Cornell Guided Notes

Biotechnology for Health (Biomedical Innovations) | 2027-04-22

Name	Period	Date	Lesson
		2027-04-22	

Lesson focus

Transformation and gel wet lab

Key words and questions	Prepared details and student notes
Essential question **What is today's target?**	Run a bacterial transformation and a gel electrophoresis to separate DNA fragments. Big idea: Transformation and gel electrophoresis are the two foundational techniques of recombinant DNA work. **My notes, examples, and questions**
Key words **What vocabulary unlocks the lesson?**	- transformation - selection - colony - digest - gel electrophoresis - DNA ladder **My notes, examples, and questions**

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Key words and questions	Prepared details and student notes
Must-know ideas **What should I understand by the end?**	- Gel electrophoresis separates DNA fragments by size: smaller fragments migrate farther through the gel matrix. - A DNA ladder provides known fragment sizes that allow you to estimate unknown band sizes by comparison. - Plate controls verify both that the transformation worked and that contamination is absent. **My notes, examples, and questions**
Process notes **What happens during class?**	- 0-10 min: Safety briefing; confirm PPE; review transformation and gel procedures - 10-30 min: Prepare competent cells and plasmid; perform heat-shock transformation; plate on selective and control media - 30-50 min: Set up restriction digest; prepare gel; load samples and DNA ladder - 50-65 min: Run gel; photograph result; record band positions in lab notebook - 65-75 min: Initiate cleanup; autoclave or bleach-treat all transformed cultures per protocol - 75-80 min: Exit ticket: note one result that matched and one that surprised you **My notes, examples, and questions**

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Key words and questions	Prepared details and student notes
Steps and evidence **What do I do and turn in?**	- Follow safety protocol and prepare your competent cells and plasmid. - Perform the heat-shock transformation and plate on selective and control media. - Set up a restriction digest of plasmid DNA. - Load digested samples and a DNA ladder into the agarose gel. - Run the gel and record band positions. Evidence: Lab report - Wet lab data record: transformation plate colony counts for each condition, gel photograph with labeled lanes, raw band position measurements, and one result comparison to pre-lab prediction. **My notes, examples, and questions**
Checks for understanding **How do I know I got it?**	- You completed a transformation with proper controls. - Your gel separated fragments alongside a DNA ladder. **My notes, examples, and questions**

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Lab or safety notes **What must I handle carefully?**	Safety: - Wear gloves, goggles, and lab coat for the entire lab; remove before leaving the lab area. - All bacterial cultures and plates are biohazardous: do not bring outside the lab, do not touch your face. - Decontaminate all materials that contact bacteria with 10 percent bleach for at least 20 minutes before disposal. - Autoclave or bleach-treat all transformed plates and liquid cultures; do not put in regular trash. - Use UV transilluminator only with proper eye protection; UV causes corneal and skin damage. Supplies: - Competent E. coli cells (BSL-1 strain, non-pathogenic) - Plasmid DNA with antibiotic-resistance gene - LB agar plates with antibiotic selection - LB agar plates without antibiotic (control) - Microcentrifuge tubes - Micropipettes and tips (10, 100, and 1000 uL) - 42-degree C water bath **My notes, examples, and questions**

Summary

Today's lesson focused on Transformation and gel wet lab. The main target was: Run a bacterial transformation and a gel electrophoresis to separate DNA fragments. The evidence of learning is Lab report: Wet lab data record: transformation plate colony counts for each condition, gel photograph with labeled lanes, raw band position measurements, and one result comparison to pre-lab prediction.. In my own words, the most important idea from today is:

My summary

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My final question or connection