



Genomics Core Facility (GCF)

Dr Jonathan Coxhead
Faculty of Medical Sciences

Research Facilities & You
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GCF – the story so far

- **April 2015** Infrastructure funding MRC + FMS (single cell genomics)
- **October 2015** Recruitment (Grade D technician; Grade F ESO bioinformatician [single cell data analysis])
- **March 2016** Launch NGS service
- **August 2016** Established as FMS Core Facility
- **February 2017** Joris Veltman academic lead
- **August 2017** Recruitment (x2 Grade D technicians)
- **September 2017** FMS funded purchase NovaSeq



Next-Generation Sequencing (x2) NextSeq 500 and MiSeq



Instrument / Format	Max Read Length (bp)	No. Reads	Output	Run time
MiSeq v3	2 x 300	25 million	15 Gb	65 hours
NextSeq 500 High	2 x 150	400 million	100 Gb	29 hours
NextSeq 500 Mid	2 x 150	130 million	36 Gb	26 hours

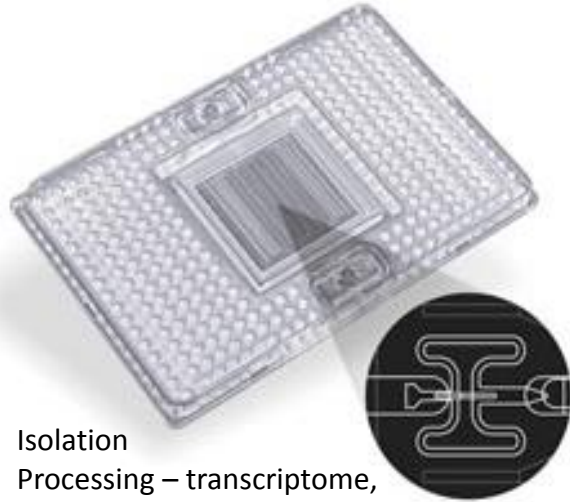
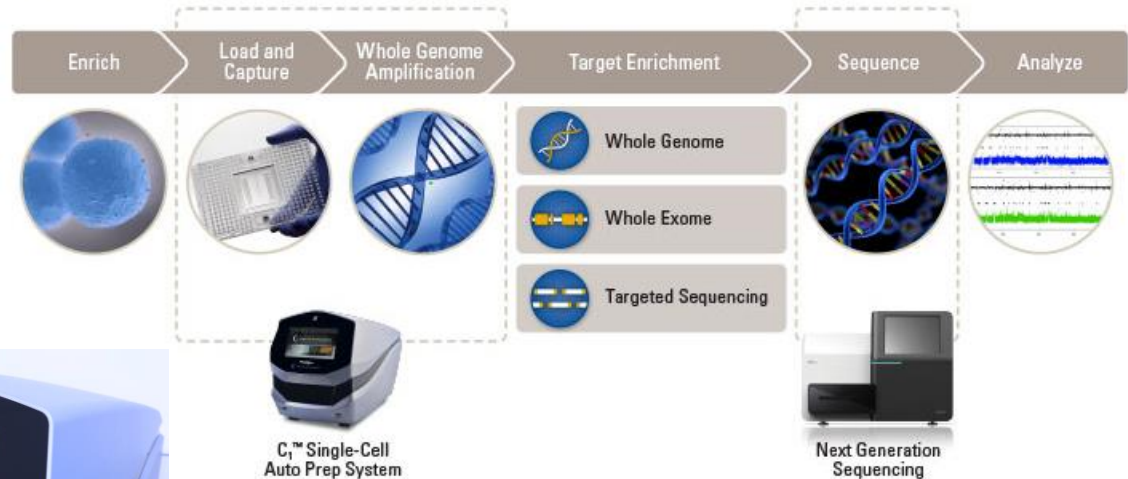


†48 human genomes per run at 30x

- Launched January 2017
- Currently 1 of 3 in the UK
- Illumina NGS focus for next 5 yrs
 - Large dataset applications –†WGS, Ultra-deep WES and Tumour-Normal profiling
 - Large sample projects - WES, RNA-Seq and Single Cell studies
 - Single or dual flow cells; 3 flow cell sizes S1, S2 and S4; 1.6 – 10 billion reads or max output 0.5 – 3 Tb per flow cell.
 - Read length 2 x 50 bp, 100 bp or 150 bp

Fluidigm C1 - automated single cell processing

A Simplified Workflow for Single-Cell Library Preparation



- Isolation
- Processing – transcriptome, genome, genotype or gene expression



- Automated single cell processing
- Nanolitre volumes
 - Reduce cost
 - Reduce possibility of contamination
- 96 barcoded single cells in <24 hrs
- 800 cells latest chip (sequence tagging for expression analysis)

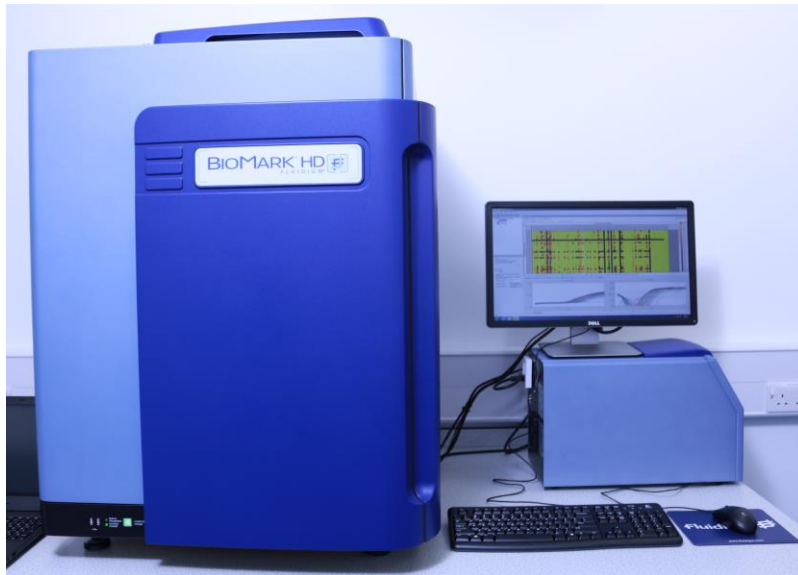
Access

- 1) Consult with GCF on study design
- 2) GCF receives live cells & charges for C1 service

Single Cell Genomics

- Gene expression
- Genotyping

Scale dependent on size of dynamic array



Flexible configuration

- 6 partitions of 12 samples X 12 assays

High throughput configuration

- 96 samples X 96 assays

Access

- 1) Consult with GCF on study design
- 2) Customer orders probes
- 3) GCF receives samples & probes and charges for BioMark HD service

Targeted Validation - Digital PCR

QX200 Digital PCR Droplet / emPCR solution



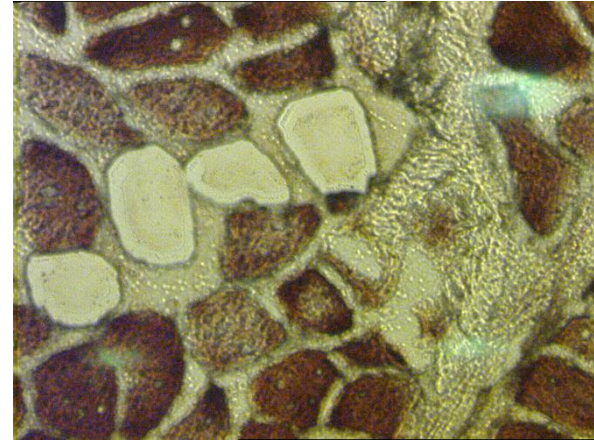
- Sample physically partitioned into individual molecules
- End point detection using fluorescence
- Absolute quantification
- No standard curve

- 20k droplets / 20 μ l
- 96 well plate automation

Access

- 1) Consult with GCF on study design
- 2) Customer orders probes
- 3) GCF supplies consumables and charges for ddPCR access

Isolating single cells – Leica LMD7



- Stain and retrieve cells from whole tissue
- Cells in situ
- Able to isolate rare cells
- Good for complex tissues
- Slow – more suitable for low throughput

Access

- 1) Consultation and training from GCF
- 2) Customer purchases slides
- 3) Access charged per hour

Ancillary items



Sonication

- DNA shearing (WGS) and LR-PCR libraries
- Chromatin shearing (ChIP-Seq)



Liquid handling

- PCR clean-up
- Sample pooling
- Plate transfers
- Dilutions



Fragment analysis

- Qualitative and quantitative QC - DNA & RNA



qPCR

- QC – NGS library prep
- Validation

Access

- 1) Consultation and training from GCF
- 2) Access charged per hour / per run

Working with you – your project

Bulk tissue / enriched cells (e.g. 1000's) / single cells

Genomics

Transcriptomics

Epigenomics

Discovery (targets
unknown)

Screening (targets
known)

Validation

Experimental design /
costing / grant application

Method development /
training

Publication assistance –
materials and methods



Genomics Core Facility

Est. August 2016



Alistair Reay

Jon Coxhead

Leigh Taylor

Rachel Queen

Raf Hussain

Academic Lead: Prof. Joris Veltman (Director IGM)