Cornell Guided Notes

Genetics of Disease (Medical Interventions) | 2027-04-23

Name	Period	Date	Lesson
		2027-04-23	

Lesson focus

Cloning and purification workflow

Key words and questions	Prepared details and student notes
Essential question **What is today's target?**	Carry out a cloning and protein-purification workflow and record results at each step. Big idea: Bacterial transformation followed by selection and purification is the core pipeline for producing recombinant proteins. **My notes, examples, and questions**
Key words **What vocabulary unlocks the lesson?**	- plasmid - recombinant DNA - ligase - transformation - expression **My notes, examples, and questions**

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Cornell Notes - Continued

Key words and questions	Prepared details and student notes
Must-know ideas **What should I understand by the end?**	- Heat shock or electroporation opens pores in bacterial membranes so plasmid DNA can enter. - Antibiotic selection kills non-transformed cells; only cells carrying the resistance gene survive. - The first purification step separates soluble protein from cell debris before chromatography. **My notes, examples, and questions**
Process notes **What happens during class?**	- 0-10: Review protocol; gather materials; confirm lab setup - 10-30: Transformation step: introduce plasmid into host cells per protocol - 30-45: Selection: plate or score cells; count or estimate transformed colonies - 45-60: Purification step: run first isolation; identify fraction with target protein - 60-72: Record yield and quality observation in workflow data table - 72-80: Clean up; submit data table to course shell **My notes, examples, and questions**

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Steps and evidence **What do I do and turn in?**	- Read the workflow protocol in the PLTW course shell and gather your materials. - Model transformation by introducing the recombinant plasmid into host cells. - Select transformed cells using the provided marker and record how many grew. - Run the simulated purification step and note where the target protein appears. - Record yield and one quality observation in your workflow data table. - Submit your cloning and purification workflow results. Evidence: Lab report - Cloning and purification workflow data table recording transformation results, selection counts, fraction data, yield, and a quality observation. **My notes, examples, and questions**
Checks for understanding **How do I know I got it?**	- You'll be able to carry out transformation, selection, and purification steps. - You'll be able to record yield and a quality note from your workflow. **My notes, examples, and questions**

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Lab or safety notes **What must I handle carefully?**	Safety: - Wear nitrile gloves and safety goggles throughout the procedure. - Treat all bacterial cultures as BSL-1 organisms: avoid mouth contact and wash hands before leaving lab. - Dispose of all biological waste (plates, tubes, tips) in designated biohazard bags. - Wipe bench with 10% bleach or 70% ethanol before and after use. - Report any spill involving bacterial culture to the teacher immediately. Supplies: - Recombinant plasmid sample (or bacterial transformation kit per PLTW protocol) - Host bacterial cells (competent E. coli or equivalent) - Antibiotic selection plates (appropriate to resistance marker on plasmid) - Heat-shock or ice bath setup (water baths at 4 degrees C and 42 degrees C) - Micropipettes and sterile tips (10 uL, 100 uL, 1000 uL) - Microcentrifuge tubes (1.5 mL) - Inoculating loops or cell spreaders **My notes, examples, and questions**

Summary

Today's lesson focused on Cloning and purification workflow. The main target was: Carry out a cloning and protein-purification workflow and record results at each step. The evidence of learning is Lab report: Cloning and purification workflow data table recording transformation results, selection counts, fraction data, yield, and a quality observation.. In my own words, the most important idea from today is:

My summary

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My final question or connection