

Genomics Lite: CRISPR in Focus *Learning Resources*



These resources are designed to support and further attendees understanding of CRISPR and genome editing, and are aimed at students in upper secondary years (e.g. year 10 and higher).

For further resources, visit yourgenome.org

What is genome editing and CRISPR?

Genome editing is a way of making specific changes to the DNA of a cell or organism. CRISPR/Cas9 is a genome editing tool that is faster, cheaper and more accurate than other tools available.

<https://www.yourgenome.org/facts/what-is-genome-editing>

<https://www.yourgenome.org/facts/what-is-crispr-cas9>

https://youtu.be/6tw_JVz_Ic

CRISPR is able to replace or remove sections of DNA by acting as a pair of 'molecular scissors'. This 3D interactive shows the molecular mechanism of CRISPR.

<https://www.biointeractive.org/classroom-resources/crispr-cas-9-mechanism-applications>

In 2020, Jennifer Doudna and Emmanuella Charpentier won the Nobel Prize in Chemistry for their breakthrough work on CRISPR technology, becoming the first two women to share the prize. Read this interview by the Nobel Prize team to learn more about how Jennifer got into science and why she thinks diversity in science is so important.

<https://www.nobelprize.org/prizes/chemistry/2020/doudna/167713-jennifer-doudna-interview-february-2021/>

CRISPR has great potential for use in genomics research - allowing scientist to edit genes to better understand their effects - and potentially in removing or replacing disease-related genetic mutations in humans. However, the tool has also been found to cause more than just the intended genetic changes.

<https://www.statnews.com/2020/10/29/lab-tests-show-risks-of-using-crispr-gene-editing-on-embryos/>

Genome editing controversies

Germline genome editing (that targets reproductive cells) has been long debated before CRISPR became a viable tool. Targeting reproductive cells with gene therapy means that edited DNA will be passed down to the next generation, who can then pass it on to future generations. This debate page highlights some of the potential benefits and risks of germline genome editing.

<https://www.yourgenome.org/debates/is-germline-gene-therapy-ethical>

A recent controversy involving CRISPR occurred when a Chinese scientist announced that he had created the world's first gene edited babies. This video highlights what the scientists did, and the potential dangers involved.

<https://youtu.be/fN4clztQRWA>