**High-throughput Native Context Mapping of the Regulatory Genome**
Technology #18012

**Applications**

This invention is a high-throughput CRISPR/Cas9-based approach that analyzes the regulatory genome for function in its native context. Understanding gene regulation for improved control allows for a number of applications including better management of stem cell differentiation.

**Problem Addressed**

Gene regulation, which underlies human variation, disease, and cancer, is poorly understood making it difficult to predict the effects of cis-regulatory variants on gene expression and to predictively alter gene expression during stem cell differentiation and reprogramming. Currently, there is no high-throughput approach capable of determining the relative importance of each gene regulatory element on native gene expression levels. This technology, Multiplexed Editing Regulatory Assay (MERA), enables the analysis of the regulatory genome at single base resolution in its native context.

**Technology**

CRISPR/Cas9 has been used in genome-wide mutation screens to identify genes required for survival, drug resistance, and tumor metastasis. MERA improves upon this previous gene mutation screening approach by ensuring cells receive a precise number of guide RNA (gRNA) per cell (i.e., one or more than one for combinatorial studies) and allows for gRNA libraries to be used without any laborious molecular cloning into a delivery vector. These methods can be used to screen for the effect of mutations anywhere in the genome.

**Advantages**

- Single base resolution
- No repeated and laborious cloning steps
- High-throughput

**Categories For This Invention:**

- Life Sciences
- Research Tools
- Expression Systems
- Screening Assays

**Intellectual Property:**

High-throughput crispr-based library screening
PCT
2017-083766
High-throughput crispr-based library screening
US Patent Pending
2018-0327740

Inventors:
David Gifford
Richard Sherwood
Nisha Rajagopal

Publications:
High-throughput Mapping of Regulatory DNA
Nature Biotechnology
January 25, 2016

External Links:
Gifford Laboratory
http://cgs.csail.mit.edu/

Image Gallery: