

## Applications of Biotechnology - January 2020 - Gene Therapy & CRISPR

Assignment: You will create 1-2 Google presentation slides about your chosen topic. (A link will be shared for your slides.) The topics all relate to CRISPR in some fashion. You will be sharing your findings with the class. Things you might address are: What is the research? What are researchers trying to do? How is the process performed? What's interesting about this topic? What is the benefit? What are concerns? What is your opinion?

1. CHOOSE YOUR OWN CRISPR Topic (ideas here: <https://geneticliteracyproject.org/category/gene-editing/?vpage=1>)
  2. CRISPR and Treating Human Eye Disorder  
<https://geneticliteracyproject.org/2018/12/10/crispr-treatment-for-rare-genetic-eye-disorder-gains-fda-study-approval/> and <https://geneticliteracyproject.org/2017/08/07/blind-birth-pioneering-gene-therapy-restores-vision-victims-rare-retinal-blindness/>  
<https://endpts.com/allergan-editsa-finally-kick-off-crispr-trial-marking-first-in-vivo-test-of-the-gene-editing-technology/>  
<https://www.livescience.com/66040-crispr-human-study-blindness.html>  
<https://www.aao.org/newsroom/news-releases/detail/genome-surgery-eye-disease-moves-closer-to-reality>  
<https://www.xconomy.com/boston/2017/03/14/first-trial-in-sight-editsa-cuts-90m-eye-drug-deal-with-allergan/> and <https://ghr.nlm.nih.gov/condition/leber-congenital-amaurosis> and <https://www.ncbi.nlm.nih.gov/pubmed/28109959> and an abstract <https://www.ncbi.nlm.nih.gov/pubmed/28109959>  
<https://www.xconomy.com/boston/2017/03/14/first-trial-in-sight-editsa-cuts-90m-eye-drug-deal-with-allergan/> and <https://ghr.nlm.nih.gov/condition/leber-congenital-amaurosis> and <https://www.ncbi.nlm.nih.gov/pubmed/28109959> and an abstract <https://www.ncbi.nlm.nih.gov/pubmed/28109959>
  3. CRISPR and transplanting Pig hearts into Baboons  
<https://www.scientificamerican.com/article/baboons-survive-for-half-a-year-after-heart-transplants-from-pigs/>
  4. CRISPR and first edited human babies (Controversy)  
<https://www.apnews.com/4997bb7aa36c45449b488e19ac83e86d> and <https://www.nature.com/news/chinese-scientists-genetically-modify-human-embryos-1.17378> and (U.S.) <https://www.technologyreview.com/s/608350/first-human-embryos-edited-in-us/> and (skeptics) <http://www.sciencemag.org/news/2017/08/skepticism-surfaces-over-crispr-human-embryo-editing-claims> and <http://time.com/4882855/crispr-gene-editing-human-embryo/> and (safety) <https://www.newscientist.com/article/2146061-we-still-dont-really-know-what-crispr-does-to-human-embryos/>  
<https://www.nature.com/articles/d41586-019-00673-1>  
<https://www.npr.org/sections/health-shots/2019/02/01/689623550/new-u-s-experiments-aim-to-create-gene-edited-human-embryos>  
<https://www.technologyreview.com/s/612458/exclusive-chinese-scientists-are-creating-crispr-babies/>
- These article maybe more directly about HIV and CRISPR:  
<https://www.templehealth.org/News/GeneEditingStrategyEliminatesHIV-1InfectioninLiveAnimalsTempleResearchersShow> and (an abstract) [http://www.cell.com/molecular-therapy-family/molecular-therapy/fulltext/S1525-0016\(17\)30110-7](http://www.cell.com/molecular-therapy-family/molecular-therapy/fulltext/S1525-0016(17)30110-7) And <https://www.genengnews.com/gen-news-highlights/crispr-eliminates-hiv-in-live-animals/81254287> And <https://www.nature.com/news/hiv-overcomes-crispr-gene-editing-attack-1.19712> and <https://www.sciencedaily.com/releases/2017/05/170501112514.htm>
5. CRISPR and have mice of same sex make babies  
<https://www.nationalgeographic.com/science/2018/10/news-gene-editing-crispr-mice-stem-cells/>  
and <https://www.scientificamerican.com/article/same-sex-mice-parents-give-birth-to-healthy-brood/>  
and <https://www.nature.com/articles/d41586-018-06999-6>

6. CRISPR and Blocking HIV in infected cells  
<https://geneticliteracyproject.org/2017/06/27/hiv-fix-can-gene-editing-work-alongside-virus-provide-cure/>  
[https://www.bionews.org.uk/page\\_136095](https://www.bionews.org.uk/page_136095)  
<https://www.sciencealert.com/chinese-scientists-transplanted-crispr-edited-blood-cells-into-a-hiv-patient>  
<https://www.sciencemag.org/news/2019/03/curing-hiv-just-got-more-complicated-can-crispr-help>  
<https://www.advisory.com/daily-briefing/2019/09/13/crispr>
7. CRISPR and Pigs (low- fat and organ transplants)  
<https://www.npr.org/sections/thesalt/2017/10/23/559060166/crispr-bacon-chinese-scientists-create-genetically-modified-low-fat-pigs> and <http://www.sciencemag.org/news/2017/08/crispr-slices-virus-genes-out-pigs-will-it-make-organ-transplants-humans-safer> and <http://time.com/4995237/crispr-gene-editing-pigs-fat/>  
<https://wyss.harvard.edu/news/pig-organs-for-human-patients-a-challenge-fit-for-crispr/>  
<https://www.technologyreview.com/s/613666/crispr-pig-organs-are-being-implanted-in-monkeys-to-see-if-theyre-safe-for-humans/>  
<https://www.sciencemag.org/news/2019/12/eyeing-organs-human-transplants-companies-unveil-most-extensively-gene-edited-pigs-yet>
8. CRISPR and Citrus Disease <https://www.nature.com/news/geneticists-enlist-engineered-virus-and-crispr-to-battle-citrus-disease-1.21997> and <http://blogs.ifas.ufl.edu/news/2017/07/11/microbiologist-ufifas-citrus-rec-works-toward-successful-greening-treatment/> and (general) <https://www.digitaltrends.com/cool-tech/crispr-gene-editing-and-the-dna-of-future-food/>
9. CRISPR and cancer <http://www.nature.com/news/crispr-gene-editing-tested-in-a-person-for-the-first-time-1.20988> and <https://www.nature.com/news/first-crispr-clinical-trial-gets-green-light-from-us-panel-1.20137>  
And <https://www.livescience.com/crispr-to-fight-cancer.html>  
And <https://www.synthego.com/crispr-cancer>  
And <https://www.the-scientist.com/news-opinion/crispr-edited-t-cells-used-in-cancer-patients-for-the-first-time-66684>
10. CRISPR and Sickle Cell Anemia  
<https://www.synthego.com/crispr-sickle-cell-disease> and <https://www.the-scientist.com/?articles.view/articleNo/51174/title/CRISPR-to-Debut-in-Clinical-Trials/> and <https://www.wired.com/story/crispr-therapeutics-plans-its-first-clinical-trial-for-genetic-disease/>  
And <https://geneticliteracyproject.org/2019/12/09/podcast-a-closer-look-at-the-crispr-experiment-that-could-cure-sickle-cell-disease/>  
<https://www.npr.org/sections/health-shots/2019/10/10/766765780/after-a-life-of-painful-sickle-cell-disease-a-patient-hopes-gene-editing-can-help>  
<https://www.npr.org/sections/health-shots/2019/11/19/780510277/gene-edited-supercells-make-progress-in-fight-against-sickle-cell-disease>  
<https://directorsblog.nih.gov/2019/04/02/a-crispr-approach-to-treating-sickle-cell/>  
<https://www.nytimes.com/2020/01/11/health/sickle-cell-disease-cure.html>
11. CRISPR and Huntington's Disease (about Huntington's - <http://hdsa.org/what-is-hd/>) technical paper: <https://www.jci.org/articles/view/92087> and <https://www.technologyreview.com/s/608967/arming-bodies-with-crispr-to-fight-huntingtons-disease-and-als/> and <https://www.genengnews.com/gen-news-highlights/crispr-reverses-huntingtons-disease-in-mice/81254532> and <http://blogs.plos.org/dnascience/2017/06/29/can-crispr-conquer-huntingtons/> and [http://news.emory.edu/stories/2017/06/li\\_hd\\_jci-CRISPR/index.html](http://news.emory.edu/stories/2017/06/li_hd_jci-CRISPR/index.html)
12. CRISPR and Muscular Dystrophy <http://news.berkeley.edu/2017/10/03/crispr-gold-fixes-duchenne-muscular-dystrophy-mutation-in-mice/> and (technical paper - <http://advances.sciencemag.org/content/3/4/e1602814.full>) and <https://muscular dystrophynews.com/2017/10/13/duchenne-muscular-dystrophy-mutation-in-mice-fixed-crispr-gold-gene-editing-technology/>

13. CRISPR, Chronic Pain and Inflammation <https://www.ncbi.nlm.nih.gov/pubmed/28109959> and <https://www.sciencedaily.com/releases/2017/03/170313102429.htm> and <https://futurism.com/a-single-gene-could-help-us-bring-an-end-to-chronic-pain/>  
And <https://www.technologyreview.com/s/614210/the-next-trick-for-crispr-is-gene-editing-pain-away/>  
<https://www.sciencedaily.com/releases/2017/03/170313102429.htm>  
and <https://www.wired.com/story/crispr-gene-editing-could-one-day-cut-away-human-pain/>
14. CRISPR, Lyme Disease and Gene Drives <http://www.wired.co.uk/article/kevin-esvelt-mit-genetic-engineering> and <http://www.capecodtimes.com/news/20160724/genetically-modified-mice-seen-as-possible-weapon-in-lyme-disease-fight> and about Lyme disease <https://www.cdc.gov/lyme/index.html>  
And <https://www.statnews.com/2019/08/22/gene-editing-to-stop-lyme-disease-caution-is-warranted/>  
And <https://tuftsmagazine.com/issues/magazine/fighting-lyme-disease-gene-editing>  
And <https://www.synthego.com/blog/crispr-lyme-disease>
15. CRISPR and Malaria and Gene Drives  
[http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news\\_24-4-2017-16-55-16](http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news_24-4-2017-16-55-16) and <https://www.npr.org/sections/health-shots/2016/12/14/504732533/to-fight-malaria-scientists-try-genetic-engineering-to-wipe-out-mosquitoes> and <http://biologywriter.com/can-crispr-eliminate-malaria/> and (technical) <https://www.nature.com/articles/nbt.3439> and ethical considerations <http://gh.bmj.com/content/2/3/e000396>  
And <https://www.nature.com/articles/d41586-019-02087-5>  
And <https://www.vox.com/science-and-health/2018/5/31/17344406/crispr-mosquito-malaria-gene-drive-editing-target-africa-regulation-gmo>  
Video: <https://www.youtube.com/watch?v=TnzcwTyr6cE> and <https://www.youtube.com/watch?v=P0HPUzsHbl>  
<https://www.science.org.au/curious/people-medicine/malaria-carrying-mosquitoes-shut-down-gene-drive>
16. CRISPR and creating a new organism <https://www.sciencealert.com/new-organisms-have-been-formed-using-the-first-ever-6-letter-genetic-code>  
<https://www.nytimes.com/2014/05/08/business/researchers-report-breakthrough-in-creating-artificial-genetic-code.html>  
<https://phys.org/news/2017-01-scientists-stable-semisynthetic.html>  
[https://www.theguardian.com/science/2017/jan/23/organisms-created-with-synthetic-dna-pave-way-for-new-entirely-new-life-forms?CMP=oth\\_b-aplnews\\_d-3](https://www.theguardian.com/science/2017/jan/23/organisms-created-with-synthetic-dna-pave-way-for-new-entirely-new-life-forms?CMP=oth_b-aplnews_d-3)
17. CRISPR, Viruses and Superbugs (Researchers Are Using Viruses to Make Superbugs Commit Suicide)  
<https://www.sciencealert.com/researchers-are-using-viruses-to-make-superbugs-commit-suicide>  
<https://www.sciencealert.com/the-rise-of-super-bugs-has-prompted-a-un-general-assembly-meeting>  
<https://www.technologyreview.com/s/604126/edible-crispr-could-replace-antibiotics/>
18. CRISPR and Biofuels  
<https://www.synthego.com/blog/crispr-bioenergy>  
<https://www.sciencealert.com/gene-editing-algae-doubles-biofuel-output-potential>  
(An abstract) <https://www.sciencedirect.com/science/article/pii/S0944501318308346>  
(Limited info) <https://allianceforscience.cornell.edu/blog/2018/07/10-ways-crispr-will-revolutionize-environmental-science/>  
<https://phys.org/news/2019-07-genome-bioenergy.html>  
Video: <https://www.youtube.com/watch?v=bdeMpibOFW0>
19. CRISPR and encoding movies in the DNA of Living Bacteria <https://www.sciencealert.com/for-the-first-time-scientists-have-encoded-a-movie-in-the-dna-of-living-bacteria>