GENE EDITING OF EMBRYOS

In 2019, the first known application of CRISPR/Cas9 in human embryos was presented at the Second International Summit on Human Genome Edition in Hong Kong. The principal scientist involved, Dr. He Jiankui, announced the birth of twins that carried CRISPR/Cas9 corrective mutations produced in one-cell embryos before the transfer to the uterus. Dr. Jiankui's work was widely condemned for the premature use of this new technology.

CRISPR/Cas9 technology allows gene editing of specific genomic target sequences with high efficiency. Prior to Dr. Jiankui's study, there had been several published reports of successful results in one-cell human embryos (which were not implanted), suggesting the possibility of permanently correcting some genetic disorders.

These successful results, however, went together with some disadvantageous consequences: 1) Off-target mutagenesis; 2) Mosaicism; 3) Large deletions and chromosome rearrangements; 4) On-site damage and biallelic modifications.

In an article in Human Reproduction (https://academic.oup.com/humrep/article/34/11/2104/5613882), the author has extensively reviewed the origin and the frequency of the harmful events that appear as a consequence of the application of the CRISPR/Cas9 technology. In agreement with the scientific community, the author highlights the need for more research to optimize the method before therapeutic editing can be considered. In this respect, the implementation of new editing methods, such as prime editing (https://www.nature.com/articles/s41586-019-1711-4) has already begun to open some promising alternatives.