

Turning Genes On and Off with CRISPRa and CRISPRi

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The set of genes expressed in a cell determines its fate

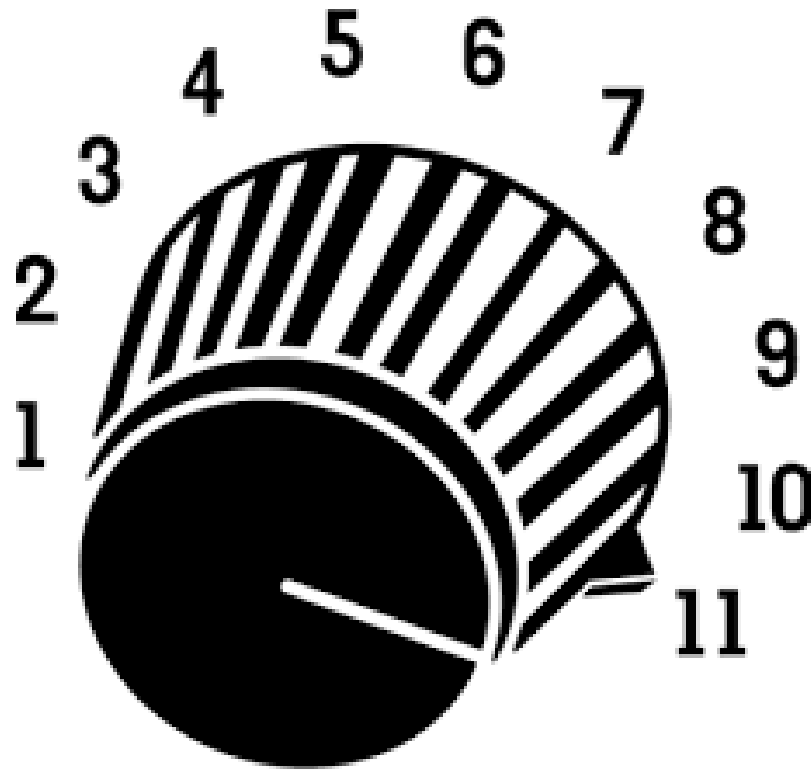


The genome of Humans and Chimpanzees are 98% identical

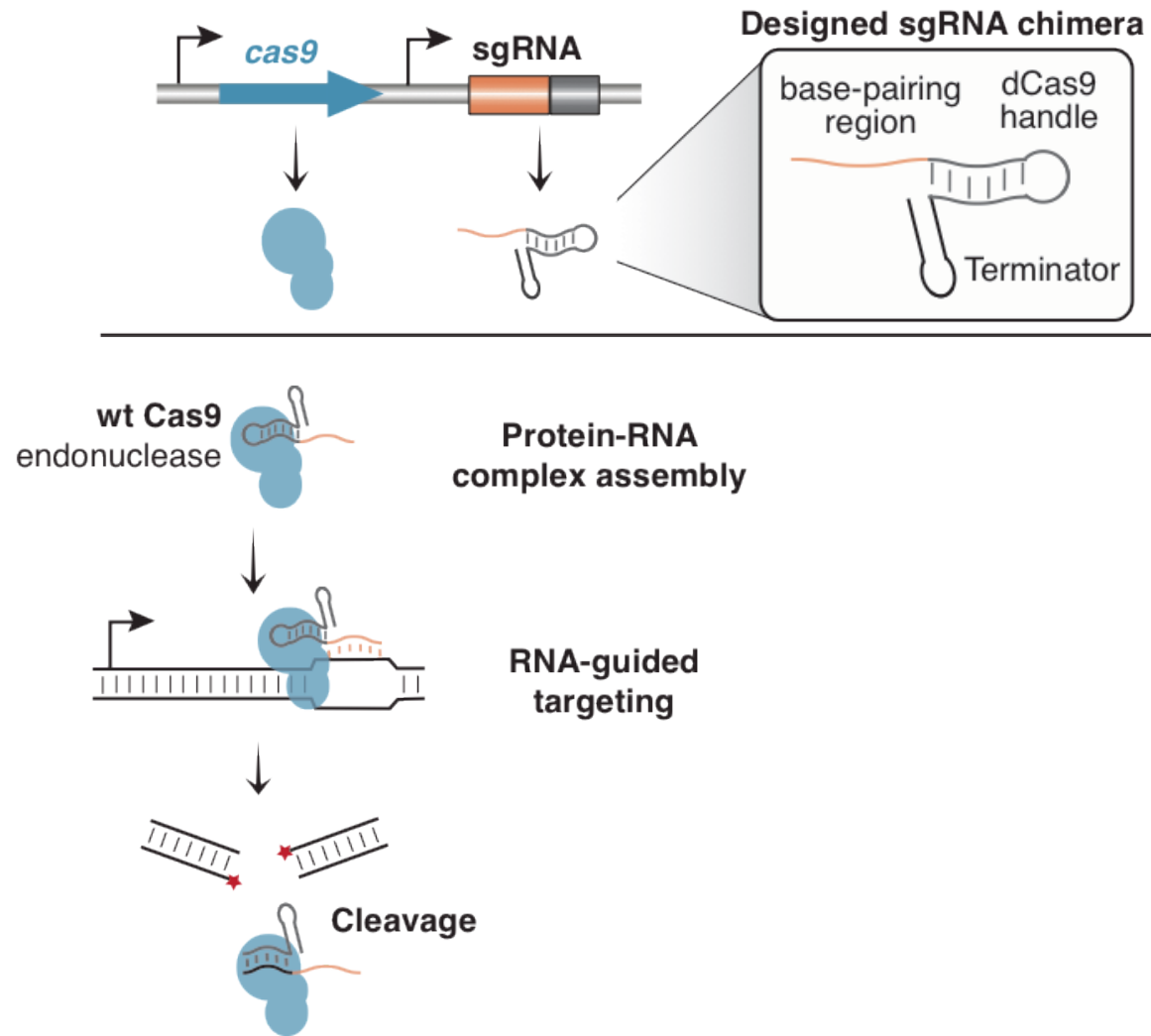




Building tools to control the “volume” of any gene



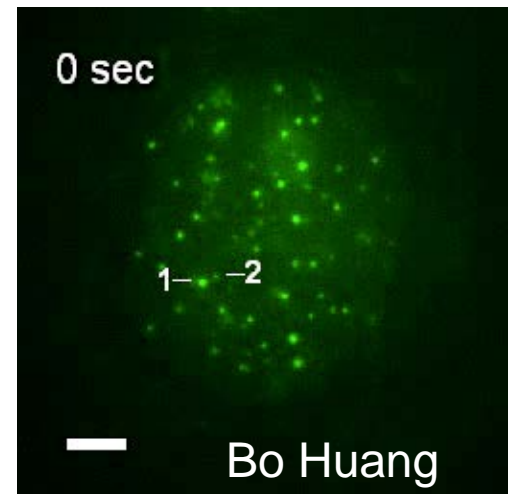
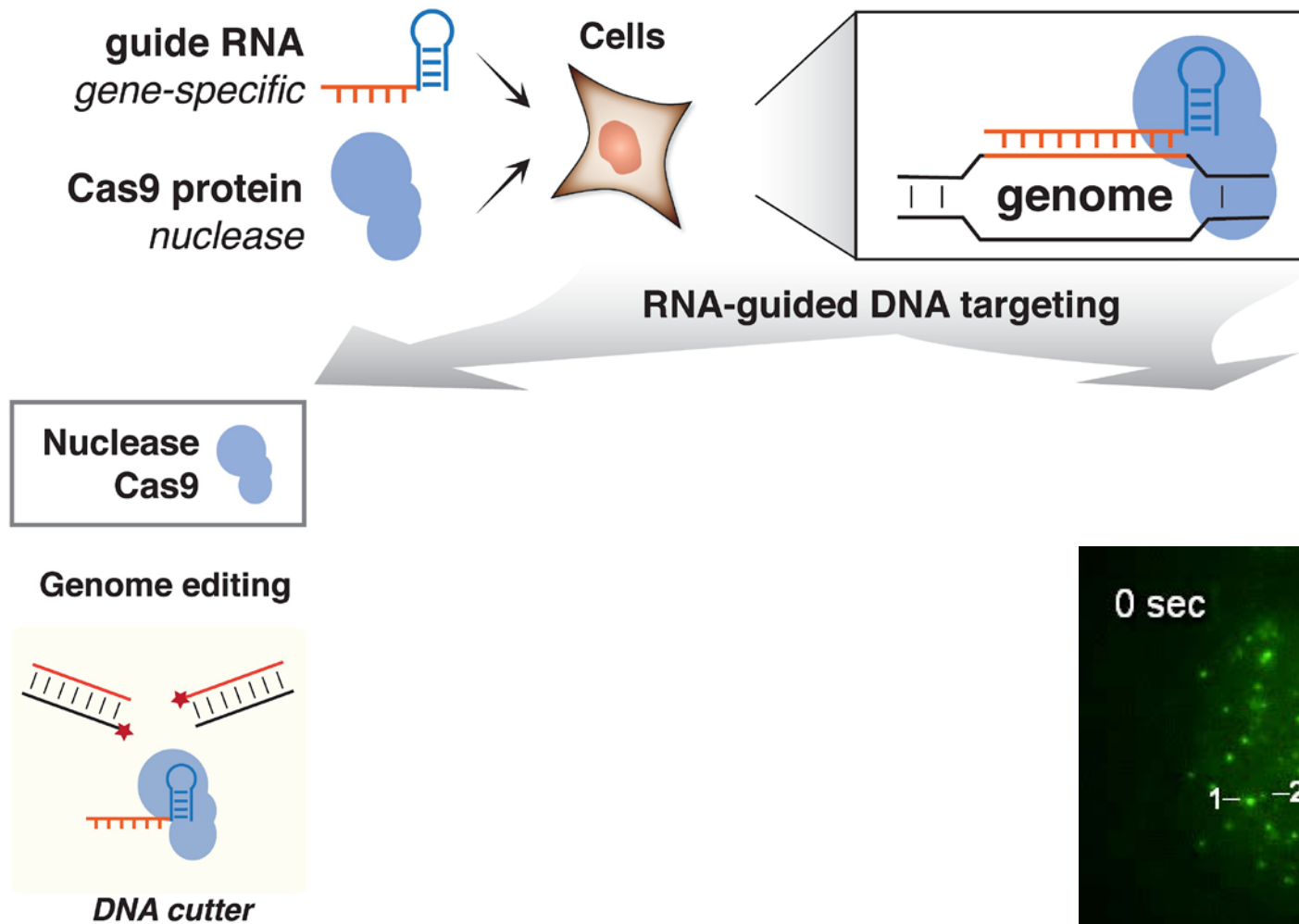
Repurposing CRISPR for genome editing



Jinek et al. *Science* 2012

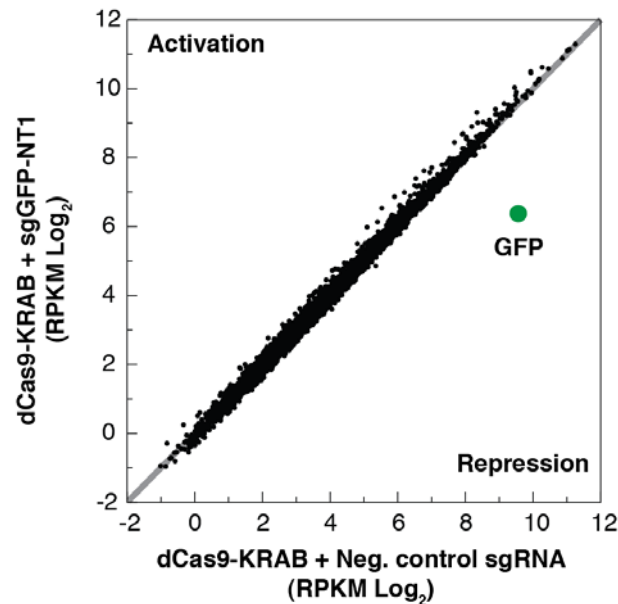
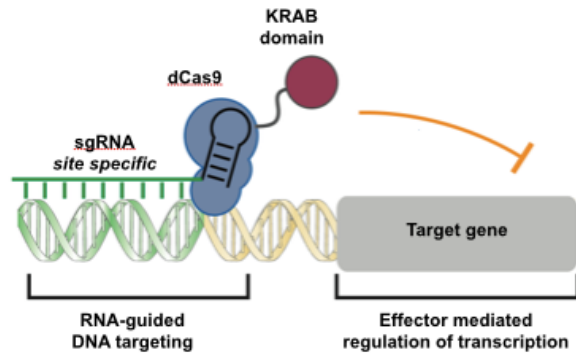
All you need is: 1 protein + 1 single guide RNA (sgRNA, ~100bp)

Retooling CRISPR to turn genes on and off

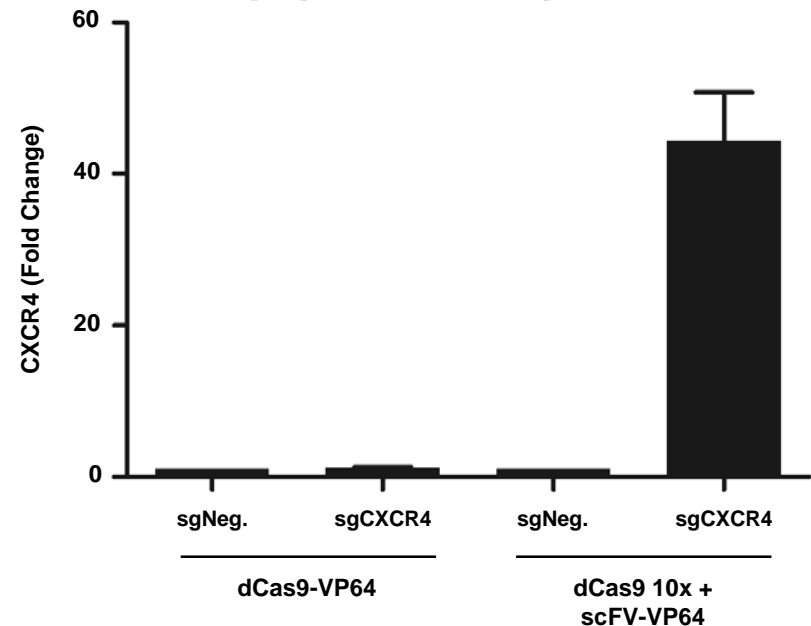
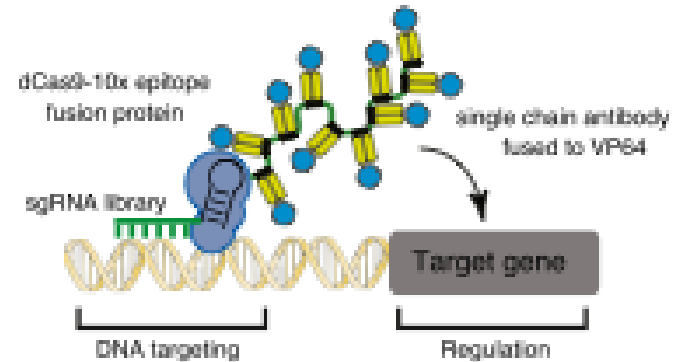


Turning genes on and off with CRISPR

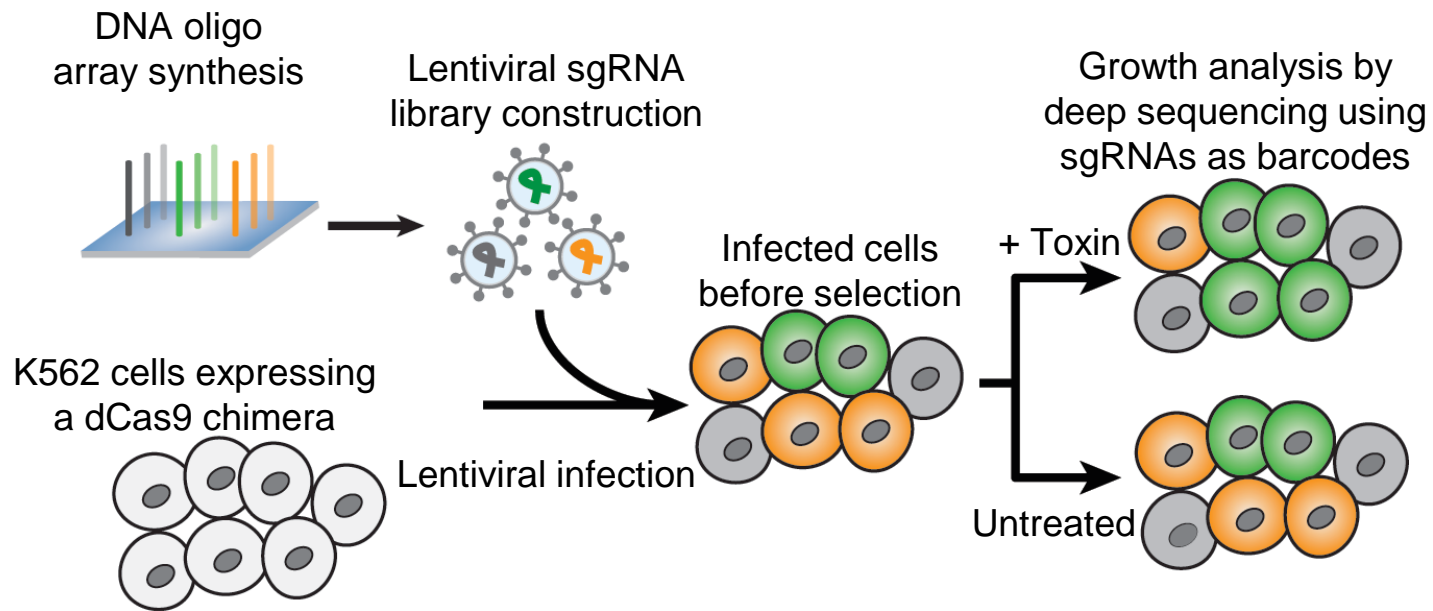
CRISPRi



CRISPRa

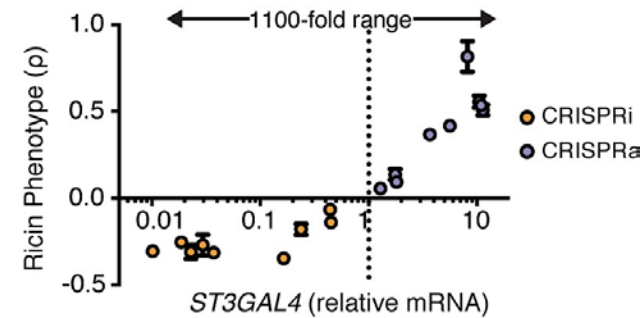


Moving from controlling one gene to all genes



Applications of CRISPRi/a approach

- Define the relationship between gene expression and phenotype.



function.

polytherapy.

Resistance severely limits efficacy of single agent therapies for rapidly evolving pathogens: Example vemurafenib as a targeted agent in BRAF V600E-driven melanoma



Pretreatment



2 month treatment

Wagle et al. JCO 2011

THANKS!

Weissman Lab

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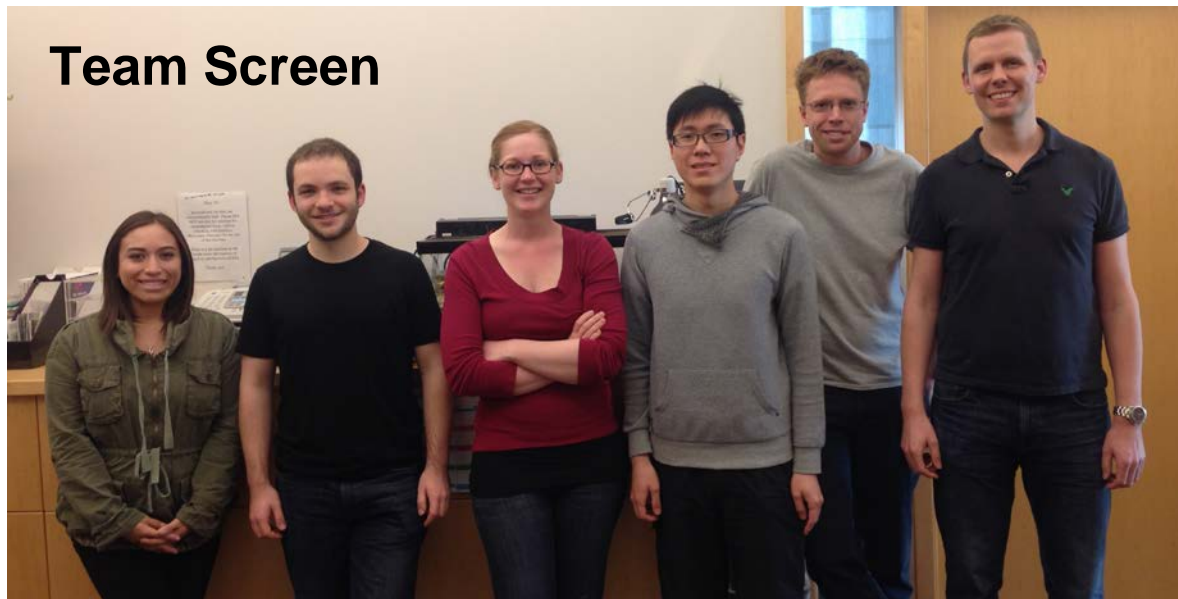
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