U.S. Gene Editing Market - Industry Outlook & Forecast 2022-2027

Market Report | 2022-11-08 | 197 pages | Arizton Advisory & Intelligence

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Report description:

The U.S. gene editing market is expected to grow at a CAGR of 21.13% during 2022-2027.

MARKET INSIGHTS

Growth in the gene editing market is fueled by increasing demand for synthetic genes in the U.S. Genomics can be used to identify genetic abnormalities in humans, drug discovery, agriculture, veterinary medicine, and forensics. Gene editing requires tools and techniques that make unique changes to the DNA sequence of an organism's genes, fundamentally altering the genetic blueprint. Unlike genetic engineering, which randomly incorporates genetic material into the host genome, gene editing aims to make changes at specific target locations.

Genome editing technology is a technique for target gene modification that allows the knockout and addition of specific fragments of DNA. This technique is widely used in biomedical research, clinics, and agriculture. A growing preference for personalized medicine, rare disease treatment research, rising R&D spending and growth in the pharmaceutical and biotech industries, rapid advances in sequencing and genome editing technologies, and increasing use of products derived from genetically modified organisms. These are some of the factors that are boosting the growth of the U.S. gene editing market.

MARKET TRENDS AND OPPORTUNITIES

The Emergence of Novel Gene Editing Tools

-CRISPR changes the way scientists work on gene editing, providing unprecedented accuracy. However, CRISPR technology is not certain and has limitations that make the leap from gene therapy and cell therapy laboratories to the bedside.
-Base editing is an innovative technology that can create gene knockouts and correct specific errors and mutations in the DNA of whole cells. Single nucleotide polymorphisms are highly pathogenic mutations that cause human illness and require only a single nucleotide change to correct the mutation.

-In October 2019, David Liu's postdoctoral fellow Andrew Anzalone and his colleagues published the development and application of prime editing on Nature's website. Prime editing is a gene editing technique that can accurately perform small, targeted insertions, deletions, and base swaps.
-The development of prime editing is a powerful add-on to the genome editing toolbox. Prime editing is the latest tool developed to address CRISPR/Cas drawbacks and calibrate the genome editing process. For educational use, the technology can be presently achieved by the Add gene repository.

Increasing Pharma/Biotech, Venture Capital, & Government Funding for Gene Editing Projects

-Genome editing aims to modify the DNA sequence so cells can make the correct protein again. NIH created the SCGE program in January 2018 to improve genome editing technology and make genome editing therapies more widely available. Genome editing has a great potential to change the treatment environment for both common and rare diseases. Gene editing is in its infancy, and these newly funded projects promise better strategies to address various challenges, including the right genes in the genome. Over the past decade, the U.S. gene editing market is witnessing many new investments from governments, private equities, and venture capitalists. For instance, the number of VC deals increased from 1 in 2012 to 29 in 2021, and the total amount of VC deals since 2012 reached USD 3.2 billion. In 2021 alone, more than USD 1.3 billion was raised, an increase of more than 250% from 2020 (USD 500 million).
-The most exciting developments in CRISPR therapeutics often come from start-ups. However, CRISPR treatments are also attracting interest from big pharmaceutical companies. Start-ups and big pharma often choose to partner. Some examples of small/large partnerships include Beam Therapeutics-Pfizer, Metagenomi-Moderna, CRISPR Therapeutics-Vertex Pharmaceuticals, Mammoth Biosciences-Bayer, Intellia Therapeutics-Regeneron Pharmaceuticals, Intellia-Novartis, and Caribou Biosciences-AbbVie.
-Advancements in Gene editing technologies have turned up novel gene editing technology that has opened new and stimulating opportunities in drug discovery and medicine. The immense potential of gene editing technologies, like CRISPR, base editing, and prime editing is starting to be accomplished in treating rare and complex diseases. Arizton expects increased activity in this area in the coming years, including additional investment in gene editing companies developing gene-editing technologies.

Diversified Application Areas of Gene Editing

-Genome editing is widely used in studying a wide variety of organisms. For example, CRISPR creates "knockout" models of various animal diseases, allowing researchers to study the underlying genetic cause. It also modifies the genes of specific tissues and organs, focusing on the criminal's genes to facilitate disease research, creating disease cell models like human pluripotent stem cells, and creating pig organs.
-Several technologies, including zinc finger endonucleases (ZFNs), transcriptional activator-like effector nucleases (TALENs), and clustered, regularly spaced, short-interval palindrome repeat / CRISPR-related nucleases (CRISPR / Cas) systems are used to achieve gene editing. Due to its simple design, rapid implementation, low cost, and robust scalability, researchers see the CRISPR / Cas system as an innovative gene-editing toolbox that extends to almost any genome target. This system is widely used, especially in cancer research, and is a potential approach for diagnosing and treating cancer.

SEGMENTATIONS ANALYSIS

INSIGHTS BY PRODUCT

The reagents & consumables segment accounted for a significant share of around 67.11% of the U.S. gene editing market. The segment is estimated to be higher because of gene editing technology based on programmable nucleases such as meganucleases, zinc finger nucleases (ZFNs), and transcriptional activator-like effector nucleases (TALENs), and CRISPR-related nucleases Cas9 that spreads the possibility of therapeutic gene editing in affected cells and tissues. It results in the removal or correction of harmful mutations or the insertion of protective mutations. Gene editing is widely used in drug discovery and

development, diagnosis, crop improvement and seed production, and livestock. The CRISPR / Cas9 KO Kit is a highly efficient and accurate gene editing kit based on the latest artificial endonuclease CRISPR / Cas9. Compared to traditional TALEN and ZFN gene knockout technologies, the CRISPR / Cas9 KO kit is easier to operate and has the highest knockout efficiency. The CRISPR / Cas9 KO kit can be applied to modify genes in almost all types of mammalian cells.

Segmentation by Products
- Reagents & Consumables
- Equipment & Software
- Services

INSIGHTS BY TECHNOLOGY

The CRISPR segment accounts for the largest share of around 63.49% in the U.S. gene editing market under the technology category. This segment is estimated to be higher because CRISPR has revolutionized research and practice outcomes in biology, especially in genome editing and genetic engineering. The CRISPR-related gene (Cas gene) was identified in 2002, and further research has provided a better understanding of the structure and function of CRISPR and CRISPR-related (Cas) proteins. CRISPR technology-based gene editing was first demonstrated in 2013, and the technology has evolved rapidly.

Emerging technologies such as CRISPR-Cas9 are vital to unlocking potential drug discovery targets and can significantly impact modern drug discovery and development. CRISPR is a genome editing technology that lets scientists precisely modify parts of the DNA sequence in the genome of any organism.

Segmentation by Technology
- CRISPER
- TALEN
- ZFN
- Others

INSIGHTS BY APPLICATION

Among all applications, the drug discovery & development segment holds a major share of 55.71% in the U.S. gene editing market. The segment is estimated to be higher because genome editing has been successfully applied to multiple diseases in preclinical and clinical studies. When assessing the feasibility of genome-editing-based therapies, the therapeutic effect of the gene modification of interest must first be established. Cancer immunotherapy has recently received much attention to leverage the patient's immune system against tumor cells. A promising area of immunotherapy is the application of genetically engineered T cells known as chimeric antigen receptors (CAR) T cells.

Segmentation by Application
- Drug Discovery & Development (DDD)
- Animal Gene Editing
- Plant Gene Editing
- Others

INSIGHTS BY END-USER

The pharma & biotech companies segment dominates the U.S. gene editing with a share of 36.52% among all end-user. This segment is estimated to be higher because, in terms of market capitalization, the top U.S.-based biotechnology firm are Johnson &

Johnson, Pfizer, Eli Lilly, and Thermo Fisher Scientific. There are some overlaps between biotechnology and pharmaceutical companies. Johnson & Johnson, Pfizer, and Eli Lilly are enormous forces in both industries, and the pharma and biotechnology companies are investing in gene editing companies. With their collaboration, they are developing gene-edited drug products in different therapeutic areas such as cancer, hematology, hereditary eye disorders, NDs, etc.

For instance, In January 2022, Pfizer is the largest pharmaceutical drug company to move into gene editing, putting a big bet on CRISPR-based therapeutics that can correct single-letter typos in DNA and a methodology known as base editing. The company has signed a USD 300 million 4-year deal with Beam Therapeutics that will see the corporations work jointly on three programs for rare liver genetic diseases, the central nervous system, and the muscles.

Segmentation by End User

-Pharma & Biotech Companies (PBC)
-Academic & Research Institutes (ARI)
-Animal & Plant Biotech Companies (APBC)
-CROs/CDMOs

COMPETITIVE ANALYSIS

Key players in the U.S. gene editing market such as Agilent Technologies, Thermo Fisher Scientific, Genscript, Takara bio, creative Biogene, and merck kgaA collectively account for significant shares in the industry. However, they are facing stiff competition from emerging and existing players. Start-ups and pure gene editing companies are developing their products, expanding their manufacturing facilities, and partnering with big pharma and biotech players, academic/research institutes & laboratories. Technological advances, particularly healthcare solutions, rapidly change the U.S. gene editing market. Market players in the global gene editing market are getting huge investments from VC and the federal government for developing the product portfolio across domains - healthcare, industrial, food & beverages, agriculture, and environment.

Key Vendors
-Agilent Technologies
-Creative Biogene
-Genscript
-Merck KGaA
-Thermo Fisher Scientific
-Takara Bio

Other Prominent Vendors
-Arbor Biotechnologies
-Beam Therapeutics
-Bluebird Bio
-Cellectis
-Caribou Biosciences
-Charles River Laboratories
-CRISPR Therapeutics
-HERA Biolabs
-Integrated DNA Technologies
-Lonza
-New England Biolabs

-OriGene Technologies
-Synthego
-Tecan
-PerkinElmer
-Precision BioSciences
-Intellia Therapeutics
-Pairwise
-Sangamo Therapeutics
-Recombinetics
-Synbio Technologies

Recent Developments and Partnerships

1.The most exciting developments in CRISPR therapeutics often come from start-ups. However, CRISPR is also attracting big pharmaceutical companies to start-up companies. Start-ups and big pharma companies frequently partner with companies offering gene editing approaches and technologies in the U.S. gene editing market.
2.The latest genome-editing company to partner with a major pharmaceutical company is Beam Therapeutics, which pioneered the fundamental editing of human disease. In January 2022, Beam and Pfizer announced their four-year exclusive research collaboration focused on an in vivo baseline treatment program.
3.In January 2022, Bayer and Mammoth Biosciences collaborated on novel gene editing technology. Mammoth Biosciences received USD 40 million to develop an in vivo gene-editing therapy.
4.In November 2021, Moderna collaborated with Metagenomi to add CRISPR-based and other novel gene-editing systems to the company's mRNA/LNP expertise to develop in vivo gene-editing therapeutics.
5.In February 2022, a gene-editing company, Intellia Therapeutics, and ONK Therapeutics, a company developing natural killer (NK) cell therapies in oncology, announced a licensing and collaboration agreement. ONK will take a non-exclusive license to Intelia?s proprietary ex-vivo CRISPR-Cas9-based gene editing platform and its lipid nanoparticle (LNP)-based technologies for the discovery & development of five allogeneic NK cell therapies.

KEY QUESTIONS ANSWERED

1.What is the expected growth of the U.S. gene editing market?
2.What is the growth rate of the U.S. gene editing market?
3.Who are the key players in the U.S. gene editing market?
4.What are the latest trends in the U.S. gene editing market?
5.What factors will drive the U.S. gene editing market?
6.How much is the CRISPR industry worth?

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