

CGP THE LAST 10 YEARS

MCGILL UNIVERSITY

150
YOUNG
RESEARCHERS



288
RESEARCH
PROJECTS



593
PUBLICATIONS



2
COURSES GIVEN TO
200+ STUDENTS



The Centre of Genomics and Policy (CGP) applies a multidisciplinary perspective, while collaborating with national and international partners, in several research areas including: stem cell research and therapies, personalized medicine, prevention and treatment of cancer, data sharing, pediatrics, genetic counseling, digital health and AI, intellectual property and open science, epigenetics, intersex and diversity in health, gene editing, genetic discrimination and biobanking (population genetics).

RESEARCH AWARDS

**Canadian Research Chair in
Law and Medicine**
(Prof. Bartha Maria Knoppers)



Canada

**FRQS Chercheurs boursier
Junior 1 & 2**
(Prof. Yann Joly)

**FRQS Chercheurs boursier
Junior 1**
(Prof. Ma'n H. Zawati)

Fonds de recherche
Santé

Québec

Bartha Maria Knoppers, Director
Yann Joly, Research Director
Ma'n H. Zawati, Executive Director
Nicole Palmour, Coordinator

Denise Avard, Past Research Director
Claude Laberge, Scientific Advisor



2023

RARE DISEASE PROJECTS

THE LAST
10
YEARS

The Centre of Genomics and Policy has been actively engaged in rare disease research, policy and tool development for more than ten years. This summary will provide an overview of the breath and depth of our engagement and expertise in this domain.

APR 2022
SEP 2023

● ALL FOR ONE HEALTH DATA ECOSYSTEM (HDE)

OCT 2020
OCT 2022

● DEVELOPMENT OF AN ETHICAL AND LEGAL FRAMEWORK FOR THE DEPLOYMENT OF RÉSEAU QUÉBEC DIAGNOSTIQUE MOLÉCULAIRE (MSSS) ACTIVITIES AND THE HARMONIZATION OF PATIENT CONSENT

MAR 2019
MAR 2022

● CANADIAN GENOMICS PARTNERSHIP FOR RARE DISEASE (ALL FOR ONE): POLICY TOOLKIT

MAR 2018
FEB 2023

● CARE4RARE CANADA: HARNESSING MULTI-OMICS TO DELIVER INNOVATIVE DIAGNOSTIC CARE FOR RARE GENETIC DISEASES IN CANADA (C4R-SOLVE)

MAR 2016
FEB 2021

● PROGRAMME DE RECHERCHE ET D'INNOVATION SUR LES MALADIES RARES (PRISMES)

MAR 2013
FEB 2017

ENHANCED CARE FOR RARE GENETIC DISEASES IN CANADA

MAR 2013
FEB 2014

RECHERCHE SUR LES MALADIES RARES: VIE PRIVÉE «BON GRÉ MAL GRÉ»? (PRISMES)

JAN 2012
FEB 2017

FRAMEWORK FOR DECISION-MAKING FOR RARE DISEASES

DEC 2011
NOV 2017

DEVELOPING A CANADIAN FRAMEWORK FOR EVALUATION AND DECISION-MAKING FOR EXPENSIVE DRUGS FOR RARE DISEASES THROUGH INNOVATION, VALUE, AND PRIORITY SETTING

MAY 2011
NOV 2012

RADICAL - RARE DISEASE CONSORTIUM FOR AUTOSOMAL LOCI

FEB 2011
JUL 2012

FINDING OF RARE DISEASE GENES IN CANADA (FORGE)

OCT 2008
SEP 2013

CIHR EMERGING TEAM IN GENOMICS SCREENING

CGP RARE DISEASE PUBLICATIONS

ARTICLES

JOURNAL ARTICLE

Driver, Hannah G., Hartley, Taila, Price, Magda E., Turinsky, Andrei L., Buske, Orion J., Osmond, Matthew, Ramani, Arun K., **Kirby, Emily**, Kernohan, Kristin D., Couse, Madeline, Le, Hannah G.B.H., Herscovich, Andrea, Marshall, Christian R., Stata, Andrew, Care Rare Canada Consortium, **Knoppers, Bartha**, Brudno, Michael, Boycott, Kym M. Genomics4RD: An integrated platform to share Canadian deep phenotype and multiomic data for international rare disease gene discovery. Human Mutation. 2022;43:800-811. Available from: <https://onlinelibrary.wiley.com/doi/pdf/10.1002/humu.24354>.

JOURNAL ARTICLE

Osmond, Matthew, Hartley, Taila, Dymont, David A., Kernohan, Kristin D., Brudno, Michael, Buske, Orion J., Innes, Micheil A., Boycott, Kym M., Brudno, Michael, Bernier, Francois, van Karnebeek, Clara, Dymont, David, Kernohan, Kristin, Innes, Micheil, Lamont, Ryan, Parboosingh, Jillian, Marshall, Deborah, Marshall, Christian, Mendoza, Roberto, Dowling, James, Hayeems, Robin, **Knoppers, Bartha**, Lehman, Anna, Mostafavi, Sara. Outcome of over 1500 matches through the Matchmaker Exchange for rare disease gene discovery: The 2-year experience of Care4Rare Canada. Genetics in Medicine. 2022;24(1):100-108. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S109836002101128X>.

JOURNAL ARTICLE

Puscas, Maria, Martineau, Gabrielle, Bhella, Gurjot, Bonnen, Penelope E., Carr, Phil, Lim, Robyn, Mitchell, John, Osmond, Matthew, Urquieta, Emmanuel, Flamenbaum, Jaime, Iaria, Giuseppe, **Joly, Yann**, Richer, Étienne, Saary, Joan, Saint-Jacques, David, Buckley, Nicole, Low-Decarie, Etienne. Rare diseases and space health: optimizing synergies from scientific questions to care. npj Microgravity. 2022;8(1):1-10. Available from: <https://www.nature.com/articles/s41526-022-00224-5>.

JOURNAL ARTICLE

Faraji, Sina, **Patrinos, Dimitri**, Hagan, Julie, **Knoppers, Bartha Maria**. A centralized rare disease database and whole-genome sequencing as a standard of care: two essential implementations for the future of health. FACETS. 2021;6:1831-1834. Available from: <https://facetsjournal.com/doi/10.1139/facets-2021-0065>.

JOURNAL ARTICLE

Bernier, Alexander. Rare disease data stewardship in Canada. FACETS. 2020;5(1):836-863. Available from: <https://facetsjournal.com/doi/10.1139/facets-2020-0050>.

JOURNAL ARTICLE

Kleiderman, Erika, Stedman Ian Norris Kellner. Human germline genome editing is illegal in Canada, but could it be desirable for some members of the rare disease community? . J Community Genet. 2019;11(2):129-138. Available from: <https://doi.org/10.1007/s12687-019-00430-x>.

JOURNAL ARTICLE

Nguyen, Minh Thu, Goldblatt, Jack, Isasi, Rosario, Jagut, Marlene, Jonker Anneliene, Hechtelt, Kaufmann, Petra, Ouillade, Laetitia, Molnar-Gabor, Fruszina, Shabani, Mahsa, Sid, Eric, **Tassé, Anne Marie**, Wong-Rieger, Durhane, **Knoppers, Bartha Maria**, on behalf of the IRDiRC-GA4GH Model Consent Clauses Task Force. Model consent clauses for rare disease research. BMC Medical Ethics. 2019;20(1):55.

Available from: <https://doi.org/10.1186/s12910-019-0390-x>.

JOURNAL ARTICLE

Issa, Amalia M., **Thorogood, Adrian, Joly, Yann, Knoppers, Bartha M.** Accelerating evidence gathering and approval of precision medicine therapies: the FDA takes aim at rare mutations. Genetics in Medicine. 2019;21(3):542-544.

Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1098360021010261>.

JOURNAL ARTICLE

Esquivel-Sada, Daphne, **Nguyen, Minh Thu**. Diagnosis of rare diseases under focus: impacts for Canadian patients. J Community Genet. 2018;9(1):37-50. Available from: <http://link.springer.com/10.1007/s12687-017-0320-x>.

JOURNAL ARTICLE

Boycott, Kym M., Rath, Ana, Chong, Jessica X., Hartley, Taila, Alkuraya, Fowzan S., Baynam, Gareth, Brookes, Anthony J., Brudno, Michael, Carracedo, Angel, den Dunnen, **Johan T., Dyke, Stephanie O.M.**, Estivill, Xavier, Goldblatt, Jack, Gonthier, Catherine, Groft, Stephen C., Gut, Ivo, Hamosh, Ada, Hieter, Philip, Höhn, Sophie, Hurles, Matthew E., Kaufmann, Petra, **Knoppers, Bartha M.**, Krischer, Jeffrey P., Macek, Milan, Matthijs, Gert, Olry, Annie, Parker, Samantha, Paschall, Justin, Philippakis, Anthony A., Rehm, Heidi L., Robinson, Peter N., Sham, Pak-Chung, Stefanov, Rumen, Taruscio, Domenica, Unni, Divya, Vanstone, Megan R., Zhang, Feng, Brunner, Han, Bamshad, Michael J., Lochmüller, Hanns. International Cooperation to Enable the Diagnosis of All Rare Genetic Diseases. The American Journal of Human Genetics. 2017;100(5):695-705.

Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0002929717301477>.

JOURNAL ARTICLE

Pupavac, Mihaela, **Zawati, Ma'n H.**, Rosenblatt, David S. A RaDiCAL gene hunt. Journal of Taibah University Medical Sciences. 2017;12(3):194-198. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1658361216301470>.

JOURNAL ARTICLE

Philippakis, Anthony A., Azzariti, Danielle R., Beltran, Sergi, Brookes, Anthony J., Brownstein, Catherine A., Brudno, Michael, Brunner, Han G., Buske, Orion J., Carey, Knox, Doll, Cassie, Dumitriu, **Sergiu, Dyke, Stephanie O.M.**, den Dunnen, Johan T., Firth, Helen V., Gibbs, Richard A., Girdea, Marta, Gonzalez, Michael, Haendel, Melissa A., Hamosh, Ada, Holm, Ingrid A., Huang, Lijia, Hurles, Matthew E., Hutton, Ben, Krier, Joel B., Misyura, Andriy, Mungall, Christopher J., Paschall, Justin, Paten, Benedict, Robinson, Peter N., Schiettecatte, François, Sobreira, Nara L., Swaminathan, Ganesh J., Taschner, Peter E., Terry, Sharon F., Washington, Nicole L., Züchner, Stephan, Boycott, Kym M., Rehm, Heidi L. The Matchmaker Exchange: A Platform for Rare Disease Gene Discovery. Human Mutation. 2015;36(10):915-921.

Available from: <https://onlinelibrary.wiley.com/doi/10.1002/humu.22858>.

JOURNAL ARTICLE

Nguyen, Minh Thu, Charlebois, Kathleen. The clinical utility of whole?exome sequencing in the context of rare diseases – the changing tides of medical practice. Clin Genet. 2015;88(4):313-319.

Available from: <https://onlinelibrary.wiley.com/doi/10.1111/cge.12546>.

JOURNAL ARTICLE

Graham, Caroline, Dawkins, Hugh, Baynam, Gareth, Lockmuller, Hanns, Bushby, Kate, Monaco, Lucia, Zatloukal, Kurt, Rubinstein, Yaffa, Mora, Marina, **Knoppers, Bartha**, Terry, Sharon, Hansson, Mats, Reiss, Olaf, Schaefer, Franz, Carpentieri, David, Taruscio, Domenica, Posada, Manuel, Bellgard, Matthew, Kole, Anna, Molster, Caron. Current trends in biobanking for rare diseases: a review. *BSAM*. 2014;:49. Available from: <http://www.dovepress.com/current-trends-in-biobanking-for-rare-diseases-a-review-peer-reviewed-article-BSAM>.

JOURNAL ARTICLE

Kleiderman, Erika, **Knoppers, Bartha Maria**, Fernandez, Conrad V, Boycott, Kym M, Ouellette, Gail, Wong-Rieger, Durhane, Adam, Shelin, Richer, Julie, Avard, Denise. Returning incidental findings from genetic research to children: views of parents of children affected by rare diseases. *J Med Ethics*. 2014;40(10):691-696. Available from: <https://jme.bmj.com/lookup/doi/10.1136/medethics-2013-101648>.

JOURNAL ARTICLE

Beaulieu, Chandree L., Majewski, Jacek, Schwartzentruber, Jeremy, Samuels, Mark E., Fernandez, Bridget A., Bernier, Francois P., Brudno, Michael, **Knoppers, Bartha**, Marcadier, Janet, Dymont, David, Adam, Shelin, Bulman, Dennis E., Jones, Steve J.M., Avard, Denise, **Nguyen, Minh Thu**, Rousseau, Francois, Marshall, Christian, Wintle, Richard F., Shen, Yaoqing, Scherer, Stephen W., Friedman, Jan M., Michaud, Jacques L., Boycott, Kym M. FORGE Canada Consortium: Outcomes of a 2-Year National Rare-Disease Gene-Discovery Project. *The American Journal of Human Genetics*. 2014;94(6):809-817. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0002929714002237>.

JOURNAL ARTICLE

Mascalzoni, Deborah, **Knoppers, Bartha Maria**, Aymé, Ségolène, Macilotti, Matteo, Dawkins, Hugh, Woods, Simon, Hansson, Mats G. Rare diseases and now rare data?. *Nat Rev Genet*. 2013;14(6):372-372. Available from: <https://www.nature.com/articles/nrg3494>.

JOURNAL ARTICLE

Ozdemir, Vural, S. Rosenblatt, David, Warnich, Louise, Srivastava, Sanjeeva, O. Tadmouri, Ghazi, K. Aziz, Ramy, Jaipal Reddy, Panga, Manamperi, Aresha, S. Dove, Edward, **Joly, Yann, H. Zawati, Ma'n**, Hizel, Candan, Yazan, Yasemin, John, Leela, Vaast, Emmanuelle, S. Ptolemy, Adam, A. Faraj, Samer, Kolker, Eugene, G.H. Cotton, Richard. Editorial [Towards an Ecology of Collective Innovation: Human Variome Project (HVP), Rare Disease Consortium for Autosomal Loci (RaDiCAL) and Data-Enabled Life Sciences Alliance (DELSA)]. *CPPM*. 2011;9(4):243-251. Available from: <http://www.eurekaselect.com/openurl/content.php?genre=article&issn=1875-6921&volume=9&issue=4&spage=243>.

JOURNAL ARTICLE

Gravel, Simon, Henn, Brenna M., Gutenkunst, Ryan N., **Knoppers, Bartha M.**, et al. Proceedings of the National Academy of Sciences. 2011;108(29):11983-11988. Available from: <https://www.pnas.org/doi/full/10.1073/pnas.1019276108>.

JOURNAL ARTICLE

Ozdemir, Vural, S. Rosenblatt, David, Warnich, Louise, Srivastava, Sanjeeva, O. Tadmouri, Ghazi, K. Aziz, Ramy, Jaipal Reddy, Panga, Manamperi, Aresha, S. Dove, Edward, **Joly, Yann, H. Zawati, Ma'n**, Hizel, Candan, Yazan, Yasemin, John, Leela, Vaast, Emmanuelle, S. Ptolemy, Adam, A. Faraj, Samer, Kolker, Eugene, G.H. Cotton, Richard. Editorial [Towards an Ecology of Collective Innovation: Human Variome Project (HVP), Rare Disease Consortium for Autosomal Loci (RaDiCAL) and Data-Enabled Life Sciences Alliance (DELSA)]. *CPPM*. 2011;9(4):243-251. Available from: <http://www.eurekaselect.com/openurl/content.php?genre=article&issn=1875-6921&volume=9&issue=4&spage=243>

G D



GENETIC DISCRIMINATION OBSERVATORY

Genetic discrimination involves treating differently and negatively or unfairly profiling individuals or a group relative to the rest of the population based on actual or presumed genomic and other predictive data.

The Genetic Discrimination Observatory (GDO) is a network of international experts and collaborators from over 23 jurisdictions dedicated to researching and preventing genetic discrimination.

GDO MAIN OBJECTIVES

1.

Document the issue of genetic discrimination in a scientific and evidence-based manner.

2.

Engage the public, policymakers and other stakeholders in a collective debate about genetic discrimination.

3.

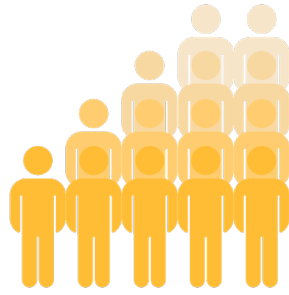
Use this information to assess existing normative models work best and develop new ones.



- AI
- LAW
- GENETICS
- BIOETHICS
- SOCIOLOGY
- HEALTH POLICY
- PATIENT GROUPS



COLLABORATIVE RESEARCH



From January to November 2022,
the GDO website reached
164,000 VISITORS
(an average of 13,700 visits/month)

GDO is now in collaboration with the Global Alliance for Genomic and Health (GA4GH) to develop tools and policies to address genetic discrimination. The first product of this collaboration is the information brief Genetic Discrimination: Implications for Data Sharing Projects (GeDI).

www.ga4gh.org/wp-content/uploads/Genetic-Discrimination-Dec.-2-2021.docx.pdf

approved by GA4GH/GDO in January 2022



GDO INTERNATIONAL COLLABORATIONS

26 COUNTRIES 27 JURISDICTIONS

CANADA	SOUTH AFRICA
UNITED STATES	UGANDA
MEXICO	UKRAINE
COLUMBIA	LEBANON
CHILE	ISRAEL
ICELAND	KAZAKHSTAN
IRELAND	INDIA
UNITED KINGDOM	CHINA
DENMARK	HONG KONG
BELGIUM	TAIWAN
FRANCE	SOUTH KOREA
GERMANY	JAPAN
SPAIN	AUSTRALIA

GDO PUBLICATIONS

Arych, M., & Joly, Y. (2022). Genetic Discrimination in Access to Life Insurance: Does Ukrainian Legislation Offer Sufficient Protection against the Adverse Consequences of the Genetic Revolution to Insurance Applicants? *É. Laws*, 11(1), 2.

Golinghorst, D., De Paor, A., Joly, Y., Macdonald, A. S., Otlowski, M., Peter, R., & Prince, A. E. (2022). Anti-selection & Genetic Testing in Insurance: An Interdisciplinary Perspective. *Journal of Law, Medicine & Ethics*, 50(1), 139-154.

Joly, Y., & Dalpé, G. (2022). Genetic discrimination still casts a large shadow in 2022. *European Journal of Human Genetics*, 30(12), 1320-1322.

Tiller, J. M., Keogh, L. A., McInerney-Leo, A. M., Belcher, A., Barlow-Stewart, K., Boughtwood, T., ... & Lacaze, P. (2022). A step forward, but still inadequate: Australian health professionals' views on the genetics and life insurance moratorium. *Journal of Medical Genetics*, 59(8), 817-826.

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