INTERFEROME V2.0 - A DATABASE OF INTERFERON REGULATED GENES

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INTRODUCTION
The innate immune system is a highly conserved, first line of host defence against infections and other disease stimuli. It initiates inflammatory responses and is important in surveillance of developing cancers. As a result of recent discoveries and an increased understanding of the components of this response, we are now able to better determine its role in diseases, assess human susceptibilities to disease and target therapeutics to this system. A key component of the innate response is the production of hormone-like proteins called interferons (IFNs). These proteins activate signalling pathways in cells resulting in the modulation of expression of up to several thousand genes that encode proteins which are responsible for constituting each of the many biological effects of interferons – they inhibit viral replication, prevent cell growth and activate cells of the immune response.

As a first step in cataloguing IFN regulated genes, Interferome v1.0 was developed. Interferome v1.0 system is a database of IFN regulated genes published in 2009 (www.Interferome.org; Samarajiwa et al., Nucleic Acids Res. 37, 852). It represented the initial stages in the capture and integration of IFN treated microarray datasets, incorporating over 40 published and internally generated microarray datasets. This approach enabled the identification of IFN regulated gene sets in many biologically diverse high-throughput microarray experiments. It has emerged as a popular resource for the research community with over 3 million “hits” in the last 3 years.

MOTIVATION
As Interferome v1.0 captured only qualitative data, was not extensively annotated with detailed metadata, did not capture research data directly from researchers and had limited capabilities in querying research data, there were still key data issues faced by researchers in accessing, sharing, publishing and reusing research data sets.

The Interferome user community (researchers from Immunology and Genomics) supported the development of Interferome v2.0, an extensible platform that would provide public access to larger data sets and enable the deposition of research data and metadata.

This project was funded by the Australian National Data Service (ANDS) as one of its data capture projects.

OVERVIEW
Interferome v2.0 addresses the data quality and data access issues faced by the researchers, by supporting existing research practice and by enabling researchers to perform complete analyses and by maximising the value from available research data.
The researchers at the Monash Institute of Medical Research (MIMR) use Agilent, a microarray platform, and large genomics data repositories like ArrayExpress and GEO. The BASE microarray data management system integrates the research data from these complementary data sources into a single repository. This data is then made publicly available through Interferome v2.0.

The Interferome v2.0 database assimilates a large number of data sets, including detailed annotation and quantitative data, from the microarray analysis pipeline and makes this available to researchers by providing enhanced search capabilities that allow researchers to query more that 2000 data points.

This platform also has the ability to publish metadata about research data collections to Research Data Australia, a searchable metadata repository provided by ANDS. This service promotes citations, data re-use and enables new discoveries from old data.

The Interferome v2.0 platform can be extended to facilitate comprehensive analyses like tissue expression and regulatory analysis.

REFERENCES

ABOUT THE AUTHORS
Professor Paul Hertzog is Director of the Centre for Innate Immunity and Infectious Diseases and Deputy Director of the Monash Institute of Medical Research. He is an NHMRC Senior Principal Fellow with an established record in research into the immune responses to cancer and infectious diseases. His research interests include cytokine signalling and gene regulatory networks and genetically modified mouse models of disease.

His achievements include a long track record of national and international grants and publications in several high impact journals including Cell, Nature Immunology and the Journal of Clinical Investigation. He has also served on NHMRC and Cure Cancer grant assessment panels and many editorial boards including the Journal of Biological Chemistry, Carcinogenesis and Journal of Interferon and Cytokine Research.

Professor Hertzog is cofounder and convenor of the Monash Infection and Immunity Network and Victorian Infection and Immunity Network, which runs the Lorne Infection and Immunity Conference.

Mr Samuel Forster is a PhD student supervised by Professor Paul Hertzog in the Centre for Innate Immunity and Infectious Diseases at the Monash Institute of Medical Research.

Ms Irina Rusinova is a postdoctoral bioinformatician working with Professor Paul Hertzog in the Centre for Innate Immunity and Infectious Diseases at the Monash Institute of Medical Research.

Mr Anthony Beitz is Manager of Monash University’s e-Research Centre. He has extensive experience in the selection, reuse, development, and deployment of eResearch.
software infrastructure. He has been project and product manager of major eResearch projects, e.g. DART integration and the ARCHER portal and dataset, and extensive consultancy experience with both technical & non-technical groups. Prior to his appointment at Monash he had over a decade in research and development with Telstra, managing the development and deployment of a range of software tools and technologies.

**Ms Anitha Kannan** is the Program Manager (Software Development) at the Monash e-Research Centre. She is responsible for the planning and delivery of the software development projects undertaken by the Monash e-Research Centre. She joined Monash University in November 2011 and has been managing the delivery of multiple projects funded by the Australian National Data Service. Prior to this appointment, she had a 15-year career in the Information Technology industry with experience in software development and project management in leading organisations like Infosys Technologies, Hewlett Packard and Texas Instruments.

**Ms Kim Linton** is the Senior Research Systems Facilitator at the Monash e-Research Centre. She is responsible for gathering requirements for proposed research systems undertaken by the Monash e-Research centre and then turning the requirements into a conceptual model for further development. She joined Monash University in October 2011. Prior to this appointment Kim was a Senior Business Analyst in the Telstra Enterprise Data Warehouse for a number of years where she integrated and reported on enterprise wide data.

**Mr Xiaoming Yu** is the Principle Software Developer at the Monash e-Research Centre. He is responsible for developing robust, user-friendly solutions for research communities. He joined Monash University in 2007 and has delivered solutions to the research community such as Archer, OzFlux and Interferome.