

Statistical science for 'omic research in Canada

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1 Overview of the Field and Workshop Motivation

Rapid advances in genome research over the past decade have engendered a unique and inventive interface between biology and statistics. It's a burgeoning field that has quickly grown into an entirely new specialty discipline tentatively called statistical genomics.

The rapid growth of statistical genomics has been driven by the vast amounts of data generated by today's genomics research that needs to ask increasingly complex questions in order to uncover relationships and interactions, and shed light on biology and meaning. Cutting-edge statistical research to develop novel analytical methods is now in great demand. It has become clear that genomic and statistical research must go hand in hand, each informing the other based on sound principles with the common goal of obtaining answers closer to the objective truth than either could have achieved alone.

Challenges have arisen in step with these advances. Funding agencies have not kept pace in recognizing that development of these critically required methodologies merits specific, independent financial support. University departments struggle to provide meaningful pathways for their graduate students and faculty in the new field. There is a strong push both from the statistical genomics discipline and the genetic research community for action on these issues.

The workshop allowed this very small community of Canadian researchers to develop and strengthen research connections and generate strategies for impacting this research area even more in the future. We wrote a white-paper type document for distribution to the statistical genomic community, which was based on the issues and solutions identified from this workshop. Hence, this proposed workshop was crucial to accelerating knowledge of genomic research and to the continuing development of Canadian interdisciplinary statistical genomic researchers.

2 Presentation Highlights

Rapid development of new high throughput technologies and accumulation of complex biological information from different perspectives are demanding ever more powerful and sophisticated statistical methods, creating the new specialized discipline of statistical genomics. Banff workshop participants identified a number of challenging problems that face the new discipline and that require novel and complex solutions.

Potential solutions for three primary challenges have been identified. Firstly, it was agreed that statistical genomic research does not fit the mandate of most genomic research funding agencies and generally,

traditional statistical funding agencies are not providing adequate funds to carry out necessary empirical validations. Strategies to improve the funding environment have been suggested. Although there have been some positive signs, implementation of these strategies is needed now.

Secondly, the workshop evaluated problems and suggested solutions for creating a workable training and career environment that will attract and retain new members in the discipline. These include the need to develop collaborations within and amongst universities and to provide training opportunities with adequate time, for example by off-loading some teaching responsibilities during training. National networks and strategies to strengthen interdisciplinary research were suggested as requirements to advance the field; as well as making a natural home for it within university departmental structures.

Finally, promising career paths are needed to generate the critical mass necessary to grow and sustain our new discipline in Canadian universities and institutions. The current situation has failed to attract large numbers into the field, even for those with masters degrees in statistics with an emphasis on genetics or genomics. To remedy this, we have made recommendations ranging from reduction of undergraduate teaching loads to establishment of a Canada Research Chair in Statistical Genomics.

3 Outcome of the Meeting

A White Paper on the Status of Statistical science for 'omic research in Canada was the main outcome of this two-day workshop. Eighteen of Canada's leading researchers (from BC, AB, ON and QC; see Appendix) active at the interface of statistics and genomics were brought together for the first time in a series of facilitated sessions to explore challenges and opportunities facing 'omic research in Canada. This report summarizes those discussions and presents key recommendations.

The White Paper was shared with and used by national leaders from the statistics field involved in the NSERC Restructuring exercise and in discussions with CIHR leadership. K. Kopciuk presented the results at the 3rd Annual Canadian Genetic Epidemiology and Statistical Genetics Meeting at the Fields Institute in Toronto on May 1, 2008. The White paper in its entirety was published in the meeting program.

4 Appendix

Workshop Participants

Name	Institution
Arcellana-Panlilio, Mayi ^a	University of Calgary
Brettschneider, Julia	Queen's University
Briollais, Laurent	Mount Sinai Hospital
Bryan, Jennifer ^b	University of British Columbia
Bull, Shelley	University of Toronto
Chandler, Graham	Independent Writer
Chen, Jiahua	University of British Columbia
Gottardo, Raphael	University of British Columbia
Graham, Jinko	Simon Fraser University
He, Wenqing	University of Western Ontario
Kopciuk, Karen ^c	University of Calgary/Alberta Cancer Board
Lesperance, Mary	University of Victoria
McNemey, Brad	Simon Fraser University
Nadon, Robert	McGill University
Ouellette, Francis	Ontario Institute for Cancer Research
Stephens, David	McGill University
Surette, Michael	University of Calgary
Turinsky, Andrei	University of Calgary
Wasserman, Wyeth	University of British Columbia
West, Sherry	University of Calgary

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