

Genome editing is a transformative but still erratic technology in health and agriculture

Genome editing has a transformative potential in healthcare or to improve crops or livestock. However, the use of Cas9 or other nucleases can yield unpredictable events at the target site or off target.

To overcome these challenge, it is critical to understand and accurately predict the whole range of possible editing outcomes.

The key to success is to combine molecular assays to evaluate the sequence changes at the target site and to quantify the number of copies of segments deleted/inserted across the genome.

For all applications, thorough evaluation of these outcomes is essential to identify all collateral damage from nuclease activity and for a real appraisal of the benefits and risks associated with applying this technology.

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The safety of genome-editing technologies is just as critical as their efficiency for their successful application in health or agriculture. Common to all fields of application are the risks associated with undesired genetic changes that can be triggered by genome editing.

The potential for unwanted off-target nuclease activity was recognized early in the application of the CRISPR/Cas9 system as a genome-editing tool. The frequency of such events and the attached risks were the subjects of much debate. The general consensus is that, with careful molecular design, off-target events are rare and generally can be segregated away from the allele of interest in genome edited animals.

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