



Developing advanced human resources for genome editing to find solutions to humanity's problems

Takashi Yamamoto

Professor
Genome Editing Innovation Center
School of Science and Graduate School of Integrated Sciences for Life

Genome editing is the emerging biotechnology that makes it possible to modify genetic information (genome) in living organisms exactly as desired. Genome editing involves the use of artificially generated enzymes (genome editing tools) to cut the DNA of a cell at a specified sequence. With humans, this means precisely targeting a spot along the approximately three billion basic sequences (of A, G, C, and T) in the human genome. To accurately modify genes, genome editing makes use of the intracellular repair mechanism that is immediately activated when the DNA is damaged. Capable of inducing various types of mutations in microorganisms, plants, and animals just like naturally occurring mutations, genome editing is expected to bring about technological innovations that can lead to the development of biofuels using microorganisms, the improvement of useful species, drug discovery, and the creation of new medical treatment methods.

At Hiroshima University, we began basic technological development for genome editing in 2008. We have produced many positive research results, including successful genome editing in microorganisms, insects, sea urchins, amphibians such as frogs and newts, and some mammals, using HU's originally developed genome editing tool (Platinum TALEN). Moreover, improvement of this technology has made it possible to regulate and

visualize (by using imaging technology) the functions of genes in cells.

In 2016, Hiroshima University led the establishment of a genome editing consortium for academia-industry collaboration. It now serves as a platform for industrial technology development projects with the participation of many private businesses. For example, Mazda Motor Corporation and HU are pursuing the development of a microalgae-based renew-

able energy to replace fossil fuels. In the field of healthcare, we are promoting the production of model iPS cells and model animals for research on hereditary diseases with researchers in and outside Japan. Because of the high potential of genome editing for therapeutic purposes, we are also working hard on technological development for cell manufacturing for regenerative medicine and cancer treatment.

In 2018, HU's "Frontier Development Program for Genome Editing" was selected as an excellent graduate school program of the Ministry of Education, Culture, Sports, Science and Technology of Japan, putting in motion our advanced human resource development. This program is designed to train researchers who will work toward new industrial creation

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