PROVA DE SELEÇÃO DO PPG-CM - NOVEMBRO/2020

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ÁREA: Prova GERAL

ARTIGO: Ledford H, Callaway E. Pioneers of revolutionary CRISPR gene editing win chemistry Nobel. Nature. 2020 Oct;586(7829):346-347. doi: 10.1038/d41586-020-02765-9. PMID: 33028993.

QUESTÕES:

1. Define what CRISPR is and describe what it does.

2. What CRISPR technology allows to perform and what are their main applications?

3. What other researchers and institutions contributed to the initial characterization of CRISPR besides Doudna, Chapentier and their colleagues?

4. What exactly did Charpentier and Doudna and their teams perform in the 2012 pivotal paper?

5. What are the main controversies of CRISPR, biggest concerns and cite an example.

RESPOSTAS:

1. CRISPR, short for clustered regularly interspaced short palindromic repeats, is a microbial 'immune system' that prokaryotes — bacteria and archaea — use to prevent infection by viruses called phages. At its core, the CRISPR system gives prokaryotes the ability to recognize precise genetic sequences that match those of a phage or other invader, and to target these sequences for destruction using specialized enzymes.
2. The technology allows precise edits to the genome and has swept through laboratories worldwide since its inception in the 2010s. It has countless

applications: researchers hope to use it to alter human genes to eliminate diseases; create hardier plants; wipe out pathogens; and more.

3. Doudna and Charpentier and their colleagues did crucial early work characterizing the system, but several other researchers have been cited - and recognized in other high-profile awards - as key contributors in the development of CRISPR. They include Feng Zhang at the Broad Institute of MIT and Harvard in Cambridge, Massachusetts, George Church at Harvard Medical School in Boston, Massachusetts, and biochemist Virginijus Siksnys at Vilnius University in Lithuania.

4. Charpentier reported the discovery in 2011 and that year struck up a collaboration with Doudna. In a landmark 2012 paper (M. Jinek et al. Science 337, 816–821; 2012), the duo and their teams isolated the components of the CRISPR–Cas9 system, adapted them to function in the test tube and showed that the system could be programmed to cut specific sites in isolated DNA. The programmable gene-editing system has inspired a gold rush of applications in medicine, agriculture and basic science — and work continues to tweak and improve CRISPR and to identify other gene-editing tools.

5. But the technology has also generated controversy — in particular for its nascent applications in human cells. In November 2018, Chinese biophysicist He Jiankui announced that twin girls had been born from embryos that he and his colleagues had edited using CRISPR–Cas9. The news sparked an outcry: editing embryos raises a host of ethical, social and safety concerns, and many researchers worldwide quickly condemned He's work.