 1999-2009
Montreal	12
Calgary	11
Côte St. Luc	8
Toronto	7
Edmonton	4
Laval	3

PROVINCE	GRANTED PATENTS IN 1999-2009
Quebec	26
Alberta	15
Ontario	13
B.C.	3
Nova Scotia	2
Saskatchewan	1

## ► DRUG DISCOVERY IN IBD

According to Thomson Pharma, there are currently **56** pharmaceutical products launched for IBD-related diseases worldwide. Within a total of **439** products, **87** products are in clinical phases and **68** products are in the discovery stage.

Internationally, there are **295** companies involved in the development of pharmaceutical products for IBD-related diseases. The table below is a list of major companies according to their number of products under discovery.

COMPANY	PRODUCTS IN DISCOVERY
Not Assigned	10
Isis Pharmaceuticals Inc	9
UCB Celltech	7
AstraZeneca plc	6
Novartis AG	5
PDL BioPharma Inc	5
Sterling Winthrop Products Inc	5
Cosmo Pharmaceuticals SpA	5
Inotek Pharmaceuticals Corp	5
Pfizer Inc	4
Immunex Corp	4
NicOx SA	3
Antibe Therapeutics Inc	1
University of Alberta	1

► **Dr. John Wallace**, director of the Farncombe Family Digestive Health Research Institute at McMaster University, founded NicOx, Antibe Therapeutics Inc. and co-founded Glnova Pharma. Antibe Therapeutics Inc. and Glnova Pharma are Canada-based with focus on the development of novel therapies for digestive disorders.

The following table is a list of the main technologies used in the discovery of pharmaceutical products for IBD-related diseases worldwide.

MAIN TECHNOLOGY IN PHARMACEUTICAL PRODUCT	PRODUCTS (#)
Small molecule therapeutic	113
Oral formulation	104
Biological therapeutic	21
Monoclonal antibody, humanized	17
Natural product	15
Intravenous formulation	12
Monoclonal antibody human	12
Oligonucleotide antisense	11
Oral controlled release formulation	11
Subcutaneous formulation	10

## ▶ CANADIAN IBD-RELATED INDUSTRIES

The figure below shows the geographic clustering of IBD-related companies and the co-location of these industries with academic and research centers in Canada.

According to Industry Canada's Canadian Company Capabilities database, there are currently **22** IBD-related companies in Canada. They are concentrated in southern Ontario and Quebec, and also in Calgary and Vancouver in western Canada. These companies are primarily in pharmaceutical and medicine manufacturing, nutraceutical manufacturing and wholesaling, and R&D in life sciences.



In Canada, there are five (5) Canadian biopharmaceutical firms with IBD-related drugs in the marketing and development pipeline.

COMPANY	YEAR ESTABLISHED	REGION	R&D EXPENSES IN 2008 (IN MILLIONS CDN)	PRODUCT	INDICATION	DEVELOPMENT STATUS
Antibe Therapeutics Inc.	2004	Calgary, AB	Start up	ATB-429	IBD	Phase I
Westaim Corporation   Nucryst Pharmaceuticals	2005	Fort Saskatchewan, AB	\$ 4.6 million	NPI 32101	Ulcerative Colitis	Pre Clinical
Welichem Biotech Inc.	1995	Burnaby, BC	\$ 2.1 million	WBI-1062	IBD	Pre Clinical
Viron Therapeutics Inc.	1997	London, ON	Start up	VT-214	IBD	Pre Clinical
				VT-346	IBD	Pre Clinical
Paladin Labs Inc.	1996	Montreal, QC	\$ 5.5 million	Cortifoam (hydrocortisone acetate)	Ulcerative Colitis	Market



## INFORMING DECISION MAKING

At this point, many of the indicators on this dimension continue to be “aspirational.”

### ► RESEARCH POLICY

The “Burden of IBD in Canada” report published by the CCFC in November 2008 continues to be the “go to” document for the human and economic numbers related to IBD.

### ► PUBLIC EDUCATION

In addition to the public lectures given by IBDRI members at regional events (listed above in the Outreach section of the Administrative and Process Indicators section), CCFC’s knowledge translation efforts will inform and update members of different professional groups (e.g. family physicians) who, in turn, will educate a wider public. Dr. Gilaad (Gil) Kaplan of the University of Calgary presented on what family doctors should know about IBD at the Family Medicine Forum where in October, 2009. Over 2000 family doctors attend this national conference annually. Dr. Brian Bressler will be presenting on the same conference when it moves to Vancouver in the Fall of 2010.

### ► MEDIA

#### **CROHN’S AND COLITIS AWARENESS MONTH – NOVEMBER 2009**

CCFC’s public relations campaign for Crohn’s and Colitis Awareness Month was designed to generate branded regional and national coverage to develop public awareness about IBD and highlight CCFC’s strengths and its mission as an organization. A new youth initiative was introduced in the 2009 campaign to enhance public understanding of the rising levels of youth IBD and its impact in Canada. The Pediatric IBD Research Initiative currently being formulated by a cross-national team of pediatric gastroenterologists and facilitated by the CCFC was introduced and will continue to gather momentum entering 2010 and beyond.

The 2009 campaign program was comprised of four components: National media relations, regional spokesperson media tour, dignitary liaison, and the Gutsiest Canadian Contest. To accelerate the national media impressions, a number of regional media opportunities in high profile TV and radio broadcasts were coordinated. The media tour of local CCFC spokespeople also attracted an exceptional number of TV and radio interviews on CTV Noon News Edmonton, CTV Live at 5 Halifax, Breakfast Television Calgary etc. In addition, the newly introduced awareness video on YouTube was viewed over 4,700 times as of February 24, 2010. As a result of these efforts, the Crohn’s and Colitis Awareness Month 2009 secured more than 43 million media impressions, surpassing the 30 million in 2008.

The dignitary outreach program was also a success. It generated more than 66 official Proclamations and Letters of Support from all levels of government. Letters of support was received from Prime Minister Stephen Harper, Health Minister Leona Aglukkaq, Canadian Premiers, MPs, and Mayors.

Lastly, the 2<sup>nd</sup> Annual Gutsiest Canadian contest nominated more than 165 Canadians and seven outstanding regional winners were named. The contest also secured an impressive amount of TV, radio and print coverage.

In terms of dollars raised, there was a spike in numbers of donations in November – 56 donations, compared to 21 in October and 33 in September. The value of those donations was \$7,661 compared to \$2,965 in October and \$4,244 in September.

	2008	2009
Media Impressions	> 30 million (100 clips)	> 43 million (130 clips)
Dignitary Support	54 letters	66 letters
Print and Online Media	75 print	120 print
Television and Radio	30 stories (> 2.9 hours of broadcast coverage)	21 stories
YouTube	-	4,700 views (as of February 24, 2010)

The following table is a breakdown of the impressions by medium for the Crohn's and Colitis Month in 2008 and 2009. The media interest in this campaign grown from 26.3 million to 30.5 million (experienced a growth rate of approximately 16 %).

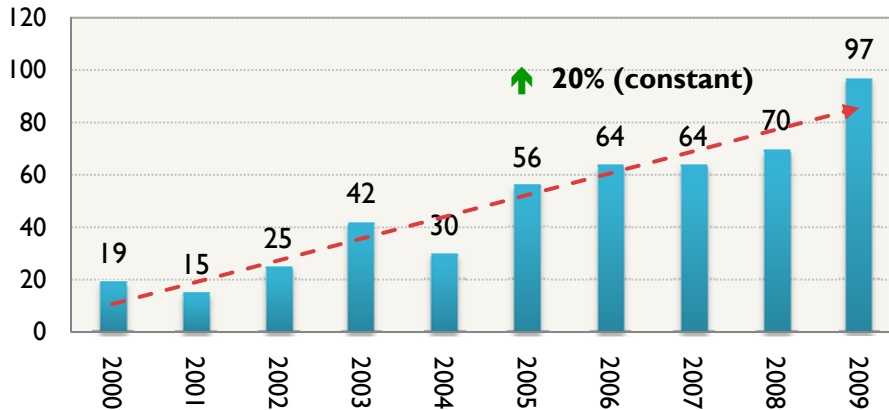
MEDIUM	2008 (IN MILLIONS)		2009 (IN MILLIONS)
Newspaper	8.34	↑	10.2
Magazine	3.47		1.34
Broadcast	5.27		2.43
Online	9.21	↑	16.5
<b>Total</b>	<b>26.3 mil</b>	↑	<b>30.5 mil</b>

## TREND IN CCFC MEDIA PUBLICATIONS (2000-2009)

This dimension was compiled from an international and a provincial (Ontario) media coverage database. The database primarily provides same-day and archival coverage in print/online publications, newswires, and television /radio transcripts. Some of the selected Canadian titles are: **Globe and Mail, Kitchener-Waterloo Record, National Post, Toronto Star, Winnipeg Free Press, La Presses Canadienne, Les actualités canadiennes de Reuters en français** etc.

CCFC Media Publications in Canada (2000-2009)

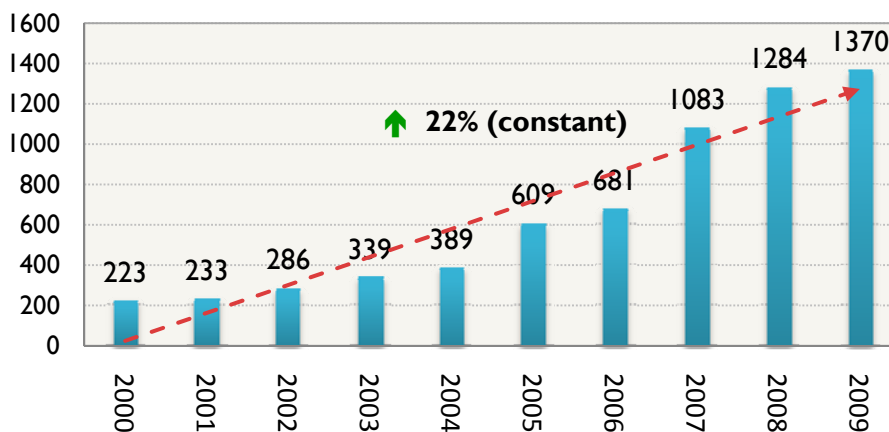
463 Items



◀ During 2000 -2009, there was a significant increase of IBD-related media publications in Canada. Assuming a steady increase, the IBD-related media publications in Canada experienced a growth rate of 22.4%.

Canadian IBD Media Publications (2000-2009)

6,497 Items



CCFC media publications also experienced a (steady) growth rate of nearly 20%.

The CCFC media publications consisted of campaigning events, partnering collaborations, research discoveries, and many more.

Source: *Factiva*

Examples of CCFC-related media publications:

### ► Recent CCFC-related Research Media Coverage

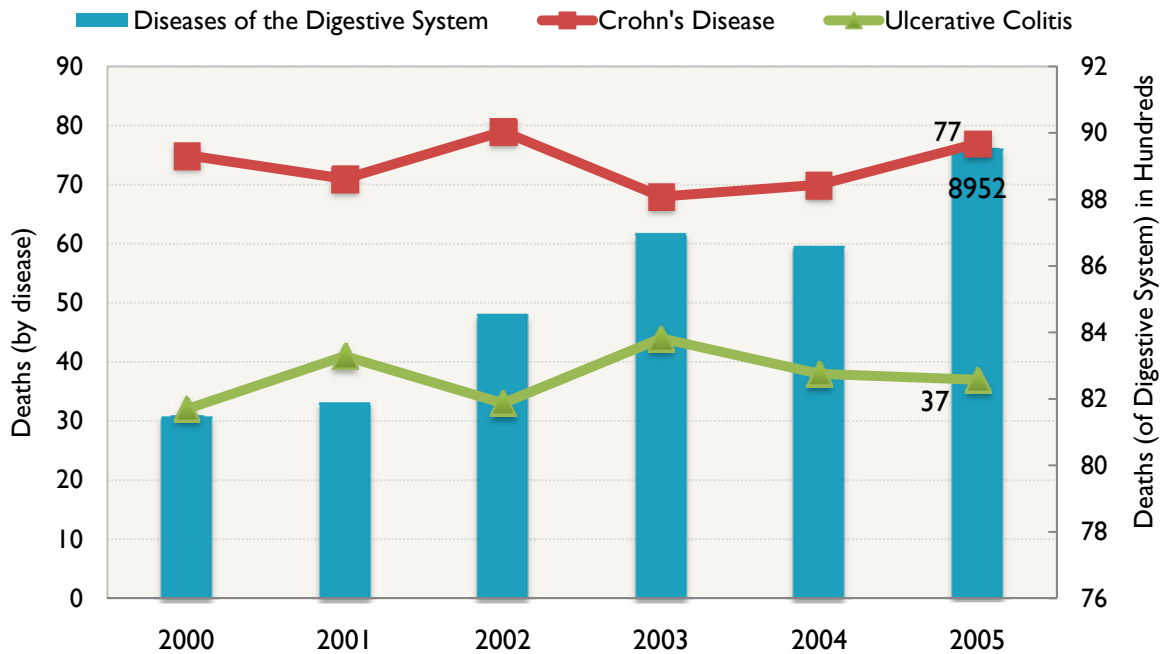
- 📄 Crohn's and Colitis Foundation of Canada Announces Pediatric IBD Initiative During Crohn's and Colitis Awareness Month (4,690,473 impressions)  
*2 November 2009, GoogleNews.ca*
- 📄 Battling Bacteria; Probiotics Show Promise in Some Colitis Sufferers  
*8 September 2009, Montreal Gazette, MTLG (reference to CCFC)*
- 📄 Ontario Facing High Rate of Juvenile-onset Bowel Disease  
*6 August 2009, Waterloo Region Record, The Canadian Press*
- 📄 Searching for A Cure; Inflammatory Bowel Diseases Afflicts Thousands in B.C., But Funding is Scarce  
*5 June 2009, Victoria Times Colonist, VTC*
- 📄 Crohn's colitis rates higher in Atlantic Canada: study  
*25 May 2009, Canwest News Service, CWNS*
- 📄 Crohn's and Colitis Foundation of Canada Urges Canadians to Recognize the Needs of IBD Patients  
*12 May 2009, Canada NewsWire, CNNW*
- 📄 "Speed of Relief" a Key Factor in Selecting Ulcerative Colitis Treatment: New Study  
*4 May 2009, Canada NewsWire, CNNW (reference to CCFC)*
- 📄 McGill Researchers Discover Gene that Increases Susceptibility to Crohn's Disease; "Broken" Bacterial Sensor Doesn't Detect Harmful Bacteria in the Digestive System  
*8 January 2009, Ascribe News, ANW*
- ...

### ► Radio | Television Coverage of CCFC & CCFC Scientists

- 📺 **CCFC Researcher:** Dr. Remo Panaccione, University of Calgary  
Alberta's High Bowel Disease Rates Studied  
*23 February, 2010, CTV – CTV News*
- 📺 CCFC Awareness Month (501,000 impressions)  
*17 November 2009, CBC Television – The National*
- 📺 **CCFC Researcher:** Dr. Anne Griffiths, Hospital for Sick Children  
5 Genes Raise Bowel Disease Risk in Young  
*16 November, 2009, CBC News – Health*
- 📺 **CCFC Staff:** Dr. George Tolomiczenko, Executive Director of Research  
**CCFC Researcher:** Dr. Kenneth Croitoru, Mount Sinai Hospital  
Normal Activities Cause Daily Challenges for People with IBD  
*7 July, 2009, CBC News – Health*
- ...

## HEALTH STATUS

### DEATHS (2000-2005)<sup>2</sup>



### PREVALENCE

Using the IBD prevalence rates from the “Burden of IBD in Canada” report released in November 2008, the number of IBD cases in 2009 was estimated to be 209,725 with provincial population estimates.

REGION	Number of Cases		
	CD	UC	IBD Total
NF	1,858	1,420	3,279
PE	514	393	907
NS	3,421	2,615	6,036
NB	2,733	2,089	4,823
QC	28,500	21,783	50,284
ON	47,512	36,312	83,824
MB	4,448	3,400	7,848
SK	3,755	2,870	6,626
AB	13,374	10,221	23,595
BC	10,652	11,151	21,803
Territories	398	304	702
<b>National</b>	<b>117,166</b>	<b>92,559</b>	<b>209,725</b>

See Appendix C for the IBD prevalence rates released in the 2008 report.

<sup>2</sup> Statistics Canada, CANSIM table 102-0531, downloaded October 28, 2009.

## DETERMINANTS OF HEALTH

### ► WAIT TIME <sup>3</sup>

The Wait Time Alliance (WTA) Report Card released on June 2009 published a study on wait-time data compiled by Ipsos-Reid in February 2009. The survey involved physicians from 11 national specialty societies in a field window of 3 weeks. 1,189 specialist physicians were surveyed and data was collected on 2,010 patients.

The study accounted for: the time a patient needs to acquire a referral from their family physician for consultation from a specialist; and the consultation (consisting of the preliminary diagnostic screening and tests) to the beginning of the treatment process.

The CAG has defined targets for appropriate wait times for access to medical care for patients with IBD. Anyone with symptoms suggestive of active inflammatory bowel disease should be seen, and if required, have an endoscopic procedure performed within *two weeks*. This target recognizes that patients with IBD can be seriously ill, suffer major disruption to quality of life, and have a significant risk to health in the absence of timely intervention.

In this study, the National Health Service (NHS) target of *18 weeks* was used to assess the wait time for this experience from initial referral to the commencement of treatment. Based on this standard, the results show that accessibility was inadequate in ophthalmology, obstetrics and gynecology, gastroenterology, plastic surgery and orthopedic.

For the clinical features of significant active IBD, the wait time decreased slightly from 2008 (CAG Survey of Access to Gastroenterology, 2008) to 2009 (Wait Time Alliance, 2009).

	2008	2009
Time to Consult	66 days	60 days
Time to Treatment	35 days	45 days
% of Patients Waiting Longer than 18-weeks	-	67 %
Total Wait Time (Median)	120 days	106 days

### ► Summary of the National Physician Diary Study

Specialty	Treatment / Procedure / Subspecialty / Therapeutic / Diagnostic	Referral to consultation (median) in days	Consultation to treatment (median) in days	Total wait (median) in days	% of patients waiting longer than 18 weeks
Gastroenterology	Bright red rectal bleeding	37	14	57	43
	Fecal occult blood test positive	93	64	156	50
	All conditions/ procedures	75	48	130	51
	Screening colonoscopy	106	39	148	60
	Clinical features of significant active IBD	<b>60</b>	<b>45</b>	<b>106</b>	<b>67</b>
	Chronic diarrhea or chronic constipation	90	139	260	75

<sup>3</sup> Wait Time Alliance, "Unfinished Business: Report Card on Wait Times in Canada", June 2009

## ► RE-ADMISSION RATES<sup>4</sup>

The number or rate of re-admission of a condition over a specific time period illustrates the effectiveness of the particular care provided by the health system. In a 2006 population-based study conducted by Dr. Charles Bernstein (a CCFC-affiliated researcher), it was reported that hospitalization rate slightly decreased for Crohn's disease over the 7 year period from 1994 to 2001. The hospitalization rate for ulcerative colitis, however, slightly increased.

The rate of readmission for CD and UC (at least once) was approximately 20% per year, and 35% during the course of the 7 year period. Although the hospitalization rate for CD remained relatively high during the study period, major surgery was more common for UC patients during hospitalizations.

Year	CD		UC	
	1994-1995	2000-2001	1994-1995	2000-2001
Age-adjusted Hospitalization Rate	29.2 /100,000	26.9 /100,000	12.6 /100,000	13.3 /100,000
Readmission (at least once)	39.4% (21.3-24.0% per year)		33.7% (18.5-20.3% per year)	
Average Length of Stay	10.3 days	9.1 days	12.2 days	10.1 days
Major Surgery during Hospitalizations	48% (44.8-49.8% per year)		55% (51.5-59.0% per year)	

Source *Statistics Canada Person Oriented Information Database, 1994-1995 to 2000-2001*

In 2008, it was estimated that there 8,900 hospitalizations for CD and 4,300 hospitalizations for UC, for a total of 125,000 days in the hospital.<sup>5</sup>

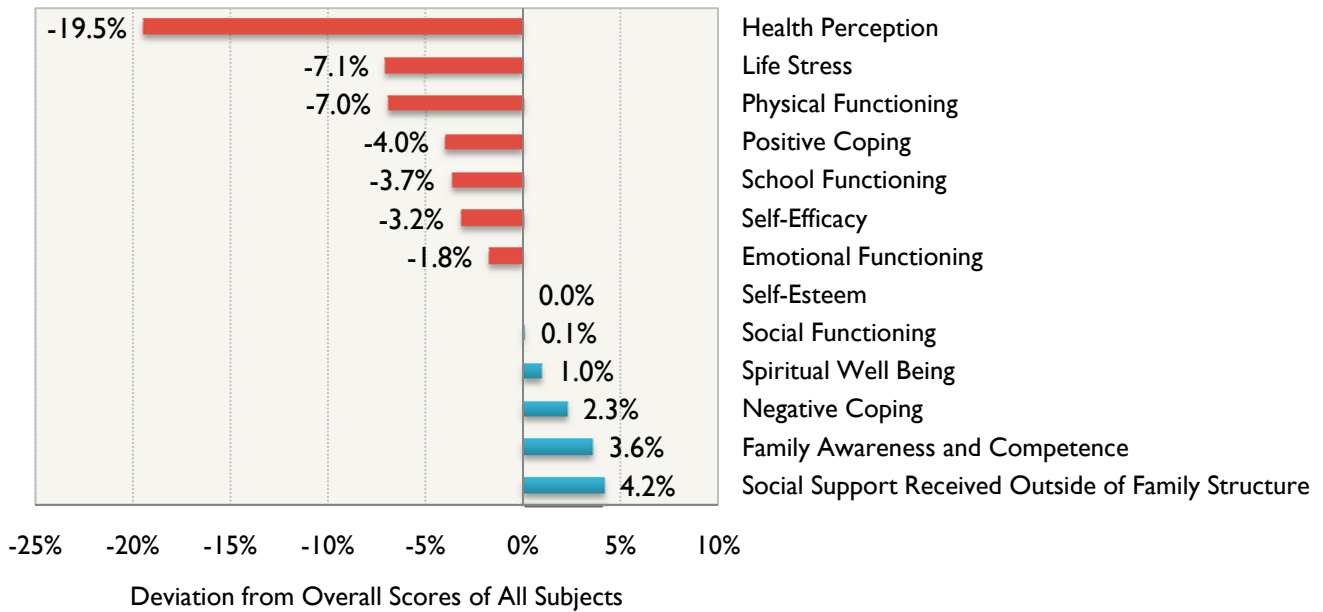
<sup>4</sup> Bernstein CN, Nabalamba A, "Hospitalization, Surgery, and Readmission Rates of IBD in Canada: A Population-Based Study", 2006, *American Journal of Gastroenterology*

<sup>5</sup> CCFC, "The Burden of Inflammatory Bowel Disease (IBD) in Canada", 2008

## BROAD SOCIAL & ECONOMIC IMPACTS

### SOCIAL IMPACT<sup>6</sup>

Health Values in Adolescents with IBD (2005-2007)



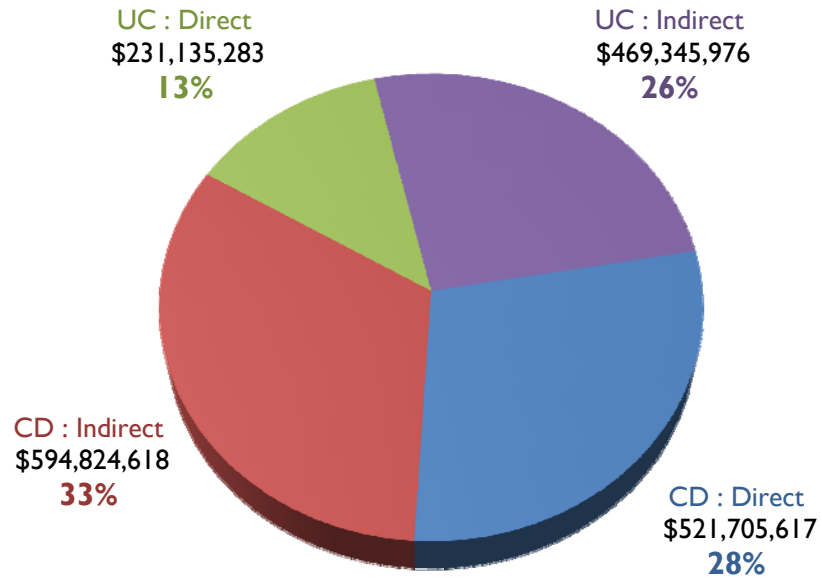
The figure above summarizes a comparison of 76 IBD patients and 88 healthy control subjects from 11 to 19 years of age, using a multivariable analysis on a variety of dimensions. Adolescents afflicted with inflammatory bowel disease scored significantly lower than controls in Health Perception (assessing their current over-all health). Other dimensions, including Life Stress and Physical Functioning, trended lower (red bars). Other dimensions, including Social Support and Family Awareness, trended higher among IBD patients (blue bars).

<sup>6</sup> Yi, MS, Britto MT, Sherman SN, Moyer S, et al. Health Values in Adolescents with or without Inflammatory Bowel Disease. April 2009. The Journal of Pediatrics.



## ECONOMIC IMPACT

The BIBDC report provided estimates of economic impact of IBD. The following pie chart from the report includes the total IBD cost estimates for 2008 including direct and indirect costs.



## CONCLUDING REMARKS & FUTURE DIRECTIONS

The CCFC continues to play a critical role fostering IBD-focused research across Canada. On the foundation of basic research that advances knowledge, additional steps are needed to yield positive impact on health and economic outcomes. This second Report continues to plot this journey via the dimensions introduced last year. This year's addition of sections on the connection between IBD research, patent applications and the formation of companies developing IBD-related products reflects the "D" part of Research and Development. A listing of research facilities hosting IBD research and CCFC's funding at these locations shows the depth and breadth of CCFC funding across Canada. Finally, the effectiveness of CCFC funding in enabling researchers successfully compete for funding from other sources is highlighted in this year's Research Report Card. Future reports will continue to present a wider array of information relevant to measuring progress toward cures for IBD.