MHTP FUNCTIONAL GENOMICS

The Functional Genomics Capability provides the tools and expertise for unbiased, systematic, high-throughput gain-of-function and loss-of-function screens in human and mouse cells. In collaboration with our MHTP Platforms network, we deliver a complete gene discovery and characterisation service.

Our pooled library screens take advantage of the latest in CRISPR-Cas9 technology (CRISPRc, CRISPRi, CRISPRa) and ORF libraries. Pooled screening is faster, less labour-intensive and more cost-effective than array-based screens, making functional genomics more accessible for researchers investigating questions ranging from fundamental biology through to addressing clinical need. We have validated genome-wide libraries available or we can work with you to custom-design libraries that suit your research needs.

KEY TECHNOLOGIES

We offer CRISPRc and CRISPRi for loss-of-function screens and CRISPRa and ORF libraries for gain-of-function screens. Each of these have unique attributes and may be used in isolation or in combination, generating powerful information from gene to phenotype.

- CRISPRc (CRISPR cutting)
  Brunello (human) whole genome library containing 76,441 unique sgRNAs targeting 19,114 genes and microRNAs plus 1000 controls.
  Brie (mouse) whole genome library containing 78,637 unique sgRNAs targeting 19,674 genes plus 1000 controls.
- CRISPRi (CRISPR interference; human)
  Single library containing 90,000 sgRNAs targeting transcriptional start sites of 17,382 genes plus 1000 controls.
- CRISPRa (CRISPR activation; human)
  Two part-libraries which collectively contain 98,000 guide RNAs targeting transcriptional start sites.
- ORF (human)
  Single library containing 16,000 human protein-coding sequences. This library contains unique ORF barcoding enabling its use in pooled screening.
- Custom CRISPR/Cas9 libraries
  Can be designed to meet specific research needs and are unique to each project.

EXPERTISE

Our team has a wealth of expertise in genomics, pooled library screening and life science research, and is dedicated to delivering excellent science across all disciplines. We encourage researchers to meet with us before starting an experiment. We can provide ideas and insight into the most effective pooled screen to use and how to get maximum value from the data generated.
Our facility works closely with Medical Genomics, FlowCore and Bioinformatics to provide a complete package of support from project design through to analysis, secondary screening and mechanistic characterization of gene targets.

WORKING WITH US

- Fee for service
- Consultancies

SPECIALIST SERVICES

Project design

MHTP Functional Genomics offers comprehensive advice on project design for your gain-of-function and/or loss-of-function screens using the latest CRISPR-Cas9 and ORF technologies. Support in formulating hypotheses for grant proposals can also be provided.

Genome-wide or custom genetic screens

Assistance can be provided for the generation of suitable Cas9 expressing cells and screens performed with gain and/or loss of function libraries. These libraries can be genome-wide or smaller custom-designed gene sets specific for your research area. These approaches enable unbiased identification of new genes that contribute to cellular activities. The data generated will further understanding of the genetic networks associated with biological processes / disease and, for example, can assist with drug development or elucidate mechanisms of drug resistance.

Mechanistic characterisation

High-throughput expression profiling can be performed by combining droplet technologies, massive parallel sequencing and CRISPR mediated gene suppression or over-expression. Data can be analysed through our integrated bioinformatics capabilities, providing a rapid and unbiased approach to define the mechanisms associated with altered gene function in different biological models.

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