

PRESENTED BY:
BDG LIFESCIENCES



CRISPR | GENE THERAPY

**10 DAY PROGRAM WITH CASE
STUDIES**

EVERY DAY 60-90 MIN LIVE SESSION

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INTRODUCTION

CRISPR is one of the most revolutionary scientific discoveries of the 21st century. It allows scientists to edit genes with precision, opening possibilities to treat genetic diseases, improve crops, and advance personalized medicine.

This 10-Day Program on Introduction to CRISPR and Its Application in Gene Therapy is designed to introduce high school students to the fundamentals of genome editing and the practical workflow behind CRISPR-based research.

Students will not just learn what CRISPR is – they will explore how gene editing experiments are designed computationally, how target sequences are selected, and how researchers evaluate editing strategies before laboratory implementation.

This program is ideal for students interested in:

- Genetics and molecular biology
- Medicine and gene therapy
- Biotechnology careers
- Science fair research projects
- Future biomedical research pathways

TRAINERS

The training programs at BDG Lifesciences are conducted by highly experienced resource persons with strong academic and research backgrounds in bioinformatics, computational biology, drug discovery, molecular modeling, genomics, and artificial intelligence applications in life sciences. Our trainers include research professionals and subject-matter experts who have worked on real-world research projects, guided students for science fairs and publications, and delivered advanced workshops internationally. With over a decade of experience mentoring students—from high school to postgraduate levels—our team focuses on building strong conceptual foundations while providing hands-on exposure to industry-standard tools and research methodologies. The teaching approach emphasizes clarity, structured progression, practical application, and personalized guidance to ensure students not only understand the concepts but also gain confidence in applying them independently.

OVERVIEW

This program is designed to take students step-by-step from basic concepts to advanced applications of CRISPR and gene therapy. Students will learn how to identify target genes, design guide RNAs (sgRNAs), and evaluate their effectiveness using computational tools. The course also covers important topics such as off-target effects, editing efficiency, base editing, prime editing, and validation strategies like primer and template design.

By the end of the program, students will understand how CRISPR workflows are designed—from selecting a genetic target to planning precise edits—and how these techniques are applied in real-world research areas such as genetic disorders, cancer, and biotechnology.

TIMETABLE - PART I (DAY 1 TO DAY 4)

| Day | Duration | Session Theme | Topics to be Covered |
|-------|-----------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Day 1 | 60-90 min | Introduction to CRISPR and Gene Therapy | Introduction to genes, genomes, and mutations; overview of genome editing; limitations of conventional editing tools; origin and biological basis of CRISPR systems; CRISPR-Cas terminology; introduction to gene therapy; somatic vs germline therapy; major therapeutic applications; ethics and biosafety overview |
| Day 2 | 60-90 min | CRISPR Design Workflow I | CRISPR theoretical review; retrieval of nucleotide sequences; introduction to target sequence selection; prediction of sgRNAs using 2 servers |

| Day | Duration | Session Theme | Topics to be Covered |
|-------|-----------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Day 3 | 60-90 min | CRISPR Design Workflow II | Retrieval of exonic sequences; prediction of sgRNAs using multiple servers; comparative understanding of guide selection approaches; continuation of sgRNA design workflow |
| Day 4 | 60-90 min | Advanced sgRNA Prediction and Evaluation | Expanded prediction of sgRNAs using additional servers; sgRNA quality evaluation using 2 servers; parameters affecting sgRNA quality including GC content, self-complementarity, mismatch tolerance, and target specificity |

TIMETABLE - PART II (DAY 5 TO DAY 8)

| Day | Duration | Session Theme | Topics to be Covered |
|-------|-----------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Day 5 | 60-90 min | Off-Target Analysis and Specificity Assessment | Concept of off-target editing; scientific importance of guide specificity; in silico off-target prediction tools; mismatch analysis; identification of potential unintended genomic targets; interpretation of specificity scores |

| Day | Duration | Session Theme | Topics to be Covered |
|--------------|-----------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Day 5 | 60-90 min | Off-Target Analysis and Specificity Assessment | Concept of off-target editing; scientific importance of guide specificity; in silico off-target prediction tools; mismatch analysis; identification of potential unintended genomic targets; interpretation of |
| Day 6 | 60-90 min | sgRNA Efficiency and Editing Performance Assessment | Guide efficiency scoring; determinants of editing efficiency; sequence context and positional biases; influence of chromatin accessibility and epigenetic features; prioritization of high-confidence sgRNAs |
| Day 7 | 60-90 min | Base Editing and Prime Editing | Introduction to base editing and prime editing; differences from nuclease-mediated double-strand-break editing; adenine and cytosine base editors; prime editing guide design concepts; advantages, limitations, and therapeutic significance |
| Day 8 | 60-90 min | Primer Design and HDR Template Design | Prediction of primers using 3 servers; principles of primer design for CRISPR validation; designing HDR templates using 2 servers; donor template architecture; homology arms; insertion, correction, and repair strategy design |

TIMETABLE - PART III (DAY 9 TO DAY 10)

| Day | Duration | Session Theme | Topics to be Covered |
|---------------|-----------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Day 9 | 60-90 min | Structural and Functional Interpretation of CRISPR Systems | Structural overview of Cas proteins; protein-RNA-DNA interaction concept; visualization of Cas complexes using structural resources; mechanistic understanding of PAM recognition, target binding, and cleavage; translational relevance in precision genome engineering |
| Day 10 | 60-90 min | Applications, Case Integration, and Workshop Conclusion | Integration of the complete CRISPR workflow; application in inherited disorders, cancer, and functional genomics; discussion of real-world case studies; limitations and regulatory concerns; recap of complete workshop; participant discussion, Q&A, and concluding remarks |

FEE- \$ 275 US

In this small fee, students gain structured, hands-on exposure to CRISPR design workflows and gene therapy fundamentals—knowledge typically introduced at advanced undergraduate levels. Compared to the long-term academic, research, and career advantages it provides, this investment is minimal while offering a powerful foundation for students aspiring to pursue genetics, biotechnology, or medical research.

NOTE-

- All live sessions will be conducted via Zoom.
- A concise summary of each session will be provided to participants for revision and reinforcement.
- The recording of each session will be shared for future reference and review.
- A Certificate of Completion will be awarded by BDG Lifesciences upon successful completion of the program.

BENEFITS OF THIS COURSE

EXPOSURE TO CUTTING-EDGE SCIENCE

Students gain early insight into CRISPR and gene therapy, technologies that are transforming modern medicine and biotechnology.

HANDS-ON COMPUTATIONAL LEARNING

Students learn how scientists design and evaluate gene-editing strategies using real research tools and workflows.

STRONG FOUNDATION FOR FUTURE RESEARCH

The program builds a solid understanding of genetics, molecular biology, and genome editing, preparing students for advanced studies and research projects.

SCIENCE FAIR & ACADEMIC ADVANTAGE

Students can apply these concepts to develop innovative science fair projects and strengthen their academic profile.

COLLEGE APPLICATION DIFFERENTIATION

Participation demonstrates:

- Advanced interest in molecular genetics
- Exposure to cutting-edge biotechnology
- Initiative beyond standard high school curriculum

CAREER EXPLORATION

Provides early exposure to careers in medicine, genetics, biotechnology, and biomedical research.

REGISTRATION



To register for this training program please scan the above QR code. Select (number of tickets you want to buy) in the ticket (name of the program in this case it is- **CRISPR & Gene Therapy | 10 Day Training Program**) and proceed for payment

Please note: Please note that the price displayed on the registration link for all tickets/programs is in Australian Dollars (AUD) and is equivalent to the amount quoted in USD.