THE GALAXY WORKFLOW FOR EPIGENETIC PROFILING OF PROGRESSING MELANOMA
16 cpu (Intel Xeon E52650)
96 GB RAM
50 TB local attached storage
RNA-SEQ, CHIP-SEQ (cellular targets of Merkel cell polyomavirus miRNA, role of polycomb gene Cbx4 in control skin stem cell activity, Is Ran GTp expression correlate with the survival rate of lung cancer patients?)
GALAXY AT UOB - LEARNING AND TEACHING ACTIVITIES

- Modules in School of Medical Sciences, UoB, curriculum
- Medical genetics
- Research and analytical methods
- Experimental Design (modules cover introduction to Galaxy and RNA-SEQ analysis)
- Master Student projects (1 student in CSS, 4 students in ICT)
DIGITAL HEALTH ZONE

- The DHEZ program - £13 million partnership led by us and backed by investment from BT, City of Bradford Metropolitan District Council and the UK government
- Aim: Use technology to manage and prevent long term conditions
- Discussion, Galaxy to be part of technology house
WHAT IS EPIGENETICS?

- Epigenetics literally means "above" or "on top of" genetics. It refers to heritable external modifications of genome that alter its activity. These do not change the underlying DNA sequence, but affect how cells "read" genes.
STRUCTURE AND FUNCTION OF THE SKIN

- Epidermis, top skin layer, protects the body from the sun and other environment factors.

- Dermis, the inner layer consists connective tissue, elastic and muscle fibers and pigment cells called melanocytes.

- Hypodermis provides shocks and thermal insulation of the skin.
Melanocytes are pigment cells resident in the basal epidermis. They are branched or dendritic, and their dendrites are used to transfer pigment granules to adjacent epidermal cells.
SKIN CANCER - MELANOMA

- **Radial growth phase (RGP):** Multiple groups of abnormal melanocytes cause a dysplastic naevus syndrome to arise.

- **Vertical growth phase (VGP):** Overt time malignant melanocytes undergo metastasis and proliferate through the basement membrane into the dermis and subcutaneous tissues.

- **Metastasis:** melanoma becomes thickened and raised; it spreads to lymph nodes via the lymphatic system or via blood vessels to other organs (i.e. lungs, brain) to develop a secondary cancer (Oakley 2012).
SKIN CANCER - MELANOMA

- **Breslow Thin Tumors**: Less than 1.0 mm in depth
- **Intermediate Tumors**: 1.0-4.0 mm in depth
- **Thick Tumors**: Greater than 4.0 mm in depth
Epigenetic balance of DNA methyltransferases and demethylases defines the state of methylation of a gene, and the balance of histone acetyltransferases and deacetylases defines the state of histone acetylation.

Pharmacological inhibitors of these enzymes can influence the balance and effect gene expression.
GOALS

- Development of the epigenetic profiling of progressing tumor pipeline in the Galaxy.

- Multi-level (transcription factors, chromatin remodeling proteins epigenetic, DNA modification) epigenetic profiling of progressing melanoma.
In our experiment we used data from genome-wide methylation analysis of III/IV tumors sample and melanoma cell lines (GEO: GSE51547).

Bisulphite converted DNA from the cancer samples as well as normal cells were hybridised to the Illumina Infinium Human Methylation450 Beadchip.

CHIP-SEQ for BRG1, MITF1, SOX10, H3K27me3 in melanocyte cell lines.
GALAXY WORKFLOW
SUMMARY

- We developed the Galaxy workflow that combine phenotype and multilayer epigenetic information about progressing tumor.
- We are in the process of the experimental validation of the results.
WHERE YOU CAN FIND US?

- Follow Us on Twitter @bioinfbrad
- K.Poterlowicz1@bradford.ac.uk
- K.Murat@bradford.ac.uk

THANK YOU